LEED – New Construction Scorecard
Glendale Cemetery/West Zone Maintenance Facility

Energy and Atmosphere

Buildings consume about 48% of the energy and 68% of the electricity produced annually in the United States. Electricity generated from fossil fuels - coal and oil - effect the environment in a myriad of adverse ways, beginning with their extraction, transportation, refining and distribution. Coal mining disrupts habitats and can devastate landscapes. Acidic mine drainage further degrades regional ecosystems. Coal is rinsed with water, which results in billions of gallons of sludge stored in ponds. Mining is a dangerous occupation in which accidents and the long-term effect of breathing coal dust result in shortened life spans of coal miners.

Conventional fossil-based generation of electricity releases carbon dioxide, which contributes to global climate change. Coal-fired electric utilities emit almost one-third of the country's anthropogenic nitrogen oxide, the key element in smog, and two-thirds of the sulfur dioxide, a key element in acid rain. They also emit more fine particulate material than any other activity in the United States. Because the human body is incapable of clearing these fine particles from the lungs, they are contributing factors in tens of thousands of cancer and respiratory illness-related deaths annually.

Natural gas has adverse environmental impacts as well. Green buildings address these issues in two primary ways by reducing the amount of energy required and by using more benign forms. The better the energy performance of a project, the lower the operation costs. As world competition for the available supply of fuels heightens, the rate of return on energy-efficiency measures improves. Electrical generation using sources other than fossil fuels reduces environmental impacts.

PREREQUISITE 1: FUNDAMENTAL COMMISSIONING OF THE BUIILDING

Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design and construction documents.

Benefits of commissioning included reduced energy use, lower operating costs, reduced contractor callbacks, better building documentation, improved occupant productivity, and verification that the systems perform in accordance with the owner's project requirements. Implementation of a commissioning process maintains the focus on quality control and high performance building principles from project inception through operation. Commissioning typically results in optimized mechanical, electrical and architectural systems – maximizing energy efficiency and thereby minimizing environmental impacts. A properly designed and executed Commissioning Plan may reduce errors and omissions in the design and installation process, improve coordination, reduce change orders, and generate substantial operational cost savings compared to systems that are not commissioned. Successful implementation of the commissioning process often yields improvements in energy efficiency of 5% to 10%.

PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE

Establish the minimum level of energy efficiency for the propose building and systems.

PREREQUISITE 3: FUNDAMENTAL REFRIGERANT MANAGEMENT

Reduce ozone depletion..

Banning the use of CFCs in refrigerants has slowed the depletion of the ozone layer. Specification of non-CFC building equipment is now standard and CFC-based refrigerants are no longer available in new equipment. None of the equipment in this building uses CFCs.

CREDIT 1: OPTIMIZE ENERGY PERFORMANCE

Achieve increasing levels of performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

This building is 31% more efficient than the current energy code requirements because of the use of high efficiency equipment (gas-fired furnace, air conditioning, etc.), decreased lighting, and minimization of areas to heat and cool. Some energy-efficiency measures may not require additional first costs.

LEED – New Construction Scorecard

Glendale Cemetery/West Zone Maintenance Facility

Indoor Environmental Quality

Americans spend on average 90% of their time indoors where the U.S. EPA reports that levels of pollutants may run two to five times – and occasionally more than 100 times - higher than outdoor levels.

PREREQUISITE 1: MINIMUM IAQ PERFORMANCE

Intent: Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

Good indoor air quality in buildings may yield improved occupant comfort, well-being and productivity. A key component of maintaining indoor air quality in a green building is providing adequate ventilation. One strategy for avoiding the introduction of contaminants is to locate air intakes away from sources of contamination - Don't locate the loading dock next to the air intake. The reference standard to meet this LEED requirement has been adopted by the City so no additional design effort or capital cost is incurred to meet this prerequisite.

PREREQUISITE 2: TOBACCO SMOKE CONTROL (ETS)

Minimize exposure of building occupant, indoor surfaces and ventilation air distribution systems, to Environmental Tobacco Smoke.

The City of Des Moines has adopted several ordinances in the past that prohibits smoking in public buildings. The State of Iowa passed a bill, which took effect in July, banning smoking in public spaces.

CREDIT 2: INCREASED VENTILATION

Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.

A trade-off for increasing ventilation rates 30% beyond the code required standard is higher HVAC energy costs and potentially greater HVAC capacity than associated with the ventilation rates established in the standard. Well designed HVAC systems and careful selection of building materials can help offset the increased costs.

CREDIT 3.1: CONSTRUCTION IAQ MANAGEMENT PLAN, DURING CONSTRUCTION

Reduce indoor air quality problems resulting from the construction process in order to help sustain the comfort and well-being of construction workers and building occupants.

Building construction invariably introduces contaminates into the building. If unaddressed, the contamination can result in poor indoor air quality extending over the lifetime of the building. Superior indoor air quality is likely to increase worker productivity translating to greater profitability for companies. Protecting and cleaning ventilation systems during construction can extend the lifetime of the ventilation system and improve ventilation system efficiency, resulting in reduced energy use.

CREDIT 4.1 & 4.4: LOW EMITTING MATERIALS, ADHESIVES, SEALANTS AND COMPOSITE WOOD

Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and will-being of installers and occupants.

Used materials that have low or no volatile organic compounds and use no urea-formaldehyde resins will contribute to providing high quality indoor air.

CREDIT 7.1: THERMAL COMFORT, DESIGN

Provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

The design team and the City identified the environmental parameters required to maintain the desired thermal comfort in the project space unlike typical buildings where the HVAC parameters are based on meeting energy requirements only.

CREDIT 8.1: DAYLIGHT & VIEWS, DAYLIGHT FOR 75% OF SPACES

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight into regularly occupied areas of the building.

Daylighting reduces the need for electric lighting of building interiors, resulting in decreased energy use. A well designed daylight building is estimated to reduce lighting energy use by 50 to 80%.

CREDIT 8.2: DAYLIGHT & VIEWS, VIEWS FOR 90% OF SPACES

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of views into regularly occupied areas of the building.

Providing access to views of the outdoors, through the incorporation of vision glazing, enables building occupants to maintain a visual connection to the surrounding environment. Buildings with sufficient natural daylight and a visual connection to the outdoor environment have proven to increase occupant productivity and comfort.

LEED – New Construction Scorecard
Glendale Cemetery/West Zone Maintenance Facility

Innovation & Design

LEED is most effectively implemented as part of an integrated design process, and this category addresses the use of a LEED Accredited Professional in the facilitation of that process.

CREDIT 2: LEED ACCREDITED PROFESSIONAL

To support and encourage the design integration required by a LEED for New Construction green building project and to streamline the application and certification process.

The LEED Accredited Professional understands the importance of integrated design and the need to consider interactions between the prerequisites and credits and their respective criteria.

Gilmor and Doyle as the LEED professional directed the effort to obtain LEED certification.

OTHERS INCLUDED IN THE TEAM:

Architect of Record: Shiffler & Associates, Russ Bitterman
Mechanical & Electrical Engineer: Gilmor & Doyle, Justin Doyle and Dan Stewart
Commissioning Agent: River Place Technologies, Mark Blackwood
Contractor: Venter Spooner, Dave Stanley
Park & Recreation Dept , Glendale Cemetery, Deanna Clausen
Park & Recreation Dept., Kevin Moran
Engineering Dept., Jill Tenney

US GREEN BUILDING COUNCIL

"A sustainable-built environment within a generation" is the vision of this nonprofit membership organization. Its membership includes corporations, builders, universities, government agencies, and other nonprofit organizations. Since USGBC's founding in 1993, it has grown to more than 13,000 member companies and organizations, a network of 72 local chapters, affiliates, and organizing groups and a comprehensive family of LEED green building rating systems. More information about LEED and the USGBC can be found at www.usgbc.org.

LEED – New Construction Scorecard

Glendale Cemetery/West Zone Maintenance Facility

Materials and Resources

Building materials choices are important in sustainable design because of the extensive network of extraction, processing and transportation steps required to process them. Activities to create building materials may pollute the air and water, destroy natural habitats and deplete natural resources. Construction and demolition wastes constitute about 40% of the total solid water stream in the United States.

When materials are selected for a project, it is important to evaluate new and different sources. Salvaged materials can be substituted for new materials, save costs and add character. Recycled-content materials reuse waste products that would otherwise be deposited in landfills. Use of local materials supports the local economy and reduces transportation.

PREREQUISITE 1: STORAGE AND COLLECTION OF RECYCLABLES

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

By creating convenient recycling opportunities for building occupants, a significant portion of the solid waste stream can be diverted from landfills. Land, water and air pollution impacts can all be reduced by minimizing the volume of waste sent to landfills.

CREDIT 2.1 & 2.2: CONSTRUCTION WASTE MANAGEMENT

Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Construction and demolition (C&D) activities generate enormous quantities of solid waste. Commercial construction generates between 2 and 2.5 pounds of solid waste per square foot, and the majority of this waste can potentially be recycled. Recycling of the construction debris from this building reduced demand for virgin resources and, in turn, reduced the environmental impacts associated with resource extraction, processing and, in many cases, transportation. Landfills occasionally contaminate groundwater and encroach upon valuable green space.

In recent years, particularly with the advent of international competition for both raw and recycled materials, the economies of recycling have improved. During this same period disposal costs have increased. Recognition for, and enactment of, more stringent waste disposal regulations coupled with ever decreasing landfill capacity have changed the waste management equation.

CREDIT 4.1 & 4.2: RECYCLED CONTENT

Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

Building products with recycled content are beneficial to the environment because they reduce virgin material use and solid waste volumes. As the number of building products containing recycled content grows, the marketplace for recycled materials develops.

CREDIT 5.1: REGIONAL MATERIALS

Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

By purchasing regionally manufactured building materials, the local economy is supported; transportation costs and environmental impacts are reduced. Americans spend on average 90% of their time indoors where the U.S. EPA reports that levels of pollutants may run two to five times – and occasionally more than 100 times - higher than outdoor levels.

LEED – New Construction Scorecard

Glendale Cemetery/West Zone Maintenance Facility

Sustainable Sites

Development and construction processes are often destructive to local ecology. Stormwater runoff from developed areas can impact water quality in receiving waters and disrupt aquatic life. It is also important to minimize project impacts on surrounding areas after construction is complete and the building is occupied. By addressing heat island effects and reducing light pollution on the site, the site can become integrated into its surroundings and serve as a considerate and beneficial neighbor for the lifetime of the building.

PREREQUISITE 1: CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Reduce pollution form construction activities by controlling soil erosion, waterway sedimentation and airborne dust.

The loss of topsoil is the most significant on-site consequence of erosion. Loss of nutrients, soil compaction, and decreased biodiversity of soil inhabitants can severely limit the vitality of landscaping. This can lead to additional site management and environmental concerns, such as increase use of fertilizers, irrigation and pesticides; and increased storm water runoff that heightens the pollution of nearby lakes and streams. Runoff from developed sites carries pollutants, sediments and excess nutrients that disrupt aquatic habitats in the receiving waters. Sedimentation also contributes to the degradation of water bodies.

By code The City of Des Moines requires adherence to the National Pollution Discharge Elimination System (NPDES). This storm water pollution prevention plan meets the requirements of LEED. Also, the city has implemented a post-construction storm water management plan to capture the first 1.25" of rainwater on site. Rain gardens, like the one to be completed here, can be used to meet the water quality requirements of the ordinance.

CREDIT 4.3: ALTERNATIVE TRANSPORTATION, LOW-EMITTING AND FUEL EFFICIENT VEHICLES

Reduce pollution and land development impacts from automobile use.

Operation of vehicles significantly contributes to global change and air quality problems through the emission of green house gases (GHGs) and other pollutants generated from the combustion engines and fuel evaporation. Alternative fuel and alternative technology vehicles offer the possibility of reducing air pollutants from vehicular travel as well as the environmental effects of producing gasoline. The one preferred parking space here at the facilities encourages the use of cars that are low-emitting and fuel efficient.

CREDIT 7.2: HEAT ISLAND EFFECT: ROOF

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

The heat island effect raises the localized temperature, impacting local microclimate. Plants and animal that are sensitive to large fluctuations in daytime and nighttime temperatures may not thrive in areas affected by heat islands. Rising temperatures lead to increased cooling requirements, require energy and causing associated emissions. The galvanized metal roof of this building has a high enough solar reflectance index to meet the reflectivity and emissivity requirements of LEED.

CREDIT 8: LIGHT POLLUTION REDUCTION

Minimize light trespass from the building and the site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.

Outdoor lighting is necessary for illuminating connections between building and support facilities such as sidewalks, parking lots, and roadways. However, light trespass from poorly designed outdoor lighting systems can affect the nocturnal ecosystem on the site, and light pollution limits night sky access. Through thoughtful design and careful maintenance, outdoor lighting can address night sky visibility issues and site illumination requirements, while minimizing the negative impact on the environment. Energy and maintenance savings over the lifetime of the project can be substantial. Sensitively designed lighting systems that minimize glare and provide more uniform light at lower levels will help create aesthetically pleasing environment that are safer and more secure. A carefully designed and maintained outdoor lighting system can help a project be a non-intrusive member of the community.

Water Efficiency

In the US, approximately 340 billion gallons for fresh water are withdrawn per day from rivers, streams, and reservoirs to support residential, commercial, industrial, agricultural and recreational activities. This accounts for about one-fourth of the nation's total supply of renewable fresh water. Almost 65% of this water is discharged to rivers streams and other water bodies after use and, in some cases, treatment.

Additionally, water is withdrawn from underground aquifers. In some parts of the United States, water levels in these aquifers have dropped more than 100 feet since the 1940s. On an annual basis, the water deficit in the United States is currently estimated at about 3,700 billion gallons. In other words, Americans extract 3,700 billion gallons per year more that they return to the natural water system to recharge aquifers and other water sources.

Many water conservation strategies involve either no additional cost or rapid paybacks. Water efficiency measure in commercial buildings can easily reduce water usage by 30% or more. In a typical 100,000 square-foot office building, low-flow fixtures coupled with sensors and automatic controls can save a minimum of 1 million gallons of water per year, based on 650 building occupants each using an average of 20 gallons per day.

CREDIT 1.1 – 1.2 WATER EFFICIENT LANDSCAPING

Limit or eliminate the use of potable water, or other natural surface of subsurface water resources available on or near the project site, for landscape irrigation.

Landscape irrigation practices in the United States consume large quantities of potable water. Outdoor uses, primarily landscaping, account for 30% of the 26 billion gallons of water consumed daily in the United States. Improved landscaping practices can dramatically reduce and even eliminate irrigation needs. Reestablishing site-adapted plants on this building site fosters a self-sustaining landscape that requires minimal supplemental water. Reduction in the amount of potable water used for irrigation lessens demand on limited supplies. Currently, the most effective strategy for to avoid escalating water costs for irrigation is to design landscaping adapted to the local climate and the site's microclimate.

CREDIT 3.1 WATER USE REDUCTION

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Installation of water-efficient fixtures and equipment can result in significant, long-term financial and environmental savings. The reduction of potable water use in this building for toilets, showerheads and faucets reduces the total amount with drawn from rivers, streams, underground aquifers and other water bodies. Another benefit of potable water conservations is reduced energy use and chemical inputs at municipal water treatment works. Reductions in water consumption minimize overall building operating costs.