

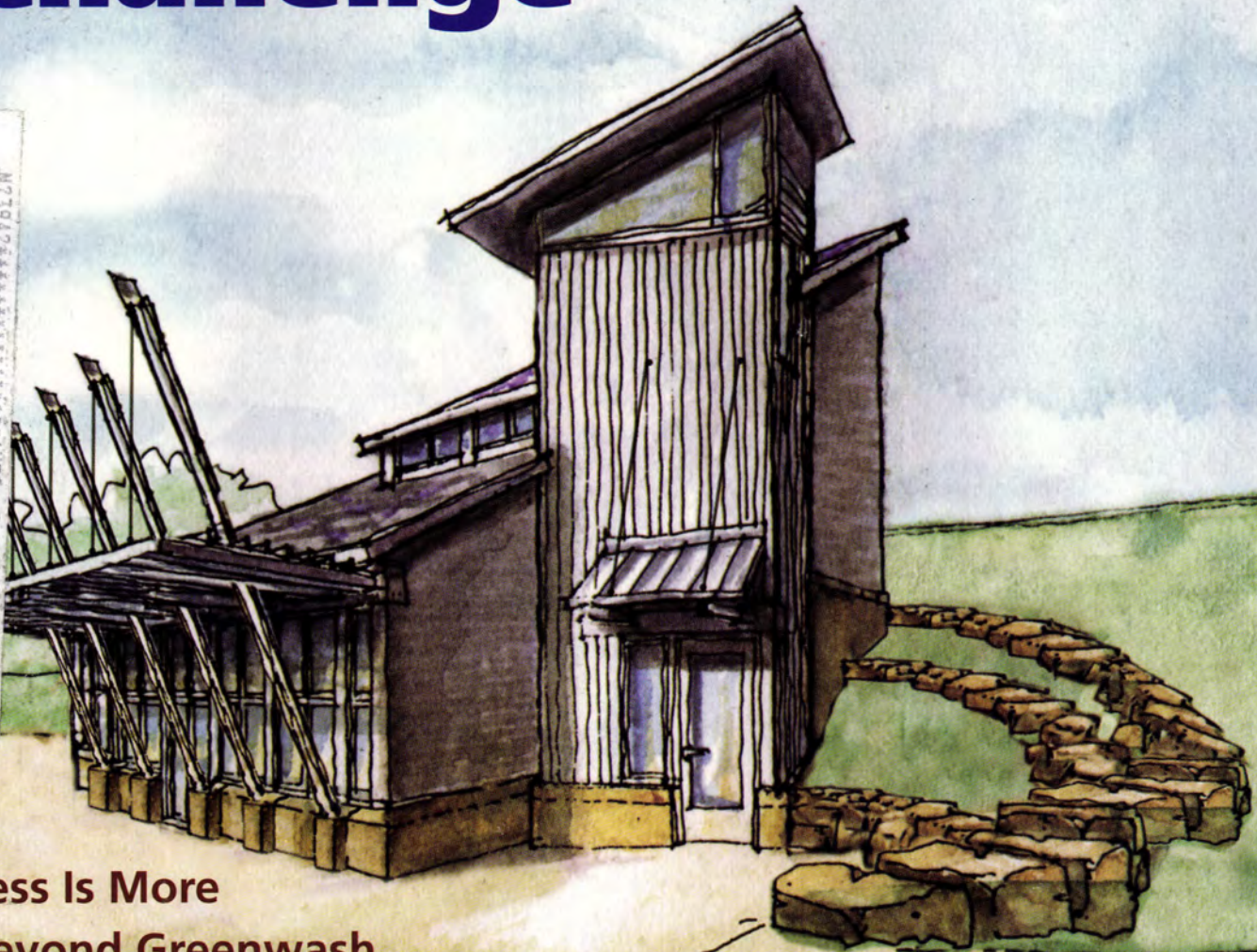
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My appreciation to the people who provided valuable insights as I created this edition of the magazine: the Architecture Minnesota committee, for helping to formulate the case-studies approach to projects; COTE, for article ideas; the B3 Three, for answering questions and commenting on drafts; and the writers who were so patient as we wrestled with putting thoughts into words. Thank you.

Less Bad Is Not Good Enough

It's them again. By the time you finish reading this sustainable-design edition of *Architecture Minnesota*, you'll realize how William McDonough and Michael Braungart, in their book *Cradle to Cradle: Remaking the Way We Make Things*, have inspired many of the articles in this magazine. The reason is simple. Their argument is persuasive, inspiring and begs for implementation.

Briefly, McDonough and Braungart write that the linear "cradle-to-grave" model of production, which began with the industrial revolution, is one in which "resources are extracted, shaped into products, sold, and eventually disposed of in a 'grave' of some kind, usually a landfill or incinerator." This system is destroying the planet, as well as human health, safety and welfare.

Since the 1970s, the ecology, green and sustainability movements have tried to combat this system through the concepts of reduce, reuse and recycle; avoid and limit; halt and sustain. But as McDonough and Braungart point out, these approaches, for all their noble intentions, merely slow the rate of destruction. "To be less bad," they write, "is to accept things as they are. . . it works within the same system that caused the problem in the first place. . . . It represents little more than an illusion of change."

The challenge, they continue, is to create a "cradle-to-cradle," "eco-effective," regenerative model that's "100-percent good." One in which products and buildings are engaged with nature, rather than in control of it.

Eco-radicals, visionaries or both? Whatever your opinion, McDonough and Braungart's ideas are influencing environmental thinkers around the globe, including those in Minnesota. In his Talking Point, Kevin Flynn, AIA, challenges his fellow architects "to adopt a holistic, interdisciplinary approach to design that places environmental concerns at its very core."

The selection of green materials is so fraught with compromises, writes Rebecca

Foss in Technology, that a regenerative system of production and use is the only way to get beyond the green-wash disguising

obsolescence. Tom Fisher, Assoc. AIA, takes a different tack in advocating that architects rethink their approach to design and client relationships by asking such questions as "Why build at all?"

Of course, when it comes to creating a building that integrates the sustainable-design strategies available to architects now, a committed client makes a world of difference. In the nine project case studies and "The Sustainable Quest," the client's role in advancing the state of sustainable design in Minnesota is clear.

I recently met with one of those clients, Medora Woods, who articulated another characteristic of the cradle-to-grave industrial model that's degrading our health, safety and welfare. "In this country," she said, "we're four percent of the population using 25 percent of the resources. We can't continue to do that and not assume that war and hatred and instability are going to result."

Nearly all the products and systems we use, she continued, are created at the expense of other people, ecosystems and resources on the planet. Only by rendering visible those hidden connections can we become responsible for our choices.

Moving beyond sustainability will challenge our spirits, imaginations and abilities. But clearly, less bad is no longer good enough.



DON F. WONG

Camille LeFevre

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Obituary

Curt Green, FAIA

Curtis Green, FAIA, who worked with Hardy Holzman Pfeiffer Associates, New York City, on Minneapolis's Orchestra Hall and was cofounder of Hammel, Green and Abrahamson (HGA), Inc., Minneapolis, died in early November after a stroke. He was 77.



AIA MN ARCHIVE

Green began his architectural training during his last year in high school and continued through college. He earned his B. Arch. from the University of Minnesota and his M. Arch. from the Massachusetts Institute of Technology, where he studied with Alvar Aalto. In 1953, he founded HGA with his friend and fellow architect, the late Richard Hammel, FAIA. Green's work focused on architecture for arts and religious organizations.

In 1991, he was awarded the Gold Medal by AIA Minnesota. In a letter to AIA Minnesota describing the highlights of his career, Green wrote that he "found it rewarding to design the St. Bede's Priory in Eau Claire, Wisconsin. . . for which HGA won their first National AIA Honor Award." Green also designed the Honeywell headquarters expansion, Minneapolis; the College of St. Catherine Arts Building, St. Paul; the Gustavus Adolphus College Arts Building, St. Peter; St. John's Episcopal Church, St. Cloud; and the Lutheran Church of the Reformation, St. Louis Park.

"Perhaps my last hurrah as a principal on a major project at HGA will be the Center for Performing and Visual Arts at Valparaiso University, Indiana," he continued in the aforementioned letter. "Through the years I have expounded on the philosophy of vigor applied to architecture. This project contains elements of broken geometries and has applied the 'live-in' theory for public spaces."

Concluding the letter, Green commented on the practice he'd established at HGA, writing, "I have found it rewarding to be the questioner, the stimulator, the mentor in all aspects of the practice in hopes that our democratic tendencies will continue to provide adequate control for accomplishing our very best. My remaining days in the profession will be filled with going any place or doing almost anything to promote our 'perfect project' that always continues to lie ahead." — C. L.

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Preservation Awards



St. Paul Central Library



Grain Belt Brew House



Lakeville Area Arts Center

THE PRESERVATION ALLIANCE OF MINNESOTA, a nonprofit organization dedicated to preserving, protecting and promoting Minnesota's historic resources, issued 13 Preservation Awards to historic projects in 2002. In addition, the organization named Mark Yudof, former president, University of Minnesota, as Preservationist of the Year for "his untiring efforts to preserve and restore the historic buildings on the Knoll, the oldest part of the East Bank campus." The Preservation Alliance also gave its first annual historic-bed-and-breakfast award to St. Hubert House, Old Frontenac. Richard T. Murphy Sr., was presented with a Lifetime Achievement Award.

Project awards went to:

St. Paul Central Library Restoration

Award recipient: St. Paul Central Library
Architects: Meyer, Scherer & Rockcastle, Ltd.

Minneapolis City Council Chambers

Award recipient: Municipal Building Commission
Architects: Skaaden-Helmes Architects, Inc.; MacDonald & Mack Architects, Ltd.

Lake Harriet Restroom Restoration

Award recipient: Minneapolis Park Board
Architects: Miller Dunwiddie Architects, Inc.

Grain Belt Brew House Renovation

Award recipients:
RSP Architects, Ltd.;
Ryan Companies U.S.
Architects: RSP Architects, Ltd.

Grimm Farmhouse Restoration

Award recipient: Three Rivers Parks District
Architects: Miller Dunwiddie Architects, Inc.

Anoka County History Center & Library

Award recipient: Anoka County Historical Society
Architects: Ortel Architects

Milwaukee Depot

Award recipient: CSM Corporation
Architects: Shea, Inc.; Elness Swenson Graham Architects, Inc.

Como Park Streetcar Passenger Depot Renovation

Award recipient: City of St. Paul, Division of Parks and Recreation
Architects: Hokanson/Lunning/Wende Associates, Inc.

Lakeville Area Arts Center

Award recipient: City of Lakeville
Architects: Grooters, Leapaldt & Tideman Architects

Newhouse 1897 Building, Pine Island

Award recipient: Vince and Sally Fangman

Walnut Street Bridge, City of Mazeppa

Award recipient: City of Mazeppa with support from Mazeppa Area Jaycees
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Old Trondheim Norwegian Church

Award recipient: Trondheim Community Preservation Society, Inc.
Art conservator: Dan Tamoveanu

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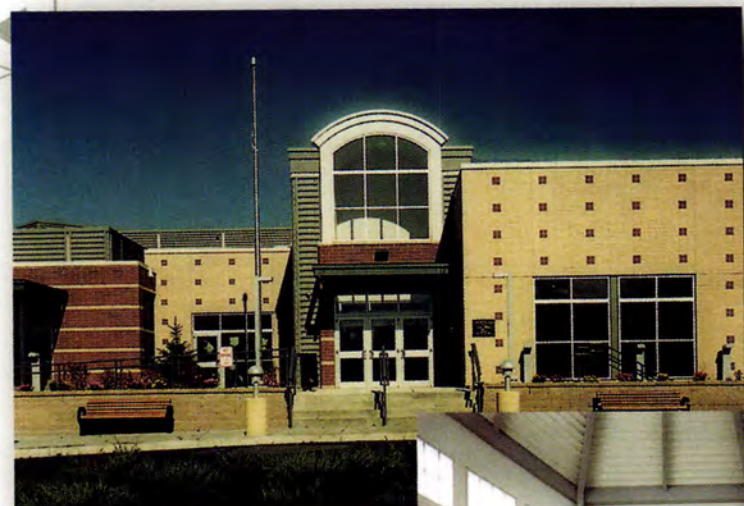
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By Bette Hammel

On a glorious fall day in October, practicing architects and retirees, architecture students, university alumni and former deans packed the College of Architecture and Landscape Architecture (CALA), for its formal dedication as Ralph Rapson Hall. Former CALA dean **Harrison Fraker, FAIA**, summed up the feelings of many speakers honoring **Ralph Rapson, FAIA**, when he told the architect, "Your life work represents this amazing creative burst that stands for American Modernism—work that was always at the edge, filled with playfulness and lightness." Other speakers recalled memories of their days at the school. **Bill Pedersen, FAIA**, partner, Kohn Pedersen Fox, New York, spoke nostalgically about his mentors: **James Stageberg, FAIA**, who convinced him to give up hockey, and **Leonard Parker, FAIA**, who later hired him. A native Minnesotan who rose to success designing skyscrapers throughout the world, Pedersen said his latest project is the most rewarding; Baruch College, a branch of the City University of New York, attended mainly by children of immigrants.

Sustainable design is really no longer a choice," says **Steve Paash, AIA**, partner, **Grooters, Leapaldt & Tideman Architects**, St. Cloud. "Most buildings have to incorporate sustainable-design features. If there is a choice, it's to what level clients will incorporate them." In designing the new Sauk Rapids High School, the firm worked closely with the Rice School District. Using a site adjoining a city park resulted in a multiuse recreational area for students and the community. The architects designed the school for flexibility, maximum natural light and classroom views of nature while the district emphasized using equipment and materials that would save money over the building's life. To accomplish this, designers stipulated low-maintenance floors and walls, high-efficiency boilers and chillers, low-e insulated glass, and lighting systems activated by daylight levels and motion.

Within sight of the State Capitol, just south of the freeway, a new office building for the St. Paul Public Housing Agency will better energy-code requirements by 49 percent, according to **Kevin Flynn, AIA**, project architect, **Hammel, Green and Abrahamson, Inc.**, Minneapolis. The design team accomplished this feat by: constructing the building on previously developed land; creating a rain garden on site to manage and treat storm-water runoff; increasing energy performance of mechanical systems; using recyclable materials throughout the building; optimizing type, size and placement of glass for improved thermal performance; and placing sun-control devices on the south façade to reduce solar-heat gain. The agency will save up to \$43,000 a year in energy costs, excluding gains in productivity, according to Flynn. Team analysis shows the project would qualify for a LEED™ gold rating and join six other projects nationally earning that status.

A long-awaited underground pedestrian walkway connecting St. Paul's downtown core to the Central Library, Ordway Theatre and RiverCentre is done. Designed by **Architectural Alliance**, Minneapolis, the tunnel is beautifully lit, warm and secure, with colorful graphic displays and five access points. One of the subway-style ground-level entrances leads directly into the classically designed 1917 library. Its Beaux Arts interior has been handsomely renovated into the 21st century by **Meyer, Scherer & Rockcastle, Ltd.**, Minneapolis, while restoration efforts have revealed the original beauty of historically significant areas. Although the building is on the National Register of Historic Places, the architects were able to design new entries and a lobby space with an adjoining coffee shop. They also opened up the Kellogg Boulevard side where **oslund.and.associates**, Minneapolis, designed a classically inspired garden.

In Minneapolis, the Committee on Urban Environment (CUE) is launching the "Front Porch Project" for homeowners, initiated by **Paul Neseth, AIA**, partner, **Locus Architecture, Ltd.**, Minneapolis. Neseth believes a human face on a front porch helps decrease criminal activity. "The front porch is that place in architecture between public and private, providing eyes on the street," he explains. "Our goal is to create prototype porches for a number of houses within Minneapolis." The project will begin with a student design competition. Fundraising for materials continues while the committee searches for a site to build the prototype front porch. CUE members are convinced the project can benefit the whole community by increasing interaction between residents.

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Dave Dimond, AIA

As AIA Minnesota's 2003 president, Dave Dimond, AIA, is committed to communicating and enhancing the value of the professional association

BY CAMILLE LEFEVRE

When Dave Dimond, AIA, earned the AIA Minnesota Young Architect Award in 1997, he submitted an exuberant statement lauding the merits of AIA Minnesota as a professional association, while emphasizing the importance of architects as good citizens and architecture as a tool of civility. His enthusiasm for design and the profession continues today.

Dimond, a St. Paul native, earned his B. Arch. from the University of Minnesota and his M. Arch. from Virginia Tech. He joined The Leonard Parker Associates, Minneapolis, as a student in 1986 and became vice president in 1995. During that time, he worked on such projects as the Honor Award-winning Pusan Convention Center in Korea and his accomplishments on the Salt Lake Courts Complex earned him an AIA National Citation for Excellence from the Committee on Architecture for Justice.

In 1997, he joined Hammel, Green and Abrahamson, Inc., Minneapolis as a senior associate, where he was lauded for his collaborative leadership and design excellence, before returning to The Leonard Parker Associates. He is currently director of design at Perkins & Will, Minneapolis. Over the years, Dimond has served as the chair of the AIA Minnesota Honor Awards Committee and taught at the College of Architecture and Landscape Architecture, University of Minnesota.

Architecture Minnesota talked with Dimond about his goals as president in 2003 and the ongoing value of AIA Minnesota to its members.

Why did you accept the nomination as AIA Minnesota president?

I believe that service to my profession is important. AIA Minnesota is the collective voice of architects in our state and I am honored by the opportunity to advocate on behalf of our membership.

How do you perceive this organization of architectural professionals?

AIA Minnesota members are a community of upbeat optimistic professionals responsible for shaping the shared spaces of a civil society. As architects, we are involved in the joyful and humanistic dialogue that balances the demands of today's community life with our responsibility to the community that will follow us. Civic purpose guides how we design the spaces that allow us all to share the limited resources of this planet.

In our role as individually licensed professionals, we are responsible to improve the health, safety and welfare of the residents of our communities by designing a safe and sustainable future. Whatever the scale of the endeavor—public or private, large or small, complex or simple, expensive or inexpensive—the value of good architectural service is perceived both immediately and forever. Architecture is both a timeful and timeless tool of civility.

What is your main priority as president this year?

My focus is on building the value AIA Minnesota brings to our members. Our association is the common resource for many specialties we have within a statewide profession. We provide supporting programs and services to small practices, large practices, architects on corporate staffs, architects in public agencies, architects working in construction management and on construction teams, in small towns, in metro areas and on and on. I look forward to utilizing the strength and clarity of our carefully considered 2002 Strategic Plan to focus association resources on highly valued programs that reach all members.

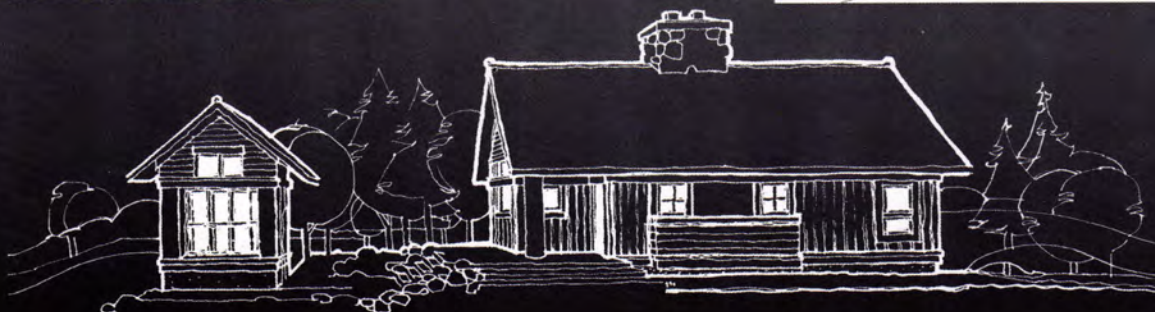
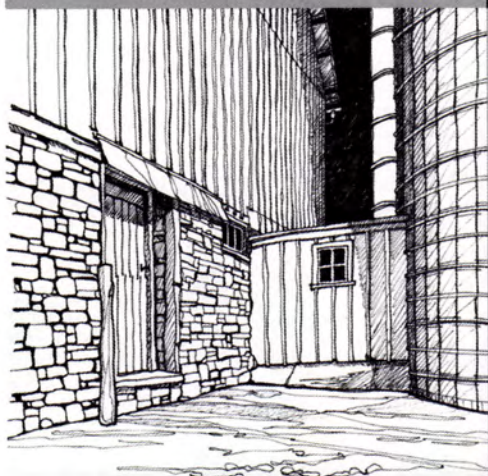



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to alone."

Continued on page 48

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Downtown Commercial District

Northfield, Minnesota

BY ROBERT ROSCOE

In 1999, Northfield's downtown commercial district was on the Preservation Alliance of Minnesota's (PAM) list of Ten Most Endangered Historic Properties. Given the downtown area's economic stability and picture-postcard image, the nomination didn't fit PAM's typical listings: financially precarious, structurally nefarious or time-tarnished properties destined for landfill. What the preservation movement saw was a downtown threatened by impending development along Highway 3 at Northfield's southwestern edge, with future big-box retail inevitably drawing shoppers away from downtown and thus causing the economic deterioration of the city's core.

Northfield, located 50 miles south of the Twin Cities in Rice County, gained its name from two men associated with its founding in the early 1870s: John W. North, a member of the state legislature who helped frame the state constitution, and Ira Stratton Field, a blacksmith and farmer who was an advocate for temperance and the abolition of slavery.

Northfield sits astride the Cannon River, whose waters powered sawmills and gristmills that gave rise to the town's early settlement. Northfield's founders recognized the river's natural features and its utilitarian aspect, building the town's main thoroughfare—Division Street—more or less parallel to the river's east bank, now lined with two- and three-story commercial buildings with remarkable architectural features.

Sixty-one buildings downtown form the historic district, which is characterized by Romanesque, Italianate and Victorian commercial streetfront architecture. Most of these buildings retain their original architectural features (there are a few nonconforming alterations) and provide an architectural consistency that reinforces the economic vitality of the downtown. In fact, Northfield's citizens can find most, if not all, of their basic goods and services downtown.

Along Division Street are two bakeries, two carpet stores, several clothing stores, a drugstore, two grocery stores, two jewelers and an auto-parts store; a dry cleaner, a shoe repair, a realty office, a VFW, a travel service, a hotel, a bank and a veterinary clinic; stores with home furnishings, sports gear and flowers; and general-merchandise marts, cafés and bars. Second-floor spaces house a variety of professional services including offices for attorneys, insurance agents, doctors, economic-development groups, market-research consultants and technical services. Most of these businesses have



One of the best examples of a sustainable commercial community in the nation, Northfield's downtown faces the dual threats of big-box retail and gift-shop creep.

ROBERT ROSCOE

served the community for several generations. There are no chain or franchise shops.

Behind Division Street the city's topography leads up to Carleton College. West of the Cannon River, St. Olaf College rests on a rocky promontory that wraps around a pleasant residential area. The pastoral environment surrounding the city of Northfield, the collegiate atmosphere exuded by St. Olaf and Carleton and the town's pleasant ambience have given Northfield its renowned moniker as the place of "Cows, Colleges and Contentment."

A recent conversation with landscape planners at the No More Blue Monday Coffeehouse brought out other factors that augment the quality of downtown Northfield. Narrow storefronts mean more stores and shops fit within an easily walkable area. This area, in turn, is enhanced by the surrounding residential neighborhood composed of mostly two-story, 19th-century houses on compact lots.

Several churches within the city's center have small, inconspicuous parking lots. One of the planners noted that Carleton College, with a student population of 1,900, operates from a campus smaller than those of recently constructed high schools. Northfield, many

Continued on page 49

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John Carmody, Rick Carter, AIA, David Eijadi, AIA

The designers of the new Buildings, Benchmarks and Beyond Project
discuss how B3 will enhance Minnesota's measurement of
sustainable-design practices

BY AMY NASH

According to the World Watch Institute, "blame for much of the environmental damage occurring today, from the destruction of forests and rivers to air and water pollution and climate destabilization, must be placed squarely at the doorsteps of modern buildings." The good news? In recent years, environmental awareness among architects, engineers and their clients has led to a focus on high-performance design that results in environmentally responsible, profitable and healthy places to live and work.

This responsibility has translated into such resource tools as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED™) Green Building Rating System (conceived in 1995). Architects across the country are using these guidelines to produce a new generation of sustainable buildings. Through LEED's rating system, buildings score points for such design elements as water efficiency, optimal energy performance and recycled content in materials, allowing projects to become certified at different levels.

In this state, the University of Minnesota, Hennepin County, the Minnesota Office of Environmental Assistance, and Chris Hammer, formerly with Hellmuth, Obata and Kassabaum Architects, San Francisco, in 1996 jointly produced the first phase of the Minnesota Sustainable Design Guide (MSDG). This Internet-based tool helps Minnesota architects incorporate sustainable-design strategies relating to site, water, energy, indoor-air quality, materials and waste into buildings. But are these programs enough?

The Minnesota State Legislature said no and last year initiated the Buildings, Benchmarks and Beyond (B3) Project. A joint mandate of the De-

partment of Administration and the Department of Commerce, B3 stipulates that all building projects funded by the state must exceed existing Minnesota energy codes by at least 30 percent and meet B3's Sustainable Building Design Guidelines. B3 differs from LEED and MSDG because it includes a system for benchmarking the success of sustainable-design strategies, as well as a client-feedback review cycle.

The first phase of B3 will be completed by January 15, 2003, after which architects can begin applying its strategies to projects. Supplemental phases will be implemented by June 30, 2006. Experts hired for the project's first phase include LHB Engineers and Architects, Minneapolis; The Weidt Group, Minnetonka; the Center for Sustainable Building Research, University of Minnesota, Minneapolis; the Adams Group, Charlotte, North Carolina; and Art Pearce IdeaWorks Consulting, Ithaca, New York. A committee of national and international advisors works with the experts.

To learn more about B3, *Architecture Minnesota* spoke with three members of its management team: John Carmody, director, the Center for Sustainable Building Research; David Eijadi, AIA, principal, The Weidt Group; and Richard Carter, AIA, senior vice president, LHB.

What is B3, why is it important and what roles do you play in the project?

RC: A year and a half ago, the state legislated that its departments of Administration and Commerce would create sustainable-building guidelines and a system of benchmarking energy efficiency. The



The B3 three (from left to right): Rick Carter, AIA, John Carmody, David Eijadi, AIA.

"B3's
benchmarking
mechanism will
verify the actual
environmental,
human and
economic impacts
made by an
architect's design
choices."

Continued on page 50

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The Greenwash Muddle

Moving past the industrial formula of waste and
obsolescence means developing a regenerative system
of production and use

BY REBECCA FOSS

Are we fooling ourselves when we search for products with higher percentages of recycled content or those produced within 500 miles of a project site in our efforts to create sustainable design? Is this approach the way to a more sustainable built environment or are we merely greenwashing ourselves and our clients into believing we're making a difference?

What are the alternatives as we seek solutions to ever-increasing demands for more "environmentally friendly" materials, products and systems? Can we move beyond our current mentality of eventual obsolescence and waste to a more regenerative system of product development, production and use?

In the design and construction-materials market, the concept of greenwash has muddied the waters for architects, interior designers and clients trying to find products that use fewer raw natural resources and have less negative impact on the environment. Greenwash, which Greenpeace describes as "cynical, superficial, public-relations marketing," with an emphasis on limited and often contradictory environmental benefits, contributes little factual information about a product. Instead, greenwash makes the user feel good by focusing on improvements in selective pieces of a product's life cycle rather than on its overall environmental performance.

For example, manufacturer's literature for a ceramic tile may claim the product is made of 95-percent recycled content, but doesn't explain what "recycled" means. The recycled content may be post-industrial or waste generated from within the production process (seconds, overruns, cutoffs,

burrs). These substances have always been included in the manufacture. A better green product is one in which the manufacturer reduced energy use, pollution or packaging waste during production and made this information available in literature, advertising and product labeling.

Now let's really complicate things. Consider that some types of wheat-straw particleboard, although made from renewable and recyclable agricultural products, contain an isocyanurate binder that's highly reactive and hazardous to factory workers, even though it's formaldehyde-free and safe once cured. Consider also that many designers go through an exhaustive process to select a certified wood, only to be forced to change the specifications after discovering the wood was not sustainably harvested, despite having a certification, or it was certified by established third-party certifiers, but is not available within a project's schedule.

Gypsum board is another difficult example. Greenwash makes us believe using gypsum-board products is reasonable. They come from plentiful and often recycled resources, are produced in tightly controlled processes that minimize energy and water consumption, and can be installed to encourage reuse before landfilling. But the realities of diminishing mineral and water resources, pollution-generating by-products and nonrenewable-energy consumption are still major components of the extraction, production and disposal process. Without adequate recycling programs near pro-



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Continued on page 51

THE BEST BUILDINGS ON EARTH ARE STILL BUILT BY HAND



More than a million bricks laid in a series of unique patterns, textures and colors make the Veterans Administration Health Care Facility in Detroit, Michigan, a striking example of masonry design by architects Smith, Hinchman & Grylls Associates. But masonry was chosen for more than its beauty and flexibility of design. Buildings built of masonry by skilled union craftworkers will outperform, outshine and outlast any others. Add to that the speed and efficiency of union masonry contractors, and you have a prescription for health care facilities that satisfies any schedule and budget. We're The International Masonry Institute, and we'd like to help you design and construct the best buildings on earth. Visit us on the World Wide Web at www.imiweb.org, or call us toll free at 1-800-IMI-0988 for design, technical and construction consultation.



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Beyond Sustainable

BY KEVIN FLYNN, AIA

I have a design challenge for my fellow architects. Design a building that through its creation and existence does the following: destroys natural ecosystems; chews up prime agricultural land; consumes precious water; contributes to ozone degradation; puts toxins in the air, land, water and our bodies; has the potential to make its users and occupants sick; depletes natural resources to the point that they will be lost forever; and generates so much waste we need to burn it, bury it or dump it out at sea.

Ethically and morally, can you do that for me? No, I shouldn't think so. The next time you respond to a Request for Proposals that doesn't require you to design sustainably, however, that's exactly the question you will be facing. As design professionals, we (un)knowingly face that decision every day.

The architectural profession's design goals have long been shallow. We certainly want our buildings to be functional and beautiful, but why stop there? Is a well-designed building one that harms air and water quality or one that improves them? Is a well-designed building one that consumes vast amounts of energy and non-renewable fuel sources or one that doesn't? Is a well-designed building one that forces its owners to spend more money on the operation of their buildings or one that saves them vital capital? Sustainable design is only the first step.

Sustainable design as we now know it succeeds where the conservation movement of the 1970s failed because its goals are based on both environmental and economic concerns. However, it is also based largely on reduction, reuse and recycling. We need to move beyond these efficiencies toward a deep, regenerative design approach founded on our kinship with the natural systems that support our existence.

Our profession's approach to responsible design has never been more critical. Talk isn't enough. Right now, for instance, we can design buildings that use 20 to 30 percent less energy than code demands, so why aren't we all doing so? Selecting carpet that contains recycled fibers so we can call a building green not only is greenwashing, but also represents hundreds of lost opportunities to do better for the project, the environment, the client and our profession.

We need to adopt a holistic, interdisciplinary approach to design that places environmental concerns at its very core; that informs our thinking from a project's inception. Actually, I want the words "sustainable design" to disappear as a term. In my view, buildings inserted within an existing infrastructure, that incorporate daylighting, conserve water, reclaim and reuse existing materials and inspire productivity are simply well-designed. Conversely, architects can't accomplish good design unless their buildings are energy efficient, environmentally responsible and economically affordable.

So here's my real design challenge, based on the concept of eco-effectiveness put forth by William McDonough and Michael Braungart in their book *Cradle to Cradle: Remaking the Way We Make Things*. Create a building that gets all its energy from the sun, creates no waste or toxins, sequesters carbon, stores and treats water, produces oxygen, improves soil health and at the end of its life is biodegradable and returns to the earth or industrial processes safely, where it becomes a nutrient for other things.

This is the direction in which architecture must move if we are to stop contributing to global problems of sprawl, pollution, environmental degradation and rising energy costs. The time for change is now. Are you ready?

"Nature does
nothing
uselessly."

— Aristotle

Sustainable Design Strategies:

Case Studies

Recycled-content materials

Indoor-air quality

LEED™/MSDG

Reclaimed materials

Daylighting/solar-heat gain

Building reuse

Site reuse

Energy conservation

Renewable energy

Designing sustainably isn't new. Many of sustainable design's primary tenets—siting a structure to maximize interior daylight and massing it to control temperature, minimizing disruption of a site and the energy needed for construction, using preexisting local materials—are common-sense techniques practiced worldwide for millennia.

But many of these techniques were abandoned after the industrial revolution. New technologies, inexpensive energy sources, mass-produced materials and the ability to transport them all vast distances gave designers the freedom to build in any climate with nearly any material without regard to energy costs. It didn't last.

The wake-up call came with the energy crisis of the 1970s. Since then, recognition of our limited natural resources, the global politics of oil, land-use issues and the correlation between employee productivity and the work environment has grown.

Today, architects embracing sustainable design are returning to time-honored building techniques while merging them with new green technologies. These nine case studies not only indicate the complexity of designing sustainably in the 21st century, but show the range of project types—corporate office building to transit facility, house to library, municipal building to demonstration project—to which sustainable-design strategies can be applied.

One strategy is highlighted for each built or unbuilt project. Every project, however, clearly illustrates how the architectural firm integrated multiple strategies to create a sustainably designed building. Collectively, these nine case studies portray the state of sustainable design as practiced by Minnesota architects.

By Camille LeFevre

Minnesota Department of Natural Resources, Tower Consolidated Headquarters

Tower, Minnesota

LHB Engineers & Architects, Duluth, Minnesota

Completed 2001



PETER BASTIANELLI KERZE



The largest DNR field-headquarters building in Minnesota, the Consolidated Headquarters in Tower includes a 10,300-square-foot field office and three garage buildings (with heated and unheated storage) at an additional 27,000 square feet. The building's design places all occupants close to windows so they can enjoy daylight, views and natural ventilation. The structure allows the building to be expanded at the gable-wall ends and long spans allow for flexible interior arrangements.



- A R-44 roof structural-insulated panels, Lester Prairie
- B Recycled steel, Duluth
- C Environ biocomposite & Dakota burl countertops, Mankato
- D Ceiling tiles (65% minimum recycled content), Cloquet
- E Wood from DNR-certified forests
- F Gravel and backfill from site, Tower
- G Milling of regional black ash for wall paneling and trim, Duluth
- H Integrated colored concrete slab, Eveleth

Highlighted sustainable-design strategy

Use of **recycled-content materials**, including: reinforced steel with 30-percent recycled content, asphalt with 25-percent recycled content, aluminum ceiling-grid system with 15-percent recycled content, gypsum-board paper facing with 100-percent recycled content, carpet with 28-percent recycled-nylon content and recyclable-content backing, countertops of bio-composite material (100-percent recycled-wood-fiber content, with resins), particleboard from recycled wheat and straw, tectum ceiling panels from renewable wood and other sustainable raw materials. Also, use of locally made products when possible.

Additional sustainable-design strategies

Energy: Building oriented to maximize southern exposure, with a three-foot overhang to minimize heat gain; translucent panels used in shop areas to maximize light infiltration; light sensors near clerestory respond to available daylight; three-way switches, light sensors, occupancy sensors

to decrease energy use; heat-recovery ventilators, in-floor heating with heated water and high-efficiency furnaces.

Indoor-air quality: Operable windows; low-VOC paints, adhesives and sealants; no formaldehyde-containing materials.

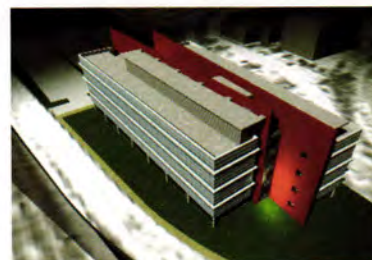
Water: Restorative design reintegrates water on site; gravel surfaces in traffic areas enhance water filtration; holding ponds for storm runoff and plowed snow; low-flow toilets and faucets in building.

Site: Building site on former gravel pit; plantings connect site with surrounding forest to create unbroken passage for wildlife; restoration of native-plant communities.

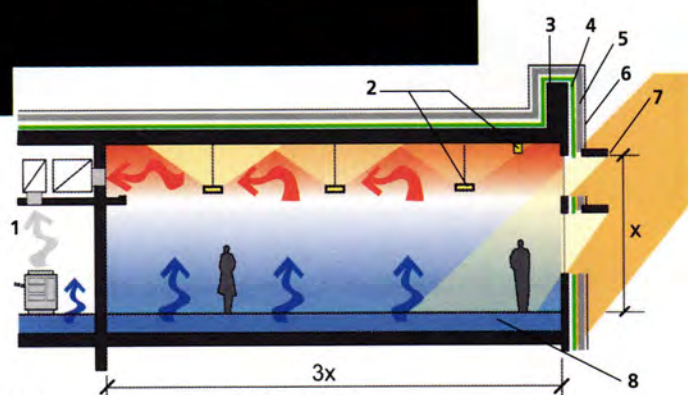
Waste: Recycling of lumber, steel, metals, glass, cardboard and wood pallets.

For more information, see www.sustainabledesignguide.umn.edu/MSDG/casestudies.html.

**American Lung Association of Minnesota
Healthy Design™ Office-Building Prototype
St. Paul, Minnesota
Perkins & Will, Minneapolis, Minnesota
To be completed 2004**



This speculative office building, designed for sustainability and workplace health, aims to change the way corporate America looks at its work environments. The initial focus of the project was on indoor-air and -environmental quality. However, the team quickly realized that energy consumption and material manufacturing affected overall air quality. Thus, the design of this prototype is a response to three interrelated problems common in office buildings nationwide: poor indoor environments, energy inefficiency and unsustainable use of natural resources.



- 1 Atmospheric separation for copiers
- 2 Indirect lighting with automatic dimming
- 3 Substructure of exterior wall
- 4 Vapor dispersion/moisture barrier
- 5 Rigid insulation/weep cavity
- 6 Exterior cladding
- 7 Sun control
- 8 Raised access flooring with displacement ventilation

Highlighted sustainable-design strategy

Indoor-air quality and indoor-environmental quality ensured through: under-floor displacement ventilation to carry air impurities away from occupied zones; desiccant dehumidification to regulate humidity; building-envelope detailing and flashing to eliminate moisture problems; single membrane at the outer face of the exterior wall and roof structure to control moisture infiltration and water-vapor/air movement; rigid insulation, moisture-drainage plane/vent space and protective cladding over the membrane to place dew point and condensation outside of building's moisture line; copy/print rooms and gas-fired boiler isolated from adjoining areas; low-VOC materials to reduce off-gassing.

Additional sustainable-design strategies

Energy: Low-energy HVAC and envelope design optimized via computer modeling; building massing and orientation (long axis running east/west) optimize daylighting while light shelves/sun shades control glare/solar gain; automatic dimmers maintain consistent light levels and conserve energy.

Materials: Recycled-content materials; recyclable materials; certified wood; durable construction and flexibility to ensure extended life.

Apple Valley City Hall

Apple Valley, Minnesota

CNH Architects, Apple Valley, Minnesota

Completed 2002



Apple Valley City Hall is a 50,000-square-foot addition to an existing 25,000-square-foot police facility. After minor remodeling, the two buildings share such amenities as a cafeteria, a boiler room, training areas and a parking lot. Together the buildings are known as the Apple Valley Municipal Center. The existing police façade was left exposed in the lobby of the municipal center. The new three-level city hall includes public areas, staff offices and space for expansion. Located within walking distance of a local bus line, the building aims to communicate an environmental message while maintaining an institutional presence.

Highlighted sustainable-design strategy

Using **LEED™** and **Minnesota Sustainable Design Guide (MSDG)** as tools to implement sustainable-design strategies involved:

Energy: High-efficiency boilers and chillers; high-efficiency motors and variable-speed drives on mechanical systems; building zoned and outside air modulated to match needs of occupants and activities; high-performance insulation; central clerestory and perimeter windows for daylighting; exterior solar screens to limit solar gain in summer; occupancy light sensors and three-way lighting controls to conserve energy.

Indoor-air quality: Low- or no-VOC finishes and adhesives to minimize off-gassing; separate exhaust system in maintenance areas; air intakes separated from pollution sources; vapor barriers, air conditioning and dehumidification for building moisture control.

Materials: Collection and storage of recyclables; 100-percent recyclable carpet with 25-percent recycled content; ceramic-tile floor in high-traffic lobby; linoleum flooring from renewable materials in service areas.

Site: Use of developed site; erosion and sedimentation control during construction; rainwater filtered on site via drywells or treated in wetland before entering storm-water system.

For more information about LEED™ (the U.S. Green Building Council's Leadership in Energy and Environmental Design Rating System), visit www.usgbc.org/LEED/LEED_main.asp. For more information about the Minnesota Sustainable Design Guide, visit www.sustainabledesignguide.umn.edu.

Rondo Houses

St. Paul, Minnesota

Cermak Rhoades Architects, St. Paul, Minnesota

Completed 2001



T

wo new single-family houses in the Rondo neighborhood of St. Paul were constructed with an environmentally responsible use of materials in mind. The core of this effort was a partnership between the Rondo Community Land Trust and Deconstruction Services, Minneapolis (a program of The Green Institute). A staff person from Deconstruction Services, the developer and the architect toured buildings slated for demolition and selected materials for use in these new homes. Deconstruction Services saved the materials and prepared them (by, for example, custom milling the interior and exterior wood trim) for reuse.

Highlighted sustainable-design strategy

Use of **reclaimed materials**, including: exterior red-wood trim, bead-board soffit, porch decking, brackets (both houses); fir interior door and window casing (one-story house), interior doors and hardware (two-story house), maple and oak hardwood floors (both houses), Douglas fir floor joists (two-story house); light fixtures (two-story house); solar panels (two-story house) for heating hot water.

Additional sustainable-design strategies

Energy: Compact floor plans and modest house sizes to reduce energy consumption and use of materials; review of specifications to maximize energy efficiency of selected systems.

Materials: High-quality interior and exterior finishes (such as quality cabinets and hardwood floors on the interior, stucco on the exterior) requiring less maintenance.

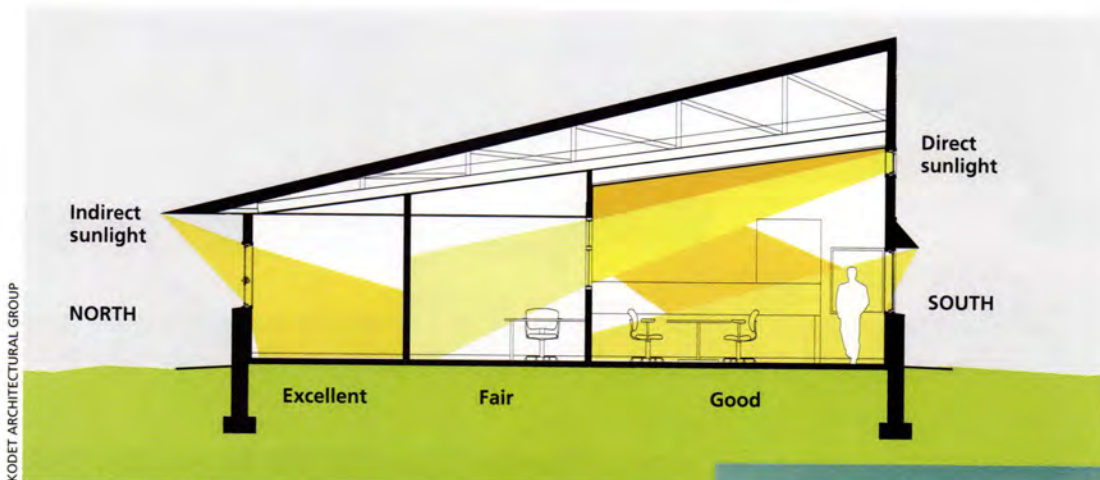
Site: Urban infill uses existing utilities and services; trust established for the land under the homes to maintain affordability for future homebuyers.

Minnesota Department of Natural Resources, Windom Consolidated Headquarters

Windom, Minnesota

Kodet Architectural Group, Ltd., Minneapolis, Minnesota

Completed 2001



The DNR Windom Consolidated Headquarters building, located on a rolling prairie site, provides office space for staff and maintenance areas with storage space for field equipment. The long linear, 8,700-square-foot building is situated so daylight reaches deep into the interior. The slope of the shed-roof office space reflects the rural setting and helps accomplish requirements for energy savings and daylighting. As spaces progress from the most private to public, the ceiling and shed heights increase. A large conference room, separated from the private office spaces by the lobby, provides a learning space in which DNR staff and the public can interact.

Highlighted sustainable-design strategy

Daylighting and solar-heat gain accomplished by: siting the building along an east-west axis to provide maximum exposure along the north-south axis; sloped shed roof and high windows on the south side allow daylight to pass through the open office spaces into the workstations beyond via interior glazing.

Additional sustainable-design strategies

Energy: High-efficiency electric lighting; high-efficiency furnaces and air-handling units assigned to building zones; computer modeling used to review payback peri-



ods, options, construction costs and other information regarding energy-conservation decisions.

Site: Approximately 50 percent of the site remains as open land; native-plant species reintroduced to restore prairie and wetland landscapes; roads, parking and traffic patterns kept to a minimum.

Indoor-air quality: Minimal use of materials with off-gassing potential; air intakes separated from exhaust-air sources to prevent risk of capturing contaminated air; humidity controls on heating and ventilation units to control microbial contamination.

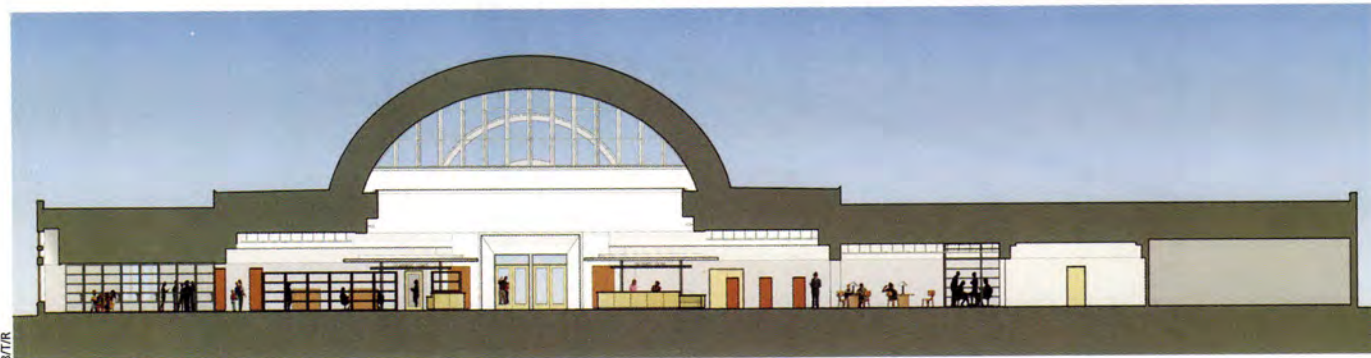
Materials: Lumber from DNR forests; concrete blocks from local source; concrete includes 35-percent fly-ash content; 60-percent recycled content in steel; exterior materials (brick, metal panel, fiber-reinforced concrete siding) selected for durability and minimal upkeep.

Hennepin County - Eden Prairie Library

Eden Prairie, Minnesota

Bentz/Thompson/Rietow, Minneapolis, Minnesota

To be completed 2003



The Eden Prairie Library is one of the fastest-growing libraries in the Hennepin County system. With an annual circulation of more than 600,000 volumes, the existing library had no more space available and no possibility for expansion. Hennepin County purchased a former Lunds Supermarket Building located just west of the existing library in order to convert the old grocery into a new library facility. The big-box grocery was constructed in the early 1970s, prior to significant energy codes. Once renovated, the building will accommodate a new 40,000-square-foot library with an additional 6,000 square feet of space for lease.

Highlighted sustainable-design strategy

Reuse of an existing building by: adding windows, skylights and a large barrel-vaulted skylight to introduce daylighting into large building footprint; minimal interior partitions to maximize daylighting.

Additional sustainable-design strategies

Energy: Exterior walls reinsulated and/or reconstructed for cavity-wall construction that eliminates moisture; new energy-saving roof insulation; computer modeling of energy systems; occupancy and light sensors to decrease energy use.



Indoor-air: Outside-air cooling during the spring and fall via fans with economizer cycle; variable-air-volume devices to deliver conditioned air.

Materials: Salvaged brick; recycled paint; low-VOC materials and adhesives; carpet with high recycled content.

Site: Reduced on-site paving; native plantings introduced.

East Metro Transit Facility

St. Paul, Minnesota

BWBR Architects, Inc., St. Paul, Minnesota

Completed 2001



DON F. WONG



BWBR

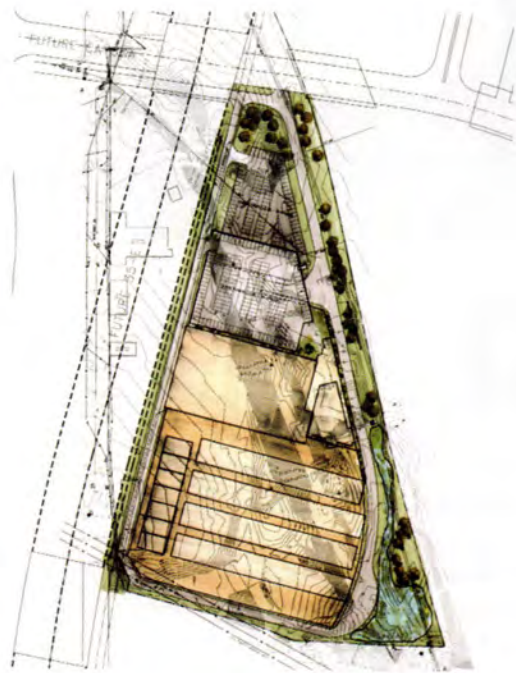
Designed to mirror and complement the city buses it serves, the 338,300-square-foot East Metro Transit Facility is long and horizontal on its triangular site. The building includes three main components: a maintenance, washing, fueling and parts-storage area; a storage area for 185 buses; and an upper level with offices, administrative pavilion, wellness room, lunchroom with atrium and training facilities. From a dispatch tower with views of all entrances and exits, staff oversee bus circulation through the facility. The building's simple palette of durable, low-maintenance, industrial materials evokes the underlying mechanical nature of the machines it houses.

Highlighted sustainable-design strategy

Reuse of an urban brownfield site involved: cleanup of pollutants from site's previous use; reducing building footprint and setting floor elevation to minimize energy and cost of moving soil during construction; tapping into existing utility infrastructure; use of native plants in landscaping to reduce needs for chemical treatments and water; creation of two retention ponds in natural depressions on site for storm-water filtration; parking deck sited on building roof rather than ground surface.

Additional sustainable-design strategies

Energy: Energy-efficient mechanical systems, daylighting controls, proper glazing, efficient air-handling units; siting building's southwest corner below ground to reduce heat gain in summer and insulate building in winter; light monitors to introduce daylight.



BWBR

Water: Low-flow fixtures, lavatories, showers; bus-wash water-reclaim system.

Materials: Exterior materials acquired from within a 150-mile radius of project site; reuse of furniture and equipment from former facility; durable materials for high-traffic areas.

Waste: Concrete debris ground and used for fill; steel recycled; holding areas and recycling stations throughout facility; use of precast-concrete panels, bar joists and other structural steel that can be disassembled and reused.

Iowa Association of Municipal Utilities

Ankeny, Iowa

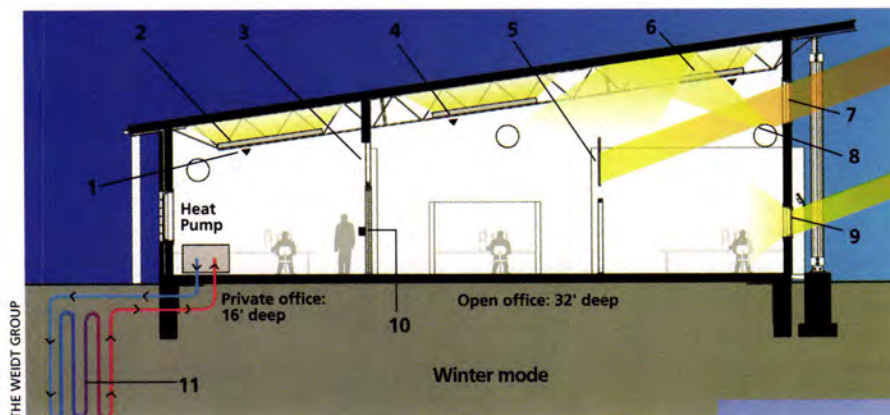
The Weidt Group, Minnetonka, Minnesota

RDG-Bussard Dilkis, Des Moines, Iowa

Completed 1999



ASSASSI PRODUCTIONS



- 1 1 photo sensor per three north-facing offices
- 2 8' indirect fixtures w/ electronic-dimming ballast
- 3 Transom/vision glass
- 4 1 photo sensor in center & south zone
- 5 Seasonal banner to control low-angle direct sun during winter
- 6 White-painted metal deck ceiling for reflectance
- 7 Daylight transom window
- 8 Supply duct doubles as light shelf to control direct sun
- 9 Horizontal blinds on south window
- 10 Occupancy sensor
- 11 200'-deep ground wells connected to heat-pump provide heating source during winter



In 2002, ALA National's Committee on the Environment selected the Iowa Association of Municipal Utilities training and headquarters building as one of its Top Ten Sustainable Design Projects in the United States. The project includes a 12,500-square-foot office/administration building (with 6,500 square feet of expansion space) and a 3,500-square-foot maintenance garage. Masonry walls to the north and west buffer the building from winter winds. Shed-roof forms rising from the low north wall to the high south wall provide passive solar gain in the heating season, while shading the building from the summer sun with a broad overhang. With its long east/west axis, the building maximizes the opportunity for controlled daylight on the north and south façades.

Highlighted sustainable-design strategy

Energy conservation achieved through: geothermal heat-pump system utilizing a vertical well field to heat and cool building; building orientation on east-west axis with a narrow 48-foot-wide floor plate to provide interior spaces with at least two sources of daylight; high north and south windows allowing primary light to the interior with glazing that allows high solar transmission; overhangs on south side to control direct sun from entering



ASSASSI PRODUCTIONS

building during cool season and seasonal light baffles to reduce direct sun from striking task areas in winter; photo-sensor-controlled light fixtures; occupancy sensors.

Additional sustainable-design strategies

Materials: Recycled cement-board siding; linoleum, minimal use of recycled carpets; wood-frame windows.

Indoor-air quality: Operable windows; low-VOC finishes; energy recovery of exhaust air to provide high ventilation rates at no energy penalty.

Site: Restoration of native-plant communities; storm-water retention ponds to reduce runoff; on-site wetland for treating the building's wastewater; exterior photo sensors for lamps; shielding of exterior fixtures to prevent light pollution; roadway cross sections with swales for natural drainage of storm water.

Environmental Experiment Center, Science Museum of Minnesota

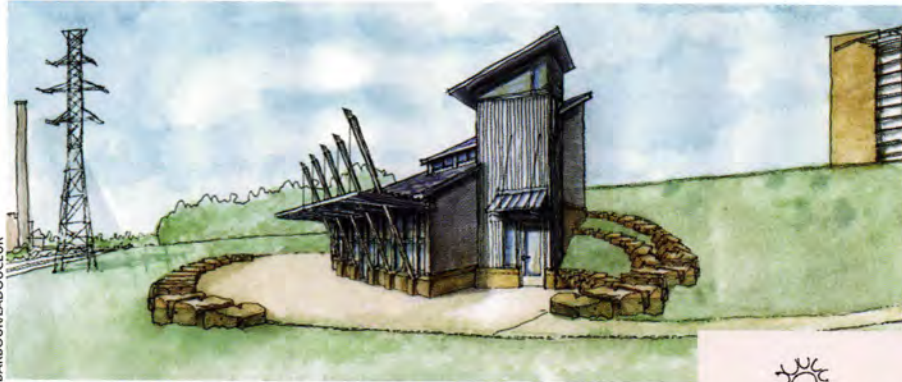
St. Paul, Minnesota

Barbour/LaDouceur Architects, PA, Minneapolis, Minnesota

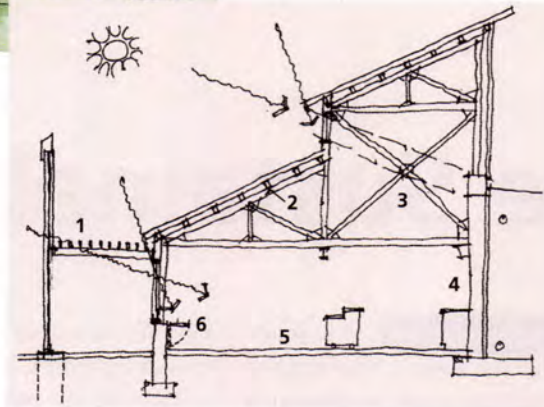
To be completed 2004



Eco-boat



The Science Museum of Minnesota's outdoor-exhibit park sits on a brownfield a short distance from the Mississippi River and directly over a major urban storm-sewer system. The centerpiece of the park will be the Environmental Experiment Center (EEC). The 1,000-square-foot, year-round facility will model renewable-energy and energy-efficient building technologies, as well as environmentally sustainable building products. The EEC will bundle together an array of sustainable-building technologies to demonstrate architecture's ability to save resources and reduce environmental degradation, while serving as a greenhouse, laboratory, exhibit area and classroom.



- | | |
|----------------------|------------------|
| 1 Adjustable louvers | 4 Concrete wall |
| 2 Wood purlins | 5 Concrete floor |
| 3 Steel truss | 6 Bench |

Highlighted sustainable-design strategy

Renewable energy to be created by: energy-conservation features and northern cold-climate building-design concepts that reduce annual energy consumption 60 percent compared with code; a photovoltaic roof system and residential-scale wind turbine that fulfill the building's energy needs while supplying excess energy to the local electric grid; siting, shaping and massing the building to integrate energy-conservation strategies; adequate roof area and orientation for photovoltaics.

Additional sustainable-design strategies

Energy: Adequate southern exposure for passive-solar heating, minimal east/west exposure, protected and earth-sheltered northern exposure; fenestration that balances conduction, loss, solar gain and daylight; daylighting through high north and south windows; photo-sensor-controlled light fixtures that dim lights according to available daylight; heating and cooling through a ground-source heat pump.

Indoor-air quality: Operable windows.

Site: Landscaping buffers northern winds in the winter and shades south plaza in summer.

Materials: Selection of sustainable products with low-embodied energy.

Clients committed to sustainable design are challenging Minnesota architects to help them realize their ideals, while architects are embracing the sustainable initiatives clients bring to projects

The Sustainable Quest

On the wind-swept prairie in the southwest corner of the state, a headquarters building for the Minnesota Department of Natural Resources sits lightly on its site. Far to the north, on Lake Superior's shoreline, a Minneapolis woman realizes her dream of renovating a cabin with a profound connection to its environment. On the grounds of Carleton College in Northfield, students and staff share a commitment to the principles of sustainable design, addressing issues from food waste to renewable energy to native landscaping throughout their campus environment.

Across Minnesota, educators, facilities managers, real-estate developers and homeowners are looking for new answers to old questions as they embark on building projects. Their rallying cry is "make it green, make it earth-friendly, make it sustainable." In the quest for sustainable buildings, they're challenging Minnesota architects to help them realize their ideals while archi-

tectes are embracing the sustainable initiatives clients bring to projects.

Take the case of the North Shore cabin owned by Medora Woods, a former Jungian therapist. When she decided to renovate a 50-year-old cabin in Tofte, Woods saw the process as an opportunity to explore her ideas about community and connection, energy and environment. She told Sarah Nettleton, AIA, Sarah Nettleton Architects, Minneapolis, "Let's build an earth-friendly house."

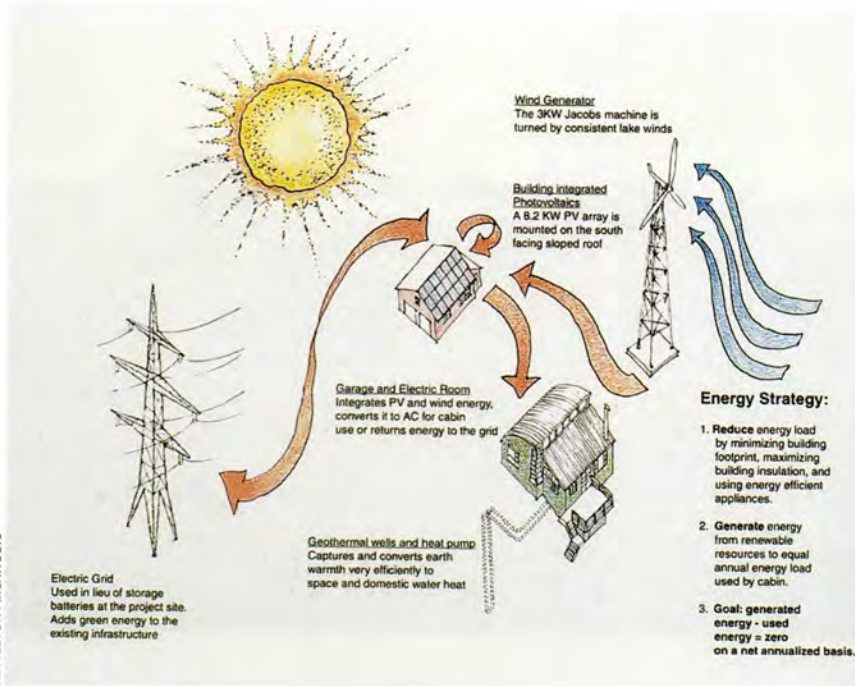
With its small footprint, wind-energy system, integrated energy-monitoring system and materials like a 75-percent-recycled-content copper roof, the cabin took the idea of sustainability to new levels. Simply put, Woods was determined to push the project to the limits of what could be achieved.

Nettleton acknowledges Woods was the driving force behind the project. "We've had other clients who talked about this

level of 'greenness' but when things got bumpy they said, 'No thanks.' Medora constantly pushed us, constantly said, 'We're staying the course.' The whole project challenged me hugely."

Other clients in Minnesota—many with multimillion-dollar state or institutional budgets behind them—share Woods's passion for sustainable design. For Mark Wallace, strategic-planning and budget manager of facilities operations for the state's Department of Natural Resources (DNR), the commitment to creating sustainable buildings is a given. "We're a substantial land holder in the state of Minnesota and we manage some very fragile landscapes," he says. "Of course we want to build buildings that minimize their impact on the environment."

In the past several years, Wallace has overseen the construction of two new DNR headquarters buildings. In both cases, Wallace's goal was to reduce the environmental impact of the buildings, increase energy



The Tofte cabin (below) incorporates numerous integrated sustainable-design strategies (left) because of the client's commitment to "earth-friendly" construction and the architect's dedication to the client's goals.



PETER BASTIANELLI KERZE

savings and make sure the buildings' occupants were comfortable and productive. While the DNR has no official policies on sustainability, Wallace calls the strategy "intuitive," noting, "If the DNR doesn't make these commitments, then who will?"

With the new DNR projects, located in Tower and Windom (see pages 27 and 31), Wallace established a predesign process in which his team developed documents outlining goals and strategies for everything from energy savings to which scientist worked where in the buildings. Only then did the DNR approach the architectural firm, selected by the state's designer-selection board, to begin design work.

"Mark dictated the standard: He wanted the building sustainable," says Ed Kodet, FAIA, Kodet Architectural Group, Minneapolis, whose firm designed the Windom project. "We started by having meetings every two weeks with about 20 people, from Mark to the maintenance staff, and

talked about everything from preserving the site and using local materials, the effects of wind direction and daylighting, to how people would use the space."

The architectural team used LEED™ (see page 29) and the Hennepin County Sustainable Guidelines to determine sustainability criteria suitable for the project. John Carmody, director, the Center for Sustainable Building Research, University of Minnesota, also assisted. "Through the combination of Mark and the DNR's high expectations, our design ideas, advice from our consultants and various sustainable-design tools, we created a strong team effort," Kodet says.

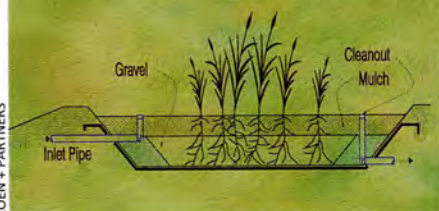
"Teamwork is critical to the sustainable-design process, as is a willing client," he adds. "An architect can propose ideas all day, but if the client isn't willing to support those ideas, they won't happen. Conversely, the architect has to come forward with design ideas and be willing to listen."

Harold Teasdale, developer of Jackson Meadow in Marine on St. Croix, is another client whose team—including David Salmela, FAIA, Salmela Architect, Duluth, and landscape architect Shane Coen, Coen+Partners, Minneapolis—helped him realize his sustainability objectives. "Sustainable was always in the back of our minds," Teasdale says. "For us, it began with the idea that we would create a community without destroying the beauty of the land."

"The thing about sustainable design," adds Salmela, "is that it's really common sense. It's common sense to save energy by gaining available energy from the sun, orienting buildings to maximize light, and drawing heating and cooling from the ground. Harold and I agreed from the start that good design is sustainable design."

The housing development sits on less than 30 percent of the site, streets were inverted to channel water down the middle and thus eliminate the need for gutters, and

Wetland Cell



Sustainable-design initiatives at Jackson Meadow (right) include a community wetland septic system to naturally treat effluent (above), which in turn facilitated the clustering of homes and thus the preservation of open space.



the surrounding meadow was restored to native prairie. The houses are finished with low-VOC paints, are fitted with premium doors and windows—"to allow for less leakage," Salmela says—and have steel roofs "that will last for 100 years, decreasing the amount of asphalt roofing that goes into landfills."

However, in order to introduce such sustainable-design technologies as geothermal heating and cooling (which five new houses have) and wind energy (which Teasdale is exploring), Salmela says, "you need a committed client like Harold to make it happen." Being sustainable, Teasdale admits, is "a tougher road to go down. You've got to have a consistent, relentless commitment to the idea because there are always obstacles. Everybody from the painter to the banker has their own way of doing business and change is hard."

So if it's a tougher road, why go down it at all? "You have to care about the future," Teasdale says. "Does that sound corny? Well, it comes down to a matter of personal commitment, a belief that this is the right thing to do. For me, that means building

something that will make sense, maybe even more sense, 20, 30, 40 years from now. People will pass down the houses we're building to their children."

Similarly, Carleton College is well-known for its dedication to sustainability, which is driven by students and staff. As director of facilities planning management, Richard Strong (who helped develop the Minnesota Sustainable Design Guidelines) spends his time spearheading new-building design and construction, exploring new energy systems, calculating waste-reduction strategies and evaluating differences between materials used in campus buildings.

Recent projects include a new building with a computerized lighting system to reduce energy costs, a residential demonstration project that features a variety of solar strategies and a new campus landscaping plan with native plantings. At Carleton, sustainability ranges from the sublime—issues of social justice and environmental activism—to the mundane—whether to choose vinyl or linoleum as flooring for high-traffic areas.

"We ask the architectural firms that work for us to evaluate projects using the Minnesota Sustainable Design Guide," Strong says. "The architects also sit down with our Environmental Advisory Committee (which consists of three staff, three faculty and three students) while designing the project. We advise the architects as to how far we want to go and they advise us on what is feasible given cost, schedule and type of project. The sustainable-design process becomes a team approach."

Kevin Flynn, AIA, project architect, Hammel, Green and Abrahamson, Inc., Minneapolis, agrees. "When we're working with Carleton on a project," says Flynn, who leads the architectural firm's sustainable-design initiative, "our team goes through the Minnesota Sustainable Design Guide with the advisory committee, and we've cautioned them against just collecting points. We want to do things that make sense for each project."

In one case, for instance, the architects and the advisory committee found that upgrading a dormitory's mechanical systems

“As a team, clients and architects are
engaged in a process of fitting the realities of
sustainable design to our evolving ideals.”

would actually increase the long-term operational energy load on the building. “So we’re currently exploring sustainable options for supplying that building with the energy it needs without raising the long-term costs of energy use,” Flynn explains.

Like any other client, those devoted to sustainability are also concerned with cost. When it came to managing the bottom line for his DNR projects, Wallace felt he was wrestling with a lot of unknowns. “We feel obliged to give the state good value for its money,” he says, “but we didn’t know if it was less expensive or more expensive to build sustainably. Even the architects couldn’t give us a good answer.”

Despite fears that a sustainable approach could have cost as much as 30 percent more, the price tag “never even came close to that,” Wallace says. Some higher first costs associated with the projects—an energy-saving shed roof on the Windom

facility, for instance—should pay for themselves in less than six years.

Another question that arises as architects and clients team on sustainable projects is who should pay for the architect’s expertise in this developing specialty. One of the most significant costs in the renovation of Woods’s cabin, for instance, was the architect’s time spent researching renewable-energy systems and sustainable products.

Strong, for one, believes architects should bear those costs. “We want to hire you if you’re a sustainable architect,” says Strong, “but we shouldn’t have to pay for your training time. I know sustainable design is a cutting-edge field, but architects have to decide if they want to be out there or not.”

When architects and clients argue over issues of cost or communication, product selection or strategy, it’s really part of one great learning curve. “We are living in a state of advanced rhetoric when it comes to

sustainable design,” says David Eijadi, AIA, vice president, The Weidt Group, Minnetonka; the firm conducts computer modeling of energy systems for nearly every sustainable-design project in the state.

“Sustainable design represents a particularly difficult shift in culture because it has several sets of intersecting and conflicting ideals. For example, human health and productivity, often paired together as a sustainable-design objective, may have two different ideal states and either one of them could be set against the value of conserving a natural resource. During the design of a building, who is to say what a satisfactory decision will be? And when will they be able to say it? As a team, clients and architects are engaged in a process of fitting the realities of sustainable design to our evolving ideals.”

“Truth be told,” Eijadi concludes, “architects and owners are together on a quest for the true meaning of sustainable design.”



Sustainable strategies incorporated into the Language and Dining Center at Carleton College (left and above) included daylighting, light sensors, energy modeling, 100-percent recycled carpeting and native landscaping.

Taking a sustainable approach demands that architects not only build less while designing for longevity and flexibility, but foster sustained relationships with clients to maximize goals with minimal means and materials

Less *is* MORE

By Thomas Fisher, Assoc. AIA

At the 1999 AIA National convention, the noted ecologist William Rees challenged the American architectural profession to reduce the resources it uses in buildings by 90 percent over the next 50 years. The audience enthusiastically applauded his keynote address, although few of us grasped the magnitude of his challenge. Reducing resource use by that much demands that architects not just make buildings greener through the introduction of, say, recycled materials or passive solar heating, both of which are important; rather, such dramatic change requires that we rethink our role as architects, as well as our relationships with clients, by pondering some seemingly unconventional questions.

"A design approach based on using fewer natural resources can open up whole new areas of practice, enabling us to become long-term counselors of clients, rather than merely one-time consultants."

The first question, when beginning any project, is to ask clients: Should you build at all? We now live at more than twice the carrying capacity of the earth, according to Rees, because we assume that every problem has a physical solution. In architecture, that assumption has led our industry to consume more than 3 billion tons of raw materials and to generate more than 40 millions tons of demolition waste annually. It has also led some clients to avoid our profession because of a sense that they will get a building, whether they need one or not.

To the architect, starting a design process by asking whether any building is needed at all may seem perverse, as if we're trying to talk ourselves out of a job. But asking the question helps us make the fundamental and often misunderstood distinction between architects, who attend to the particular needs of clients, and developers and contractors, who provide a more or less standard product in the form of a building.

Questioning whether clients need to build can also be one of the best ways to ensure repeat business. Firms such as Gensler in San Francisco and the Hillier Group in Princeton, New Jersey, have found that when they have saved corporate clients from building unnecessarily, those clients keep coming back.

If the answer to the first question is yes, the next question becomes: How can we minimize the extent to which we build? That question not only has environmental benefits, enabling us to reduce the total amount of natural resources we use, but has economic benefits in ensuring that clients spend only what they must.

The question also has aesthetic advantages as we demonstrate the value of design in producing the greatest results with the least number of moves. We need to revisit Mies van der Rohe's adage "Less is more," not as a prescription for a particular style, but as a mantra for how sustainable design can generate far more benefits than costs.

Building as little as possible may also sound perverse, as if we are trying to reduce our scope of work or our fees. But a design approach based on using fewer natural resources can open up whole new areas of practice, enabling us to become long-term counselors of clients, rather than merely one-time consultants.

Such an approach would enable us to provide a wider variety of services, both earlier and later in the development process, that might include helping clients to use existing facilities better or differently, redesigning their organization or operation or rethinking their communications and identity. Foster Associates in London, for example, has shown how the redesign of such activities can often reduce the amount of space clients need, saving them from building too much, while also potentially increasing their productivity and visibility.

A third question involves asking how long a building will last. Designing buildings to be as functional and durable as possible dominates the decision making of every architect; rarely, however, do we ask whether buildings need to be as functional or as durable as we assume they must. Modernism taught us to tailor spaces to the specific programs of one-time clients and yet that often limits how a building might be reused over time.

To reduce the waste of resources that goes into the demolition or major renovation of buildings, we must design with the building's second, third or even fourth life in mind. This approach benefits clients by making

"We need to revisit Mies van der Rohe's adage 'Less is more,' not as a prescription for a particular style, but as a mantra for how sustainable design can generate far more benefits than costs."

buildings more flexible and appealing when up for sale. The opposite approach—making buildings more temporary by designing for disassembly and recyclability—has similar benefits for clients.

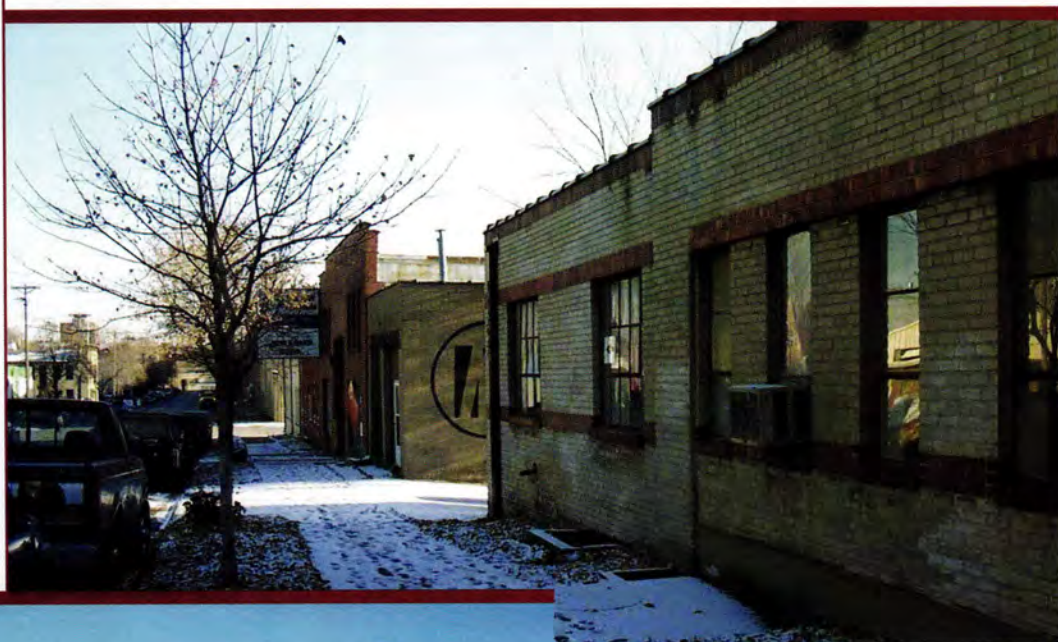
The national building codes, for reasons of health and safety, have driven architects to design increasingly long-lasting structures, even as the economy and public policy have pushed the private and public sector toward evermore rapid change in their operations and organizations. As a result, we end up throwing away relatively durable materials—brick, block, steel, gypsum board—in buildings or interiors undergoing frequent alteration. Developing structures and enclosures that use biodegradable or recyclable materials, or that allow for easier disassembly and reuse of products, would increase a building's flexibility and use over time.

Designing for greater longevity on the one hand and for easy disassembly on the other are two approaches premodern cultures took in creating religious and institutional buildings that changed hardly at all and residential and commercial buildings that could biodegrade without a trace. Architects need to revive those traditions, updating them to address current needs.

In summary, asking these questions demands that architects consider what we do not in terms of creating buildings, but in terms of creating sustained relationships in which we understand clients and their needs well enough to help them maximize their goals with a minimal expenditure of money and materials. In other words, a recommitment to relationship building will allow us not only to sustain our profession with a wider range of services, but to create a more sustainable built environment through a wiser use of resources.

WASTED, NOT!

A Minneapolis arts organization refurbishes its 19th-century building by salvaging and reusing materials from a defunct luxury shopping center
By Heather Beal



HEATHER BEAL



After the Conservatory was slated for demolition (right), No Name Exhibitions embarked on an operation to salvage building materials that could be reused in the Soap Factory (above and top).



SHIN KOYAMA

"BOLD," "OUT-THERE" AND "JUST PLAIN CRAZY." These were the reactions a Minneapolis-based arts organization heard when it first proposed recycling pieces of the Conservatory, a nearly new upscale shopping center on Nicollet Mall in downtown Minneapolis, by reusing them to renovate a 19th-century industrial building next to the Mississippi River. Nevertheless, the nonprofit No Name Exhibitions @ The Soap Factory and more than 100 volunteers have spent the past four years implementing this idea.

As a member of No Name's board of directors with experience working for both architecture and engineering firms, I understood the initial skepticism. When transportation, storage and refurbishment expenses are added to the labor costs of deconstructing materials, then installing them elsewhere, it almost always costs less to buy new. A series of serendipitous circumstances, however, made deconstruction and reuse an option and reduced the logistical and financial barriers that make this approach unfeasible for

"Ironically, because the Conservatory had been built to last, deconstruction was extremely energy-intensive and brutal. Almost everything we saved had to be ripped, punched or cut from its location."

most groups that want to reduce construction and demolition waste by reusing building materials.

In the mid-1990s, when this process began, No Name was cash poor. As a young organization supporting emerging artists, we had neither the individual donor base nor the established revenue sources to complete major building improvements. We also had extensive needs.

When Ryan Companies US, Inc., Minneapolis, announced in April 1996 that it would demolish the Conservatory and replace it with a new office tower, we had just begun to realize the magnitude of improvements needed to transform the former National Purity Soap Factory, a 48,000-square-foot-building donated to us by Pillsbury/Grand Met, into a multiuse center for the arts. Our priorities ranged from installing hundreds of panes of window glass and replacing the roof to repairing the exterior masonry. Inside, we needed everything from fire sprinkler heads, exit signs and doors to toilets, bathroom partitions, railings, ceramic tile and sinks.

DELAYS AND OPPORTUNITIES

I soon found myself wandering through the Conservatory and noting items that could live a long and useful life at the Soap Factory. Clearly, we could successfully reuse equipment and materials others wouldn't even think of rescuing from such a grand building. Since the Conservatory was less than two miles from the Soap Factory's riverfront site, we wouldn't have to transport deconstructed items very far.

I ran a wish list by fellow board members, then called Ryan to express No Name's interest in sending volunteers to the Conservatory to salvage items. Ryan explained the entire complex would be demolished as soon as possible. Two scheduling delays, however, created the window of time we needed to plan a deconstruction effort that included: determining how to remove specific items; securing a staging area on the loading dock; finding companies to loan us trucks with drivers; and scheduling volunteers for loading and unloading salvaged items.

The first delay arose because Ryan was committed to signing a lease with a major anchor tenant for its new office tower before demolishing the Conservatory. Since few companies were looking for downtown office space at the time, achieving this goal

took several months. The second delay resulted when two remaining tenants in the Conservatory refused to move until they could negotiate higher compensation for early termination of their leases. Both tenants were in the 808 Building, an existing structure incorporated into the Conservatory's design, which meant deconstruction could begin in the newer areas of the retail complex far away from the occupied spaces.

The Conservatory was still standing in Spring 1997 when I learned the Minnesota Office of Environmental Assistance (OEA) was accepting grant applications to help private, public and nonprofit organizations finance projects that prevented pollution, reduced waste or conserved resources. Our proposal to recycle pieces of the Conservatory achieved all three objectives. A report by OEA researcher Michelle McGuire confirmed that virtually all of the Conservatory's items we wanted to reuse would otherwise be sent to landfills.

SALVAGE CHALLENGES

Ryan agreed to review our wish list to determine what could be saved—with one caveat: We would have to recruit or hire a licensed salvage crew to remove the items. Our list changed as local building-industry professionals advised us on what we could reuse and still meet building-code requirements. Fred King, project director, Inspec, Minneapolis, and a board member of the local chapter of the Association for Facilities Engineering, joined No Name's advisory committee. Engineers from Michaud Cooley Erickson, Minneapolis, the firm that designed the original mechanical and electrical systems for the Conservatory, helped us determine which system components could safely be reused.

Salvage experts—including Jeff Stebbins of CHQ Construction Services, Minneapolis, Bob Alf of the Reuse Center, Minneapolis, and Kaymarie Colaizy, who had managed various deconstruction projects for the Minneapolis Community Development Agency—walked through the Conservatory with us to review reuse possibilities.

The fact that the Conservatory had been solidly constructed of highly durable materials presented special challenges. For example, when we first asked for some of the cast-iron benches, we were told we'd need a crane to remove them because they had



HEATHER BEAL



Racing the wrecking ball, the team salvaged items from the former luxury shopping center, famous for its marble staircase (above) and balconies (top), by enlisting volunteers to transport materials to the Soap Factory (right).



been welded together in groups. Later, Ryan's project manager, Doug Dieck, recommended cutting the benches into sections so they could be carried. Still, four to six burly volunteers were required to lift a single bench.

Since we needed tile to renovate Soap Factory bathrooms and none of the ceramic tile installed in the Conservatory could be saved, we looked at the marble tile. But the marble had adhered so strongly to wall surfaces that removing it required shattering one large piece and ripping the remaining tiles off columns or large expanses of wall. To reuse this marble we'd have to soak the substrate off the back or deep-set the tiles with the substrate attached. When Ryan discovered boxes of unopened attic-stock ceramic tile, we reduced our request for marble, choosing ease-of-reuse over the prestige of the finer finish material.

Throughout the research and planning stage, we also called local building-code officials with questions. We learned, for example, that to maintain established ratings for fire doors we had to punch them from walls with their frames and assemblies intact. When we encountered ambivalence about whether toilets from the Conservatory could be reused and still meet commercial building-code requirements, we eliminated these from our wish list.

As our project gained momentum, more people contributed creative ideas and assistance. In December 1997, Ryan decided to have its subcontractors deconstruct items and set them aside for us—a tremendous benefit since we could then focus our efforts on recruiting and scheduling volunteers and securing the trucks needed to transport salvaged items from the Conservatory to the Soap Factory.

Deconstruction and transportation ran from late January through early March of 1998. More than a dozen companies and 100 volunteers collaborated to transport, inventory and store the salvaged items. Ryan donated approximately \$80,000 in professional services and salvaged equipment or materials to our effort. In July 1998, the OEA awarded No Name a \$75,000 grant to pay for the design and construction services needed to reuse the salvaged items. We hired Shea Architects, Inc., Minneapolis, and LHB Engineers and Architects, Minneapolis, to prepare the design documents and preliminary cost estimates we needed to raise additional construction funds.

INSTALLATION AND REUSE

Refurbishing and installing the salvaged items often proved as challenging as removing them. Neil Thelen, Soap Factory project manager, and David Pitman, installation manager, reviewed design documents, verified the characteristics of existing spaces and searched through the salvaged items to find the exact ones shown in architectural drawings. To meet requirements established by the Americans with Disabilities Act, for ex-

ample, they had to find a specific countertop that would fit flush between two walls and could be mounted with the correct hardware at the proper height.

Highly customized materials were the most difficult to reuse. The majority of the ceramic tile, for instance, was arranged in a geometric pattern on a web backing. The cost of having a subcontractor lay out these sheets in a precise pattern was prohibitive. So we used solid-color tile to finish the floors and walls of our unisex bathroom and saved the patterned tile for small inconspicuous places.

Since deconstruction began four years ago, we have installed not only ceramic tile, sinks and countertops, but bathroom partitions, fire exit signs, electrical panels, light fixtures, fire doors, toilet-paper holders, hand rails, paper-towel dispensers with built-in wastepaper baskets and a broad range of miscellaneous items. Four bathrooms have been renovated, doors throughout the first floor replaced, a security/fire-alarm system installed and major electrical-system improvements completed.

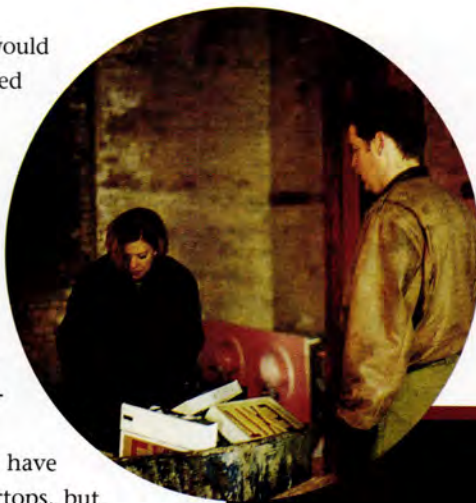
We estimate the total retail value of items salvaged from the Conservatory and installed at the Soap Factory to be approximately \$25,000. A substantial inventory of salvaged items remains in storage for future use, sale or donation. We used the OEA grant to purchase grout, primer, wire, piping, drywall, ductwork and conduit; and to pay for the installation of salvaged items, additional donated lighting fixtures, and plumbing, electrical and life-safety system components.

LESSONS LEARNED

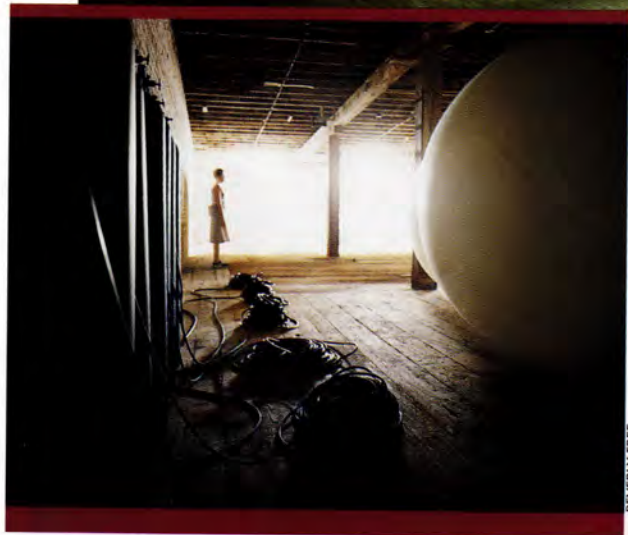
As we brought the Soap Factory up to code, we began to view buildings differently; as repositories of natural resources. Two-by-fours were once trees. Bricks, ceramic tile and porcelain were once clay. Copper and iron are mined from the earth; marble and granite are carved out of it.

Researching how to remove and reuse specific materials also increased my awareness of how much energy is expended to transform raw materials into building components, transport them to a site and assemble them into a structure. Ironically, because the Conservatory had been built to last, deconstruction was extremely energy-intensive and brutal. Almost everything we saved had to be ripped, punched or cut from its location.

The idea of rescuing items from a lavish, urban shopping center to save a 100-plus-year-old soap factory seems farfetched—even in retrospect. However, saving and reusing items that would have otherwise been sent to landfills has not only helped us make steady progress on our renovation, it has allowed us to forge the alliances between private, public and nonprofit organizations that we believe are essential for the success of sustainable-development projects.



HEATHER BEAL



BEVERLY FREE

Ken Potts, AIA, and Leslie Westphal, members of the salvage crew, ponder the reuse possibilities of exit signs piled in a wheelbarrow (top).

Some salvaged items are being stored in the Soap Factory's upper floors (middle) until new uses are found, while many other materials were used to bring the art-exhibition space (above) up to code.

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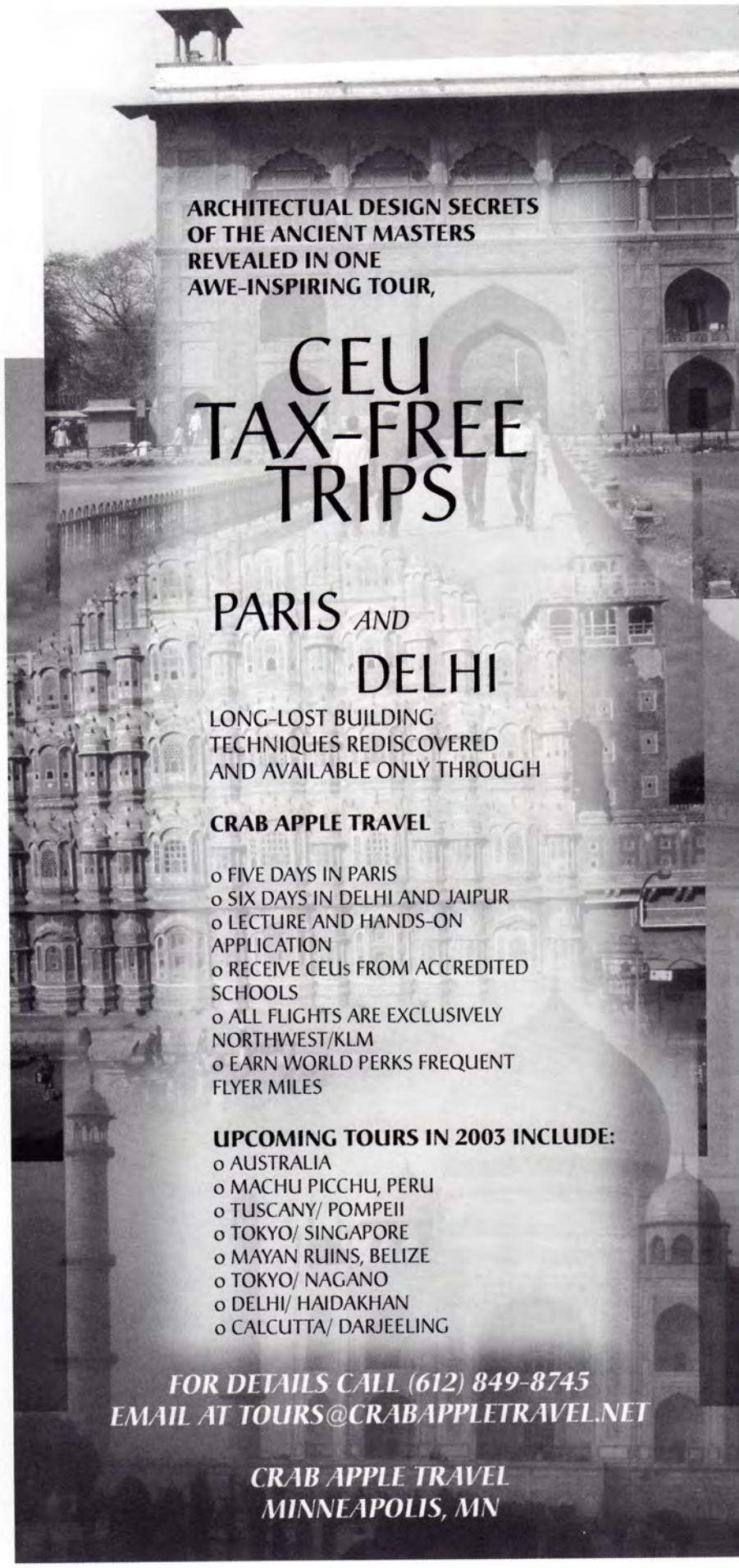
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president's message

Continued from page 17

Can you define what you mean by value?

As suggested earlier, value is a quality that is perceived. Perceiving value requires participation from both individual members and the association. It requires alignment: Both parties must care about the same objectives to see value.

For example, as an association, AIA Minnesota may see itself as an exceptional member-led organization. Membership is strong and programs are attended in droves. Our state has 1,667 licensed architects. More than 1,320 licensed architects are members of AIA Minnesota and the total membership is more than 1,890. More than 1,500 of our members attended the state convention this past November. Within AIA National, we are considered one of the strongest regional components and certainly one of the most financially solid.

These are all good signs of a strong professional community. I would certainly think that the success of our association is a result of providing valuable service to our members.

But value for individual members can often be perceived as "What is AIA Minnesota doing for me today?" It's a great and fair question! The answer, of course, is varied and yet specific to the many different needs of our individual members. Our daily focus, at AIA Minnesota, is to assist individual members in the growth and improvement of the professional service they provide to their clients, companies or constituencies.

Can you give examples of the value AIA Minnesota gives its members?

AIA Minnesota provides knowledge-building resources that help professionals bring leadership to their clients and communities on the important and challenging issues facing society today and into the future. Sustainable design, for example, is one value the architecture profession has brought forward over the years.

The Committee on the Environment, both locally and nationally, has been actively engaged for many years in building the dialogue on sustainable design and en-

interview

Continued from page 21

state stipulated that the B3 design team accomplish three specific tasks: development of the Sustainable Building Design Guidelines (SBDG), benchmarking and project management. LHB's role as project manager is to integrate SBDG development with benchmarking and keep the whole project on track.

DE: Right now there are a number of sustainable-design guidelines that are global in nature, but following them won't necessarily result in a great building for employees, the economy or the environment. B3 gives us an opportunity to create a system that's accountable and thus will benefit Minnesota's environment and economy. The Weidt Group is working on two aspects of the project: the accountability portion, which involves the creation of a benchmarking database for existing buildings and future buildings, and developing the energy portion of the guidelines.

JC: B3 is an unprecedented opportunity to make the state a leader nationally and internationally in transforming the way buildings are built. It's mandatory, it's well-funded and it's a thoughtfully mapped-out process. My role is to lead the development of the guidelines.

RC: In addition to the three tasks the state asked for, we added two. The Adams Group is focusing on the project-delivery process and financial analyst Art Pearce will examine the life-cycle costs for buildings.

How will B3's design guidelines, or SBDG, differ from MSDG and LEED?

JC: Our goal is to build on them in order to connect B3's SBDG to real, measurable outcomes. We really need to understand a building's effects on the environment, human health and productivity, the community, and the short-term and long-term costs of buildings.

RC: When people ask me to identify the one most important sustainable strategy, I used to say energy monitoring. Now I say that's the second most important thing. The first

thing is to better utilize space from the start. LEED does not in any way address the idea of building more efficient space.

DE: And you can design a LEED-certified building and have an energy hog. In other words, an architect can disregard LEED's energy category and still get a good rating.

JC: These guides have their place and they are constantly evolving. LEED does certain things well; it's usable and recognized. MSDG is similar to LEED, but it came out of regional issues and priorities with a flexibility that allowed us to make it more useful to architects and clients. With B3, however, we have a chance to move to the next level where we say, "Okay, we're not just going to give people little proxy measures of using recycled-content materials without connecting them to some real, measurable outcomes."

DE: I have a slightly more aggressive view. I have a real love/hate relationship with LEED. On the one hand, it gets design teams and others talking about many aspects of design, such as improved productivity and environmental impact. It has a social mechanism—a point system—to get people to do something. On the other hand, as John just pointed out, almost all of the things a designer gets points for are proxies for real environmental or human impacts.

In other words, LEED does not get to anything fundamentally measurable and measurement is critical because otherwise there's no way of telling whether the strategy is really effective in protecting the environment. With B3, the benchmarking or outcomes mechanism we hope to put in place will verify the actual environmental, human and economic impacts made by an architect's design choices. But we still need to come up with a system for B3 that is as rewarding as LEED for the people who use it.

So the benchmarking portion of B3 is really what will make a difference.

RC: Right. The benchmarking was conceived as a tool to measure energy consumption. But in the future, B3 will also provide benchmarking in areas like human productivity and water conservation, which haven't really been measured before.

JC: The benchmarking built into B3 is about recognizing that we have to track what's going on in buildings through post-occupancy evaluations and through client and architect feedback on the design guidelines. This knowledge will also tell us what is happening in architectural firms practicing sustainable design and in the sustainable buildings they create.

DE: B3 is a cyclical process as opposed to a static process. Through B3, the state finally has a system that accounts for the decisions architects and clients make about their buildings.

How will architects use B3, as well as be involved in the ongoing development of the project?

RC: The three of us have been thinking about sustainability for at least 10 years. It's an integral part of our lives and work. So we have to keep in mind the person who doesn't know anything about sustainable design. Architects are already overwhelmed with staying on time and under budget on their projects. B3 is another thing on their plate.

JC: So we sent out a survey to architects and other potential users asking for feedback on the benefits and drawbacks to various systems like LEED and MSDG. We're using this information to enhance B3's SBDG. In the next year, we also plan to schedule a series of input sessions with architects and clients to hear their suggestions on how to better the guidelines.

DE: What we produce for the January deadline is going to be our best effort at making sustainable-design guidelines that are simple, usable and valuable. But we don't expect our guidelines to point at the perfect solution for every project. Inevitably, some things in the guide will make people want to come back to us and say, "Gee, that was a little tough" or "We think we can get the same result another way." In fact, we are counting on the design community and state agencies to do exactly that. Listening to users of the guide is the best way to enhance its design. In the end, the community's refinements will lead the way to a more sustainable built environment. **AM**

duction facilities, the potential for reducing landfill waste is lost.

Similarly, consider that current sustainable solutions are based on replacing non-renewably sourced products (those with toxic components or negative life-cycle assessment) with products that reduce those negatives. Eventually, however, even these products end up in a landfill because their component materials have reached an end-of-life uselessness.

In other words, these products weren't developed to be continually recycled. In order to get away from this detrimental "cradle-to-grave" industrial formula, which William McDonough and Michael Braungart describe in their book *Cradle to Cradle: Remaking the Way We Make Things* (North Point Press, 2002), we need an approach to product and building creation that is based on a natural, regenerative model. Consumables made from either biodegradable sources or nontoxic recyclable synthetic materials, for instance, and using energy sources that are renewable and nonpolluting, would eliminate waste from the equation and allow for constant renewal.

One of the first steps in this revisioning was proposed by Christopher Alexander in *A Pattern Language* (Oxford University Press, 1977). He describes a "conservation economy" in which materials, whether natural or toxic, follow prescribed paths that never allow for detrimental buildup in the biosphere.

"During the life cycle of a product, from extraction through manufacture, use and disposal," he writes, "there are needs for water, energy, bulk materials and specialized substances. When a product is designed for obsolescence, to be thrown away when next year's model arrives, the energy and materials added during production—and the wastes generated—are only amortized over a single use. The alternative is Extended Product (or Producer) Responsibility (EPR), in which the manufacturer retains ownership of a product's materials, with the corresponding responsibility to remanufacture them."

Examples of this "service-provider" economy have begun to appear. Compa-

nies leasing copiers from Xerox® with "copying-service" contracts return their used machines to Xerox for remanufacture and subsequent reuse. Carrier, the world's largest manufacturer of air-conditioning equipment, now offers "thermal comfort" as a service for buildings; the company will maintain a desired comfort level within a building through an ongoing combination of energy-efficient building retrofits, new equipment and improved control and management.

**"A better green product
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manufacturer reduced
energy use, pollution or
packaging waste during
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information available."**

Interface, a carpet manufacturer, offers a "floor-covering service," in which a client leases floor covering with the understanding that the manufacturer will replace and upgrade the product based on wear, maintenance and aesthetics for a set fee. At the end of its usable life, the carpet is returned to the manufacturer for recycling or remanufacture.

The European Union (EU) has taken the lead in this service-oriented direction by implementing programs, to be phased in over the next few years, that will require electronics and electrical products to be taken back by their manufacturers for reuse and proper disposal. The EU is also devising programs to make cars part of a mandatory recycling program, which would control the hazardous materials associated with their production and maintenance.

The field is wide open for manufacturers to take the lead in developing this potential before legislation forces them to. In their book, *Cradle to Cradle*, McDonough and Braungart elucidate how intelligent design and "eco-effective strategies" can "create products and systems that con-

tribute to economic, social and environmental prosperity."

In a new product-development process that is inherently regenerative, they write, products would be designed for continual service and value, not obsolescence. Economic policies would be created to favor manufacturers who take back and reuse products. Companies would be required to label products and building components with instructions for disassembly and remanufacturing.

"Long-term prosperity depends not on the efficiency of a fundamentally destructive system," they write, "but on the effectiveness of processes designed to be healthy and renewable in the first place."

Compare this cradle-to-cradle process with what happens in the marketplace today. Manufacturers tweak a flawed system to minimize toxic pollution and waste of natural resources—which goes only part way and is, in effect, greenwashing. Similarly, current sustainable-design guides and rating systems—such as LEED™ and the Minnesota Sustainable Design Guide—provide strategies and criteria for creating change in current building practices; but again, they reflect changes to existing systems, not truly innovative solutions.

Rather than reducing nonrenewable energy consumed during extraction or production or transportation, we should be maximizing energy from renewable solar and wind sources. Instead of using nonrenewable mineral resources, why not develop renewable synthetic, nontoxic materials designed for perpetual recycling into new wall, ceiling and floor products? Why not put the time and resources currently devoted to liability reduction and regulatory compliance toward enhancing economic, social and ecological benefits? We have the technical capabilities, but apparently lack the ability to create economic incentives that make the effort worthwhile.

Fundamentally changing the way we build and operate in our economy and the world will not be easy, inexpensive or without pitfalls. But we need to move beyond current models of product design, production and evaluation to a regenerative model in which buildings are integrated with natural processes and entire systems continually evolve. **AM**

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RCDD	Registered Communications Distribution Designer
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Firm Personnel by Discipline
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Structural Engineers 1
Mechanical Engineers 2
Chemical Engineer 1
Geologist/Hydrogeologist 13
Geotechnical 13
Preservation/Restoration 2
Metallurgical 1

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Administrative 28
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Administrative 2
Total 11

— Mechanical and electrical engineering for commercial, industrial and institutional building and site developments, including HVAC, plumbing piping, fire protection, communications, power distribution and interior and exterior lighting systems. Specialties include computer modeling of lighting and HVAC systems as well as interdisciplinary coordination studies.

Our Savior's Lutheran Church, Minneapolis, MN; New High School, River Falls, WI; St. Michael's Church and St. Croix School, Stillwater, MN; Black Bear Casino, Cloquet, MN; Department of Public Works (Phase I and II Facilities), Minneapolis, MN; North Hennepin Community College General Education Building, Brooklyn Park, MN

■ **CLARK ENGINEERING CORPORATION**

621 Lilac Drive North
Minneapolis, MN 55422
Tel: 763/545-9196
Fax: 763/541-0056
Web: www.clark-eng.com
Established: 1938
Other Offices: Aberdeen and Sioux Falls, SD

Larry McMurtry
Michael A. Fowler
Hadi Sajadi
Cory Casperson
Tim LaBissoniere
Abi Assadi

Continued on next column

Firm Personnel by Discipline
Civil Engineers 7
Structural Engineers 11
Other Professional 4
Technical 30
Administrative 7
Total 59

— Complete structural engineering, civil engineering and land surveying services for educational, commercial, industrial, public sector facilities. Specialty design services for blast resistant structures, special foundations, elevated towers and overhead material handling systems. Civil engineering and surveying services for site development, planning, water supply and distribution, waste water treatment and disposal and storm water management.

— Neshaminy High School, Shamokin, PA; Keeler Apartments, Minneapolis, MN; Beltrami County Law Enforcement Center, Bemidji, MN; Holiday Inn Sun Spree Resort, Aruba, Dutch Caribbean; Fitzgeralds Casino, Black Hawk, CO; General Electric Air Filtration System, Long Beach, CA

■ **DARG BOLGREAN MENK, INC.**

7575 Golden Valley Road, Ste. 210
Golden Valley, MN 55427
Tel: 763/544-8456
Fax: 763/544-8914
E-mail: info@dbm-inc.com
Web: www.dbm-inc.com
Established 1966

Gene Bolgrean
Harry D. Menk

Firm Personnel by Discipline
Structural Engineers 4
Technical 2
Administrative 1
Total 7

— Complete structural engineering services for commercial/retail, office/warehouse, academic, industrial, governmental, medical/ health, housing, religious and parking facilities. With expertise in steel, concrete, masonry and wood, DBM has engineered new construction, additions and renovations/ restorations on over 5,000 projects in 24 states.

Minnetonka Operations and Maintenance Facility, Minnetonka, MN; Rochester Golf & Country Club, Rochester, MN; Minneapolis Women's Club Addition, Minneapolis, MN; Becker Furniture World Addition, Becker, MN; St. Hedwig Senior Housing, Minneapolis, MN; Village Square at Little Canada, St. Paul, MN

■ **DATA CORE ENGINEERING**

2021 East Hennepin Ave., Ste. 200
Minneapolis, MN 55413
Tel: 612/617-1200
Fax: 612/617-1299
E-mail: mleutgeb@datacoreeng.com
Web: www.datacoreeng.com

James W. Giefer PE
James A. Keller PE
D. Lane Hersey PE
Robert B. Full PE
Mark V. Leutgeb
—
Firm Personnel by Discipline
Mechanical Engineers 2
Electrical Engineers 2
Technical (Audio Video and
Data Network Support/Design) 10
Administrative 1
Total 15

—
Data Core is a technology consulting firm. We provide technology planning and design services to architects and engineers for the integration of computer, audio/visual and communications systems on new construction and renovation projects. In addition, we help businesses and institutions integrate computer systems and software programs to best support current and future objectives.

—
Citywide Offices Network, City of South St. Paul, MN; Minnesota Counties Insurance Trust, St. Paul, MN; Technology Upgrade, Owatonna Public Schools, Owatonna, MN; Network and Intranet Support, Cretin Derham Hall, St. Paul, MN; Technology Upgrade, Hastings Public Schools, Hastings, MN

■ **THE DESIGN GROUP, INC.**

2125 - 2nd Avenue East
Hibbing, MN 55746
Tel: 218/262-1959
Fax: 218/262-1976
E-mail: dgroup@the-bridge.net
Web: www.thedgroup.org
Established 2001

Otto W. Maki PE
Joseph S. Vespa PE
Kimberly D. Pollary
—
Firm Personnel by Discipline
Mechanical Engineers 1
Electrical Engineers 1
Technical 5
Administrative 1
Total 8

Continued on next column

The Design Group, Inc. provides Mechanical, Electrical and Custom Graphic and Web Design and Development Services. We specialize in engineering for HVAC systems, plumbing systems, lighting, power and communication data systems in both new and remodeled facilities.

—
Floodwood Schools Addition/Remodel, Floodwood, MN; Nisswa Elementary School Remodel, Nisswa, MN; Jessey Lake Church Addition/Remodel, Talmoon, MN; Hibbing Park Hotel HVAC, Hibbing, MN; Itasca County Generator, Grand Rapids, MN; Bigfork Auditorium, Bigfork, MN

■ **DLR GROUP**

9521 West 78th Street
Minneapolis, MN 55344-3853
Tel: 952/941-8950
Fax: 952/941-7965
E-mail: minneapolis@dlrgroup.com
Web: www.dlrgroup.com

Established 1966
Other Offices: Chicago, IL; Colorado Springs, CO; Des Moines, IA; Farmington, NM; Honolulu, HI; Kansas City, MO; Milwaukee, WI; Omaha, NE; Orlando and Tampa, FL; Overland Park, KS; Philadelphia, PA; Phoenix, AZ; Portland, OR; Sacramento, CA; Seattle, WA

—
Griff Davenport AIA
Matt Johnson RA
Thomas D. Sindelar AIA
Marlene Evenson AIA
Jon Crump AIA
George Fantauzza AIA, CID

—
Firm Personnel by Discipline
Civil Engineers 1
Structural Engineers 2
Mechanical Engineers 7
Electrical Engineers 4
Architects 25
Other Professional 3
Technical 9
Administrative 13
Total 64

Continued on next column

DLR Group has been providing exceptional engineering and design services since its inception in 1966. As a full-service architectural and engineering (mechanical, electrical, structural, civil and technology/communications) firm, we are a national leader in the design of corporate, industrial, educational, sports, justice and health care facilities, and associated building systems.

—
East Central School District, New K-12 School, Sandstone, MN; Red Lake Public School District, New Middle School, Red Lake, MN; Scott County Jail, New Jail and Law Enforcement Center, Shakopee, MN; B.H. Whipple Federal Building, Building Renovations, Minneapolis, MN; Verizon Wireless, Tenant Improvements, Plymouth, MN; VA Medical Center, On-going Projects, Minneapolis, MN

■ **DOLEJS ASSOCIATES INC.**

1624 N. Riverfront Drive
Mankato, MN 56001
Tel: 507/625-7869
Fax: 507/388-9225
E-mail: dolejs@mninc.net
Established 1977
Other Offices: Burnsville, MN

—
Joseph M. Dolejs PE
David A. Kroells
Chris Dolejs PE
Mike Dolejs PE
—
Firm Personnel by Discipline
Mechanical Engineers 3
Technical 9
Administrative 1.5
Total 14

—
Dolejs Associates provides Mechanical and Electrical Design Services for the building industry. An experienced and stable staff provides expertise in the HVAC, Plumbing, Fire Protection, Temperature Control, Lighting Power, Communication and Life Safety Systems. Recent projects include schools, restaurants, athletic facilities, motels, engineered housing, churches, ADA and energy conservation retrofits.

—
Waseca Junior High School, Waseca, MN; Math and Science Building, Bethany College, Mankato, MN; Hilton Inn, Shoreview, MN; Hosanna! Lutheran Church, Lakeville, MN; Mankato Armory, Mankato, MN

■ **DPRA INCORPORATED**

332 Minnesota St., Ste. E-1500
St. Paul, MN 55101
Tel: 651/227-6500
Fax: 651/227-5522
E-mail: dprae-news@dpra.com
Web: www.dpra.com

Established 1961
Other Offices: Dallas, TX; Denver, CO; Manhattan, KS; Knoxville, TN; Princeton, NJ; Rosslyn, VA; San Diego, CA; Toronto, ONT; Yellowknife, NWT

—
Martin D. Bonnell PE
Steven C. Heikkila PE
Carol L. Sarnat

—
Firm Personnel by Discipline
Civil Engineers 5
Mechanical Engineers 1
Other Engineers (Chemical, Geological, Environmental) 6
Other Professionals 8
Technical 2
Administrative 3
Total Staff 25

—
DPRA Incorporated has been a leader in environmental engineering services for over 40 years. DPRA's services include: civil, environmental and geo-technical engineering, brown-field redevelopment property transaction services, compliance auditing and air quality assessments.

—
United Postal Service, Various National Locations; Twin Lakes Redevelopment Area, Roseville, MN; Drake Building, St. Paul, MN; BP Amoco, Various Locations; Williams Hill Redevelopment, St. Paul, MN; Hennepin County, MN

■ **DUNHAM ASSOCIATES, INC.**
8200 Normandale Blvd., Ste. 500
Minneapolis, MN 55437
Tel: 952/820-1400
Fax: 952/820-2760
E-mail:
info@dunhamassociates.com
Web:
www.dunhamassociates.com
Established 1960

Kathleen Kolbeck	PE
Dale Holland	PE
Jay Rohkohl	PE
Mark Sigel	PE
Paul Thompson	PE, SE
Ron Feldhaus	PE

—
Firm Personnel by Discipline
Structural Engineers 7
Mechanical Engineers 37
Electrical Engineers 28
Other Engineer (RCDD) 1
Other Professionals 2
Technical 13
Administrative 8
Total Staff 96

Dunham Associates provides mechanical, electrical and structural consulting engineering along with lighting design, fire protection, telecommunications distribution design and Indoor Air Quality. Our IAQ expertise includes Thermal Displacement Ventilation and Computational Fluid Dynamics modeling. We provide our clients with specialized expertise in all business markets – Aviation, Commercial/Industrial, Education, Healthcare, Hospitality and Retail.

—
Minneapolis/St. Paul International Airport Terminals Expansion, St. Paul, MN; Carver County Public Works Facility, Cologne, MN; University of Minnesota Microbial and Plant Genomics Building, St. Paul, MN; Abbott Southwest Ambulatory Center, Edina, MN; Hard Rock Café at Block E, Minneapolis, MN; Grand Casino Mille Lacs and Hinckley, Onamia & Hinckley, MN

■ **ELLERBE BECKET**
800 LaSalle Ave.
Minneapolis, MN 55402
Tel: 612/376-2000
Fax: 612/376-2271
E-mail: info@ellerbebeck.com
Web: www.ellerbebeck.com
Established 1909
Other Offices: Greenville, SC; Kansas City, MO; San Francisco, CA; Washington, DC; Cairo, Egypt; Dubai, UAE

Continued on next column

Rick Lincicome	AIA
Randy Wood	PE
Al Wenzel	PE
Charles Franklin	PE
Blake Ellis	PE
Tom Grogan	PE

—
Firm Personnel by Discipline
Civil Engineers 2
Structural Engineers 21
Mechanical Engineers 43
Electrical Engineers 31
Architects 160
Other Professional 104
Technical 37
Administrative 79
Total 477

—
Ellerbe Becket has designed efficient, reliable engineering systems for 90 years, including heating and cooling systems, reliable energy networks, building automation and life safety systems, code compliance investigations, special electrical and lighting systems, HVAC improvements, structural investigations, vibration control, material/waste handling systems, and manufacturing improvements to existing facilities.

—
Nicollet Mall Development, Minneapolis, MN; Mayo Clinic Gonda Building, Rochester, MN; Seattle Seahawks Stadium, Seattle, WA; Science Museum of Minnesota, St. Paul, MN; University of Minnesota Pedestrian Bridges, Minneapolis, MN; Target Technology Center, Minneapolis, MN

■ **ENGINEERING DESIGN INITIATIVE**
420 North Fifth Street, Ste. 1090
Minneapolis, MN 55401
Tel: 612/343-5965
Fax: 612/343-5982
E-mail: lnemer@edilimited.com
Established 2002

Jay Hruby	PE
Larry Nemer	PE
Larry Svitek	PE

—
Firm Personnel by Discipline
Mechanical Engineers 2
Electrical Engineer 1
Technical 2
Total 5

Continued on next column

—
EDI provides innovative M/E engineering solutions for a variety of building types. EDI is committed to delivering designs that are energy-efficient, maintainable and sustainable. We are passionate in our creative design, attention to detail and commitment to teamwork - from the establishment of initial performance goals through validation by commissioning.

—
Min No Aya Win Clinic, Cloquet, MN; Lower St. Croix Valley Fire District Station, Afton, MN; FDL Sawyer Community Center Addition, Sawyer, MN; Nobles County Human Services Remodeling, Worthington, MN; Grinnell College Energy Plant and New Housing Commissioning, Grinnell, IA; MSN/MCTC Law Enforcement Pre-design Study, St. Paul, MN

■ **ERICKSEN ELLISON AND ASSOCIATES, INC. (EEA)**
2635 University Ave. W., Ste. 200
St. Paul, MN 55114-1231
Tel: 651/632-2300
Fax: 651/632-2397
E-mail: info@eeaengineers.com
Web: www.eeaengineers.com
Established 1954
Other Office: Grand Rapids, MN

William F. Thiesse	PE
James H. Art	PE
Todd A. Peterson	PE
Terri A. Fleischhacker	
David L. Larson	RCDD

—
Firm Personnel by Discipline
Mechanical Engineers 5
Electrical Engineers 3
Other Professional (RCDD) 3
Technical 19
Administrative 7
Total 37

—
The consulting engineering firm of EEA specializes in electrical and mechanical design of HVAC, plumbing, fire protection, specialty lighting, power, security/surveillance and electronic communication system designs for educational correctional, manufacturing, and recreational facilities, libraries, offices, clean rooms and data centers. EEA provides systems commissioning, operator training, and facilities infrastructure planning.

Continued on next column

Walter Library Technology Center, University of Minnesota, Minneapolis, MN; Macalester College Central Chiller Plant and Campus Distribution, St. Paul, MN; Elmer L. Andersen Library and the Minnesota Library Access Center, University of Minnesota, Minneapolis, MN; Eli Lilly Corporation Data Center, Indianapolis, IN; Grinnell College Energy Center, Grinnell, IA; Sherburn County Jail and Sheriff's Office Expansion, Elk River, MN

■ **ERICKSEN ROED & ASSOCIATES, INC.**
2550 University Avenue W., Ste. 201-S
St. Paul, MN 55114
Tel: 651/251-7570
Fax: 651/251-7578
Established 1985

Alfred "Bud" Erickson	PE
Thomas E. Amundson	
James D. Roed	PE
Robert A. Curtis	PE
William T. Buller	PE
Robert J. Quinn	PE
Michael A. DeSutter	PE
David J. Pluke	

—
Firm Personnel by Discipline
Structural Engineers 16
Technical 14
Administrative 2
Total 32

—
Full-service structural engineering for a broad range of facility types. Our experience includes design and construction observation for industrial, retail, medical, commercial, educational, computer centers, high-rise offices, parking facilities, sports and recreational facilities, as well as conduct investigations of existing structures for remodeling and renovation, building review studies and forensic engineering. We are registered as Professional Engineers in Minnesota and throughout the United States.

—
Fairview Southdale Hospital Expansion, Parking Ramp and Skyway, Edina, MN; Piper Jaffray Tower, Minneapolis, MN; Lawson Commons Office Building, St. Paul, MN; Guthrie Theater, Minneapolis, MN; University of Minnesota Riverbend Commons Dormitory and Parking Ramp, Minneapolis, MN; Target Retail/Office Building, 900 Nicollet, Minneapolis, MN

■ **FOSTER, JACOBS & JOHNSON, INC.**
345 Canal Park Drive, Ste. 200
Duluth, MN 55802
Tel: 218/722-3060
Fax: 218/722-1931
E-mail: mail@fjj.com
Established 1922

James R. Johnson PE
Charles F. Jacobs PE
—
Firm Personnel by Discipline
Mechanical Engineers 7
Electrical Engineers 5
Technical 2
Administrative 2
Total 16

Full Service Mechanical and Electrical consulting services, including design and preparation of contract documents for fire protection, plumbing, HVAC, controls, lighting, power distribution, communications and life-safety systems and construction administration. We offer computer-aided selection of M/E equipment and generate drawings using AutoCad with "soft desk" building services.

—
Biosolids Management Facility-WLSSD, Duluth, MN; Blue Cross/Blue Shield Adjudication Centers, Virginia and Aurora, MN; City of Duluth Public Works and Utilities Maintenance Garage, Duluth, MN; Fond du Lac Tribal and Community College Academic Addition, Cloquet, MN; Grand Rapids Middle School, Grand Rapids, MN; Minnesota Air National Guard Composite Aircraft Maintenance Complex, Duluth, MN

■ **FUTRELL FIRE CONSULT & DESIGN, INC.**
8860 Jefferson Highway
Osseo, MN 55369-1500
Tel: 763/425-1001
Fax: 763/425-2234
E-mail: scottf@ffcdi.com
Web: www.ffcdi.com
Established 1989

Scott A. Futrell PE (WI)
Rich Pehrson PhD, PE (MN)
Ken Strand PE (MN)
—
Firm Personnel by Discipline
Fire Protection Engineers 3
Technical 4
Administrative 2
Total 9

Continued on next column

Fire Protection Engineering, fire sprinkler, fire alarm and fire suppression system design, risk analysis, plan and engineering report reviews, special inspections, commissioning, expert witness, third-party review and project management.

—
U.S. Steel, Mountain Iron, MN;
3M Company, Nationwide; University of Minnesota, Various Projects - Minneapolis Campus, MN; Guardian Angels School, Chaska, MN; St. Paul Public Housing Authority, Front High Rise, St. Paul, MN; Minnesota Air National Guard Hangar, Duluth, MN

■ **GAUSMAN & MOORE ASSOCIATES, INC.**

1700 W. Highway 36
700 Rosedale Towers
Roseville, MN 55113
Tel: 651/639-9606
Fax: 651/639-9618
E-mail: gmmail@gausman.com
Web: www.gausman.com
Established 1935
Other Offices: Duluth, MN;
Portland, OR

James W. Giefer PE
James A. Keller PE
D. Lane Hersey PE
Robert B. Full PE
Mark V. Leutgeb

—
Firm Personnel by Discipline
Mechanical Engineers 11
Electrical Engineers 6
Other Professional 1
Technical 30
Administrative 11
Total 59

—
FIELD OF PRACTICE: Mechanical, electrical, fire protection, lighting, energy conservation, renewable energy, audio/visual and voice/data through its Data Core facility. ACTIVITIES: Mechanical and electrical engineering, including design of heating, ventilating, air conditioning, fire protection, plumbing, lighting, power, security and communication and computer systems for all building types. We also provide prototype rollouts, engineering studies, life safety studies, renewable energy system design, energy audits, and energy retrofit design.

Continued on next column

Target Stores, Nationwide; St. Paul Public Schools, St. Paul, MN; University of Minnesota Duluth, Weber Music Hall, Duluth, MN; Fred Meyer Stores, Nationwide; Sappi Corporation, Cloquet, MN; Christopher & Banks, Nationwide; University of Minnesota, Numerous Projects, Statewide

■ **HALLBERG ENGINEERING**

1750 Commerce Court
White Bear Lake, MN 55110
Tel: 651/748-1100
Fax: 651/748-9370
E-mail: hei@hallbergengineering.com
Web: www.hallbergengineering.com
Established 1984

Joseph W. Hallberg PE
James R. Penkivech PE
Larry A. Jensen PE

—
Firm Personnel by Discipline
Mechanical Engineers 13
Electrical Engineers 6
Technical 21
Administrative 5
Total 45

—
Mechanical, electrical, technology and facility management engineering services for educational, commercial, institutional, health care and correctional facilities. Mechanical services include HVAC and plumbing design, ventilation audits and system modification to improve indoor air quality. Electrical and technology services include design for power distribution, lighting, fire alarms, security systems and technology infrastructure. Our Commissioning group provides mechanical and technology commissioning for new and existing facilities.

—
District Energy Chiller Plant, St. Paul, MN; Anoka-Hennepin Technical College, Anoka, MN; Bloomington Schools Commissioning, Bloomington, MN; Monticello Senior High School, Monticello, MN; Northeast Metro 916 Commissioning and Remodeling, White Bear Lake, MN; Roseville Schools Ventilation Studies, Roseville, MN; Wayzata City Hall and Library, Wayzata, MN

■ **HGA (Hammel, Green and Abrahamson)**

701 Washington Avenue N.
Minneapolis, MN 55401
Tel: 612/758-4000
Fax: 612/758-4199
E-mail: info@hga.com
Web: www.hga.com
Established 1953
Other Offices: Rochester, MN; Milwaukee, WI; Sacramento, Los Angeles, San Francisco, CA

—
Dave Galey PE
Leigh Harrison PE
Kenny Horns PE
Yan Shagalov PE
Jeff Harris PE
Chuck Cappellin PE

—
Firm Personnel by Discipline
(licensed/unlicensed)
Civil Engineering 5/3
Structural Engineering 18/17
Mechanical Engineering 22/30
Electrical Engineering 14/19
Industrial Engineers 2
Architects 256
Other Professionals 20
Technical 22
Administrative 133
Total Staff 561

—
HGA has engineering expertise in the design of a broad range of facility types. In addition to traditional HVAC, structural and electrical systems, HGA has specialists in clean environments, industrial processes, central plants, utility infrastructure, condition surveys, property evaluations, telecommunication networks, specialty lighting and parking structures. HGA engineers serve as both prime consultants and sub-consultants.

—
Medtronic World Headquarters, Fridley, MN; MIND Institute, University of California at Davis Medical Center, Sacramento, CA; Grace Church, Eden Prairie, MN; Walker Art Center Expansion, Minneapolis, MN; Woodlands Medical Center, Houston, TX; Minnesota Departments of Agriculture, and Health, St. Paul, MN

■ **HPTO, INC.**

(Hansen Thorp Pellinen Olson)

7510 Market Place Drive
Eden Prairie, MN 55344
Tel: 952/829-0700
Fax: 952/829-7806
E-mail: jmorrow@hpto.com
Web: www.hpto.com
Established 1980
Other Office: Fountain Hills, AZ

—
Laurie Johnson PE
Lloyd Pew LS
Dan Thorp LS
Paul Thorp LS

—
Firm Personnel by Discipline
Civil Engineers 10
Other Professional 5
Technical 23
Administrative 4
Total 42

—
HPTO has been providing civil engineering, surveying and landscape architecture services since 1980 including complete site planning and design services: sanitary sewer, storm sewer, water main, street and roadway engineering and surveying services. We provide these services for commercial, industrial, municipal, educational, religious and healthcare site design projects.

—
Grant Park, Minneapolis, MN;
Melrose Apartments, Minneapolis, MN; Norman Pointe, Bloomington, MN; 1600 Tower, St. Louis Park, MN; 8500 Tower Norman Lake, Bloomington, MN; Carlson Twin Towers, Minnetonka, MN

■ **INSPEC, INC.**

5801 Duluth Street
Minneapolis, MN 55422
Tel: 763/546-3434
Fax: 763/546-8669
E-mail: fking@inspec.com
Web: www.inspec.com
Established 1973
Other Office: Milwaukee, WI

—
Dwight D. Benoy PE
Gary C. Patrick AIA
Michael D. Remington PE
Richard W. Phillips AIA
David W. Campbell
Fred W. King

—
Firm Personnel by Discipline
Civil Engineers 7
Structural Engineers 1
Architects 3
Other Professional 6
Technical 57
Administrative 14
Total 88

Continued on next column

INSPEC, INC. is an independent consulting engineering/architectural firm specializing in roofs, pavements, waterproofing, and exterior walls. Other services include investigations, laboratory testing, surveys/evaluations, management programs, design/consultations, and construction administration.

—
West Publishing, Eagan, MN;
Glensheen, Duluth, MN; Minnesota State Capitol, St. Paul, MN;
American Swedish Institute, Minneapolis, MN; Minnesota State Colleges and Universities (54 campuses), Statewide; Anoka County, MN

■ **KARGES-FAULCONBRIDGE, INC.**

1983 Sloan Place, Ste. 3
St. Paul, MN 55117
Tel: 651/771-0880
Fax: 651/771-0878
E-mail: kfi@kfi-eng.com
Established 1996

—
William J. Karges, Jr. PE
James A. Faulconbridge PE
—
Firm Personnel by Discipline
Mechanical Engineers 15
Electrical Engineers 3
Chemical Engineers 1
Commissioning 6
Other Professional 18
Administrative 5
Total 48

—
Karges-Faulconbridge, Inc. (KFI) is a unique firm of engineers, designers, professional estimators, and commissioning specialists registered in 50 states and the District of Columbia. KFI provides consulting engineering and construction management services for industrial, institutional, healthcare and commercial organizations. KFI clients rely on this unique combination of skills and experience to address issues of constructability, phasing, maintenance and operations early in the design stage, conserving time and resources.

—
Soybean Extraction Plant, Cenex Harvest States, Fairmont, MN; Minnesota Veterans Home, Infrastructure Improvements, Hastings, MN; New Vegetable Oil Refinery, AGP, Hastings, NE; Robbinsdale School District 281, Ventilation Systems, Robbinsdale, MN; Estimating for Minneapolis-St. Paul International Airport Expansion, Bloomington, MN; Commissioning Osseo Schools, Osseo, MN

■ **KRECH, O'BRIEN, MUELLER & WASS, INC.**

6115 Cahill Avenue
Inver Grove Heights, MN 55076
Tel: 651/451-4605
Fax: 651/451-0917
E-mail: jkrechkomw@komw.com
Web: www.komw.com
Established 1987

—
James H. Krech PE
Michael J. Lisowski PE
Daniel J. O'Brien AIA
Brady R. Mueller AIA
Brian C. Wass AIA

—
Firm Personnel by Discipline
Structural Engineers 3
Architects 7
Architectural Interns 3
Other Professional 2
Technical 6
Administrative 3
Total Staff 24

—
KOMW offers structural engineering, architecture, interior design and construction management services. Registered structurally in 20 states, typical structural projects include industrial, commercial, institutional, ecclesiastical, forensic, agricultural, blast resistance, and hazardous waste containment. Specialties include granular material storage, hazardous liquid containment, corrosive environments, blast resistance, and aluminum greenhouse design.

—
Van Hoven Resource Recovery, South St. Paul, MN; Ultra Machining Company, Monticello, MN; Caribou Coffee, Minneapolis, MN; Novartis Nutrition Corporation, St. Louis Park, MN; Watrous Company, South St. Paul, MN; St. Louis Park Arena, Renovation, St. Louis Park, MN

■ **LS ENGINEERS, INC.**

200 South Main Street
Le Sueur, MN 56058
Tel: 507/665-6255
Fax: 507/665-6818
E-mail: lseng@mninc.net
Established 1988

—
Robert L. Sprengeler PE
William P. Lehnertz PE

—
Firm Personnel by Discipline
Structural Engineers 4
Technical 4
Administrative 1.5
Total 9.5

Continued on next column

Structural engineering services for all building types in the areas of industrial, commercial, religious, institutional, residential, manufacturing, as well as specialized structures for water and wastewater plants. Full range of services including feasibility studies, investigations, construction documents, cost estimates, and field observations.

—
Minnesota Department of Transportation District Building, Mankato, MN; Winona County Courthouse Exterior Wall Restoration, Winona, MN; Rice Lake Harley Davidson Retail Facility, Rice Lake, WI; St. Johns Lutheran Church, Belle Plaine, MN; Medford Furniture Outlet, Medford, MN; Boise Cascade Warehouse, Lakeville, MN

■ **LANDFORM**

650 Butler North Building
510 First Avenue North
Minneapolis, MN 55403
Tel: 612/252-9070
Fax: 612/252-9077
E-mail: dlazan@landformmsp.com
Web: www.landform.net
Established 1994
Other Office, Phoenix, AZ

—
Darren Lazan
Steve Johnston PE
Ross Larson
Carolyn Krall AIA
Mike Cannon LS

—
Firm Personnel by Discipline
Civil Engineers 14
Architects 6
Other Professional 9
Technical 18
Administrative 7
Total 54

—
Landform provides civil engineering, planning, landscape architecture, land surveying and architectural services. Our broad range of local and national clients includes developers, architects, corporate/commercial groups, builders, and government entities. Specialties are industrial, restaurant, office, retail, housing, institutional, public sector, hospitality and medical.

—
ADC Telecommunications World Headquarters, Eden Prairie, MN; Church of the Open Door, Maple Grove, MN; University of Minnesota Law School Addition, Minneapolis, MN; Applebee's Restaurants, Multiple Midwest Locations; Lifetime Fitness, Savage, MN; Sunrise Assisted Living, Roseville, MN

■ **LARSON ENGINEERING OF MINNESOTA**

3524 Labore Road
White Bear Lake, MN 55110
Tel: 651/481-9120
Fax: 651/481-9201
E-mail: info@larsonmn.com
Web: www.larsonengr.com
Established 1979
Other Offices: Naperville, IL; Appleton, WI; Norcross, GA; St. Louis, MO; Phoenix, AZ

Lee Granquist PE
Kesh Ramdular PE
Henry Voth PE

—
Firm Personnel by Discipline
Civil Engineers 6
Structural Engineers 21
Technical 7
Administrative 7
Total Staff 41

—
Larson Engineering of Minnesota offers engineering services in both STRUCTURAL (including architectural, curtain wall and industrial), and CIVIL (including pavement management and athletic facilities).

—
STRUCTURAL: Sauk Rapids High School, Sauk Rapids, MN; Disney Concert Hall, Los Angeles, CA (CW); Sea-Tac International Airport, Seattle, WA (CW). CIVIL: Slumberland Stores, Multiple Locations; Northfield Middle School, Northfield, MN; St. Croix Lutheran High School, West St. Paul, MN

■ **LHB ENGINEERS & ARCHITECTS**

21 West Superior Street, Ste. 500
Duluth, MN 55802
Tel: 218/727-8446
Fax: 218/727-8456
E-mail:
joellyn.gum@LHBcorp.com
Web: www.LHBcorp.com
Established 1966
Other Offices: Minneapolis, MN

William D. Bennett PE
Joseph D. Litman PE
Jay B. Bergman PE
Timothy E. Korby PE
David M. Sheedy PE
David T. Williams PE

Continued on next column

Firm Personnel by Discipline
Civil Engineers 11
Structural Engineers 9
Mechanical Engineers 6
Electrical Engineers 3
Architects 22
Other Professional 13
Technical 38
Administrative 28
Total Staff 130

—
LHB's services include survey, civil, electrical, mechanical, and structural engineering. We design engineering systems for buildings, site development and infrastructure for clients in government, public works, education, health-care, pipeline, workplace and housing. LHB specializes in high performance design which considers a balance of social, economic and environmental concerns and responsibilities.

—
St. Paul Port Authority's Great Northern Business Center Site Development, St. Paul, MN; MN/DOT's T.H. 169 Lake Pokegama Causeway, Grand Rapids, MN; MN/DOT's I-494 Glen Road Interchange Steel-Girder Bridges, St. Paul, MN; Wastewater Treatment Plant Upgrade and Expansion, Bethel, MN; City of Duluth West Leg Natural Gas Main Pipeline, Duluth, MN; Street and Sewer Improvements, Red Lake Falls, MN

■ **LIGHTOWLER JOHNSON ASSOCIATES**

700 Main Avenue
Fargo, ND 58103
Tel: 701/293-1350
Fax: 701/293-1353
E-mail:
cking@lightowlerjohnson.com
Web:
www.lightowlerjohnson.com
Established 1954
Other Office: Oakes, ND; Moorhead, MN

Stevan Dewald PE
Cameron Meckel PE
Winton Johnson PE
Joe Lightowler, Jr. PE
Steve Goldade AIA
Frank L. Kratky AIA

Continued on next column

Firm Personnel by Discipline
Civil Engineers 2
Structural Engineer 1
Mechanical Engineers 3
Electrical Engineers 2
Chemical Engineer 1
Architects 4
Other Professional 2
Technical 16
Administrative 3
Total 34

—
Lightowler Johnson Associates is a full-service Engineering and Architectural firm. We provide civil, structural, mechanical and electrical engineering as well as land surveying and architectural services.

—
Soybean Processing Plant, Brewster, MN; Soybean Processing Plant, Volga, SD; Holiday Inn Express, Grand Forks, ND; Rice Lake Community Center, Rice Lake, MN; Bridgeview Pointe Subdivision, Moorhead, MN; Wingate Inn, Cheyenne, WY

■ **LOUCKS ASSOCIATES**

7200 Hemlock Lane, Ste. 300
Minneapolis, MN 55369
Tel: 763/424-5505
Fax: 763/424-5822
E-mail:
home@loucksmclagan.com
Web: www.loucksmclagan.com
Established 1976
Other Offices: Loucks McLagan, St. Paul, MN

Thomas G. Loucks PE
Jeffrey A. Shopek LS
Paul J. McGinley
John S. Bergh
Michael J. St. Martin PE
Richard Licht LS

—
Firm Personnel by Discipline
Civil Engineers 7
Other Professionals 28
Technical 23
Administrative 4
Total Staff 62

—
Services include site layout, grading, storm water conveyance systems, water quality retention ponds, wetland mitigation, landscape architecture, parks and trails, EAW/EIS/AUAR documents. Phase I and II ESAs, groundwater contamination, ALTA title surveys, site feasibility studies, comprehensive plan amendments, rezoning, GIS, permitting and approvals for industrial, commercial, retail, corporate campus, assisted living community, senior co-op, townhome and education facilities.

Continued on next column

Allianz Corporate Facility, Golden Valley, MN; Gramercy Co-op, Statewide Locations, MN; Protein Design Lab (PDL), Brooklyn Park, MN; Target, Cambridge, MN; St. Anthony Lofts/Townhomes/ Brownstones, Minneapolis, MN; North Quadrant/Sibley Mixed-use, St. Paul, MN

■ **LUNDQUIST, KILLEEN, POTVIN & BENDER, INC. (LKPB)**

1935 W. County Road B2, Ste. 300
Saint Paul, MN 55113
Tel: 651/633-1223
Fax: 651/633-1355
E-mail: vknut@lkpb.com
Web: www.lkpb.com
Established 1969

Leonard A. Lundquist PE
Peter A. Potvin PE
Gayland J. Bender PE
John M. Killeen PE
Stephen J. Gentilini PE

—
Firm Personnel by Discipline
Mechanical Engineers 10
Electrical Engineers 4
Other Professional 3
Technical 18
Administrative 8
Total 43

—
LKPB is a full-service mechanical and electrical consulting engineering firm that provides service to clients in many environments. Much of the work we do is represented in post secondary, medical and commercial/corporate settings.

—
New Library on Storr's Avenue, Middlebury College, VT; New Science Building, St. John's University, Collegeville, MN; Cuyuna Regional Medical Center, Crosby, MN; Ho-Chunk Tribal Wellness Center, Baraboo, WI; Gustavus Adolphus College, C. Charles Jackson Campus Center, St. Peter, MN; Mill City Museum, Minneapolis, MN

■ **MARTIN PEVZNER ENGINEERING P.A.**
8030 Old Cedar Avenue S.
Bloomington, MN 55420
Tel: 952/854-1934
Fax: 952/854-1948
E-mail:
martin@martinpevzner.com
Web: www.martinpevzner.com
Established 2000

Roger Martin PE
Boris Pevzner PE
Paul Suby PE
—
Firm Personnel by Discipline
Mechanical Engineers 3
Electrical Engineers .5
Administrative .5
Total 4

—
Mechanical and Electrical building systems design. Specialize in existing systems trouble-shooting, evaluation analysis, energy management and master planning. Remodeling and retrofit of systems are strong related competencies.

—
Silicon Graphics Office Building, Eagan, MN; Elk River Schools, Elementary School, Elk River, MN; Kremer Spring & Alignment Vehicle Maintenance Facility; St. Vincent De Paul Catholic Church Mechanical Systems Evaluation; Aniston, AL; Army Combat Vehicle Rebuild Master Planning and Retrofit; Marquette Plaza (former Federal Reserve Bank) Remodeling; Blue Earth School New Boiler Plant, Blue Earth, MN

■ **MATTSON/MACDONALD, INC.**
1516 West Lake St., Ste. 102
Minneapolis, MN 55408
Tel: 612/827-7825
Fax: 612/827-0805
E-mail:
davem@mattsonmacdonald.com
Established 1983

Wesley C. Mattson PE
David H. Macdonald PE
Stephanie J. Young PE
—
Firm Personnel by Discipline
Structural Engineers 8
Technical 3
Administrative 1
Total 12

Continued on next column

Structural engineering services for commercial, educational, industrial, institutional and residential buildings. Design of new buildings, renovation and restoration of existing buildings. Experienced in the restoration and adaptive reuse of historic buildings.

—
Milwaukee Road Depot Restoration, Minneapolis, MN; Stone Arch Lofts, Minneapolis, MN; Wayzata City Hall and Library, Wayzata, MN; Uptown Transit Station, Minneapolis, MN; Hosanna Lutheran Church, Lakeville, MN; Boutwells Landing Seniors Community, Oak Park Heights, MN

■ **MCCONKEY JOHNSON SOLTERMANN, INC.**
3144 Hennepin Avenue South
Minneapolis, MN 55408
Tel: 612/822-6950
Fax: 612/822-8385
E-mail: mjseng@qwest.net
Established 1978

Richard W. Johnson PE
Christian Soltermann PE
—
Firm Personnel by Discipline
Structural Engineers 3
Technical 2
Administrative 1
Total 6

—
Structural engineering consulting services for commercial, industrial, institutional, public and residential projects. Rehabilitation and remodeling of existing structures. Structural investigations and reports. Licensed in 24 states.

—
Plymouth Christian Youth Center, Minneapolis, MN; Eckankar Outdoor Chapel, Chanhassen, MN; The Shores, Shoreview, MN; Lake Country Community Bank, Faribault, MN; Park Place, Forest Lake, MN; Word of Peace Lutheran Church, Rogers, MN

■ **MEYER, BORGMAN & JOHNSON, INC.**
12 South Sixth Street, Ste. 810
Minneapolis, MN 55402
Tel: 612/338-0713
Fax: 612/337-5325
E-mail: jglasper@mbjeng.com
Established 1955
Other Office: Duluth, MN

Daniel E. Murphy PE
Michael J. Ramerth PE
—
Firm Personnel by Discipline
Structural Engineers 24
Technical 7
Administrative 3
Total 34

—
MBJ's single discipline is structural engineering applied to the design of educational, medical, commercial, parking, industrial, advanced technology, recreational, religious, and residential facilities with annual services totaling approximately \$350 million in construction dollars. Services include feasibility studies, analysis and design, construction documentation, field observation and special inspection services, and building and parking ramp condition surveys.

—
McNamara Alumni Center, University of Minnesota, Minneapolis, MN; Cathedral of St. Paul Restoration, St. Paul, MN; Minneapolis Heart Hospital, Minneapolis, MN; Weber Music Hall, University of Minnesota, Duluth, MN; SEI Corporate Headquarters, Oaks, PA; Allianz Life Corporate Headquarters, Golden Valley, MN

■ **MICHAUD COOLEY ERICKSON**
333 South 7th St., Ste. 1200
Minneapolis, MN 55402
Tel: 612/339-4941
Fax: 612/339-8354
E-mail:
rtaylor@michaudcooley.com
Web: www.michaudcooley.com
Established 1946

Dean A. Rafferty PE
Monty L. Talbert PE
Douglas C. Cooley PE
Joseph A. Tennyson
—
Firm Personnel by Discipline
Mechanical Engineers 56
Electrical Engineers 42
Administrative 15
Total 113

Continued on next column

MCE designs HVAC, plumbing, fire protection, electrical, illumination, security, life safety, audiovisual, building automation and other specialized building systems. Feasibility and deficiency studies, reports and master planning. Tenant representation, and fit-up services. Commissioning and facilities management. Indoor air quality analysis.

—
Allianz Life, Corporate Headquarters, Golden Valley, MN; American Express Client Services Center, Minneapolis, MN; Guthrie New Riverfront Theatre, Minneapolis, MN; Wells Fargo Operations Center, Shoreview, MN; Woodwinds Health Campus, Woodbury, MN; Bureau of Criminal Apprehension, St. Paul, MN

■ **MJP ASSOCIATES, LTD.**
4362 Oakmede Lane
White Bear Lake, MN 55110
Tel: 651/426-7037
Fax: 651/426-6643
E-mail: mike@mjp-associates.com
Web: www.mjp-associates.com
Established 1993

Michael J. Preston PE
—
Firm Personnel by Discipline
Structural Engineers 1
Administrative .5
Total 1.5

—
Specialized structural engineering services tailored to high-end residential projects, specialized component evaluation, and miscellaneous structures including investigative studies, feasibility studies, structural analysis and design, preparation of contract documents, and construction observation.

—
Pickled Parrot Restaurant Prototype, Various Locations; Rogers High School Exterior Metal Studs, Rogers, MN; Wolsted Residence, Plymouth, MN; Fireside Hearth & Home Exterior Metal Studs, Eagan, MN; Gearen Residence, Minneapolis, MN; Field Stone Retaining Walls, Various Locations

■ **The MOUNTAINSTAR GROUP, INC.**
7800 Metro Parkway, Ste. 212
Bloomington, MN 55425
Tel: 952/851-3085
Fax: 952/851-3086
E-mail: mohara@mtstar.com
Web: www.mtstar.com
Established 1988

— Michael A. O'Hara
—
Firm Personnel by Discipline
Fire Protection Engineers 3
Technical 1
Administrative 3
Total Staff 7

— Fire Protection, Building and Fire Code Consulting Compliance, Safety, Special Inspections of Smoke Control Systems and Performance-based Design. Specialized areas: Code Equivalencies and Alternate Methods of Construction

— ADC Telecommunications World Headquarters, Eden Prairie, MN; Minneapolis Convention Center Expansion, Minneapolis, MN; Best Buy World Headquarters, Richfield, MN; K-Mart Distribution Center, Florida, NY; Carleton College, Northfield, MN; IBM, Rochester, MN; Grain Belt Brewery, Minneapolis, MN; Fairview University Medical Center, Minneapolis, MN; 900 Block, Minneapolis, MN; Riverbend Commons, University of Minnesota, Minneapolis, MN

■ **NORTHERN TECHNOLOGIES, INC.**
14000 Sunfish Lake Blvd., Ste. M
Ramsey, MN 55303
Tel: 763/433-9175
Fax: 763/323-4739
E-mail:

mike@northerntechinc.com
Web: www.northerntechinc.com
Established 1996
Other Offices: St. Cloud, MN; Fargo, ND

— Marc D. Shannon PE
Bret R. Anderson PE
Michael Wasmund PE
Peter Holler

— Firm Personnel by Discipline
Civil Engineers 7
Technical 21
Administrative 2
Total 30

Continued on next column

NTI performs geotechnical engineering, testing and field exploration. NTI also performs materials testing of soil, concrete, masonry, steel, wood and bituminous materials. Other services include environmental engineering and forensic evaluations.

— City of Ramsey Utility and Street Improvements, MN; Osseo High School Addition, Osseo, MN; Centra Care Parking Ramp, St. Cloud, MN; Sauk Rapids, Schools, MN; Alexandria Vo-Tech School Addition, MN; Ralph Engelstad Arena, Grand Forks, ND

■ **REIGSTAD & ASSOCIATES**

192 West 9th Street, Ste. 200
St. Paul, MN 55102
Tel: 651/292-1123
Fax: 651/292-8015
E-mail: greigstad.com
Web: www.reigstad.com
Established 1980

Other Office: Biloxi, MS

— Gordon H. Reigstad PhD, PE
David Senter PE
Charles Ashton PE

— Firm Personnel by Discipline
Structural Engineers 10
Technical 10
Administrative 5
Total 25

— From parking garages to grand casinos, education, retail and entertainment facilities, Reigstad is dedicated to structural design with solutions to the most demanding challenges. Services and specialized investigative studies, structural analysis and design. We are willing to respond to our clients' needs to complete project on time and within budget.

— Caesar's Indiana 3000-car Parking Garage; Minnesota State Athletic Facilities Phase I and II, Mankato, MN; Staybridge Suites, Rochester, MN; U of MN Hockey and Tennis Facility, Minneapolis, MN; Stratosphere Hotel Addition, Las Vegas, NV; Best Buy Stores, Nationwide

■ **RLK-KUUSISTO, LTD.**

6110 Blue Circle Drive, Ste. 100
Minnetonka, MN 55343
Tel: 952/933-0972
Fax: 952/933-1153
E-mail: info@rlk-kuusisto.com
Web: www.rlk-kuusisto.com
Established 1959
Other Offices: Ham Lake, Duluth and Hibbing, MN

Continued on next column

Chuck Poppler
John Jamnick PE
Steve Schwanke AICP
John Dietrich ASLA
Tom Fast

— Firm Personnel by Discipline
Civil Engineers 120
Other Professionals
Administrative
Total
— RLK-Kuusisto, Ltd. Is a professional consulting firm providing civil engineering, planning, surveying and landscape architecture to municipal, commercial, residential and energy sector clients.

— Hidden Lakes, Golden Valley, MN; River Ridge Development, Faribault, MN; Jackson Meadows, Marine on St. Croix, MN; Andover Station, Andover, MN; United Health Group, Eden Prairie, MN; Penn Place, North St. Paul, MN

■ **SEBESTA BLOMBERG**

2381 Rosegate
Roseville, MN 55113
Tel: 651/634-0775
Fax: 651/634-7400
Web: www.sebesta.com
Established 1994
Other Offices: Boston, MA; Chicago, IL; Cleveland, OH; Dallas, TX; Rochester, MN; Rosslyn, VA; Shanghai PR China
Contact: Lisa Johnson, 651/634-7216

— James J. Sebesta PE
Paul J. Blomberg PE
Rebecca T. Ellis PE
John A. Carlson PE
Dean R. Sharpe PE
Oleksa P. Breslawec PE

— Firm Personnel by Discipline
Civil Engineers 4
Structural Engineer 1
Mechanical Engineers 67
Electrical Engineers 25
Environmental/Chemical Engineers 6
Architects 1
Other Professional 28
Technical 28
Administrative 30
Total 190

Continued on next column

Sebesta Blomberg is a specialty engineering and management consulting firm providing services to institutional, healthcare, industrial and public markets nationwide. Services include: utility infrastructure modernization and optimization, building systems design and analysis, commissioning, architectural lighting, controls and automation, process engineering, power generation, transmission and distribution, facilities management support and construction services.

— University of Minnesota, Minneapolis, MN; The Pentagon, Arlington, VA; 3M, Saint Paul, MN; University of Maryland at College Park, College Park, MD; Mayo Foundation, Rochester, MN; Minnesota Historical Society, Saint Paul, MN

■ **SETTER LEACH & LINDSTROM**

730 Second Ave. S., Ste. 1100
Minneapolis, MN 55402
Tel: 612/338-8741
Fax: 612/338-4840
E-mail: info@setterleach.com
Web: www.setterleach.com
Established 1917

— Charles M. Ault PE
Nancy S. Cameron IIDA, CID
Robert G. Egge AIA
Howard Goltz AIA
Thomas A. Olesak AIA
Jerome A. Ritter AIA

— Firm Personnel by Discipline
Civil Engineers 2
Structural Engineers 11
Mechanical Engineers 10
Electrical Engineers 10
Architects 33
Other Professional 5
Administration 16
Total 87

— A design award-winning firm, Setter Leach & Lindstrom provides architectural, interior design, civil, structural, mechanical, electrical, communication and technology engineering services to public and private sector clients. We provide these services nationally, and focus on retail, health care, industrial, financial, technology, large assembly, government and educational business sectors.

— Bayfront Convention Center, Erie, PA; C.E. Jacobson Elementary School, Rush City, MN; Memorial Medical Center, Neillsville, WI; Education Center, Ellsworth AFB, SD; Walgreen Stores, Nationwide; Sysco Food Service of Minnesota, Moundsview, MN

■ **SHORT ELLIOTT HENDRICKSON INC. (SEH)**

Butler Square Building
100 N. 6th Street, Ste. 710C
Minneapolis, MN 55403-1505
Tel: 612/758-6700
Fax: 612/758-6701
Web: www.sehinc.com
Established 1927
Other MN Locations: Brainerd, Duluth, Gaylord, Glencoe, Grand Rapids, Minnetonka, Rochester, St. Cloud, St. Paul, Virginia, Worthington

Other Locations: Appleton, Chippewa Falls, Madison, Milwaukee, Rice Lake and Wausau, WI; Boulder, Denver, Fort Collins, CO; Bozeman, MT; Chicago, IL; Gary, Lake County, IN; Sioux Falls, SD

Gary Gray	PE
David Pillatzke	PE
Brad Forbrook	AIA
Nancy Schultz	AIA
Doug Parrott	PE
John Hinzmann	PE

Firm Personnel by Discipline	
Civil Engineers	214
Structural Engineers	9
Mechanical Engineer	1
Electrical Engineers	6
Architects	24
Other Professional	64
Technical	242
Administrative	121
Total	681

SEH is a multi-disciplined consulting firm offering Architecture, Engineering, Environmental and Transportation Services.

Aquaculture Lab/Fishery Facility, Red Cliff, WI; Ramsey Fire Station, Ramsey, MN; East Grand Forks Floodwall Treatment, Municipal Pump Stations, Parks and Trails, East Grand Forks, MN; New Government, Forestry and Maintenance Facility for Washburn County, Shell Lake, WI; Aircraft Fire Fighting and Rescue Facility, St. Cloud Regional Airport, St. Cloud, MN; Hopkins Fire, Police and Public Works Facility, Hopkins, MN

■ **STEEN ENGINEERING, INC.**

5650 North Lilac Drive
Brooklyn Center, MN 55430
Tel: 763/585-6742
Fax: 763/585-6757
E-mail: steen@steeneng.com
Established 1993

Mark R. Brengman	PE
Steven M. Youngs	PE
Eugene A. Striefel	

Firm Personnel by Discipline	
Mechanical Engineers	5
Electrical Engineers	6
Technical	5
Administrative	3
Total	19

Steen Engineering provides a practical approach to its Mechanical and Electrical design for our corporate, municipal, medical, hospital, institutional and retail clients. Our design experience includes HVAC, plumbing, fire protection, lighting, power distribution, life safety, automatic temperature control, energy analysis and deficiency studies.

Con Agra Offices, Omaha, NE; Hotels/Motels, Nationwide (AmericInn, Country Inn & Suites, Hilton and Marriott); City Bella Grammercy, Richfield, MN; Hennepin County Government Center Falls Cafeteria Remodel, Minneapolis, MN; Numerous Independent, Assisted and Skilled Nursing Facilities, Nationwide; Brinks Facility, Pittsburgh, PA

■ **STRUCTURAL DESIGN ASSOCIATES, INC.**

6860 Shingle Creek Parkway, Ste. 201
Minneapolis, MN 55430
Tel: 763/560-5300
Fax: 763/560-5400
E-mail: sda@sdaeng.com
Web: www.sdaeng.com
Established 1989
Other Office: Brainerd, MN

Gregory J. Duerr	PE
------------------	----

Firm Personnel by Discipline	
Structural Engineers	5
Technical	3
Administrative	1
Total	9

Continued on next column

Structural Engineers providing design, construction documents, reports, and construction administration services for projects in the educational, industrial (manufacturing, warehousing, equipment supports, and repairs), commercial, municipal, medical, and renovation fields. Services provided to Architects, Owners, Contractors, Developers and others.

Waconia Middle School, Waconia, MN; Buffalo High School, Buffalo, MN; Green Bay Packaging Addition, Wausau, WI; Conference Center for Andersen Windows, Bayport, MN; Redwood Falls Hospital Addition, Redwood Falls, MN; University of Minnesota Housing, Minneapolis, MN

■ **TKDA**

1500 Piper Jaffray Plaza
444 Cedar Street
Saint Paul, MN 55101-2140
Tel: 651/292-4400
Fax: 651/292-0083
E-mail: deitner.we@tkda.com
Web: www.tkda.com
Established 1910
Other Office: Aurora, IL

Richard N. Sobiech	PE
William E. Deitner	PE
Robert A. Boyer	PE
Gary M. Christensen	PE
Vincent T. Montgomery	PE
Dean A. Johnson	AIA

Firm Personnel by Discipline	
Civil Engineers	72
Structural Engineers	9
Mechanical Engineers	8
Electrical Engineers	3
Transportation Engineers	2
Architects	9
Other Professional	4
Technical	66
Administrative	30
Total Staff	203

Planning, design, and construction engineering for mechanical, electrical, structural, municipal, environmental, highway/bridge/railroad, airport, architectural and landscape architectural projects.

Light Rail Transit Maintenance Facility, Minneapolis, MN; Waterous New Corporate Offices, South St. Paul, MN; Metro Transit Control Center, Minneapolis, MN; Airfield Lighting Electrical Center, MSP International Airport; Hennepin County Energy Center, Minneapolis, MN; Eagan Central Park Community Center, Eagan, MN	
---	--

■ **VAN SICKLE, ALLEN & ASSOCIATES, INC.**

2955 Xenium Lane N., Ste. 10
Plymouth, MN 55441
Tel: 763/559-9100
Fax: 763/559-6023

E-mail: sstangeland@vansickleallen.com

Web: www.vansickleallen.com

Established 1978

Other Offices: Hutchinson, KS

Richard Van Sickle	PE
Scott Stangeland	PE
Keith Jacobson	PE
S. (Shawn) Shahriar	PhD, PE
Bernie Jansen	
Gene Haldorson	

Firm Personnel by Discipline	
Civil Engineers	4
Structural Engineers	13
Other Professional	3
Technical	14
Administrative	4
Total	38

Structural and Civil Engineering services for commercial, corporate, educational, retail, government, health care, hotel, senior housing and parking facilities. Engineering and planning for industrial and agribusiness including food and dairy processing facilities, shipping and handling facilities, grain storage, handling and processing, ethanol facilities, manufacturing, and power plants.

New Guthrie Theater, Minneapolis, MN; Fort Snelling Army Reserve Building, Fort Snelling, MN; University of Minnesota Morris, Morris, MN; Meridian Crossing, Richfield, MN; Sysco Food Warehouse Expansion, Moundsview, MN; Blaine Sports Center, Blaine, MN

■ **WENZEL ENGINEERING INC.**

10100 Morgan Avenue S.
Bloomington, MN 55431
Tel: 952/888-6516
Fax: 952/888-2587
E-mail: weing@mcleodusa.net
Established 1990

Lowell E. Wenzel	PE
Patricia A. Cole	PE
Jeff A. Segar	PE
Steve Rivard	PE

Firm Personnel by Discipline	
Structural Engineers	4
Technical	1
Administrative	1
Total	6

Wenzel Engineering, Inc. is a Structural Engineering Firm dedicated to understanding and meeting our clients' goals. Our experience includes new facilities, renovations, additions, and investigations for commercial, industrial, public, retail, educational, religious and healthcare clients.

State of Minnesota Bureau of Criminal Apprehension Building, St. Paul, MN; Grand Forks Flood Control, Grand Forks, ND; Lamoreaux Building Addition, Minneapolis, MN; Marketplace Lofts, Hopkins, MN; Mercy Heart Center/Medical Center, Sioux city, IA; American Indian Resource Center, Bemidji State University, MN

■ **WESTWOOD PROFESSIONAL SERVICES, INC.**

7599 Anagram Drive
Eden Prairie, MN 55344
Tel: 952/937-5150
Fax: 952/937-5822
E-mail: wps@westwoodps.com
Established 1972
Other Office: St. Cloud and Brainerd, MN

Dennis Marhula	PE
Dwight Jelle	PE
Allan Klugman	PE
Martin Weber	PE
Timothy Erkkila	ASLA
Richard Wiebe	ASLA

Firm Personnel by Discipline	
Civil Engineers	14
Other Professional	22
Technical	68
Administrative	8
Total	112

Continued on next column

Westwood is a multi-disciplinary engineering consulting firm headquartered in Eden Prairie, MN. The company provides civil engineering, traffic engineering, landscape architecture, planning, surveying and environmental services to the development community. Westwood has a solid reputation with private developers, architects, cities, and government agencies throughout the Midwest for providing consistent, quality services in a timely and cost-efficient manner. Westwood is celebrating 30 years of engineering services.

West Ridge Market (regional commercial), Minnetonka, MN; Riverdale Village (regional commercial), Coon Rapids, MN; Woodbury Village (regional commercial), Woodbury, MN; Loring Park City Apartments, Minneapolis, MN; Evermoor (residential PUD), Rosemount, MN; Liberty of the Lake (residential PUD), Stillwater, MN

■ **WIDSETH SMITH NOLTING**

2000 Industrial Park Road S.
Baxter, MN 56425
Tel: 218/829-5117
Fax: 218/829-2517
E-mail: wsnbrd@wsn-mn.com
Web: www.msn-mn.com
Established 1975
Other Offices: Bemidji, Crookston and Alexandria, MN; Grand Forks, ND

Don Anderson	PE
Bruce Buxton	PE, LS
David Kildahl	PE
Tim Moe	PE
Paul Richards	AIA
Kevin Donnay	AIA

Firm Personnel by Discipline	
Civil Engineers	25
Structural Engineers	3
Mechanical Engineers	4
Electrical Engineers	1
Architects	14
Other Professional	12
Technical	57
Administrative	19
Total Staff	135

Continued on next column

WSN offers professional services in engineering, architecture, land surveying and environmental areas. Our registered architects, engineers (CMI, structural and water resources), environmental scientists and land surveyors effectively solve a wide variety of design and construction issues - overseeing a project from the planning stages through completion.

ISD #181, Forestview Middle School, Baxter, MN; Mills Fleet Farm, Fergus Falls, MN; Alexandria Lakes Area Sanitary District (ALASD) System Improvements, Alexandria, MN; City of Crookston Well System Improvements, MN; Tastefully Simple, Inc. Office and Warehouse Renovation and Expansion, Alexandria, MN; Beltrami County CSAH 19 Bridges/Road/EAW/Design

■ **WOLD ARCHITECTS AND ENGINEERS**

305 Saint Peter Street
Saint Paul, MN 55102
Tel: 651/227-7773
Fax: 651/223-5646
E-mail: mail@woldae.com
Web: www.woldae.com
Established 1968
Other Offices: Elgin, IL; Troy, MI

R. Scott McQueen	AIA
Michael S. Cox	AIA
Kevin Marshall	PE
Blane Krause	PE

Firm Personnel by Discipline	
Mechanical Engineers	16
Electrical Engineers	9
Architects	68
Other Professionals	10
Administrative	18
Total	121

Professional mechanical and electrical consulting engineering services, including: indoor air quality, HVAC system design, plumbing system design, fire protection systems, energy management, voice/data communications, media technologies, design and specifications of electrical power systems, and security systems.

Lakeville High School II; Lakeville, MN; Ramsey County Law Enforcement Center, St. Paul, MN; Dakota County Northern Service Center, West St. Paul, MN; Hastings High School, Hastings, MN; Minnesota Department of Transportation, St. Paul, MN; St. Louis County Courthouse, Duluth, MN

■ **YAGGY COLBY ASSOCIATES**

717 Third Avenue SE
Rochester, MN 55904
Tel: 507/288-6464
Fax: 507/288-5058
E-mail: info@yaggy.com
Web: www.yaggy.com
Established 1970
Other Offices: Mendota Heights, MN; Mason City, IA; Delafield, WI

Donald Borcharding	PE, RLS
Chris Colby	AIA, CID
Jose Rivas	AIA
Scott Samuelson	PE
Robert Ellis	

Firm Personnel by Discipline	
Civil Engineers	4
Other Engineers (Municipal, Transportation, Land development, Geo-technical, Environmental)	38
Architects	4
Other Professional	45
Technical	29
Administrative	27
Total	147

Municipal, transportation, land development, geo-technical, environmental and structural engineering including streets, water supply and storage, storm sewer systems, highways, airports, subdivision design, water and wastewater treatment, and environmental studies, bridges, box culverts, buildings and other structures. Surveying activities for engineering, land and geodetic control surveys.

IBM Courtyard, Rochester, MN; Mayo Gonda Building Street Reconstruction, Rochester, MN; Golden Tee, Byron, MN; Professional Skaters Association Building, Rochester, MN; CSAH 44, Fillmore County, MN

Minnesota Department of Natural Resources: Tower Consolidated Area Headquarters

Location: Tower, MN
 Client: Minnesota Department of Natural Resources
 Architect: LHB Engineers & Architects
 Principal-in-charge: Steven McNeill, AIA
 Project manager: James Brew, AIA
 Project architects: Mark Poirier, AIA
 Project lead designer: Mark Poirier, AIA
 Project team: Brandon Bartlett; Joan Vorderbruggen
 Structural-engineering team: LHB Engineers & Architects
 Mechanical-engineering team: David T. Williams, Brent Tonner, Matt Ortscheid, Andy Thielen, Ryan Thorson
 Electrical-engineering team: Linnea Weyandt, Robin Rusboldt
 Civil-engineering team: Jay B. Bergman, Randy Willie, Michael Rust, Nathan LaVine, Paul Voge
 Lighting designer: Linnea Weyandt
 Interior designer: Kiiri Schoenberg, Sue Anderson, Aaron Hanson
 Landscape architect: Mark Anderson, David Chmielewski
 Flooring systems/materials: Integrally colored, honed concrete; walk-off carpet tile; US Rubber Recycling; carpet; Shaw
 Window systems: Office, Loewen Skylights; Velux, Translucent Panels; Kalwall
 Architectural metal panels: Star Building, Wick Building, Una-Clad
 CMU; Anchor Block
 Concrete work: H.G. Harvey; Terrazzo & Concrete Restoration Inc.
 Millwork: St. Germain's;
 SIPs (Structural Insulated Panels): R-Control
 Roof shingles: CertainTEED
 Overhead doors: Clopay
 Contractors: H.G. Harvey (main project) and Max Gray (Cold Storage Building B)
 Electrical contractor: Tromco
 Mechanical contractor: Tini Mechanical
 Other consultants: The University of Minnesota Center for Sustainable Building Research
 Photographer: Peter Bastianelli Kerze

American Lung Association of Minnesota Healthy Design™ Office-Building Prototype

Location: St. Paul, MN
 Client: American Lung Association of Minnesota
 Architect: Perkins & Will
 Principal-in-charge: Chuck Knight, AIA
 Project manager: Sandy Christie
 Project architects: Doug Pierce, AIA, Tim Vaughn, AIA
 Project lead designer: Dave Dimond, AIA
 Project team: Beth Crumbaker, Dave Koenen, Tony Layne, Dave Paepier, AIA, Richard Price, Jerry Worrell, AIA
 Structural-engineering team: BKB Engineers
 Energy/daylighting analysis: The Weidt Group
 Mechanical-engineering team: Dunham Associates
 Electrical-engineering team: Dunham Associates
 Civil-engineering team: BKB Engineers
 Interior design: Perkins & Will
 Construction manager: Kraus-Anderson Construction Company
 Landscape architect: Thompson-Dyke Associates
 Building scientist: Joe Lstiburek, Building Science
 Research coordinator: David Grimsrud, Ph.D., Grimsrud Associates; U.S. Department of Energy: Paul Torcellini

Apple Valley City Hall

Location: Apple Valley, MN
 Client: City of Apple Valley
 Architect: CNH Architects
 Principal-in-charge: Wayne Hilbert, AIA
 Project team: Greg Van Sickle, Rey Custer, Al Reuvers, Marcia Grutza, John Natwick, AIA, Quinn Hutson, AIA
 Structural-engineering team: Van Sickle, Allen and Associates: Gary Nagel, Rodney Bowman
 Mechanical-engineering team: Ericksen, Ellison and Associates: James Art, Roger Brandel
 Electrical-engineering team: Ericksen, Ellison and Associates: Todd Peterson, Brent Larsen
 Civil-engineering team: Bonestroo Rosene Anderlik and Associates: Keith Gordon, Carmen Brandel
 Interior design: Facility Systems, CNH Architects
 Landscape architect: Damon Farber Associates: Damon Farber, Matt Wilkins
 General contractor: Shaw-Lundquist & Associates
 Cabinetwork: Wilke Sanderson
 Flooring systems/materials: Facilities 2000/Shaw Contract Group
 Photographer: Brian Droegge

Rondo Houses

Location: St. Paul, MN
 Client: Rondo Community Land Trust
 Architect: Cermak Rhoades Architects
 Principal-in-charge: Terri Cermak, AIA
 Project manager: Michelle Baltus, Assoc. AIA
 General contractor: BCB Construction, Inc.
 Reclaimed building materials: Deconstruction Services, a program of The Green Institute
 Reclaimed solar panel: Innovative Power Systems
 Energy consulting: St. Paul Neighborhood Energy Consortium
 Structural engineer: Mattson/Macdonald, Inc.
 Photographer: Cermak Rhoades Architects

Minnesota Department of Natural Resources: Windom Consolidated Area Headquarters

Location: Windom, MN
 Client: Minnesota Department of Natural Resources
 Architect: Kodet Architectural Group, Ltd.
 Principal-in-charge: Edward J. Kodet Jr., FAIA
 Project manager: Joan Bren, AIA
 Project lead designer: Edward J. Kodet Jr., FAIA
 Project team: Edward J. Kodet Jr., FAIA; Joan Bren, AIA; Ken Stone, AIA; Marie Dorn, AIA; Kevin Hadlich; Teri Nagel; Lani Fischer; John Brandel; Laura Bradt
 Structural-engineering team: Mattson/Macdonald, Inc.
 Mechanical-engineering team: Dolejs Associates, Inc.
 Electrical-engineering team: Dolejs Associates, Inc.
 Civil-engineering team: Clark Engineering Corporation
 Interior design: Kodet Architectural Group, Ltd.
 Landscape architect: Damon Farber Associates
 Face brick: (burnish block) Aggregate Industries
 Stone: (pre-cast) Gage Brothers
 Cabinetwork: Wilke Sanderson
 Flooring systems/materials: (quarry tile) Dal Tile; (VCT) Armstrong; (carpet) Shaw Advantage System
 Window systems: Eagle Windows
 Architectural metal panels: Uni-Clad
 Concrete work: local redi-mix

Millwork: Wilke Sanderson
 Photographer: Edward J. Kodet Jr. FAIA

Hennepin County - Eden Prairie Library

Location: Eden Prairie, MN
 Client: Hennepin County
 Architect: Bentz/Thompson/Rietow, Inc.
 Principal-in-charge: Ann Voda, AIA
 Project manager: Ann Voda, AIA
 Project architects: Randy L. Moe, AIA
 Project lead designer: Milo H. Thompson, FAIA
 Structural-engineering team: Mattson-Macdonald
 Mechanical-engineering team: Gausman and Moore
 Electrical-engineering team: Gausman and Moore
 Acoustical consultant: Kvernstoen and Kehl
 Daylight/energy modeling: The Weidt Group, Inc.
 Interior design: Bentz/Thompson/Rietow, Inc.
 Landscape architect: Damon Farber Associates
 Landscape project team: Damon Farber, Benjamin Hartberg
 General contractor: Oakwood Builders
 Concrete and masonry: Braemar Concrete and Masonry
 Structural framing: Husky Steel, Inc.
 Millwork: Illinois Fixture
 Window systems: Harmon Glass
 Doors and hardware: Kendall Doors and Hardware
 Rough carpentry: Lamperts
 Roofing and metal wall panels: Industrial Roofing and Sheetmetal
 Electrical contractor: Larson Electric Services, Inc.
 Mechanical contractor: R & S Heating and Air Conditioning
 Fire protection: Viking Automatic Sprinkler Co.
 Gypsum board: Minuti-Ogle Company
 Elevator: Schindler Elevator
 Painting: Rich Prairie Painters, Inc.
 Window treatment: Custom Expressions

East Metro Transit Facility

Location: St. Paul, MN
 Client: Metropolitan Council/Metro Transit
 Architect: BWBR Architects, Inc.
 Principal-in-charge: Steve Patrick, AIA
 Project manager: John Strachota, AIA
 Project architects: Doug Wild, AIA
 Project lead designer: Jim Widder, AIA (no longer with the firm)
 Project team: Jeff Krueger, Stephanie McDaniel, AIA, Mike Meehan, AIA, David Leighly, AIA; Sheldon Wolfe; Jason Thury; Steve Wilmot, Viren Gori (no longer with firm)
 Interior design: Jennifer Wenger, Jennifer Ingvaldstad
 Design consultant: Maintenance Facility Consultants (Houston, TX)
 Cost estimator: Professional Project Management
 Environmental/geotechnology: Braun Intertec
 Traffic consultant: Benshoof & Associates
 Energy consultant: The Weidt Group
 Structural-engineering team: Palanisami & Associates
 Mechanical-engineering team: Dunham Associates
 Mechanical subcontractor: New Mech Companies
 Electrical-engineering team: Dunham Associates
 Civil-engineering team: Melchert Walkky Associates
 Construction manager: Adolfson & Peterson
 Landscape architect: Melchert Walkky Associates
 Public-information consultant: Richardson, Richter & Associates
 Face brick: Ochs
 Precast: Fabcon
 Cabinetwork: Paul's Woodwork

Flooring systems/materials: St. Paul Linoleum
 Window systems: Gateway Rochester/Efco
 Architectural metal panels: Specialty Systems
 Concrete work: Adolfsen & Peterson
 Millwork: Paul's Woodwork
 Roofing: Johns Manville
 Photographer: Don F. Wong

Iowa Association of Municipal Utilities

Location: Ankeny, IA

Client: Iowa Association of Municipal Utilities

Sustainable-energy designers: The Weidt Group
 - Tom McDougall

Architect of record: RDG Bussard Dikis -
 Des Moines

Principal-in-charge: David J. Dulaney, AIA

Project manager: Kevin Nordmeyer, AIA

Project architects: Kevin Nordmeyer, AIA

Project lead designer: Kevin Nordmeyer, AIA

Sustainable-energy designers: The Weidt Group
 - Tom McDougall

Structural-engineering team: James Wilson-
 structural engineer

Mechanical-engineering team: Alvine and
 Associates, Omaha

Electrical-engineering team: Alvine and
 Associates, Omaha

Lighting designer: Alvine and Associate, RDG,
 The Weidt Group

Interior design: RDG Bussard Dikis

General contractor: Story Construction

Landscape architect: RDG Crose Gardner Shukert

Landscape project team: Rich Gardner

Flooring systems/materials: Blueridge Carpets

Window systems: Pella Windows

Cement-board siding: VIROC Siding Panels

Concrete work: Story Construction

Roofing: Galvalume Standing Seam Roofing -
 Berridge Manuf.

Masonry: Tinted smooth concrete block

Insulation: Prairie Foam Insulators, Icynene
 Insulation System

Photographer: Assassi Productions

Environmental Experiment Center

Location: St. Paul, MN

Client: Science Museum of MN

Architect: Barbour/LaDouceur Architects

Principal-in-charge: Janis LaDouceur, AIA

Project manager: F. John Barbour, AIA

Project architects: F. John Barbour, AIA/
 Janis LaDouceur, AIA

Project lead designers: F. John Barbour, AIA,
 Janis LaDouceur, AIA, Kurt Gough

Project team: Andrea Doebbert, Jackie Millea,
 Fred Poehler, John Vander Velde. The Weidt

Group - David Eijadi, AIA, Tom McDougall,
 Jason Steinbock. Science Museum of MN -

Patrick Hamilton, Chris Krumm

Structural-engineering team: Mattson/
 MacDonald Inc.

Mechanical-engineering team: Martin
 Mechanical Design, Inc.

Electrical-engineering team: Vareberg
 Engineering

Geotechnical engineering: Gale-Tec
 Engineering, Inc.

Lighting designer: The Weidt Group

Interior design: Barbour/LaDouceur
 Architects, P.A.

Construction manager: Sterns & Associates, LLC.

Landscape architect: Barbour/LaDouceur
 Architects, P.A.

Landscape project team: Fred Poehler ASLA

Window systems: Andersen Corporation
 (System 2 Windows)

Architectural metal panels: Progressive Building
 Systems

Concrete work: LS Black Constructors, Inc.

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In this photo, taken around 1896, Beret Hagebak sits beside her family dwelling—a house made of prairie sod. During the final decades of the 19th century, about a million sod houses dotted America's midsection, concentrated in the Great Plains and the Upper Midwest. Thousands were built in Minnesota, especially in the plains west of Willmar. Designed to last a generation, these homes have now mostly dissolved into the prairie. Fewer than 100 still stand.

The settlers of Minnesota, Iowa, the Dakotas, Kansas and Nebraska who erected these houses borrowed techniques used earlier by Plains Indians and by Europeans who made bricks from peat moss. With little affordable timber available for construction, home builders turned to the dense growth of wild grasses beneath their feet. Eons of summer heat and freezing winters had dried the earth into "prairie brick." Using plows to cut uniform lengths of the soil and its tangled roots, settlers ripped the sod from the ground, which they documented as sounding like the tearing of canvas. They stacked the foot-thick prairie bricks face down to form the walls of their new house.

Often the homesteaders left a door opening on the south side of the house and created window openings covered only by oiled canvas. A sod layer supported by poles and tar paper made up the roof. The result was a house of one or more rooms and a packed earthen floor, which kept cool in the summer and warm in winter.

Usually equipped with a stove or fireplace and the simplest of furnishings, sod houses were vulnerable to a variety of dangers and discomforts. An old joke maintained that it rained two days longer in a "soddie" than it did outside, and leaking water frequently turned the floor into a quagmire. Clumps of dirt and grass sometimes fell from the ceiling. With little else to rub their itching hides against, grazing cattle frequently knocked down



Hagebak Family Sod House, Lac Qui Parle County, (late 1800s)

walls. The sod was also home to such nonhuman tenants as fleas, rodents, snakes and beetles.

Minnesota settlers gave up their sod houses when they were able to afford more permanent homes. Yet they often felt a lasting affection for their old dirt-walled shelters; many of their descendants continue to take an interest in sod. Adventurous travelers can stay in a sod-house bed and breakfast in Sanborn, built by the McCone family in 1987. (See *Architecture Minnesota*, January-February 1996). The National Sod House Society in Holdrege, Nebraska, has nearly 200 members. Gothenburg, Nebraska, and Aline, Oklahoma, boast sod-house museums. **Jack El-Hai**

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