

BARNARD

Fall 2022

On Site

People building for People.

Driving Collaboration

SVCW Project Reaches
Substantial Completion





Driving Collaboration

Among the first tunnel projects in the United States to use the progressive design-build model, the Silicon Valley Clean Water (SVCW) Gravity Pipeline Project achieved substantial completion this spring.

After five years and 3.3 miles of tunneling, the new gravity pipeline is ready to accept wastewater flow from the San Francisco Bay Area and convey it to Owner SVCW's wastewater treatment plant in Redwood Shores, California. This marks a major milestone on a successful journey for SVCW, Barnard Bessac Joint Venture (BBJV), Engineer Arup, and many other stakeholders and subcontractors.

The progressive design-build procurement model facilitated collaboration between the owner, contractor, and engineer. Among its many benefits, the procurement model helped the team agree on design direction, align the scheduling approach, manage project risks, and achieve a final project cost within the owner's budget. Looking back on the project and its process, it's clear how the work finished safely, on time, and within budget. With the right team and tools in place, even the most complex infrastructure projects can follow the right path to success.



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The Project

SVCW's existing force main sewer system was constructed more than 45 years ago and was designed to last between 25-50 years. Additionally, due to significant population growth in the San Francisco Bay service area, their system handled roughly three times more pressure than it was designed for. Since the system went into operation, it experienced a series of costly failures from the strain of increased use, degradation of original construction materials, and ground subsidence over half a century. To address these system failures, SVCW planned for a larger and more sophisticated gravity pipeline system to provide stormwater and wastewater storage during the peak wet weather months. With this new system, SVCW's O&M department is able to optimize its pumping strategy at the SVCW wastewater treatment plant.

The Process

To ensure contractor involvement from the design phase through construction, SVCW split the contract into two stages: initial design and early works and final design and construction. During Stage 1, BBJV and Arup progressed the project's initial design from 10 percent to 60 percent. The team attributes their success in part to their co-location with SVCW immediately upon award. In just over a year, the team evaluated design criteria, progressed the design, performed ground investigations, estimated schedule and cost implications for multiple design options, and coordinated with a separate design-build contractor working concurrently onsite.

The flexibility of the progressive design-build process enabled the team to achieve major milestones earlier in the project. For example, the team ordered the *Herrenknecht* TBM and fully designed the precast concrete segmental lining and TBM launch shaft during Stage 1, prior to negotiating the Stage 2 construction contract. As a result, the team reduced the schedule by approximately six months.

Throughout Stage 2, BBJV and Arup brought the design from 60 percent to 100 percent and completed all tunneling, shaft construction, pipe installation, and necessary tie-ins. In just under two years, "Salus," the 16-ft.-dia., 625-ft.-long earth pressure balance TBM, completed two tunnel drives to connect the new gravity pipeline to the existing sewer network and wastewater treatment plant. The second tunnel drive proved the most complex, extending 2.3 miles with multiple S-curves and traveling beneath a major transportation artery and the existing active and failing force main. Throughout this tunnel drive, BBJV was maintained minimal ground subsidence thresholds. All tunneling occurred in soft ground conditions consisting of an upper-layered sediment geology.

Beyond tunneling and shaft construction, the team installed the largest-diameter fiberglass reinforced plastic (FRP) pipe in North America. *Future Pipe Industries* produced the pipe at their facility in Jakarta, Indonesia. The pipe traveled more than 9,000 miles across the Pacific Ocean to reach the project. To prevent a potential material procurement delay, the team securely stored the pipe for two years ahead of its installation. BBJV worked with *Kelley Engineered Equipment* to design a rail-mounted, custom-fabricated pipe placer capable of picking up, transporting, positioning, and stabbing approximately 1,000 sticks of pipe, each weighing 16,000 pounds.

The Result

Today, SVCW has a state-of-the-art wastewater conveyance system and a successful progressive design-build project under its belt. With the project's 100-year design life, the authority now has the infrastructure in place to serve residents and protect the San Francisco Bay. Final acceptance testing is scheduled for mid-2023, at which point a separate design-build contract will complete its work on the receiving lift station at the SVCW wastewater treatment plant.

1. Members of the BBJV team stand with the TBM cutterhead after the second and final tunnel drive.
2. Representatives from SVCW, SVCW advisors, BBJV, and Arup at the TBM naming ceremony.
3. One of the project's large, custom-designed FRP pipe pieces that



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Top Ranked

Among the 53 specific project types within Engineering News-Record's Top 400 Contractors Sourcebook, Barnard ranked in 10 categories this year. Notable rankings include:



Cullen O'Brien joins Business Development Team

This summer, Barnard welcomed Cullen O'Brien to our heavy civil business development team. Originally from the Adirondack region of New York, Cullen earned a B.A. in General Communications from the State University of New York at Oswego. He went on to work in business development, marketing, and sales for more than 30 years. Cullen's diverse background includes serving as Director of Business Development for several heavy civil, construction management, and architecture and engineering firms in the Northeastern United States. At Barnard, he will pursue opportunities in the heavy civil market and support business development strategies within Barnard's other operating units, including bridge, rail, tunnel, and resiliency projects.



Barnard Earns Governor's Safety Achievement Award

In August, Barnard received the 2022 Governor's Safety Achievement Award from the State of Montana. This award recognizes the hard work of Montana employers who commit to the importance of safety in their work and stand out as safety leaders within their industries. At Barnard, our people are our greatest assets, and this award honors each and every person for their steadfast commitment to safety in the workplace.



SCENES FROM THE CENTRAL OREGON COAST



Along the Central Oregon Coast, Barnard completed upgrades to three *Bonneville Power Association* substations ahead of the rainy season. At the Tahkenitch and Santiam Substations, Barnard removed and replaced substation equipment and foundations, upgraded station lights and power,

and modified the indoor wiring. Barnard also expanded the Toledo Substation by adding new bays in the 230kV and 69kV yards. The expansion work involved tree felling, clearing, and grubbing; excavating soil; and installing new retaining walls and site drainage.

Throughout the summer, Barnard and foundation subcontractor *Granite Construction* worked on two sites simultaneously while meeting critical four-week outage windows for bay upgrades. Congratulations to the team for safely completing these critical upgrades.

BY THE NUMBERS:

12 new 230kV disconnect switches	53 new foundations	38,000 LF of secondary cable	10,000 CY of soil excavation	2 new bays in 230kV and 69kV yards
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BUILDING UP: Chimney Hollow Reservoir Takes Shape



Rockfill placement on the main dam in August 2022.
Inset: Groundbreaking ceremony in August 2021.



On a four-year project, it's not always easy to reflect on accomplishments when a significant amount of work lies ahead. Each day presents new work scopes and logistical challenges. But one year into the **Chimney Hollow Reservoir Project**, it's impossible not to step back and appreciate all that *Northern Water* and its team have accomplished since shovels broke ground in August 2021.

To deliver one of Northern Colorado's largest public works projects, Northern Water assembled a top team consisting of Barnard as the General Contractor, Engineer *Stantec*, and Construction Manager *Black & Veatch*. The 90,000 acre-foot reservoir, located southwest of Loveland, Colorado, is on track to be completed in 2025.

This fall, more than 300 craft employees are working around the clock at various work fronts. The largest operation is the project's signature feature: the 350-ft.-tall main dam, a rockfill structure with a hydraulic asphaltic concrete (HAC) core. Over the past year, the team has prepared the dam's foundation for embankment and HAC placement—truly no small task. Crews have stripped 2 million CY of soil and excavated 500,000 CY of rock out of the 80-acre foundation, and continue to clean and grout the foundation and place sections of the concrete plinth. A two-row grout curtain, installed by

Nicholson Construction, will reduce seepage beneath the dam, while the concrete plinth serves as a base for the dam, creating a stable and consistent surface for foundation grouting and initial HAC placement.

At the quarry and crushing operation, production has ramped up to produce the filters and HAC aggregates to build the dam over the next three years. To get to this point, crews stripped all overburden off the 88-acre quarry and established a three-stage crushing plant. The crushing operation, operated by *Fred Weber*, produces 23 different types of material. At the peak of construction, the Chimney Hollow quarry will be the largest of its kind in Colorado.

Crews continue to construct the features that will bring water in and out of the reservoir, including the conduit and tunnel for the inlet/outlet system. The conduit, consisting of 1 mile of buried 72-in.-dia. steel pipe, will draw water from existing infrastructure that is part of the Colorado-Big Thompson (C-BT) Project. The team is currently working through a 71-day outage to connect the conduit to the C-BT system. Beneath the dam's right abutment, a 2,000-ft. tunnel will house the conduit where it connects to the inlet/outlet tower within the reservoir. The team will finish mining the downstream portion of the tunnel later this fall.

Barnard Kicks off Transmission Project with WAPA

This summer, the Chimney Hollow Reservoir Project got some new neighbors. In late June, Barnard began a new transmission line upgrade project with the *Western Area Power Administration (WAPA)* just a few hundred feet from the Chimney Hollow site. The **Estes-Pole Hill-Flatiron 115-kV Double Circuit Rebuild Project** spans 16 miles and cuts through remote, mountainous terrain with limited public access between Loveland and Estes Park, Colorado. Barnard's work will reduce the transmission corridor's size by 50 percent and create a more resilient steel transmission line. Overall, the project will help mitigate wildfire hazards from powerlines and provide improved maintenance access for routine work and emergency situations.

For the remainder of this year, the team will expand site access and install foundations. The right-of-way (ROW) consists of new and existing easements that require significant clearing and grubbing. Upon clearing the ROW, the team will build new roads and prepare the foundation sites by blasting prior to augering.

The transmission line work is set to begin next spring. Barnard will follow a work sequence similar to that used on the West of Devers Upgrade Project, which involved 16 separate outages in a densely populated region of Southern California. We'll apply this expertise to remove 30 circuit miles of existing single-circuit 115kV line, including conductor, groundwire, and wood pole structures, while maintaining service to the residents of Estes Park. Once complete, the new corridor will consist of 15 miles of double-circuit 115kV transmission line.



Top: Site preparation activities.

Bottom: The Estes-Pole Hill-Flatiron transmission corridor travels through rugged, mountainous terrain with limited access.

Barnard appreciates our team of subcontractors working together to complete the project on time and injury free:

- » Condon-Johnson & Associates
- » Fortress Development Solutions
- » Gillespie, Prudhon, & Associates
- » High Range Tree Service
- » Interstate Utility Services
- » K2 Environmental
- » Ryno Works
- » Survey Land Consultants



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OnSite
Barnard's official newsletter.

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Kemano T2 Project Recognized by TBM Magazine

Remote work. Avalanche danger. A global pandemic. The **Kemano T2 Project** team faced all of these challenges—and more—while boring a tunnel through a mountain in the rugged North Coast region of British Columbia. In recognition of the team's innovation and the project's benefits to the community, *Tunnel Business Magazine (TBM)* awarded *Rio Tinto's* Kemano T2 Project the 2022 Tunnel Achievement Award. This is the first time the award has recognized a project from the private sector. In July 2020, Barnard was selected to complete the remaining 4 km of the upstream TBM tunnel drive. We worked closely with Rio Tinto, *Hatch*, the *Cheslatta Carrier Nation*, *Pioneer Rail*, *Herrenknecht*, and other key stakeholders and subcontractors to complete the project in March 2022.

Barnard's "Next Generation"

Baby girl born to **Nathan and Kali Foulger**. **Sylvie Elizabeth Foulger** was born on July 25 weighing 5 lbs. 8 oz.

Baby girl born to **Victor and Susan Mendoza**. **Sophie Mai Mendoza** was born on August 15 weighing 8 lbs.

Baby girl born to **Leo and Vanessa Weiman-Benitez**. **Rose Weiman-Benitez** was born on September 8 weighing 8 lbs. 3 oz.