

Pipeline Construction Methods - a

▶ Pipe Assembly

- ▶ Welding Pipe – Comes in 40 to 60-Foot Lengths, Need to Connect
 - ▶ Manual, Mechanized, Certified Welders
- ▶ Field Coating – Factory Coated with Fusion Bonded Epoxy or Extruded Polyethylene - At Least Outside and Perhaps Inside
- ▶ Handling and Installing Pipe
 - ▶ Damage to Pipe, Welds and Coatings

▶ QA/QC

- ▶ Key to the Success and Long-Term Performance of the Pipeline
- ▶ Inspection, Testing

▶ Work Plans and Submittals Process

Coated Pipe Arrives at Site



From NCPR
(northcountrypublicradio.com)

Welding – Manual & Mechanized



From INGAA Foundation Report 2013.01



From Miller
(www.millerwelds.com)



From Gasprom
(www.gasprom.com)

Welding



From Pacific Connector Gas Pipeline
(www.pacificconnectorgp.com)



From Plymouth HDD (2004)



Field Coating Welds



From North American Oil and Gas Pipelines
(www.napipelines.com)

Pipeline Construction Methods - b

- ▶ Trenchless to Pass Under Areas with Less Disturbance
 - ▶ Pipe Jacking, Microtunneling, Horizontal Directional Drilling (HDD)
- ▶ Underwater Construction
 - ▶ Similar Methods as On Land Plus Plowing
 - ▶ Environmental Management of Underwater Construction Challenging
 - ▶ Ballasted to Prevent Floating, Scour Protection, Future Dredging

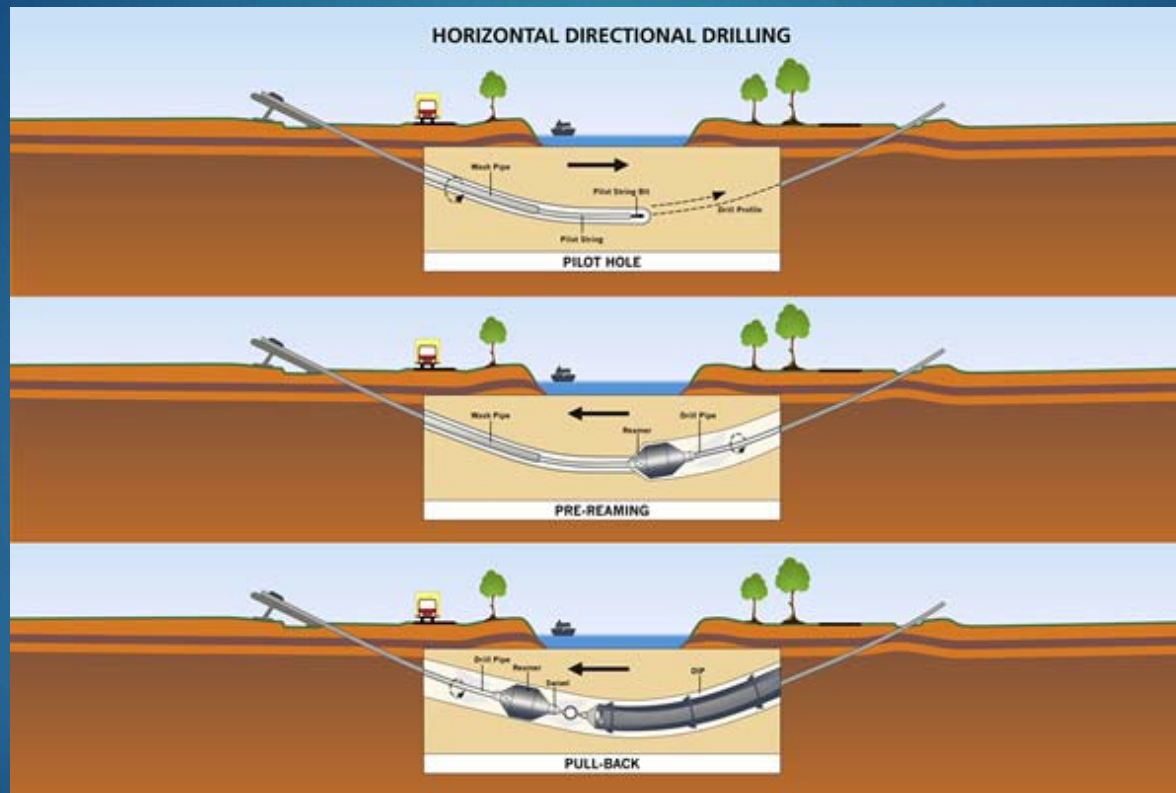
Microtunneling Machine - MTBM



MACHINE INTRODUCED TO JACKING PIT

From Herrenknecht
(www.herrenknecht.com)

Horizontal Directional Drilling (HDD)



From FirmGreen
(www.firmgreen.com)

Horizontal Directional Drilling (HDD)



From
www.pipeliners-uk.com



From Plymouth HDD (2004)

HDD Start of Pullback with Reamer Head



From alibaba.com

From
www.pipeliners-uk.com

HDD End of Pullback at Exit Pit



From Accurate HD
(www.accuratehd.com)



From Trenchless Technology
(trenchlessonline.com)

Pulling Pipe Through a Casing



From Kinnan Engineering, Inc.
(www.kinnanengineering.com)

Pipe Pulled into Casing Installed Via Trenchless Methods In Sensitive Area



From Kinnan Engineering, Inc.
(www.kinnanengineering.com)

Installing Pipe Underwater



From Nuova Ghizzoni S.p.A.
(www.ghizzonispa.com)

From Nuova Ghizzoni S.p.A.
(www.ghizzonispa.com)

Wetlands Construction Using Temporary Dams and Dewatering



From Burns McDonnell
(www.burnsmcd.com)

Pipeline Construction Methods - c



▶ Difficult Ground

▶ Very Hard Ground

- ▶ Blasting, Expansive Grouts, Mechanical Breaking, Mechanical Cutting

▶ Very Soft Ground

- ▶ Presupport, Ground Modification

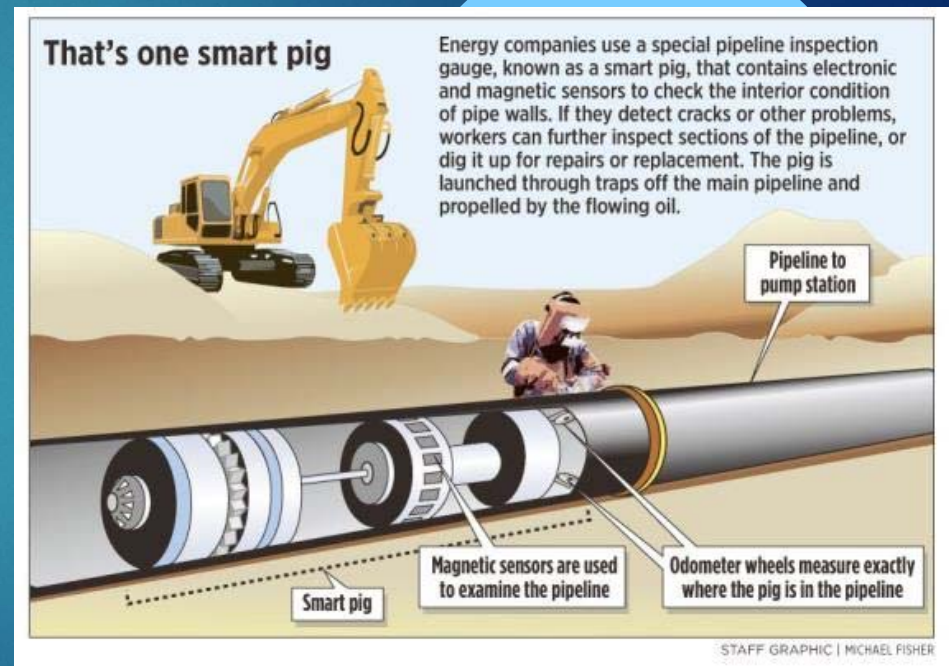
▶ Ground Water Inflows

▶ Unstable Ground – Slopes, Subsidence

Smart Pig to Inspect and Test Pipeline



From Pipeline101
(www.pipeline101.com)



From Portland Press Herald, posted March 31, 2013
(www.pressherald.com)

Potential Landowner Concerns



- ▶ Right of Way Limitations
 - ▶ How Close to Structures – Min. Dist. = 40 feet, or Class 4 Construction (220 CMR 109)
 - ▶ Vegetation – Pipeline Company Will Cut to Maintain Access.
 - ▶ Excavation - Restricted
 - ▶ Load Limits
- ▶ Leaking Gas
 - ▶ Health Effects – Primarily Methane
 - ▶ Diffusion Dissipates – Lighter than Air -Don't Want to Trap – Want Barriers to Migration Along Trench
 - ▶ Explosion Potential
- ▶ Noise, Dust and Emissions
 - ▶ During Construction
 - ▶ During Operation - Compressors