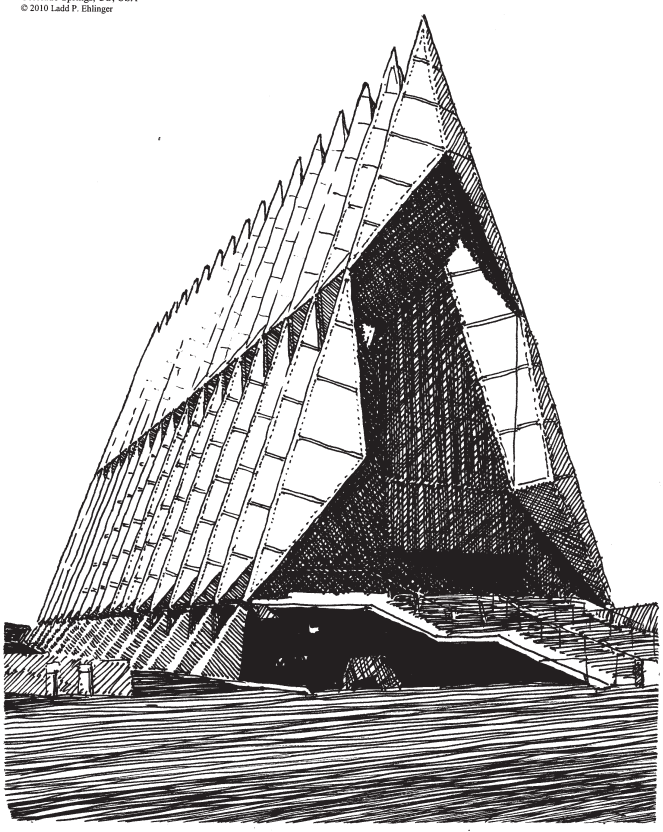
# ARCHITECTURE

EHLINGER & ASSOCIATES FIRST QUARTER 2010

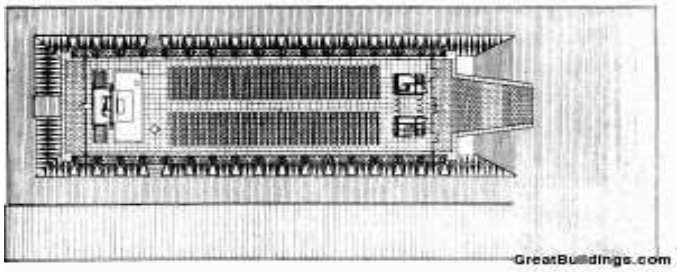
**Cadet Chapel, Air Force Academy**
Colorado Springs, CO, USA

**Cadet Chapel, U.S. Air Force Academy**

The Cadet Chapel at the United States Air Force Academy in Colorado Springs, CO was designed by Walter Netsch, Architect of Skidmore Owings & Merrill (SOM), Architects & Engineers. The construction was begun in 1955 and completed in 1962 by Robert E. McKee, Inc., General Contractors of Santa Fe, New Mexico.

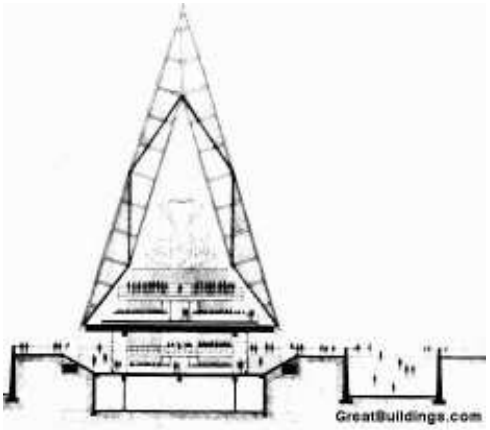
The Chapel is the centerpiece of the entire ensemble of buildings, all of which (except the Chapel) are designed in the International Style of modernism, so effortlessly confected by SOM, a Master of and famous professionally for this genre. Because the Chapel is so expressive it was highly controversial, initially for its contrasting form said to be an ab- straction of a group of fighter jet planes zooming into the sky, and later for its high maintenance because of leaks and other detailing problems. Despite the controversy (or perhaps because of it), the Chapel received the Twenty-five Year design Award from the American In- stitute of Architects in 1996, and was named a Nat- ional Historic Landmark in 2004.




This issue's limited edition print of a sketch by Ladd P. Ehlinger, AIA, is of the front entry, which is from a raised platform midway between the two major floors of the Chapel. One goes up to the Protestant Chapel on the upper floor, and one goes down to the Catholic Chapel and the Jewish Chapel below. There is also an "all faiths" chapel in the basement. One is unsure of the symbolism of this placement: the Protestant faiths are founded on a Judeo-Catholic base? Or Jews and Catholics are less important that Protestants? Or it simply reflects the demographics?

The basic structure of the Chapel is composed of steel tube tetrahedrons sheathed in aluminum plate panels that are spaced one foot apart, and terminate at the top in seventeen spires. The one foot space between each group of tetrahedrons is infilled with stained glass, giving a striking effect on the interior.

The Protestant Chapel is on the upper floor and its walls / ceiling are formed directly by the tetrahedrons and the stained glass infills, which become progressively lighter as they get nearer the altar opposite the entry.. It seats 1,200 Cadets who face a chancel with a multi-colored reredos that is semi-circular in plan and encompasses a 46' high aluminum cross. The pews were




sculpted on the ends to resemble propellers and on the rear the trailing edge of a wing. Above the narthex (entry) is a balcony for the choir with a large pipe organ.

The Catholic Chapel below seats 500 people. Its focal point is the reredos behind the altar which is composed of multi-colored glass mosaics. There are statues here of Carrera marble of the Virgin Mary and the Archangel Gabriel. There is also a choir loft with 100 seats and a pipe organ.

The Jewish Chapel is also below, and is circular in plan with a 42' diameter defined by a vertical grill with glass inserts designed to suggest a tent-like structure. The vertical stanchions of the grill are of Israeli cypress and the floor paving is of Jerusalem brownstone donated by the Israeli Defense Forces.

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## LEED: Green Architecture

I recently received my LEED GA (Green Associate) certification from the USGBC, so now I can officially describe myself as a "Green" architect. LEED stands for Leadership in Energy and Environmental Design, and is a program which provides a standard to rate buildings for their energy performance and respect for the environment.

It is sponsored and managed by the USGBC (US Green Building Council), and is currently a completely voluntary program. Some States, like California, are pushing initiatives which would require minimum LEED certification for all construction, and there are some Federal and other government construction projects which are requiring LEED participation as part of specific projects, or giving extra consideration to selecting firms willing to seek LEED certification for their projects.

The goal of the LEED program is to create sustainability in development, architecture and construction. Defined, Sustainability is seeking means and methods to continue growth without harm, to maintain and enhance the capacity of the environmental system, and to minimize human impact on the earth. It is the embodiment of what LEED's calls its "Triple Bottom Line": Economic Prosperity, Environmental Stewardship, and Social Responsibility. Will a development promote a more efficient environment? Does it promote the well being of the building's owners, employees, and occupants? Will it have a negative or positive impact on the environment?

In order to achieve these goals, LEEDs awards credits for design and methods implemented in seven different categories:

1. Sustainable Sites
2. Water Efficiency
3. Energy & Atmosphere
4. Materials and Resources
5. Indoor Environmental Quality
6. Innovation in Design
7. Regional Prioritization

There is some overlap of these different categories, and if a particular design method does overlap, a credit is often awarded in both of the categories. The standards used are based against "traditional" design and construction methods, and the standards are subject to change in the future, based on the evolution of what is considered standard at the time.

**Sustainable Sites.** The main concern is to determine where to develop, and how to develop a site. The goal is to develop in areas already densely developed, with connection to the community, and access to a variety of means of transportation. Special consideration is given towards remediation and redevelopment of brownfields, as they reclaim land damaged by previous use.

Once a site is selected, then concern is placed towards sedimentation and erosion controls, protecting the local habitat, maximizing open space, stormwater management, reduction of the heat island effect, and reducing light pollution.

**Water Efficiency.** The goals are to reduce potable water usage for landscape irrigation, and reduce wastewater and whole-building consumption, using process and tracking devices. Some techniques employed include using efficient or waterless fixtures, reuse of greywater, and on-site treatment methods.

**Energy and Atmosphere.** The main concept is to reduce consumption of energy and to protect the environment by managing refrigerants in air conditioning systems. This is achieved by commissioning systems and an on going reporting with measurement and verification of performance. Credits are also awarded for use of renewable energy sources, both on-site and off-site; for example, installing photovoltaic cells, or purchasing blocks of green energy from the local utility provider.

**Materials and Resources.** By reusing building elements and materials, recycling materials, using regional materials, and rapidly renewable materials, the intent is to extend the life cycle of the "embedded energy" in new construction, reduce waste, and reduce the environmental impact of new buildings as they relate to materials and transportation of those materials.

**Indoor Environmental Quality.** This section relates to the comfort and health of the occupants of a building, including thermal and comfort control, indoor air quality, and use of daylighting and views. Chemical and pollutants control is a large concern for indoor air quality, and LEED promotes the use of low VOC (Volatile Organic Compounds) materials and furnishings

**Innovation in Design.** This division provides awards for designs which address environmental concerns, but aren't related to other credits. It also provides awards for exemplary performance relating to credits in the other categories. For example, if a project doubles the water efficiency from the base standard for a credit in that category, it may qualify for an innovation credit.

**Regional Prioritization.** Different areas have different environmental concerns, and the local chapters of the USGBC determine what specific categories are of importance to that area. Additional LEED credits can be awarded for giving emphasis to those concerns in a design.

**LEED Certification.** There are four levels of certification that can be achieved for a LEED's registered project:

Certified: 40 points
Silver: 50 points
Gold: 60 points
Platinum: 80 points

There are a total of 110 points available to be earned, but a "perfect" LEED building is likely impossible, as some credits require trade-offs that may make a credit in another category difficult to attain.

**Why Participate?** Even if you don't subscribe to the "green" movement, there are several recognized benefits to constructing a green building. Based on a General Services Administration (GSA) survey of green buildings, they have 13% lower maintenance costs, use 26% less energy, and have 27% higher levels of occupant satisfaction.

Humans are indoors 90% of the time, and productivity can increase up to 16% with enhanced indoor environmental quality, so it's worth consideration .

The initial costs can easily be offset by the reduced maintenance and energy costs, and being "green" is a marketable tool. LEED provides a system which ranks and credits these achievements, along with a certificate that can be prominently displayed.

*R. Perrin Ehlinger*