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Analyzing the Bread and Butter Benefits of Water Main Pipe Bursting

Richard (Bo) Botteicher, PE



What is meant by the term 'bread and butter' for water main pipe bursting rehabilitation?



Utilizing Pipe Bursting Rehabilitation and Replacement Techniques for Potable Water Distribution Piping Systems

Distribution systems with:

- Consistent, smaller pipe diameters
- Consistent materials
- Consistent layout
- Larger areas of rehabilitation typical

Potable water distribution system specifics are a good match to pipe bursting rehabilitation and replacement methodology



1. Prescriptive design practices used for original installation
2. Consistent depths of bury
3. Generally consistent materials
4. Consistent methods of original bedding/bury, construction
5. Locatable appurtenances
6. Modest upsize or size-on-size requirements
7. Parallel separation from other utilities, conflicts limited to small number of crossing utilities

The “80%”

Pipe bursting is a unique, low-dig solution for potable water distribution system rehabilitation and replacement

1. Allows existing pipes to be upsized
2. Utilizes the same utility and easement corridor and location
3. Provides a new, wholly-structural, factory produced pipe product
4. A competent low-dig technology to reduce widespread surface and customer/constituent disturbance



Challenges for 'bread and butter' pipe bursting rehabilitation of potable water distribution systems

1. Maintaining service for customers
2. Mechanical reinstatement of service connections
3. Required surface (street) restoration



Aging water infrastructure is the common challenge

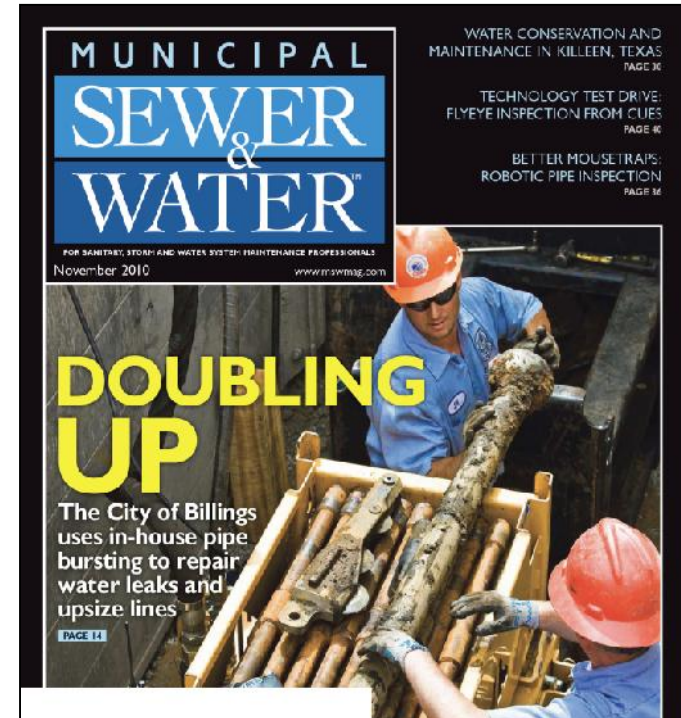


- Pipe that may be nearing the end of its useful life.
- Pipe that is undersized due to additional required capacity or deterioration.
 - Increasing break rates
 - Water quality concerns
 - Tubercles
 - Fire flow concerns



Pipe Bursting Basics for Water Main Rehabilitation

- The actual pipe bursting process is similar regardless of end use application.
- However, potable water applications require:
 - Pressurized service
 - Potable disinfection
- Static pipe bursting systems are advantageous due to the common materials used for water piping and water piping repairs.



Temporary Water or Pre-chlorinated Pipe Bursting?



- Temporary Water system
 - Requires installation of temporary piping
 - Disinfection and testing
 - Swap-over of service
 - Disassembly after work complete
 - Standard pipeline commissioning for rehabilitated section
- Pre-chlorination
 - Requires disinfection of pipe PRIOR to installation
 - Care with installation and reconnection
 - Can limit the time out of service
 - Eliminates the need for temporary water
- Decision is based on comfort of utility in risk associated with no backup should service be delayed in the case of pre-chlorinated pipe bursting

Efficiency for 'bread and butter' water pipe bursting



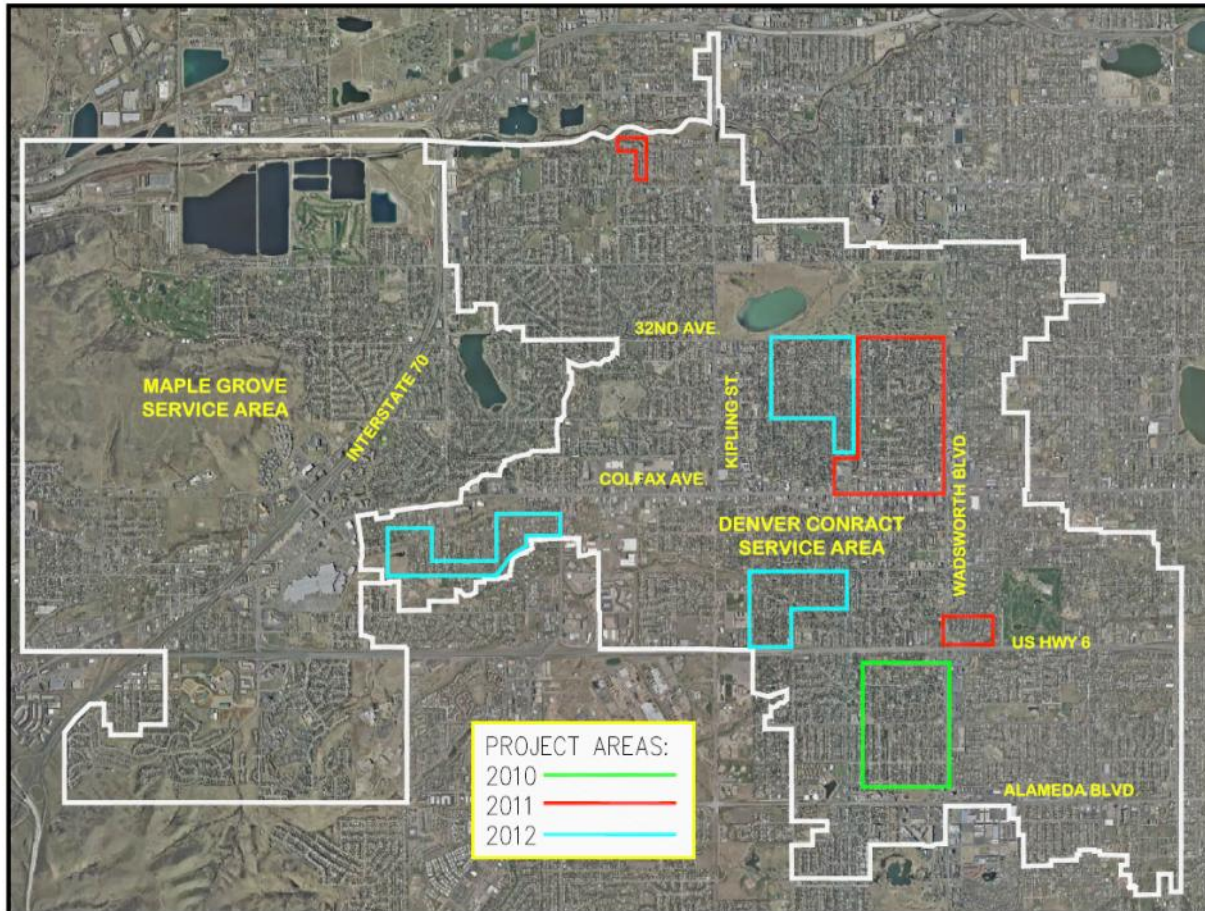
- Bread and Butter water pipe bursting gets a significant efficiency boost through the potential repetitive nature of the work.
- Efficiency in the program then drives time and cost savings:
 - Planning
 - Repetitive Labor
 - Minimizing the system 'unknowns'
- These efforts can reduce time and labor, but cost will still be primarily driven by the cost benefits of the method:
 - Surface restoration
 - Excavation materials costs

The importance of planning for bread and butter construction

- Plan out larger blocks of work to be completed at the same time
 - Work should be grouped geospatially as much as possible
 - Pipe size and type organized together
 - Work grouped this way lends itself to easy ‘sorting’
- Efficiency is maximized by setting similar bursts, close together, in succession
 - Tasks remain similar
 - Equipment
 - Materials
 - Standardization on new system components



Grouping geographic areas of work together



- Areas of need are by geographic location
- Similar installation time frame
- Similar materials and methods of original construction
- Similar needs for rehabilitation

Planning can also increase Labor Efficiency

- Example of a 'Rolling Block' type of labor breakdown.
- A singular crew keeps preparation, temp water, pipe fusing, installation and clean-up moving over a couple blocks at a time.
- Efficiency is attained by keeping labor busy over several functions of the process depending on the actual location of the burst.

Day No.	Day	Block # 1 Activity	Block # 2 Activity	Block # 3 Activity
1	Wednesday	Fuse Pipe - 1		
2	Thursday	Temporary Water System Installed		
3	Friday	Fuse Pipe - 2		
4	Monday	Prepare Existing Water Main		
5	Tuesday	Prepare for Pipe Bursting Activity		
6	Wednesday	Pipe Burst Activity	Fuse Pipe - 1	
7	Thursday	Pipe Burst Activity	Temporary Water System Installed	
8	Friday	Commission and Testing of new water main	Fuse Pipe - 2	
9	Monday		Prepare Existing Water Main	
10	Tuesday		Prepare for Pipe Bursting Activity	
11	Wednesday		Pipe Burst Activity	Fuse Pipe - 1
12	Thursday		Pipe Burst Activity	Temporary Water System Installed
13	Friday		Commission and Testing of new water main	Fuse Pipe - 2
14	Monday			Prepare Existing Water Main
15	Tuesday			Prepare for Pipe Bursting Activity
16	Wednesday			Pipe Burst Activity
17	Thursday			Pipe Burst Activity
18	Friday			Commission and Testing of new water main

Minimizing Bread and Butter Pipe Bursting Unknowns



- Do your homework during planning stages
 - Repair records
 - Critical crossing (encasements)
 - Sanitary sewer laterals
 - Valves and appurtenances
- Understand the 'unknowns' early – plan for them – don't allow them to ruin efficiency
 - Tooling sized for repair clamps
 - Tooling ready for other pipe materials (from repair)
 - Protocol for dealing with lateral line breaks or issues

Critical parameters for Bread and Butter Water pipe bursting success



- The following items are imperative for project and program success:
 - Focusing on efficiency of installations
 - Waterline testing requirements
 - Pavement rehabilitation requirements
 - Community support
 - Political support
- Beware the institutional traps of alternate methods!
 - Lack of commitment
 - No ‘champion’ in the utility
 - ‘Silver Bullet’ trap
 - Contractor vs. utility economics

Utility	City of Billings, MT	Consolidated Mutual Water (Lakewood, CO)	Cheyenne Board of Public Utilities, WY	Lee's Summit, MO	Greensboro, NC
Type	Public	Private	Public	Public	Public
Annual Burst Lengths (LF)					
2008	520	-	-	-	-
2009	1,210	-	-	12,700	2,720
2010	5,185	23,000	-	-	6,720
2011	4,000	31,000	2,070	-	6,280
2012	3,300	43,000	4,700	14,000	8,400
2013	2,000	30,640	4,650	11,000	4,950
2014 est	2,000	40,000	9,570	5,400	8,950
TOTAL Lineal Feet	18,215	167,640	20,990	43,100	38,080
Existing Pipe	4-8" CI	4-8" CI	4-8" CI	4-8" CI/DI	2-8" CI
Replacement Pipe	8" and 12" DR14 FPVC®	4", 6" (mostly) & 8" DR18 FPVC®	Mostly 8" DR14 FPVC®, some 12" DR14 FPVC®	6" & 8" DR18 FPVC®	Mostly 6" and 8" DR18FPVC®
Design Engineer	City Engineer	CMW	Cheyenne BOPU	City of Lee's Summit	Greensboro Water Resources
Bid Type	Internal	Internal	Typical	Typical	Annual Contract
Installing Contractor	City Crews	CMW	Aztec Construction	Wiedenmann & Godfrey, Lamke Trenching & Excavating	KRG Utility
Fusion Contractor	City Crews	CMW	UGSI and Aztec	CES Industrial Piping Supply	KRG Utility
Pipeburst Equipment	Hammerhead	TT Technologies	TT Technologies	TT Technologies	TT Technologies
3rd Party Publications	Municipal Water & Sewer, March 2014 Municipal Sewer & Water, Nov 2010 No Dig Conference, Chicago 2010	AWWA Opflow, Sept 2012 Trenchless Technology Project of the Year, Oct 2013 No Dig Conference	No Dig Conference, Sacramento 2013	ASCE Pipelines, Ft. Worth 2013	NCAWWA, ASCE Pipelines, No Dig Conference
Documented Savings	~\$200/ft for open-cut to ~\$100/ft	~\$100/ft for open-cut to ~\$50/ft	~20% savings	~23%	N/A ¹⁵

Conclusions

Cost Reduction or Savings

- Make your own estimates of cost and efficiency based on YOUR situation
- Will depend on paving and excavation requirements
- Do not trade your economics for those of a contractor or supplier!

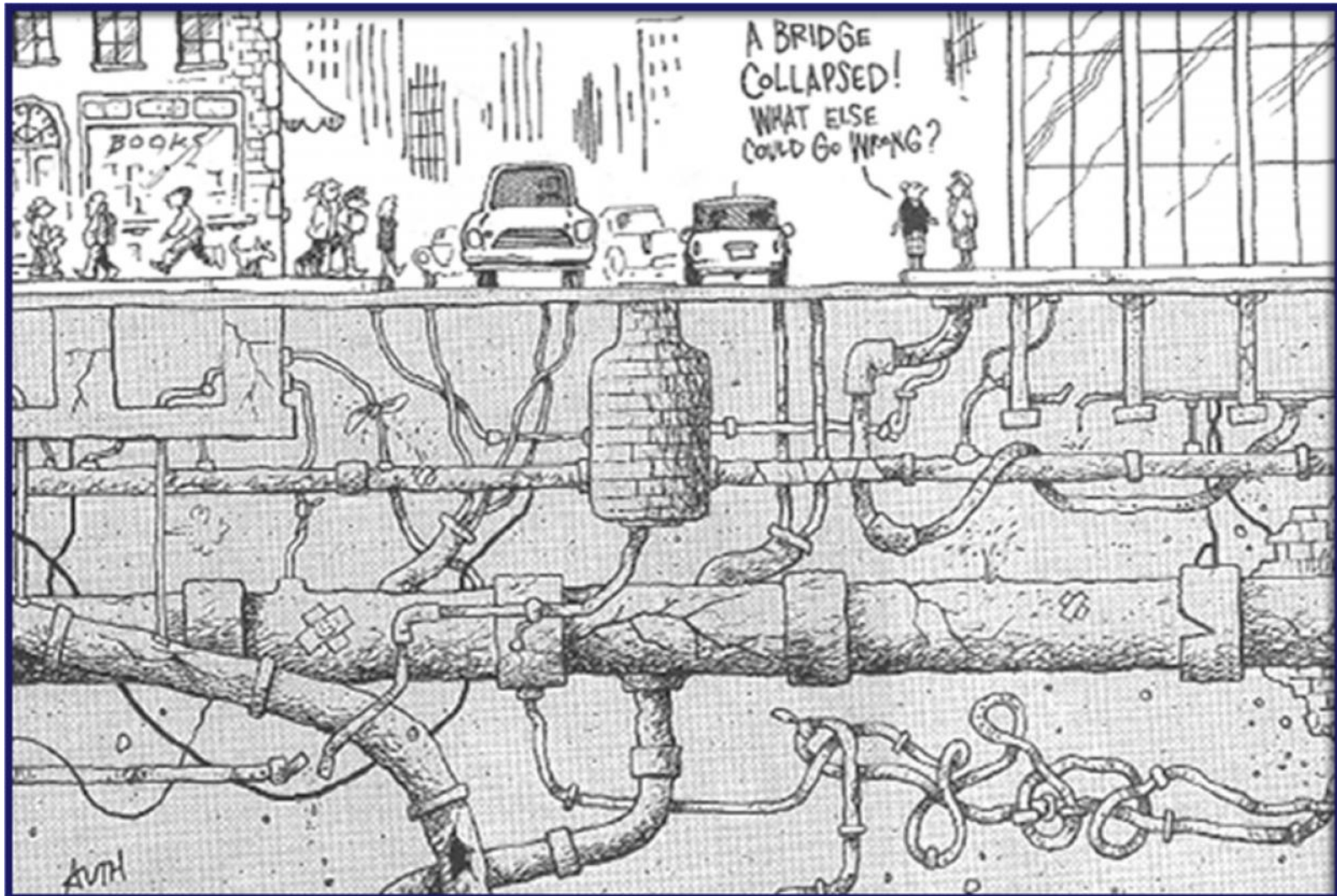
Efficiency – doing more with less

- Allow the greatest efficiency for bread and butter pipe bursting by packaging it together correctly
- Repetitive labor and installation scenarios will save time and money

Customer relations

- Pipe bursting has value beyond the dollar to those customers that use the system
- Providing a valuable product at a reasonable price is something to brag about!

Question and Answer





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Underground Solutions, Inc.

bbotteicher@ugsi.us

(303) 521-2618