Pipe-Manhole Connections

Debunking the Myths on Designing a Truly Water-Tight Seal

Regardless of the manufacturer or material being used, all gravity sewer pipe used for both storm and sanitary applications share three things in common:

- The pipe must serve as a conduit to allow the conveyance of liquids.
- The structural integrity of the pipe must not be compromised.
- All sewer pipe must connect to a concrete manhole structure.

This article will focus on the last point and debunk the myths and misperceptions that municipal engineers and designers hold in regards to different connector options.

Water-tight Connections:

1. Rigid Pipe – Concrete to Concrete

   The connection between a concrete pipe and concrete manhole is ideal because the manhole, the pipe, and the grout are made from the same material. A rough-cut hole connection for a manhole is formed during production, before the concrete has cured. Using a high pressure water stream, the outline of the hole is made by blasting away the dry-mix concrete and exposing the steel reinforcement. Once the manhole barrel arrives on site, it is placed in the trench where the contractor will then cut the exposed steel and remove the “coupon”; this exposes a rough surface which provides more contact area for the grout to take hold. The concrete pipe is then aligned in the hole and grouted in place, creating a water-tight seal.

2. Flexible Pipe – Plastic to Concrete

   Myth: There’s no issue grouting flexible pipe to a manhole structure.

   Reality: Flexible pipe should not be grouted into place as you are creating a fixed connection between a rigid manhole and a flexible pipe. Over time, these two structures will settle at different rates and create a separation at the connection, compromising the water tight seal. It’s not a matter of if, but when it will happen. Furthermore, flexible pipe is designed to deflect and shed load to the surrounding soil which is prohibited when it is grouted into place. Like many municipalities in Canada, the City

Differential settlement has caused this grouted flexible connection to separate.

of Edmonton has made it mandatory to have a resilient connector for flexible pipe to manhole connections, as per ASTM C923. Complying with this standard will help to eliminate misalignment and leakage between the pipe and manhole.

Value Engineering:

Myth: The cost difference of the various manhole-pipe connections is negligible.

A smooth cored hole with a booted gasket connection is a water-tight design for flexible pipe.

Reality: Rough cut holes in manhole barrels require very little labour and no specialized equipment so it's relatively inexpensive to make. The average cost for a rough-cut hole is around $200, regardless of size.

For flexible pipe, coring a smooth hole and installing a boot is much more labour intensive and takes a significant toll on the coring bit being used. The cost is also highly dependent on the size of the core and the wall thickness of the manhole; costs for cores range from $400-$4000 or more and booted connectors can range from $100-$300. That's an added cost for every 20-30 metres of pipe!

Myth: Allowing the contractor to core their own holes on site is always fine; come on, it's concrete!

Reality: It is always recommended that the manhole design be done by a consulting engineer and confirmed by the precast concrete supplier. This helps to prevent a scenario where the structure of the manhole is compromised due to incorrectly coring or cutting holes on-site. This is especially important when a manhole barrel has multiple connections in it. Proper hole spacing is key in helping to preserve the integrity of the structure. Coring on site is acceptable so long as the producer confirms the size and location beforehand.

Barrels are specially designed for each project to ensure the cores don't impact the structural integrity of the manhole.

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