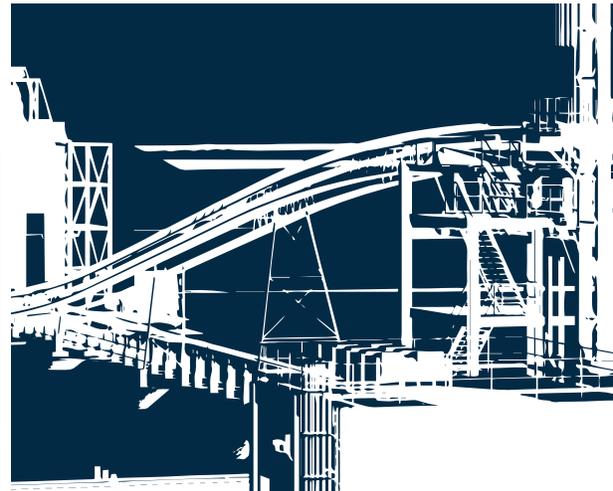
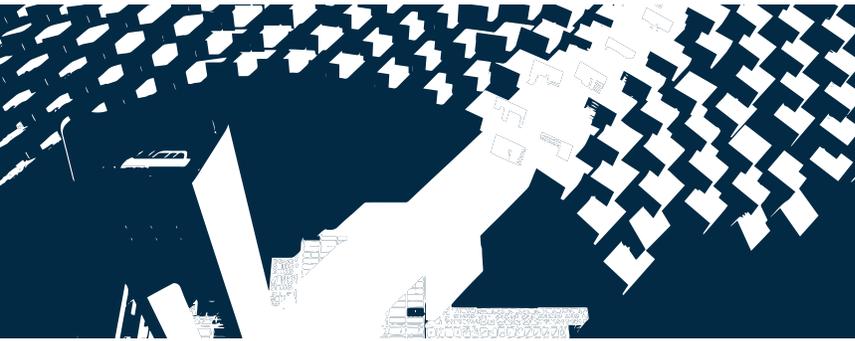
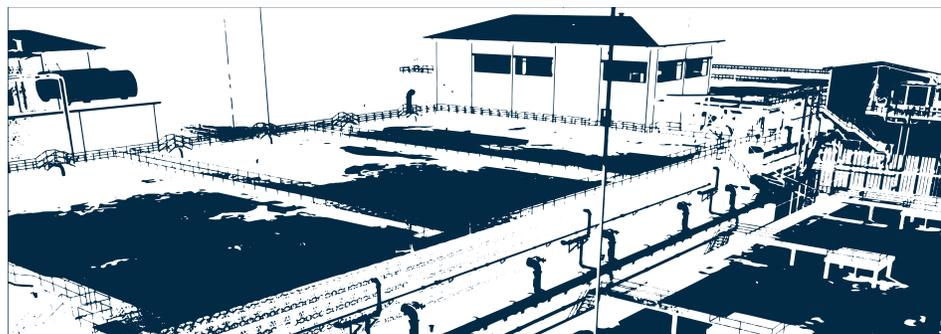


THE PROJECT DELIVERY SHOWCASE



Extraordinary Infrastructure of the *Be Inspired Awards*





Bentley's mission is to provide innovative software and services for the enterprises and professionals who design, build, and operate the world's infrastructure — sustaining the global economy and environment for improved quality of life.

The Project Delivery Showcase and *The Year in Infrastructure* series of publications are project yearbooks published by Bentley Systems, Incorporated that showcase the extraordinary work of Bentley users sustaining the world's infrastructure.

For information about how to enter your innovative project for consideration in the next *Be Inspired Awards* competition or for additional information about this program, visit www.bentley.com/beinspired.

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INSPIRATION ACROSS ENGINEERING, PROCUREMENT, AND CONSTRUCTION MANAGEMENT

The professionals who design, build, and operate infrastructure strive to improve the quality of life for people around the world and that goal is what drives the amazing projects presented in *The Project Delivery Showcase*. Within these pages you will find works of infrastructure that are inspirational on many levels: for the distances they span, the people they connect, the environment they sustain, and the complexity of the solutions they create and manage.

Bentley enables engineering, procurement, and construction management (EPCM) firms to effectively manage risk and maximize return by providing choices in key areas such as interoperability and scalability. The credentials include unique experience gained among EPCMs as the leading software platform provider for information modeling, project team collaboration, and construction simulation.

Each of the projects shown here in *The Project Delivery Showcase* has also been nominated for a *Be Inspired Award* for innovation in infrastructure. They demonstrate our society's resilience in the face of tremendous challenges, both economic and environmental, and serve as a testament to the ability of professional engineers and architects around the globe to solve any problem, great or small. These EPCM projects ensure that the infrastructure delivered will be sustainable for generations to come.

TABLE OF CONTENTS

CONNECTING PROJECT TEAMS	2 - 8
BUILDING	8 - 11
CONSTRUCTION	12 - 13
MINING AND METALS	14 - 19
POWER GENERATION	19 - 23
PROCESS MANUFACTURING	23 - 26
RAIL AND TRANSIT	27 - 30
ROADS	31 - 36
WATER RESOURCES	37 - 41

INDEX	
ALPHABETICAL BY ORGANIZATION	41 - 42

CONNECTING PROJECT TEAMS

There is an increasing need among infrastructure organizations to connect people and secure critical project information. The projects in this category demonstrate success in connecting widely distributed project teams for dynamic collaboration and work sharing to improve project performance.

CONNECTING PROJECT TEAMS

AECOM

SH 161 Phase 4

Dallas, Texas, United States

The State Highway 161 Phase 4 project in the Dallas/Fort Worth metroplex is a four-lane, 6.5-mile tolled roadway with 45 bridges and two major interchanges. The \$416 million project is the North Texas Tollway Authority's first design-build project. AECOM is the lead design team and subconsultant to the contractor. All major design elements had to be completed 15 months after notice to proceed.

Using ProjectWise for CAD file management, quality control, and document storage, AECOM coordinated 12 outside subconsultants and connected 210 users in 22 offices throughout the United States. With ProjectWise the company saved more than \$838,000 in travel, review cycles, and document management and coordination costs, returning 22 times the original investment on this project alone.



2011 FINALIST

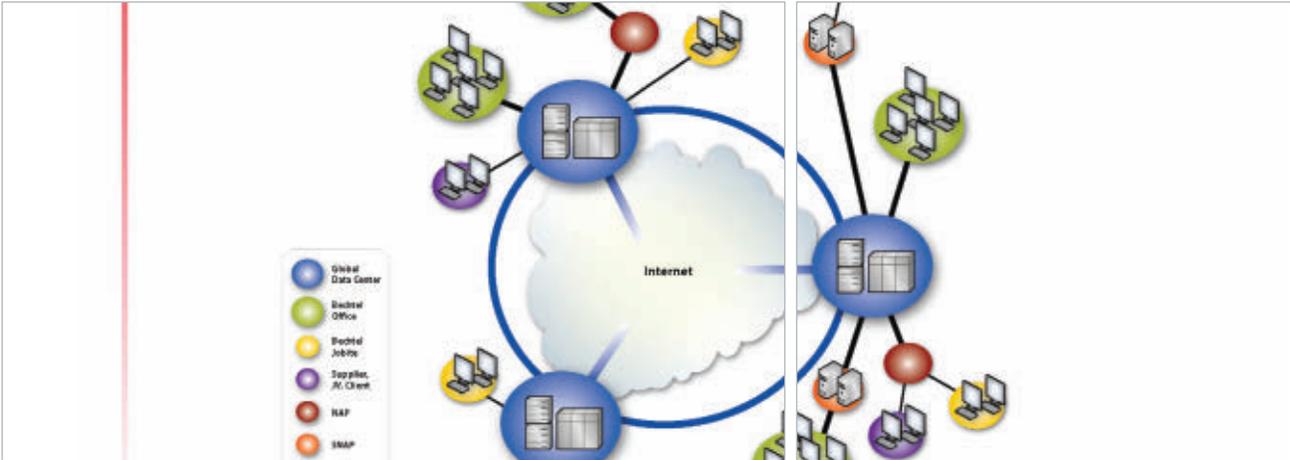
Bechtel Ltd — OGC London IS&T

ProjectWise in the Cloud

London, United Kingdom

As a global engineering, construction, and project management corporation, Bechtel faces challenges associated with the broadening geographic distribution of projects and employees; increasing numbers of non-Bechtel entities—contractors, partners, competitors, suppliers, and customers—participating on integrated project teams; and growing concerns about security, confidentiality, and data integrity. Bechtel is using cloud technology to deploy ProjectWise for project collaboration.

Bechtel's Project Services Network is accessed directly from the Internet via a portal. Bentley's Professional Services helped design the new ProjectWise architecture, write XenApp Farm add-ons, and review documentation to ensure a standard build-out would work for the global rollout. Project team members were based in London, Singapore, and Ashburn, Va.



2009 FINALIST

CONNECTING PROJECT TEAMS

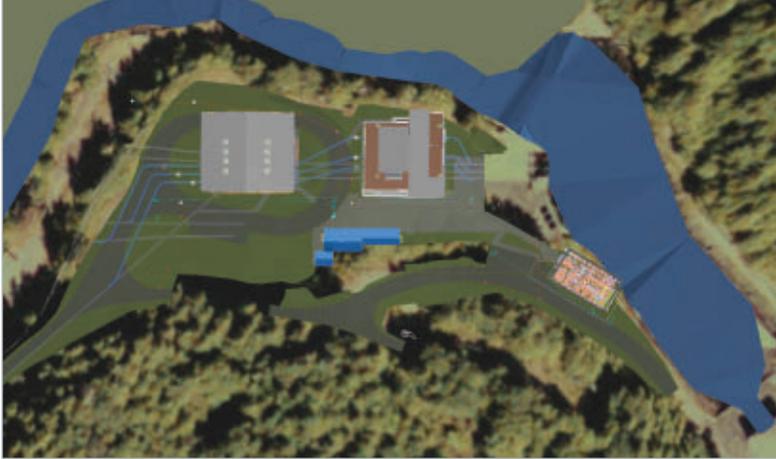
CH2M HILL

PWB Bull Run Supply Treatment

Portland, Oregon, United States

Portland Water Bureau's \$100 million treatment plant is located on a constrained site on Bull Run River in Oregon. With both MicroStation and AutoCAD applications in use throughout multiple internal offices and 28 external entities, CH2M HILL monitored consistent implementation of the project-specific standards built into each platform. Modeling datasets were also provided to building, plant, and civil disciplines.

ProjectWise caching servers connected CH2M HILL's offices over its wide area network, while ProjectWise Gateway Service and ProjectWise Web Servers connected external users. Using ProjectWise reduced ramp-up time from one week to eight hours per entity and saved eight hours per week with automated reference file management/data synchronization.



Crossrail Limited

Crossrail

London, United Kingdom

Crossrail is a cross-London rail link being developed to serve London and southeast England. The \$24.5 billion project will address London's heavy traffic congestion, providing modern trains to bring an additional 1.5 million people within a 60-minute commute of key financial and leisure centers. The project includes twin-bore 21-kilometer tunnels under central London with interchanges to the existing rail network.

To overcome the size and complexity of the project, Crossrail's integrated project team standardized on Bentley products. All of these software applications share a common software platform and contribute to a fully coordinated 3D model. The distributed project team is connected across multiple locations by the ProjectWise collaboration platform to deliver significant time and cost savings. Currently there are more than 1,300 ProjectWise users involved in the project.



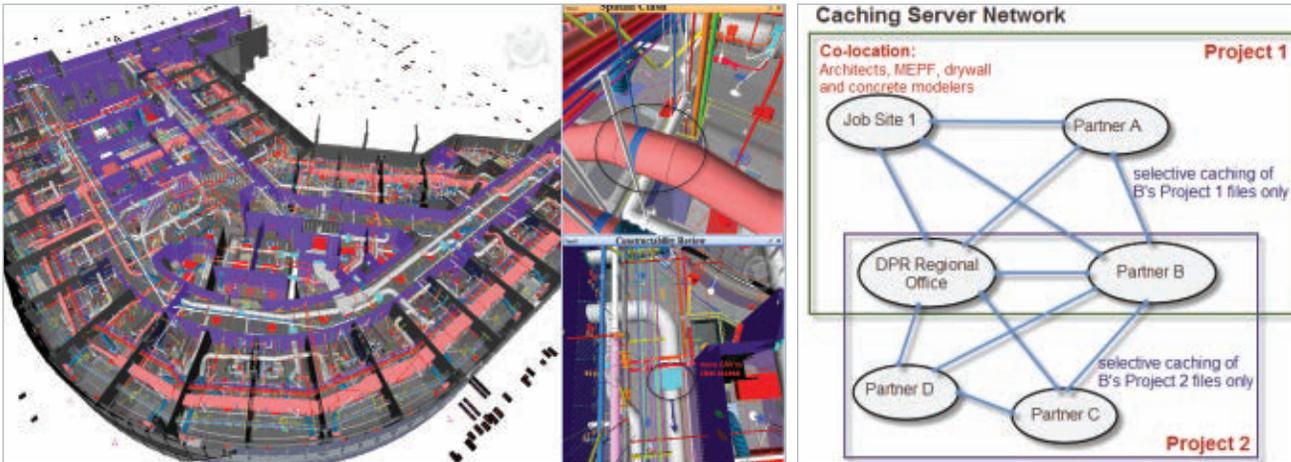
2010 WINNER

CONNECTING PROJECT TEAMS

DPR Construction
ProjectWise Implementation
San Francisco, California, United States

As the document manager relaying information between designers and specialty contractors, DPR Construction is responsible for communicating the latest information to all teams. DPR's \$500,000 ProjectWise implementation has been the document-sharing platform for 41 projects with a combined net value of more than \$2.5 billion since 2009, facilitating efficient collaboration by unifying team members in multiple companies at different geographic locations across 10 regions.

ProjectWise has streamlined information exchange and improved performance among team members by automating the workflow. San Francisco, Calif.- based DPR has a ProjectWise network that currently has 1,300 users in 300 companies. As more companies join the DPR network, ProjectWise deployment on new projects becomes quicker, and conversations that can save money and time are more direct and transparent.



DPR Construction
UCSF Medical Center
San Francisco, California, United States

The University of California, San Francisco (UCSF), brought together DPR Construction and key trade contractors to collaborate during design development for the \$1.5 billion UCSF Medical Center at Mission Bay, a six-story, 289-bed specialty hospital in San Francisco. The project implemented virtual building processes to produce coordinated documents, and minimize construction costs and schedule impacts.

One goal was to meet milestones by resolving 80 percent of issues within four hours. ProjectWise helped meet this goal by streamlining information exchange and automating workflows to improve performance among the more than 350 unique users. Compared to an FTP site, ProjectWise saved \$35,000 per design coordination area by reducing time spent managing updates. Similarly, managing reference models took 5 percent less time and sharing clash models saved \$65,000.



CONNECTING PROJECT TEAMS

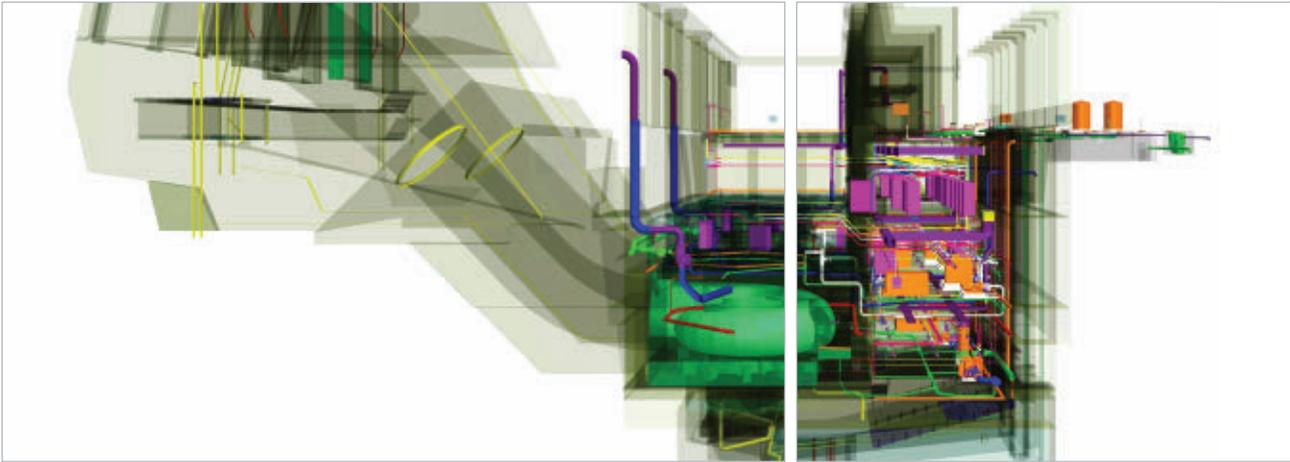
Engevix Engenharia S.A.

Hydropower Plant Coqueiros

Goias, Brazil

Located on the Claro River in Brazil, Coqueiros is a 90-megawatt hydroelectric power plant that will generate energy for 650,000 people in the state of Goias. To design the \$180 million plant on an accelerated schedule, Engevix deployed professionals in geographically distant units, some in cities 700 miles away. ProjectWise was critical to connecting people and information across project offices, enabling team members to collaborate, optimize workflows, and reduce production time by about 40 percent.

Engevix launched a training program that included OnDemand eLearning to quickly bring team members up to speed. The company also took advantage of the synergy between design disciplines. From Bentley View and MicroStation PowerDraft to InRoads and PlantSpace, team members used integrated applications to design geotechnical, electrical, and mechanical solutions. The hundreds of drawings delivered by each discipline were produced up to five times faster with fewer errors, and revisions cost half as much to generate from the 3D model.



2009 WINNER

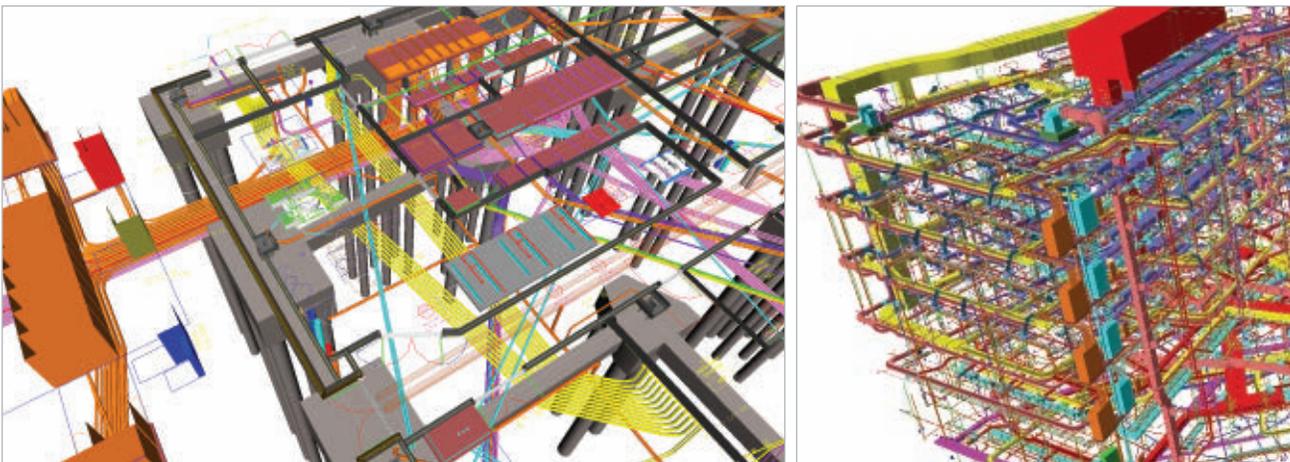
GHAFARI Associates, LLC

Sutter Medical Center

Castro Valley, California, United States

This 130-bed, 230-square-foot acute-care hospital is being designed and delivered for Sutter Health in Castro Valley, Calif., by an integrated project delivery team of 300 professionals spread throughout the United States. GHAFARI customized a ProjectWise deployment to support document sharing needs, with an integration server hosted at its main office and 10 file storage and caching servers deployed at other office locations.

All project documents—including 3D models, 2D CAD files, specifications, and other supporting information—are stored on ProjectWise. The system has connected design teams and contractors distributed over multiple locations, accelerated information sharing and communications across teams, eliminated duplication of files, and reduced rework due to the use of outdated files.



2009 FINALIST

CONNECTING PROJECT TEAMS

Hatch

How To Ensure Consistent and Real-Time Information

Postmasburg, South Africa

The goal of this project was to reduce design time, ensure consistency, and enable work sharing during project development for a new iron ore plant in the Northern Cape, South Africa. The collaboration technology applied was based on Microsoft SQL Server Replication, Microsoft BizTalk Server, and Bentley

solutions that include ProjectWise, PlantSpace, and Bentley Data Manager. Bentley's data-centric solutions ensured real-time collaboration among the more than 200 project team members in disparate locations.



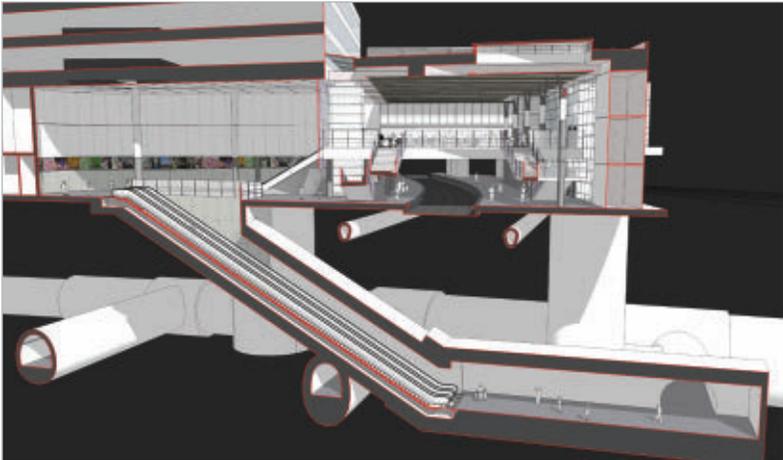
URS/Scott Wilson

Crossrail Farringdon Station

London, United Kingdom

When Crossrail opens in 2017, it will expand London's public rail transport network capacity by 10 percent. As lead designer for the Farringdon station, URS/Scott Wilson is co-located with Crossrail in Greenwich and is responsible for managing the interface with all stakeholders, including Network Rail, London Underground, and Westminster City Council.

The Crossrail project has specified Bentley software as the preferred design platform, using ProjectWise for collaboration. The project workflows follow BS1192 procedures at all stages. Using ProjectWise, the team can search, locate, and validate engineering information 35 percent faster than on previous projects. URS/Scott Wilson has estimated time savings to date of 62,200 man-hours for cost savings of £2.8 million.



2010 FINALIST

CONNECTING PROJECT TEAMS

URS/Scott Wilson

East London Line

London, United Kingdom

North and south extensions will connect the East London Line with existing rail services to expand the network and prepare for the 2012 Summer Olympic Games. URS/Scott Wilson provided design services to the joint venture partners for this project, and its major works included detailed designs for four stations, two warren truss bridges, a bowstring arch bridge, and three viaducts. Detailed designs were also provided for numerous smaller projects.

The global team was connected through ProjectWise for real-time collaboration. ProjectWise connected more than 300 professionals in 15 offices, enabling team members to search, locate, and validate engineering information 25 percent faster than on previous projects. Using ProjectWise, URS/Scott Wilson also accelerated information sharing and communications across the team. This technology will potentially save the client £5.54 million in reduced time costs.



2010 FINALIST

BUILDING

Advanced technology aids in the delivery of high-quality buildings in terms of aesthetics, adherence to program, and meeting budget. It is also increasingly critical in areas of environmental sustainability, operational performance, and compliance with regulations and accreditations. Moreover, today's buildings must provide a clear return on investment. The projects in this category demonstrate excellence in designing, building, or operating one or more buildings.

Architetto Enrico Cristoforetti
Residential Building and Public Facilities
Pontassieve, Italy

The objective of this \$4.6 million residential building project in Pontassieve, Italy, was to implement innovative energy technologies such as solar greenhouse and photovoltaic solar panels with minimal cost as compared to conventional building construction. An accurate feasibility study and ROI analysis on bioclimatic architecture was adopted as the main driver for design.

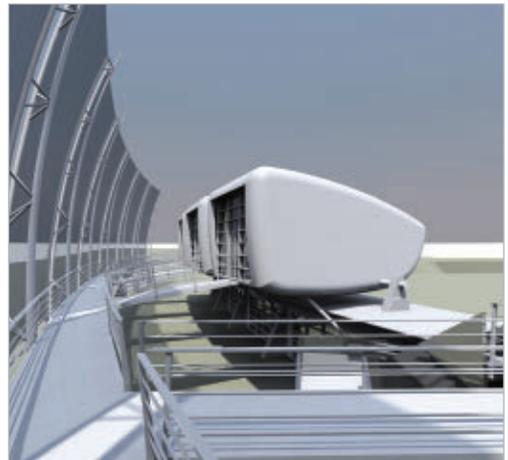
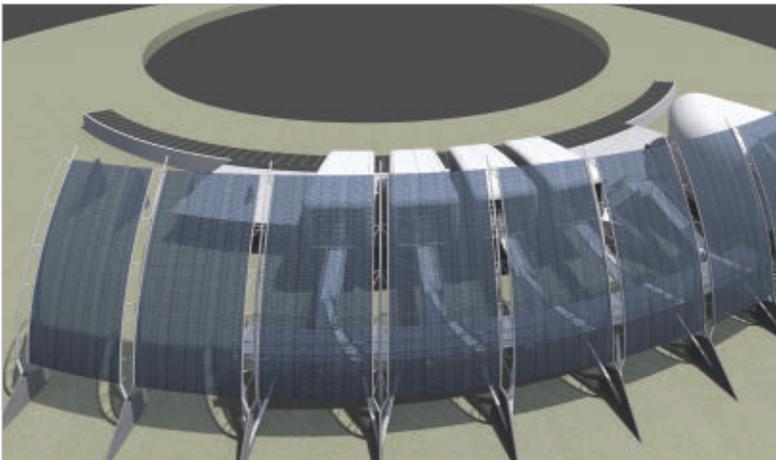
Architetto Enrico Cristoforetti used Bentley design software to facilitate rapid deployment of the project team and ensure design quality and project data accuracy. Project collaboration and data sharing for structural and mechanical design helped to optimize costs. Traditional structural design and construction methodologies were also adopted to reduce costs.



Atlas Industries
Namibian Hydrological Centre of Excellence
Western Coast, Namibia

The greatest resource issue facing Namibia today is its lack of potable water. Left unresolved, this problem could stifle the country's economic and social development. Inspired by the method used by Namibian desert beetles to catch moisture from the air, the Hydrological Centre of Excellence along the western coastline of Namibia will use its "sails" to capture large droplets of water from desert fog.

Atlas Industries' goal was to develop a design proposal for an education center that actively demonstrates alternative means of fresh water generation. The team used Bentley design software to quickly visualize 3D building models from 2D drawings. The designers then used 3D modeling for more detailed analysis of critical components of the building. The building model will provide insight into the operation of the structure and inform maintenance and development.



BUILDING

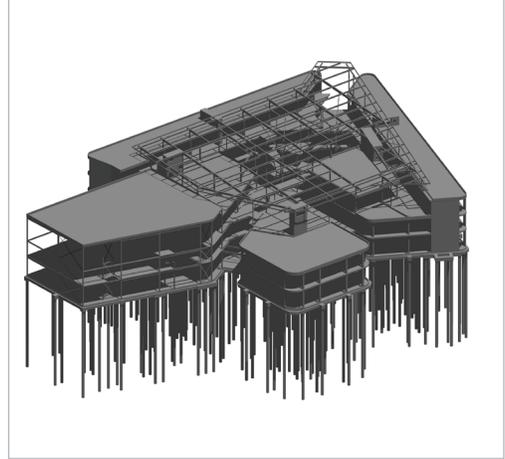
BDP

Teddington School

London, United Kingdom

The £34 million Teddington School in London, United Kingdom, fuses modern inspirational educational building design with innovative educational planning, organization, and teaching. It will replace the existing school where one of two hockey pitches was used for the new building site. As a result, the design strategy was to fit a sports hall, assembly areas, two teaching wings, an arts block, and a science block within the constraints of the existing hockey pitch.

Bentley Structural, Bentley Architecture, and STAAD.Pro brought significant project benefits. The 3D visualization formed the basis of communications with the client. The combination of 3D visualization and building information modeling allowed the design team to verify the structural solution. Combined with traditional MicroStation 2D drawings, these tools helped to inspire the client and illustrate the building form.



2009 FINALIST

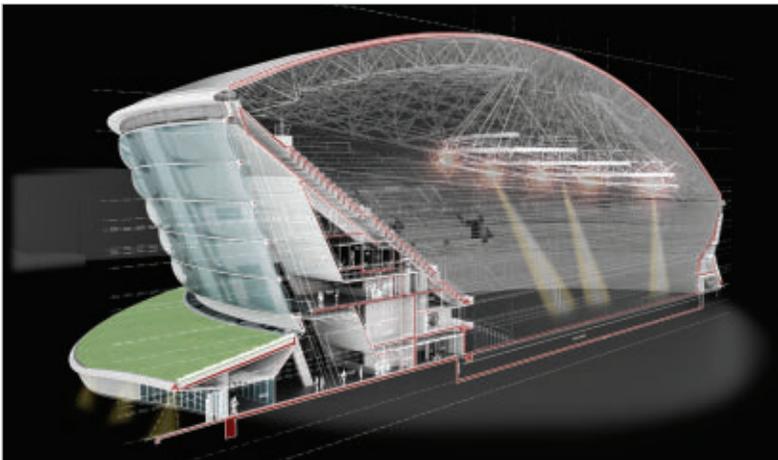
Foster + Partners

Scottish National Arena

Glasgow, Scotland

In a bid for the 2014 Commonwealth Games, the City of Glasgow, Scotland, is building an iconic event arena in the Queen Anne's dock area. The 12,500-seat stadium is located on a complex, split-level site, which called for an iterative conceptual design process to explore alternative building forms. Other design challenges included the diagrid space frame roof, doubly curved concrete bank, and curved-panel façade.

Foster + Partners used GenerativeComponents and custom scripting to rapidly explore design options and rationalize the design. GenerativeComponents helped to resolve the layout of 945 nodes and 3,312 connections in the 126-meter-span roof frame as well as to optimize the 157 facade panels for fabrication. Bentley Architecture and Bentley Navigator allowed designers to work directly with contractors to deliver a fully coordinated model.



2011 FINALIST

Lend Lease Corporation Limited **C11 EXO Hybrid Building** Melbourne, Australia

The C11 site in the Victoria Harbour master plan was designated for a multideck car park with 570 spaces serving the surrounding commercial district. The triangular shape and prime location made design a challenge. The project team proposed an unconventional solution: a seven-level car park below four levels of residential units. The hybrid building is cloaked in a façade system that disguises the mixed use.

The project team used MicroStation and Bentley Architecture to collaborate with various consultants on multiple options for site layouts. Multiple iterations were produced in relatively short periods of time. The optimum design included an efficient use of EXO-skin panels, which created a random look for the abstract building form. ProjectWise was used to manage files and drawing approvals.



Webber LLC **Ourimbah Campus Library** Ourimbah, Australia

The \$2.1 million extension of the Ourimbah Campus Library in Ourimbah, Australia, integrated the building with the adjacent quadrangle, provided an entry with a sense of arrival, and modified the interior meeting and study spaces. The double-height glazed space included a steel-framed curved stair connecting the two levels. Challenges included balancing the visual connection with the quadrangle against the need to limit heat and glare in the interior.

Using MicroStation and Bentley Architecture, most details were modeled in 3D to visualize how they would look in context. Visual communication with the client was vital to the success of the project. Accurate modeling facilitated the creation of many illustrations depicting options for several design elements, which resulted in clear client feedback.



CONSTRUCTION

Projects in this category exemplify overall excellence during the construction phase of a project. They demonstrate a clear return on investment via shortened project schedules, mitigated risks to avoid overruns, and the application of technology for advanced work processes within the construction workforce to benefit all stakeholders.

Jacobs

Automating WorkFace Planning

Corpus Christi, Texas, United States

In response to new emissions standards for diesel vehicles, a major oil company contracted Jacobs for engineering, procurement, and construction services on a diesel desulphurizer project on the Gulf Coast of Texas. Cost and safety were the driving factors. To meet the challenge, Jacobs implemented automated workface planning that integrated project data into an up-to-date, virtual construction model.

Using ConstructSim for workface planning allowed Jacobs to identify constraints and resolve issues effectively. ConstructSim accelerated creation of field installation work packages, addressed requests for information before these work packages were issued, and visualized issued-for-construction status. Jacobs saved an estimated 1,000 man-hours, improved productivity by 11 percent, and reduced rework to less than 0.5 percent.



2011 WINNER

CONSTRUCTION

Land Transport Authority Boon Lay Extension (MRT Line) Singapore

The Boon Lay Extension is a mass transit project that consists of two identical elevated stations located in the center median. The primary design goal was to have a column-free platform, giving commuters an unobstructed view of incoming trains. To accomplish this, a vault shell structure was chosen for the roof.

The complex roof geometry created multiple nodes, each bringing together six steel sections to form a series of diamond-grid frames. The undulating shape caused every node to connect at a slightly different angle. Structural engineers used the MicroStation 3D model to calculate loads, determine the sizes of the steel members, and detail the node connections that were then later used by the steel manufacturer to fabricate the roof during the construction stage.



2010 FINALIST

PT McDermott Indonesia Cuu Long Su Tu Vang Project Mekong Basin, Vietnam

The Su Tu Vang Central Processing Platform off the coast of Vietnam was a fully integrated engineering, procurement, construction, and installation project that included a 4,400-ton, eight-leg jacket; 17,000-ton floatover topsides; 66-person, 1,323-ton living quarters; pipelines; umbilicals; and manifolds. The challenge was to complete the project within 10 percent of the authorized budget while maintaining the highest safety record.

ConstructSim facilitated the fast-tracking that allowed concurrent overlapping design and construction. In just six months from contract award, the primary steel drawings were released for construction. Taking advantage of steel delivery earlier than anticipated, the fabrication schedule was moved forward by one month. Twenty-four months from the first steel-cutting ceremony, the project produced its first oil.



2010 WINNER

MINING AND METALS

Mining and metals engineering professionals strive to shorten project schedules and lower operating costs through improved access to mission-critical information. The projects in this category use software to demonstrate both short-term and long-term benefits that not only improve the performance of engineering and construction capital projects, but also increase the efficiency of operations for mines and metals processing and refining plants.

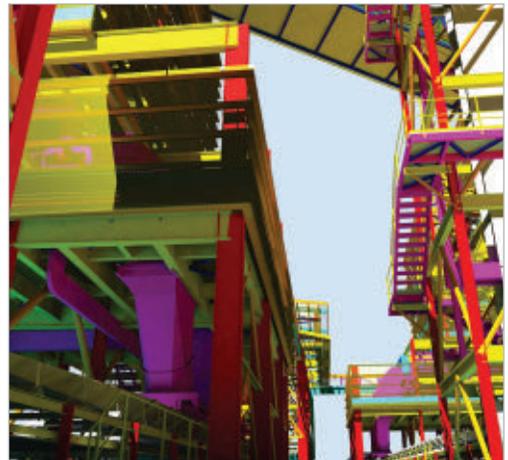
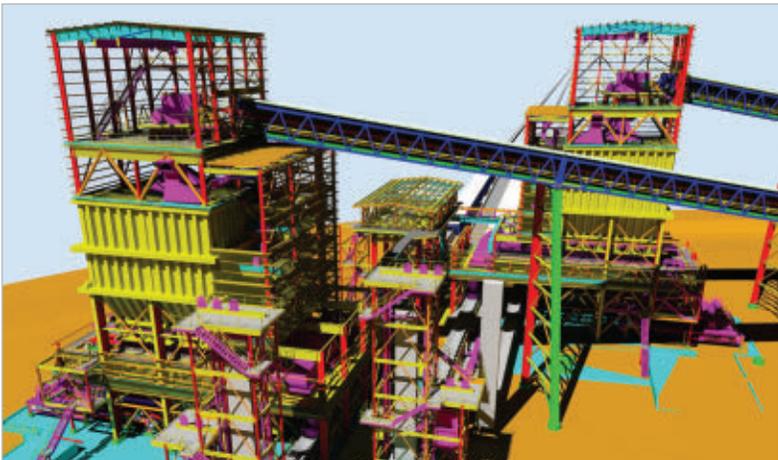
Aurecon Hatch

Collaboration Using Bentley Navigator

Hay Point, Australia

BHP Billiton Mitsubishi Alliance is expanding its coal mining operations in the northern section of the Bowen Basin in Queensland, Australia. The capacity of the Hay Point Coal Terminal will increase from 44 to 55 metric tons per year in a first-phase expansion. A potential second stage would increase capacity from 55 to 75 metric tons per year.

BHP Billiton Mitsubishi Alliance, Bechtel, and Aurecon Hatch collaboratively completed the project definition using Bentley Navigator. Work hours were reduced by approximately 25 percent compared to the hours required to produce traditional drawings, and engineer training time was reduced by 50 percent.



MINING AND METALS

Aurecon Hatch

Wiggins Island Coal Terminal

Gladstone, Australia

The AU\$2 billion Wiggins Island Coal Terminal will provide additional export capacity for the central Queensland coal industry. This project entailed new rail works, a rail dump station, a six-kilometer overland conveyor, a stockyard, and an export berth. The project goals encompassed the adoption of state-of-the-art technical solutions and caused zero harm to the sensitive Great Barrier Reef marine park and local Gladstone community.

Initiated in a 2D environment, project communication and coordination were not aligned with best practices so Aurecon Hatch implemented a data-centric 3D environment. Bentley Navigator provided a platform for visualizing complex designs, which aided reviews across disciplines and by stakeholders. Bentley 3D software helped to reduce the schedule by 15 percent and rework by 10 percent through improved clash detection.



2010 FINALIST

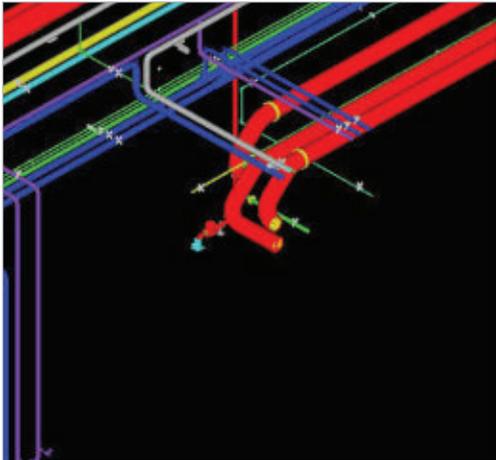
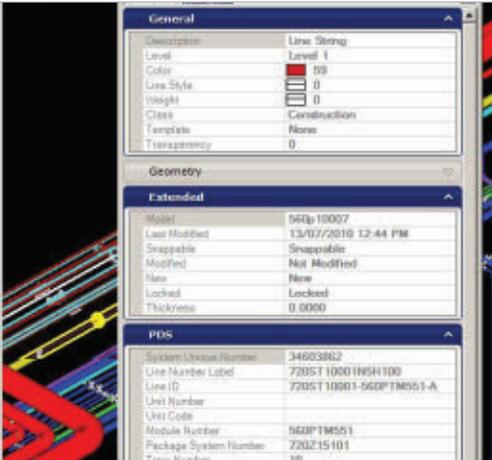
Bechtel Australia

Y2

Gladstone, Australia

Yarwun Stage 2 is a \$1.9 billion expansion of the alumina refinery in Queensland, Australia, which will increase production by 2 million tons per year for a total of 3.4 million tons per year. For the Stage 1 design, the main 3D modeling tool was PDS. In Stage 2, parts of the design referenced Stage 1 models and data. Therefore, it was a requirement to use PDS for the Stage 2 design.

The client, Rio Tinto, required a data handover and used MicroStation and ProjectWise. Bechtel decided that it was logical to convert the PDS model into an intelligent 3D model in MicroStation, saving a system upgrade. The PDS models were converted to MicroStation using ProjectWise PDx Dynamic Review Service. ProjectWise was also used to keep the models and data current and available.



2010 FINALIST

MINING AND METALS

Hatch Africa (Pty) Ltd

QMM Ilmenite Project

Fort Dauphin, Madagascar

The primary goal of this project was development of a productive ilmenite mine consisting of a mining extraction pond, dredger, wet plant, and mineral separation plant. Before construction of the \$900 million industrial facility could commence in Fort Dauphin, Madagascar, Hatch Africa had to design and build extensive ancillary services and infrastructure including a port, power station, roads, water supply, and communications networks.

Hatch improved workflows and reduced costs by deploying 3D plant design using MicroStation as the CAD platform and software including Bentley Structural, TriForma, PlantSpace, and Bentley Navigator. The intelligent 3D models reduced 2D drawing deliverables and produced steel fabrication and construction drawings as part of the engineering effort. This ensured that the steel fabrication contract order could be placed earlier than normal, which improved the critical path of the construction schedule.



2009 WINNER

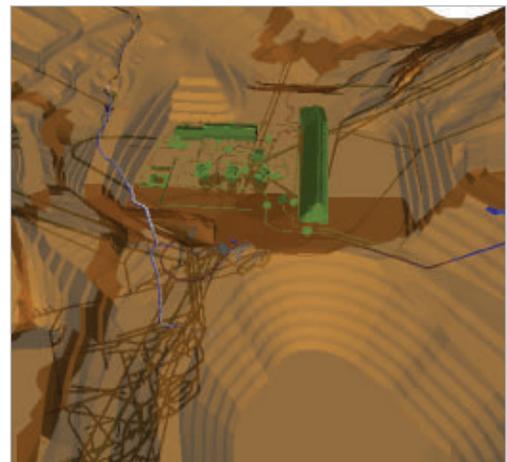
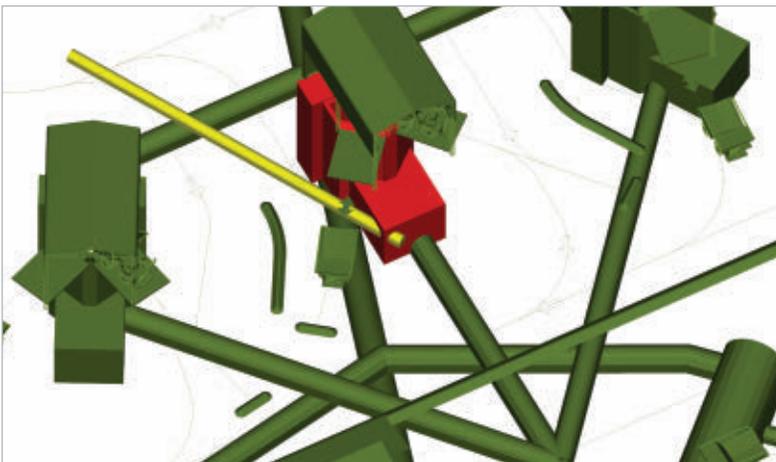
Hatch

Dynamic 4D Environment To Analyze Constructability and Safety

Santiago, Chile

The Andina Division of CODELCO, a Chilean state-owned copper mining company, asked Hatch Chile to develop a dynamic 4D environment to analyze the engineering design, constructability, and safety conditions of projects to be executed from 2010 to 2016 within a 2-kilometer area of the Phase II development project.

Hatch Chile based the solution on the integration of Bentley 3D modeling tools to create a visualization and review module. Leveraging the high-level capabilities of Bentley Navigator, the solution enables dynamic 4D visualization and design review of projects during a given time period within the area of interest.



Hatch

Re-establishment of the Fenix Ferronickel Production Facility

Izabal, Guatemala

The goal of the Fenix project in Izabal, Guatemala, was to refurbish and upgrade a 1970s-era nickel mine and nickel matte processing plant to allow low-cost ferronickel production. This entailed modifying the process plant, changing the fuel source from oil to coal, upgrading existing and installing new equipment and environmental systems, and upgrading regional infrastructure.

Estimated at \$750 million, the project encountered obstacles and opposition requiring major modifications. Using the PlantSpace and Hatch work-sharing methodology allowed the project team to work in several Hatch offices as well as with specialized subcontractors. Layouts, critical tie-in points, and material takeoffs were reviewed in weekly 3D design reviews until the project was suspended in late 2008.



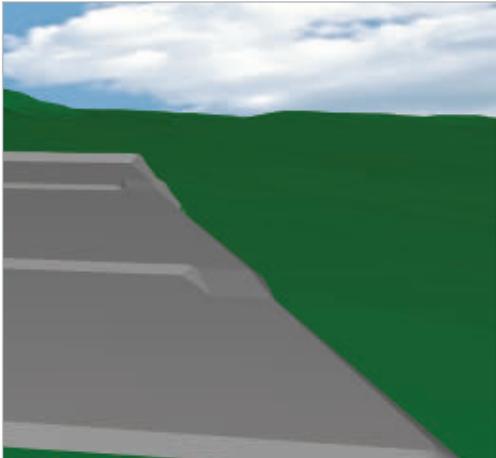
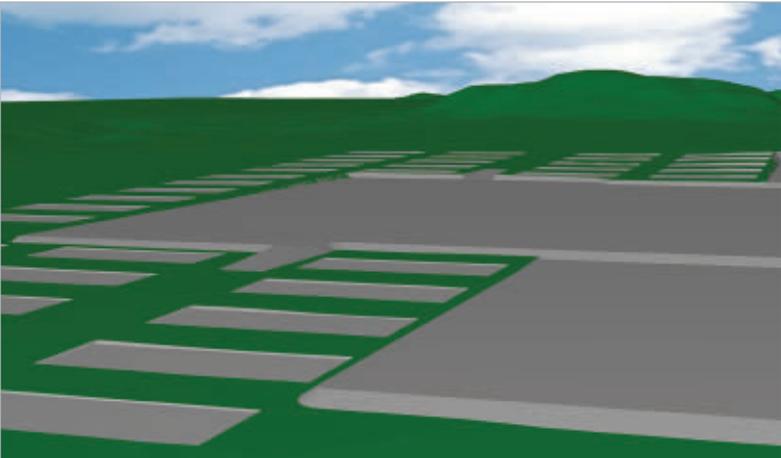
Hatch

Sustainability Challenge of Moving 10000000m3 of Earthworks

Canaa dos Carajas, Brazil

When two projects near Canaa dos Carajas, Brazil, resulted in 10 million cubic meters of earthwork, Hatch was challenged to minimize the environmental impacts in the project region. The project team developed several studies to observe the client's sustainability guidelines.

Using the InRoads suite, the team defined the best platform position, adopting as a rule the best natural profile of the land. Bentley solutions optimized infrastructure work efficiency for both projects.



MINING AND METALS

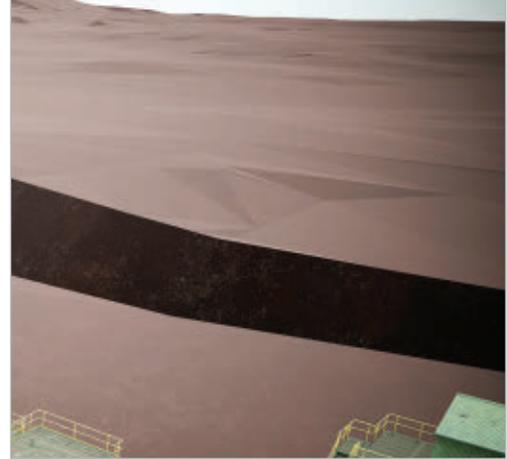
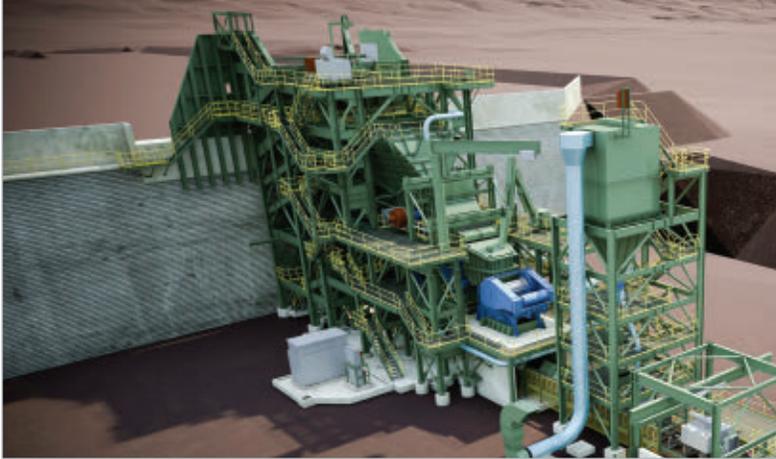
PDC Consultants

Brockman Syncline No. 4 Project

Pilbara, Australia

For the \$1.5 billion mining facility in Pilbara, Western Australia, PDC Consultants provided 3D modeling and shop detailing for over 4,000 tons of mechanical and structural steel and associated platework. The facilities included a primary and secondary crushing facility; product screening facility; product sampling stations; stacker, reclaimer, stockpile, and train lead-out bin; and 10 interconnecting conveyors and transfer stations.

ProSteel provided PDC with an efficient and powerful solution that enabled collaboration across detailed engineering phases, cutting 10 to 20 percent off the estimated modeling and detailing man-hours. This ensured the project was completed earlier than expected within the aggressive schedule. Construction sequencing and planning tools assisted in delivering an accelerated construction program.



2010 WINNER

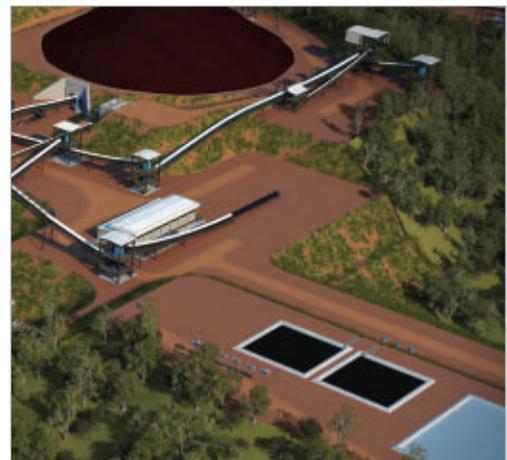
SEI Engenharia Ltda

Cristalino Project

Carajas, Brazil

Vale, the second largest mining company in the world, is building a \$2.6 billion copper plant in northern Brazil that will produce 16 million tons per annum of run-of-mine with average annual production of 340,000 tons of copper concentrate. SEI Engenharia was contracted to perform front-end loading and deliver a 3D model, which was unprecedented at Vale.

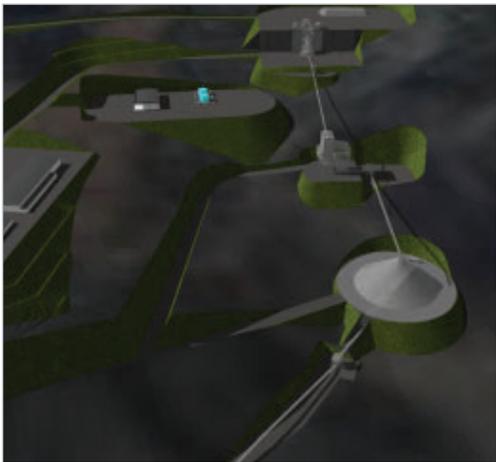
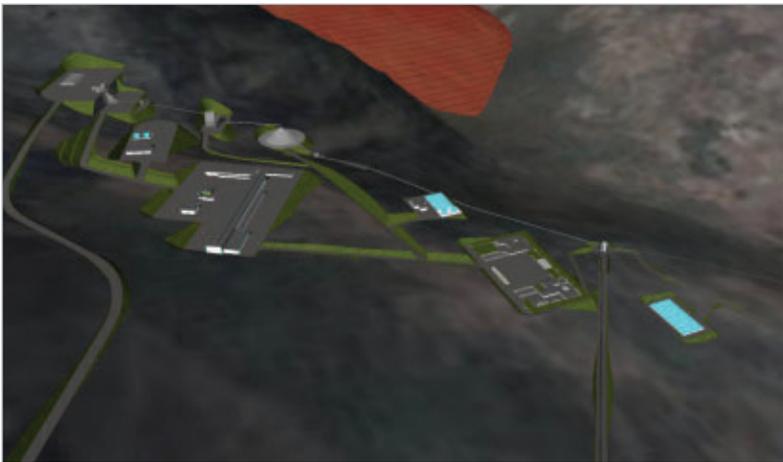
SEI trained a multidisciplinary design team to use MicroStation, Bentley Architecture, Structural Modeler, InRoads, and Bentley Navigator for modeling infrastructure, concrete structures, steel structures, substation, and industrial installations. The integrated workflow saved about 5,100 man-hours and reduced front-end loading costs by \$400,000.



2011 WINNER

The \$2.5 billion Simandou Iron Ore Project is located in a remote region of Guinea, West Africa. Poor base topography and the absence of established infrastructure make the project particularly challenging. In addition to the mine, processing facilities, and on-site infrastructure, the project includes a heavy-haul railway spanning over 800 kilometers, and a major port and ship-loading facilities at Conakry on the coast.

SNC-Lavalin/Minerconsult performed the feasibility study and conceptual design for the ore mining, stockpile, and rail-loading facilities. Using Bentley's integrated products, including MicroStation and PowerCivil, the project team was able to exclude the most expensive earthworks and detect clashes, thereby lowering costs. When presenting the conceptual design to the client, the 3D model helped the client to visualize the project.



POWER GENERATION

From the largest utility to the smallest rural or municipal utility, power professionals work to efficiently produce and deliver energy. They share the common goals of improving efficiency, reducing cost, and delivering better customer service while sustaining and expanding aging power generation plants and adding new generation capacity. This category recognizes innovative projects ranging from the traditional fossil fuel power plants to nuclear power stations and renewable energy sources such as hydroelectricity, solar, and wind power.

POWER GENERATION

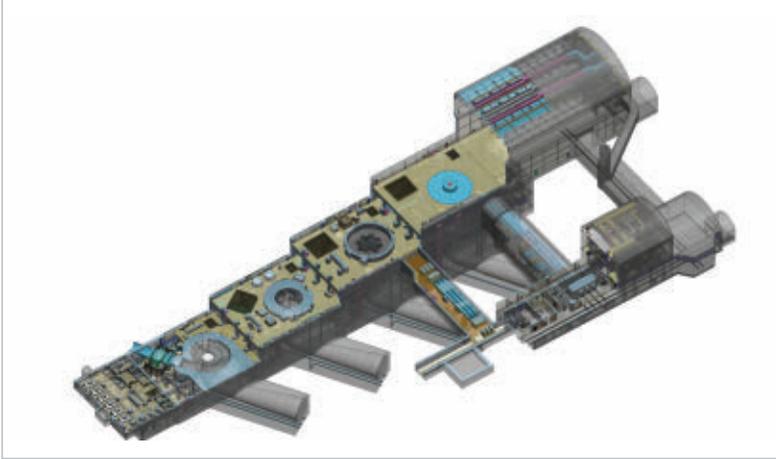
ECIDI

Pumped Storage Power Station

Hangzhou, China

Pumped storage power is a type of hydroelectric power generation that is currently the most cost-effective means of storing large amounts of electrical energy. China plans to increase its pumped storage power installed capacity from 10.9 to 50 gigawatts by 2020. Pumped storage power is increasingly important to the grid due to its significant social and economic efficiencies in energy savings, environmental protection, and lower carbon offsetting.

With the implementation of MicroStation, ProjectWise, Bentley Architecture, Structural Modeler, PlantSpace, promis•e, and Bentley Navigator, East China Investigation and Design Institute (ECIDI) shortened the concentrated design cycle from three months to two weeks. With this new technology, ECIDI has become the top hydro-solution designer, winning the largest share of the pumped storage power market (45.7 percent) in China.



2010 FINALIST

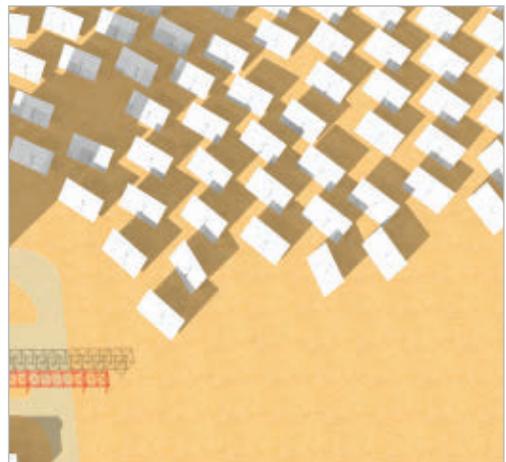
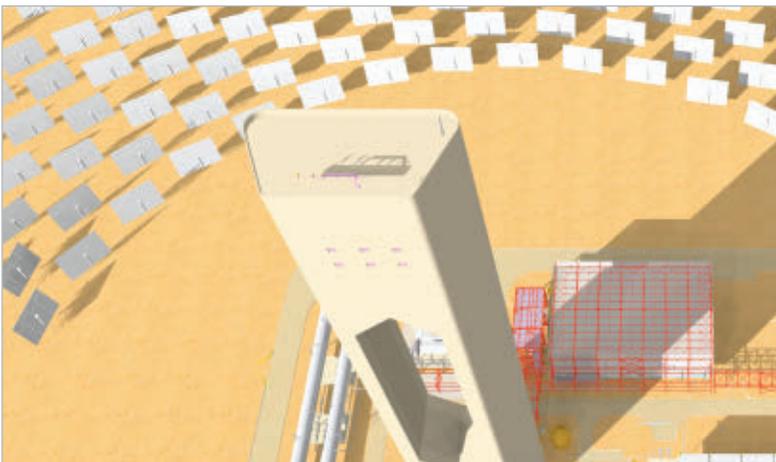
Energoprojekt Gliwice, S.A

Central Solar PS20

Sanlucar la Mayor, Spain

The goal of this project was to design a second solar power plant on Abengoa property near Seville, Spain, based on the existing power plant design but doubling the power output. The 80 million euro PS20 solar unit will have a 20-megawatt capacity, generating 48.6 gigawatts per hour per year of clean energy, which is enough to supply about 12,000 households.

Energoprojekt Gliwice pioneered the use of this technology in large-scale facilities. At this site, steam parameters and periodic plant schedules caused by day-night changes influenced the chosen materials and design solutions. Atypical equipment requirements led to frequent changes in piping and structure. Basic and detail engineering design were performed using MicroStation PowerDraft, PlantSpace, and TriForma.



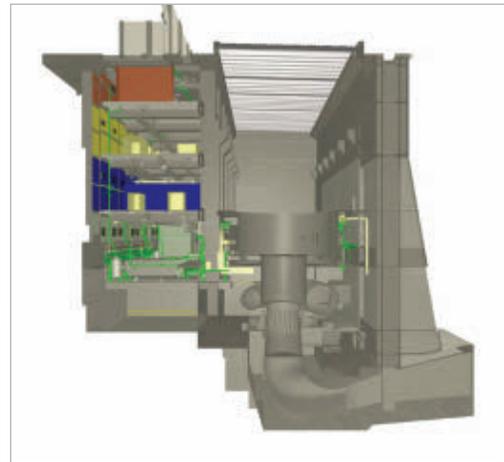
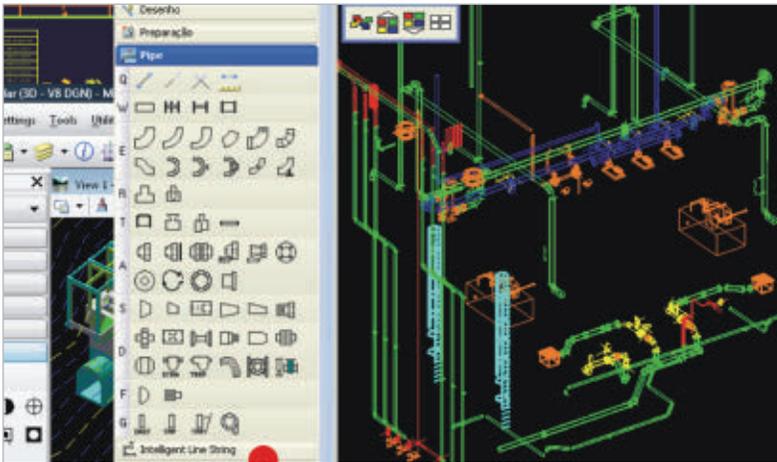
2009 WINNER

POWER GENERATION

Engevix Engenharia S.A Hydropower Plant Sao Domingos Agua Clara, Brazil

Engevix Engenharia designed the \$150 million, 48-megawatt Hydropower Plant São Domingos in Brazil with project team members spread across multiple offices. It was critical that information be available to the geographically separated partners, including an important turbine supplier in China. This collaborative approach enabled Engevix to negotiate a 45 percent better deal than was available from local suppliers.

Using ProjectWise, MicroStation, MicroStation PowerDraft, InRoads, TriForma, PlantSpace, Structural Modeler, and Bentley Building Mechanical Systems, Engevix has established intelligent design environments, enabling its designers to become 30 percent more productive. Its supply chain is also in this environment and it has decreased revisions by 70 percent. Since implementing ProjectWise, Engevix has set up more than 700 users on 160 different projects.

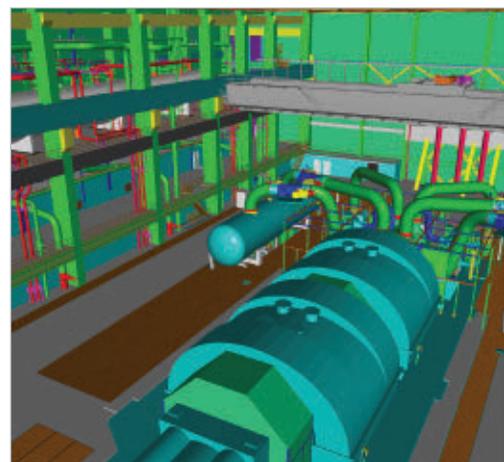


2010 FINALIST

Guangdong Electric Power Design Institute Hongyan River Nuclear Power Plant Dalian, China

The 4x1,000 megawatt Hongyan River Nuclear Power Plant is the first nuclear power plant in northeast China and the first to be approved for simultaneous construction of four units. To facilitate cooperation among the multiple Chinese and foreign companies participating in the \$730 million project, Guangdong Electric Power Design Institute implemented a 3D design environment to promote collaboration throughout the design lifecycle.

Bentley solutions covered building, plant, and structural design as well as provided the content management platform. The 3D models supported design reviews, interference checking, and design communication. ProjectWise allowed team members to access the right information in real time for a paperless workflow. The 3D design process increased productivity by 10 percent, saving 4,000 work days, and decreased the probability of clashes by 90 percent.



2011 FINALIST

POWER GENERATION

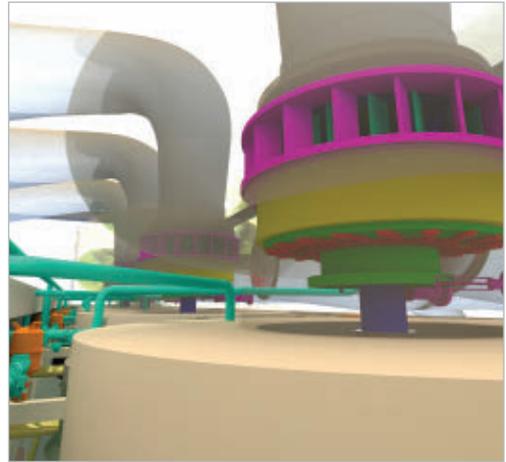
HydroChina Zhongnan Engineering Corporation

Tuoba Hydro-Power Station

Diqing, China

The \$1.9 billion Tuoba Hydro-Power Station will provide China's Guangdong Province with 410 megawatts of renewable energy each year. HydroChina Zhongnan Engineering shortened design time from six months to 39 days. MicroStation, Bentley Architecture, Structural Modeler, GEOPAK, PlantSpace, promis•e, Bentley Navigator, and Bentley Substation improved design efficiency, and facilitated communication and cooperation among disciplines.

ProjectWise connected on-site designers with headquarters, ensuring everyone used the enterprise standards and latest file versions. This technology saved HydroChina Zhongnan 50 percent of the cost associated with managing enterprise standards. Other efficiencies gained included shortening layout design time from one or two weeks to less than eight hours and cutting final drawing production time from two or three days to just one day.



2011 FINALIST

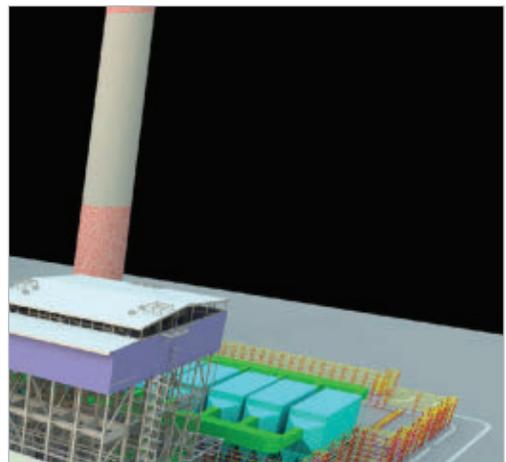
L&T—Sargent & Lundy Limited

3x660 MW Supercritical Thermal Power Plant

Nagpur, India

As part of India's initiative to replace aging power stations with environmentally friendly plants, a 3x660 megawatt supercritical thermal power plant is under construction in Nagpur, India. L&T – Sargent & Lundy provided complete engineering solutions for the \$1.5 billion project. To meet the challenge, the team relied upon a coordinated and controlled 3D environment based on Bentley products for plant model integration.

MicroStation and Bentley Navigator ensured team members working from disparate locations with consistency from conceptualization to detailed design. The customized platform also made it easier to manage changes, which fostered a culture of innovation. Use of 3D models embedded in 2D drawings and high-definition videos to clarify complex areas accelerated project progress. Bentley software helped to reduce engineering time by 10 percent.



2011 WINNER

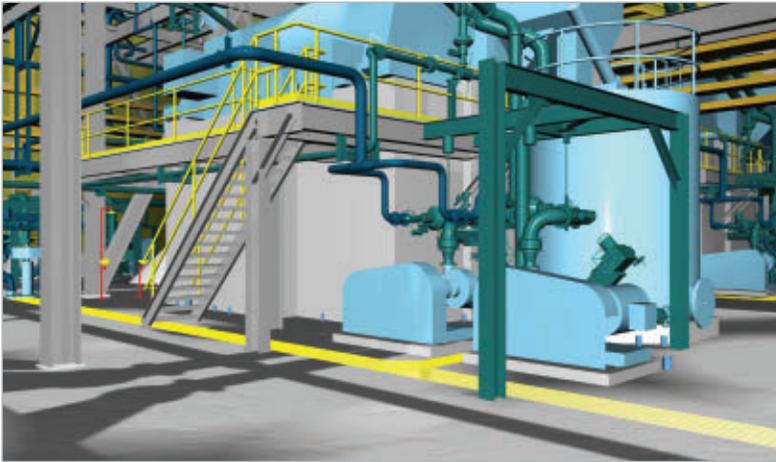
Sargent & Lundy, LLC

Coffeen Wet FGD Unit 1 and 2

Coffeen, Illinois, United States

At more than 40 years old, the two-unit 1,000-megawatt Coffeen power station has gone through various retrofits and modifications to improve its efficiency. To meet the latest federal clean air legislation, it required \$500 million in modifications to burn high-sulfur coal while meeting emissions standards. Sargent & Lundy developed an optimized design for installing SO₂ scrubbers on both units and a new electrostatic precipitator on Unit 2.

MicroStation, Structural Modeler, Bentley Navigator, TriForma, and STAAD.Pro managed the 3D model and integrated more than 900 models from equipment suppliers. This facilitated accurate and up-to-date internal and external design reviews, interference checking, and design communications. The products also helped construction sequencing to minimize plant outage time and construction costs.



2009 FINALIST

PROCESS MANUFACTURING

This category covers a wide range of industries including upstream and downstream oil and gas facilities, petrochemical and chemical complexes, pharmaceutical and manufacturing plants, and more. For greenfield plants and retrofits to existing plants, safety and environmental concerns are at the top of the priority list, and the management of engineering information and innovative use of technology are critical to achieving project success and process improvements.

PROCESS MANUFACTURING

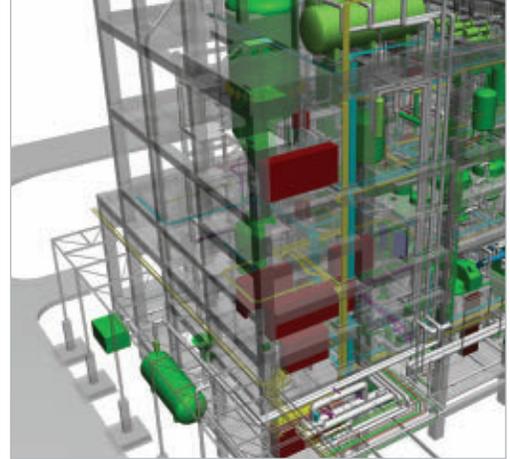
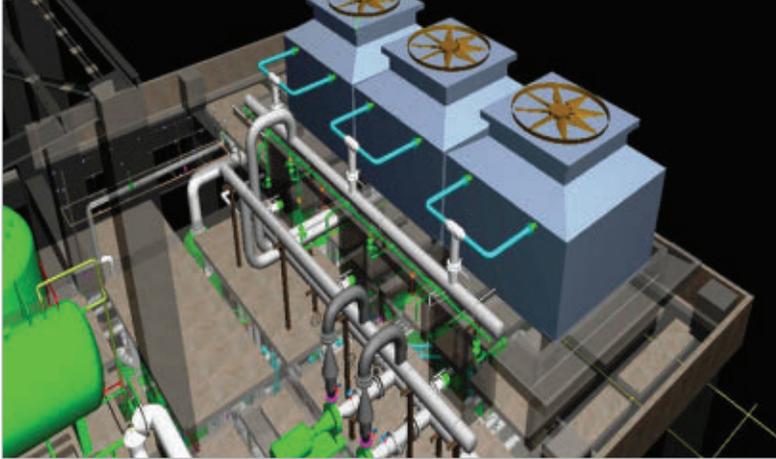
Ausenco Engineers Pvt. Limited (Ausenco Sandwell)

Continuous Polymerization Plant

Bajpur, India

Polyplex India set up an 8.7-meter-wide polyester (PET) film line with a continuous process chips plant and metalizer at a new location in Bajpur, India. Ausenco Sandwell developed the 3D model to generate a clash-free piping and equipment layout for the chips plant comprised of 180 to 200 pieces of equipment and 650 lines. The project also called for high-end process conceptualization, piping material specification, and modeling of specialized equipment.

AutoPLANT was used to develop a model meeting all process requirements and extract drawings, isometrics, and bills of quantity. The stress model for critical pipelines analysis was created in AutoPIPE and structural design and detailing was completed using STAAD.Pro and ProSteel. The modeling seamlessly integrated all design groups and contributed to achieving a tight execution schedule with minimum rework.



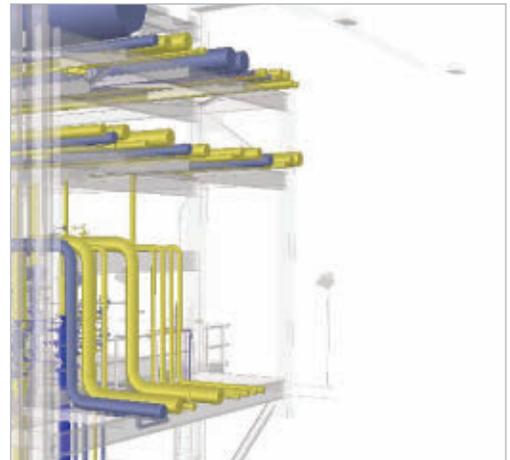
Cianbro

Motiva Crude Expansion Project

Brewer, Maine, United States

In January 2004, a paper mill that had operated in Brewer, Maine, for more than 100 years closed its doors, leaving behind blighted brownfields and economic hardship for the community. Cianbro Constructors revitalized the site and the entire community in partnership with South Brewer Redevelopment LLC by turning this abandoned paper mill into the state-of-the-art \$110 million Eastern Manufacturing facility to fabricate and construct 54 modules for the Motiva Refinery in Port Arthur, Texas, as part of the 325,000 barrel-per-day Crude Expansion Project.

Cianbro deployed ConstructSim and its rich 3D visualization capabilities to show the workers what they were building overall by module and down to the detail for each piece of pipe and structure. ConstructSim also helped them plan, sequence, execute, and monitor all the construction activities from within the data-rich plant model. ConstructSim enabled Cianbro to visually communicate the massive scope of this project at all levels—from the media, engineers, and production team to the construction crews themselves.



2009 WINNER

PROCESS MANUFACTURING

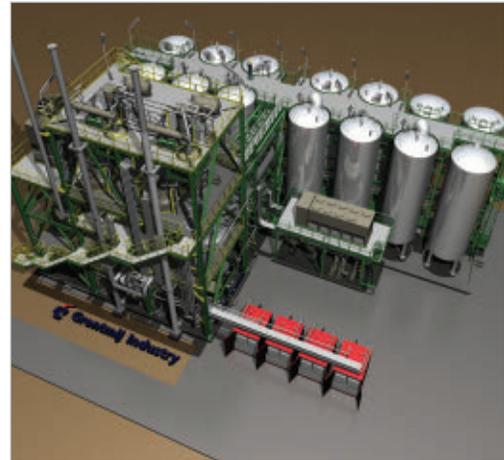
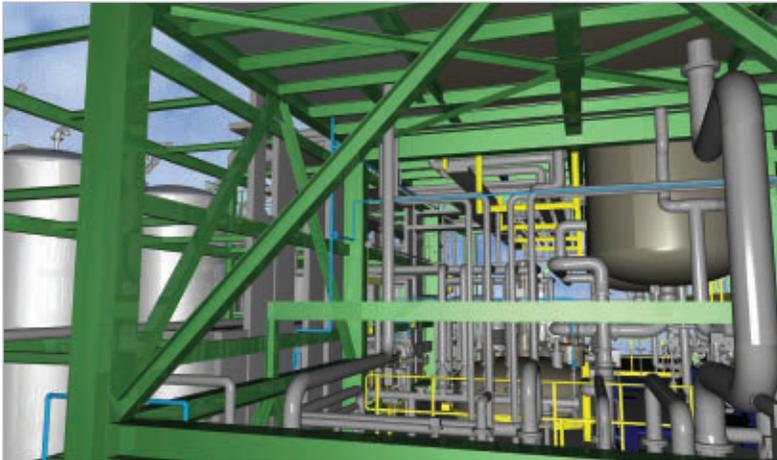
Grontmij Industry

Fully Automatic Production Unit for Sika

Zwijndrecht, Belgium

Grontmij Industry provided engineering, procurement, and construction management for a \$12.9 million high-performance concrete plasticizer production installation at the INEOS Oxide site in Antwerp, Belgium. The project needed to be built as fast as possible so it was split into three phases— storage area, chiller area, and process area. This enabled engineering, procurement, and construction of each subphase to take place concurrently.

AutoPLANT was used in this fast-track project to enable geographically distributed team members to centralize design data from all disciplines in a master 3D model. Grontmij requested bids in three stages with just a 3D review file plus detailed bill of materials. This made the scope of work clear to all contractors and decreased bidding time. Contractors were selected and 2D deliverables finalized for each phase while design progressed on later phases.



2010 WINNER

Hatch

Feasibility Study of El Lajjun Oil Shale Project

El Lajjun, Jordan

Hatch's regional office in Calgary, Canada, was retained to conduct a feasibility study and conceptual design for the El Lajjun Oil Shale Project in El Lajjun, Jordan. Based on the 30 percent complete design, the project team rapidly produced a cost estimate. Accurate material take-offs were automatically generated from the models.

Hatch deployed PlantWise, PlantSpace, Structural Modeler, and InRoads for design and Bentley Navigator for design reviews. PlantWise enabled the project team to produce accurate MTOs and plot plans at a point in the design phase when that level of detail is not typically required or expected.



PROCESS MANUFACTURING

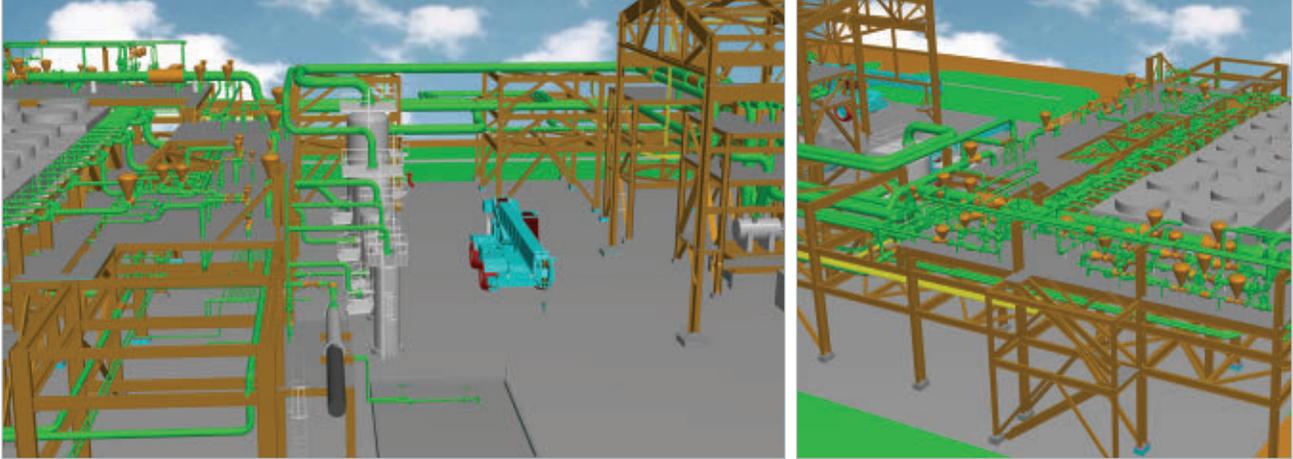
Larsen & Toubro Limited

Gas Recovery and Injection Project

Abu Dhabi, United Arab Emirates

Abu Dhabi Gas Industries is conducting a pilot test of gas recovery and injection at the Habshan Gas Processing Plant north of the United Arab Emirates' capital city. The \$90.7 million project must be completed within 34 months. To bid on the lump sum turnkey project, Larsen & Toubro performed detailed engineering and construction modularization using Bentley solutions.

PlantWise expedited the pre-bid engineering package development, AutoPIPE calculated loads on critical lines, and STAAD.Pro checked the structural feasibility of piping runs. PlantWise generated annotated general arrangement drawings to ensure no clashes. Interoperability enabled fast and efficient 3D model generation, data sharing among disciplines, and shorter review times. Compared to other platforms, 3D modeling cost 2.25 times less using Bentley solutions.



2011 FINALIST

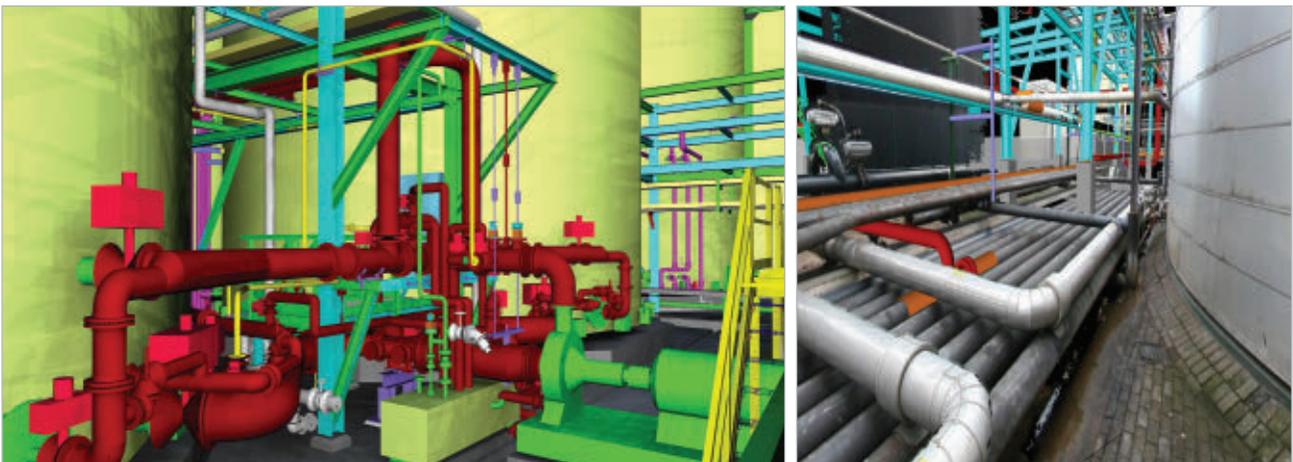
Royal Haskoning Industrial Engineering

Vopak Tank Terminal Expansion Project

Rotterdam, Netherlands

Royal Haskoning Industrial Engineering designed the tank storage and distribution system for a \$60 million expansion of the Vopak Tank Terminal in South Holland. The project involved detailed engineering of the utility system; pipe racks for process, utility, and distribution lines; cable trays and instrumentation panel; and platforms for operation and maintenance. 3D laser scanning was used to compile exact as-built data of the existing plan.

Teams in India and the Netherlands started design and modeling of different areas simultaneously. The 3D models developed using AutoPLANT, ProSteel, and STAAD.Pro were accurate, and Interference Manager facilitated the smooth integration of models developed in both locations. The integrated 3D models facilitated smooth execution in the construction phase.



2010 FINALIST

RAIL AND TRANSIT

The projects in this category share the common goals of driving down maintenance costs, improving asset knowledge and reliability, managing rail real estate, renewing and reconfiguring existing infrastructure, designing and delivering new infrastructure, and planning urban integration. These projects demonstrate innovation in the rail and transit lifecycle, ranging from data collection and design to maintenance and capital project planning.

AECOM

Neasden Depot Upgrade Project

London, United Kingdom

AECOM set a goal of providing London Underground with a means to build and deliver key new infrastructure for Neasden Depot, London Underground's largest rail depot. AECOM also plans to maintain a fully operational facility throughout the six-stage construction program of demolition, refurbishment, and new-build elements that represent the largest rail depot upgrade in London in recent years.

MicroStation, Bentley Rail Track, and Bentley PowerRebar were used for the depot's multidisciplinary design and project management. Creating a single building model with Structural Modeler and incorporating 3D renditions of key design elements resulted in significant time and cost savings. AECOM deployed ProjectWise to rigorously control project data and develop an integrated working team.



2010 FINALIST

RAIL AND TRANSIT

Hatch Mott MacDonald

Toronto-York Spadina Subway Extension

Toronto, Canada

The Toronto Transit Commission engaged Hatch Mott MacDonald to design the 6.7-kilometer tunnel segment of the \$730 million Toronto-York Spadina Subway Extension. The twin-bore tunnels pass under buildings, railways, highways, waterways, and utilities to connect six subway stations. Hatch Mott MacDonald realized cost benefits by using Bentley software to design the tunnel lining system, six emergency exit buildings, and seven tunneled cross passages.

Track alignment was designed with InRoads, building structures were analyzed with STAAD.Pro, and emergency exit building models and drawings were produced with Structural Modeler. The company used MicroStation to model the tunnel lining system's steel reinforced rings and 3D modeling of the entire alignment and associated structures established a single integrated model.



2011 WINNER

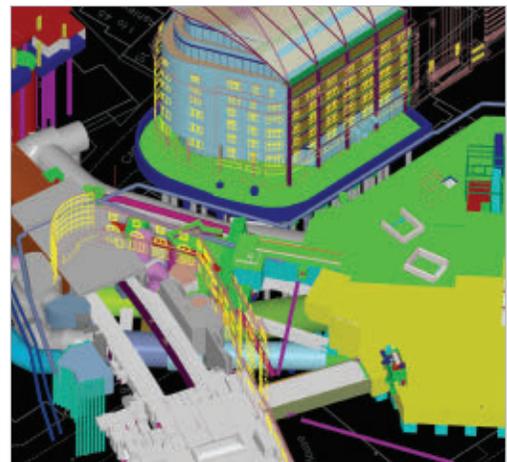
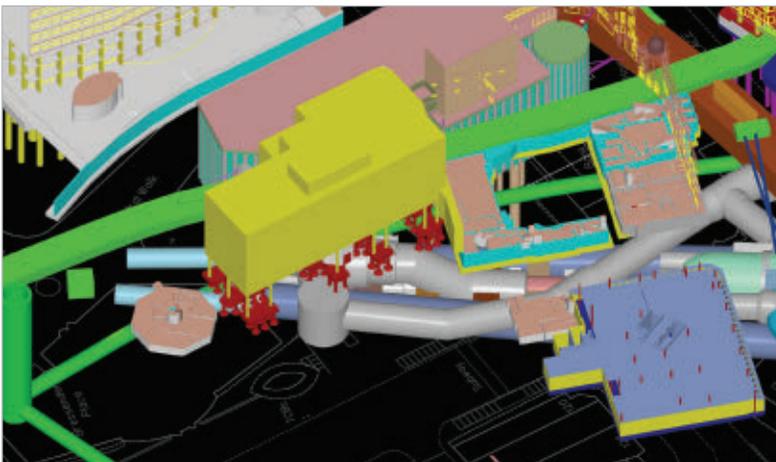
Mott MacDonald Limited

Victoria Station Upgrade Project

London, United Kingdom

The Victoria Station Upgrade Project is a \$925 million improvement and expansion of one of London Underground's busiest stations. Used by more than 80 million passengers each year, the station has been experiencing passenger numbers that have outstripped its capacity, causing severe congestion and delays. A significant construction challenge is the station's central London location, in the midst of historic buildings, other important structures, and numerous utilities.

Bentley's building information modeling (BIM) solutions were used to create a geospatially correct object-oriented 3D model of the existing station. ProjectWise was used to manage the massive amounts of data and the collaborative BIM process. STAAD.Pro was used for structural analysis. Bentley's interoperable applications accelerated information sharing across project teams in multiple locations, minimizing waste and cost overruns.



2010 WINNER

RAIL AND TRANSIT

Parsons Brinckerhoff

Central Phoenix/East Valley Light Rail System

Phoenix, Arizona, United States

As general engineering consultant for the 20-mile light rail system linking downtown Phoenix, Tempe, and Mesa, Ariz., Parsons Brinckerhoff led a diverse group of seven primary design subconsultants and 56 sub-subconsultants to deliver the project in just six years. The civil portion of this \$1.4 billion project was divided into five line sections ranging in length from 2.27 miles to 5 miles, six park-and-ride lots for 26 stations, the 1,500-foot-long Town Lake Bridge, and a maintenance and storage facility for 50 light rail vehicles.

The design team was comprised of more than 250 local and national experts experienced in the use of Bentley products. When the client required the job to be completed using Autodesk products, however, Parsons Brinckerhoff proposed using MicroStation but delivering the finished design in DWG file format. Time and money was saved by using Bentley products from the beginning of this project as it allowed the staff to hit the ground running. Applications included InRoads, InRail (now Bentley Rail Track), StormCAD, and CulvertMaster.



2009 WINNER

Parsons Brinckerhoff

Glenfield Transport Interchange

Glenfield, Australia

New South Wales initiated the \$2.1 billion South West Rail Link project to improve reliability and capacity on the Sydney metropolitan rail network. Parsons Brinckerhoff is part of the Glenfield Junction Alliance delivering the majority of Phase 1 works, including a major upgrade of Glenfield Station and interchange. The challenge is constructing within a live rail corridor while maintaining passenger and freight operations.

Glenfield Junction Alliance developed staging designs and 3D models using MicroStation, ProjectWise, Bentley Rail Track, InRoads, Bentley Architecture, and Structural Modeler, which helped to optimize and clearly communicate design alternatives for the fly-overs and station. The construction program was accelerated by up to one year and the resulting design improvements saved up to \$1 million.



2011 FINALIST

RAIL AND TRANSIT

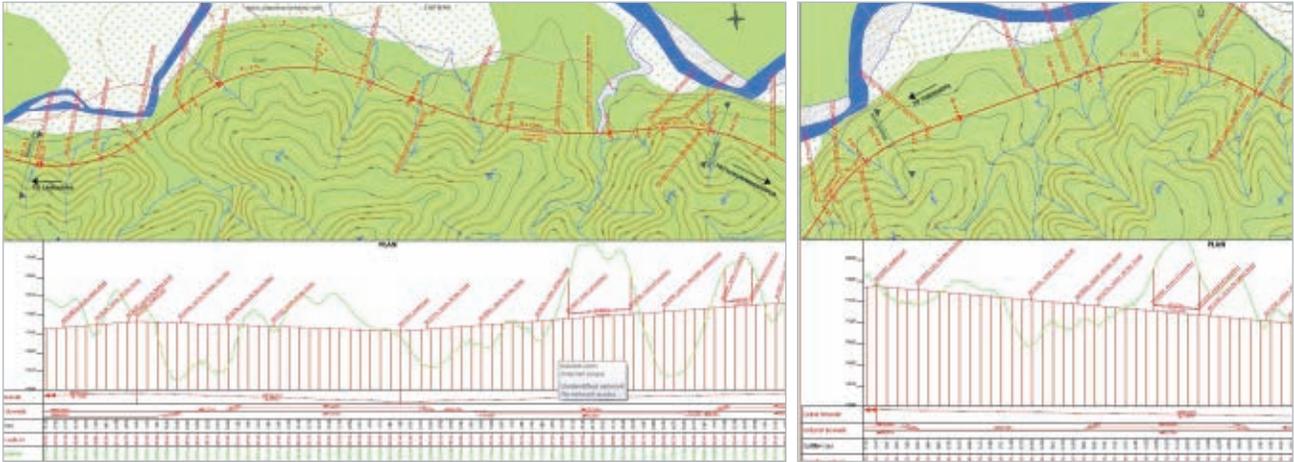
RITES Ltd.

Mechi-Mahakali and Pokhara-Kathmandu Electrical Railway

Nepal

Nepal is one of the world's least developed countries due in part to poor transportation infrastructure. In association with Nepalese consultants, the Indian government commissioned RITES to study the feasibility of constructing a \$9.8 billion east-west railway. Passing through mountainous terrain and across deep river gorges, the 1,218-kilometer alignment includes 154 kilometers of tunnels and 401 major bridges.

The integration of Bentley Map and Google Earth helped to identify locations for river crossings, tunnel portals, and township connections. The team used MXRAIL and Bentley Rail Track to plan alternative alignments based on terrain, topography, development, and other features. Detailed design, optimization, and quantity estimating were also performed. The project was completed in eight months, saving about 10 months and nearly \$560,000.



2011 FINALIST

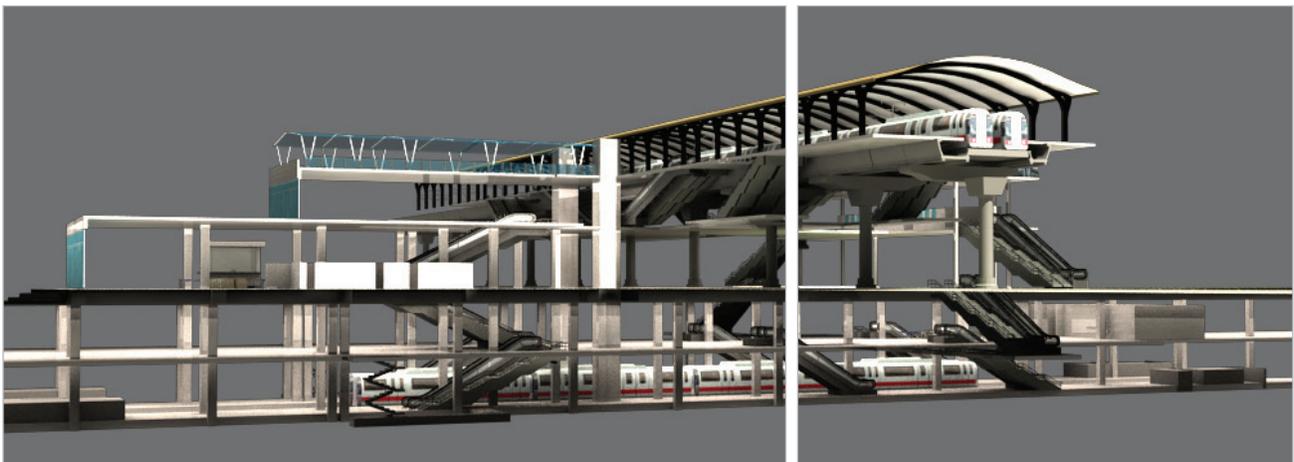
SREI Infrastructure Finance Limited

Lucknow Metro—Alignment Design

Lucknow, India

SREI Infrastructure Finance prepared detailed project reports for two rail transport metro corridors in Lucknow, India, the capital of Uttar Pradesh. The tasks encompassed alignment planning and design, geotechnical investigation, station planning, and environmental and social impact assessment. With an estimated capital cost of \$1.2 billion, the project is needed to meet the anticipated population growth from 2.3 million to 4 million by 2021.

Bentley Rail Track was deployed to automate design and workflows, which increased productivity, saved time, and optimized 48 kilometers of track alignment in less than three months. Shallow station design with stacked alignments was used to reduce the width of structures and depth of the station. This approach allowed for tight but safe clearances while minimizing property acquisition and related disruption in this designated heritage city.



2010 FINALIST

ROADS

The challenge of today's civil and transportation engineers, contractors, governments, and owner-operators is to work more productively, collaborate more globally, and deliver better-performing infrastructure assets. The projects in this category have demonstrated excellence in planning, engineering, analysis, and design of roads or highways in a mission to sustain transportation infrastructure.

AECOM

AECOM Road Corridor

Jamshedpur, India

Just one road directly connects Jamshedpur City to India's national highway network. With a population growth rate of 20 percent and area industries expanding operations, the city required dedicated corridors to separate personal vehicles and trucks on urban roads. AECOM developed a city bypass, and toll and non-toll corridors. The design was constrained by minimal available right-of-way.

The \$292 million project included an 11.9-kilometer corridor with 8.4 kilometers of elevated roadway, link roads connecting major industries, service roads for local traffic, a four-tier tube interchange, five major intersections, and nine toll plazas. Land use was optimized by analyzing various alignment options. STAAD.Pro modeled all structural components and MXROAD managed the complex interchange.



ROADS

AECOM

Clem Jones Tunnel (CLEM 7)

Brisbane, Australia

The AU\$3 billion Clem Jones Tunnel (CLEM7) is one of the largest road infrastructure projects ever undertaken in Australia. Project contractor Leighton Contractors and the Boulderstone Hornibrook Bilfinger Berger Joint Venture engaged AECOM and Parsons Brinckerhoff as lead designers. AECOM's challenge was to meet the stringent demands set by the project's fast-track construction approach.

AECOM's innovative design work and efficient drawing management directly contributed to CLEM7's opening to traffic ahead of schedule. ProjectWise and ARENIUM replaced the previous design system to ensure that searches could be done quickly and accurately and eliminate the accidental use of outdated document revisions. As a result, team members contributed to a smooth transition from design to construction.



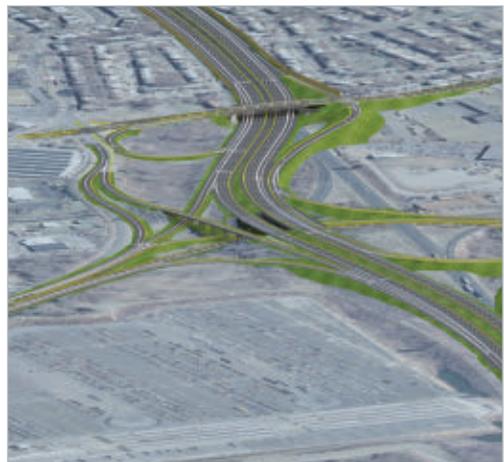
AECOM

I-95/US Route 322 Interchange Improvement Project

Chester, Pennsylvania, United States

To alleviate traffic congestion created by up to 150,000 vehicles per day, the I-95/US Route 322 Interchange Improvement Project will reconfigure the connection between two heavily traveled corridors in Pennsylvania. The \$130 million project will resolve the substandard geometric design contributing to bottleneck conditions. The Pennsylvania Department of Transportation expects the project to improve roadway safety, access, and operations.

AECOM's conceptual design process involved evaluation of multiple alternatives modeled with InRoads. The 3D photorealistic models allowed quick calculation of earthwork volumes, pavement quantities, and other construction costs for each alternative. Constructability issues, right-of-ways, and staging concepts were also reviewed. The software produced significant time and cost savings in the conceptual design phase.



Arup/Safelink Alliance
Ipswich Motorway Upgrade
 Brisbane, Australia

Part of the western corridor into Brisbane, Australia, the Safelink Ipswich Motorway operates under peak demand with significant commute delays and poor safety records. This project includes upgrading 2.5 kilometers of centenary motorway; expanding 5.5 kilometers of Ipswich Motorway from four to six lanes; earthworks and bridgeworks for a new rail line; a new multilevel interchange for road and rail; and civil works involving 30 bridges, underpasses, and drainage structures.

With the motorways required to be fully operational during construction, the design team had to focus on temporary works and staging as well as the ultimate design. Because a skilled-labor shortage necessitated gathering team members from around the globe, the project team selected MXROAD and ProjectWise as intuitive design tools with the flexibility to operate on multiple CAD platforms and manage design data among offices.



2009 FINALIST

Aurecon
SH18 Hobsonville Deviation
 Auckland, New Zealand

In undertaking the tender of the \$200 million Hobsonville Deviation project in Auckland, New Zealand, Aurecon's goal was to deliver an innovative design at a competitive price and enable HEB Construction and Aurecon to continue with detailed design of the road project. Using MXROAD, Aurecon was able to create a model easily adaptable to design changes. Aurecon reduced design modifications time required to two hours from the typical one to two weeks.

This allowed Aurecon to test multiple alignments in rapid succession and quickly take on the contractor's board-revised geotechnical constraints and operational demands. Through this iterative process of alternate scenario studies, the total earthwork cut for the project was reduced from 1.5 million cubic meters to 1.2 million cubic meters.



2010 FINALIST

ROADS

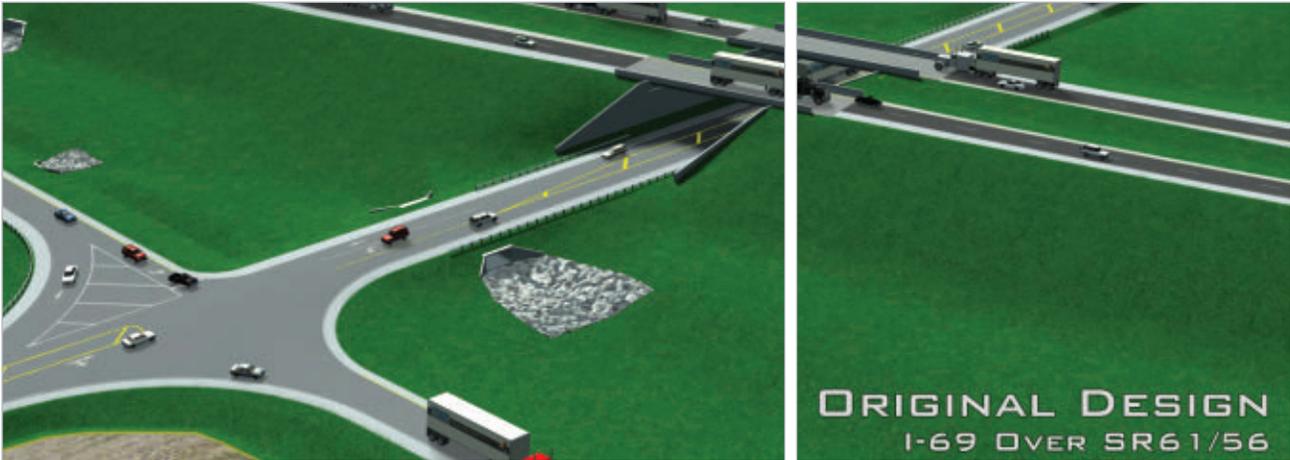
Beam, Longest and Neff, L.L.C

I-69 at State Road 61/56

Pike County, Indiana, United States

Located near Petersburg, Ind., the junction of I-69 and State Road 61/56 was originally designed as a traditional diamond interchange. Beam, Longest and Neff proposed a cost reduction initiative that flipped the layout so SR 61/56 passed over I-69 instead of under. The company executed the \$17.5 million redesign while working within the Indiana Department of Transportation's right-of-way restrictions and completion deadline.

MicroStation, GEOPAK, LEAP CONSPAN, and LEAP RC-PIER facilitated timely redesign, plan review, and submittal. One change alone reduced the area requiring rammed aggregate piers by 99 percent. Overall, Bentley software accelerated design changes, reduced duplicate work, and promoted effective information exchange. The redesign reduced construction costs by \$5.5 million and construction time by 2.5 months.



2011 WINNER

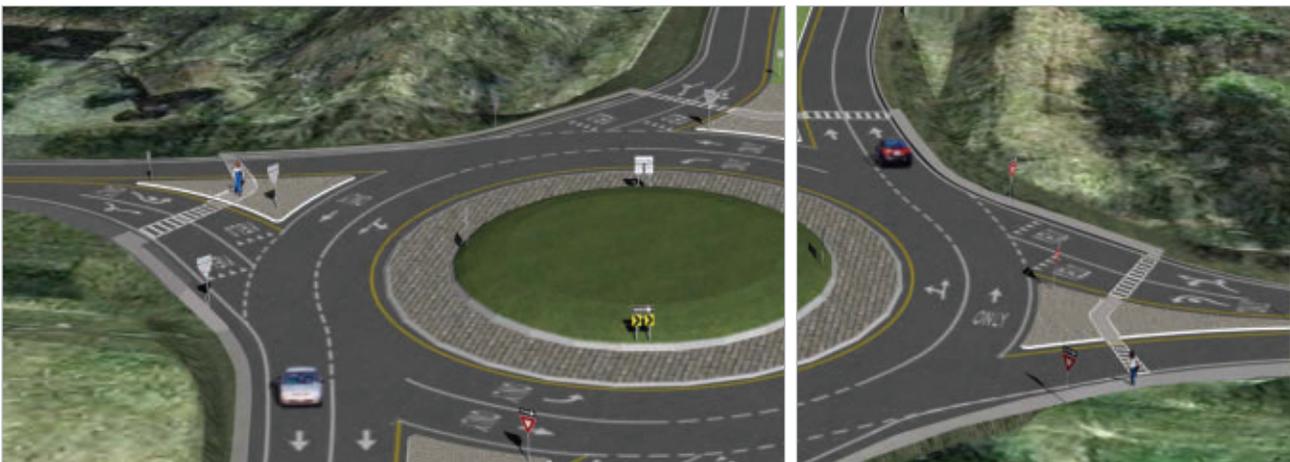
Creighton Manning Engineering, LLP

Route 85 Slingerlands Bypass Extension

Bethlehem, New York, United States

The \$15.2 million bypass extension in Bethlehem, N.Y., addressed mobility and congestion issues on Route 85 by expanding vehicle capacity, relieving congestion, improving safety, and providing acceptable levels of service for the 20-year traffic forecast. The project included constructing a 1.5-mile, four-lane divided highway and three roundabouts as well as widening a three-lane bridge to five lanes and a new pedestrian/bicyclist bridge.

Maintaining traffic and environmental constraints were primary factors contributing to the complexity of the project. The Slingerlands Bypass carried approximately 16,000 vehicles per day traveling at 60 miles per hour approaching Blessing Road. The new construction was designed in a context-sensitive alignment to avoid or minimize impacts to ravines, wetlands, and historic properties.

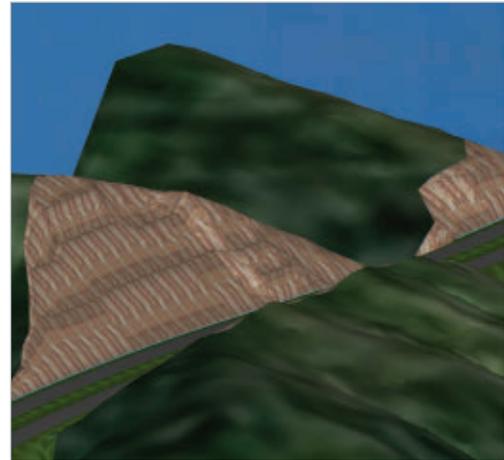


2009 WINNER

E.L. Robinson Engineering W.V. U.S. 35 Design-Build Winfield, West Virginia, United States

This \$73 million project relocated 6.8 miles of U.S. 35 to a four-lane controlled access road that included six at-grade intersections, one interchange, 28 culverts, and more than 10 million cubic yards of earthwork. Kokosing Construction and E.L. Robinson Engineering used GEOPAK to quickly assess various roadway vertical profiles and provide a cost-effective design within a tight construction schedule.

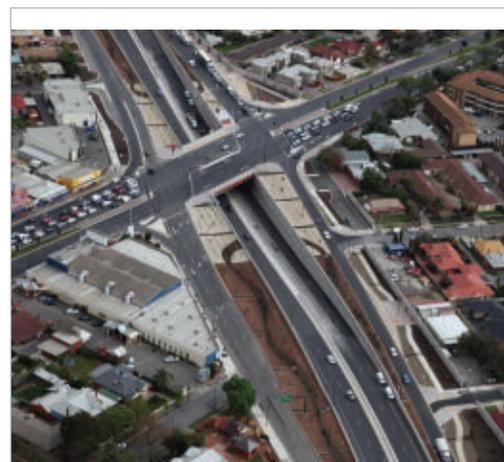
Using MicroStation and GEOPAK, the team significantly reduced the overall volume of earthwork from the original estimate to save West Virginia taxpayers crucial transportation monies. GEOPAK was also instrumental to the project team's successful bid, which was significantly under the engineer's estimate and \$30 million less than the next responsive bidder.



Parsons Brinkerhoff Australia Gallipoli Underpass Adelaide, Australia

Traffic on South Road, the strategic north-south arterial route for moving freight within metropolitan Adelaide, Australia, is predicted to increase 6 percent each year through 2020. To accommodate the increase, the South Australian government plans to transform South Road into a 22-kilometer nonstop route between the Southern Expressway and the Port River Expressway.

The major challenge facing the design team was maintaining two lanes of open traffic at all times. MXROAD was essential in developing traffic plans and diversion routes, and MXROAD easily accommodated the evaluation of multiple scenarios, assuring the development of the most cost-effective design and safest construction possible. The quick evaluation of multiple scenarios also reduced disruptions impacting local businesses.



ROADS

Parsons Corporation

Saadiyat Island Infrastructure

Abu Dhabi, United Arab Emirates

Plans for Saadiyat Island in the United Arab Emirates include residential, retail, commercial, hospitality, entertainment, cultural, recreational, and public facilities as well as landscaped open space. Parsons is providing design and construction supervision services for roads, bridges, and infrastructure. The Phase 1 Saadiyat Expressway is complete and operational, and the Phase 2 Cultural District design is complete.

Parsons used MicroStation, MXROAD, and GEOPAK to design the project, and ProjectWise to coordinate work with many consultants and contractors. The software aided Parsons in the role of project supervisor and facilitated the collaboration among various design disciplines and construction teams. This helped to ensure delivery an executable design for storm, sewer, electrical, telephone, gas, potable water, and irrigation.



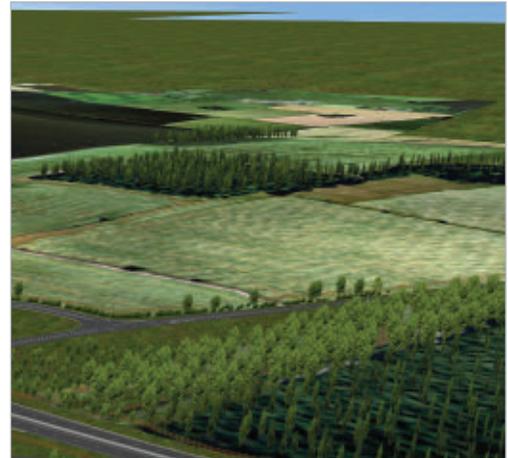
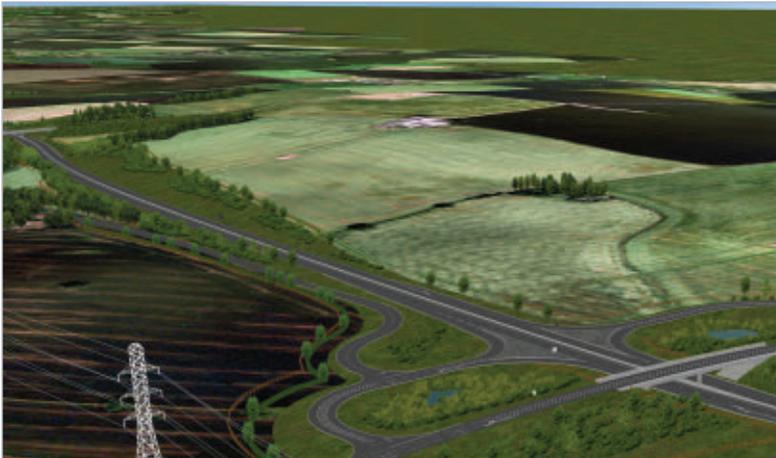
URS/Scott Wilson

A46 Newark to Widmerpool

Newark, United Kingdom

The A46 is a trunk road connecting the United Kingdom's East and West Midlands in Nottinghamshire. The 28-kilometer stretch between Widmerpool and Newark is a single carriageway carrying more than 25,000 vehicles per day, well in excess of its capacity. The hazardous road is being upgraded to a dual two-lane carriageway at a cost of \$572 million. URS/Scott Wilson provided services for engineering design, statutory procedures, and environmental matters.

MXROAD enabled the team to quickly evaluate alternative alignments, junctions, side roads, and private access designs and routes for nonmotorized users. It provided excellent designs and preserved the historical, environmental, and archeological requirements of the project. URS/Scott Wilson's team combined data from the MXROAD model and aerial photography to generate 3D visualizations for engineers, contractors, and constituents. In total, the firm generated 7,400 engineering deliverables for the client over a two-year span.



2010 WINNER

WATER RESOURCES

Common goals of water resource professionals include increasing efficiencies in engineering processes while minimizing environmental consequences, preserving public capital investment, and enhancing the level of service of costly but necessary water infrastructure. This category features projects that demonstrate the innovative use of technology to plan, design, manage, model, and construct water and wastewater treatment plants and networks.

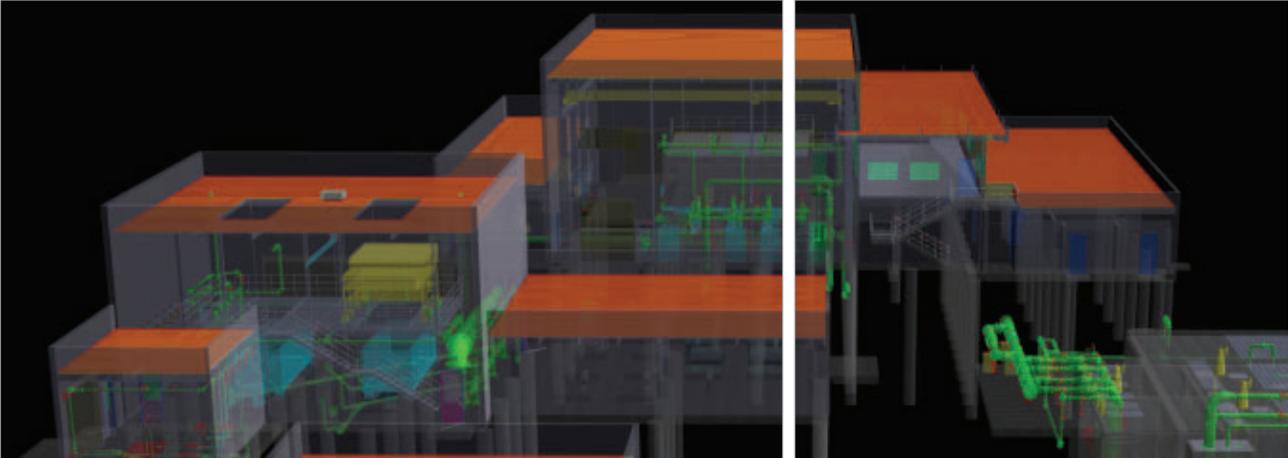
Carollo Engineers

Ak-Chin Indian Community Water Reclamation Facility

Maricopa, Arizona, United States

The Ak-Chin Indian Community located near Maricopa, Ariz., initiated this \$31 million capital improvements project to provide advanced water and wastewater system capacity for future development in the community, including a planned commercial center. The project consists of a new water reclamation facility that includes a membrane bioreactor and UV disinfection process, a new drinking water treatment facility, and miles of water, wastewater, and reclaimed water pipelines.

Carollo Engineers used MicroStation, ProjectWise, STAAD.Pro, Bentley Structural, Bentley Architecture, PlantSpace, TriForma, and InRoads to accelerate both the design schedule and the necessary time for community design reviews. MicroStation's 3D design helped the design team identify potential conflicts between different design disciplines, minimizing potentially costly changes during construction.



2010 WINNER

WATER RESOURCES

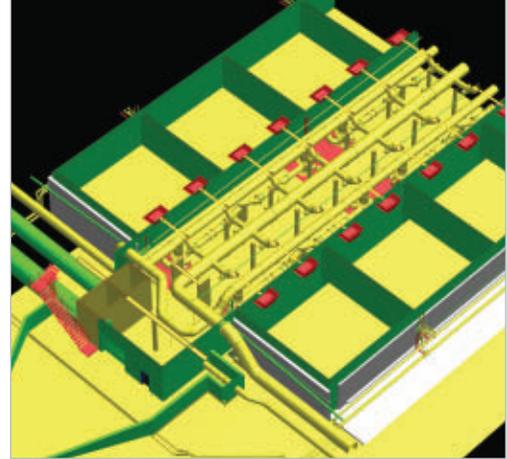
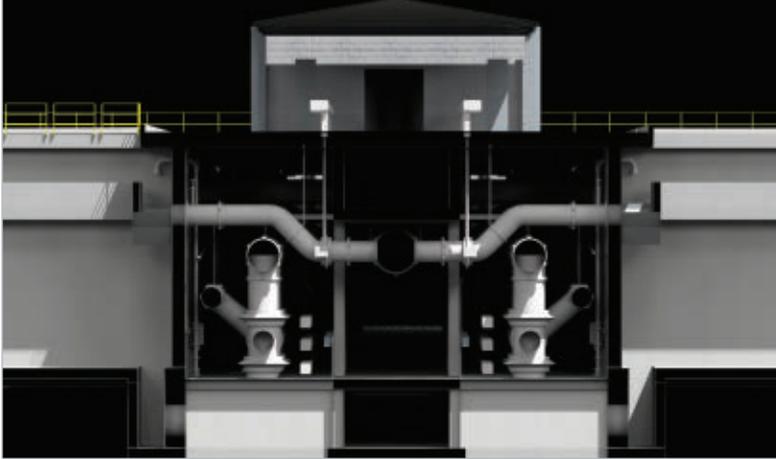
Carollo Engineers

City of Phoenix 24th Street Water Treatment Plant

Phoenix, Arizona, United States

To control the formation of disinfection by-products in a potable water distribution system, the city of Phoenix, Ariz., implemented an innovative 3D design for a \$65 million, 120 mgd granular activated carbon post-filter contactor facility. Efficient interaction between the city and contractor using 3D models visualized the intricate design, accommodated plant operator needs, and minimized and resolved conflicts between various elements within the contactor pipe gallery.

Weekly team meetings—using ProjectWise to share files and submit drawings—facilitated coordination among the prime consultant and two major subconsultants. The enhanced design process using MicroStation, PlantSpace, and STAAD.Pro allowed the city to improve water quality for customers within budget while making the project up to 25 percent more profitable for the contractor.



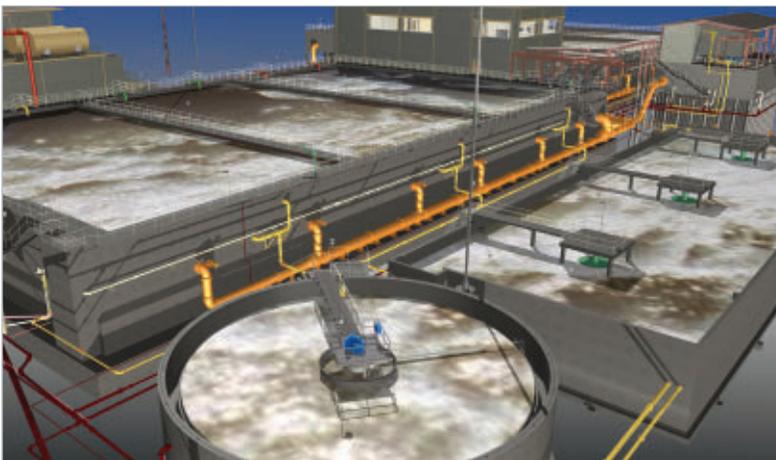
CDM

Galveston Main Wastewater Treatment Plant

Galveston, Texas, United States

Located on a barrier island off the Texas Gulf coast, Galveston was devastated by Hurricane Ike in 2008. The extended storm surge caused a major portion of the public wastewater facilities including the 10-million-gallon-per-day Main Wastewater Treatment Plant to fail to function. Design of the \$60 million project to rebuild the plant was completed in less than a year to help ensure federal block grant funding eligibility.

CDM constructed a 3D/4D model of the seven facilities using original drawings and field surveys. Intelligent modeling drove the integrated design process from front-end engineering and design through phased construction. ProjectWise facilitated management of more than 8,800 documents for 162 team members in 22 offices. Using 3D/4D models shortened client and regulatory review time by 25 percent and reduced design time by 30 percent.



2011 WINNER

CH2M HILL

New Cairo Water Supply Hydraulic Modeling Analysis

Cairo, Egypt

The population of New Cairo, Egypt, is expected to grow from about 350,000 people to 5 million by 2020. With a budget of \$3 million, the Egyptian government is using public-private partnerships to improve and expand water service to New Cairo. To this end, CH2M HILL was contracted to evaluate the hydraulics of the New Cairo Raw Water System.

CH2M HILL built a hydraulic model of the system. WaterGEMS performed extended-period modeling simulations for pump cycling evaluation, and HAMMER performed hydraulic transient (surge) analyses to size surge tanks for the system. Information from the analyses will allow appropriate modifications to the surge protection system and operating procedures, and ensure a sustainable water system.



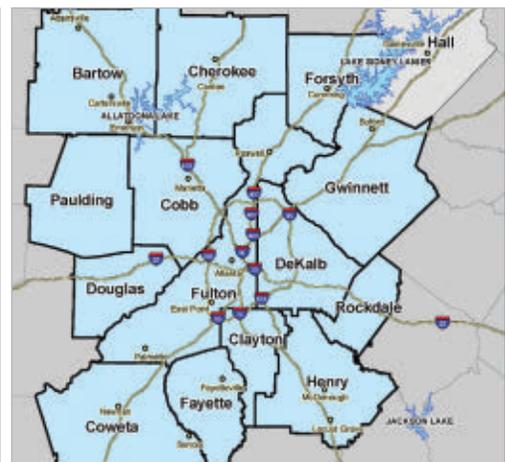
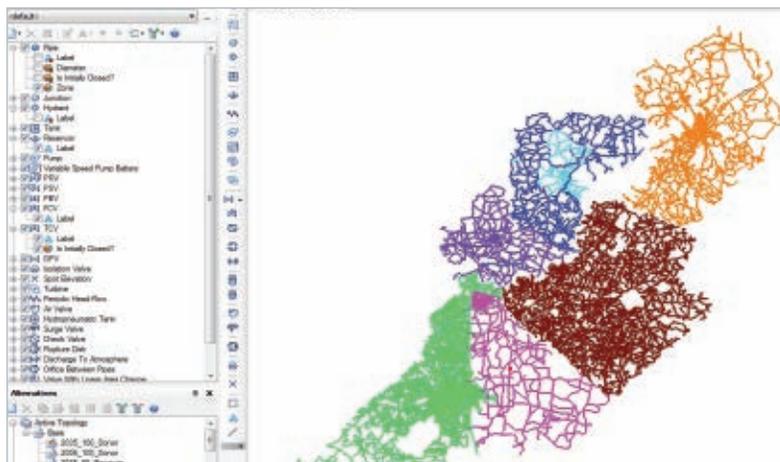
CH2M HILL

Water System Interconnection, Redundancy, and Reliability Project

Atlanta, Georgia, United States

The Metropolitan North Georgia Water Planning District's Water System Interconnection, Redundancy, and Reliability Plan encompasses 33 water systems in 15 counties, including all of metro Atlanta. Using WaterGEMS to model multiple water systems, CH2M HILL developed recommendations for capital projects that will enable the district to meet interconnection targets and maintain water service.

The \$1.7 million project involved converting hydraulic models for all 33 water systems to WaterGEMS and then evaluating the hydraulic capacity of system interconnections. The metro-Atlanta study alone covered 4 million people and 20 water system models. Where existing connections did not provide enough water, new infrastructure was added to the model, which allowed quick assessment of alternatives and optimization of solutions.



WATER RESOURCES

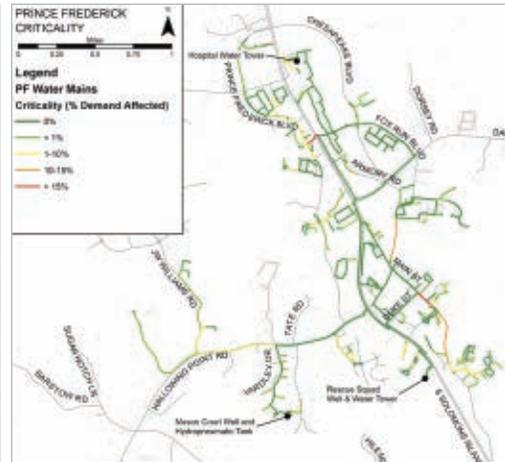
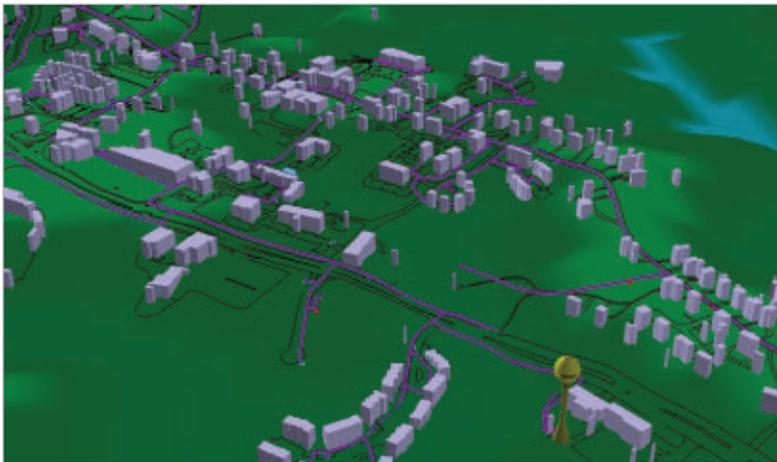
GHD Pty Ltd

Water Master Plans

Prince Frederick, Maryland, United States

Master plans for two water distribution systems in Calvert County, Md., analyzed the impact of projected growth on pipe criticality, fire flow, and service reliability. Based on hydraulic modeling of current and future conditions, GHD identified areas most vulnerable to water main breaks and recommended improvements that would enable the county to maintain service and supply the required fire flow.

GHD used WaterGEMS to create hydraulic models from the county's existing water network GIS and customer water meter data. In an automated, singlestep process, a criticality analysis determined the percent demand that would be unserved during an outage for every pipe in the combined 50-mile network. GHD predicted improvements to one system would reduce unserved demand due to a water main break by half.



Kellogg Brown & Root Pty Ltd

Northern Network Pipeline Project

Chevallum, Australia

As a member of a broad alliance, Kellogg Brown & Root (KBR) undertook the planning, design, construction, and commissioning of about 48 kilometers of underground, reverse-flow pipeline in Queensland, Australia. In light of anticipated population growth, KBR's project goal was to help protect the region from drought by improving the current water supply infrastructure and its ability to sustainably service its users.

Bentley's promis•e was used to create all instrument control, electrical drawings, and documentation associated with the pipeline infrastructure rollout. KBR delivered its project services on schedule with standardization of design drawings. The company estimated that it saved about 7 percent in labor and time for the production of the instrumentation control and electrical drawings.



Walsh Construction undertook a \$76.9 million contract to expand the capacity of the CAP Water Treatment Plant for the city of Scottsdale, Ariz., within a period of four years and three months. Bentley software including PlantSpace and GEOPAK drastically reduced errors in the field by aiding in full coordination among various scopes of work and disciplines early in the construction phase.

The project team created a 3D model representing virtually every component of the project, which enabled evaluation of the constructability of the proposed design and better decisions about construction staging. Visualization of the structures gave the project managers the power to better plan, coordinate, review, verify, and communicate—all of which were crucial for successful delivery.



INDEX – ALPHABETICAL BY ORGANIZATION

ORGANIZATION NAME	PROJECT NAME	PAGE
AECOM	AECOM Road Corridor	31
AECOM	Clem Jones Tunnel (CLEM 7)	32
AECOM	I-95/US Route 322 Interchange Improvement Project	32
F AECOM	Neasden Depot Upgrade Project	27
F AECOM	SH 161 Phase 4	3
Architetto Enrico Cristoforetti	Residential Building and Public Facilities	9
F Arup/Safelink Alliance	Ipswich Motorway Upgrade	33
F Atlas Industries	Namibian Hydrological Centre of Excellence	9
F Aurecon	SH18 Hobsonville Deviation	33
Aurecon Hatch	Collaboration Using Bentley Navigator	14
F Aurecon Hatch	Wiggins Island Coal Terminal	15
Ausenco Engineers Pvt. Limited (Ausenco Sandwell)	Continuous Polymerization Plant	24
F BDP	Teddington School	10
W Beam, Longest and Neff, L.L.C	I-69 at State Road 61/56	34
F Bechtel Australia	Y2	15
F Bechtel Ltd — OGC London IS&T	ProjectWise in the Cloud	3
W Carollo Engineers	Ak-Chin Indian Community Water Reclamation Facility	37
Carollo Engineers	City of Phoenix 24th Street Water Treatment Plant	38
W CDM	Galveston Main Wastewater Treatment Plant	38
CH2M HILL	New Cairo Water Supply Hydraulic Modeling Analysis	39
CH2M HILL	PWB Bull Run Supply Treatment	4
CH2M HILL	Water System Interconnection, Redundancy, and Reliability Project	39

INDEX – ALPHABETICAL BY ORGANIZATION

	ORGANIZATION NAME	PROJECT NAME	PAGE
W	Cianbro	Motiva Crude Expansion Project	24
W	Creighton Manning Engineering, LLP	Route 85 Slingerlands Bypass Extension	34
W	Crossrail Limited	Crossrail	4
	DPR Construction	UCSF Medical Center	5
	DPR Construction	ProjectWise Implementation	5
	E.L. Robinson Engineering	W.V. U.S. 35 Design-Build	35
F	ECIDI	Pumped Storage Power Station	20
W	Energoprojekt Gliwice, S.A	Central Solar PS20	20
W	Engevix Engenharia S.A	Hydropower Plant Coqueiros	6
F	Engevix Engenharia S.A	Hydropower Plant Sao Domingos	21
F	Foster + Partners	Scottish National Arena	10
F	GHAFARI Associates, LLC	Sutter Medical Center	6
	GHD Pty Ltd	Water Master Plans	40
W	Grontmij Industry	Fully Automatic Production Unit for Sika	25
F	Guangdong Electric Power Design Institute	Hongyan River Nuclear Power Plant	21
	Hatch	Dynamic 4D Environment To Analyze Constructability and Safety	16
	Hatch	Feasibility Study of El Lajjun Oil Shale Project	25
	Hatch	How To Ensure Consistent and Real-Time Information	7
	Hatch	Re-establishment of the Fenix Ferronickel Production Facility	17
	Hatch	Sustainability Challenge of Moving 1000000m3 of Earthworks	17
W	Hatch Africa (Pty) Ltd	QMM Ilmenite Project	16
W	Hatch Mott MacDonald	Toronto-York Spadina Subway Extension	28
F	HydroChina Zhongnan Engineering Corporation	Tuoba Hydro-Power Station	22
W	Jacobs	Automating WorkFace Planning	12
	Kellogg Brown & Root Pty Ltd	Northern Network Pipeline Project	40
W	L&T Sargent & Lundy Limited	3x600 MW Supercritical Thermal Power Plant	22
F	Land Transport Authority	Boon Lay Extension(MRT Line)	13
F	Larsen & Toubro Limited	Gas Recovery and Injection Project	26
	Lend Lease Corporation Limited	C11 EXO Hybrid Building	11
W	Mott MacDonald Limited	Victoria Station Upgrade Project	28
W	Parsons Brinckerhoff	Central Phoenix/East Valley Light Rail System	29
F	Parsons Brinckerhoff	Glenfield Transport Interchange	29
F	Parsons Brinckerhoff Australia	Gallipoli Underpass	35
	Parsons Corporation	Saadiyat Island Infrastructure	36
W	PDC Consultants	Brockman Syncline No. 4 Project	18
W	PT McDermott Indonesia	Cuu Long Su Tu Vang Project	13
F	rites Ltd.	Mechi-Mahakali and Pokhara-Kathmandu Electrical Railway	30
F	Royal Haskoning Industrial Engineering	Vopak Tank Terminal Expansion Project	26
F	Sargent & Lundy, LLC	Coffeen Wet FGD Unit 1 and 2	23
W	SEI Engenharia Ltda	Cristalino Project	18
	SNC-Lavalin/Minerconsult	Simandou Project	19
F	SREI Infrastructure Finance Limited	Lucknow Metro Alignment Design	30
W	URS/Scott Wilson	A46 Newark to Widmerpool	36
F	URS/Scott Wilson	Crossrail Farringdon Station	7
F	URS/Scott Wilson	East London Line	8
	Walsh Construction Co.	Arizona CAP Water Treatment Plant Expansion Project	41
	Webber LLC	Ourimbah Campus Library	11

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