

Pilot Tube Guided Boring New Sanitary Sewer Install in Milwaukee, WI



TRACK V: Utility Construction Developments

DATE: Tuesday, Feb. 7

TIME: 9:30-9:55 am

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UNDERGROUND CONSTRUCTION TECHNOLOGY

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Pilot Tube Guided Boring Method

What is it?

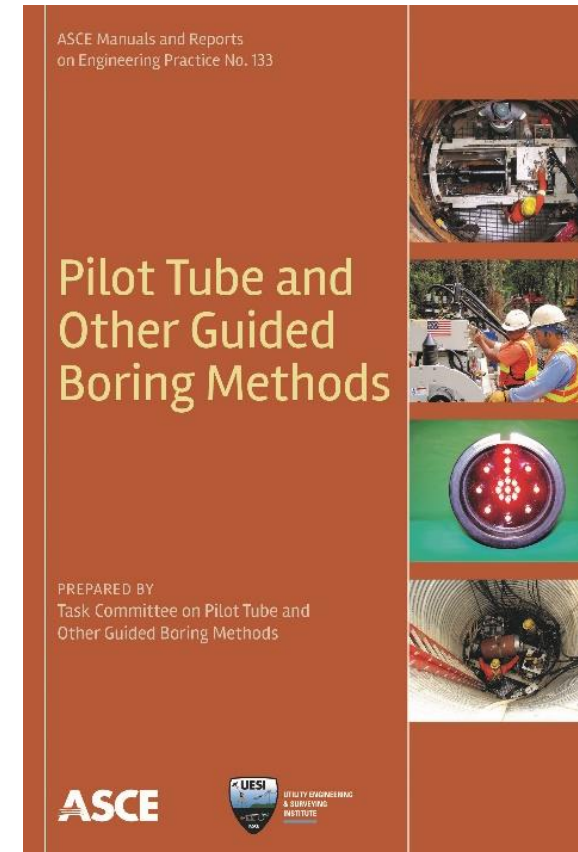
- New Pipeline Installation Method (Guided)
- Diameters: 4-48 in. (102-1,220 mm) OD
- Most common sizes are 8"-24"
- Quick Setup
- Small Footprint
- Versatile



Pilot Tube Terminology

- Pilot Tube Microtunneling (PTMT)
- Guided Boring Method (GBM)
- Guided Auger Boring (GAB)
- Pilot Tube Method (PTM)

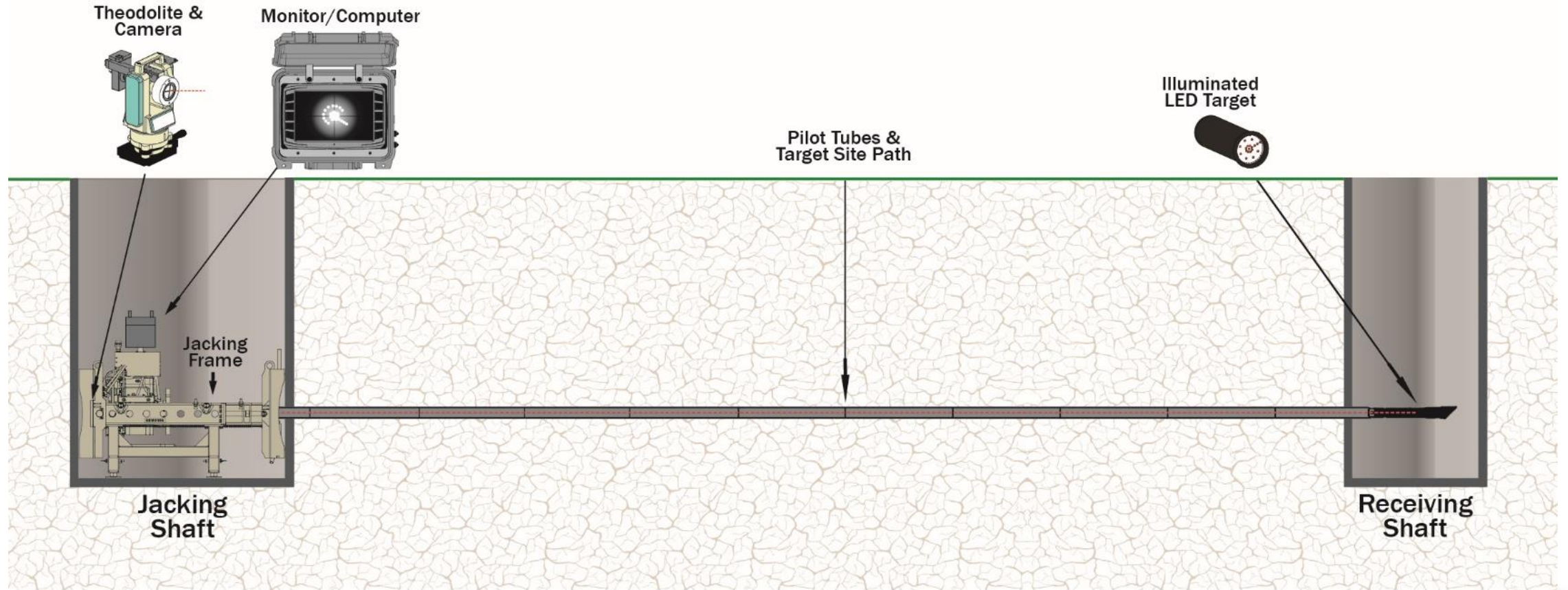
ASCE MOP No. 133



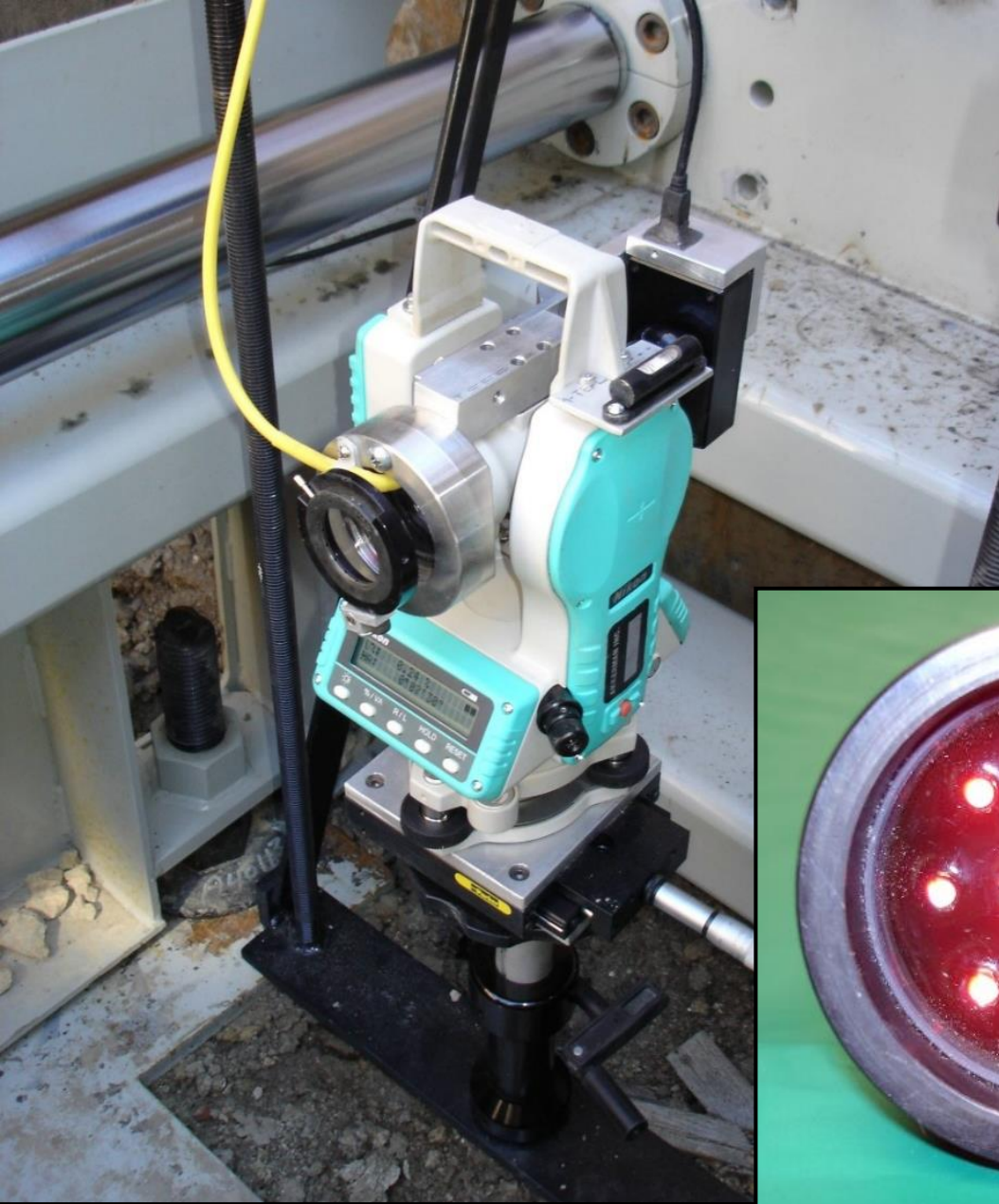
PTM/ GBM Accuracy

- The Pilot Tube Method is the most accurate “State of the Art” “Rifle Barrel Straight” form of small diameter tunneling available with a specified accuracy of:
 - **¼ inch per 500 linear feet**

Pilot Tube Method (MOP 133) – Step 1 Of 3



PTM Guidance System

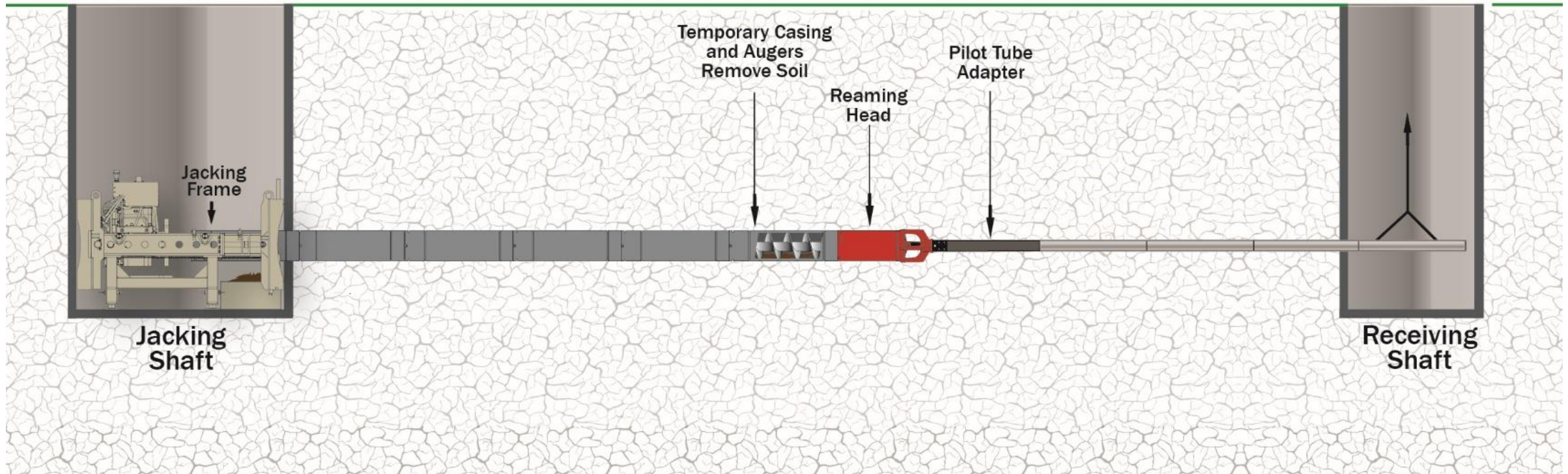


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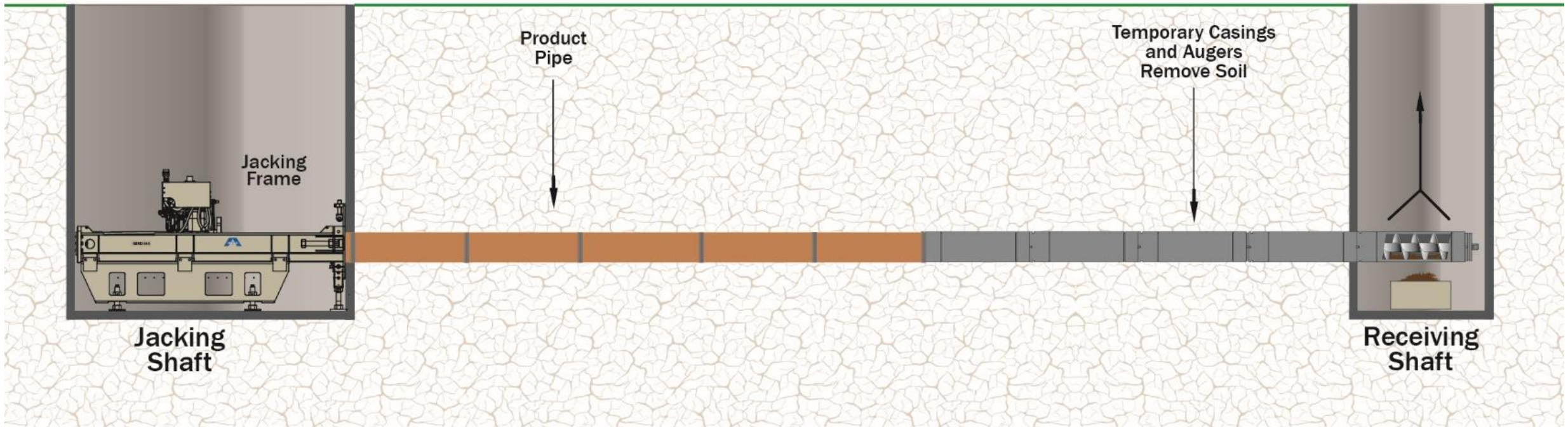
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Pilot Tube Method (MOP 133) – Step 2 Of 3



Pilot Tube Method (MOP 133) – Step 3 Of 3



Applicability Of Method For Identified Geotechnical Conditions

Source: ASCE MOP No. 133: Table 4.2

SPT N-Value	Geotechnical Condition	Applicability (by method)	
		Displacement	Non-displacement
0-1*	Very soft clays, silt, and organic deposits	Marginal ¹	Marginal ¹
2-4	Soft clays, silt, and organic deposits or very loose sands	Yes	Yes
5-10	Medium stiff clays and silts or loose sands	Yes	Yes
11-30	Stiff to very stiff clays and silts or medium dense sands	Yes	Yes
11-30	Soil with gravels (1 to 3 inches)	Yes ⁵	Yes ⁵
11-30	Soils with occasional cobbles (3 to 12 inches), boulders (> 12 inches)	Marginal ²	Marginal ²
11-30	Soils with significant cobbles, boulders, and obstructions larger than 4 inches	No	No
31-50	Hard clays or dense sands	Marginal ³	Possible ⁴
>50	Very dense sands or weak weathered rock	No	Possible ⁴
>50	Weathered rocks, marls, chalks, and firmly cemented soils	No	Possible ⁴
>50	Significantly weathered to unweathered rocks	No	Possible ⁴



Case Study: 21" Pilot Tube Guided Boring Project

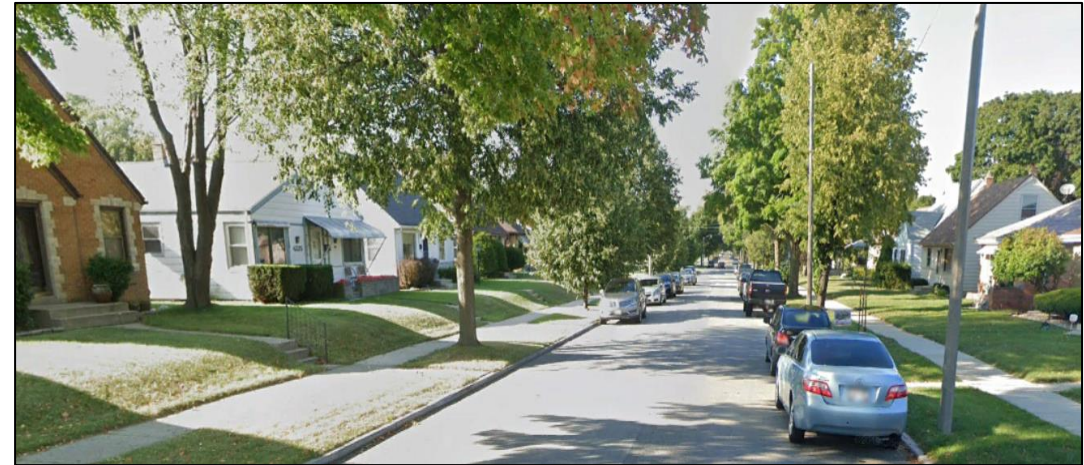
- **Owner:** City of Milwaukee
- **Project Name:** Notice 27-2022 New Sanitary Sewer and Sanitary Relay
- **Location:** Capital Heights (Neighborhood in Milwaukee)
- **Engineer:** Clark Dietz, Inc.; WI
- **Contractor:** Globe Contractors, Inc. / Bore Master, Inc.
- **Project Start:** April 2022
- **Actual Completion Date:** July 2022

ON TIME & UNDER BUDGET!



Project Overview

- **Project Purpose:** Eliminate problematic sewer shed from large rainfall events.
- **Scope:** Install ~1,900 lf of 21" VCP Overflow SAN Sewer
- **Method of Choice:** Pilot Tube Method (PTM)
- **Sewer Depths:** 15' to 26' Deep
- **Pipe:** NO-DIG 21" Vitrified Clay Pipe



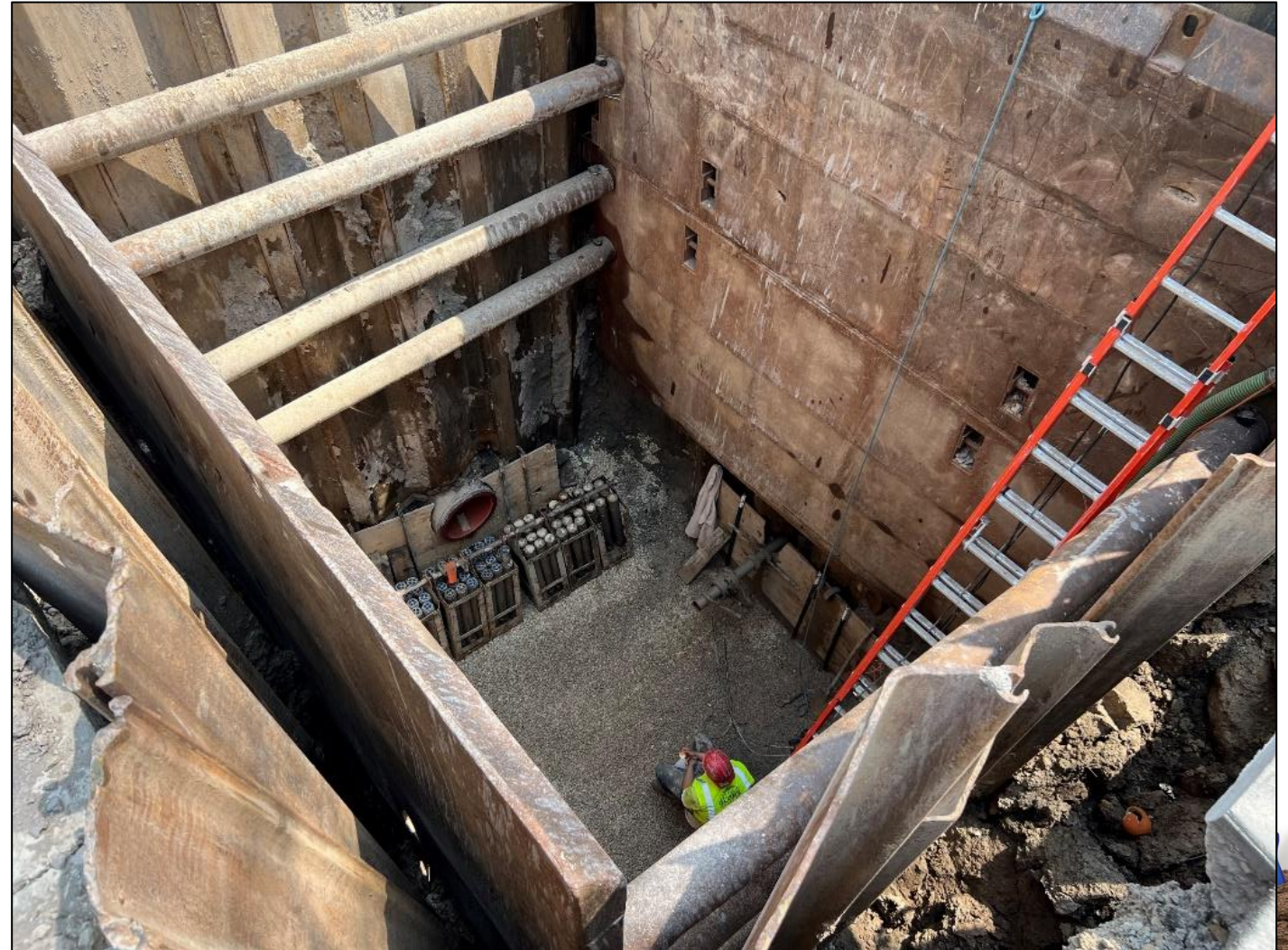
PTM Drive Lengths



- Drive #1: 445 lf
- Drive #2: 230 lf
- Drive #3: 270 lf
- Drive #4: 375 lf
- Drive #5: 270 lf
- Drive #6: 385 lf

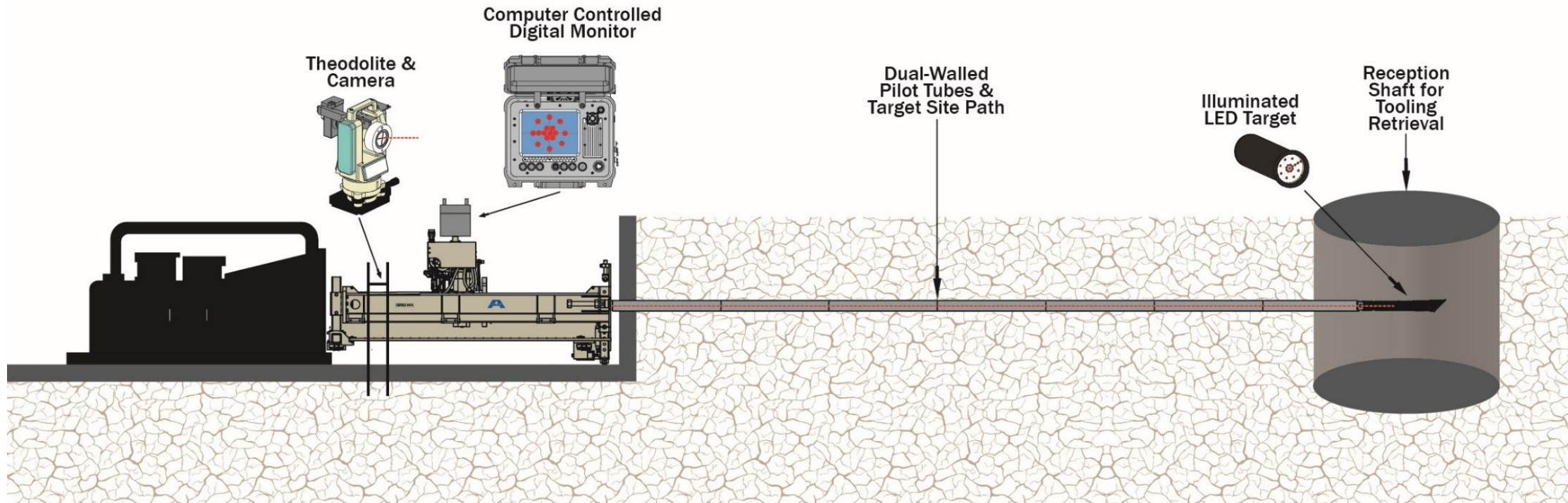


Jacking & Receiving Pit Designs



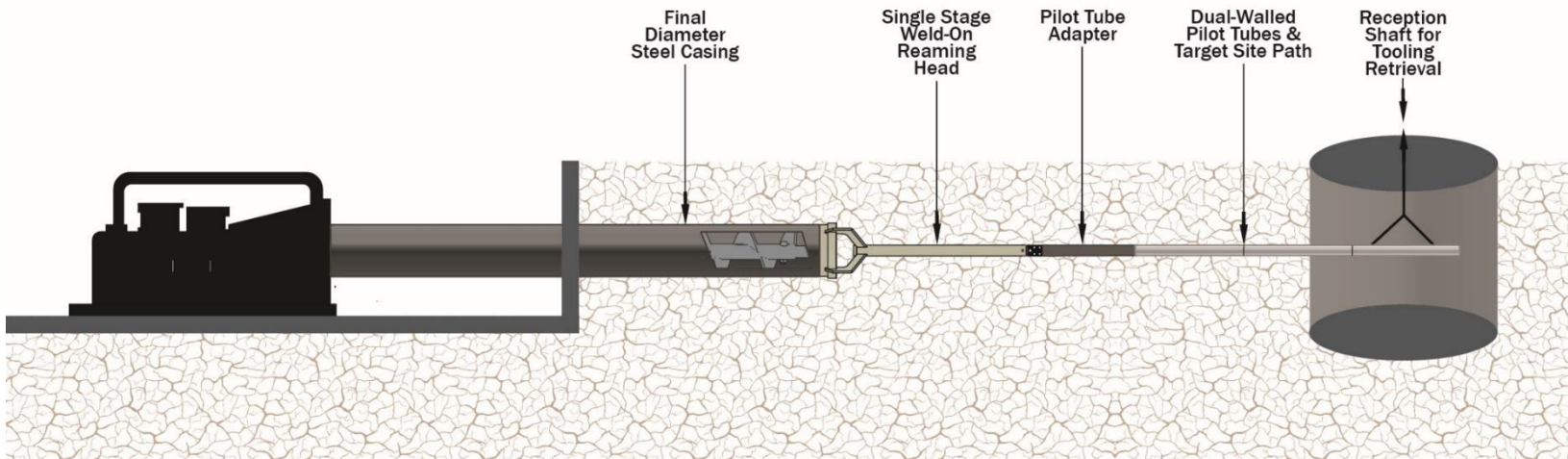
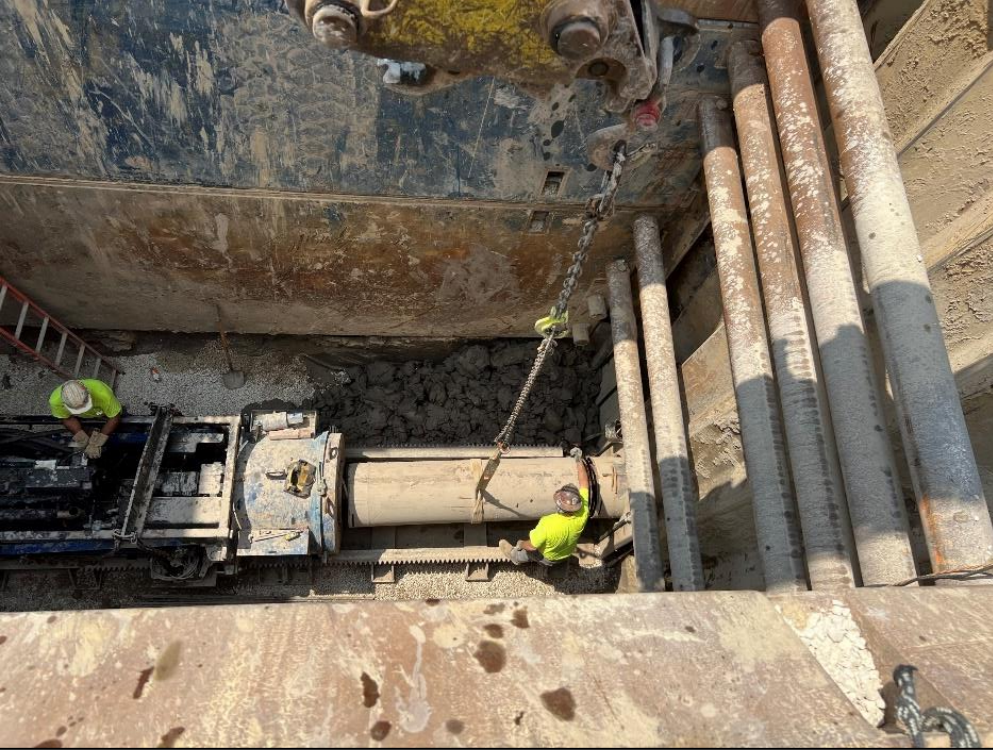
PTM – Step #1 Of 3

- Akkerman 240A System Utilized
- Standard 45deg. Steering Head



PTM – Step #2 Of 3

- 36-600
- WORH
- THRUST CASINGS



PTM – Step #3 Of 3



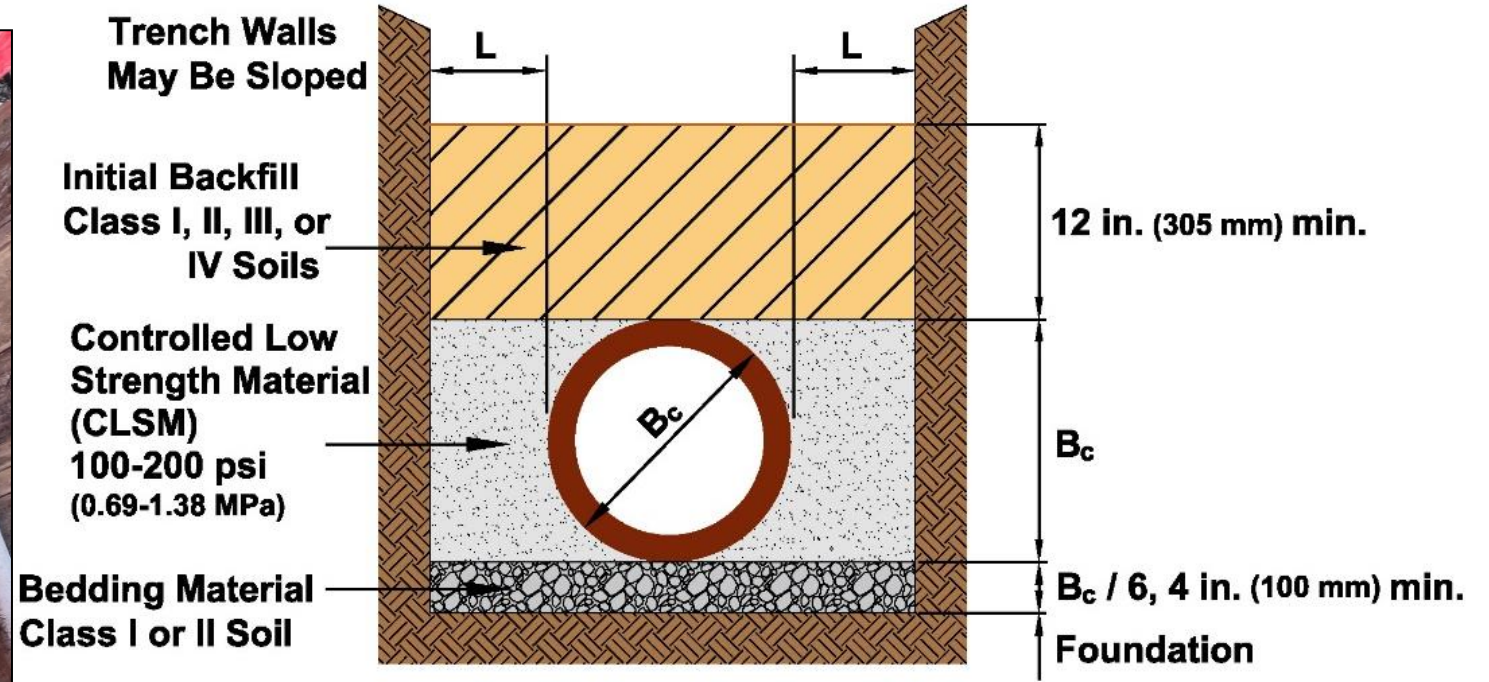
Pipe Adaptor- Casing to Jacking Pipe



PTM – Step #3 Of 3



MH Install / Shaft B' Fill



$L = 9$ in. (229 mm) min. For Pipe Dia. 8-21 in.
 $L = 12$ in. (305 mm) min. For Pipe Dia. 24 in. and Greater

Controlled Low Strength Material (CLSM) Bedding - Load Factor = 2.8

Shaft B' Fill Placement



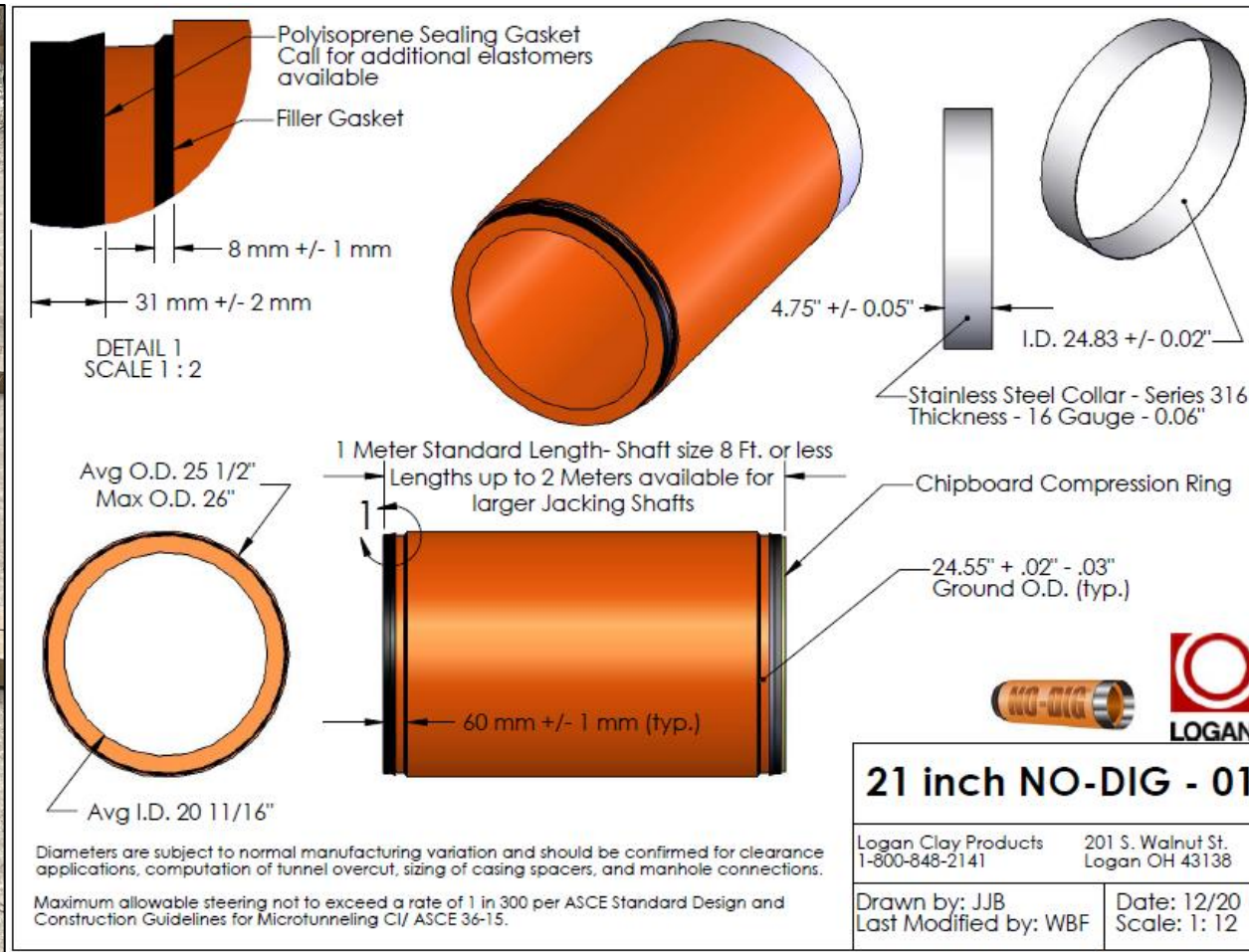
Production

- Production Rate (See below example for 400 lf run):
 - Setup / Install Pilot Tube: ~200 lf / day (2 Days)
 - 25" Casings: ~160 lf / day (2.5 Days)
 - 21" VCP: ~400 lf / day (1.5 Days)
- Overall Avg: ~60 lf / day

Activity Name	PTM WEEKS							
	1	2	3	4	5	6	7	8
Manual Entry	4/18	4/25	5/2	5/9	5/16	5/23	5/30	6/6
Pilot Tube Microtunnel								
Install 21" Jacked VCP (~410') - Between Pit #1 & #2	B	C						
Install 21" Jacked VCP (~240') - Between Pit #2 & #3			C					
Install 21" Jacked VCP (~255') - Between Pit #3 & 4				C				
Install 21" Jacked VCP (~365') - Between Pit #4 & #5				B	C			
Install 21" Jacked VCP (~260') - Between Pit #5 & #6						C		
Install 21" Jacked VCP (~375') - Between Pit #6 & #7							B	C



21-inch NO-DIG VCP



Joint Assembly in Jacking Frame





NATIONAL CLAY PIPE INSTITUTE
The VCP Authority Since 1917



City of Milwaukee

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