

FLOWABLE FILL AND PVC PIPE

Flowable fill is an alternative to compacted backfill in pipe trenches. The earliest major pipe installation occurred in 1964, a pipeline length of almost 300 miles. Since then, ongoing research and field experience have improved the materials, equipment, and techniques used for flowable fill.

DESCRIPTION

Flowable fill is a mixture of soil, cementitious material, and water that hardens into a substance that is stiffer than compacted soil. The material is placed as a flowable liquid that fills the haunch area of the pipe without the necessity for shovel slicing. It then hardens to provide high load-bearing properties. Flowable-fill materials are self-compacting, quick-setting, and non-shrinking – attributes which can be beneficial for pipeline projects. It is typically installed as a self-leveling slurry. Other commonly used terms for flowable fill are:

- “Controlled low-strength material” (CLSM)
- “Soil-cement slurry”
- “Controlled low-strength cementitious material”
- “Controlled-density fill”

Flowable fill mixtures are also low-strength compared to concrete or mortar, allowing for removal of the material when necessary. The specified strength typically ranges between 25 and 150 psi. Materials used in flowable fill do not need to be high-end:

- Soils can range from imported aggregates to native clays.
- The cementitious material is usually Portland cement, but it may be supplemented with less expensive substances such as fly ash.
- Water is not required to be potable.

FLOWABLE MIX APPLICATIONS

Pipe Trenches: can be used for bedding, embedment, and backfill of a pipeline. It is designed to flow into all the voids around a buried pipe.

Pipe Trenches Under Roads: some mix designs allow concrete pavement to be installed shortly after flowable fill placement, reducing traffic delays. These mixes maintain the ability to excavate the fill afterwards and its non-shrink properties prevent subsequent settlement of the highway pavement.

Manholes and Buried Structures: can be used as a replacement for traditional embedment materials around manholes and other buried structures. It can easily flow around non-uniform structures.

SUITABILITY AND BENEFITS FOR USE WITH PVC PIPE

Flowable fill has been used successfully for almost 60 years in PVC pipe projects and is suitable for use for both pressure and non-pressure applications, requiring no special equipment during installation. As with all pipe materials, contractors should account for possible flotation of pipe, either by limiting lifts to a certain depth or using ballast/weights to anchor the pipe. Flowable fill materials are usually more expensive than typical compacted backfill materials. However, depending on the project, they can reduce labor and machinery time compared to placement and compaction of backfill materials.

CONCLUSION

While not applicable for all conditions, flowable fill can be a suitable option for contractors, offering numerous benefits, including project flexibility. Since it behaves as “liquid soil” it can be used without specialized equipment or procedures. Using flowable fill is a longstanding and proven method for installing PVC water and sewer pipe – providing users with the same 100+ year PVC pipe longevity as with traditional backfill materials.

References: Howard, A. “Pipeline Installation 2.0.” Second Edition (2015); National Ready-Mix Concrete Association, website: www.flowablefill.org