

## SITES Case Study: Carroll A. Campbell Jr. U.S. Courthouse, Greenville, South Carolina



North Façade (Photo © Tim Hursley)

The Carroll A. Campbell Jr. U.S. Courthouse is located at 250 E. North Street, Greenville, South Carolina 29601. Completed in 2021, the 193,000 square foot building includes private underground parking, six floors of office and courtroom space and seventh floor mechanical space.

The project budget was \$105 million, of which \$2,016,000 represents the budget for the landscape design and site portion. The facility houses seven courtrooms and chambers for nine judges, along with offices for the U.S. Marshals Service, the U.S. Probation and Pretrial Services, the U.S. Attorney's Office, and a Federal Public Defender.

The project team includes: Owner: United States General Services Administration Atlanta; Architect: HBRA Architects, Chicago, IL; Civil and Landscaping: Seamon Whiteside & Associates; Structural Engineering: MMSA, Inc.; Blast Design Consultant: Applied Research Associates; Mechanical/FP/HVAC: MECA, Inc.; Associate Architect: LS3P Associates, LTD.; Electrical Engineering: Burdette Engineering, Inc.; Lighting: Claude Engle Lighting; Acoustical Consultant: Jaffe Holden Acoustics; LEED and SITES Consulting: Crozier Architecture, LLC.; Contractor: Brasfield & Gorrie LLC; Commissioning Agent: Jacobs Engineering Group.

This Federal Courthouse was designed and constructed to earn LEED BD&C LEEDv4 certification at the Gold level and SITESv2 at the Silver level. The following outlines measures taken to meet specific SITES credit requirements in the ten SITES credit categories as well as performance benefits, cost comparison of sustainable vs conventional strategies, lessons learned and maintenance and monitoring to promote long term sustainability.



*Aerial View of Formal Lawn and Entry Plaza*

### **Challenges and Solutions:**

Many of the design challenges for the site stemmed from its urban location and relatively small site size compared to building size. It was a challenge to create habitat and incorporate sustainable features with limited open space and a significant number of existing utilities and other items requiring significant coordination.

The site is very compact but does allow for the 50-foot minimum GSA required security setback at all sides of the building from the street. This allows for a relatively generous amount of pervious earthen areas to help reduce site runoff and reduce heat island effects in this urban area. The landscape edges are defined either by curbing/landscape walls with landscaped horizontal surfaces, such as the north courtyard, or partially enclosed with fencing of varying heights for security.

Providing sustainable storm water management on site via bioswales and infiltration versus traditional hard pipe methods was an important priority for the project. This was challenging due to the previous use of the site as an urban parking lot, which resulted in highly compacted soil. The solution to this challenge was to remove the poor-quality soil and replace it with a highly efficient bioretention soil mix. The development of multiple infiltration depressions across the open space of the site, allowed for infiltration across the site, rather than only at a single depressed area, thus maximizing the available open space for sustainable stormwater management.

Another challenge was creating a sustainable native landscape in an urban environment. Due to the nature of the project, a higher level of finish was required for the landscape than an unstructured native planting scheme could provide. The solution was to strike a balance of using native and regionally adapted plant species to create a landscape that was more structured adjacent to the building and more organic in the larger open spaces. The urban condition made it impossible to forgo irrigation entirely, but the use of recycled rainwater via a rainwater system for irrigation, allowed for the irrigation of the landscape with the elimination of (a significant reduction in) potable water use. The incorporation of a pollinator garden allowed for the creation of a valuable habitat for regionally significant species, despite the generally small size of the site. All

of these solutions allowed for the creation of a sustainable native landscape despite the small size and urban nature of the project site.



*Before: Surface parking lot*



*After: Completed construction*

### **Sustainable Features:**

The project is located in downtown Greenville, South Carolina on a previously developed site and employs existing infrastructure. This siting approach minimizes the environmental impact of construction by reusing existing, adjacent utilities and roadways. The public and employees have access to a centrally located building that is pedestrian friendly. This high-density neighborhood offers over eight existing diverse businesses such as restaurants, retailers, daycare centers, and medical offices. Bicycle facilities include bike storage for visitors and employees within 200-yards of the building entry, at least 10 diverse uses, access to bike trails and employee changing rooms with showers.

No public parking is located on the site. City owned parking structures exist in close proximity to this facility. The reduced parking footprint includes one level of secure, partially underground parking in support of building functions and offers parking to a select group of employees. 5% of parking spaces are reserved for low-emitting, fuel efficient and electric vehicles to help reduce pollution from automobile usage, a key contributor to climate change and poor air quality. These spaces are located the closest to building entrances as an incentive and reward for driving electric vehicles and “green” cars as defined by the ACEEE.

Low impact development (LID) features utilized on this project are designed to retain the 95% storm intensity for Rainwater Management. Designers incorporated LID/Green infrastructure techniques to retain water on-site. A rainwater harvesting cistern meets the irrigation requirements for the project and a bioswale area allows water infiltration and plant uptake. Both practices provide harvested rainwater; what the plants do not intake can be utilized for ground water recharging through percolation. The bioswale system will require monitoring, because unlike traditional stormwater structures, living growing plants play a role in the system. The health of the bioswale plants is important to ensure the stabilization of bioswale soils and the prevention of erosion, so these plants will need to be monitored. The bioswale overflow pipes will also need to be monitored in heavy rain to ensure the pipe inlets are not blocked by debris or natural material.

Open space makes up 33% of the site, and of this 43% is vegetated. The open space to the north of the site is a pedestrian oriented turf area with seating opportunities to accommodate casual outdoor social activities. Aesthetically pleasing vegetation is integrated throughout the open space to provide year-round visual interest as well. The open space to the west and south of the site is a native garden space designed to provide year-round visual interest at both the street level

and to building occupants. The native garden also has pollinator and stormwater functions. The open space at the southwest corner of the site is a pedestrian oriented area that provides seating and social opportunities and serves as a social node and connection to the surrounding city as well as a viewing space for the native garden.

To reduce glare and development impact from lighting on nocturnal environments, exterior lighting is designed to prevent light trespass over site boundaries and into the night sky while still maintaining a safe pathway for pedestrians and automobiles. Exterior lighting fixtures are full cut-off by design such that no more than 5% of the total initial designed lumens that are emitted 90 degrees or higher from nadir. To reduce operational costs and energy consumption, exterior lighting adheres to and exceeds all ASHRAE 90.1 watts per square foot and watts per linear foot requirements. All non-emergency interior lighting has automatic controls to limit the amount of light trespass from the building during non-business night hours. Exterior lighting operational costs contribute to an estimated 66.58% savings.

Water shortages often affect the southeastern states. Rainfall shortfalls due to climate change affect availability in states without chronic access issues. Potable water consumption can be reduced with minimal extra project cost using high efficiency indoor plumbing fixtures. The installation of high-efficiency, ultra- low flow, and flush type fixtures, coupled with sensors and automatic controls resulted in a projected 35% water savings when compared to fixtures meeting minimum code compliance.

Landscape irrigation practices in the United States consume large quantities of potable water. This landscape design includes native and adaptive plants to reduce the need for irrigation. Condensate and rainwater are collected in an underground storage tank to reduce the need for potable water by 100%.

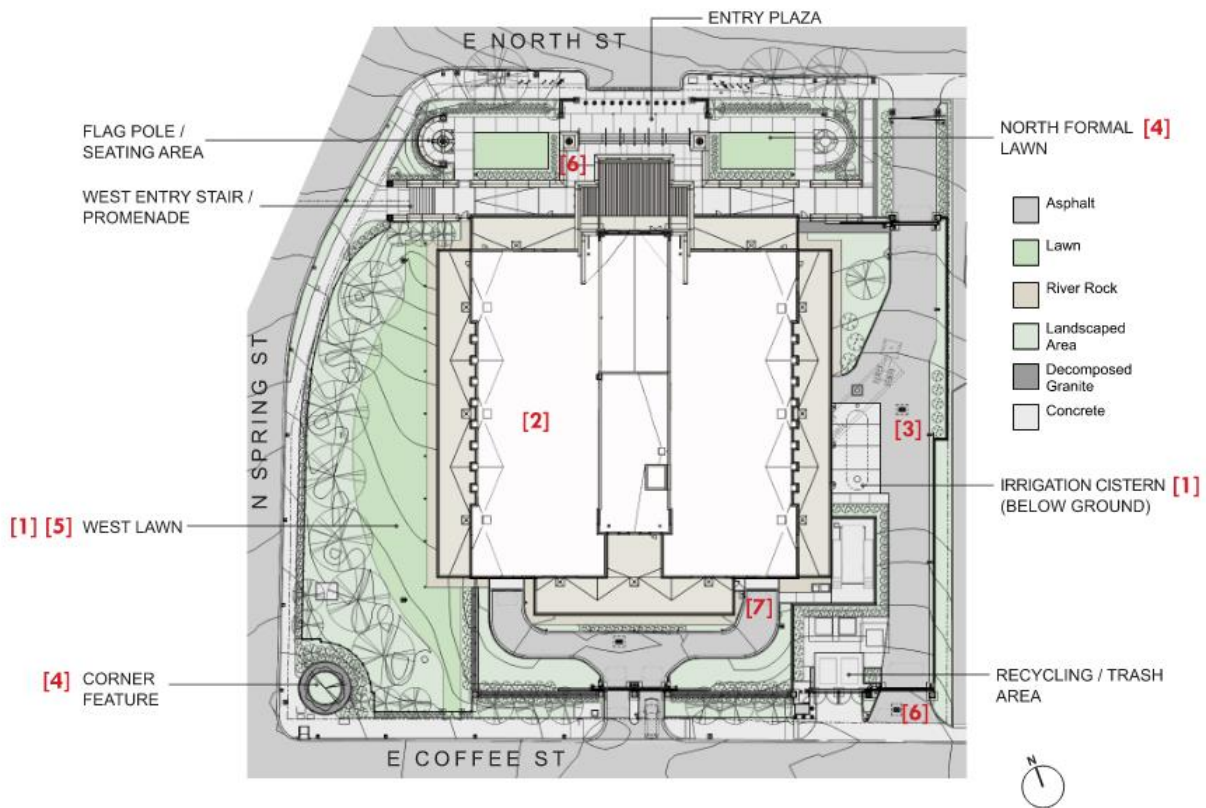


*Installation Photo of the Irrigation Cistern*

The facility maintenance personnel manage a recycling program inclusive of central and personal recycling containers for paper, cardboard, plastic, glass, and metals which are strategically located to prevent a significant portion of the solid waste stream from entering local landfills. Construction waste, inclusive of concrete, metal, wood, and cardboard, was collected and sorted to prevent more than 75% by weight from entering local landfills.

Energy savings of 26% are projected in this 3A Climate Zone due to an integrated design approach that includes high efficiency heating and cooling equipment, efficient building envelope and LED lighting. Products and materials for which life-cycle information is available and supports environmentally, economically, and socially preferable life-cycle impacts were specified, installed, and tracked. An exemplary credit was earned with at least 40 different permanently installed building materials with Environmental Product Declarations (EPD) sourced from at least five different manufacturers.

Enhanced Acoustical Performance was selected as a LEED Pilot credit and a SITES Innovation credit outside the SITESv2 rating system. Exterior noise sources were designed and located so as to not exceed credit compliant noise levels. Noise sources include building equipment HVAC equipment, transformers, and traffic. A 24-hour noise assessment study was conducted.



**Examples of Sustainable Site Features:**

Feature locations are marked with [#] on the site plan above

**Use an Integrated Design Process:**

An integrated design team was formed to develop and participate in a collaborative design process. Project sustainability principles and performance goals were developed and incorporated into a program plan. Site users and stakeholders were identified. Construction oversight was provided by a team member other than the contractor. All team members were involved in the development of a site maintenance plan.

***Manage Precipitation on Site and Beyond the Baseline [1]:***

To encourage natural filtration on the Courthouse site, a rain harvesting cistern and bioswale area have been installed. These strips improve water quality by limiting the volume of runoff generated and encouraging natural filtering through plant material and allowing stormwater to infiltrate into the ground. The project which will capture 95% of the site runoff and contaminants.

***Reduce Urban Heat Island Effects [2]:***

The overall site of the Courthouse project contains 42.54% of vegetated open space. This was achieved by minimizing the building footprint and strategic placement of hard-surface areas such as concrete and asphalt parking areas and sidewalks. The open space serves many purposes: it provides large open outdoor area for Employees and Visitors to enjoy as well as potential habitat space for many types of insects, small animals, and birds.

***Minimize Exposure to Environmental Tobacco Smoke [3]:***

The GSA provides a safe indoor air environment for all residents and visitors by offering a smoke-free facility. The GSA has adopted a Smoke-Free Policy to protect building occupants from exposure to secondhand smoke. Smoking and all other tobacco use is prohibited in the building. A designated smoking has been established on the site.

***Divert Construction and Demolition Materials from Disposal:***

The contractor diverted 1544 tons of on-site generated construction waste from the landfill. This totals 78% of the waste developed during construction.

***Minimize Pesticide and Fertilizer Use [4]:***

To reduce plant stress, decrease negative effects on human health and to minimize or eliminate synthetic pesticide and fertilizer use the project O & M plan provides measures to eliminate “weed and feed” type fertilizers, establish fertilizer buffer zones, include safety requirements for storage, use and fertilizer spills, and detailed record keeping.

***Restore Soils Disturbed by Previous Construction [5]:***

In support of healthy plants, biological communities, water storage, and infiltration, the restoring of soils in this previously disturbed development was accomplished by restoring soils to a minimum of 12” and more at tree plantings. Additionally, testing was conducted of organic matter, compaction, and soil chemical characteristics.

***Reduce Outdoor Energy Consumption [6]:***

Greenhouse gas emissions were reduced by minimizing energy consumption and costs associated with site use and operations. Outdoor lighting was selected for a 60%+ reduction from baseline energy use from similar type products.

***Encourage Fuel Efficient and Multi-modal Transportation [7]:***

The GSA provided an underground parking area to accommodate building functions and tenant security. With 72 parking spaces provided minimum local zoning

requirements have been reduced by 81.59%. 5.5% of available spaces are identified as preferred and reserved spaces to encourage carpooling. The use of low-emitting and fuel-efficient vehicles is encouraged to reduce air pollution and land development impacts (from automobile use). To find out how green your vehicle is or if it meets these requirements, check out the American Council for an Energy-Efficient Economy's website for their annual ranking of green vehicles ([www.greencars.org](http://www.greencars.org)).

***Use Recycled Content Materials:***

The Courthouse project is constructed with many materials containing recycled content. Postindustrial products installed include fly ash in concrete, drywall, acoustical ceiling tiles and grid, steel, miscellaneous metals, insulations, roofing, and mulch. The building and grounds are calculated to contain 40 different materials with recycled content.

**Environmental, Social, and Economic Performance Benefits:**

There were many benefits of pursuing a SITES sustainable design for this project. The prominence and visibility of the project as a federal courthouse in the heart of downtown Greenville, make it an excellent tool for display of and education about sustainable design practices. Many of the sustainable features of the site are directly adjacent to public sidewalks in the heart of downtown, so the project will be highly visible and provide great opportunities to expose the employees, site visitors, and the larger public to sustainable design practices.



*Public Bike Racks*



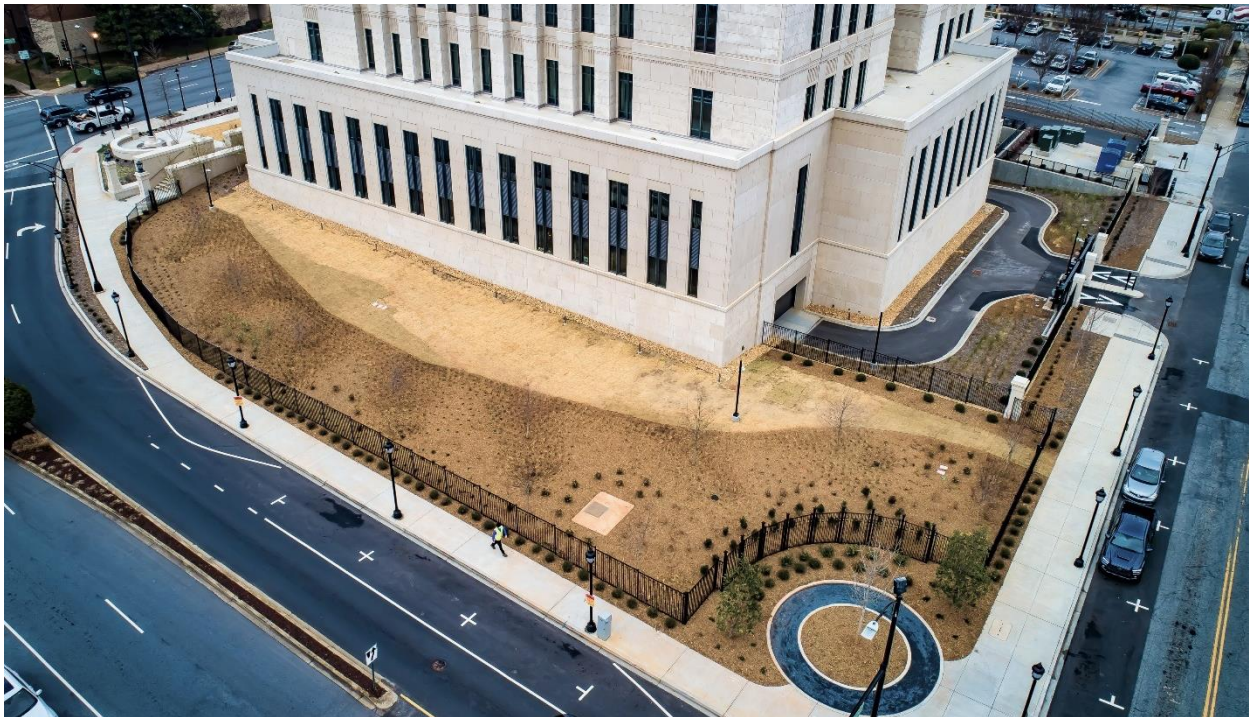
*Examples of Native Plantings*

Another benefit to the sustainable design is the positive impact the project has on the local environment. Sustainable stormwater management keeps the site from adding to the flooding and stormwater management challenges the City of Greenville is currently facing and provides an example of how urban projects can be designed to deal with stormwater on site in a sustainable way. The introduction of pollinator supporting species will support the vegetative health not only of the site but also of the surrounding city.

One lesson learned from this project is the value of considering and incorporating sustainable design from the earliest stages of the project. Exploring sustainable design options as

you develop the early phases of the design, allows sustainability to be integrated into the project on a foundational level, rather than being tacked on as an afterthought. By pursuing sustainable design from the outset of the project, low impact design goals can inform the design process and shape the design from the beginning. Coordination amongst the GSA/CMa/CMc/Integrated Design Team throughout the process was useful to identify, track, and complete SITES credits and establish the initial desired outcomes for the sustainability of the site.

### **Cost Comparison of Sustainable vs. Conventional Strategies:**



*Aerial View of West Lawn and Bioswale*

Sustainable strategies sometimes have a higher up-front cost, but a lower cost to function over time. This is true of the graywater irrigation system installed on site. The upfront cost of installing the cistern and rainwater capture system is higher than the installation of a traditional irrigation system using potable water, but over time, the system saves money by using rainwater rather than requiring the purchase of city water.

The use of native plants, on the other hand, has a comparable upfront cost to non-native plants, and should result in lower maintenance costs over time, as the plants are adapted to the local area and should require less use of fertilizer, pesticides, etc.

The installed cost for the landscape and site portion, including costs for site demolition, landscape/plantings, infrastructure (cistern, paving, fencing/walls, lighting etc.), and earthwork/site preparation was \$2,016,000, or roughly 2.5% of the total cost of the project. Some cost comparisons for sustainable vs conventional features include:

- Had conventional construction been used rather than the cistern and bioswales,  $\pm 7,500$  cf of underground fill for quality, with sand filter, or approx. \$90,000 for traditional stormwater quality management. This compares to the \$127,000 installed cost of the



bioswales. The slightly higher upfront cost is justified by the long-term benefits of the bioswale for plant longevity, stormwater treatment, and irrigation water savings.

- The cost of plant material was roughly equivalent for native and non-native species. While the material costs are similar, cost savings of native plantings comes in that there should be less maintenance required for native plants (i.e., less fertilizer, pesticides, irrigation etc.) Installed cost for the plantings was \$147,500.
- The use of LED fixtures vs. Conventional for site lighting results in a 66% reduction in energy use per year (5K vs. 15K). This is a savings of roughly \$1,000 per year.
- The cistern irrigation system will save approximately 393,000 gallons per year of potable water being needed and the additional load on the sewer system, for an approximate annual savings of \$600.

### **Site and Landscape Maintenance:**

Maintenance and monitoring are being provided by a third-party GSA approved contractor who is responsible for promoting long-term sustainability for the building and the site. The one-year contract for this vendor includes a green cleaning policy describing the purchase guidelines for low VOC and recycled content consumable products, trash collection and recycling, cleaning and maintenance procedures, equipment selection, and staff training. HVAC, plumbing, and lighting maintenance includes energy and water consumption monitoring. The framework for ongoing maintenance was established in coordination with the SITES Maintenance Plan and the GSA's maintenance contract. Specific focus with relation to SITES will be to establish best practices and activities which will help achieve 10-year desired outcomes, as well as identify the specialists / certified professionals required for site maintenance tasks. Long-term plans for Landscape Maintenance, Integrated Pest Management (IPM), Waste Stream Management Plan, etc. for the Greenville Courthouse are established to achieve these sustainable goals.

For additional information about this project visit the GSA website at:

<http://gsa.gov//CampbellJrUSCHGreenvilleSC>

For information about LEED and SITES visit the United States Green Building Council homepage at: [www.USGBC.org](http://www.USGBC.org).

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2022