

CASE STUDY
UNITED STATES AIR FORCE ACADEMY
CENTER FOR CHARACTER AND LEADERSHIP DEVELOPMENT
 COLORADO SPRINGS, COLORADO

ASHRAE ILLINOIS CHAPTER
 EXCELLENCE IN ENGINEERING AWARD 2016

In 1954, Skidmore, Owings and Merrill (SOM) was selected to design a campus for the newly created United States Air Force Academy on a picturesque site abutting the Rocky Mountains. In contrast to this rugged backdrop, the designers created a rigorously modern campus with an iconic chapel at its center. To integrate character and leadership development into the cadet experience and house a think tank for leadership initiatives nationwide, a new space was needed that would elevate these important functions and fit seamlessly into the National Historic Landmark District-designated campus.

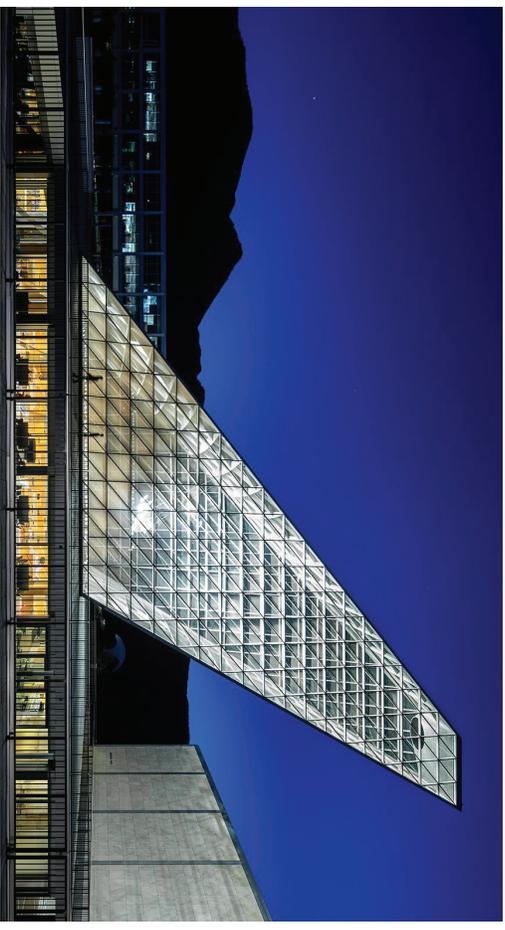
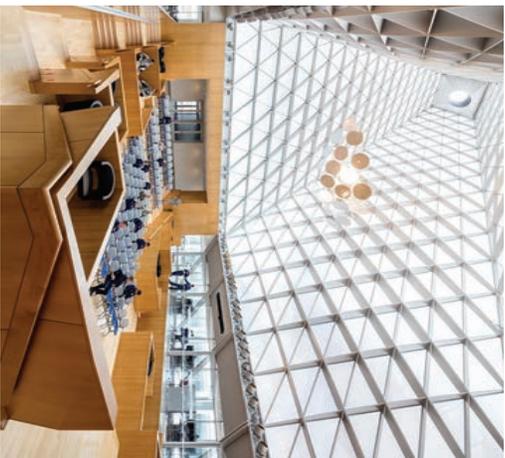
The Center for Character and Leadership Development (CCLD) meets these needs with a design that serves as an architectural focal point for the campus. Optically aligned with with Polaris — the North Star — the CCLD's soaring 105-foot-high skylight structure is a symbolic compass, reflecting the Academy's steadfast commitment to guiding the next generation of military and civic leaders. Constructed of diagonal steel plates composed in a triangular grid, precisely calibrated to resist lateral forces, the skylight is fluid-yet-disciplined anchor for the campus.

Sustainable leadership goals extend beyond building systems to include additional site-wide strategies that reduce the environmental impact of the CCLD. The Center is LEED® Gold-certified (version 2.2), and is designed to achieve LEED® Platinum. To meet these goals and achieve a 37% energy cost reduction, the design team developed integrated building systems that influence all aspects of the building's design, construction, and operation. Radiant heating and cooling, high-efficiency air handling units, and displacement ventilation help significantly reduce energy expenditure.

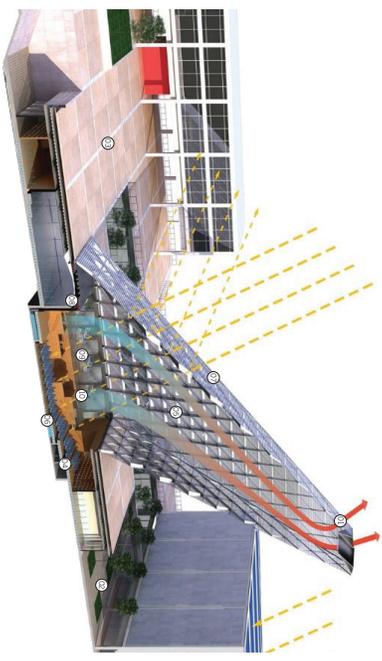
The large plaza area above the CCLD also serves as the roof and is paved with high solar reflectance index (SRI) materials to reduce heat island effect by reflecting sunlight rather than absorbing it. The landscaping is a turf-only scenario — "Air Garden" terraces were seeded with Green Resistor grass seed, and no permanent irrigation system was required.

With the soaring meeting place at its center, the CCLD forms a new place for convening on the Academy campus, ushering in the next generation of leaders with its uplifting, highly sustainable design.

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 SKIDMORE, OWINGS & MERRILL LLP



- 01 **Skylight Natural Ventilation**
 The skylight structure is designed to maximize natural light and provide a solar chimney effect, exhausting through hidden operable vents.
- 02 **Garden Microclimate**
 Turf, turf and foundations reduce heat load on adjacent vertical glazing.
- 03 **High SRI**
 The skylight's high Solar Reflectance Index reflects sunlight instead of absorbing it.
- 04 **Radiant Heating and Cooling**
 Radiant heating and cooling systems provide heat more efficiently than air conditioning and cooling systems.
- 05 **Structural Design**
 Diagonal structural steel fins and direct solar shading.
- 06 **Displacement Ventilation**
 100% outside air is delivered at low speeds near the floor.
- 07 **High Performance Glazing**
 Solar Heat Gain Coefficients are optimized with low-e coatings and frit.
- 08 **Deep Sky Radiation**
 Radiant tubes counteract nighttime temperature swings due to high-altitude deep sky radiation.
- 09 **Efficient Artificial Lighting**
 Energy efficient fixtures, daylight sensors, occupancy sensors, motorized shades.
- 10 **Daylighting**
 Natural light is maximized by the skylight and floor-to-ceiling glazing in classrooms and offices.



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