

# **GUIDE TO GROUTED CONCRETE-TO-CONCRETE CONNECTIONS FOR SOIL TIGHT APPLICATIONS**

## Guide To Grouted Concrete-To-Concrete Connections For Soil Tight Applications

### INTRODUCTION

Drainage and sewage conduit systems comprising pipe and connecting structures, such as catch basins and manholes, are underground networks that provide critical infrastructure to convey stormwater and wastewater to designated points. These systems need to be structurally sound, hydraulically adequate, soil tight or watertight depending on the application, sustainable and durable to meet design expectations. For the system to function as intended *it is important for each component of the system to operate in accordance with design.*

These conduit systems have pipelines connected at junction points using structures sized to accommodate the various pipe diameters and intercepting pipe angles while also allowing access for inspection and maintenance. Precast concrete structures, both circular and rectangular, provide excellent structural strength, durability and design flexibility.

This guide focuses on one key aspect of the system – the connection of the precast reinforced concrete pipe to the precast concrete structure when that connection is made using hydraulic cement grout conforming to ASTM C1107. The information presented in this document provides guidance for opening sizing and grouting procedures for precast reinforced concrete pipe connections to precast structures. This guide is not recommended for use with thermoplastic pipe-to-concrete structure connections.

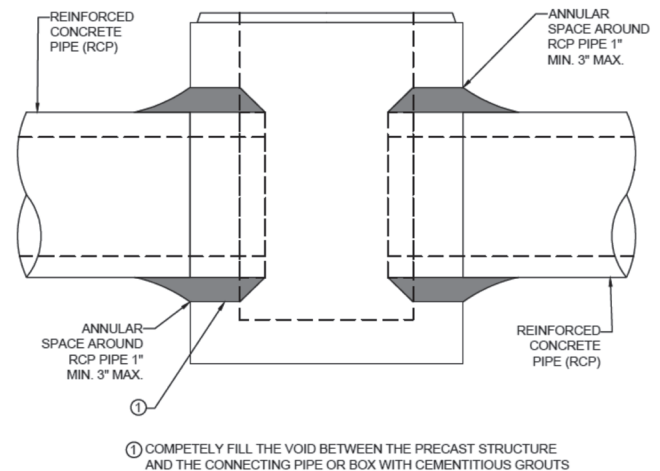


Figure #1

### INSTALLING THE PIPE:

Minimum cast or cored opening for pipe O.D. (O.D. +2") (See figure #1)

Maximum cast or cored opening for pipe O.D. (O.D. +6") (See figure #1)

When installing or inserting pipe into a cored or cast opening, the pipe should be centered in the opening. Do not lay the pipe on the bottom of the penetration; doing so will prevent the hydraulic cement grout material from being packed between the bottom of the O.D. of the pipe and the bottom of the penetration. Instead, elevate the pipe in the cored or cast opening.

Elevating the pipe in the cored penetration can be accomplished in many ways, including placing a sufficient amount of preformed flexible joint sealant between the bottom of the O.D. of the pipe and the structure. This will allow for grouting material to be installed evenly around the entire outside diameter of the pipe, thus filling the

recommended 1" - 3" annular space. The preformed flexible joint sealant material will become encased in the grout. Make sure to thoroughly compact the bedding and foundation of the connecting pipe in accordance with the pipe manufacturer's instructions to minimize differential settlement between the pipe and the structure.

### **GROUT SELECTION AND INSTALLATION:**

Grouting should be accomplished by employing a hydraulic cement grout that conforms with ASTM C1107. The substrate surfaces should be clean, dry and prepared in accordance with the grout manufacturer's recommendations. Additionally, the grout should be mixed and installed in accordance with the manufacturer's recommendations. The compressive strength of the grout shall be per the contract plans and/or specifications. Follow grout manufacturers' specified recommendations for proper curing prior to backfilling the pipe and structure.

### **ADDRESSING EXCESSIVE ANNULAR SPACE:**

If the recommended annular space around the outside of the pipe wall exceeds the guidance above, then great care and attention should be given to creating a consistently placed flow of hydraulic cement grout so that the entire pipe is evenly grouted in place. Situations such as field cut openings that create irregularly shaped holes may cause the space between the pipe and structure to be excessive.

In that situation, one of the following procedures, as approved by the engineer, may be used:

- Create a form that is placed against the inner or outer wall of the structure that is tight and true. From the non-formed side of the structure, place the hydraulic cement grout with a consistency that is dry enough to be stacked and consolidated properly into the hole. Finish the patch around the pipe in a workmanlike manner.

- Anchor dowels into the annular space before packing it with hydraulic cement grout.
- Other procedure approved by the engineer.

**Broken brick, waste rubble or other waste materials or site aggregate shall not be used to fill an overly large space around a pipe to be grouted.**

### **WATERTIGHT APPLICATIONS:**

In the event a watertight connection is desired, there are options available. Please contact sealant/water stop suppliers for recommendations. The procedures describe in this document are typically not sufficient to create a watertight connection.

### **SUMMARY**

Precast concrete is inherently a natural, durable and versatile material. When properly designed and produced, precast concrete products are capable of near maintenance-free performance for the duration of their design life.

The information presented in this document provides a quick and easy reference for opening sizing and grouting procedures for precast reinforced concrete pipe connections to precast structures. The ultimate connection design is the responsibility of the engineer, who must ensure the proper grouting requirements.