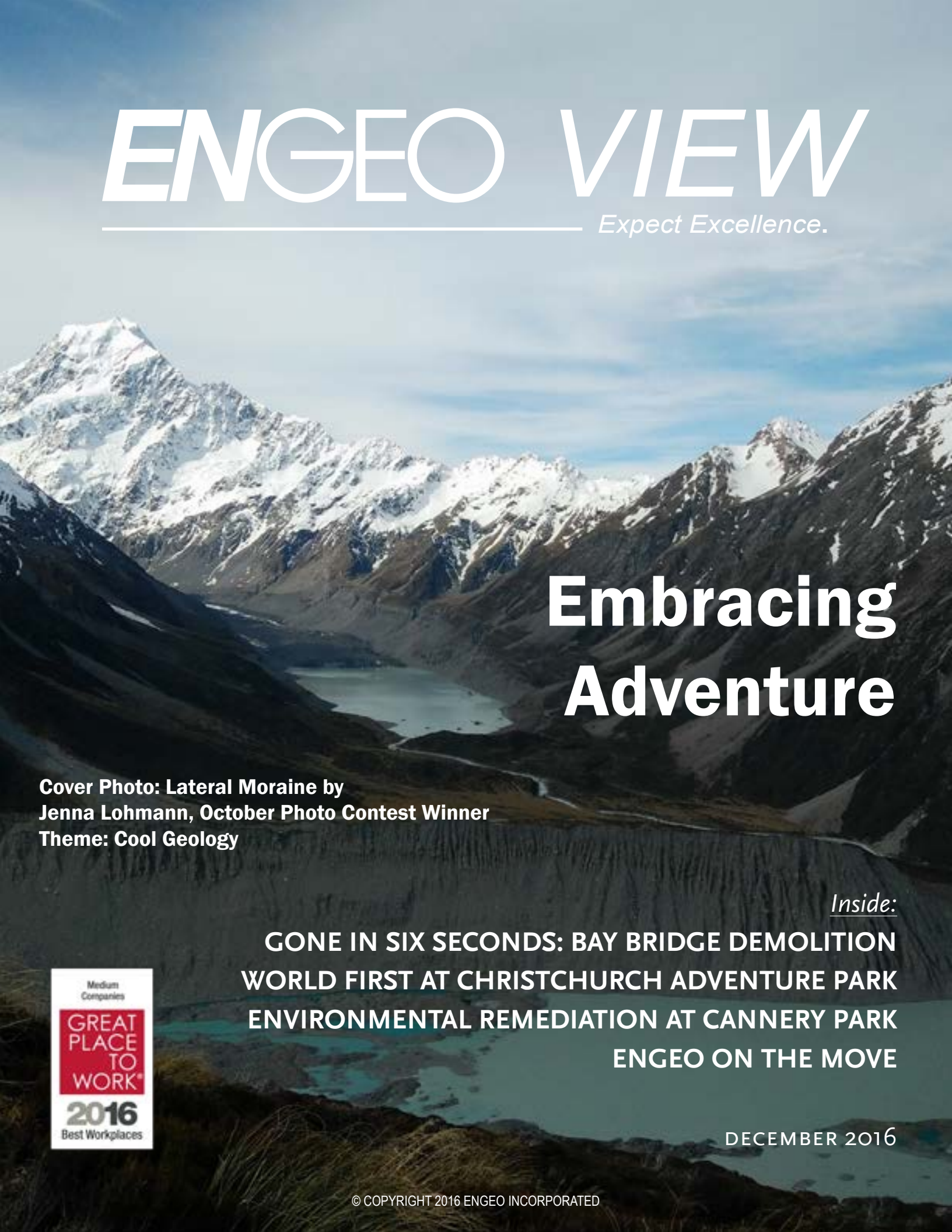
ENGEO VIEW

Expect Excellence.



Embracing Adventure

Cover Photo: Lateral Moraine by Jenna Lohmann, October Photo Contest Winner
Theme: Cool Geology

Inside:

Medium Companies
GREAT PLACE TO WORK®
2016
Best Workplaces

DECEMBER 2016

GONE IN SIX SECONDS

SAN FRANCISCO BAY BRIDGE FOUNDATION REMOVAL PROJECT

by Jonathan Buck, GE
San Ramon, California

Early on the morning of November 14, 2015 at slack tide, after years of planning and preparation, and after having received more than a half dozen federal and state permits, a successful implosion of one of the underwater pier foundations of the old San Francisco Oakland Bay Bridge occurred. In just six seconds, nearly 600 controlled charges weakened the 50 feet of Pier E3, which stood above the bay floor, allowing gravity to collapse the concrete caisson tower into its hollow casing located below the mudline.

"Caltrans estimated that a mechanical removal.... would have lasted nearly 4 years."

After examining several other alternatives, the California Department of Transportation (Caltrans) concluded that an implosion of Pier E3 with controlled charges would be the most economical and least environmentally damaging alterative to remove the old bridge's in-water pier foundation system. Removal of the pier structures above the bay floor mudline was a condition of the project from various federal and state agencies to improve wildlife and maritime passage. Caltrans estimated that a mechanical removal would have required the pounding of almost 400 piles to build a watertight wall around the pier that would have had to be pumped dry for workers. By their estimation, operations disruptive to maritime traffic and marine biology would have lasted nearly four years.

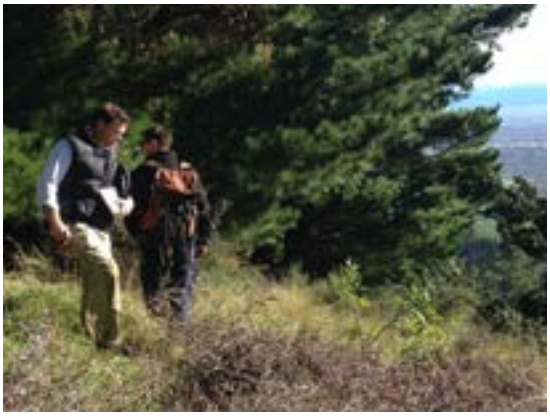
After extensive studying of the impact associated with the Pier E3 implosion, which was considered to be a demonstration project, Caltrans received permits to implode an additional 14 pier systems (E4 – E18) in 2016, 2017 and 2018. Results indicated that impacts to biological and water quality were minimal to the San Francisco Bay after the Pier E3 implosion occurred. The contractor for the project employed many best management practices to mitigate concerns raised by the public and local, State and Federal agencies.

After the piers are lowered to near sea level, the demolition process is followed by drilling into the underwater pier structure and placing charges for the planned implosions. The piers are also surrounded by a blast attenuation system (BAS), or "bubble curtain." Each BAS consists of approximately fourteen 1,600 cubic feet per minute (cfm) air compressors which surround each pier immediately before the detonations occur with a wall of air bubbles sent from the Bay floor. This system is estimated to cut down the pressure waves from the implosion by about 80%. Blast mats are also placed around the top of each structure prior to the detonation to control the upward mobility of pier materials.

CONTINUED ON PG. 4

WORLD FIRST AT CHRISTCHURCH ADVENTURE PARK

by Regan King
Christchurch, New Zealand



With the construction of the Christchurch Adventure Park now under way, local ENGEO staff have been heavily involved in the development of a world-class facility that sets a new international benchmark for mountain biking.

The Christchurch Adventure Park is set on a 902-acre site less than 3 miles from the center of Christchurch. The Park will be the first, lift accessed, four-season mountain biking operation globally. It will be the first with a chairlift specifically designed for mountain bikes and their riders, and at over a mile long and rising a vertical height of over 1,400 feet, will be the longest in the Southern Hemisphere.

It will be the first with a chairlift specifically designed for mountain bikes and their riders, and at 1800m long and rising a vertical height of 430m, will be the longest in the Southern Hemisphere.

Around 75 miles of trails, pump track, skills center, zip lines, bar and restaurant, retail, rental, rock climbing, hiking and sightseeing are also being constructed as part of the Phase 1 development, while Phase 2 will involve the construction of a mountain coaster and accommodations.

ENGEO has been involved with the Adventure Park project for a number of years during the entitlement and permitting processes, but the vast majority of our involvement has occurred since the granting of consent and finalization of funding for the development in February 2016.

ENGEO has been on the ground almost every day since February, and construction progress has been nothing short of impressive. Our scope of work has included most every aspect of our skill set:

Hydrology

- Rainfall assessment and catchment flood modeling
- Culvert capacity design
- Development of a Water Management Plan for the construction and operation phases of the development
- Stream quality monitoring

Geotechnical

- Engineering geological hazard mapping of the bike park
- Geotechnical assessment of the Village development, chairlift, bike trails and zip lines
- Rockfall modeling and risk assessment
- Design of rockfall risk reduction works

CONTINUED ON PG. 4

ENVIRONMENTAL REMEDIATION AT CANNERY PARK BROWNFIELD REDEVELOPMENT SITE, SAN JOSE

Divya Bhargava, PE
San Ramon, California

The Cannery Park Village, located in San Jose, California, is approximately 8.7 acres in area, and is surrounded by both residential and light industrial uses. The former site development consisted of several large-footprint, two-story warehouses built between the 1920s and the 1950s, which were historically occupied by Tri-Valley Growers & Continental Can Company. The proposed development includes four stories of multi-family apartments, 5,000 square feet of ground-floor commercial space, a four- to five-story parking garage, and a park area.

This site is listed as an open Regional Water Quality Control Board (RWQCB) Cleanup Program Site, for potential groundwater and soil gas impacts due to historical canning operations. Multiple soil, groundwater, and soil gas investigations have been conducted at the site since 1985. Elevated concentrations of volatile organic compounds (VOCs) (with trichloroethylene [TCE] being the primary constituent of concern) have been observed in soil gas and groundwater.

The site owner and the RWQCB entered into a California Land Reuse and Revitalization Act (CLRRA) Agreement, and as required under the CLRRA Agreement, a "Response Plan" was prepared to address chlorinated solvent impacts at the site. The Response Plan included (i) additional soil, soil gas, and groundwater sampling across the site, (ii) removal of former utility corridors, (iii) soil excavation, (iv) groundwater injections, (v) mobile soil vapor extraction (SVE), (vi) installation of a vapor intrusion mitigation system (VIMS) beneath portions of the proposed multi-family building, and (vii) land use controls (LUC) restricting on-site groundwater use and requiring periodic inspections and maintenance of the VIMS.

Soil vapor extraction was proposed to mitigate VOCs in soil gas at the site. Using a high-vacuum mobile SVE system, vacuum was applied throughout the area of soil with VOC impacts in soil gas. The extracted vapor was treated by passing through a granulated active carbon treatment system before discharging to the atmosphere. Additionally, an in-situ enhanced bioremediation technology (bioaugmentation) was used to degrade the chlorinated VOCs in groundwater.

Recent soil gas and groundwater results have demonstrated that the extensive cleanup activities have been effective. Post-remediation groundwater results have shown significant reductions in TCE in groundwater and favorable dechlorination trends have been observed, including initial increase in concentrations of daughter products (cis-DCE and vinyl chloride). Further reductions in TCE levels are expected to continue as the groundwater treatment continues over the next two years.

GONE IN SIX SECONDS (CONT'D FROM PG. 1)

Blasting occurred in October 2016 for Piers E4 and E5, and is scheduled to continue in Fall 2017 and 2018, when the least wildlife will be present in San Francisco Bay. There are typically no salmon runs, bird nesting, or herrings during this time. This minimizes, but does not completely eliminate, harm to the marine environment.

Blasting was scheduled in October and November of 2016-2017 when the fewest animals are present.

Immediately after the implosions, debris booms are employed to contain any loose debris. The San Francisco Bay Regional Water Quality Control Board also requires monitoring of excessive foam being generated by each implosion based on the Pier E3 experience. The contractor employs several small skiffs with vacuums to collect foam or smaller debris within the area surrounded by the debris booms immediately after the blasting is completed.

After each blast, a hydrographic survey is performed on the Bay floor to verify the location of any excess debris near the Pier structure. Any large debris is removed with a clam-shell bucket and off-hauled.

With the results of positive environmental impact studies associated with this demolition procedure, it is possible that other underwater demolition projects in the State of California will be performed using these means and methods.

ENGEO is currently providing Water Pollution Control/ SWPPP Preparation and QSD/QSP services for Kiewit/ Manson JV, the project contractor.

CHRISTCHURCH ADVENTURE PARK (CONT'D FROM PG. 2)

- Development of a Rockfall Risk Management Plan for the operational phase of the development
- Geotechnical investigations for Bridge abutments
- Construction Monitoring

The work is not without its challenges. The timeframe for opening is mid December 2016, which means that almost every aspect of the project is time critical. From a purely civil engineering point of view, the construction fits squarely into the observational construction method, where the design process and construction monitoring are integrated. In particular for the chairlift, a detailed ground investigation would have had serious implications for the overall program, and for a number of the chairlift towers we have had to undertake foundation redesign based on the excavation conditions.

A lot of the design has evolved during the course of the development of the project. And unlike most civil engineering projects, aspects of the design, particularly for the bike trails, are done because they feel good (the awesomeness factor) and add to the total experience for the park users. For the ENGEO team accustomed to dealing with civil engineering projects, we've had to become used to ideas evolving over-time (even if this means a little re-work!) and we have a new-found appreciation for the skills and the creativity of the design team developing the Park.

There is never a dull moment, with a new deliverable almost every week. We're immensely proud to be part of the design and construction team, and very much looking forward to the park opening this month! Its going to be awesome!

ENGEO ON THE MOVE

ENGEO NAMES NEW PRINCIPAL

Macy Tong, GE, Principal
Macy joined ENGEO in 1985. She manages geotechnical engineering services for large-scale hillside development, educational and recreational facilities, reservoirs and water infrastructure, bridges and transportation systems, and commercial and industrial construction. She specializes in slope stability analysis in large-scale hillside development; deep fill settlement/swelling analyses; mechanically stabilized earth system design; soil nail wall design; liquefaction evaluation techniques and new mitigation methods; soft soil consolidation analyses and cost-effective mitigation schemes. Macy holds a Masters of Science in Geotechnical Engineering from University of California, Berkeley.

ENGEO MOVES CENTRAL VALLEY OFFICE

We have officially outgrown our space and have relocated our Central Valley office to Lathrop, California. We are excited that our new space includes our materials testing laboratory under the same roof. This allows us to better serve our clients and their projects. Come see us at our new office!

17278 Golden Valley Parkway
Lathrop, CA 95330
(209) 835-0610

ENGEO NAMED ONE OF THE

UNITED STATES' BEST WORKPLACES

BY GREAT PLACE TO WORK® AND FORTUNE

Medium Companies
GREAT PLACE TO WORK®
2016
Best Workplaces

**At ENGEO, we don't just stand behind our work.
We stand behind the people who make it possible.**

A positive work environment is essential to a healthy business and has been a central component of our success. So we're proud to announce that ENGEO has earned a place among of the country's Best Small and Medium Workplaces recently announced by consulting firm Great Place to Work® and Fortune.