

CASE STUDY / MICROFILTRATION MEMBRANE WATER TREATMENT PLANT

## AN EFFICIENT DESIGN-BUILD APPROACH SAVES TIME AND MONEY

Westminster, Colorado, needed a new water treatment plant (WTP) to manage increased demand for water.

When cost estimates for a 10 million-gallons-per-day (MGD) plant exceeded the \$20 million budget, the city opted for a design-build process led by Burns & McDonnell and Garney Construction.



# AN EFFECTIVE DESIGN-BUILD PROJECT EXCEEDED EXPECTATIONS IN ESTIMATED COST, CAPACITY AND PERFORMANCE.

An effective design-build project exceeded expectations for capacity, performance and cost savings.

## CHALLENGE

Westminster, Colorado, experienced summer water demand that was quickly pushing the limits of its 44 MGD primary WTP. With a projected long-range demand of 63 MGD, the city needed a second facility to help deliver at full capacity. Having recently decommissioned an 8 MGD facility, due to age and obsolete technology, a new treatment plant was needed to generate at least 10 MGD.

When an \$18 million cost estimate for a 10 MGD facility increased to \$27 million at the 30 percent design phase, city leaders decided to pursue a design-build procurement option and solicited proposals from prequalified firms.

## SOLUTION

The city selected Burns & McDonnell, in partnership with Garney Construction, to provide design and construction services for the new 15 MGD Westminster Northwest WTP.

## RESULTS

The water treatment plan increased allowable flux of membrane units by 50 percent by adding pretreatment. The project resulted in a reduced unit price, and the design allowed for future expansion. In 2012, the city increased capacity by 5 MGD, making it a 20 MGD WTP to surpass the overall demand of 63 MGD.

## DESIGN SPECIFICS

- The design included enhanced conventional water treatment with plate settlers followed by microfiltration membrane units. This method increased the membrane units' allowable flux capacity by 50 percent.
- The plant piping is organized with flexibility to bypass pretreatment and use raw water pressure for direct microfiltration during periods of low turbidity in raw water.
- The membrane system was designed to use one skid for secondary recovery or to recycle membrane backwash water to the pretreatment process, allowing for flexible operation in high recovery or higher process flow modes.
- The design included a 2 MG clearwell with a 15 MGD high service pump station (expandable to 20 MGD).
- Sizing the plant with a hydraulic capacity of 20 MGD accommodated future process equipment. The membrane system design included eight units with 82 microfiltration modules per unit (656 total). Additional space allowed for three more racks (246 modules), which were installed in 2012.

## PROJECT STATS

### CLIENT NAME

City of Westminster,  
Colorado

### COMPLETION DATE

2002

### CONSTRUCTION COST

\$20 million

## DESIGN-BUILD FOR NEW

**15**  
MGD WTP

## INCREASED

**50%**

OF ALLOWABLE FLUX  
OF MEMBRANE UNITS

## REDUCED UNIT PRICE PER GALLON TO LESS THAN

**\$1.33**  
FROM \$2.70