This presentation premiered at WaterSmart Innovations

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INNOVATIONS

Achieve a Sustainable Water Supply by Eliminating Leakage

by

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KEY POINTS of PRESENTATION

- Sustainable Water Supply
- Unaccounted for water
- Learn about the changes required to reduce the water loss due to leakage and corrosion.

SUSTAINABLE WATER SUPPLY

- Increase our Water Source
  - Economic and Social Issues
- Water from other sources
- Reduce the unaccounted for water loss in our existing water systems

UNACCOUNTED FOR WATER

Approximately 40 billion gallons of water is treated and pumped to its destination every day in the US.

The unaccounted for water loss is estimated at 10-20% which is about 6 billion gallons per day

UNACCOUNTED FOR WATER

This is potable water that has been treated and has been pumped through main and distribution pipelines to its destination but doesn’t arrive.

UNACCOUNTED FOR WATER

- Water used in fighting fires
- Water loss due to theft
- Water lost due to pipe breaks
- Water used to flush piping systems after breaks and for new installations
- Water lost due to pipe leakage

UNACCOUNTED FOR WATER

- Most experts believe that between 45-70% of this unaccounted for water loss is due to water breaks and leaking pipe joints.
- If we use 50%, that is 3 billion gallons of water per day that we could save if we eliminated this problem.

UNACCOUNTED FOR WATER
LOSS DUE TO PIPE BREAKS

- Per AWWA, there are on average 250 water line breaks per 100 miles of pipeline / year.
- With an estimate of 1 million miles of main and distribution pipelines in the US, this equates to 2,500,000 breaks per year.

UNACCOUNTED FOR WATER
LOSS DUE TO PIPE BREAKS

- Breaks due to third party damage

UNACCOUNTED FOR WATER
LOSS DUE TO PIPE BREAKS

- Breaks due to corrosion of the pipeline.

UNACCOUNTED FOR WATER
LOSS DUE TO PIPE LEAKAGE

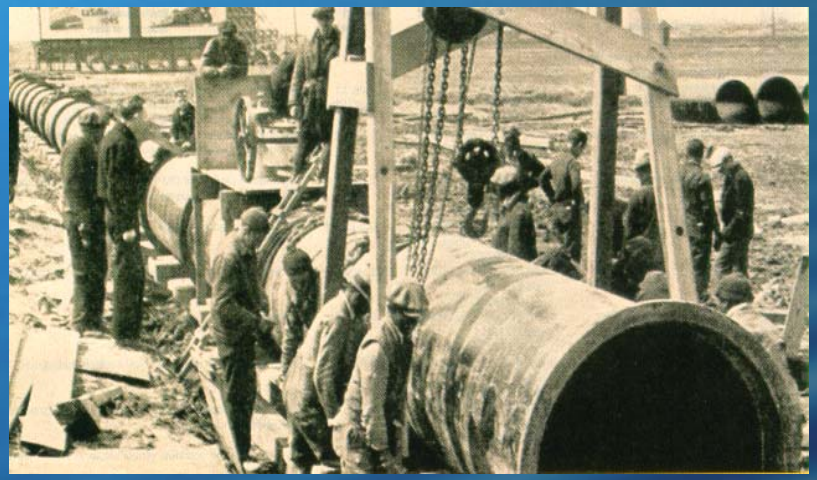
- Pipe leakage can also be caused by corrosion of the pipeline but on a smaller scale.
- A great deal of this pipe leakage is found at the joints due to ground movement or leaking seals.

EXISTING DISTRIBUTION SYSTEMS

- Cast Iron, Ductile Iron, PVC and Concrete
- 20’ pipe segments or shorter
- Bell and Spigot connections

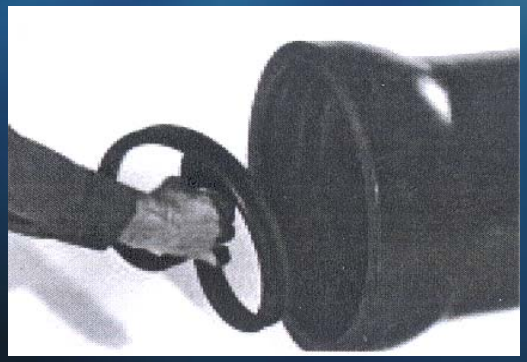
Historical Pipe Joining Method

That was then------This is now

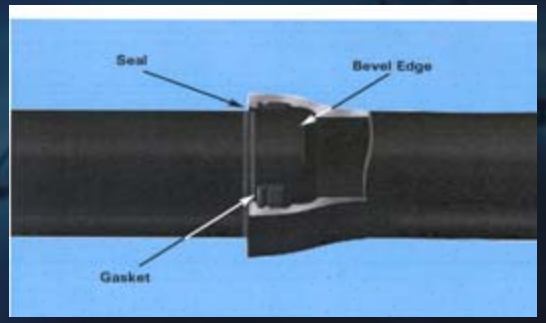


100 Years Ago

Today



STILL - pushing it together!



EXISTING DISTRIBUTION SYSTEMS

Cast Iron and Ductile Iron pipes not only corrode externally but also develop a biofilm on the ID that reduces water flow and compromises water quality.

We Have Reason To Think -

"When distribution pipe begins to deteriorate, disinfectants are less effective in controlling microbiological growth."

"If pressure is lost or if negative pressure is induced, contaminated water or sewage can be pulled into the system through leaks."

"Even in systems with excellent treatment, leaking pipes can lead to a loss of pressure and cause back-siphonage of contaminated water."

Selected Comments from EPA's G-058 1997 Report

How do we improve our Distribution Systems and conserve our most precious natural resource?

- Use a piping material that does not corrode, has a 50-100 year life, does not leak at the joints and will not break due to ground movement.

WHY USE POLYETHYLENE (HDPE) PIPE ?

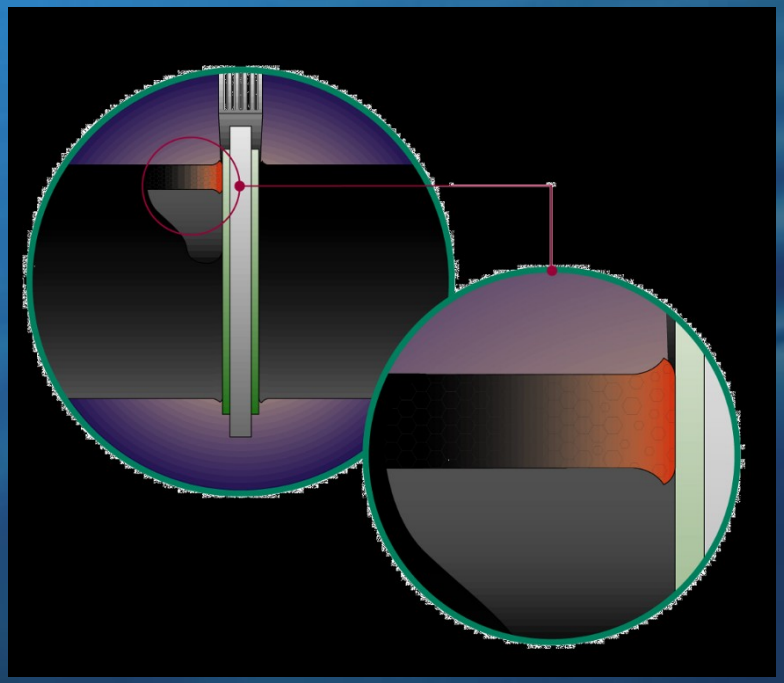
Piping Systems Also Evolve

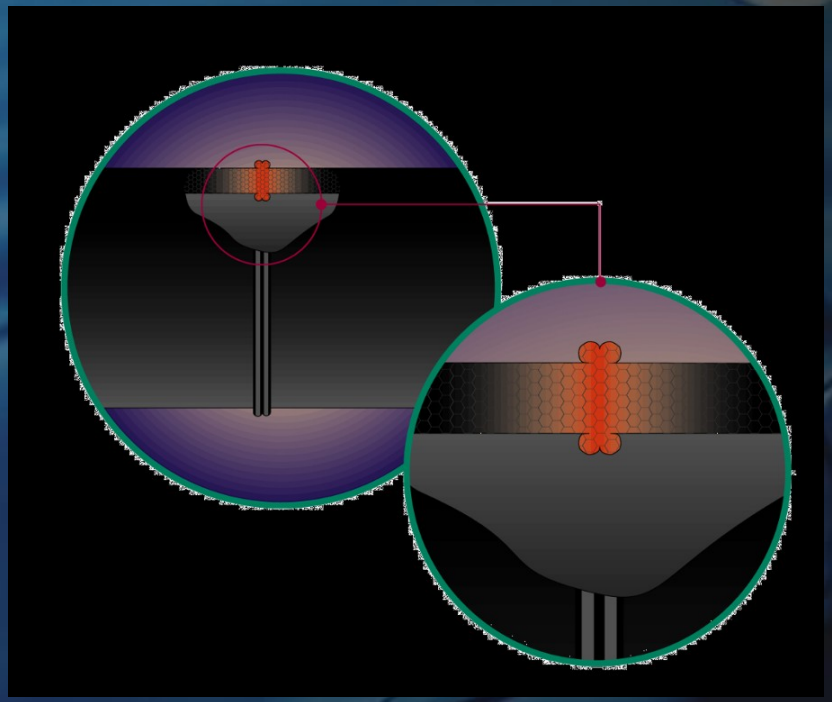
Wood → Cast Iron → Spun Iron → Asbestos → Steel → Ductile Iron → PVC Plastic → 2008 and Beyond

ADVANTAGES of USING POLYETHYLENE PIPE

- Heat Fused Joints – Eliminates leaks
- Flexible and Fatigue Resistant
- Corrosion and Chemical Resistant
- Lightweight and Tough – Construction Advantages
- Cost Effective – Lowest Life Cycle Cost
- Better flow characteristics over time
- Provides Highest Joint Integrity and Reliability

BUTT FUSION





GENERIC JOINING PROCEDURES

ASTM standard F2620

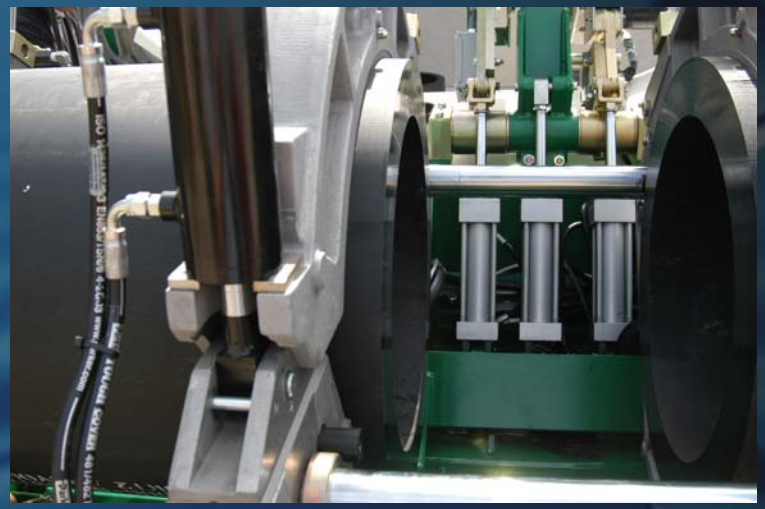
Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

BUTT FUSION JOINING PROCEDURE

- Clean / Install pipe / Clamp
- Face
- Align
- Heat
- Fuse
- Cool

BUTT FUSION
Clean / Install pipe / Clamp

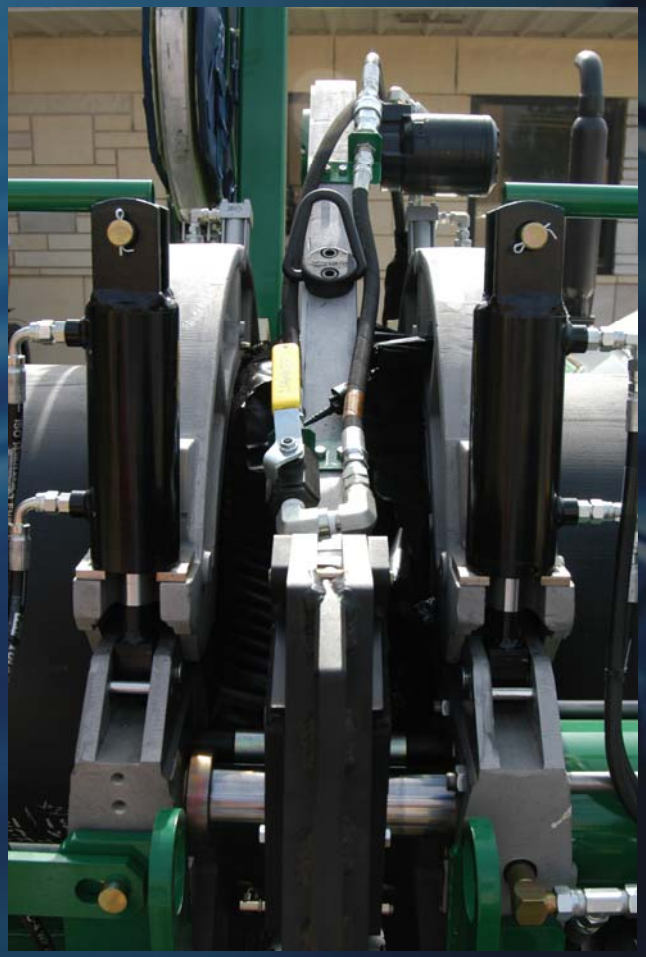
- Clean to remove contamination
- Install pipe in line with the fusion machine centerline using pipe support stands if necessary
- Clamp the outer jaws to prevent slippage and the inner jaws to round the pipe



BUTT FUSION

Face

- Face the pipe ends to remove any oxidation or contamination on the pipe ends
- Facing to mechanical stops will establish clean, parallel mating surfaces for the heating operation.



BUTT FUSION

Align

- Use the inner jaws to align the pipe ends.
- Always tighten the high side down to align pipe ends
- Bring the pipe ends together in the facing pressure and look for any gaps between the pipe ends

BUTT FUSION

Heat

- Install the heater in the fusion machine between the pipe ends
- Apply fusion pressure against the heater until an indication of melt is shown around the circumference of the pipe ends.
- Drop the pressure to just maintain contact between the pipe ends and the heater until the proper melt bead is formed. This is the “Heat Soak” cycle.

BUTT FUSION

Fuse

- After the proper bead is formed, open the carriage, remove the heater and apply the pre-set fusion pressure between the pipe ends.
- Keep pressure on the joint until the joint is cool according to the standard

BUTT FUSION
Cool

- Maintain the fusion pressure on the joint for approximately 30 to 90 seconds per inch of pipe diameter.
- Use the higher number for heavier wall pipe

BUTT FUSION MACHINE

- Equipment Size Range ½” to 65”
- Most units will fuse a 3:1 ratio of pipe sizes
- One man fusion operation

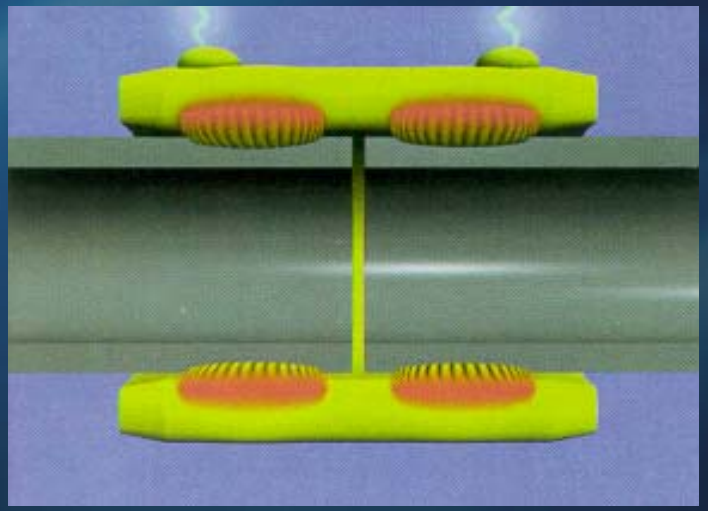
BUTT FUSION MACHINE

- Larger equipment have almost all functions hydraulically assisted

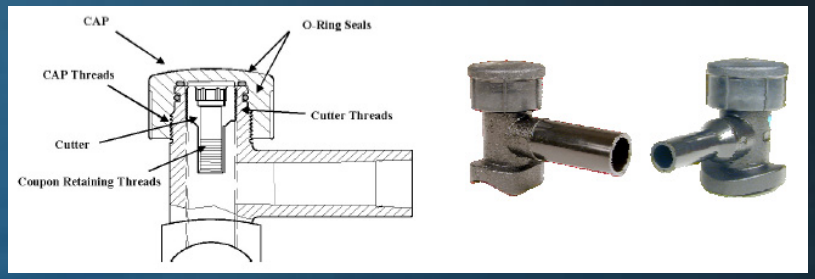
BUTT FUSION MACHINE

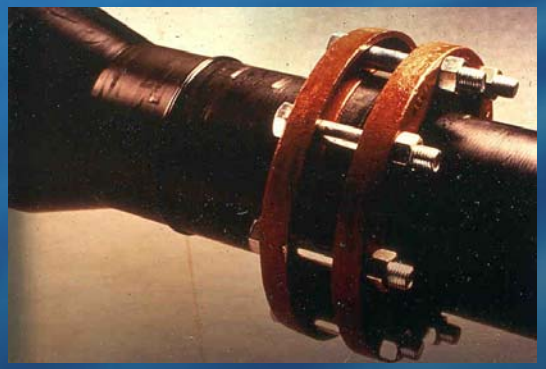
- In-Ditch Fusion Applications

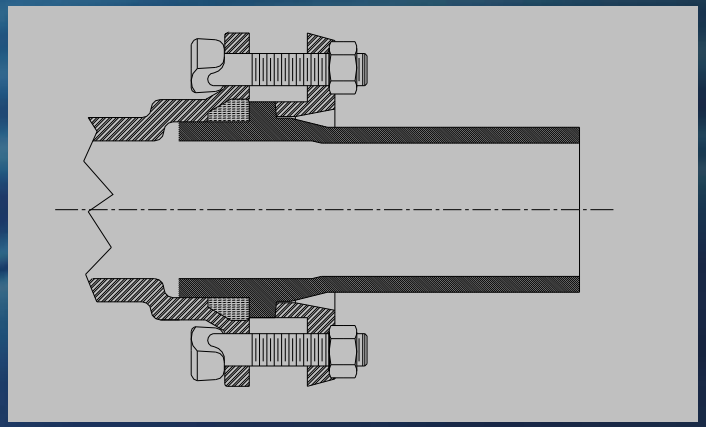
OTHER HEAT FUSION OPTIONS

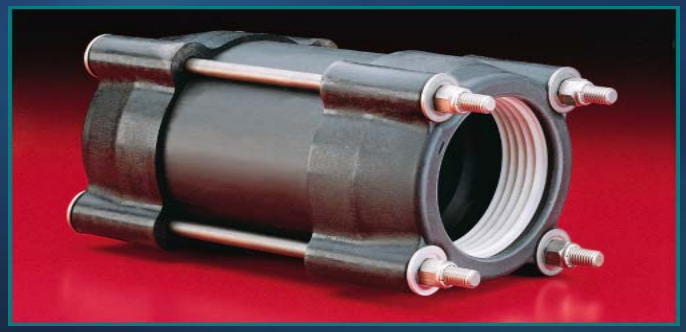


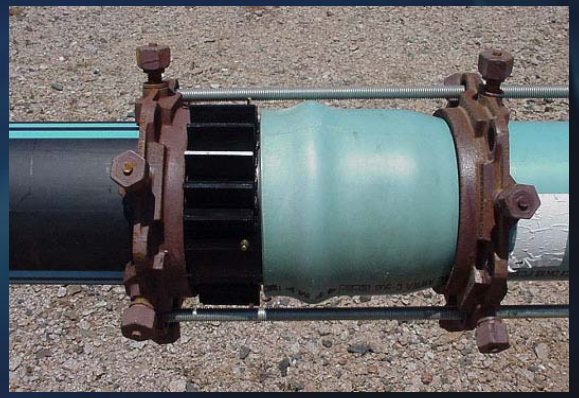
CONNECTIONS











RESTRAINT REQUIREMENTS - HDPE

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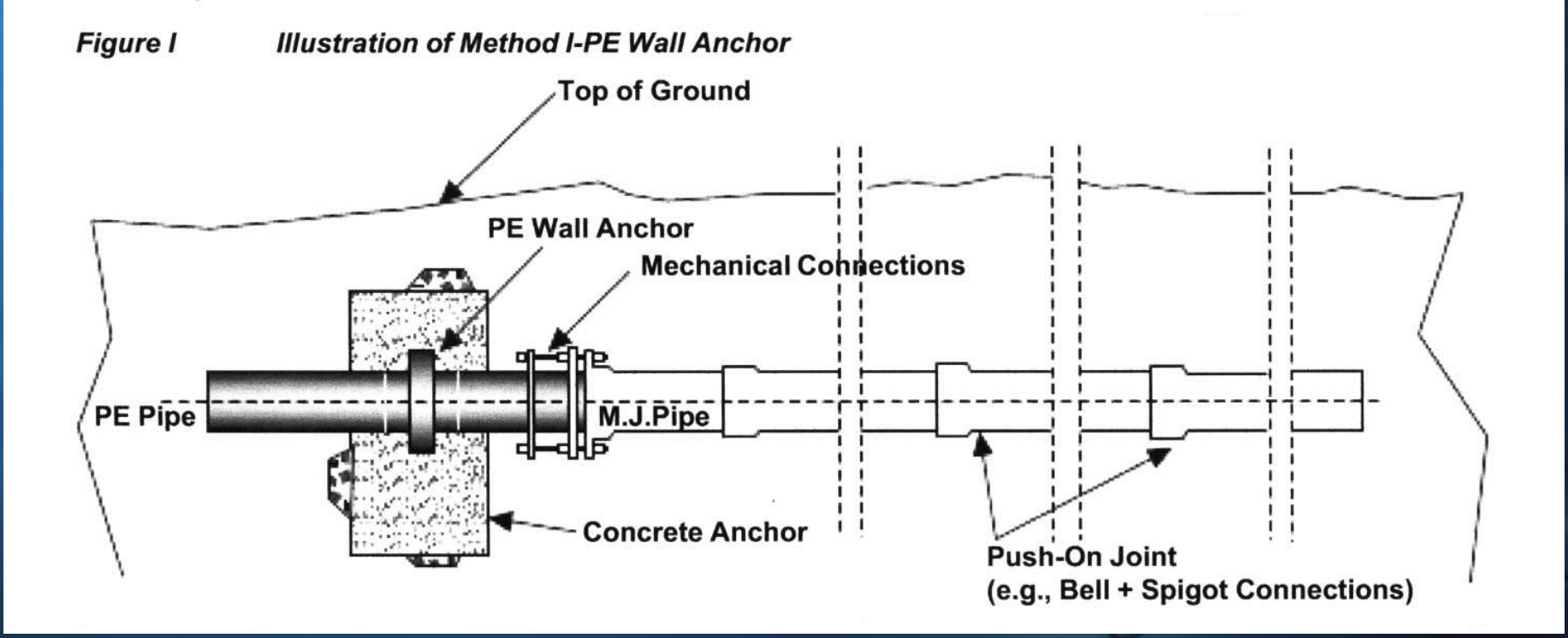
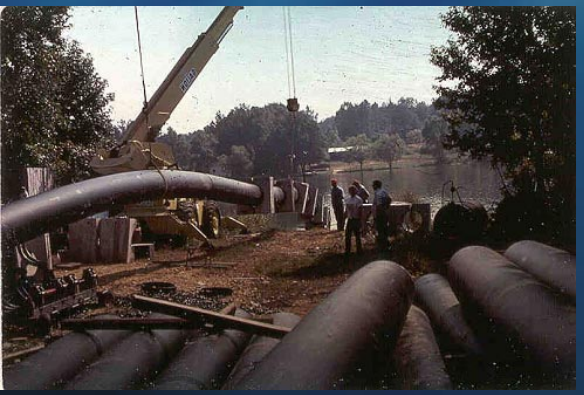
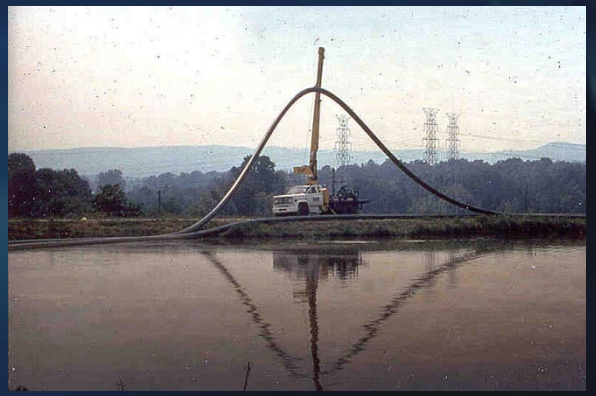


MOST COST EFFECTIVE APPLICATIONS





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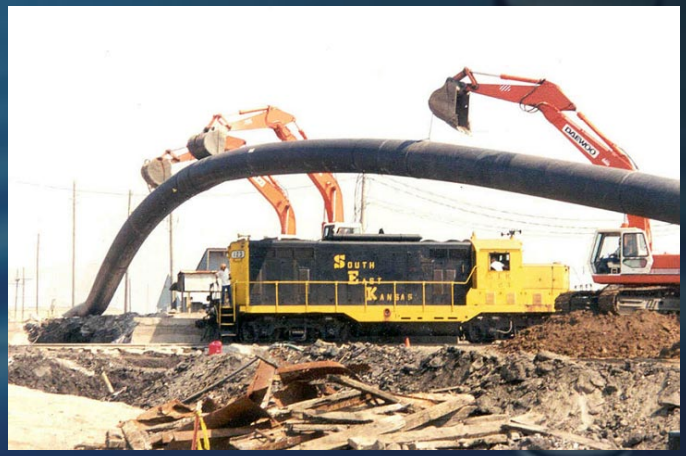
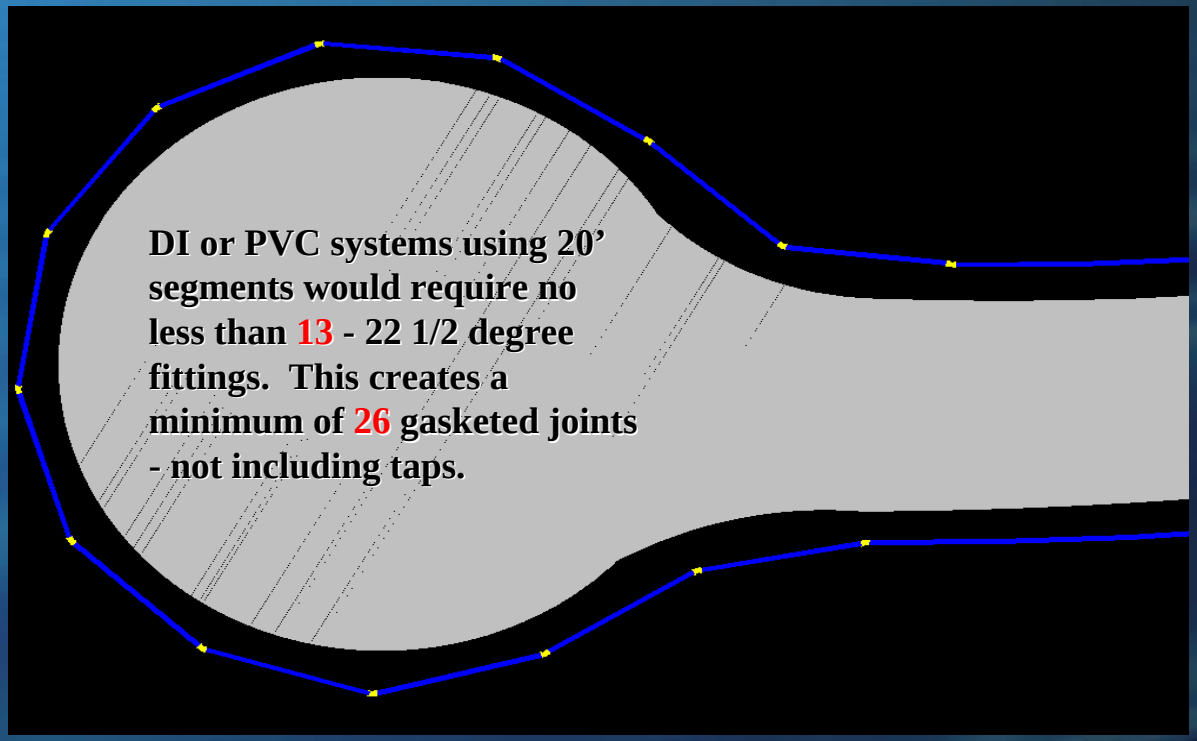
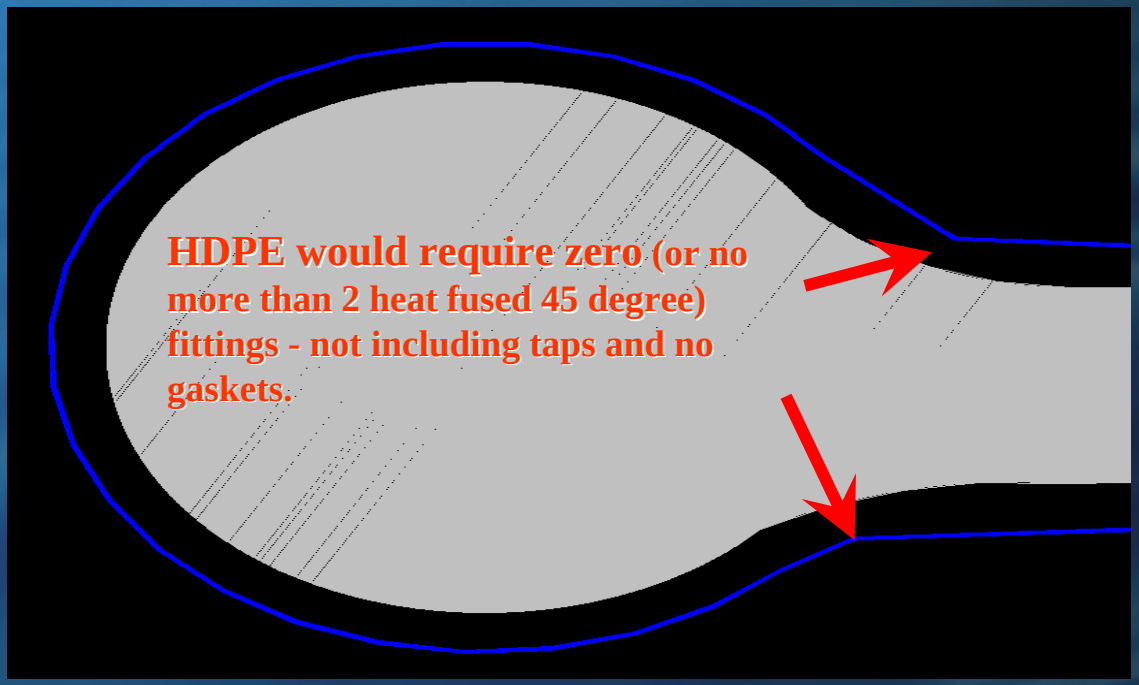


CUL-DE-SAC APPLICATIONS



CUL-DE-SAC APPLICATIONS



CONCLUSION

- Most municipalities recognize the leakage problem and have adopted a leak detection program to find and patch leaky pipes
- The key to future success is putting Polyethylene Pipe in the ground on new installations or when a water system needs replacing.

CONCLUSION

- **Polyethylene Pipe**
  - Does not corrode
  - Has a 50-100 year life
  - Has the lowest life cycle cost
  - Will not break due to ground movement.
  - Joints are leak free and self restrained

CONCLUSION

It “IS” the answer to our corroding, leaking infrastructure and a way to preserve our water supply for future generations.