INTRODUCTION

Recreation Center, Philadelphia, Pennsylvania is a 3 story, 85,292 ft² building. The estimated construction cost is $460/sq.ft.

Recreation Center is described as follows:


The client is Drexel University. The architect is Sasaki Associates. The mechanical engineer is Ewing Cole, the electrical engineer is Ewing Cole and the structural engineer is Ewing Cole.

Summary of Your Achievement: Recreation Center achieved an overall rating of 66%.

To find out how the performance of Recreation Center compares to other buildings that have been assessed, and to obtain certification, the data must be verified by a licensed engineer or architect who has undergone the Green Globes training and certification.

Percentage of points achieved by Recreation Center for each module:

<table>
<thead>
<tr>
<th>Module</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>82%</td>
</tr>
<tr>
<td>Site</td>
<td>78%</td>
</tr>
<tr>
<td>Energy</td>
<td>63%</td>
</tr>
<tr>
<td>Water</td>
<td>44%</td>
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<tr>
<td>Resources</td>
<td>41%</td>
</tr>
<tr>
<td>Emissions</td>
<td>76%</td>
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<tr>
<td>Indoor Environment</td>
<td>78%</td>
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PROJECT MANAGEMENT POLICIES AND PRACTICES Rating Earned: 82%

This section evaluates the extent to which an integrated design process and a team approach have been used to generate design solutions that will meet the needs identified in previous stages of the project delivery process. It also addresses the purchasing policy and development of commissioning documentation and an emergency response plan.

Recreation Center achieved a score of 82% on the Green Globes™ rating scale for its integrated design process,
integration of environmental purchasing, a commissioning plan and emergency response plan.

Integrated design process

Summary of Your Achievements
An integrated design process was used for the design development.
A team approach was used throughout the progressive stages of the design process. It involved collaboration of the architect, engineers, consultants, and other stakeholders.

Green design facilitation was used to support integration of energy and environmental considerations throughout the design stages.

Environmental Purchasing

Summary of Your Achievements
Aspects of green specifications have been incorporated (e.g., Recycled content rubber flooring, Locally mined slate siding, pervious paving, courtyard rainwater harvesting system for toilet flushing).

Environmental purchasing has been integrated, including the procurement of energy-saving, high-efficiency equipment.

Commissioning Plan - Documentation

Summary of Your Achievements
A best-practice, project commissioning plan is being implemented that includes the following:
- A Commissioning Authority has been engaged.
- “Design Intent” and “Basis of Design” documentation has been reviewed.

Opportunities for improvement

Include Commissioning requirements in the Construction Documentation.

Develop a Commissioning Plan.

Emergency response plan

Summary of Your Achievements
Division 1 includes the project's environmental goals and procedures with regard to emergency response. The response plan will be in place prior to project start-up to mitigate the likelihood of environmental emergencies occurring on-site during site preparation or construction.

SITE Rating Earned: 78%

This section evaluates the design strategies for optimal use of the site based on information about the site, and in response to the requirements set out at the previous stages of the project delivery process.

Recreation Center achieved a score of 78% on the Green Globes™ rating scale for the site design and enhancement measures to minimize the building's impact on the site.

Development area

Summary of Your Achievements
The building is constructed on an existing serviced site.
The building is constructed on a remediated, previously contaminated land.
The building is constructed on a site with a development density of at least 14,000 m²/ha (60,000 ft²/acre).
The building is constructed on land that is neither a wetland nor a wildlife corridor.
The design accommodates the building's functions while minimizing disturbance to the site's topography, soils and vegetation.

Minimization of ecological impact

Summary of Your Achievements

Erosion control measures are in place in accordance with best management practices (BMPs) to protect the site during construction as well as over the long term.

At least 30% of impervious surfaces will be shaded to avoid creating a heat island.

High albedo materials (reflectance of at least 0.65 and emissivity of at least 0.9) on at least 75% of the roof surface will reflect heat and avoid creating a heat island.

Obtrusive aspects of exterior lighting such as, light trespass and sky glow will be avoided to preserve the nocturnal sky.

Enhancement of watershed features

Summary of Your Achievements

Storm water run-off will be controlled to prevent damage to the building and vegetation, and to minimize run-off into waterways.

A storm water control plan will achieve a 25% decrease in storm water run-off.

Enhancement of site ecology

Summary of Your Achievements

The site-planning documents specify a naturalized landscape using native trees, shrubs and ground cover, with minimal lawn.

ENERGY Rating Earned: 63%

This section evaluates the design strategies to minimize the building's energy consumption using the site's features and microclimate, space optimization, the integration of energy-efficient systems and renewable energy, and alternatives to automobile transportation.

Recreation Center received a score of 63% based on the assessment of best-design practices and energy performance on the Green Globes™ rating scale for energy efficiency.

Building energy performance

Recreation Center achieved a sub-score of 40% for its energy consumption, based on the projection that the building will be 20% more energy efficient than the reference building, with an annual energy use of 6,467,035 kBtu (75.822 kBtu per gross square foot per year).

Summary of Your Achievements

Energy targets are reportedly being met.

Energy demand minimization

Summary of Your Achievements

Space optimization

The floor area has been optimized to efficiently fulfill the building's functional and spatial requirements while minimizing the amount of space that needs to be heated and cooled (i.e. dedicated corridor space is minimized, other circulation is within programed space dedicated zones for heating and cooling can be setback according to...
Opportunities for improvement

Response to microclimate and topography
The building is located and oriented on the site to optimize the effect of microclimatic conditions for heating or cooling (i.e. Long side is oriented south (glazing) short side is west and east. shading devices integrated).

Opportunities offered by the site topography, and design measures – including location and orientation – are optimized to provide shelter against wind and snow deposition.

Integration of daylighting
The amount of daylighting is optimized through building orientation and window-to-wall size ratios (i.e. light scoops in exercise areas. sky lights in athletic gallery integral shading devices).

The indicated visible transmittance (VT) of the window glazing is .

Electrical lighting has been integrated with daylighting, taking into account daily and seasonal variations.

Building envelope
The thermal resistance of the exterior enclosure meets Building Energy Code levels. The reported thermal resistance (R) of the exterior wall is 14.7 and of the roof is 15.24.

Window glazing with a low U value and window treatments that enhance interior thermal comfort are specified.

The indicated U value of the window glazing is 0.33.

There are measures to prevent groundwater and/or rain penetration into the building.

The integrity of the building envelope is optimized, using best air/vapor barrier practices:

- Air barrier materials meet the requirements of local and national building codes
- Drawings provide air barrier detailing between components of the building envelope and around penetrations
- Mock-ups and mock-up testing is required for air and vapor barrier systems
- Field review and testing is required for air and vapor barrier systems

Opportunities for Improvement

Space Optimization
If possible, phase the construction process.

Response to microclimate and topography
Include measures to maximize natural ventilation and cooling or to integrate hybrid ventilation. These might include, operable windows, trickle vents, openings located to catch prevailing breezes, or horizontal pivot windows. Consider the room depth and height ratios and the possibility of open floor plans to optimize cross-ventilation.

Energy metering
Specify the sub-metering of processes which are considered major energy consumers (i.e. any area, system, group or item of equipment that uses over $2,000 worth of fuel per year (typically 20,000 kWh of electricity, 25,000 ft³ of gas, or 2,000 G of oil), such as lighting, motors, hot water heaters, boilers, fans, the cooling and humidification plant, computers and catering facilities. Provide a summary of the instrumentation and controls for the equipment monitoring categories, highlighting the I/O data points. Provide manufacturers’ information on sensors and the data collection system used to provide continuous metering.

Energy-efficient systems
Summary of Your Achievements
The building’s energy efficiency is increased through the use of energy-efficient equipment. The design includes the following:

- Energy-efficient lighting fixtures, lamps and ballasts
- Lighting controls
Opportunities for improvement

Consider integrating the following energy efficient equipment:

- Energy-efficient HVAC equipment
- High efficiency (modulating or condensing) boilers
- Building automation systems
- Variable speed drives
- Energy-efficient motors

Renewable sources of energy

Summary of Your Achievements

The construction documents indicate the integration of renewable energy sources that will supply between 5% and 10% of the total load.

Energy-efficient transportation

Summary of Your Achievements

Public transport/car-pooling

Public transport is easily accessible, within 0.3 miles and with service at least every 15 minutes during rush hours.

Cycling facilities

Changing facilities for building tenants and staff are included in the design.

Opportunities for improvement

Public transport/car-pooling

Include features that will promote car/van pooling, such as sheltered waiting areas and priority parking.

Cycling facilities

Provide safe, covered storage areas with fixed mountings for securing bicycles against theft.

WATER Rating Earned: 44%

This section evaluates the design strategies to conserve treated water and minimize the need for off-site treatment of water.

Recreation Center achieved a score of 44% on the Green Globes™ rating scale for water consumption and measures to minimize its use.

Water performance

Opportunities for improvement

Ensure that the projected water consumption meets the water-use targets.

Water-conserving features

Summary of Your Achievements

Minimal consumption of potable water
The design includes the following of water-efficient equipment:

- water-saving devices or proximity detectors on urinals
- low flush toilets (less than 6 L)
- water-saving fixtures on faucets (4 L/min) and showerheads (9.0 L/min.)
- other water-saving appliances

Minimal use of water for cooling towers
There are no wet cooling towers.

Minimal use of water for irrigation
A water-efficient irrigation system is specified.
The specified landscaping uses plants that are able to withstand extreme local weather conditions, and that require minimal irrigation.

Minimization of off-site treatment
An on-site wastewater treatment system is specified (i.e. on-site rain water treatment for toilet flushing).

Opportunities for improvement

Minimal use of water for irrigation
Specify irrigation using non-potable water (i.e. captured rainwater or recycled site water). If rainwater will be used, ensure that there is a system for catchment, storage and distribution.

Minimization of off-site treatment
Consider integrating a graywater collection, storage and distribution system. Provide design drawings and specifications documentation for the system.

RESOURCES, BUILDING MATERIALS AND SOLID WASTE Rating Earned: 41%

This section evaluates the selection and specification of environmental requirements for construction materials.
Documentation to ascertain the environmental sourcing of materials such as timber and timber products, blocks, bricks, plasterboards, paints etc. used on the project should be available.

Recreation Center achieved a score of 41% on the Green Globes™ rating scale for managing resources through waste reduction and site stewardship.

Systems and materials with low environmental impact

Opportunities for improvement

Specify materials with low embodied energy. Provide evidence that the foundations, floor, structural system (column and beam, or post and beam combinations), roof and envelope (cladding, windows etc.) assembly materials have undergone a life cycle assessment. The specifications should reflect the results of the “best run” life cycle assessment of the building's materials. “Best run” here means the specification with the lowest life cycle impact out of the number of the alternatives investigated. In Division 1, state the project's environmental goals and the general environmental procedures with regards to material selection and specification.

Materials that minimize consumption resources

Summary of Your Achievements

- Building materials with recycled content will be used in the construction (i.e. Steel aluminum rubber flooring carpet acoustical ceiling ).

Opportunities for improvement
Specify the reuse of building materials and components such as, bricks, flooring, paneling, hardware, doors and frames, fixtures, cabinetry, and large-dimension structural lumber (beams and posts) or steel. Highlight reused items in drawings so that they receive special attention. Avoid older components that may contain hazards such as lead paint, older toilets and showerheads that do not meet current water consumption standards, and older windows that do not insulate well. In Division 1, state the project's environmental goals and the general environmental procedures that address reused materials and re-manufactured products. Identify reused and re-manufactured items in appropriate CSI/Masterformat specification sections.

Maximize the use of locally manufactured products and materials (produced within 500 miles of the site) as they generally require less energy for transportation and should therefore be cost competitive over materials from a more distant source. A target of 25% of the total percentage of products or materials should be locally manufactured or be from renewable sources. Documentation of locally manufactured materials should reflect the results of their life cycle assessment.

Where feasible, specify renewable materials such as cork, and bamboo. Before making the final selection, conduct a life cycle assessment using a tool such as Athena™ Environmental Resource Guide or BEESTM™.

Specify that only wood products from certified and sustainable sources will be used. Provide references to local, provincial, federal, and industry certified wood standards, regulations, and requirements. Provide a written confirmation from suppliers regarding the composition of the wood-based panel products and/or certification ((SFI), (FSC), (ATFS), (CSA-SFM)) that the wood products have been monitored from origin to end consumer. In Division 1, state the project's environmental goals and the general environmental procedures that address certified sustainable wood. In Divisions 6, 9, and 12, list at least three different suppliers of certified wood.

Reuse of existing buildings

Building durability, adaptability and disassembly
Summary of Your Achievements
- Building assemblies and materials have been specified for their durability and low maintenance (i.e. metal panels, slate porcelain tile, CMU walls, concrete).
- The construction documents indicate that the design promotes building adaptability (i.e. flexible use of the building, open floorplan with modular structural system).
- The design, and selection of materials and fastenings allow easy disassembly (i.e. face fastened exterior materials, accessible ceiling systems).

Reuse and recycling of construction/demolition waste
Summary of Your Achievements
- The construction documents indicate that a construction, demolition and renovation waste management plan is incorporated into the project. The management of all construction waste will be carried out according to the plan.

Facilities for recycling and composting
Summary of Your Achievements
- The construction documents indicate that there will be 135 ft² of space designated for the storage of recyclable waste.

EMISSIONS, EFFLUENTS AND OTHER IMPACTS Rating Earned: 76%

This section evaluates the strategies to avoid or minimize air emissions, ozone-depleting substances, effluents, pesticides, and hazardous materials. Note that it is assumed that halon-containing materials will not be introduced into the building.
Recreation Center achieved a score of 76% on the Green Globes™ rating scale for emissions, effluents and other environmental impacts.

Minimization of air emissions

Minimization of ozone-depletion
Summary of Your Achievements
The ozone-depleting potential of the refrigerant is greater than 0 and less than 0.05.

Opportunities for improvement
Specify refrigeration systems which avoid use of ozone-depleting substances (ODS) and potent industrial greenhouse gas (PIGGs) or that combine lowest ozone depleting potential (ODP) with the lowest global warming potential (GWP).

Control of surface run-off and prevention of sewer contamination

Pollution minimization
Summary of Your Achievements
Compliant storage tanks
The construction documents indicate that soil and surface water contamination will be prevented.
Integrated pest management
Components, materials and the protection of structural openings are specified to avoid infestation by pests.
Storage and control of hazardous materials
There will be secure, appropriately-ventilated storage areas for occupants to store hazardous and flammable materials.

INDOOR ENVIRONMENT Rating Earned: 78%

This section evaluates the implementation of strategies used to ensure that the indoor environment is healthy and comfortable, in terms of providing a high level of indoor air quality, effective lighting, thermal comfort and suitable acoustic conditions.

Recreation Center achieved a score of 78% on the Green Globes™ rating scale for measures to provide a healthy, productive and comfortable environment.

Effective ventilation system
Summary of Your Achievements
To avoid re-entrainment, air intakes and outlets will be positioned at least 10 m apart, and inlets will not be downwind of outlets.
Air intakes will be located more than 60 ft from major sources of pollution and at least the minimum recommended distances from lesser sources of pollution.
The mechanical systems will provide effective air exchange (i.e. outdoor air intake).
The mechanical ventilation system will have the capability of flushing-out the building with 100% outside air at ambient temperatures above 0°C.

Opportunities for improvement
Specify an indoor air quality monitoring system either as an independent system or as a function of the BAS. Locate the CO₂ monitors in areas with high occupant densities and at the ends of the longest runs of the distribution ductwork.

Specify that personal control over the ventilation rates will be provided for a maximum of four to six occupants, either
through personalized HVAC controls or, for naturally ventilated buildings, operable windows or operable trickle vents.

Source control of indoor pollutants

Summary of Your Achievements
There are measures to minimize the accumulation of moisture within the building and prevent the growth of fungus, mold, and bacteria on building surfaces and in concealed spaces (i.e. location of air and vapor barrier on exterior wall, anti microbial flooring finishes in locker room cement board substrate and tile in all wet areas).
There will be easy access for the air-handling units (AHUs) to facilitate their maintenance and drainage and avoid the accumulation of debris.
There are measures to avoid pollution at-source (i.e. direct exhaust of lockers showers toilets cafe kitchen and recycling room walk off mats at all entrances air intakes on roof).
The domestic hot water system is designed in such a way as to prevent the occurrence of *Legionella*.
Interior materials are specified that are low-VOC emitting, non-toxic, and chemically inert (i.e. carpet non formaldehyde plywood rubber flooring).

Lighting

Summary of Your Achievements

Daylighting
The construction documents indicate that the building provides direct ambient daylight to 80% of the primary spaces.
The building will provide ambient natural lighting, achieving a daylight factor of 0.2 for work places and or living/dining areas requiring moderate daylighting, and 0.5 for well day-lit work areas.
The construction documents indicate that there will be views to the building exterior, or to atria from all primary interior spaces.
Solar shading devices are specified to enable occupants to control brightness and glare from direct daylighting.

Lighting design
Lighting levels will meet those recommended in *IESNA Lighting Handbook, 2000* for the types of tasks to be anticipated in the various building spaces.
There are measures to ensure that the spaces will be free of excessive direct or reflected glare, as defined in *IESNA RP-5, 1999, Recommended Practice of Daylighting*.
The building design integrates local lighting controls related to room occupancy, circulation space, daylighting and the number of workstations in office areas.

Thermal comfort

Summary of Your Achievements
The building design appears to conform to the *ASHRAE 55-2004* for thermal comfort.

Acoustic comfort

Summary of Your Achievements
The building is sited, and spaces within the building are zoned so as to provide optimum protection from undesirable outside noise, and fall within acceptable noise criteria (NC) ranges.
The construction documents specify noise attenuation of the structural systems, and measures to insulate primary spaces from impact noise.
The design provides acoustic controls to meet the acoustic privacy requirements (i.e. partition types specific to adjacent spaces. duct silencers, isolated equipment curbs).
Speech intelligibility requirements are met for the various spaces and activities such as face-to-face
communication and conferences.

There are measures to mitigate acoustic problems associated with mechanical equipment noise and vibration, and plumbing systems.

Opportunities for improvement

Specify the permitted sound level transmission through the building envelope.