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TRENCHLESS TECHNOLOGY

The Construction or Rehabilitation of Underground Utilities With Minimum use of Open-cut Excavation

THE SEVEN TRENCHLESS VARIABLES

Product

Piping Material

Size

Distance

Ground Conditions

Cover

Motivation

SLURRY BORING

The forerunner of directional drilling, Slurry methods use a drilling fluid to aid in the drilling process and spoil removal. The slurry bore method uses mechanical cutters to excavate the soil and the drilling fluid to create a slurry to remove the spoil from the bore hole. Also known as “slick boring” or “wet boring”.

SLURRY BORING

Product	All
Material	Smooth Outer Profile
Size	1” to 30”
Distance	1’ to 120’
Ground	All Except: Sand, Wet Soils and Rock
Cover	3’ to 5’ Minimum
Motivation	All: Except Water and Railroads

SLURRY BORING – 24” RCP

In clay under a concrete street
Houston, TX

HORIZONTAL DIRECTIONAL DRILLING

The next generation in slurry boring, horizontal directional drilling (HDD) utilizes radio emitting locating devices, drilling mud and technologically advanced machines to bore under obstacles. HDD excavates a bore hole in a similar fashion to slurry boring. However, the equipment utilized allows for a surface to surface operation eliminating the need for boring and receiving shafts.

HORIZONTAL DIRECTIONAL DRILLING

Product	All Except: Gravity Lines
Material	HDD Pipe
Size	1” to 42”
Distance	40’ to 5,000’+
Ground	All
Cover	Based on Length
Motivation	All

HORIZONTAL DIRECTIONAL DRILLING

Under South Padre Island Dr
Corpus Christi, TX

HORIZONTAL DIRECTIONAL DRILLING

Under Carretera 57
Monclova, COAH, Mexico

HORIZONTAL DIRECTIONAL DRILLING

Under Swamp
Port Arthur, TX

PILOT TUBE

The process of boring from a launching shaft to a receiving shaft. A casing pipe is advanced and spoil is removed through the casing pipe with the use of a rotating auger. A cutter head is attached to the forward end of the auger to mechanically excavate the embankment ahead of the casing pipe. Also known as “dry boring”.

PILOT TUBE

Product	All: Best When Line and Grade are Critical
Material	Jacking Pipe
Size	4” to 48”
Distance	20’ to 500’+
Ground	All: Except Rock
Cover	3’ to 5’ Minimum
Motivation	All

AUGER BORING

The process of boring from a launching shaft to a receiving shaft. A casing pipe is advanced and spoil is removed through the casing pipe with the use of a rotating auger. A cutter head is attached to the forward end of the auger to mechanically excavate the embankment ahead of the casing pipe. Also known as “dry boring”.

AUGER BORING

Product	Any
Material	Steel Casing (Mandatory)
Size	20” to 48”
Distance	20’ to 400’+
Ground	All
Cover	3’ to 5’ Minimum
Motivation	All

AUGER BORING

Under Taxiway
Hobby Airport, Houston, TX

PIPE JACKING

Pipe jacking is a process of utilizing hydraulic jacks to force a pipe forward. The excavation for the pipe is accomplished either through mechanical excavation or through hand excavation utilizing pneumatic tools.

PIPE JACKING

Product	Any
Material	Jacking Pipe
Size	36” to 144” 3’x3’ to 14’ x 10’
Distance	20’ to 500’+
Ground	All: Dependant Upon Excavation Method
Cover	5’ Minimum
Motivation	All

PIPE JACKING

Under IH-10
Houston, TX

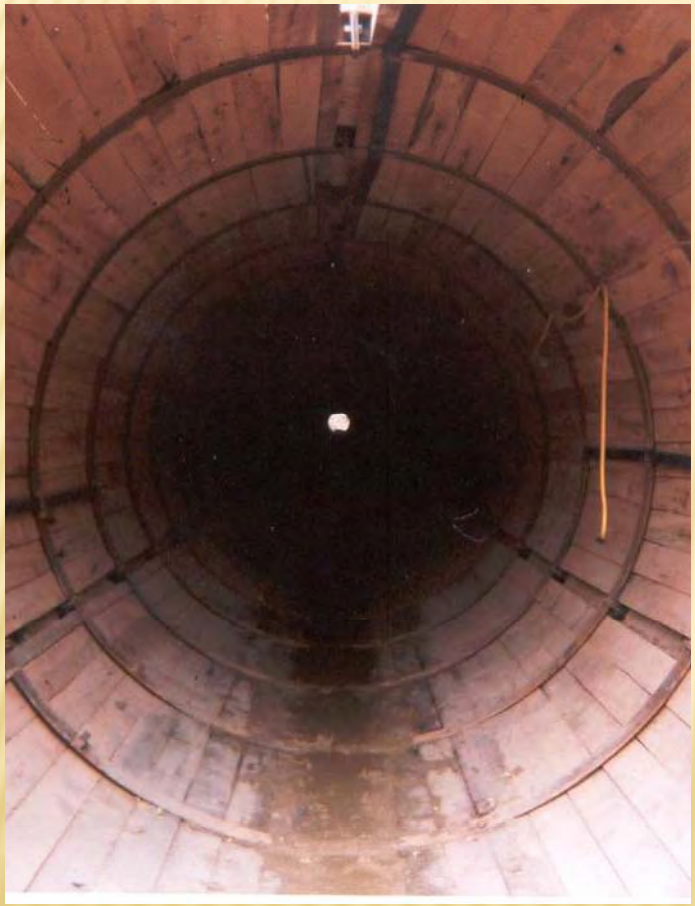
PIPE JACKING - TECHNIQUES

PIPE JACKING - TECHNIQUES

TWO-PASS TUNNELING

Two-Pass tunneling is the process of installing a primary liner prior to the insertion of the carrier pipe. This primary liner can be steel casing, tunnel liner plate (TLP), steel ribs with lagging, rick bolt or wood box. Two-Pass tunnels can be constructed per the hand tunneling method or machine.

TWO-PASS TUNNELING



Product	Any
Material	Liner Plate, Rib & Lagging, Segments, Rock Bolts, Wood Box
Size	60” to 500”+
Distance	20’ to 20,000’+
Ground	All: Dependant Upon Excavation Method
Cover	Dependant Upon Ground Conditions and Liner
Motivation	All

TWO-PASS TUNNELING

Under Main St & METRO Light Rail
Houston, TX

TWO-PASS TUNNELING

Under City Street adjacent to Pedernales River
Marble Falls, TX

TWO-PASS - TECHNIQUES

Hand Excavation

TWO-PASS - TECHNIQUES

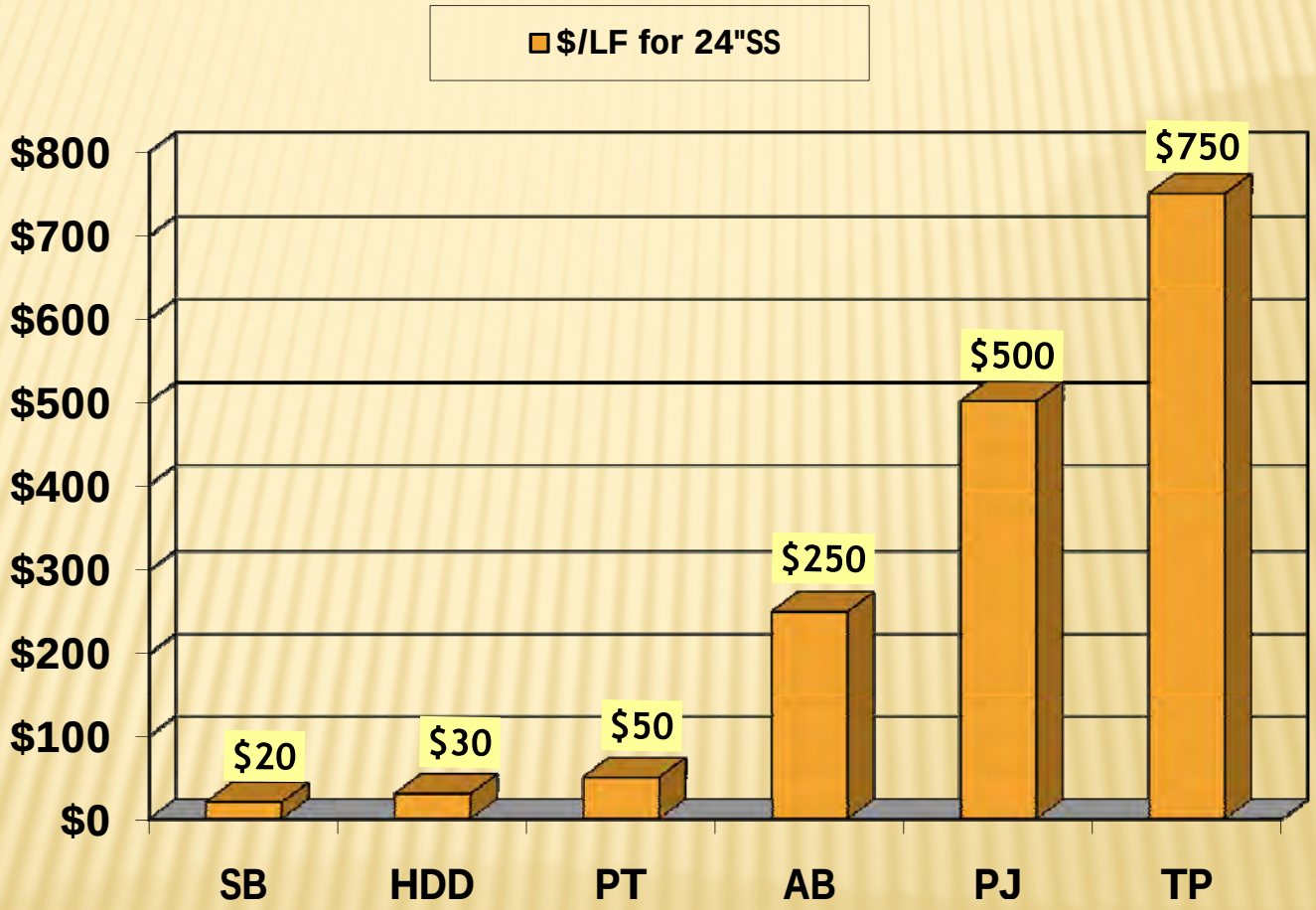
PRICING RULES

- Rule 1 – As the length of a trenchless technology crossing increases, the price per linear foot decreases.
  - The mobilization, setup and tear down, for the most part, is the same regardless of the crossing length.
- Rule 2 – The depth of a crossing is as important in determining price as the length.
  - The shaft size and depth, as well as the amount of cover are factored into the estimate.

PRICING RULES (CONT.)

- Rule 3 – The existing ground conditions play a major role in determining the price of a crossing.
  - Wet sand or rock are the most expensive conditions for boring and tunneling.

PRICING


$/LF for 24"SS
$800
$700
$600
$500
$400
$300
$200
$100
$0
$20
$30
$50
$250
$500
$750
SB
HDD
PT
AB
PJ
TP

STEEL CASING BASICS

Readily Available Sizes:

- 2” to 20” in 2” increments
- 20” & 24”
- 30” to 48” in 6” increments
- Above 48” in rolled and welded.

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Piping Material

Size

Distance

Ground Conditions

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