AMERICAN SCHOOL & UNIVERSITY
SHAPING FACILITIES & BUSINESS DECISIONS

Working Together

David R. Duda and Julia C. Neville
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The movement to provide more sustainable school buildings continues to grow. At the same time, the Sept. 11, 2001, terrorist attacks and recent campus shootings are driving education institutions to construct safer campuses and more secure buildings. Although these movements appear to have little in common, they complement each other in several areas.

The U.S. Green Building Council's LEED program rates buildings for compliance with engineering design principles and development strategies to produce more energy-efficient and environmentally friendly buildings, including:

- Selecting and protecting sustainable sites.
- Limiting water use and protecting water resources.
- Optimizing energy efficiency and protecting the atmosphere.
- Using green building materials to protect natural resources.
- Optimizing and protecting the indoor environment.
- Encouraging design innovation.

So, just how do these strategies mesh with the call for better building security?

Outside in

Where the security risks of a facility warrant (i.e., high-risk animal or medical research facilities), vehicles should be screened for explosives before they can pass beyond a predetermined safe distance from the building perimeter. This “standoff” distance is based on an amount of explosives in a credible threat to attack the facility. This theoretical threat is the design basis threat.

The standoff distance is the distance from the building that must be contained in order to limit the losses to an acceptable level in an explosion. To be effective, this standoff distance must stop the design-basis-threat vehicle before it can proceed through the perimeter.

The perimeter barriers can consist of anything that sufficiently obstructs a vehicle from proceeding through the standoff perimeter. Some compatible strategies suggested by the LEED-NC (v.2.1) Reference Guide to better manage stormwater:

- Construct an earth dike (a mound of stabilized soil) to divert surface runoff volumes from disturbed areas or into sediment basins or sediment traps.
- Excavate a pond area or construct earthen embankments (sediment trap or sediment basin) to allow settling of sediment from stormwater volumes.
- Construct wetlands in the sustainable landscape.

LEED also provides points for limiting site disturbance or exceeding the local green (open) space requirements by 25 percent, or providing green (open) space equal to the development footprint. Providing the needed standoff distance around the perimeter of the site often is seen as a waste of space. However, this intermediate space can be green space, thereby helping to meet LEED certification requirements.

Another way to better manage stormwater is to install a green roof, which stores and uses the rain water that otherwise would contribute to the stormwater supply. Vegetation cools the surrounding area by way of evapotranspiration. It also helps reduce the heat-island effect that is detrimental to humans and wildlife.

A green roof requires multiple layers of material: primer, rubberized asphalt, root block, insulation, filter fabric, growing media and plant material. These layers increase the time, effort and force needed to penetrate the roof.

Lighting the way

LEED strategies aim to reduce energy costs, eliminate light trespass and minimize sky-glow. Effective safety lighting includes adequate and uniform levels of lighting along roads, driveways, parking areas and other places where pedestrian traffic is anticipated. Although it is possible to deal with very low lighting levels by using low-light-capable cameras or infrared light sources, people have a difficult time discerning people or objects in very low light levels, especially where very dark areas are flanked by a glaring light source or where distant people are backlighted.

LEED strategies can be employed to achieve credit for reducing light pollution. Designs can eliminate light trespass from a building and site, and minimize sky-glow to improve nighttime visibility. Concurrently, adequate light quality makes security cameras more effective and provides a sense of safety and security.

Effective exterior lighting design incorporates layers of light. This can be achieved by providing a minimal amount of ambient lighting for pedestrian areas and street lighting. Lighting key features, building facades, trees and other vertical surfaces adds interest and assists in the detection and identification of potential intruders or other hazards such as stairs, street curbs and other obstacles.

Using luminaires that are shielded to reduce or eliminate uplight not only aids in achieving the LEED credit for reducing light pollution, but also reduces glare. Glare obscures images on a security camera and dominates the field of vision, therefore making it more difficult to identify a potential intruder.

A lighting designer can assess the lighting needs for a project, provide recommendations that help in attaining LEED certification, and perform point-by-point calculations that demonstrate the horizontal illuminance values to meet LEED requirements at the property boundary.

LEED recognizes four lighting zones:

- **LZ1:** Intrinsically dark areas, which require the use of full cutoff fixtures.
- **LZ2:** Low ambient brightness, which requires the use of cutoff fixtures.
- **LZ3:** Medium ambient brightness, which requires the use of semicutoff fixtures.
- **LZ4:** High ambient brightness, which requires the use of semicutoff fixtures.

In the air

LEED strategies to improve indoor air quality call for keeping fresh air intakes a minimum of 25 to 40 feet from sources of contaminants. Administrators must be aware of the potential threats from terrorists who might try to introduce chemical, biological, or radiological compounds into a building via fresh-air intakes. For this reason,

air intakes on buildings should be placed at the highest practical level.

Duda, PE, CPP, LEED AP, is associate partner with Newcomb & Boyd Consultants and Engineers, Atlanta. Neville, LC, LEED AP, is an associate with the firm.

On camera

- **Low-light-level day/night CCTV cameras** provide color video during the day and usable black-and-white video at night with as little as 0.01 footcandle (0.1 lux) of light incident on the subject. The latest development is a camera that provides color images with as little as 0.08 footcandles (0.8 lux) of light incident on a subject.
- **Wide dynamic-range cameras** improve the camera's ability to adjust to backlighted situations. Where standard CCTV cameras are backlighted, the automatic iris will adjust to the average image light level, creating bright areas and dark areas in the picture that will be useless for assessment or identification in a security breach. Wide dynamic-range cameras have processing circuitry that adjusts video levels from individual sections or pixels.
- **Infrared spot and flood lights** produce light waves outside the visible spectrum. They can be used in specific combinations to illuminate areas up to 150 feet out, providing high-quality images with no visible light (and no pollution on neighboring properties).
- **Thermal imaging cameras** detect heat rather than visible light. These cameras can detect and image people at great distances (thousands of feet) in complete darkness. They frequently are used to detect people, but lack sufficient definition for identifying specific individuals.