Engineering and Construction Strategies for Successful Water Distribution Replacement

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Agenda

1. Aqua NEPA Program
2. 2016-2017 Projects
3. Engineering
4. Construction
5. Q&A
Aqua NEPA Program
Aqua NEPA Program

1) Know your Assets

2) Identify Your Deficiencies and Long Term Plans
   - Asbestos Cement Pipe
   - Unlined Cast Iron Pipe
   - Improperly Installed Pipe
   - Break History
   - Undersized Pipe / Growth or Expansion
   - Water Pressure & Quality Issues / Customer Complaints

3) Prioritize and Budget
What are you doing for Asset Management?
2016 - 2017 Projects
Aqua & GHD Watermain Replacement Projects

Since 2008, GHD and Aqua have teamed on over 175 watermain replacement projects.
- $100 million in construction
- Over 130 miles of main replacement
2016-2017 Projects

Presentation focuses on two Aqua PA Divisions

Roaring Creek Division
• 17 Projects in 3 Counties
• $18 Million in Construction
• Over 40,000 linear feet of watermain replacement

White Haven Division
• 9 Projects in 4 Counties
• $18 Million in Construction
• Over 28,000 linear feet of watermain replacement
Aqua & GHD 2016 and 2017 Project Highlights

- Cove Mountain Drive Phase I Watermain Replacement
- Zion Grove
- Country Club Drive Transmission Main
- Eagle Rock Resort
- Atlas Phase I Watermain Replacement
- Atlas
- Girardville Phase I Watermain Replacement
- Girardville
- Ralphi Phase II Watermain Replacement
- Ralphi Twp
- Overlook Phase I Watermain Replacement
- Shamokin
- Market Street Watermain Replacement
- Ralphi Twp
Engineering
Trench Design

- Dependent on pipe location
- Compaction is key
Trench Design

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Trench Design

NOTES:

1. NEW WATERMAIN TRENCH TO BE BACKFILLED WITH FLOWABLE FILL FROM STATION 15+75 TO STATION 21+25. REFER TO TRENCH DETAIL.
Trench Design

NOTES:
1. DETAIL APPLIES FOR NEW WATERMAIN TRENCH FROM STATION 13+75 TO STATION 21+25.
2. ALL STONE GRADATIONS ARE AASHTO CLASSIFICATION.
3. STEEL PLATES TO BE USED AFTER FLOWABLE FILL IS INSTALLED. EXISTING WEARING COURSE TO BE MILLER SO PLATES ARE FLUSH WITH ROADWAY. MINIMUM 10" ON EACH SIDE OF TRENCH.

TRENCH DETAIL (STATION 13+75 TO 21+25)
NO SCALE
Polywrap

Method A for Normal Dry Trench Conditions

Step 1. Cut a section of polyethylene tube approximately two feet longer than the pipe section. Remove all lumps of clay, mud, cinders, or other material that might have accumulated on the pipe surface during storage. Slip the polyethylene tube around the pipe, starting at the spigot end. Bunch the tube accordion-fashion on the end of the pipe. Pull back the overhanging end of the tube until it clears the pipe end.

Step 5. Overlap the secured tube end with the tube end of the new pipe section. Secure the new tube end in place.

Step 6. Take up slack in the tube along the barrel of the pipe to make a snug, but not tight, fit. Fold excess polyethylene back over the top of the pipe.

Step 7. Secure the fold at several locations along the pipe barrel (approximately every three feet).

Step 8. Repair all small rips, tears, or other tube damage with adhesive tape. If the polyethylene is badly damaged, repair the damaged area with a sheet of polyethylene and seal the edges of the repair with adhesive tape.

Step 9. Carefully backfill the pipe according to the AWWA C600 standard for backfill procedure. To prevent damage during backfilling, allow adequate slack in the tube at the joint. Backfill should be free of cinders, rocks, boulders, nails, sticks, or other materials that might damage the polyethylene. Avoid damaging the polyethylene when using tamping devices.

Step 2. Dig a shallow bell hole in the trench bottom at the joint location to facilitate installation of the polyethylene tube. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe.

Step 3. Move the cable to the bell end of the pipe and lift the pipe slightly to provide enough clearance to easily slide the tube. Spread the tube over the entire barrel of the pipe. Note: Make sure that no dirt or other bedding material becomes trapped between the wrap and the pipe.

Step 4. Make the overlap of the polyethylene tube by pulling back the bunched polyethylene from the preceding length of pipe and securing it in place. Note: The polyethylene may be secured in place by using tape, string, plastic tie straps, or any other material capable of holding the polyethylene encasement snugly against the pipe.
House Services

To minimize the possibility of dissimilar metal corrosion at service connections, wrap the corporation stop and a minimum clear distance of three feet of the copper service with polyethylene or a suitable dielectric tape.
Services

- 3/4-inch type K copper
- Open Cut trench or trenchless installation
Services

NOTES:
1. 30 LF of new 6" dip watermain tapped for twenty one new copper water services to serve Mifflin Manor Apartments. (services not shown for clarity.)
Directional Drill

- HDPE
- Railroad, State Road, Stream Crossings
- Drill Logs
Directional Drill
Directional Drill
Directional Drill

• Designers need to account for rig space.
Auger Bore

- Typically DIP encased in Steel casing pipe.

- Railroad, State Road, Stream Crossings

- Drilling pit needs to be properly sized and accounted for.

- Concrete barriers around pit.
Auger Bore
Bid Form and Schedule

• Projects are bid using detailed bid schedules and pay items.

• Quantities are verified in field by full time inspection staff.

• Detailed bid Schedule tightens up bid price.
Standardized Specifications

- What materials do you and/or your client want installed.
  - Pipe Materials
  - Fittings
  - Restraint Systems
  - Valves and Valve Boxes
  - Tapping Sleeves
  - Service Lines
  - Brass Fittings and Curb Boxes
  - Meter Pits and Vaults
  - Fire Hydrants
  - Blow Offs
  - Air Release Valve and Chamber
  - Sampling Stations

- Establish standards to be carried through all projects
Construction
Mechanical Joint Assembly

- CLEAN
- LUBRICATE
- STAR PATTERN
Corporation and Curb Stop Installation

- NO PIPE WRENCHES
- T-Head should always be on side
- Round Pipe
- Clean and Remove Burrs
- Straight Pipe Coming out of Joint
- Follow the Joint Instructions for Assembly
Sources & References

1. Source 1
2. Source 2
3. Source 3
Thank you

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