

*LEED® Summary Report
for the
Monroe Community College PAC Center
(Athletic Field House) Project
A LEED® Gold Certified Project*



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*CHA Project Number:
1644*

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Program

Location

Project Team

Sustainability & LEED®

Sustainable Sites

Water Efficiency

Energy & Atmosphere

Materials & Resources

Indoor Environmental Quality

Innovation in Design

USGBC Technical Review

LEED Premium Costs

NYSERDA Technical Analysis

Monroe Community College (MCC) constructed its first athletic facility, Building 10, in 1968. A swimming pool and health and fitness center were added to the Samuel J. Stabins Health & Physical Education Complex in the 1970s and 1980s, respectively. The gymnasium was the only indoor facility that MCC's 14 intercollegiate athletic teams can use for practices, which results in scheduling conflicts and maintenance issues. The gymnasium must also accommodate intramural programs and physical education/health curricular activities. The demand was further compounded by the college's enrollment growth, from approximately 8,000 students in 1968-69 to over 36,000 full and part-time students today.

MCC's 2003-2008 Facilities Master Plan included investigating the expansion of its athletic facilities. In July 2004, MCC retained Clough Harbour & Associates LLP (CHA) to study the need for, and requirements of, improvements to the athletic facilities, including a potential field house. The study recommended the field house be sited adjacent to the swimming pool on the south side of campus.

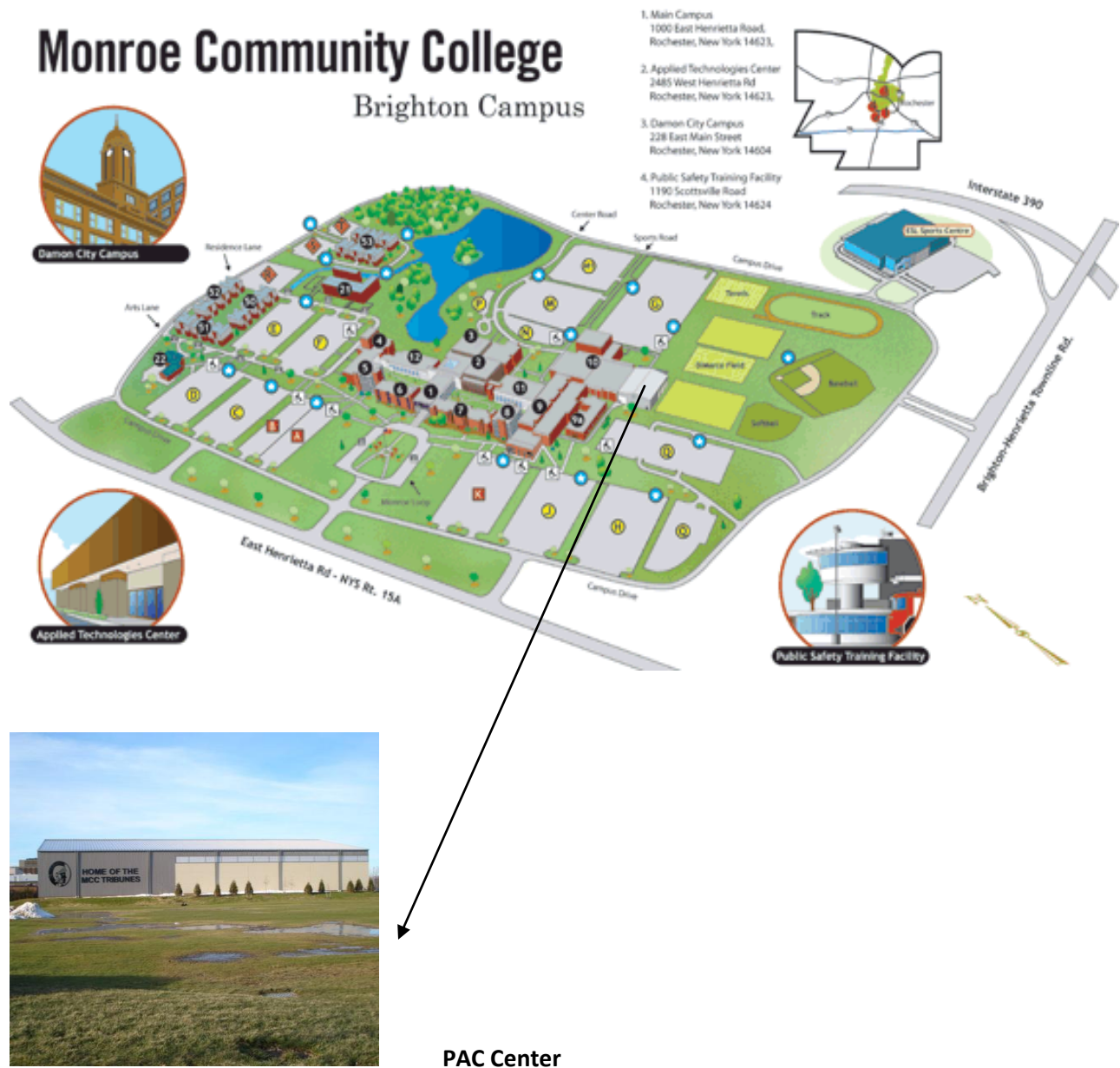
The single story, 55,743 square foot building includes the following features:

- A Field House with a 136 foot by 220 foot turf field with lighting controls, (2) retractable batting cages (10 x 12 x 60), and perimeter and ceiling netting as well as a center divider curtain
- The turf field is surrounded by a (2) lane walking/jogging track
- Interactive lobby
- 3,500 sf Fitness Center with cardio & strength training
- 1,800 sf Training Room including hot and cold hydro pools
- (4) Men's/Women's Team Locker Rooms
- Meeting Room
- Cleat lobby with public restrooms that can be used for outdoor turf field events
- Coaches offices
- Equipment storage areas

The new building is constructed on land previously used as a practice field.

The project utilized the LEED V2.2 for New Construction rating system as a guideline to design and certify green elements. Documentation for certification was compiled and submitted to the United States Green Building Council in the first quarter of 2009.

The PAC Center is located on the Brighton Campus of Monroe Community College in Rochester, New York on the south side of campus adjacent to the Building 10 Aquatic Center.



The project team set out to capture every opportunity to integrate function, architecture and engineering through a collaborative team effort. The design and construction team members were:

- Architect: Clough Harbour Sports
- Site/Civil: Clough Harbour & Associates
- Structural Engineer: Clough Harbour & Associates
- MEP Engineer: M/E Engineering, PC
- Sustainability Consultant: Sustainable Performance Consulting, Inc.
- Construction Manager: DiMarco Constructors
- General Contractor: Christa Construction
- Mechanical Contractor: JW Danforth
- Electrical Contractor: East Coast Electric
- Plumbing Contractor: Thurston Brothers

Monroe County & MCC staff were heavily engaged throughout the process, including in the selection and reviews of materials, building systems, and equipment. They consisted of:

- Reinhard Gsellmeier- Monroe County
- Valarie Avalone – MCC
- Blaine Grindle – MCC

The Pamela Ann Cheonis (PAC) Center is a sustainably-designed building and has earned 41 points and achieved LEED-Gold Certification through the U.S. Green Building Council's (USGBC) Green Building Rating System, Version 2.2.

The USGBC's mission is to transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life.



LEED®, which stands for Leadership in Energy and Environmental Design, is a Green Building Rating System and is the nationally accepted benchmark for the sustainable design, construction, and operations of high performance green buildings.

The PAC Center project was designed and constructed using the LEED for New Construction (LEED-NC) rating System, Version 2.2, as the basis of sustainability. Monroe County and MCC challenged the Design Team to produce a project that would earn, at a minimum basic LEED Certification from the USGBC. Collectively, the project team worked toward a goal of achieving the LEED Gold level of Certification. The required documentation for certification was submitted to the USGBC in August, 2009, and the project was awarded its certification in October, 2009.

The LEED V2.2 rating system is divided into six categories and contains a total of 69 points:

- Sustainable Sites – 1 prerequisite, 14 points
- Water Efficiency – 5 points
- Energy & Atmosphere – 3 prerequisites, 17 points
- Materials & Resources – 1 prerequisite, 13 points
- Indoor Environmental Quality – 2 prerequisites, 15 points
- Innovation in Design – 5 points

The final LEED-NC certification ratings are awarded according to the following scale:

- Certification** - 26-32 points
- Silver** - 33-38 points
- Gold** - 39-51 points
- Platinum** - 52-69 points

Sustainable Building Highlights:

- **Energy use: 31.6% energy cost reduction from a baseline building as defined by ASHRAE Standard 90.1, 2004**
- **Water use: 30% reduction from Energy Policy Act of 1992 Fixture Performance Requirements**
- **Implementation of a Stormwater Mgt. Plan that prevent post-development discharge rate from exceeding pre-development rates**
- **52% diversion of construction waste away from landfills**
- **30% of the construction materials purchased for the project contain recycled content**
- **10% of all materials used on the project were harvested or extracted and manufactured within 500 miles of the project supporting local resources and reducing the environmental impacts resulting from transportation**
- **Indoor Air Quality Management Plans were implemented during Construction and before Occupancy**
- **All adhesives, sealants, paints and coating installed in the project were Low emitting or no VOC products**



Establishing sustainable design objective and integrating building location and sustainable features were a metric for decision making that encouraged development and preservation practices that limited the environmental impact of buildings on the local ecosystems. Following are some of the objectives achieved:

Construction Pollution Activity Protection: MCC created and implemented an Erosion and Sedimentation Control Plan for all construction activities associated with the project. Erosion on existing sites typically results from foot traffic killing the vegetation, creating steep slopes where stormwater flow exceeds the vegetation holding power. Sedimentation contributes to the degradation of water bodies. The build-up of sedimentation in stream channels can lessen flow capacity, potentially leading to increased flooding. It also affects aquatic habitat by increasing turbidity levels. Turbidity reduces sunlight penetration into the water and leads to reduced photosynthesis in aquatic vegetation, causing lower oxygen levels that cannot support aquatic life.

Preventive measures that were implemented on this project were silt fences, temporary seeding, and filter fabric that were put into place during construction to prevent runoff.

Alternative Transportation – The environmental effects of automobile use include vehicle emissions that contribute to smog and air pollution as well as environmental impacts from oil extraction and petroleum refining. Increased public transportation can improve air quality. Reduction in private vehicle use reduces fuel consumption and air and water pollutants from vehicle exhaust. On the basis of passenger miles traveled, public transportation is approximately twice as fuel efficient as private vehicles. Another benefit is the associated reduction in the need for infrastructure used by vehicles. MCC has convenient access to existing transportation networks to minimize the need for new transportation lines. The PAC is Located within 1/4 mile of one or more stops for two or more public or campus bus lines usable by building occupants. In addition, MCC added no new parking to support this new facility. Parking facilities for automobiles also have negative impacts on the environment, since asphalt surfaces increase storm water runoff and contribute to urban heat island effect. By not adding additional parking lots, MCC is maintaining a healthier green space.

Bicycling & Showers – secured bicycle racks have been provided within 200 yards of a building entrance AND showers and changing facilities are also provided within the building. Building occupants can realize health benefits through bicycle and walking commuting strategies. Bicycling and walking also expose people to the community, encouraging interaction and allowing for enjoyment of the area in ways unavailable to automobile passengers. Bicycle commuting also relieves traffic congestion, reduces noise pollution, and requires far less infrastructure for roadways and parking lots. Roadways and parking lots produce stormwater runoff, contribute to the urban heat island

effect and encroach on green space. Bicycles are more likely to be used for relatively short commuting trips. Displacing vehicle miles with bicycling even for short trips, carries a large environmental benefit, since a large portion of vehicle emissions occur in the first few minutes of driving following a cold start, as emissions control equipment is less effective at cool operating temperatures

Heat island effect – (thermal gradient differences between developed and undeveloped areas). Heat Island Effects occur when warmer temperatures are experienced in urban landscapes compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to the heat island effect include streets, sidewalks, parking lots and buildings. As a result of heat island effects, ambient temperatures in urban areas can be artificially elevated by more than 10 degrees Fahrenheit when compared with surrounding undeveloped areas. This results in increased cooling loads in the summer, requiring larger HVAC equipment and higher electrical demand resulting in more greenhouse gas and pollution generation, and increased greenhouse gas and pollution generation and increased energy consumption. MCC worked to mitigate heat island effects by installing a highly reflective roof, and utilizing higher reflectance for fifty percent of the project site hardscaped: ie: concrete walkways vs. asphalt.

Community Connectivity -- The project site contains functional adjacencies with respect to transportation and community. There are at least 10 of basic services (library, place of worship, convenience grocery, day care, cleaners, medical and dental offices, pharmacy, fitness center) are within ½ mile to reduce transportation impacts. In addition, access to these services is walkable and will improve productivity of MCC building occupants by reducing time spent driving between services and accessing parking. In addition, occupant health can be improved by increased levels of physical activity.

Light Pollution Reduction – Outdoor lighting is necessary for illuminating connections between buildings and support facilities such as sidewalks, parking lots, roadways and community gathering places. 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 at the PAC Center addresses night sky visibility issues and site illumination requirements, while minimizing the negative impact on the environment





In the United States, approximately 340 billion gallons of 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-quarter of the nation's total supply of renewable fresh water.

Outdoor uses, primarily landscaping, account for 30% of water consumed daily. Improved landscaping practices can dramatically reduce and even eliminate irrigation needs. MCC included native and adaptive vegetation on the project site, which fosters a self-sustaining landscape that requires no supplemental water and provides other environmental benefits such as aiding in the conservation of local and regional potable water resources. No irrigation system was installed

Water conserving fixtures that use less water than requirement in the Energy Policy Act of 1992 can result in a significant, long-term financial and environmental savings. Conversely, using large volumes of water increases lifecycle costs for building operations and increases consumer costs for additional municipal supply and treatment facilities. Facilities that use water efficiently reduce costs through lower water use fees and lower sewage volumes. At the PAC Center, occupant water use was reduced by 30% compared to Energy Policy Act of 1992 – compliant plumbing fixtures. Water reduction was achieved by using low flow showerheads, toilets and urinals, and low-flow sinks.



Commercial and residential buildings consume approximately 2/3 of the electricity and 1/3 of all energy in the United States. Energy efficiency in buildings limits the harmful environmental side effects of energy generation, distribution and consumption while reducing operating costs. The project set out to meet the high standard of environmental stewardship and energy efficiency. The result is energy cost savings of 31.6% more efficient than a building built to the ASHRAE 90.1, 2004 standard which is the reference document for the New York Energy Construction Conservation Code. An energy model was developed for the PAC and used to optimize the building systems. The performance data shows that the building's total energy use is predicted to be 5,008 MBtu/year equating to a predicted cost of \$139,128 annually (based on 2008 energy cost). The Field house was constructed using pre-engineered metal panels with steel beam support framing, and utilized a highly-reflective roofing surface to reduce solar gain. High-performance low E glazing was incorporated for all building fenestrations.

The interior lighting systems incorporate high efficient light fixtures and occupancy sensor controls, in addition to lighting scenes for the field house. A variable air volume HVAC system was designed to condition the offices spaces, locker rooms and training spaces. The system utilizes campus chilled and hot water. All HVAC and Fire Suppression equipment is free of CFC based refrigerants. Carbon dioxide based demand controlled ventilation sensors are included to reduce ventilation rates during periods of low occupancy. Heat recovery is utilized for the locker room areas to save energy due to the large amount of exhaust required in these spaces. The field house itself is conditioned using a single heating and ventilating unit. A Whole Building Design Analysis, which involved a holistic approach to building simulation in which the interactions between all of the different building systems and features were modeled. Energy measures included: high performance building envelope, exhaust heat recovery, high efficiency lighting and occupancy sensor controls, variable air volume system, and demand controlled ventilation.

Building systems commissioning (the process of verifying and documenting that facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements) ensured that systems were designed and installed for optimal performance. Other measures include: Demand control ventilation: Two carbon dioxide monitors and a DDC system use the variable frequency drive to modulate the amount of outside air, based on demand.



Non- Energy Benefits Summary

Annual Reduction in

NO_x – 301.5 lbs

SO_x – 607.9 lbs

CO₂ – 219.8 lbs

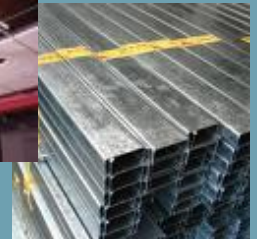
Equivalent # of Cars Removed
from the Road - 22

Building materials choices are important in sustainable buildings 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. Materials selected for the field house project contained recycled-content which reuse waste products that would otherwise be deposited in landfills. Building products with recycled content are beneficial to the environment because they reduce virgin material use and solid waste volumes. Some of the materials used included: athletic flooring, hollow metal doors and frames, metal studs, gypsum board, acoustical ceiling tiles, ceramic wall tile, mortar, grout, the building shell and roof, glazing, plastic wall panels, etc.

Materials supplied locally, within a five hundred mile radius of the jobsite, supported the local economy and reduced pollution associated with transportation. Some of the materials used included: steel framing components, glazing, insulation, concrete, recycled crushed stone, carpet, wall tile, rubber flooring, etc.

Construction and demolition waste constitutes about 40% of the total solid waste stream in the United States. The PAC Center project recycled 52% of the total waste on the project site. During the construction of the PAC Center, occupancy was maintained in the existing buildings surrounding the project. Care was taken during construction to reduce the associated environmental impact of producing and delivering all new materials to the project site.

MCC developed a comprehensive program for the storage and collection of recyclable materials within the PAC Center. Containers designated for Cardboard, Glass, Metal, Plastic and Cardboard are located throughout the facility to provide easy access for maintenance staff as well as the building occupants to dispose of such materials. By creating convenient recycling opportunities for building occupants, and instituting a comprehensive plan to dispose of these items, a significant portion of the solid waste stream will be diverted from landfills. Recycling of paper, metals, cardboard and plastics reduces the need to extract virgin natural resources.



Indoor Environmental Quality

On average, Americans spend 90% of their time indoors where the US Environmental Protection Agency reports that levels of pollutants may run two to five times higher than outdoor levels. Many of these pollutants can cause health reactions in the estimated 17 million Americans who suffer from asthma and 40 million who have allergies. The PAC Center project strived to attain high Indoor Environmental Quality and incorporated construction practices that were aimed at preventing many IEQ problems from arising. Some steps taken were in the specification of materials that release fewer and less harmful chemical compounds. Specification and installation of adhesives, sealants, paints, carpets with low levels of potentially irritating off-gassing compound were aimed at reducing occupant exposure. Scheduling of deliveries and sequencing construction activities to reduce material exposure to moisture and absorption of off-gassed contaminants was also incorporated. Permanent entryway systems were installed to capture debris prior to entering the building. Deck to deck partitions enclose areas of chemical usage. Lighting and thermal comfort controls were provided for occupant comfort.

The air handling systems in the building were protected during construction and a building flush-out prior to occupancy was performed to further reduce potential for problems arising during the operational life of the building. The joint efforts of the College, building design team, contractors, subcontractors and suppliers were integral to providing a quality indoor environment.

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. The ventilation system was designed to meet the minimum outdoor air ventilation rates of the ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) Standard 62.1. This implementation reduces potential liability regarding indoor air quality issues. Permanent monitoring systems that provide feedback on ventilation system performance were installed to ensure that ventilation systems maintain design minimum ventilation requirements.

The relationship between smoking and various health risks, including lung disease, cancer and heart disease, has been well documented. A strong link between Environmental Tobacco Smoke (ETS) or “second-hand smoke” and health risks has also been demonstrated. MCC has developed a Smoking Policy for the campus called “Smoke Free Inside and Out” which delineates a smoke-free perimeter that is more than twenty-five feet away from all entrances to buildings, outdoor air intakes and any operable windows opening to common areas. MCC has also made over-the-counter nicotine replacement products, such as gum and lozenges, conveniently available for purchase at the College Bookstore.



LEED® Facts	
Monroe Community College	
PAC Center	
Rochester, NY	
LEED for New Construction v2.2	
Gold	41*
Sustainable Sites	9/14
Water Efficiency	4/4
Energy and Atmosphere	9/17
Materials and Resources	4/13
Indoor Environmental Quality	10/15
Innovation and Design	5/5
* 69 Points Available (39 - 51 Gold)	



Sustainable design strategies and measures are constantly evolving and improving. New technologies are continually introduced to the marketplace and up-to-date- scientific research influences building design strategies. The purpose of this LEED category is to recognize projects for innovative building features and sustainable building knowledge.

Occasionally, a strategy results in building performance that greatly exceeds those required in an existing LEED credit. Other strategies may not be addressed by any LEED prerequisite or credit but warrant consideration for their sustainability benefits.

The PAC Center submitted four Innovation credits:

Exemplary Performance in Water Efficiency – achieved 10% greater savings than the credit requirement – total 40% savings over the baseline.

Exemplary Performance in use of Recycled Products – achieved 10% greater use than the credit requirement – total 40% of the cost of materials contained post and pre-consumer recycled content.

Exemplary Performance in the use of Green Power – purchased through Monroe County an additional 35% of the buildings predicted electricity from renewable sources by engaging in a renewable energy contract for two years.

Innovation in Education – provided an educational display and web page information detailing the sustainability aspects of the building to share with the community.

In addition, the PAC Center project retained a LEED consultant to guide the design and construction team through the LEED standards and to coordinate the documentation process that is necessary for LEED Certification. In addition, design and construction team members were also LEED Accredited Professionals.



LEED-NC

How to Interpret this Report

Purpose The Leadership in Energy and Environmental Design (LEED) Rating System was designed by the US Green Building Council to encourage and facilitate the development of more sustainable buildings.

Environmental Categories The report is organized into five environmental categories as defined by LEED including: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Enviro

LEED Prerequisites Prerequisites must be achieved. Non-compliant prerequisites must be resolved before a certification can be awarded.

LEED Credits The environmental categories are subdivided into the established LEED credits, which are based on desired performance goals within each category. An assessment of whether the credit is earned or denied is made and a narrative describes the basis for the assessment.

Achieved The applicant has provided the mandatory documentation which supports the achievements of the credit requirements, achieving the associated points. Currently the project has scored the adjacent points in this category.

41

Denied The applicant has applied for a point in a particular credit, but has misinterpreted the credit intent or cannot substantiate meeting the requirements. Currently the project has the adjacent points in this category.

3

Rating This Project has achieved enough points for Gold Rating.

Official Scores Official LEED v2 Scores: Certified: 26-32 Silver Rating: 33-38 Gold Rating: 39-51 Platinum Rating: 52+

Earned	Denied		
11	0	Sustainable Sites	Possible Points 14
0	0	Construction Activity Pollution Prevention	Prerequisite 1-Version 2.2
		Design Application	7/22/2009
		<p>The LEED Submittal Template has been provided stating that the project has followed local erosion and sedimentation control standards and codes, which are equally as stringent as the NPDES program requirements. The following supporting documents have also been provided:</p> <p>1) A narrative describing the implemented erosion and sedimentation control measures; 2) A copy of the project's erosion and sedimentation control plan, and; 3)Details of the control strategies.</p>	
1	0	Site Selection	Credit 1-Version 2.2
		Design Application	7/22/2009
		<p>The LEED Submittal Template has been provided stating that the project site does not meet any of the prohibited criteria.</p>	
1	0	Development Density & Community Connectivity	Credit 2-Version 2.2
		Design Application	7/22/2009
		<p>The LEED Submittal Template has been provided stating that the project site is located within 14 community services and a residential district with a density of 13 units per acre. Additionally, a listing of the neighborhood services has been provided in the Template. A narrative and site map showing the 0.5 mile radius with the locations of the community services and residential district has also been provided.</p>	
		Brownfield Redevelopment	Credit 3-Version 2.2
1	0	Alternative Transportation: Public Transportation Access	Credit 4.1-Version 2.2
		Design Application	7/22/2009
		<p>The LEED Submittal Template has been provided stating that the project is served by 2 bus lines within 0.25 miles of the project site. A scaled map and transit brochures showing the location of the transit stops have been provided.</p>	

1	0
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Alternative Transportation: Bicycle Storage & Changing Rooms Credit 4.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project is non-residential. The Template states that bicycle storage facilities have been provided to serve 14% of FTE and Transient building occupants, measured at peak occupancy, and shower facilities for 82% of the FTE building occupants. A narrative, FTE calculations, and a cut sheet for the bicycle racks have been provided.

Plans have also been provided showing the location of the shower/changing facilities and the bike storage facilities. However, one of the bicycle racks claimed appears to be outside of the LEED site boundary and closer to an adjacent existing building. It is unclear whether the bicycle rack was installed as part of the project scope or if the bicycle spaces are dedicated to the new project building.

TECHNICAL ADVICE: Please provide additional information, such as a narrative or revised plan, to clarify how all bicycle spaces claimed will be dedicated to the project. If bicycle stalls are shared, please provide information to demonstrate that sufficient stalls are provided to accommodate the occupants of both buildings. Please note that in a campus setting, the bicycle storage requirements must be satisfied for each individual building, and all stalls claimed must be located within 200 yards of the building entrance.

Construction Application

9/29/2009

The project team has provided an updated site plan and a revised narrative with calculations demonstrating that all bicycle storage has been relocated to be within the LEED project boundary, and that the project has installed a sufficient number of bicycle storage spaces to serve both the project facility and the adjacent building.

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Alternative Transportation: Low-Emitting & Fuel Efficient Vehicles Credit 4.3-Version 2.2

1	0
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Alternative Transportation: Parking Capacity

Credit 4.4-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that no new parking has been added to the site. A narrative and parking map have been provided to demonstrate that existing campus parking will be sufficient to meet the project needs.

0	0
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Site Development: Protect or Restore Habitat

Credit 5.1-Version 2.2

1	0
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Site Development: Maximize Open Space

Credit 5.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project has been developed in an area with no minimum local zoning code requirements for open space. The Template further states that 57,000 sq. ft of dedicated open space, compared to 55,743 sq ft of the building footprint has been provided adjacent to the building. A letter and site drawings have been provided in support of this credit, noting that shared campus open space has been allocated for this project.

1	0
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Stormwater Management: Quantity Control

Credit 6.1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project has implemented a stormwater management plan that results in no net increase (rate and quantity) in runoff from calculated pre-project conditions, for 1 and 2 year, 24 hour peak discharge. A narrative, stormwater report summary, and calculations have been provided to demonstrate compliance with the requirements of this credit.

1	0
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Stormwater Management: Quality Control

Credit 6.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project has implemented a stormwater management plan that captures and treats the stormwater runoff from 100% of the average annual rainfall using an open vegetated channel and detention basin. The Submittal Template indicates that the project's BMPs are capable of removing 90% of the total suspended solids (TSS) from the average annual post-development runoff. A narrative, stormwater report summary, and TSS removal calculations have been provided in support of this credit.

1	0
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Heat Island Effect: Non-Roof

Credit 7.1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that 86% of the non-roof impervious surfaces on-site have been paved with highly reflective materials. Calculations provided in the submittal claim that of the 9,777 sq.ft. of total non-roof impervious surfaces, 8,415 sq.ft. (86%) have been paved with white concrete that has a SRI of 86. A site plan showing the extents of the paved areas has been provided.

1	0
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Heat Island Effect: Roof

Credit 7.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the roofing materials used on the project have a minimum SRI value of 53 for 87% of the roof surface. A narrative, product color chart, and roof plan have been provided in support of this credit.

1

0

Light Pollution Reduction

Credit 8-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project's interior and exterior lighting has been designed in accordance with the requirements of this credit.

Interior Lighting: The Template indicates that interior lighting fixtures were located to maintain the maximum candela output, from fixtures near exterior glazing, within the building. Interior lighting plans have been uploaded to support this claim.

Exterior Lighting Power: The Template indicates that the lighting power densities for exterior area fixtures do not exceed 80% of the ASHRAE recommendations and that the LPD of exterior facade/landscape lighting does not exceed 50% of the referenced ASHRAE Standard recommendations. Exterior lighting plans have been uploaded to support this claim.

Light Trespass: The Template indicates that the project is located in a LZ-3. Based on requirements for LZ-3, the project complies with this portion of the credit requirement.

In addition, a Site Lumen calculation has been provided, along with a narrative explaining that light trespass is below the required limits at the campus property boundary.

Earned
4
2

Denied
0
0

Water Efficiency	Possible Points	5
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Water Efficient Landscaping

Credit 1.1-1.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that no permanent irrigation system has been installed. A narrative has also been included describing the landscaping design strategies installed on the site. The narrative states that the planting will only be watered for one year of initial plant establishment. A landscape plan is provided that includes a list of all plant species on the site. However, the narrative and plant schedule do not appear to include the area of sod shown in the landscape plan. From the narrative provided, it is unclear how this plant type will be maintained without the use of irrigation.

TECHNICAL ADVICE: Please provide additional information to clarify the plant species included in the area of sod, and the means to maintain them without the use of irrigation. If irrigation will be used, please provide a description of the water use calculation methodology and estimated savings.

Construction Application

9/29/2009

The project team has provided a revised landscape plan and narrative demonstrating that the sod area will not require permanent irrigation since the seed mix is comprised of species adapted to the local climate.

Innovative Wastewater Technologies

Credit 2-Version 2.2

10/29/2009

Construction Application Review

2	0
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Water Use Reduction

Credit 3.1-3.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project has reduced potable water use by 34% from a calculated baseline design through the installation of dual flush toilets, low-flow urinals, low-flow lavatories, and low-flow showers. A narrative, cut sheets, and FTE calculations have been provided in support of this credit.

Earned	Denied
9	0
0	0

Energy & Atmosphere	Possible Points 17
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Fundamental Commissioning of the Building Energy Systems Prerequisite 1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the fundamental commissioning requirements have been completed. In addition, a narrative was provided describing the commissioned systems, as well as the results of the commissioning process.

0	0
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Minimum Energy Performance

Prerequisite 2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project complies with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ASHRAE 90.1-2004. The Template denotes that the project is pursuing EA Credit 1 and has used a simulation model to confirm satisfaction of this prerequisite. A narrative and Baseline/Design Comparison Chart has been provided in support of this prerequisite.

0	0
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Fundamental Refrigerant Management

Prerequisite 3-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that base building HVAC&R systems use no CFC-based refrigerants.

7	0
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Optimize Energy Performance

Credit 1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template and supporting documentation have been provided stating that the project has achieved an energy cost savings of 31.6% using the ASHRAE 90.1-2004 Appendix G methodology. Energy efficiency measures incorporated into the building design include a high efficiency envelope, reduced lighting power, and high efficiency HVAC systems. A narrative is provided stating that the USGBC CHP Calculation Methodology was used to model energy savings. Input and output summaries, occupancy schedules, and utility rate information has also been provided in support of this credit.

<input type="checkbox"/>	<input type="checkbox"/>	On-Site Renewable Energy	Credit 2-Version 2.2
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<input type="checkbox"/>	<input type="checkbox"/>	Enhanced Commissioning	Credit 3-Version 2.2
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<input type="checkbox"/>	<input type="checkbox"/>	Enhanced Refrigerant Management	Credit 4-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that the project selected refrigerants and HVAC&R equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. The completed Refrigerant Impact Calculation indicates that the project's total refrigerant impact is 58.9 per ton, which is less than the maximum allowable value of 100.

<input type="checkbox"/>	<input type="checkbox"/>	Measurement & Verification	Credit 5-Version 2.2
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<input type="checkbox"/>	<input type="checkbox"/>	Green Power	Credit 6-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that 76% of the building's electricity usage is being provided by renewable sources and is engaged in a 2-year renewable energy contract. The submitted narrative and purchase agreement state that Renewable Choice Energy will provide green power.

Earned	Denied		
4	0	Materials & Resources	Possible Points 13

<input type="checkbox"/>	<input type="checkbox"/>	Storage & Collection of Recyclables	Prerequisite 1-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that the project has provided appropriately sized dedicated areas for the collection and storage of recycling materials, including cardboard, paper, plastic, glass, and metals. A narrative and recycling container location plan have been provided in support of this prerequisite.

<input type="checkbox"/>	<input type="checkbox"/>	Building Reuse	Credit 1.1-1.2-Version 2.2
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<input type="checkbox"/>	<input type="checkbox"/>	Building Reuse, Non-Structural	Credit 1.3-Version 2.2
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<input type="text" value="1"/>	<input type="text" value="0"/>	Construction Waste Management	Credit 2-Version 2.2
--------------------------------	--------------------------------	--------------------------------------	----------------------

Design Application 7/22/2009

The LEED Submittal Template has been provided stating that the project has diverted 103.9 tons (60%) of on-site generated construction waste from landfill. Calculations have been provided to document the waste types and receiving agencies for recycled materials. A narrative has been provided describing the separation and diversion destination of all materials.

<input type="text"/>	<input type="text"/>	Resource Reuse	Credit 3-Version 2.2
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<input type="text" value="2"/>	<input type="text" value="0"/>	Recycled Content	Credit 4-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that 39% of the total building materials content, by value, have been manufactured using recycled materials.

<input type="text" value="1"/>	<input type="text" value="0"/>	Regional Materials	Credit 5-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that 13% of the total building materials value is comprised of building materials and/or products that have been extracted, harvested or recovered, as well as manufactured within 500 miles of the project site.

<input type="text"/>	<input type="text"/>	Rapidly Renewable Materials	Credit 6-Version 2.2
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<input type="text" value="0"/>	<input type="text" value="0"/>	Certified Wood	Credit 7-Version 2.2
--------------------------------	--------------------------------	-----------------------	----------------------

Earned	Denied		
<input type="text" value="6"/>	<input type="text" value="2"/>	Indoor Environmental Quality	Possible Points 15

1 0

Minimum IAQ Performance

Prerequisite 1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project complies with the minimum requirements of ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality, using the Ventilation Rate Procedure. A supplemental sequence of operations narrative has been provided to describe the project's ventilation design. Calculations have also been provided that include specific information regarding fresh air intake volumes.

0 0

Environmental Tobacco Smoke (ETS) Control

Prerequisite 2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that smoking is prohibited inside buildings within the project and that designated smoking areas have been located 25 feet away from building openings and air intakes. A copy of the campus no smoking policy and a map of prohibited smoking areas have also been included in support of this prerequisite.

1 0

Outdoor Air Delivery Monitoring

Credit 1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that carbon dioxide concentrations are monitored within all densely occupied spaces and that direct airflow measurement devices have been provided for each mechanical ventilation system serving non-densely occupied spaces. The Template further states that monitoring equipment has been configured to generate an alarm when conditions vary by 10% or more from the setpoint. A narrative describing the project's ventilation design and CO2 monitoring system has been included, stating that a CO2 monitor will be located in the main return air duct and room sensors will be included in high occupancy spaces. Drawings and mechanical schedules have been provided documenting the location and type of installed sensors. However, the location of room sensors and the designation of high occupancy spaces is not clear from the documentation provided.

TECHNICAL ADVICE: Please provide a more detailed narrative to describe which specific spaces have a high occupant density, and where room sensors are located. Please include specific information about mounting height and the control sequence in these densely occupied spaces.

Construction Application

9/29/2009

The project team has provided room density calculations, revised mechanical plans, AHU sequences of operations, and an updated narrative demonstrating that CO2 sensors have been provided in the breathing zone of all densely-occupied spaces and that the building control system is programmed to open the damper of the associated VAV box whenever the room CO2 concentration exceeds 800ppm.

0 0

Increased Ventilation

Credit 2-Version 2.2

1	0	Construction IAQ Management Plan: During Construction	Credit 3.1-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that the project developed and implemented a construction IAQ Management Plan that followed the referenced SMACNA Guidelines, and that air handling units were not operated during construction. A copy of the project's IAQ Management Plan and photos highlighting the implemented IAQ measures have been provided.

1	0	Construction IAQ Management Plan: Before Occupancy	Credit 3.2-Version 2.2
---	---	---	------------------------

Design Application 7/22/2009

The LEED Submittal Template has been provided stating that the project has performed a flush-out prior to occupancy by supplying a total air volume of 14,000 cu. ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of 60 degrees F and relative humidity of 60%. A narrative describing the project's pre-occupancy flush-out process has been provided as required. A confirmation letter and sample trend data has also been provided that includes information regarding the temperature, air flow, and duration of the flush-out.

1	0	Low-Emitting Materials: Adhesives & Sealants	Credit 4.1-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that all indoor adhesive and sealant products comply with the VOC limits of the referenced standards for this credit. The Template includes a list of the required product details.

Please note for future projects that all laquers and coatings should be included in the submittal for EQ Credit 4.2.

1	0	Low-Emitting Materials: Paints & Coatings	Credit 4.2-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that all indoor paint and coating products comply with the VOC limits of the referenced Green Seal and SCAQMD standards. The Template includes a list of the required product details.

1	0	Low-Emitting Materials: Carpet Systems	Credit 4.3-Version 2.2
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that the installed carpet complies with the testing and product requirements of the CRI Green Label Plus Program, and no carpet cushions have been used, and all carpet adhesives comply with the requirements of EQc4.1. The Template includes a list of the carpet product details.

0	0	Low-Emitting Materials: Composite Wood & Agrifiber	Credit 4.4-Version 2.2
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1

0

Indoor Chemical & Pollutant Source Control

Credit 5-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the project has installed the required indoor chemical and pollutant source control measures required by this credit. A listing of each entryway product installed in the building has been provided. Copies of the project's construction drawings have been provided to show the installed entryway systems, room separations and required ventilation systems. The Submittal Template also confirms that MERV 13 filtration media has been installed in all HVAC systems prior to occupancy.

1

0

Controllability of Systems: Lighting

Credit 6.1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that a sufficient quantity of lighting controls are provided for individual workstations, and states appropriate lighting controls are available for shared multi-occupant spaces. A narrative has also been provided describing the project's lighting control strategy with a description of the type and location of the lighting controls.

1

0

Controllability of Systems: Thermal Comfort

Credit 6.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that a sufficient quantity of thermal controls are provided for individual workstations, and that appropriate thermal controls are available for all shared multi-occupant spaces. A narrative has also been provided describing the project's thermal control strategy with a description of the location of thermal sensors. However, the type of control in each space is not clear from the drawings and narrative provided.

TECHNICAL ADVICE: Please provide additional information to describe the specific type of controls provided in both multi-occupant and individual spaces. Please specifically address how occupants are provided with a means of adjustment for at least one primary factor of thermal comfort.

Construction Application

9/29/2009

The project team has provided a revised Submittal Template, an additional narrative and a temperature sensor cut sheet demonstrating that occupants of both private offices and shared spaces are able to control indoor temperature by adjusting a wall-mounted temperature sensor with a manual override feature.

0

1

Thermal Comfort: Design

Credit 7.1-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that the HVAC systems and building envelope have been designed to meet the requirements of the ASHRAE Standard 55-2004. The project team has provided a narrative describing the method used to establish thermal comfort criteria for the project and how the systems address the design criteria. The narrative further states that the field house portion of the project is not provided with cooling, and the temperatures will follow the outdoor conditions. However, it is unclear how the summer ranges stated in the Submittal Template will be maintained, given a design outdoor temperature that exceeds these ranges.

TECHNICAL ADVICE: Please provide additional information to demonstrate how thermal comfort will be maintained in the field house during the cooling season. Please provide specific information about how the requirements of ASHRAE 55-2004 have been met assuming a higher metabolic rate and a lower clothing value.

Construction Application

9/29/2009

The project team has provided a revised narrative stating that the methods for determining acceptable thermal conditions defined in ASHRAE 55-2004 are not applicable to the Field House space due to the elevated metabolic rates expected by occupants. However, per the LEED-NC v2.2 CIR ruling dated 4/23/08, project teams may not exclude spaces from ASHRAE 55-2004 compliance due to an inability to use the three calculation methods defined in the standard. The CIR ruling states that when the recommended methods of demonstrating compliance cannot be used, project teams must "utilize an alternative compliance method or extrapolation of existing data to show compliance with the credit." Therefore, this credit is denied.

0

1

Thermal Comfort: Verification

Credit 7.2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided explaining that a thermal comfort survey will be distributed to building occupants within the first 6 to 18 months of occupancy. The narrative includes an appropriate corrective action plan if the survey results indicate that 20% or more of the building occupants are dissatisfied with thermal comfort based on the environmental variables outlined in ASHRAE 55-2004.

However, this credit is denied pending the achievement of EQc7.1.

Construction Application

9/29/2009

Since EQc7.2 cannot be earned unless EQc7.1 is achieved, this credit is denied.

0

0

Daylighting & Views: Daylight 75% of Spaces

Credit 8.1-Version 2.2

Daylighting & Views: Views for 90% of Spaces

Credit 8.2-Version 2.2

Earned	Denied	Innovation & Design Process	Possible Points	5
4	1			
1	0	Innovation in Design	Credit 1.1-Version 2.2	

Design Application 7/22/2009

The LEED Submittal Template has been provided demonstrating that the project achieves exemplary performance for MR Credit 4 as specified in the LEED Reference Guide. A copy of the MR Credit 4 Template has been provided in support of this credit, showing a recycled content percentage of 39.5%.

1	0	Innovation in Design	Credit 1.2-Version 2.2	
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating that an education program has been developed to present the project's sustainable design practices to occupants and visitors to the facility. As required per a LEED-NC v2.1 IDc1.1 CIR ruling dated 9/24/2001, the program includes at least two educational components, including an educational display highlighting the building's sustainable design features, a website outlining the project highlights and the LEED program, and a case study describing the project's design features. A copy of the posted signage and links to the website have been provided in support of this credit.

0	1	Innovation in Design	Credit 1.3-Version 2.2	
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Design Application 7/22/2009

The LEED Submittal Template has been provided stating the project team has applied for an innovation in design credit for Curriculum Coursework - Verification of Building Performance. A narrative has been provided with a statement of the credit intent, project's approach for achievement of the credit, and required submittals for achievement. The narrative states that the project will be studied through a 10-week course developed to track the energy utilization of the building and to suggest recommendations to the college facilities group. The narrative further states that both energy and water flows will be monitored through this course.

Although this proposal represents a commendable approach to building operations and a learning opportunity focused on green buildings, an Innovation Credit cannot be awarded due to significant overlap with the existing credits available in the LEED rating system. Credit for long-term monitoring and improvement is available through EA Credit 5, and the project is already pursuing an Innovation Credit for an Education Program. If the project team believes that this approach is comprehensive, they are encouraged to pursue an alternative compliance path for EA Credit 5, and submit an additional proposal for this Innovation Credit.

Construction Application 9/29/2009

10/29/2009

Construction Application Review

1	0
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Innovation in Design

Credit 1.4-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided demonstrating that the project achieves exemplary performance for EA Credit 6 as specified in the LEED Reference Guide. A narrative, copy of the EA Credit 6 Template, and a copy of the green power purchase agreement have been provided in support of this credit.

1	0
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LEED Accredited Professional

Credit 2-Version 2.2

Design Application

7/22/2009

The LEED Submittal Template has been provided stating that a LEED AP has been a participant on the project development team. A copy of the LEED AP certificate for Tammy Schickler has been included as required.

Earned	Denied
0	0

Administrative Inquiries	Possible Points	0
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LEED-NC

LEED Premium Costs



Yes		?		No		MCC PAC Center		Construction Cost Premium	Design Cost Premium	Notes
11	0	0	Sustainable Sites							
0			PR1	Construction Activity Pollution Prevention			\$0	\$800		
1			CR1	Site Selection			\$0	\$220		
1			CR2	Development Density & Community Connectivity			\$0	\$550		
1			CR4.1	Alternative Transportation , Public Transportation Access			\$0	\$350		
1			CR4.2	Alternative Transportation , Bicycle Storage & Changing Rooms			\$1,200	\$600		
1			CR4.4	Alternative Transportation , Parking Capacity			\$0	\$220		
1			CR5.2	Site Development , Maximize Open Space			\$0	\$340		
1			CR6.1	Stormwater Design , Quantity Control			\$0	\$600		
1			CR6.2	Stormwater Design , Quality Control			\$0	\$600		
1			CR7.1	Heat Island Effect , Non-Roof			\$0	\$220		
1			CR7.2	Heat Island Effect , Roof			\$0	\$340		
1			CR8	Light Pollution Reduction			\$0	\$820		
4	0	0	Water Efficiency							
1			CR1.1	Water Efficient Landscaping , Reduce by 50%			\$0	\$400		
1			CR1.2	Water Efficient Landscaping , No Potable Use or No Irrigation			\$0	\$550		
1			CR3.1	Water Use Reduction , 20% Reduction			\$0	\$450		
1			CR3.2	Water Use Reduction , 30% Reduction			\$0	\$600		
9	0	0	Energy & Atmosphere							
0			PR1	Fundamental Commissioning of the Building Energy Systems			\$0	\$100	Cx part of original program, not considered a premium for LEED	
0			PR2	Minimum Energy Performance			\$0	\$200		
0			PR3	Fundamental Refrigerant Management			\$0	\$200		
7			CR1	Optimize Energy Performance			\$0	\$200	NYSERDA - EAA	
1			CR4	Enhanced Refrigerant Management			\$0	\$550		
1			CR6	Green Power			\$0	\$500		
4	0	0	Materials & Resources							
0			PR1	Storage & Collection of Recyclables			\$0	\$700		
1			CR2.1	Construction Waste Management , Divert 50% from Disposal			\$0	\$520		
1			CR4.1	Recycled Content , 10% (post-consumer + ½ pre-consumer)			\$0	\$850		
1			CR4.2	Recycled Content , 20% (post-consumer + ½ pre-consumer)			\$0	\$850		
1			CR5.1	Regional Materials , 10% Extracted, Processed & Mfg Regionally			\$0	\$1,050		
9	2	0	Indoor Environmental Quality							
0			PR1	Minimum IAQ Performance			\$0	\$460		
0			PR2	Environmental Tobacco Smoke (ETS) Control			\$0	\$420		
1			CR1	Outdoor Air Delivery Monitoring			\$0	\$1,140		
1			CR3.1	Construction IAQ Management Plan , During Construction			\$5,000	\$720		
1			CR3.2	Construction IAQ Management Plan , Before Occupancy			\$1,000	\$2,220		
1			CR4.1	Low-Emitting Materials , Adhesives & Sealants			\$0	\$700		
1			CR4.2	Low-Emitting Materials , Paints & Coatings			\$0	\$700		
1			CR4.3	Low-Emitting Materials , Carpet Systems			\$0	\$400		
1			CR5	Indoor Chemical & Pollutant Source Control			\$0	\$1,040		
1			CR6.1	Controllability of Systems , Lighting			\$0	\$700		
1			CR6.2	Controllability of Systems , Thermal Comfort			\$0	\$400		
	1		CR7.1	Thermal Comfort , Design			\$0	\$740		
	1		CR7.2	Thermal Comfort , Verification			\$0	\$240		
4	1		Innovation & Design Process							
1			CR1.1	Innovation in Design : Exemplary Performance - Recycled Content			\$0	\$200		
1			CR1.2	Innovation in Design : Education			\$0	\$1,200		
	1		CR1.3	Innovation in Design : Curriculum Course			\$0	\$1,500		
1			CR1.4	Innovation in Design : Exemplary Performance - Green Power			\$0	\$500		
1			CR2	LEED® Accredited Professional			\$0	\$12,000		
41	3	0	Project Totals				\$7,000	\$38,660		
Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points										

April, 2008
Final

TECHNICAL ASSISTANCE STUDY IN SUPPORT OF THE NEW CONSTRUCTION PROGRAM

Completed By:
Erdman Anthony & Associates
Contract #: 8105

For:
Monroe County - MCC Field House
Rochester, NY
Project #: NCP7191

Erdman Anthony & Associates
2165 Brighton Henrietta Town Line Rd.
Rochester, NY 14623

New York State Energy
Research and Development Authority



Notice

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Abstract

New York State Energy Research Development Authority administers the **New York Energy \$martSM** program, which aims to achieve reductions in electricity use throughout the state. The New Construction Program (NCP) assists eligible building owners and leaseholders in improving the energy efficiency of either new or renovated buildings. \$12 million is available through PON 1035 to conduct technical assessments of energy efficiency measures in building designs and to offset a portion of the incremental capital costs to purchase and install electric energy efficiency measures that exceed standard practice.

The NCP encourages greater resource and energy-efficient practices into selected renovations and new construction throughout the state. The goal of the program is to produce a permanent improvement in standard design practices among building designers and owners.

The New Construction Program includes several ways to access incentives, which are based upon the complexity of the project and the schedule. Pre-Qualified Equipment, Custom Measure (system-based) and Whole Building incentives are offered. The three opportunities allow flexibility for the New Construction Program to help as many building owners as possible to participate. Applicants may request that NYSERDA provide expert technical assistance services to applicants and their design teams to assess opportunities to participate through Custom Measure and Whole Building Design approaches and to identify eligible capital cost incentives. These services are completed by private firms, called technical assistance providers, under contract to NYSERDA.

A building must reduce sufficiently the electric demand and electricity use (with emphasis on demand) to satisfy the NCP requirements and be eligible for capital cost incentives. The NCP website (www.nysERDA.org/funding/1035pon.html) has a listing of Energy Efficiency Measures (EEMs) that typically qualify.

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Appendices

Appendix A – Project Contact List

Appendix B – VisualDOE 4.1 / DOE 2.1 Input Data Summary for the Baseline & Proposed Case Energy Model

Appendix C – VisualDOE 4.1 / DOE 2.1 Output Report for the Baseline Case, Proposed Case, and Individual Proposed Energy Efficiency Measures

Appendix D – Miscellaneous Supporting Information from the Owner, Design Team and Equipment Vendors

Appendix E – NYSERDA Whole Building Worksheets

Appendix F – LEED® Energy & Atmosphere Credit 1 Submission Package

Section 1 – Executive Summary

Project Overview:

The New York State Energy Research and Development Authority (NYSERDA), through PON 1035, is offering financial incentives to qualified customers who implement energy efficient measures that exceed standard design practice (current version of the New York State Energy Conservation Construction Code (NYSECCC)) in new construction or major renovation projects. These incentives can help to offset the incremental first-cost premiums associated with the selection and installation of qualifying energy efficient measures (EEMs).

Erdman Anthony has completed an evaluation of electric energy efficiency measures that are under consideration for the construction of a new field house facility (PAC Center), along with new office and locker room spaces at Monroe Community College in Rochester, NY.

The owner is planning to construct a new 58,000 square foot addition to building 10 on the Monroe Community College, Brighton Campus. The new building addition will include a 38,000 square foot field house and 20,000 square feet of office, locker room, and athletic training type spaces. The building will be used year round for indoor athletic training and sports-related meetings.

The field house will be constructed with pre-engineered insulated metal panels and high-performance clerestory windows. The roof will be pre-engineered metal panel with steel beam support framing, and it will utilize a highly-reflective roofing surface to reduce solar gains.

The office portion will be single-story and constructed with pre-engineered insulated metal panels and high-performance low-E windows. The roof will be pre-engineered metal panel with steel beam support framing, and it will utilize a highly-reflective roofing surface to reduce solar gains.

The interior lighting systems will incorporate high efficient light fixtures and occupancy sensor controls.

The office, locker room and training spaces will be heated and cooled, while the field house will only be heated. A variable air volume system will be installed to condition the office, locker room and training spaces. This system will utilize campus chilled and hot water. Carbon dioxide (CO₂) based demand controlled ventilation will be installed to reduce ventilation rates during periods of low occupancy. Heat recovery will be utilized for the locker room areas due to the large amount of exhaust required in these spaces. The field house will be conditioned using a single heating and ventilating unit. This unit will incorporate additional cabinet space to accommodate a future cooling coil.

Monroe Community College and the project team are actively pursuing a Leadership in Energy and Environmental Design (LEED ®) rating for the project. The goal for the project is a Silver rating.

List of Measures:

The following proposed EEMs were selected for evaluation as part of a Whole Building Analysis for possible financial incentives through the New Construction Program:

1. High performance building envelope
2. High efficiency lighting & occupancy controls
3. Variable volume air handling system
4. Demand controlled ventilation
5. Exhaust energy recovery

Results:

A Whole Building Design (WBD) analysis involves a holistic approach to building simulation in which the interactions between all of the different building systems and features are modeled. The results of the simulation illustrate that the proposed building performs 33% better as compared to a baseline, code compliant, building.

Select output sheets from the energy simulation program used for this analysis can be found in the appendices of this report. Further explanation of the analysis methodology followed for this simulation can be found in Section 2 of this report.

Table 1-1, on the following page, summarizes the results of our analysis of the baseline building model [BASELINE], the new building model with all of the proposed and recommended EEMs incorporated [WBD], and the individual measures [WBD LESS EEMs].

Table 1-1 Notes:

- 1.) The annual energy savings (kWh) of the Whole Building with all measures included is less than the sum of the annual energy savings (kWh) of the individual measures because of the interactive benefit of all measures.
- 2.) Whole Building (All EEMs) Less Measure: In order to ascertain the energy savings (kWh) and cost savings of each individual measure, each measure was removed from the Whole Building model to isolate these values. The tabulated results that are shaded reflect the Whole Building model with only that specific measure having been removed. Savings as compared to [WBD] building model.
- 3.) Summer demand (kW) values were taken for the month of August for this comparison.
- 4.) Winter demand (kW) values were taken for the month of December for this comparison.
- 5.) Fossil fuel consumption and savings are expressed in mmBtu (1 mmBtu = 1,000,000 Btu's).
- 6.) Incentive information can be found in NYSERDA's standard templates in Appendix E for all the Proposed EEMs.
- 7.) As defined by NYSERDA, the incentives are subject to the lesser incentive amount of the following incentive rules:
 - Incentive equal to 60% (75% for LEED® certified building) of the entire project incremental cost
 - Incentive cap of \$400,000 (\$500,000 for LEED® certified building achieving 4 points in the Optimized Energy) for the entire project
 - Incentive cap of \$200,000 for individual measures
 - Incentive cap adjustment so that the payback will not be reduced to less than one year, for the entire project

In addition to the energy savings achieved by the implementation of these EEMs, the following societal benefits will be realized:

Energy savings from the whole building measures evaluated in this study would, if implemented, provide societal benefits in the form of reduced emissions from power generating plants including nitrogen oxides (NO_x), sulfur oxides (SO_x), and carbon dioxide (CO₂). The energy savings associated with the project are equivalent to removing 22 cars from the road. Table 1-2 summarizes these non energy related benefits for the project.

Table 1-2: Non-Energy Benefits Summary

EEM	Annual Reduction in NO_x (lbs.)	Annual Reduction in SO_x (lbs.)	Annual Reduction in CO₂ (lbs.)	Equivalent Number of Cars Removed from the Road
All EEMs	301.5	607.9	219,803	22.0

Incentives:

Based on the results of the Whole Building analysis, Table 1-3 below summarizes the available incentives to Monroe Community College.

Table 1-3: Incentives Summary

Incentive Summary	NYSERDA Incentives
WBD Incentive - Proposed EEMs (1-5)	\$79,125
Design Team Incentive	\$9,630
LEED® Additional Incentive (25% increase to WBD Incentive)	\$19,829
Applicant LEED® Incentive	\$15,000
Total potential incentive	\$123,584

Per NYSERDA PON 1035, the capital incentives available under the Whole Building Design approach are based on the kW and kWh saved by the proposed EEMs, but are limited to 75% of the incremental cost, a program cap of \$400,000, or an incentive adjustment so that the payback will not be reduced to less than one year, whichever is lowest.

The WBD incentive is based on summer kW saved and annual kWh saved. The proposed design is 33% better than a building compliant with the NYSECCC. Per PON1035, if the performance of the proposed design building is at least 25.1% better than Code, or more, the WBD incentive rates are: \$0.17 / annual kWh saved, plus \$ 420 / summer kW demand saved. Applying these incentive rates to the kWh and kW saved for the proposed design building with all EEMs included results in the following equation: $\$0.17 * 201,285 \text{ kWh} + \$420 * 107 \text{ kW} = \$79,125$.

The Design Team incentive is based on summer kW saved, subject to various caps, is available. Per PON 1035, if the performance of the proposed design building is 25.1% better than Code, or more, the Design Team Incentive rate is \$90 / kW summer saved with a cap of \$15,000. Applying this incentive rate to the kW saved for the design building with all EEMs included results in the following equation: $\$90 * 107 \text{ kW} = \$9,630$.

The LEED Additional incentive is available for LEED® certified projects. The WBD incentive for projects that achieve two (2) points in the LEED® Energy & Atmosphere Credit 1, Optimized Energy Efficiency category, will be increased by 10%, up to a maximum of \$440,000 per building. The WBD incentive for projects that achieve four (4) points in the LEED® Energy & Atmosphere Credit 1, Optimized Energy Efficiency category, will be increased by 25%, up to a maximum of \$500,000 per building. The proposed building achieves 7 points, therefore the LEED Additional incentive is: $\text{WBD Incentive} * .25 = \$79,316 * .25 = \$19,829$.

The Applicant LEED incentive is available to LEED® certified building. Incentives here are dependent on total building square feet. Buildings equal to or less than 50,000 square feet are eligible for \$7,500; Buildings greater than 50,000 square feet are eligible for \$15,000. The proposed building is greater than 50,000 square feet and qualifies for an additional \$15,000 incentive.

Section 2 – Analysis Methodology

Erdman Anthony performed a detailed analysis of the combination of the proposed EEMs to estimate the electrical energy savings of the Whole Building. Electrical energy and demand savings were estimated using simulation software, VisualDOE 4.1 interface (utilizing DOE2.1). The baseline system was modeled using the simulation software to determine energy usage and demand of a system consistent with standard design practice. For the proposed measure analysis a model was generated for each measure, using the simulation software, in order to calculate the building energy use and demand of each measure's effect on the entire system.

Monroe Community College purchases electricity and natural gas from Monroe Newpower Corporation. Monroe Newpower Corporation provides heat and power to MCC and is co-owned and operated by Siemens Building Technologies and Monroe County. Monroe Community College personnel provided current utility information. The electric rate for the cogen is \$0.04/kWh, and the electric rate for the grid is \$0.45/kWh. The natural gas rate is \$1.09 per therm. Appendix D contains utility rate information received from Monroe Community College.

The analysis took into consideration equipment and operations schedules, space loading, equipment efficiencies, and unit energy costs. The design team provided equipment information and operating schedules for the measures. Only electrical energy and electrical demand reductions can be considered for calculation of incentives under the New Construction Program; the natural gas reductions are included for the owner and design team to make informed decisions regarding each measure.

Building occupancy schedules were developed based on information obtained from the design team and typical trends of this occupancy type. These schedules remained the same for both the baseline and proposed energy efficiency measure models.

Section 3 – Energy Efficiency Measures

The Whole Building analysis performed, including all of the measures listed in Section 1, indicates an energy savings compared to the baseline building.

The description of the baseline and measure, along with the savings and incremental cost is summarized for each EEM below.

The criteria input data that was used for all of the building simulations and calculations performed for this analysis is included in Appendix B.

Measure #1: High-performance building envelope

The field house will be constructed with pre-engineered insulated metal panels, metal stud and dry-wall, with 6” batt insulation between metal framing to achieve an insulating value of R-22. High-performance glazing will be installed, constructed of clear, single pane glazing, with thermally-broken aluminum frames. The windows will have a solar heat gain coefficient of 0.45, a U-factor of 0.38 and a visible light transmittance of 0.7. The roof will be pre-engineered metal panel with steel beam support framing, with 4” of continuous polyisocyanurate insulation between metal panels to achieve an insulating value of R-32 on the roof. The roof will also utilize a high-reflectivity material to reduce solar gains.

The office portion of the addition will be single-story and will be constructed with pre-engineered insulated metal panels, metal stud and dry wall, with 5.5” batt insulation between metal framing to achieve an insulating value of R-19. High-performance glazing will be installed, constructed of clear low-E, double pane glazing, with argon gas in the space between panes and thermally-broken aluminum frames. The windows will have a solar heat gain coefficient of 0.37, a U-factor of 0.21 and a visible light transmittance of 0.7. The roof will be pre-engineered metal panel with steel beam support framing, and 4” of continuous polyisocyanurate insulation between metal panels to achieve an insulating value of R-32 on the roof. The roof will also utilize a highly-reflective material to reduce solar gains.

Baseline: The baseline case is a building construction compliant with NYSECCC.

EEM: The proposed case is a building envelope with increased / improved wall and roof insulation, and improved window glazing. The shell constructions are improved above the requirements of the NYSECCC requirements.

The U-values, R-values, and shading coefficients are summarized in Table 3-1.1 and Table 3-1.2.

Table 3-1.1: Office/Training Spaces - High-Performance Building Envelope Summary

Item Description	Modeled Values	
	Baseline / Code Compliant	EEM
Wall insulation (non-continuous)	R-13	R-19
Roof insulation (continuous)	R-19	R-32
Windows north (SHGC*)	0.49	0.37
Windows non-north (SHGC*)	0.49	0.37
Windows north (U-value)	0.57	0.21
Windows non-north (U-value)	0.57	0.21
Glazing Visible Light Transmittance	0.7	0.7

*SHGC = Solar Heat Gain Coefficient

Table 3-1.2: Field House - High-Performance Building Envelope Summary

Item Description	Modeled Values	
	Baseline / Code Compliant	EEM
Wall insulation (non-continuous)	R-13	R-22
Roof insulation (continuous)	R-19	R-32
Windows north (SHGC*)	0.49	0.45
Windows non-north (SHGC*)	0.49	0.45
Windows north (U-value)	0.57	0.38
Windows non-north (U-value)	0.57	0.38
Glazing Visible Light Transmittance	0.7	0.7

*SHGC = Solar Heat Gain Coefficient

Energy Savings Calculations: The energy and cost savings for this measure were calculated using the simulation software which compared the energy consumption and cost of the baseline building envelope described above against the proposed high-performance building envelope. The appendix includes input and output reports from the simulation software.

Annual Energy Savings:

Energy Savings (kWh)	50,524
Peak Summer Demand Savings (kW)	27
Peak Winter Demand Savings (kW)	12
Fossil Fuel Savings (mmBtu)	1,181
Annual Cost Savings (\$)	\$21,917

Incremental Cost: The incremental cost increase for the high-performance building envelope is \$85,061. Cost information was obtained from RS Means Building Construction Cost Data 2007. Based on past experience with similar installations, it is Erdman Anthony’s opinion that this cost is indicative of the actual cost to implement this measure.

Measure #2: High efficiency lighting and controls

Baseline: The baseline case is the installation of standard lighting power densities (LPDs) and scheduled on/off lighting controls per NYSECCC. The LPDs were set according to NYSECCC requirements for all spaces.

EEM: The energy efficient measure is the installation of high efficient lighting with reduced lighting power density, and occupancy sensor controlled lighting for all spaces. The lighting power densities were obtained from the construction documents.

The LPDs for the baseline / code compliant model and the proposed model are summarized in Table 3-2.1 below. The Building Area Method was used per NYSECCC.

Table 3-2.1: Lighting Power Density Summary

Lighting Power Density [W/sf]		
Occupancy types	Baseline	Proposed
Offices / Training Rooms	1.3	0.81
Field House*	2.0	2.0

* The field house lighting was designed to specific foot-candles per NCAA regulations for safe indoor lacrosse playing; and no improvement, as compared to the NYSECCC, can be achieved. We assisted the project engineers in an attempt to lower the light power density (LPD) and still maintain NCAA requirements. The design team determined that 2.0 W/SF is the lowest possible light power density attainable that still meets the NCAA requirements.

Energy Savings Calculations: The energy and cost savings for this measure were calculated using the simulation software which compared the energy consumption and cost of the baseline lighting system described above against the proposed lighting system with high-efficiency light

fixtures and lighting controls. The appendix includes input and output reports from the simulation software.

Annual Energy Savings:

Energy Savings (kWh)	38,140
Peak Summer Demand Savings (kW)	13
Peak Winter Demand Savings (kW)	12
Fossil Fuel Savings (mmBtu)	58
Annual Cost Savings (\$)	\$8,154

The lighting power load is reduced due to increased lighting fixture efficiency and lighting controls. Occupancy sensors are used to control when the lighting is on or off in each space.

Incremental Cost: The estimated incremental cost increase for the high efficiency lighting, occupancy controls, and daylighting controls is \$25,000. Cost information was obtained from RS Means Electrical Cost Data 2007. Based on past experience with similar installations, it is Erdman Anthony’s opinion that this cost is indicative of the actual cost to implement this measure.

Measure #3: Variable volume air handling system

Baseline: The baseline case is the installation of air-handling systems for the office and field house with constant speed supply and return fans serving the new building spaces. The baseline was determined according to NYSECCC and ASHRAE Standard 90.1-1999 requirements.

EEM: The energy efficiency measure is the installation of variable volume air-handling system with premium efficiency fan motors. The fans will be equipped with variable frequency drives (VFDs). Additional control points will be used to control the VFDs and monitor the system static pressure.

Energy Savings Calculations: Electrical energy and fossil fuel savings were estimated using the building simulation software. The appendix includes input and output reports from the simulation software.

Annual Energy Savings:

Energy Savings (kWh)	62,985
Peak Summer Demand Savings (kW)	9
Peak Winter Demand Savings (kW)	18
Fossil Fuel Savings (mmBtu)	1,079
Annual Cost Savings (\$)	\$23,382

The energy savings are a result of the reduction in fan brake-horsepower due to the VFDs.

Incremental Cost: The incremental cost increase for the VFD and controls is estimated at \$90,197. Cost information was obtained from RS Means Mechanical Cost Data 2007. Based on past experience with similar installations, it is Erdman Anthony’s opinion that this cost is indicative of the actual cost to implement this measure.

Measure #4: Demand-Controlled Ventilation

Baseline: The baseline case is an air-handling system that would supply a constant amount of outdoor air during occupied hours based on a set building schedule. The outdoor air damper would open to a fixed position or close fully according to the occupancy schedule. No CO₂ demand-controlled ventilation sensors would be incorporated into the system operation. The baseline was determined according to NYSECCC and ASHRAE Standard 90.1-1999 requirements.

EEM: The energy efficient measure is the installation modulating control dampers, carbon dioxide (CO₂) sensors, and additional control points. The CO₂ sensors would monitor the concentration of carbon dioxide in the spaces and compare it to the outdoors. The controller would modulate the ventilation air dampers at each make-up air unit to supply the amount of outdoor air needed to maintain air quality within the spaces. Variable frequency drives will control the supply and exhaust fan speeds to match the systems ventilation air requirements.

Energy Savings Calculations: The energy and cost savings for this measure were calculated using the simulation software which compared the energy consumption and cost of the baseline system with no DCV as described above against the proposed system with DCV. The appendix includes input and output reports from the simulation software.

Annual Energy Savings:

Energy Savings (kWh)	6,017
Peak Summer Demand Savings (kW)	2
Peak Winter Demand Savings (kW)	1
Fossil Fuel Savings (mmBtu)	300
Annual Cost Savings (\$)	\$4,200

Energy savings are the result of conditioning reduced volumes of outside air.

Incremental Cost: The incremental cost increase for demand controlled ventilation including sensors, wiring, modulating dampers and programming is estimated at \$4,000. Cost information was obtained from RS Means Mechanical Cost Data 2007.

Measure #5: Exhaust energy recovery

Baseline: The baseline case is the installation of a make-up air handling unit that do not have energy recovery capabilities. Exhaust air is removed from the building using exhaust fans. Outdoor air is conditioned using ventilation units to temper the air from ambient conditions to interior space design conditions. The baseline was determined according to NYSECCC and ASHRAE Standard 90.1-1999 requirements.

EEM: The energy efficiency measure is the installation of an air-to-air, plate type, total enthalpy energy recovery unit. The energy recovery unit is installed to recover energy from the exhaust air stream to pre-heat or pre-cool the incoming outdoor air year-around.

Energy Savings Calculations: The energy and cost savings for this measure were calculated using the NYSERDA custom measure tools (CMT) to compare the energy consumption and cost of the baseline system with no energy recovery described above against the proposed system with energy recovery. The appendix includes input and output reports from the NYSERDA CMT bin hour calculator.

Annual Energy Savings:

Energy Savings (kWh)	2,475
Peak Summer Demand Savings (kW)	8.9
Peak Winter Demand Savings (kW)	0
Fossil Fuel Savings (mmBtu)	229
Annual Cost Savings (\$)	\$2,983

Energy is conserved during the winter and summer. During the heating season, the plate warms the incoming outside air and provides some humidification when the outside air is drier than the exhaust air. During the cooling season the plate will pre-cool the incoming air and provide dehumidification.

Incremental Cost: The incremental cost increase for the energy recovery equipment is estimated to be \$17,764. Cost information was obtained from RS Means Mechanical Cost Data 2007, and vendor supplied quotation. Based on past experience with similar installations, it is Erdman Anthony’s opinion that this cost is indicative of the actual cost to implement this measure.

The incentives for these measures were calculated based on information obtained by the design team and the construction documents. In order to receive the stated incentive, all proposed energy efficient features will be subject to field verification, post construction by NYSERDA personal, to verify items and or systems have been installed.

Section 4 – Green Building Analysis

LEED® Overview:

The design team is incorporating features into the building that meet the criteria for a rating from the United States Green Building Council (USGBC) using the Leadership in Energy and Environmental Design (LEED®) v2.2 rating system. To assist in this effort Erdman Anthony developed a baseline model and a proposed model using Visual DOE 4.1 / DOE 2.1E modeling software. The proposed model includes all energy costs within and associated with the building; and complies with the mandatory provisions of ASHRAE 90.1-2004. The baseline model complies with the requirements of ASHRAE 90.1-2004, Informative Appendix G – Performance Rating System.

The two Cases were compared to each other to determine the percent improvement in the Proposed Case performance rating compared to the Baseline Case performance rating. The LEED® Option 1- Whole Building Energy Simulation compliance path was followed. Option 1 is derived from ASHRAE 90.1-2004, Informative Appendix G – Performance Rating System. The percentage saving between the Proposed Case performance and the Baseline Case performance indicates how many points in the LEED® Energy & Atmosphere (E&A) Credit 1 that the project is eligible for.

Results:

The new building performs 33% better than ASHRAE 90.1-2004, Informative Appendix G – Performance Rating System. This qualifies for 7 points under the E&A credit one – *Optimized Energy Performance*.

The entire LEED® v2.2 E&A Credit 1 submittal package is included in Appendix F.