

2016

Green Globes SI
Final CD Review
CSU Center for the Arts
Fort Collins, CO



Ron Lincoln, AIA, Green Globes Assessor, LEED AP

A3C – Collaborative Architecture

3/8/2016



March 8, 2016

Helene Gotthelf and Ellie Troxie
Institute for the Built Environment
Colorado State University

Subject: Green Globes® SI Final CD Review
CSU Center for the Arts
1400 Remington St
Fort Collins, CO 80524

Thank you for the opportunity to complete a Green Globes Final CD Review analysis of the Colorado State University Center for the Arts in Fort Collins, Colorado. The project is a Sustainable Interiors addition to the University Art Museum. It is a single-story building of approximately 6288 square feet. Construction was completed in September, 2015. This is the final stage of the Green Globes Assessment.

The Final CD Review is a third-party assessment of the project's final construction documents conducted after construction is completed. It includes submittal and review of any commissioning documentation or product submittals and documentation necessary to verify the targeted achievement that was defined in the online Survey.

Additional documents reviewed for this assessment were submitted by the Client electronically between January 14 and February 17, 2016.

The Green Globes Post-Construction – Assessor's online survey was updated and reviewed in addition to the above listed documents.



Survey

The purpose of the Final CD Review is to verify that the final interior build out conforms with the online survey information submitted to the Green Building Initiative™ prior to the Final CD Review. The independent rating is based upon submitted construction documents, including drawings and specifications. The following information was utilized to create this report:

- Green Globes Survey Documentation, January 25, 2016.
- Several e-mails and transfers of supplementary information, compiled as a result of information identified as unknown or undetermined, that was requested after a preliminary review of the online survey.

Following the online survey, the preliminary rating of 51% reflected the building score prior to final adjustments by the Assessor. That rating was based upon some online survey information that was incomplete or required further verification. The final point score for the CSU Center for the Arts is 355 points out of 746 applicable points after the score was adjusted by the Assessor as a result of the assessment. That point award level lowered the final overall rating of the Center for the Arts to 48% which still translates into a One Green Globe rating. This is a nice achievement and reflects a sound level of effort to design and renovate this facility with sustainability as a major focus.

The breakdown of scoring for each of the six sections used to assess the building is shown in the chart below. Green Globes online tools create this summary as part of a recommendation report that is generated upon completion of the questionnaire.

The remainder of this report will further explain the methodology used to derive the final score, review each of the individual sections, comment on key accomplishments, and provide recommendations for improvement if appropriate. The recommendations are offered as suggestions for continual improvement with the intent that sustainability is a lifelong process for any building and continues after the initial construction.

Green Globes Recommended Rating

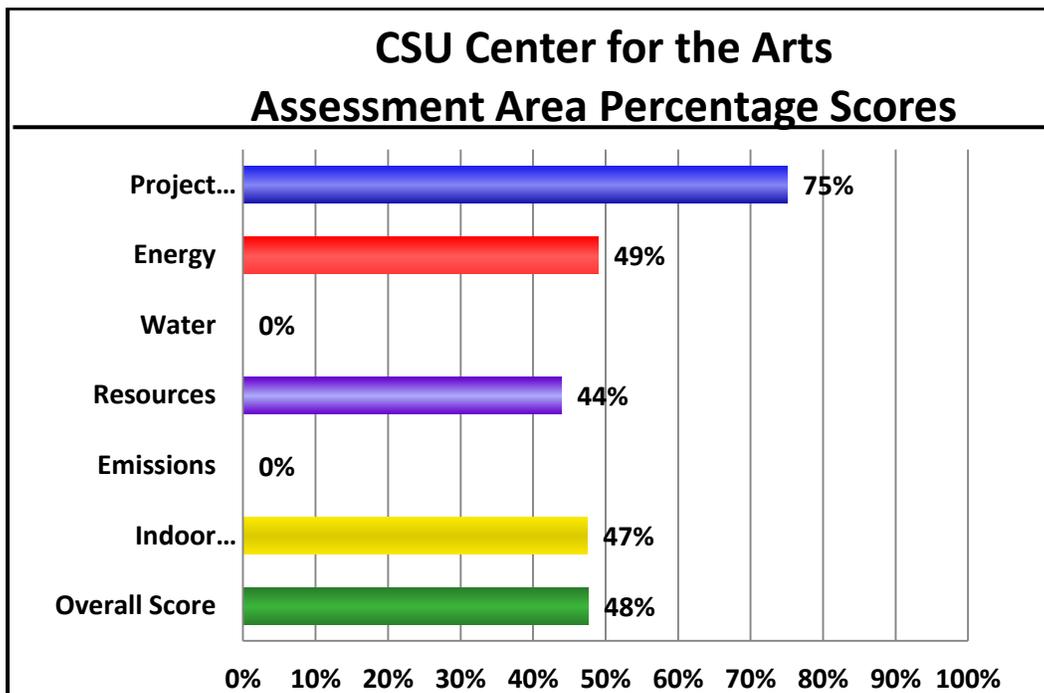


One Green Globe



GREEN GLOBES RATING SCALE		
Buildings that achieve 35% or more of the points possible in the Green Globes rating system are eligible for a certification of one, two, three, or four Green Globes.		
85-100%		Demonstrates national leadership and excellence in the practice of energy, water, and environmental efficiency to reduce environmental impacts.
70-84%		Demonstrates leadership in applying best practices regarding energy, water, and environmental efficiency.
55-69%		Demonstrates excellent progress in the reduction of environmental impacts and use of environmental efficiency practices.
35-54%		Demonstrates a commitment to environmental efficiency practices.

The scoring breakdown for each of the six assessment areas is shown in the chart below.



Summary of Your Achievement: The CSU Center for the Arts achieved a final rating of **48%**.



SCORING SUMMARY

The table below provides a summary of the present level of sustainable design represented by the on-line survey, construction documents and assessment for the CSU Center for the Arts.

Green Globes®			
Sustainable Interiors Final CD Review Assessment			
CSU Center for the Arts			
Assessor: Ron Lincoln, AIA			
Assessment Date: March 8, 2016			
Sections	Applicable	Scored	Rating Earned Percentage
<i>Project Management</i>	<i>68</i>	<i>51</i>	<i>75%</i>
<i>Energy</i>	<i>245</i>	<i>120</i>	<i>49%</i>
<i>Water</i>	<i>0</i>	<i>0</i>	<i>0%</i>
<i>Resources</i>	<i>205</i>	<i>90</i>	<i>44%</i>
<i>Emissions</i>	<i>30</i>	<i>0</i>	<i>0%</i>
<i>Indoor Environment</i>	<i>198</i>	<i>94</i>	<i>47%</i>
<i>Total</i>	<i>746</i>	<i>355</i>	<i>48%</i>

This report summarizes the project's verified achievements in each of the six Green Globes SI assessment areas. It also identifies items that were undefined or unable to be verified in the Client's online Survey review and required clarification or supporting documentation prior to or during the Final CD Review assessment. In some assessment areas suggestions for improvement have been made that may be applied to future projects.



ENVIRONMENTAL ASSESSMENT AREAS

The following is a summary of relevant environmental features that have been verified, by category. The points listed in parenthesis (5 points) are the points scored per category or issue.

PROJECT MANAGEMENT (55 Points)

INTEGRATED DESIGN PROCESS (17 Points)

Integrated Design Meetings (6 out of 6 Points)

The online survey identified 15 key disciplines that were involved in an integrated design process for the design of this project. That represents a unanimous commitment to interactive cooperation and input from varied members of the design team.

The principal members were: Hord Coplan Macht, Architect & Interior Design; Cator Ruma, MEP Engineers; Fransen Pittman, General Contractor and GG Management, Project Manager and Sustainable Design Coordinator.

IDP Performance Goals (8 out of 11 Points)

Qualitative green design goals were claimed for 6 out of 7 areas of concern at the pre-design phase. Setting these goals early in the design process and reviewing them through all phases enables the entire Team to focus on achieving these goals efficiently.

Performance goals and metrics for achieving them ensure that not only the construction but the operation of the building were considered during the pre-design and design phase. Metrics were set for lighting power density and plug load power density.

IDP Progress Meetings for Design (3 out of 3 Points)

Progress meetings were held at the completion of each progress phase during design as reviewed in the provided Meeting Minutes.

ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION (10 Points)

Building Materials and Building Envelope (2 out of 2 Points)

The project has been identified in the online survey as having materials protected during transport to the site and while in storage on site.

The building envelope was identified as being weather tight before installation of interior finishes and systems as no work was undertaken on the exterior enclosure.

IAQ During Construction (8 out of 8 Points)

The typical procedure for maintaining Indoor Air Quality during the construction process is to flush the area for 7 days and change filters afterward but prior to occupancy. Project specific procedures were reviewed.

Parts of the building were occupied during construction that necessitated control of dust, odors, or irritants. Documentation was provided that confirmed how these were accomplished.



ENVIRONMENTAL PURCHASING (0 Points)

The online survey states that environmental purchasing plans were not established for either Construction or Post-Occupancy. Such plans and policy documents represent a commitment by the future tenant organization's decision makers to continue the practice of environmental purchasing after the project is complete and the space is occupied. It appears that there is no Campus-wide policy in place. Because this is a relatively easy plan to develop and implement, due to the plethora of templates and samples available, it is highly recommended that this be undertaken for future projects and potentially "retro-fitted" to this one.

COMMISSIONING (24 Points)

Commissioning Requirements (18 out of 22 Points)

A commissioning process, a Plan, and a Report were provided for the Review for the BAS, Electrical Systems, HVAC & Controls, and Light Systems & Controls. This process has beneficial value to the construction outcomes and operations efficiencies.

Training (3 out of 3 Points)

Owner training was specified in the documents and documentation was provided outlining how this was carried out.

Operations and Maintenance Manuals (3 out of 3 Points)

An Operations and Maintenance Manual was completed and submitted to the Owner upon completion of construction, as part of the project closeout procedure for the construction team. This item was reviewed.

The Project Management score is 51 out of 68 possible points for a 75% rating.

Suggestions for Future Projects:

- It is highly recommended that an Environment Purchasing Plan be developed for future projects and potentially "retro-fitted" to this one.

ENERGY (120 Points)

ENERGY SUB-METERING (0 Points)

The documentation for the project indicates that there are no separate building level electric and heating fuel meters for this addition. There are no sub-meters for the space and no monitoring features or analysis conducted that would enable tenants to evaluate load reduction. This does not provide any inducements for tenants to minimize their energy usage.

BUILDING OPAQUE ENVELOPE (10 Points)

The windows meet the U-values and SHGC criteria for Climate Zone 5B. There are no "existing" windows to be re-sealed. There are no supplementary heating or cooling units provided.

LIGHTING (95 Points)

Lighting Power Density (40 out of 40 Points)

Total lighting power density for the building has been determined by the Building Area Method as being



in compliance with the Green Globes Table 2.3.1.1-A. Documentation was provided by the electrical engineer to verify the compliance.

Interior Automatic Light Shut-off Controls (30 out of 30 Points)

The office lighting is controlled by an occupancy sensor. All other lighting is connected through a 7 day programmable time clock with automatic daylight savings time adjustment.

Light Reduction Controls (25 out of 25 Points)

All of the lighting fixtures in the Galleries and Corridor are controlled on dimmer switches.

DAYLIGHTING (0 Points).

Controls for Daylighted Zones (0 out of 15 Points)

There are no integrated automatic daylighting controls such as photocell sensors.

HVAC SYSTEMS AND CONTROLS (15 Points)

Automation System (15 out of 15 Points)

A central Building Automation System is provided for the addition's main systems operation that integrates with, but operates independently of the adjacent main building's systems.

Domestic Hot Water Heaters (0 out of 0 Points)

There are no water fixtures and hence no HWH required or provided on this project.

PLUG LOADS (0 Points)

Plug Load Inventory (0 out of 16 Points); **Plug Load Limiting** (0 out of 12 Points);

Plug Load Management (0 out of 22 Points)

No plug load inventory was conducted and no planned monitoring or tracking is provided on any regular basis providing feedback to occupants. A Plug Load Limiting Policy has not been adopted and there is no environmental purchasing policy that requires specification of energy-efficient equipment, such as ENERGY STAR, for future copiers, printers, computers, monitors, etc..

The Energy score is 120 out of 245 possible points for a 49% rating.

Suggestions for Future Projects:

- While the addition has very limited regular User/occupant load (only one office for any equipment) CSU could develop a campus-wide Plug Load Limiting Policy that identifies acceptable plug-in equipment, criteria or restrictions for use, and remedial measures to remove or replace non-compliant equipment. Part of the Plug Load Limiting Policy should also include occupant education on the subject.
- Consider developing and implementing a campus-wide Environmental Purchasing Policy.



WATER (0 Points)

The Gallery addition contains no plumbing fixtures and has no water use except hot water heating (and return) that are served by an adjacent existing system extension.

PLUMBING FIXTURES (0 Points - NA)

There are none of these uses in this project.

RESIDENTIAL & COMMERCIAL FOOD SERVICE FIXTURES AND EQUIPMENT (0 Points)

Residential Plumbing Fixtures (0 out of 0 Points - NA)

There are none of these uses in this project.

Commercial Food Service Equipment (0 out of 0 Points - NA)

There are none of these uses in this project.

WATER INTENSIVE APPLICATIONS (0 Points)

Laboratory and Medical Equipment (0 out of 0 Points - NA)

Laundry Equipment (0 out of 0 Points - NA)

Special Water Features (0 out of 0 Points - NA)

Metering (0 out of 0 Points - NA)

There are none of these water intensive uses in this project.

The Water score is 0 out of 0 possible points for a 0% rating.

MATERIALS & RESOURCES (90 Points)

INTERIOR FIT-OUT (INCLUDING FINISHES AND FURNISHINGS) (0 Points)

Path B: Prescriptive Path for Interior Fit-outs (0 out of 50 Points)

The Center for the Arts followed Prescriptive Path B for Assessing Interior Fit-out Material Performance. Only two submittals included EPDs and without percentage cost calculations. Manufacturers of many products are constantly improving the availability of EPDs and Third Party Certifications; all utilized to compare products and their impacts to the environment. The goal is for design professionals and specifiers to use EPDs to evaluate and compare different products for the same application. Future projects should make greater use of these available instruments or of Life Cycle Assessment tools.

MINIMIZED USE OF INTERIOR MATERIALS (0 Points)

There are no furnishings being provided as part of this project.

DECONSTRUCTION, DISASSEMBLY, AND REASSEMBLY (15 Points)

The easy of disassembling a building or its components is another method of saving embodied energy over the life span of a building. Credit is verified for the use of modular furniture systems.

WASTE (65 Points)

Construction and Operational Waste (65 out of 80 Points)

This criterion on diversion of construction waste from landfills was listed as > 74% in the online survey and follow-up documentation was provided for verification of 93%; a remarkable achievement.



Design and expectation of the recycling of waste that is generated during the operation of the building is indicated in the online survey as having been considered and planned for the Center for the Arts. Storage for temporary collection and waste hauling areas for ultimate pickup is part of the operational plan of the building. A composting program is not available.

BUILDING SERVICE LIFE PLAN (10 Points)

There is a Building Life Service Plan for the schedule of preventive maintenance available. There is no housekeeping plan or policy for environmentally preferable cleaning products available for review. All products are stored in a central location remote from this project.

REUSE OF NON-STRUCTURAL ELEMENTS (0 Points - NA)

This being a new addition to an existing adjacent building, there were no existing interior non-structural elements or furnishings available for reuse.

The Materials & Resources score is 90 out of 205 possible points for a 44% rating.

Suggestions for Future Projects:

- A significant aspect of sustainability that could be expanded and evaluated to a greater degree in this section is the use and evaluation of life cycle assessment. A lifecycle assessment (LCA) is considered to be the most reliable way to calculate and compare the cradle-to-grave environmental effects of common building materials. Designers can use the modeling tools described to examine the lifecycle environmental effects of a complete structure or of individual assemblies or furnishings and can experiment with alternative designs and different material mixes to arrive at the best environmental footprint. The objective of the simulation is to aid the Designer in selecting building assemblies with the lowest reported impact in terms of energy consumption, air and water toxicity index, global warming potential (GWP), ecologically weighted resource use, and solid waste emissions. This is a critical task to prepare adequately for the best sustainable approach to the building construction and operation. Decisions made from this analysis are then reflected in the construction documents. This exercise is significant in approaching the design, materials, and construction of a facility with long term sustainability as a focus, and we strongly suggest performing the LCA evaluation. The alternate (Path B) is to make greater use of available EPDs and Third Party Certifications for product evaluation and selection.
- Consider developing and implementing a campus-wide housekeeping plan and/or policy requiring environmentally preferable cleaning products and procedures.

EMISSIONS (0 Points)

INTEGRATED PEST MANAGEMENT (0 Points)

There is no pest management policy to review.

LEAK DETECTION (0 Points)

There are no leak detection and/or alarm systems installed on the rooftop units. There is a low pressure alarm tied back to the BAS. Whether rooftop or interior units, the intent is to alert and mitigate the release of refrigerants to the atmosphere.



JANITORIAL EQUIPMENT (0 Points)

Janitorial supplies and equipment are stored remotely from this project's location and are not under the control of this tenant.

The Emissions score is 0 out of 30 possible points for a 0% rating.

INDOOR ENVIRONMENT (198 Points)

VENTILATION (15 Points)

Ventilation Air Quantity (15 out of 15 Points)

The project has designed the ventilation air for this building in compliance with ASHRAE 62.1 – 2010. Supply air flow ratings (cfm) for each space and a ventilation schedule per room was identified in the *Minimum ASHRAE 62.1 Ventilation Rate Procedure* spreadsheet.

CO₂ Sensing and Ventilation Control Equipment (0 out of 0 Points - NA)

Due to the sensitive environment required to protect the gallery's art work, controls do not have CO₂ sensing or monitors for ventilation control. While the Tech Manual states that this is grounds for an "NA", the online Survey does not present an NA option. The points will be manually corrected for this report.

SOURCE CONTROL AND MEASUREMENT OF INDOOR POLLUTANTS (42 Points)

Volatile Organic Compounds (42 out of 51 Points)

There are specification requirements for compliance with prescribed VOC limits for all categories except carpet (which for the project is NA) and systems furniture/seating. Construction product data submittals were provided which verify that installed products meet or exceed these criteria.

Moisture and Vapor Control Methods (0 out of 10 Points)

There are no "high humidity" spaces (kitchens, toilets) in the project. There are no floor drains in the project. Some drain pans are provided under specific rooftop equipment with float sensors and alarms.

Ventilation and Physical Isolation for Specialized Activities (0 out of 0 Points)

There are no specialized activities within the project that require separate ventilation or physical isolation.

LIGHTING (2 Points)

Daylighting (0 out of 22 Points)

The combination of wide gallery areas and UV sensitive art work prohibits the introduction of enough daylight into the project to qualify for any of the individual items. Roller blinds, originally specified in the documents, were later excluded from the project. There are no photocell sensors to regulate artificial lighting.

Lighting Design (2 out of 30 Points)

The only points claimed in this category are for a wayfinding system comprised of the artwork itself. The



online survey did not indicate that any other lighting design factors were considered nor were they documented or verified.

THERMAL COMFORT (23 Points)

Thermal Comfort Design (18 out of 18 Points)

The online survey indicates that ANSI/ASHRAE 55-2013 has been used as the basis for the design of the space conditioning for the space. The Mechanical Engineer provided confirmation via the CBE (Center for the Built Environment) Thermal Comfort Tool.

Thermal Comfort Strategies (5 out of 15 Points)

The smaller functional areas (office) within the space have thermal comfort zones of less than 750 square feet in area. These zones are indicated by the thermostat locations shown on *Drawing Sheet M2.01*.

ACOUSTIC COMFORT (12 Points)

Acoustically separated areas (the galleries) are located remotely from less noise sensitive areas (Storage/Mechanical/Electrical) and many spaces are separated from each other by partitions that are acoustically insulated to the deck above with through-wall penetrations being acoustically sealed according to ASTM C919 in the *Sealant* specifications. Completion of the sealant installations was verified by HCM.

The criterion regarding use of low noise electronic ballasts (Sound Rating Class A) could not be verified by manufacturer's cut sheets, nor was the noise from light fixtures and other electrical fixtures confirmed as having been designed in compliance with ANSI/ASA S12.60-2010, Part 1.

There is an acoustically separated office for conference calls on speaker phones.

No other acoustic comfort criteria was selected in the online survey or submitted for verification.

The Indoor Environment score is 94 out of 198 possible points for a 47% rating.

Suggestions for Future Projects:

- The lighting design for a project should take into account a number of factors including: IESNA recommended light levels, Owner's Project Requirements for light levels, and applicable energy code's maximum lighting power density. Lighting levels should take into account special needs and circumstances and address such factors as glare, and luminance ratios between tasks and backgrounds. With the advances within the lighting industry, designing a lighting system that meets both the energy codes and recommended luminance values can be readily achieved.
- Utilizing low noise ballasts (and drivers) and ensuring fixture designs that comply with ANSI S12.60 Part 1 is an effective method to cut down on background "hum" that may require retro-fit sound masking to overcome.



SUMMARY

The CSU Center for the Arts is a good example of the success possible in sustainable design and the integration of design and construction professionals in that process. The team considered many of the sustainability impacts of design decisions and their influence on the day to day operations of the facility as well as the long term benefits to the tenant.

The final score is 355 points out of 746 points or 48%, representing One Green Globe.

I am recommending to the Green Building Initiative that they award the CSU Center for the Arts One Green Globe for Sustainable Interiors, in recognition of their level of effort to create this facility with attention to sustainability in all aspects of the process. One Green Globes is a nice accomplishment and you should be proud of the manner in which you approached the design and construction of this facility for efficient use of energy and resources, a healthful environment for visitors, and fiscal prudence for the owners and surrounding environment.

In addition to the design and construction team, CSU's administration appears dedicated to a sustainable approach to building and operating facilities. After a minimum of 12 months, assessment of the facility with respect to operation can be evaluated for compliance with the standards of the Continual Improvement of Existing Buildings (CIEB). This is mentioned here to make note of the concept that sustainability is a dynamic process and continues for the lifetime of a building. If interest in assessment of the operations of the facility is desired, a minimum amount of time is required due to the need to evaluate utility bills and usage data and evaluate the increased performance over time. The collection of operational data is important to constantly monitor the success of building performance goals.

We have no doubt that the CSU Center for the Arts will continue its dedication to the concept of sustainability through operations, as exhibited by the dedication to these goals in the cooperative initial design and construction of the facility.

AUTHORIZATION

Congratulations on the team effort and pursuit of goals that will result in reduction of environmental impact to the City of Fort Collins and the Larimer County area. It has been a pleasure to work with you through the Green Globes rating process.

Best of luck on all future projects and we hope to work with you again.

Sincerely,



Ron Lincoln, AIA, GGA, LEED AP

cc: Dianne Elliott, The Green Building Initiative
Kevin Stover, The Green Building Initiative

