

Green Projects Entry
Alberici Corporate Headquarters (o)

Section 1 - Project Overview Information Part 1

Project name: Alberici Corporate Headquarters (o)
Project owner: Alberici
Project address: 8800 Page
Overland, MO 63114

Section 2 - Project Overview Information Part 2

Project completion date: 12/2004 (m/y) format
Project Site: Previously Developed - Brownfield Site
Project type: Commercial office
Project site context/setting: Suburban
Other Building description: New (73% new, 27% renovated)
Lot size: 13.59 acres
Building gross floor area: 108586 ft2
BOMA floor area method used?: yes
Number of permanent occupants: 200
Number of visitors: 150
Occupants (hours/week/occupant): 40
Visitors (hours/week/visitor): 2
Total project cost: \$20,100,000

Section 3 - Project Overview General Description

General description: This project entails the adaptive reuse of an existing manufacturing plant into a corporate headquarters for one of St. Louis' oldest and largest construction companies. Requirements included an open office environment, structured parking, training rooms, exercise facilities and dining facilities.

When company growth led to the decision to move, the company CEO "wanted to be in a place that fosters teamwork and creativity." After investigating 45 different sites, a 13.59 acre brownfield site became available with a 1950's-era office building and 155,633 gsf former metal manufacturing facility. With 70' and 90' clear-span bays 505' long, it was a "cathedral of steel."

The client wanted to lead by example, transform the design and construction market place and set a goal of Platinum level LEED certification, reminding all of "the future generations who will someday work in this building."

The project achieved Platinum level certification from the USGBC. With 60 of 69 points, the highest total ever, the team and client has demonstrated an exceptional commitment to environmental design and conservation and set new standards nationally. The company now enjoys a healthy, comfortable, beautiful environment which fosters teamwork, creativity and collaboration, and a 50 year old adaptively reused structure has new life.

Section 4 - Top Ten Measures

Top Ten Measure 1: Sustainable Design Intent & Innovation

Key environmental aspects: Introducing natural light while also controlling it generated the final form of the building. The original manufacturing plant faced southwest—a difficult solar orientation. The addition of south facing “saw-tooth” offices in effect reoriented the building due south, providing ample glazing for daylight while blocking unwanted western sunlight with solid masonry walls. External sunscreens effectively block out unwanted solar gain. This design is literally responds to and is shaped by the sun’s path.

With the selective removal of the roof deck in the second bay of the industrial building, light and ventilation were provided via a newly formed courtyard between the garage and office building.

The heat island effect was dramatically reduced by eliminating all surface parking and adaptively reusing the north two bays as structured parking.

The interiors are organized around three large atria and receive abundant light, fresh air, and views to the outdoors. In addition to visually uniting the two floors, the atriums act as thermal flues to induce ventilation. The open plan environment fosters teamwork and collaboration, while affording 90% of building occupants direct views to the outdoors.

Sustainable design led to “editing” the design, doing more with less, and solving multiple issues with each response.

Top Ten Measure 2: Regional/Community Design & Connectivity

Regional/Community Design: The project has become an instant landmark within the community and region. At 125 feet in height, the wind turbine is the most visible and kinetic element alongside the interstate. The building has been dramatically transformed—opened up visually and literally to the public. A courtyard welcomes visitors and leads them to a generous two-story lobby. Visitors are educated about the project through environmental graphic displays, both in the lobby and on “main street.” A large meeting room is generously offered for community use. Visitors are numerous each week due to great public interest (150/week, approximately 2 hours/visit). The project received an innovation credit for education and outreach from the USGBC.

The office building accommodates 200 staff (160 staff at present). A carpool policy encourages alternate transportation. Six per cent (10 of 160 staff) carpool. Two bus lines serve the site. One café staff takes the bus. No one currently walks or bike to work.

Local zoning required a parking ratio of 4 spaces per 1000 gsf or 435 spaces. A 26% reduction (112 spaces) was granted, resulting in 323spaces, all placed under roof. This dramatically reduced the parking requirements and eliminated the heat island effect of surface parking.

Use other transport options: 6%
Parking spaces per person: 1.60

Top Ten Measure 3: Land Use & Site Ecology

Site ecology: The project context is that of office/warehouse facilities alongside an interstate highway. The 13.59 acre site had 9 acres of impervious surface, including 3.7 acres under roof.

The team consulted with the Missouri Botanical Gardens and Shaw Nature Preserve on the approach to ecologically sensitive site restoration and to set new standards for corporate campus design. Pavement was reduced to a bare minimum. The development footprint was a fraction allowed by local zoning. The suburban, brownfield site was restored with native, drought-resistant plantings, including 6 acres of Missouri prairie grass and wetland plants. Over 250 Missouri native trees and 4,200 perennial plants and bushes were planted, placed by type, growth rate and shade requirements. By using 100 percent of local native plant types, the site becomes a seed bank for the St. Louis area, providing the resources to establish other native landscapes at properties owned by non-profits and local government.

Retention ponds and constructed wetlands retain 100% of the storm water runoff and form a filtration process in the forebay pool, removing 80% of total suspended solids and 40% of total phosphorous from stormwater discharged into ponds. The site had been 50% impervious surface but is now its own watershed.

Top Ten Measure 4: Bioclimatic Design

Bioclimatic design: Passive design strategies are the foundation of the design. Introducing natural light while also controlling it generated the final building form. The original manufacturing plant faced southwest—a difficult solar orientation. The addition of the south facing “sawtooth” offices in effect reoriented the building due south providing ample glazing for daylight and ventilation while blocking unwanted western sun with solid masonry walls. Just as a sunflower responds to the sun, this design is literally responds to and is shaped by the sun’s path.

With the selective removal of the roof deck in the second bay of the industrial building, light and ventilation were admitted through a newly formed courtyard between the garage and offices. The garage is located in the northern two bays of the existing structure and helps to buffer the north winds while the office building is located to the south to take full advantage of the southern exposure. Building orientation takes full advantage of prevailing breezes for natural ventilation.

The interiors are organized around three large atria and receive abundant light, fresh air, and views to the outdoors. The atriums act as thermal flues to induce ventilation.

Top Ten Measure 5: Light & Air

Light & Air: A mix of lighting consumes .67 watts per square foot – half the power typically used for lighting an office building. High-efficiency fixtures, ballasts and lamps, daylight harvesting (75% of spaces are day lit), occupancy sensors, dimming and building automation system controls save energy.

Operable windows provide cross-ventilation. Clearstory windows open mechanically when environmental conditions are conducive. Three atria increase daylight and induce ventilation as thermal flues, allowing hot air to stratify at the top of the structure away from occupants. When in the free cooling mode, 100% of the building can be naturally

ventilated.

Under-floor air distribution, displacement ventilation, reduced use of re-circulated air, carbon dioxide monitoring, and natural ventilation all contribute to indoor air quality. Thermal, ventilation, and lighting systems are controlled by occupants (perimeter and non-perimeter) through manually controlled floor registers, hard-wired task lights at each work station, and operable windows.

The team specified and purchased all adhesives, paints, sealants, and carpets using a low emitting program to protect occupants from debilitating effects of volatile organic compounds (VOC). Through building re-orientation, use of three shades of glass to vary visual transmittance, and careful placement of interior walls, 90% of employees have a direct view to the outdoors.

Percent of building area that is daylit:	75%
Percent of building that can be ventilated or cooled with operable windows :	79%

Top Ten Measure 6: Water Cycle

Water Cycle:

This project earned a LEED Innovation credit for exemplary performance for water use reduction. Rainwater from 60% of the garage roof area (42,200 sf) is collected and stored in a 30,900-gallon cistern (size based upon 27 years of local rainfall records), treated (strainer filter and sand filter before being chlorinated and held in a secondary 500-gallon tank) and used for 100% of sewage conveyance. This, along with water efficient fixtures, results in a 70% water use reduction and savings of 500,000 gallons of water annually. Besides sewage conveyance, the water is used in the HVAC system's cooling tower. The cistern's overflow drains into the north retention pond, one of two ponds on site. This pond is a living ecosystem with fish, frogs and predacious aquatic invertebrates – all insect predators which thrive in this environment. Native plants combine forces with flowing, infiltrating water to create excellent biodiversity.

In summary, 100% of the precipitation is managed on site, 288,000 gallons/year are used indoors, 0 gallons/year are used outdoors (no permanent irrigation system), 146,000 gallons/year are from reclaimed sources, and 0 gallons/year of wastewater are reused on site.

Precipitation managed on site:	100%
Total water used indoors:	288000 gal/yr
Total water used outdoors:	0 gal/yr
Percent of total water from reclaimed sources:	146%
Percent wastewater reused on-site:	0%
Calculated annual potable water use:	2.65 gal/sf/yr

Top Ten Measure 7: Energy Flows & Energy Future

Energy description:

This project exceeds minimum energy efficiency by 60%. On-site renewable sources generate 17% of required energy. A 65KW NordTank wind turbine (recycled from a California wind farm) provides 92,000 kWh annually and 20 % of the

facility's electrical needs annually. Solar panels are used for hot water pre-heat. An efficient building envelope (roof R-30, walls R-19) results in lower energy usage.

An underfloor air distribution system supplies air at the level of the occupants. Stratification occurs naturally at the top of the space, where the system uses an enthalpy economizer and has enthalpy wheel energy recovery to capture heat from the exhaust air while tempering incoming fresh, outside air. The design features a natural ventilation mode and enhanced ventilation mode. Indoor air quality is monitored with an integrated carbon dioxide monitoring system.

The cooling plant uses two 100-ton water cooled chillers (12.9 EER). The cooling tower features a variable speed fan. The plant can use the tower in a water-side economizer mode. The heating plant uses two 1.2 MMBTU/hr output high efficiency boilers modeled with 86% efficiency at full-load.

The energy model was developed in eQuest (DOE2.2). Measurement and verification through commissioning and continued monitoring has insured proper performance. A control system tracks and measures factors ranging from gas, electricity and water usage, to atmospheric elements, readings on rain and wind gauges. It regulates and monitors functions including light, HVAC variable-frequency drives and operation of the solar hot water and cistern systems. The control system's metering equipment interfaces with an internal computer network, into which all data is periodically transferred for in-depth analysis and long-term storage. The owner's level of control and monitoring provides them with informed budgeting for annual utility costs. Their control system is a smart, one-time investment in long-term energy savings.

Performance Rating		
	EPA 85	
	HERS	
	Percent total energy savings	63
	Base Case	Design Case
Total energy (Btu/sf/yr)	94091	42004
Electricity (Btu/sf/yr)	73914	32454
Natural gas (Btu/sf/yr)	20178	9550
Other: (Btu/sf/yr)		
<hr/>		
Heating (Btu/sf/yr)	19090	9135
Cooling (Btu/sf/yr)	16733	10029
<hr/>		
Cooling capacity (sf/ton)	356	550
Lighting load connected (W/sf)	1.3	0.64
Lighting load after controls (W/sf)		0.448
Plug load (W/sf)		1.03
<hr/>		
Peak electricity demand (W/sf)	3.23	2.37
<hr/>		
Percent on-site renewable energy (%)		17
Percent grid-supplied renewable energy (%)		0

Supplemental Narrative

The energy model was developed in eQuest (DOE2.2).

Top Ten Measure 8: Materials & Construction

Materials description: No existing structural component was removed from the site. Crane rails were reused to support concrete tees in the garage.

20% of materials were manufactured within a 500 mile radius. Of that 20%, 57% were local (store front system, fabricated steel, concrete block, concrete, cabinets, and casework).

New materials specified totaled 31% recycled content (synthetic gypsum—a bi-product of coal burning) and 10% (post-consumer + 1/2 post-industrial) recycled content (steel frame and rebar, furnace slag, fly ash in concrete block, carpet backing, and translucent panels).

Rapidly renewable resources include plyboo (plywood made from bamboo), cork flooring, woodstalk (particle board made from wheat instead of wood fibers), and a 90% reflective, highly emissive roof of white, Energy Star rated polymer made of natural soybean oil.

Over 50% of wood specified is Forest Stewardship Council certified (trim woods, doors and frames, borrow light frames).

Over 10% of materials were salvaged or refurbished (wind turbine purchased from a California wind farm).

93% of all construction and demolition waste (6000 tons) was diverted from landfills. A “gyp monster” ground drywall for use as soil amendment. The original office building was deconstructed and used as structural fill to help raise the entry roadbed.

Top Ten Measure 9: Long Life, Loose Fit

Long life, loose fit: This project embodies the concept of “long life, loose fit.” Indeed, the former manufacturing plant had generous dimensions—90’ and 70’ clear spans, 505’ long, and 28’ clear height to truss bottom chord—which led to the site selection and decision to adaptively reuse this structure. A new mezzanine level was inserted into the office area. A raised floor system was installed throughout the office area accommodating the underfloor air distribution system as well as power and wire distribution. Fixed walls were kept to a minimum. Departmental boundaries are flexible, permitting the ebb and flow of staff size and work loads while fostering interaction. Except for three enclosed offices, everyone works in an open office arrangement. Reconfiguration is easily accomplished.

The floor level of the new structured parking deck was set to match the mezzanine level of the office area should the owner ever decide to convert the structured parking into additional office space.

With a venerable, 85 year history, the construction company who now calls this project home and its corporate headquarters sets its sights on the next 85 years. The adaptability and flexibility instilled into the planning and construction will permit the changes which are sure to come.

Top Ten Measure 10: Collective Wisdom & Feedback Loops

Collective Wisdom & Feedback Loops: To realize a project of such environmental aspirations requires the full commitment of the owner to undertake such an effort. Goals and aspirations were established through a series of environmental design and strategic planning charettes. All had a say and vote, and this commitment was essential to the projects’ success.

The design concept was established early in a collaborative eco-charette with the client/builder, architect, environmental consultant, commissioning agent, and engineers (structural, MEP, civil). Each team member embraced the LEED approach

and actively contributed ideas from their unique perspectives—ideas flowed and feedback was rapid.

Design presentations were made to the city for review and approval, especially as new ways of thinking (landscape, site design, mechanical and plumbing systems, generating on site renewable energy on site) were involved.

As construction progressed, interest mounted. Newspaper stories featured the project with in depth articles. The local Public Broadcast Station also featured the project, reaching an even broader TV audience. Interest continues with visitors to the facility each day.

The owner continually evaluates the energy usage of the building from data stored in the building management system. Several changes have been made since move in to better achieve design goals and use less energy.

Section 5 - Project Economics

Finance:

While there was nothing unusual about the project financing, it should be noted that the valuation of the building was enhanced due to the perceived quality, the sustainable design approach and energy saving features. The owner did seek state assistance with tax credits, MO First Linked Deposit Program, and training assistance and local assistance with the Urban Redevelopment Corporation (Ch. 353), traffic management assistance (MODOT), permitting fees & process assistance. The owner did receive two small grants from the Missouri Department of Conservation and the Missouri Department of Natural Resources.

Cost and payback analysis: The total project costs were \$20,100,000 with the following breakdown:

Sitework: \$2,051,930 Parking Garage: \$3,010,390 \$9,320/space Building Shell & Core: \$11,381,530 \$105/sf Building Interior Fitout: \$2,257,220 \$21/sf General Conditions: \$1,393,860

At the outset, the team set as a goal to attain a LEED Platinum rating and meet a budget for a conventional office building. This was done to dispel the common perception that LEED projects always have to cost more. If sustainable design is to gain traction and truly transform the marketplace, it needs to be financially competitive.

All “deep greening” materials and design features (wind turbine, solar panels, etc) totaled approximately \$500,000. In determining which project components would be included into the final design, a payback period of 7.5 years was one of the determinants.

Section 6 - Process and Results

PreDesign:

Once the decision was made to relocate the corporate headquarters, an extensive site search was undertaken. Over 45 different sites and buildings were investigated. The final selection was a brownfield site with a former metals manufacturing plant whose structural frame and dimensions were most impressive and offered great promise for adaptive reuse. Likewise the site, at 13.59 acres, was large enough to offer flexibility in planning, use and growth, as well as the opportunity to improve a previously developed site rather than forever alter a greenfield site. Strategic planning, goal setting, and consensus building were also key predesign activities.

Design: Collaboration was critical to the project success. The owner/builder, architect, engineers, and LEED consultants strategized early with rapid prototyping and feedback leading to the preferred design direction rather quickly. The metrics of evaluating design within the context of sustainable design is much more objective, with the goal of attaining an elegant, refined and "edited" design which meets the project requirements on multiple levels, doing the most with the least. As R. Buckminster Fuller once asked a fellow architect, "How much does your building weigh?"

Construction Process: At the outset, there were several hundred skeptical construction workers. At the completion of the project, there were several hundred construction workers looking for the next "green" project to build. They came to know the benefits of the approach and valued their contributions to this significant effort. (47 words)

LEED construction guidelines were incorporated and tied to contracts with the subcontractors. The owner/contractor developed a construction compliance program which included an erosion and sediment control plan to control erosion and reduce the negative impact on water and air quality — a "storm water pollution prevention plan"— based upon the EPA's best practice guidelines, a construction indoor air quality plan which protected building material and ductwork during construction, and a construction waste management plan which diverted 93% of all the construction and demolition waste from landfills.

Indoor air quality is not just beneficial to the final occupants, but creates a healthier construction site. Workers were going home feeling better, not dizzy from the typical construction materials, products, and processes. Indeed, if anyone tried to use the wrong products, their fellow workers stopped them. If any member of the construction team had a better idea to accomplish the desired results, their ideas were heard, evaluated and possibly incorporated. Safety lunches were held on-site each month which further built camaraderie and a sense of a shared mission.

Operations/maintenance: The maintenance company prepared a building maintenance program utilizing environmentally friendly cleaners and paper products. The café serves food on washable dishware and utensils in lieu disposable paper or styrofoam plates, thus dramatically reducing the volume of waste. When the plates and utensils are sprayed off with water prior to placing them in the dishwasher, a re-circulating pump and filter saves on the water usage

Commissioning: A commissioning agent was involved from the outset of the project. Commissioning the building upon completion of construction led to several adjustments and fine tuning as one might expect with a project of this size. After twelve months, the building was re-commissioned, again with a variety of adjustments made (valves, boxes, etc.) to further enhance performance

Measurement & verification/post-occupancy evaluation: The owner continually evaluates the energy usage of the building. Several changes have been made since move in to better achieve our design goals and use less energy. All energy data is stored in the owner's building management system for evaluation. Some examples of changes that have been made include; garage lights on photo sensors, adjusting levels of outside air brought into the building, adjusting hours of operation on building HVAC systems, adjusting sequencing of HVAC systems to be more efficient. A post occupancy evaluation has just been conducted to survey staff about the building. The report is being prepared at the time of this writing

Rating System Name: US Green Building Council LEED-NC
Version: 2.1
Rating Date: 09/28/05

Score or rating level: platinum
Credits: 60 of 69 credits were achieved

Sections 7: Visuals

Exhibit A

aerial.jpg



Description:

Image has been scaled down. Click it to view actual size...
existing industrial site

Exhibit B

site concept copyR.jpg



Description:

Image has been scaled down. Click it to view actual size...
site restoration and building transformation concept

Exhibit C

Picture3 copy.jpg



Description:

Image has been scaled down. Click it to view actual size...
building section

Exhibit D

Picture1.jpg



Description:

Image has been scaled down. Click it to view actual size...
aerial view prior to indigenous plantings

Exhibit E

south side dusk cropped no duck_direct from frankeSMALL.jpg



Description:

Image has been scaled down. Click it to view actual size...
south "saw-tooth" addition

Exhibit F

vert. dusk.jpg



Image has been scaled down. Click it to view actual size...
north facade

Description:

Exhibit G

horiz people.jpg



Image has been scaled down. Click it to view actual size...
courtyard

Description:

Exhibit H

Main Lobby.jpg



Image has been scaled down. Click it to view actual size...
lobby

Description:

Exhibit I

Mezzanine.jpg



Image has been scaled down. Click it to view actual size...
office atrium

Description:

Exhibit J

Main Street_conference room.jpg



Image has been scaled down. Click it to view actual size...
main street

Description: