



UNIVERSITY OF MINNESOTA
WEST CENTRAL RESEARCH AND OUTREACH CENTER

MORRIS, MINNESOTA

Sustainable Walking Tour

UNIVERSITY OF MINNESOTA
EXTENSION

 College of Food, Agricultural
and Natural Resource Sciences
UNIVERSITY OF MINNESOTA

JLGedu
architects

University of Minnesota

West Central Research and Outreach Center

Providing Leadership in Energy and Environmental Design (LEED)

The design intent of the West Central Research and Outreach Center's Administration Building Remodel and Renewable Energy Addition was to:

- **Be a model for sustainable building design.**
- **Double the square footage without increasing net energy consumption. This is accomplished through energy efficiency and on-site renewable energy production.**
- **Develop larger, more effective, and technically advanced public educational space.**
- **Add office space for growing programs areas.**
- **Create a healthier, more productive work environment for staff and visitors.**
- **Obtain a LEED Silver Certification. LEED stands for Leadership in Energy and Environmental Design. The LEED program was developed by the United States Green Building Council and has become a national standard for sustainable design.**
- **Develop a real-world research and demonstration platform for small-scale renewable energy and energy efficiency technologies.**

Renewable energy systems were included in the building design. The original office building made use of geothermal heating and cooling. The existing geothermal system was upgraded and expanded. The building has 15 heat pumps which supply both cooling and heating for the facility. The geothermal system includes ten new 200-foot wells which provide the necessary heat exchange.

In addition to the main geothermal system, the building was designed with an expandable renewable energy test-bed. The U of M Initiative for Renewable Energy and the Environment (IREE) and the State provided funds to establish a small-scale renewable energy test-bed. Two solar thermal systems were installed to begin the testing process. The first system, manufactured nearby in Starbuck, uses two panels to provide domestic hot water. The second system uses 40 panels to provide approximately 10 tons of space cooling and 15 tons of heat for the new addition; amounts equivalent to one-third of the overall heating and cooling needs of the building. The ability to use solar thermal energy for cooling is a very desirable and unique feature.

Since monitoring and data acquisition is important to evaluate small-scale renewable energy systems in this real world environment, a Honeywell Energy Management System was incorporated. The Energy Management System allows for continuous system monitoring in addition to collecting and storing relevant data.

We envision a place for University-wide faculty to conduct experiments and provide innovative educational experiences for graduate and undergraduate students. We envision a sustainable building which acts as a case study for other projects, and as an example of the implementation strategies that are achievable by following Minnesota Sustainable Guidelines and the US Green Building Council's LEED® rating system.

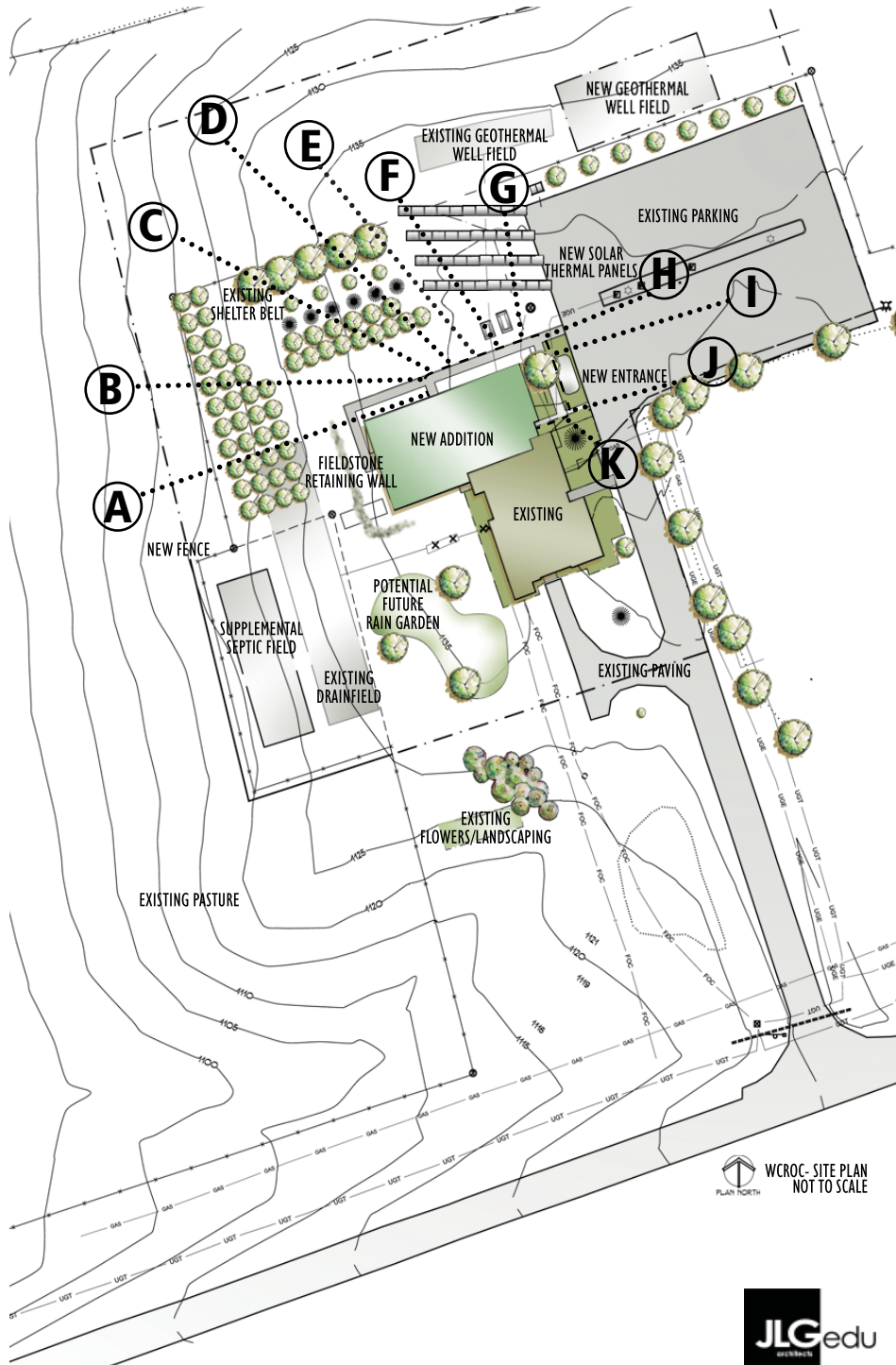
US Green Building Council- LEED® Introduction

The US Green Building Council developed the LEED® Rating system nearly 15 years ago as a way to quantifiably measure the sustainable aspects of our built environments. Since then, the program has blossomed to include 5 specialty tracks or rating systems that cover interiors, homes, existing buildings, neighborhoods, and new construction.

The rating systems generally cover seven core topics including sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation in design and regional priority. Each of these core topics have a break down of prerequisites and credits which have points assigned to them. An example would be Site Selection Credit 4.4, Alternative Transportation, Parking Capacity, which is worth 2 points for achievement. The point system totals qualify projects to attain one of four levels of certification: Certified, Silver, Gold and Platinum. The rating system is continually updated every couple of years for buildings to reach higher and higher levels of sustainable achievement. This project was registered with the LEED® for New Construction version 2.2.

By registering with LEED®, this project guaranteed achievement of the sustainable goals and level of performance the building committee planned for by committing themselves, the design team and the construction crew from design conception thru building occupation





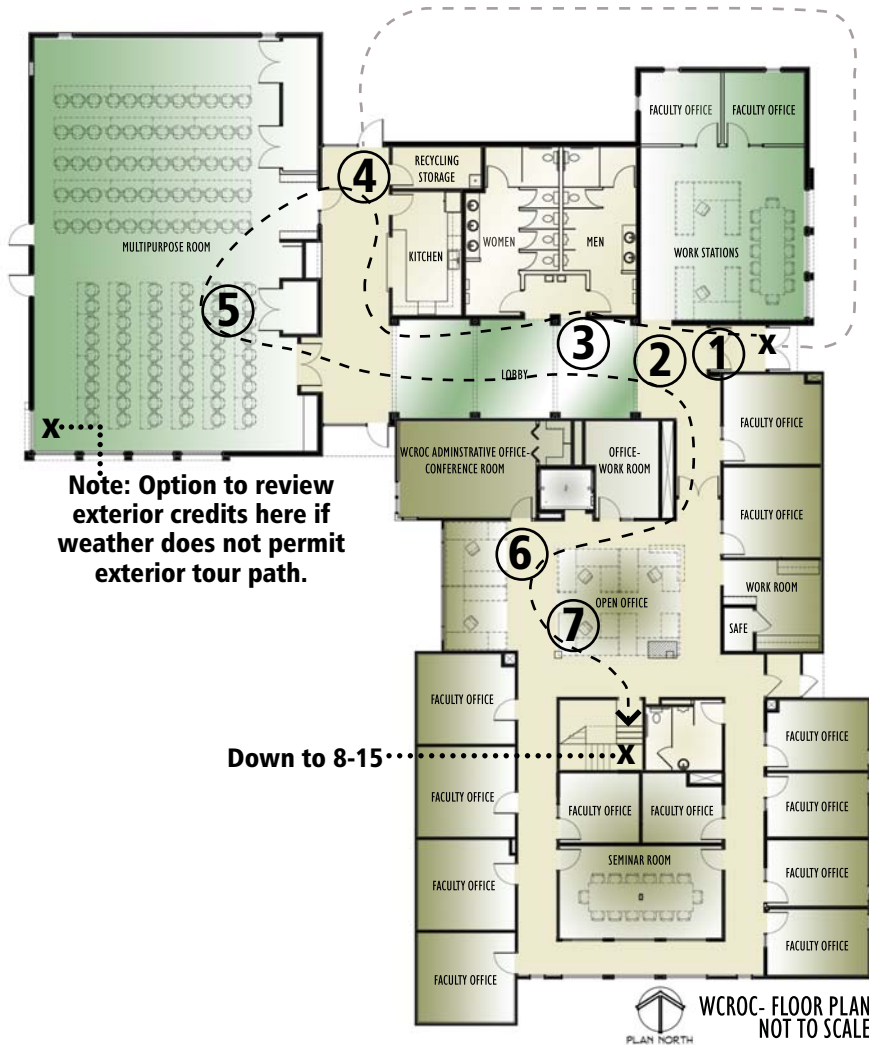
Sustainable Design and LEED® Implementation on Site

University of Minnesota West Central Research and Outreach Center

- A** Environmental Tobacco Smoke Control
Exposure to Environmental Tobacco Smoke was minimized to the building occupants, indoor surfaces, and ventilation air distribution systems, through the prohibition of smoking inside the building during and after construction. The campus is also smoke free which made the credit easily achievable.
- B** Site Selection
To avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site, the existing facility was reused and added on to.
- C** Maximize Open Space
To promote biodiversity and maintain a high ratio of open space, a vegetated open space adjacent to the building and equal to its size was provided. The footprint was minimized by reusing the existing structure and compaction of the new addition.
- D** Construction Activity Pollution Prevention
The intent of this credit is to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation. Temporary silt fencing was installed around the site during construction to achieve this.
- E** Heat-Island Effect, Roof
To reduce heat island effect and to minimize the impact on micro climate and human and wildlife habitat a white roof was installed throughout the facility.
- F** Light Pollution Reduction
Design considerations were made to minimize light trespass from the building and site, which reduces sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on the nocturnal environment.
- G** On-Site Renewable Energy
Solar Thermal Panels were installed on site not only for future study, but also to aid in the facilities space cooling, heating, and hot water production. An expandable test-bed has also been created in order to test and demonstrate other small-scale renewable energy systems.
- H** Water Efficient Landscaping:
Reduce by 50%
To limit the use of potable water, or other natural surface or subsurface water resources available on or the project site, for landscape irrigation, the design implements local plant species that alleviate the need for irrigation.
- Water Efficient Landscaping:
No Irrigation
Due to the aforementioned plant selection no permanent irrigation was installed on the site, therefore eliminating the need to use potable water for landscape purposes.
- I** Parking Capacity
To reduce the pollution and land development impacts from single occupancy vehicle no new parking was added to the existing parking lot.
- J** Alternative Transportation:
Low Emission and Fuel Efficient Vehicles
To reduce pollution and land development impacts from automobile use; preferred parking is provided for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.
- K** Construction Waste Management:
Divert 50% from Disposal
Throughout construction, demolition and land clearing at least 50% of the debris was diverted from disposal in landfills and incinerations. These materials were redirected to recycling centers to return to the manufacturing process.

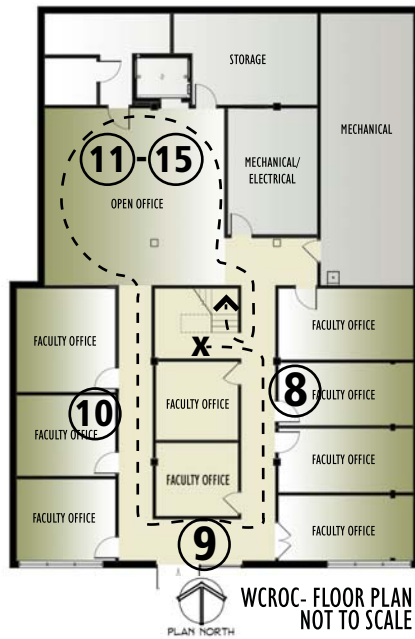
WCROC - SITE PLAN
NOT TO SCALE

Sustainable Design and LEED® Implementation- First Floor



- 1** **Building Reuse:**
Maintain 95% of Existing Walls, Floors & Roof:
 To extend the life cycle of existing building stock, conserve resources, reduce waste and environmental impacts of new buildings this facility aimed to reuse the majority of existing walls, floors and roof. Cost savings was an added benefit of this credit.
- 2** **Recycled Content:**
10% (post consumer + 1/2 pre-consumer):
 To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and process of virgin materials, the use of recycled materials was a priority for this facility.
- 3** **Water Use Reduction:**
30% Reduction
 Low flow fixtures were used to maximize the water efficiency within the building to reduce the burden on municipal water supply and wastewater systems. A 30% reduction from a baseline case was achieved.
- 4** **Storage and Collection of Recyclables:**
 To reduce the burden on landfills from building occupants and to facilitate the reduction of waste generated, recycling areas have been designated along with storage and an overall collection area.
- 5** **Low-Emitting Materials:**
Adhesives and Sealants
Paints and Coatings
Carpet Systems
 To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants low emitting materials were used throughout the facility.
- 6** **Construction IAQ Management Plan:**
During Construction/Before Occupancy
 To reduce indoor air quality problems resulting from construction and renovation and to help sustain the comfort and well-being of construction workers occupants a Indoor Environmental Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases was developed and implemented.
- 7** **Daylight and Views:**
 To provide the building occupants a connection between the indoor spaces and outdoors, the introduction of daylight and views was introduced in as many interior spaces as possible.

Sustainable Design and LEED® Implementation- Lower Level



8 Thermal Comfort: Design
A comfortable thermal environment that supports the productivity and well-being of occupants and meets ASHRAE Standard 55-2004 was part of the design of this facility.

9 Controllability of Systems: Lighting
A high level of lighting control by individual occupants or by specified groups, such as an open office area, was part of the design for the facility. This promotes productivity, comfort and well-being of building occupants.

10 Minimum IAQ Performance
A minimum indoor air quality performance standard based from ASHRAE 62.1-2004 was established, to enhanced indoor air quality within the building, thus contribution to the well-being and comfort of the occupants.

11 Minimum Energy Performance
The building envelop as well as HVAC and lighting systems, among other things, have been designed to meet and exceed ASHRAE/IESNA Standard 90.1-2004.

12 Optimize Energy Performance
Relating to Energy and Atmosphere PR 2, the building has been designed to exceed the baseline energy requirements by 17.5%. This not only has a positive environmental impact, but also saves substantially on energy costs.

13 Fundamental Refrigeration Management
To reduce ozone depletion no CFC based refrigerants have been used in the new HVAC&R systems. Any reused equipment will be incorporated into a phase-out plan eliminating its use.

14 Fundamental Commissioning of Building Energy Systems
To verify that the building's energy related systems have been installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents fundamental commissioning of the building's energy systems has been performed by an experienced commissioning agent.

15 Measurement and Verification
To provide for the ongoing accountability of building energy consumption over time a Measurement and Verification Plan has been developed and implemented covering a period of no less than one year post-construction occupancy.

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