



NORTHWATER TREATMENT PLANT

Overview

**End of Year
Report**

2022

*View of downtown Denver,
overlooking Arvada's Blunn
Reservoir from the Ralston Site*



TEAM

PROJECT PRIORITIES



Complete

- Achieve 1.5M manhours
- Complete Moffat Repurposing
- Dry-in all Northwater Treatment Plant (NTP) buildings
- Complete allowance release for GMP08
- Complete all structural concrete and hydrostatic/leak testing of all structures



In Progress

- Complete NTP construction
- Bring NTP online
- Complete operational readiness testing
- Complete system acceptance testing
- Achieve 2M hours with no lost time
- Initiate Facility Commissioning and Startup (FCS) field activities

TOTAL REVIEWS TO DATE

RFIs **1,303**

SHOP DRAWINGS **1,730**

SUBMITTALS **4,276**

CONSTRUCTION MWBE

OF MWBE
CONSTRUCTION
FIRMS:

65



CURRENT PROJECTED
PARTICIPATION

\$31,676,287

EXPENDITURE THRU
THE END OF THE YEAR

\$27,281,137

DESIGN MWBE

OF MWBE
DESIGN
FIRMS:

24



CURRENT PROJECTED
PARTICIPATION

\$4,172,315

EXPENDITURE THRU
THE END OF THE YEAR

\$3,634,429

TEAM HOURS



1.92
MILLION HOURS
TEAM HOURS THRU 2022



2022 TIMELINE

Q1 - 2022

- » Filter Concrete Complete
- » Operations Building Dried In
- » Floc/Sed Concrete Complete
- » Backwash Supply, Clearwell Drain Lines Substantial Completion (Bid Package (BP)11)
- » Chemical Building Concrete Complete
- » Clearwell Influent & Effluent, Dechlorination, and Drain Pipelines Substantial Completion (BP11)
- » Thickened Solids and Raw Water Pipelines Substantial Completion (BP11)

Q2 - 2022

- » American Water Works Association (AWWA) Innovation Award
- » National Safety Council Perfect Record Award (May 2018-June 2022)
- » Headworks Concrete Complete (BP12-003)
- » Moffat Concrete Complete (BP22)
- » Design Package Task 5A Amendments
- » Main Electrical Building Dried In (BP18)
- » Agency Partners & Media Site Tours
- » TSPS Concrete Complete (BP12-003)
- » Unthickened Solids Pipeline Substantial Completion (BP11)

Q3 - 2022

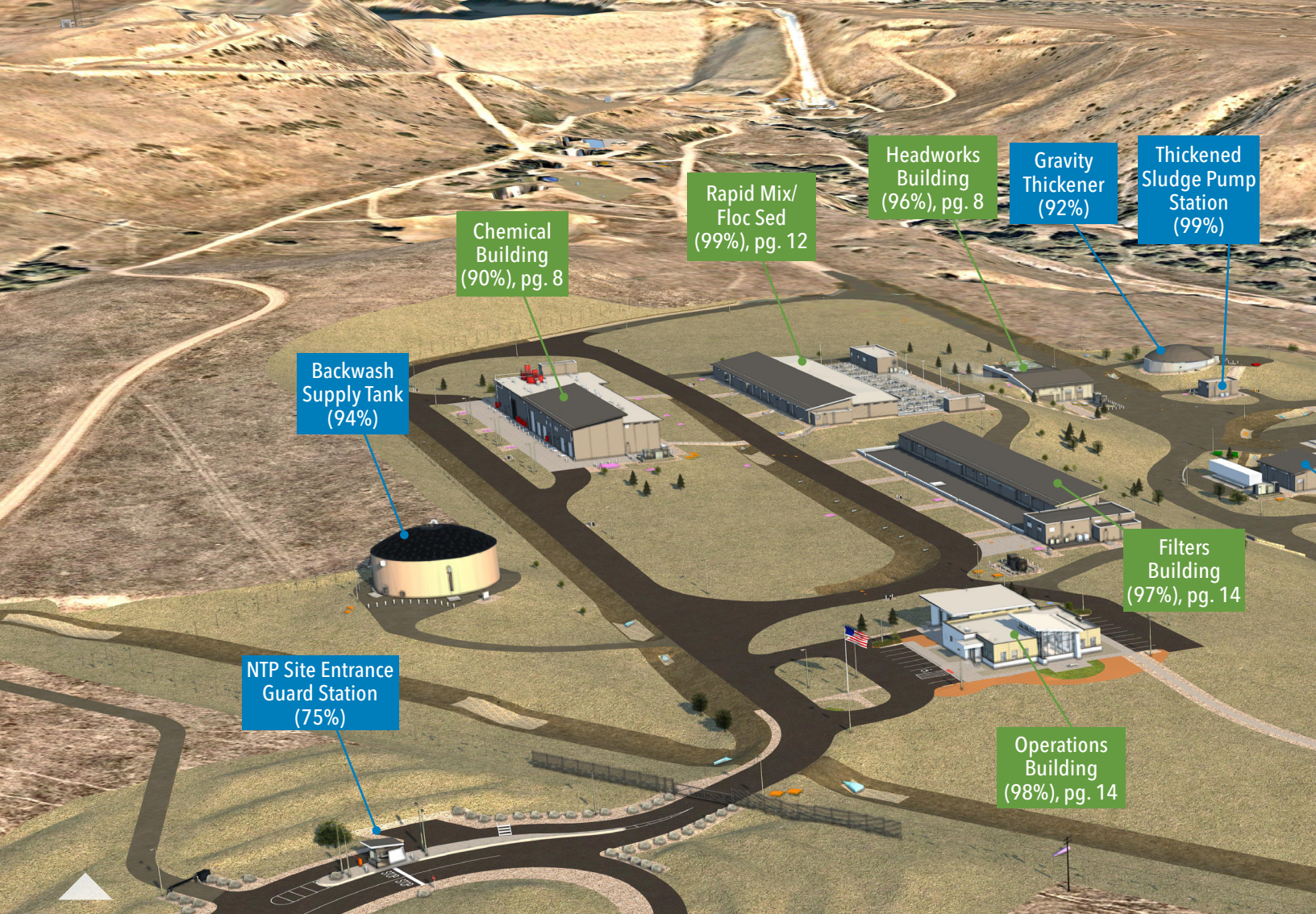
- » AWWA Journal cover article "Denver Water Ensures a Sustainable Future with its Northwater Treatment Plant" (July/August 2022)
- » Clearwell Effluent Valve Vault (CEVV) Building Dried In (BP18)
- » Communications Tower Building Dried In (BP18)
- » Return Flow Equalization (RFEQ) Vault Dried In (BP18)
- » Operations Building Electrical Complete (BP15)
- » Thickened Sludge Pump Station (TSPS) Building Dried In (BP18)
- » RFEQ Basin Concrete Complete (BP12-003)
- » Backwash Return Pipeline Substantial Completion (BP11)
- » Moffat Process Complete (BP22)

Q4 - 2022

- » GMP08 Site Finishes Allowance Release and GMP10 Amendment
- » Headworks Building Dried In (BP18)
- » Filter Building Dried In (BP18)
- » Moffat Electrical Complete (BP22)
- » NTP-Conduit No. 16 Connection Complete
- » RFEQ Concrete Complete (BP12-003)
- » Garney Clearwells Substantial Completion (BP14)
- » Moffat Sleeve Valve Vault Substantial Completion (BP22A)



Site Photo - Summer 2022



Chemical Building
(90%), pg. 8

Rapid Mix/
Floc Sed
(99%), pg. 12

Headworks
Building
(96%), pg. 8

Gravity
Thickener
(92%)

Thickened
Sludge Pump
Station
(99%)

Backwash
Supply Tank
(94%)

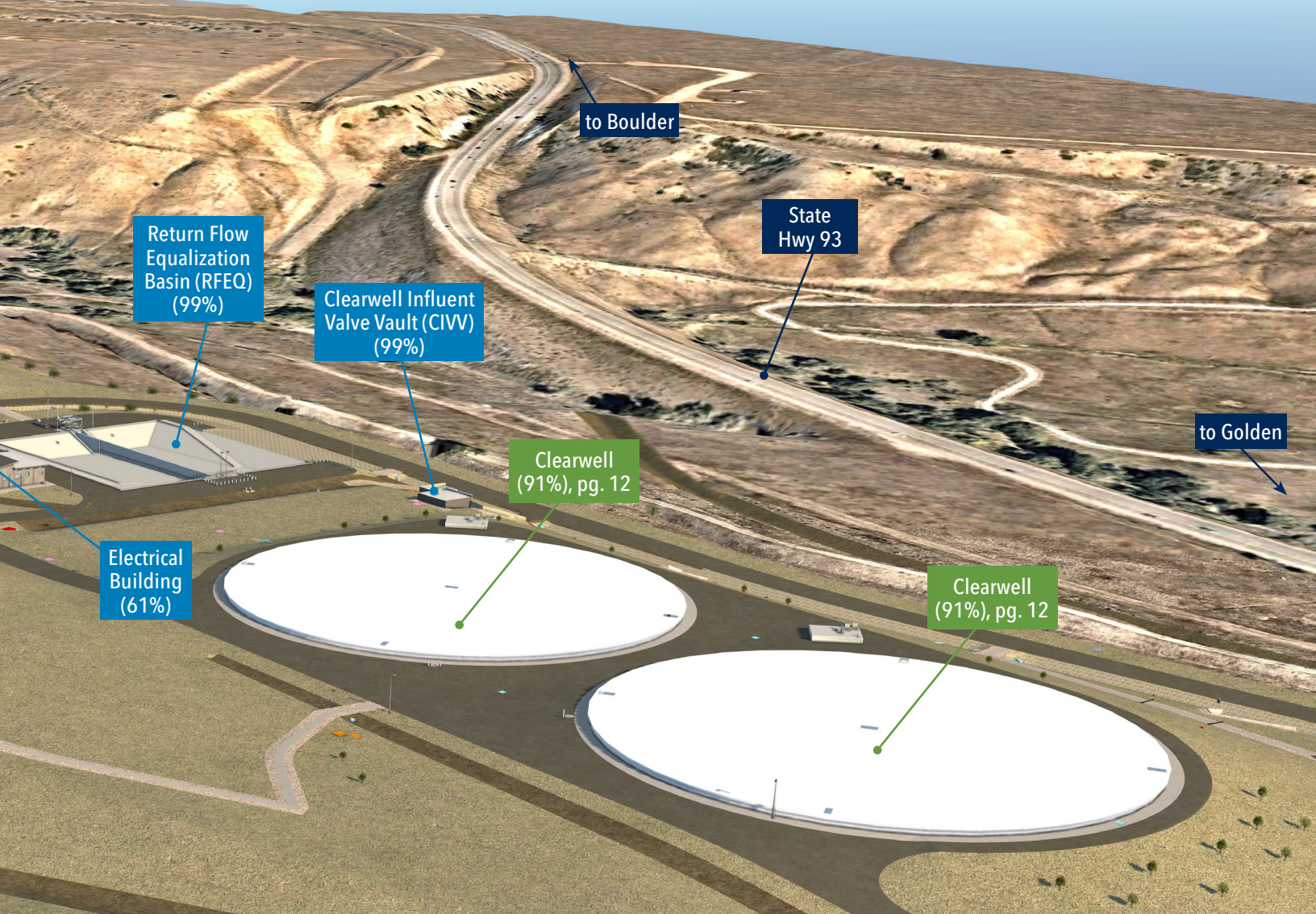
Filters
Building
(97%), pg. 14

NTP Site Entrance
Guard Station
(75%)

Operations
Building
(98%), pg. 14

Site Rendering looking Northwest

(facility % complete based on earned value)
Green highlighted buildings are featured in the report



to Boulder

State Hwy 93

to Golden

Return Flow Equalization Basin (RFEQ) (99%)

Clearwell Influent Valve Vault (CIVV) (99%)

Clearwell (91%), pg. 12

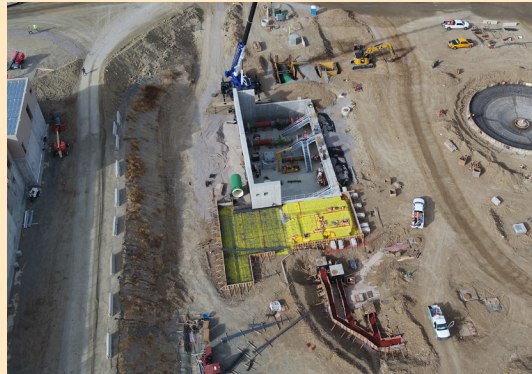
Clearwell (91%), pg. 12

Electrical Building (61%)

CONSTRUCTION FOCUS

HEADWORKS

- Completed Concrete
- Completed Precast Installation
- Completed Roofing Installation
- Hydroturbine Installed
- Completed Building Dry-In



January 2022



December 2022

CHEMICAL BUILDING

- Completed Roofing Installation
- Completed Building Dry-In
- Received all Chemical Pump Skids
- Process and Electrical Work Ongoing



January 2022

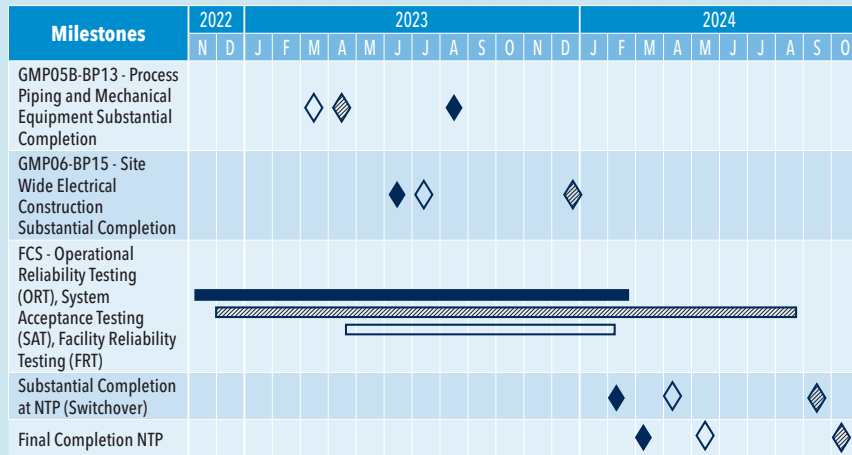


December 2022

CHANGE MANAGEMENT

SCHEDULE RECOVERY

The NTP Project Team worked together to implement a recovery schedule that gained five months back into the schedule. Available contractual tools were used to prompt recovery in the form of withholding payments, partnering meetings with subcontractors and CMAR, and OR weekly reporting to the Project Management Team (PMT) on progress and slippage. This gave PMT the tools and information to promote teamwork to build a workable recovery schedule. The team was accepting of these drivers by adding second shift crews, select area building dry-ins to move the schedule into areas of work, and reduced FCS durations. These actions collectively drove the schedule in the right direction.



Schedule Legend

- ◆ TCC Date
- ◇ Recovery Date
- ▨ Slip Date

The Change Management Team continued weekly meetings throughout 2022, and evaluated nearly 500 new issues as follows:

- 460 New Issues Opened and Evaluated
- 460 New and Existing Issues Resolved, including:
 - 219 Issues Resolved at No Cost to DW
 - 197 Proposed Change Orders Approved
- 113 Open Issues as of January 1, 2023

With the number of changes remaining steady year over year, the team continued to employ a Pre-Change Meeting to identify and address questions on the process, confirm conformance of documentation with contract requirements, and confirm appropriate funding and back-up data sources. The heavy interior trade coordination at NTP in 2022 brought opportunity for project and field management teams to rely on tools developed and maintained by the Change Management Team, including the Change Management Dashboard, to help identify areas with coordination challenges and proactively monitor associated disciplines to coordinate approvals and installations.

BUILDING LASTING PARTNERSHIPS IN THE COMMUNITY

JOINING FORCES WITH GRE TO ADD VALUE FOR DW

In September 2022, upon receipt of a \$4M price tag for a Gross Reservoir Expansion (GRE) carpool lot at the intersection of CO Hwy 93 and CO Hwy 72, the NTP and GRE teams joined forces to implement a more cost-effective solution. With Tim LaPan (DW Engineering) guiding the process, the team was able to arrive at a compromise whereby a portion of the NTP Craft Parking Lot was dedicated and fenced for use by the GRE Team. In addition, three bi- and tri-plex trailers were assigned for GRE use and fenced to maintain NTP security.

The NTP and GRE Teams continue to work through needed amendments to scope, permits, and Intergovernmental Agreements (IGAs) to accommodate GRE's parking and offices on the NTP site, which will remain after NTP Substantial Completion. At the end of the day, this approach saved DW significant capital cost, as well as the construction time of the originally planned lot - GRE was able to move onto the NTP site in early November 2022.

SAYING GOODBYE TO COLO

The shutdown coordination effort for the Denver West colocation office that housed the NTP team throughout planning and design started in April 2022. With multiple move dates between July and November for Kiewit, the Gross Reservoir Expansion (GRE) Team (DW/BV), and NTP, multiple parties came together to make the move a success. The lease required removal of furniture, security and IT equipment, and wiring to return the suite to move-in ready.

The closure of the Colo would classify as a sustainable and economical move. Kiewit's vendor recycled miles of ethernet cables, another vendor reused electrical outlet whip cords, and furniture movers plan to reuse unwanted chair mats. All the NTP office furniture went to the GRE project to furnish their trailers, leaving only 11 damaged chairs to dispose of.



2017 - before move in



2017 - 2022 - Occupied



2022 - move out

STARTUP COMMISSIONING AND OPTIMIZATION (SCO)

CLOSE AS YOU GO

In 2022, the OR worked with DW and the CMAR to further optimize the “Close as You Go” process that was initiated in 2021. Additional steps were identified to enhance the tracking and reporting of multiple closeout elements. DW released over \$1.5M in retainage on fully closed work, conducted punchlist walks on 13 BPs, and closed out 6 BPs. Record drawing production and archival tallied 93 sheets, accomplished through working in collaboration with DW engineering. The OR worked closely with DW’s Finance department to submit and receive approval for 10 Fixed Asset Accounting packages. The Document Control team worked throughout the year with the CMAR to ensure all project documents were received and uploaded to TeamBinder and ProjectWise.

In an effort to drive continuous improvement and to provide an ongoing measure of the performance of the Close as You Go process, the team actively tracks number of days between Substantial Completion Request and release of retainage for each bid package.

The Facilities Turnover Lead continued to work closely with the Denver Water Startup Commissioning and Optimization (SCO) team on several project tasks required to successfully commission, startup, and turnover the Northwater Treatment Plant. Throughout 2022, SCO continued to provide input on programming screens, supported design related changes, drafted Standard Operating Procedures (SOPs), and developed the project’s asset list for Maximo. Related to the project’s FCS activities, SCO provided input on the approach to Equipment, Systems, and Process training and assisted in the development of the overall disinfection plan and FRT plan. On site presence, biweekly meetings, and a separate SCO schedule continued to aid in their successful accomplishments this past year. Throughout 2023, SCO engagement on the project and on-site presence will continue to be a critical part of the NTP FCS planning and execution.



Site Photo - December 2022

CONSTRUCTION FOCUS

RAPID MIX/FLOC-SED

- Completed Concrete
- Completed Precast Installation
- Completed Roofing Installation
- Completed Building Dry-in
- Process and Electrical Work Ongoing



January 2022



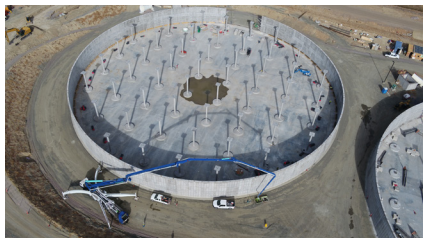
December 2022

CLEARWELLS

- Completed Walls and Columns
- Completed Roof Slabs
- Clearwell Pipes (Inlet, Outlet, Drain, Overflow) Completed
- Clearwells Substantial Completion Granted



January 2022



January 2022



December 2022

NTP AWARDS

In 2020, Jim Lochhead challenged the NTP Team to beat Operations Complex Redevelopment (OCR) project and become the most awarded project in Denver Water's history. Challenge accepted! In 2022, the NTP team received two awards. The AWWA Innovation Award recognized the project's sustainable, scalable, and streamlined approach, which included the hydroelectric capability to make the facility a net energy producer. Adaptability was demonstrated via construction families during the COVID-19 pandemic, and continuous improvement was used to scale the plant capacity with the ability for future expansion. Team diversity during design delivery was provided through eight separate design packages to utilize consultant's specific area of expertise.

The NTP Team was also recognized with a National Safety Council Perfect Record Award. This award recognizes projects

that are able to maintain a year or more with zero lost time incidents. The NTP's Award was granted for Kiewit's greater than 300,000 safe man-hours worked between the start of construction in 2018 and June 2022.



PARTNERING SITE TOURS

In spring, the Team took advantage of sunny weather to invite our project partners on a site tour. Attendees spanned multiple agencies the team has worked with to provide permits, utilities, and emergency services over the course of design and construction. Agencies in attendance included City of Arvada, North Table Mountain Water & Sanitation District (NTM), Jefferson County, Fairmount Fire, Colorado Department of Transportation, and Colorado Department of Public Health and Environment (CDPHE). The site tour provided a great opportunity to show off the progress made, as well as answer technical questions.

As a follow-up to our site tour, the City of Arvada and NTM hosted tours of their facility for NTP team members and members of Denver Water's O&M SCO. These tours provided an excellent opportunity to forge relationships between DW's operations staff who will run NTP once it is commissioned and those who run the two treatment plants across Highway 93, which also treat water from Ralston Reservoir.

As always, the team wishes to thank the agency partners that have worked with us throughout design and construction!

CONSTRUCTION FOCUS

OPERATIONS BUILDING

- Completed Building Dry-in
- Completed Install of Mechanical and Plumbing
- Interior Finishes Ongoing
- Final Electrical Work Ongoing



FILTERS

- Completed Concrete
- Completed Precast Installation
- Completed Building Dry-in
- Process and Electrical Work Ongoing



OPERATIONAL PERMITS

In late 2022, the NTP Permitting Team turned a page and shifted its focus from construction permits to those needed for plant commissioning and ultimate plant operations. Working in close collaboration with DW Engineering, Operations & Maintenance, and Environmental Compliance, the NTP Team submitted multiple permit applications to CDPHE Water Quality Control Division, Air Pollution Control Division, and Hazardous Materials and Waste Management Division. Additional operational/emergency management documents were prepared for Fairmount Fire. These permits are representative of the forthcoming shift in 2023, from construction to commissioning focus, and an important step for the NTP Project Team.

Construction of the Moffat Treatment Plant Improvements continued in 2022, completing all necessary construction activities required to be completed prior to the end of the Fall 2021 outage, allowing the Moffat WTP to return to service on schedule. This year, the remainder of the 42-inch Conduit No. 16 through the existing raw channel was completed, along with transformation of existing sedimentation basins 5-10 into off-spec water storage for NTP. New process equipment, including the sleeve valve and new CO2 system were delivered and set, and the associated programming to tie to the existing Moffat SCADA system was completed. Site-wide electrical, instrumentation, and control work was also completed, providing power and controls to the new CO2 system, sleeve valve, sleeve valve vault, and associated appurtenances along Conduit No. 16. Surface restoration, including landscape and hardscape repair, in all impacted work areas was also completed. The work in 2022 culminated in Fall 2022 with the commissioning of the new sleeve valve vault and site-wide punchlisting in preparation for final construction activities and completion of work at Moffat during the first half of 2023.



Gravity Thickener Dome Installation



PROJECT MANAGEMENT TEAM

Pete McCormick, PE, PMP

peter.mccormick@denverwater.org

Jill Crockett, PE, PMP, PGMP

jill.crockett@jacobs.com

Travis Baumgartner

travis.baumgartner@kiewit.com



Ralston Reservoir