SERVICE CREDIT UNION HEADQUARTERS CASE STUDY

Eric Svahn[1]

INTRODUCTION

Creating a new headquarters is a unique opportunity to celebrate mission, optimize operations, and invest in the future of an institution. This article describes the process of conceptualizing, designing, and constructing a new world headquarters for Service Credit Union in Portsmouth, NH, that achieved LEED Gold certification.

As the headquarters to a not-for-profit institution, the project needed to embody Service Credit Union's core mission of service to its members. From the beginning, sustainable design was embraced as a methodology to increase employee retention and productivity, lead to more self-sufficient operations, and ultimately provide value and benefit to all its members.

The new world headquarters for Service Credit Union takes advantage of smart design strategies, green materials and technologies, while planning for the future. It creates an iconic corporate image for the forward-thinking credit union with quality and integrity as standout characteristics of the building design.

KEYWORDS

smart design strategies for a new corporate headquarters, healthy and productive workspaces, site rehabilitation, LEED-ND, renewable energy sources

ABOUT SERVICE CREDIT UNION

Service Credit Union was founded in 1957 on the former Pease Air Force Base, Portsmouth, NH, and has since grown to be the largest credit union in the state. In addition to serving residents in nine out of the ten counties in New Hampshire, Service Credit Union is also a recognized military credit union with branch offices on sixteen U.S. military installations in Germany. Approximately two-thirds of its members are in the military, assigned across the U.S. and the world.

Due to expansion and continual increased assets, creating a unified headquarters with state-of-the-art facilities became a priority for Service Credit Union more than a decade before undertaking this project. Prior to the new building, Service Credit Union's corporate and service center operational offices were located in separate 1960s buildings with limited space. In direct support of Service Credit Union's strategic plans of advancing service to its members and improving the work environment for its staff, Service Credit Union developed a new building initiative to support its planned growth.

[1]AIA, LEED AP BD+C, www.gundpartnership.com.

In 2009, Service Credit Union commissioned architects GUND Partnership LLC to design its new 100,000 sq. ft. headquarters to accommodate its present operational requirements and expected future growth over the ensuing 10 to 15 years. From the start, sustainability was embraced as adding value to the project.

Upon completion of its new headquarters in 2012, the credit union employs more than 600 staff across all its locations. In addition to its Portsmouth headquarters, Service Credit Union has 38 branch offices, 16 of which are located in Germany. Offering continual 24-hour, seven-day-a-week service, the credit union anticipates significant growth with potential future branch expansion in the state and overseas. The new building immediately housed 100 employees, bringing 60 new jobs to the credit union. Significant room for expansion is provided, supporting the credit union's plans to create an additional 40 new positions over the next five years.

The program of the new building called for a full service call center, community rooms, conference rooms, and departmental and executive offices. Additional staff amenities include a cafeteria, gallery, gym, and three community rooms that are open for use by local city government, not-for-profit organizations, and other community-based associations.

Service Credit Union identified the following operational and design goals for the new building project:

- increased operational efficiency benefitting employee performance and productivity;
- integration of a new technologies supported by a flexible infrastructure that will enable future changes;
- increased security;
- energy efficient building operations that provide long-term cost savings;
- employee health benefits;
- new corporate branding defined by the building image and green design concepts;
- space to host corporate and public events in support of local community groups;
- public museum to showcase the history of the credit union; and
- new staff amenities provided on site.

GUND PARTNERSHIP'S DESIGN METHODOLOGY

GUND Partnership is a nationally recognized architecture and planning firm based in Cambridge, MA. The firm maintains a diverse practice encompassing a broad range of building types, including corporate headquarters, academic buildings, performing and visual arts centers, cultural destinations, athletic and civic centers, multifamily housing, hotels, resorts, and single family residences.

The firm's work is characterized by a highly responsive and sensitive approach to context and a commitment to strengthening the fabric of the built environment. The firm does not have a preconceived architectural style or signature, but partners with clients to express mission, goals, and culture in new ways.

With each commission, small teams lead a rigorous process of discovery and exploration to uncover the fundamental nature of the architectural challenge at hand, and develop sustainable design solutions that are functionally responsive, strengthen community, advance the clients' missions, and provide long-term value. Early in the design process, project teams identify green design strategies, materials, and systems that respond to the unique context of each project.

DESIGN APPROACH

Site Selection

After a multi-year site selection process, Service Credit Union secured a 17.1-acre former brownfield site in Portsmouth for its new headquarters. This site is located on a major business access corridor approximately four miles from downtown Portsmouth and less than a mile from Service Credit Union's previous corporate and operational offices. This proximity enabled Service Credit Union to keep some infrastructure in place in the existing offices, while also maintaining full service operations during construction and move-in.

Providing a symbolic proximity, the site is also 1.5 miles from Portsmouth International Airport at Pease, the former Pease Air Force Base where Service Credit Union was founded. Pease is a public-use joint civil-military airport with the second longest runway on the east coast, and is base for a military air refueling squadron. Sitting directly under the flight path of planes descending to Pease, the visual impact of the large tanker and transport planes is a unique and dramatic feature of the site and inspired our design approach. This flight path helped shape the building geometry and many of its details.

The apparently clean and level site was formerly home to a large truck salvage yard, and before that a colonial-era family farm. The owner conducted an ASTM Phase II site assessment, which identified limited site contamination. In the soil remediation process, several buried storage tanks and drainage structures were discovered and properly remediated. Existing structures were demolished and crushed on site for reuse. Rehabilitating the site to a clean and productive space was embraced because it enabled Service Credit Union to demonstrate its commitment to environmental stewardship in the region.

FIGURE 1. Aerial view of the site c. 1978.

Several old graves from the family farm were relocated as part of the site rehabilitation process. As most of the site was stripped and leveled when it was repurposed as a junkyard, the graves sat undisturbed on one of the last remaining spots of original topsoil and elevation of nearly eight feet. Much of the mature trees, surrounding vegetation, and grade level was preserved when the graves were relocated. This area was turned into a focal feature of the landscape—now known as the knoll.

Located in the City of Portsmouth's new "Gateway District," the new headquarters building was the first project designed and constructed under the new zoning ordinances. The intent of the new Gateway District Zoning Ordinances is to develop a more civic approach to the city and enhance the visual character and environmental quality along existing developed commercial corridors. Seeking to remove a typical 100 ft. setback, the ordinances reward more favorable building placement along the street edge with greater building height allowances. For example, dimensional standards set a typical building height allowance at 40 ft.; however, placing a new building within 45 ft. of the street edge is rewarded with a maximum 60 ft. of building height. This promotes smart growth and density and limits the "big box developer syndrome" with a building in the center of the site surrounded by a sea of parking at the street edge.

Taking advantage of the zoning ordinances, the new building was positioned at the northern corner of the site, adjacent to Lafayette Road (U.S. Rt. 1) to create a prominent street presence and provide room for landscape features and staff amenities. Parking was located

FIGURE 2. Initial site sketch.

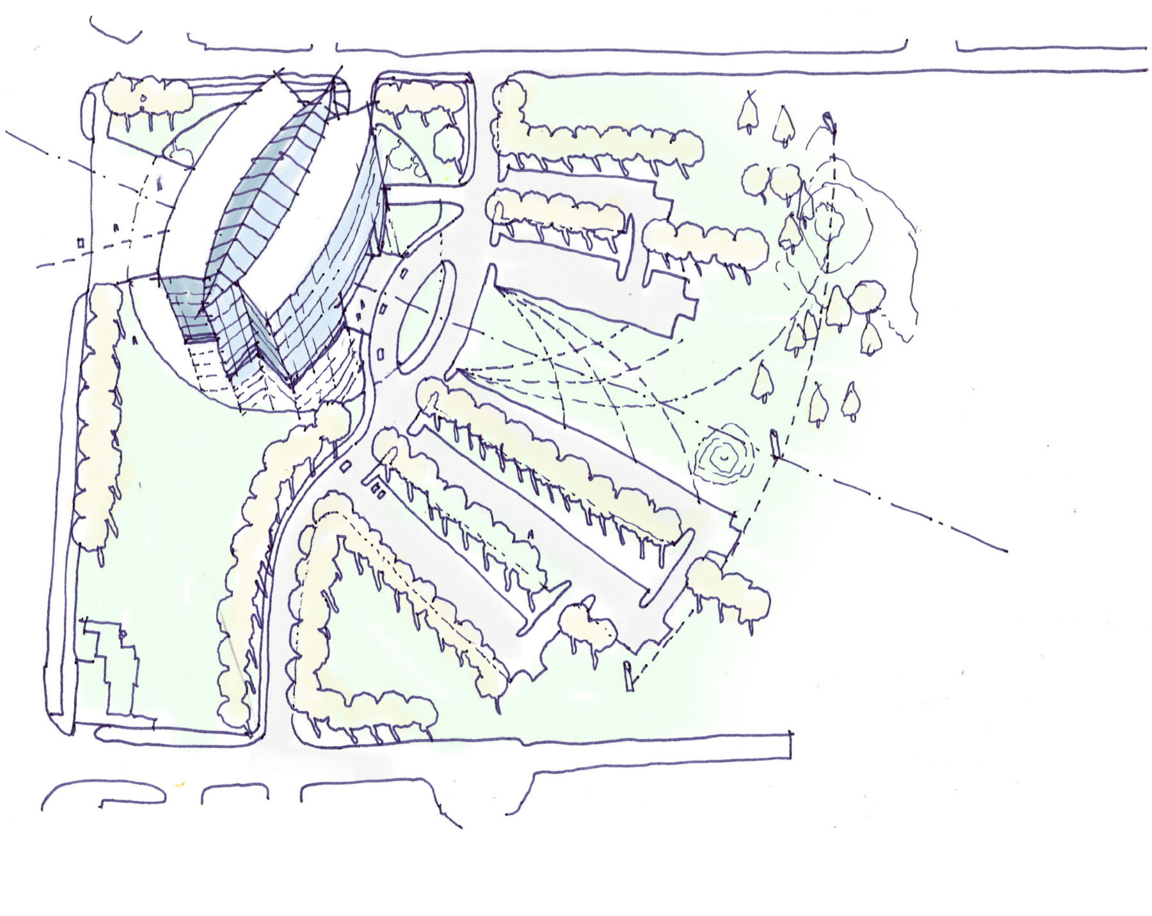
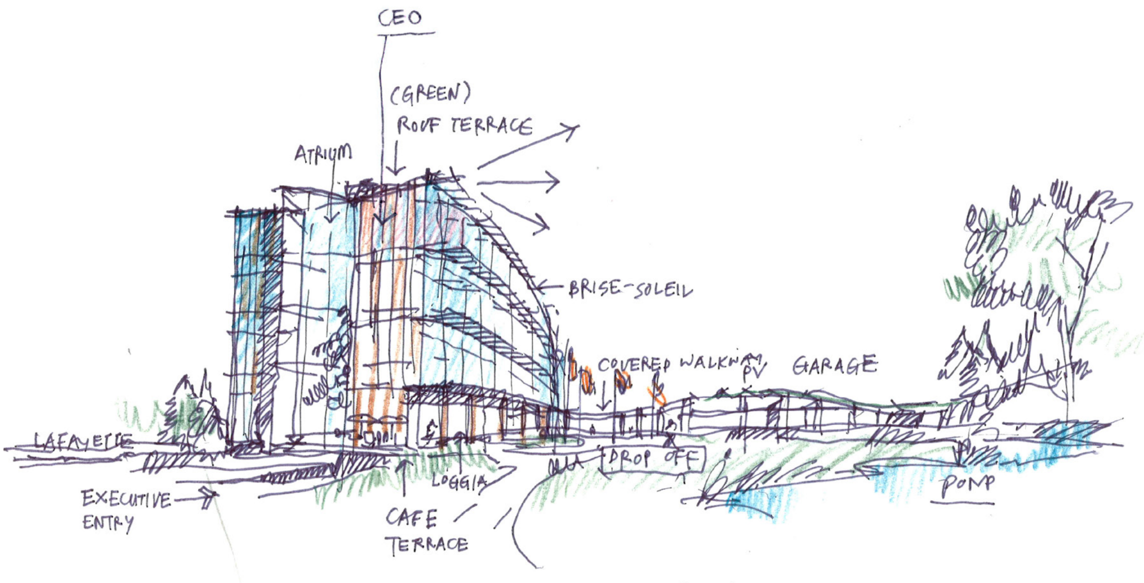


FIGURE 3. Initial design sketch identifying green design opportunities.



within the site, away from the street edge, and broken into distinct, non-rectilinear sections separated by rain gardens. Walking trails and landscape amenities were envisioned across the site to encourage staff to engage in the landscape features. We really wanted to take advantage of the site's generous size and create a space that staff would use during lunch breaks. Unlike typical office parks, we envisioned the landscape as more of a public park with walking trails, benches, and landscape features.

As the first project in the Gateway District, meeting the new requirements provided some challenges and several amendments to the ordinances were granted to the project. Although projects had to demonstrate the ability to meet the LEED for Neighborhood Development requirements through submittal of a LEED-ND scorecard, the project site failed to meet some of the urban density prerequisite credit requirements due to its location outside of the downtown district. The zoning board granted an amendment to this and a second amendment for additional mechanical appurtenance height of an elevator override enclosure to enable elevator access to the roof terrace. This allowed a key design feature of creating exterior space in a desirable location.

Ample space for growth and expansion is provided on the site's 17.1 acres. The site master plan, developed as a campus setting, identified future development strategies for a parking garage and potential locations for additional buildings as needed with future growth of the credit union. Again, taking advantage of the new zoning ordinances, all required parking spaces were designed and engineered, but only half of the required spaces were constructed. The intent was to only provide spaces for the initial occupancy load.

Creating healthy, productive workspaces for all employees was a primary design goal, and key to this concept is providing natural light to all work areas. The initial building parti envisioned a four-story curved building with a sky-lit atrium on one side in a typical central core spec office building layout. As the design advanced, and with the desire for the building workspaces to be as dramatic and corporate as the exterior building image, the typical office floorplate was altered to create a central atrium. The typical solid core was moved to the ends

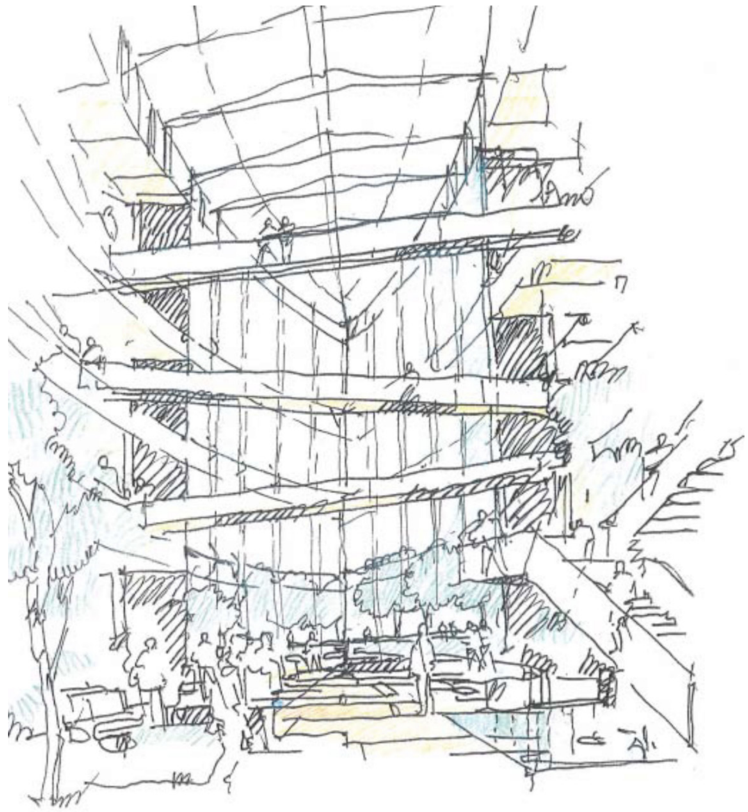


FIGURE 4. Sketch of the central sky-lit atrium commons.

of the floor plate to open the atrium. Work spaces are provided on both sides with enclosed offices at the edges of the floorplate. This provides all employees access to natural light and views, and a unique transparency was provided across the building.

The sky-lit atrium was envisioned as a dynamic commons where all staff are visible to each other, offering all staff a shared identity and sense of community. A grand stair connects all floors, creating a clear circulation path that is visible from all floors. Informal lounge spaces and breakout areas along the circulation path form natural hubs for gathering. Adding to this activity, the elevator core is positioned in a central location within the atrium. A glass enclosure reveals the vertical circulation and provides light transmittance.

Green Design Analysis

GUND Partnership encourages integrated and collaborative thinking by all members of the project team. A sustainable design charrette was conducted as an early step in the design process. The charrette provided the opportunity to brainstorm ideas, create a collective set of goals, and most importantly, set expectations for the project. The outcome of this charrette included a defined set of sustainability goals documented in a USGBC LEED-NC scorecard, giving each stakeholder a better understanding of his/her responsibilities to achieve project opportunities.

Service Credit Union's forward-thinking CEO and President, Gordon Simmons, wanted the new building to be "off the grid and off the pump." Influenced by his frequent trips to Service Credit Union offices in Germany, Simmons was very interested in taking advantage of the latest European technologies to capture renewable energy. The Fire station in Heidelberg, Germany, designed by Peter Kulka, was among the precedents from which he drew inspiration. Solar photovoltaic, solar thermal, and wind power were identified as potential renewable energy sources to be investigated.

To provide self-sufficient building operations, the team considered using an efficient ground source heat exchange system, coupled with underfloor air distribution and driven by the renewable energy. Early in conceptual design, the design team conducted a feasibility study to assess these renewable energy technologies, based on calculating life cycle costs.

Wind power first appeared to be very promising with the site's close proximity to the Atlantic Ocean, just under two miles due east; however, wind data collected by Portsmouth International Airport at Pease suggested otherwise. Wind at the airport was steady from the west, but had inconsistent speeds. GUND calculated the average airport speed to be about 4 m/s. Although the large site would allow for a turbine of approximately 260 ft., the minimum air speed for turning that size turbine needed to be consistently greater than 5 m/s. Smaller vertical access turbines mounted on the roof were considered as a building feature; however, the wind strength questioned the viability of this option as well.

Building-integrated photovoltaic (BIPV) systems, roof-mounted photovoltaic (PV) systems, and solar thermal photovoltaic (STPV) systems were the second source considered as enhancements to the building envelope. The atrium skylights and non-vision glazing were considered as possible location for building-integrated photovoltaic systems; however, the solar orientation of these areas was not ideal, on top of a 40% reduction in cell efficiency from ideal conditions that was expected for these areas. Similarly, due to the poor solar orientation of the skylights, the atrium glass and aluminum curtain wall were not seen as viable locations for BIPV. The technology of using PV fabric to cover large areas of the building was still in its infancy at the time of design. The south-facing opaque wall systems on the ends of the office bars offer good solar orientation; but from a budget point of view, the opaque walls were the least expensive on the building and would therefore convert to BIPV at the highest sq. ft. cost premium.

In addition to the cost-benefit analysis, the team also considered the aesthetic implications of BIPV. While using BIPV makes a strong visual statement that identifies the building as an early adopter, it will also likely date the building as this rapidly developing technology evolves. For most of the options considered, the BIPV would be located on the southernmost exposures only—in contradiction to the building's characteristic symmetry.

At the time of the building design, PV panels were more cost-effective than the BIPV. Preliminary research in PV options indicated a \$6 to \$8 per W in peak power with a required roof area between 0.1 and 0.2 sf/W in peak power. In Portsmouth, 1 W peak power will yield about 1000 kWh/year. Initial layout schemes of the roof structures indicated a 5000 sq. ft. system would fit comfortably on the floor. At \$7/W peak power and 0.15 sf/W peak power, this system would be budgeted at \$233,000 and be expected to yield approximately 34,000 kWh/year, or \$5800 at \$0.17/kWh. The \$5800 savings per year would indicate a less than ideal payback of 40 years.

As the shape of the building and rooftop mechanical equipment evolved, the remaining available square footage did not make photovoltaic technologies a substantial source. Knowing that a future parking garage planned for the site—with approximately 45,000 sq. ft. of available rooftop space—could produce approximately 60% of the building's electrical consumption, the team felt this would be the best strategy for taking advantage of photovoltaic technologies. Additionally, in 2009 the price of photovoltaic technologies was falling as panel efficiency was significantly improving. We planned to take advantage of these cost savings and efficiency gains in the future garage.

The next technology reviewed was a solar thermal (ST) array that could provide the domestic hot water needed to support the cafeteria kitchen, restrooms, and the locker room showers. The domestic hot water load in the building, based on an estimated 200 meals served and 50 showers taken, is estimated at 1000 gal/day. This indicates a ST system with a collector area of 700 to 800 sq. ft. and requires a roof area of approximately 1500 sq. ft. The installed cost for this system was budgeted at $40,000 to $80,000. The payback on ST systems is generally expected to be much faster than PV systems. With a projected annual energy savings of $2800/year (over gas at $1.50 /therm), the simple payback would be 25 years. Although this is typically considered an unfavorable payback time for the investment, a small six-panel array was installed as a symbolic gesture. The solar hot water heating system represents a 1% cost reduction in the building's annual energy consumption.

The building's daylighting strategy includes simple, full height glazing on both sides of the floor plate. This allows natural light to penetrate to the mid-point of the 50 ft. wide floor plate, reducing the need for artificial lighting. Use of occupancy sensors and daylight harvesting controls would further reduce the lighting automatically. Based on data provided by our sustainability consultant, lighting accounts for approximately 38% of a typical office building's annual electrical use. Reduced lighting lowers heat build-up and reduces the cooling that typically accounts for 13% of a building's electrical annual use. Combined lighting and cooling account for more than half of a typical office building's electrical use.

From the client's point of view, one of the most important design elements revolved around selection of the exterior glazing. The design team started with a strict requirement for glazing selection that tried to balance a low solar heat gain coefficient with high physical light transmission. Selecting glazing with both the ideal technical properties and aesthetics was a challenge and touring several local buildings was an effective method of educating the client on glazing options. Considering how color, tint, and reflection impacted different glazing, the team pursued a slightly tinted and slightly reflective glass. Window performance—U-value, glazing, solar heat gain coefficient (SHGC)—U: 0.29, Low-E Insulated (Argon) Glass Units, SHGC: 0.40.

A discovered challenge with glazing aesthetics is that sometimes from the exterior you can see too much. Staff may have papers stacked at the curtain wall or all the shades are at different levels, which can result in a less than refined exterior image than Service Credit Union wanted to achieve. Selecting a slightly tinted and slightly reflective glass was our strategy to hide these details.

Having completed several projects that incorporate a ground source heat pump system, GUND Partnership is more confident in the mechanical system off-sets—in particular eliminating a heating boiler—that can be omitted to reduce redundancy. The geothermal well field is an important part of the system and we were eager to drill a test well to find out the conductivity of wells on the project site. A test well was drilled to 500 ft. deep and a 1.25 in. HDPE pipe with a u-bend connector at the bottom was set in the well with thermal grout having a conductivity of approximately 1.0 Btu/hr.-ft-°F. After 48 hours of testing, the well's formation temperature registered 52.5 °F, with a thermal conductivity of 1.46 Btu/hr.-ft-°F. These data indicated decent conditions but were not exceptional given the bedrock conditions below the site. The conductivity, along with the project building's heating and cooling loads, then determined the system parameters of number of wells, depth of well, and spacing of the wells.

An important environmental benefit of the well field is that it is a closed loop system, so there is no contact between the circulating water and groundwater. It also provides aesthetic benefits as the system is hidden from view because the well fields stop six to eight feet below the surface. In addition to the system's energy savings, geothermal is a popular strategy for heating and cooling the building because it provides aesthetic benefits and net size improvements by eliminating the need to house a boiler or cooling tower and an on-site oil tank. The well field serving the geothermal heat pump system is located underneath the central green in the center of the site. It consists of 100 boreholes approximately 500 feet deep spaced on twenty-eight foot center. Each borehole is grouted solid after a plastic pipe loop is placed. Our design originally started with a concrete extension of the basement foundation wall with a custom metal manifold plate. As the design progressed, we learned of a PVC tank that would house the manifold collecting the pipes from the well field and with a pump move the condition fluid in two large supply and returns pipes into the building.

HEALTHY AND PRODUCTIVE WORKSPACES

Various building forms were evaluated to determine the most appropriate massing strategy. A shift on a typical central dark core office building design, dramatic curved facades containing open work floor surrounding a central sky-lit atrium created a dynamic environment that unifies all four levels and connects all workers with views to each other and the landscape. Service Credit Union workers enjoy coming to work and feeling vested in the credit union, creating higher performance levels that add value to their work and to Service Credit Union members.

Drawing on the site's proximity to Portsmouth International Airport at Pease, the angle of the skylights follow the path of planes in flight to and from Pease. This pattern carries through to the angle of the LED floor lights in the atrium and the angle of the ceiling panels throughout the building. The important design structure allows natural light to permeate the building.

Daylighting studies were conducted to properly right-size the floorplate. It was determined that limiting the floorplate to 50 ft. wide would enable all staff across the workspace to have access to natural light. An open office organization was developed for the majority of the workspace, with enclosed offices along the perimeter. Transparency in these perimeter offices balances security concerns and access to natural light and views to the outdoors from many different vantage points in the open workspace. Users have full control over lighting systems both in individual offices and group work spaces, and a centralized system controls all building shades so that shade positions can be reset to a consistent level when needed.

The building is organized with the public uses on the ground level, featuring a reception lobby, cafeteria, gallery, gym, and three community rooms, which are offered for use by local city government and other community-based groups. Operations occupy the mid-levels, with the upper floors reserved for executive offices and the board rooms.

The focus on basic LEED credits started with maximizing the use of materials with a high recycled content. This resulted in more than 24% of materials having recycled content. During construction more than 97% of waste generated was diverted from landfills. One initial concern was the site's close proximity to the Atlantic Ocean, which would limit sourcing of material within the 500-mile radius limit. This did not prove true as more than 25% of materials used were regional. More than 50% of the wood-based materials—mostly wood doors, panels, and veneer—were sourced from sustainably managed forestry operations, which have met the rigorous certification requirements of the Forest Stewardship Council.

Underfloor Air Distribution

The ventilation system was designed to provide fresh air at least 30% above the required rate—providing a healthier indoor environment and a better working environment. The program spaces called for a fair amount of open office areas coupled with the prospect that the building would not be fully occupied for 10 years based on Service Credit Union's business growth projections. A key goal of the design was flexibility. The team looked into an underfloor air distribution system that would deliver that flexibility while providing more control and quality of air to the indoor environment.

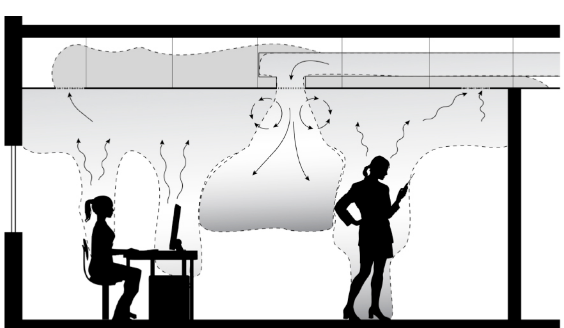
The System

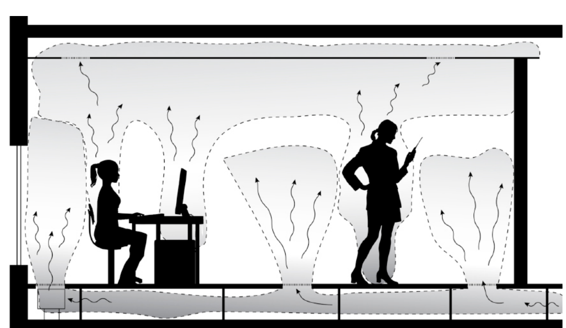
The geothermal well field delivers chilled water into the building to a modular four unit chiller package. The modular unit, when compared with conventional chiller and boiler plants systems, was projected to occupy a smaller footprint; lower installation costs; maximize energy efficiency; provide true redundancy; offer infinite expandability; and operate with a minimal amount of non-ozone depleting, chlorine-free refrigerant. The four units could operate separately, providing heating and cooling simultaneously.

The modular units supply either hot water or chilled water loops. Two hot water pumps circulate hot water through the building and two chilled water pumps circulate chilled water through the building's upper floors. The first floor utilizes a separate and slightly different configuration, with two condenser loop circulating water through the heat pumps serving the first floor, atrium balconies, and heat pumps by the elevator serving the elevator lobbies.

There are four rooftop units with chilled and hot water coils providing 60° F air to raised floor areas by supply air risers. Air is returned by a return air risers through the ceiling. For each riser and at each floor connection, there is a control damper to maintain plenum pressure. For the interior zones, thermostatically controlled floor diffusers control the amount of cool air the zone is requiring. One big difference to traditional systems is that there is no heat for the interior zones. To provide early warm up of the entire building, a heating coil for the RTUs was specified. A large issue was controlling typical occupied office spaces, as the full building occupant load might not be reached for several years. Manual closing of floor diffusers in areas that are not occupied would mitigate these issue.

FIGURE 5. HVAC diagrams.





Traditional offices buildings in northern climates need to provide heat along a glazed perimeter in the colder seasons. Much consideration was given to the heating and ventilation strategy where the underfloor air distribution system met the curtain wall. Perimeter heating and cooling solutions are typically separate from the main floor area to control the large temperature swings at the building envelope. If a separate system was not provided, then it is likely that the typical floor area would be under- or over-cooled in dealing with the large temperature variations at the perimeter. The exterior zones have fan-powered VAV units in the raised air plenum that take cooler air from the plenum and run it over the hot water heating coil and discharge it into the space through the floor registers.

A new technology for chilled beam perimeter boxes with the VAV unit was just becoming available after the mechanical design phase was complete as construction started. The term chilled beam was a misnomer from the beginning and the technology challenged the experience of the project engineers and the budget of the project, but was eventually included. The new variable chilled beams have the capacity to both heat and cool to allow for plenum air to be passed through the fin tube box via a variable air volume damper. In cooling mode, cool air from the plenum is passed through the chilled beam; if the load becomes higher, then chilled water is passed through the unit to provide additional cooling. The reverse in heating mode, the chilled beam provides heating equal to a typical baseboard system.

The first floor is heated and cooled with heat pumps. A heat recovery unit provides controlled outdoor air through VAV boxes to each zone and also removes room air equal to outdoor air from the zone, a very traditional HVAC system. Each zone can heat and cool as required and is not depending on the interior zone to generate heat and then open the floor diffusers. The atrium has a separate heat pump system provided along balconies of each upper floor.

Employee comfort

Adjustable diffuser grates offer workers the ability to adjust their local thermal environment to suit individual needs. Floor grills can easily be rotated and dampered floor boxes moved to redirect air away from employees as needed. Service Credit Union has committed to surveying building occupants to confirm satisfaction with the thermal environment, as employee comfort directly equates to productivity.

Flexibility

One must think of the raised access floor and the underfloor air distribution as two separate building systems. The curved building floorplate layout provided some challenges in using an orthogonal raised floor system. Intersections of the two-foot-square tiles along the radius' exterior wall required additional cutting and supports for the many small floor tile pieces. Even with an underfloor plenum, limited ductwork is required to move air from the ends of the building (where the shafts are located) to the center of the floor. Additionally, a few of these ducts met the modular pedestals of the floor system at odd angles, making special bridging required.

AN ICONIC WORLD HEADQUARTERS

The building design strived to embody quality, integrity, and strength. The dramatic scale of the building and curved glass facades are complimented by locally-sourced granite blocks with 50% more insulation than required by code. Granite was selected for its strength and contrast with the curtainwall. Regional sourcing and aesthetic character directed the selection of

FIGURE 6.

Deer Isle granite from Crotch Island, just across the Deer Isle Thoroughfare from Stonington, Maine. Shipping the stone from the quarry to the fabrication plant and on to the project site totaled only 340 miles. Deer Isle granite can be recognized on many monuments and buildings across the nation, from the Statue of Liberty, Washington Monument and picture gallery of the Museum of Fine Arts in Boston, Massachusetts.

Some consider Deer Isle Granite the densest stone in the world at 193 pounds per cubic foot. When it is quarried, the granite is cut into large blocks, approximately 5 × 5 × 10 ft. that are shipped to finishing plants. Several options for determining the thickness of the granite veneer were investigated. One option was to use a ⅛ in. veneer granite in a metal backing, which seemed promising in reducing the amount of material but required shipping the large quarried blocks across the U.S. to the manufacturing plant. Even though there was no cost benefit, the team determined that the more local labor and manufacturing could be obtained, the more sustainable the construction process would be.

GUND Partnership sought to design a noble building that conveys the mission of Service Credit Union. The arrival sequence to the corporate campus is a very dignified and energizing experience. Five military flags alongside the national and New Hampshire flags are prominently displayed on site. These are meaningful symbols saluting the credit union's membership. A custom stainless steel globe sculpture at the building entrance also signifies the global reach of serving members in the military.

GUND wanted to provide employees and visitors entering the building with a dramatic sense of arrival. The sky-lit atrium is the major organizing space of the building, linking the workspaces visually and providing a shared identity for all workers. A grand cantilevered glass staircase loops around the atrium, connecting all floors and benefiting the user experience. The height of the guardrail around the atrium was raised to make staff feel secure on all levels. Intimate lounge areas are located off the stair landings, providing a place for respite and interaction. Vertical circulation is also serviced by the central glass elevator.

FIGURE 7. View of the atrium.

All employees must clear a security check point as they enter the building. The next level of maintaining strict security oversight—essential to the credit union's operation—is achieved by the straightforward building organization and high level of visibility to all public and work areas.

Responding to the growing need for meeting space in the area, Service Credit Union reserves several multipurpose rooms on the ground level for use by local organizations in the community. These flexible spaces are equipped with audio-visual technologies and are offered free of charge to local government, non- and not-for-profit organizations, and other community-based groups. The community rooms are a way for Service Credit Union to give back to the community and invite the public in.

A public museum and gallery space celebrating Service Credit Union is located right at the building entrance and is an additional resource for the credit union's members. It explains the history of the credit union and showcases Service Credit Union's service in the community. A prominent wall of the museum is dedicated to describing the building's sustainable design approach that highlights the process and results of the new headquarters project. The diagrammatic displays, combined with a take-away informational brochure and building performance dashboard in the lobby that continually informs occupants and visitors about the building's performance, makes the building itself an educational tool. Employees and visitors can walk away with a greater understanding of sustainable design and green technologies.

Service Credit Union periodically hosts special events for its members and the community. An accessible roof terrace looking out over the landscape is a popular venue for special

FIGURE 8. A public museum and gallery celebrates Service Credit Union.

events. An intimate seating area with tables and chairs is shaded by an aluminum trellis. The roof terrace offers dramatic views across the site. You can almost see the ocean, which is only two miles away, due east.

LANDSCAPE

The landscape design focuses on restoring the site with native and adaptive vegetation that promotes biodiversity. Native plantings were selected to bloom incrementally throughout the growing season. Also planted for staged blooming are Allium, Camassia, Narcissus, Hyacintoides Hispanica, and Leucojum bulbs. Many native tree species were selected for drought resistance and low maintenance, including Taxodium distchum (Common Bald Cypress), Ulmus americana (Princeton American Elm) and Cornus mas Cornelian Cherry (Cornelian Cherry). A variety of grasses including molina heidebraut, calamagrostis karl forester, hakonechloa macra were included for their drought resistance. The intense planting selection and layout were carefully chosen to minimize the lawn areas. The team understood the intended mature landscape would not be achieved for several seasons. With each season and passing year, plants reseed and develop between the originals becoming more vibrant and requiring less and less weed maintenance.

Good growth is due to careful soil preparation. Identifying amendments and tilling of these into the existing soils is a must to achieving vibrant plant growth. One lesson learned is the better the soil, the better the plant growth. As plants infill, they choke out the weeds and develop more color and texture, while requiring less maintenance and watering needs. Irrigation was limited to a small portion of the site. Several wells were drilled to provide irrigation off the city water source. This area is irrigated using smart technologies and appropriate vegetation, with the goal of reducing irrigation by 50% compared to standard strategies. The project helps reduce the burden on the municipal stormwater system by reducing and treating the stormwater runoff from the site.

Promoting healthy lifestyles and a positive work-life balance is at the heart of the landscape design. More than 0.33 miles of walking trails with outdoor seating areas and a picnic pavilion encourage staff to take advantage of the open space. The walking trails are a direct

FIGURE 9. The corporate campus is a welcoming public.

extension of the recreation and fitness facilities in the employee fitness center. During work and non-work hours, the site is accessible to the public for recreational use. Service Credit Union also prohibits smoking anywhere on the property, protecting occupants from exposure to environmental tobacco smoke.

A sustainable component of the Gateway District Zoning Ordinances was to promote a vibrant urban environment through a range of transportation options. Improving safety and providing the infrastructure for pedestrians, cyclists, and motorists is central to this. Walkways on site are 5 ft. wide to comfortably accommodate pedestrian and bicycle traffic together. The extra-wide walkways were an important component of the zoning ordinances. Employees who cycle to work can ride directly to the building entrance.

The overall parking count has been limited to the minimum required by zoning to reduce the impacts of the impervious area of the site and its associated effects. Another sustainable concept of the new zoning ordinances allowed for differed build out of the required parking spaces, reducing the impervious site area until it is needed.

LEED GOLD CERTIFICATION AND ENERGY EVALUATION

The project pursued LEED-NC v2009 certification. The preliminary design phase review for the project achieved a total of six prerequisites and 21 credits worth 21 points. Three prerequisites and five credits worth 20 points noted as pending. The project had a good start, but the project needed much more to achieve a Gold level certification.

The construction phase attempted a total of 66 points, including those achieved in the first phase. After review, 58 points were approved, one denied, and seven pending, and we reluctantly dropped one credit, forfeiting one point. The project obtained 64 points and a LEED Gold level.

Limited onsite power generation in this first phase of development, in addition to budget concerns, put a Platinum level certification out of reach. The project achieved LEED Gold certification, with 64 points out of 110 points.

FIGURE 10. LEED Facts scorecard.

LEED Facts

Service Credit Union Headquarters
Portsmouth, NH

LEED-NC v09
Certification awarded July 2013

Gold	**64***
Sustainable Sites	13/26
Water Efficiency	6/10
Energy & Atmosphere	20/35
Materials & Resources	7/14
Indoor Environmental Quality	10/15
Innovation & Design Process	6/6
Regional Priority Credits	2/4

**Out of a possible 100 points + 10 bonus points*

The energy model concluded an annual energy savings of 36.44% and an energy cost savings of 36.44% over an ASHRAE 90.1-2007 baseline code compliant building. The energy cost savings were enough to earn 13 out of a possible 19 points under the LEED EAc1 credit category, which is one more point than expected.

This corresponds to an Energy Star rating of 98. Energy Star also indicates that the as-designed building energy consumption results in the release of 348 metric tons of CO_2 per year, which is 63% less than the median for all electric office buildings.

Although significant energy savings are realized in the Service Hot Water end use category, most of the savings (approximately 75%) are attributed to the geothermal heat pumps and the water usage demand reduction documented in LEED Water Efficiency Credit 3. The remaining savings are attributed to the solar thermal system, which accounts for less than 1% of the building energy cost. As a result, no renewable energy credit will be earned under Energy & Atmosphere Credit 2. We are still hopeful that Phase II can achieve on-site generation.

TABLE 1. Energy analysis summary table.

End Use	Baseline Building Results (KBtu)	Proposed Building Results (KBtu)	Energy Savings (KBtu)	Percent Savings
Space heating	870,575	204,000	666,575	76.6%
Snowmelt	575,765	194,509	381,256	66.2%
Interior lighting	990,100	724,100	266,000	26.9%
Fans	475,025	320,000	155,025	32.6%
Space cooling	342,900	189,100	153,800	44.9%
Exterior lighting	345,433	204,603	140,830	40.8%
Service water heating	71,038	13.579	57,459	80.9%
Heat rejection	23,000	—	23,000	100.0%
Receptacle equipment	976,200	976,100	100	0.0%
Elevators	377,502	377,502	—	0.0%
Pumps	—	17,100	(17,100)	0.0%
Total	**5,047,538**	**3,220,593**		**36.2%**
EUI	**52.63**	**33.58**		

A third party commissioning agent was engaged to ensure the project is built and operated as designed. Commissioning will likely reduce operating costs and ensure that facilities personnel understand how to properly operate building systems.

Special measuring devices were incorporated in the design to capture and isolate energy for different end uses. This information is compared against the energy model to understand potential anomalies and opportunities for improvement in operation or occupant behavior.

PLANNING FOR THE FUTURE

Beyond the green design concepts implemented in this project, Service Credit Union identified future opportunities to integrate renewable energies to further offset its operations. The master plan for the site includes a photovoltaic array on a future planned garage.

One of the planned buildings with a footprint of approximately 40,000 sq. ft. could hold roughly 2,600 PV modules. Today's current panel efficiency of 15.7% would produce 690 kwh, or 1.35 mwh annually on site. Wind data is also being collected as part of the mechanical system control in hope the smaller turbines could be mounted on site or on the building to someday take the campus off the grid.

As part of the project, Service Credit Union evaluated business policies and programs to understand and identify opportunities for the Credit Union to reduce its burden on the environment. Renewable energy credits have been purchased to offset 100% of the building's electricity demand for the first two years of operations, with the option of renewal.

PROJECT COLLABORATORS

Service Credit Union (client); GUND Partnership (architect); Suffolk Construction (construction manager); Davis Langdon (cost estimator); Zade Company (mechanical, electrical and plumbing engineer); LeMessurier Consultants (structural engineer); The Green Engineer (sustainable design consultant); Kohler Ronan, LLC Consulting Engineers (geothermal well field designer); Tighe & Bond, Inc. (civil engineer); S.W. Cole Engineering, Inc. (geotechnical engineer); Oehme van Sweden & Associates, Inc. (landscape architect); Stefura Associates, Inc. (furniture consultant); Lam Partners (lighting designer); Acentech (acoustical consultant).