

Bartillon Shelter

LEED and Building Performance DD Report

Prepared October 17, 2023



Summary

This document includes a narrative description of each prerequisite and credit on the LEED v4.0 checklist as well as specific building performance topics such as Net Zero energy and airflow disease transfer risk.

The current status of each LEED credit and building performance topic are described. This document will be revised during each design phase to include the latest information. It also indicates which credits align with the Owner consensus statements from AIA Framework for Design Excellence process and the results of the Trauma Informed Design report.

At present the LEED checklist (attached) indicates approximately 63 points are likely to be achieved which would result in a LEED Gold rating. In addition 19 points are in the Maybe Yes category and will be further assessed during CD.

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Integrative Process

The energy modeling scope and the pre design massing charette held in February 2023 will make up the bulk of the narrative. HabLab will write the narrative for this credit.

Supported by Owner Team as described in AIA Framework Category “Integration”

Location and Transportation

LEED for Neighborhood Development Location

This project is not located in a LEED for neighborhood development location.

Supported in AIA Framework Category Integration

Sensitive Land Protection

This project is reusing an existing building site so this credit should be achieved. HabLab will write the narrative for this credit.

High Priority Site

The project qualifies for 1 point via “Option 2. Priority designation.” The specific designation is the “Department of the Treasury Community Development Financial Institutions Fund Qualified Low-Income Community.” In order to qualify for this designation, the site must be located in a census tract with either a poverty rate more than 20% or a median family income less than 80% of area median income

The project is located in a census tract that has a median family income of \$71,536 and the Madison Metro Median Family Income is \$97,334. Dividing these figures gives a ratio of 73% which qualifies the census tract for the designation.

Surrounding Density and Diverse Uses

This credit has two categories:

- Surrounding Density: HabLab performed a detailed analysis of the density of the surrounding neighborhood and found insufficient building square footage to qualify for this credit. Although the project benefits from the large multistory MATC campus the larger area is dominated by parking lots which do not help with achieving this credit.
- Diverse Uses: Based on a neighborhood analysis, there are 10 diverse uses in the ½ mile walkshed of the project main entrance. This translates to 2 points for the Diverse Uses

Access to Quality Transit

This project will sit within the required walking distances for both a new Bus Rapid Transit stop (1/2 mile max for BRT stops) and regular route “L” (1/4 mile max for regular buses).

Between these two services the new shelter will receive 89 weekday trips which qualifies for 1 point. Service would need to be increased to 100 weekday trips in order to receive 2 points.

Bus Route A serves the same stops as BRT but it cannot be counted because these stops more than ¼ mile away and regular buses must be within ¼ mile to count. This is unfortunate because Route A serves 64 trips per day and would allow this project to easily clear the requirements for 2 points.

Bicycle Facilities

The project team is opting to pursue the v4.1 version of this project to allow the design team more flexibility in locating the bicycle storage facilities.

This project should qualify for this credit for the following reasons:

- The surrounding roads have a 25 mph speed limit which qualifies them to serve as a bicycle network
- This “bicycle network” will connect to both a BRT stop and the Truax Campus of Madison College and both of these destinations are within 3 miles
- Dimension IV has included the bicycle storage requirements from this credit in DD, including short and long term storage facilities and showers per LEED requirements.

The project needs about 10 short term and 10 long term bicycle parking spots. In DD the design was updated to include bicycle sharing (“BCycle”) spots and these bikeshare spots “.. may count for 50% of the long-term and short-term bicycle storage space” per LEED. For example: if a Bcycle station with 10 spots is installed the project could reduce the long and short term bicycle parking to 5 spots each.

Reduced Parking Footprint

This credit has two major requirements:

- Do not exceed local parking minimum allowances
- The total number of parking spots must be 40% lower than some baseline number. (Normally the requirement is just 20% below the baseline but we are held to a stricter standard because the team is also pursuing the Surrounding Density and Diverse Uses credit.)

There are several challenges with this credit:

- The project is located within Madison’s new Transit Overlay District (TOD). This means that the minimum number of parking spots is not actually explicitly specified.
- The LEED reference for baseline parking figures does not include a project type that aligns well with a shelter like Bartillon.

The design team proposes the following response to each issue:

- For the parking minimum question, we think the intent of the LEED credit is not to punish projects in a TOD. Per advice from the LEEDuser forum, LEED often suggests that projects try to locate in TOD areas or push their local governments to implement TOD areas. Therefore we feel it is reasonable to suggest to LEED that this project meets the intent of the “don’t exceed minimum parking allowances” statement.
- To set an appropriate baseline, we propose the following argument. There aren’t any appropriate categories in the LEED reference but there are several local requirements to consider for a baseline.
 - The TOD district rules include a maximum parking allowance of 1 per 600 sf which would give a maximum of 71 spots for this site.
 - The regular zoning code for non-TOD areas would declare this project as a Mission House with a minimum of 1 spot per 400 sf which would give a minimum of 106 spots for this site.

The DD site plan includes 27 parking spots and this number is easily 40% below either of the figures we are suggesting for a baseline.

Green Vehicles

For this credit the project team is opting to use the v4.1 version of the project to avoid the requirement to label some parking spots as “green vehicle only.” The Owner team was concerned that labeling spots as “green vehicle only” would make parking difficult at the shelter since there are only 27 spots total and these spots are projected to be in high demand.

This newer version of the credit requires 5% of total spots (about 2) to have electric chargers instead of 2% (about 1 spot) in the older version of LEED. Per IBC there will be 2 chargers installed so the requirements of the v4.1 version of the credit will be met.

Sustainable Sites

Construction Activity Pollution Prevention (Prerequisite)

The requirements for this prerequisite will be included in the project specifications.

Site Assessment

This credit is a collection of technical assessment documents for the site. HabLab will assemble these documents with support from the Design Team. This credit should be achievable.

Supported by Owner Team as described in AIA Framework Category “Ecosystems”

Site Development - Protect or Restore Habitat

The design team is opting to pursue the v4.1 version of this credit because it provides much more flexibility. The existing site has no natural habitat but some habitat could be restored. Restored habitat would require import of restored soil and planting of native plants that allow for biodiversity.

The site needs at least 15,000 sq ft of native plants to qualify for 1 point. The early CD landscaping plan indicates about 16,000 sq ft of site area is dedicated to native plantings which is enough to achieve the credit. Snyder has also confirmed the following required site design elements are included:

- Soil Composition
 - Project must meet requirements set out by LEED for soil composition
 - Requirements are detailed for the following properties: organic matter, compaction, infiltration rate, biological function, and chemistry
- Soil Testing
 - Project must perform testing on soil used in native planting areas
 - Comply with requirements for base, anion, cation, etc
- Pollinator Habitat
 - Some areas (within the native planting area) need to be specifically set aside as pollinator habitat
 - LEED recommends areas adjacent to parking lots for this
- Plant Selection
 - Need to choose plants from an EPA Database (available at bplant.org)
 - Need to pick 2 of the following 3 options for plant categories: shrubs, trees, and ground cover

With all of these requirements included this credit should be achieved.

Supported by Owner Team as described in AIA Framework Category “Ecosystems”

Open Space

The DD site plan includes more than 30% open space and almost all of the open space is vegetated which makes this credit very straightforward to achieve.

Supported by Owner Team as described in AIA Framework Category “Ecosystems” and the Trauma Informed Design report

Rainwater Management

As of DD this credit has been set to Maybe Yes pending further analysis by Snyder.

Supported by Owner Team as described in AIA Framework Category “Water”

Heat Island Reduction

HabLab performed a full weighted analysis of the site with the DD site plan. The result indicates this credit should be achieved. Many site elements support this credit, including the solar PV panels, the white EPDM roof, the sedum trays on the standing seam roof areas, the gray concrete (rather than asphalt) driveway/parking area, and also all the shade trees in the landscape design.

Supported by Owner Team as described in AIA Framework Category “Ecosystems”

Light Pollution Reduction

As of DD the design meets this credit using BUG ratings.

Water

Outdoor Water Use Reduction, Indoor Water Use Reduction, Building-Level Water Metering (Prerequisites)

The indoor and outdoor water use reduction prerequisites requirements are accounted by their corresponding credits below.

Water metering is required by the City of Madison water utility and covers the pre-requisite.

Outdoor Water Use Reduction

As of DD the project design is still set for zero irrigation to outdoor plants. This credit should be fully achieved.

Supported by Owner Team as described in AIA Framework Category “Water”

Indoor Water Use Reduction

The design includes an underground storage tank for harvesting rainwater.

The number of points available for this credit depends on how much of indoor water use can be reduced through the use of low flow fixtures. As of DD, IBC projects 3–6 points could be achieved depending on how the design proceeds.

Supported by Owner Team as described in AIA Framework Category “Water”

Cooling Tower Water Use

The current HVAC system design concept does not include a cooling tower, therefore this credit is indicated as No.

Water Metering

For rainwater harvesting systems, the City of Madison will require an additional meter to measure sewer water consumption. This additional meter will allow the project to earn the LEED credit without any additional design changes.

Energy and Atmosphere

Fundamental Commissioning and Verification (prerequisite)

This service is being performed by the Commissioning Agent Baumann.

Minimum Energy Performance (prerequisite)

This service is being performed by the Commissioning Agent Baumann.

Building-Level Energy Metering (prerequisite)

As of DD the Main Switch Board has a Demand Meter that can be monitored by the BAS.

Fundamental Refrigerant Management

The specs for equipment utilizing refrigerant only allow for refrigerants that are non-cfc based which should meet this prerequisite.

Enhanced Commissioning

Baumann has provided specifications to fulfill the requirements of all enhanced commissioning activities.

Optimize Energy Performance

Baumann performed energy modeling with the DD documents and projects 10 LEED points for this credit. In the ~200 kW of PV panels on the roof will allow additional points for this credit and likely bring the total up to 16 points.

Supported by Owner Team as described in AIA Framework Category "Energy"

Advanced Energy Metering

The Owner Team have declined to pursue this credit.

Demand Response

The Owner Team have declined to pursue this credit.

Renewable Energy Production

The DD design includes ~200 kW of PV panels on the roof and based on the DD energy model this PV system should easily offset at least 10% of the energy cost. This would allow achievement of all 3 points in this credit.

Supported by Owner Team as described in AIA Framework Category "Energy"

Enhanced Refrigerant Management

As of DD the total refrigerant impact calculation (per LEED) is less than 100 which should allow achievement of this point.

Green Power and Carbon Offsets

This project aims to meet the goals outline in the City of Madison 100% renewable energy plan. This plan allows for the purchase of green power offsets as a part of achieving the 100% renewable energy goal. As a result the Owner team has affirmed interest in this credit.

At this time it isn't clear how many green power offsets may be required to achieve the planned goals because the design has not advanced far enough to assess this metric. Therefore this credit is indicated as 1 point maybe Yes and 1 point maybe No.

Supported by Owner Team as described in AIA Framework Category "Energy"

Materials and Resources

Storage and Collection of Recyclables (prerequisite)

Dimension IV has ensured this feature is included in the design. Several trash/recycling collection areas are identified on the architectural sheets (at the lobby, at the dining room (right before the dish return) and at the top of stairs on second floor). The storage area will be at the trash enclosure.

Supported by Owner Team as described in AIA Framework Category “Resources”

Construction and Demolition Waste Management Planning (prerequisite)

Requirements for fulfillment of this prerequisite will be included in project specifications.

Building Life-Cycle Impact Reduction

This project is eligible to pursue Option 4 “whole-building life-cycle assessment.”

HabLab performed a draft assessment of the embodied carbon assessment using the Athena software tool in DD. The analysis indicates that significant carbon will be saved in the wood framed Bartillon design as compared to a reference building using steel framing. However it appears the project cannot achieve more than 1 point in this credit because the default wood product data reports significant acidification and eutrophication and these factors actually violate the requirements of the LEED credit beyond the single point tier.

In CD HabLab will investigate whether alternate wood product data could be obtained that did not indicate a high level of acidification and eutrophication reported in the default wood product data. Depending on the wood supplier it is possible specific data to the actual wood resource could be used to achieve more points in this credit.

Supported by Owner Team as described in AIA Framework Category “Resources”

Building Product Disclosure and Optimization - Environmental Product Declarations

Requirements to fulfill this credit will be included in project specification documents. Please note that this project team intends to substitute the LEED v4.1 version of this credit.

For now this credit is marked as Maybe Yes because there will likely be some difficulty ensuring contractors provide all the required paperwork during construction phase to comply with this credit.

Building Product Disclosure and Optimization - Sourcing of Raw Materials

Requirements to fulfill this credit will be included in project specification documents. Please note that this project team intends to substitute the LEED v4.1 version of this credit.

For now this credit is marked as Maybe Yes because there will likely be some difficulty ensuring contractors provide all the required paperwork during construction phase to comply with this credit.

Snyder Associates has already suggested that existing site asphalt and substrates may be reusable and could contribute to this credit.

Supported by Owner Team as described in AIA Framework Category “Resources”

Building Product Disclosure and Optimization - Material Ingredients

Requirements to fulfill this credit will be included in project specification documents. Please note that this project team intends to substitute the LEED v4.1 version of this credit.

For now this credit is marked as Maybe Yes because there will likely be some difficulty ensuring contractors provide all the required paperwork during construction phase to comply with this credit.

Construction and Demolition Waste Management

Requirements to fulfill this credit will be included in project specification documents. With proper planning the general contractor should be able to meet the requirements to meet all 2 points of this credit.

Supported by Owner Team as described in AIA Framework Category "Resources"

Indoor Environmental Quality

Minimum Indoor Air Quality Performance (prerequisite)

The MEP engineers IBC have confirmed that their design will meet the requirements of ASHRAE 62.1-2010 as dictated by this prerequisite.

Environmental Tobacco Smoke Control (prerequisite)

The design includes several smoking areas for guests. These smoking areas make it slightly challenging to achieve the prerequisite but Dimension IV is laying out the site very carefully to meet this prerequisite as well as the stringent requirements for smoking areas in Madison city ordinance.

As of DD the requirements for LEED are met in the design.

Enhanced Indoor Air Quality Strategies

IBC have designed the mechanical system to include MERV 13 filtration which meets the LEED credit. Additionally Dimension IV have included appropriate walk off carpets at vestibules. With these requirements met the credit should be achievable.

Supported by Owner Team as described in AIA Framework Category “Well-being”

Low-Emitting Materials

Requirements to fulfill this credit will be included in project specification documents. Please note that this project team intends to substitute the LEED v4.1 version of this credit.

For now this credit is marked as Maybe Yes because there will likely be some difficulty ensuring contractors provide all the required paperwork during construction phase to comply with this credit.

Construction Indoor Air Quality Management Plan

Discussions about the IAQ management plan (such as where it should be located in the specification) are ongoing in CD.

Indoor Air Quality Assessment

The Owner Team has indicated a preference for the “flushout” version of this credit.

Currently the construction for completion at end of summer of 2025. Flushout can only occur after all interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and other moveable furnishings are installed and major VOC punch list items are finished. If the current schedule holds, the flushout will occur during the warmer months.

Thermal Comfort

Per discussions with IBC this credit is not possible for this design because it requires individual thermostat control that cannot be achieved in the congregate sleeping areas.

Supported by Owner Team as described in AIA Framework Category “Discovery”

Interior Lighting

As of DD Option 1 of this credit is not achievable because the dorms areas do not include task lighting at beds and there are no controls available for the overhead lights. The control intent for the daytime

overhead and nighttime steplights is currently to schedule those on/off, and not give control to the occupants so they aren't flicking on overhead lights at night.

Option 2 is not achievable because the preferred fixtures in the project specifications are not compatible with the credit requirements. Additionally Option 2 would require significant coordination and careful selection with interior finish design to achieve the required level of material surface reflectance.

Neither of these options are likely to be achieved and this credit is marked as No on the checklist.

Supported by Owner Team as described in AIA Framework Category "Discovery"

Daylight

Dimension IV prepared a rough assessment of daylighting performance in DD. This assessment indicated insufficient daylighting to achieve this credit. However the design has since been modified with more windows so it is likely that the team can achieve at least 1 point.

HabLab will perform the final analysis for this credit and prepare the associated paperwork.

Supported by Owner Team as described in AIA Framework Category "Well-being" and in the Trauma Informed Design report

Quality Views

Dimension IV will perform this assessment in CD. With the recent addition of more windows to the design this credit is likely achievable.

Previously the credit was unlikely because of reduced window areas compared to pre design assumptions and the inclusion of many opaque window products (i.e. KalWall).

Supported by the Trauma Informed Design report

Acoustic Performance

Although the owner team professed some interest in this credit there was not additional scope provided to achieve the requirements.

Supported by the Trauma Informed Design report

Innovation

A total of six points area available in innovation section. The innovation credits are broken into three potential categories.

Exemplary Performance (1 point potential)

- The project may be able to achieve Exemplary Performance for the Optimize Energy Use credit. Baumann will produce a revised LEED energy model in CD to help determine the likelihood of this credit. As of DD this exemplary performance point appears unlikely.
- There is also a possibility to achieve very good rainwater harvesting performance and score high enough on the LEED credit to achieve an EP point.

The design team hoped that Access to Quality Transit might serve as an Exemplary Performance point opportunity with the new Bus Rapid Transit system planned for Madison but the threshold for exemplary performance in this category is much higher than the BRT service will provide.

Pilot Credits

- Design for Indoor Air Quality and Infection Control (1 point)
 - This credit should be achieved because the design includes MERV 13 filters and includes adequate ventilation to achieve ASHRAE 90.1-3016 requirements.
- Passive Survivability and Back-up Power During Disruptions (~~2 points~~)
 - The credit requires a generator that can run on both something “clean” burning like natural gas, and a storable fossil fuel like diesel. The design as of DD does not accommodate a generator with dual fuel capability.
- All-Gender Restrooms (~~1 point~~)
 - Although the architectural program indicates all bathrooms are “all gender” bathrooms there are a few LEED requirements which are not compatible with this project:
 - Any urinals must be fully enclosed to achieve this credit. This would require significant extra floor space which the project could not easily accommodate. The urinals are technically not required by local code so they could be eliminated to help achieve this credit but that would not be an acceptable outcome for this design.
 - Feminine hygiene products would need to be made freely available inside the restrooms which could be an opportunity for bad actors to abuse the product supply and create unnecessary waste and litter in the bathrooms.

Innovation Catalog or Unique Features (1-3 points potential)

- Bird Friendly Glass (Innovation Catalog) (1 point)
 - The requirements of this credit appear to complement those of the Madison Bird Friendly Glass Ordinance so this credit should be possible to achieve. In DD Dimension IV have indicated the design complies with LEED requirements.
- Innovation: Purchasing – lamps (1 point)
 - This credit is still available in the innovation catalog and would be fairly straightforward to achieve given the intention to install LED lighting throughout the facility
- Unique Feature – Lighting/Sound for Trauma Informed Design (1 pt)
 - This potential innovation credit will be fully evaluated in CD.

- The general suggestion is to create a credit based on a detailed reading of trauma informed design guidance. The following features could be part of the credit description:
 - Step or toe kick lighting for wayfinding at night
 - Circadian rhythm lighting
 - Sound muffling for early risers
 - Follow inspiration from fire station sleeping areas – for example: bathroom lights should turn on slowly so as not to overwhelm occupants at night
- IBC has already indicated an interest in pursuing this feature, more detail will be developed during DD
- To submit for a Unique Feature the team must develop the following documentation:
 - the intent of the proposed innovation credit;
 - proposed requirements for compliance;
 - proposed submittals to demonstrate compliance; and
 - the design approach or strategies used to meet the requirements.
- IBC is evaluating the details of creating a custom credit during CD.

Regional Priority

The following regional priority credits should be achieved in the design as currently envisioned:

- Sensitive land protection
- Bicycle facilities
- Optimize energy performance
- Green vehicles

Building Performance Items

Resilience for HVAC System

During DD the project team discussed a variety of resilience issues for the heating, cooling, and ventilation system at the shelter. Each issue is addressed below:

- Occupant surge: The building is designed to accommodate up to 250 people during typical operations. The project team discussed a potential emergency scenario where the building would be asked to accommodate more than 250 people. The team decided a rough figure for an occupant surge scenario would be about 300 people. With this guidance the engineers at IBC agreed to increase HVAC system capacity to allow for 300 occupants if necessary.
- Electrical Supply Risk: The project team discussed how the HVAC system should function if the electrical grid has a failure event. The building has an emergency generator as part of the design so the HVAC system would be able to continue function but would it be able to function at 100% capacity?
 - If the system was unable to function at 100%, should the design team account for some relaxed temperature setpoints? If so what should be the allowed range?
 - As design progressed the Owner team decided that the HVAC system needed to be able to function at 100% capacity while on backup generator power. The backup generator has been sized to meet this design goal and there is no longer a need to establish an expanded temperature window.
- Extreme Weather from Climate Change: The project team discussed the reality of extreme future climate events and how to design the building to accommodate future weather. HabLab produced “morphed” weather data for Madison that aligns to future weather conditions and shared this data with IBC.
 - There is some difficulty in choosing a future weather condition because there is uncertainty in all the models. HabLab provided “best” and “worst” case scenarios for climate change for IBC to consider.
 - The weather files have the following characteristics:
 - Projected weather for the year 2050.
 - Climate projections (aka “shared socioeconomic pathways” or SSPs) are sourced from the IPCC Sixth Assessment Report (2021)
 - Best Case Scenario (“Taking the Green Road”) SSP1-2.6: Global CO₂ emissions are cut severely, reaching net-zero after 2050. Temperatures stabilize around 1.8 °C higher by the end of the century.
 - Worst Case Scenario (“Taking the Highway”) SSP5-8.5: Current CO₂ emissions levels will roughly double by 2050. By 2100, the average global temperature will increase 4.4 °C.”

Battery Energy Storage System (BESS)

The project team considered whether a BESS using lithium ion technology battery play a useful role at the shelter. HabLab proposed that a BESS could serve multiple functions including backup electricity production, reduction in power demand charges, allow “self consumption” of solar PV (especially during power outage), and provide a backup source that is verified daily since it is used every day.

However the cost for a lithium ion microgrid battery system in 2023 appeared very high. As an example a system capable of powering Bartillon for 100 hours in July would cost \$1-2 million. Given the very high cost of BESS, the Owner team decided the design should feature the natural gas generator as the primary backup power source and any BESS would only be a complementary system to the primary backup generator.

The project team further discussed how to incorporate a BESS because the Owner team continued to show interest in batteries as a way to help take advantage of the solar PV during outages, provide a hedge against potential changes in PV net metering buy back rates, and reduce demand costs . These discussions led to the idea of making the building “BESS ready” by including certain features to enable future installation of a BESS. As of DD these features include:

- Dedicated wall area in the electrical room to for a future microgrid controller
- Dedicated site area for locate the future BESS

Airflow Disease Transfer Risk

HabLab performed an extensive analysis of COVID airflow transfer risk in the shelter dormitories. A full report for this analysis has been added to the OPR as an appendix.

Net Zero Energy

The OPR lists Net Zero energy as a goal for this project. Achieving this goal requires a combination of low energy consumption in the building and significant on site renewable energy from photovoltaic panels. For this project “net zero” was defined as offsetting 80% of the buildings energy consumption (on an annual basis) with energy produced by PV panels.

During DD the project team collaborated to identify the rough requirements needed to achieve net zero given the geometry of the building and the Owner’s preference to keep all PV on the building roof if possible. The following section lays out the technical details of the Net Zero design process.

- The roof is ~20,000 sq ft which allows about 215 kWdc total photovoltaic panel capacity. (This is before accounting for code required offsets, walking lanes, etc). This yields about 260,000 kWh of production (per NREL's SAM Tool) which is about 21 kBtu/sf/yr in EUI "points" to spend (PV design assumptions: 10 deg tilt angle, 0.9 GCR, due south orientation, 1.15 DC/AC ratio)
- With this energy budget in mind HabLab calculated potential EUI targets implied by different renewable energy shares:
 - 50% offset requires EUI 42 kBtu/sf/yr or lower
 - 80% offset (target established during pre design) EUI 26.4 or lower
 - 100% offset (full net zero) EUI 21 or lower

The energy model developed by Baumann during DD indicates the building will likely have an EUI of 48 kBtu/sf/yr which exceeds all of the targets described above. Further progress toward Net Zero could be achieved by adding ground mounted PV panels.

Wind Rose for Outdoor Comfort

The OPR includes a requirement to study the "winter wind" in designing the site layout. HabLab developed seasonal wind rose diagrams to aid Snyder in this effort.

The wind rose diagrams indicated the most hours of winter wind come from the northwest for this project site. HabLab suggested that site elements such as trees should be placed to block the northwestern wind to allow better outdoor comfort in the winter months.