

# WASHINGTON CONTRACTOR



THE OFFICIAL PUBLICATION OF THE AGC OF METROPOLITAN WASHINGTON DC

Fall 2008



## Project Spotlight Phelps Architecture, Construction and Engineering High School

AGC of DC Pioneers Partnership with DCPS on the  
1st Comprehensive Construction Industry High School



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Washington Contractor  
 Fall 2008



# TABLE OF CONTENTS

**2** President's Message

**3** Chapter News



**8** Project Spotlight:  
 Phelps Architecture, Construction and  
 Engineering High School



**16** Supply Chain Management: Going  
 Paperless & Closer to Automation

**22** Index of Advertisers



on the cover:

Principal Johnson & Mayor Fenty at the PACE Phelps High School ribbon cutting.





## Message from the PRESIDENT



Depending on perspective, one year can be viewed as a very long time period or the blink of an eye. As I prepared my first message as the new AGC of DC President, I concluded that this year will probably feel more like a blink than a prolonged time period. So, that means it's absolutely critical that we stay focused and energized to achieve our ambitious goals.

At the Strategic Planning Meeting that the AGC of DC board held this past July, we discussed specific challenges that AGC of DC faces as we act boldly on being "The Essential Tool for DC Contractors." Our talented members, dedicated board, and efficient staff are resolved to lead AGC of DC to new heights. There aren't many reasons why we cannot enjoy even greater success than we've had in the past.

At the July session, we discussed the prospect of recruiting more medium-sized GCs to our association, as

well as the necessity for increased participation of our entry to mid-level professionals within the AGC. We tried to be realistic in our projections for membership and financial growth - all the while acknowledging that growth must be part of the equation for the 2008-2009 goals.

Among our broad objectives for the next two years are the following: enhancing interaction with an enlarged member base; emphasizing more communication with members and potential members; increasing interaction with DC government officials; continuing to strengthen our Young Constructors' Forum; and developing programs, education, and training directed specifically for small and medium-sized companies.

This year we can anticipate the beginnings of a fully-integrated design and construction DC public high school program at Phelps Architecture, Construction and Engineering High School. Another

exciting thing is the newly formatted awards program. AGC of DC will be awarding 3 environmental sustainability awards, and also recognizing project architects for Architect of the Year at the 8th Annual Washington Contractor Awards. The board has voted this year to award the US Army Corps of Engineers, Baltimore District as the Owner of the Year at the event. I look forward to seeing members at our celebrated Washington Contractor Awards on October 7th at The Newseum.

I hope members will join me in making a commitment to bring AGC of DC to its full potential, and remain active participants in our upcoming year. I enthusiastically look forward to serving as President and working with members to transform our vision into reality.

### **Nigel Parkinson**

AGC of DC President  
Parkinson Construction Co., Inc.

Schnabel



## CHAPTER NEWS

### AGC of Metropolitan Washington DC

#### *A Tribute to a Dear Industry Friend, Benny Pasquariello:*

Benny was born in Hartford, Connecticut on July 28, 1935 and throughout his very happy and fruitful life, he contributed his charm, wit and experience to those in our construction industry here in DC working at George Hyman, Sigal Construction Corp., and Turner Construction Company during his time. After his retirement last year, he continued to work as a consultant to many including Gilford Construction Corporation. He served as a President of AGC of DC back in 1978 and was crowned King of the 2006 Builders' Ball because of his great fundraising ability and popularity among his peers. His family, motorcycle, and friends filled his life and we will all miss him. He died on August 25, 2008.

*Alison Lyons from DPR Construction said that Benny will always be remembered for his can do approach to everything in his life, and as a character that moved at the speed of light and touched many people's lives.*



### Meet our New Board Member, Steve Speer

Steve Speer of Hensel Phelps Construction Co. joined the AGC of DC board this year, but he's been associated with the AGC his entire career. And now he's looking forward to giving back to the industry and to helping the chapter "continue to attract more membership and grow," he says.



Until recently, "I never took the time to get serious about joining a board," he says. "As I have spent a lot of time helping our organization to grow in the Mid-Atlantic region, we are now operationally very strong and I felt it was time to put energy into an organization like AGC to help promote our industry and to push hard to get younger individuals interested in our industry for both craft and supervisory careers."

All who are in the industry are responsible "to give back when we are able to help others share from our knowledge," he says.

The Washington state native has a lot to share. He started with Hensel Phelps 26 years ago, right out of Washington State University. After 17 years based in Colorado, with time on projects in Idaho, Texas, Florida and Colorado, he transferred to the Mid-Atlantic District in 1998, about 18 months after it opened. Five years ago, he became vice president/district manager.

The division office operates as a self-supportive profit center independent of the corporate office in Greeley, Colo., and is responsible for construction activities in Virginia, Maryland, Washington, D.C., Pennsylvania, West

Virginia, North Carolina and South Carolina. The office will also manage projects elsewhere to accommodate the specific requirements of long-term, repeat clients.

Steve says "some of the notable projects I've been associated with" locally are: Pentagon Renovation Wedges 2-5, the National Air and Space Museum [Udvar-Hazy Center], the Smithsonian American Art and Portraiture Gallery, the Baltimore Hilton Convention Center Hotel, and T.C. Williams High School, to name a few.

An impressive array, for sure. And very important to the nation, too. As one construction trade publication put it in a recent interview, "As the vice president for Hensel-Phelps Mid-Atlantic District, Steve has had the pleasure to help build structures that are home to American icons and are themselves pretty iconic."

Speer's pride in working on national treasures comes through in the interview. "Some builders get to work on one project of a lifetime in their careers. I feel like I've had the chance to work on several projects of a lifetime," he said. "Working for the Smithsonian Institution on the National Air and Space Museum or the American Art and Portraiture Gallery means working on things that are American history. There's a great challenge; we have to preserve history, so the buildings we build need to meet, and exceed, a certain standard."

The intensity is often high, too. For the Steven F. Udvar-Hazy Center at Dulles Airport, Hensel Phelps had to meet a quick deadline, building a mammoth structure to house about 80 percent of the museum archives.

But the deadline couldn't slip: "The 100th anniversary of the Wright Brothers' first flight in Kitty Hawk fell in December, 2005, so we were definitely presented with a deadline we could not miss," Speer said.

While he's had many professional challenges, Speer says he and wife Karen, also a native of Washington State, have enjoyed their move from the West Coast. At first, "we were not sure how we would enjoy the East Coast. [But] it has turned out to be a wonderful place for us and our children in all aspects: historically, culturally and professionally. We love it here!"

The family still heads back west to snow ski -their girls are 8 and 10-but they visit Lake Anna to water ski. Karen Speer was a senior manager in the CH2M HILL design group for some time; the couple met when they were both studying to be civil engineers.

With so much to juggle and so many big projects on his plate, how does Speer manage? He doesn't hesitate in his answer: "It's a lot of confidence and competence in the people around you. When you have good people, you can do about anything."

**AGC of DC's Annual Strategic Planning Board Meeting**

Our board spent two days at beautiful Nemaquin Woodlands Resort in July determined to crank out a plan that made sense for our thriving organization. We took a lot of time to review the things that we are having success with and tried to picture where the industry might be in the next few years to help us determine what programs and services the membership would benefit from the most.

We have a very successful young constructors' program this year and we want to grow even more in 2009



**Above: AGC of DC board members Steve Shapiro, Walter Hsu, Nigel Parkinson, George Kreis, and Greg Druga deep in discussions at the strategic planning dinner.**

by adding training and development for those entry to mid-level employees. This training will in turn benefit their employers. We will continue to give high quality training, information and events for members, while still providing new and innovative approaches to wrestling with our industry issues and challenges. In general, we continue to have 3 major objectives for the organization: Owner Liaison, Legislative Outreach, and Workforce Development.

Below are the major objectives for the upcoming year:

- Increase profile, access, and interaction with owners while communicating this value to members and potential members
- Influence procurement policy and legislation in the DC government
- Develop programs that add value to small to medium sized general contractors
- Continue to strengthen and integrate YCF into the mainstream AGC organization.

**Right: A group of Hess Construction + Engineering Services YCF members take a break from their lobster at the July Clambake. Will Neal of MC Dean, Inc. at work painting a row house for SOME in June.**

**Young Constructors' Forum**

In June, 35 volunteers donated their Saturday morning to provide property beautification for SOME (So Others Might Eat). We not only painted the exteriors of 4 row houses, but also fed about 25 homeless people with our lunches. Overall, it was a great experience to give back to the community and improve the conditions of SOME homes where homeless families live while they get their life in order.

The entry to mid-level professionals of AGC of DC's YCF also held some very well attended and fun networking events this summer. On July 17th over 250 people gathered at the East Pier of National Harbor for a delicious lobster clambake. YCF members invited their subcontractor friends as guests to show their appreciation and to mingle with the AGC. On August 14th, the group gathered at the rooftop of the



Clarendon Ballroom to soak up the last days of summer.

The last YCF event for 2008 will be on October 22nd. All those who participated in YCF this year, and those who are interested in joining for 2009 are encouraged to attend. Contact Laura Curtin for more information: [laura@agcofdc.org](mailto:laura@agcofdc.org)

## MEMBER NEWS

### **Clark Construction Group, LLC Groundbreaking Signals Start of Work at United States Institute of Peace**

A Clark Construction Group, LLC project team has begun work on the United States Institute of Peace headquarters and Public Education Center. To commemorate the occasion, the 24-year-old organization held a groundbreaking ceremony on June 5. More than 500 people attended the event, including President George W. Bush, Speaker of the House Nancy Pelosi, U.S. Senate Majority Leader Harry Reid, and a host of foreign dignitaries and representatives.

Plans to build a permanent headquarters for the Institute date back to the organization's inception in 1984. Considering the years spent securing the site, designing the structure, and obtaining the funding, Institute President Richard H. Solomon called June 5, "perhaps the most remarkable date in the Institute's history."

During his remarks, President Bush credited the efforts of the Institute with helping to alleviate the country's conflicts with Soviet communism and praised the construction of its headquarters.

Designed by Moshe Safdie and Associates of Somerville, Mass., the building is located on one of the National Mall's last available sites, at the corner of 23rd Street and Constitution Avenue, across from the Lincoln Memorial. The building's roofs form a series of wing-like elements. Constructed of steel frame and white translucent glass, they will

The Electrical Alliance

be white on the exterior during the day and glow gently from light within at night. The exterior will feature a curving foundation and landscaped plaza.

The 154,000 square-foot headquarters will include a training cen-

ter for professional conflict managers, office and conference space, and a 20,000 square-foot Public Education Center with state-of-the-art multimedia exhibits. The Institute expects more than 500,000 visitors a year.

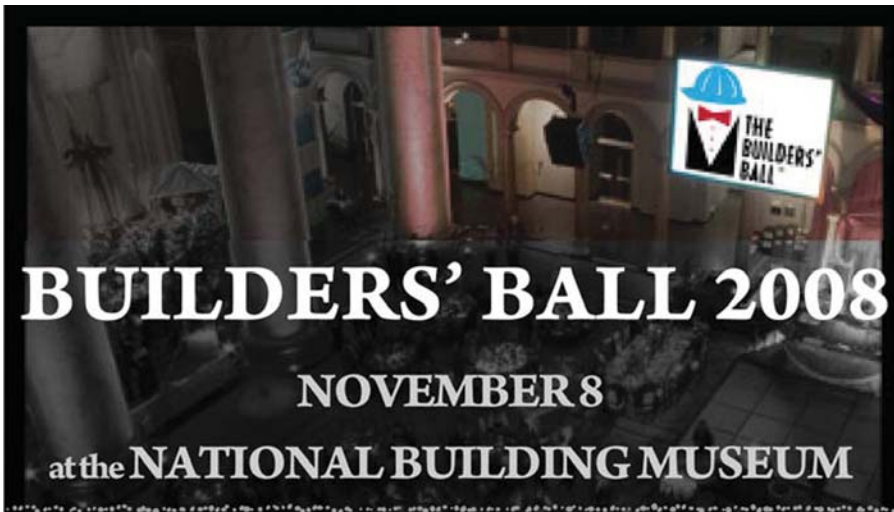
## Sigal Construction DC Mayor Fenty's "Buff & Scrub" a Huge Success

SIGAL Construction is proud to announce that the Buff & Scrub work is now complete for Key Elementary School in Washington, DC. The Buff & Scrub initiative, which was coordinated through the Office of the Deputy Mayor for Education, was designed to allow schools in the District of Columbia in need of some repair to receive donated help over the summer by local developers, contractors, architects, and other trade organizations. SIGAL Construction was excited to have this opportunity to roll up its sleeves and get involved.

SIGAL was assigned Key Elementary school and in conjunction with two of our subcontractors, Truland System, Inc. and Joshua Construction, has been performing work throughout the summer in an effort to fix doors, repair playground equipment, patch roofing, touch up paint, and rewire electrical work. The final day of the Buff & Scrub was August 8, 2008 when SIGAL closed its corporate office at noon and sent its staff to give the school a deep cleaning before the students returned for the 2008 - 2009 school year.

A staff of about 30 SIGAL employees scrubbed walls, cleaned windows and doors, washed chairs and spent an afternoon weeding the school "Butterfly" garden. "The Buff & Scrub initiative is a wonderful program we are proud to have taken part in", said Gerald R. Sigal, President of SIGAL Construction. "My entire staff was excited to be a part of the process and to have the opportunity to give back to our community."

SIGAL would like to thank the Mayor's Office for the opportunity to contribute to this valuable initiative and the trade organizations who partnered with us this summer, without their efforts we could not have completed the work. Thank you to Truland System, Inc. and Joshua Construction, Inc. for their generous



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*The Essential Tool for DC Contractors*

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[www.buildersball.org](http://www.buildersball.org)**

support. Additionally, we would like to acknowledge David Landeryou, Principal of Key Elementary and his wonderful staff for their help in coordinating all our efforts and their positivity throughout the process. This was a wonderful experience we hope to be a part of for years to come.

### **Grunley Construction Co.** Grunley Awarded 4th Phase of US Department of Interior Modernization

The U.S. General Services Administration (GSA) awarded Grunley Construction, a local general contractor, a \$29 million contract to renovate Wing 3 (250,000 SF) of the U.S. Department of the Interior Headquarters Building in Washington, DC. In prior phases Grunley modernized Wings 4, 5 and 6 (600,000 SF) within the 1,290,000 SF occupied structure.

Highlights of this phase include:

- Replacement of the telecommunication and electrical systems, and associated wiring to include new switchgear and transformers.
- Replacement of the existing HVAC mechanical systems and associated pipe and duct to include new air handling units and integration with mechanical equipment installed in the previous wings.
- Modernization of the Central Plant and Cafeteria.
- Installation of eight large skylights over the Cafeteria dining space.

Grunley Construction provides a full spectrum of professional construction services, and is well known for its expertise in renovations, restorations, modernizations and additions. The firm is listed among the Engineering News Record's Top 400 Contractors.

### **National Memorial Joint Venture** McKissack & McKissack / Turner Construction Co. / Gilford Corp. / Tompkins Builders, Inc Joint Venture

The Washington, DC Martin Luther King, Jr. National Memorial Project Foundation, Inc and the McKissack & McKissack / Turner Construction Company/ Gilford Corporation / Tompkins Builders, Inc. Joint Venture, announced that Angela Fortson, an African-American owner of Southeastern Granite Company based in Elberton, GA, will serve as a granite consultant on the Martin Luther King, Jr. National Memorial. Fortson will assist in the selection of the Inscription Wall granite and in identifying suitable domestic sources.

"It is extremely important to the Design-Build Joint Venture that African-American, minority and women owned businesses are an integral part of the design and construction of this incredible Memorial," said Construction Executive Ken Terry. "The opportunities to participate are many, and we have made it a priority to inform interested parties about these opportunities and the qualification processes. The Martin Luther King, Jr. National Memorial will be constructed in accordance with Dr. King's philosophies of equality and conscience."

As a 46 year old black female business owner, Fortson's success story is in keeping with the positive messages, stories and lessons that have inspired the design and construction of the Memorial. Fortson is a 2nd generation granite entrepreneur. In the early sixties, her father, George M. Fortson started the Fortson Stone Company with nothing more than a business dream, hard work, a chisel and a hammer.

Fortson explains, "Visits to my hometown of Elberton, Georgia, turned into a learning experience.

My father would proudly take me to various job sites and granite companies, explaining the details of the business."

Today, Southeastern Granite Company and Fortson Stone Company have collectively supplied granite for major projects throughout the Southeast including the Jimmy Carter Presidential Parkway, City of Atlanta Emory University, Gordon College, The Richard B. Russel State Park, and most recently partial reconstruction of the Granite Bowl in Elberton Georgia For over a decade, Fortson has continued her father's proud tradition in the granite business.

She says, "I must emphasize that this is not my story; this is the story of sacrifice and foresight of Dr. Martin Luther King, Jr, and those who have gone before me and gave their life to make it possible for a black female from Elberton, Georgia to make a small contribution towards the construction of this great Memorial in honor of Dr. Martin Luther King, Jr."

Ms. Fortson's scope of work also includes evaluating the suitability of proposed granite, assisting in the selection of slabs and evaluating the design details and submittal review of the stone shop drawings. Lisa Anders, Senior Program Director for the design firm Mckissack & Mckissack, said "Ms. Fortson's qualifications and expertise in the granite industry will make her a great asset. Her life-long experience and insight will ensure the selection of the most suitable granite for the Inscription Wall."



## PROJECT SPOTLIGHT: Phelps Architecture, Construction and Engineering High School



**Above: DC Mayor Adrian Fenty cuts the ribbon as alumni, DC City Council members, and students watch.**



**Michelle Rhee and Allen Lew both spoke at the ribbon cutting ceremony.**

The District's new Phelps Architecture, Construction and Engineering High School is not just a DC public school, the structure itself is an education.

The building complex in Northeast Washington is the first public school of its kind devoted to architecture, construction, and engineering and is the culmination of a dream for the AGC of Metropolitan Washington D.C. and D.C. Public School officials. The renovations were a design-build collaboration between Turner Construction Co., Fanning Howey Architects, A1-Construction and Bryant Mitchell.

The school's innovative instructional design allows the students to use

the building as a learning tool. Classes will incorporate all aspects of the design and construction process. In English, for example, students will be taught how to read and write construction documents and contracts. In math, they may construct scale models, or learn how plumbing systems operate, or calculate dimensions for construction projects.

The facilities have a solar water and solar power component, geothermal features, and wind turbines in the career technology training bays. The greenhouse has computer-controlled window shades and watering systems so that students can see the latest in energy efficiency and water conservation practices. "Students will be able to read controls that will register the energy-savings contributions to the utility company," says Pamela Murray Johnson, project manager for Turner.

In some parts of the school, ceiling pipes are exposed and color-coded as in typical commercial construction, so that the students can follow the paths of the electrical wires, plumbing lines and the sprinkler system.

The state-of-the-art construction goes hand-in-hand with the mission of the school, a decommissioned public vocational high school that has been transformed in only one year into a state-of-the-art career academy. It is designed for high school students interested in entering the industry immediately after high school and also those planning on attending college.

At the helm of the project are practiced professionals. Turner, the general contractor, is one of the largest contractors in the D.C. area and one of the largest general contractors in the United States, and Fanning Howey is the second largest designer of K-12 schools in the country.

**The AGC of DC is a critical partner** in the \$63.8 million undertaking. Among some of the AGC goals is to attract newcomers to the construction field. Career academies have been embraced by other industry groups across the country, but Phelps is the only public school in the nation that

is focused exclusively on architecture, engineering and construction. "A graduate of Phelps is just the sort of prepared worker we need on our projects," says Allen Lew, executive director of the D.C. Office of Facilities Modernization.

Lew, who came to the new modernization office after managing construction of the Washington Nationals baseball stadium and the Washington Convention Center, says the Phelps project is a breakthrough for the city and for the idea of industry specific education.

"With an entirely new business model for the D.C. Public Schools, we have delivered on a concept that goes way beyond the 20th century stereotype of 'vocational education,' " he says.

The old Phelps Vocational School, established originally in a different location in 1912 as Cardozo Vocational School, was moved to the Benning Road area in the mid-1930s during segregation. Black students there were first trained in shoe repair, architectural drafting, and general shop. Later on, Phelps offered specific trades such as bricklaying, auto repair, horticulture, and upholstery. Additions were built in 1960 and 1971. The school closed in 2002 as school systems around the nation closed outdated and rundown Vot-tech facilities.

District Mayor Adrian M. Fenty has talked about the significance of the school to students and to the city. "This initiative marks a new chapter in public education in the District of Columbia," he said at the groundbreaking on July 31, 2007, "... it symbolizes the growing importance of both technical and academic education."

In just over a year later after the ribbon-cutting ceremony, Fenty remarked to Washington Contractor Magazine that the school "has a rich history in the District of Columbia" and that he "is honored to be part of its restoration. I look forward to ushering in a new generation of graduates."

Fenty commented that "for too long



Mayor Fenty at the ribbon cutting ceremony.

**The Project Team**

**Project Sponsor:** District of Columbia Office of Public Education Facilities Modernization (OPEFM)

**Program Manager:** McKissack & McKissack/Brailsford & Dunlavey/URS

**Architect of Record:** Fanning Howey

**LSDBE (local small business) Sub-Architect:** Bryant Mitchell PLLC

**General Contractor/Construction Manager:** Turner Construction Company

**LSDBE (local small business) Sub-Construction Manager:** A1 Construction & Consulting LLC

vocational education has received a bad rap, and with the re-emergence for Phelps HS the District is committed to showing the nation and our industry leaders the value of teaching skills that will enable our young people to pursue viable careers after graduation. We want to create a learning environment that encourages our students to weigh all their options and now we have the structure to do so."

Phelps is the first whole school modernization project completed since Mayor Fenty and the D.C. City Council took control of the D.C. public schools.

**The school** ribbon cutting ceremony



**Phelps High School not only has a new entrance, but also a new learning approach that will expose students to industry.**

was on August 18th, and the school opened its new doors on August 25th. General contractor Turner Construction Co. turned the building over on August 4th. The principal and

staff moved in that same day. The project was delivered in 14 months from start to finish.

The school, located high on a hill near Langston Golf Course and close to RFK Stadium, not only has an extraordinary design and building schedule, but it breaks new ground in other ways. It is the first LEED for Schools certified facility in the Washington, D.C., region, according to Pamela Murray Johnson. The LEED for Schools designation was implemented as a requirement under the DC Green Building Act in 2007.

The Office of Public Education Facilities Modernization has layered on a new renewable energy component to the project, Pamela Murray Johnson said in an e-mail just before the project was turned over.

“We are providing a geothermal system tied in to the existing mechanical system (providing energy from the Earth), [and] a solar water and a

solar power component providing heated water to the kitchen and power to some areas of the building (providing energy from the sun).”

Murray Johnson said the schedule has been intense. The project team had problems getting plans approved, getting approvals from the utilities, and obtaining raze permits. “It has really been a fast track design-build delivery. We have all been working under the spirit of collaboration, everyone involved. It has not been easy. The building permit process has no consideration for expediting a project.”

“We had to pour concrete foundations during the winter months,” she added. “We were doing rough-ins and walls before we could fully enclose. We needed to keep moving throughout the winter and it was often too cold to set masonry walls and set ceramic tile. We worked days and nights. We never, however, sacrificed quality.”

But “now that we have completed

Precision Wall Tech

**Right: "The Commons" hallway during construction, before arches were placed to join multiple buildings as one.**

the building and we see the results, we all feel that those 12-hour days/7 days a week have been well worth it," she said.

The transformation of the existing 136,000 square feet into 146,510 square feet of new construction and renovated space was completed in three phases. Phase 1 included upgrading and modernizing the 1960 "high-bay" areas (which are specialty trade technology areas) of the old structure. Phase 2 renovated the original 1934 structure, to accommodate more than 24 classrooms, a new welcome center, and administrative offices. Phase 3 focused on the 1971 additions to the original Phelps building. This section will contain some classrooms and a gym, cafeteria, auditorium,



Alpine Services

Early Cassidy & Schilling

greenhouse and horticulture labs.

**Those who worked on the school say they are proud** to have been part of the effort, particularly because of the school's own mission to help bring students into the industry.

"We are pleased to be working on this project," said Murray Johnson. "We believe it is a privilege to work on this school that is making an investment into the future of our industry. We are excited about the new principal and his vision for the students. We believe that the school will offer wonderful opportunities to the students who attend."

Cindy Athey, owner of Precision Wall Tech Inc. in Manassas, echoed those words. "We were just really proud to be on it," said Athey. "Just the idea of being able to give back to the community was inspiring, because that's what it's there for, to train the youth."

Athey currently trains her painters through an apprenticeship program,

but says she would consider using students from Phelps High.

The project is a great educational device, she says. As the painting contractor, she followed design plans calling for the color-coding of exposed pipes. "They've exposed a lot of the ceilings, especially in the career technology bay areas and the hallways."

Nigel Parkinson, CEO of Parkinson Construction Co. Inc. and president of the AGC of DC, believes AGC contractors across the board "will be looking forward to hiring apprentices as they graduate from Phelps."

Parkinson's firm did general construction work on the school, mainly in carpentry. "It went very well, and very fast," he says, complimenting Turner Construction on the scheduling.

Officials with M.C. Dean, Inc. say the project means a lot to the company. "It has been a pleasure working with Turner Construction and the District of Columbia Public Schools," said Jason

Massoth, operations manager for M.C. Dean, Inc. "Throughout this project, we have seen this school transformed into something special, and are proud to have worked on this facility."

The company's work included demolishing the different electrical and energy systems of the past and moving into the future, by designing and installing new energy-efficient systems. For the 1960s High Bay Building, which now includes spaces for a new computer lab, media center, wood shop, weld shop and shop area/vocational lab spaces, M.C. Dean, Inc. designed and configured electrical systems to accommodate specific equipment and power supply layouts needed to facilitate hands-on learning specific to each building trade.

M.C. Dean, Inc. also designed and installed power distribution and lighting systems, a new emergency generator, fire alarm system, theater lighting and sound systems, public

Long Fence

Woodbridge



## Meet the Principal

The new principal at Phelps Architecture, Construction and Engineering High School is also one-of-a-kind.

Michael A. Johnson comes to the job after a remarkable career in New York City, where his school reform efforts as a principal and district superintendent were tracked by *The New York Times*, and after a year as a professor in education at St. John's University in Queens. He was recruited to be the new Phelps High School's first principal after a nationwide search, an approach that he says "impressed me ... I believe that the national search was a statement by [D.C. Public Schools Chancellor Michelle] Rhee that they're really serious about this school."

He arrived in May.

Johnson this summer said he was very energized by starting up the school—"it's like getting ready for opening night of a play!" He was working late hours, interviewing every pupil, working out the details of the curriculum and talking with parents, alumni of the old Phelps High School, new school staff and central administration. His assistant principal is Mary Outlaw, who comes from the District school system. "We have a good balance, one from the inside and one from outside," he said.

The pace has been intense because "with a brand-new school, you have to do everything" to get up and running, he said. "There are things that you take for granted" with existing schools, "like rituals and procedures that you've got to build in a new school."

The new students, he said, are a good "ethnic mix" and include girls and boys from public schools, charter schools and private schools. "I'm excited because the students I've been meeting with are so bright and they're really nice kids and the parents are optimistic about the future for their children."

His hopes for the school are also very high. "The

building is beautiful... And the AGC have been really super partners." Beyond their commitment to the school, the members of the AGC of DC "are actually funding the first uniforms" for the students, he said. The logo will be a combination of the school mascot, the Phelps panther, and the AGC symbol.

Johnson is used to breaking new ground.

A *New York Times Magazine* article in 1996 described Johnson's work as the principal and founder of the Science Skills Center, a Saturday afternoon program that eventually turned into a strong-scoring public high school at the base of the Manhattan Bridge in Brooklyn.

Johnson, who grew up in Brooklyn, graduated from Empire State College with a degree in science education. He came to teaching while he was the only black person at a Manhattan engineering firm and saw how few African-Americans were in his field. He began an after-school science and math program for neighborhood kids in a Crown Heights storefront. Soon, the program drew kids from all over the city, and he won a \$2 million grant from the National Science Foundation to run the program full time, the *Times* magazine article said.

The high school was created in '93 with a group called New Visions for Public Schools, that in searching for reformers had heard a lot about Johnson. New Visions worked with the private sector and New York City's Board of Education to promote school reform. Under Johnson's direction, the Science Skills school set high goals, requiring all of its 650 students "to take the kind of advanced-placement classes in history, science and math that one typically finds in the better private schools," the article said.

And it was "wildly successful," the article said, by the criteria the NYC board used to grade its own schools—attendance, dropout rates, number of violent incidents and students' scores on minimal-competency exams. In its third year, the "attendance rate is 94 percent; no one has

dropped out; last year, despite a sudden increase in violent incidents throughout the city's school system, Science Skills did not report a single altercation. And although all of Johnson's students come from the city's open lottery system, all of them, even those designated as special-education students, take his Regents [exam] program and are passing, which requires a score of 65 percent. This is in contrast to a school system where half of all entering freshmen fail to meet even the minimum requirements to graduate in four years."

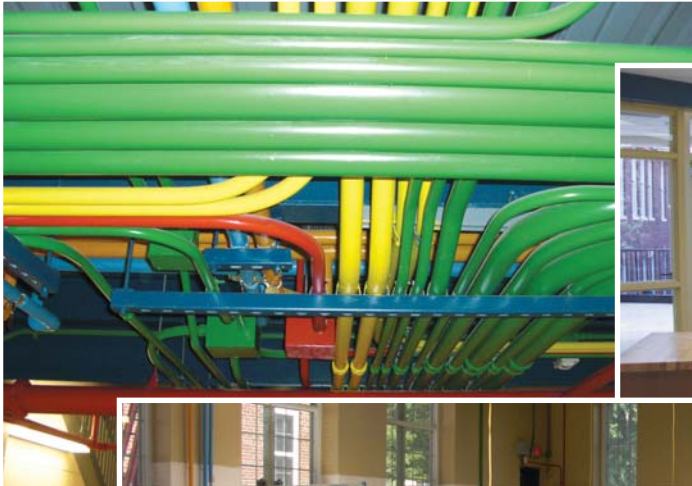
Though some reform advocates at the time were critical of Johnson's approach and emphasis on standardized tests, the story said they could not dispute his achievements and that "[p]arents are evidently pleased: the Science Skills Center has received three times as many applications as any other New Vision school."

Johnson's theory then was that many children need to have a "back-to-basics curriculum" with specified goals, rather than subjective standards. Though critics balked then at standardized testing, federal education decision makers have since come to embrace it.

After seven years at the Science Skills Center, Johnson became superintendent of a school district in Queens, with about 30,000 students. The city at that time, he said in an interview with *Washington Contractor*, had about 1.1 million students in some 40 districts.

Another *New York Times* article in 2000 looked again at Johnson after this appointment. Again he had a big challenge: His new job was "to take one of the city's most middle-class black school districts and turn it around." The headline on the story was "Trying a Stern Hand on a Mediocre School District," and it noted how much was riding on Johnson's efforts.

Johnson says now that he's used to new challenges, and relishes them. "Whatever job you have, it'll be a challenge to master it," he told *Washington Contractor*. "You've just got to absorb everything."



Exposed painted pipes allow students to learn as they walk to class; the art classroom features lots of light and high tables; one bay-area lab is devoted to plumbing.

Atlantic Risk Management

Corning Construction



**AGC of DC's president, Nigel Parkinson, was on hand for the school's open house to speak with students and parents about careers in the design and construction industry.**

address/clock system, complete telecommunications passive networks, and security access control/intrusion detection.

The firm, which has worked on five LEED-certified facilities, including the new T.C. Williams High School in Alexandria, reports that Phelps High goes the extra mile to save energy. "This is the first time that we have installed a wind turbine and solar panels," Massoth says.

For the 1930s historic classroom building, and the 1970s-era gymnasium and classroom building, the contract called for a full-service kitchen with its own chef, food service and lab facilities, and a new administrative wing.

A new commons walkway connects the three existing renovated wings. A special feature is an open opal carbonate skylight. The commons is both a literal and figurative symbol for the opportunity and responsibility that lies ahead for the Phelps High students.

**The industry will serve a key purpose** in assisting the teachers with offering enriched learning experiences, donating industry-specific supplies for classrooms, donating volunteer time, and extending the hand as role models for the students. In late August 2008, Chancellor Michelle Rhee commented

to Washington Contractor Magazine on the industry partnership AGC of DC and DCPS have formed.

"Public-private partnerships are an important piece to providing a broad-based curriculum...Partnerships like this enrich our academic programs - and offer more compelling instruction for our students," Rhee said.

AGC of DC and its members are committed to financially supporting Phelps Architecture, Construction and Engineering High, with both direct and in-kind services. AGC of DC has already donated industry specific instructional books for teachers, and will work with curriculum specialists to help integrate construction into core classes.

Rhee says that the industry adds "to the educational experience by working directly with our instruction teams to develop and integrate curriculum that will teach students employable skills."

AGC of Metropolitan Washington DC also sponsored and launched the high school Website ([www.pacehs.org](http://www.pacehs.org)) and worked on recruiting students. Some activities included attending the nearby Brown Middle School career day, the Phelps High open house, and a meeting for District public school guidance counselors.

The AGC officials have been "really super partners," says Michael A. Johnson, Phelps' new principal. "They've been fully involved since before I came [in May]. ...They even paid for the uniforms."

The ultimate goal for Rhee is to "create a model school" where "college-prep and career-prep work seamlessly together" so that students will have opportunities and choices after high school.

AGC of DC and its members will serve an integral role as an industry-wide resource and prove to be a highly involved advocate of Phelps High for many years to come. Phelps High School will not only prove to be a great addition for the DC public school system, but will also contribute future skilled and knowledgeable professionals to the design and construction industry.

## Good News on Academies

Just before the Phelps academy was to open, a new report card was issued with high marks for career academies-schools that combine academics with career development opportunities.

The report, "Career Academies: Long-Term Impacts on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood," came out in June. It was the result of a 15-year study of career academies in nine urban high schools around the country conducted by MDRC, a nonprofit, nonpartisan research organization. The study followed the 1,400 students from when they entered high school until eight years after their scheduled graduation. More than 80 percent of students in the sample were Black or Hispanic.

According to MDRC, the study "shows that the [career academy] model produces sustained employment and earnings gains, particularly among young men. While Career Academies had no impact (positive or negative) on educational attainment, they did show modest positive effects on increasing family stability."

MDRC says the study is particularly significant for urban high schools, where "too many students who manage to graduate are unprepared for postsecondary education or the world of work. And they often enter a labor market that offers them few opportunities for good jobs."

The main findings were:

- Career Academies produced sustained earnings gains that averaged 11 percent (or \$2,088) more per year for program participants than for individuals in the control group - a \$16,704 boost in total earnings over the eight years of follow-up.
- These impacts on earnings are concentrated among young men and students at risk of academic failure. Young men saw an annual earnings gain of 17 percent (or \$3,731) - or nearly \$30,000 over eight years.
- Career Academies serve as viable pathways to a range of postsecondary education opportunities, but they do not appear to have been more effective than other options available to students. More than 90 percent of the students graduated from high school or received a General Educational Development (GED) certificate, and half earned a postsecondary degree or credential.

The study was written by James J. Kemple, director of MDRC's K-12 Education Policy Area, and Cynthia J. Willner. "The findings ... suggest that pitting academic preparation against career development in high schools may be a false dichotomy," Kemple said in a press release. "The impressive labor market gains seen by Career Academy students did not come at the expense of their education attainment: Eight years after scheduled graduation, 95 percent had finished high school or received a GED and 50 percent had earned some form of postsecondary certificate or degree."

According to MDRC, more than 2,500 career academies are in operation. They typically serve 150-200 students in grades 9 or 10 through grade 12, are organized as small learning communities, combine academic and technical curriculums around a career theme, and establish partnerships with local employers to provide work-based learning opportunities.



# Going Paperless & Automating the Supply Chain

**G**et ready for some big changes in how contractors keep track of materials and supplies, from ordering to delivery and installation.

The revolution in technology that has hit the front office with Building Information Modeling (BIM) software—which allows contractors, subs, and architects to simultaneously work on 3-D models—is coming to the field and to the supply chain management process.

One of the latest innovations is to connect the new computer building modeling software with onsite tracking devices. As a result, contractors can “see” through their computers at headquarters or through handheld devices in the field exactly where materials are in the delivery and installation chain. And, they can

update the information to reflect delays, costs, or change-orders.

Usually, the new BIM tools have focused on design and coordination, rather than on the supply chain. But now, some contractors who use BIM computer models to overlay construction drawings for design purposes and as a way of detecting possible construction “clashes”—such as when plumbing pipes would run into ductwork—are finding they can marry field software to BIM models to track supplies.

It's a revolution for the construction industry, which typically has lagged behind commercial manufacturing in automating the supply chain, and which is generally resistant to change. But it's something that big contractors have been considering as projects have become immense and where

“dense city locations have limited lay-down space” for materials, says Glenn Ballard, co-founder of the Lean Construction Institute, a nonprofit organization dedicated to improving project management at construction facilities. Utilizing supply chain management can be applied to lean construction principles.

Because of the site limitations and schedule time constraints, contractors have been “forced to manage logistics” and to consider the “just in time” materials-delivery systems that Toyota pioneered at its automobile manufacturing facilities two decades ago, says Ballard. (Ballard's group follows an even more choreographed philosophy to plan construction, avoid waste, and improve efficiencies. See “The Lean Machine.”)

Contractors are only one of many

## The Lean Machine

Glenn Ballard, an accomplished educator and author with 25 years of construction industry expertise, and Greg Howell, a professor in construction management, a project engineer on heavy construction and general building projects, and the head of his own construction consulting firm, founded the Lean Construction Institute in 1997.

The nonprofit research organization wants to reform the management of production in design, engineering, and construction for capital facilities. The institute developed the Lean Project Delivery System™ (LPDS) that applies principles pioneered in manufacturing to construction. LPDS tools facilitate planning and control, maximizing value and minimizing waste throughout the construction process.

Howell and Ballard regularly conduct seminars and address industry organizations on Lean Project Delivery, restructuring workflow, maximizing value and minimizing waste. Tools and techniques developed by LCI remove waste

from design and construction processes, and lead practicing companies to enhanced competitiveness and profitability.

The institute says key differences between lean construction and other forms of project management include:

- Control is redefined from “monitoring results” to “making things happen.” Planning system performance is measured and improved to assure reliable workflow and predictable project outcomes.
- Performance is maximizing value and minimizing waste at the project level. Current practice attempts to optimize each activity and thus reduces total performance.
- Project Delivery is the simultaneous design of the facility and its production process. This is concurrent engineering. Current practice, even with constructability reviews is a sequential process unable to prevent wasteful iterations.
- Value to the customer is defined, created

and delivered throughout the life of the project. In current practice, the owner is expected to completely define requirements at the outset for delivery at the end, despite changing markets, technology and business practices.

- Coordinating action through pulling and continuous flow. This is opposed to traditional schedule-driven push with its over-reliance on central authority and project schedules to manage resources and coordinate work.

- Decentralizing decision making through transparency and empowerment. This means providing project participants with information on the state of the production systems and empowering them to take action.

“In summary,” says the institute, “Lean construction is a production management based project delivery system emphasizing the reliable and speedy delivery of value. It challenges the generally accepted belief that there is always a trade between time, cost and quality.”

industries looking for ways to go paperless, says Benjamin Whitcomb of Microdesk, Inc. in Washington, D.C. Microdesk markets the Autodesk Revit software, one kind of BIM computer modeling platform. "I call it going from file to factory to field," says Whitcomb.

Some contractors have recently taken giant steps to automate the supply chain.

**At the Meadowlands Stadium-**under construction in New Jersey--the general contractor has attached radio-frequency ID tags to the huge pre-cast concrete blocks that will form the bowl of the structure. The tags electronically identify the blocks so that they can be tracked by a sophisticated computer network to save time on the \$1 billion project's schedule.

The system tracks items as they pass various points along the supply chain, and can provide valuable information to the contractor on the specific purpose of a particular item (such as whether it is pre-cast, or a window section, or steel), and its current location and status.

General contractor Skanska USA Building Inc. estimates it will save about \$1 million through the "just-in-time" materials tracking system at the Meadowlands. The tags stay embedded in the 3,200 pieces of concrete--sticking out like key chains from manufacture to installation and inspection, so they can be snipped off later. That lets all of the players follow their status on mobile screens and back at the office.

The software used to capture the radio-frequency signals and to allow tracking on Tablet PCs (personal computers) was designed by Vela Systems of Burlington, Mass. That system feeds into other types of tracking and building model software created by Tekla Inc. of Atlanta. Together, the programs allow field personnel to write notes onscreen on the progress and status of the job, to consult thousands of design and construction drawings while onsite,

and to keep the computer building model up to date. The results? Skanska is shaving 10 days of project schedule, the equivalent of saving \$1 million in total costs. According to Vela, the "joint software solution" at the Meadowlands was the first combination of field and BIM software for construction supply chain management in the U.S.

Just outside Washington, D.C., at the Gaylord National Resort & Convention Center, global architecture firm Gensler saved 95 person-days during construction using similar mobile field software, according to Josh Kanner, co-founder of Vela Systems.

Gensler needed to draw up a punch list for each of the resort's 2,000 hotel rooms to make sure problems were detected and fixed by opening day. So Don Ghent, a Gensler principal, collaborated with Vela on an electronic tablet that could track the location and status of each room's problems, and that would allow the architect and contractor to see the same information online.

With 15 to 20 fixes needed per room, on average, "punching" a room with pencil and paper could take up to an hour. But, using Vela software on PC tablets made by Austin's Motion Computing, the inspectors had access to more than 3,000 drawings while onsite and the inspection time was cut to an average of 20 to 40 minutes.

"We knew doing it the paper way would cost us 10 times as much as doing it electronically," Ghent said later. "We needed to be fast and nimble."

"With 10,000 rooms [counting the bathrooms, closets and living spaces in each hotel room] to check... we didn't think that we could do a punch list by hand," Ghent said in an interview. "There was no system at the time that we could use... but we worked with Vela to manipulate their system to do it. ... We literally worked out the bugs in their system on the job."

Such time savings are typical, Vela says.

The Vela technology replaces the paper typically dragged onto job



sites--journal books and tubes of drawings--with specialized software installed on rugged Tablet PCs. "Vela Systems puts entire file cabinets of documents that were formerly stored in trailers at the fingertips of people in the field," company releases say. "The solution offers a suite of modules designed to accomplish specific tasks such as materials tracking, field reports, punch lists, owner walk-throughs and safety inspections."

Ghent asked for Tablet PCs rather than PDAs, as originally proposed. The field personnel couldn't mark their computerized drawings with electronic pushpins with the PDAs, he said. To protect the Tablet PCs from construction dust, he bought cases. "We spent about \$3,500 per computer ... and we pay them a fee every month," he said. The monthly fee is about \$350 per licensed user per month.

Gensler is now using the technology for the new JetBlue terminal at John F. Kennedy International Airport in New York City.

**M.C. Dean, Inc.** manages materials and equipment at its 360,000-square-foot Michael D. Dent Fabrication and Logistics Campus in Caroline County, Va., with a bar code system tied to a materials management computer application. Material and equipment orders are made and tracked through the automated system. Orders are checked in and tagged with a bar code when they arrive at the warehouse, and the sys-

tem automatically forwards proof of delivery to the accounts payable department.

Repeated manual counting isn't needed. And since orders are planned in advance, "fewer separate orders are made," says Matthew Martinez, M.C. Dean, Inc. Operations Manager, "decreasing shipping and handling costs and enabling M.C. Dean, Inc. to make bulk purchases, and to enjoy the associated cost savings offered by the manufacturer when the same item is needed for multiple projects."

When the job site is ready to receive the items for installation, the warehouse staff scans the bar codes as they repackage the items for shipment to the job site. That data is also recorded electronically. The application deducts the shipped items from inventory and alerts the project manager when the stock reaches the reorder set point.

**Barton Malow Company** is using Tekla software on a five-story, 116,000-square-foot academic building at the University of Virginia that also has a 90-foot-wide landscaped pedestrian crossing over a major campus roadway. The \$105 million project is to be completed in 2010.

The "original goal" for using the BIM model, says Brian Larson of Barton Malow, was "to control risks by integrating models and analyzing clashes." But it also helps with supply chain management, he says, because "Tekla allows us to associate almost any data we wish with pieces in the model. Basically, we have the ability to track anything we want through color-coded versions of our 3-D model. We tag pieces of the model with submittal, RFI [request for information], and change-order data. We can then visualize this information to quickly and accurately assess our supply chain risks."

Larson says the company decided to see how many ways the technology could be used. "We had all these 3-D models and we wanted to see what else we could do with them. Using them to analyze risk not only from graphical classes but from supply chain issues was a logical next step."

The strategy "has saved time and money" because of "the simple philosophy of having so much data in one place with such easy tools for analyzing that data," he says. "But a hard number cannot be put to those savings with reasonable accuracy."

Another way advanced software can be used is in designing and fabricating materials.

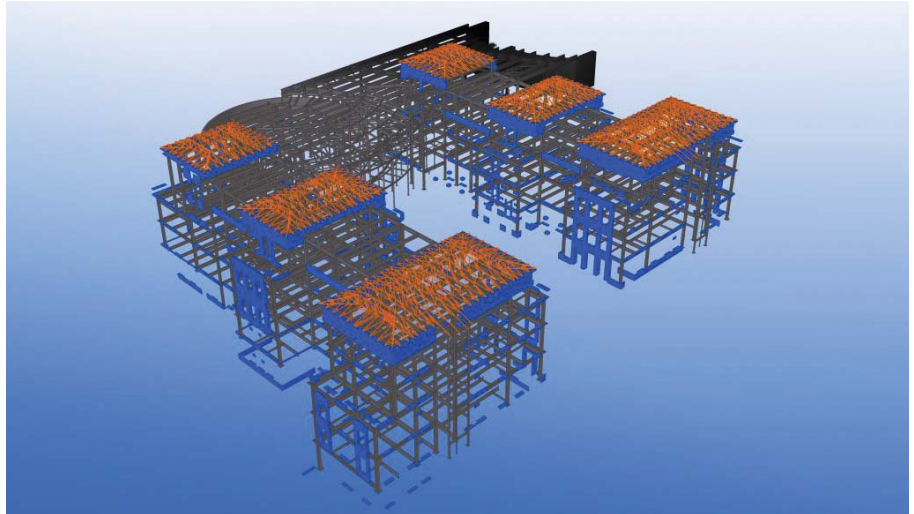
**Clark/Balfour Beatty Construction** used Tekla 4D design/modeling software to design and fabricate 9,000 tons of structural steel at the new Nationals Ballpark, says Rick "Buck" Buckovich of Clark/Balfour Beatty.

Trade Source

RPG

**Right: Aerial diagram of a building.**

The technology is so sophisticated that the electronic data on the design could be fed “to the actual machines in the steel-fabrication shop, and the machines cut the beams to the right lengths ... and cut the holes where they're supposed to be,” he says. Bar codes, imprinted with information about each piece of steel and where it is supposed to go, were used to track the materials.



**Radio-frequency ID (RFID) tags and bar codes** have been used in other fields in the past, particularly to track parts in auto plants and to track consumer products in warehouses. Walmart, for instance, told its top 100 suppliers they had to use RFID tags on their pallets and cases by 2005. The technology replaced visual counting methods,

with time and cost savings.

But the technology being used onsite at the Meadowlands and Gaylord—the combination of RFID tags and a computer network linked in the field to a building model—offers an even bigger promise, according to Skanska officials. It could be the

opening to major advances in supply chain management, as well as in using computer models and tracking devices to keep up with equipment maintenance schedules and to automatically fabricate orders based on architects' drawings.

These “real time” systems can

Verizon

## Universal Concrete

## Equipment Corporation

reduce the number of trips to the construction trailer or to the home office to check drawings and data, because they allow data to be refreshed electronically and the building model to be updated whenever changes are written in by hand onsite or coded in at the office.

In an April 28 cover story in ENR on the Meadowlands process, Skanska officials raved about the breakthrough in linking field data to computer modeling. The firm is also using the RFID/network system for two soon-to-be-built water treatment plants in Westchester County, N.Y. The article concluded: "However, one thing is sure, [Skanska vice president David Campbell] says, 'We're not going back to paper and pencil.'"

Campbell was equally boosterish in an interview with Washington Contractor this spring for a story on BIM. He described a new future for the contracting industry—from design to material manufacture, delivery, installation, supply chain management and maintenance—because of advances in computer modeling and onsite tracking.

Campbell's enthusiasm seems to be catching. Josh Kanner, co-founder of Vela, said in an interview with Washington Contractor this summer that a working group of more than 25 construction industry members has been meeting on how the technology can move into the mainstream in fieldwork. The Field BIM working group plans to issue a white paper in the fall, he said. Vela expects to hold a videoconference on field BIM and the results of the industry survey.

**It would be a big step** for American industry to introduce such technology into supply chain management on a grand scale, but the idea has been discussed for two decades in academic settings and has already become common in some construction uses in Finland, where Tekla is based, and in South Korea, according to journal articles.

American and Taiwanese academ-

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ics have also long been researching the idea of using RFID tags or bar codes on materials and linking them through communications portals to building models.

According to the April 28 ENR, South Korean academic researchers: "substantial South Korean government and industry support are making a huge push to apply Radio Frequency Identification tag technology to construction. Now, they are bringing their success to the U.S."

The magazine said the DoallTech Corp. is "commercializing technology developed in conjunction with Sungkyunkwan University (SKKU) in Suwon, South Korea, for an RFID-based project management system for daily labor control. It has been implemented at about 400 construction projects in South Korea and other countries."

ENR reported that DoallTech's chief technology officer, a visiting scholar at the University of Illinois at Urbana-Champaign, is launching a DoallTechUS in Champaign, Ill., to market its Gateway access-control system, to track personnel and supply-chain management.

The system involves a reader, tags and a project-data management system that DoallTech compares to Autodesk's Constructware and Meridian's Prolog, ENR said. The expectation is that the U.S. branch will focus on marketing its hardware but not project-management. ENR reported that the company will encourage software developers to integrate Gateway with their own systems. The system works with 4-D CAD, or computer-assisted design.

**"South Korea has hundreds of projects"** using similar technology, says Kanner. "In many ways they are ahead of the U.S. on this."

Finland has also been a front-runner, according to Andy Dickey, business and product development manager, contractor segment, for Tekla Inc.

No wonder, perhaps: Tekla, Inc.'s parent company, Tekla Oyj, is head-

quartered in Espoo, Finland. The software engineering corporation, founded in 1966, specializes in 2- and 3-dimensional design and drafting, and now has offices all over the world.

Tekla Structures is the company's 3-D and 4-D BIM software. Dickey says the company offers BIM structural design, structural steel detailing, pre-cast concrete detailing and construction management solutions.

As far as supply chains, Dickey says, "There are really two supply chains in construction, the information supply chain and the physical/material supply chain. We have significant capabilities in both and they are connected."

The software is interoperable with virtually all of the 3-D modeling software via IFC, DWG, DGN and more, Dickey says. "It is also built atop a database so that non-BIM information can be integrated quite easily as well. This means requests for information [RFIs], change order, submittal information, etc." can be incorporated into the computer model, he says. The computer model is color-coded to track progress of materials and other steps.

David Campbell, vice president of Skanska, got the idea for the Meadowlands tracking process after hearing about how RFID and tracking tools for pre-cast components were being used at another Skanska project in Finland. "The technology it was using was not transferable, but the idea was; so [Campbell] brought Vela and Tekla together and worked with them to develop the system," reported ENR.

"This solution is giving us a precise view of production management," Campbell, who is also director of SIMCon, the Skanska Integrated Modeling for Construction program, says in an April press release. "Bringing together RFID, BIM and field software into a single solution has vastly improved our ability to track materials along the entire process, from the plant to erection in the structure."

Kanner says competitors in provid-

## The Meadowlands Example

Andy Dickey, business and product development manager-contractor segment, of Tekla, Inc. in Atlanta, offers this brief rundown on how his company helped Skanska track the concrete pieces used in the stadium bowl with radio-frequency ID (RFID) tags.

1. The computer model is completed and the pieces of pre-cast shown on the electronic model are numbered to correspond with the numbers on the real pieces.

2. RFID tags are hung on pre-cast pieces at four different plants 100+ miles from the job site.

3. At each stage as the concrete moves through the supply chain, the pieces are scanned electronically.

4. The computer user, whether it is the architect, the contractor or the sub, can make notes about the piece electronically as the piece moves along physically. The status is tracked on the model through color-coding.

5. This information is synchronized with a Vela Systems computer network server.

6. The Tekla Structures Model Database is then synchronized with the Vela Systems Database.

7. Then the users can create reports on the various parts of the supply chain; visualize the status of the project, etc.

Everyone "sees" what's happening in real time throughout the supply chain.

Other Uses of Tekla Structures for Construction Management software at the Meadowlands:

- Clash checking: They used Tekla Structures for Construction Management to find clashes in the model.
- Proposed fixes to problems they discovered by modeling the proposed solution.
- Modeled concrete and rebar installation and delivery.
- Coordinated the models they received for structural steel, pre-cast, etc.
- Tracked submittal status in the model by colorizing and reporting on it (e.g., green = approved, red = overdue).
- Coordinated the architectural design with the structural design and detailing (even though the architect used 2-D drawings).
- Verified painting and galvanizing was carried out properly by the steel fabricator.

Tuckman Barbee

Kelly

ing similar technology are overseas, where the processes are more common.

Vela came about, he says, when co-founder Adam Omansky, a construction manager and architect by training, was intrigued by the lack of field technology in America. Omansky decided to survey the available technologies for field management of data and CAD in 2004 when he was at Harvard's Graduate School of Design.

"He saw how much technology and software money was being spent to automate the back office... but he saw nothing out there when you were in the field. There, people still had to use pencil and paper," Kanner said.

The company founders spent "the last three years" working out how to bring drawings to the field, developing field software optimized for the Tablet PC pen-based screen, and finding the right computer to go into the field, Kanner said.

One of the key steps, says Kanner, was the Tablet PC, which had been introduced by Bill Gates as the wave of the future in 2001, but which had failed to meet expectations. The problem, Kanner says, was that for the early models of the Tablet PC, "the hype outstripped the reality." Now, he says, the Tablet PCs have "matured" and are meeting Gates' prediction.

"They are as powerful as a regular computer," says Kanner. "You can use a pen on them to write information which is translated [into the computer database]... They have a battery life of seven hours... And the screens can be viewed outside in direct sunlight."

"The technology has finally become mature enough for the construction industry to use it," Kanner said.

At the same time the Tablet PCs were evolving, so was BIM. The Meadowlands project brought the two technologies together for the first time, Dickey said.

He noted that, in early field applications in Finland, Nokia cell phones were used instead of Tablet PCs, but critics said the cell phone screens



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were hard to read and the buttons too small for easy use. Also, the coding to set up the connections was not common knowledge. "But every teenager knows how to use a PC," he said, so the directions for coding the steps in the process are easily taught.

### Supply chain management

has come a long way over the past two decades.

According to several research papers, Toyota had the first 'Just-in-Time' delivery and management system, which aimed at providing supplies to the production line in just the right amount at just the right time. Other industries took similar approaches, but experts say the construction industry has been slower in adopting new strategies.

Some pieces of the puzzle, however, have been put into place by many contractors.

Construction firms began to consider using bar codes to manage tools by the beginning of the 1990s, according to a 2006 paper on RFID-based supply chain management by Taiwanese researchers. The Taiwanese scientists, however, said the approach has some problems: Although affordable and established, bar codes can only be read close up, and become unreadable if they are scratched or dirty, the researchers wrote. They said RFID technology has been under study for construction since at least 1995, after becoming very popular in other areas.

Some of the recent research papers have also examined how RFIDs can be linked up to portals using personal digital assistants, or PDAs.

Some contractors working overseas are using Global Positioning System-enabled tracking devices and computer software to keep an eye on their expensive or highly critical equipment and deliveries shipped abroad, says John W. Barotti of Skanska USA Building Inc.

These GPS devices can be attached to items such as a new crane or a container of Italian marble, to permit



the tracking of the component in real time around the world, he says.

"These units typically update their positions every 15 minutes and can provide real-time status of critical shipments to worksites," Barotti said. "They also can be a great asset to assist in recovery efforts of stolen components in the same way that 'LoJack' works on cars. LoJack actually has a cargo protection unit also."

### Resources

for more information:  
--Vela Systems, Inc. at <http://www.velasystems.com/> or call 888.VELA.SYS, or contact Jeff Miller, Davies Murphy Group, 781-791-3170, <http://www.daviesmurphy.com/>

--Tekla, Inc., Andy Dickey, Business and Product Development Manager - Contractor Segment, Atlanta, 770-426-5105. ext. 238.

-- The Computer Integrated Building Processes Group (CIBP) at the National Institute of Standards and Technology, <http://cic.nist.gov/>

--The AGC BIM Forum, [www.bimforum.org](http://www.bimforum.org)

-- The Lean Construction Institute, [www.leanconstruction.org/](http://www.leanconstruction.org/)

--FIATECH, the nonprofit Fully Integrated and Automated Technology Consortium in Austin, an organization founded under the auspices of the University of Texas at Austin: [www.fiatech.org](http://www.fiatech.org)



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**INDEX OF  
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NRI .....22

RPG .....18

Schnabel Foundation Company .....2

Seyfarth Shaw LLP .....BC

Southland Concrete .....IBC

The 2008 Builder's Ball .....6

The Electrical Alliance .....5

Trade Source .....18

Tuckman-Barbee Construction Co. Inc. .22

Universal Concrete Products Corp. .20

Verizon Wireless .....19

Woodbridge Glass Company .....12

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