the magazine of kiewit corporation

KIEWAYS

2018 / Quarter 1

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 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 2017 revenues of $8.7 billion and employs 22,000 staff and craft employees.

MANAGING EDITOR
Jessica Jensen

CREATIVE EDITOR
Shawn Vaughan

EDITORIAL DIRECTOR
Sharon Armstrong

CONTRIBUTING WRITERS
Jessica Jensen, Kate Harris, Susan Houston Klaus, Teresa Shada

CONTRIBUTING DESIGNERS
Krista Aiello, Emma Farrell, Shawn Vaughan

EDITORIAL TEAM
Sharon Armstrong, Carrie Chambers, Leisha Harrison, Tom Janssen, Jessica Jensen, Tammy Korgie, Bob Kula, Amy Nussmeier, Toni Oestmann, Craig Olson, Gary Pietrok, Teresa Shada, Shawn Vaughan, Ashley Wedeking

CONTRIBUTORS
Carrie Chambers, Eric Grundke, Leisha Harrison, Rand Magee, Megan Nelson, Tricia Todd

KIEWAYS
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BENEATH THE GARDINER
Below a busy expressway in Toronto, Kiewit crews are helping shape a new urban gathering space. More on Page 6.

EXCELLENCE AT ALL LEVELS

Big picture thinking and attention to detail — it takes both to accomplish the work Kiewit builds across North America and beyond. You can't practice one without the other and still get results like those featured in this issue of Kieways.

Take emergency repairs to spillways at the country's tallest dam, for example. When 200,000 people are evacuated from their homes, time is a luxury communities don't have. On Page 16, see how Kiewit's vision and meticulous problem-solving skills met the challenge head on.

I believe that Kiewit's unique culture attracts and develops people with extraordinary characteristics; our employees love a challenge, are innovative and creative. Starting on Page 6, you'll see another example of those qualities come to life in the unused space right below one of Toronto's busiest expressways. Today, it's an unexpected and thriving space for entertainment, wellness and civic engagement.

So how does Kiewit develop people capable of everything from seeing the big picture to executing the smallest details? We don't take training lightly. From coaching the future industry leaders we host every year at the Women's Construction Leadership Seminar (Page 4) to giving our employees hands-on training at our state-of-the-art training facilities in Omaha and Denver (Page 10), Kiewit invests in the potential.

It's an amazing thing to see our teams evolve into well-rounded, industry-leading professionals. I'm proud that it's reflected in the work they build and the impact they have on our communities.

BRUCE GREWCOCK
Chairman and CEO

AN UNCOMMON PROJECT
On Page 16, at the tallest dam in the U.S., Kiewit crews completed more than 700,000 man-hours in less than six months to repair the main spillway in advance of Northern California's winter rainy season.

ON THE COVER

ALSO INSIDE

KIEWIT NEWS

What began in 1884 with two hard-working brothers has grown into a Fortune 500 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
- MINING
- OIL, GAS & CHEMICAL
- POWER
- TRANSPORTATION
- WATER/WASTEWATER

OUR VALUES:

- PEOPLE
- INTEGRITY
- EXCELLENCE
- STEWARDSHIP

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WOMEN'S CONSTRUCTION LEADERSHIP SEMINAR

Sixty-one students representing 54 universities attended Kiewit's Women's Construction Leadership Seminar (WCLS) events in Colorado and Ontario in January. The participants, collegiate females studying construction and engineering, were joined by Kiewit employees to discuss what it takes to have a successful career in the industry. The two-day events included a dinner and roundtable discussions with some of Kiewit's female leaders, and a hands-on workshop spent designing an outreach initiative to encourage young women in elementary through high school to consider a career in construction and engineering. Attendees were also able to tour technical welding, piping and electrical labs at the U.S. event, and take a virtual project tour at the Canadian event.

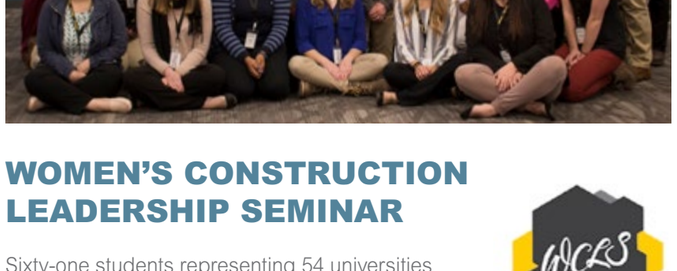
This was Kiewit's tenth year hosting its Women's Construction Leadership Seminar (WCLS), and its second year hosting events in both the U.S. and Canada. Nearly 500 attendees from 123 universities have attended the event through the years.

Here's what participants had to say about this year's event:

"It helped me believe in myself that I need to speak up to my ideas and don't be shy to share what I am passionate in."

"The technical session gave me a lot of confidence, I would have never imagined I would ever weld and was a step outside of my comfort zone. By doing this hands-on activity, I proved to myself that what I can do is limitless and that I'm the only thing holding myself back. Additionally, getting to network with the other girls and being engaged in the presentations allowed me [to] hear some wise words and strategies that I can bring back to my university."

"I really enjoyed the seminar and am so thankful I was given the opportunity to come! It's awesome to see a company who really cares about young women in the industry and supporting them. I definitely left with a lot of new knowledge that I hope I can pass on to fellow students and help them succeed and hopefully we can all grow together."



A FIRST-HAND LOOK

The **U.S. 34 Big Thompson Permanent Repairs** project hosted the Colorado State University-ASC Heavy Civil Team to a site tour. Project management guided a tour that showcased the unique scope of work throughout the canyon. Students observed both roadway and riverbank improvements, as well as two new three-span highway bridges.

CO-OP EMPLOYER OF THE YEAR

The University of Victoria (UVic) of British Columbia presented Kiewit its Co-Op Employer of the Year Award. Selection criteria for the award included: quality of work experience; contribution to co-op and career education; provision for professional growth experience; and mentoring relationships.

AWARD-WINNING

Organizers of POWER-GEN recognized two power plants completed by TIC - The Industrial Company (TIC), a subsidiary of Kiewit Corporation, with awards at its annual conference last December. **Petra Nova** (pictured above), the first commercial-sized, post-combustion carbon capture system in the U.S., was named Best Coal-Fired Project and Best Overall Power Project of the Year. **Grand River Energy Center (GREC) Unit 3** was second runner-up for Best Natural Gas-Fired Project. GREC provides 495 megawatts of reliable electricity to the people of Oklahoma and features the nation's first installed M501J combustion turbine generator.

The TH 53 Relocation project was awarded the Associated General Contractors' (AGC) 2018 Marvin M. Black Partnering Excellence Award and the 2018 Build America Award in the Construction Management Civil category. The project scope included relocating more than 3 miles of highway and building what is now Minnesota's tallest bridge. Kiewit completed the project for the Minnesota Department of Transportation (MnDOT).

THE BENTWAY

A cool new space debuts in downtown Toronto

The Bentway Project is already changing the way citizens think about the area beneath the Gardiner.

For many urban planners, adding extra space in a crowded city usually means looking up.

But in Toronto, a bustling metropolis of 2.8 million people, city builders have turned that notion upside down — literally.

The Bentway Project is transforming four hectares (10 acres) of unused space underneath the elevated section of the city's Gardiner Expressway, from just west of Strachan Avenue to Spadina Avenue, into a unique multi-functional public area, which includes an outdoor skating trail that made its debut in January.

By this summer, the site will play host to a variety of community programming events, with an emphasis on culture, placemaking, civic engagement, food, education, health and wellness, and the environment.

A terraced green-space amphitheater with stages and bleacher seating will welcome audiences to public performances, and in coming years the area will display public art commissions. In warm weather, a 1.75-kilometer (1.1-mile) neighboring trail will welcome walkers and joggers.

The site itself connects with the historic Fort York Visitor Centre, providing additional landscaping and parking.

Awarded a $17.8 million construction manager-general contractor (CMGC) contract, Kiewit has been partnering with client Waterfront Toronto to bring the project to life. Onsite work began in April 2017 and project completion is expected this June.

The team built several pieces, including prepping the land for construction, performing underground work and building construction, placing surface finishes, rigging and lighting, in preparation for the skating trail's January opening.

"That's the nice thing about the project," said Project Manager Navid Ganji. "It has a lot of different disciplines involved, from excavation, backfill and installing

Map of The Bentway: Phase 1

The Bentway extends 1.75 kilometers beneath Toronto's Gardiner Expressway. It connects existing attractions like the Fort York Visitor Centre, with new additions such as the Strachan Gate and Amphitheatre and a skating rink, to create a unique public gathering space which will host public art installations, festivals, performances and more.

Project boundary

> “Kiewit has been able to anticipate changes on the project, as well as effectively respond to unforeseen challenges in order to keep the aggressive schedule moving forward.”
>
> **SHANNON BAKER,** SENIOR PROJECT MANAGER, WATERFRONT TORONTO

underground piping like water mains, sewers and electrical conduit to structural concrete and building finishes, hardscape and softscape finishes and lighting.”

The skating trail, the venue's highest profile attraction, is 220 meters (.14 miles) long, and is designed to help skaters glide smoothly all season, thanks to 13,746 meters (8.5 miles) of embedded refrigerant piping.

An adjacent building houses refrigeration equipment and an ice-cleaning Zamboni machine. It's also home to public facilities like washrooms and changing rooms with lockers.

Making the skating trail a reality has been a project highlight for Ganji and the team. Not so long ago, they were in the middle of an eight-month long design and procurement process — determining what equipment was needed to meet the winter deadline on a long lead-time item.

“One of the early challenges we had on this project was to come up with a solution that would have the refrigeration package and the skating trail ready for the winter opening,” Ganji said.

“We broke up the design and procurement into various components and prioritized them according to the overall schedule. For this particular package, Kiewit and our vendor came up with an innovative design-build solution that uses a hybrid CO2-glycol coolant system, which helped shorten the fabrication and installation time significantly.”

In September, they checked off a big item on the list, completing the trail concrete pour. Just a few days later, the team reached another landmark when the equipment package arrived onsite and was installed in the building.

“Those were some of the top milestones on the project schedule and we hit them both within three days of each other,” Ganji noted.

As The Bentway reimagines the area as a dynamic new public space, the organization has found a flexible partner in Kiewit, said Shannon Baker, senior project manager for Waterfront Toronto.

“Creating a new gathering place in an unconventional space presents certain challenges in both design and construction, and requires an approach that is nimble.

“Kiewit has been able to anticipate changes on the project, as well as effectively respond to unforeseen challenges in order to keep the aggressive schedule moving forward.”

Ganji credits the success of the project to the cohesiveness of the Kiewit team and its subcontractors, Waterfront Toronto, and the designers.

“It just feels like a family,” he said. “We’re very transparent, we work well together, and when there’s an issue everyone jumps in to solve it. The nice part is that everyone contributes to the solution.”

Will Ganji, a Torontonian himself, be a frequent visitor to the skating trail?

“I’m not a very good skater,” he laughed, “but I’m definitely going to bring my kids here.”

How The Bentway got its name

Last year, Torontonians were invited to cast their votes to name the space. The top vote-getter is a nod to the support columns and beams — or “bents” — that comprise the expressway architecture.

In September 2017, the Kiewit team completed one of its major milestones, the concrete pour of the skating trail. The concrete slab included 8.5 miles of embedded refrigerant piping to carry the coolant and it required a special concrete mix placed in a continuous and monolithic pour.

BUILDING OUR LEGACIES

Developing Kiewit's future

Every year, more than 6,000 Kiewit employees from across North America visit two Kiewit-owned facilities for career training and development. Located in Omaha, Nebraska, and Aurora, Colorado, Kiewit University and The Training Center are equipped with modular classroom spaces and state-of-the-art technology among many other features to enable hands-on learning.

While the buildings — each less than two years old — are brand new, the company's commitment to training and development is not. Today, more than 130 years after the company's founding, Kiewit continues a rich tradition of developing its employees.

A HISTORIC COMMITMENT

Throughout his tenure leading the company, Peter Kiewit spoke often about employee training and development. More importantly, he put those words into action. As early as the 1940s, Kiewit held formalized training on important topics and competencies like safety, equipment management and managing field operations.

Today, the philosophies of Peter Kiewit's era remain the foundation of Kiewit's training and development programs.

"Our goal is to ensure our corporate, district and project development efforts all complement each other and support our employees having the right knowledge and experiences to build safe work in the most efficient and effective manner," said Kiewit Talent Development Director Alicia Edsen. "We want all employees to have the opportunity to reach their maximum potential."

While its commitment to training is historic, Kiewit continuously adapts to meet the needs of a modern workforce. The most significant change to the program came in 2007 with the launch of Kiewit University, which formally brought all of the company's corporate trainings under one umbrella. In 2016 and 2017, the company showed its strongest commitment to employee training programs yet when it opened its two new facilities for corporate trainings, a brick and mortar Kiewit University and The Training Center.

TRAINING FOR KIEWIT PEOPLE, BY KIEWIT PEOPLE

Kiewit University and The Training Center host Kiewit's corporate training, referred to as corporate schools. Topic areas range from operations management, to project scheduling, formwork, design integration and craft training.

"Our corporate school programs provide the backbone for career-long professional development and are tailored to the responsibility levels of participants, ranging from entry to executive level," said Edsen. "The curricula reinforces our culture and core values, educates on business and finance, and develops technical, management and leadership skills."

Content is designed and delivered by Kiewit people for Kiewit people. Each year, more than 500 managers deliver training to employee learners. By engaging managers to be instructors, the students are exposed to important subject matter and to tenured co-workers who provide valuable insight into the company's culture and core values.

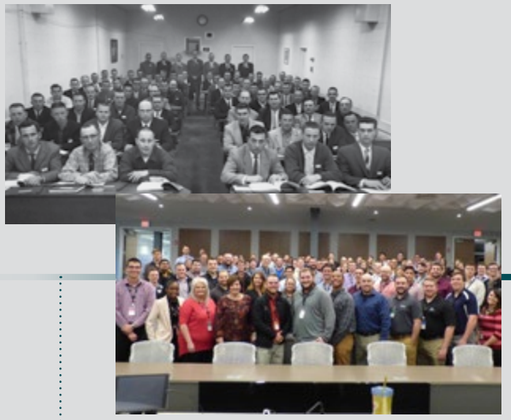
Michael Ferry, a construction director with Kiewit, is a training facilitator, a role he considers both a privilege and an obligation.

1. The Training Center opened in Colorado in 2016. 2. Employee learners gather in Kiewit University's Innovation Center to discuss emerging ideas to help Kiewit reach its business goals. 3. Craft employees get hands-on training in the Electrical NCCER Program.

Through the years

"The amount of work any individual can do is limited. What he can accomplish in recognizing talent, directing, energizing, developing and inspiring it is without limit. That is real leadership."

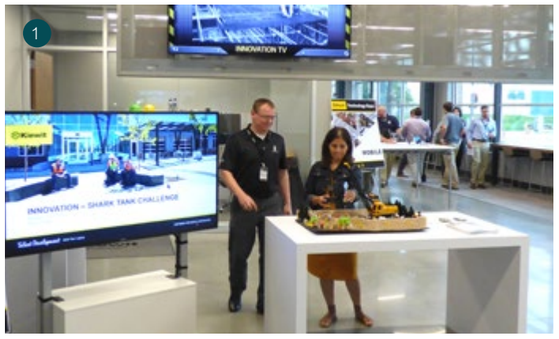
— Peter Kiewit



Kiewit has a long tradition of bringing employees together to discuss best practices and learn from each other.

From equipment to field operations, hands-on training teaches employees the Kiewit way of doing business.

Job site safety trainings have always been commonplace on Kiewit's projects.



1. Kiewit University students attend technology expos to learn about new and emerging technologies the company uses to get and build work. 2. Employees observe a concrete material test demonstration during Concrete and Formwork Technical School.

"No third-party facilitator could emulate the passion of our Kiewit culture," he said. "The learning can be a two-way street. As the facilitator, you engage the class and as a leader, you listen to the students' experiences and quickly identify areas that can be improved and act on it."

Kiewit's Talent Development department routinely collects feedback from learners, managers and executive leadership to ensure corporate schools reflect the needs of the business. For example, in 2017, a Field Operations Technical School was added to provide the company's newest field engineers with more hand-on learning experiences in multiple craft disciplines to better prepare them for future roles supervising construction operations.

ON-THE-JOB TRAINING AND DEVELOPMENT

Formal corporate trainings complement on-the-job assignments, which have always been the most important opportunities for development at Kiewit.

While leading the company, Peter Kiewit discussed on-the-job training and development often, and at Kiewit's 2017 Annual Meeting, COO Rick Lanoha shared similar thoughts with employees.

"On our jobs is where we learn how to do our jobs. The first five years of your career, we don't know how great of a leader you're going to be. We need to find out that you're technically proficient in what we're asking you to do," Lanoha said.

Andy Palowski, a discipline superintendent on Kiewit's Bayonne Bridge project, has held six different roles over the course of his 10-year career with Kiewit.

"Nothing has been more impactful to my career development than rolling up my sleeves and becoming engaged in on-site operations," he said. "Between our key craft folks and our experienced managers, every person in the company has a mountain of resources available to help learn and become technically proficient in our operations."

As he has transitioned from one role to the next, Palowski has developed new skills. Like Lanoha referenced, technical proficiencies were focus number one before being tasked with managing a team.

"When I transitioned from superintendent to general superintendent, I suddenly went from managing a technical operation to managing large groups of people. Managing people and personalities is a whole new bag of tricks, especially for an engineer."

Included in Palowski's mountain of resources is his mentor, Mike Kiggins, a senior operations manager for Kiewit who has helped Palowski make these adjustments throughout his career.

"Having a close mentor to guide me through this transition in roles and responsibilities has been invaluable to my career development. For 10 years, Mike has made a special effort to develop my career, and he has yet to let me miss an opportunity to grow and learn."

PREPARED FOR A COMPLICATED BUSINESS

Corporate training, on-the-job assignments and mentorship all help prepare Kiewit employees for long careers in the construction and engineering industry — an industry that Kiewit Chairman and CEO Bruce Grewcock says can be complicated.

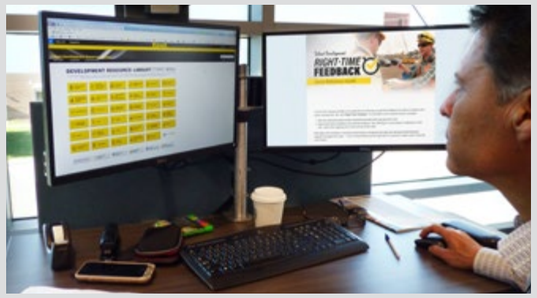
"Starting out, it's impossible to know everything you need to know to be successful in our industry. It's a complicated business," he said. "Job rotations and training programs developed by our people allow us to teach employees the fundamentals and the Kiewit way of doing business early, and then continuously develop new skills and interests that allow them to flourish in their careers."

> "Starting out, it's impossible to know everything you need to know to be successful in our industry. It's a complicated business. Job rotations and training programs developed by our people allow us to teach employees the fundamentals and the Kiewit way of doing business early ..."
>
> **BRUCE GREWCOCK,** CHAIRMAN AND CEO, KIEWIT

Alternative learning methods

At Kiewit, training materials are available in many formats to suit today's workforce. Employees can access e-learning via online resources like Red Vector, Lynda.com or an internal Development Resource Library. Maintained by the company's Talent Development department, the Development Resource Library is a collection of employee-uploaded materials reviewed by a subject matter expert to ensure relevance and accuracy. Gold standard learning modules created by internal subject matter experts are available for download and can be used to deliver training anytime, anywhere. These packages include presentation materials, facilitator guides, learner materials, and built-in workshop activities and assessments. They're designed to enable experts on project sites to have pre-built resources to quickly facilitate a training.

Kiewit has also taken a more progressive look at performance management and development. Called Right-Time Feedback, this new process delivers frequent, informal feedback centered around telling employees what's important and making them good at it.



AGAINST THE CLOCK

The race to rebuild Oroville Spillways

In February 2017, Lake Oroville's main spillway was compromised. After the emergency spillway was used for the first time, the hillside below began eroding. As nearly 200,000 people were evacuated, the California Department of Water Resources (DWR) began working on an emergency repair plan for both spillways at the nation's tallest dam.

In the beginning of April, eligible contractors were given a week to turn in their bids for the Lake Oroville Spillways Emergency Recovery Project, which involved extensive reconstruction of the damaged 3,000-foot main spillway and constructing a new emergency spillway. An addendum provided little relief to the contractors, extending the bid period to 10 days.

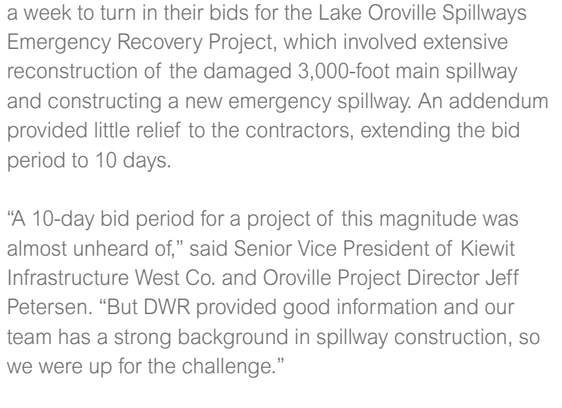
"A 10-day bid period for a project of this magnitude was almost unheard of," said Senior Vice President of Kiewit Infrastructure West Co. and Oroville Project Director Jeff Petersen. "But DWR provided good information and our team has a strong background in spillway construction, so we were up for the challenge."

Three of the four shortlisted contractors submitted bids on April 15, and DWR announced Kiewit as the low bidder at $275.4 million. Less than $2 million separated the two lowest bids.

Once the contract was awarded, DWR and Kiewit faced a lofty goal: ensure a functional 3,000-foot main spillway, which could safely handle flows from winter storms, was in place by Nov. 1, 2017. Achieving this in such a short timeframe would not only be uncommon, it would be remarkable.

A MONTH TO MOBILIZE

Kiewit's resources proved critical. Within a month of being awarded the contract, the team had mobilized key personnel and equipment from Kiewit's fleet across the United States and Canada. Within eight weeks, the full team of 125 staff and more than 500 units of equipment were on site, including a fully functioning concrete batch plant, a rock-crushing plant and a roller-compacted concrete (RCC) plant. The team moved in 22 excavators, 10 cranes, 13 off-road trucks, 12 dozers and 12 loaders. It set up 35 trailers for offices and provided temporary water and power for all of its operations.



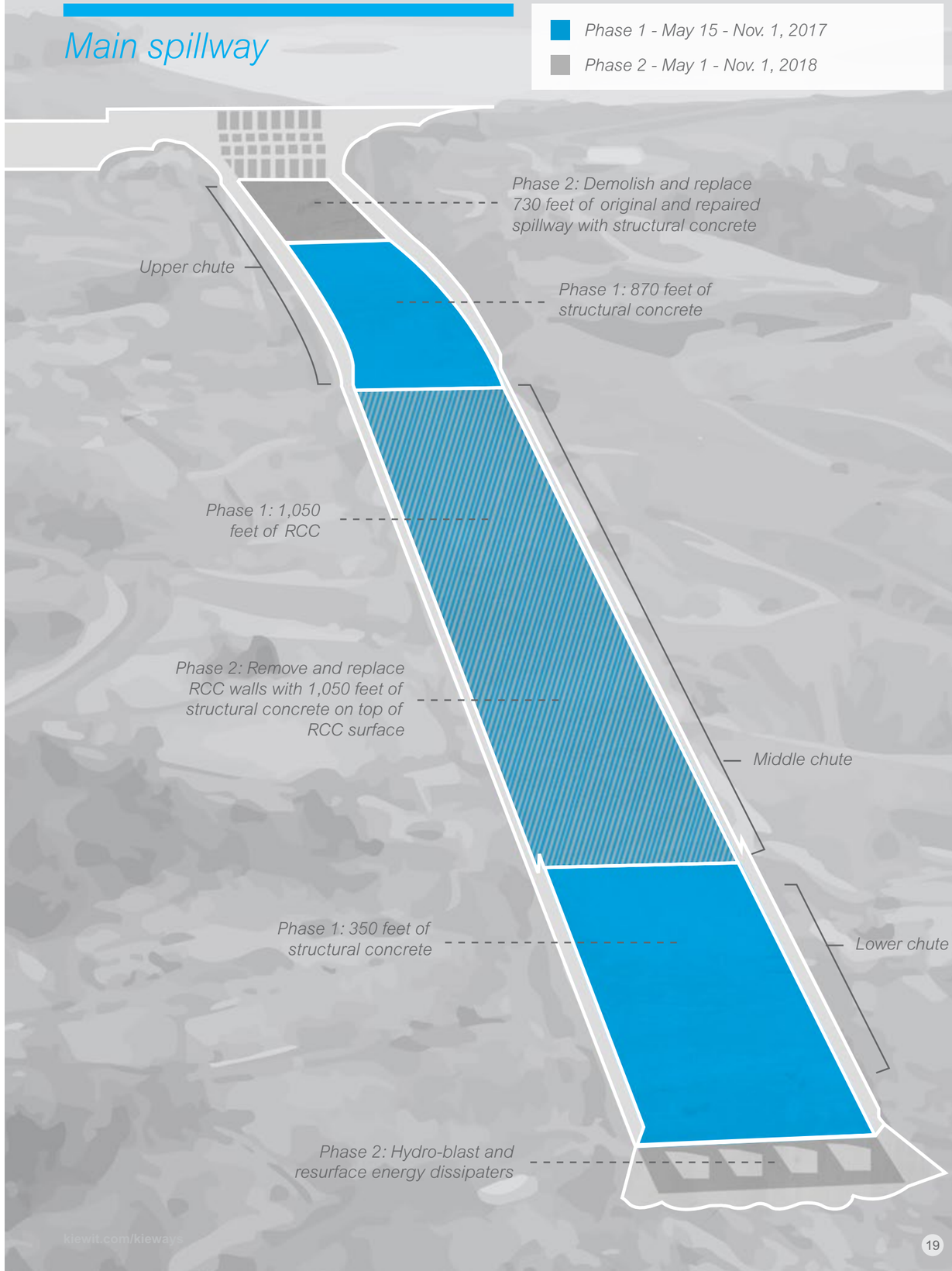
1. Crews place roller-compacted concrete in the erosion area between the upper and lower chute — the most damaged section of the main spillway. 2. Crews install a portion of the 234 structural concrete slab sections installed in the main spillway during Phase 1. 3. Crews install rebar for the structural concrete walls of the upper chute.

The team knew that once it was given access to the main spillway, it had to be ready to begin demolition. Every minute counted.

165 DAYS

On May 20, the countdown clock began. Kiewit had 165 days to safely repair the main spillway for the next winter season — an extremely aggressive schedule considering the quantity growth since the original bid.

To accomplish the challenge, the team patched and reinforced the upper 730 feet of the existing spillway. An 870-foot section of the upper chute and 350 feet of the lower chute of the main spillway were completely demolished and reconstructed with steel-reinforced



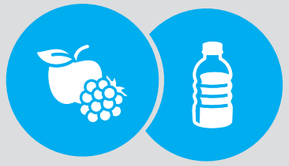
By the numbers

Within eight weeks of being awarded the project, Kiewit mobilized more than
500 units of equipment and 125 staff

Every 5 minutes
a dump truck placed
21 cubic yards
of roller-compacted concrete on the main spillway middle chute

138,000 cubic yards
of structural concrete — enough concrete to build a
5.5-foot-wide sidewalk
from Sacramento to Los Angeles

Finished Phase 1 with more than
780,000 man-hours
without a recordable injury



To help employees stay hydrated during Phase 1, Kiewit distributed more than
4,000 pounds of fruit and 39,600 gallons of drinking water

structural concrete to final design. The original spillway incident left two large scour holes in the most challenging area of the chute. This 1,050-foot middle section was rebuilt with roller-compacted concrete, a sturdy, yet temporary solution to ensure the spillway could safely handle flows of 100,000 cubic feet per second (cfs). During Phase 2, crews will place permanent structural concrete on top of the middle chute's RCC surface as part of the spillway's final design, bringing the main spillway to final design capable of passing up to 270,000 cfs in case of extreme flood conditions.

HOT DAM

With the world watching, the countdown was on. "Dam cams" broadcasted construction activities live and drones were used daily to document the work. Crews worked around the clock to repair and reconstruct the main spillway. Before any concrete was placed, crews cleaned and vacuumed the foundation. Under normal circumstances, foundation cleaning is a labor-intensive job. The hazards were amplified at Oroville due to the 4:1 slope and an extreme, long-lasting heat wave where temperatures often exceeded 100 degrees.

Shade tents helped combat the heat. Crews talked about the signs and dangers of heat stress, injuries and risks. Thousands of water bottles and crates of fruit helped maintain hydration, and Kiewit provided sunscreen packets to crews daily. Kiewit implemented a Craft Voice in Safety (CVIS) program, a time-tested Kiewit way to ensure craft employees can immediately and effectively raise safety issues and take accountability for keeping each other safe. A medic was also stationed on-site in case of any unexpected medical issues.

"The safety focus on this project is incredible," Petersen said. "We had a very fast ramp-up and worked more than 780,000 man-hours, completing Phase 1 without a recordable injury. Our team works very hard to ensure nobody gets hurt on this project."

Northern California's deadliest wildfire season also affected the project. Smoke hindered visibility. Some employees' homes were evacuated and one local fire had the project under an evacuation advisory. CalFire flew their planes across Lake Oroville to refill their water tanks, and work on the spillway continued.

TO THE WIRE

Despite an aggressive schedule and extra challenges from Mother Nature, Kiewit met the Phase 1 deadline. The team finished placing the final one-foot layer of enriched RCC at noon on Nov. 1, leaving plenty of time for the concrete to properly cure before the spillway might possibly be needed.

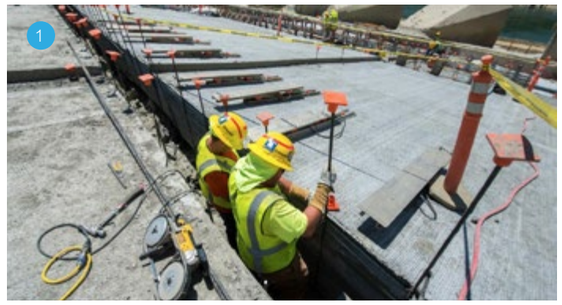
"It was down to the wire," Petersen said. "Phase 1 was fast, it was about teamwork and it only occurred because the contractors, the owner, the designers and the regulatory agencies all worked together with the same common goal."

Kiewit Executive Vice President David Miles provided executive oversight to the project team. He describes the Phase 1 accomplishments as a true team effort.

"Our team only had 10 days to bid the job, one month to mobilize and then 165 days to rebuild and repair a 3,000-foot spillway," he said. "More than 600 people put their lives on hold, working long hours, six to seven days a week in 100-degree weather to ensure there was a functional spillway in place for the winter season."

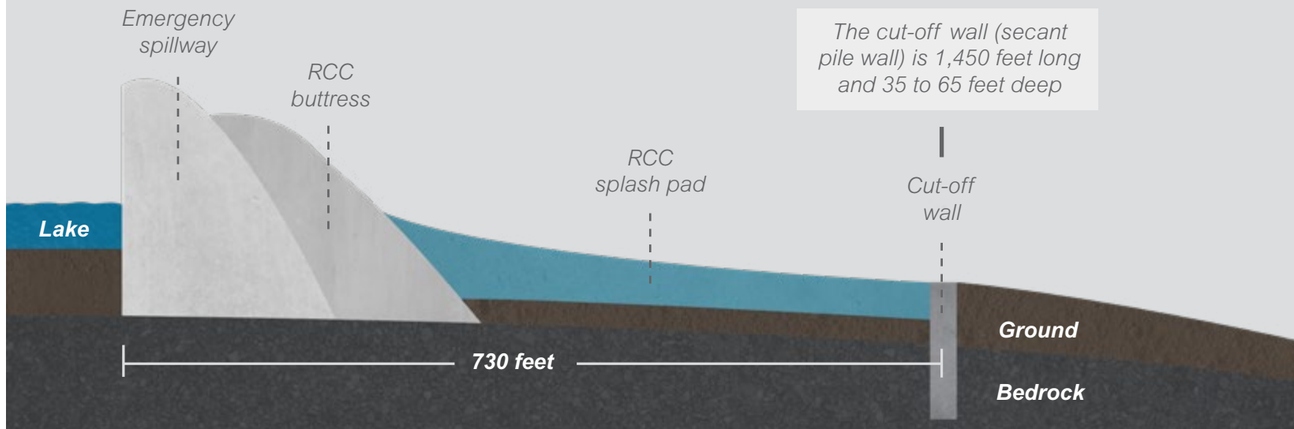
MORE SCOPE AHEAD

The project's second phase officially began on Nov. 2, 2017. In Phase 2, construction crews once again need to overcome numerous challenges and accomplish two lofty goals before the next milestone — bringing both the main



1. Kiewit carpenters Gary Pendergrass, left, and Jacob Hudick cut the excess length from the vertical rebar on the stay-forms used to form the drainage system trench in the lower chute. 2. Workers perform final foundation cleaning before placing RCC in the middle chute.

Phase 2 work on the emergency spillway



Flood control is the primary purpose of the Oroville Dam. Lake Oroville, California's second largest reservoir, has two spillways that are a part of the Oroville Dam complex. One is the flood control spillway — also called the "main" spillway — which allows for controlled water releases from the reservoir. The second is the emergency spillway, shown in the above diagram, which allows for uncontrolled water releases to prevent the dam from over-topping. The old emergency spillway was never used before February 2017. Kiewit is rebuilding the emergency spillway to help ensure the uphill erosion that happened in 2017 never happens again if the spillway is ever used.

Oroville time-lapse

165 DAYS

MAY 20, 2017

Kiewit receives access to the main spillway on May 20 and was given 165 days to repair and rebuild the main spillway to safely handle flows from winter storms in 2018.

124 DAYS

JUNE 30, 2017

During June, crews focus on 35,000 cubic yards of demolition, 500,000 cubic yards of excavation and 80,000 square yards of rock foundation cleaning. Structural and roller-compacted concrete batch plants are operational. Crews work in double shifts, 10 hours a day, 6 days a week, with some working seven days.

94 DAYS

JULY 30, 2017

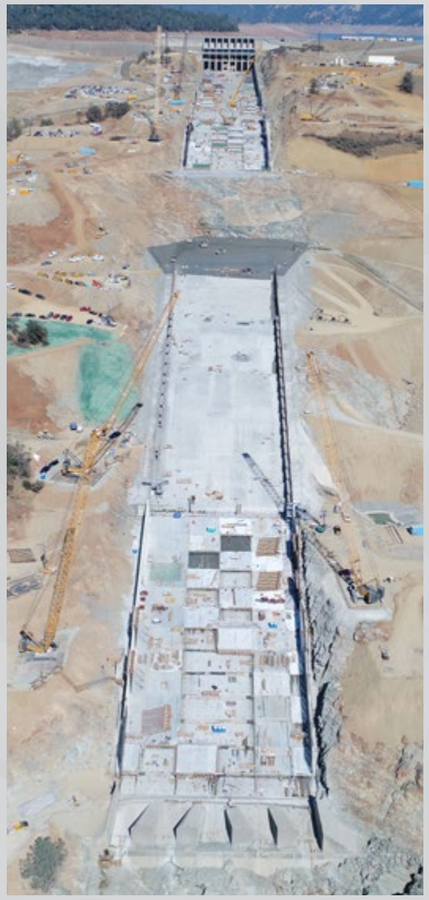
More than 100 laborers and operators are halfway through the foundation cleaning efforts. Crews begin placing RCC in the deepest portion of the spillway's middle chute. The underdrain and leveling concrete operations are under full production.

63 DAYS

AUGUST 30, 2017

The first structural spillway chute walls are erected. Crews are more than 20 percent complete with RCC placement in the middle chute, and structural concrete slabs are being placed in the upper and lower chutes. More than 900 slab anchors have been installed.

32 DAYS



SEPTEMBER 30, 2017

Nearly 85 vertical feet of RCC placement work remains in the middle chute. All rock foundation cleaning for the year is complete and crews are 60 percent complete with concrete slabs and walls in the upper and lower chutes. By the end of September, crews installed 2,500 slab anchors — 80 percent of what is needed in 2017.

0 DAYS

NOVEMBER 1, 2017

Phase 1 is complete. In just 165 days, nearly 15,000 linear feet of drains and 3,000 slab anchors were installed, as well as 234 slab sections and 78 wall sections. The 1,050-foot middle chute was rebuilt with 350,000 cubic yards of RCC. Crews placed 4,000 square yards of shotcrete to the middle chute's RCC training walls.

"DWR and Kiewit worked side by side and were dedicated to the public safety objective of the project. The DWR and Kiewit teams worked around the clock to complete what is typically several years' work in just months."

– Ted Craddock, Assistant Deputy Director of Oroville Infrastructure, DWR

> “Our team only had 10 days to bid the job, one month to mobilize and then 165 days to rebuild and repair a 3,000-foot spillway.”
>
> **DAVID MILES,** EXECUTIVE VICE PRESIDENT, KIEWIT

spillway and the new emergency spillway to final construction.

Almost 350,000 cubic yards of RCC were used on the main spillway’s middle chute in Phase 1. For Phase 2, the emergency spillway will require more than 530,000 cubic yards of RCC. Crews cleaned nearly 80,000 square yards of rock foundation in Phase 1. During Phase 2, crews will clean 160,000 square yards of rock foundation.

During the winter, efforts have been concentrated on the emergency spillway construction. Crews recently finished the secant pile wall, an underground wall of 605 individual 36-inch diameter piles, built into bedrock at depths of 35 to 65 feet.

If the emergency spillway is used in the future, the secant wall, the 850-foot-long crest cutoff wall and the 10-foot-thick RCC splash pad will prevent the kind of uphill erosion and scouring that occurred last February. More than 1 million tons of aggregate will be crushed in Phase 2 to produce the amount of RCC necessary to finish the emergency spillway buttress and apron by November.

When Kiewit once again has access to the main spillway in May of 2018, crews will demolish and rebuild the top 730 feet of the upper chute, and bring the middle chute to final design by placing a 2.5-foot-layer of erosion resistant concrete over the RCC and replace the temporary RCC walls with permanent structural concrete walls. Less than half of the slab anchors needed for the project were placed in Phase 1. The remaining quantity will be placed in this second phase. The energy dissipaters at the end of the spillway will be hydro-blasted and resurfaced. Once the main spillway is constructed to final design, it will be able to handle flows up to 270,000 cfs.

THE COUNTDOWN CONTINUES

“A lot of people didn’t think we were going to have a functional spillway in place in 165 days, but we did it,” Petersen said. “We have a magnitude of work ahead of us and only a few months to plan the work as DWR obtains approval of the final design. When you bring an incredible team together and work towards a common goal, together you’ll accomplish uncommon things.”

Kiewit

Kiewit Corporation
3555 Farnam St.
Omaha, NE 68131

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