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PVC PIPE FOR ABOVE-GROUND TEMPORARY WATER PIPELINES

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ABSTRACT:

This paper details two case studies using PVC pipe for above ground temporary water pipelines.

Case Study #1

South Coast Water District (SCWD) needed a cost-effective solution for an emergency repair. A leak in the existing 27 in. CCP pipeline conveying potable water, was replaced with dual 16 in. ASTM D2241 Restrained Joint (RJ) Certa-Lok® Yelomine® SDR 21 PVC pipelines installed above ground. This recent temporary bypass pipeline project skirts a residential area in San Clemente, CA adjacent to Interstate 5. The project location was a challenge, with a steep change in elevation and limited space for equipment. A total of 900 ft of PVC pipe was successfully installed and remains in service. The project was delivered in April 2021.

Case Study #2

A major improvement project by the San Juan Water District (SJWD) included the rehabilitation of the Hinkle Reservoir. The project required that the 62-million-gallon water reservoir be taken out of service while the District replaced the liner and cover. An 18 in. diameter pipeline was also to be out of service for approximately two years and a temporary watermain was needed to ensure water supply to local residents and businesses. A total of 400 ft of 12 in. ASTM D2241 restrained joint Certa-Lok® Yelomine® SDR 26 PVC pipe was installed in December 2020 as a temporary bypass pipeline. This temporary pipeline was later disassembled, relocated to the other side of the tanks and then successfully reassembled in 2021.

For both projects, Certa-Lok® Yelomine® PVC pipe manufactured by NAPCO was selected, due to its ability to be used in above-ground, exposed applications. The spline-locking restrained joint PVC pipe provided a quick installation and overall cost-effective solution for both projects discussed in this paper.

CASE STUDY 1: SOUTH COAST WATER DISTRICT

1. INTRODUCTION

South Coast Water District (SCWD) is a provider of water and wastewater services to roughly 35,000 residents, 1,000 businesses, 2 million visitors in Southern California's Orange County service area of Dana Pt, South Laguna, San Clemente and San Juan Capistrano.

2. CONSTRUCTION CHALLENGES & SOLUTIONS

A 27 in. CCP break was discovered in February 2021 in a residential area in San Clemente, CA. SCWD worked quickly to alert the residents being impacted and collaborated with the local fire department to isolate the leak in the pipeline and coordinated a resolution for a time sensitive emergency repair. The project also required collaboration with Metropolitan Water District's services. The entire project had very tight time constraints. The project location was indeed a challenge, with a steep change in elevation, limited space for equipment, and the existing vegetation which needed to be cleared prior to mobilization. The soil conditions and a high-water table presented difficulties. Slope stabilization also had to be considered during this project. SCWD needed to grade an access road, complete surveying work and locate tie-ins where the contractor could be given enough room to stage equipment. The pipeline was adjacent to Interstate 5 (I-5) and Caltrans ROW.

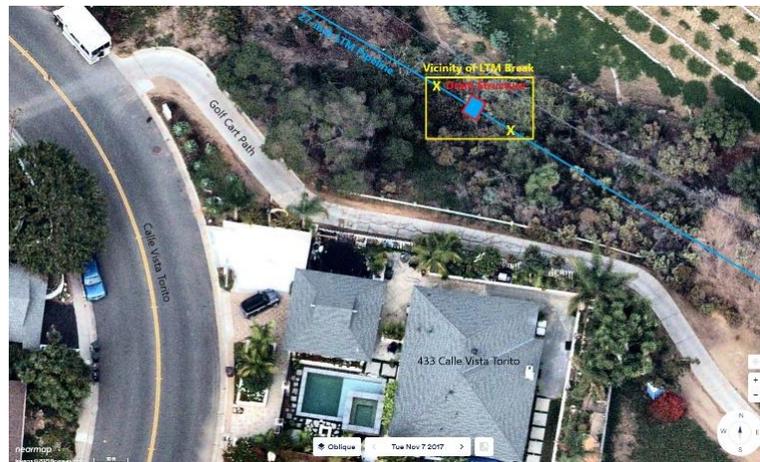


Figure 1. project photo courtesy of South Coast Water District showing location of the pipeline.

3. PIPELINE MATERIAL SELECTION

It was necessary to utilize restrained joints in this temporary bypass pipeline. SCWD had considered various pipeline materials, however, in the end, selected the option of installing 900 ft of 16 in. D2241 Restrained Joint Certa-Lok Yelomine SDR 21 PVC pipe with a pressure rating of 200 psi.

Dual 16 in. PVC pipelines were used to ensure the correct volume was maintained. The installation of Certa-Lok Yelomine pipe was chosen and was anticipated to be in use above ground for approximately 1-2 years. The critical factors for material selection included: material availability, cost, ease of installation, ability to restrain the pipeline, product installation with limited space. SCWD required the

pipe manufacturer to provide product documentation with NSF 61 certification and ensure the pipe would be able to meet the minimum required 150 psi pressure rating.

Yelomine products are the industry's first non-metallic, corrosion-free restrained joint product, with nearly a 50-year history of successful installations.

As shown in Figure 2, Certa-Lok Yelomine pipe utilizes precision machined grooves on the pipe and both sides of the coupling which, when aligned, allow a spline to be inserted, resulting in a fully circumferential restrained joint. This product minimizes the jobsite footprint demand and community disruption due to a reduced need for larger staging areas. The Yelomine pipe compound contains impact modifiers and inhibitors, which provide higher impact strength over an extended period of time, making this product suitable for above-ground, exposed applications.

SCWD had previous experience with NAPCO's C900 Certa-Lok restrained joint PVC products on a recent trenchless project. Since this bypass project required a pipeline to be left above-ground, there were a few options that would meet their specific requirements.

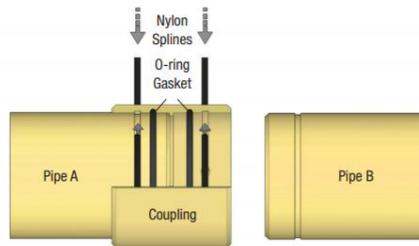


Figure 2. D2241 RJ Certa-Lok Yelomine PVC Pressure Pipe (Photo courtesy of NAPCO Pipe & Fittings, ©NAPCO 2021)

4. INSTALLATION & TESTING

TE Roberts Inc. was the contractor hired to complete the installation of the pipeline. Due to jobsite space constraints and limited access for construction equipment, the dual 16 in. lines were placed only inches apart, separated by wood blocking. Concrete thrust blocks were installed at the connection points to mitigate thrust forces and restrain the connections.

When the bypass pipeline was connected to the existing line, SCWD proceeded with chlorination and flushing. SCWD observed the line successfully pass pressure testing, before putting the line in service. Monitoring continues to ensure pipeline performance with additional erosion protection. To-date, the temporary bypass remains in service.

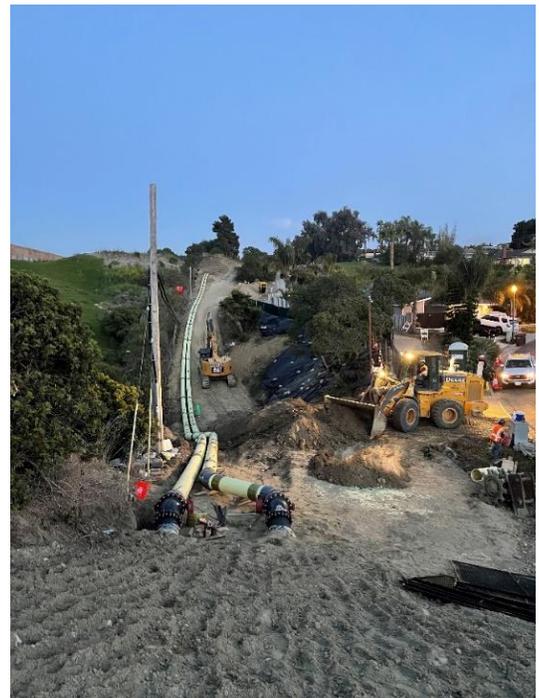


Figure 3. project photo courtesy of South Coast Water District showing above-ground pipeline installed.

CASE STUDY 2: SAN JUAN WATER DISTRICT

1. INTRODUCTION

A major improvement project underway by the San Juan Water District (SJWD) included the rehabilitation of the Hinkle Reservoir. The project required that the 62-million-gallon water reservoir would be out of service for approximately 2 years while SJWD replaced the liner and cover. The liner and reservoir were originally constructed in 1980. The Hinkle Reservoir has a surface area of 12.5 acres and provides drinking water to more than 265,000 people annually in the Sacramento region. To assist with operational control during the project, two large temporary tanks were planned for installation on SJWD's property just beyond the main entrance gate. The bolted steel tanks would support water delivery to residents while the reservoir was being serviced. The only suitable location for the large tanks was also over an existing buried 18 in. C905 PVC pipeline, with a depth of cover approximately 5-7 ft. The existing buried pipeline supplies water for drinking and fire service to the City of Folsom, an adjacent residential and commercial area with a population of over 86,000.

2. CONSTRUCTION CHALLENGES & SOLUTIONS

When it became evident that the temporary water tanks were needed to offset storage lost by taking the Hinkle Reservoir out of service for repairs and to alleviate the concerns of a potential outage in case the existing buried pipeline was damaged, SJWD decided to install a temporary above-ground bypass pipeline. The new bypass pipe had to meet requirements of the current operating pressure of 50 -70 psi and accommodate an anticipated delivery of water at 3,000 gallons per minute from the new tanks.

3. PIPELINE MATERIAL SELECTION

SJWD opted to install 400 ft of 12 in. D2241 RJ Certa-Lok Yelomine SDR 26 PVC pipe for the above-ground temporary pipeline.

4. INSTALLATION & TESTING

The work was completed by SJWD staff. A four-person crew installed the temporary bypass line a few feet away from the new water tanks. To support the pipe, various options were considered, including bare earth, wood blocking and adjustable steel supports on concrete footings. Ultimately, SJWD chose sandbags piled 6 in. above ground level to keep the pipe in place, as shown in Figure 4. The pipe was raised in order to provide a gap between the ground and the bottom of the pipeline allowing for drainage into a nearby channel. Since soil stability had not been an issue, sandbags worked well from a cost and schedule viewpoint. The sandbags were double-bagged and UV rated to provide enough strength and durability to last the project duration. The 20 ft lengths of Yelomine pipe were installed cartridge-style with no extra equipment required at a rate of about 1 minute per joint. The 12 in. Yelomine bypass pipeline was then connected to an existing 18 in. pipeline and successfully passed pressure testing.



Figure 4. project photo courtesy of San Juan Water District showing above-ground pipeline installed.

CONCLUSION

For both projects discussed in this paper, Certa-Lok Yelomine RJ PVC pipe was selected. Yelomine products are manufactured from a specially formulated PVC compound containing impact modifiers and UV inhibitors, that provides up to 6 times the impact strength over an extended period of time, allowing for Yelomine products to be used aboveground and in high-impact situations such as temporary bypass. Joints assembled with the non-permanent gasket option can be disassembled and reused for future installations or system changes. This was an excellent choice for the referenced above-ground applications, offering a quick installation and overall cost-effective solution. This spline locking, restrained joint PVC pipe technology was introduced decades ago and continues to offer cost effective solutions for municipal projects today.

Thank you to both South Coast Water District and San Juan Water District for providing project photos and positive feedback post-installation.

MORE INFORMATION ON CERTA-LOK YELOMINE PIPE

The pipe product presented in this paper is manufactured by NAPCO, Pipe and Fittings, a Westlake Company. The D2241 RJ Certa-Lok Yelomine pipe may be used for above ground, temporary bypass, static pipe-bursting, HDD or open cut installations and is available from 2 in. to 16 in. diameters. Yelomine pipe is manufactured at NAPCO's Lodi, CA and McPherson, KS extrusion plants. It is important to note there are two gasket options when using Certa-Lok Yelomine products: permanent and non-permanent.

Permanent use Certa-Lok joints utilize an O-ring gasket with a slightly larger cross-section. Disassembly can be achieved, but may be extremely difficult depending on the diameter of the piping system. Permanent use Certa-Lok Joints are intended for use in installations which do not require disassembly during the service life of the system. Applications include buried installations, bridge, river and road crossings, and all installations in which joints are subjected to long-term misalignment due to external loads. Non-permanent O-rings are designed for ease of disassembly. Non-permanent use Certa-Lok joints also utilize an O-ring gasket, however, are typically used in above-ground, exposed installations for mining, irrigation, temporary bypass or slurry lines or any installation that will typically require disassembly and reuse.

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