THE CAYUGA MEDICAL CENTER A Case Study in Landscape Master Planning and Sustainability

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INTRODUCTION

Long-term planning is essential for larger institutions to achieve sustainable goals and visions. To be truly sustainable, individual projects must fit within a larger scope of campus planning. Landscape and site systems such as parking, transportation, pedestrian connectivity, storm water treatment, and human health and well-being must be considered and coordinated.

The Cayuga Medical Center in Ithaca, New York, is an example of effective long-term master planning that takes into account both building sustainability and site sustainability. Master planning for the campus incorporated guidelines such as creating a healing environment, improving wayfinding and site circulation, minimizing impervious surfaces, and increasing stormwater quality. Individual projects were incorporated under the master plan to express the overall vision and create a more sustainable campus with numerous opportunities to view and experience gardens and nature.

The Emergency Department addition received LEED Silver certification and is the first hospital project in New York State to receive LEED certification. Two additional projects are in the process of seeking LEED certification.

KEYWORDS

restorative gardens, sustainable landscape planning, master planning, health care design, LEED

CAYUGA MEDICAL CENTER BACKGROUND

Cayuga Medical Center is a regional facility serving four largely rural counties. The facility houses 204 beds and employs 1,200 health care professionals as well as a medical staff of 200.

The main campus comprises approximately 24 acres of parking, building, and green space as well as over 100 acres of additional open space adjacent to the property. It is located in Ithaca, New York, in the Finger Lakes region on the west side of Cayuga Lake. The site sits on a bluff overlooking the lake and is sloped with a grade change of approximately 100 feet across the entire property. Although it is sited along a busy two-lane highway, the building is separated from the road by topography and is flanked by green space to the north and south, with views to Cayuga Lake to the east.

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FIGURE 1. The outdoor eating area at Cayuga Medical Center is adjacent to the cafeteria. It provides a soothing environment surrounded by plants and can be viewed from inside the building as well.

The hospital's commitment to creating a comprehensive healing environment indoors and out was the overall mission that guided decision making. A belief that landscapes, whether viewed from a window or directly experienced, benefit human health and well-being led to a commitment to develop a variety of garden spaces on the hospital campus.

Trowbridge Wolf & Michaels Landscape Architects in partnership with HOLT Architects has worked closely with the client since 2002 to design the campus master plan and the individual projects within that plan.

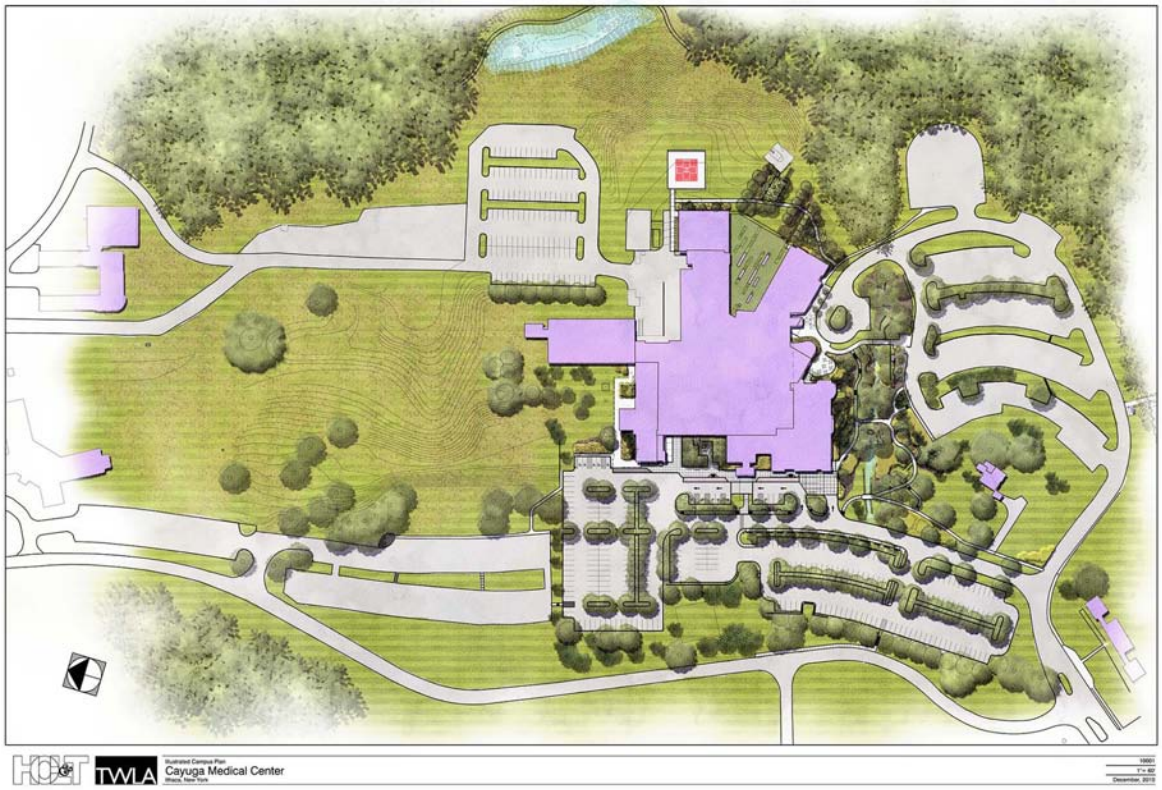
A master plan was first prepared that included a comprehensive and holistic approach to the site, stormwater management, and architecture. Sustainable goals of the master plan pertaining to the landscape included:

- providing restorative spaces and views of the natural environment;
- wayfinding and site circulation improvements;
- the use of porous pavement;
- minimizing impervious surfaces and increasing water infiltration;
- minimizing irrigation needs;
- improving stormwater management.

A number of individual projects have been constructed or are in the process of being designed. The various projects work together to improve the patient experience as well as staff and employee well-being. In each project, Trowbridge Wolf & Michaels Landscape Architects and HOLT Architects worked closely together to create views to beautiful outdoor spaces from indoor spaces, both public and private.

Site changes for Cayuga Medical Center were made to the entire campus, and several additions and renovations were undertaken to the hospital itself. Additions and improvements were phased-in over a number of years. The major projects included an expansion of the education center with basic site work, an addition to the cafeteria with exterior gardens and eating spaces, the creation of a radiation oncology center with exterior gardens and site work, an emergency room addition (also known as the southwest addition) with waiting

FIGURE 2. The site plan for Cayuga Medical Center focuses on creating green space and gardens for human health and well-being and minimizing impervious surfaces.



room exterior garden spaces, and a laboratory addition and green roof. Major landscape improvements included creating a new garden and gathering space to replace a garden that was displaced by the footprint of the southwest addition, designing parking, entry, and circulation changes, and installation of a porous pavement parking lot.

CONSOLIDATING PARKING

One of the initial site requests from the client was for increased parking. Existing parking was haphazard with no assigned lots, leading to a perception that parking was not sufficient. A parking study was undertaken in 2003 to assess the available parking and the need for additional parking. The importance of the parking study was two-fold: First, it established that there was already sufficient parking to meet existing demand and that future demand was not as great as had been anticipated. Second, as a result of the study, the traffic engineers and landscape architects worked together to reconfigure existing parking and to develop guidelines and regulations to better make use of existing capacity.

The existing parking came up to the building edge, leaving no room for green space. The landscape architects reconfigured the parking lots to create buffer zones between the hospital building and the parking lots. Many of these zones are now gardens and courtyards that create an arrival experience as well as views to green space from waiting rooms and public areas. An entry drive was created to separate through-traffic from parking lots and increase pedestrian safety.

A parking system was developed through permitting and signage that separated lots for employees, staff, patients, and doctors. Managing parking resources in this way gave priority to patients and visitors for prime parking spaces while minimizing the need for constructing new parking to accommodate growth on campus. The site design included thoughtful development of information needs, such as clear signage for hospital patrons. In addition, a bus stop, bicycle racks, and pedestrian walkways were instituted to help visitors and patients navigate safely around the campus and adjacent properties.

The master parking plan also considered current and future building projects so that parking could be developed systematically rather than haphazardly. Lastly, the parking study allowed for a realistic assessment based on need rather than perception and saved the institution the cost of building unnecessary parking. Limiting construction of additional parking resulted in a reduction in impervious surfaces and accompanying improvement in stormwater quality. The institution was able to improve its parking system through policy change rather than construction.

STORMWATER MANAGEMENT: MINIMIZING IMPERVIOUS SURFACES AND FILTERING STORMWATER

Overall, there was a campus-wide strategy to increase water infiltration and reduce impervious surfaces. A number of strategies to manage stormwater and improve its quality were incorporated into the master plan. These include the use of porous pavement, the construction of a bioretention basin to store and filter stormwater, reduction of impervious surfaces and an increase in pervious surfaces, the construction of a detention pond, and the conversion of mowed lawn and building footprint areas to meadow.

Porous Asphalt Parking Lot

The proposed new building additions would have displaced some of the existing parking. The parking study revealed that a minimal amount of additional parking would be necessary to accommodate parking due to building construction and a ten-year projected growth for the hospital. A parking area with approximately 106 spaces was created to fill that need. While adding parking spaces added impervious surfaces, every attempt was made to identify strategies for minimizing the increase. Sixty-nine spaces, over two-thirds of the additional parking spaces, were constructed in a porous pavement lot. The remaining section of parking was constructed as conventional asphalt because of its location directly uphill of the hospital building and the risk of storing water underground close to the Emergency Room.

A unique constraint for this project was convincing the client, engineers, and local municipalities that a porous pavement lot could be successful in Ithaca's cold climate. In addition, no local contractor or asphalt plant had ever produced or installed this type of pavement. This issue was addressed through a concentrated effort in educating the project team, the client, and the local government about how porous pavement works and what the benefits are. Specific case studies from similar climates were presented. During construction, Trowbridge Wolf & Michaels worked directly with the local asphalt plants since this was the first batch locally produced. In addition, a high level of site supervision and communication was provided during the installation of the porous pavement lot. Working with the contractor to assure that they understood and embraced new installation materials and techniques added to the success of the project.

The porous pavement parking lot cost slightly more than a conventional lot. Additional grading and base material were needed to provide an infiltration area that is typically deeper than that required for a conventional asphalt profile. The approximate additional 10–12 inch depth of base course could easily be offset by the ability to eliminate the need for conventional stormwater structures and piping.

The porous pavement requires less plowing and needs less salt applied compared to a conventional lot, thereby contributing to improved stormwater quality as well as lower maintenance costs. The lot should receive vacuum cleaning every five years or so over the course of its lifetime but the porous asphalt lot is still new enough that it is functioning well and has not yet received this treatment.

Because it is the first porous pavement parking lot installed in the greater Ithaca area, several local educational workshops have included site visits to the campus to see the lot first-hand.

No-Mow Meadow

A no-mow meadow was created on the site of a former building adjacent to the main hospital. The meadow provides open space and habitat for wildlife while serving as a temporary placeholder for possible future development on the campus. The meadow, which was hydroseeded, cost approximately as much to install as traditionally mowed lawn. However, the reduced cost of mowing this area increases the long-term savings. The meadow requires less to maintain over its life cycle, with mowing only once a year. This is significantly less than a typical tree-and-lawn campus landscape, where mowing can occur as often as twice a week throughout the growing season. Because of the reduced maintenance, the hospital has experienced savings in fertilizer, gasoline, and labor.

Bioretention Basin

A bioretention basin was created in the northwest area of the site. The basin is planted with moisture-loving grasses and shrubs. The plants were chosen for the ability to withstand submerged conditions as well as for their aesthetic qualities. The bioretention basin holds and treats stormwater from parking areas before it enters the municipal system.

FIGURE 3. The bioretention basin holds and filters stormwater from parking areas.

A retention pond was also constructed on campus. It is surrounded by meadow and handles stormwater quantity and quality needs for the campus. It was designed and sized during the master planning phase to accommodate future building expansion.

GREEN ROOFS

The incorporation of green roofs into building additions has resulted in increased pervious surfaces on the campus and the accompanying improvements in stormwater quality. In addition, green roofs provide garden space as well as views from the interior of the building.

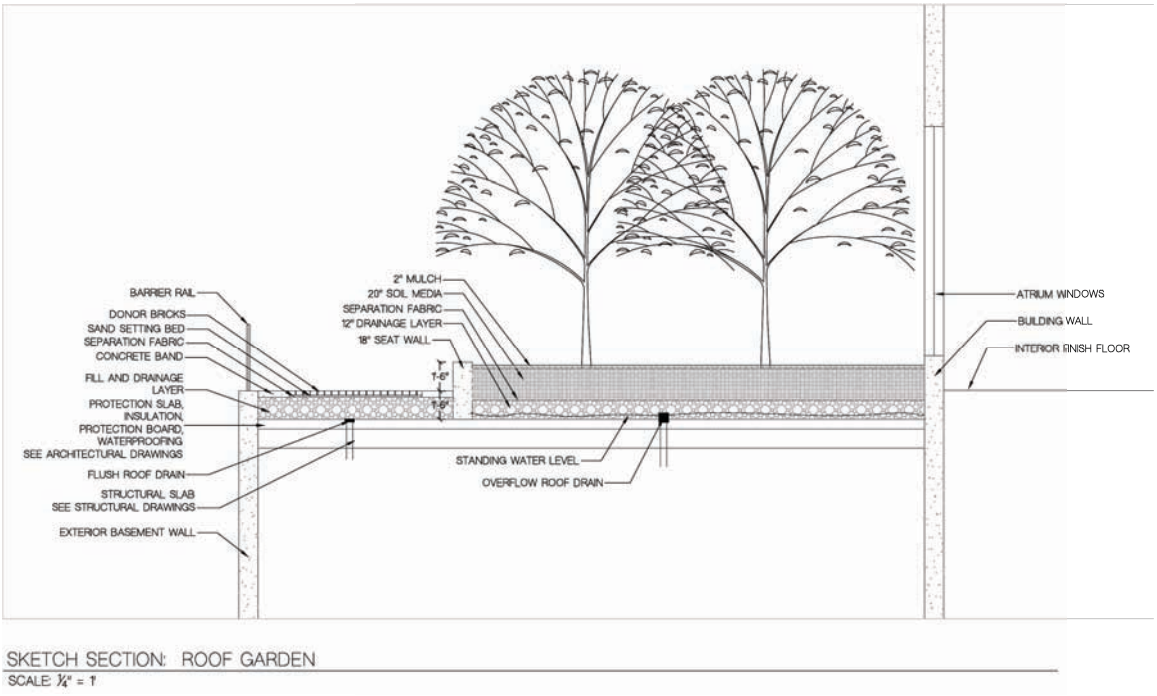
Intensive Green Roof at the Radiation Oncology Center

A 2,400 square-foot addition to the hospital was designed to provide services to the latest medical technology in radiation services while providing views of nature. Care was taken to allow a calming arrival experience from the parking areas to the building entry. The center's entrance is separated from the main hospital entrance giving a quieter, more private quality. Two large planted areas flank the entry to the covered walkway that leads from the parking lot to the roof garden located at the entrance to the double story patient lounge. The walkway entry gardens are planted with River Birch and Oriental Spruce as well as Spiraea and Juniper. At the entry, tall glass windows provide views from the lounge outside to the roof garden and sky.

The roof garden is a 700 square-foot intensive green roof designed with a deep profile that is able to accommodate larger plants. A 12-inch drainage layer was designed to hold standing water after rain events so that the larger plants can be irrigated by the captured rainfall. A layer of separation fabric divides the drainage layer from the 20 inches of soil medium. A two-inch layer of mulch was applied to retain soil moisture and minimize weeds. This deeper soil profile and accompanying rainwater-holding basin allowed larger plants and even small trees to grow without the need to install a traditional irrigation system. The planting plan included Redbud trees (*Cercis Canadensis*), Autumn Joy Sedum (Sedum x "Autumn Joy"), Compact Burning Bush (*Euonymous alatus* "Rudy Haag," Magic Berry Snowberry (*Symphoricsrpos x doorenbossi* "Magic Berry") and Compact Yew (*Taxus baccata procumbens*).

FIGURE 4. The Green Roof at the Radiation Center provides green space as one enters the building and can be viewed from the waiting area inside the building.

FIGURE 5. The green roof at the Radiation Center was designed with a deeper profile than a typical green roof so that larger plants and small trees could grow.



The Laboratory Addition Green Roof

The site of the proposed Laboratory Addition lies between two patient wings on the east side of the hospital. Currently it is a planted garden area with small trees and shrubs. The two wings of the building contain patient rooms and public spaces that house waiting areas and elevators. Views from the hospital rooms are controlled by the saw tooth geometry of the building with views out to the east. The waiting areas enable full views across the project site and out across the landscape to Cayuga Lake and the hills beyond.

The roof of the Laboratory Addition was designed as an extensive green roof to be viewed from patient room and waiting areas. Superimposed over the green roof are long linear skylights that establish a geometric framework on the roof. The lines of the skylights will carry through the design of the roof and the new site work below. Rectangular gravel strips play off the linear nature of the skylights and provide textural contrast with the plantings. Three cultivars of low-growing, drought tolerant sedums were chosen that could survive and thrive in the shallow planting medium: Sedum acre "Aveum" (Golden Stonecrop), Sedum spurium "Fuldaglut" (Fuldaglut Two Row Stonecrop), and Sedum sexangulane (Tasteless Stonecrop). The sedums bloom at different times to maximize visual interest. Chives and crocus were also planted to provide further variety in texture, bloom time, and color. Once established the plants will not require any irrigation and will form a very low, uniform vegetated field. Because the 4-inch deep planting medium is not hospitable to many other plants, few weedy materials will be able to survive, limiting the necessary maintenance of the roof planting. A hose bib will be required on the roof to help with the establishment of the plants and for other building maintenance needs.

This project is in the process of seeking LEED certification.

FIGURE 6. The site plan for the green roof at the Laboratory Addition maximizes views from inside the hospital and continues the green roof geometry on the ground plane in gardens and seating areas.

GARDEN SPACES

Restorative Garden

In line with the hospital's goal of creating a healing environment inside and out, several garden spaces were created on the campus, the largest of which is a restorative garden. Located near the main entrance and the Emergency Department, yet offering seclusion from the building and parking, the garden is a restful place that is used by patients, staff, and visitors. A creek that wanders through the site originally had a concrete culvert. As part of the design, the concrete was covered with slabs of stone, creating a small waterfall that blends in with its surroundings. A stonedust path meanders through the garden and is lined with shrubs, perennials, and understory trees such as amelanchier. Plantings were chosen that maintain a compact, defined shape and so need less maintenance. Special care

FIGURE 7. Cayuga Medical Center is surrounded by extensive gardens of native and adapted plants.

FIGURE 8. The waterfall at the Restorative Garden.

FIGURE 9. The restorative garden is designed to provide quiet space surrounded by nature just steps away from the entrance to the Emergency Department.

was taken to preserve existing mature tress during the construction process. Several mature beech trees and sugar maples, for example, lend the garden a more established presence. Bluestone benches are placed at points along the path.

The centerpiece of the garden is a bluestone and stonedust patio. The patio takes its form from bluestone seating walls and is outfitted with picnic tables. The animal sculptures incorporated into the garden are cast-stone pieces created by artists commissioned by the Works Progress Administration during the Depression. Re-use of these campus artifacts offers a glimpse into the history of the hospital and the United States and provides playful visual appeal within the garden.

Garden at the Southwest Addition

The primary purpose of the Southwest addition was the creation of a welcoming main entrance to the facility. HOLT architects designed the two-story addition, which also houses a new pharmacy, Emergency Department and Intensive Care Department. The double height entry lounge is filled with natural light and has views to the garden outside. The garden provides benches for seating and is screened from the mobile medical unit entrance by a green wall constructed of green screen and planted with Five Leaf Akebia.

Cafeteria Garden

A large outdoor dining space was created adjacent to and accessible from the renovated hospital cafeteria, named The Garden Café. The paved patio space provides tables and chairs and is surrounded by lushly planted garden beds that provide interest in all seasons. The dining space is designed to provide a quiet and restful connection to nature and can also be viewed from inside the cafeteria through an expansive, curved wall of glass that mediates the indoor/outdoor relationship. The plants in the garden, such as chives, catmint, and allium, were chosen to have a relationship with the sensory qualities of food.

FIGURE 10. The Garden Café outdoor dining space provides views from inside as well.

Laboratory Addition Garden

Garden space on the ground plane is also planned for the future Laboratory Addition. The linear geometry of the skylights and the roof garden serve as an organizational tool that extends below to the landscape at grade. Rows of trees will complement the vertical lines radiating from the roof garden, with each row representing a different species. In the spring *Pyrus calleryana* "Autumn Sunset" (Autumn Sunset Callery Pear) and *Cornus kousa* "Milky Way" (Milky Way Kousa Dogwood) will bloom with white flowers in the spring, and *Cercis Canadensis* (Redbud) with pink flowers. *Acer truncatum* "Pacific Sunset" (Pacific Sunset Painted Maple) will turn bright orange in the fall while a row of *Ginkgo biloba* will glow with bright yellow leaves and provide textural interest.

Bluestone benches are set in linear rows beneath the trees, creating an area for respite or conversation. There are also picnic tables for staff, visitors, and patients. The ground plane of the seating area is paved with pea gravel, which is porous and contributes to improved stormwater quality.

FIGURE 11. The Garden Café patio is surrounded by nature.

Large planting beds further contribute to the garden quality of the project and create visual appeal from both the ground plane as well as from inside the building from patient room and waiting areas. The beds will be densely planted with native and adapted plants that are appropriate to the site and climate and will require minimal maintenance. The plants will not need irrigation once they are established. Minimal weeding or pruning will be necessary. The beds will provide habitat for birds, butterflies, and beneficial insects.

The planting plan consists of a limited palette of shrubs, grasses, and perennials, densely planted and naturalistic. Specified shrubs include *Hydrangea quercifolia* "Snowqueen," *Myrica pensylvanica* (Northern Bayberry), *Rhus aromatica* "Gro Low" (Gro Low Fragrant Sumac), *Spiraea x bumalda* "Anthony Waterer" (Anthony Waterer Spiraea), and *Vibunum plicatum f. tomentosum* "Doublefile" (Doublefile Viburnum). Perennials include tall grasses such as *Panicum virgatum* "Rotstahlbusch" (Rotstahlbusch Switchgrass) and *Miscanthus sisnensis* "Morning Light" (Morning Light Maidenhair Grass), and flowering plants such as *Echinacea purpurea* "Twilight" and "Coconut Lime" (Twilight Coneflower and Coconut Lime Coneflower), *Monarda didyma* "Jacob Kline" (Jacob Kline Bee Balm), *Rudbeckia fulgida* "Goldsturm" (Black Eyed Susan), and *Rudbeckia hirta* "Prairie Sun" (Green Eyed Susan).

ALTERNATIVE TRANSPORTATION

The master plan creates connections to public transportation and other forms of alternative transportation. Tompkins Area County Transit serves the facility and connects it to downtown Ithaca, which is located just a few miles away, as well as to other destinations. Bus shelters are located both in front of the facility as well as along the road.

The master plan includes pedestrian connections around campus so that the entire site is linked and accessible. Smaller garden spaces are linked through the trail system that circles the property, and the campus trail system connects to a larger regional trail system, known as the Black Diamond Trail. Bicycle racks are located at main entrances to the building.

As part of the Laboratory Addition project, a porous asphalt walk will create a connection where none previously existed, from the garden space and new staff entry to the staff parking lot.

CONCLUSION

The client began the process with the goal of incorporating sustainable principles into its planned expansion. Having initially contracted for a single project, however, the client understood that further projects could conflict or compete, thereby reducing the potential to be sustainable. By encouraging the client to think long-term, to develop goals, and to manage the property as a whole, Trowbridge Wolf & Michaels Landscape Architects and HOLT Architects were able to incorporate individual projects into a broader sustainable vision. The resulting campus efficiently maximizes existing site parking, reduces impervious surfaces, provides pedestrian circulation, and includes a trail system as well as links to public transportation and alternative transportation. At the same time, it provides space for possible future expansion. Perhaps most important, the hospital is surrounded by garden space and incorporates views to nature from inside the building wherever possible to provide multiple opportunities for interaction with restorative spaces and improved human health and well-being.

LEED POINTS

The Southwest Addition receives the following points for LEED Silver certification:

Sustainable Sites – 6 points

- Site Selection – 1 point
- Alternative Transportation, Public Transportation Access – 1 point
- Alternative Transportation, Bicycle Storage & Changing Rooms – 1 point
- Reduced Site Disturbance, Development Footprint – 1 point
- Stormwater Management, Treatment – 1 point
- Landscape & Exterior Design to Reduce Heat Islands, Roof – 1 point

Water Efficiency – 2 points

- Water Efficient Landscaping, reduce by 50% – 1 point
- Water Efficient Landscaping, No Potable Use or No Irrigation – 1 point

Energy & Atmosphere – 12 points

- Optimize Energy Performance – 10 points
- Additional Commissioning – 1 point
- Ozone Depletion – 1 point

Materials & Resources – 3 points

- Building Reuse – 1 point
- Local/Regional Materials – 1 point
- Certified Wood – 1 point

Indoor Environmental Air Quality – 10 points

- Increase Ventilation Effectiveness – 1 point
- Construction IAQ Management Plan, During Construction – 1 point
- Construction IAQ Management Plan, before Occupancy – 1 point
- Low-Emitting Materials – 4 points
- Indoor Chemical & Pollutant Source Control – 1 point
- Thermal Comfort, Comply with ASHRAE 55-1992 – 1 point
- Thermal Comfort, Permanent Monitoring System – 1 point

Innovation & Design Process – 2 points

- Innovation in Design, 1.1 – 1 point
- LEED Accredited Professional – 1 point

PROJECT TEAM

HOLT Architects
Trowbridge Wolf & Michaels Landscape Architects
SRF and Associates Traffic Engineering and Planning Consultants
T.G. Miller Engineers