

Design and Installation of Buried Pipes

Purpose and Background

Designers often think of design and installation of buried pipe as two separate processes. In fact, since performance of buried pipe depends to a large degree upon good soil support, the two processes cannot be separated. Proper design procedures require the coordinated design of pipe and installation and subsequent construction procedures must fulfill design assumptions.

This seminar, demonstrates the fundamentals of pipe-soil interaction behavior, how soil and pipe behavior can be jointly considered in design and how proper construction methods can achieve design assumptions in the field. The principals of soil-structure interaction covered in this seminar apply to all types of pipe. The primary objective of this seminar is to show how simultaneous consideration of pipe and soil, as two interrelated parts of one pipe-soil system, can optimize pipe performance and longevity, prevent failures, and minimize the high cost of downtime and repairs.

Seminar Instructors

Amster K. Howard, Jr., M.ASCE, is an international pipeline installation expert and instructor on soil classification, earthwork construction control, and pipe installation. He spent over 30 years conducting research on buried pipe and troubleshooting for pipe installation projects for the Bureau of Reclamation. At the Bureau, Mr. Howard participated in preparing specifications, writing installation manuals for pipe ranging in diameter from 2 inches to 25 feet, and training inspectors. He has been a keynote speaker for the European Clay Pipe Association and the Plastic Pipe Institute. His table of E Prime values has been adopted by AWWA, ASTM, and ASCE for use in the Iowa Formula to calculate the deflection of buried flexible pipe. He wrote an ASTM standard for construction practices for plastic pipe and is currently working on a standard for installing pipe using flowable fill. Mr. Howard is now a consulting civil engineer in Lakewood, Colorado.

Jesse L. Beaver, P.E. M.ASCE, is Associate Principal with U.S. engineering firm, Simpson Gumpertz & Heger. Mr. Beaver specializes in the performance of underground structures, structural materials, and bridge construction. He has conducted numerous studies using the finite element method to analyze soil-structure interaction, authored standards and specifications for related industries, delivered industry training, assisted in the resolution of construction disputes, and conducted materials and field-testing for the properties of structural materials and structure behavior. Mr. Beaver has authored several papers on his activities and made presentations to industry groups. He is a veteran of the United States Army and has work experience with a City Department of Public Utilities and a State Department of Transportation.

Seminar Benefits

- Learn about the latest changes in pipe specifications and why they are being made
- Learn from case histories what can go wrong in pipeline construction and the consequences of not following good practice
- Understand how to design installations that minimize risk
- Learn how uncompacted bedding can help pipe performance
- Understand the correlation between soil density, which is measured in the field, and soil stiffness, the soil property that affects pipe performance
- Identify the best in-place density tests for different soil conditions
- Find out when and how to use flowable fill (controlled density fill) for pipe embedment and backfill
- Learn approximate and sophisticated methods for predicting deflection of flexible pipe
- Get maximum benefit from ASCE Standard 15-93 for design and manufacture of reinforced concrete pipe and other ASCE standards for reinforced concrete pipe and box sections
- Understand the relationship between pipe and soil and know how to apply this information in your own work to build durable, efficient pipelines which yield substantial short and long term savings for you, your organization, and your clients

Who Should Attend?

- Design Engineers
- Project Managers
- Construction Foremen
- Public Works Engineers
- Construction Managers
- Soil Testing Personnel
- Pipeline Owners
- Contractors
- Specification Writers
- Construction Inspectors
- Anyone else involved in pipe design and construction

Summary Outline

Day One: Led by Jesse Beaver

- Pipe Materials and Design
- Soil Properties
- Loads
- Elasticity Design Methods
- Iowa Deflection Formula
- Ring Compression Theory
- Finite Element Analysis
- Universal Design Concept
- Analysis and Design of Flexible Pipe
- Analysis and Design of Rigid Pipe (including ASCE 15-93)
- Design for Longitudinal Effects
- Analysis for Buckling Capacity

Day Two: Led by Amster Howard

- Pipe Installation
- Fundamentals of Pipeline Installation
- Shipping, Handling & Storage
- Inspection of Pipe Interiors
- Trench Excavation
- Foundation & Bedding
- Laying & Joining
- Appurtenances & Fittings
- Embedment & Backfill
- Soil Classification
- Soil Properties
- Compaction of Soil
- Installation of Flowable Fill
- Safety Concerns

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