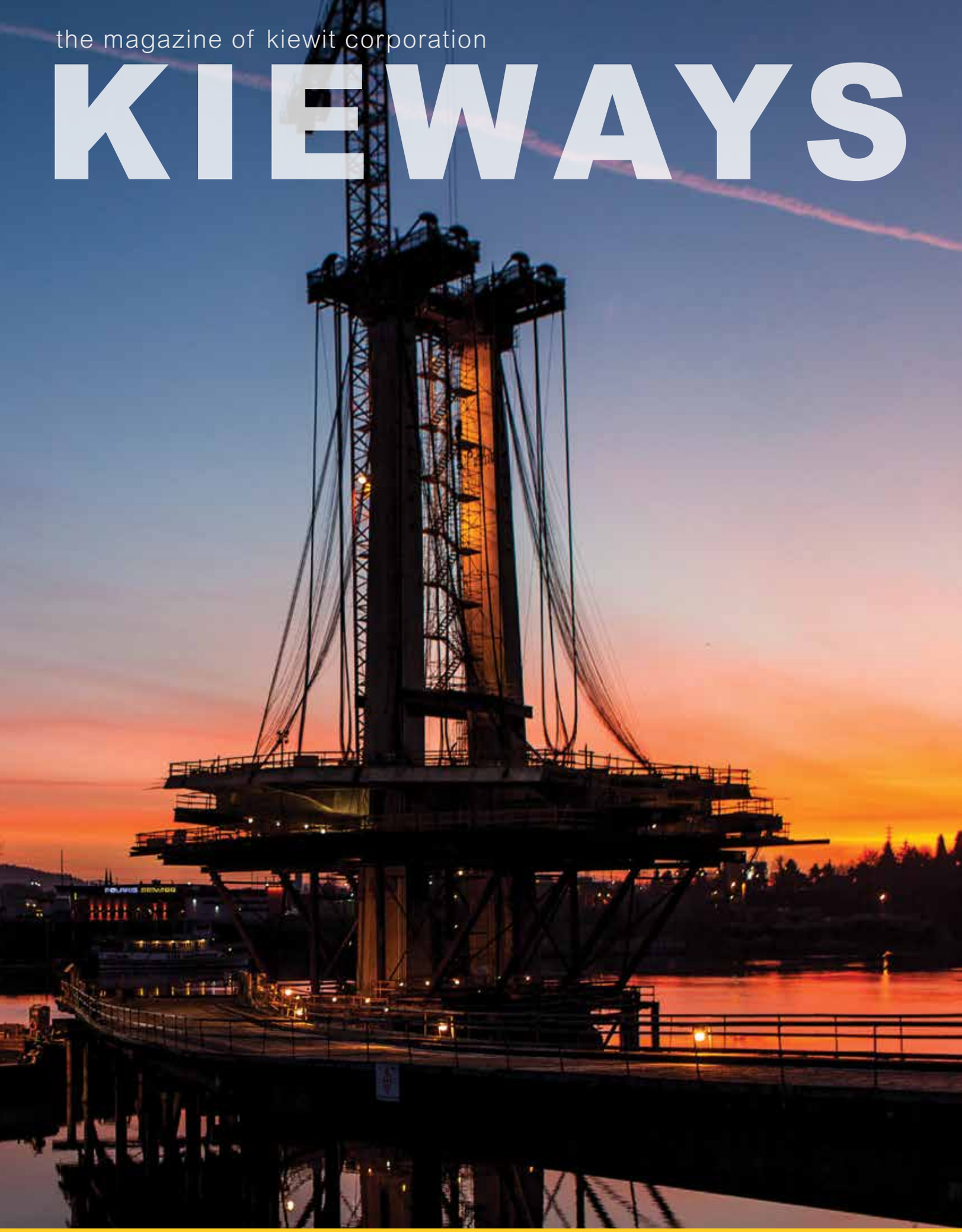
the magazine of kiewit corporation

KIEWAYS



2013 / Quarter 2

Kiewit

Kiewit is one of North America's largest and most respected construction and engineering organizations. With its roots dating back to 1884, the employee-owned company operates through a network of offices and projects in the United States, Canada and Australia. Kiewit offers construction and engineering services in a variety of markets including transportation, water/wastewater, power, oil, gas and chemical, building and mining. Kiewit had 2012 revenues of more than $11 billion and employs more than 30,000 staff and craft employees.

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KIEWAYS
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Winner Construction Marketing STAR

FSC

PEAKING AT THE RIGHT TIME
California's commitment to the environment when it comes to energy is unmatched, and "peaker plants" help fill in the gaps. Learn more on Page 14.

OUR CLIENTS, OUR PARTNERS

Building a strong relationship and being the best partner we can be is a fundamental part of how we operate — we are here to serve our clients no matter if they are a longtime, repeat client or contracting with us for the first time.

Whether we're working on a small or large project, for a public or private owner, we conduct our business with the highest ethical standards and treat others the way we want to be treated: with respect and fairness. Our commitment to excellence means we never stop raising the bar on our performance, consistently focusing on building a high quality project and delivering the highest value to our clients. We listen; we communicate; and we work shoulder-to-shoulder with clients to overcome challenges and develop solutions. And while we're not perfect — we are an organization made up of people, after all — we never stop trying to be perfect, constantly seeking improvement in all we do.

The projects featured in this issue of Kieways are products of great partnerships with our clients. It includes articles on our rehabilitation work for the Washington Metropolitan Area Transit Authority on its busiest subway line in the District of Columbia; our construction of the nation's first car-free transit bridge for the Tri-County Metropolitan District of Oregon; our work on three rapid-response power plants for three different clients in California; and our diverse work in the oil, gas and chemical markets. No matter what kind of work we're building or who we are building it for, our clients can rest assured that we are also working to build a strong and lasting relationship with them.

BRUCE GREWCOCK
Chairman and CEO

HEAVY LIFTING
Kiewit offers a plethora of services in the booming oil, gas and chemical market. Story on Page 4.

IN THIS ISSUE

ON THE COVER

It is projected that the Portland region will add a million new residents by 2030, so it has set out to build a new one-of-a-kind transit bridge to support the boom. Story on Page 22.

HEAVY LIFTING

CONSISTENCY IN THE OIL, GAS AND CHEMICAL MARKET

Kiewit's ability to serve a variety of different markets – transportation; water/wastewater; power; oil, gas and chemical; building; and mining — has helped it navigate the intense cycle of market "ups" and "downs." When one market is slow, another is booming. And right now, few markets are growing as fast as the oil, gas and chemical market.

"Our diversified nature keeps us ready for any opportunities that present themselves," said Dan Lumma, senior vice president of Kiewit Energy Group. "In recent years, the oil, gas and chemical market has grown to represent 25 percent of our business."

Kiewit does work in four oil, gas and chemical sub-markets — offshore, oil sands, midstream and downstream.

OFFSHORE

More than 25 percent of the world's oil and gas reserves are offshore, with most of those reserves found in the Gulf of Mexico, Alaska and the Middle East.

The Shell Olympus floating tension leg platform (TLP) will be installed in 3,000 feet of water in the Gulf of Mexico. A TLP is a moored floating structure used for the offshore production of oil or gas.

Kiewit's work on the project includes fabrication and integration of 25,000 tons of topsides in five major modules. Once installed, it will be the largest TLP in the Gulf of Mexico and will extend the life of Shell's Mars B Oil Field development to 2050. The platform will produce 100,000 barrels of oil and 180 million cubic feet of gas per day.

OFFSHORE

1. The Heavy Lifting Device at the Kiewit Offshore Services yard in Corpus Christi, Texas, can lift up to 11,000 tons of topsides into place at once. 2. The Shell Olympus floating tension leg platform will produce 100,000 barrels of oil per day. 3. Olympus' 25,000 tons of topsides will include living quarters, a helipad and the entire platform's control center. 4. The Noble Tamar deck is part of a 10,000-ton platform.

"What makes this project such a great example of Kiewit's abilities is that it brings together people from different backgrounds," said Lumma. "We've got people with an offshore background and people with a building background because this project needs that kind of diversity, just because of the work it entails.

"I'm continually impressed by our people's willingness to go where the work is. This is another great example of that."

One of the topsides modules is the living quarters module — a 5,000-ton structure that will provide living accommodations for 192 people in addition to housing emergency rescue vessels, a helipad for two helicopters and the control center for the entire platform. Kiewit is uniquely equipped to handle a module like this because of its experience in both offshore work and building work — Kiewit Offshore Services and Kiewit Building Group joined together in an internal joint venture.

OIL SANDS

Canada's oil sands are a large deposit of tar-like oil, a mixture of crude bitumen, sand, clay and water. There are 173 billion economically recoverable barrels of oil located there, which makes up 15 percent of the world's total oil reserves.

Since 2009, Kiewit has executed more than $2.3 billion of grading and industrial work at the Kearl Oil Sands in Alberta. In 2012, the Froth Treatment Silo reached mechanical completion, capping a year in which the project team worked more than two million man-hours in the Kearl Initial Development phase. Other aspects of the work included re-assembly of 39 modules and the fabrication of 900,000 feet of pipe.

"Our focus on safety and quality has been relentless," said Troy Ritcy, business development manager. "We've got such a committed team here that stands by Kiewit's core values. We wouldn't be nearly as successful if they hadn't bought into the culture from the beginning. It's truly been a great project."

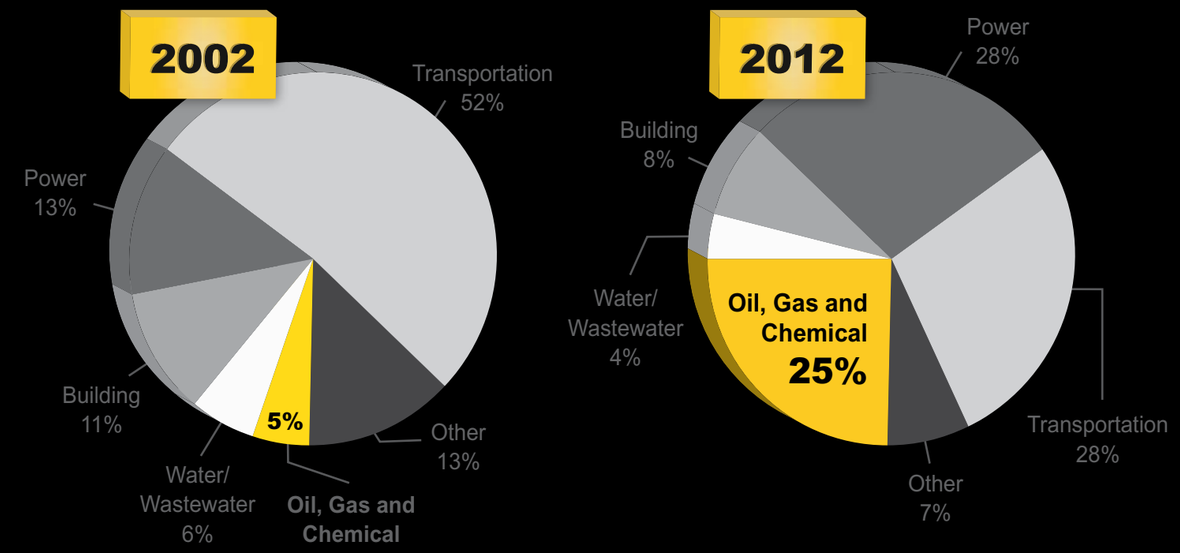
The Kearl Expansion project is nearly an exact replica of the Initial Development phase's Froth Treatment Plant. The job teams has driven more than 2,000 piles, placed 5,000 cubic meters of concrete, set 16 modules and worked more than 480,000 man-hours without an injury.

OIL SANDS

1. There are 173 billion economically recoverable barrels of oil located in Canada's oil sands — 15 percent of the world's oil reserves. Kiewit has executed more than $2.3 billion worth of grading and industrial work at the oil sands in Alberta. 2. Kiewit reassembled 39 modules and fabricated 900,000 feet of pipe at the Kearl Froth Treatment Silo in Alberta.

Kiewit oil, gas and chemical

Over the last 10 years, the oil, gas and chemical market is where Kiewit has seen its largest growth — by a wide margin.



OFFSHORE

2012 percentage of OGC revenue:
37%

ENR:
No. 2
Offshore and Underwater Facilities

Kiewit's extensive experience in this market includes the fabrication and integration of topsides that can weigh 25,000 tons or more. Kiewit Offshore Services' Heavy Lifting Device in Corpus Christi, Texas, can lift 11,000 tons at once, setting the topsides in place.

OIL SANDS

2012 percentage of OGC revenue:
9%

ENR:
No. 7
Pipelines

The oil sands in Canada are a large deposit of tar-like oil — a mixture of crude bitumen, sand, clay and water. Kiewit provides many services in the oil sands market, including construction of treatment plants, module fabrication and assembly, and other grading and industrial work.

MIDSTREAM

2012 percentage of OGC revenue:
10%

ENR:
No. 8
Petroleum

Kiewit's work in the midstream market includes processing, storing and transporting oil, natural gas and natural gas liquids. The company offers wide-ranging experience in constructing and installing piping, towers and modules.

DOWNSTREAM

2012 percentage of OGC revenue:
44%

ENR:
No. 5
Refineries and Petrochemical Plants

The downstream market is Kiewit's biggest OGC market. Projects include oil refineries, petrochemical plants and natural gas distribution centers.

MIDSTREAM

1. A crane operates at the Tioga gas processing facility in Tioga, N.D. 2. Kiewit is working to expand Tioga's processing capacity to 250 million cubic feet of gas per day. 3. With tight working quarters, the engineering team at Tioga — and its advanced use of 3-D modeling — has played a huge role.

MIDSTREAM

Midstream activities include processing, storing, transporting and marketing oil, natural gas and natural gas liquids.

"This is becoming a huge part of the OGC market," said Lumma. "With the natural gas sector expanding fast, the midstream sub-market is taking off. Everyone needs to be able to process and store all that natural gas and liquid natural gas."

Kiewit is working with Hess Corporation to expand Hess' gas processing facility in Tioga, N.D. The expansion will increase processing capacity to 250 million cubic feet of gas per day and allow Hess to process Ethane in addition to propane, butane and natural gas.

Kiewit's early contractor involvement model recently helped it win the Cove Point liquefaction facilities project in Lusby, Md. This collaboration from the early stages of a project's development helps to enhance the trust between the two parties and ensures a great working relationship.

"We want to be seen by owners as a group they can bring in early rather than waiting until bid time," said Lumma. "This is exactly what we did on Cove Point and elsewhere – we partner with the engineers and get in early."

DOWNSTREAM

Downstream work consists of the refining of crude oil and the selling and distribution of natural gas, jet fuel, diesel oil and plastics. This includes projects and clients such as oil refineries, petrochemical plants, retail outlets and natural gas distribution companies.

Ganotec West, a subsidiary of Kiewit, was the major contractor that performed civil, pipe and mechanical work at the Enbridge Terminal in Alberta in 2012. Mechanical completion was achieved in early December.

The Enbridge Terminal is a major hub for oil distribution from northern Alberta oil production facilities. Enbridge is also responsible for storage and transportation of petroleum for a large number of the major oil and gas producers across North America.

"With more production facilities comes a greater need for storage and distribution," said Lumma. "Kiewit is uniquely positioned to assist in any aspect of the OGC sector."

The project included fabricating process pipe and structural steel, erecting pipe rack steel and installing various foundations and mechanical process equipment. There are multiple future plans for continued expansion of this terminal as well as other Enbridge terminal facilities across Canada.

COMPLETE COVERAGE

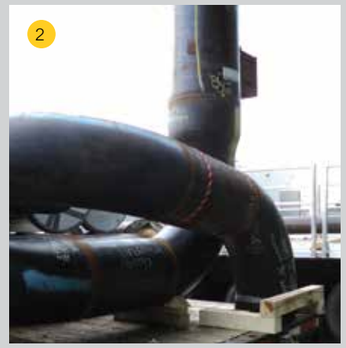
According to Lumma, Kiewit has "complete coverage" of the OGC market.

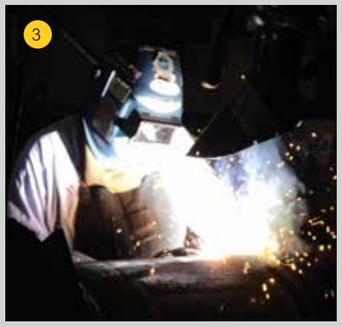
"We can go anywhere and do anything," he said. "And we have resources that not many others can offer."

Kiewit Offshore Services' yard in Corpus Christi, Texas, for example, features its Heavy Lifting Device – the world's largest on-shore lifter. At 550 feet tall — almost 250 feet taller than the Statue of Liberty — the HLD can lift 13,000 tons, perfect for placing offshore topsides on their bases.

"Our resources and experience are tough to beat," said Lumma. "I expect the market to continue to boom, and I expect that we'll be seeking a place in the market for as long as we can."

DOWNSTREAM





1. The Enbridge Terminal in Alberta is a major hub for oil distribution from northern Alberta oil production facilities — part of the downstream sector of the OGC market. 2 and 3. MugaFab, a company owned by Ganotec, has pipe fabircation shops in Quebec and Edmonton. 4. Fabrication of process pipe, structural steel fabrication and erection of pipe rack steel were all included in Ganotec's scope on the Enbridge Terminal.

CAPITAL IMPROVEMENTS

Rail rehab in Washington D.C.

The infrastructure throughout the United States is due for an upgrade. The American Society of Civil Engineers gives the nation's infrastructure a grade of "D." Over the next 30 years, it's predicted that a tremendous amount of work needs to begin throughout the country.

The District of Columbia, however, has already begun to rehabilitate its subway system, including more than 90 stations overall on five different lines. The Red Line is the most heavily used of the five lines, and it includes the oldest stations — the section from Rhode Island Avenue to Farragut North inaugurated Washington's subway system in 1976.

The line's age can be obvious to riders. Many elevators and escalators don't work; ceilings and platforms are deteriorating; the lighting is poor; and the announcements are often unclear. Plus, it's really hot — even underground — in the summer.

Planners in the D.C. area have been working for several years on a rehabilitation program that eventually will reach all the lines, but the Red Line effort is the first, and Mass. Electric Construction Company, a Kiewit subsidiary, has a contract for the first batch of stations.

The Red Line Rehab project includes the rehabilitation of station platforms, lighting, HVAC equipment, automatic train control, traction power, emergency trip stations, PA systems, closed-circuit TV systems, kiosks, ceiling tiles and skylights.

"We have a very broad range of scopes," said Matt Swanson, one of the project managers. "It's primarily an electrical job, but there is some civil work with platforms and building work. Coordinating all of these items has been the biggest challenge, but so far, so good."

The relationship between MEC and the client has been "outstanding" and has led to successes throughout the project. In fact, both entities are co-located in the same headquarters building.

"When folks wander the hallways, you're hard-pressed to tell who's WMATA (Washington Metropolitan Area Transit Authority) and who is from the contractor," said Ron Smith, the other project manager. "Our great relationship has been a huge key to success. Anytime you're working on an operating line, it's a major challenge. Simply getting access to the work requires a shutdown, so the communication between us has to be outstanding. And it has been."

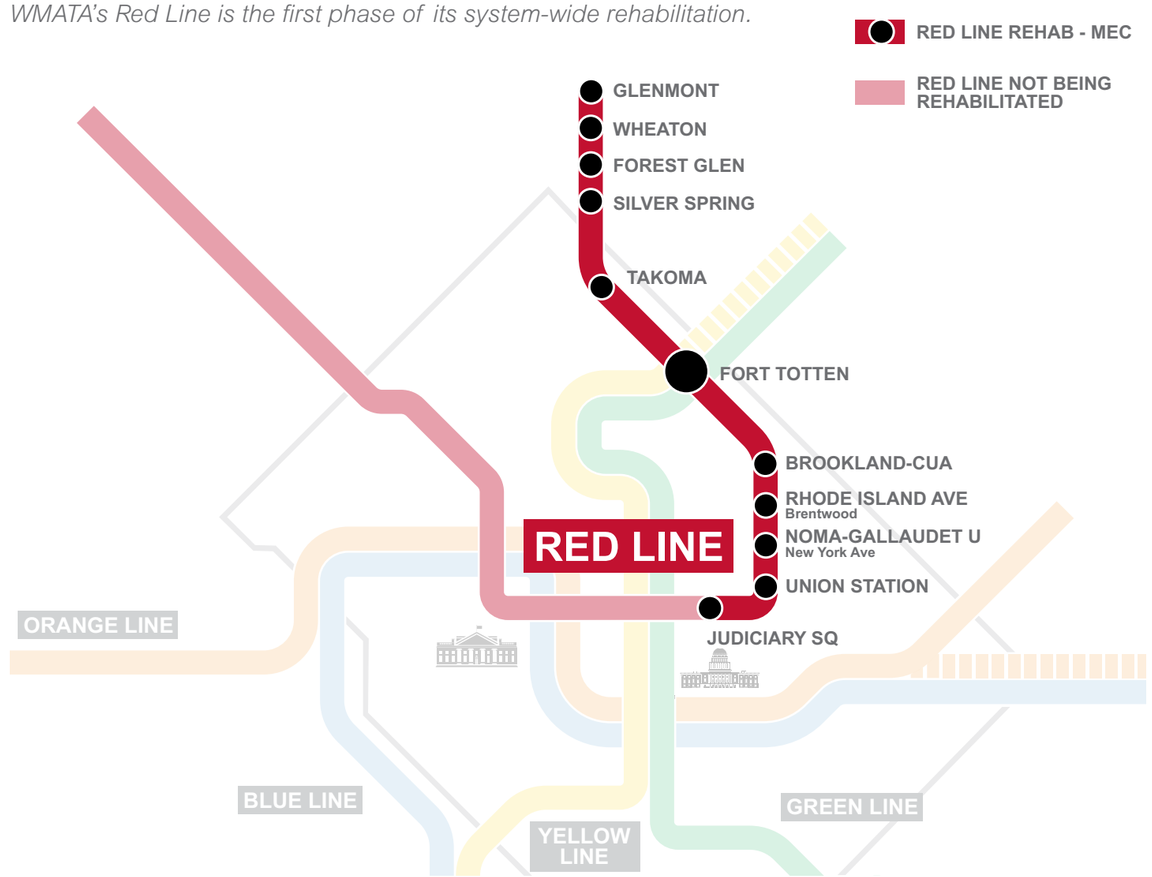
SETTING THE STANDARD

Part of MEC's scope includes upgrading all the stations to include new Internet Protocol high-definition cameras for its closed-circuit television security and surveillance system. After MEC completed the first 10 stations, including the Judiciary Square station, and WMATA was getting ready to divide the remaining stations among its other contractors, it held a kick-off meeting.

During the meeting's introduction, MEC and its

Red Line updates

WMATA's Red Line is the first phase of its system-wide rehabilitation.



WMATA Red Line Rehab by the numbers

74	Individual design packages
14.5 thousand	Communication devices replaced or installed at 12 passenger stations
64	Escalators and elevators replaced or rehabilitated
10 thousand	Track fasteners replaced
144 thousand	Square feet of structural platform repairs
58	Wayside signals replaced or installed

representatives were acknowledged by WMATA's deputy chief engineer as the model contractor. This means that all design and installations as part of the new surveillance system must meet the standard set by MEC at Judiciary Square.

"We weren't informed that this was going to happen," said Chris Jones, field engineer. "After we introduced ourselves, WMATA informed the entire crowd — including other contractors and WMATA management — that it is MEC's design and installation standard that all future work is required to meet."

MEC's design at Judiciary Square included 45 cameras, four intermediate network enclosures, 5,000 linear feet of rigid conduit, 12,500 linear feet of category 6 cable and the tie-in of the local area network into WMATA's existing wide area network.

"MEC has set the bar for all other electrical contractors," said Swanson. "It's pretty cool recognition. It provides motivation and recognition for the staff and craft, and it drives us to continually improve."

DIVERSE SCOPE

Other work performed on the project includes traction power, automatic train control and communications upgrades, tunnel lighting replacement, tunnel ventilation pipe rehabilitation, public address system upgrades, station wall repairs, air conditioning and ventilation equipment rehabilitation and replacement, lighting change-outs, and elevator and escalator rehabilitation.

It's a project with a diverse scope of work and a need for a range of different specialties.

"It's been all about peer-to-peer communication and relationship-building," said Kyle Marler, subcontracts manager. "We've been sure to have one plan, one message, and have everyone singing the same song. It stretches from the upper levels, to the field, to our subcontractors, and WMATA.

"We're a community with so many different people — we have to communicate in different ways to make sure it's all applied correctly."

A unique scope of work isn't anything new for MEC, said Swanson.

"MEC has a pretty diverse background," he said. "It allows us to take on a project like the Red Line with its many different components. And when we look to hire subcontractors, our relationships provide us an advantage."

TEAM EFFORT

The project has been a true team effort from the beginning.

"We were able to work with the client in the early stages, and that was extremely helpful," said Smith. "Now that we're pretty far into the project, we've become like a family. Our successes are their successes, and vice versa."

The rehab is a high-interest, highly visibile project in the D.C. area, especially with the impact shutdowns have on commuters.

"We just make sure to talk about it," said Swanson. "Letting the public know what sections of track are going to be shut down and when — people generally understand as long as we keep the communication open and transparent."

EXPECTATION OF EXCELLENCE

As one of Kiewit's core values, excellence is expected on every Kiewit project. But the MEC team has taken it above and beyond.

"MEC has again reinforced its credibility with WMATA as a high quality contractor," said Swanson. "We set the bar for other electrical contractors. We couldn't be prouder of the job we're doing here."

> "We've been sure to have one plan, one message, and have everyone singing the same song. It stretches from the upper levels, to the field, to our subcontractors, and WMATA."
>
> **KYLE MARLER,** SUBCONTRACTS MANAGER

PEAKING AT THE RIGHT TIME

California is home to more than Hollywood, Disneyland and the Golden Gate Bridge. The fortune cookie, Apple, blue jeans and Barbie all were invented here. With nearly 40 million residents, California's population is greater than all of Canada. You can cover a lot of ground here, too: In a single day, a person can travel from the lowest point in the continental United States — Death Valley — to the highest: 14,494-foot-tall Mt. Whitney. Many things keep California in the global spotlight. Increasingly, however, it is California's commitment to the environment that is gaining recognition — especially when it comes to energy.

From limiting greenhouse gas emissions and mandating that motorists use a special gasoline blend, to placing a de facto ban on new coal-fired power plants, California goes above and beyond to reduce its emissions.

In 2006, the California State Legislature enacted the Global Warming Solutions Act, A.B. 32, which caps greenhouse gas emissions at 1990 levels by 2020. To help ensure the state reaches this aggressive goal, its renewable portfolio standard requires utilities to provide 33 percent of their electricity sales from renewables within seven years.

While natural gas makes up more than 55 percent of its electricity generation, California uses alternative energy sources such as nuclear, hydro, geothermal, wind and solar for the rest.

SEEKING A SOLUTION WITH RAPID RESPONSE

To produce energy, most renewables have to rely on certain variable sources — wind, water and the sun, for example.

As a result, many utilities are seeking a solution for days when the combination of their renewables and natural gas plants can't meet the energy demands, such as in periods of extreme heat and on cloudy or windless days.

To back up the power grid when demand is high, some utilities are choosing to use rapid response plants, or peakers. A peaker plant is a natural gas plant that fires up quickly and is only intended to be used when the grid is at its peak.

Kiewit recently constructed three of these plants across California for three different clients. All were engineer-procure-construct contracts and came online within a month of each other.

HAYNES UNITS 5 & 6 REPOWERING PROJECT

In Long Beach, Kiewit constructed a 600-megawatt simple-cycle generating system for the Los Angeles Department of Water and Power — the Haynes Units 5 & 6 Repowering Project. This peaker plant is made up of six 100-megawatt natural gas-fired combustion turbines. When powered up, the system has the ability to deliver 600 megawatts of power to the grid within 10 minutes.

The repowering project charged Kiewit with building a new power plant to replace two of the old generating units. The new peakers are more energy efficient, create fewer emissions and increase the reliability of the power grid.

"This is our third natural gas-fired power plant project with LADWP," said Julien Jeannel, project manager. "Having that open, transparent relationship with our client already established before work on this EPC project even began was a definite advantage. It's one of many reasons why it's been such a success."

Before it began work to repower Units 5 & 6, Kiewit won a design-build contract in 2002 to repower Units 3 & 4. After completion, those units resulted in 94 percent cleaner emissions and had a 40 percent increase in fuel efficiency.

Power plants need a lot of cooling water to generate electricity, which is why so many facilities along the coast use cold ocean water to cool down their systems — a process known as once-through cooling. The old units used this process. However, to protect aquatic life, new federal and state regulations soon will no longer allow the use of once-through cooling.

With the introduction of the new units, LADWP is committing to eliminate the use of ocean water in all its coastal power plants. These new units use a dry-cooling system that leverages an air-cooled heat exchanger. The ACHE is similar to a car radiator in the way it uses air to cool a closed-looped water system. LADWP's goal is to implement dry-cooling systems and eliminate the use of ocean cooling in all its coastal power plants by the end of 2029.

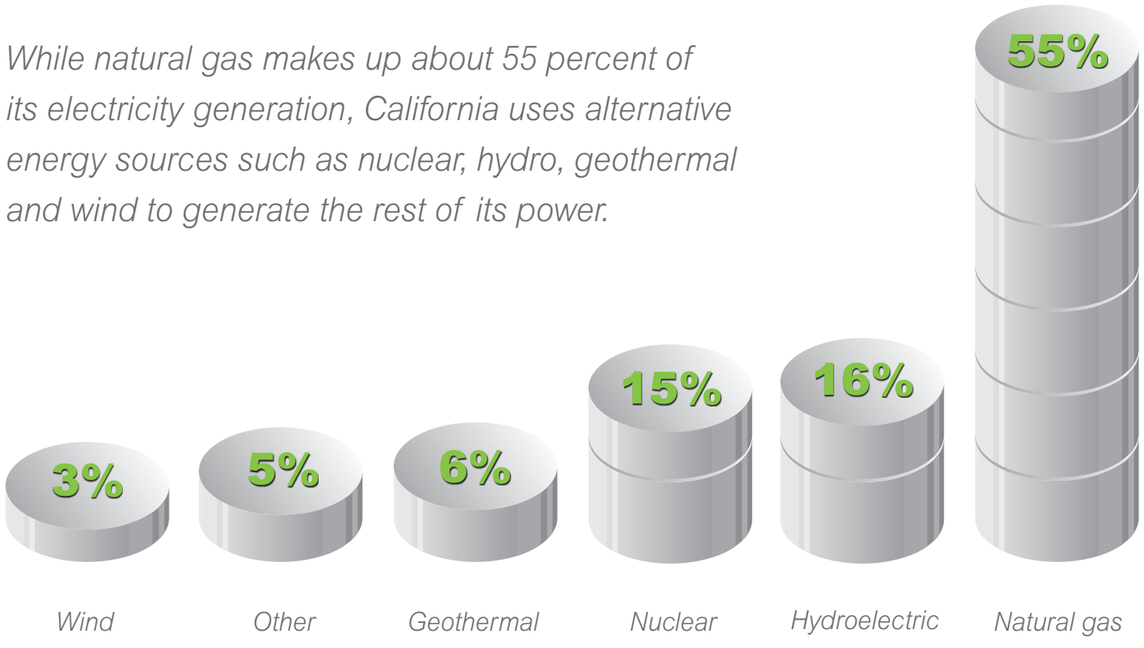
MARSH LANDING GENERATING STATION

In Antioch, Kiewit constructed the Marsh Landing Generating Station within the existing Contra Costa Power Plant site. This brownfield development used existing site infrastructure, so no new offsite transmission or gas lines were necessary to begin construction. By redeveloping an existing industrial site, the team was able to remove five oil storage tanks and efficiently preserve other non-industrial sites for additional uses.

Marsh Landing is made up of four 200-megawatt simple cycle gas turbines. The plant is capable of delivering 400

Not always natural

While natural gas makes up about 55 percent of its electricity generation, California uses alternative energy sources such as nuclear, hydro, geothermal and wind to generate the rest of its power.



Source: U.S. Energy Information Administration, 2010

1. Kiewit built a new power plant at the Haynes Generating Station in Long Beach, Calif., to replace two older generating units. The new peakers are more energy efficient and create fewer emissions. 2. The Marsh Landing Generating Station in Antioch, Calif., can deliver 400 megawatts of energy to the grid in just 10 minutes. 3. A module is lifted into place at the Haynes Generating Station. The new units at Haynes will use a dry-cooling system as LADWP eliminates ocean cooling in its plants by 2029.

megawatts of power to the grid in 10 minutes — and all 800 megawatts within 20 minutes.

"Marsh Landing is a great project for California," said Mike Rinehart, project manager. "It provides a reliable backup to ever-growing renewable, but often unreliable, generation assets in our state. Its rapid-response capability qualifies its total capacity as standby generation, even when the plant's units are offline and sitting idle."

The client, NRG Energy, wanted the plant designed and built with the environment in mind. It uses Best Available Control Technology, an EPA standard for emissions control. Each unit incorporates ultra-low nitrogen oxide combustors and selective catalytic reduction systems. Combined, these work to keep nitrogen oxide emissions at the lowest possible level. Additionally, the site's new administration building is seeking Leadership in Energy and Environmental Design, or LEED, certification — an international standard for environmentally friendly construction.

Rinehart describes the project as the first configuration of its kind — a simple cycle peaking plant made up of F-class units with emissions abatement up to California standards.

Greetings from California

To back up California's power grid during high-demand times, some utilities are choosing to use rapid-response plants, also known as peaker plants. Kiewit recently constructed three of these plants across the state.

Marsh Landing Generating Station, Antioch

Marsh Landing is capable of delivering 400 megawatts to the grid in 10 minutes — and 800 within 20 minutes.

Walnut Creek Energy Park, City of Industry

A 500-megawatt peaker plant — made up of five 100-megawatt turbines — was built on less than 12 acres.

Haynes Units 5 & 6 Repowering Project, Long Beach

A new power plant replaced two of the older generating stations at Haynes.

"It's a prototype of a new market of extremely large peaker plants," he said.

During high demand, Marsh Landing will supply power to more than 750,000 homes.

WALNUT CREEK ENERGY PARK

Haynes and Marsh Landing were built on existing facilities, but the team executing the EPC contract for Walnut Creek Energy Park didn't have the same luxury. They had to build the 500-megawatt peaker plant for City of Industry, Calif., on a 12-acre site.

Among the toughest challenges of the project were the coordination and effort required for access, logistics for getting material on site and creative strategies for reducing required manpower in the area. The project team developed a plan to minimize the impact on a congested site with a tight schedule.

"The site was shaped like a landing strip," said Chuck Gipe, project sponsor. "Construction managers Roger Real and Billy Ibison were like air traffic controllers. Instead of plane traffic, they safely coordinated heavy equipment, cranes, large plant equipment and, most importantly, people."

Because of the access issues, workers used specially designed trailers to haul the five 100-megawatt, 400,000-pound turbines from General Electric's yards to the job site. The emissions control module was constructed offsite to avoid congestion and space restrictions. All heavy and oversized load moves took place at night and involved maneuvering trucks through city streets with the help of the California State Patrol.

Traditionally, power plant projects have a laydown yard onsite — a place to store parts and materials. However, because the WCEP site was so small, the team had the additional challenge of using an offsite laydown. Coordination between the plant site and laydown yard was crucial to the project's success.

WCEP's schedule for commissioning and starting the plant was just as challenging as its construction timeline. Procurement Manager Ernie King and his team needed to trim 30 days off the schedule for the plant to be ready to produce power by the end of the year — a milestone important to the client, Edison Mission Group.

"The only way that I felt we could accomplish this was to make sure that construction and start-up worked together and focused on the same goals," Gipe said.

> "This is our third natural gas-fired power plant project with LADWP. Having that open, transparent relationship with our client already established before work on this EPC project even began was a definite advantage."
>
> **JULIEN JEANNEL,** PROJECT MANAGER, HAYNES UNITS 5 & 6

1. The Walnut Creek Energy Park is a brand new, 500-megawatt power plant for the City of Industry, Calif. It can deliver its energy to the grid within 10 minutes. 2. Craft work on the Marsh Landing Generating Station, which will provide power to 750,000 homes during peak times. 3. The Walnut Creek Energy Park was built in tight quarters. The project team had to develop a plan to minimize the impact on a congested site with a tight schedule.

The Kiewit team delivered WCEP's power to the grid for the first time on Dec. 31, 2012.

Today, WCEP can deliver energy to the grid within 10 minutes. Similar to Marsh Landing, the plant uses Best Available Control Technology to reduce emissions. The facility also uses reclaimed water for cooling as well as for site landscape irrigation.

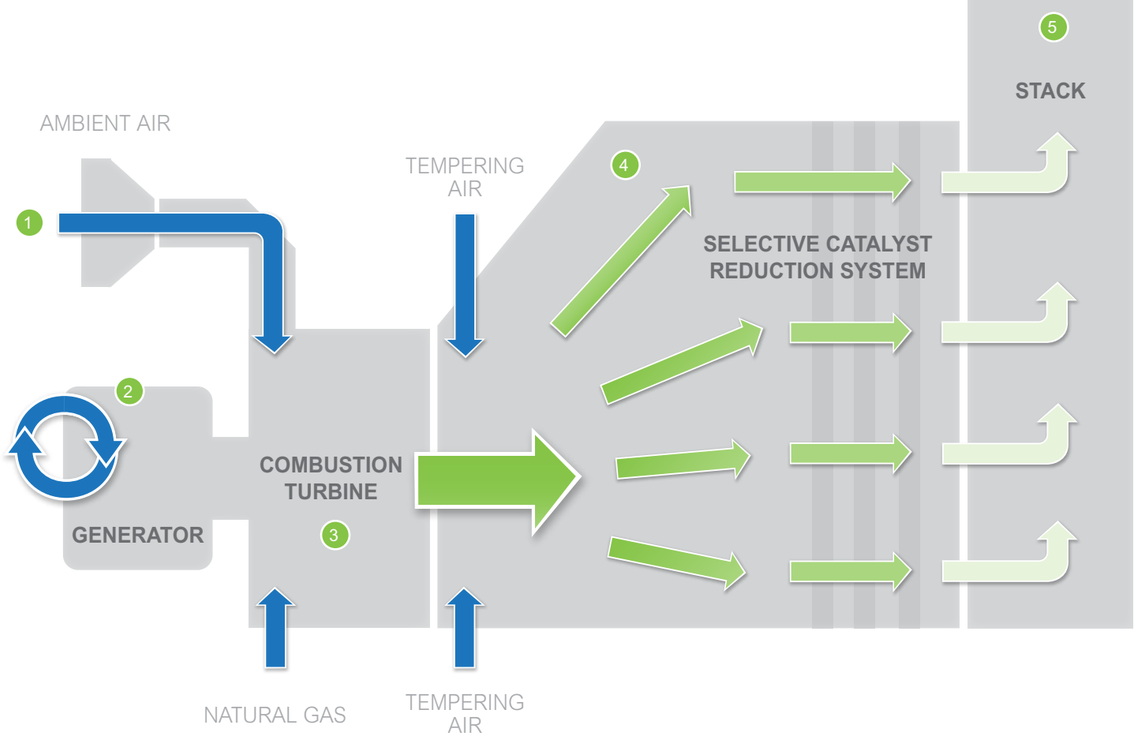
PEAKERS AND RENEWABLES — THE PERFECT PAIRING

As renewable energy continues to grow in popularity, utilities will need solutions to meet the electric loads and back up intermittent renewable electricity sources. Peaker plants, with their ability to start up quickly when demand is high, offer utilities the flexibility they want with the reliability they need. Combined, Haynes, Marsh Landing and WCEP have the ability to deliver 1,500 megawatts of electricity to the grid in 10 minutes — and as much as 1,900 megawatts in 20 minutes.

Simple-cycle generation

These natural gas power plants use a simple-cycle generating system to produce power. Sometimes "simple" is a misnomer. Here's how it works.

1. Ambient (outside) air goes through the filter house and into the combustion turbine where it is introduced to natural gas.
2. The air and the gas ignite into an explosive fireball that spins the turbine fans inside the cumbustion turbine, which causes the generator rotor to spin. The spinning generator produces power. From there, the power goes to an electrical switchyard for public distribution.
3. Even though electricity has been produced, the tempering, or bad, air inside the cumbustion turbine is hot and too polluted to be released back into the atmosphere. It needs to be cooled and cleaned.
4. Air first is cooled by tempering fans and then introduced to the selective catalyst reduction system. Here, the air is cooled even more and sent through catalysts, or filters, that inject ammonia to remove carbon monoxide.
5. The cooler, cleaner air now meets the air quality permit requirements and is safe to exit the stack.



NO AUTOS ALLOWED

THE NATION'S FIRST CAR-FREE TRANSIT BRIDGE

In a city connected by bridges, not all bridges are created equal.

With a million new residents forecasted for the region by 2030, Portland's transportation authority, Tri-County Metropolitan District of Oregon (TriMet), has set out to build a one-of-a-kind bridge to increase transit capacity.

On Dec. 14, 2010, TriMet awarded Kiewit a $119 million design-build contract for the Portland-Milwaukie Light Rail Transit Bridge. The endeavor is a vital part of TriMet's $1.49 billion, 7.3-mile light rail alignment project.

Spanning the width of the Willamette River, this will be the first bridge built over the river since the addition of the Fremont Bridge in 1973. It will also be the first of its kind in the United States not to carry any cars — it will be used only by light-rail trains, buses, cyclists, pedestrians and streetcars.

Opening to the public in 2015, the bridge will connect downtown Portland to a suburban area at Park Avenue in north Clackamas County. It will provide easy access to many of Portland's attractions, including the Oregon Museum of Science and Industry (OMSI), the Portland Opera and Oregon Health & Science University.

"This is the future of transit in the area," said Vince Castro, construction manager. "It's going to really enhance the mobility of the town."

TECHNICAL CONSTRUCTION

Featuring a design chosen for its cost, minimal environmental impact and overall aesthetics, the structure — an open grid, cast-in-place segmental, cable-stayed bridge — also boasts features unique for the area and the industry.

"The design really pushed us to get creative and think outside the box," said Ralph Salamie, project sponsor. "Combining concrete segmental technology with relatively new cable-stay technology presented many unique challenges for our design and construction team."

"In terms of bridge construction, it doesn't get any more sophisticated than this," added Steve Cochran, assistant project manager. "It's two technical bridge types in one."

The bridge's span will be supported from above by a system of cables that run continuously through the towers. The roadway and support beams will be thin, maximizing vertical clearance for marine traffic.

The new bridge will be built to carry light rail, three bus lines and eventually the Portland Streetcar's Central Loop Line.

A 14-foot bike-pedestrian path will line both sides.

While the structure will not accommodate private vehicles, its design will allow access to emergency vehicles.

THE COMMUNITY'S BRIDGE

Prior to putting the project up for bid, TriMet underwent an exhaustive three-year assessment to ensure the community and its key stakeholders would be satisfied.

"There was a lot of public interest because the bridge would be the first to be built in Portland's downtown core in 40 years," said Rob Barnard, TriMet's Portland-Milwaukie Light Rail project director. "Our bridges are part of our city's identity."

TriMet worked with a citizens' committee led by former Portland mayor Vera Katz. The group was comprised of various stakeholders from both sides of the river, and it included designers, architects and engineers. A number of outreach meetings — "a whittling process," Barnard said — were held to ensure alternatives were evaluated collaboratively and impartially to reach a consensus.

"TriMet's early community involvement really paid off," added Castro. "There's definitely a lot of positive buzz."

AESTHETICS

A key takeaway from TriMet's assessment was the public's focus on aesthetics.

"Because the bridge sits in such a picturesque spot for the city, there has been a definite vision in mind," said Salamie.

While design-build projects normally require flexibility, Barnard said the client needed the final product to look exactly as promised. Therefore, Kiewit bid on prescriptive shape dimensions that allowed for very little change.

"But our team's clever engineering was able to reduce the cost of the bridge while still sticking to the requirements," said Barnard.

DESIGN-BUILD INNOVATIONS

The project's location on the Willamette River meant in-water construction had to be completed during a "fish window." Set by the National Marine Fisheries Service, the period from July 1 to Oct. 31 is a time when salmon migration is the lowest of the year.

During the remaining months, the team was prevented from disturbing the river bottom. Early planning allowed the team to complete all necessary in-water work during the months leading up to the restricted period.

"Many of our construction means and methods were chosen with the idea of limiting impact to the river," said Salamie.

The cable-stayed design itself will help to protect the environment, removing the need for intermediate towers in the river and significantly reducing disturbance to the river and fish population.

Precast concrete mats placed around the towers will act as a protective layer to stabilize the river bottom and defend against erosion as the river flows around them.

"We are pleased that our environmental results have all been positive," said Cochran. "It was a big team effort. Everyone involved deserves a pat on the back."

AN ACTIVE COMMUNITY

The spring and summer months presented their own challenges due to an active marine community. Dragon boat (a human-powered watercraft) races and kayaking are quite popular in the area. To ensure these mariners were aware of specific construction efforts — and how to avoid them — the team distributed regular communications and provided navigation tools.

Keeping Portland's equally active cyclist and pedestrian community informed also was important to the Kiewit team.

"It's unbelievable the amount of cyclists in the area," Castro said. "I've traveled around the country, and this is by far the most I've ever seen, even in the winter. I can see the importance of this project in such an active community."

To engage the public, the project team gives several tours each year to local student groups. The team is also working with OMSI to feature the bridge in upcoming education programs. The museum, for example, currently provides live construction footage.

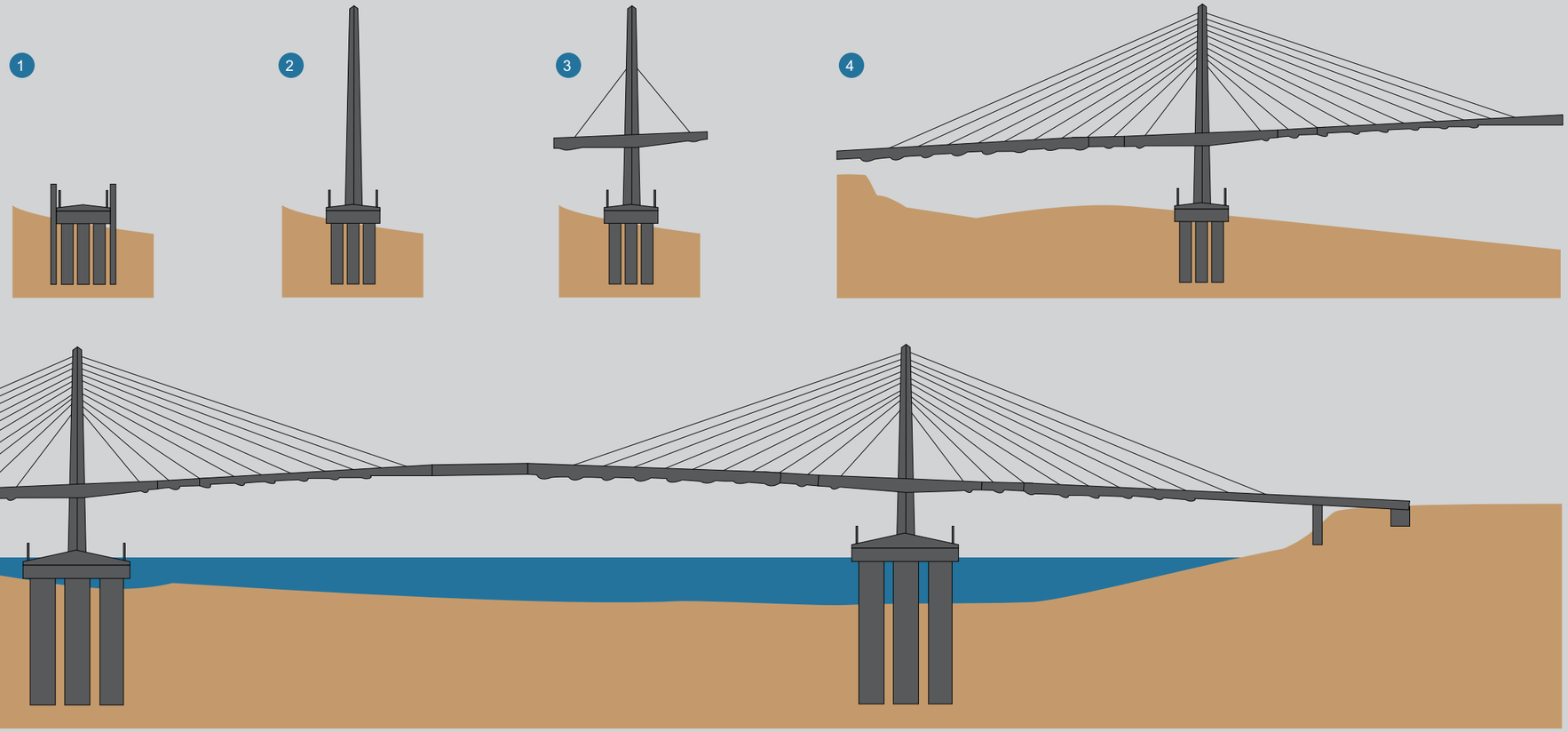
"The entire community seems excited about the bridge," said Castro, "and is eagerly tracking its construction and anticipating its opening."

He and others on the project team are also active in the community in other ways. For instance, they spent time mentoring disadvantaged business enterprises that have a role in building the specialized bridge.

"We hope to develop their capacity to provide additional scope services," said Cochran. "To really get them pointed in the right direction."

Building the Portland-Milwaukie light-rail bridge

1. Cofferdams (temporary water-tight structures) are built and water is pumped out. Foundations to support the towers are made.
2. Once the foundation is in place, the towers are erected.
3. The first segment of the bridge deck is built and cables are attached to it.
4. Additional deck segments and cables are attached 32.5 feet at a time. Cabling the rest of the bridge begins.
5. The entire bridge will be completed September 2014.



Portland-Milwaukie by the numbers

75.5 feet	Typical width of the bridge. At the towers, the width is 110.5 feet.
3.5 miles	Approximate amount of cable
2	Bicycle paths, each 14 feet wide
180 feet	Tower height, from pier cap to top
1,720 feet	Total length between landside abutments
780 feet	Length of midspan between towers
25 mph	Maximum speed of buses or rail vehicles on bridge

Castro, who spends considerable one-on-one time with DBE management, notes that working with DBE companies is really a win-win.

"Both the project and DBE firms benefit," he said. "We're helping them understand the design-build process and how it works to achieve goals and, in turn, complement our schedule."

CONSTRUCTION SEQUENCE

Design work and fish-window preparation began in January 2011, and Kiewit's design firm, T.Y. Lin International Group, played an important role. "Their efficient and innovative ideas really helped us," said Salamie.

From July through October, in-water work included construction of watertight cofferdams. These temporary enclosures, one for each tower, allowed the project team to work inside the structure during the restricted period.

Temporary bridges were also built. The structures provided efficient access to both towers for crews, equipment and materials — an aspect critical to the project's success.

By 2012, the team had completed construction on the 180-foot-tall west tower and a 100-foot section of bridge deck surrounding the tower.

PROJECT COMPLETION

Castro says 2013 promises to be a big year: All 76 of the 16-foot-long bridge segments will be constructed.

"Essentially, you build each segment one at a time," he said. "Then we flip to the other side, install cable supports and repeat the cycle."

Because of the slender bridge span and the weight of each individual segment — 440,000 pounds — the team will also install temporary cable-stays between each permanent stay to support the span during construction.

The project is on track for substantial completion by July 2014.

"Everyone wants to make sure the bridge is done well," said Barnard.

"This is a signature bridge for the city of Portland that will stand as a landmark for the next century," added Salamie.

Kiewit

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