

Thornton Tomasetti



COLLABORATION

intransitive verb: to work jointly with others or together, especially in an intellectual endeavor

2012/2013 ANNUAL REPORT

Thornton Tomasetti provides engineering design, investigation and analysis services to clients worldwide on projects of every size and level of complexity. Our six integrated practices (see inside back cover) address the full life cycle of structures. Founded in 1956, today Thornton Tomasetti is a 700-person organization of engineers, architects and other professionals collaborating from offices across the United States and in Asia-Pacific, Europe, Latin America and the Middle East.

Cover: Bruce Arita and Thornton Tomasetti colleagues at the nightly meeting of the Sandy response team, with key leaders from Syska Hennessy, Hardesty & Hanover and Hatzel & Buehler. This group met each night to determine staffing allocations for the next day. See page 26 for more.

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Last year, our annual report focused on how success depends on both *relationship* excellence and *technical* excellence. We have found that trust, respect and camaraderie underlie all our successes.

This year, our report further examines what makes our relationships fulfilling. The answer: collaboration.

Collaboration requires holistic thinking and behavior – a whole-team approach. No single team member has a monopoly on good ideas, and the continuous and candid exchange of ideas nearly always leads to their improvement. When we look back at our most successful projects, a common thread is that everyone on the team felt a strong sense of collaboration from the first charrette, through the long nights, to the milestone celebrations.

For this report, we looked at the positive impact of healthy collaboration on our projects. We visited a façade fabricator near Toronto to assist hands-on with quality assurance (page 14); we hosted a symposium in London to update the insurance community about earthquake recovery in New Zealand (fold-out section, page 18); and in Brooklyn and

Oklahoma City we joined the integrated design teams for the opening day of Barclays Center and to celebrate the completion of Devon Energy Center, the tallest building in Oklahoma (pages 22 and 24). There is more. Browse the pages and you'll see.

Collaboration doesn't just happen. It takes deliberate effort. We seek, attract and nurture people who thrive on working closely with colleagues and as a part of a team. We look for the ability to engage in open communication, to go deeper and ask the right questions, to share information, and to do the early legwork that makes later work go more smoothly for all.

This approach is threaded into our DNA. In the early 1960s, the small shop that grew into Thornton Tomasetti – Lev Zetlin Associates – got its big break collaborating with the greatest architects and city planners of the day to develop more than a dozen pavilions for the 1964 World's Fair in New York City. Those amazing structures envisioned an architecture of the future, and it was only by working closely with contractors, architects and fabricators that such nonlinear, swooping designs could be built (in the days well before advanced computational modeling and analysis).

Today, our six complementary practices afford us many ways to address challenges throughout a structure's life cycle – and many opportunities for collaboration. Our practice diversity means our contributions move farther upstream in project conception and farther downstream in support of long-term building value. For example, sustainability is best integrated into a structure at the start, not tacked on later. Likewise, our Building Performance practice assists clients in getting the longest and most productive life out of their investments. This “across the life cycle” approach is illustrated in the fold-out section of this report.

As new technology changes project roles and responsibilities, we seek advances that enable us to find better ways to deliver projects. On the design side, for example, we love to make the model our deliverable because it removes doubt: What you see in the model you'll find in the field. In our Building Performance practice, we use Forensic Information Models to manage and show everything we learn in an investigation. In our Property Loss Consulting practice, we share interactive map data with clients so that managers, owners, insurers and their agents can zero in on how their properties might be affected by new flood zone mapping.

As we add new ways to assist our clients across disciplines and technical cultures, collaboration is not an option. For us, it's fundamental.



Tom Scarangelo
Chairman & CEO



Bob DeScenza
President



Just under the surface of any successful project you'll find a robust collaboration between team members. For this year's report, we asked: What does this kind of collaboration look like? How does it work? How does it enhance success?

We went far and wide to explore these questions. Here you'll find candid moments of project teams at work – moments of laughter, of tension, and of deep thought (yes, work imitates life).

We hope you enjoy taking this journey with us.

PROJECT TEAM: *Owner* Confidential; *Architect* Wilson Architects; *MEP Engineer* Bard, Rao + Athanas Consulting Engineers (BR+A); *Cleanroom Consultant* Abbie Gregg Inc.; *Structural Engineer* LeMessurier Consultants; *Construction Manager* Turner Construction

THORNTON TOMASETTI provided sustainability consulting services.



Porter Gifford

Members of the project team take a break at the Barrington Coffee Roasting Company, just down the street from Wilson Architects' office in Boston. From left: Matt Leslie, Wilson Architects; Vamshi Googe, Thornton Tomasetti; Jacob Knowles, BR+A; Michael Pulaski, Thornton Tomasetti; and Samir Srouji, Wilson Architects.

Studying sustainability strategies for a high-performance lab

Thornton Tomasetti provided pre-design-phase sustainability consulting for a planned laboratory building that will unite state-of-the-art research facilities with cutting-edge sustainability strategies. Designed to accommodate researchers from several disciplines, it will include the latest equipment and cleanroom technology. Because air in a cleanroom must be filtered and recirculated constantly to control airborne particles and humidity, these facilities require intensive use of HVAC systems – and necessarily use more energy than other buildings of similar size. So how do you realize significant sustainability gains without giving up function? By exploring all the options – even seemingly small ones.

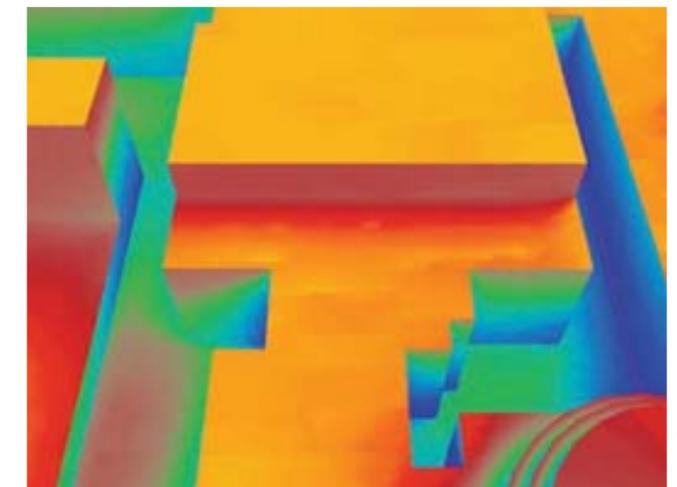
Our Building Sustainability professionals partnered with Wilson Architects and MEP engineer BR+A early in the project's planning phase to explore all the options for reducing the building's environmental impact, an effort that went well beyond a standard LEED-focused assessment.

First, we met with the project team to learn details of the proposed program and its MEP requirements. Next we researched the local climate, reviewed similar facilities' performance, and studied options for incorporating alternative and renewable energy sources. Then we facilitated a team sustainability workshop to identify project goals and explore a range of design strategies.

Through our innovative energy programming analysis, we examined opportunities for configuring interior spaces to maximize building system efficiency. Grouping areas with similar tolerances for temperature variations, for example, allows HVAC capacity to be concentrated where it's needed most, while creating opportunities for natural ventilation in spaces with less stringent requirements.

In facilities like today's high-tech labs, the MEP engineer's careful design of HVAC systems is the clearest way to save energy. But achieving truly ambitious sustainability goals requires a rigorous, multifaceted approach. Identifying all the options for improvement early on allows the team to choose a set of high-performance design strategies that together add up to success.

We used the Rhino plug-in DIVA to model solar radiation patterns resulting from proposed building massing and surrounding structures. We also performed thermal and daylight analyses, shading studies and comfort simulations.



Thornton Tomasetti

New England Research Laboratory

PROGRAMMING

Designing across eleven time zones

PROJECT TEAM: *Client* Parramatta City Council Property Development Group; *Architect* Grimshaw Architects; *Local Structural Engineer* AECOM; *Façade Consultant* Arup
THORNTON TOMASETTI is providing structural design services.

Situated in the center of the Greater Western Sydney metropolitan area, the city of Parramatta is experiencing significant growth and investment to become New South Wales' second leading central business district.

At the heart of the city, the City Council has approved a new master plan for a commercial and civic precinct surrounding a new public square. The precinct is subdivided into four landmark developments, each of which was the subject of an invited international design competition. Working with Grimshaw's Sydney office, Thornton Tomasetti helped deliver the winning architectural design for the tallest tower in the new precinct: a 78-story residential building.

At 280 meters, Aspire Tower will be the tallest building in New South Wales. Its sustainable design incorporates a stepping façade that self-shades as it twists up toward the sun, as well as fully ventilated sky gardens on every sixth floor that establish a series of vertical neighborhoods.

"The client's objectives include an iconic design that is predicated on amenity, efficiency and buildability," said Mike Roberts, Thornton Tomasetti project manager. "We worked closely with Grimshaw to fulfill their exciting architectural vision with the most effective yet simple structural system."

A local team was engaged to deliver the project through the planning phase, for which we partnered with AECOM. This partnership linked Thornton Tomasetti's worldwide experience in high-rise design with AECOM's knowledge of local conditions and construction practices.

"Working across offices, continents, time zones and cultures is an increasingly common way of collaborating," said Tanya de Hoog, Thornton Tomasetti project principal. "It is certainly a reflection of our ability to deliver anywhere through effective use of technology, whilst drawing on our firm's global experience."

The gentle twist of the tower is achieved through a highly constructable rectilinear framing system that slides outward at each level. The ghosted images represent future towers included in the master plan.



Courtesy Grimshaw Architects



Chris Moyes

Aspire Tower
Parramatta, New South Wales, Australia

CONCEPT DEVELOPMENT



Edmonton Arena
Edmonton, Alberta, Canada

Thornton Tomasetti

Sharing the model with the team

The NHL franchise where hockey great Wayne Gretzky first rose to prominence needs a new home. The Edmonton Oilers now play in a northern suburb of the city at one of the oldest facilities in the NHL, the 39-year-old Rexall Place. The Oilers' agreement with the arena expires after the 2014-15 season and a plan has been drawn up to move the team to a new arena, which would also serve as an anchor for Edmonton's downtown revitalization.

Working on the new arena with 360 Architecture, Thornton Tomasetti teams in New York, London and Denver are providing structural design through construction administration and building skin modeling through design development. We are also collaborating with Dialog, a Canadian multidisciplinary design firm.

The design process has been accelerated by Thornton Tomasetti sharing the 3D Revit model with the architect for their use in design development.

The complexity of the development requires collaboration between a number of teams working on adjacent and shared structures. The arena includes underground parking and a link to an adjacent indoor community ice rink, as well as a winter garden and a bridge connecting the arena to a nearby mixed-use site and supplementary parking.

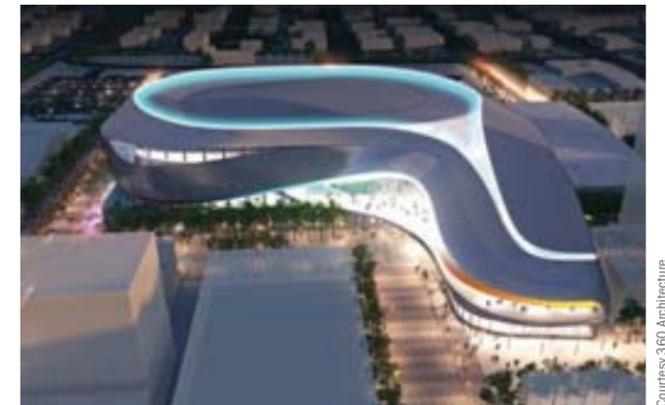
One significant design challenge is presented by a curved structure projecting from the basic bowl shape of the arena, giving the arena, in plan view, a shape like the oil drop in the Oilers' logo. To accommodate the geometry of this feature in our building skin modeling, we developed a custom panelization tool, BowlBuilder, and other software interoperability tools specifically for the project. "A great thing about these models is that everyone benefits from them," said Rob Otani, Thornton Tomasetti project manager. "This one helped the architect optimize design and determine cost overall, and also helped the fabricator and contractor optimize fabrication and constructability."

PROJECT TEAM: *Owner* Edmonton Arena Corporation (Developer) and the City of Edmonton; *Architect* 360 Architecture; *Associate Architects* Dialog and Manica Architecture; *Local Structural Engineer* Dialog; *Mechanical Engineer* ME Engineers

THORNTON TOMASETTI is providing structural design and building skin modeling services.

Opposite page, from left: Ryan Gedney, 360 Architecture; Rob Otani, Thornton Tomasetti; George Heinlein, 360 Architecture; Jesse Chrismer, Thornton Tomasetti; David Gile, 360 Architecture

The shape of the arena's roof echoes the team's logo.



Courtesy 360 Architecture

DESIGN DEVELOPMENT

Knowing the right questions to ask

Top: A structural Revit model shows the large cantilevers of the southeast lobby. We worked closely with the architects to find patterns in the asymmetric forms and place columns where they could support aesthetic and programming priorities as well as walls and slabs.

Bottom: The new arts center will host music, dance, opera and theatrical productions. The building's skin will consist of alternating tiers of glass and overlapping stainless steel shingles.



A gleaming edifice of curving tiers will soon rise near the banks of the Iowa River, a new performing arts center anchored by a 1,850-seat proscenium theater. The building will feature a three-level main lobby surrounded by tapering cantilevered terraces and a façade of stainless steel and glass. Theater design is never simple, but Hancher Auditorium's compressed schedule and sculptural form added extra complexity to its design.

A requirement for early steel bid packages put structural design far in advance of other disciplines. Our engineers reached out often to all team members for details on their design criteria, equipment choices and loading requirements. Insight gleaned from past theater projects taught us which questions needed to be asked. Establishing these particulars upfront increased the quality of our construction documents, reducing the potential for coordination issues later on.

The unified effort of our building skin and structural teams helped solve the project's biggest engineering challenge. A building 500 feet long would typically include an expansion joint to handle thermal expansion and contraction, but this would mar the façade's sleek, continuous curves. Together, our designers analyzed the problem and defined parameters for a solution, then worked with the entire team to find a combination of structural support, skin design and operational guidelines that controls thermal movement, without sacrificing aesthetic priorities.

A proactive approach to communication, a culture of collaboration and a thorough understanding of performing arts facilities enabled our building structure and skin experts to deliver coordinated solutions to complex design challenges.

Thornton Tomasetti's Nate Sosin (right) explains a structural detail at an all-team coordination meeting at OPN's Cedar Rapids, Iowa office. Clockwise from front center: Matt Sargent, Scott Koelzer, Sam Haberman and Gary Cooper, Alvine Engineering; Mitch Hirsch and Katy Harp, PCPA; Joe Troness, Mortenson; Anthony Shou and Joseph Myers, Kirkegaard Associates; Amrit Pilo and Gina Narracci, PCPA; Tim Perez, Threshold; Scott Crossfield and Jill Collins, Theatre Projects Consultants.



PROJECT TEAM: *Owner* University of Iowa; *Design Architect* Pelli Clarke Pelli Architects (PCPA); *Architect of Record* OPN Architects; *Construction Manager* M.A. Mortenson Company; *MEP/T Engineer* Alvine and Associates; *Acoustics* Kirkegaard Associates; *AV Consultant* Threshold; *Theater Consultant* Theatre Projects Consultants; *Civil Engineer* Shive Hattery Inc.; *Vertical Transportation* Lerch Bates, Inc.; *Environmental Design Consultants* Atelier Ten; *Food Service* Michael L. Bradnan & Associates; *Lighting Design* Cline Bettridge Bernstein; *Signage* Pentagram; *Landscape Architects* Balmori Associates and Confluence

THORNTON TOMASETTI is providing structural engineering and building skin design services.

Hancher Auditorium, University of Iowa
Iowa City, Iowa

CONSTRUCTION DOCUMENTS

Preparing a classic for the 21st century

Opposite page: Conferring at the Global Precast plant near Toronto, Melissa Wong (foreground), Thornton Tomasetti project manager with (from left) project architect Robert Harlow of BBG-BBGM, Tony DiRoma of Global Precast, and Ryan McGovern of Pavarini McGovern.



Walter Smith

Right: Installation of a finished panel.



Walter Smith

When a new owner took over the classic 1910 building at 330 Hudson Street in lower Manhattan, it was with a new vision to upgrade the structure, doubling its height but preserving its historic language.

Two of our practices joined the project team, working to optimize the structure of the eight-story addition and the new façade’s design, engineering, waterproofing and thermal performance.

The façade design was an especially challenging aspect of the project. The new façade – four stories of brick precast panels topped by four stories of glass unitized curtain wall – incorporates high-performance modern materials while complementing the original stone cladding and elegant detailing.

“Because the façade interfaces with everything else, you’re always balancing how to maximize its performance with design decisions that affect other systems in the building, such as mechanical and structural,” said Melissa Wong, project manager for the façade portion.

“We worked side by side with the architect throughout the design phases,” she said. “There was also a lot of collaboration with façade system manufacturers – we spoke with them often about their systems, discussing different details and options. With the façade, the answers are always changing; there is always something new and every project is unique in its own way. Our continuing collaboration with manufacturers helps us better match each project with the right solution.”

PROJECT TEAM: Owner Beacon Capital; Architect BBG-BBGM; Construction Manager Pavarini McGovern; Precast Subcontractor Global Precast; Curtain Wall Subcontractor Genetech

THORNTON TOMASETTI provided building skin design and structural engineering services.



330 Hudson Street
New York, New York

Peter Sibbald

FABRICATION

PROJECT TEAM: Owner Baha Mar, Ltd.; Executive Architect AECOM; Construction Manager (Self-perform Contractor) China Construction America (Bahamas), Ltd.; MEP Engineer JB&B
THORNTON TOMASETTI is providing structural engineering services.

Uniting an international team



Bahamas Visual Services

Thornton Tomasetti's Anna Lopez (left) and Sharath Babu (right) on a field inspection with China Construction America Project Engineer Huan Shu and Assistant Technical Manager Ismail Jiang.

Baha Mar, on Nassau's Cable Beach, is the largest single-phase resort project in development in the Western Hemisphere.



Courtesy Baha Mar, Ltd.

This world-class resort, on a 600-acre beachfront property, will soon be home to four associated but separate three- to five-star hotels, rising up to 26 stories. The site will incorporate extensive landscaping and complex structures that connect over a lagoon that winds through the site.

A complex, multi-building project is challenging anywhere. But when the project includes team members from four countries, effective ongoing communication becomes an absolute necessity, during both design and construction.

The design team – the executive architect, design architect and MEP engineer – is U.S.-based, so American means and methods were chosen as the standard. “Since the owner’s representative is British, the contractor Chinese and the engineer of record Bahamian,” said Torsten Gottlebe, Thornton Tomasetti senior associate, “a major part of the project was achieving a common understanding of how to proceed. What we call the ‘sidewalk’ the British call the ‘pavement’ – that was the easy part! We had to work closely to agree on construction approaches, which are different in the different cultures.”

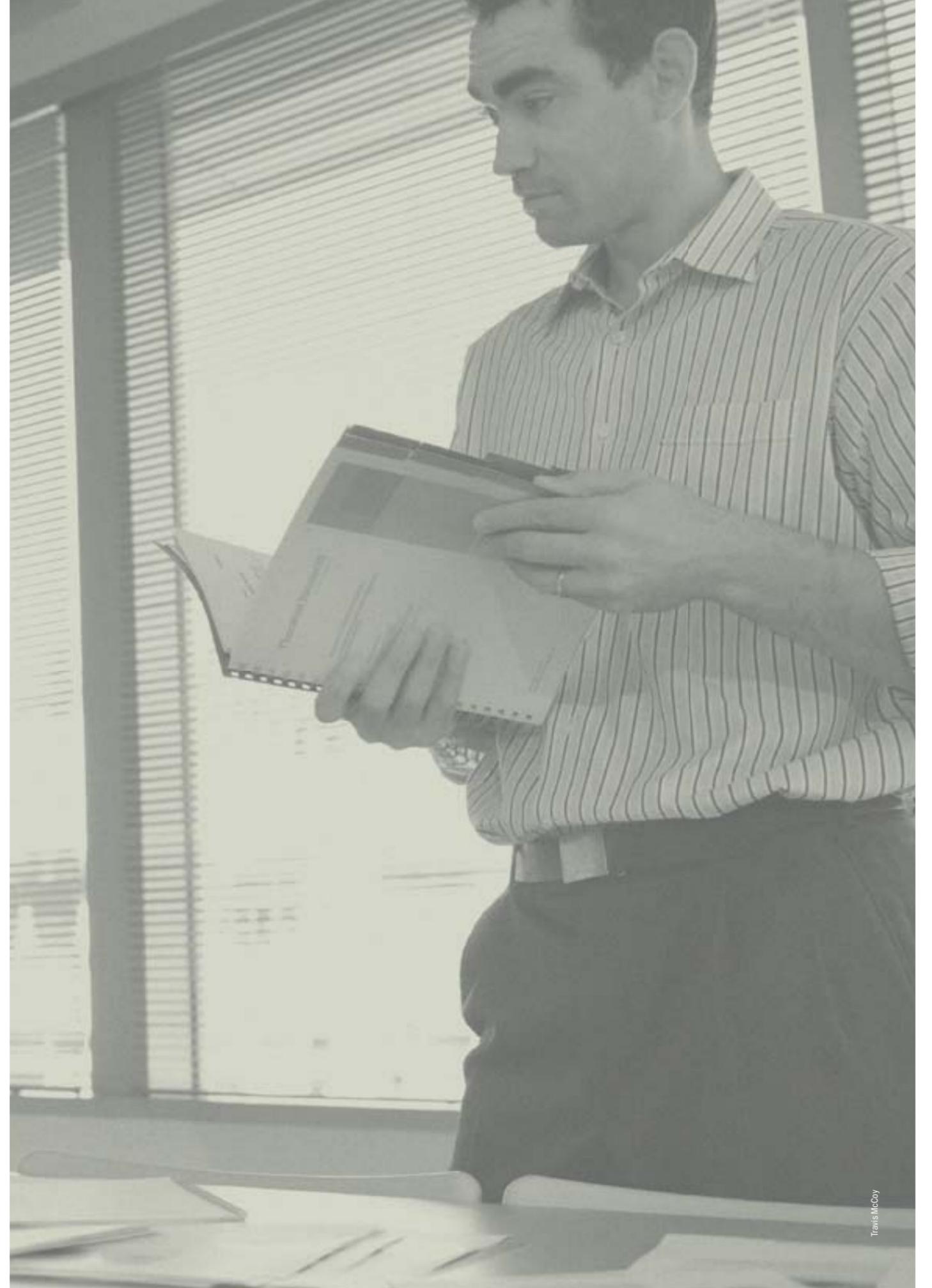
To make sure that common understanding carried through construction, a Thornton Tomasetti field team was on-site, assisting the contractor’s and owner’s construction managers with interpretation of drawings and resolving any construction issues related to the structure. “So essential to keeping the project moving,” Gottlebe said, “was keeping the lines of communication open and always on.”

Baha Mar Resort
New Providence, Bahamas

FIELD INSPECTION

We collaborate with clients and team members to create and support structures throughout their life cycle.

Look inside for a sampling of our 2012/2013 work: from conception to construction, during use and through renewal.



Supporting clients at every stage

WHERE OUR PROJECTS BEGIN

When teams are forming to pursue a project, internal collaboration is the key to producing winning proposals. We get the best results from close coordination between the efforts of our marketing staff and technical personnel. From initial RFP review to shaping a strategy and compiling detailed proposal packages, we work together to provide our clients with timely, informative responses.



Travis McCoy

Marketing Coordinator Kelly Koscielny discusses proposal strategies for an upcoming pursuit with Aaron Beebe, leader of our San Diego office.

KEELUNG HARBOR SERVICE TERMINAL Port of Keelung, Taiwan

Building skin design and structural engineering for a three-level, 300-meter-long ferry terminal and an adjoining 53,000-square-meter administration building. **Client** Neil M. Denari Architects



Courtesy Neil M. Denari Architects

REGIONAL AIRPORT TERMINAL Saudi Arabia

Structural design for a complex crescent-shaped steel roof. We used advanced computational modeling to generate, analyze and document our design. **Client** Rafael Viñoly Architects

9TH AND BROADWAY San Diego, California

Structural design for a 17-story, 238,000-square-foot residential building that includes retail space, underground parking and landscaped plazas on the first, fifth and 15th floors. **Client** MVE Institutional



Thornton Tomasetti

CONFIDENTIAL DATA CENTER Colorado

Structural design for an 85,000-square-foot data center for a communications company. **Client** Gensler

SANCTUARY FOR SUFISM REORIENTED Walnut Creek, California

We provided structural design and building skin consultation for this marble-clad place of worship that features 13 domes.

Two-thirds of the building will be underground to reduce its visual impact in the surrounding residential neighborhood and reduce energy use. To help meet the owner's resiliency goals, we applied performance-based design principles to deliver an enhanced design that exceeds seismic code requirements.

We also provided technical consultation and specifications for the marble cladding and plaza paving system. Our building skin team will continue to assist our clients throughout construction.



Courtesy Philip Johnson/Alan Ritchie and Sufism Reoriented

Owner Sufism Reoriented; **Architects** Philip Johnson/Alan Ritchie and Soga & Associates; **Landscape Architect** SWA Group; **Concrete Prime** Overaa Construction

PREPARATION . . . Education & Training ■ Research & Development ■ Business Development ■ Qualifications & Proposal ■ Design Competition ■ Project Award . . .

DESIGN . . . Kick-off ■ Charrette ■ Master Planning ■ Feasibility Study ■ Project Programming ■ LEED/BREEAM Administration ■ Concept Design ■ Specialty Analysis & Modeling ■ Schematic Design ■ BIM ■ Design Development ■ Construction Documents ■ Connection Design ■ Detailing ■ Peer Review ■ Value Engineering . . .

CONSTRUCTION . . . Bidding ■ Contractor Sustainability Workshop ■ Fabrication ■ Erection & Stability Engineering ■ Groundbreaking ■ Construction Administration ■ Field Inspection ■ Topping Out ■ Interior Fit-Out ■ Commissioning ■ Opening . . .

TEACHING SUSTAINABILITY

In 2012, our staff gave numerous lectures on green design and taught sustainability courses at the University of California, Berkeley, Cornell University and in Sweden.



Anette Andersson/AA Fotograf

WTORRE MORUMBI São Paulo, Brazil

Structural steel consulting and peer review services for two linked 30-story office towers totaling 177,650 square meters. **Client** Medabil Sistemas Construtivos S/A

SHAHDAG WINTER/SUMMER RESORT Shahdag, Azerbaijan

Structural design for a mixed-use resort to include two luxury boutique hotels, 150 apartment units, retail space, restaurants and entertainment venues. **Client** Dorsky + Yue International



Courtesy Dorsky + Yue International and DIA Holding

CALIFORNIA STATE UNIVERSITY MONTEREY BAY, ACADEMIC BUILDING II Seaside, California

Structural design for a 58,000-square-foot academic center consisting of two separate structures linked by an atrium and footbridges. Moment frames with ConXtech connections resist California's high seismic loads. **Client** HMC Architects

NEW PRUDENTIAL TOWER Newark, New Jersey

Structural engineering and steel connection design services for a project that includes a 21-story office tower atop a five-level podium and a 500,000-square-foot garage. **Clients** Kohn Pederson Fox; Cives Steel Company

NATHANI HEIGHTS Mumbai, India

Structural design for a 75-story concrete residential tower. Upon completion in 2016, it will be one of the 20 tallest buildings in India. **Client** Nathani Parekh Construction Pvt. Ltd.



Courtesy Skyline Architects

ADVOCATE ILLINOIS MASONIC MEDICAL CENTER FOR ADVANCED CARE Chicago, Illinois

Structural design for a 156,000-square-foot healthcare facility. The building features a sweeping, curved glass wall that required meticulous coordination between the structure and façade. The center's foundations, columns, and lateral system were designed to support a planned six-story vertical expansion. **Client** SmithGroupJJR

UNIVERSITY TOWN CENTER MALL Sarasota, Florida

Steel connection design for an 880,000-square-foot, 3,500-ton shopping mall. **Client** Schuff Steel

PENN STATE UNIVERSITY, PEGULA ICE ARENA University Park, Pennsylvania

Structural design and construction support services for a 6,000-seat hockey arena and an adjacent 500-seat practice facility. Our advanced deliverables included a connected structural steel Tekla model. **Clients** Crawford Architects and Mortenson Construction



Thornton Tomasetti

MERCEDES-BENZ SUPERDOME SUPER BOWL XLVII CONCERT RIGGING New Orleans, Louisiana

Structural analysis of the stadium's dome to determine appropriate points from which to hang lights and equipment for the halftime show.
Client SMG

SHIMIZU HEADQUARTERS Tokyo, Japan

LEED consulting and energy modeling for a 22-story office building, the first in Japan to receive LEED Gold for New Construction certification.
Client Shimizu Corporation

HARRIS METHODIST SOUTHWEST HOSPITAL EXPANSION PROJECTS Fort Worth, Texas

Structural design for multiple projects, including a 42,000-square-foot expansion with eight new operating rooms and supporting facilities, a 200-space parking garage with a helipad, and interior renovations to a waiting room and lobby.
Client Texas Health Resources

CHICAGO MARRIOTT BALLROOM Chicago, Illinois

Structural design for a 20,000-square-foot addition atop the podium roof of an existing hotel.
Client Studio/Gang/Architects



Courtesy Studio/Gang/Architects

HOTEL AND CASINO FACADE ASSESSMENTS Atlantic City, New Jersey

Evaluation of the façades of eight buildings and recommendations for a five-year maintenance plan.
Client Caesars Entertainment Corporation

680 MADISON AVENUE

In 2010 a new owner of the former Helmsley Carlton House hotel planned to convert the 16-story structure to residential and retail space. Because modern retail space calls for high ceilings, the three lower floors will become two and existing columns will be reduced from 100 to 40.

We were hired by Titan Contracting Group as the demolition and bracing engineer. Working with the entire project team, we developed the sequence of demolition and designed temporary bracing to ensure the structure remained stable during disassembly and construction of new portions.

Architect Beyer Blinder Belle; *Demolition Contractor* Titan Contracting Group; *Construction Manager* Lend Lease; *Developer* Extell Development Company



Walter Smith

From right, Daniel Colasuonno of Titan Contracting Group; Ali Ashrafi and James Feuerborn of Thornton Tomasetti; Russel Cohen, foreman for Titan; Ryan Quinn and Ryan Maher of Lend Lease.

SPEED ART MUSEUM EXPANSION & RENOVATION Louisville, Kentucky

Building skin design and structural engineering for the renovation of multiple historic museum buildings and for a new 46,000-square-foot glass-clad North Building expansion.
Clients wHY Architecture and K. Norman Berry Associates



Courtesy wHY Architecture

USE . . . Energy Measurement & Verification ■ Tenant Alterations ■ Due Diligence ■ Vulnerability & Risk Assessment ■ Condition & Performance Evaluation ■ Sustainability Audit ■ Expansion . . .

LOSS . . . Emergency Response ■ Investigation ■ Assessment & Documentation ■ Forensic Information Modeling (FIM) ■ Litigation Support & Expert Witness . . .

RENEWAL . . . Repair ■ Upgrade & Retrofitting ■ Re-Cladding ■ Renovation ■ Adaptive Re-Use ■ LEED EB: O&M Administration ■ Historic Preservation ■ Deconstruction Engineering ■ Field Monitoring ■ Preparation for Reconstruction . . .

FEDERATION OF KOREAN INDUSTRIES HEADQUARTERS Seoul, South Korea

We provided structural services for a 245-meter tower and building skin design for the curved glass exterior of an attached conference center. The tower topped out in December, 2012.
Client Adrian Smith + Gordon Gill Architecture



Thornton Tomasetti

PORT CANAVERAL WELCOME CENTER Cape Canaveral, Florida

Structural design and construction support services, including connection design and Tekla modeling, for a seven-story welcome center featuring a sail-shaped steel canopy that extends 58 feet above a curved exterior wall.
Clients GWWO Architects and Skanska



Thornton Tomasetti

POST-SANDY INSPECTIONS New York, New York

After Sandy struck in October 2012, our Building Performance practice supported the recovery effort by inspecting 500 residences throughout the city. Accompanied by Department of Buildings (DOB) representatives, 20 Thornton Tomasetti professionals performed rapid structural assessments to determine whether homes could be reoccupied, required further evaluation and repair, or were too damaged to enter safely. Our staff followed up with detailed inspections of 400 buildings.

We helped the DOB complete its task of inspecting 80,000 residential buildings in less than a month. Though the pace was hectic – team members investigated dozens of structures a day – our staffers were proud of their work. Said Principal Glenn Thater: “We were helping the people of New York most affected by the event to know if their homes were safe.”

Client New York City Department of Buildings



Bess Adler/Thornton Tomasetti

Luis Valderruten (foreground) and Charles Passarotti assess a structure's condition.

HISTORIC ROUTE 66 CONCRETE PRESERVATION Illinois

Research for and development of a concrete treatment guide and repair/restoration specifications for the limited remaining historic concrete roadway segments along Illinois' Route 66 corridor.
Client Illinois Historic Preservation Agency



Thornton Tomasetti

RICHARD H. POFF FEDERAL BUILDING CURTAIN WALL REPLACEMENT Roanoke, Virginia

Evaluation of the deteriorating building envelope of a 1970s-era building, feasibility study of remediation options and design for curtain wall replacement.
Client TranSystems Corporation

SAN FRANCISCO CITY HALL LEED CONSULTING San Francisco, California

Sustainability consulting services to gain LEED EB: O&M certification for an historic municipal building dating from 1915. This work is part of a larger project to retrofit eight buildings – totaling 2.2 million square feet – in the city's Historic Civic District.
Client kW Engineering

NEW ZEALAND EARTHQUAKE RECOVERY SYMPOSIUM London, United Kingdom

Since shortly after the first of five major earthquakes struck New Zealand in 2010, our Property Loss Consulting professionals have been on the ground in Christchurch, evaluating structures and expediting insurance claim resolution.

In October 2012, we held a symposium that brought officials and technical experts – members of the Canterbury Earthquake Recovery Authority (CERA), its Christchurch Central Development Unit and New Zealand's Natural Hazards Research Platform (NHRP) – to London to share the latest plans, policies and technical information with representatives of the insurance community.



Vicky Dawe

Dr. Kelvin Berryman, NHRP Manager, GNS Science, and John Hare, CERA Principal Engineering Advisor and Technical Director of Holmes Consulting Group, brief a group of 250 international insurers and reinsurers on technical issues affecting post-earthquake building evaluation and disposition.

Smoothest construction, ever

Everyone smiles at a topping out party, so it's no surprise the people who worked hard on Fort Benning's new community hospital looked happy on September 14, 2012. But the respect and camaraderie evident among team members were forged long before the final beam was placed.

In fiercely competitive federal design-build procurements, efficient designs and accurate bids are crucial, so Turner Construction brought in a fabricator to manage steel costs during the design competition. Schuff Steel joined the team having already partnered with Thornton Tomasetti on many projects. They encouraged our selection as structural engineer and hired our Construction Support Services practice for connection design.

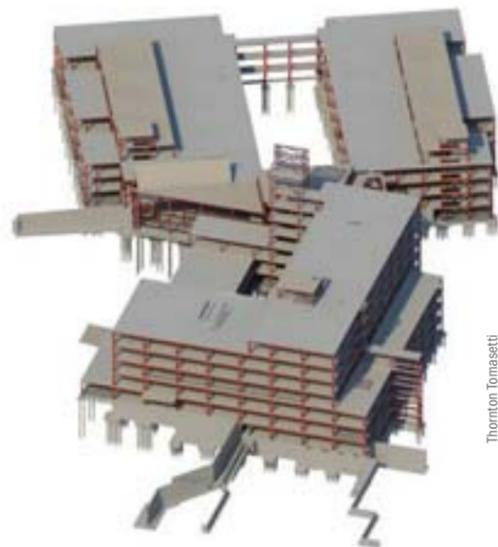
We shared our preliminary analysis models so Schuff could accurately define the tonnage of proposed designs and suggest more cost-effective alternatives early on. Strong relationships and mutual trust based on past collaborations promoted this process, which generated savings that helped win the contract.

Open communication also contributed to the project's exceptionally trouble-free construction. We met with the entire team early on to get detailed requirements from each discipline. Establishing a common understanding of project needs, processes and goals enhanced design efficiency and quality – resulting in fewer RFIs and problems in the field.

Having structural engineers and connection designers under one roof also offered efficiencies. "It had a big impact on quality," said structural project manager Zach Kates, "because it was easy to raise and resolve design issues, even minor ones." This close coordination, paired with an innovative "in-model" review procedure, made checking shop drawings much faster.

We bring our commitment to collaboration – from sharing our model to sharing a joke before a meeting – to every project. When the entire team shares this approach, the outcome is an extraordinary project, one that provides the best possible value to the community of active and retired U.S. Army personnel the new hospital will serve.

Below: Revit model of the 745,000-square-foot structure, which houses a 70-bed hospital and two clinics. An all-BIM design process required weekly submission of current models for integration into an all-discipline Navisworks model that was used for continuous constructability review. Our final structural deliverable wasn't a set of paper drawings, but a complete model.



Thornton Tomasetti

PROJECT TEAM: *Owner* U.S. Army; *Construction Manager* U.S. Army Corps of Engineers; *Design-Builder* Turner Construction Company; *Architect* Ellerbe Becket/RLF A Joint Venture (Ellerbe Becket is now AECOM); *Mechanical Engineer* TLC Engineering for Architecture; *Civil Engineer* Sain Associates; *Geotechnical Engineer* Building & Earth Sciences, Inc.; *Steel Fabricator* Schuff Steel; *Electrical Subcontractor* M.C. Dean; *Mechanical Contractor* Brown-MMC LLC

THORNTON TOMASETTI provided structural engineering and connection design services.

Project team members celebrate the new hospital's topping out. From left: Marty Miller, Turner Construction; Wayne Stocks, Thornton Tomasetti; Paul Zugates, AECOM; and Mike Pastir, Schuff Steel.



Tom England

TOPPING OUT

Martin Army Community Hospital
Fort Benning, Georgia

PROJECT TEAM: *Owner* Forest City Ratner Companies; *Architect* AECOM Ellerbe Becket; *Design Architect* SHoP; *Contractor* Hunt/Bovis JV; *Steel Fabricator* Banker Steel Company; *Steel Erector* James F. Stearns Co.

THORNTON TOMASETTI performed structural design and construction support services.



Matt Zugale

At the opening of Barclays Center, from left, Chris Sharples and Jon Mallie of SHoP, Jeff Fisher of Hunt Construction, and Mike Squarzini of Thornton Tomasetti.

Barclays Center Brooklyn, New York

Staying ahead of an evolving project vision

When the Barclays Center opened in 2012, the NBA's Brooklyn Nets became the first national-league team to call Brooklyn home since the Dodgers baseball team left for Los Angeles in 1957.

The new arena had to clear numerous hurdles, including challenges by neighborhood groups, changes in project team members, and complex underground construction adjacent to transit lines.

"A constant through the design iterations was the partnership between Thornton Tomasetti and Banker Steel," said Jeff Callow, Thornton Tomasetti's project manager for structural design. "We were team partners in the initial design versions, which enabled us to expedite the design and detailing process with each iteration."

Thornton Tomasetti provided structural design, security engineering and construction support services, including connection design and erection engineering. Our design deliverable was a partially connected Tekla model, which enabled the fabricator to submit the mill order directly from the model. "Because everyone was clear about the connection intent shown in the model," Callow said, "this eliminated another round of submittal comments and revisions. The steel detailer produced shop drawings directly from that model."

One significant structural challenge was integrating the weathered steel façade into the base structure's design, notably the 85-foot canopy. The enhanced façade design came late to the project, but thanks to efforts by Hunt Construction, Banker Steel, AECOM Ellerbe Becket and SHoP, the vision was incorporated quickly. Working closely with SHoP, we ran dozens of iterations of the façade support design, taking the architect's Catia models and using Tekla to model the support steel and coordinate skin and structure seamlessly.

"In the end," Callow said, "we had all been working on this project so long that when it opened, we all felt, 'Wow! We actually did it!'"



Thornton Tomasetti

OPENING

Celebrating success and the relationships that made it possible

In assembling their team to design Devon Energy's new headquarters complex, Hines picked tried and true consultants they trusted to work collaboratively to solve the challenges that would inevitably arise during design and construction of an 850-foot tower.

Our relationship with the development team stretches back many years. Aine Brazil, Thornton Tomasetti vice chairman, and principals Leo Galletta and Greg Bieberly have worked with Hines on a string of high-rise projects across the U.S., including 1180 Peachtree in Atlanta. That tower was also designed by architects Pickard Chilton and Kendall/Heaton Associates. This history – and the strong relationships it has fostered – brought the team together and contributed to its success.

Among the project's challenges was the support system for the tower's triple crown. While we modeled the entire project in Revit 3D, the crown's glass-clad tapering triangular facets called for a more sophisticated approach. We developed a Tekla model to clearly define the supporting steel geometry and its connections with the curtain wall. We worked closely with the contractors, steel supplier, curtain wall consultant, architects and owner to refine the details and deliver a conflict-free, constructable design for this signature aesthetic element.

As often happens, our work at the Devon Energy Center didn't end when the base building was complete. We worked with Gensler to perform structural design for the building's interiors. Then we provided guidance on the placement of monumental holiday displays throughout the complex, including a number of 1,400-pound pinecones hung from the rotunda's steel frame. We look forward to assisting Devon and Hines with any engineering needs in the building for years to come.

PROJECT TEAM: *Owner* Devon Energy Corporation; *Developer* Hines; *Design Architect* Pickard Chilton; *Architect of Record* Kendall/Heaton Associates, Inc.; *MEP/FP/T Engineer* Cosentini Associates; *Curtain Wall* Permasteelisa; *Steel Fabricator* Hirschfeld Industries; *Interiors Architect* Gensler; *General Contractor* Holder-Flintco Joint Venture

THORNTON TOMASETTI provided structural design and construction support services for the base building, and structural design for all interiors and for large-scale hanging holiday ornaments.



Detailed steel models of the crown structure, which rises 60 feet above the roof level, were critical to effective coordination between the structural steel and curtain wall.



Devon Energy's new 1.8 million-square-foot home features a 50-story office tower, the tallest in the state. A six-story glass and steel rotunda serves as the main entrance.

Thornton Tomasetti Associate Senad Ovcina snapped this photo the day of the party. An expert on the building's details after managing structural construction administration, he reviewed loads and analyzed the steel frame to identify the best places to hang these large-scale ornaments.



On November 13, 2012, Devon Energy hosted an event for project team members to celebrate a job well done. Thornton Tomasetti Principal Greg Bieberly (left) with Gerald D. Hines, founder and chairman of real estate developer Hines, and Thornton Tomasetti Principals Leo Galletta and Pat Coleman.

Devon Energy Center
Oklahoma City, Oklahoma

CELEBRATION

THORNTON TOMASETTI has provided post-Sandy assistance to owners, property managers, government and municipal agencies, tenants, residents, insurers, adjusters and legal representatives.

Nightly resource management meetings in Thornton Tomasetti's event room were held to organize the day's project progress and assign teams for new tasks. Clockwise from left foreground: Michael Maldari of Syska Hennessy and Thornton Tomasetti staff members from multiple offices: John Boyer (New York), Steve Rosenthal (Kansas City), Kiyoo Hooshiar (Washington, D.C.), Scott Nacheman (Chicago), Jason Jeffries (Kansas City, Missouri), Mark Andrews (New Jersey, seated), Chuck Passarotti (New York), Amy MacDonald (New York), and Bruce Arita (Irvine, California).



Thornton Tomasetti

Helping people move forward faster

When it swept through New York and New Jersey on October 29, 2012, CAT 90-Sandy (the ISO Property Claims Services designation for the storm) left behind massive destruction across the region. As the extent of the damage became clear, professionals in our Property Loss Consulting and Building Performance practices reported for duty. Our multidisciplinary teams of structural engineers, forensic architects and MEP engineers – experts in assessing building safety and investigating and documenting property conditions – were in the field within hours of Sandy's departure. Since then, we have been retained for more than 300 storm-related projects.

Working on behalf of insurance industry clients, our Property Loss Consulting practice has evaluated commercial high-rise buildings and construction sites in the financial district, utility infrastructure, and critical transportation systems – including tunnels and bridges – across the region.

Our Building Performance practice has worked with owners, property managers, and government agencies to conduct inspections and assessments of a variety of building types, including commercial, residential, sports and industrial facilities, in the areas affected by the storm.

To meet the high demand for multidisciplinary response teams, Thornton Tomasetti staff mobilized swiftly to support this urgent work. Professionals from eight offices volunteered for temporary transfers to New York, with assignments lasting from weeks or months to a year or more. We also engaged three consultant firms to supplement our in-house capacity. Staff from Syska Hennessy, Hardesty & Hanover and Hatzel & Buehler set up camp in our office for months after the storm. Working side-by-side with them on scope of damage assessments and documentation enabled us to respond to our clients more quickly.

In Sandy's wake, we have one goal: to speed the region's recovery by helping our clients move forward.

Jane Zellar (left) and Ali Ashrafi assess the condition of a basement in lower Manhattan. The commercial building had 80 feet of seawater filling multiple basement levels and rising four feet above its street-level plaza.



Bess Adler/Thornton Tomasetti

Responding to Sandy
New York and New Jersey

RESPONSE

Corporate Sustainability Report 2012/2013

SUPPORTING OUR 2030 COMMITMENT

We kick-started our effort to LEED certify our new San Francisco office build-out with a sustainability charrette facilitated by Lynn N. Simon, senior vice president in our Building Sustainability practice. Our goal is LEED-CI Platinum under the new LEED v.4 criteria.



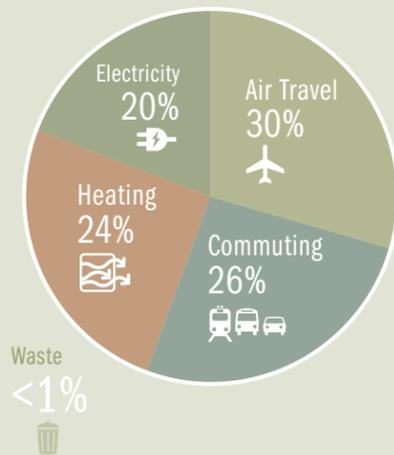
At Thornton Tomasetti we design, investigate and analyze structures and assist stakeholders in achieving their goals for efficient use of materials, energy and water. We strive to provide a workplace where the priority we give to sustainability is reflected not only in the work we do but also in our day-to-day business operations.

OPERATIONS

We are shrinking our environmental footprint by limiting our consumption of energy and other resources and reducing waste generation. We conduct regular carbon footprint assessments of our offices to measure progress. Our corporate sustainability department, established in 2012, works with "Green Champions" – dedicated employees across our firm – to implement our Sustainable Offices Policy. This year we put in place nearly 100% purchasing of green office supplies for our U.S. locations. We target LEED certification, Gold or higher, for all new office spaces. Our new Philadelphia location is registered for LEED certification, and our LEED Gold Chicago office is a 2012 winner of that city's Green Office Challenge.

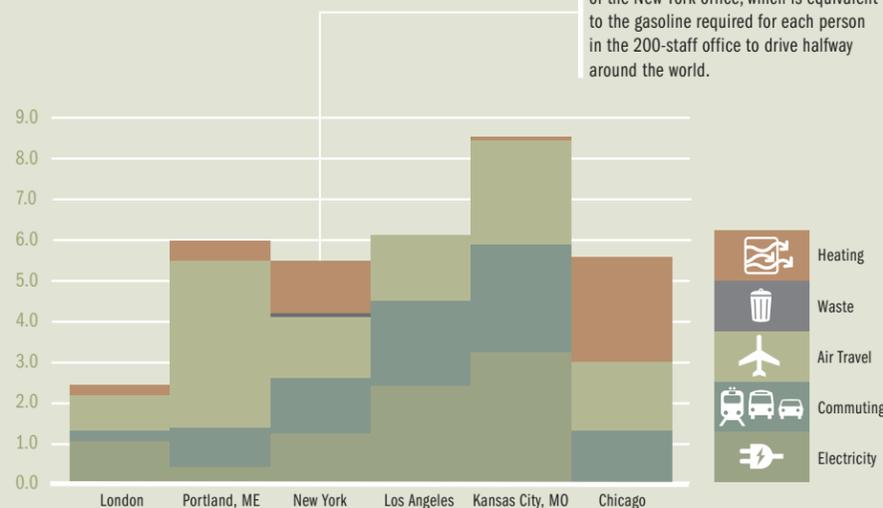
In 2012 we began measuring sustainability indicators as a baseline for carbon footprinting. In 2013, we set targets for reductions in waste and in energy and water consumption.

OPERATIONAL CONTRIBUTORS TO CARBON FOOTPRINT*



CARBON FOOTPRINT PER OFFICE*

(Tons CO₂/person, 2012)



*Data reflect baseline assessment for six offices; we continue to assess all locations. **Electricity:** Includes A/C, ventilation, lighting and plug loads. May be estimated by square footage if office is not sub-metered. Electric heating in Los Angeles and Kansas City is included under "Electricity." Chicago offsets all electricity-related emissions. **Heating:** May be estimated by square footage; one floor in the Kansas City office building is heated by natural gas, but heating there is primarily electric. Emission factors based on type of fuel. **Commuting:** Data based on employee survey, 80% response rate. **Air travel:** Based on employee expense reports. In smaller offices like Portland, the impact of one frequent traveler can be significant. **Waste:** Incomplete or estimated data; several offices do not receive a waste report. Where waste is reported or estimated through a waste study, a high recycling rate minimizes emissions.

SUSTAINABILITY RESULTS

Husson University Living Learning Center Bangor, Maine

Annual energy use savings	46% (-3,287 MMBTU)
Energy use intensity	79,500 BTU/SF
Annual energy cost savings	37% (-\$51,612)
Annual water savings	46% (-1,547 kGal)
Annual heat load reduction (space heating)	57%
Annual lighting load reduction	41%
Payback for sustainability services	1-2 years

Metrics based on energy modeling.



PRACTICE

We are committed to advancing a future in which buildings are dramatically greener and more resilient than those of today. We contribute to this transformation through our sustainability consulting services and through our efforts to reduce the environmental footprint of all our building projects. We have made progress toward goals established by the AIA 2030 Commitment, a program promoting carbon-neutral buildings as a key to achieving a sustainable environment. In 2012, we implemented a process to quantify, track and ultimately reduce the energy and carbon embodied in the structures we design.

Left: This scorecard shows the predicted results of Thornton Tomasetti's sustainability consulting. We served as the owner's sustainability representative and LEED consultant on this 61,500-square-foot classroom/dormitory project.

Below: We measure the embodied energy and carbon of our structural design projects to meet reporting requirements of the AIA 2030 Commitment and to measure progress toward our internal sustainability goals.

STRUCTURAL EMBODIED ENERGY AND CARBON IN BUILDINGS

We tally the total amount of structural materials in each project to calculate its EMBODIED ENERGY and EMBODIED CARBON.

Parameters affecting EMBODIED ENERGY and CARBON include:

Percentage of cement (the primary carbon footprint factor in concrete) replaced by supplementary cementitious materials, such as fly ash, slag or silica fume

- Structural material choices
- Recycled content
- Recycled vs raw materials
- Distances
- Energy sources
- Architectural building geometries

Raw material extraction/mining/harvest



Transportation to manufacturing plant



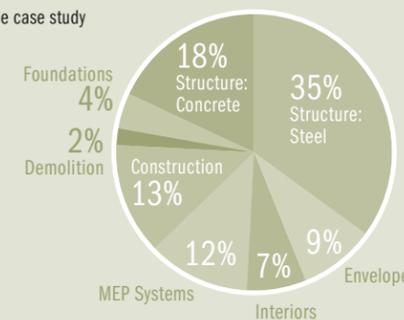
Manufacturing



For consistent comparisons across projects, the total EMBODIED ENERGY and EMBODIED CARBON for each are divided by total square feet. These per-square-foot values allow us to assess the relative embodied energy and carbon efficiencies of our projects. These are closely related to the structural design efficiencies (structural materials use per square foot), which in turn are influenced by the architectural geometry and many other factors. Our goal is to successively improve the average embodied energy and carbon efficiencies of our structural design portfolio over the coming years.

LIFE CYCLE OF EMBODIED CARBON IN A COMMERCIAL BUILDING

An sample case study



Source: Case Studies: Footprint Measurement and Reduction, dcarbon8, 2007.

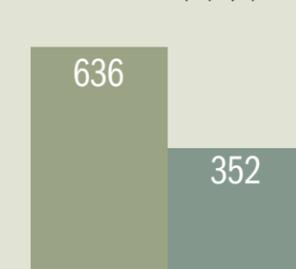
EMBODIED ENERGY AND EMBODIED CARBON EFFICIENCIES

First-year averages for projects of the Chicago and New York offices

(Chicago project values are higher because of unique aspects of a few very large projects.)

Chicago New York

EMBODIED ENERGY (MJ/sq ft)



EMBODIED CARBON (kg CO₂e/sq ft)



Social Sustainability

Part of the London Construction team: from left, Dziugas Reneckis, Teresa Farina, Laura Hannigan, Caroline Mills, Lee Earl and Michael Roberts. Their rocket-inspired entry, titled "One Small Step for Can, One Giant Leap for Cankind," won the Best Use of Labels prize.



Thornton Tomasetti takes a "triple bottom line" approach to sustainability. We measure our degree of sustainability by evaluating performance along the interrelated dimensions of profits, people and the planet. The social component of this three-legged stool includes providing charitable donations and our expertise to the communities we serve and to those that are underserved, in addition to providing fair and safe treatment of our employees. We include measurement of our performance in social sustainability in this report with the understanding that sustainability is about creating and maintaining quality of life for people.

CONSTRUCTION Our London office was one of several Thornton Tomasetti offices that took part in this nonprofit event, in which firms buy and donate canned food to local food banks and compete to design and build the most original structure out of the cans. Also in 2012, our London and New York Construction teams joined forces to build a display for the Puma shoe company, which was on display at Puma Yard in London before being donated to www.fareshare.org.uk.

CHILDREN'S MEMORIAL HOSPITAL A team from our Building Skin and Building Structure practices in Chicago volunteered their services to design and construct a fabric shade for Kevin's Garden, an 11th-floor terrace at the new Ann and Robert H. Lurie Children's Hospital of Chicago. After performing solar access analysis to determine the sun's impact on the terrace for the entire year, the team designed the fabric and support structure and assisted with erection in time for the dedication ceremony in April.



Edward Peck (left) and Alloy Kemp install the shade above Kevin's Garden, named in honor of former Chicago Mayor Richard Daley's son Kevin, who died of spina bifida in 1981.

FEEDING THE HOMELESS A team from our Kansas City office participated in a "Bring and Serve" meal effort that fed more than 200 of the city's less fortunate residents. The entire staff contributed the ingredients for a hearty breakfast: more than 60 dozen eggs, 50 pounds of mixed fruit, 15 gallons of orange juice, 70 pounds of bacon and 72 pounds of hash browns.



From front, Darren Hartman, Apeksha Mishra, Erik Messner and Swapnil Deshpande prepare food donated by the Kansas City office.

SPARK PROGRAM The Spark program provides one-on-one apprenticeships to youth in underserved communities, giving them an opportunity to learn about a selected career. This year, Lee Fritz, with help from engineers Jerome Tobolski and Chigozie Ozor, hosted Jasabella Clark, an eighth grader from Chicago's Legacy Charter School. She learned about the structural engineering profession, including the education required, basic structural engineering principles and sketching skills. They also visited the site of a Thornton Tomasetti project, the Northwestern Memorial HealthCare Outpatient Care Pavilion, where they observed caisson construction. "Participating in the Spark program was a great experience," Fritz said. "It forced me to explain the profession in readily understandable terms. And her enthusiasm for learning in general and engineering in particular was infectious."



Lee Fritz mentored eighth-grade student Jasabella Clark.

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In 2012, the Thornton Tomasetti Foundation, an independent 501(c)3 nonprofit organization, distributed \$105,000 in scholarships, charitable projects and other efforts in support of its mission. Since its inception in 2008, it has distributed more than \$400,000 in grants and scholarships to more than 20 organizations.

See more at www.ThorntonTomasettiFoundation.org.

Highlights of commitments during 2012 include:

- GeoHazards International received \$17,000 to fund student involvement with a network of earthquake engineering researchers and professionals who are working to improve the seismic performance of concrete frame structures.
- Daniel Lu, Cameron Ritchie and Barbara Simpson were named the first recipients of the Thornton Tomasetti Foundation National Scholarship. The three engineering students each received \$10,000 to pursue master's degrees in structural engineering. The recipients, graduates of Cornell University, Princeton University and the University of Kansas, respectively, intend to pursue careers in structural engineering upon completion of their degrees.
- A donation of \$15,000 was made to the Global Orphan project, in collaboration with 360 Architecture, to support the design and construction of an orphanage and school in Haiti, which will include architectural and engineering courses.
- Our annual \$25,000 partnership with Engineers Without Borders supported, in part, projects by chapters at the University of Maryland College Park and Princeton University. The Maryland chapter is designing and building a sustainable stream crossing in Addis Alem, Ethiopia, to provide 30,000 people with safe access to markets during the rainy season. The Princeton chapter is building a school library in Ashaiman in the Greater Accra region of Ghana.



Daniel Lu, Cameron Ritchie and Barbara Simpson.

VOLUNTEERISM AND CHARITABLE CONTRIBUTIONS

Thornton Tomasetti donated

4,800

employee hours to projects and charities in 2012, and

\$490,000

to charities in the same period.*



*Excludes charitable donations made to the Thornton Tomasetti Foundation.

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FOUNDING PRINCIPALS

Our practices

BUILDING STRUCTURE We collaborate with architects, owners and builders to design elegant solutions that meet the demands of challenging projects of all types and sizes – new structures, renovations and conversions. We focus on achieving the optimal balance among multiple objectives: form, function, schedule, sustainability, constructability and budget.

BUILDING PERFORMANCE Building owners and managers have ever-increasing expectations for high performance in moisture management, thermal comfort and noise control, as well as in meeting challenges such as sustainability, force protection, and pre-event and post-event evaluation. We recommend maintenance regimes, guide owners through expansions, adaptive reuses, rehabilitations and repairs, and provide expert witness representation.

BUILDING SKIN We apply our expertise in systems and materials to integrate building skin and structural designs in new buildings, renovations and re-cladding projects. We provide façade consulting and engineering services to architects, building owners and developers; perform a suite of specialty analyses that solve complex design challenges, improve constructability, maximize energy efficiency and increase security; and offer a range of construction support consulting services to assist contractors during bidding, negotiation, value engineering, post-contract review and site supervision.

PROPERTY LOSS CONSULTING We assist insurance companies, their representative attorneys and executive general adjusters in evaluating the scope and nature of losses related to natural and man-made events. We offer scope of damage determination; covered-loss assessment; cause and origin investigation; expert witness testimony; green claims consulting; and multihazard risk assessment.

CONSTRUCTION SUPPORT SERVICES Integrating design and construction teams through the use of technology helps projects move efficiently and effectively from concept to completion. We offer project delivery strategies, developing a project approach customized to each client's budgetary and scheduling priorities. Through our advanced project delivery and modeling services, we coordinate complete structures, using a single model to create design drawings and construction deliverables to the contractor ranging from fabrication-ready models to complete shop drawings and sequencing procedures and plans. We provide erection engineering, stability engineering, lift design, fixture design, and equipment and logistics planning, as well as on- and off-site field engineering support.

BUILDING SUSTAINABILITY We collaborate in the design, construction and operation of sustainable buildings to provide innovative solutions that balance economic, social and environmental factors. Our experienced team provides integrated services, including sustainable design strategies, energy modeling and building physics, green building certification, and education and training.



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