

**Carlson Studio Architecture** is committed to high quality design solutions that promote commercially viable sustainability by minimizing the consumption of materials and maximizing their reuse while protecting the environment. The Twin Lakes Park facilities are intended to be a demonstration project that will showcase ecological design as "feasible, proven and cost effective". The project has been designated to achieve a LEED Gold Certification, and Michael Carlson, the project architect, is one of the first architects in the state to be certified as a LEED Accredited Professional.

The project contributes to a more sustainable future in several ways:

- I. Reduction in water usage: A 28,000 gallon cistern will be used to collect rainwater. This water will be used in water closets and for irrigation.
- II. Waterless urinals will be used throughout the project.
- III. Low flow plumbing fixtures will be used.
- IV. Photovoltaics will be utilized to generate a portion of the electrical power.
- V. Use of natural daylighting will be employed and optimized through the use of a sophisticated lighting control system that monitors daylight and automatically adjusts the brightness of the electric lights. This reduces the use of electricity and is proven to increase productivity.
- VI. Both buildings will have geothermal cooling with two wells providing cooling using water.
- VII. The green building will be oriented with north exposure for daylighting without heat gain, south exposure headed with overhangs and limited east and west exposure.
- VIII. Materials that have recycled content and are easily recycled will be used, and indoor air quality will be improved through the use of low VOC paints, carbon dioxide sensors and the use of no particle board or pressure treated wood.

Using the LEED 2.0 Green Building Rating System, the project is designed to be resource efficient and cost effective in both its first cost and life cycle costs. It combines many proven green technologies into a single facility. The facility is intended to be a public demonstration facility to show green systems integration into a commercial building. It demonstrates both adaptive reuse and new construction.

The project is designed to use a minimum 30 percent less water, 40 percent less energy, 10 percent renewable energy, minimum 25 percent recycled content materials and a minimum of 20 percent local/regional building materials compared to a conventional commercial facility.

## TWIN LAKES PARK SUSTAINABLE ASPECTS SUMMARY

### I - SUSTAINABLE SITE

The building and the site can contribute to the beauty of the surrounding area, support a healthy, diverse biological community and contribute to addressing global environmental and economic challenges that we face. Sarasota enjoys a subtropical climate: high humidity, high water tables, hurricane risk, flood and drought cycles, and unique, sometimes aggressive, vegetation.

- A. Project encourages **Alternative Transportation**: A covered bike rack is provided for 7 bicycles. Shower and changing facilities are provided for the convenience of the building occupants.
- B. **Reduced Site Disturbance**: Site disturbance during construction was limited to 40. beyond the building perimeter.
- C. **Stormwater Management**: Impervious surfaces are significantly reduced by utilizing pervious concrete for sidewalks and patios and pervious parking lot using open grid system with gravel. Stormwater runoff is minimized.
- D. **Reduce Heat Islands** effect to minimize impact on microclimate and human and animal habitat: Pervious parking lot using open grid system with gravel for the new parking lot. Energy Star, high reflectance roofing was used to reduce heat absorption of exterior materials. Both these design features keep the microclimate around the building cooler. The Energy Star roofing also contributes to energy savings.
- E. **Light Pollution Reduction**: Exterior lighting is designed to minimum recommended foot-candles and lighting has zero direct beam illumination leaving the building site. This improves night sky access and reduces the project's impact on nocturnal environments.
- F. **Erosion and Sedimentation Control**: During construction the contractor implemented an erosion and sediment control plan. This reduces the negative impact of the construction on water and air quality.

## II - WATER EFFICIENCY

This unique biosphere . the sphere of life . has an amazing diversity and abundance of life forms . each unique. The common element we share with every life form is water. Every living cell contains water. Water is literally life.

Freshwater supplies, which have been relatively constant for millions of years, are being stretched by population demands and increased per capita consumption of water. Water tables are falling in much of Florida and the rest of the U.S. In many regions in the world, mankind is pumping out the groundwater faster than nature can replenish it.

Sarasota County is an acknowledged leader in ensuring that we do not needlessly squander water resources. Sarasota has the lowest per capita water use in the State of Florida. The State-wide Florida Yards program, which encourages using native Florida and water-wise landscaping, originated in the County. Twin Lakes Park presents a wonderful opportunity to demonstrate a new standard in water management leadership.

The project demonstrates a new standard of leadership in conserving our precious water resources. This commitment is reflected in the following features:

- A. **Water Use Reduction:** The project has a 28,000 gallon cistern located under the outdoor classroom. Water is collected from the roof of the building, filtered, and then piped underground into the cistern. Cistern water will be used in water closets and for irrigation. Collecting rainwater is not only water conserving, it is also energy conserving since the energy needed to treat and pump water over a large service area is bypassed. Rainwater harvesting lessens the amount of storm water runoff that contributes to erosion, flooding and waterway contamination.
- B. **Water Efficient Landscaping:** Use of potable water for irrigation is eliminated. High efficiency irrigation is utilized, and uses only the water from the cistern. Water efficient, native, climate tolerant plants are used throughout the landscape.
- C. **Water Use Reduction:** Toilets: Low flow toilets are used throughout the project. Toilets use only the water from the cistern.
- D. **Water Use Reduction:** Waterless urinals are used throughout the project. These use no water. Water-free urinals can save approximately 20,000 gallons of water per year. This substantially reduces potable water use, as well as significantly lowers sewer costs.
- E. **Water Use Reduction:** Sink faucets use motion sensors to turn on and off automatically.
- F. **Water Use Reduction:** Water efficiency reduces the burden on the municipal water supply. Water efficiency reduces cost of operating the building and ultimately saves the county taxpayer money.

## III - ENERGY AND ATMOSPHERE

The National Academy of Sciences was asked to report on how the scientific community regarded the threat of global warming. They concluded in June 2001 that global warming is a "real problem" that has become more prominent in the past 20 years.

The evidence includes:

- 1. the retreat of glaciers in the Arctic and far North from historic dimensions
- 2. the felling of utility poles, other structures and even trees as warming melts the frozen permafrost that provides stability
- 3. rising sea water levels
- 4. shifting rainfall patterns that have caused drought and famine, from China and Tajikistan to Israel's Sea of Galilee and beyond.

Sarasota County and its citizens have a tremendous investment in land and buildings that are directly threatened by higher sea levels and an increase in the factors that precipitate hurricanes and forest fires. Reducing energy demand directly translates into reducing the emissions of carbon dioxide and other gases that are entering our atmosphere at historically unprecedented levels.

- A. **Solar Orientation:** The new building is properly oriented with its long axis East/West, which puts the long sides of the building facing North and South. North light can be harvested with minimum heat gain. South windows can be easily shaded. East and west exposures are minimized. No windows face east or west to reduce heat gain. East and West windows are more difficult to shade, because the sun is lower in the sky in the morning and later afternoon. Proper orientation and fenestration reduce energy requirements.

B. **High Performance Building Envelope** for the new building. This includes: walls made of Autoclave Aerated Concrete (AAC) panels that provide improved insulating value and thermal mass. The Roof is made of structural Insulated Panel roof (SIP) with an R-value of 48, which is much better than the code required R-19. Windows have insulated, impact resistant, low e glazing. Window frames have recycled content.

1) **Autoclave Aerated Concrete** benefits include:

- good thermal resistance
- durable structure - strong & lightweight,
- all natural materials (lime, sand, cement and water)
- relatively inexpensive; price competitive to CMU if final interior finish is gypsum plaster (no furring & drywall required)
- fire resistant (ASTM: E 84-89a and E 119-88)
- termite and pest resistant
- moisture proof (ASTM C 666)
- quiet (ASTM C 423-90)
- time-tested material - used for over 70 years throughout the world in a wide range of climates & conditions
- available through a local manufacturer, ACCO, that can offer engineering support.

2) **Structural Insulated Roof Panel (SIP)** benefits include:

- energy efficient R48
- resistance to damage from earthquakes, tornados and hurricanes
- fast construction - lower labor costs
- reduced on-site waste
- fire resistant (ASTM: E 84-89a and E 119-88)

3) **Metal Roofing** benefits include:

- Energy efficient Energy Star, high reflectance roofing reduces heat island effect and keeps the microclimate around the building cooler.
- rainwater collection for harvesting to cistern
- durable - Standard manufacturer warranties are generally at least twice as long as conventional single ply roof systems. Properly installed, a metal roof should last as long as the building. Roofing represents 25% of construction waste because of its frequent replacement cycle. Over the last 40 years, 7 - 10% of landfill space has been occupied by roof debris. In Florida, asphalt roofs have an average expected life of 10 -12 years.
- sustainable - Steel is highly recycled and 100% recyclable. The overall recycling rate of steel products in North America is nearly 64 percent--the highest of any construction material.
- cost competitive - Higher material costs are offset by substantially lower life cycle costs due to reduced operating & maintenance costs and durability
- solar power . The PV system is designed to easily mount on standing seam roofs without the need to add a frame assembly.

#### 4) Window System

- Insulated glazing for energy efficiency
- Low E glazing for energy efficiency
- Impact resistant, laminated glass for protection from flying debris

##### **Solar optical properties of standard green glass windows:**

- Transmittance visible light - 57%
- Transmittance solar energy - 22%<
- U value Winter nighttime - 0.28 Btu/hr/sf
- U value Summer daytime - 0.29 Btu/hr/sf
- Shading Coefficient - 0.34
- Solar factor - 0.29

##### **Solar optical properties of green glass with dot silkscreen:**

- Transmittance visible light - 34%
- Transmittance solar energy - 13%
- U value Winter nighttime - 0.28 Btu/hr/sf
- U value Summer daytime - 0.29 Btu/hr/sf
- Shading Coefficient - 0.24
- Solar factor - 0.20

- C. **Improved Building Envelope for existing Building A.** This included upgrades to increase the R value of the walls from R-7.28 to R-11.73. (A 63% improvement) and upgrades to increase the R value of the roof from R-14.39 to R-32.14 (a 223% improvement). All the existing window were removed and replaced with windows that are insulated, impact resistant and have low e glazing. South facing windows have fixed louvers to provide shading and reduce heat gain. The East and West facing windows were reduced in size to reduce the heat gain from these unshaded openings. The East and West facing windows have an additional screen that increases the shading coefficient of the glazing and reduces the heat gain through these openings.
- D. **Renewable Energy** through photovoltaics: Mounted on the roof of the new building is a 10 KW building integrated, photovoltaic array. This will generate approximately 5% of the building's electricity requirements. The solar panels are applied between the seams of the standing seam metal roof. This system is manufactured by Uni-Solar. Photovoltaic systems have no moving parts, are relatively simple in design, need very little maintenance and are environmentally benign. The "cost" of sunlight is unlikely to increase and the long-term supply seems assured. PV systems have not reached sufficient market penetration to be cost-effective. There are unusual regulatory obstacles in Florida that inhibit the adoption of solar-generated electricity. Florida Power & Light generates about 60% of its electrical power through the combustion of fossil fuels. These fuels emit carbon dioxide and other gases into the atmosphere. Florida Power & Light generates about 25% of its electrical power from nuclear power plants. Nuclear power does not emit carbon dioxide or noxious gases, but does produce quantities of some of the most deadly substances ever created. Current government policy is to seek a solution to "contain" these waste products for only 10,000 years though they remain quite deadly for hundreds of thousands of years. No known long-term "solution" yet exists. Quite a remarkable inheritance for untold generations! Sarasota County's decision to invest in an alternative energy strategy places a higher economic value on the legacy we leave our next generation of citizens than on harvesting "cheap" energy quickly.

- E. **Geothermal HVAC Cooling System:** Two 6. wells will provide cooling for both buildings using the cool underground water of the aquifer. One well extracts the water. It is then pumped through a heat exchanger, and then returned to the aquifer through the second well, called an injection well. No water is actually consumed. The system pumps about 310 gallons per minute. The water is all returned to the aquifer that it is extracted from. The cool water cools the coils of the air handlers which cools the air, which cools the building. These wells and this system serve both the new building and the existing, remodeled building. Benefits include:
- energy efficient - more efficient than standard DX-type system
  - cost-efficient - reduces operating costs
  - well-established technology
  - does not use refrigerants that are known to deplete the ozone layer protecting the earth from the ultraviolet rays of the sun
  - well-established technology.
- F. **Non-operable windows:** On "nice" days, building occupants like to open windows to get fresh air. Unfortunately, it becomes quite difficult to control humidity with open windows. Southwest Florida's subtropical climate is often moist & hot. Excessive moisture in a building encourages the growth of mildew and mold that is quite unhealthy. Moisture in the air substantially increases cooling costs because both the air and the water need to be cooled. Moisture in air (latent heat) accounts for 30% of the cooling load.
- G. **Desiccant Wheel:** benefits include:
- energy efficient - much more efficient than AC equipment in removing moisture
  - cost-efficient - reduces size of compressor unit required. Typically, lower humidity can reduce the size compressor required by 20%
  - promotes healthy indoor air quality - can increase natural air ventilation while discouraging microbial growth
  - allows greater thermal comfort - independent control of temperature and humidity.
- H. **HVAC equipment sizing:** HVAC equipment was carefully sized to reflect superior envelope design (less solar heat gain, less cool air loss due to tighter envelope) and lower humidity due to desiccant technology.
- I. **Solar water heating:** Solar hot water systems are a well-proven technology and quite cost-effective in Florida.
- J. **Natural daylighting:** The project harvests natural daylight to supplement electrical lighting and thus reduce the use of electricity. Buildings designed for daylighting typically use 40% to 60% less electricity for lighting needs than do conventional buildings. These savings are more likely to be realized with the installation of automatic systems that control the electrical lighting system in response to natural light levels.
- K. **Electric lighting:** The project uses a sophisticated lighting control system that monitors daylight and automatically adjusts electric lights levels up and down based upon the amount of natural light available at any time. This reduces the use of electricity.
- L. **Lighting controls:** Spaces that are only occupied some of the time, such as bathrooms, storage rooms, and equipment rooms, utilize motion detecting switching which turn the lights on when a person enters the room and turn the lights off when there is no activity in the room. Occupancy sensors can save 25 - 50% of lighting energy use in spaces with irregular patterns of occupancy.

M. **Building System Commissioning:** A separate commissioning authority, The Florida House Institute, was engaged by Sarasota County to verify and ensure that building elements and systems were designed, installed and calibrated to operate as intended. Total Building Commissioning is a process for achieving, validating and documenting that the performance of the total building and its systems meet the design needs and requirements of the owner. Because all building systems are integrated, a deficiency in one component can result in sub-optimal operation and performance among other components. Remedying these deficiencies can result in a variety of benefits including:

- Improved occupant comfort
- Energy savings
- Improved environmental conditions
- Improved system and equipment function
- Improved building operation and maintenance
- Improved building productivity.

Recent studies indicate that, on average, the operating costs of a commissioned building range from 8-20 percent below that of a non-commissioned building.

N. **Reduce ozone depletion:** Only Non-CFC based refrigerants were used on the project. No HVAC or refrigeration equipment contains HCFC.s or Halon. This helps save the ozone layer and reduces global warming. Air conditioning systems and refrigerators use a cooling refrigerant. The most common refrigerant in use today is Chlorofluorocarbon (CFC): a compound consisting of chlorine, fluorine, and carbon. CFCs are broken down by strong ultraviolet light in the stratosphere and release chlorine atoms that then deplete the ozone layer. CFC's take up to 15 years to reach the stratosphere but can stay in the atmosphere from 50-200 years. The ozone layer in the stratosphere keeps 95-99% of the sun's ultraviolet radiation from striking the earth. A compromised ozone layer -- and the resulting increase in ultraviolet (UV) radiation hitting the earth's surface -- can have serious consequences. Overexposure to UV radiation in humans can cause a range of health effects, including skin damage (skin cancers and premature aging), eye damage (including cataracts), and suppression of the immune system.

O. **Ongoing accountability and optimization:** A sophisticated measurement and verification system is installed in the project. This system provides ongoing accountability and optimization of building energy and water consumption.

P. **Reduced overall energy use:** All of the building elements and systems work together as a fully integrated system to reduce the energy use and energy cost for the building. This optimized energy performance is predicted to be 40% better than code minimum ASHRAE standards. Energy efficiency reduces the burden on the energy utility company. Energy efficiency reduces cost of operating the building and ultimately saves the county taxpayer money.

#### IV - MATERIALS AND RESOURCES

Many products, materials and processes used in the construction and furnishings of buildings are harmful to living beings (including the people mining, harvesting, manufacturing and using these products and materials).

A typical commercial construction project in the US generates up to 2.5 pounds of solid waste per square foot of floor space. Our society continues to generate more waste than we can safely and economically dispose of.

Better process and product design can reduce waste, better product and material selection can reduce harmful effects to our living planet, and better life-cycle management can effectively reuse and/or recycle materials rather than discard them into landfills.

A. **Encourage Recycling / Storage & Collection of Recyclables:** A room of the building is dedicated to the separation, collection and storage of materials for recycling. This will facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

B. **Building Reuse:** Based upon the criteria established by LEED to maintain the existing building structure and shell, the project was able to keep and reuse 89.7% of the existing Building A. This extends the life cycle of the existing building, conserves resources, reduces waste, and reduces the environmental impacts of new construction as they relate to materials manufacturing and transportation.

- C. **Construction Waste Management:** During the construction process, over 75% of construction waste, demolition and land clearing debris was diverted from the landfill. Recyclable material was diverted back to the manufacturing process. Construction debris was hauled to the Central County Solid Waste Disposal Complex to be processed by Meyer & Gabbert, the County's C&D recycling contractor.
- D. Use of materials with **Recycled Content:** The project uses building materials that incorporate recycled content material, which reduces impacts from extracting new material and creates market demand for products that contain recycled content. Examples of materials used at Twin Lakes Park include: (note-the contractor is compiling a comprehensive list of all product with recycled content)
  - 1. Carpet tile- Interface
  - 2. Ceramic tile-Terra Green Ceramics, minimum 58% recycled content
  - 3. Kawneer aluminum window and door framing-49% secondary and 51% primary recycled content
  - 4. Steel wall stud framing- minimum 66% recycled content
  - 5. Toilet Compartment- minimum 10% to max of 90% recycled content
  - 6. Acoustic Ceiling tile
  - 7. Synthetic gypsum board (drywall) - minimum 95% recycled content
  - 8. Rubber flooring-EcoSurfaces, minimum 99% recycled content
  - 9. Rubber wall base, Johnsonite
- E. The project utilizes **Local and Regional Materials:** This is defined by LEED as building materials that are manufactured within 500 miles of the site. This is intended to increase the demand for products manufactured locally, reducing the environmental impacts resulting from transportation, and supporting the local economy. Examples include the ACC wall panels, poured in place concrete, pervious concrete, and parking lot gravel. (note-the contractor is compiling a comprehensive list of all local and regional material)
- F. **Certified Wood:** The cabinetry is made from Forest Stewardship Council (FSC) wood and carries the FSC .ecolabel. The product, when edge banded, as is specified, has been tested and has zero formaldehyde emissions, it uses a low emitting Urea-formaldehyde adhesive, and the finish is a zero-emissions UV acrylic surface. This encourages environmentally responsible forest management.

#### V - INDOOR ENVIRONMENTAL QUALITY

- A. **Low Emitting Materials:** All **adhesives** used in the project do not exceed the current VOC limits of the South Coast Air Quality District (SCAQMD) Rule #1168. All sealants meet or exceed the Bay Area Air Quality Management District Regulation 8, Rule 51.
- B. **Low Emitting Materials:** The VOC levels of all **paints and coatings** do not exceed the Green Seal - Standards GS-11 VOC and chemical component limits of the standard. The interior paint is by Sherwin Williams, Harmony line.
- C. **Low Emitting Materials:** All **carpet** meets the Carpet and Rug Institute's Green label Indoor Air Quality Test Program requirements. The carpet tile is by Interface.
- D. **No Smoking** - There is no smoking allowed in the buildings. This prevents building occupants and systems from exposure to environmental tobacco smoke.
- E. **Carbon Dioxide Monitoring:** The buildings uses carbon dioxide (CO2) monitors to assure and sustain long term occupant health and comfort.
- F. **Increase Ventilation Effectiveness:** The buildings effectively mix and deliver fresh air to building occupants to support their health safety and comfort. Air change effectiveness is greater than or equal to .9 as determined by ASHRAE 129-1997.
- G. **Construction IAQ Management Plan:** During construction the contractor developed and implemented an Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the building. This prevents indoor air quality problems and is intended to sustain long term installer and occupant health and comfort.
- H. **Indoor Chemical and Pollutant Chemical Control:** There are permanent entryway systems to capture dirt and particles etc. at all high volume entry ways. These grates reduce the amount of contaminates that would otherwise enter the building.

- I. **Indoor Chemical and Pollutant Chemical Control:** All janitor closets throughout the project have separate exhaust to the exterior, no air recirculation and negative pressure to avoid exposure of building occupants to potentially hazardous chemicals that adversely impact indoor air quality.
- J. **Thermal Comfort:** The integrated building envelope and HVAC system design of the building achieves comfortable conditions based upon temperature, air velocity and humidity. A permanent monitoring system is installed to monitor these conditions.
- K. **Daylighting:** The project harvests natural daylight to provide for improved indoor environmental quality. Examples of daylight harvesting include exterior windows, interior windows to transfer natural light into interior spaces, clerestory windows and skylights. This provides a connection between the indoor spaces and the outdoor environment. The sophisticated lighting control system monitors daylight and automatically adjusts electric lights levels up and down based upon the amount of natural light available at any time. Daylighting may also reduce the loss of worker productivity during power failures. Some studies claim that if a person in a day lit office can continue productive work for even one hour during a power cut, the dollar savings are equal to the cost of lighting that person.s work area for an entire year. Other studies credit daylighting retrofits with a reduction in absenteeism. Even a small decrease in absenteeism provides a noticeable increase in productivity. Although difficult to quantify, daylighting generally increases occupant satisfaction by providing a healthier, more pleasant environment. The human eye adapts easily to daylight. Various studies suggest that daylighting increases worker productivity, enhances student learning and health and reduces absenteeism in schools, and contributes to higher sales in retail stores.
- L. **Views:** regularly occupied spaces have views to the exterior. This provides a connection between the indoor spaces and the outdoor environment.
- M. The project contains **No CCA pressure treated wood**