



educational sessions

THE TOTAL SOURCE



# Design Considerations and Benefits of Pipe Bursting

Presented by the Leadership of the IPBA – A Division of NASSCO

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Regional Manager, TT Technologies, Inc.



# WHAT IS PIPE BURSTING?



- **trenchless rehabilitation & replacement technology - staying in the existing pipe and utility corridor**
- **fracture or split existing pipe while simultaneously installing a new “factory manufactured “pipe**
- **replace aging, deteriorating, and capacity deficient mainline and lateral systems w/ same size or larger diameter pipes**
- **4 inches to over 36 inches in diameter**



# TWO MAIN TYPES OR CLASSES OF PIPE BURSTING SYSTEMS

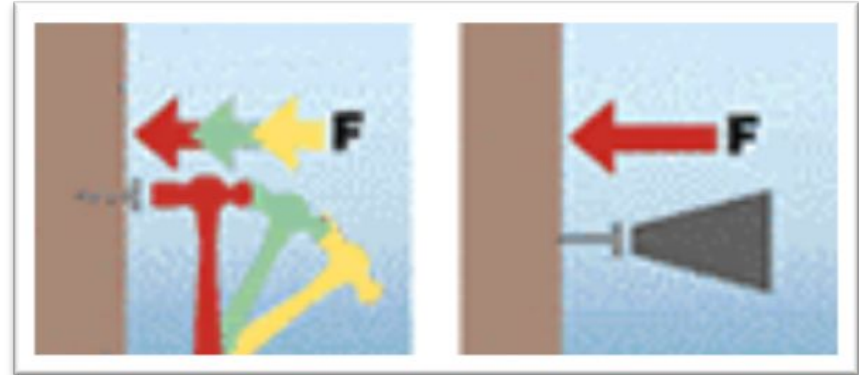
- Pneumatic Systems



- Static Systems



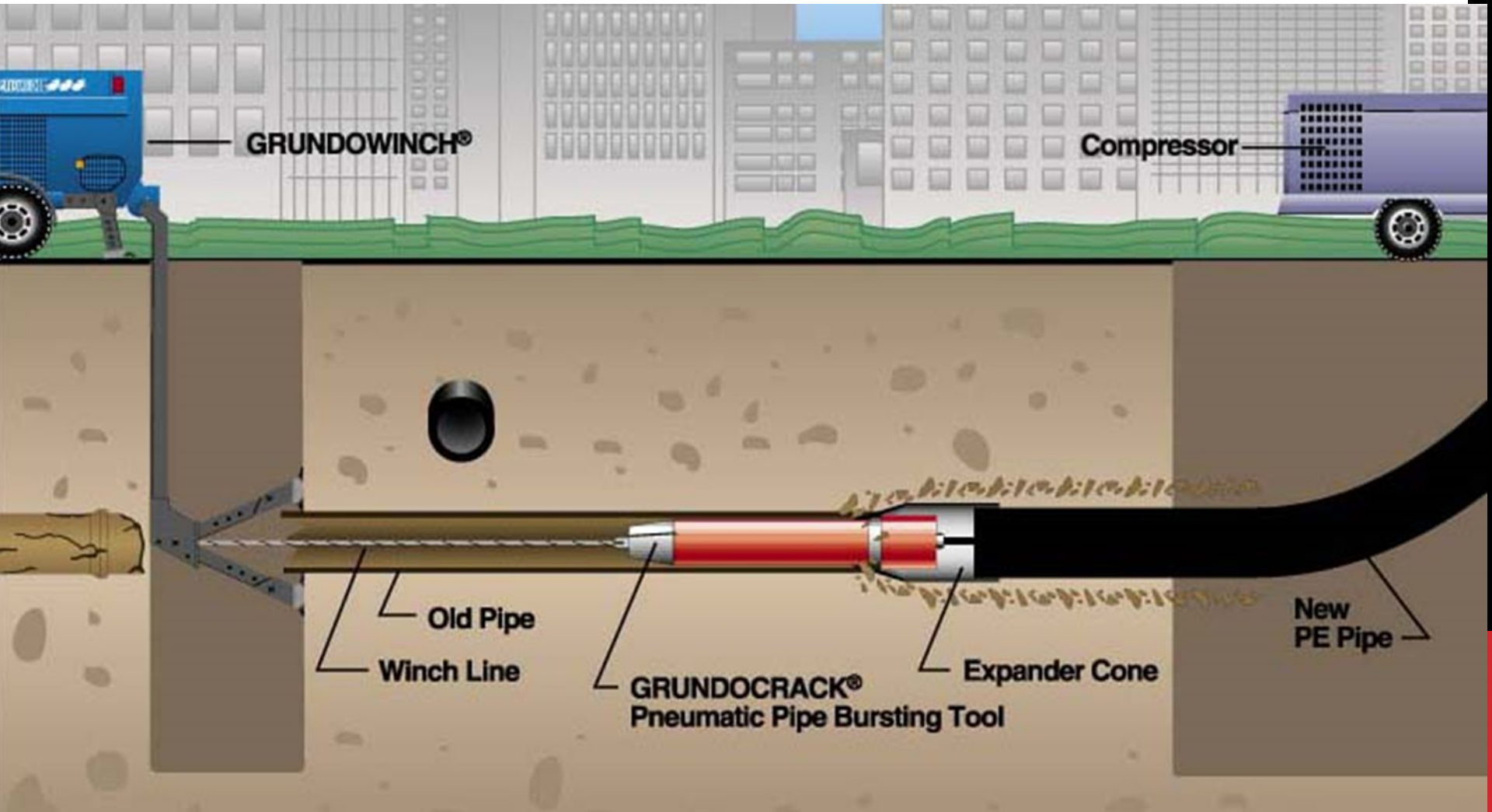
# PNEUMATIC PIPE BURSTING SYSTEM



- **Pneumatic Hammer**
- **Air compressor**
- **Winch**
- **Specialized accessories to meet conditions**
- **Most widely used in sewer systems**



# PNEUMATIC PIPE BURSTING SYSTEM

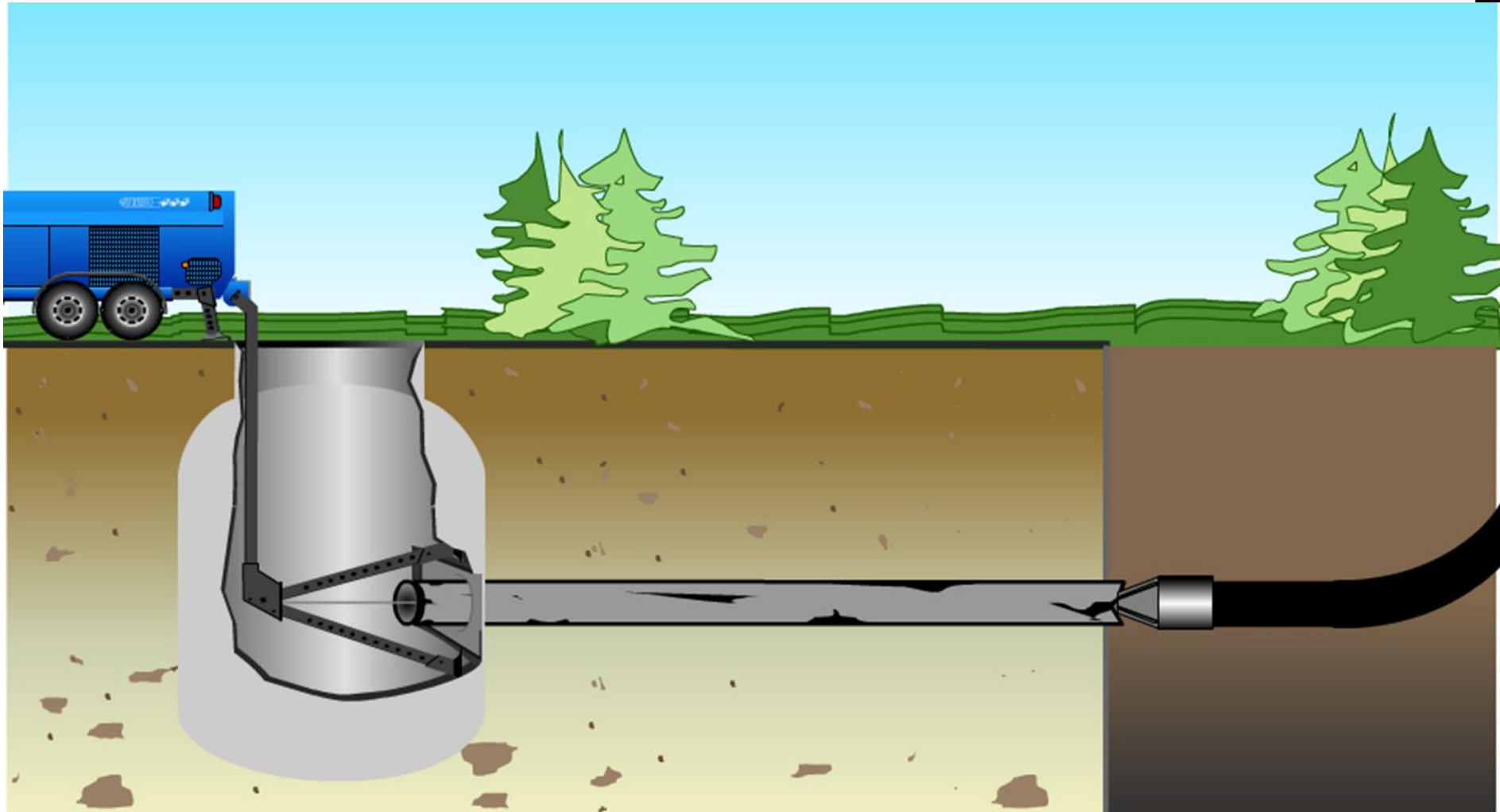




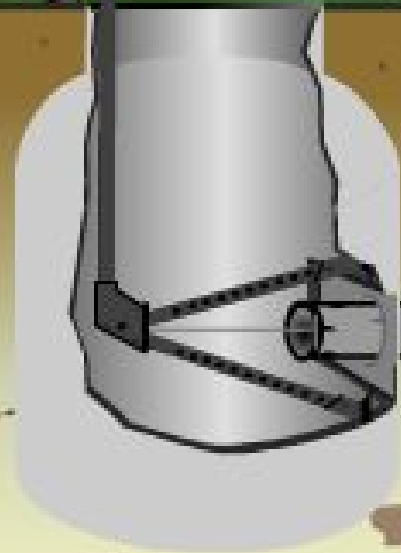




# REVERSIBLE PNEUMATIC SYSTEMS



GRUNDOWINCH®

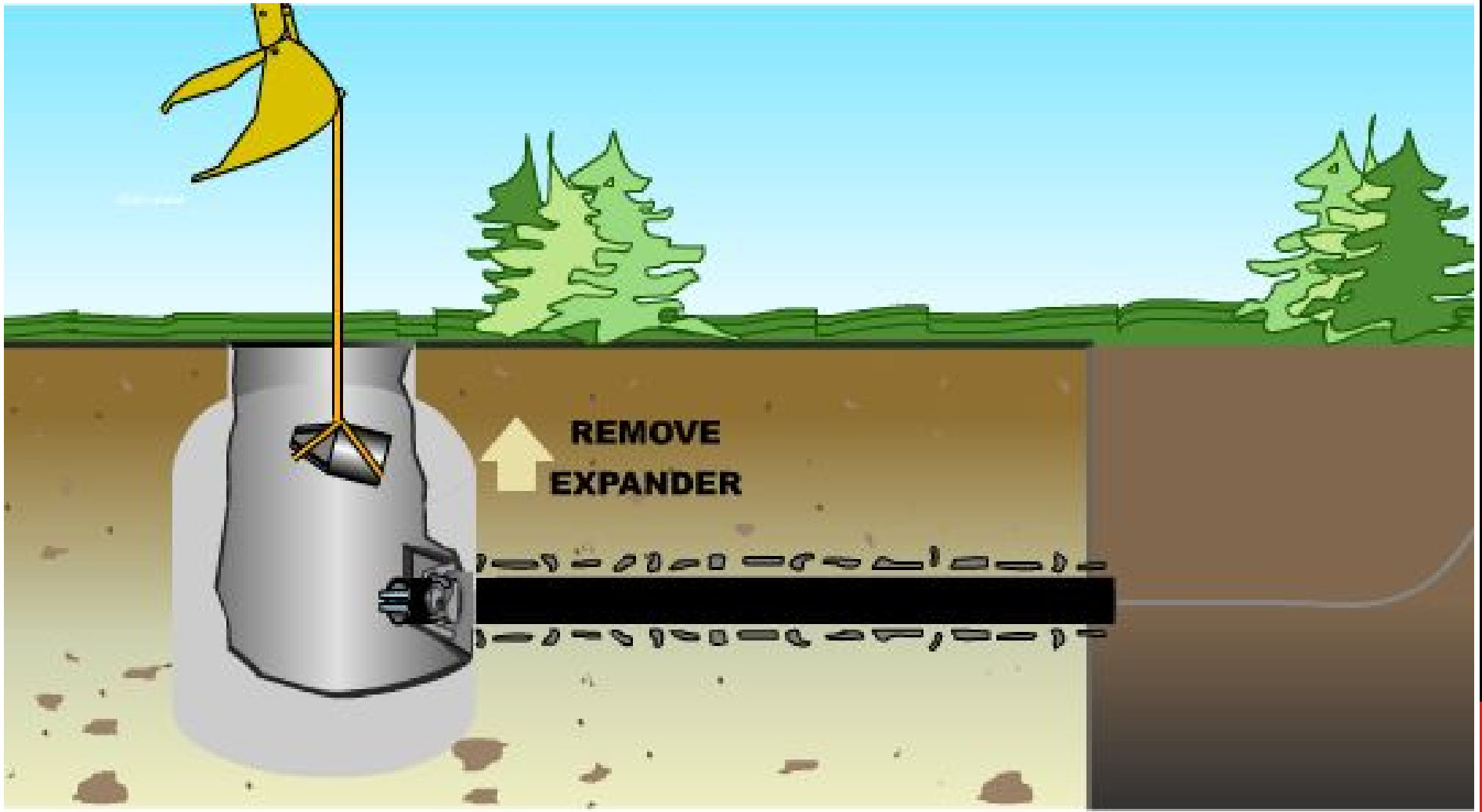


Front Expander  
Threaded  
w/New Pipe

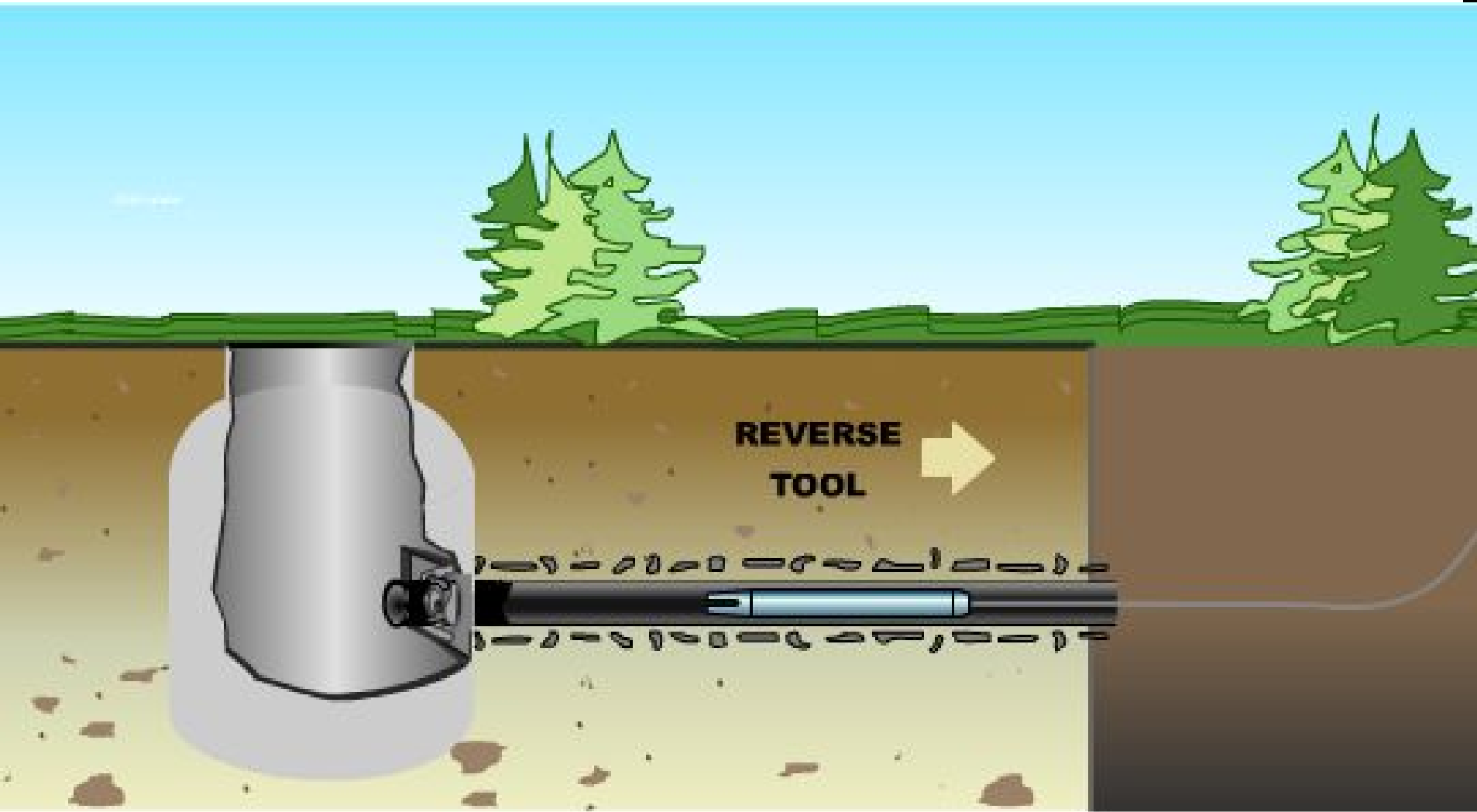


OLD PIPE















# **CAPABILITIES:**

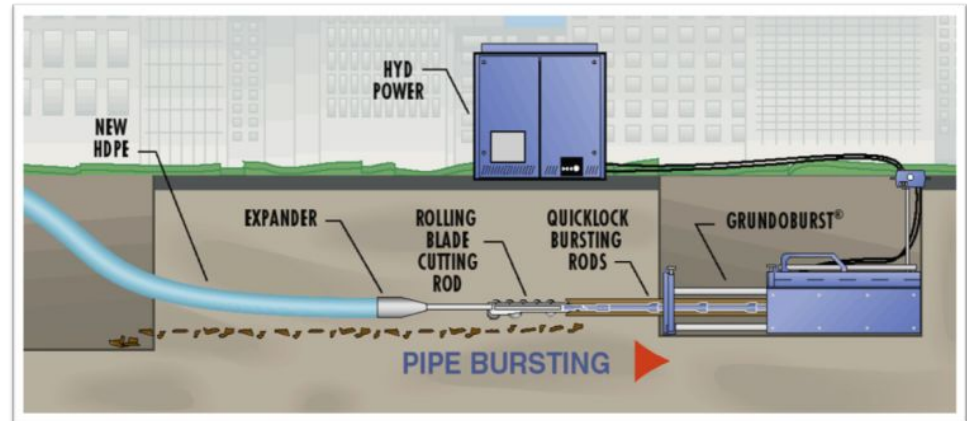
## **PNEUMATIC SYSTEMS**

- **Pipe Burst Existing Fracturable pipes only  
(VCP, Concrete, Cast Iron, PVC and Asbestos  
Cement “Transite”)**
- **New Pipe - HDPE only**



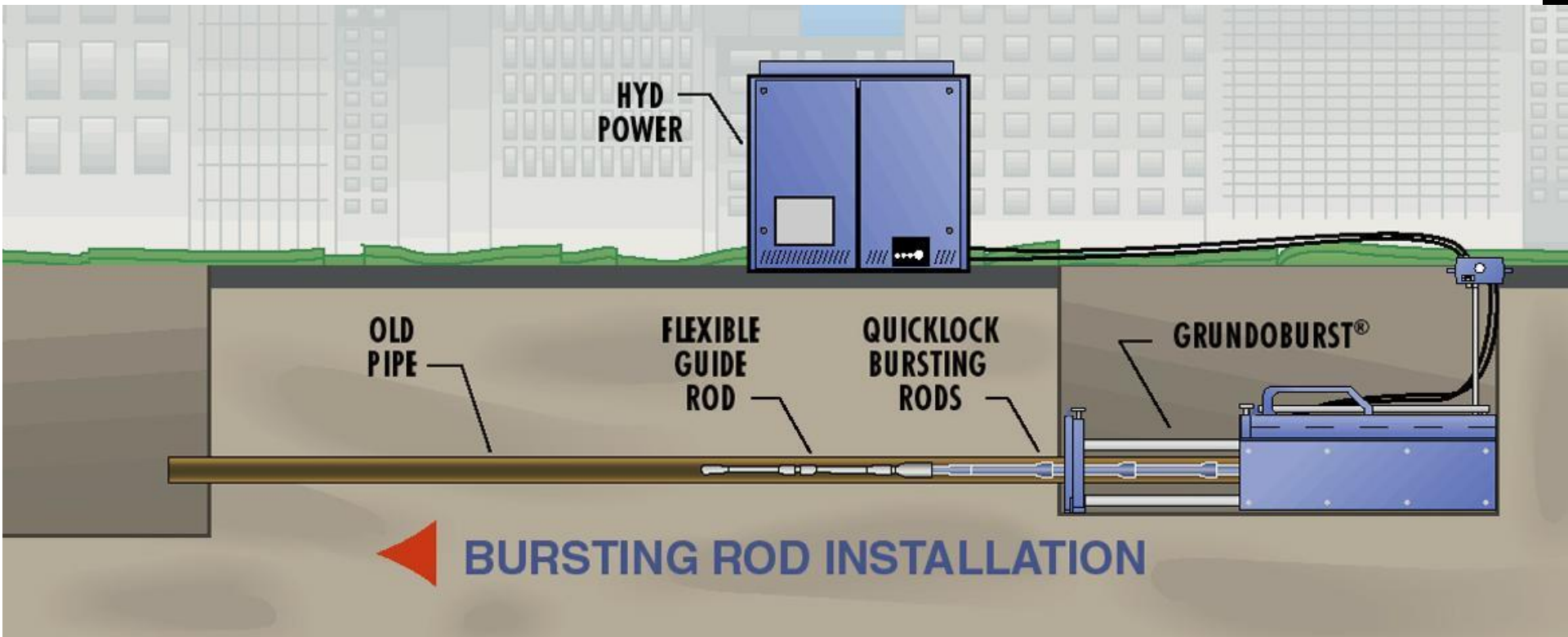
# STATIC PIPE BURSTING SYSTEMS

- Hydraulic power pack
- Pulling Forces do the work
- Steel rods provide “static” pulling
- Specialized accessories available to meet conditions
- New Pipe – variety of choices
- Equipment capacities range from 20 tons to over 300 tons

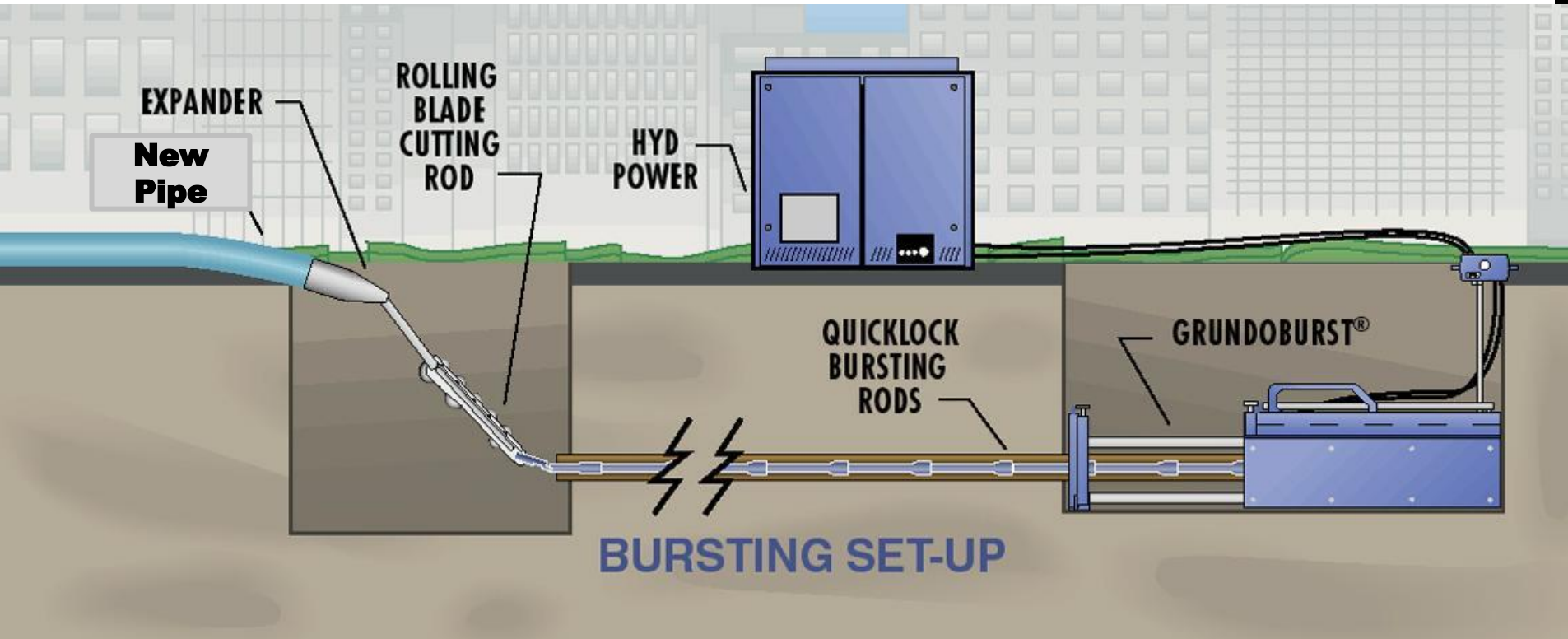




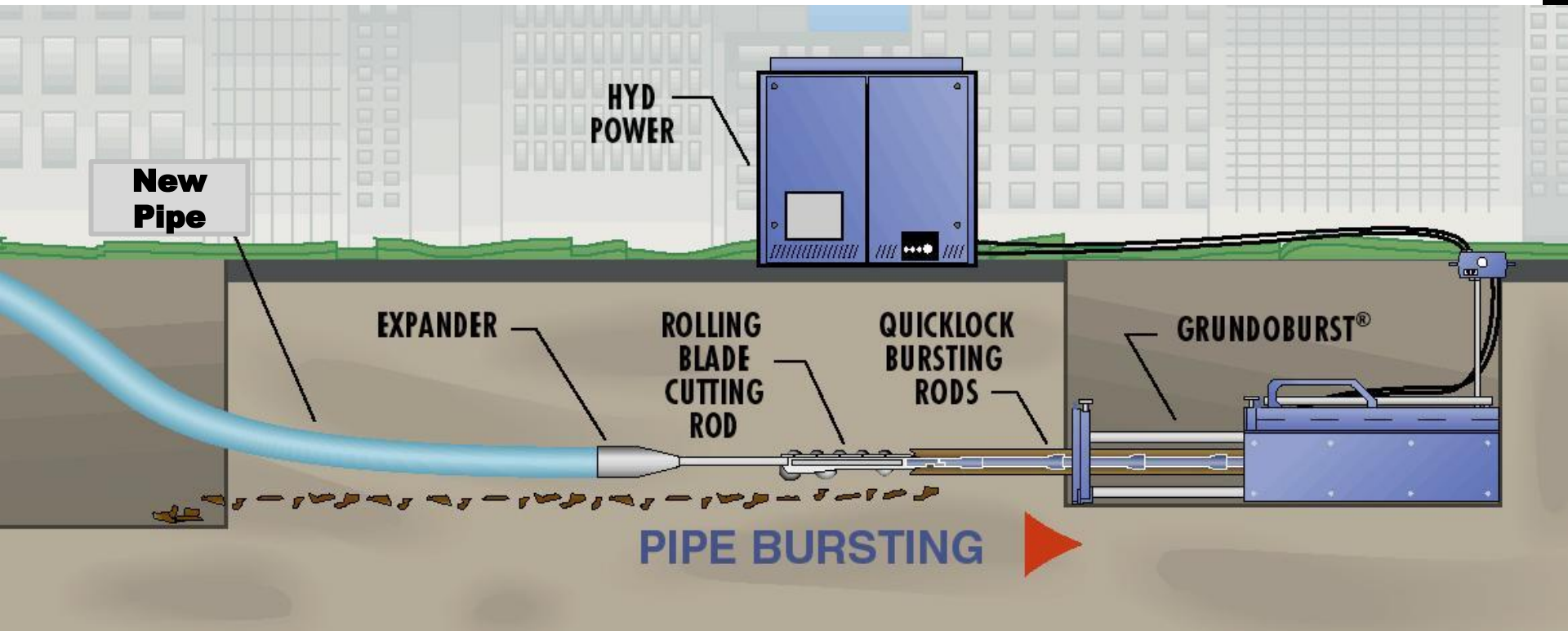
# STATIC BURSTING STEP 1



# STATIC BURSTING STEP 2



# STATIC BURSTING STEP 3







# **CAPABILITIES: STATIC SYSTEMS**

- **Pipe Burst Not Only Existing Fracturable Pipe but, also Non-Fracturable Pipe (HDPE, Ductile Iron, Steel)**
- **Accessories used to help split mechanical repairs & fittings**
- **New Pipe - All types (FPVC, HDPE, Retrained Joint PVC, Ductile Iron, VCP)**



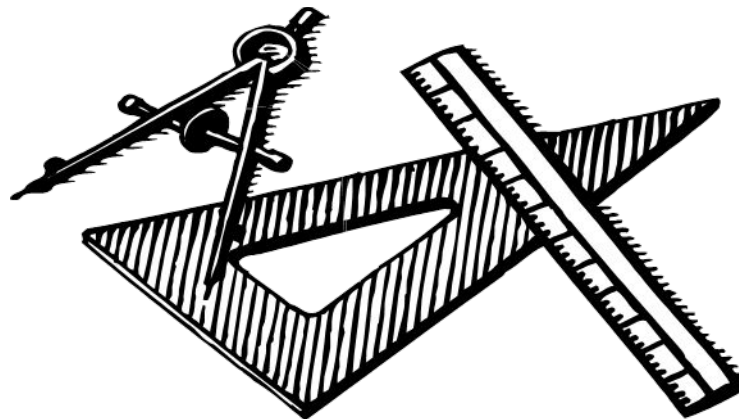








# DESIGN CONSIDERATIONS





# CLASSIFICATIONS OF DIFFICULTY AND INCREASE OF NEW PIPE DIAMETER

	Degree of Difficulty	Depth of Pipe (ft)	Existing Pipe ID (in)	New Pipe Diameter Comparative to Existing Pipe	Burst Length (ft)	Original Trench Width	Soil Type
<b>IPBA CLASSIFICATION</b>	<b>A</b>	Minimal	<12	2 – 12	Size on Size	0 – 350	Relatively wide trench compared to expander head outside diameter. Compressible soils outside trench (loose sand, gravel, soft clay).
	<b>B</b>	Moderate	>12 to <18	12 – 18	Single Upsize	350 – 500	Trench width less than 4" wider than the expander head outside diameter. Moderately compressible soils outside trench (medium dense to dense sand, medium to stiff clay).
	<b>C</b>	Comprehensive	>18 +	20 – 36	Double / Triple Upsize	500 – 1,000	Incompressible soils outside trench. Constricted trench geometry (width less than or equal to outside diameter of burst head).
	<b>D</b>	Developmental					



# EXPANSION – WHERE DOES IT GO?

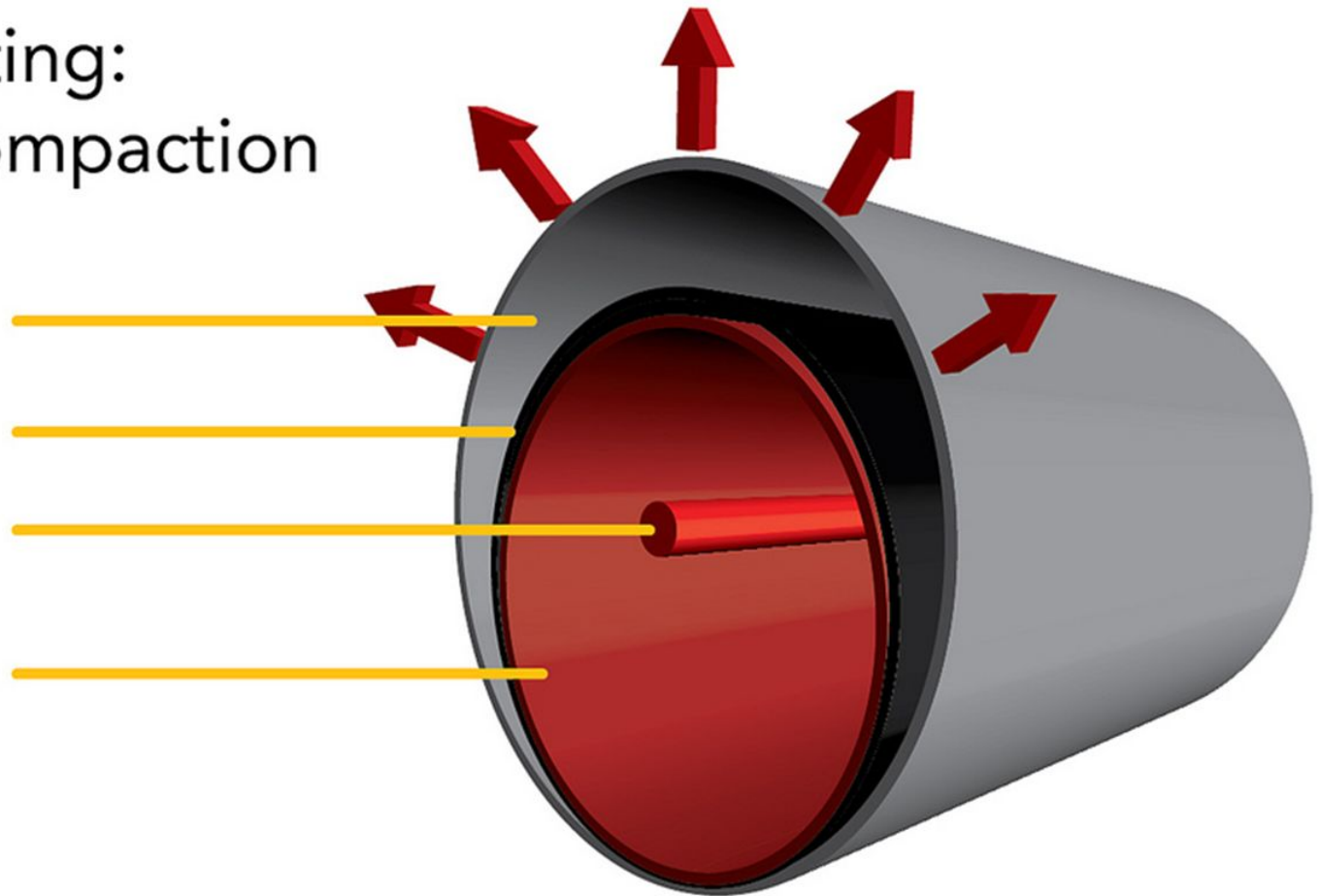
Pipe Bursting:  
Typical Compaction

Expander

New pipe

Connection  
center point

Existing pipe





# Class A Pipe Burst

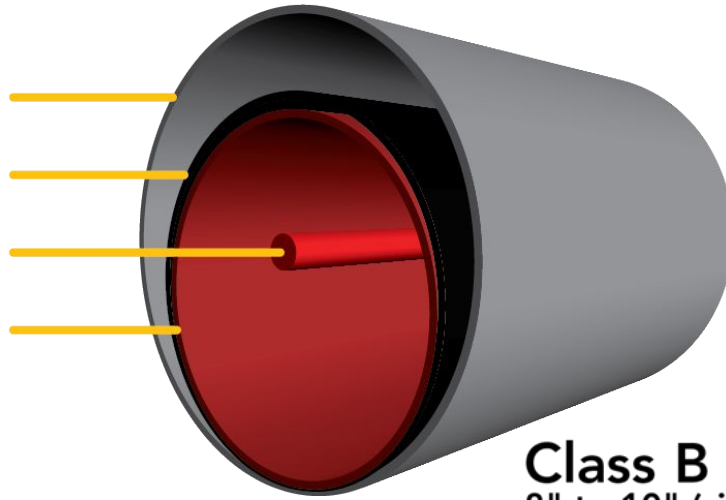
8" to 8" (size on size)

Expander OD: 10.35"

New pipe OD: 8.625"

Connection center point

Existing pipe ID: 8.00"



# Class B Pipe Burst

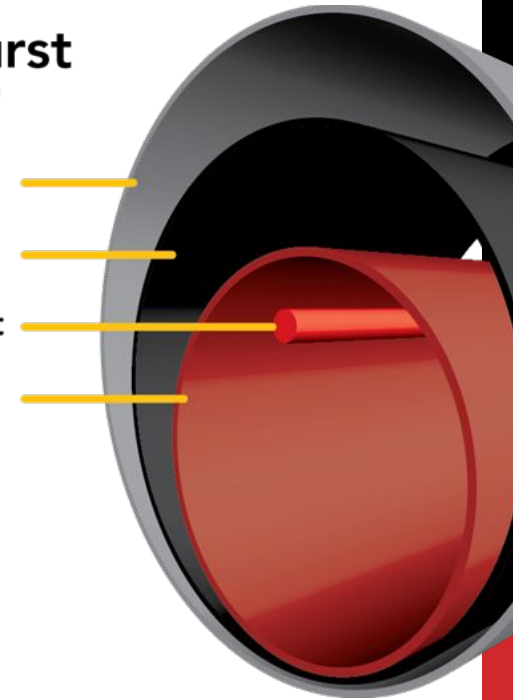
8" to 10" (single upsize)

Expander OD: 12.90"

New pipe OD: 10.75"

Connection center point

Existing pipe ID: 8.00"



# Class C Pipe Burst

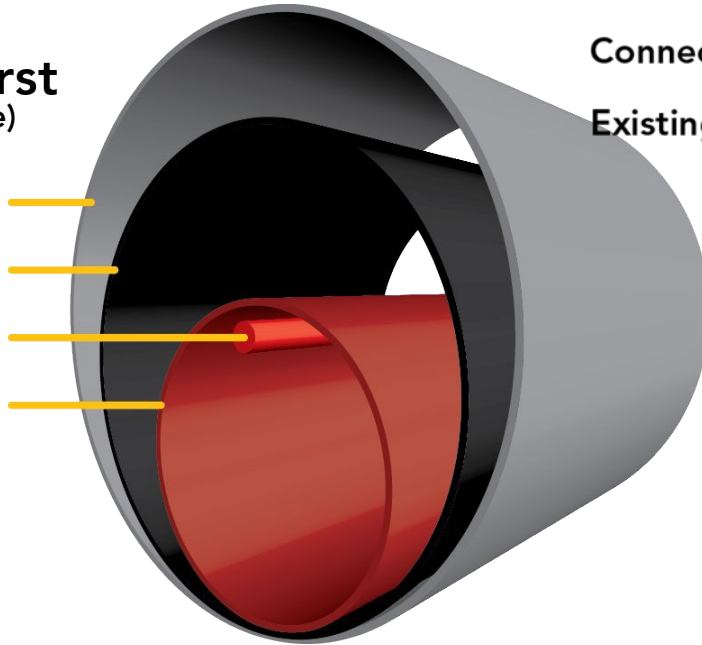
8" to 12" (Double Upsize)

Expander OD: 15.30"

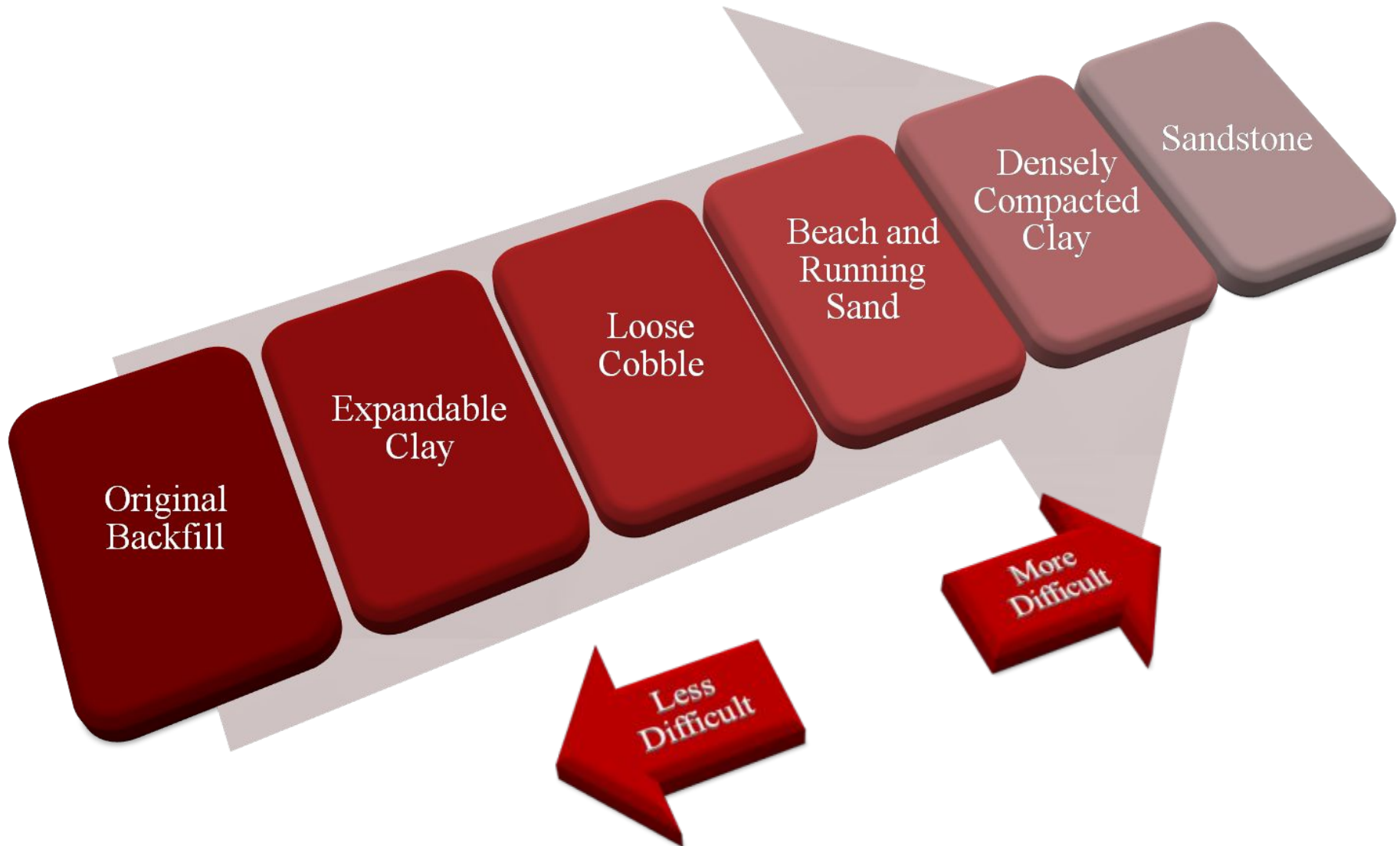
New pipe OD: 12.75"

Connection center point

Existing pipe ID: 8.00"



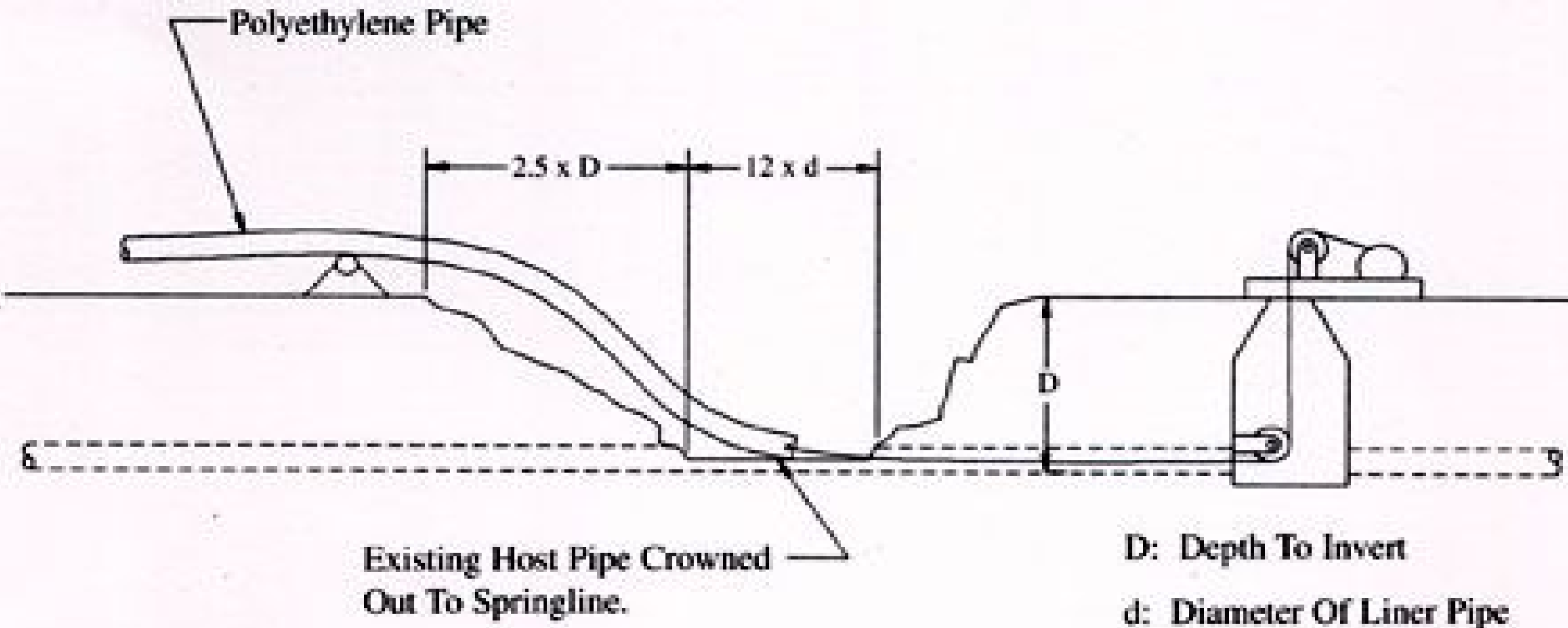
# SOIL CONDITIONS



# LAUNCH PIT – PIPE ENTRY

**Existing pipe depth determines new pipe entry pit length.**

- Entry pit length is minimum  $2\frac{1}{2}$  - 3 times depth



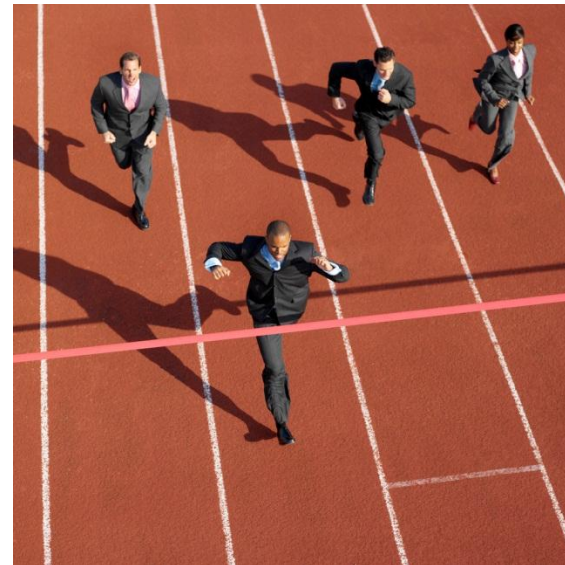






# GOING THE DISTANCE – HOW TO OVERCOME LIMITING CONDITIONS...

- Increase static energy (static applications)
- Increase impact energy (pneumatic applications)
- Limit upsize (What size pipe do we really need?)
- Shorten run lengths
- Reduce pipe friction
  - Lubrication





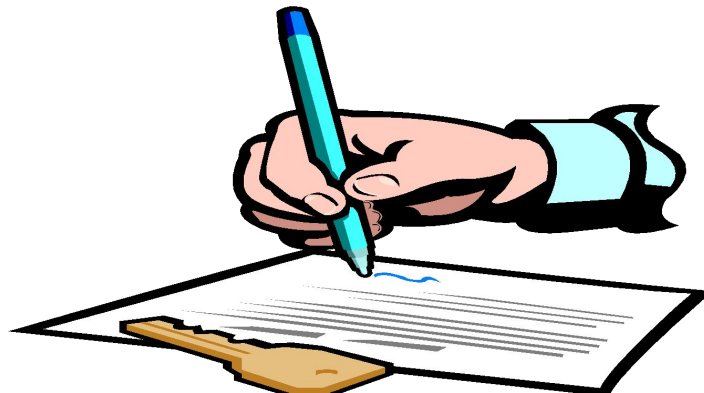




# BIDDING



- Pre-Bid Meeting and RFQ
- Contractor Qualification Requirements
- Selection of Contractor
- Notice of Award and Execute Contract Documents



# PRE - CONSTRUCTION

- Pre-Construction Meeting with Stakeholders
- Review Contingency Planning
- Job Site Logistics and Layout
- Bypass and Temporary Services
- Methods for Reconnection of Services





# PRE-CONSTRUCTION CONTINUED...

- Locations of Excavations and Pits for Pipe Bursting
- Pipe Bursting Equipment and Tooling
- Dewatering Plan
- Site Safety Plan
- Schedule of Work and Work Hours



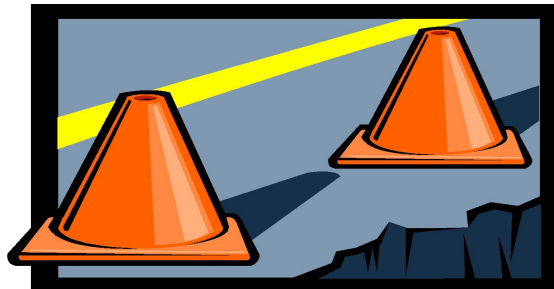






# CONSTRUCTION

- One Call Mark-outs of Utilities
- Confirm Utility Location and Depth
- Mobilization
- Site Safety Review
- Set up Traffic Control
- Set up Temporary Bypass













# CONSTRUCTION CONTINUED...

- Deliver and Stage New Pipe
- Excavate Launch, Receiving Pits and Services
- Pre-Burst CCTV inspection (Gravity Sewer)
- Disconnect Service Laterals from Main

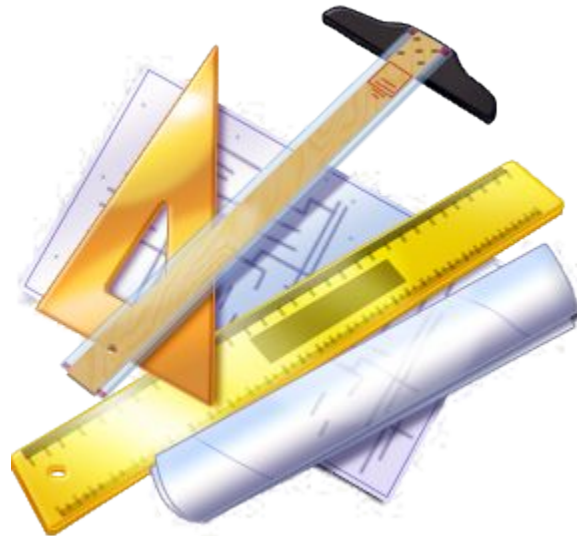






# CONSTRUCTION CONTINUED...

- Burst the Existing Pipe while Pulling in New
- Reconnect Mains & Services
- Pressure Test as Required
- Backfill and Pave



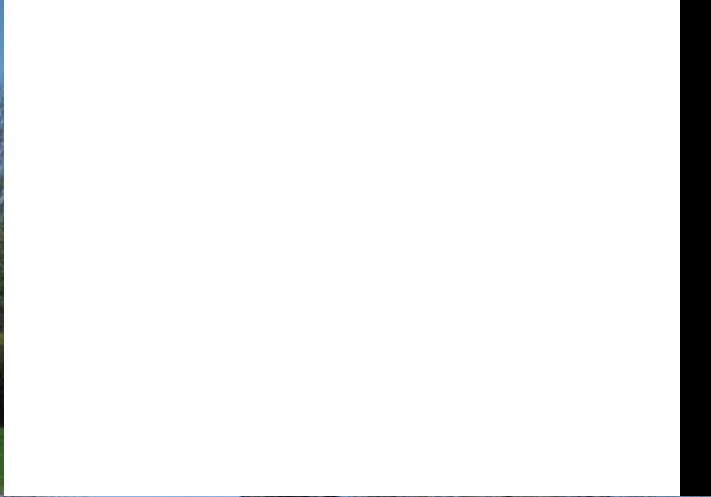








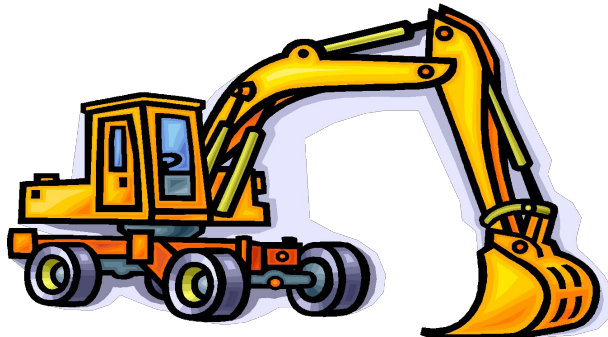




# BURSTING VS. OPEN CUT

## “DIRECT COSTS”

- Less material removed and replaced
- Less Dewatering
- Less equipment and labor
- Utilizes existing pipe, utility corridor and ROW
- Lower cost overall

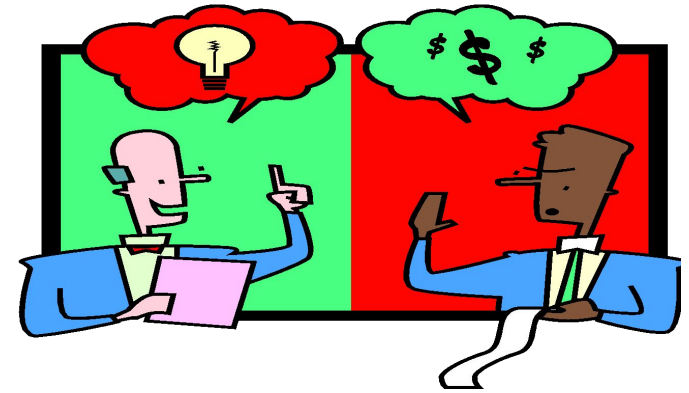




# BURSTING VS. OPEN CUT

## “INDIRECT COSTS”

- Smaller work zone or “footprint”
- Less disturbance to traffic
- Less time
- Less Impact to businesses
- Less emissions – lower carbon foot print “Green Benefits”



# BURSTING VS. OTHER REHABILITATION OPTIONS (SLIP-LINING, CIPP, ETC.)

- No reduction in inside diameter (improved hydraulic capacity)
- Same or Increased pipe diameters
- Factory Manufactured Pipe (vs. “field manufactured” CIPP, epoxy, and CML, etc.)
- Hard service reconnects (not simply “reinstated”)
- Better return on cost - engineering economic life (new pipe)

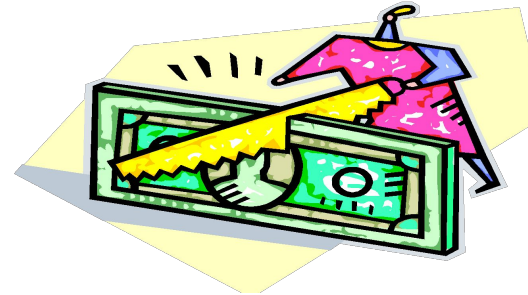


# SUMMARY

## PIPE BURSTING IS...



- Proven, has history, and widely used (not new, you will not be the first!)
- Effective (it works!)
- Costs less
- Lower impact to all
- New factory manufactured pipe
- “Green Technology” – environmentally friendly





# QUESTIONS?

