

3200 W PIPE CROSSING STUDY - FINAL

Date: May 2, 2022Project No.: 201086

Jordan Valley Water Conservancy District

Subject: Identify Approximate Pipe Sizing and Routing for Pipes Crossing 3200 West for Plant Expansion To 255 MGD

Introduction

Background

Jordan Valley Water Conservancy District (JVWCD) owns and operates the Jordan Valley Water Treatment Plant (JVWTP), a conventional plant with a 180-million gallon (MG) raw water reservoir, and two finished water reservoirs (8 MG and 12.5 MG), all located east of what would be the 3200 West corridor (a private roadway on JVWCD property). The JVWTP has a current capacity of 180 million gallons per day (MGD) and a planned future ultimate capacity of 255 MGD. The concepts for the plant expansion include raw and finished water reservoirs on JVWCD-owned land. There is an existing 10-inch sewer along a portion of 3200 West that has been proposed for extension and expansion to serve future developments south of JVWCD property.

Project Purpose

The purpose of this study is to identify conceptual pipe sizing and routing between the expanded plant and the new reservoirs to identify potential interferences with the existing and extended 10-inch sewer pipeline. The conceptual locations for the new reservoirs were based on previous planning studies, existing ground elevations, and previous plant hydraulics. Pipe sizing was based on providing operational flexibility to deliver the full 255 MGD future plant capacity to and from these new reservoirs to preserve the operational flexibility and redundancy appropriate for municipal drinking water treatment facilities.

The discussion in this report is conceptual in nature; more specific details (e.g., detailed hydraulics, structure sizing, facility locations, pipe design, etc.) will be needed as part of a future predesign report.

255 MGD Raw Water and Finished Water Reservoir Expansion Concept

To meet the desired plant capacity of 255 MGD, the existing raw water and finished water storage structures will need to be expanded. The current concept is to construct a new 75 MG raw water reservoir (RWR), which would provide a total raw water (RW) storage of 255 MG. This provides the expanded plant with flexibility to meet variable diurnal demands without relying on upstream conditions. The available space on the JVWCD property west of 3200 West appears to be an ideal location for a new reservoir.

The current concept for the finished water side is to construct a new 15 MG finished water reservoir (FWR) to help meet chlorine contact time (CT) requirements for the new 255 MGD buildout capacity. The conceptual location presented in this memorandum positions the 15 MG FWR next to the existing 12.5 MG FWR to facilitate operation and maintenance and to reduce pipe length and excavation. The existing 12.5 MG and 8 MG FWRs sit approximately 20 feet below the surface profile of 3200 West. The new 15 MG FWR must be placed at a similar elevation due to plant hydraulics. This location conflicts with the existing 3200 West roadway. Rerouting the 3200 West access road around the reservoirs presents the most logical location from an engineering, operations, and cost perspective.

The raw and finished water 255 MGD upgrade concept is shown in Figures 1 and 2. Figure 1 provides an overview of the plant site and Figure 2 shows the process flow diagram of both the raw water and finished water processes.



A SITE OVERVIEW
SCALE: 1" = 300'

FIGURE 1 - RAW AND FINISHED WATER SITE CONCEPT OVERVIEW
JWWTP 3200 W PIPE CROSSING PROJECT

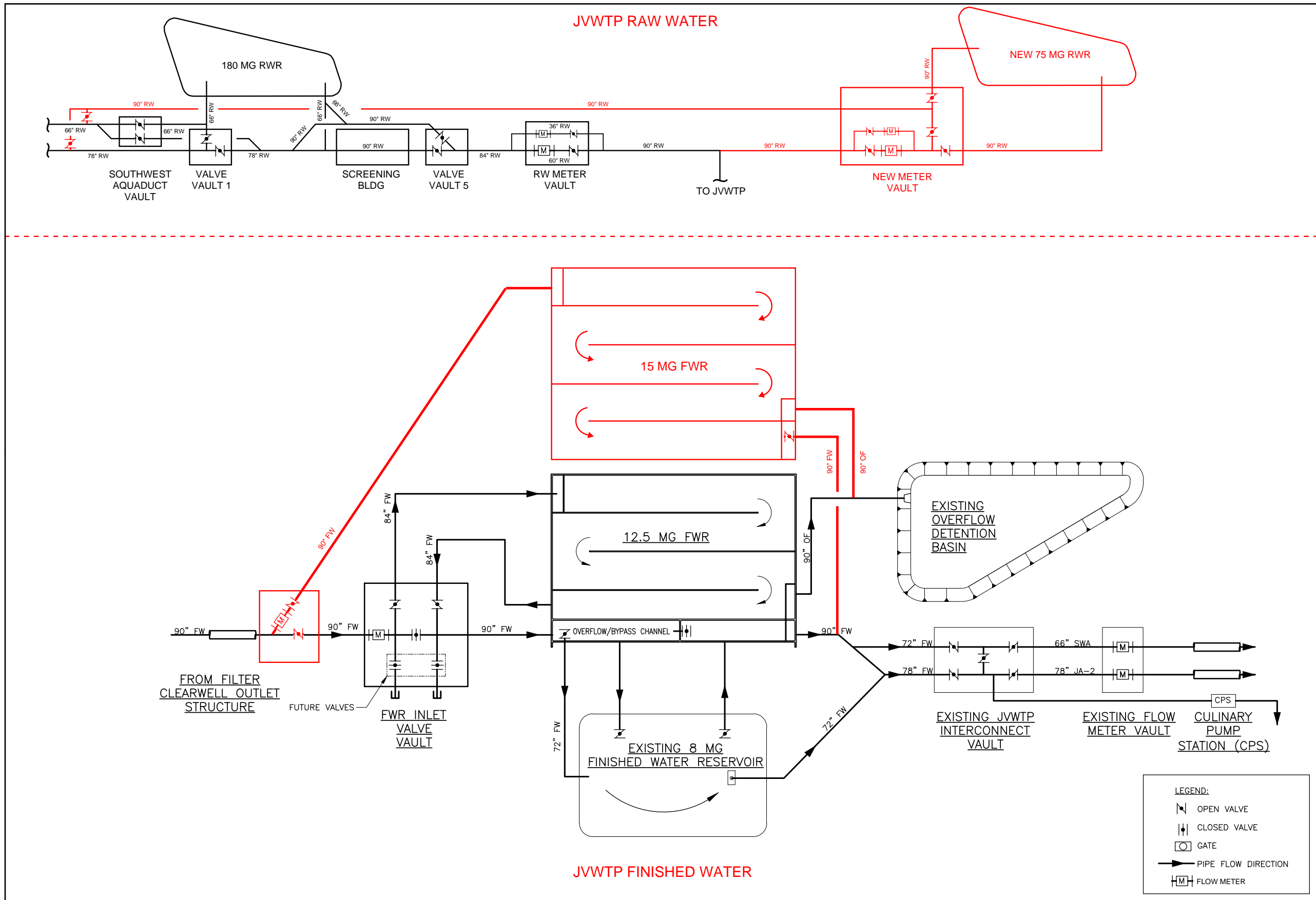


FIGURE 2 - RAW AND FINISHED WATER PROCESS FLOW DIAGRAM
 JWWT 3200 W PIPE CROSSING PROJECT

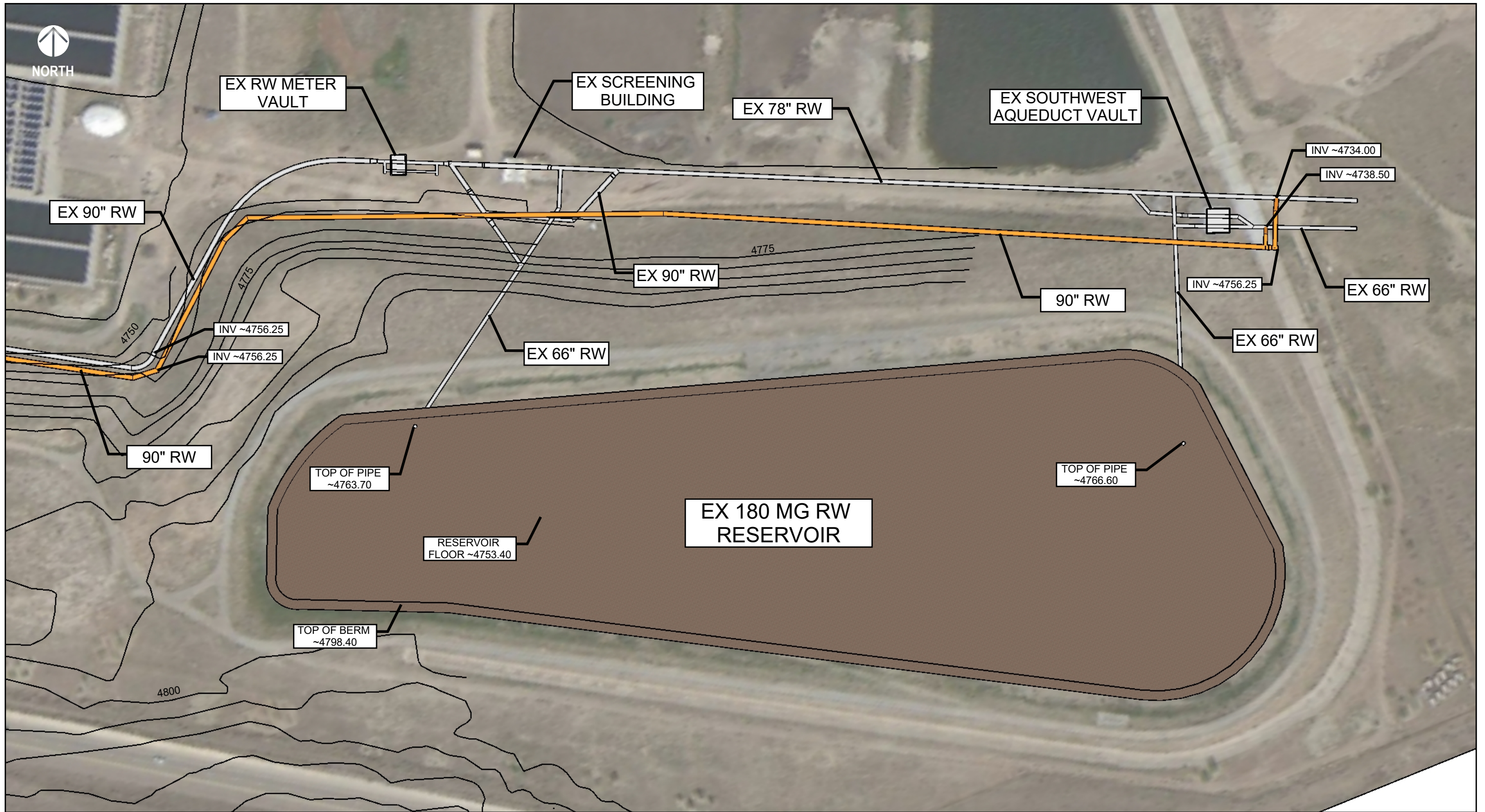
Raw Water Reservoirs

Currently, the JVVTP can store up to 180 MG of raw water in the existing 180 MG RWR. Water is routed to the plant one of two ways:

1. **Through the 180 MG RWR.** Water from the 78-inch Jordan Aqueduct Reach 1 (JA-1) and the 66-inch Southwest Aqueduct Reach 1 (SWA-1) is routed to the 180 MG RWR through the existing 66-inch RW inlet piping. Water from the RWR then travels through the 66-inch RW outlet, connects to a 90-inch RW pipeline, which runs through the RW meter vault and to the front of the plant.
2. **Bypass the 180 MG RWR.** Water can be bypassed around the 180 MG RWR through the 78-inch JA-1 line, which connects to a 90-inch RW pipeline that runs around the screening building. This pipeline then runs through the RW meter vault and to the front of the plant.

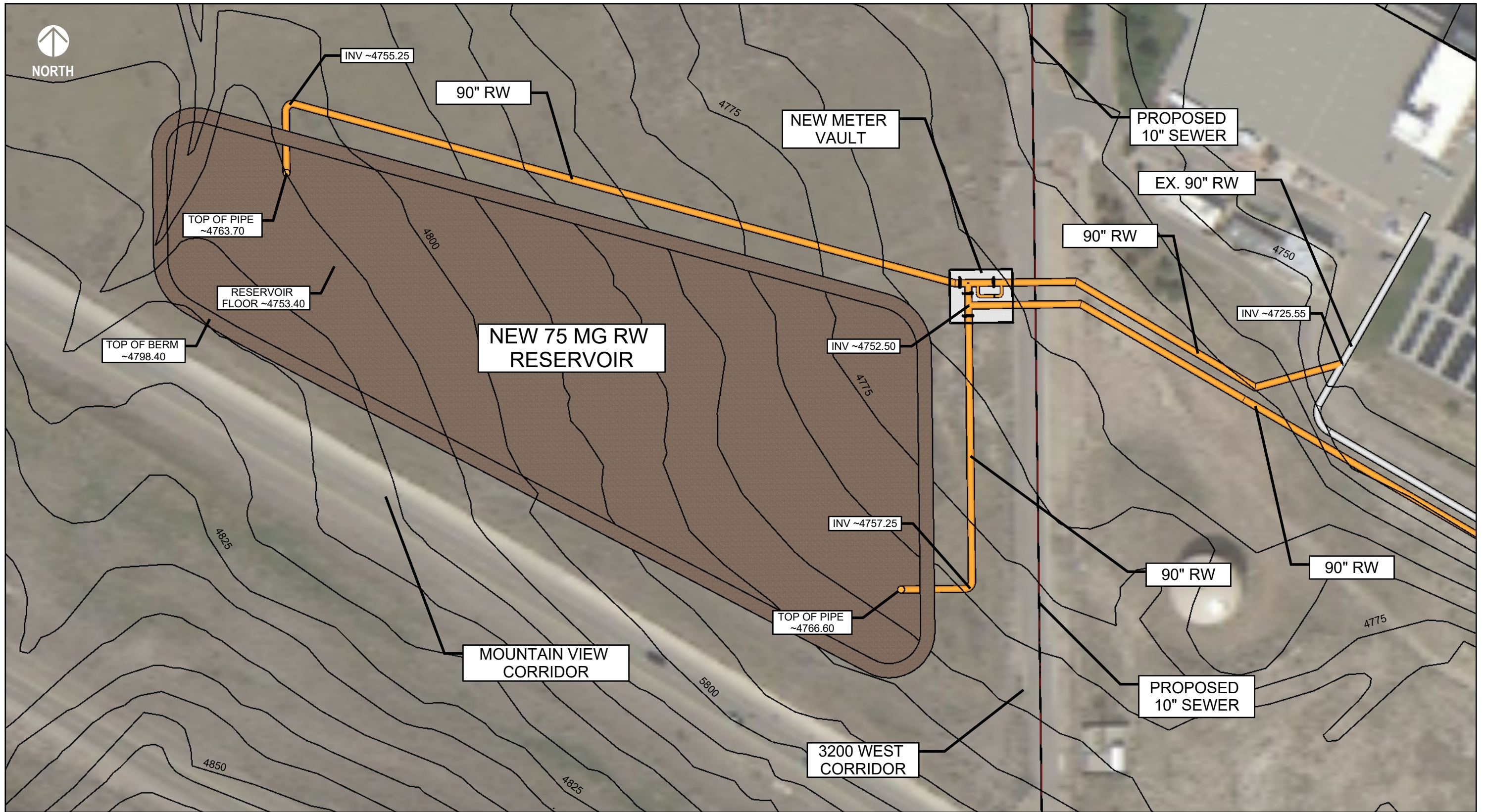
Due to the hydraulic restrictions of the 180 MG RWR (i.e., 66-inch inlet and outlet piping), pushing 255 MGD through this reservoir would not be feasible. Therefore, the proposed concept is to feed the 75 MG RWR with a new pipeline that diverts water upstream of the 180 MG RWR. A 90-inch pipeline was selected to maximize flow around the 180 MG RWR. This would provide redundancy for the plant if the 180 MG RWR needed to be taken out of service during peak flow.

There is available area for the new 75 MG RWR west of 3200 West. Based on current elevations, locating the new RWR adjacent to North Mountain View (Highway 85) is the most logical location. This would require the new 90-inch RW pipeline to run across 3200 West to the new RWR. A new meter/bypass vault would be needed and could be located on either side of 3200 West. Valves can be manipulated to route flow through or around the 75 MG RWR. In addition, water could be routed through two different sized flow meters to provide better accuracy for low flow and maximum capacity conditions (similar to the existing RW meter vault). The 180 MG RWR and 75 MG RWR concepts are shown in Figures 3 and 4, respectively.



A 180 MG RAW WATER RESERVOIR OVERVIEW
 SCALE: 1" = 150'

FIGURE 3 - RAW WATER PIPING AND 180 MG RESERVOIR CONCEPT OVERVIEW
 JWTP 3200 W PIPE CROSSING PROJECT



A 75 MG RAW WATER RESERVOIR OVERVIEW
 SCALE: 1" = 100'

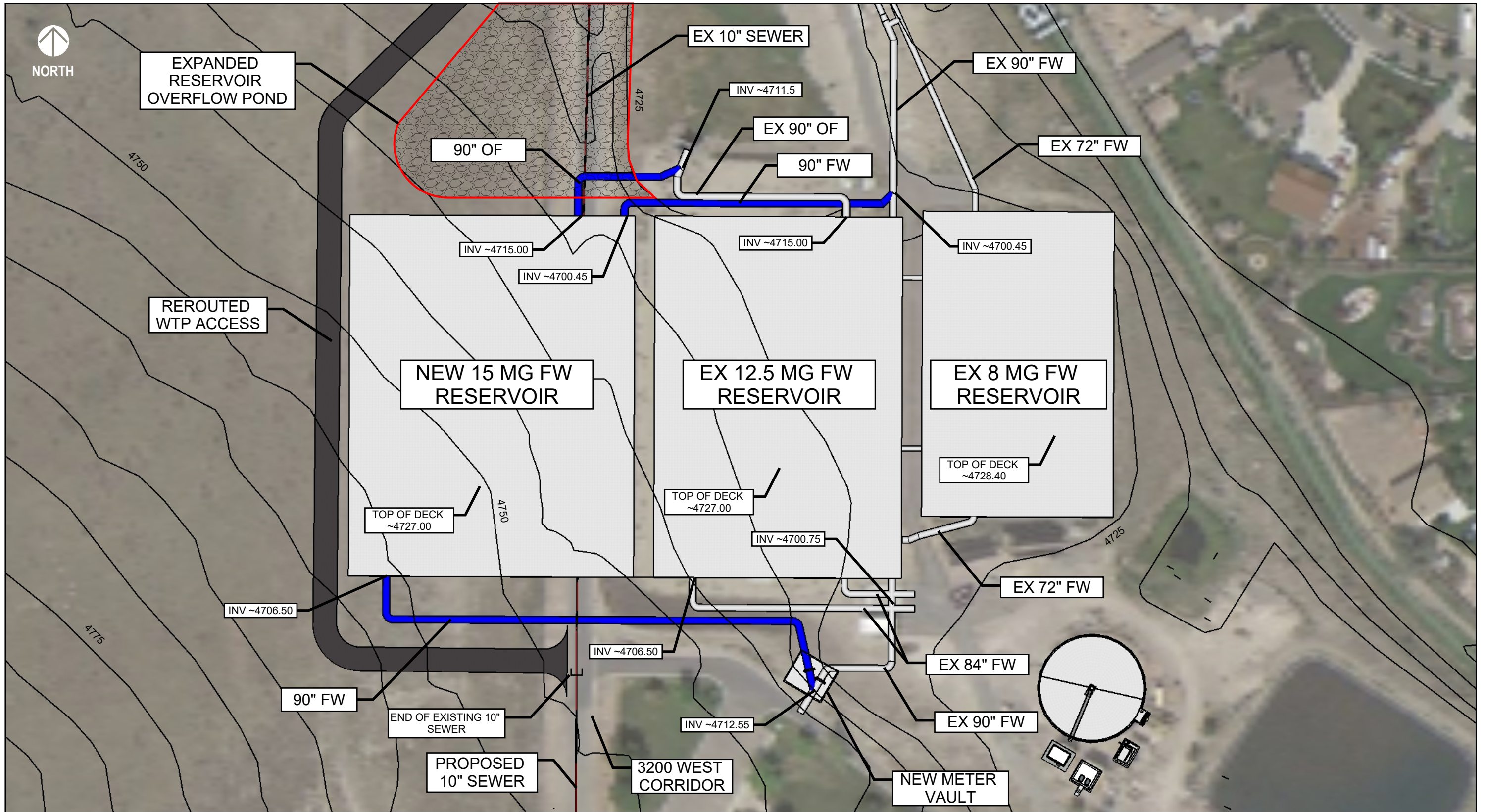
FIGURE 4 - RAW WATER PIPING AND 75 MG RESERVOIR CONCEPT OVERVIEW
 JWTP 3200 W PIPE CROSSING PROJECT

Finished Water Reservoirs

The JWTP currently has a baffled 12.5 MG and an unbaffled 8 MG FWR which can be operated either in series or parallel. This is done by manipulating valves in the existing finished water reservoir inlet valve vault. Finished water (FW) flows into the 12.5 MG FWR via an 84-inch FW pipeline and exits in a 90-inch FW pipeline. Finished water enters and exits the 8 MG FWR in a 72-inch FW pipe. The two FWR outlet pipes connect downstream at an intersection for the Southwest Aqueduct and Jordan Aqueduct Reach 2 pipelines.

A new vault, with a bypass valve and a flow meter, would be needed to divert flow to the new 15 MG FWR. Similar to the raw water side, a 90-inch pipeline was selected to maximize flow around the 12.5 MG and 8 MG FWRs. This provides redundancy for the plant if the 12.5 MG or 8 MG FWRs needed to be taken out of service during peak flow. The FW inlet and outlet piping of the new 15 MG FWR, as well as the overflow, were set at a similar elevation as the 12.5 MG FWR to keep hydraulics consistent. The current concept is to connect the 15 MG FWR outlet piping just downstream of the 12.5 MG FW outlet. The overflow could tee into the existing overflow piping that empties into a detention basin. The existing detention basin may not be large enough for both overflows so it may need to be expanded or a new detention basin constructed adjacent to the new 15 MG FWR

The finished water piping and new 15 MG FWR concept is shown in Figure 5.



A FINISHED WATER RESERVOIR OVERVIEW
SCALE: 1" = 100'

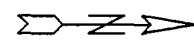
FIGURE 5 - FINISHED WATER PIPING AND RESERVOIR CONCEPT OVERVIEW
JWTP 3200 W PIPE CROSSING PROJECT

10-inch Sewer Pipeline

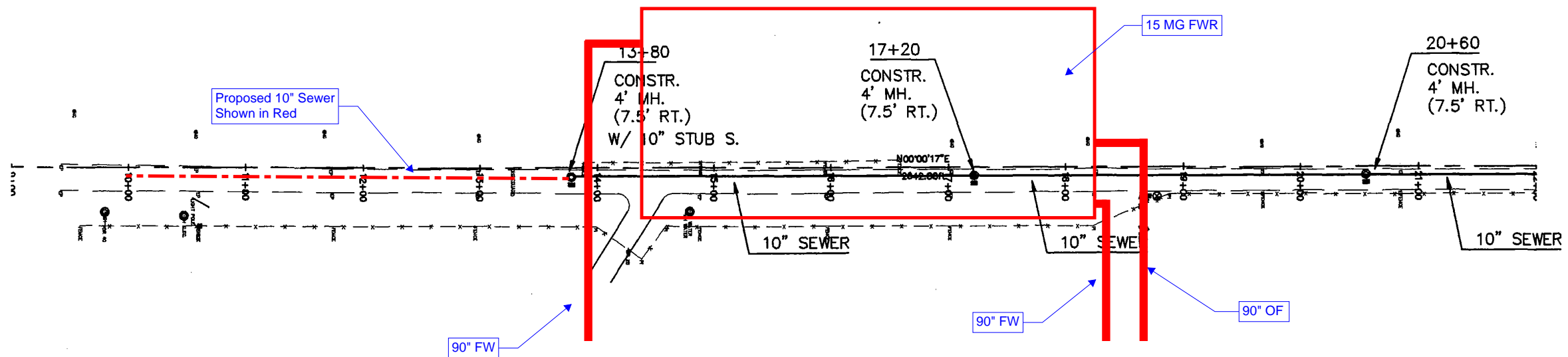
There is an existing 10-inch sewer pipeline, owned by South Valley Sewer District (SVSD) (formerly known as Salt Lake County Sewer Improvement District No. 1), that runs through the middle of the 3200 West Corridor. The sewer line is approximately 22 feet below grade and ends near the turnout just south of the 12.5 MG reservoir. The SVSD has asked JWCD about the feasibility of extending the 10-inch sewer to Mountain View Corridor to accommodate future development south of the JWTP. However, this poses conflicts with the future 255 mgd expansion project at the JWTP. For this conceptual planning memorandum, it was assumed that the 10-inch sewer extension would continue to follow the grade of the access road at a depth approximately 22 feet below grade. The profile of the 10-inch sewer line is shown in Figures 6 and 7.

As shown in Figure 6, the existing 10-inch sewer line would directly interfere with the new 15 MG reservoir. It would need to be rerouted or removed completely when the new FWR is constructed. The JWTP also has primary power currently routed along the 3200 West Corridor, but future improvement by Rocky Mountain Power will provide alternative primary power (from the Redwood Road Sub Station) for the planned water treatment plant expansion. The proposed 10-inch sewer extension does not interfere with the RW piping for the current concept (Figure 7) but could limit District flexibility in exploring other potential reservoir locations east of what is currently shown.

In Carollo's experience, it is generally uncommon for municipalities/districts throughout the country to allow easements through the middle of plant property for other utilities. Generally, treatment facilities that contained easements for other utilities either inherited it because the easement was in place before the plant was built/expanded or allowed it because it was mutually beneficial.

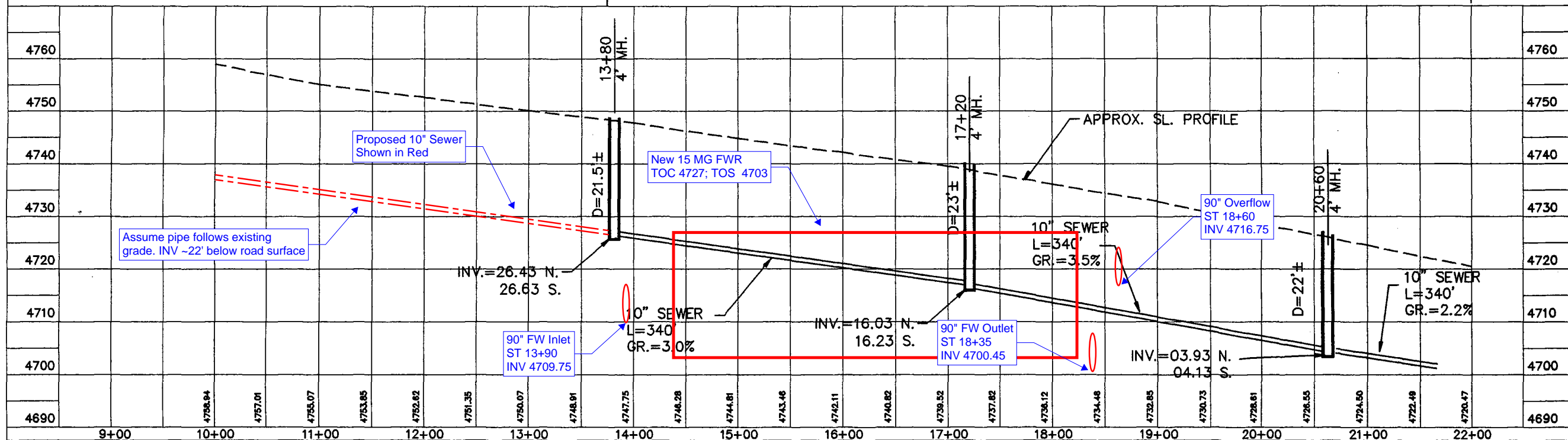


3200 WEST STREET



SCALES:
 1" = 50' HOR
 1" = 10' VER

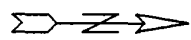
D-LOAD=3300 lbs/ft



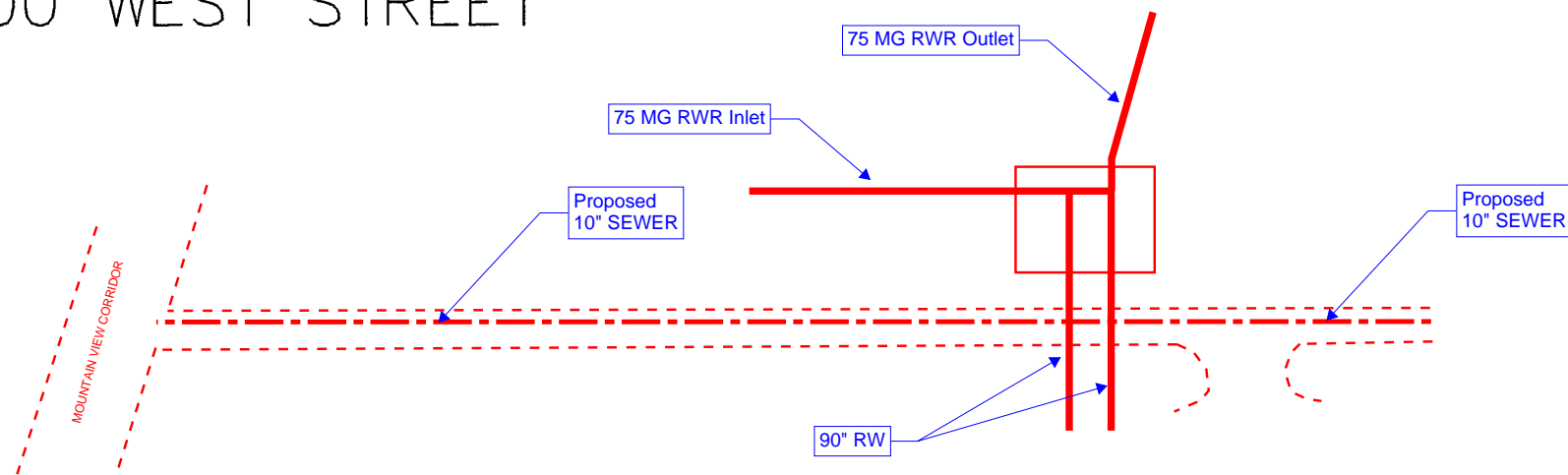
PROFILE ALONG CENTERLINE OF 3200 WEST STREET



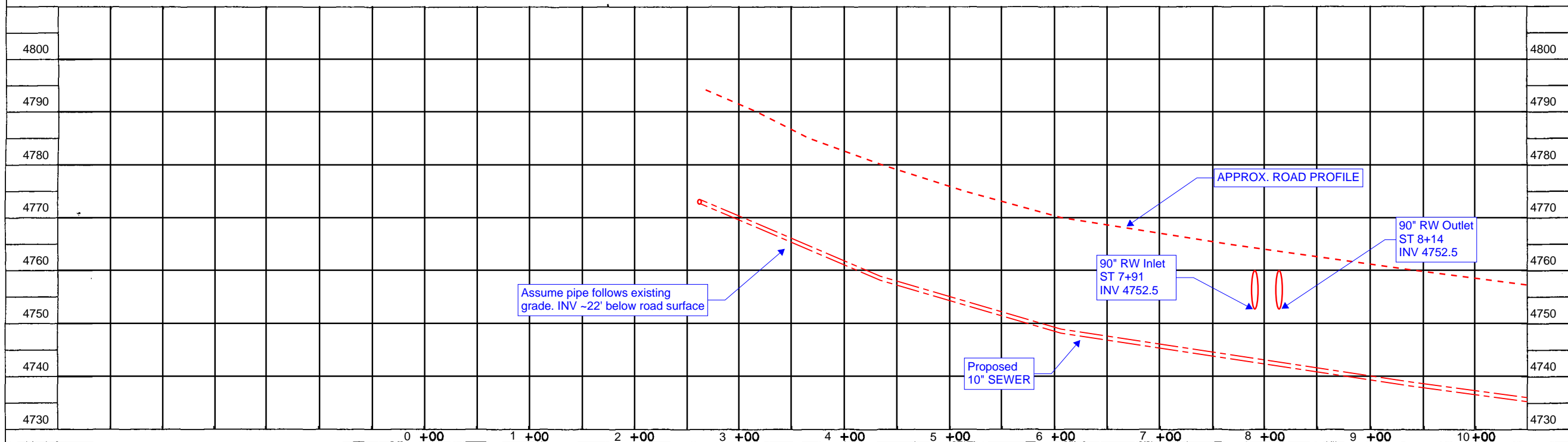
FIGURE 6 - 3200 W 10" SEWER PLAN AND PROFILE (FW)
 JWTP 3200 W PIPE CROSSING PROJECT



3200 WEST STREET



SCALES:
1" = 50' HOR
1" = 10' VER



PROFILE ALONG CENTERLINE OF 3200 WEST STREET



FIGURE 7 - 3200 W 10" SEWER PLAN AND PROFILE (RW)
JVWTP 3200 W PIPE CROSSING PROJECT

Recommendations

Carollo Engineers was contracted to identify conceptual pipe sizing and routing between the expanded plant and the new RW and FW reservoirs to identify potential interferences with the existing and extended 10-inch sewer pipeline along 3200 West. This memorandum presents one conceptual location of the RWR that would not interfere with the sewer extension. However, the sewer may limit potential siting options for the new RWR. New raw water piping (a minimum of 90-inch diameter) would be needed to convey 255 MGD of water to a new 75 MG RWR located west of 3200 West. The pipe and reservoir would provide the plant additional raw water capacity and redundancy to meet future needs. Similarly, a new 15 MG finished water reservoir with new inlet and outlet piping (a minimum of 90-inch diameter) would be needed to provide additional redundancy at 255 MGD. This memorandum presents a proposed conceptual location for the new 15 MG reservoir -- adjacent to the existing FWRs. This location is in direct conflict with the existing access road, plant electrical supply, and sewer. The plant access road is easily re-routed around the new reservoir and the plant electrical supply will be rerouted during plant expansion regardless, but any sewer installed at that location would interfere with this concept.

Prepared by:

A handwritten signature in blue ink that reads "Stetson Bassett". The signature is written in a cursive, flowing style.

Stetson Bassett, PE