Thornton Tomasetti

Building Solutions

ANNUAL REPORT 2010/2011

Thornton Tomasetti is a leader in engineering design, investigation and analysis, serving clients worldwide on projects of all sizes and complexity. With practices in building structure, building skin, building performance, construction support services and property loss consulting, Thornton Tomasetti addresses the full life cycle of a structure. We have supported clients working in more than 40 countries, on projects ranging from the tallest buildings and longest spans to the restoration of prized historic properties. Founded in 1956, today Thornton Tomasetti is a 550-person organization of engineers and architects collaborating in five practice areas from offices across the United States and in Asia-Pacific, Europe and the Middle East.

OUR PRACTICES

Building Structure

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

Building Skin

Our expertise in skin and structural systems extends from applications of innovative materials and point-supported and cable-supported glass, which can provide signature architectural statements, to budget-friendly conventional curtain walls. The creative use of new materials and techniques, combined with our pragmatic approach of unifying structure and skin, offers our clients valuable opportunities to achieve solutions that are both striking and sustainable.

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 challenges such as sustainability, force protection, and pre- and post-event evaluation. We recommend maintenance regimes, guide owners through expansions, adaptive reuses, rehabilitations and repairs, and provide expert witness representation.

Construction Support Services

Our services include project delivery strategy, design-build, steel detailing, precast modeling, cast-in-place modeling, building façade modeling, steel connection design and construction engineering for erection engineering and site logistics, stability engineering, and equipment and logistics. Our experienced engineering professionals provide early planning for integrated project delivery (IPD) and design-build projects, as well as building information modeling (BIM) coordination and document services. Working closely with developers, construction managers, fabricators, erectors, and general and specialty contractors, we move a project efficiently through concept, delivery and final completion to project close-out.

Property Loss Consulting

We assist insurance companies and their representative attorneys and adjusters in evaluating the scope and nature of a loss related to natural and man-made events. We offer scope of damage determination, including cause and origin investigation, engineering, architectural and MEP evaluation, building code consulting and the administration of property claims related to LEED-certified properties. In many instances, as a result of our cause and origin investigation, we provide expert reports and testimony. We also provide due diligence surveys prior to a catastrophic event to help evaluate and mitigate the nature and level of risk related to specific structures or a portfolio of properties.

Cover: *Our integrated modeling expertise simplified design of the steel frame for the curves and sloping planes of Philip Johnson's Interfaith Peace Chapel at the Cathedral of Hope in Dallas, Texas. Using the architect's Rhino surface model to establish spatial constraints, we created a Tekla model that fully defines the building's structural geometry.* *See story, page 5.*

OUR PRACTICES

CONTENTS

Tom Scarangello, Dan Cuoco, and Bob DeScenza

Chairman and CEO's Message

Thomas Z. Scarangello, P.E.

May 12, 2011

As Dan Cuoco retires this month as president and chief executive officer, and Bob DeScenza takes on the role of president, I would like to recognize Dan for his 40 years of invaluable service to Thornton Tomasetti and his integral role in the seamless transition and expansion of leadership that is at the heart of our firm's success. Dan was the youngest of six principals when Thornton Tomasetti was a small, closely held firm and has served as a guiding hand and generational bridge for the growing organization we are today (page 32). During his tenure we grew from about a dozen people in one office in New York City to 550 people in 23 offices in nine countries. Dan's contributions will be felt long after he hands off his day-to-day duties. I am happy that Dan will consult with us on future projects, particularly in our building performance and property loss consulting practices.

Climbing out of the "great recession," we are honing our strategic plan by expanding our geographic reach as well as the depth and diversity of our core services. We opened offices in India, Vietnam, New Zealand and Saudi Arabia, expanded our base in the Pacific Rim and Europe, and are building momentum in Latin America. We elevated our property loss consulting and construction support services to practices this year, and added global leadership in our building skin practice. In 2011, we will grow these core services as well as build new practices that offer added value to our long-time clients and to our growing roster of new clients around the world.

Throughout our history, we have continuously evolved our organizational structure to enable clients and staff to easily take advantage of our growing services and thought leadership. The region- and practice-based structure we put in place this year further streamlines our workflow. This organization enhances our internal communications and allows us to more easily match our expertise with client needs.

I recently came across a quote that claimed that "the future has already arrived – it's just not widely distributed."

This resonated for me, since we're in the business of distributing the future. A hallmark of Thornton Tomasetti is the continuous reinvention of who we are. We aspire to be a practice that is never emergent but always emerging. Our culture is to help clients address their challenges today and be ready to help them achieve their vision for the future.

All of us at Thornton Tomasetti look forward to stepping up to these challenges with our clients and continuing to provide building solutions that succeeding generations can look back on with awe and pride.

President's Message

Robert P. DeScenza, P.E., LEED AP

I am honored to have been chosen by Thornton Tomasetti's board of directors to serve as the firm's president on the retirement of Dan Cuoco. We continue on the planned leadership transition path envisioned by Charlie Thornton and Richard Tomasetti that has kept the firm resilient. I look forward to increased responsibilities and to upholding the extraordinary standards of leadership and professionalism that Dan provided to our firm and our clients.

This year marks another transition in Thornton Tomasetti leadership: I extend my thanks to our partner Daniel Marquardt, a managing principal of the firm, who retires in May. Daniel joined the firm in 1993, when we established our Chicago office with the acquisition of Cohen Barreto Marchertas. Daniel remains a resource for us and will support the expansion of our practice into Latin America.

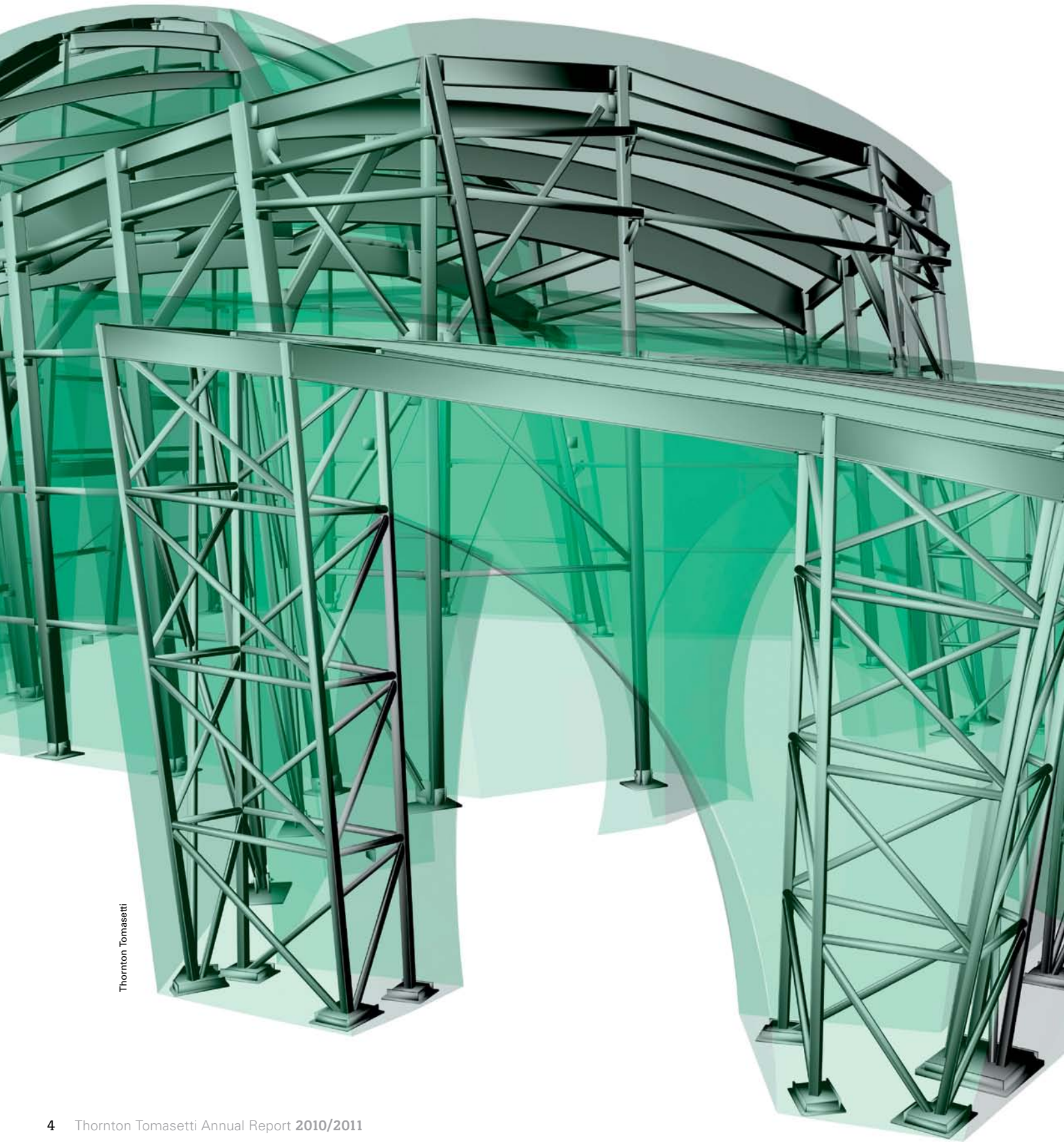
Our geographic expansion and the growing breadth of our complementary practices have increased our ability to deliver value to our clients. In 2010, our revenue from work outside North America grew by 25%, from projects such as the King Abdullah Financial District in Saudi Arabia (page 13) and Crescent Tower in Azerbaijan (page 28). The Basra Sports City main stadium in Iraq, which is nearing completion, is an example of our participation in the growth in the international sports market sector. I expect this trend to continue. We have established our five practice areas – building structure, building skin, building performance, construction support services and property loss consulting – to be synergistic and collaborative. These groups routinely share staff and jointly support our clients' needs. On many projects we are integrating services from several of our practices.

The AEC industry is changing the way buildings are conceived, built and sustained. We are at the forefront of this trend, sharing design information and evolving delivery methods that enable our clients to achieve the economies afforded by better project processes.

Supporting our sustainability objectives – in both our designs and our operations – we were the first engineering firm to sign the AIA 2030 Commitment, which promotes carbon-neutral building design. Toward this end, we are collaborating with our industry partners to quantify and reduce the embodied energy and carbon impact of our work.

Globally, we are seeing signs of gradual recovery and growing confidence, and I look forward to the next twelve months as a time of resurgence within the industry. Our goal is to continue to proactively adapt to changes in our industry and position our firm to take advantage of an improving economy. We are confident that we will emerge from the challenging business climate of 2010 with our financial strength undiminished and will capitalize on our most recent strategic investments to deliver innovative solutions to our clients on projects of every size and level of complexity.

Construction Support Services



Thornton Tomasetti

Cathedral of Hope Interfaith Peace Chapel ■ ★

Dallas, Texas

Integrating structural design with construction support and advanced delivery services provided an efficient method for making the sculptural curves and planes of this unconventional chapel, originally conceived by Philip Johnson, a reality. We created a single 3D Tekla model to define the asymmetrical structural geometry, lay out steel framing, and fully design connections. The model was then used to generate design drawings and was delivered to the steel subcontractors for use in producing shop drawings. In a building with no defined column grid, this approach was critical in anticipating clashes and avoiding field conflicts.

Design Architect: Philip Johnson/Alan Ritchie Architects
Architect of Record: Cunningham Architects
General Contractor: Constructors and Associates
Completion Date: 2010

Philip Johnson, who designed this chapel in the 1990s, said of the project: "This is a building I've waited all my life to build. It will be my memorial."

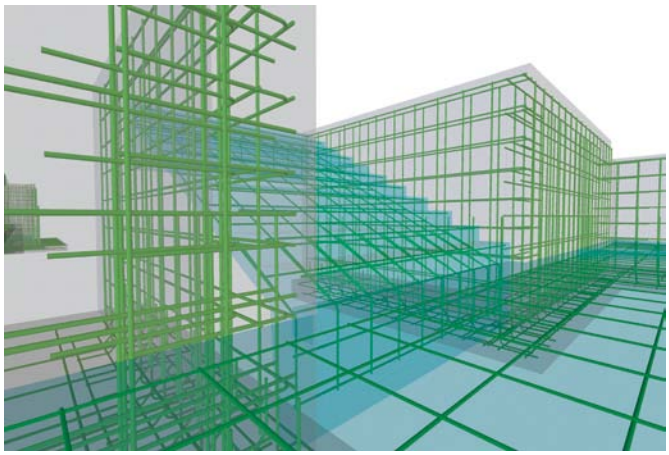
■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Putting our Faith in BIM. It's one thing for Thornton Tomasetti to claim a leadership role in the use of BIM. It's quite another when a top digital design software manufacturer points to us as an innovator on its own website. Autodesk recently interviewed Associate Suzanne Provanzana about our use of Revit Structure. Having worked with Revit on hundreds of projects, we know that BIM is good for everyone on the design team. "It allows us to catch conflicts in the model rather than the field," says Provanzana," and that's a cost and time savings for everyone."

Morgan State University
Center for the Built Environment and Infrastructure Studies ▲★

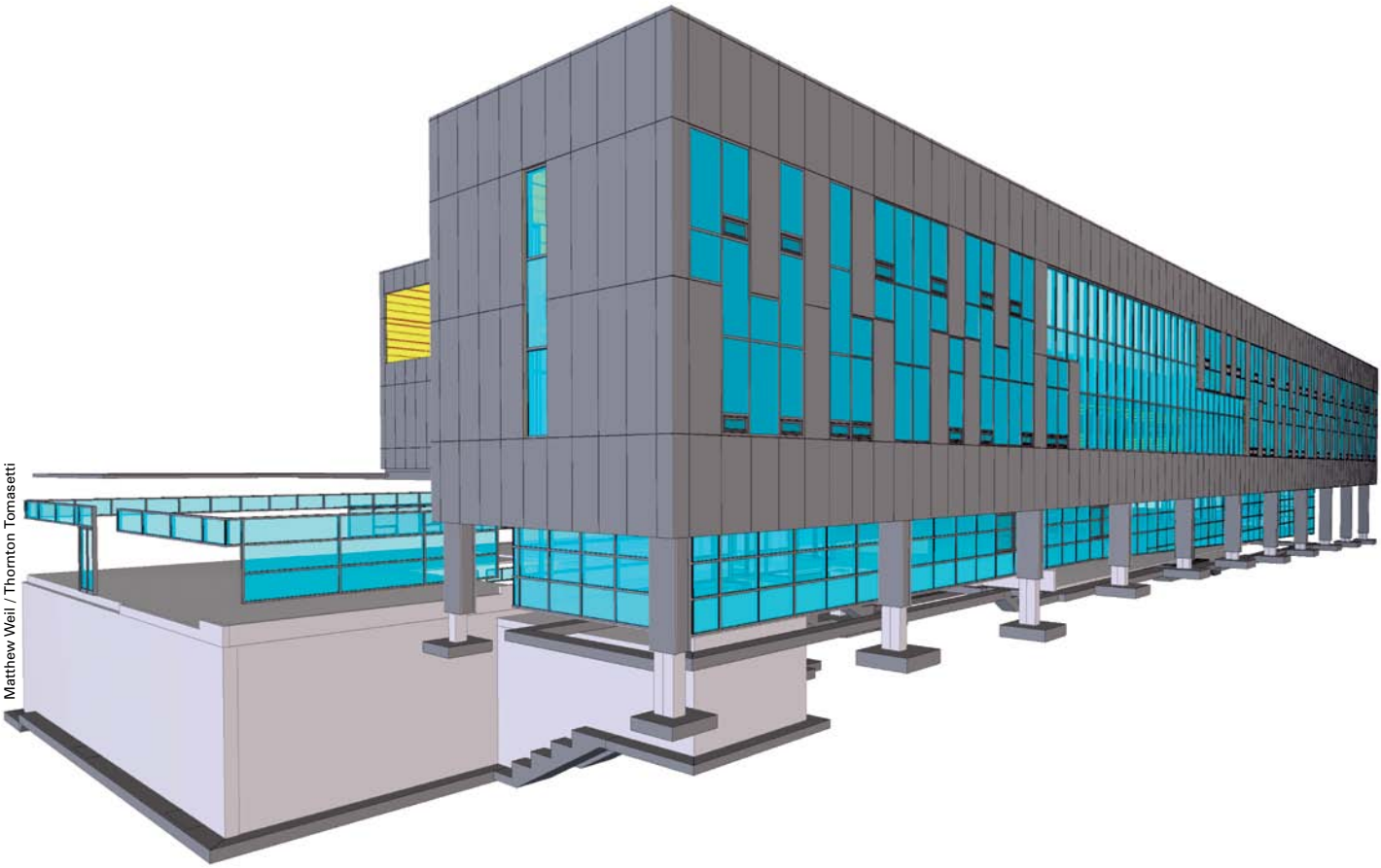
Baltimore, Maryland

We used Tekla Structures to help project contractors coordinate construction of a 124,800-square-foot academic facility. Building on our expertise designing and detailing steel with Tekla, we modeled the building's skin system and concrete structure. The 3D façade model vividly illustrates the complex design, which combines lower-level storefront and curtain wall with integrated metal panels, louvers, sun shades and operable panels. Potential field issues were identified and resolved during the parametric modeling of reinforcing bar, wire mesh and other components cast into the concrete. Models developed by each subcontractor were integrated for use in the field to clearly convey overall design intent and improve construction efficiency.



Joshua Bradshaw / Thornton Tomasetti

Façade Contractor: Zephyr Aluminum
Concrete Contractor: Schuster Concrete Construction
Construction Manager: Barton Malow
Completion Date: 2013



Matthew Weil / Thornton Tomasetti

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Archie Carpenter/UPI Photo

CONSOL Energy Center ■ ★
Pittsburgh, Pennsylvania

The new home of the NHL's Pittsburgh Penguins presented engineering challenges from the ground up. A tight urban site was complicated by an 85-foot drop in grade and subsurface conditions ranging from bedrock to soft alluvial soils. Our engineers combined multiple strategies to improve and build up the ground to support the structure. Working with the construction manager, we designed and developed a sequencing schedule for a temporary bracing and shoring system for the foundation walls. Integrating our structural design expertise with our construction support services helped the team overcome logistical difficulties and sped the arena's construction.

Owner: Sports & Exhibition Authority of Pittsburgh and Allegheny County
Architect: Populous
General Contractor: PJ Dick / Hunt Construction (joint venture)
Completion Date: 2010

Construction Support Services

ACE at New Meadlowlands. The ACE Mentor Program of New Jersey staged one of its most successful fundraising events in April at the Thornton Tomasetti-engineered New Meadowlands Stadium, home to the NFL Jets and Giants teams. The ACE program, which provides mentoring and scholarship opportunities to high school students interested in architecture, construction and engineering careers, netted $39,000 at the event. Thornton Tomasetti has been involved with the ACE Mentor Program since it was established in New York in 1994 by Founding Principal Charlie Thornton.

On the turf at the 82,500-seat New Meadowlands Stadium, Thornton Tomasetti Associate Cristina Martinez (in red) with ACE students and (back row) Giants MVP Ottis "O.J." Anderson, Gregory Murphy of Skanska, and Frank Falciani, senior construction executive for the stadium.

Property Loss Consulting

Earthquake Damage Assessment ◆

Haiti, Chile, Mexico, New Zealand

Within days of earthquakes in Haiti, Chile, Mexico and New Zealand, our engineers were on the ground, conducting damage assessments to determine the safety of damaged structures and remediation needed to return them to full function. In Haiti, we surveyed facilities related to shipping and construction that were crucial to enabling Haiti's recovery. In Chile, we evaluated more than a dozen facilities, from schools to a document storage facility to a fish processing plant, over a three-month period. Most of our work was on behalf of insurance clients to assist them in assessing damage. We also established an office in New Zealand to expedite detailed damage assessments and identify repair options.

Christchurch, New Zealand suffered some NZ$4 billion in damages during the September 4th earthquake.

This four-story concrete residential building in Maipú, Santiago province, has become a symbol of the earthquake damage there.

All photos Thornton Tomasetti

Project Director Vince Aleo, left, was part of our field crew in Port-au-Prince, Haiti.

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

A hexagonal house being assembled (bottom) and in schematic (left and below). The design allows joining HaitiSOFTHOUSES to form a contiguous unit for families and extended families.

Housing for Haiti. What kind of shelter endures earthquake and hurricanes and is affordable and simple to fabricate and build? That would be the HaitiSOFTHOUSE design, an initiative to help Haitians still homeless after the January 2010 earthquake. Vice President Rob Otani teamed with colleagues at Pratt Institute, where he is an adjunct professor of architecture, and developed a simple structural frame to meet the requirements. "There are lots of tents designed for temporary housing," he says, "but none designed as a five-year structure able to withstand a Category 3 hurricane [130-mph wind]." The HaitiSOFTHOUSE is anchored to a concrete pad and, while a hurricane may rip apart the nylon walls, the structure is intended to stay intact. "The frame may bend and yield, but it won't become a missile," Otani says.

Images courtesy SOFTHOUSEgroupLLC


Dave Weihing/Thornton Tomasetti

1 Bank of America Center ■

Charlotte, North Carolina

We provided structural engineering design for this glass-skinned, 37-story mixed-use complex, which opened in June. Features include vertically stacked, three-story sky gardens that engage every floor, an enclosed glass lobby, a 445-seat auditorium, two glass pedestrian walkways, and The Urban Garden, a transparent atrium linking the tower to the new Ritz-Carlton Hotel.

The steel-framed tower cantilevers 32 feet over an adjacent structure to optimize the office floor plate area while preserving the existing campus infrastructure. The landscaped corner sky gardens provide occupants a four-season respite from the weather while drawing natural light further into the facility through glass-clad conference rooms cantilevered into the space. LEED Gold certification is being sought.

Architect: Perkins+Will
Completion Date: 2010
Total Area: 1.4 million square feet


Dave Weihing/Thornton Tomasetti

Commercial

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Our glass staircase project team (from left), Eli Gottlieb, principal with Kai Xiong and Rebecca Jones, project engineers.

Special Structures: The Floating Glass Staircase ■

New York, New York

To create a signature feature in a law office at 11 Times Square, we worked with interior design architect Gensler to develop a minimalist tubular steel and glass staircase that appears to float in space. In this graceful structure our double cantilever design anchors the staircase at top and bottom, requiring no support under the landings. A major concern with stairs is vibration and allowance for the motion of the staircase itself as well as excitation from floors above and below. Our modeling studies allowed us to incorporate glass treads, landings and handrails as stiffening agents to minimize vibration without resorting to secondary steel elements.

Owner: Proskauer Rose
Architect: Gensler
Completion Date: 2010

Kohinoor Tower ■ ▲

Mumbai, India

We are providing structural engineering design for what will be India's tallest office building, at 60 stories, and façade design for both towers in this commercial development. The structure comprises a concrete core and post-tensioned concrete slab and spandrel beams. The tower structure and shaping were based on extensive wind-load studies. The façade consists of faceted unitized aluminum curtain walls with provisions for double façades on portions of the tower. The podium features custom point-supported glazing on specialty steel trusses. LEED India certification is being sought under the Indian Green Building Council's rating system.

Owner: Kohinoor CTNL Infrastructure
Architect: gkkworks / SSA
Completion Date: 2012

Richard Tomasetti (left) with John Cavanaugh of Amec Construction across from 130 Liberty Street on September 11, 2001.

Thornton Tomasetti Photos

130 Liberty Street Deconstruction

New York, New York

Our work on this 40-story building began on the afternoon of September 11, 2001, when Richard Tomasetti led the first engineering assessment on site and evaluated the building's stability after it was struck by debris during the World Trade Center collapse. The next day some of the 36 Thornton Tomasetti engineers who were on site conducted further evaluations of the building. We later investigated its stability following microbursts and in preparation for an impending hurricane – and finally engineered its safe and efficient deconstruction when it was deemed contaminated by dust from the Trade Center collapses. Completion of the project in 2010 has cleared the way for further renewal of New York's financial district.

Owner: Lower Manhattan Development Corp.
Completion Date: 2010

Mission Critical and Data Centers

Adaptability, integrity and speed to market are the required characteristics of these essential facilities, which we have designed for many different institutions.

The growth of the information and service economies has fueled enormous demand for mission-critical facilities that serve as information nerve centers. Financial institutions, universities, healthcare facilities, and information technology and communications companies need robust yet quickly constructed structures for data storage and processing. These facilities may serve as primary operations centers or as redundant installations for disaster recovery. We design structural systems, often enhanced to withstand seismic and wind-loads, and sometimes hardened to withstand blast. In addition to new design, our experience encompasses forensic investigation, renovation, conversion and the addition of on-site and off-site centers or stand-alone facilities.

Architect: Gensler
MEP Consultant: Syska Hennessy Group (below) and AKF Group (right)
Completion Dates: 2011 and 2012

Courtesy Gensler

We are providing structural engineering for data centers commissioned by a major university (above) and a major medical center (left), among others.

Courtesy Gensler

Rendering (below) of the Crystal Towers that form the gateway to Riyadh's main financial center.

Commercial

King Abdullah Financial District ■

Riyadh, Saudi Arabia

We are providing structural engineering for this mixed-use new development, with an overall master plan of 30 plots connected by a web of skywalks and green recreational stretches intertwining at ground level. Our design includes the main financial center of the development, with two towers (135 meters and 95 meters) linked by a 70-meter long-span elevated podium bridge. The complex will form a new hub for Middle East trade and finance.

Owners: Capital Market Authority and the Public Pensions Agency
Riyadh Investment Company
Architect: Henning Larsen Architects
Completion Date: 2012
Total Area: 160,000 square meters

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Courtesy Ayers Saint Gross

Education

University of Delaware
Interdisciplinary Science & Engineering Laboratory ■
Newark, Delaware

Construction is underway on this facility, which combines cutting-edge materials science labs with flexible classroom and instructional lab space that will define the University of Delaware as a leading research institution. Our engineers worked closely with the design team to optimize structural systems for vibration control. When we recommended concrete frames and slabs to provide the best performance for this project, the architect and construction manager worked with us to educate the owner about the advantages of this system over lower cost options. Trust and collaboration among project team members helped the university get the best value for its money.

Architect: Ayers Saint Gross
General Contractor: Whiting-Turner Contracting

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Westmoor High School, Giammona Natatorium

Daly City, California

Minimizing long-term maintenance was a priority for the owners of this new indoor pool. Our engineers designed the entire structure using concrete, masonry and glass, eliminating metal components that corrode easily. This approach left the structure exposed, requiring close collaboration with the architects on details to meet the project's aesthetic goals. We also worked with California's Division of the State Architect (DSA) to gain product approval for the use of sound-absorbing CMU block. Our long-standing relationships within the DSA facilitated a regulatory review process that permitted the material's first use in a San Francisco Bay Area school.

Architect: AEDIS Architecture & Planning
General Contractor: Gonsalves & Stronck Construction Company
Completion Date: 2010

3D Underwater Kinetic Design. When she is not practicing as a senior designer in our Irvine, California office, Jane Pereverzoff (back row, right) gets in touch with her inner fish. This year she was cast in the synchronized swim group performing in the 2010 tour video for the rock band Phish. She has a long list of swim credits: as a baby, she swam before she walked (her parents lived on a boat in the Caribbean); from ages 8 to 18 she competed in synchronized swimming at state and national levels; and in September she completed her first one-mile swim in the Pacific as part of an Olympic Triathalon. So the Phish video was a natural – for a fish.

Kevin Mastman/Courtesy Angela Schaub

Dan Palotas/Whiting-Turner Contracting

Pennsylvania State University, Millennium Science Complex

University Park, Pennsylvania

Creative structural design successfully balances the competing demands of form, function and efficiency at Penn State's signature science building. The new home of the Life Science and Material Science programs has two four-story wings that meet over a dramatic entrance plaza. Each wing cantilevers 154 feet over the plaza, supported by two tapered steel trusses on each side. Splitting the load minimized the steel tonnage needed, reducing construction costs. Wind tunnel tests identified the possible vibration effects of multi-directional wind loads on the cantilever – a critical factor in a laboratory building with sensitive equipment. A nanotech lab requires even stricter motion control: we designed a structurally isolated area that "floats" within the building to eliminate vibration from surrounding effects.

Architect: Rafael Viñoly Architects
General Contractor: Whiting-Turner Contracting
Completion Date: 2011

Back to School. Principal Kyle Krall, who directs our United Arab Emirates operations, returned to his alma mater, Penn State, to receive the 2010 World-Class Engineer Alumni Award. While on campus, he met with seniors working on a BIM study of the New York Times Building, a project Krall managed. "It was nice to be able to talk to the students," he says. "I told them to go out and see the world and to take on new responsibilities because you never know what lies around the corner."

Courtesy Penn State University

George Mason University, The Mason Inn Conference Center and Hotel ■

Fairfax, Virginia

At 179,000 square feet, this facility involves a lot of complexity for its size. With a post-tensioned podium supporting a seven-story hotel tower constructed using a proprietary light-gauge bearing wall system, a long-span steel-framed conference center built atop a reinforced concrete parking garage, and a concrete-framed wing housing a kitchen and other support operations, the project runs the gamut of structural systems. The various components required special attention to detailing where construction types interfaced. During construction, our team took the initiative to resolve on-site issues directly with the contractor to keep the project on schedule. As Senior Engineer Lisa Chong says: "We did our best to provide old-school customer service, to treat our clients the way we'd want to be treated ourselves."

Master Developer: Concord Eastridge
Architect: Gensler
General Contractor: Balfour Beatty Construction
Completion Date: 2010

Courtesy Vicki Q. Galindo / The Mason Inn

Education

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Courtesy Interactive Design | Eight Architects and GSA

A. J. Celebrezze Federal Building Façade Overclad

Cleveland, Ohio

How do you improve security and increase energy efficiency in a 32-story office building without interrupting the operations of tenants inside? Our engineers designed the support structure for a new blast-resistant skin to be installed outside the existing façade. This double wall system will allow work to be completed without moving occupants – a must, since a lack of available swing space doesn't allow for phasing. The new façade will also create a layer of air between the new and old skins that will act as insulation, reducing heating and cooling requirements.

Architect: Interactive Design | Eight Architects
Completion Date: 2013

Government

U.S. Department of the Interior Headquarters Building, Cafeteria Renovation

Washington, D.C.

A fully renovated cafeteria reopened in 2010 as part of a phased modernization of this 1936 federal building. The updated design called for new openings in terra cotta walls that support historic murals. Steel framing, inserted through pockets cut from behind, now carries the load over open spans below. We provided the contractor with step-by-step guidelines for demolition and installation to guard against damage to the murals. Our detailed plan and extensive on-site presence were critical to the successful preservation of this irreplaceable artwork.

Architect: Shalom Baranes Associates
General Contractor: Grunley Construction
Completion Date: 2010

New glass partitions beneath *Harvest Dance*, a mural painted by James Auchiah, also known as Tse Koy Ate (Big Bow), in 1939. The headquarters building is listed on the National Register of Historic Places.

Courtesy GSA

Ed Eckstein

Ed Eckstein

Roosevelt Island Tramway Rehabilitation ●★

New York, New York

As engineer of the original 1974 facility, Thornton Tomasetti was tapped to assist in a comprehensive rehabilitation of this aerial commuter system. Our team, along with strategic partners Hardesty and Hanover, conducted a multidisciplinary evaluation; we then designed significant structural alterations to two stations and modifications to three support towers to accommodate a new tramway system. We also provided connection design services for three tower-head replacement structures. Our expertise in multiple practice areas allowed us to provide seamless delivery of evaluation, design and construction support services.

Design-Build Contractor: Poma
Completion Date: 2010

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Thornton Tomasetti

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Smithsonian Environmental Research Center
Contee Farm Mansion Stabilization

Edgewater, Maryland

When the Smithsonian acquired land occupied by the ruins of an 18th-century mansion, we designed both emergency bracing and permanent support to preserve what remains of this historically significant property (left and below). As working nearby was risky, the temporary system had to allow for installation from a safe distance. Braced frames of engineered lumber stabilized by ballasted counterweights now protect the ruins without damaging an archaeologically rich site. A permanent bracing system of slender steel struts with tube-steel bracing will simulate the mansion's original profile. We designed the structure to allow for installation of the permanent bracing before removal of the temporary system, so that the ruins will never be unprotected.

Architect: GWWO, Inc./Architects
General Contractor: Worcester Eisenbrandt

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Government

ASCE Honorees. Three rising young stars recently received honors from the American Society of Civil Engineers (ASCE) and the American Council of Engineering Companies (ACEC). Project Engineer John Barry and Senior Engineer Alexandra Iannitelli were named 2010 New Faces of Civil Engineering by ASCE, which recognized 10 engineers under 30 for their professional accomplishments and community contributions. John Peronto, a Senior Project Engineer, was an ACEC 2010 Young Professional of the Year. The three share a dedication to working collaboratively in solving engineering challenges and to taking their technical expertise into the wider world through teaching and volunteering.

John Peronto (left), Alexandra Iannitelli and John Barry

Ed Eckstein

The University of Chicago Medical Center, New Hospital Pavilion ■ ★

Chicago, Illinois

Specialty care, with a focus on cancer and advanced surgical treatments, will be provided in this12-story, one-million square foot hospital for which we provided structural engineering, connection design and construction support services. Designed for future flexibility, the project's innovative building approach allows for easy reconfiguration for a wide range of purposes, from in-patient beds to surgical rooms, without changing the basic frame of the building. We worked closely with the project team to meet vibration criteria for MRI and CT equipment on elevated floors.

Architect of Record: Rafael Viñoly Architects
Healthcare Planner: Cannon Design
Completion Date: 2012

Washington Hospital Critical Care and Emergency Department Building ■

Fremont, California

Located just a few hundred yards from the Hayward Fault in Northern California, this new facility is the first hospital in California to use triple pendulum base isolation to dampen seismic forces. It partially replaces an existing hospital that under new seismic safety requirements must be taken out of service by 2030. Our structural design for the three-story, 300,000-square-foot building comprises a base-isolated steel moment frame on a base-isolation system. The facility significantly expands and upgrades the hospital's critical care unit and emergency room and houses several catheterization laboratories, an intensive care unit, a critical care unit and an emergency department.

Architect: Fong & Chan Architects
Completion Date: 2015

Healthcare

Rush University Medical Center Transformation Program ■

Chicago, Illinois

We are the structural engineer for a multi-year redevelopment plan that is reorganizing an entire campus. The project includes a new 845,000-square-foot, 14-story hospital addition, a new underground loading dock, utility tunnels, a pedestrian bridge, a central utility plant and a medical office building. A new entry pavilion, which serves as the main entrance to both the new addition and the existing hospital, features a three-story lobby area with an open-air terrarium that rises 40 feet to a rooftop garden. The transformation program is also focused on environmental efficiency and responsiveness and is seeking LEED Gold certification.

Architect: Perkins+Will
Completion Date: 2012

Thornton Tomasetti

Jack Lesniak/Perkins + Will

Our Revit model (left) and the hospital under construction.

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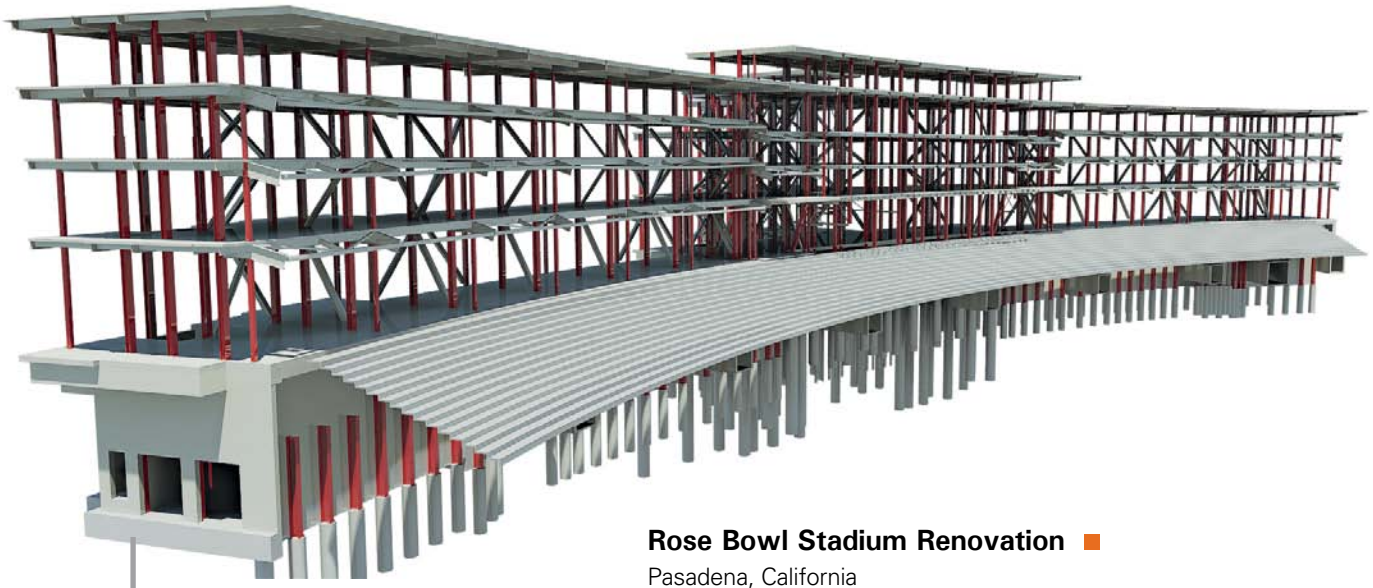
Scott Rasmussen

Building a Bridge to Healthy Families. Some people hit the beach for a summer vacation, while others prefer the countryside. Project Engineer Ryan Hopeman traveled to Honduras to help build a bridge. A member of Engineers Without Borders, Hopeman spent 10 days in a mountain village, working to span the Yure River with a 120-foot vehicle bridge leading to 110 acres of level ground suitable for farming. "Many villagers are barely able to raise enough food to feed their families," says Hopeman, "access to the farmland will allow them to grow enough for themselves and to sell to others."

Sports/Cultural



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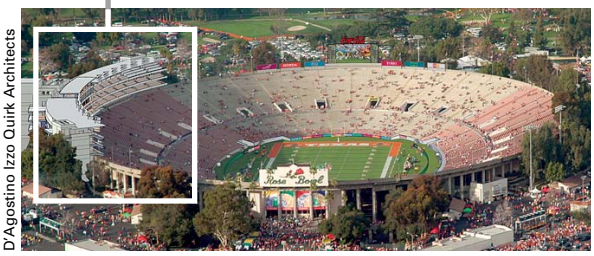


D'Agostino Izzo Quirk Architects

Rose Bowl Stadium Renovation ■

Pasadena, California

Teamwork and design flexibility are paying dividends during the upgrade of this 88-year-old historic stadium. The initial configuration of the press box expansion – the first of three renovation projects – required a complex and expensive piled foundation scheme. Working closely with the construction manager and architect, we designed an alternative system that increases the depth of excavation to permit the use of mat foundations that integrate the temporary shoring piles into the permanent structure. The revised design isn't just more cost-effective and constructible: it adds another entire level to the concourse, expanding program space without cost increases or schedule delays.

Owner: Rose Bowl Operating Company
Architect: D'Agostino Izzo Quirk Architects
General Contractor: Bernards and Barton Malow
Completion Date: 2014

AIA 2030 Commitment Task Force. Director of Sustainability Wolfgang Werner (center), Vice President Rob Otani and Project Engineer Rebecca Jones are leading the effort to reduce the environmental impact of our projects and operations. Thornton Tomasetti was the first non-architecture firm to join the AIA 2030 Commitment, a pledge to reduce energy consumption in the built environment. Many of our clients – including Barclays Center architect Ellerbe Becket – are also program participants. "As sustainability-minded engineers," says Werner, "we can partner with architects as they work toward designing carbon neutral buildings."

Our AIA 2030 Commitment task force on the site of Barclays Center in Brooklyn, N.Y., an arena that is pursuing LEED Silver certification.

Ed Eckstein

Courtesy Parsons Brinckerhoff


Courtesy Aedas

Vista Xchange
Integrated Civic and Cultural Hub ■

Singapore

With construction well underway, our structural design for this dynamic development is fast becoming a reality. The 54,000-square-meter complex combines a 5,000-seat auditorium with meeting and event rooms, amphitheaters, shops and restaurants. The centerpiece of the unconventional building is the "floating" theater and lobby atrium, supported all around by four-story-deep wall trusses that rest on elegant sloping columns. Working with local Parsons Brinckerhoff engineers, we provided initial design for the project, performing extensive vibration analysis and devising the structural and lateral support systems that make the building's unique geometry possible.

Owner: Rock Productions and CapitaLand
Architect: Aedas
Engineer of Record: Parsons Brinckerhoff
General Contractor: Hexacon Construction
Completion Date: 2011

■ Building Structure | ▲ Building Skin | ● Building Performance | ★ Construction Support Services | ◆ Property Loss Consulting

Qatar National Convention Centre ■

Doha, Qatar

Construction is nearing completion on this 76,000-square-meter convention center, the core of Qatar's new Education City development. The design-build project, for which LEED Gold certification is being sought, consists of a main building with meeting, exhibition and performance spaces and three connected podium structures topped by roof gardens containing a full meter of soil. The center features an acoustically isolated auditorium with an extra-robust fly loft structure – nicknamed the "flight tower" by the engineers – that supports cables and equipment that can lift the entire stage.

Owner: Qatar Foundation
Architect: Yamasaki Architects
General Contractor: Baytur Construction and Contracting
Completion Date: 2011


Thornton Tomasetti

Residential

New Ring of Moscow Residential Complex

Moscow, Russia

In the quest to replace Stalin-era Soviet housing with modern facilities, the city of Moscow is undertaking a 20-year plan to rebuild more than 60 residential complexes in a ring 10 kilometers from the heart of the city. This year, we completed structural engineering services through working drawings for two of these complexes, Lublino and Mar'ino. The main construction material is high-strength reinforced concrete. Our use of 3D Advance Concrete modeling software, a program designed specifically for the preparation of concrete shop drawings, both increases the accuracy of the working documents and shortens the time to delivery.

Developer: Moscapstroy Construction
Design Architect: Swanke Hayden Connell Architects
General Designer: Interproject
Completion Date: 2012
Total Area: 3.2 million square feet

Courtesy Swanke Hayden Connell Architects

Cracks in the cladding before repair (below left) and undergoing repair (below right). New sheathing (yellow) encapsulates the damage and is then coated with an air/moisture barrier (gold), covered with an insulation layer (white) and finally coated to match the original stucco texture and color.

All photos Jan Kalas/Thornton Tomasetti

Vi at Aventura ●

Aventura, Florida

We assisted the owner of this senior living community in evaluating and repairing cracks and delamination of the stucco cladding. Large areas of the community buildings were affected, including the two 23-story apartment towers and the amenities building. We designed a structural sheathing system that encapsulates the damaged stucco with cladding, using an exterior insulation and finish system (EIFS) to replicate the original design. We also provided expert consultation to the owner's counsel related to the building skin failure litigation.

Owner/Client: Vi (formerly Classic Residence by Hyatt)
Completion Date: 2010

■ Building Structure	▲ Building Skin	● Building Performance	★ Construction Support Services	◆ Property Loss Consulting

Special Structures for Sculptures. When an installation of 31 Antony Gormley sculptures visited New York in March, the sponsoring organization, the Madison Square Park Conservancy, turned to us for creative ways to realize the artist's desire that 27 of the sculptures appear to perch on the rooftops of buildings around the park.

Developing innovative and efficient supports for the sculptures was a challenge in engineering as well as logistics. We designed support bases to avoid roofing penetrations amid complex constraints posed by early 20th-century parapets and many rooftop equipment conflicts. Associate Kirstin Nicholson and Project Engineer John Barry developed the special structure designs, and Barry also supervised the complex installations. The exhibition, which ran from March 26 to August 15, was viewed by an estimated 600,000 people.

James Ewing

Residential

Four Seasons Abu Dhabi at Sowwah Island ■ ▲

Abu Dhabi, United Arab Emirates

We provided structural, civil and façade engineering for this mixed-use development in a new financial district on Sowwah Island. The project comprises a 34-story hotel and apartment building with 200 hotel rooms and 120 apartments. Core size is limited by the slender profile of the tower, so our design strategy involved coupling the cores with embedded steel link beams and specially designed slab elements to increase its utility and efficiency. Our Building Skin practice provided façade detailing, structural design of custom steel, aluminum and glass elements, as well as construction and testing methods. External shading in aluminum and structural glass mitigates the effects of solar radiation.

Owner: Mubadala
Client/Architect: PLP Architecture
Completion Date: 2013
Total Area: Tower: 40,000 square meters
Podium: 30,000 square meters

Crescent Tower ■ ▲

Baku, Azerbaijan

We provided structural and parametric skin design services through design development for these iconic residential towers on a hillside overlooking the Caspian Sea (right). To resist extreme winds (Baku means "windy city") and severe seismic forces, we designed a dual system: a special reinforced concrete (RC) shear wall and a special RC moment frame. The structural floor system combines a two-way 200-millimeter slab and RC beams. The curved towers have special requirements for façade panelization that allows the use of flat quadrangle unitized façade systems. Parametric modeling allowed us to determine the optimal façade unit geometry, thereby reducing fabrication and erection costs.

Owner: Crescent
Client/Architect: Heerim Architects & Planners
Completion Date: 2012
Total Area: Tower 1 – 46 stories, 56,522 square meters
Tower 2 – 37 stories, 45,464 square meters

Outstanding Asian American. Vice Chairman Dennis Poon was named one of the 2010 Outstanding 50 Asian Americans for his contributions to the design of tall and complex structures. The award was given in June by the Asian American Business Development Center in recognition of the achievements of Asian American entrepreneurs and business professionals in many fields, including architecture, technology, finance, law and healthcare.

Dennis Poon (left), with Luo Qun, Deputy Mayor of Nanjing, China.


Courtesy Heerim Architects & Planners
Building Structure
Building Skin
Building Performance
Construction Support Services
Property Loss Consulting

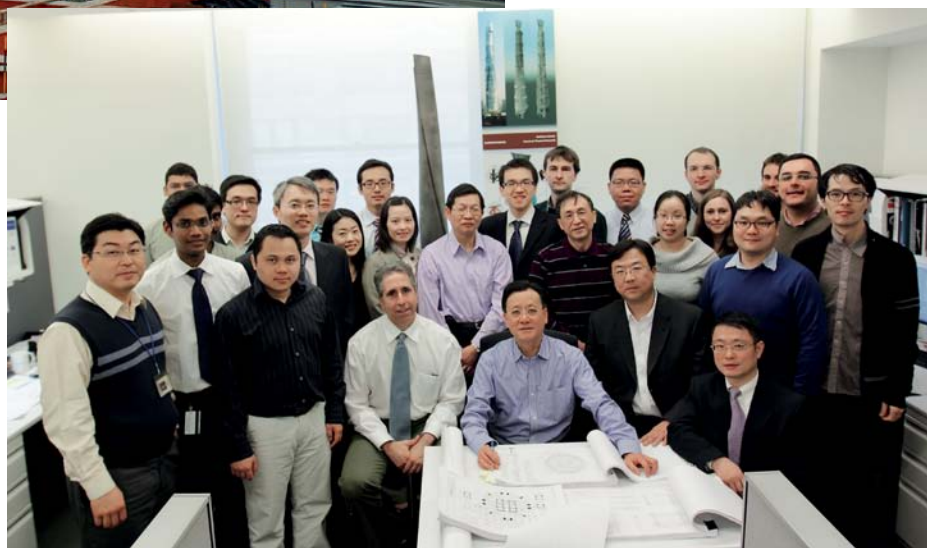
Project Update

Shanghai Tower

Shanghai, China

Our 2008 annual report described our innovative design for the 124-story Shanghai Tower, which broke ground that year. By the end of 2010, the concrete core had begun to rise. Multiple cranes are helping accelerate construction, which averages two floors per week. The tower is on schedule for completion in 2014, when it will become the tallest in China.

Courtesy Howe Kaen Foong



Vice Chairman Dennis Poon (center), with the Thornton Tomasetti engineering team on the Shanghai Tower project.

Thornton Tomasetti Foundation

www.ThorntonTomasettiFoundation.org

Thornton Tomasetti Foundation Mission

Fund fellowships, scholarships and internships for undergraduate students, and those planning to pursue graduate studies in building engineering, design or technology.

Provide financial support for individuals and organizations pursuing philanthropic activities related to building engineering, design or technology.

Foundation Officers

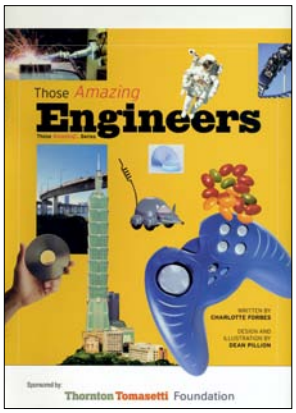
Richard L. Tomasetti, chairman
Joel S. Weinstein, vice chairman
Daniel A. Cuoco, secretary
Jeffrey R. Schreier, treasurer

In 2010, the Thornton Tomasetti Foundation distributed $85,500 in scholarships, charitable design projects, and other efforts in support of its mission.

"Despite the downturn in construction," said Richard Tomasetti, Foundation chairman, "the continued generous support of our donors has made possible a year of excellent programs that advance the future of aspiring design professionals and help those most in need."

Highlights of commitments in 2010 include:

- Support of Engineers Without Borders projects for health clinics in Cameroon and Honduras.
- Sponsorship of the Penn State University senior thesis program, and scholarships for three college students who plan to pursue careers in the design profession: two NYU-Poly undergraduates, Andrew Bowen and Jack Daoud, and Lehigh student Eddie Guerra Fuentes.
- Support for the Urban Assembly family of innovative, themed public schools, many of which support underserved students pursuing careers in the AEC industry.
- Grant to launch the Adopt-a-School program to distribute *Those Amazing Engineers* (below left) nationally to more than 18,000 middle school students.
- We began support this year for the nonprofit organization GeoHazards International, for its efforts in the seismic retrofit of education and healthcare facilities in Peru.



Foundation board member Dan Cuoco (left), with Eddie Guerra Fuentes of Lehigh University.

Courtesy GeoHazards International

Scholarship recipients Jack Daoud (left), and Andrew Bowen with Richard Tomasetti.

Our support of GeoHazards International (GHI) helps underwrite research like this shake table study of adobe construction, observed by (from left), Verónica Cedillos, GHI project manager; Eduardo Miranda, professor of civil engineering, Stanford University; and Álavaro Rubiños, civil engineering graduate student at Pontificia Universidad Católica del Perú.

Daniel A. Cuoco, P.E., F. ASCE

On my first day with the firm in 1971, the 15 engineers who would later become Thornton Tomasetti worked out of a small office in midtown Manhattan. Most of our projects were in the metropolitan New York area and we were gathering steam as the little shop that could – that could do challenging design work and also investigate a collapsed or damaged structure to determine the cause of failure. What our band of engineers lacked in size and breadth we made up for in intelligence and enterprise.

The ambition that I felt on that day I still feel today in any Thornton Tomasetti office – that desire to reach for the next challenge, to think not one or two but three or four steps ahead, and to belong to a partnership that cultivates and rewards the best ideas. Although we have grown to 550 people in 23 offices, those qualities remain in our gene code.

As the firm grew, I was honored to become the youngest of six owners in 1983, and the oldest of the group of managing principals now leading the firm. I therefore served as the bridge between the previous generation and the generation ascending to leadership. There was then – as there is now – a continuing discussion about leadership succession, and we are fortunate that our current managing principals have an average tenure of 30 years with the firm, and our senior principals have an average tenure of 16 years with the firm. This kind of stability and institutional knowledge are rare in any industry, and gives us a common understanding and ability to efficiently manage our firm for future growth.

Today Thornton Tomasetti reaches far beyond midtown Manhattan. Among us are native speakers of some 40 languages and graduates of the world's top engineering programs. We serve more market sectors with more practices, and work in more geographies, than ever before. Yet we have remained true to our core talents: our new ventures have always been complementary fits with our established offerings, never overextensions. We have not grown as fast as some firms, but we have grown intelligently, and in this latest downturn, we remain profitable when many others have not.

Theodore D. Sherman/ENR

In addition to Charlie Thornton and Richard Tomasetti, the firm had four other owners in 1983: (from left) Joe Zuliani, Abe Gutman, Dan Cuoco and Jay Prasad.

Ed Eckstein

As I advise young, aspiring design professionals: be sure to connect with a firm that plans for the future and gives you the opportunity to invent that future. I saw that attitude at Thornton Tomasetti 40 years ago, and I still see it today as what enables us to anticipate the evolving demands of our clients.

This firm is unique in our industry not only because we are able to deliver world-class services in such diverse practice areas, but because of our deep leadership bench and the exceptional abilities and devotion of our current and future leaders. As I retire, it is gratifying to know that the firm is in good hands, with leadership in place that is the best in our business.

It's hard to believe that 40 years have gone by so quickly – pretty scary, actually. But not surprising, when you consider that I have had the privilege of working on so many challenging projects with an amazing group of professionals. It was a great gift to have spent a major part of my life with colleagues and friends who are immensely talented, and to see firsthand the professional growth and development of our next generation of leaders.

It has truly been a wonderful ride.

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Dan Cuoco (right), with Manny Velivasakis during the 1989 investigation of a scaffold collapse at 4 Times Square, New York City.

Services

Building Structure
- Buildings
- Supertall Buildings
- Long-Span Structures
- Special Structures
- Specialty Analysis
- Project Delivery

Building Skin
- Building Skin
- Specialty Skin Analysis
- Skin Systems
- Special Skin Structures
- Innovative Skin Materials
- Skin Sustainability

Building Performance
- Forensics
- Emergency Response
- Building Envelope
- Building Assessment & Renovation
- Seismic Assessment & Rehabilitation
- Sustainability

Property Loss Consulting
- Damage Determination
- Cause & Origin Services
- Building Code Evaluation
- Sustainability Claims
- Risk Assessment

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- Precast Modeling
- Cast-in-Place Modeling
- Building Façade Modeling
- Steel Connection Design
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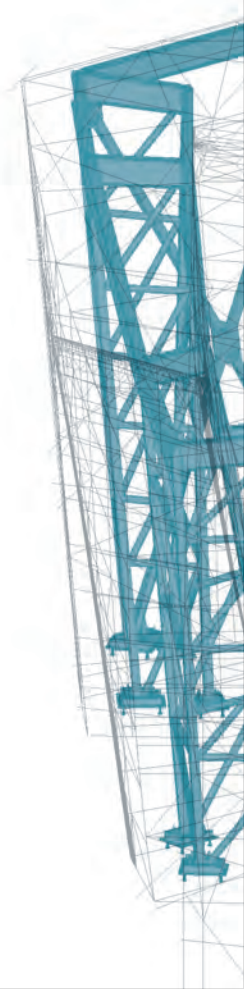

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