

# CENTRAL COLLEGE WELLER CENTER 9/9/99 revised 9/28/99

## SUSTAINABLE DESIGN FEATURES

Prepared by Russ Ver Ploeg, AIA, Savage-Ver Ploeg & Assoc. Architects

### NATURAL DAYLIGHT:

Providing plenty of daylight inside a building has many benefits. A California study of 21,000 students and 2,000 elementary school classrooms found that "students whose rooms had the most daylight learned 20% faster on math tests and 26% faster in reading than those in rooms with the least daylight".

Increased daylighting also reduces the energy expended by artificial lighting and reduces the cooling required to counteract the heat created by artificial lighting.

### "HARVESTING" OF NATURAL DAYLIGHT at THE WELLER CENTER:

Dimming systems on photocell will read daylight levels and automatically dim the lights to a level that is still acceptable.

Interior walls have glass in them so that daylight from nearby exterior windows can penetrate further into the building. This "borrow light" glazing is common at the interior classroom walls to receive daylight from the clerestory windows at the roof of the atrium The larger classrooms were located beneath the smaller classrooms so they could receive atrium daylight and not be shaded by projecting balconies. See the attached section cut through the building.

Borrow light glass is also provided at certain faculty offices that are adjacent to the waiting areas. These "commons" areas can then share the daylight that the offices enjoy.

### WINDOWS:

The square "punched" windows are the most energy efficient 1" glazed windows made by the Pella Corp. It is their "Insulshield" system which has a total unit R value of 3.33. The low emissivity coating and the argon gas filled space between the glass panes allow this superior R value.

However, in a building this size we are often more concerned about too much solar heat gain through the windows than heat loss – even in the winter. Excessive heat from equipment, people, artificial lighting, etc. can make the ability for glass to block solar heat gain very important. This ability is called "shading coefficient" (SC). Most of the glass on the building has a very efficient SC of 0.46. There is a trade-off however. When the SC is improved, the visible light transmission (LT) is lessened. Since the building is "harvesting" daylight in many ways, a lower LT provides less daylight and should be avoided whenever possible. In the locations where the glass is shaded by sunscreens, the SC is lessened to 0.64 so that the visible light transmission can be kept high at 0.76

### SUNSCREENS:

Horizontal sunscreens are installed on south facing windows. A vertical sunscreen is the most effective orientation for windows that face east or west because the sun can be so low at times. Vertical sunscreens had been planned for the east and west windows but were deleted due to cost. Instead, vertical steel channels are mounted there to symbolize the building's response to the different sun positions. The sunscreens are white to reduce visual contrast against a bright sky. White also reflects more light into the building.

#### PHOTOVOLTAIC SOLAR CELLS:

Solar cells are converting solar energy to electricity for the building. The solar cells and the curved roof shapes that they sit on help to make the 2 primary building entrances more prominent. The slope of these roofs is perpendicular to the sun's 50 degree profile angle at the equinox. Half the year the sun is above this perpendicular to the roof and the other half it is below.

#### RECYCLED MATERIALS:

The 2 most predominate finish materials inside the building are carpet and ceiling tile. They were therefore targeted by the Architect to have as much recycled material as possible.

Several ceiling tile were evaluated for cost, recycled content (pre-consumer waste), light reflectance and noise reduction. Recycled content and light reflectance directly affect energy consumption. Eclipse tile by USG was chosen because it scored high in every category. It's recycled content is 82% and light reflectance is 0.84. However, pre-consumer waste is not as noteworthy as post-consumer waste because it is "off the factory floor" rather than diverted from a landfill. At the time of ceiling tile selection, no manufacturers were found that had any published record of using post-consumer waste in their product.

2 carpet companies were singled out because of their exceptional approaches to recycling among their peers. They were allowed to bid on the Weller Center and the Interface Co. was chosen. The vinyl backing on the Interface carpet is made "from post-consumer and a little post-industrial reclaimed carpet products". The nylon pile of those products is separated from it's vinyl backing. 100% of the Interface backing is made from this reclaimed vinyl.

Other materials in smaller quantities include the vinyl composition floor tile by Mannington Co. Mannington recycles it's pre-consumer waste. They also have a record of post-consumer waste reuse. While it is a minimum of only 5%, this "represents thousands of tons of vinyl scrap per year that would otherwise go to a landfill".

The wall base installed is vinyl rather than rubber because it can be recycled more easily.

#### WILDFLOWER LAWN AREAS:

See the 9/28/99 explanation by Kent Zarley

#### ENERGY CONSERVATION MEASURES BY THE ELECTRICAL ENGINEER:

- A. Dimmable fluorescent on photocell for daylight harvesting.
- B. Occupancy sensors on lighting.
- C. Variable Frequency Drives and Direct Digital Controls
- D. T-8 lamps and electronic ballasts.
- E. Digital monitoring for post-occupancy evaluation of energy savings.

#### CENTRAL COLLEGE WELLER CENTER - ARCHITECTURAL STYLE

Prepared by Russ Ver Ploeg, AIA, Savage-Ver Ploeg & Assoc. Architects 9/28/99

It is difficult to categorize the Weller Center into one "style" because like most buildings, it is influenced by a variety of architectural movements. In broad terms the building is in the International Style. That movement promoted the theory of a universal design. Strictly speaking, it suggested "one single building for all nations and climates". And I would add "all functions". In terms of forms, that style was characterized by walls that appear to be thin and hung like curtains rather than the more traditional load-bearing wall. The large glass wall on the west façade has the industry name of "curtainwall". Another characteristic of that style seen in the Weller Center is the placement of columns away from the building perimeter and especially away from the outside corners therefore requiring cantilevers.

The building takes a significant detour from the International Style in that it is influenced by the natural environment. With the emphasis on bringing daylight indoors, many of the building forms are a response to the sun and what we loosely call "its' movement". The attached drawing shows the movement of the sun in its' extreme high and low positions. The 2 curved roofs reflect that curved solar movement and they also make the 2 main building entrances more prominent. Photovoltaic panels that sit on those roofs are converting solar energy to electricity for the building. The slope of the roofs is perpendicular to the sun's 50 degree profile angle at the equinox. Half the year the sun is higher than this perpendicular to the roof and the other half it is lower.

Another form of the building that followed the function of improved daylighting is the glass wall on the west side of the building. Its' "T-shape" is an extension of the T-shaped atrium that is directly inside this glass. The atrium has clerestory windows in the roof providing daylight to the classrooms and offices there. The larger classrooms were located beneath the smaller classrooms so they could receive atrium daylight and not be shaded by projecting balconies. See the attached section cut through the building. This t-shape that brings light into the first floor rooms is then extruded out the west end of the building to express what is happening on the inside.

Another design feature of the building has historical value. As the college grew and surrounded the railroad, it became a prominent part of the campus – for better or worse. The building sits where the railroad used to be and a piece of the rail now climbs up the side of the elevator shaft. It can hold banners or plants but it also serves as almost a memorial. We wanted to remind people of how the campus used to be and of how the railroad used to play such a critical role in the development of our small towns.

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## CENTRAL COLLEGE WELLER CENTER – WILDFLOWER PLANTINGS

Prepared by Kent Zarley, ASLA, Savage-Ver Ploeg & Assoc. Architects

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The site features a series of wildflower beds along the south edge of the building and in the center of plaza at the flag circle near the building's main entry. The background and use of these beds relate to ecology, resource management, education, economics, and aesthetics.

These wildflower beds, or as we call it "Wildscaping", are a statement relating to the coming wave of sustainable design and how these areas can be ecologically diverse. In the natural landscape, it is the exception when the ground plane has a limited number of species (ie: lawn). In this instance we have reintroduced more than 20 native wildflower species, providing a phenological calendar with nearly continuous bloom from April to November. These wildflowers also have a tendency to have deep and fibrous root systems. As a result, these root systems, over time, will have a tendency to "heal" the soil's structure and fertility, which was destroyed during the construction activities.

As Wildscaping pertains to ecology, it also impacts resource management. This comparison is between a wildflower bed and the plebeian lawn treatment. Lawns are fertilized up to five times each year, clipped about once each week, core aerated about once each year, and commonly irrigated in commercial settings. The resource management beauty of Wildscaping is the fact that you don't fertilize at all, clipped about four times each year; never core aerated, and only need irrigation during germination and during seedling growth. The use of chemicals, gasoline, labor, water usage and the propagation of noise are greatly reduced, making this landscape resource much more efficient in comparison to the traditional turfgrass.

The educational aspect of Wildscaping not only comes from the botanical side, or the economics side, or the wildlife biology side, but also from the aspect of the personal. Reflection, contemplation, personal investigation, and discovery of worldly connectedness are parts of our enrichment fostered by a "natural" space. Students of all ages who can take the time to look, sniff, and touch, gain a deeper appreciation of the nature of this gem, placed within a block of Suburban America.

The economic benefits, as they relate to the insatiable demand for limited resources, should be a significant drive for Facilities Engineers today more than ever before. At our office, we save about \$100 each week in grounds maintenance by using Wildscaping. Although Wildscaping has initial costs comparable to sod, the payback, if irrigation is required, is less than one year. If irrigation is not required it may be a little longer, depending on your pay scale for the people moving your sprinklers.

The one negative aesthetic issue comes up because, culturally, Westerners are more amenable to turfgrass in large unbroken swatches of landscape, rather than the more native and rough look of an ecologically, resource efficient, educational experience.

The five aspects of Wildscaping, noted at the beginning are important to us. We believe that a piece of "green building architecture" requires a statement of sustainable landscape development to maintain a parallel design philosophy.

The base is by Burke Industries, which is one of the few companies that publishes recycling data. It's recycled content (pre-consumer waste) "can be as much as 40% at times".