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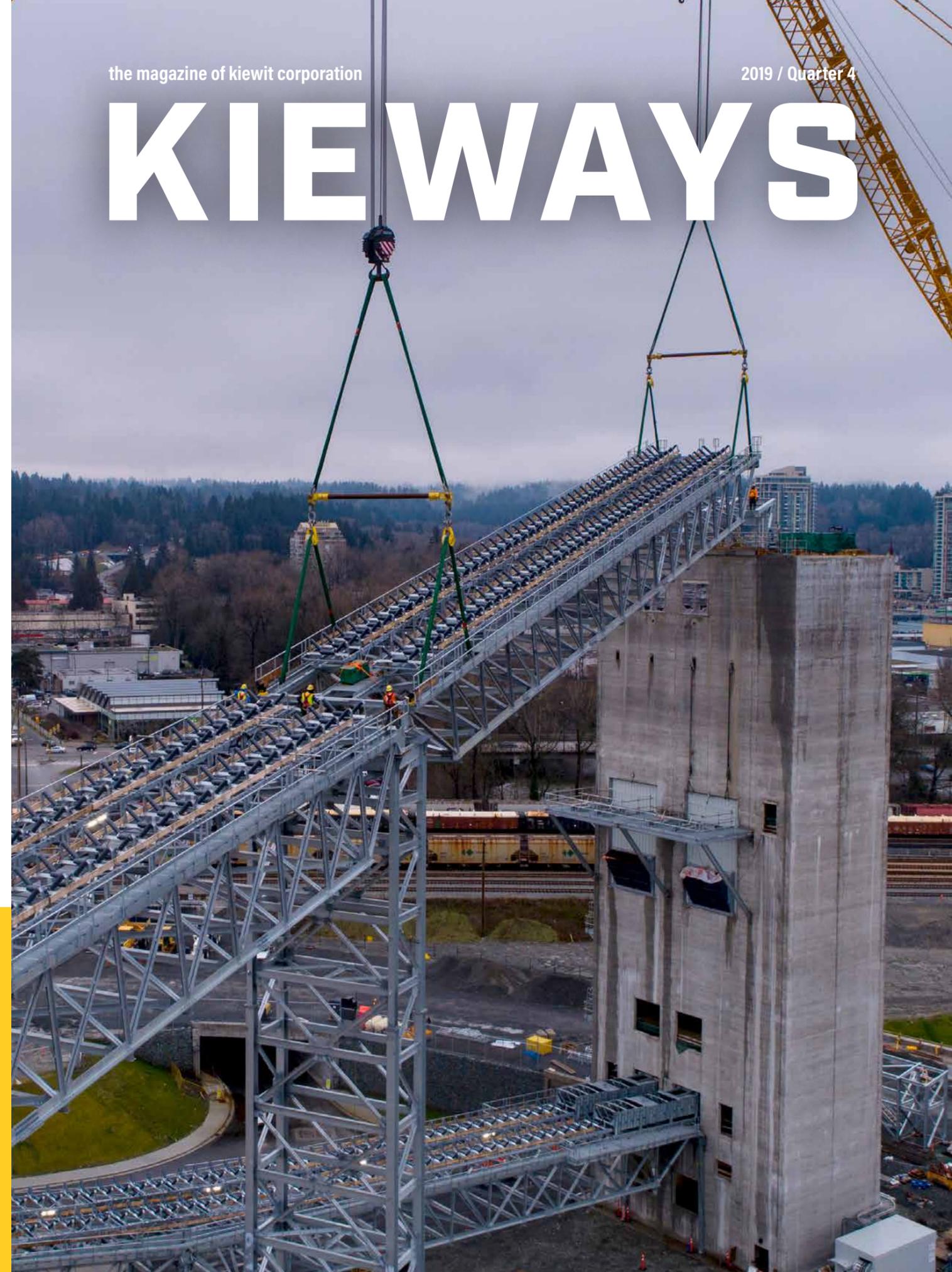


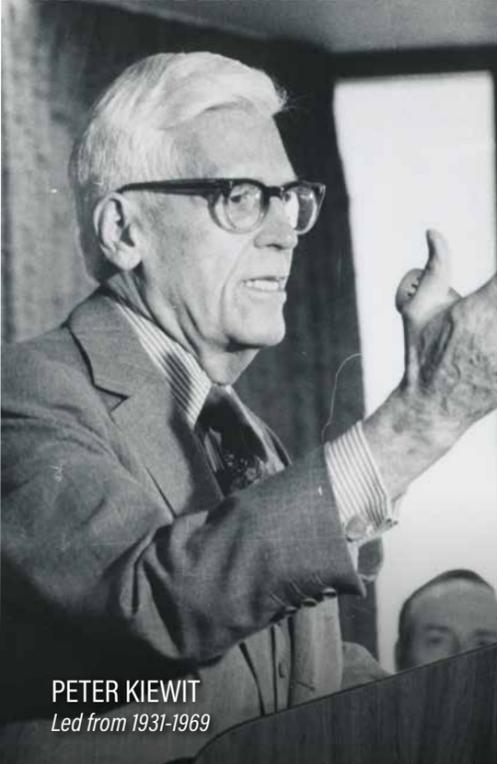
**SINCE 1884**

the magazine of kiewit corporation

2019 / Quarter 4

# KIEWAYS





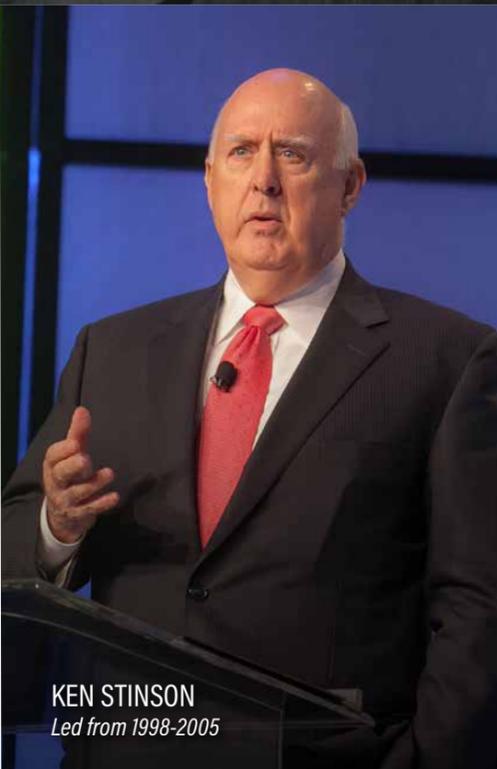
**PETER KIEWIT**  
*Led from 1931-1969*



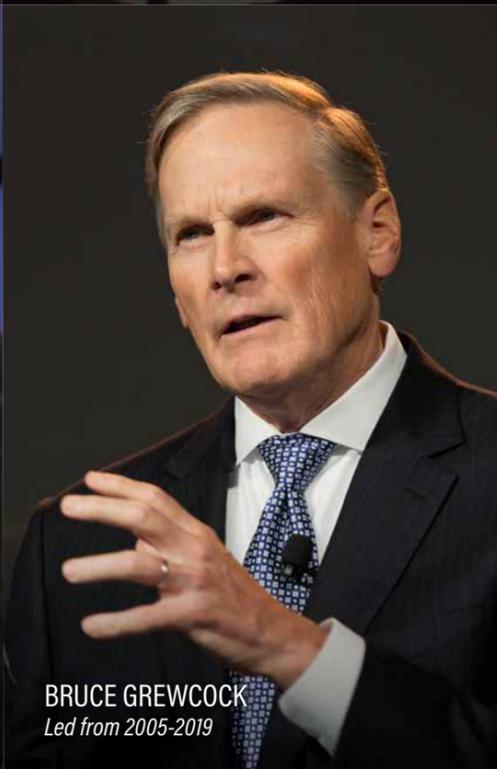
**BOB WILSON**  
*Led from 1969-1979*



**WALTER SCOTT, JR.**  
*Led from 1979-1998*



**KEN STINSON**  
*Led from 1998-2005*



**BRUCE GREUSCOCK**  
*Led from 2005-2019*



**RICK LANOHA**  
*New CEO, January 2020*



## PASSING THE TORCH

Frequent readers of Kieways and anyone with personal ties to the Kiewit organization understand how much we value the idea of stewardship. Our company leaders, at all levels, see themselves as caretakers of a unique and special culture. I certainly do. It was such an honor to serve as the fifth chief executive officer since Peter Kiewit himself held the role. Kiewit Chairman Emeritus Ken Stinson passed that torch to me in 2005 and at the beginning of January, 2020, I will be passing it on to our company's sixth CEO — Rick Lanoha.

If anyone has enough experience and vision to step up and lead Kiewit into the future, it's Rick. He started with the company as a part-time employee in 1986, and after receiving his bachelor's in construction engineering at the University of Nebraska at Omaha, he started full-time as a field engineer in Southern California. During this time in California, he held many managerial roles, overseeing work in the region on jobs like the High Desert Power Plant project in Victorville. He was promoted to area manager in 2000, and then again in 2002 as vice president and district manager of a regional operating group we then called Kiewit Pacific Co.

In 2003, Rick made a leap in his Kiewit career and across the country, becoming district manager and president for Mass. Electric Construction Co., a Kiewit subsidiary located in Boston, Massachusetts. Over the next few years, his industry, market and management experience grew and he was named senior vice president of Kiewit Corporation. He also

served as division manager of three more company subsidiaries, MEC Industrial, MEC Transportation, and The Industrial Company (TIC) Holdings, along with Kiewit's Southeast District and Kiewit Engineering.

Rick joined Kiewit's Board of Directors in 2009 before becoming executive vice president of Kiewit Industrial Group with oversight of its then two divisions—Kiewit Oil, Gas & Chemical and Kiewit Power. He was named president and chief operating officer in 2016, overseeing all company operations. Rick's commitment to safety, growing our engineering services, using technology to improve our business, and staying true to our fundamental processes are exactly the qualities required of a successful leader of this company.

As for me, I'm not going anywhere anytime soon. As exhibited by the continued work of the CEOs before me, this industry — this company — is too fun to tie up with a traditional retirement party. I'll remain executive chairman of the board, playing an active role in both the evolution of Kiewit and the construction and engineering industry. Again, it has been one of my greatest honors to lead this incredible organization. I'm also honored to be passing it on to Rick Lanoha. I hope he enjoys it as much as I have.

**BRUCE GREUSCOCK**  
Chairman and CEO



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 organization operates through a network of subsidiaries in the United States, Canada, and Mexico. Kiewit offers construction and engineering services in a variety of markets including transportation; oil, gas and chemical; power; building; water/wastewater; industrial; and mining. Kiewit had 2018 revenues of \$9 billion and employs 20,000 staff and craft employees.

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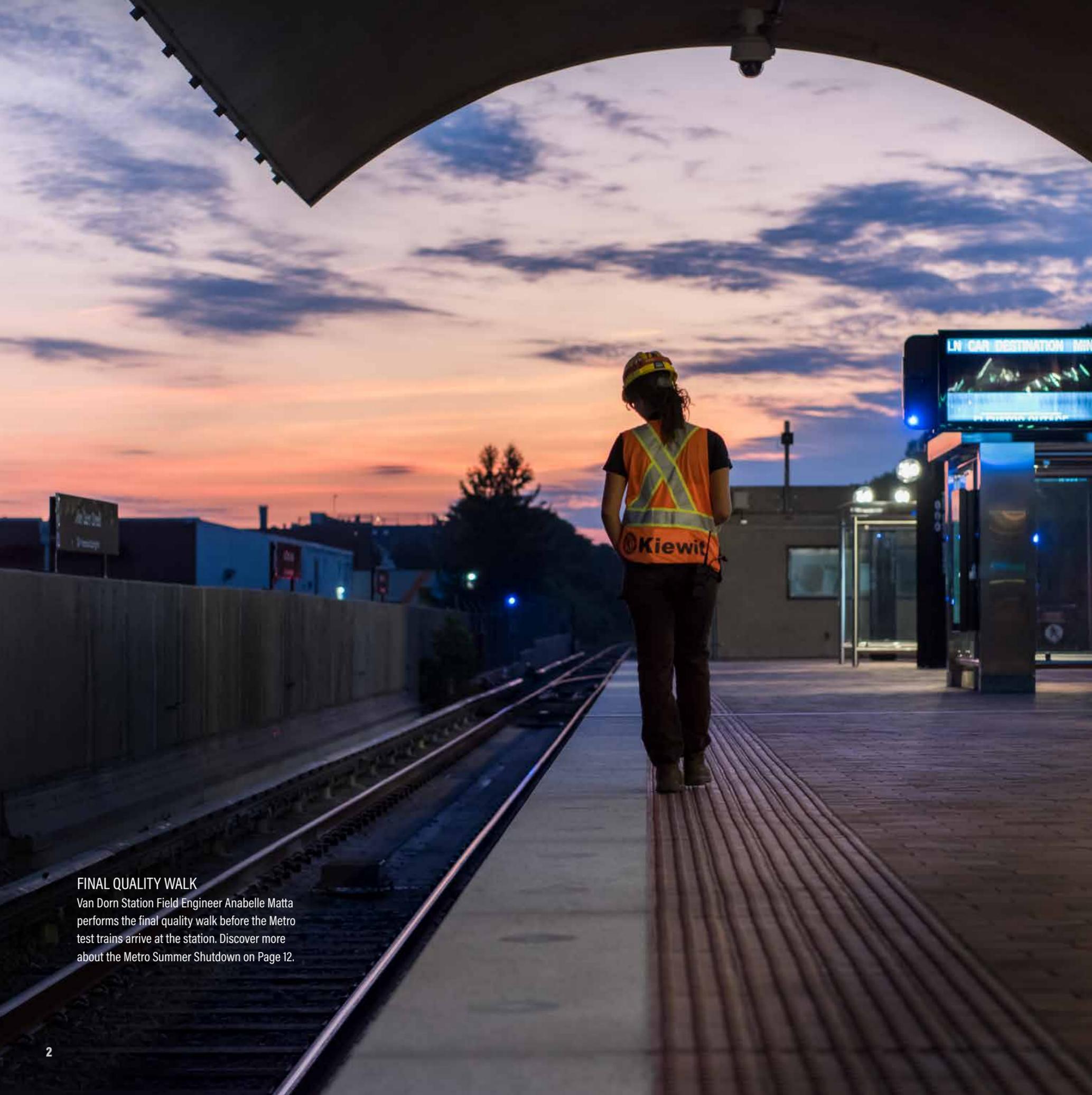
### KIEWAYS

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#### FINAL QUALITY WALK

Van Dorn Station Field Engineer Anabelle Matta performs the final quality walk before the Metro test trains arrive at the station. Discover more about the Metro Summer Shutdown on Page 12.

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# KIEWIT NEWS

What began in 1884 with two hard-working brothers has grown into a construction and engineering industry leader. As a multi-billion dollar organization, Kiewit can tackle projects of all sizes, in any market. Here's a brief collection of recent news and information from around the company.

## OUR MARKETS:

-  BUILDING
-  INDUSTRIAL
-  MINING
-  OIL, GAS & CHEMICAL
-  POWER
-  TRANSPORTATION
-  WATER/WASTEWATER

## OUR VALUES:

-  PEOPLE
-  INTEGRITY
-  EXCELLENCE
-  STEWARDSHIP

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## BUILDING UP ENGINEERING EDUCATION IN NEBRASKA

In a partnership with the University of Nebraska-Lincoln, Kiewit is donating \$20 million toward an \$85 million expansion project. Part of the expansion includes a new facility, to be named Kiewit Hall, which will serve as the College of Engineering's academic hub and will house the university's construction management programs.

"As stewards of our community and the construction and engineering industry, Kiewit is happy to not only support the College of Engineering's physical expansion, but also the strategic efforts to grow UNL's engineering program into one of the best in the country," said Bruce Grewcock, Kiewit's chairman and chief executive officer.

The University of Nebraska offers engineering programs in both Lincoln and Omaha, where Kiewit was founded and where its headquarters are located. By 2026, Nebraska will need nearly 15,000 new workers in the engineering and computer science fields.

"The powerful combination of Kiewit and UNL will significantly grow the impact of Nebraska engineering," said Chancellor Ronnie Green. "That is a top priority for the University of Nebraska. We are making great strides under the strong leadership of Dean Pérez, and I am so excited about the trajectory of this program."

Fundraising is actively continuing with engineering alumni and other donors so that the new building can meet its tentative completion date of 2023.



## DAVE FLICKINGER NAMED TO INGRAM'S 250

Kiewit Energy Group Executive Vice President Dave Flickinger is one of this year's Ingram's 250 honorees. The Ingram's 250 list recognizes Kansas City's most influential business leaders.

Dave has been with Kiewit for more than 25 years. He currently oversees more than \$2.5 billion in annual power generation, transmission and distribution work.

Dave's contributions to the Kansas City community include serving as a chair of this year's American Heart Association KC Heart Ball. Dave and Kiewit are also strong supporters of Braden's Hope for Childhood Cancer.



## FIRST FIRES COMPLETED AT FOUR PLANTS

Over a recent six-week period, Kiewit completed first fire on four new combined-cycle power plants. In all, eight gas combustion turbines were safely fired — two on each project.

- Alamitos Energy Center, California
- Fairview Energy Center, Pennsylvania
- Hickory Run Energy Center, Pennsylvania
- Huntington Beach Energy Project, California

## TOPPING OUT KIEWIT'S NEW HEADQUARTERS

Construction of Kiewit's new headquarters in Omaha, Nebraska, topped out in early November. A topping out ceremony marked the new building reaching its maximum height. Employees commemorated the milestone by signing the final beam. Kiewit's new headquarters is scheduled to open in 2021 and is next to Kiewit University, Kiewit's training facility which opened in 2017 and annually hosts nearly 3,000 learners from across the company.



## KIEWIT KIDS MAKE SAFETY PERSONAL

For more than a decade, Kiewit has encouraged families to share their passion for safety in an annual calendar contest. More than 600 Kiewit kids submitted their artwork in hopes of being featured in the 2020 safety calendar. Check out some of the winning submissions below.



## CORRECTION

Wells in the Permian Basin are expected to produce 5.4 million barrels per day by 2023. The production was reported incorrectly in the "Hidden Treasure in the Permian" story in the Q3 issue of Kieways.

# MORE THAN A BRIDGE



## Rebuilding a Piece of American History

The historical landmark that connects the Lincoln Memorial and Arlington National Cemetery is getting new life, thanks to Kiewit's innovative engineering and meticulous preservation.

The Arlington Memorial Bridge in Washington, D.C., has seen a lot in its nearly 90-year history.

The iconic neoclassical structure is a symbolic post-Civil War connection between North and South.

It's carried the bodies of President John F. Kennedy and Senator Robert Kennedy over the Potomac River to their final resting places in Arlington National Cemetery.

One of seven vehicular bridges connecting the District of Columbia and Virginia, it's been responsible for delivering about 68,000 vehicles — as well as thousands of cyclists and pedestrians — to their destinations every day.

The stress of traffic, weather and age has taken its toll on the historical monument. Without a complete rehabilitation, travel on the bridge would compromise users' safety and cause further damage.

In the years since it opened as a tribute to our nation's military on Jan. 16, 1932, the structure has never been completely cleaned and repaired.

In 2018, the National Park Service took action to change that.

### A DOUBLY CHALLENGING JOB

Kiewit Infrastructure Co. won the bid for a contract that includes repairing the concrete arches and stone facades on the 10 approach spans, replacing the bascule span's steel superstructure, reconstructing the bridge deck and sidewalks, and resurfacing all travel lanes.

With a compressed timeline, the team had a doubly challenging job: Preserve the historical integrity of the bridge and create engineering solutions to make sure it would be structurally sound for another 75 years.

Under the direction of the Federal Highway Administration, along with the National Park Service, Kiewit would make its own kind of history with some first-ever innovations.

The bulk of the work began in October 2018, but detailed planning, procurement and a lot of brainstorming started six months before that.

The process included creating a menu of options for the client to choose from.

"Often, these options had to go through several agencies for approval," said Project Manager Donnie Arant.

"Every party had something that was important to them, so by giving them ways to pick and choose the pieces they wanted, we could come up with a collaborative solution."

Throughout the planning process, Kiewit strived to strike a balance between preserving the original materials and

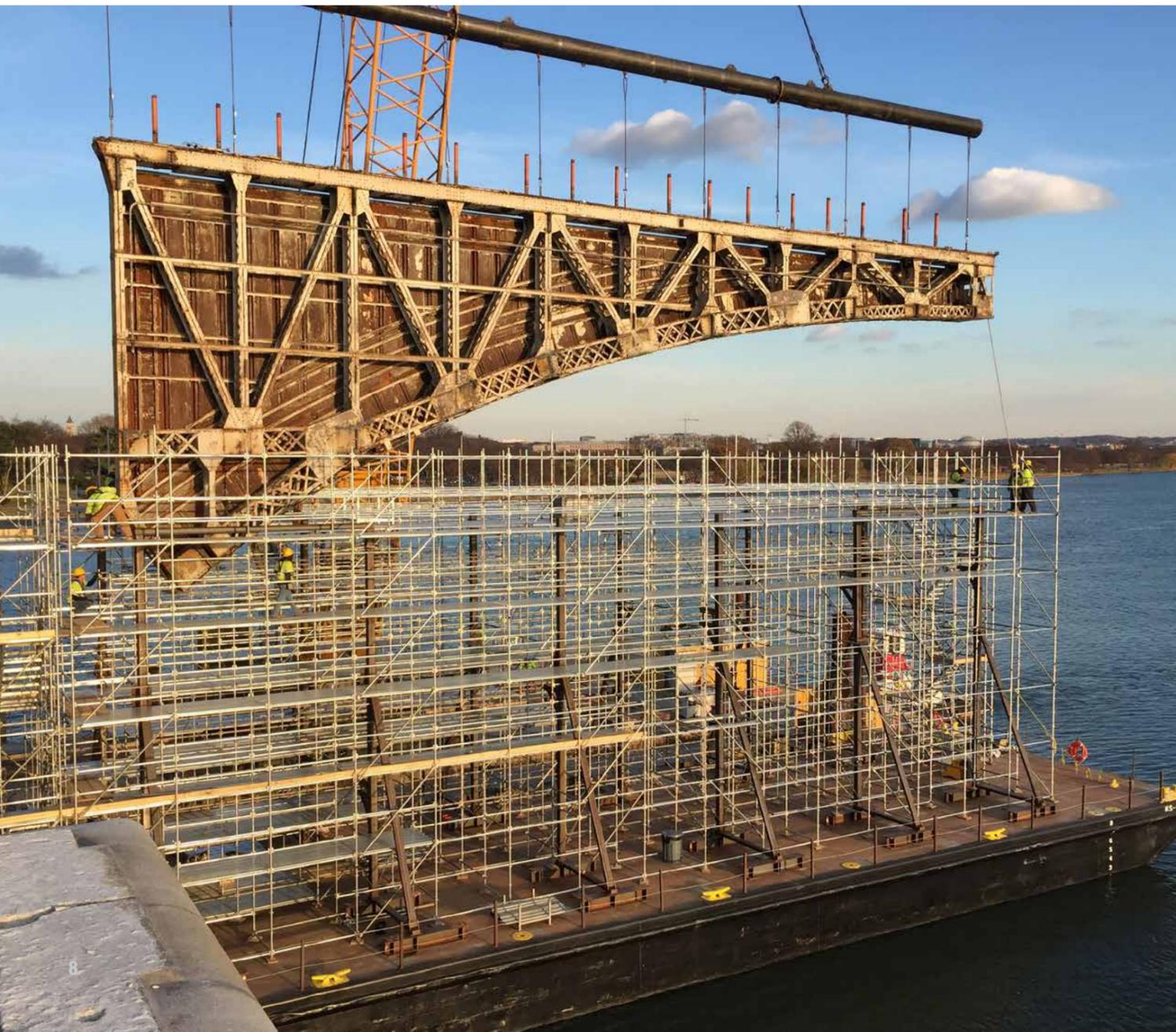
suggesting the highest-quality products to extend the life of the bridge.

### PRIDE ON THE JOB

To put together a craft workforce with the experience and specific skill sets needed for this project, Construction Manager Luke Silvus reached out to his local contacts.

"I called the business agents for the unions in different disciplines, and I had them send out a couple of their key folks. I met with those guys and interviewed them. And then I had them recommend the best people for the job."

Once the team was assembled, the momentum "spread like wildfire," Silvus said.



## About the bridge

President Warren Harding and the Arlington Memorial Bridge Commission picked the site for Arlington Memorial Bridge in the early 1920s. The bridge connects Arlington National Cemetery and the Lincoln Memorial. It symbolizes the reunification of the North and the South following the Civil War.

The bridge was designed by architectural firm McKim, Mead & White. They worked with Joseph Strauss on the design. Strauss would later go on to design the Golden Gate Bridge.

The Army Corps of Engineers started construction in 1926 and finished more than six years later. The bridge was dedicated on Jan. 16, 1932, by President Herbert Hoover and opened to traffic on May 6, 1932.

The 2,100-foot-long bridge was listed in the National Register of Historic Places in 1980.

The bridge's 216-foot central drawbridge was once the longest, heaviest and fastest-opening in the world. According to a Park Service report, it could be raised in about 90 seconds. Over the years, other lower bridges on the Potomac River prevented navigation by taller ships. The span opened for the last time during 1961 and has not operated since.

The bridge also serves as the ceremonial entrance to Arlington National Cemetery, our nation's most hallowed ground and the final resting place for more than 400,000 active-duty service members, veterans and their family members.

Source: nps.gov

“At the monthly safety meetings, we would have some of our craft come up and say a few things about what they were building.

“We’ve built such high morale on the job. A lot of it has to do with the pride that people are feeling, working here.”

### KEEPING THE PATINA

Maintaining the original look of the bridge, and wherever possible the original materials and finishes, has been a top priority.

“The standards set by the Secretary of the Interior dictate that a light patina is part of the nature of an historical structure,” Arant said. “The project owner wanted to make sure we took a lot of care in how each element was restored in order to maintain the original character.”

The catch basin grates along the curb line, for example, needed to look exactly the same. They’re not industry

*1. Kiewit removed the existing historic fascia with a custom picking device to refurbish it to its original condition. 2. Once it was fully restored, the piece was reinstalled, maintaining the historic fabric of the bridge. 3. Each piece of the bridge railings had to be meticulously cataloged, removed, repaired, cleaned and reinstalled in the same exact location.*



standard anymore, so the team made custom molds to recreate them exactly as they originally were.

Preserving the bollards — the original pop-up protective posts on the drawbridge that’s no longer in use — was also important to the project owner.

“The posts were in conflict with one of our walls we had to build,” said Arant. “The client said, ‘Please do everything you can to retain them; they’re an important historical piece.’ So we actually came up with some engineering to not have to remove them.”

### RECREATING THE ORIGINAL

To allow for restoration of the drawbridge façade, the team built a custom cradle on a barge. Handling the piece as a complete unit was a much preferable option compared with removing every piece of detail and reassembling it.

Kiewit also worked with subcontractor Lorton Stone to



inventory the thousands of balustrades, carefully clean them, and replace them in the exact same location.

“The client wanted them pointed in the correct direction that they were originally,” Arant said. “So if a certain railing had a certain portion of it pointing north, that had to be placed pointing north.”

### ‘THE JOB OF A LIFETIME’

With the south side of the bridge substantially complete, attention now moves to the north side where the team will perform the same tasks. The entire job is scheduled for completion by spring 2021.

The team says memories of this project will stay with them for a long time.

“These clients have been true partners, and I would consider them true friends,” Arant said. “Our team has the kind of chemistry that just doesn’t happen on every project. It’s one of the best I’ve ever worked with.”

“There have been half a dozen times on this job where we look at ourselves and say, ‘This is just amazing that we’re doing all of these first-ever kind of things,’” Senior Structural Engineer Dave Lamoureux noted. “The project is a really cool experience.”

“This is the job of a lifetime,” added Silvas. “Every morning we get up, and we come to work and get to watch the sun rise over the Lincoln Memorial and the Washington Monument. It’s unreal.” **K**



## Engineering a first for Kiewit

Creative engineering not only has been a hallmark of the job, it’s been a necessity in order to meet the deadline.

To maintain traffic on one side of the bridge, the team has had to perform the bridge construction in two phases. That meant the existing drawbridge had to be cut in half, requiring extensive in-water shoring.

In an example of pure Kiewit innovation, the team developed a jack-up barge for the shoring system to support the structural steel on the bascule span.

The design was adapted from a previous job in Miami about 10 years ago, said Senior Structural Engineer Dave Lamoureux.

Before starting work, however, the plan needed to be approved by the client.

“We had to show them that we had done our due diligence and all the proper engineering to ensure we weren’t going to damage the structure and cause any risk to the traveling public.”

Per Kiewit policy, the team had to secure independent reviews of the plan and also responded to about 250 questions from the client and the engineer of record.

“We addressed all the comments and concerns that were raised and got everyone more comfortable after working through the process,” Lamoureux said.

“We were able to pre-fabricate a lot of the work on the shore and then float the barge into position and jack it up into place. That eliminated a lot of the work that would have been done out on the water, and a lot of the low headroom work under the bridge.”

From design to execution, creating this solution has been a satisfying first for Kiewit, said Lamoureux.

“We hadn’t done it in totality this way before, but we’ve taken bits and pieces of what we’ve done before to come up with a solution to this particular problem.”

# A FRACTION OF TIME



In an unprecedented move, the Washington Metropolitan Area Transit Authority (Metro) decided to close all six of its Metrorail stations south of Reagan National Airport this summer for critical platform repairs and infrastructure improvements. Compared to previous platform reconstruction projects, this approach reduced the length of the project by as much as 94%.

Instead of a lengthy combination of overnight work, single tracking and weekend outages that stretch on for years, Metro fully closed stations, allowing contractors to have 24-hour access to the work sites instead of limited, sporadic hours.

Kiewit Infrastructure Co. was awarded the \$200 million project in November 2018 and had from Memorial Day weekend until the evening of Sept. 8 to complete the repairs and get the stations ready for a return to passenger service on Sept. 9 — a fraction of the time it would take to do the repairs without the summertime shutdown.

### ON THE RIGHT TRACK

To ensure the project started off on the right track, Project Director Paul Beljan and Project Manager Brian Watkinson needed to ensure the best team was in place. Some of Kiewit's best "athletes" came from all over North America — Georgia, Illinois, Florida, New York, Nebraska and even California.

Beljan and Watkinson's approach to the project was to break it up into smaller, manageable segments. Each

station was assigned a station manager to act as a project manager over their scope of work. Those station managers reported to one of three general superintendents, Fred Bianchi, Matt Higgins or Jim Majors, who reported to Construction Manager Joe Cunningham.

This approach allowed each station manager to focus on their individual stations as if they were project managers of their own isolated projects. Beljan, Watkinson, Bianchi, Higgins and Cunningham ensured that everything flowed seamlessly as a team.

While the six stations — Braddock Road, Eisenhower Station, Franconia-Springfield, Huntington, King and Van Dorn Station — had similar scopes of work, each station had its own unique challenges and features.

### PLATFORM EDGES

Repair of the cantilevered platform edge was one of the most pivotal scopes of work for each station. Some of the edges were beginning to deteriorate at a rapid rate, and Metro had installed temporary supports to ensure passenger safety until reconstruction could take place.



## Reducing public impact

During the shutdown, Metro provided free shuttle bus services to its passengers to help minimize the impact of their commutes. Metro offered alternative routes for every station being renovated and even offered express buses for more popular routes.

Kiewit assisted in the construction and maintenance of temporary bus service facilities on-site that allowed Metro to keep transportation services running for its riders. Metro ensured greeters were available at each shuttle stop to direct passengers and answer questions. By the third week of the shutdown, there were almost 34,000 people using the shuttles every day.

To further demonstrate its appreciation to its customers, Metro provided free parking at all its stations. This allowed passengers taking advantage of the free shuttle service to also enjoy free parking.



Kiewit's task: remove the old edges and replace them with new, structurally sound edges.

In total, the station teams removed and replaced 7,200 linear feet, or 1.4 miles, of platform edge.

### UPGRADED TILE

All platform tile needed to be demolished and replaced with an upgraded slip-resistant tile. Shortly before the shutdown began, Metro added a change order to have Kiewit replace all tile throughout the stations, including the mezzanine areas. While some stations were able to complete the mezzanine tile replacements within the shutdown window, some teams finished the task later in the fall due to the manufacturer's ability to produce the tile.

### NEW SHELTERS, BENCHES AND PYLONS

Crews installed stainless-steel platform shelters equipped with USB charging ports. In each shelter, crews installed 55-inch digital displays and new windscreens to provide Metro customers with protection from the elements. The new digital displays replaced static maps and will display dynamic content such as service alerts, important messages and emergency information.

In total, Kiewit installed 128 passenger information and map displays across all stations.



1. Van Dorn Station Manager Kayleigh Weber overlooks progress made on the station's platform edges. 2. A look at Braddock Road's new skylight and light fixtures.

# Station improvements

- Slip-resistant tiles on platforms and mezzanines
- New stainless steel platform shelters with digital displays and USB charging ports
- Upgraded passenger information displays (PIDs)
- Improved platform speakers and PA system equipment
- New canopy roofing/skylights
- Refinished and new ceiling panels
- New platform surveillance system (CCTV) to enhance customer safety
- New passenger call button to directly contact station managers and operation control center
- Brighter, energy-efficient LED lighting and lighted handrails
- Station cleaning and painting
- Renovated bathrooms
- Concrete repairs
- New bus shelters
- Fire/life/safety enhancements



Tyler Turpin, Huntington Station manager, left, and Kyle Peterson, Huntington Station project engineer, get the station ready for the public.

## MAKING THE MOST OF THE SHUTDOWN

Early in the design process, Metro identified additional scopes of work that should be performed at some of the stations to take full advantage of the summer shutdown. In response, Kiewit mobilized 50 additional people to complete the additional scope.

## HUMP-FREE AT BRADDOCK ROAD STATION

Among Metro's list of change orders for the Platform Improvement Project was the elimination of the "Braddock Hump." When Braddock Road Station first opened in 1983, the platform at the south end was approximately two to four inches higher than the level of the train floor, creating a barrier for wheelchair users exiting a train and posing a tripping hazard for riders. The Braddock team adjusted the piers and rotated the platform bearings to bring the 1.6-million-pound platform to an even level.

"We completed this portion of work eight weeks ahead of schedule," Beljan said. "The team controlled the work from day one with a good estimate. We understood the risks and put the right people and focus on our critical path."

## RETURN TO SERVICE

On Sept. 9, commuters at Metro's six Blue and Yellow line Metrorail stations south of the Reagan National Airport were welcomed back to the remodeled platforms. While the end of the summer shutdown marked the completion of the majority of the project, there was still work to be done. Finishing touches, civil work and mezzanine tile replacements continued at some of the stations, as well as work in the bus loops adjacent to the stations, including installation of new stainless steel bus shelters. **K**

# A sea of yellow

At the age of one, Whitaker, a local Alexandria, Virginia toddler, was diagnosed with Stage 4 neuroblastoma. After years of treatment, six rounds of chemo and 20 rounds of radiation, his scans came back clear and, at 3 years old, Whitaker beat cancer.

Whitaker wanted a Bumblebee Transformer theme to celebrate his first cancer-free birthday. In a Facebook post, his mom asked those with yellow vehicles to park on their street to surprise her son. She wanted a sea of yellow cars outside their home as they walked Whitaker to school on his fourth birthday.

Kiewit joined the community to ensure his street was lined with plenty of black and yellow vehicles — and the boy was overjoyed.



# A FINAL PLACE for veterans to rest

Two Kiewit teams were honored to expand national cemeteries in Oregon and California, providing additional space for U.S. veterans.

On any day at any of our 136 national cemeteries, visitors can hear the sounds of three rifle volleys piercing the air. Each time, they honor the service of a veteran being laid to rest.

For Kiewit's staff and craft working on projects at two of the cemeteries, in California and Oregon, the salutes are a sobering reminder of the importance of their tasks.

They also reflect an urgent need to continue to give our veterans the respect they deserve.

Space for some types of interments at California's Riverside National Cemetery and Oregon's Willamette National Cemetery is expected to run out by 2020.

In 2018, Kiewit Infrastructure West Co. was awarded design-build contracts by the Department of Veterans Affairs to add another 10 years of burial capacity at each cemetery.

That includes building double-stacked casketed gravesites or crypts where veterans and their spouses can choose to be interred together; in-ground burial sites for cremated remains; and columbarium niches, which are walled structures that hold sealed containers of cremated remains.

Together, the projects will add more than 23,000 burial spaces.

"From the first day the client said, 'This is not just a road job you guys are used to building. We're building a national shrine for the heroes to rest in perpetuity,'" said Nick Drury, Willamette project sponsor.

#### SETTING A NEW PRECEDENT

Kiewit faced a unique challenge with these contracts: The company had no precedent for working on a cemetery job.

"We couldn't just call somebody in the company and say, 'How do you place these fragile crypts so close to one another, ensuring they fit perfectly at the end of the day?'" Drury said.

"Or, 'How do you build the columbarium walls with the tight tolerances they require, so by the time the stone façades are put on them the gaps line up absolutely perfectly?'"

While the landscape differs between the two sites — Riverside is flat, and with an 8 percent grade and greater, Willamette is curving and hilly — the teams came together, both to trade construction strategies and develop a friendly competition.

#### A HELPFUL SOUNDING BOARD

Willamette was the first to break ground on their addition,

so members of the Riverside team went to Oregon to look at their progress.

When Riverside began setting crypts, a Willamette field crew member visited to offer another set of eyes and talk them through the process.

"Having two at one time really benefited because we were able to have two teams coming up with ideas at the same time," said Drury.

The communication and cooperation between the teams have provided a helpful sounding board and extra motivation to work hard, added Riverside Project Manager Evan Phelps.

"Managers were asking both jobs, 'Hey, how did you do today, where are you at, what was your production today,



**WILLAMETTE  
NATIONAL CEMETERY**



**RIVERSIDE  
NATIONAL CEMETERY**



Riverside National Cemetery

★  
 Kiewit's work  
 at the national  
 cemeteries is  
 scheduled for  
 completion in  
 February 2020.  
 ★

what did the other job get?" he said. "There was a lot of back and forth. We used both jobs to kind of key off of one another."

Before long, the teams were comparing statistics on how many crypts were placed — and placed within specific tolerances — in one day. (Riverside took the record at 263.)

**'THE BEST LASTING IMPRESSION POSSIBLE'**

Matching a consistency in quality with the existing cemeteries matters a lot.

"Everything on these projects is about creating a final look that shows respect to those who are buried there," said Drury.

Even though there are design variations with the columbaria, for example, the overarching goal of Kiewit's work is to make the best lasting impression possible, Phelps said.

Over the course of the project, that's meant frequent meetings and coordination to consider every detail with the designer, cemetery administration and the Department of Veterans Affairs.

"There's granite trim and cast stone caps and precast concrete, cast-in-place concrete and stone veneer, and flatwork that all tie together," said Phelps. "And there are

tight tolerances that come together with exact lines, edges, textures and colors."

**A DEEPLY PERSONAL PROJECT**

These projects have been meaningful for every staff and craft member. But for one particular Kiewit employee, the project has been deeply personal.

"The father of one of our foremen, Todd Phillips, who oversaw setting all the crypts and our columbarium work, recently passed away," Phelps said.

"He's worked with the cemetery to ensure his father's remains can go into the columbarium he built. I know he has a lot of pride knowing that his father is going to be buried here at this cemetery." **K**

## Two cemeteries, 1,000 miles apart

Riverside National Cemetery, near March Air Reserve Base in Southern California, is the third-largest cemetery managed by the National Cemetery Administration (NCA). Established in 1976, the NCA has designated it "most active" in the system based on number of interments, up to 40 burials every day. Kiewit's project includes 20,000 casketed gravesites, 10,000 columbarium niches and approximately 14,000 in-ground burial sites for cremated remains.

Located 10 miles southeast of Portland, Oregon, Willamette National Cemetery had its first burial in 1951. Kiewit is building 6,650 pre-placed crypt gravesites for casket interments, 13,000 columbarium niches and 3,500 in-ground cremation gravesites.

Besides gravesite development, Kiewit's work on the national cemetery projects also includes construction of memorial walls, ossuary, access roads, utilities, signage, site furnishings, fencing, irrigation, environmental preservation and mitigation.



Willamette National Cemetery



# COMPLETING THE CHAIN

## Vancouver Terminal is final link for G3

More than 90 percent of Canadian farmers send their products to markets across the globe. With agricultural-related exports accounting for about \$56 billion each year, they are a critical component of Canada's economy.

Efficiently moving these commodities from the farm to the end customer is paramount to meeting the continued global demand for food.

G3 is an integral player in the agricultural export market, with an impressive grain handling network that spans Canada coast-to-coast. The most recent addition, G3 Terminal Vancouver (G3TV), is strategically located on the north shore of Vancouver's Burrard Inlet. It is the final component of G3's supply-chain efficiency strategy, effectively bringing farmers' grain and oilseeds to market. It's also the first new grain terminal constructed at the Port of Vancouver since the 1970s — and proudly built by Kiewit.

**STRONG PARTNERSHIP IS KEY TO SUCCESS**

G3 Terminal Vancouver is a good example of how a strong partnership between the client and Kiewit positively impacts a project. The relationship began in 2014 when T.E. Ibberson Company, a subsidiary of Kiewit that had recently completed a similar grain export terminal project in Longview, Washington, was engaged to start work on the terminal.

Through an early contractor involvement (ECI) model, the two entities worked together to develop the preliminary scope and pricing for the project.

"I have been involved in large projects prior to G3TV, and good scope definition and budgeting early in a project life are absolutely key to success," said Tom Price, vice president of Project Planning and Engineering at G3.

Kiewit was at G3TV for about two and a half years, working with G3 to refine the project's scope.

"Through an iterative and engaged process, concepts were refined, and we were able to achieve very good project definition," he said. "Our project is nearing completion and deviations from final results of the ECI process have been few. The Kiewit team has been great to deal with both from an overall project and individual people perspective."

**COOPERATION AND CREATIVITY**

Kiewit subject matter experts from across North America began joining the team in 2015, bringing valuable experience in local infrastructure, permitting, advanced engineering, EPC processes, structural steel and procurement of specialty equipment. After a key development permit was secured, G3 and Kiewit finalized a contract for the engineering, procurement, construction and commissioning of the terminal.

"Working through the challenges of construction on a brownfield site in a hyper-sensitive, environmentally-focused urban environment has been daunting," said G3 Vice President and General Manager Bill Mooney. "The Kiewit team along with G3 and its owner's engineers have cooperatively and creatively overcome some substantive challenges."



"As we head to commercialization in mid-2020, you can see the incredible potential ahead for G3 as the terminal completes the unique state-of-the-art loop track to port terminal logistics model," added Mooney. "Making railways and vessels more efficient while doing it in an environmentally effective way will provide the competitive advantage."

**AN EXPANSIVE SCOPE OF WORK**

Construction of the state-of-the art grain export terminal officially began in March 2017, with the removal of existing buildings and preparation work on the 58-acre site. It represents the largest industrial project Kiewit has ever undertaken.

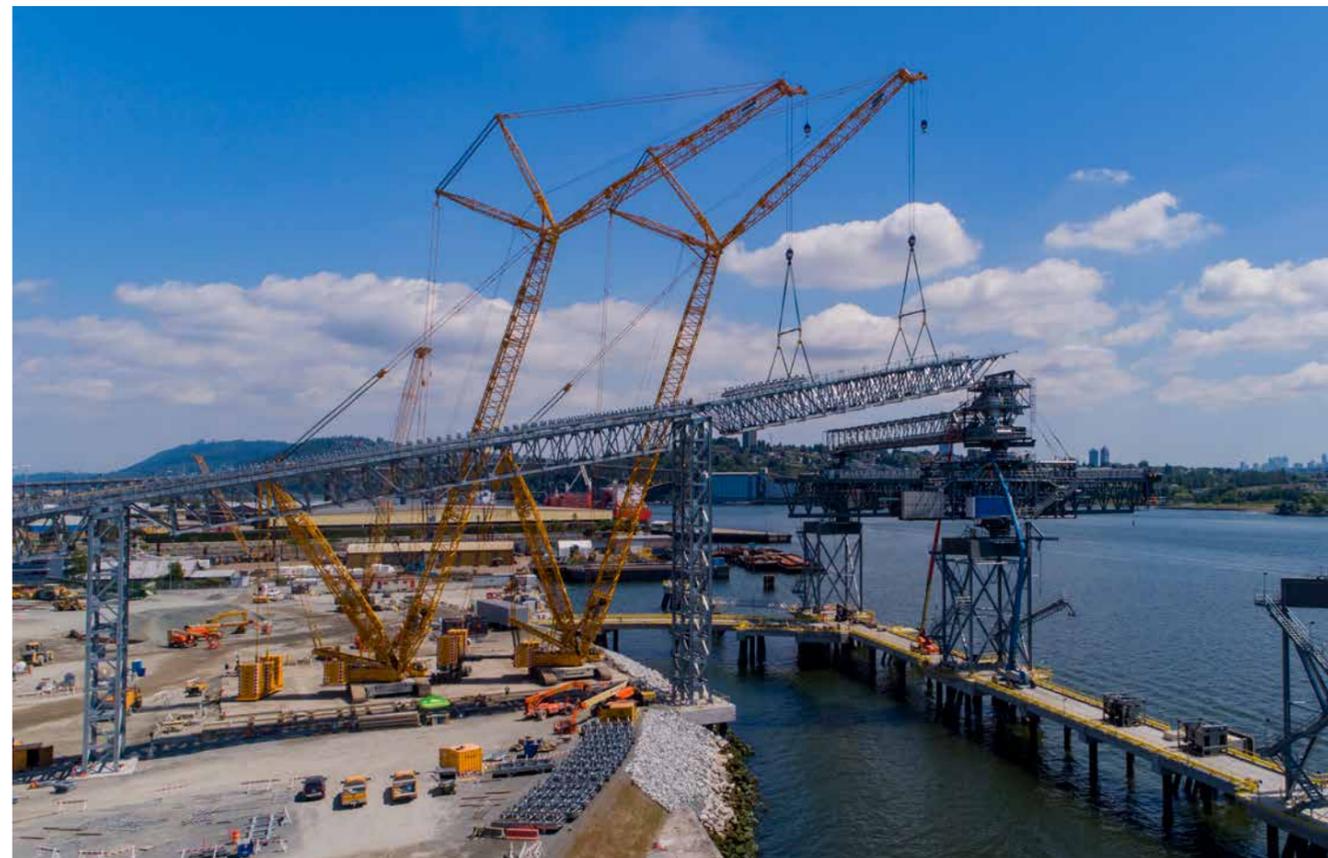
1. Crawler cranes were used to install 14,000 linear feet of conveyors on the project. 2. The terminal is strategically located at the Port of Vancouver, expanding opportunities for farmers to export grain. 3. The north annex slip operation consisted of 16 individual cells that make up a third of the terminal's total storage capacity. An average of 200 craft worked day and night to install 10,000 cubic yards of concrete and 2.4 million pounds of rebar without any recordable injuries.

“While the majority of our large, high-profile work is in the infrastructure and energy markets, industrial projects, such as G3TV, have allowed us to fully leverage our expertise and expand our project portfolio,” said Don Jacobsen, project director for Kiewit. “G3 brought an innovative concept and vision to us and we worked together, side-by-side, to make it a reality.”

Kiewit used a collaborative model to streamline construction schedules and optimize costs. This included an in-house design and engineering team that was fully integrated with construction operations throughout the life of the project.

“When design and construction report up through one centralized channel, the team has more control over priorities,” said David Roth, commercial manager for Kiewit. “We are better able to make sure that we have the right resources in place and have the capacity to do more thorough, in-depth constructability reviews.”

From start to finish, Kiewit’s scope of work was expansive, starting with the demolition of existing buildings on the site and the construction of an underpass and access roads.



The current dock required substantial modifications to accommodate large shipping vessels. New structures were built, including a cleaning facility, storage silos, a conveyor system, an administration building and a maintenance shop. The installation of a nearly 7-mile rail car loop rounded out the project scope.

**SPEED, EFFICIENCY AND 10 MILLION POUNDS OF REBAR**

For the design of the terminal, the speed and efficiency of moving product through the terminal was essential and was greatly enhanced by the state-of-the-art loop track technology. With this technology, rail cars can be unloaded simultaneously while in motion and the unit train can remain intact. The system features robotic gate openers for continuous unloading. Full length loop tracks allow trains to pull directly into the site, avoiding the need to push or pull train components from the main line or switch to another track.

The most visible and notable operations involved the slip-poured structures, which included three annexes, each comprised of 16, 140-foot tall storage silos — a total of 48 silos. Extensive slip pour operations were also used on the 163-foot scale building and a 223-foot cleaning building,

# Terminal components

*The North Shore Grain Terminal is comprised of a complex network of structures and systems.*

**GRAIN CLEANING FACILITY:** At a height of 264 feet, the facility includes conveying equipment, cleaning equipment, grain and byproduct bins, and a load-out system. Here, the product flows from the top of the building and is processed via vertically aligned systems into clean grain and byproduct paths set to meet the contractual export specifications.

**GRAIN STORAGE FACILITY:** As a throughput facility, storage is used to position cargos in advance of ship arrivals or for required grain cleaning. Train or ship arrivals rarely perfectly align due to factors that affect inbound or outbound logistics, such as weather or contract windows. G3’s 180,000 tonnes of storage was established in order to hold enough grain for three Panamax vessels to ensure railcars can be taken off when delivered and ships can be effectively loaded upon arrival. This surge capacity is critical to optimizing the supply chain. The facility consists of 48 140-foot-tall concrete silos.



**RAILWAY LOOP TRACK:** Unit trains of 150 cars of wheat, durum, canola, barley, peas and soybeans enter the railway loop track system. When a train arrives at the unload pit, the railcar gates are opened and closed using automated robotic technology. The grain drops into a below-grade pit beneath the tracks, which serves as the beginning of the conveyor system. Although geared to process trains upon arrival, if need be, G3’s terminal can hold up to three 150-hopper car trains. The system facilitates trains to travel to Vancouver, unload while in continuous motion, and travel back to one of G3’s primary elevators without detaching from their locomotives, critical to increasing supply-chain efficiency.

**SHIP LOADERS AND DOCK:** After leaving storage, the grain cargo is weighed, quality verified and sent via conveyor to the loading system that can put up to 6,500 tonnes per hour onto a waiting vessel. Three ship loaders are used to transfer product onto ships tied to a new dock capable of accommodating the largest ships expected to handle grains in the coming decades. To build the new dock, extensive in-water work, including piling, was required to support the ship loaders and dock structure.

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**DAVID ROTH**

Kiewit Commercial Manager

which required a crew of 250 people working around-the-clock for 12 days to complete.

In total, the project placed roughly 90,000 cubic yards of concrete and more than 9 million pounds of rebar.

With more than 17,000 linear feet of conveyors, the project required about 9,000 tons of structural steel work. Using detailed 3D modeling, the design of the structural steel was fully integrated with the mechanical equipment.

**GROWING ON THE JOB**

Across the entire project, Kiewit was able to self-perform about 80% of the work, which accounted for more than 1 million direct man-hours — a testament to the company's diverse capabilities.

"We were well-equipped to put the framework of the plant together. A lot of the work, such as the concrete slips and the steel going up in the air, are not that different from bridge or petro-chemical plant work. The only big difference is the mechanical equipment that comes in after the fact," added Roth. "The job relied on standardized construction processes and project controls tools used throughout Kiewit and these were key factors in our success."

For Kiewit employee Keifer MacDonald, who joined the project during startup, the company's diverse capabilities translated into opportunities for career growth. From field engineer to lead engineer to superintendent to general superintendent, his responsibilities included running crews on night shift and overseeing a major supplier nearly 6,000 miles away.

"I gained meaningful hands-on experience. The opportunity to grow and learn has been my favorite part about working on this project," MacDonald said. "We all brought good attitudes and teamwork to the job each and every day." **K**

