

**Canebrake County Water District**  
**County of San Diego**

**Private Water System:  
3-inch PVC Above Ground Water Line**

**December 20, 2021**

Prepared by:

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**Job Number 156-001**



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## **Introduction**

The Canebrake County Water District is replacing their potable water supply line from their well to their distribution system. Because of the desert terrain which consists of minor depths of sand overlaying rock, it is not practical to excavate a pipe trench and bury the new pipeline in the conventional fashion.

In addition, the existing supply pipeline which is being replaced is primarily above ground.

## **Background**

At the time that Dexter Wilson Engineering, Inc. was contacted by Canebrake County Water District (the last week of October 2021), the District had already purchased the straight sections of pipeline for the project. In addition, the District had contacted and discussed the project with the local manufacturer's representative for Spears Manufacturing, a manufacturer and supplier of PVC pipe, fittings, and other PVC products.

Dexter Wilson Engineering, Inc. agreed to assist Canebrake County Water District with conceptual design of the pipeline. The District was not intending to prepare engineered plans and specifications. It was planning to construct the new pipeline using a local contractor with assistance from members of the District.

### **Design Considerations**

There are several design considerations which will be addressed within this document. Primary among the design considerations is the effect of expansion and contraction of the pipeline due to the extreme hot and cold temperatures experienced in this desert location.

The expected range of temperatures in the desert area of this project is 20 degrees F to 140 degrees F. Since the pipeline will be full of water normally, it is unlikely that the pipe and water temperature will reach 140 degrees F. However, the design considerations incorporated into this document are based on the full range of potential temperatures. This approach is acknowledged to be conservative.

The maximum working pressure in the proposed 3-inch pipeline is 30 psi according to Canebrake County Water District.

Additional design considerations are outlined below under the heading, "Recommendations."

If Canebrake County Water District has additional questions regarding the design and installation of this new pipeline, they should consult with Dexter Wilson Engineering, Inc. and the local PVC pipe representative, as well as their installation contractor.

### **Recommendations**

1. **Pipe Material and Pressure Class.** Pipe material for this project was selected prior to the involvement of Dexter Wilson Engineering, Inc. The material selected is PVC Schedule 40 for 3-inch diameter pipe.

This material is acceptable for this project. At 73 degrees F this pipe has an allowable operating

pressure of 260 psi. The allowable working pressure for PVC pipe is reduced at higher operating temperatures. For the maximum possible temperature of 140 degrees F, the allowable working pressure is 57 psi. This is nearly twice the highest expected operating pressure of 30 psi. Thus, even at the highest temperature, the pipeline materials will be adequate for the pipeline's intended service.

2. **PVC Pipe Joints.** The 3-inch PVC pipe is recommended to be joined only with solvent welded joints. Threaded fittings are not to be used.

Solvent welded joints for 3-inch PVC pipe must be made in strict accordance with the pipe manufacturer's and solvent cement manufacturer's instructions. The use of a primer is recommended.

Care must be taken to ensure that the solvent welded joints are made correctly. Training and practice are highly recommended for anyone who will be performing this work. The joints are a key factor in completing a successful project.

3. **Exterior Pipe Coating.** The exterior surface of the entire length of above ground PVC pipe must be coated with an ultraviolet light barrier. The following is a recommendation; other paint manufacturers can supply equivalent products.

Surface Preparation:

Thoroughly and uniformly abrade by sanding and clean all surfaces.

Product and Manufacturer:

Primer: Tnemec Series V115 Uni-Bond DF, one coat, 2 to 4 mils dry film thickness (DFT).

Finish: Tnemec Series 1029 Enduratone, one coat, 2 to 3 mils DFT.

4. **Expansion and Contraction.** Pipe expansion and contraction due to temperature variations is proposed to be mitigated by installing pipe loops at regular intervals along the main line. These loops will allow shorter segments of the pipe to expand and contract so that pipe movement will be small and localized to each pipe segment.

Attachment 1 shows the required minimum dimensions for the pipe loop based on various lengths of the main line segments. It is not necessary that all the segments be uniform in length; however, staying with a uniform segment length will reduce the chance of installing the loop pipe with the incorrect pipe lengths.

5. **Installation Temperature.** It is preferred but not required that the main line installation be completed at a temperature approximately midway between the maximum and minimum ambient temperatures. This is 80 degrees F. If possible, perform the closure connections when the pipe temperature is 70-90 degrees F.
  
6. **Ninety-Degree Elbow Sweeps.** When constructing the expansion/contraction pipe loops, it is preferable to use 90-degree sweep elbows at the corners in lieu of the standard 90-degree elbows.

7. **Crossing Water Courses.** Where the new 3-inch pipe must cross a water course (wash, or creek, or channel, or other low point where surface water flow may occur), raise the 3-inch pipeline sufficiently above the water course so that during a high flow event the pipe remains clear of the highest water surface elevation.

It is recommended that when the 3-inch pipe is suspended across a water course, the new pipe be continuously supported by a steel pipe or beam with sufficient straps to prevent the new pipe from sagging. The spacing between pipe straps shall be no greater than 3 feet. The steel pipe or beam which is bridging the water course shall be firmly supported on both ends such that the 3-inch PVC pipe is fully supported by the bridging beam until it transitions to the ground surface.

8. **Constraining Pipe Movement.** It is recommended that some means be employed to restrict the potential horizontal movement of the pipe. We term this “constraining” the pipe, not “restraining” the pipe. That is, the pipe must be allowed to move axially, along the pipe alignment; but it should be prevented from sliding



horizontally. This can be achieved in several ways such as laying the pipe along and between boulders, attaching the pipe loosely to sections of the existing steel pipe, or other simple means that will preclude the pipe from moving side-to-side.

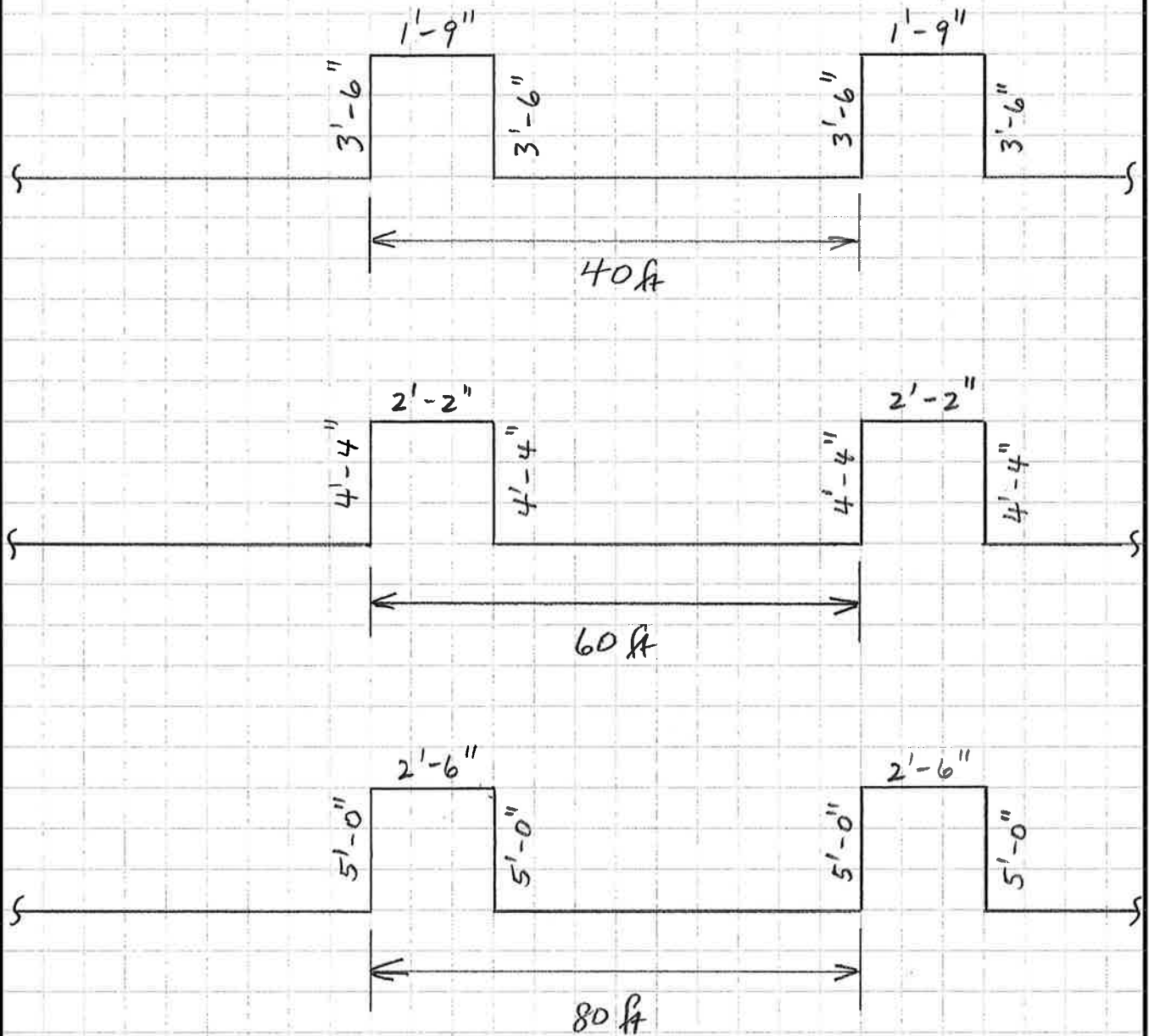
If there are any questions that arise from the review of our recommendations or from field conditions during construction, please do not hesitate to contact the following:

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# **ATTACHMENT 1**

## **EXPANSION/CONTRACTION PIPE LOOP SIZING**

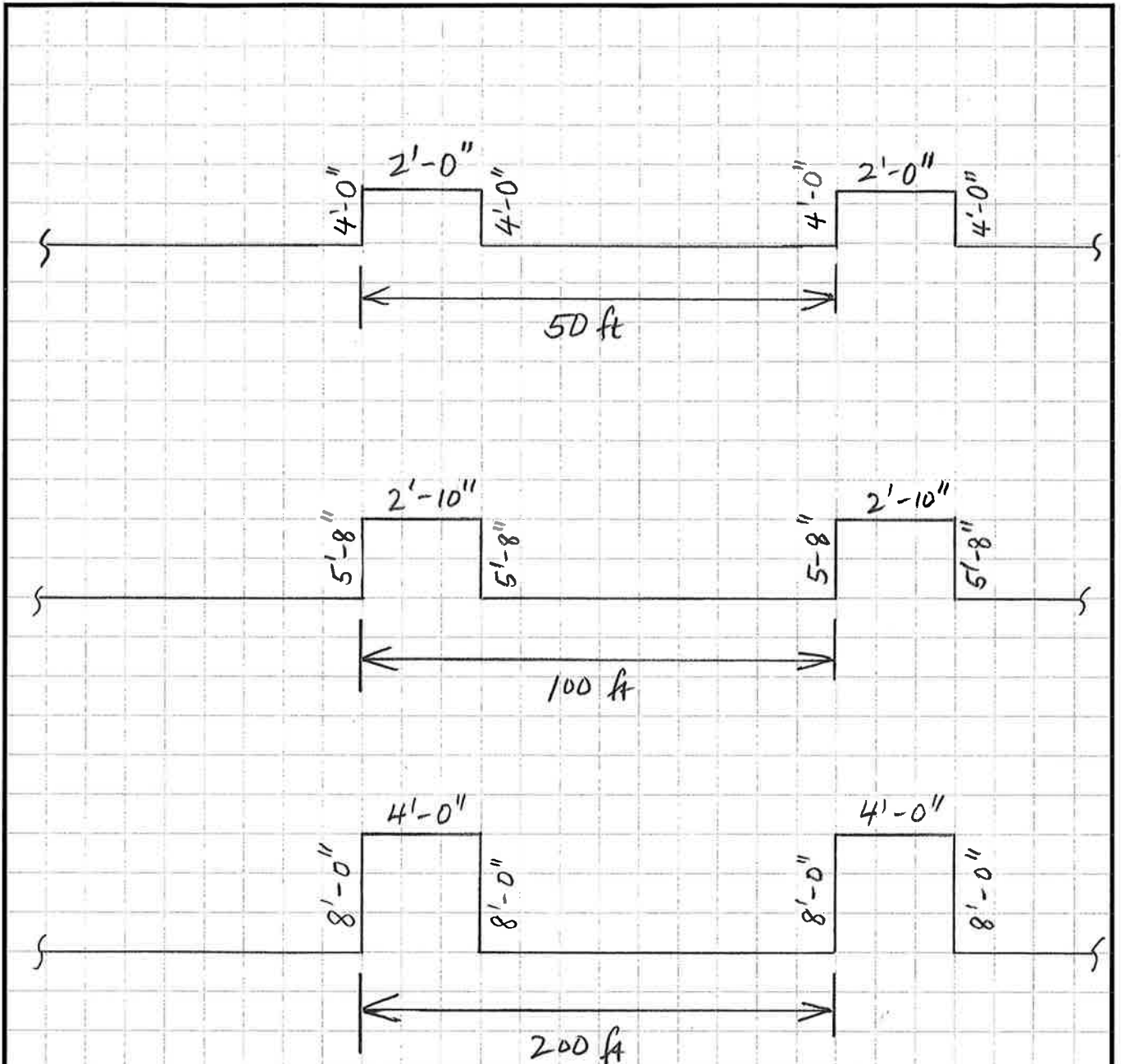
DEXTER WILSON ENGINEERING, INC.



Expansion/Contraction Loop Dimensions based on different spacings.

Design for: 3" PVC Sch 40 pipe  
20 - 140 deg. F temp. range

DEXTER WILSON ENGINEERING, INC.



Expansion/Contraction Loop Dimensions based on several spacings.

Design for: 3" sch 40 PVC

20 - 140 deg. F temp range