6.0 Sustainability

6.1 Sustainability Approach

Sustainability Defined

Buildings in the U.S. account for 36 percent of total annual energy use, 30 percent of raw material use, and 12 percent of fresh drinking water use.* Buildings also produce approximately 30 percent of the nation's annual greenhouse gas emissions, according to the U.S. Green Building Council (USGBC). The degree to which buildings reduce resource use and chemical emissions is connected with the way their component materials, products and systems are designed and built. The informed application of certain design, construction and operational practices can significantly reduce the negative environmental impact of buildings. Following such practices is referred to as sustainable or green building.

The LEED Process

The U.S. Green Building Council (USGBC) is a 501(c)(3) non-profit organization that certifies sustainable businesses, homes, hospitals, schools, and neighborhoods. USGBC is dedicated to expanding green building practices and education, and its LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™.* The USGBC actively promotes the design and creation of buildings that are environmentally responsible, profitable, and healthy to occupy. LEED provides a measure of the degree to which a building creates a sustainable environment and its standards serve to create competition in the building design and construction industry.

LEED Categories and Credits

LEED is a voluntary certification program that defines high-performance green buildings based on standard measurements in five categories: sustainable sites; water efficiency; energy and atmosphere; materials and resources; and indoor environmental quality. A sixth category is meant to encourage innovation in green operations, maintenance, education or exemplary performance in the other five categories. Buildings are awarded points based on successfully meeting the criteria of credits within the six categories, and the number of points a project earns determines its certification level.

LEED Credits Pursued for the Cal Poly Recreation Center

Based on a preliminary analysis, the project team will incorporate the following green building strategies:

- Secure bicycle storage and changing rooms will be provided.
- Preferred parking for alternative fuel vehicles and van pools.
- Roofing material will have with high solar reflectance to reduce the heat island effect.
- Reduction of light pollution to the night sky through appropriately designed and placed exterior light fixtures.
- 30% water use reduction through ultra low flow and flush plumbing fixtures.
- High percentage of energy use reduction.
- 75% of the existing building will be reused in the new construction.
- At least 75% of construction and demolition waste will be diverted from landfill streams.
- 20% of building materials will have recycled content.
- 10% of building materials will be purchased from regional sources within 500 miles of the project site.
- Wood-based products used in the project will be sourced from Forest Stewardship Council certified, sustainably managed forests.
- Low VOC emitting materials such as carpet, paint, adhesives and composite wood will be used on the interior of the building.
- Responsible construction practices will be maintained in order to protect indoor air quality.
- The building will have optimal temperature controls in regularly occupied spaces.
- A green cleaning program and policy will be implemented.
- An education and outreach program will be documented to provide awareness of the LEED rating system and the green components of the building.

* Source: The USGBC website, www.usgbc.org.
* Ibid.

6.2 Sustainability Checklist

LEED-NC

CANNONDESIGN

LEED-NC Version 2.2 Registered Project Checklist
California Polytechnic University, San Luis Obispo
San Luis Obispo, CA

s	?	No			
5	4	**5**	**Sustainable Sites**		**14** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
		1	Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
	1		Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	1		Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development,** Protect or Restore Habitat	1
		1	Credit 5.2	**Site Development,** Maximize Open Space	1
		1	Credit 6.1	**Stormwater Design,** Quantity Control	1
	1		Credit 6.2	**Stormwater Design,** Quality Control	1
	1		Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
1			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
2	3		**Water Efficiency**		**5** Points
	1		Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
	1		Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
	1		Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
5	4		**Energy & Atmosphere**		**17** Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
4			Credit 1	**Optimize Energy Performance**	1 to 10
	1		Credit 2	**On-Site Renewable Energy**	1 to 3
	1		Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
	1		Credit 5	**Measurement & Verification**	1
	1		Credit 6	**Green Power**	1

continued...

Yes	?	No			
8	3	2	**Materials & Resources**		13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
1			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
1			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
	1		Credit 3.1	**Materials Reuse**, 5%	1
		1	Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
1			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	1
	1		Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	1
	1		Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1

Yes	?	No			
10	3	2	**Indoor Environmental Quality**		15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
	1		Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
		1	Credit 6.1	**Controllability of Systems**, Lighting	1
		1	Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
	1		Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

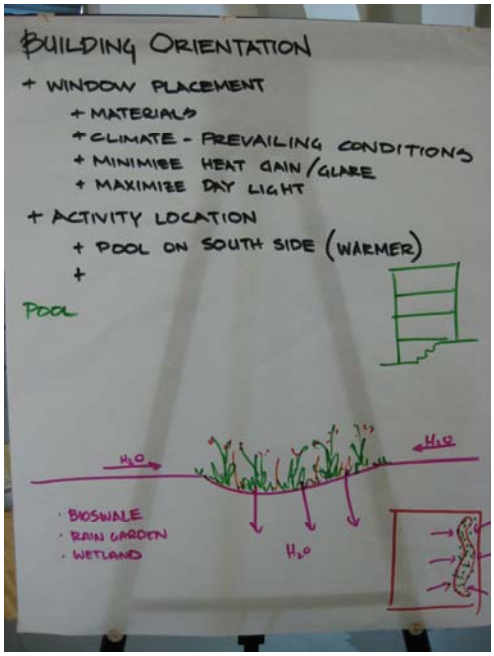
Yes	?	No			
1	4		**Innovation & Design Process**		5 Points
	1		Credit 1.1	**Innovation in Design**: Green Building Education	1
	1		Credit 1.2	**Innovation in Design**: Green Housekeeping Products - "Green Seal" Rating	1
	1		Credit 1.3	**Innovation in Design**: Double Regional Materials (40%)	1
	1		Credit 1.4	**Innovation in Design**: Recycled Content (30%)	1
1			Credit 2	**LEED® Accredited Professional**	1

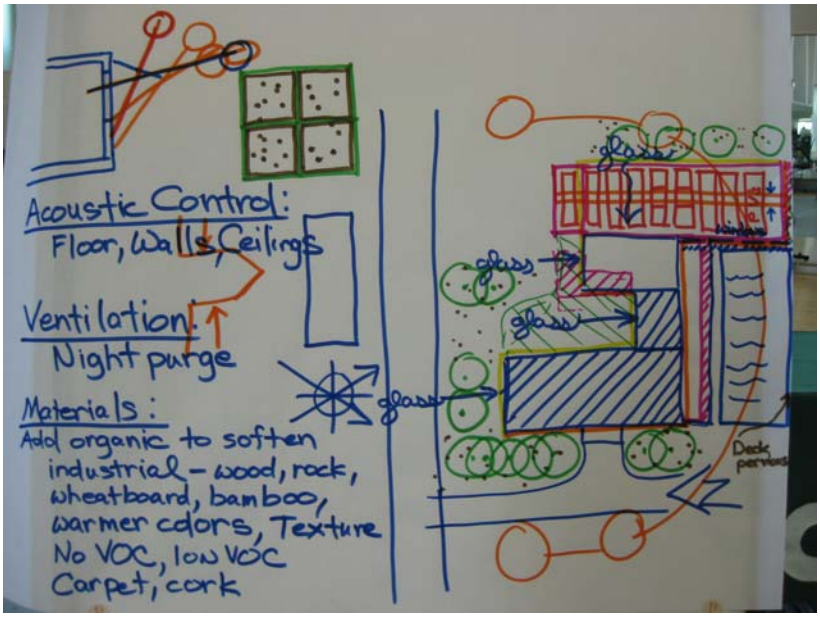
Yes	?	No		
31	21	9	**Project Totals** (pre-certification estimates)	69 Points

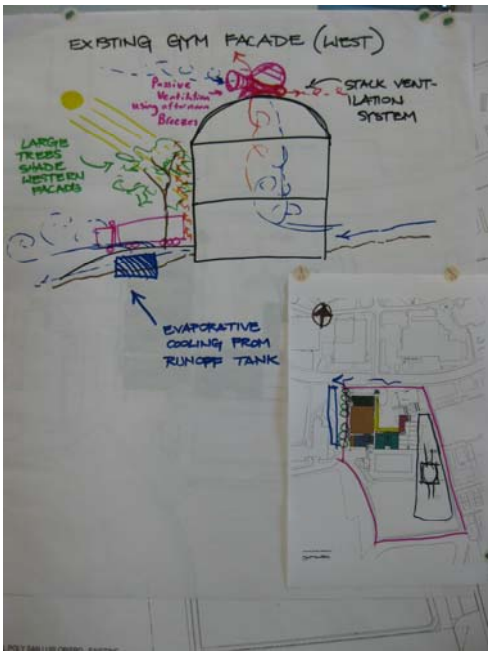
Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

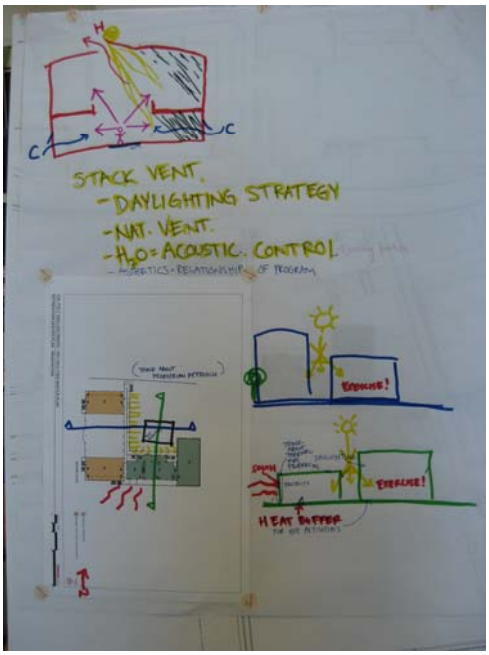
6.3 Sustainability Workshop

The design team held a sustainability workshop at the University to create a dialogue on sustainable building strategies for the project. It was open to students, faculty, and staff of the University. The workshop began with an overview of the project and a presentation on various sustainable elements including site and water, energy and water use reduction, health and indoor air quality, and material selection. A sustainability exercise was assigned and the participants broke into groups to complete the assignment. Below are some photos from the workshop that show the ideas that were presented by the various groups. The narrative at the beginning of this section summarizes the major ideas discussed.






EXISTING GYM FACADE (WEST)
STACK VENT-ILATION SYSTEM
LARGE TREES SHADE WESTERN FACADE
EVAPORATIVE COOLING FROM RUNOFF TANK


STACK VENT.
-DAYLIGHTING STRATEGY
-NAT. VENT.
-H2O=ACOUSTIC. CONTROL
EXERCISE!
EXERCISE!
HEAT BUFFER