



INSIGHTS

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Pipe Dreams

Selecting the Best Pipe for Your Application

Part One of Two

There are a variety of different types of piping materials to use for underground infrastructure projects. Some types of pipe materials will provide better service than others depending on the application, e.g., water main, water services, sanitary sewers, sanitary force mains, and storm sewer.



Introductions of new pipe materials, changes in pipe classifications and labeling conventions can create confusion. In this two part series we will discuss some of your options by offering our opinions about properties, advantages, and disadvantages of the various types of pipes that are commonly used in northern Michigan. We will also provide some of the common names for these pipes that may not be technically current but may still be in general use.

Water Mains and Services

Perhaps more than any type of facility, a wide variety of pipe materials have been and are currently used for water mains. These include: ductile iron (DI), polyvinylchloride (PVC), copper, high density polyethylene (HDPE), and prestressed concrete (PCCP). By far, the most commonly used pipes for water main in northern Michigan are ductile iron and PVC while copper is the most common water service material.



PVC Water Main

The table on the next page summarizes some of the characteristics, advantages and disadvantages of water main pipes.

Other materials can be used for water mains and services but they are not common in northern Michigan. These include chlorinated polyvinyl chloride (CPVC) and polybuty-



Mechanical Joint Ductile Iron Water Main

lene (PB). While no longer used, an extensive amount of cast iron (CI) and asbestos-cement (A-C or Transite) pipes are in active service throughout Michigan. These pipes are comparatively brittle and A-C pipe posed health concerns. The health concerns were not from a drinking water perspective, rather dust caused from pipe cutting and milling endangered pipe installation crews.

Water main services are usually copper, PVC or HDPE. Plastic water services are less costly and easier to install, however, they are not electrically conductive (for grounding and thawing) and some water customers are sensitive to tastes that plastic pipes (particularly HDPE) can give to drinking water.



Copper Water Service Pipe

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Sanitary Force Mains

Sanitary sewer force mains generally utilize the same materials as water mains. Often PVC and HDPE pipes are favored over ductile iron because they are much more resistant to the corrosive effects of wastewater. Because many sewage force mains operate at lower pressures than water systems, thinner walled pipes may be used.



Prestressed Concrete Water Main (PCCP)

The second part of this newsletter will discuss piping materials for sanitary and storm sewers.

For more information about piping materials, contact Clyde Johnson, P.E. at Gosling Czubak Engineering Sciences, 800-968-1062.

Water Main Material Comparison



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Material	Available Sizes	Common Standards & Classifications	Fittings	Corrosion Resistance	Service Taps	Advantages	Disadvantages	Comments
Ductile Iron (DI)	4" to 64"	AWWA C151 Pressure Class 150 to 350 & Class 50 & 52. Also available in Class 53 to 56	Ductile Iron	Moderate	Usually direct tapped	Sturdy, rigid pipe. Electrically conductive (grounding & thawing)	Heavy. More costly than plastic pipes. Can corrode	Considered the standard for water mains by some. Available in variety of joint types with Class 50 and 52 the most commonly used. Pipes have cement lining to resist corrosive water. Can be wrapped in polyethylene sleeves in corrosive soils
PVC	4" to 24"	AWWA C900 & C905, DR-18. Also available in DR-14 and DR-25	Ductile iron	Very Good	Most water systems use tapping saddles	Less costly & lighter (easier to handle) than DI. Uses DI fittings. Has the same O.D. as ductile iron	Not electrically conductive. Pipe should be carefully bedded and backfilled	With DI, DR-14 and DR-18 are the most commonly used water main materials. Available with fusion welded joints for directional bores
PVC	½" to 63"	ASTM D1785, Schedule 40 & 80. ASTM D2241, SDR-21 & SDR-26	PVC	Very Good	Tapping saddles or sleeves are used	Less costly & lighter weight than C900 or C905 PVC	Not electrically conductive. Pipe should be carefully bedded and backfilled	Often used for sewage force mains and water services
HDPE	½" to 65"	AWWA C906 DR-9 & DR-11	HDPE, PVC & DI (adapters required)	Very Good	Most water systems use tapping saddles	Sturdy, heavy walled plastic pipe. Can be fusion welded in long lengths	Requires adapters for fittings and transition pieces for connection to other types of pipes	Fusion welded joints. Often used with directional bores
Prestressed Concrete (PCCP)	16" to 144"	AWWA C301	Prestressed concrete specifically made for each project	Good	Usually not tapped for services	Very sturdy. Considered by many to be the finest water main pipe	Heavy and very costly to purchase and install. Connections to differing pipe types is laborious and costly	Usually used for major transmission mains
Copper	½" to 6"	ASTM B88 Type K	Brass compression or flared type	Good	Commonly used for services	Electrically conductive	Costly. Jointing can take longer than plastic services	Considered by some to be the standard for water services

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