

MEMORANDUM

TO: District Engineers

THROUGH: Larry Robinson, Engineering Supervisor *LR*

FROM: Jeff Hermansky, Northwest District Engineer *JH,*

SUBJECT: Flow-fill Encasement, Policies 13.9.11 and 14.14.14

DATE: January 24, ¹⁹⁹⁴~~1995~~

This policy is intended as a clarification of the Department of Environmental Quality/Water Quality Division (DEQ/WQD) Chapters XI and XII Regulation's for water and sewer line separation and crossings as well as WQD Policies 13.9.7 and 14.14.10. This policy adds normally constructed sewer lines embedded in flow-fill as an acceptable alternative method to protect water systems from possible contamination from leaking sewer lines when the minimum regulatory separation requirements can't be met. Currently, construction of the sewer line with water line grade pipe or the use of a carrier pipe for one of the lines are the only acceptable methods.

The Water Quality Division regulations require separation of water and sewer lines by ten (10) feet horizontally and eighteen (18) inches vertically. This regulation was derived from the 10 States Standards which were originally developed in the 1950's when clay pipe was the most commonly used sewer pipe. This was prior to the introduction of PVC sewer pipe and better joining systems for other materials, which when properly installed, insure a virtually leak free system. The basis of this policy is that when sewers are installed in accordance with manufactures recommendations and then protected from movement, deflection, or damage, by embedment in flow-fill, the sewer will maintain its integrity and remain leak free for the life of the installation. With no leakage, nearby water lines, regardless of the vertical or horizontal separation, will be protected from potential contamination. Repairs or tapping of the lines embedded in flow-fill is possible since flow-fill is designed to be excavated with conventional excavation equipment.

Material

Flow-fill is also known as cement treated fill, non-shrink backfill, no shrink backfill, low density concrete backfill, structural backfill, etc. The mix design for flow-fill can vary greatly provided that it meets a 28 day compressive strength of between 30 and 60 psi. An acceptable design can be found in Section 02510 of the Wyoming Public Works Standard Specifications, "Portland Cement Treated Mixtures". The project engineer may modify this design to allow reject or recycled materials provided that the 28 day compressive strength is confirmed by lab testing to be between 30 and 60 psi. However, non-specification material is not recommended for heavy loading or water and sewer crossings in which structural support depends on the flow-fills shear strength. Air should be entrained at 1.5 to 2.5% to improve workability.

Installation - Pipelines

Assembly must be done under dry conditions with all joints completely cleaned of dirt and contaminants. Pipe ends and joints shall be kept covered until connection with next pipe segment or fitting. All joints shall be lubricated in accordance with the manufactures recommendations and assembled by pushing the spigot into the bell until the reference mark on the pipe barrel is flush with the end of the bell.

The pipe to be embedded in flow-fill can be laid on a 4 to 6 inch bed of washed gravel that has been excavated for the bells so that the pipe is uniformly supported along its entire length or the pipe can be set on 4 inch high blocks spaced no further than every 10 feet. The flow-fill or washed gravel must bear on undisturbed trench bottom. It may be necessary to stake the pipe to prevent lateral movement or floating during the placement of the flow-fill. The flow-fill must be placed carefully under and around the pipe and extend from undisturbed trench sidewall to sidewall. Placement may be by chute, bucket, or other means to assure that the line and grade of the pipe or pipes is maintained. The flow-fill must extend to at least 2 inches above the top of the pipe.

Installation - Pipe Crossings

Wherever possible, the pipes should be laid so there are no joints or taps within 9 feet of the crossing. The flow-fill shall extend from undisturbed earth at the bottom of the lower pipe to at least 2 inches above the top of the upper pipe and extend from one side of the trench to the other. Pipes crossing one another can be separated by as little as 2 inches when embedded in flow-fill according to the provisions of this policy. The block of flow-fill must be wide enough to ensure the structural integrity of the installation. All sewer services crossing over water mains must be encased in flow-fill in accordance with the provisions of this policy.

INSPECTION

It is recommended that full time inspection be performed where flow-fill is to be used. This is critical since pipeline integrity must be assured before the pipe is encased.

Of special concern are situations where sections of existing lines are replaced by new lines without testing before the new pipes are placed in service. If pressure testing is not possible, then the inspector must verify that all gaskets are properly seated (not buckled out of gasket groove). Verification can be performed by inserting a thin metal gauge - similar to a hacksaw blade - between the bell and the spigot around the entire circumference of the joint. The blade must penetrate only to a reference mark on the blade which indicates the depth of a properly seated gasket.