THIS IS EVERY BUILDING

IOWA UTILITIES BOARD / OFFICE OF CONSUMER ADVOCATE

BNIM

ABOUT BNIM

We deliver beautiful, integrated, living environments that inspire change and enhance the human condition.

BNIM is one of the most important design firms working to redefine practice in the realm of green architecture today. As early pioneers in the arena of sustainable design, BNIM continues to shape the national and global agenda for responsible architecture and design excellence. Established in 1970, the firm has emerged nationally as a leading resource for established methodologies, innovative technologies and cutting-edge research in architecture, planning, landscape, workplace and institutional design. BNIM's process is deeply rooted in the concept of integration, where clients and collaborators work together to create buildings and spaces that embrace the Triple Bottom Line—a balance of people, planet and prosperity. BNIM's body of work maps the evolution of sustainable design process and thinking: from early pilot projects that defined the USGBC's LEED rating system, to the first LEED Platinum state office building, to current work that goes beyond LEED's highest standards to achieve Living Building and regenerative status.

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DES MOINES, IOWA

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"A great building must begin with the immeasurable, must go through measurable means when it is being designed and in the end must be unmeasurable."

LOUIS KAHN

Vision, Leadership, Results: The critical path to high-performance design

ROD KRUSE, FAIA | PRINCIPAL, BNIM

Exemplary results require vision and exemplary leadership. Consider these examples: exemplary athletes visualize their success and have exemplary coaches; exemplary symphonies visualize a performance and have exemplary conductors; exemplary businesses have a strong vision for their future and have exemplary CEOs.

Exemplary performance requires vision and exemplary leaders. Vision is essential; leadership is essential.

This is especially true of high-performance buildings. Without visionary leaders, high-performance design is difficult to achieve. The Iowa Utilities Board / Office of Consumer Advocate Building (IUB/OCA) is an example of leaders providing a vision to ensure proven high-performance metrics.Consider the following:

Vision
The State of Iowa established a vision for a high-performance facility to house the organizations that regulate utility companies in the State of Iowa and represent the interests of the consumer with regards to utilities. The vision and resultant goals were simple and forward thinking. The facility was to consume no more than 28.0 KBTUs per square foot per year—a 68% reduction from the national average energy consumption for office buildings (90.0 KBTUs per square foot per year). The building was to be constructed within the financial parameters of a state budget and to incorporate methodologies that could be utilized by other public bodies and private sector building owners. The vision was simple, direct, challenging, and achievable.

Leadership
Under the leadership of the Iowa Utilities Board former Chair John Norris, Judi Cooper, Joan Conrad, David Lynch and current Chair Elizabeth Jacobs, and former Consumer Advocate John Perkins, Ron Polle, and current Consumer Advocate, Mark Schuling, the vision held fast. Every decision made during the programming, design, development, documentation, and construction of the project was reviewed for compliance with the vision and goals for the project.

Each decision focused on achieving or exceeding the performance goals, meeting the financial requirements of the project, and demonstrating practical and affordable methods of achieving a high-performance facility. The State's representatives remained loyal to their vision when decisions were easy and, most importantly, when they were difficult. Not all ideas could be realized, but the ideas that were realized supported the primary vision without significant compromise.

The IUB/OCA project simply would not have achieved the high-performance results without their leadership.

Results

This project demonstrates the results of visionary and committed leaders. The construction cost of the 45,000 gross square foot building was $10,150,000 including photovoltaic panels and the development of a six-acre site. The building is currently consuming 16.7 KBTUs per square foot per year equivalent to an 81.5% reduction over the national average energy use for office buildings.

The result is an annual savings of approximately $50,000 in utility costs. These are real metrics after two years of occupancy. These metrics are the result of replicable methodologies including building orientation, maximizing daylight, a wel-insulated building envelop constructed of precast concrete, a geothermal system, natural ventilation, appropriately proportioned and configured workstations, occupancy sensors at every workstation and office, and leadership that does not forget the vision.

The Unanswered Question

So why is there not a greater demand for similar facilities in the surrounding area? The project, its measured performance metrics, and the initial cost of the facility have been well publicized.

Even if an individual or organization does not support the concept of climate change, whether induced by humankind or a natural repeating cycle of our climate, why would an individual or organization not see the advantage of a facility that improves human health and productivity, is filled with natural light, reduces the consumption of natural resources, and reduces operating expenses by over $50,000 per year with a construction cost no greater than the cost a traditional facility of comparable quality?

Leaders with vision are critical. Vision and leadership produce results.

Commendation

The representatives of the State of Iowa who had the vision and delivered the leadership that allowed this project to be realized are to be commended. They made this project happen. We, as the design team, simply used our knowledge to facilitate the journey. Just think what could happen if every government—state and federal—stepped forward to show this kind of vision and fiscal stewardship.

Summary

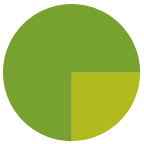
An infill development on the State of Iowa Capitol Complex in Downtown Des Moines, the new office building for the Iowa Utilities Board (IUB) and the Office of Consumer Advocate (OCA) was developed on a challenging, awkwardly proportioned landfill site that now creates a strong gateway to the complex at its southeast corner. In its design and performance, the building serves as a testament to the sustainable stewardship of the State of Iowa. It is a model energy-efficient office building demonstrating proven, cost-effective energy efficiency measures for new construction.

The 44,640-square-foot building is organized into two wings: the north wing comprises the IUB, while the south wing accommodates the OCA on level two and common space on level one. The common space includes a hearing room, conference center, and lounge areas. Linking the two wings, a two-story lobby houses vertical circulation and service functions. An entrance courtyard sits between the wings, and a plaza is located off of the south wing.

BNIM purposefully designed the building to integrate replicable sustainable strategies—serving as a demonstration project for other government facilities at the state and local level, and also for the general public and private enterprise. While many of the employed strategies are either "off the shelf" to varying degrees or have been used elsewhere, their application on the IUB/OCA project is particularly significant due to the multitude of strategies integrated together to achieve a building of exemplary energy performance.

STEWARDSHIP AT A GLANCE

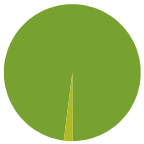
LEED Platinum Certified



75%

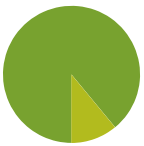
reduction in energy usage compared to an Iowa Energy Code compliant facility

Net-Zero-Ready Facility



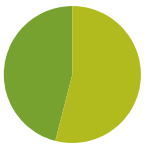
98%

of building receives enough daylight that lights are off during daylight hours



89%

of construction waste was recycled



46%

reduction in Potable water use

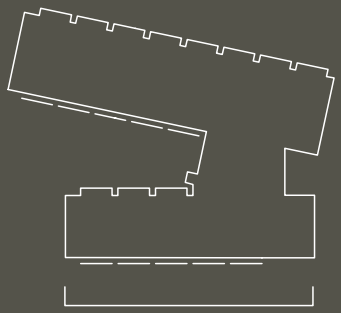
EVERY ASPECT OF THIS BUILDING'S PROCESS AND DESIGN CAN SERVE AS A STARTING POINT FOR THE DESIGN OF ANY OTHER BUILDING.

REPLICATE... THEN INNOVATE.

This building emerged through a process that is replicable by any team, and it has attained results that are achievable by any project. It is critical to establish clear goals that are embraced by all as well as assemble a project team that can perform in an integrated and collaborative manner. Through informed evaluation of given information about a given site, it is possible to make the best decisions for the project, often discovering that prescriptions and seemingly good ideas cannot always be taken at face value. Each project will have its own innovations that can then be replicated, benefitting the profession and other projects.


THIS IS
EVERY
BUILDING

01



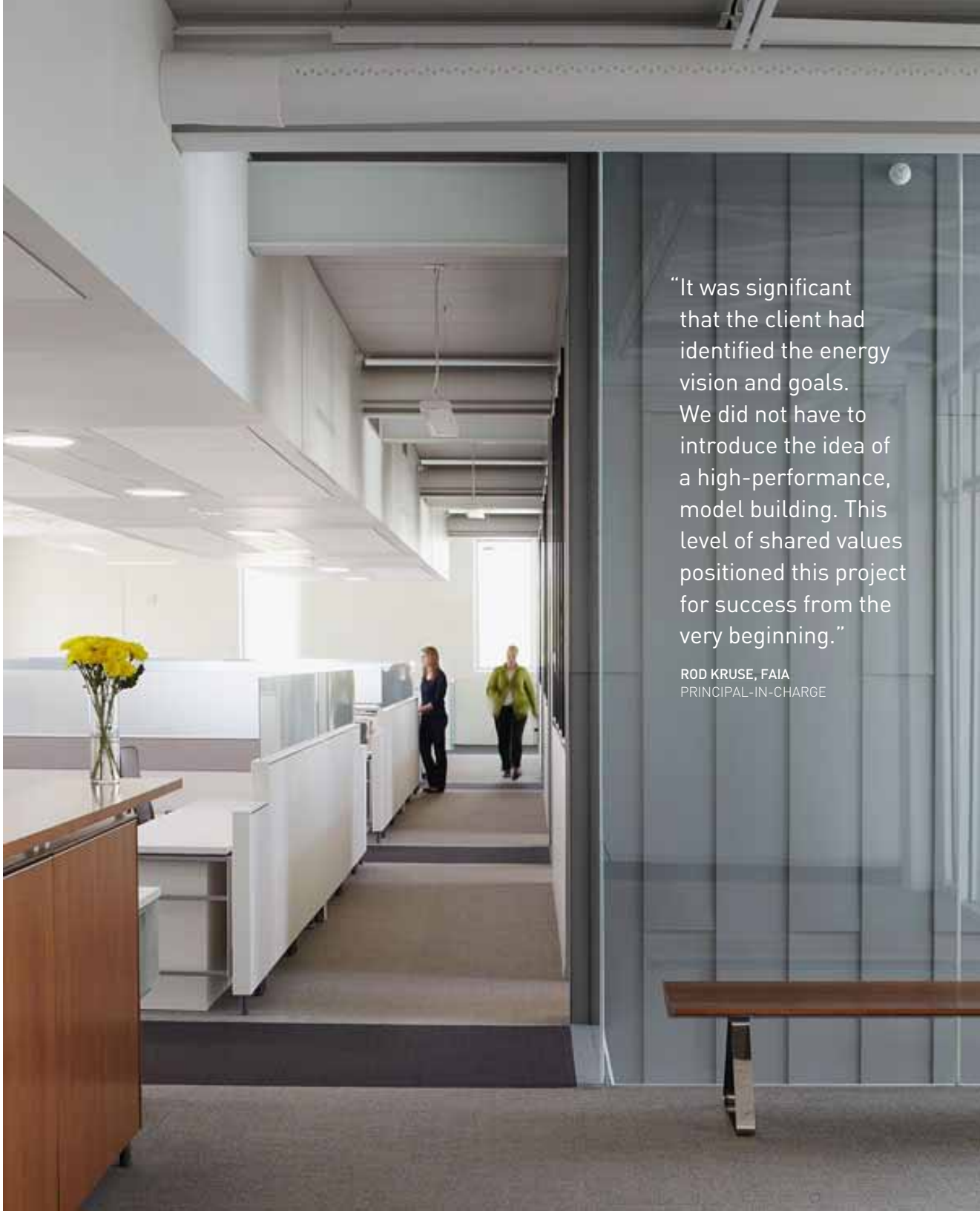
PROCESS

Designing toward a Clear Vision

As home to the regulator of utilities, the new IUB/OCA office building embodies a mission to lead by example for other building owners while educating the public about energy efficiency. At the outset of their new office building project, IUB/OCA presented a clear and fundamental goal to BNIM's project team: achieve or exceed an energy use intensity of 28 kBTU/SF per year, equivalent to 60% energy savings beyond the energy code baseline (ASHRAE 90.1-2004). Secondly, they established a LEED Platinum rating as a goal, giving elevated importance to a range of sustainable strategies such as stormwater management, water conservation, and responsible material use. The client's specified energy performance framed the project and became the primary driver for every decision BNIM's team made throughout the design process.

Through BNIM's high-performance integrated design (HPID) process—which brings all team members and disciplines together in the earliest stages of design—the design and client team members worked collaboratively to identify the strategies vital to performance: building placement and orientation, a high-performance envelope, open-office/enclosed-office relationships, material selection and configuration, geothermal and energy recovery, and most importantly, the complete integration of these strategies and systems.

The energy performance goal allowed the team to quickly establish these core strategies and develop the next level of refinement by integrating them into a design that embodied design excellence while respecting the owner's financial expectations. IUB/OCA's strong directive allowed the big picture conceptual goals to become deeply ingrained in the process. The demand for performance commanded a process to reach the goal efficiently and through each aspect of design and construction.



"It was significant that the client had identified the energy vision and goals. We did not have to introduce the idea of a high-performance, model building. This level of shared values positioned this project for success from the very beginning."

ROD KRUSE, FAIA
PRINCIPAL-IN-CHARGE

A Process for a Market Rate, Net Zero Ready Building

High-Performance Integrated Design (HPID)

The IUB/OCA project is a model case study demonstrating a successful high-performance integrated design process. To achieve the client's performance goals, BNIM brought critical disciplines—civil, mechanical, electical and structural engineers, among others—together at the beginning of the schematic design phase. This early engagement allowed the building and site design to evolve in a way that integrated all systems and strategies. As the design was developed, the team could discuss and analyze the impact of each decision on the various building systems related to building performance. The HPID process helped streamline the design of the building, mitigated costly modifications in later project phases, and yielded a building that is truly integrated in the way it facilitates its performance and function.

Collaboration: BNIM + Integrated Team + Iowa Energy Center

Early in the design process, BNIM worked closely with the Iowa Energy Center (IEC), a research and advising entity administered by Iowa State University and funded through the Utilities Board. The BNIM-led project team, IEC, and client team worked collaboratively through each project phase to discover and ensure the desired level of high-performance design strategies for the new building. This transparent and open feedback loop allowed strategies to be evaluated quickly and collaboratively for the best decisions and results for the project.

Following the building's completion, the IEC has continued assisting the client with documenting the performance of the building.

Prioritizing Goals

Through the team's early process of prioritizing the owner's vision with critical design strategies (orientation, building envelope, and organization of the plan to ensure efficiency and daylight penetration), the design process focused on decision making that emphasized passive strategies for capturing "free energy" simply by using the conditions of the site and climatic data. Energy modeling and daylighting confirmed these decisions and allowed the team to layer additional strategies to reduce the energy consumption with confidence, while eliminating other strategies because the investment would not be offset through increased performance. The visual on the right shows how the goals were listed and prioritized.

Post Occupancy: Measurement and Verification Plan

The IUB/OCA building owners understand the value of monitoring the performance of their new facility. They have developed and are executing a comprehensive energy measurement and verification plan to measure energy use of all building systems including HVAC, plumbing, general lighting, task lighting, office equipment, solar photovoltaics, and server room. To facilitate this monitoring, all outlets are designated in one of three ways: as critical power, noncritical power, or task lighting. Open office and enclosed offices outlets are tied to occupancy sensors that shut down all noncritical loads when not in use (excluding CPUs). Task lighting circuits are individually monitored as part of a larger daylighting study effort within the building to help the owner understand the extent of savings and total energy use assigned to artificial lighting. In this way, the owner can compare calculated energy use and actual energy use and make adjustments to maximize the efficiency of the building systems for additional savings. The project case study is now a viable demonstration model for other projects seeking similar outcomes and performance.


TREATMENT TRAIN
STORM WATER
RAINWATER CAPTURE
ENVELOPE
RECYCLED MATERIALS
OCCUPANT TRAINING
ORIENTATION
NETZERO READY
WEATHER STATION
PHOTOVOLTAICS
TEAM SELECTION
MANAGEMENT
FAÇADE TUNING
DAYLIGHT
NATIVE PRAIRIE
OCCUPANCY SENSORS
REGIONAL MATERIALS
NATURAL VENTILATION
SHARED PARKING
VIEWS
MATERIAL DUALITY
COOL ROOF
OWNER VISION
SITE LOCATION
DISPLACEMENT VENTILATION
PLUGLOAD MANAGEMENT
INTEGRATED DESIGN
BUDGET EFFICIENCY
SUNSHADING
CERTIFIED WOOD
GEOTHERMAL
HEALTHY MATERIALS
PROGRAM
DEMAND-CONTROLLED VENTILATION
CLIENT EDUCATION
WATER CONSERVATION
HOURS OF OPERATION
PLAN ORGANIZATION
PERVIOUS PAVEMENT
KNOWLEDGE SHARING
WIND ENERGY
DAYLIGHT HARVESTING
CONSTRUCTION WATER RECYCLING

01: MINIMIZE ENERGY CONSUMPTION

The mandate was for energy usage of 28 kBtu/SF/Year or Less, a 60% reduction from Code Baseline (ASHRAE 90.1–2004).

02: SERVE AS A DEMONSTRATION PROJECT

The application of multiple passive and active strategies on this project is a model for other Governmental Agencies and Public and Private Sector Building Owners.

03: HIGH PERFORMANCE ON A MODEST BUDGET

This project has proven that exemplary performance can be achieved within a state construction budget, in this case with a cost of $213* per square foot.

04: MONITOR BUILDING PERFORMANCE METRICS

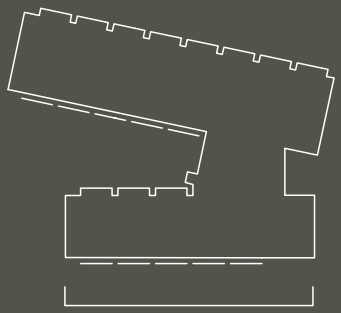
To assist in maintaining the performance of the building, building monitoring is used to tune the ventilation and electrical systems for maximum efficiency.

*based on 2010 market rate

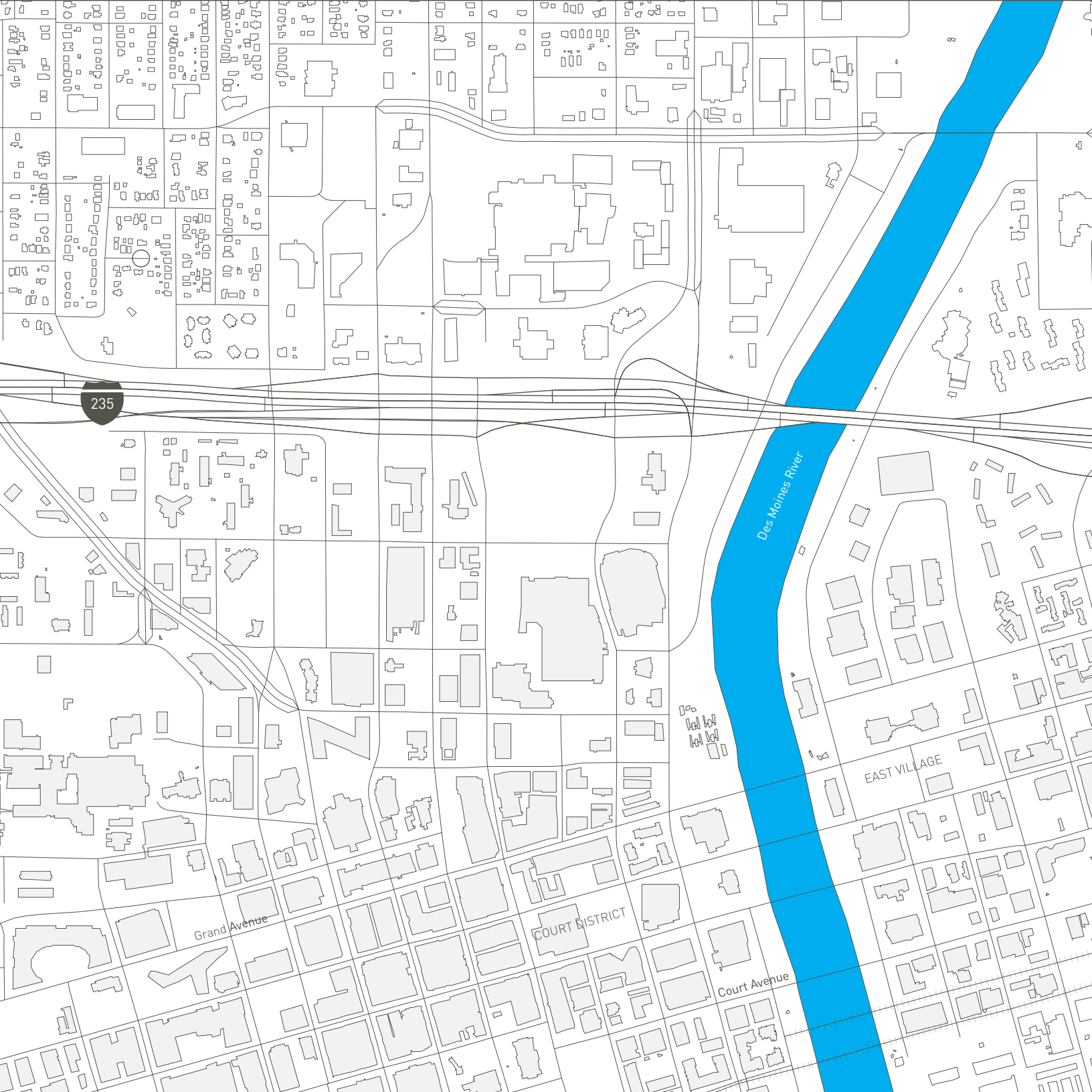
"This project was always framed in reference to the client's initial energy goal. But greater than that, the building was shaped by a larger sustainable spirit shared by both the client and design team. Design decisions were made based on the overall spirit of sustainable stewardship."

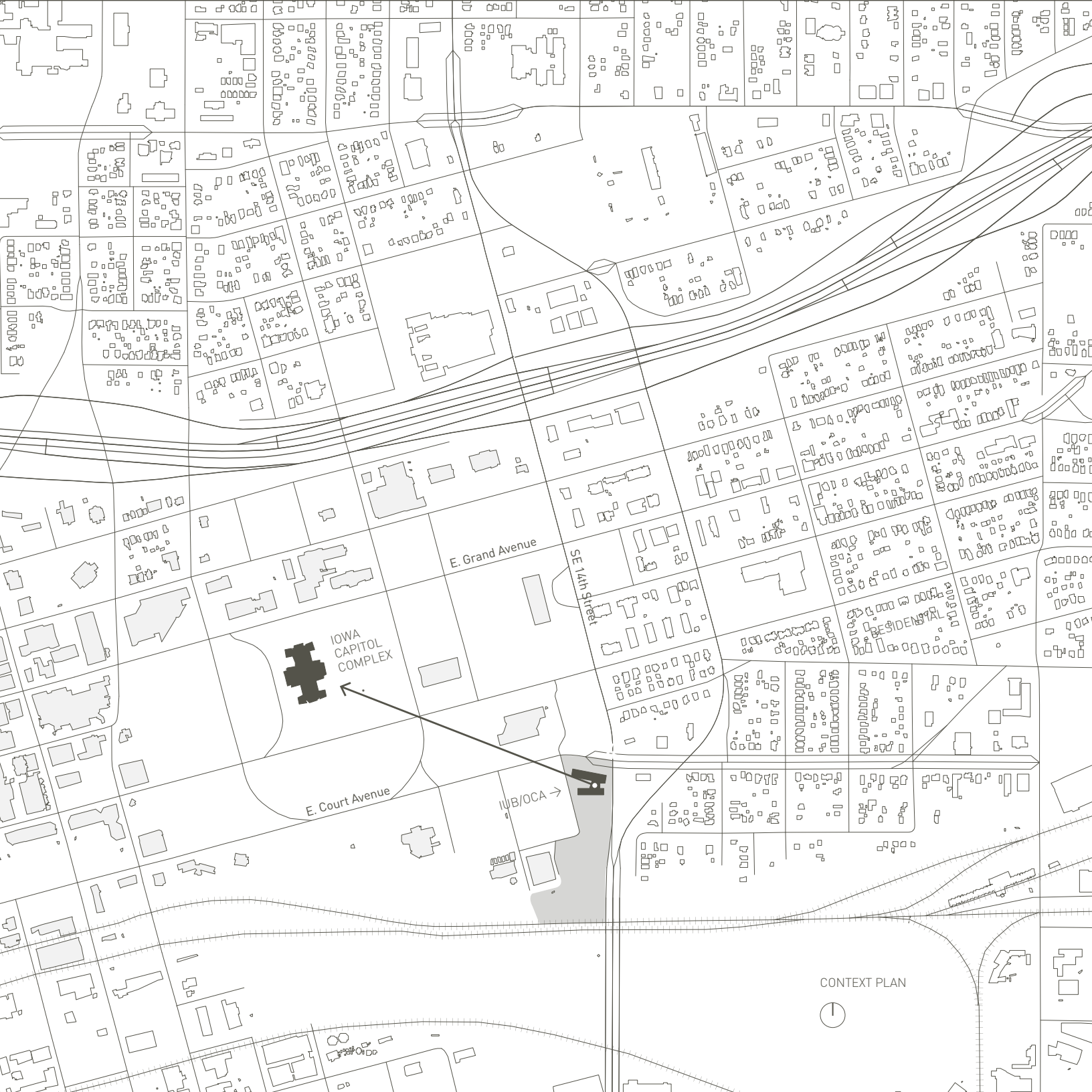
CAREY NAGLE, AIA
PROJECT ARCHITECT

02



BUILDING + SITE


235
Des Moines River
EAST VILLAGE
COURT DISTRICT
Grand Avenue
Court Avenue



CONTEXT PLAN

Context and Site

The selected building site, adjacent to the existing Iowa State Capitol Complex, created a new gateway to the complex at its southeast corner. One of the most important opportunities embodied in the client's vision for this project was the assumption that the new IUB/OCA building would deviate from the more traditional buildings within the Capitol Complex. It would be more contemporary and explicitly different from the existing historic stock while respectful in terms of scale, proportion, and value. It would represent a new generation of civic architecture—one that symbolizes proactive stewardship of both environmental and financial resources. The client's strong sustainability goals would be an outward representation of commitment to model positive development by the State and its agencies.

The new IUB/OCA building and site offer a strong eastern entry to the Capitol grounds, a bridge between varying architectural styles, old and new, and a link to transportation. The Capitol is a significant hub for metro area transit options, as all city routes are available on site or within one transfer. Preferred parking is available on site for vanpools and alternative fuel and hybrid vehicles; showers are provided to encourage cycling and walking; and parking was reduced to the minimum allowed by local code.

The building is sited at the northern edge of its site. The landscape transitions from prairie restoration on the south end of the site to a more formal expression on the north as it merges with the landscape of the larger Capitol Complex. The entrance courtyard is comprised of planting beds filled with little bluestem, a dominant species in the pre-development history of the state. These more organized plantings tie the building into the landscape while showcasing a symbol of the state's natural history.

SITE PLAN

0 50'


Iowa Utilities Board
Office of Consumer Advocate

Building

The new IUB/OCA building marked a significant cultural shift for the two state agencies. Coming from an office environment with tall workstation partitions and limited natural daylight, employees now enjoy a light-filled work environment that fosters collaboration and transparency.

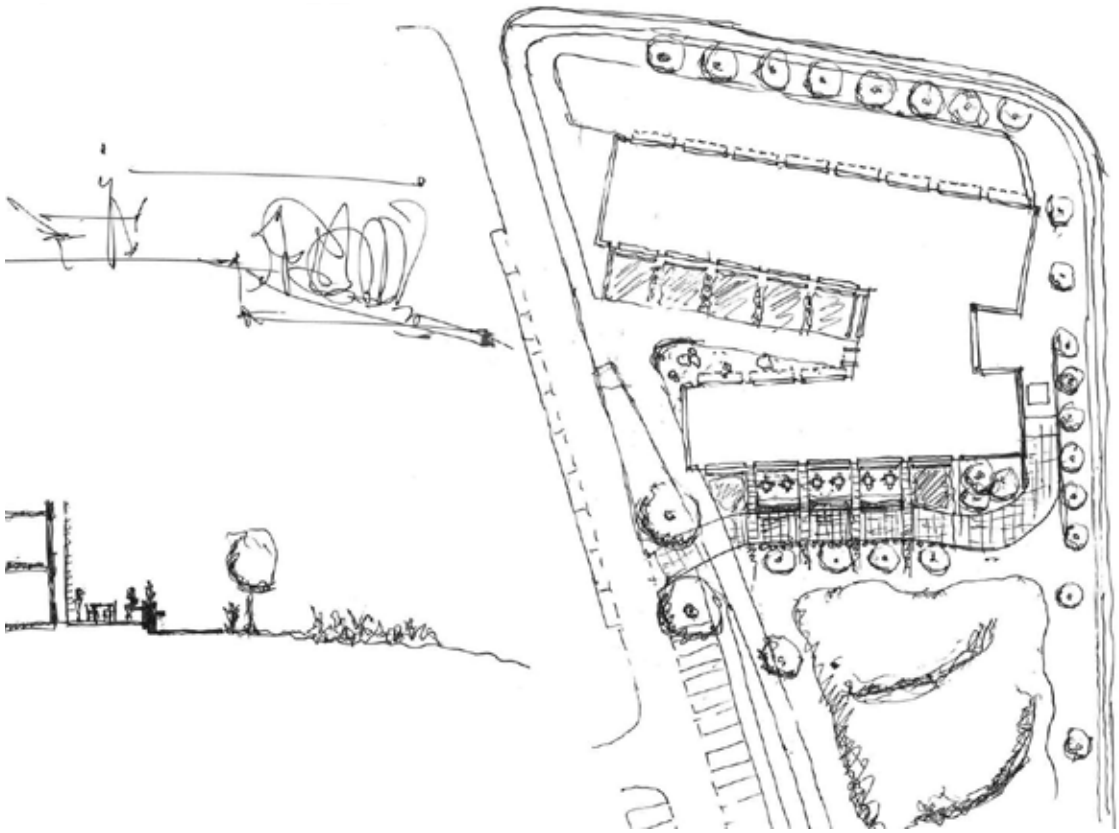
The 44,640-square-foot building is organized in two wings joined by a central lobby. The north wing accommodates the IUB on two levels while the south wing houses the OCA on the second level and common spaces on the ground level.

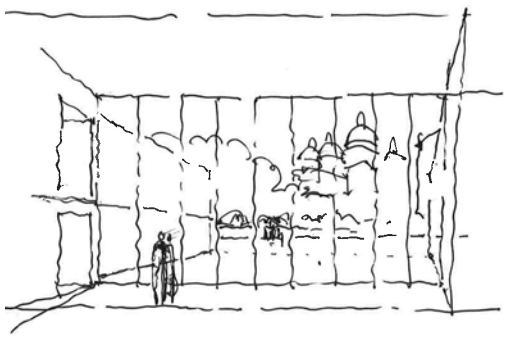
Through their organizational structure, the two wings of the building—joined by the separately articulated connecting lobby—express the function of the distinct state agencies while also providing a space for occupants to mix and collaborate.

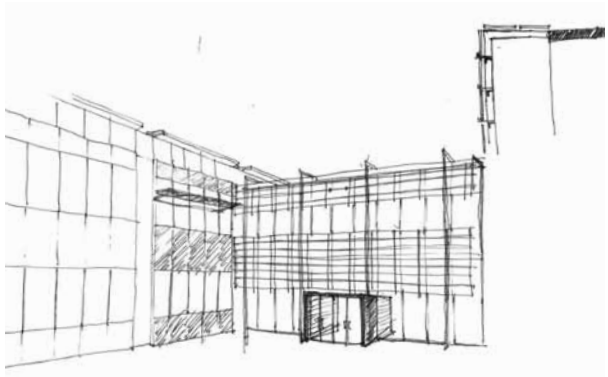
The notion of modularity as a means to support efficiency and long-term growth is articulated in a repeating bay rhythm of 21-foot-wide occupied zones separated by 4-foot-wide cross aisles. This motif appears in both wings and defines the spatial organization for the program and the architecture.

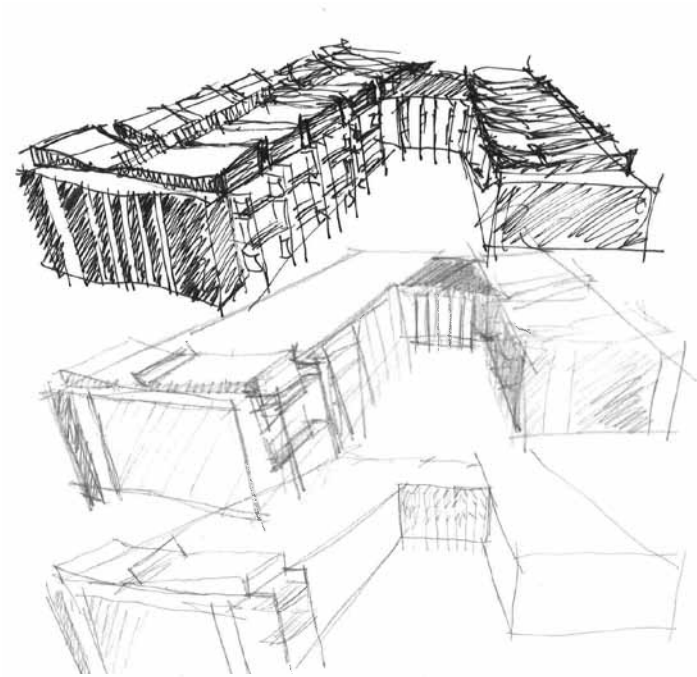
The relationship of solid, void, and translucency underpins the architectural articulation while also supporting the passive strategies to ensure the client's ambitious energy goals. The articulation of the west and east ends anchors each bar and mitigates harsh exposure. Glazing at these ends subtracts from the mass to reveal key views at circulation terminations. The north and south elevations reveal the plan organization and the building's response to the needs of each exposure and occupancy. On the south, the texture of the daylight-harvesting sunscreen provides depth and animation to the façade while also serving to diffuse daylight within the open office spaces. On the north, the envelope of enclosed office masses extend from the interior of the building bar, supporting their daylight needs while also providing borrowed light to the building core. On both elevations, the bay rhythm is strongly expressed, revealing the organization of the interior and providing clear views through the width of the space at the contiguous cross aisles.

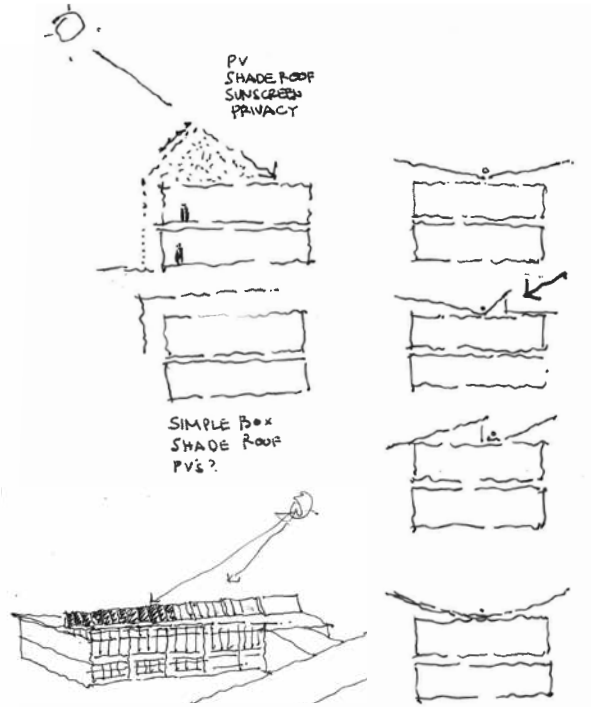
A spare palette of white highlights the daylight-driven design and provides a simple timelessness while further expressing the responsible use of government resources. Warm walnut millwork and wall planes punctuate the interior at key insertions, and the materiality and light of translucent glass enliven the spaces. The employment of a material duality where structure is revealed as finish throughout allows for a single material solution to multiple needs and further promotes an attitude of resource conservation.

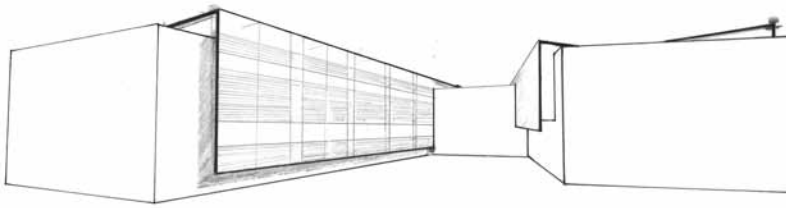


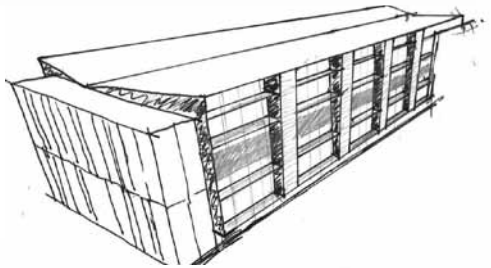


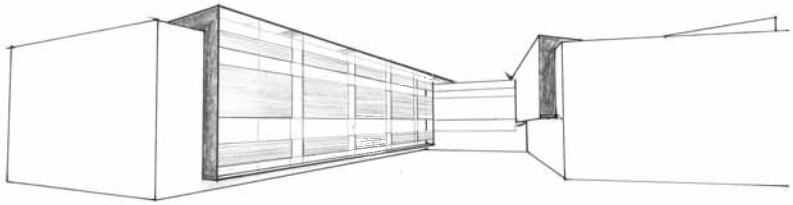


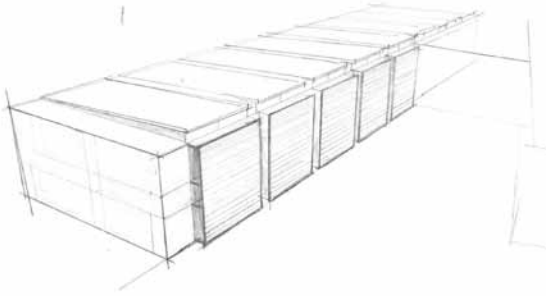


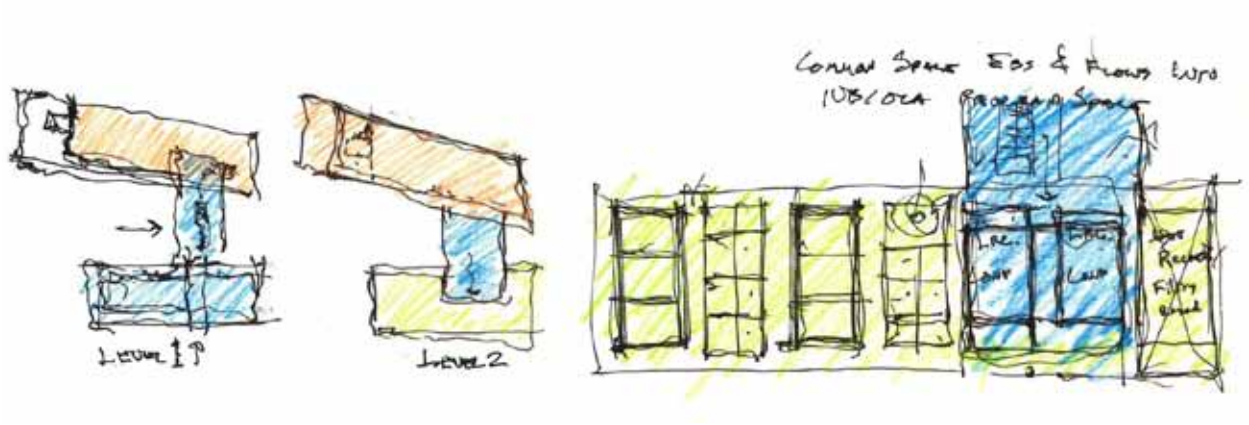

PV
SHADE ROOF
SUNSCREEN
PRIVACY
SIMPLE BOX
SHADE ROOF
PV's?

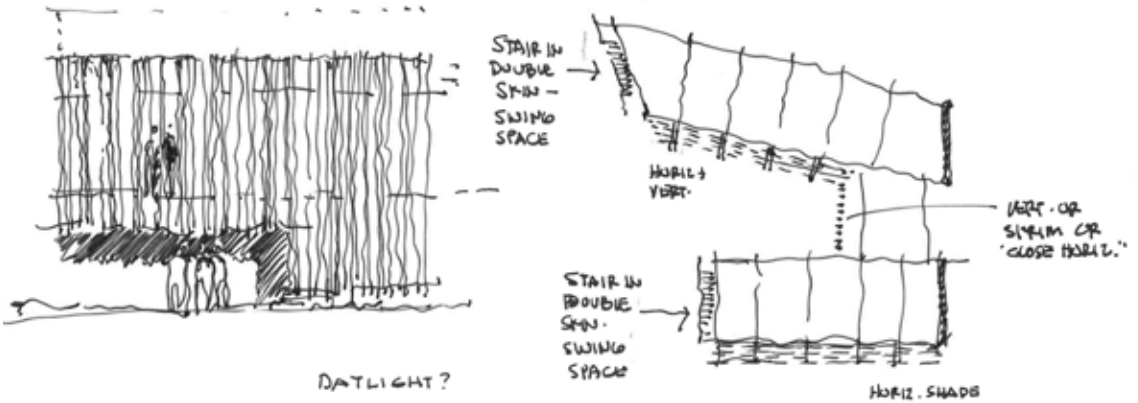


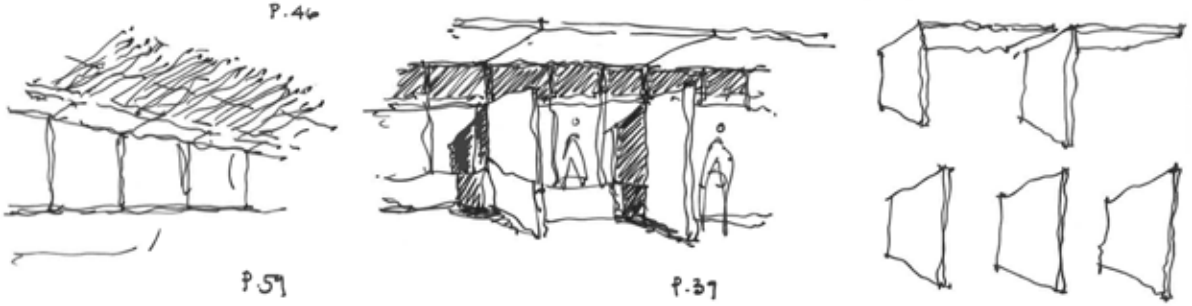







LEVEL 1
LEVEL 2


STAIR IN DOUBLE SPACE - SWING SPACE
HORIZ + VERT.
VERT. OR SYSTEM OF "CLOSE HORIZ."
STAIR IN DOUBLE SPACE - SWING SPACE
DAYLIGHT?
P.46
HORIZ. SHADE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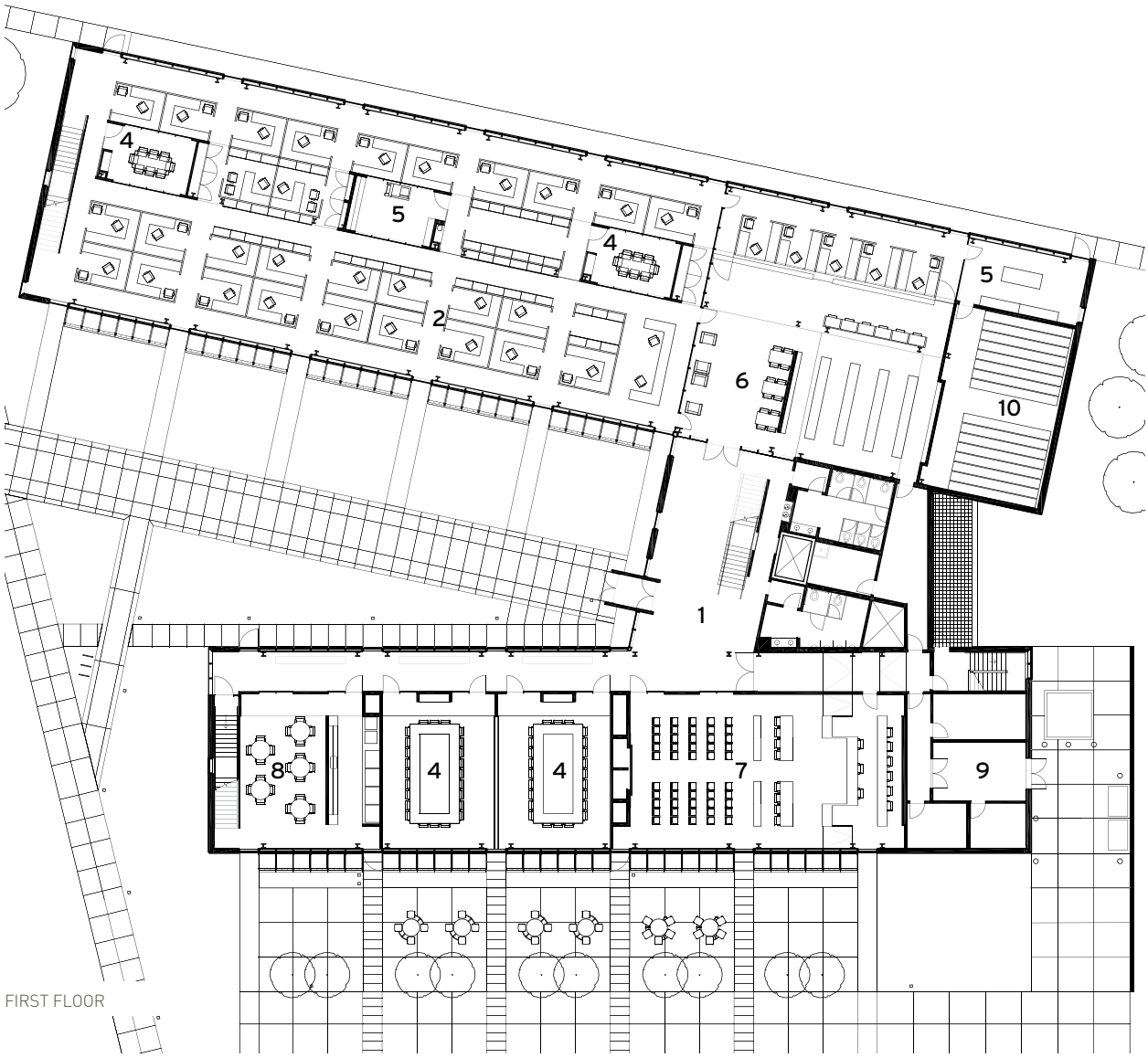
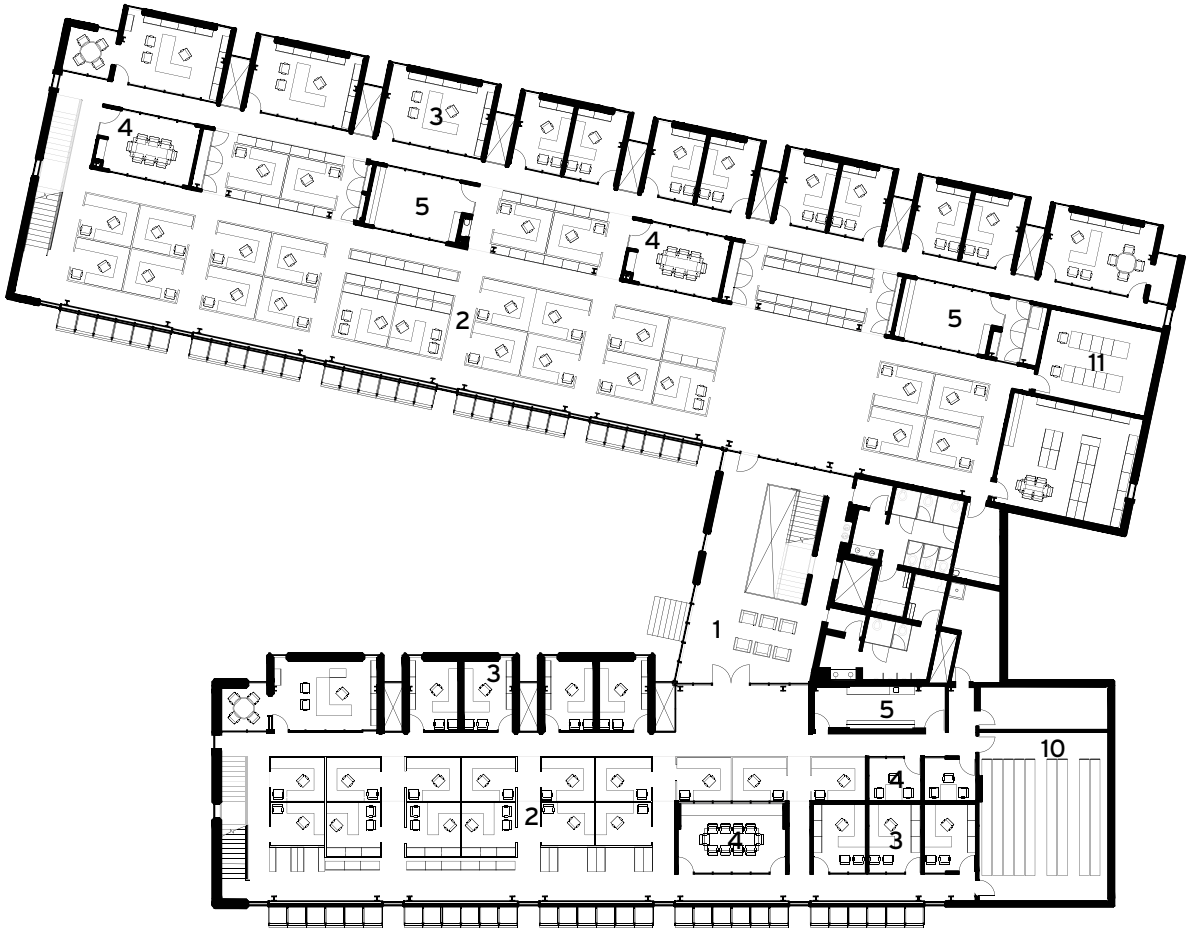
P.39



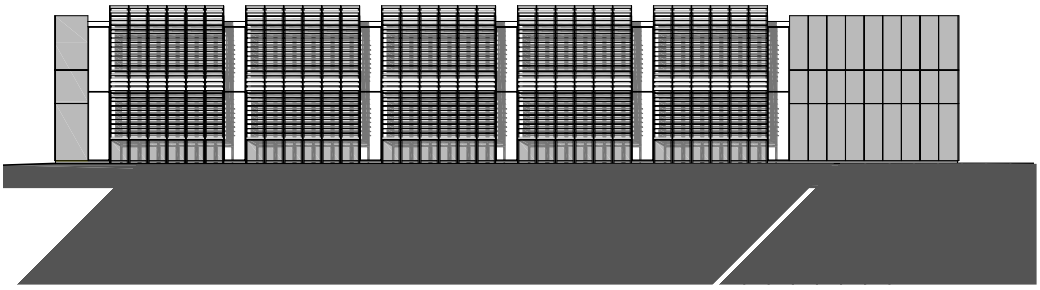
FIRST FLOOR



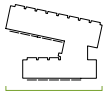
SECOND FLOOR

0 32'

1 lobby
2 open office
3 enclosed office
4 meeting room
5 copy/work room
6 records information center
7 hearing room
8 break room
9 receiving
10 files/storage
11 server room

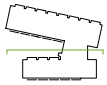


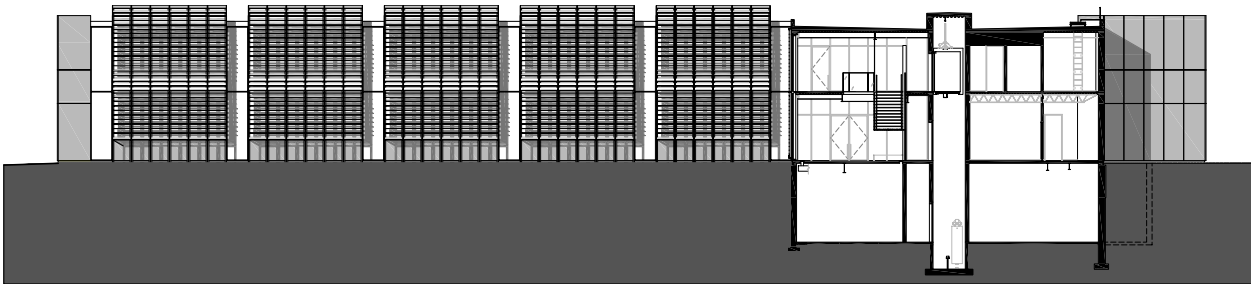
SOUTH WING SOUTH ELEVATION



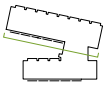
SOUTH WING NORTH ELEVATION

0 32'



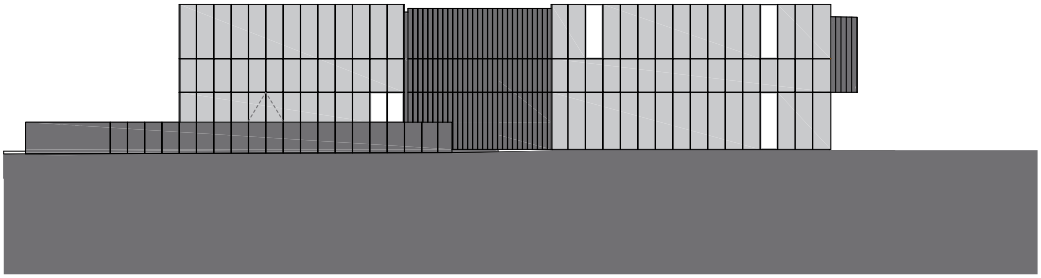


NORTH WING NORTH ELEVATION

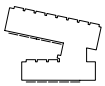


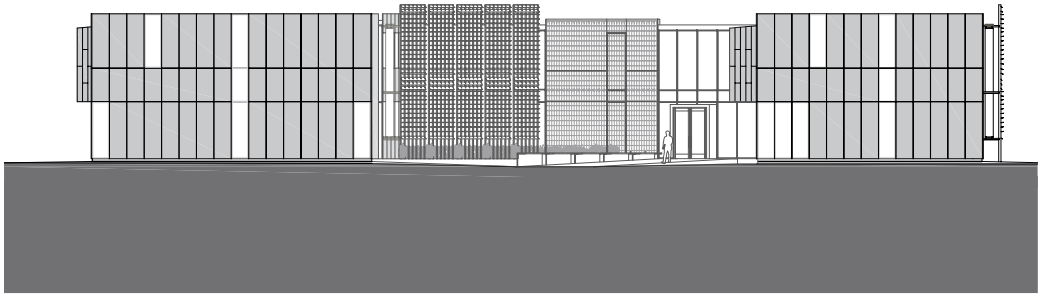
NORTH WING SOUTH ELEVATION


1375



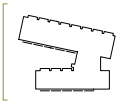
EAST ELEVATION

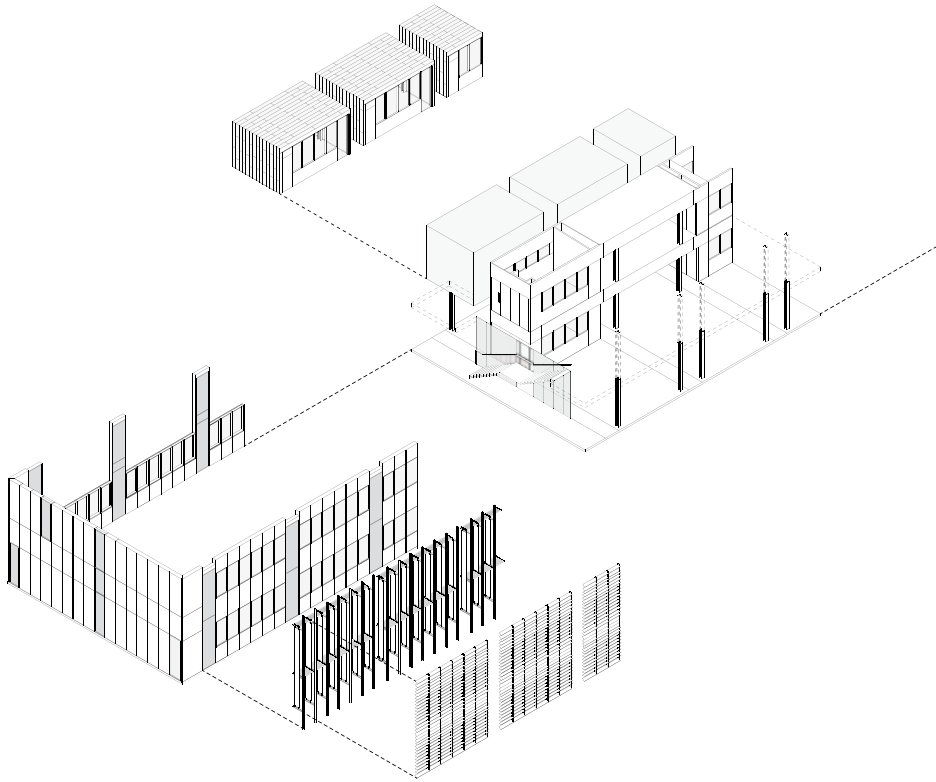


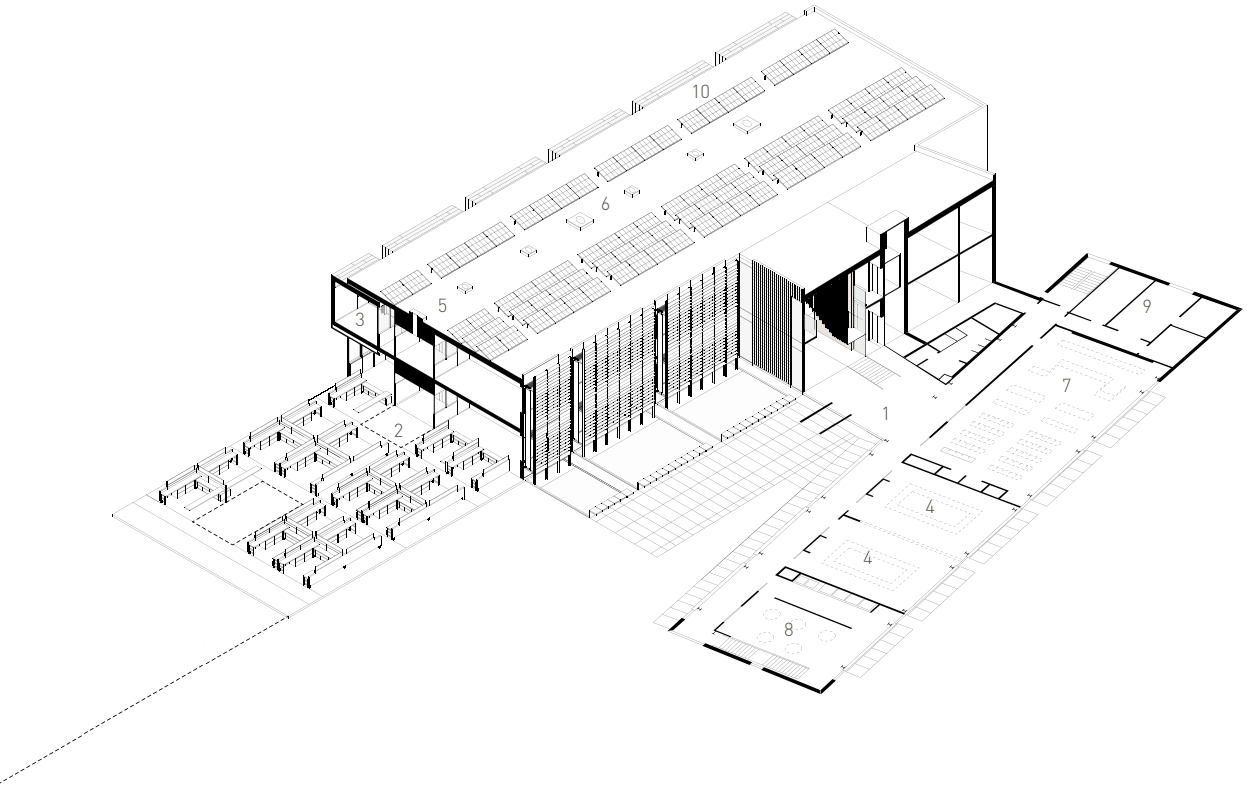


WEST ELEVATION

0 32'





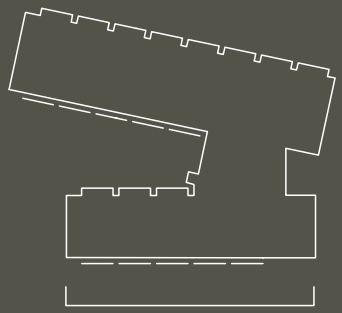


AXONOMETRIC

0 24'

1 lobby
2 open office
3 enclosed office
4 meeting room
5 light tube
6 cool roof
7 hearing room
8 break room
9 receiving
10 photovoltaic panels

03



REPLICATION + INNOVATION


EXIT

DESIGN STRATEGIES

The IUB/OCA building project represents a paradigm shift from the traditional process of innovating for the sake of innovation alone. It pioneers by examining the building as a series of layers, and within each layer an integrated network of high-performance systems. It embodies a process of replication and innovation—that is, taking an existing concept, evolving its form and performance, and sharing it so that the innovation may be adopted and further developed by others for future applications. This cycle of continual improvement goes from simple innovation to identifying patterns for replication in other projects.

By replicating past successful strategies and building upon the foundation they provide, those in the industry can continually innovate new solutions and constantly broaden the base of replicable strategies to build upon in the future. In the case of IUB/OCA and its demonstrable goals, those strategies become a public knowledge base for replication by others.

The search for and development of new processes, products, strategies, and methodologies within the IUB/OCA project has given rise to a case study for implementation that can be shared with others—government entities, design professionals, educators, real estate developers—in pursuit of hyper efficiency.

While many building's replicable strategies are "off the shelf," what makes their application significant in this project is the multitude of strategies integrated together to achieve exemplary energy performance. The synergistic opportunities of these multiple strategies have a multiplier effect on the building's performance.

1. PASSIVE STRATEGIES
2. DAYLIGHTING STRATEGIES
3. NATURAL VENTILATION
4. BUILDING ENVELOPE
5. ENERGY SYSTEMS
6. MATERIALS
7. SITE ECOLOGY
8. WATER STRATEGIES
9. LONG LIFE, LOOSE FIT

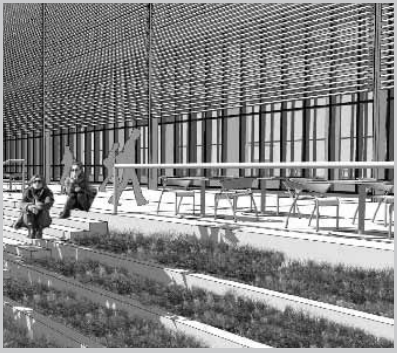
Replication and Innovation = Continual Improvement

The precast system utilized on the IUB/OCA building has already inspired subsequent BNIM projects.

For the new Bloch Executive Hall at the University of Missouri-Kansas City's (UMKC) Bloch School of Management, BNIM's project team used the IUB/OCA precast system as a starting point for a unique insulated concrete wall systems clad in polychromatic terra-cotta panels that connects the new facility with existing buildings and campus context.

Insulated precast offers high performance energy characteristics, speed of construction, durability and low cost, but an exposed precast aesthetic did not blend well with the UMKC campus. Since the high cost of terra-cotta lies not in the material but in the installation process when installed traditionally, a hybrid approach was proposed for the new building—combine low-cost, high-performance insulated concrete panels with beautiful polychromatic terra-cotta installed in the factory. This is the first time this system has been used. The collaboration included the general contractor, concrete panel fabricator, and terra-cotta manufacturer.

For the Qualcomm's new AY & AZ buildings, BNIM employed a strategy of replication-innovation with regard to the sunscreens that were originally developed for the IUB/OCA project. At the outset of design for the new Qualcomm buildings, the IUB/OCA building was used as a model to inform development and high-performance strategies, and the Qualcomm team used IUB/OCA's daylight harvesting sunscreens as a take-off point for a much larger installation on the southern elevations of the AY building.

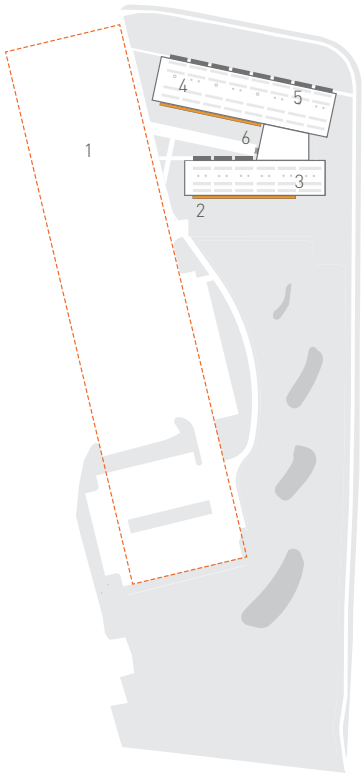


They employed a similar configuration of horizontal louver blades and vertical screens to mitigate heat gain and glare while employing a simple parabolic shape to harvest and deliver daylight deep into the building's shallow north-south footprint. The sunscreens were appropriately tuned to the local climate and building and massaged so as to respond to the specific conditions of the AY building's articulation and scale.


REPLICATION
CONTINUAL IMPROVEMENT
INNOVATION

1. PASSIVE STRATEGIES

Though renewable energy solutions are often assumed to be the primary solution to the challenge of energy savings, the design team analyzed and employed hyper-efficiency and passive strategies first. These strategies capture the "free energy" first—energy gained through strategic siting, orientation, and climate. Only after load reductions through passive means were effectively implemented did the team turn to renewable options. The rigorous use of passive strategies is the greatest opportunity for market-rate, net-zero projects to become a realistic norm.

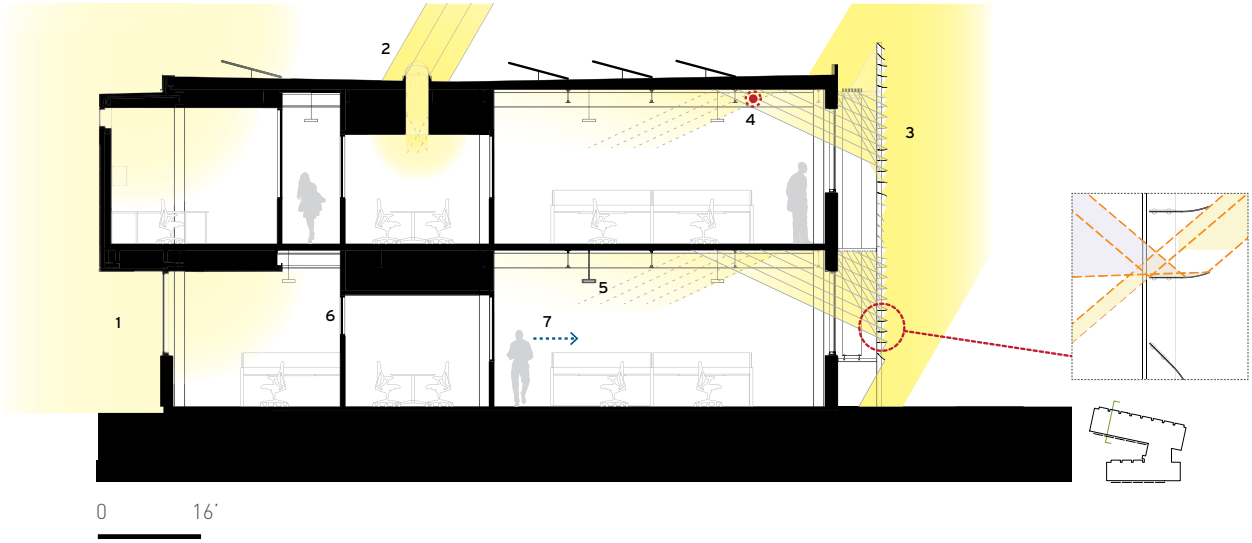


1 geothermal well field below existing parking
2 daylight harvesting sunscreens
3 photovoltaic panels
4 cool roof
5 light tubes
6 green wall

2. DAYLIGHTING STRATEGIES

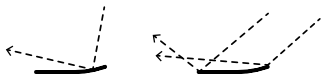
More than 98% of regularly occupied spaces in the IUB/OCA building have daylight and views due to the glazing on the northern and southern elevations. The team innovated the design of a daylight harvesting sunscreen that was modeled to exceed the performance of traditional louvers by capturing daylight down to eye level rather than the 8' height offered by traditional light shelf systems.

The design team determined the articulation at each façade based on sun exposure. The high-performing louvered sunscreens, with horizontal blades and vertical fabric panels at the south elevation of each wing, reflect daylight during all seasons, block unwanted summertime heat gain, and allow passive winter heating. The parabolic profile reflects high elevation summer sun off of the curved portion and low winter sun angles off of the flat portion of the louvers. The sunscreens, combined with an optimal building footprint depth, allows daylight to penetrate deeply into the building during all seasons. Zinc-clad office enclosures on the north elevations take advantage of diffused northern light. Solid west and east elevations define the mass of each wing with glazing strategically located to frame views.



1 diffuse northern daylight
2 light tubes
3 daylight harvesting sunscreen
4 light sensors
5 daylight responsive artificial lighting
6 interior glazing transmits daylight
7 exterior view throughout

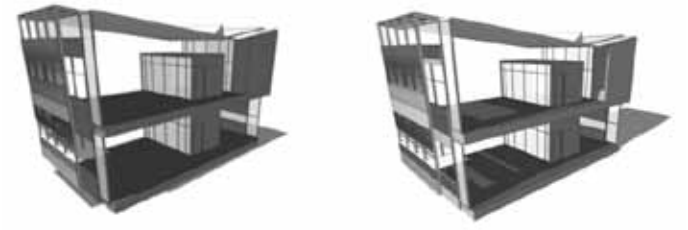
Sunscreen Conditions



summer winter

Summer Winter

Light Shelves

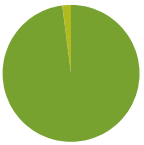


Mesh Screen

Horizontal Louvres

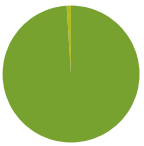
In 2012, Brooks Borg Skiles Engineering, LLP and the University of Idaho Integrated Design Lab conducted a comprehensive daylighting and glare analysis of the new IUB/OCA building. The report, prepared by Kevin Van Den Wymelenberg, PhD of the University of Idaho, stated that the design of the building and its daylighting strategies were not only successful, but also provide a valuable case study for others in the industry to reference as a model. An excerpt taken from the glare analysis report:

"The energy use index (20-22 kBTU/SF/YR according to building staff) is evidence of a truly effective energy efficient design and an equally well operated and maintained building. Documenting these energy savings and sharing them with the broader design community...are important opportunities for the ownership and project teams as well as for the design profession as a whole. This building case study has the potential to meaningfully impact the knowledge and practice of the lighting and daylighting scientific and design communities." (Van Den Wymelenberg, K., Ph.D. November 1, 2012.)



98.09%

Regularly occupied spaces with daylighting



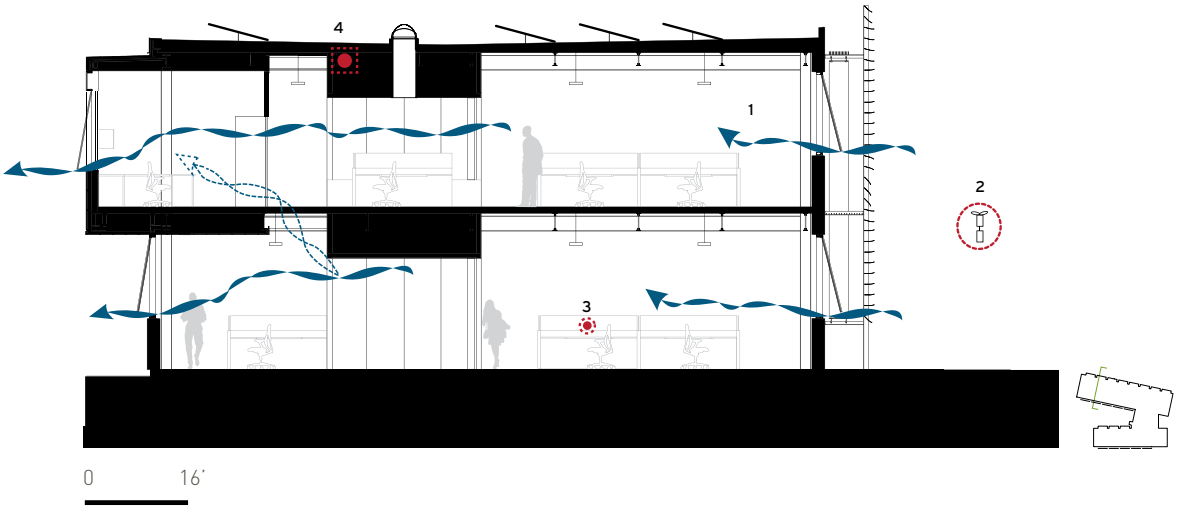
98.94%

Regularly occupied spaces with views

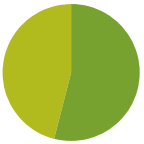
3. NATURAL VENTILATION

The project team employed an overarching theme of interconnection between the building interior and the exterior context and landscape that allows users to perceive exterior conditions and understand when to utilize natural ventilation. All employees have access to operable windows.

The building's automated system and on-site weather sensor monitor exterior conditions, and the system sends emails to occupants instructing them to open or close windows based on weather conditions. The automation system shuts down associated zone's heat pumps when windows stay open, ensuring energy is not wasted.



1 operable exterior windows
2 weather sensor measuring temperature, humidity, wind speed, and direction
3 weather station alerts occupants to open and close windows
4 mechanical system shuts down when windows are open



53.5%

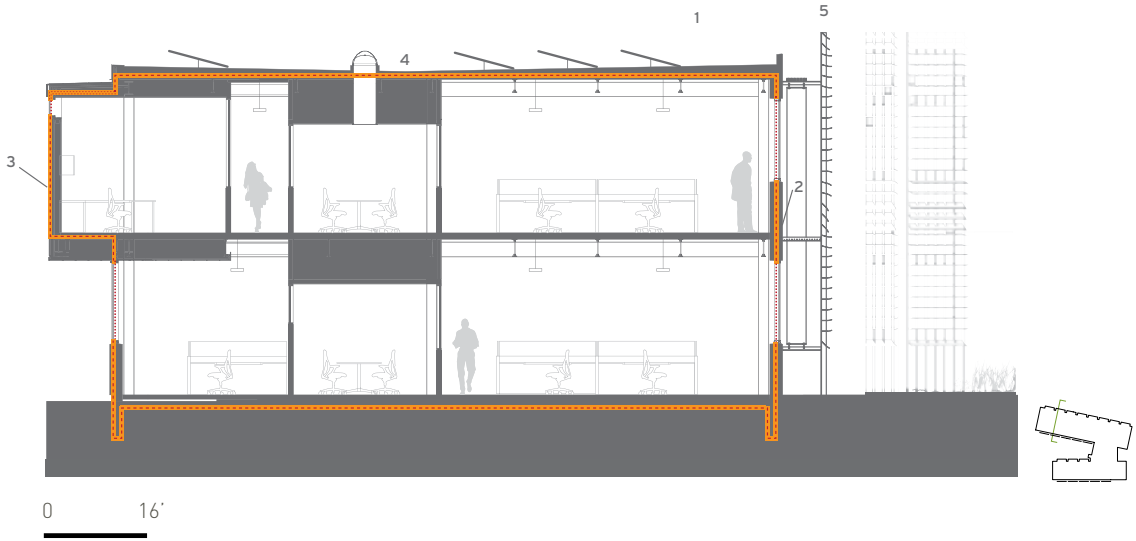
Regularly occupied spaces within 15’ of operable windows

100%

Occupants have access to operable windows

4. BUILDING ENVELOPE

The envelope was meticulously detailed to avoid thermal bridging, which is typically responsible for significant envelope losses in traditional construction. In the Des Moines climate of hot/cold extremes, white Thermomass precast concrete (with continuous insulation and non-thermally conductive ties) provides a simple yet high-performance envelope, eliminating traditional thermal bridging at roof interfaces, foundation walls, and wall openings. The team innovated details that allow insulation to wrap uninterrupted from the roof into the thermal wythe of the wall panel and down and around the foundation system and across the underside of the slab on grade. These detail innovations are now being delivered as "standard options" in the manufacturer's offerings.



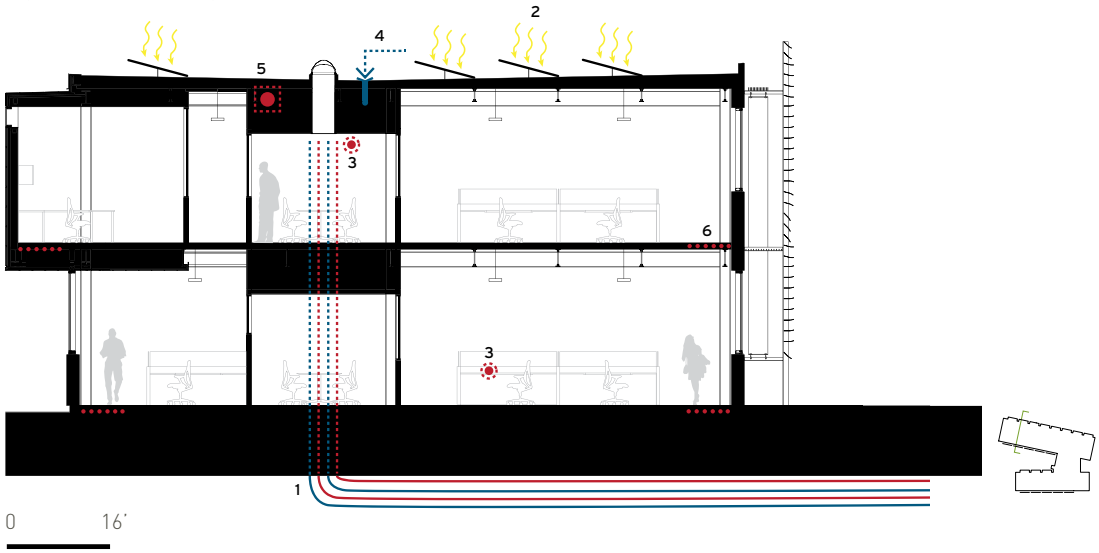
1 continuous thermal and air barriers at construction interfaces
2 thermomass precast concrete wall system
3 zinc cladding
4 cool roof
5 daylight harvesting sunscreen

"Knowing the potential impact of thermal envelope losses on low energy buildings, the team was obsessive about thermal bridges. In addition to systems such as the precast sandwich panel skin with non-thermally conducting ties, details were innovated to eliminate thermal bridging at major building element interfaces, a significant source of loss in traditional construction."

CAREY NAGLE, AIA
PROJECT ARCHITECT

5. ENERGY SYSTEMS

Optimal orientation and massing, along with a hyper-efficient building envelope, support the building design's contribution to a secure energy future. Additional strategies allow the building to outperform a goal of 60% energy savings beyond the energy code baseline by 15%. The owner has implemented a comprehensive energy measurement and verification plan to measure energy use of all building systems including HVAC, plumbing, general lighting, task lighting, office equipment, solar photovoltaics, and server room. This plan will allow the owner to compare calculated energy use and actual energy use and make adjustments to maximize the efficiency of the building systems. The project team, not wanting to overstate results, developed the energy model to reflect conservative performance. Plug load strategies, for example, were not given full credit in the model despite the estimation that they would pay dividends. The owner and project team believe that occupancy sensors at each workstation are saving more than 10% of the baseline lighting energy use in this building.



1 geothermal system
2 photovoltaic roof panels
3 occupancy sensors for lighting and plug load reduction at each work station and office
4 stormwater filtered and infiltrated on site
5 continuous monitoring of all systems
6 perimeter radiant heating

* Variable frequency drives; high-efficiency, low-power density lighting; automated dimming for interior lighting; occupancy sensor for lighting and workstation plug loads; time-of-day control of office equipment plug loads; CO2 sensors for moderated control of ventilation air

6. MATERIALS

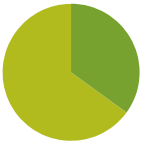
Materials, fenestration, and detailing throughout the building share a common thread of material duality, enabling singular material systems to serve multiple purposes. Exposed structure, carefully organized into a rhythmic bay arrangement, expresses conservation of both materials and fiscal resources. A simple precast panel skin features elegant, minimal detailing while serving as a continuous thermal envelope. Details define articulation, like the outer wythe of precast skin falling away to create an exterior recessed base condition, allowing the mass to land softly on the landscape.

The project team carefully selected finishes based on a number of criteria: cumulative reduction in material use, inherent qualities, integration with the overall design, contribution to a healthy environment, and embodiment of the state's efficient use of limited resources. The team also exploited structural elements as finished materials, choosing to tightly detail structural elements to create an elegant aesthetic. The interior finish of the precast panels, for instance, remains exposed as a lightly sandblasted hard-troweled concrete finish, which saved significant materials and cost and greatly reduced drywall dust, which led to a healthier construction site. Similarly, more than 50% of the ceiling is exposed acoustical composite deck; the lobby and restrooms make use of a finished concrete deck.

The reduction in materials also freed finances that the project team redirected toward achieving energy goals. This approach offset some of the costs of other items in the big picture.

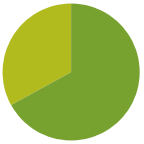
Materials contribute significantly to the stewardship of the building. A few strategies, among others, include:

- Agrifiber, a rapidly renewable and regionally sourced material, was used for the door cores.
- Furniture achieves Cradle-to-Cradle certification or equivalent standard.
- Low V.O.C. material is used throughout.
- All furniture within the project is Greenguard certified at a minimum.



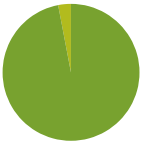
35%

of total material content was recycled



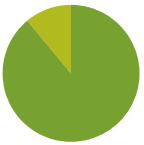
67%

of materials were regionally extracted, harvested and fabricated



96%

of wood used was Forestry Stewardship Council certified, hence responsibly harvested



89%

of construction waste was recycled

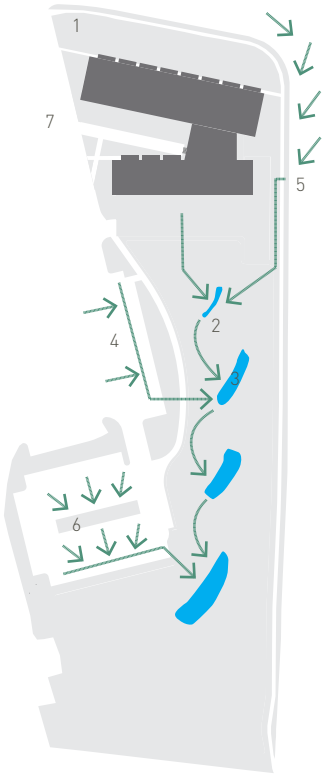
7. WATER STRATEGIES

The IUB/OCA project represented a leadership opportunity in the wake of recent catastrophic flooding and water quality issues that affected the state.

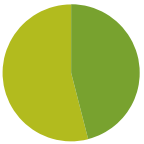
By managing stormwater from both the immediate and adjacent sites, the project is a good neighbor and good example. The stormwater treatment train consists of a stormwater interceptor, infiltration basin, rain gardens, bioswales, and pervious pavement. Stormwater enters the landscape through a limestone boulder sediment trap that slows water and controls erosion. It moves across the native prairie restoration into infiltration basins planted with native grasses, where root structures host organisms that feed on suspended pollutants. The basins feature valves that regulate the system when plants are being established or for longer detention during storm events.

Native species encourage additional infiltration with a lower runoff coefficient. Simple farm terraces throughout the state inspired the process of water movement across the landscape, while moderating steep site slopes. The native prairie restoration on the Capitol Complex grounds, while serving as a symbol of the pre-development condition of the landscape, also serves to draw attention as a demonstration component that can be effectively replicated for other projects throughout the state.

Inside, a simple and replicable strategy—comprised of ultra-low-flow plumbing fixtures with sensors and faucet aerators and automatic sensors to reduce water flow—contributes to a water-use reduction of 46% compared to a typical office building.

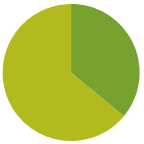


1 rain garden
2 sediment basin
3 water infiltration basin
4 pervious pavement
5 off-site storm diverter
6 bioswale
7 on-street parking (minimizes impervious surface)



46%

Reduction in Potable water use



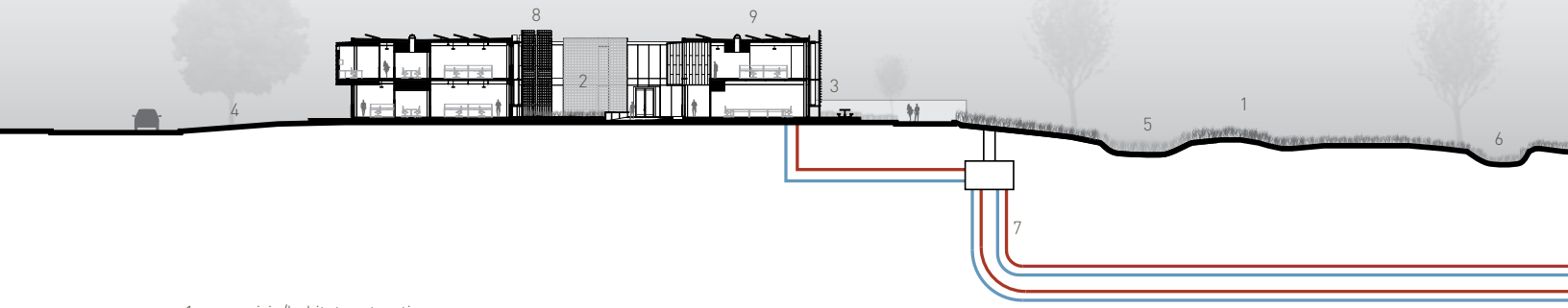
36%

of rainwater/stormwater from a 2-yr rainfall event is captured and treated on site (goes back to water table)

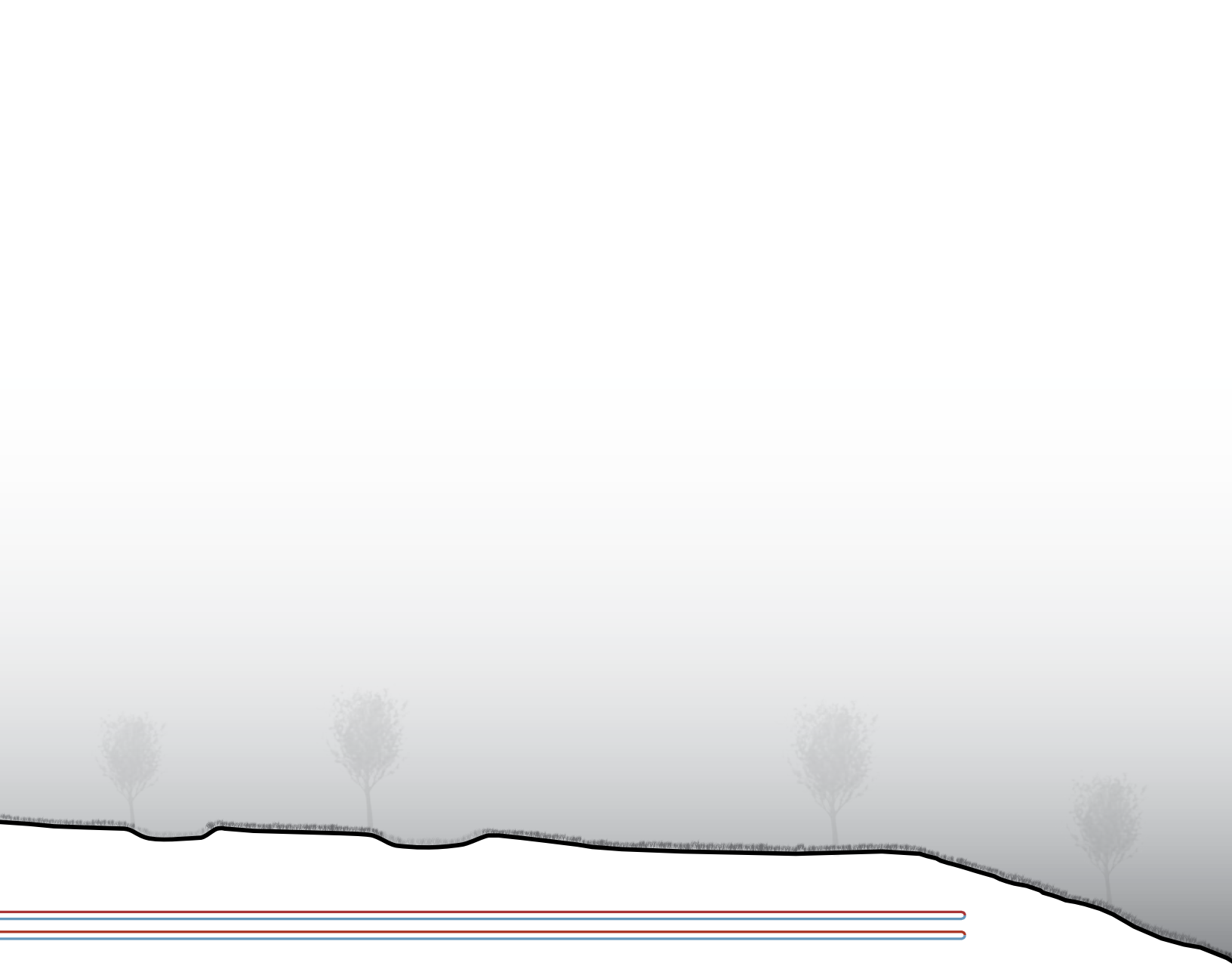
100%

of stormwater from average rainfall event on this 6 acre site is captured and infiltrated

In addition, 100% of stormwater from the adjacent 6 acres is also diverted to this site for treatment and infiltration.



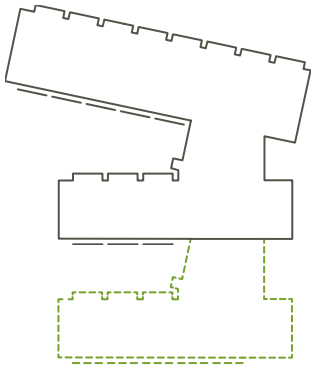
1 prairie/habitat restoration
2 entry court
3 south patio
4 rain garden
5 sediment basin
6 water infiltration basin
7 geothermal bore field
8 louvered sunscreens
9 photovoltaic panels



8. LONG LIFE, LOOSE FIT

First and foremost, the building's parti, with two wings emanating from a central lobby, supports long-term flexibility. Each wing utilizes an open-plan configuration, and the modularity of the workplace design allows the space to adapt to evolving functional needs or relocation of staff. The wings, or bars, were chosen to support a seamless future addition to the south, should the need arise.

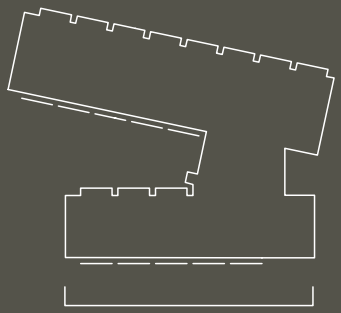
Within the building, a flexible approach extends to the support spaces, where conference areas were sized and designed to serve the entire Capitol Complex. Large conference rooms employ an operable partition, allowing them to be scaled up or down for various needs. The hearing room is "right sized" for typical crowds and includes A/V connections that support overflow viewing in the adjacent large conference rooms. Furthermore, durable materials such as zinc cladding and precast concrete wall panels allow for a 100-year useable life, no matter the tenant.



FUTURE ADDITION

	REPLICATION	INNOVATION
1. Passive Strategies	• Building Orientation • Shallow N-S footprint depth • Daylighting • Natural Ventilation • Solid West and East envelope • Mitigate heat gain • Mitigate glare	• Energy reduction through informed high-performance integrated design • Elimination of thermal bridges • Innovative building envelope details
2. Daylighting Strategies	• Daylight/windows • North diffuse light • Views • Light Shelf • Daylight-reponsive dimming	• Light tubes • Daylight-harvesting sunscreen • Parabolic Louver blades (high angle summer daylight and low angle winter daylight) • Shorter furniture panel system provides daylight 50% more of the time at the building core • 98% of all spaces are daylit
3. Natural Ventilation	• Operable windows	• Weather station • Building automation system alert • Systems tie-in • Cost effectiveness of implemented strategies
4. Building Envelope	• Cost effective precast envelope • Horizontal windows • Efficient thermal envelope • Cool roof	• Daylight harvesting system becomes the articulation • Thermal bridging mitigation • Non-conductive precast system • Material duality • Thermally isolated zinc cladding anchor system • Glazing attuned to exposure • Green screen provides shading and localized cooling effect
5. Energy Systems	• Geothermal heat pump system • Total energy recovery system • Radiant heating • Building automation system • User controlled ventilation • CO2 sensors • Occupancy sensors • Time-of-day outlet controls	Combination of many strategies, such as: • 1-to-1 energy management at open office workstations (developed system with manufacturer for 1-to-1 control as opposed to previously available capability that required 4 vacant workstations prior to plug load control) • Vast array of energy monitoring techniques • Partnership with Iowa Energy Center (IEC) • On site renewable energy – photovoltaic panels • Research and demonstration components
6. Materials	• Appropriate finishes • Durable materials	• Responsible material selection / conservation • Healthy indoor environment • Sustainable manufacturing and harvesting (do we want to insert recycled and regional material, FSC wood and construction waste stats here)
7. Site Ecology	• Shared Parking	• Native prairie restoration and demonstration on State Capitol Complex • Habitat restoration managed on site
8. Water Strategies	• Stormwater Strategies • Water-conserving fixtures	• Management of 6 acres of off-site stormwater • Stormwater treatment train
9. Long Life, Loose Fit	• Modular, flexible design	• Coordination of two agencies to achieve commonality in spatial design and ability to meet the needs of potential future occupant agency • Supports potential expansion of future south wing

04



RESULTS

Developed at the beginning of the design process, the Visionary Goals (pages 18-19) for the IUB/OCA project served as a road map for each decision made throughout design and construction. The building's site, configuration, fenestration, materials, systems, and technology all reflect careful consideration given to how each would contribute to the four goals.

VISIONARY GOAL 01: MINIMIZE ENERGY CONSUMPTION

Through a variety of means, including the MidAmerican Energy Commercial New Construction program, the project team analyzed optimal orientation, glazing, and massing options for the building to reduce the energy use before any systems were designed. Based on their findings, they selected a high-efficiency mechanical system using water-to-air heat pumps coupled to a geothermal well field with total energy recovery of ventilation. A number of efficient, integrated lighting strategies—including automatic daylighting controls, occupancy sensors, and a task ambient lighting system—contribute to an overall 60% energy reduction goal for the building compared to an ASHRAE 90.1-2004 code-compliant building. With a goal of 28 kBTU/SF for the project, the project team paid significant attention to the plug loads. The team worked with the owner to choose Energy Star equipment and to control the equipment with occupancy sensors as much as possible to reduce energy use not only during the day, but also during the night to eliminate "phantom" loads. Once the loads had been reduced as much as possible, the team applied a photovoltaic system to further reduce the energy footprint.

MEASURED AVERAGE ANNUAL ENERGY USE (kBTUs/sf/yr)

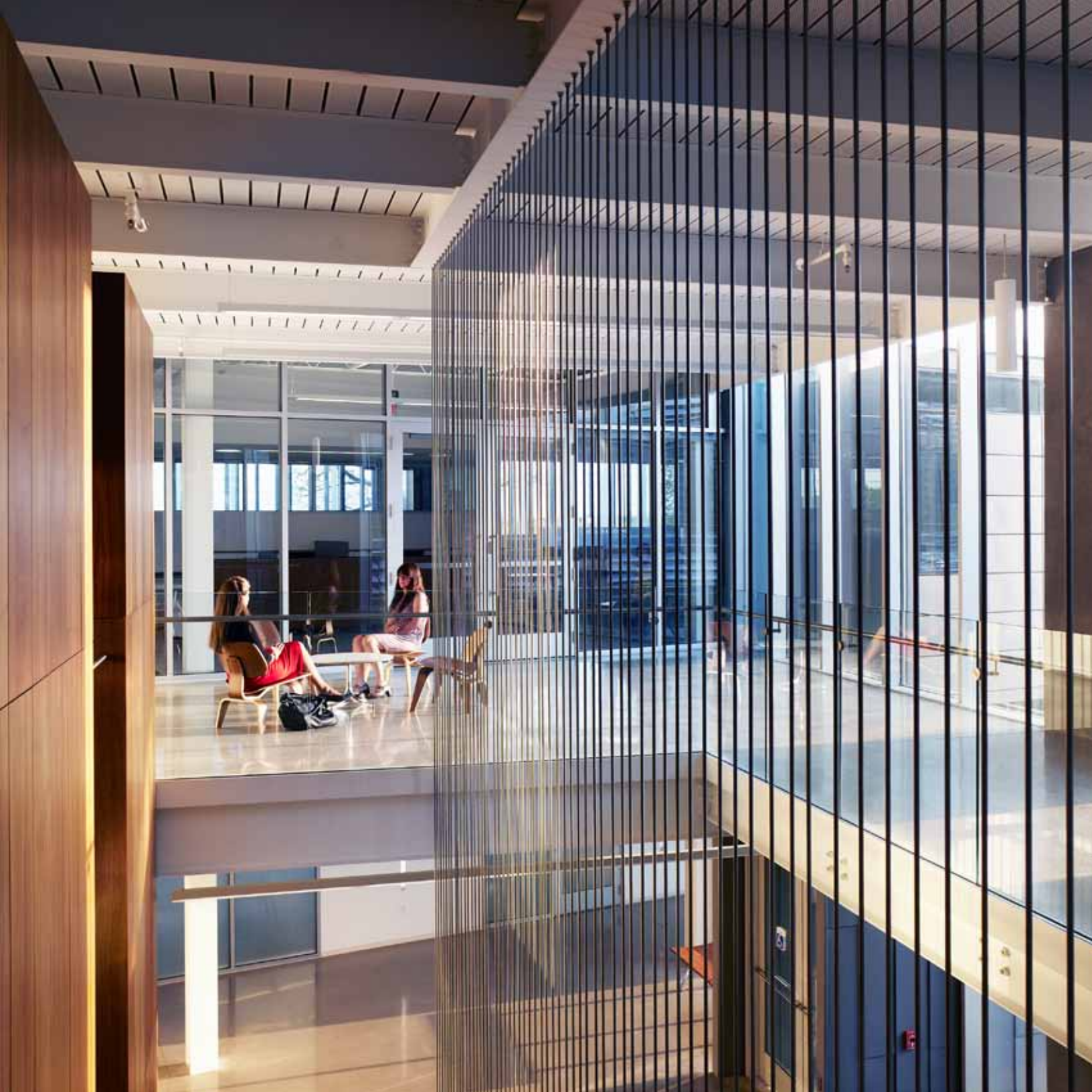
DATA COLLECTION FROM THE BUILDINGS SECOND YEAR OF OCCUPANCY

VISIONARY GOAL 02: SERVE AS DEMONSTRATION PROJECT

The IUB and OCA agencies are required by state law to share a building while maintaining office space independent of one another. The design of their workplace has become a living laboratory of sorts, demonstrating a visionary level of elegant and efficient workspace design. The result is a headquarters building that demonstrates how a high-performance workspace that inspires high-performing people can be achieved within state budgets. IUB/OCA is a testament to integrated design, close collaboration, and the power of a focused and bold client partner.

The owner has shared feedback that the space has changed the culture of the IUB/OCA workplace. Workstation configurations have promoted increased collaboration between teams. Larger shared and common spaces such as the Hearing Room and two large conference rooms offer flexible space that has performed well for many purposes, including training, small and large group meetings, and the intended use of hearings.

The organizational efficiencies not only impact the two state agencies in this building, but they serve all of the state agencies in the Capitol Complex that are able to employ the shared resources of the project. The measurement/verification plan, employed to measure energy use, allows the owner to make adjustments and facilitates ongoing research in partnership with the Iowa Energy Center. This partnership further magnifies the project demonstration goals and ensures that others will learn from this example—an appropriate investment for any public entity.



VISIONARY GOAL 03: HIGH PERFORMANCE ON A MODEST BUDGET

Utilizing past experience and industry cost data, representatives of the State of Iowa established the area and financial budget for the IUB/OCA project prior to selecting BNIM as the architect.

During design and development, the team studied numerous strategies to meet the programmatic and performance goals and the financial requirements of the project. They monitored the construction cost of the project continuously throughout the process, making adjustments as needed at each stage to ensure that the project did not exceed financial parameters.

This process yielded many difficult decisions. During the decision-making process, the team considered numerous alternatives. While this process was challenging, the Owner's team never faltered in its pursuit of a high-performance building. The performance goals were regarded as sacred and were required to be achieved within the preestablished construction budget. Each aspect of the design considered as potential cost savings was also considered with respect to energy performance. Elements that resulted in minimal energy performance or that could be provided through an alternatively less costly method became the focus of process. As an example, the team replaced clerestory daylighting provided through roof shapes with highly efficient and effective light tubes to assist with the daylighting of the most interior spaces.

The ongoing commitment of the State to protect the high performance requirements of the project was essential to the project's success. Too often compromises are made in building projects, and close is considered good enough. The leadership of the State of Iowa held fast to their expectations, however, never faltering. This leadership and commitment is commendable, and it is required for a building of this nature. The result is a high-performance building delivered within a State Government budget.

Return on Investment

IUB/OCA operates very efficiently at 81% below the national office building average at a cost of $226 per square foot, inclusive of site cost. Also embedded within the costs is a bonus: photovoltaic panels (PV) are mounted on the roof and generate 21.2% of the building's energy.

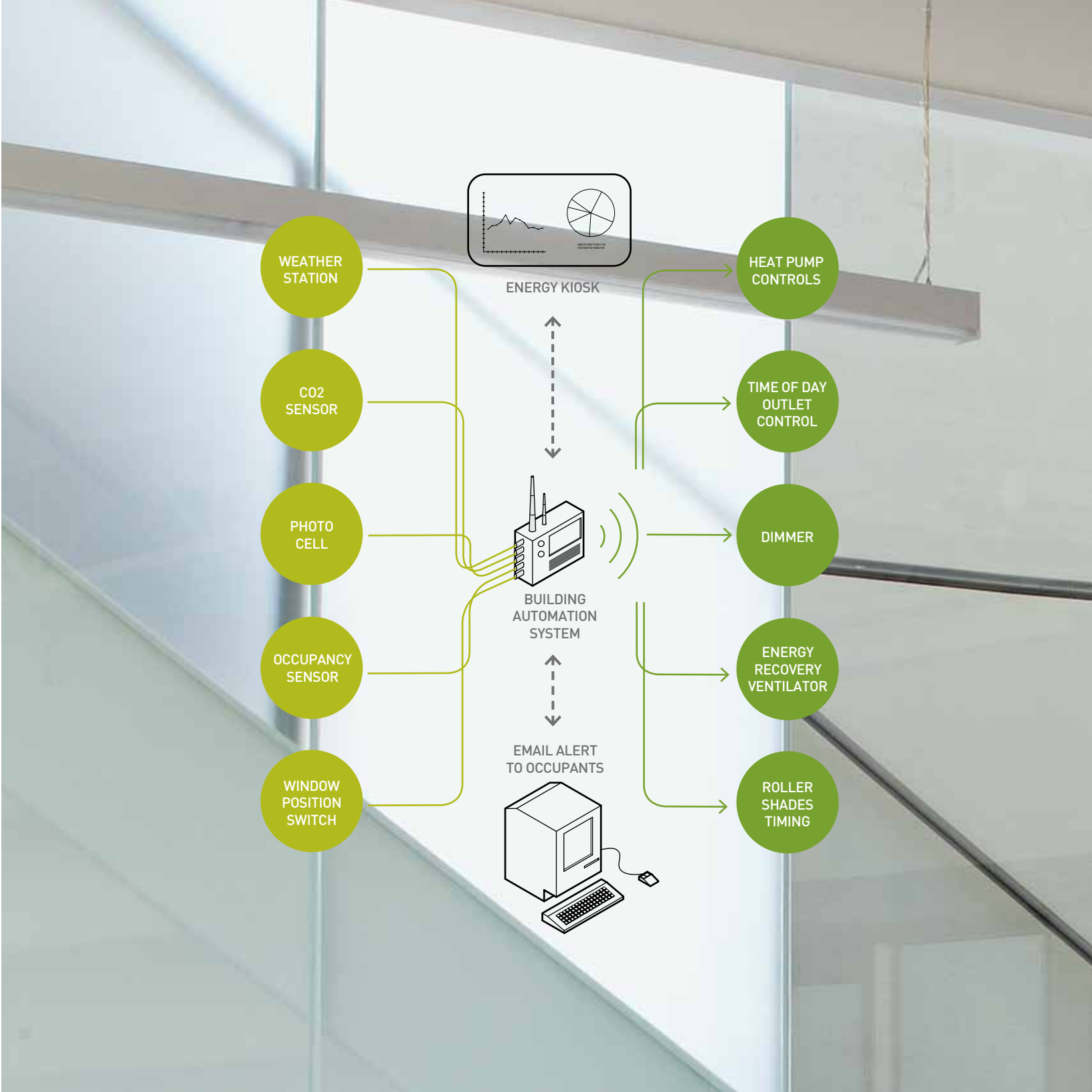
Through design and performance, the building contributes to a secure energy future—a tangible benefit for governments operating with leaner budgets. The incremental construction cost for added efficiency measures and PV is $280,821 ($143,321 without inclusion of owner PV costs) with inclusion of utility-based incentives. After two years of operation, actual annual energy savings were $40,172 (relative to the code baseline), resulting in a payback period of just 6.9 years. (This is based on an average state government rate of 4.8 cents/kWh. These savings would be considerably larger for the average private sector utility customer in the state at an average of 10.5 cents/kWh.)


STORMWATER FILTRATION
100%
WATER USE
46%
ENERGY USE
81.4%
CONSTRUCTION WASTE
89%
DAYLIGHT/ VIEWS
%86

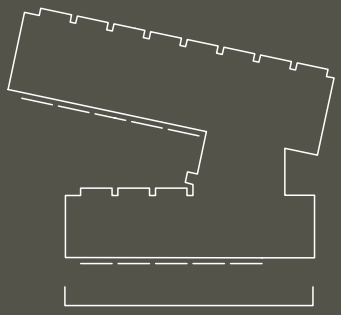
VISIONARY GOAL 04: MONITOR BUILDING PERFORMANCE METRICS

The building features a significant amount of performance monitoring. Nearly every outlet can be measured. Real-time data is monitored and analyzed to improve building performance. This work is being done in partnership with the State of Iowa Department of Administrative Services and the Iowa Energy Center. The Energy Center will further use results to support various research projects.

To conduct this monitoring, all outlets are designated as critical power, non-critical power, or task lighting. Open office and enclosed office outlets are tied to occupancy sensors that shut down all non-critical loads when not in use (everything except CPUs). Task lighting circuits are individually monitored as part of a larger daylighting study effort within the building to understand the extent of savings and total energy use assigned to artificial lighting.


WEATHER STATION
CO2 SENSOR
PHOTO CELL
OCCUPANCY SENSOR
WINDOW POSITION SWITCH
ENERGY KIOSK
BUILDING AUTOMATION SYSTEM
EMAIL ALERT TO OCCUPANTS
HEAT PUMP CONTROLS
TIME OF DAY OUTLET CONTROL
DIMMER
ENERGY RECOVERY VENTILATOR
ROLLER SHADES TIMING

05



UNMEASURABLE


1375

Building as a Legacy

At a micro level, this project has transformed the IUB and OCA organizations—in their culture, in their message, in their processes, and in the level of fiscal and environmental stewardship they now demonstrate. The individuals who work in the facility are also strongly impacted. Their knowledge and awareness of building performance is heightened, and their behavior will be forever changed by interacting with this facility.

At a macro level, this building is transforming the design and construction industry. It is both a culmination of past influences and a resource for future innovators. Its design was shaped by the lessons learned from buildings that preceded it. In turn, the lessons learned from this building will influence those that are designed and built in the future.

The process for designing the IUB/OCA facility began with explicit benchmarks and goals, and it evolved through a scientific process of discovery and innovation. Every member of the client, design, and construction team for this project discovered something new in the process of completing the building. Every decision made for this project will impact the future work of the respective firms, contractors, and suppliers involved. Every new idea developed for this building has been adopted into the industry lexicon. Every strategy used can be modified to serve other projects.

This is every building.

"The team saw that the impact of their work was bigger than just the building. It was to set an example for other government buildings."

JURY MEMBER
2012 AIA COTE TOP TEN PROJECTS SELECTION COMMITTEE

"From the beginning BNIM was active in achieving our goals for the highest levels of energy efficiency. Our headquarters building demonstrates that an elegant, high performance workspace that also inspires high-performance among its occupants can be achieved on a state budget. Increased collaboration is among the many benefits that our employees enjoy in this workplace. The success of IUB/OCA is a testament to integrated design and close collaboration with a focused architectural partner, such as BNIM."

JUDI COOPER
DEPUTY EXECUTIVE SECRETARY | IUB-OCA


EXIT

"The reason we exceeded our [performance] goal is because the occupants got what we were trying to do from the top down [...] we walked in the door with a set of protocols that we all helped to develop and understood. We don't plug in superfluous loads. We function with daylight. With the systems that are there—the geothermal, the photovoltaics—there are times when the building is producing more than we are using and sending it back to the State Capital Complex."

JUDI COOPER
DEPUTY EXECUTIVE SECRETARY | IUB-OCA


UTILITIES BOARD

"Young people are aware of [this building] and excited by it. I've taken unsolicited phone calls from high school students saying, I see your new building on the Capital complex. Can I come and see it? And I say, Of course you can! I take them on a tour. I've taken teachers, architecture students, people from around the world. They are aware of it, and I am excited by what they will do when they are the ones out there designing like this."

JUDI COOPER
DEPUTY EXECUTIVE SECRETARY | IUB-OCA

"It was obvious that every design decision that needed to be made in support of the climate strategy was really made. There was a rigor and focus to the execution that you don't see in most projects."

JURY MEMBER
2012 AIA COTE TOP TEN PROJECTS SELECTION COMMITTEE

AWARDS AND HONORS

2014	Second Place, International ASHRAE Technology Awards, Category I (Commercial Buildings – New)
2013	Citation Award, Allied Arts and Crafts, AIA Kansas City (Staircase)
	First Place, Region VI ASHRAE Technology Awards, Category II (Other Institutional - New)
	First Place, Iowa Chapter ASHRAE Technology Awards
	Architectural Record Good Design is Good Business Award
	Silver Award, Civic & Government, Mid-America Design Awards, International Interior Design Association (IIDA)
	2012 CoreNet Global Innovator's Award Nominee
	Merit Award of Sustainable Excellence, AIA Iowa
	AIA/COTE Top Ten Green Projects Award
2011	Merit Award, AIA Kansas City
	Merit Award, Excellence in Architecture, AIA Central States Region
	Merit Award, AIA Kansas
	Merit Award, AIA Iowa
	Center on Sustainable Communities, Environmental Impact Awards, Commercial Winner, Built Environment Category

GENERAL PROJECT INFORMATION

Project Completion Date	Jan. 17, 2011 (Occupancy) April 28 - June 25, 2011 (Landscape Installation Complete)
Project Site	Previously Developed
Project Type	Office, Assembly/Meeting Space
Project Site/Context	Urban State of Iowa Capitol Complex
Other (New Or Renovated)	New
Lot Size	6.06 Acres
Building Gross Floor Area	44,640 Sf
Building Footprint Area	20,003 Sf
Hours Of Operation	6:00 A.M. – 5:30 P.M.
Building Occupancy	Permanent 90 x 44 Hours Visitors 20 Per Week x 4 Hours
Total Project Cost	9,865,768 + 275,000 (PV) = $10,140,768 (Construction Costs)

PROJECT ECONOMICS

The project was engaged with the Mid-American Energy New Commercial Construction Program which provided a utility-based incentive for implementation of efficiency measures. The incremental construction cost, with added efficiency measures, was $261,721 (exclusive of PV). The Utility incentive was $118,400. Project adjusted incremental cost considering this incentive was $143,321. Although modeled payback with incentive would occur in just 4.6 years, actual measured annual energy savings of $40,172 will result in payback in just 3.5 years. A grant through the Iowa Office of Energy Independence provided for half of the cost of the PV installation. The ongoing measurement and verification tracking in the building is being conducted in partnership with the Iowa Energy Center for research and potential improvement.

RATING

The project received a LEED Platinum certification under LEED version 2.2. Platinum certification requires a minimum of 52 points of the 69 available. The IUB/OCA achieved 58 points by the USGBC. LEED Platinum certification was a secondary goal of the project after development of the aggressive energy goal. The team found the energy goal to be a far more significant challenge than the Platinum rating. Energy "points" within LEED version 2.2 cap out at 10. Given the system of points associated with incremental savings, the project would have achieved 15 points if available, leaving an opportunity for LEED to become more aggressive from an energy perspective. However, the LEED goal was very significant within the framework of this project as it allowed the extended team to share a common goal of always maintaining the "sustainable spirit" of the project. It allowed for items such as stormwater management, domestic water reduction, material conservation and great indoor air quality to be elevated in importance beyond the energy theme.

ABOUT BNIM

With the support of our visionary clients, BNIM is redefining the national and global agenda for progressive planning strategies, responsible architecture and design excellence. We design creative environments that inspire behavior change and enhance the condition of people and the planet.

With more than four decades of experience, BNIM has a reputation for thoughtful and responsive design, thorough technical competence and conscientious service. Throughout its history, the firm has focused on building healthy facilities through a balance of social, economic and environmental solutions. BNIM has emerged as a national leader in sustainability and innovative design while remaining committed to the regional community.

CREDITS

Iowa Utilities Board
Office of Consumer Advocate
Iowa Department of Administrative Services
Iowa Energy Center

Architect
BNIM

Civil Engineer
Snyder and Associates

MEP Engineer
KJWW Engineering

Structural Engineer
Charles Saul Engineering

Energy Modeling
The Weidt Group

Daylight Modeling
BNIM

Geotechnical Engineer
Team Services

General Contractor
J .P. Cullen

Landscape Architect
BNIM

Lighting Designer
KJWW Engineers

Sustainability/LEED
BNIM

IMAGERY

Farshid Assassi, Assassi Productions pages 2-3, 7, 28-29, 49, 51, 53, 55, 61, 63, 68, 85, 86-87, 88, 90-91, 92-93, 94-95, 96-97, 106, 107, 108-109, end pages | Mike Sinclair pages 13, 14-15, 20-21, 38, 44, 47, 57, 57, 67, 73, 75, 77, 79, 82-83, 84, 89, 90-91, 98, 99, 100-101, 102-103, 104-105, front and back cover | James Ewing page 46 | BNIM All others

IOWA UTILITIES BOARD - OFFICE OF CONSUMER ADVOCATE

BNIM designed the recently completed, energy efficient office building to house the Iowa Utilities Board (IUB) and the Office of the Consumer Advocate (OCA). An infill development on the State of Iowa Capitol Complex in Downtown Des Moines, the project was developed on a challenging, awkwardly proportioned landfill site and serves to create a gateway to the complex at its southeast corner. The building will serve as a testament to the sustainable stewardship of the State of Iowa. It is a model energy efficient office building demonstrating proven, cost-effective energy efficiency measures for new construction.

The project was designed to integrate replicable sustainable strategies; serving as a demonstration project for other government facilities at the state and local level, and also for the general public and private enterprise. While many of the employed strategies are "off the shelf" to various degrees or have been used elsewhere, what makes this application particularly significant is the multitude of strategies integrated together to achieve a building of exemplary energy performance.

The facility is consuming 81.4 percent less energy than the national average for energy consumption of office buildings.

BNIM designing what's next.

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