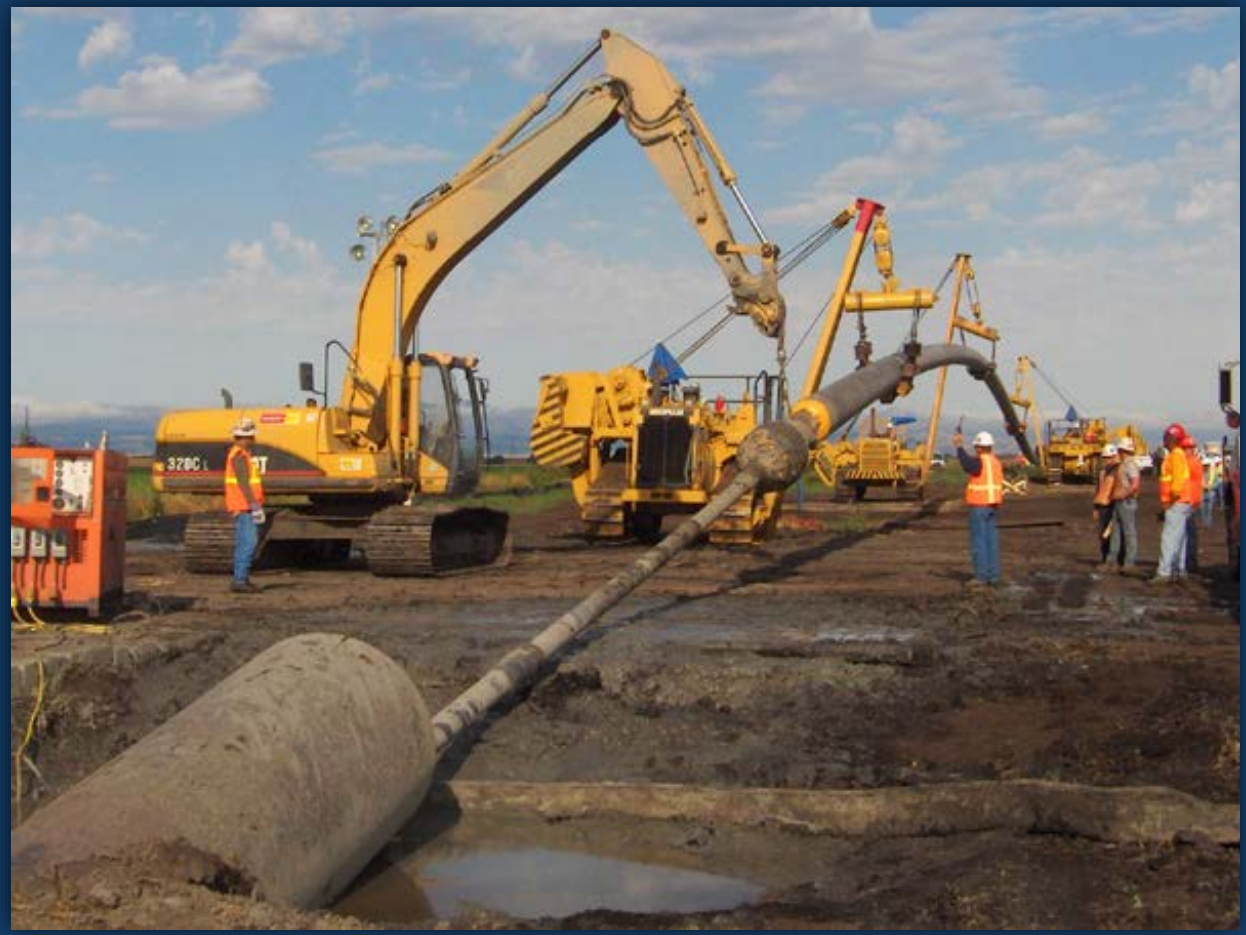
Provides Solutions for Next

Horizontal Directional Drilling

for Microduct Installation

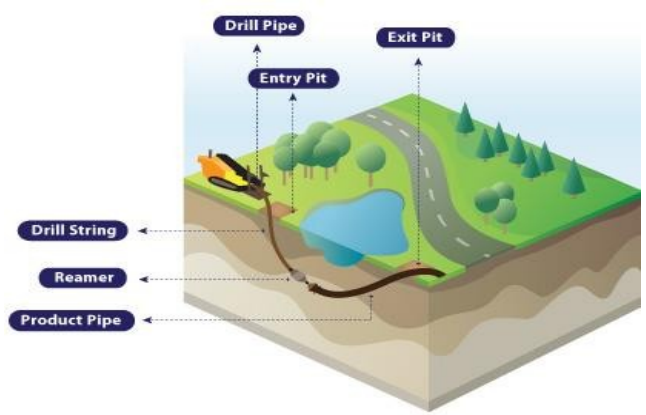


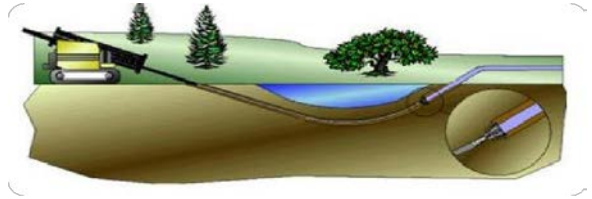
Contents

Overview

Definition

- Trenchless construction technology to install underground utility with minimal disruption of ground surface
- Direction adjustment using location sensor
- Up to 2,000m & 60” diameter PE pipe installable





Crossing River

Crossing Road

Advantage

FAST deployment

Able to running in LIMITED space

Reduce of time, space and COST.

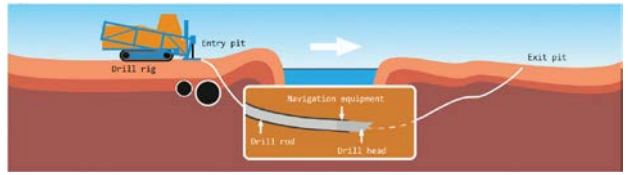
Designed for EASY to mobilize at congested area or traffic

General

Drilling process

Pilot drilling
Reaming
Pull back

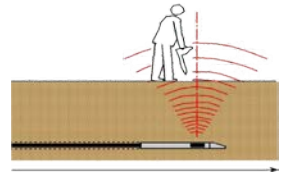
Pilot drilling



Drilling from entry to exit pit

Boring by drill bit rotation or rod pushing
At entry pit, rods supplied for sequential string connection
Boring mud is supplied through rod

Sensing & adjustment



Sensing of bit location :
RF signal & detector: wireless detection(battery driven)
Around 25m depth range(DigiTrak)
Magnetic: wired & precise method
Direction control
By bit angle or rotation

Drilling mud- Bentonite

Montmorillonite(Sodium)
Clay of volcanic ash: absorbent Aluminum phyllosilicate
5% mix with water: swell(x 15), lubricant & gel state
Function
Drill bit cooling & lubricant, borehole suspension, soil cutting removal etc.
Thixotropic: gel – sol change

General

Drilling process

Pilot drilling/Boring

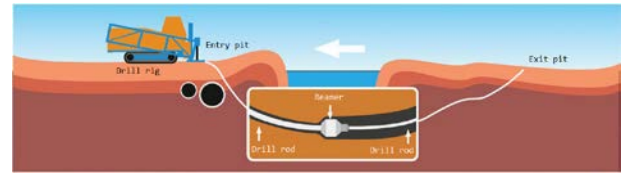
Reaming

Pull back

Reaming

Borehole diameter enlargement

To get enough diameter for pipe accommodation
120~150% bigger than utility pipe diameter
If necessary, more than one pass reaming is done



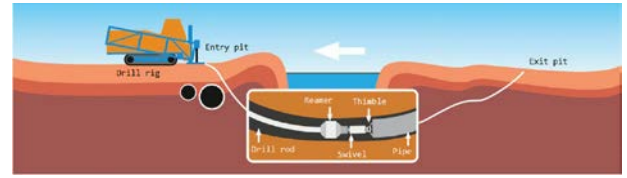
Reamer - Depending on application

Diameter and shape varies

Pipe pulling & install

Installation of pipe

Swivel, thimble & fuse are required for proper pulling
At entry, each drill rod is removed after pulling
Control of tensile load & deformation is important



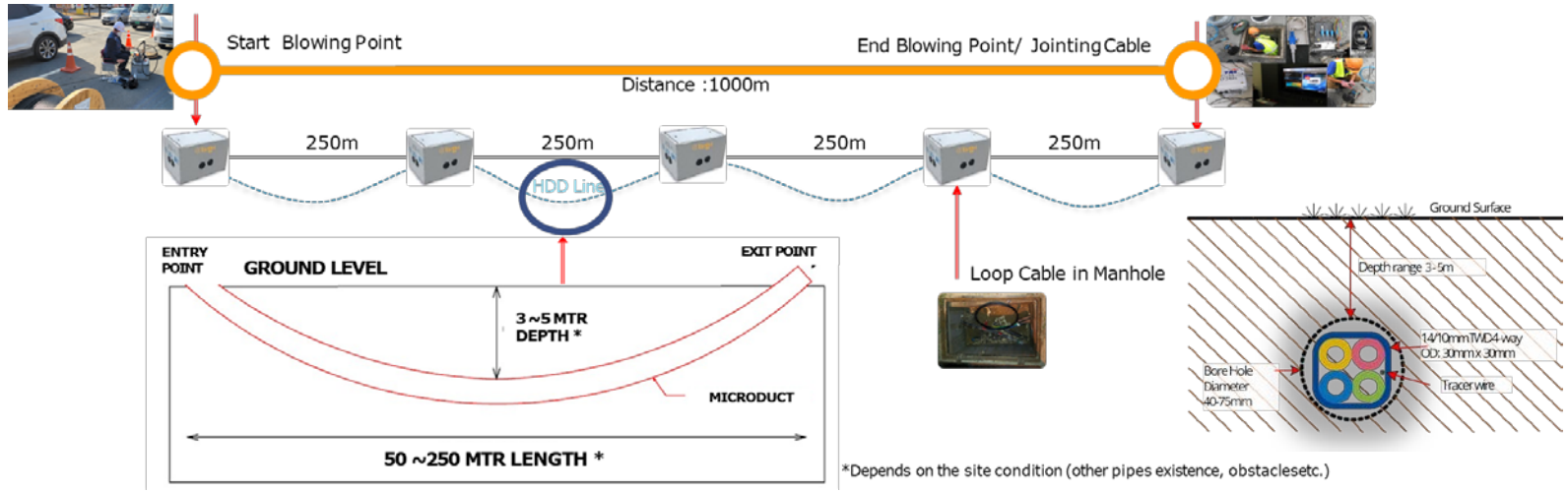
Pulling

More than one pipe can be pulled at a time
Excess length needed for shrinkage due to axial tensile elongation & thermal stabilization
At exit pit location, butt fusion is done

Microduct
HDD Installation

HDD Cross Sectional Drawing Sample (Microduct Installation)

Microduct type - Direct Buried Duct or Double Sheath Duct
Up to 3 ~5 meter depth range / 100~ 250m Bore length / 40~75 mm Bore Diameter
Ground Dive Speed : 3.5 mph (93meter/min)



Drilling Process

Pilot drilling/Boring
Reaming (No need for microduct installation)
Pull back

Microduct Recommendation

Double Sheath Duct - Developed for HDD

Knet's Double Sheath Multi Duct is designed with double layers of outer sheath applied to thick walled tube to maximize the prevention of duct damage during HDD Installation or Pulling.

Double sheath double protection
Prevention from excessive abrasion while installing the duct
Crush and impact resistance
Solution specialized in Horizontal Directional Drilling and Open Cut
Applicable in harsh environment

14/10mm 7way

Unwelcomed method of trenching was driving the customer to chose HDD in Philippines. Trenchless drilling requires the microduct withstanding pullback loads, external service loads and 14/10mm 7way with Double Sheath Multi duct were the right choice for this installation requirement

14/10mm 4way

This product were used for river crossing with HDD. Two layer of sheath meets the hydraulic requirement. Average 5000ft (1.5Km) were installed under the river at one time

Direct Buried Duct

TWD (Thick Walled Duct) or DBHS (Direct Buried High Strengh)

T W D

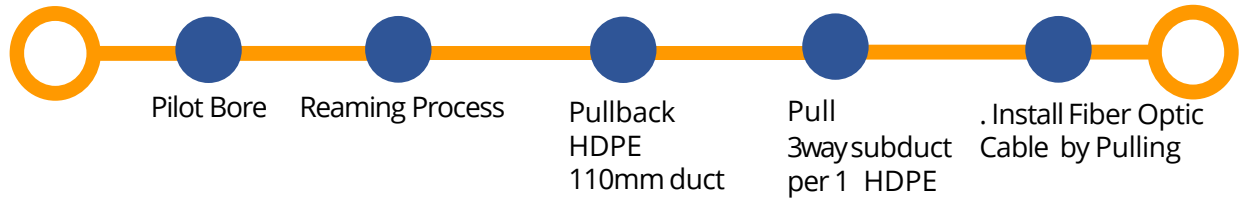
D B H S

Comparison

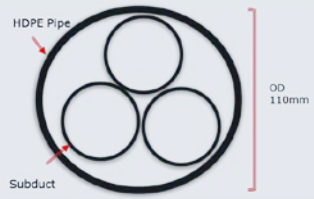
Conventional Duct
VS
Microduct

Installation Scenario for 216 fiber capacity

Conventional Duct



Microduct

	CONVENTIONAL DUCT	MICRODUCT
Duct Type		
Formation of Duct	1 x110mm HDPE Pipe +3 innerduct	1 x4way microduct 14/10mm
Outer Diameter Size	HDPE Duct: 110mm Subduct:32mm	Microduct 33mm Subduct :14mm
Total Subduct	3 subduct	1 Duct
Type of Cable Used	Conventional Fiber Optic Cable 72coreOuter Diameter :14mm	Air Blown Cable 72core Outer Diameter :6.0mm
Total Cable	72core x3subduct =216core	72core x3subduct=216core + 1 subduct for future proof

4way Double Sheath Microduct
- Using 3 duct to cover 216core and even save 1 tube for future usage which total capacity becomes 288 core

72 Core Micro cable (6.0mm)

Air Blowing Installation

Benefit

HDD of Microduct

Benefit of HDD Method

5. Long and complicated crossings can be accomplished with a great degree of accuracy
4. Can make deep installations and avoid surface obstacles such as rivers, railways, or highways
3. Requires a relatively short set up time
2. Less invasive than the traditional open cut
1. Surface disruption is minimized

Benefit of Using Microduct

1) Minimizing the costs
- ✓ Initial costing : one time charge for civil works
- ✓ Long term costing : reduce cost for upgrading

2) Future-proofing
- ✓ Future expansion of subscription can be installed immediately
- ✓ Easy to change and upgrade to latest technology / fiber types

3) Minimize number of splicing points
- ✓ Splicing cable only done after ~1.5km

4) Quick and smooth installation of duct and cable
- ✓ Reducing the risk of cable damaged
- ✓ Increasing installation distance of cable blowing

5) Less use of manpower
- ✓ Small equipment and tools, easy to install

Reference & Useful Videos

- Chapter 12 Horizontal Directional Drilling, The Plastics Pipe Institute Handbook of Polyethylene Pipe 2nd edition, PPI
- Horizontal Directional Drilling, Brochure of MEC, 2012

Video clips

horizontal directional drilling (HDD) demo video

Horizontal directional drilling (how it works)

Prime Drilling - Horizontal directional Drilling explained

Horizontal Directional Drilling (HDD): How the Drill Bit is Steered

Further reading

Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe, TR-46, PPI, 2009

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