Pipe Bursting
Case Study at Zeeland, MI
Collections Seminar – September 6, 2012
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Engineering Clean Water

Presentation Agenda
What is Pipe Bursting?
History of Pipe Bursting
Types of Pipe Bursting
Pipe Materials and Sizes
Advantages and Disadvantages
Planning and Design Considerations
Zeeland, MI Pipe Bursting

What is Pipe Bursting?
Replacement method involving bursting the existing pipe through brittle fracture and pulling a new pipe of the same or larger size through the old fractured pipe from within.

History of Pipe Bursting
Bursting developed in the UK in late 1970’s
Method for replacement of small diameter cast iron gas mains
By 1985, used to install 16” diameter piping
Now linear footage of burst pipe increasing by 20% per year, majority of this is sewers

Types of Pipe Bursting
Static Bursting Systems
Pneumatic Bursting Systems
Hydraulic Bursting Systems
Tenbusch Insertion Method
Pipe Splitting Method
Types of Pipe Bursting

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Types of Pipe Bursting Heads

Standard Cone Shaped Head

Pneumatic Head
Types of Pipe Bursting Heads

Expanding Cone Head

Types of Pipe Bursting Heads

Splitting Head
(cutting wheel or knives)

Selection of Method

Type of Existing Pipe
Type of Soils
Type of New Pipe

TABLE 2.1 from ASCE MOP 112

Discuss with Contractors

Types of Materials and Size

What types of pipe materials can be burst?
CI, DI, VCP, AC, RCP, PVC, HDPE, Copper, etc.

What types of pipe materials can be installed?
HDPE, PVC, DI, VCP, RCP

What are the minimum and maximum sizes that can be burst?
Pipe bursting has been successfully completed on 4"-36" piping.

How large can you make the new pipe?
New pipe can be upsized 2-3 sizes depending on soil conditions, new pipe material, and depth.

Advantages

No trenching involved means minimal disruption of existing infrastructure.
Pipe size can be increased along the same route.
Can be more cost effective given project conditions.
Faster installation than open cut, especially for deep pipe.
Minimal dewatering necessary in wet conditions.
Minimizes social costs such as traffic diversions, etc.

Disadvantages

Must dig up lateral locations
Cannot change slope of line
Bypass Pumping is usually necessary
Cannot burst through valves
Repair sleeves or encasements may be difficult or impossible to burst
If HDPE or welded PVC is pulled through, need room for long run of pipe
If heaving occurs, may need some surface restoration
Planning and Design Considerations

Soil Types and Conditions and Groundwater Depths
Existing Pipe Material and New Pipe Material
Surface Heaving
Utility Locations and Connection Points
Televise Existing Pipeline
Pit Locations and Pipe Layout Locations
Cost Considerations (including Social)

City of Zeeland Case Study

Background:
Business Growth Created Need for Increased Pipe Size, Larger Pump station

Project:
Increase 700 LFt of VC gravity sewer from 8” to 12” by pipe burst
Increase pump station capacity
Increase forcemain size from 6” to 10” by open cut

Why Choose Pipe Bursting?

Utilities over the existing deep sewer pipe
- Water
- Electrical (4)
- Storm Sewer
- Gas
- Sidewalk
- Parking Lots
- Storm Pond
- Fiber Optic Cable

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Why Choose Pipe Bursting?

Pipe type conditions were favorable
Deep pipe would have had large dewatering costs
Minimal laterals to connect
Distance (700 ft) favorable for single pull
Directly outside of business parking lot
Prevent Dewatering of Decorative Stormwater Pond
Surface heave not a problem in this case

Existing Utilities and High Groundwater Levels
Excavating the Pulling Pit

Bypass Pumping & Gentex Temp Drive

Placing Whalers At Pulling Pit

Placing Thrust Blocks at Whalers

Placing Hydraulic Pulling Skid

Hydraulic Pulling Skid in Place

Capacity = 300 ton
Hydraulic Unit for Pulling Skid

Connecting Pulling Rods

Pushing the Pulling Rods Through the Existing Piping

Excavating Manhole at Insertion Pit

Layout of Long HDPE Pipe Run, DIPS, DR17

Pulling Head w/ Expander
Pulling Shaft w/ Attachment Clevis

Attaching Pulling Shaft to Expander Head

Larger Pipe being pulled into existing “burst” pipe

Backhoe in Place to Bend New Pipe to Horizontal Entrance

Pulling Shaft Through Existing Pipe

Removing Shafts as Pulling Occurs
Pipe Has Been Pulled Through

Cutting End of Pipe and Prep for Electrofusion

Electrofuse Pipe at Insertion Pit

Top of Pipe Cut in “Pass-Through” Manhole

Cutting off Bursting Head at Pulling Pit

Prep for Electrofuse of Piping from New Manhole in Pulling Pit
New Manhole at Pulling Pit Connected

New Manhole at Pulling Pit

Cutting in Laterals and Electrofusing
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