

MANHOLE CORING AND PENETRATIONS

When it comes to openings in precast concrete manholes, it's important to take into account a variety of factors in order to make a decision on which practice works best for your plant. Whether you are building a new plant and trying to decide which method to use or have an existing plant and want to determine if your current method is the most efficient, concrete mix design, aggregate type and plant layout all must be considered.

Providing holes for pipe connections in precast concrete manhole sections can be achieved by several methods, and each requires careful consideration before making the investment in training and equipment.

SCORED HOLES:

For dry-cast operations, holes may be scored using high-pressure water or air, or by hand-chiseling the fresh, uncured concrete. These are non-precision holes and should be limited to storm structures and grouted pipe connections where watertight connectors are not essential. When watertight penetrations are required on a dry-cast product, the use of a positive-seal gasket is required which requires coring or forming equipment to properly create a satisfactory penetration.

CORED HOLES:

Perhaps the biggest benefit of coring holes is the reduction in production lead times. The ability to core holes in blank stock bases and riser sections to achieve one- or two-day turnaround times can be a huge advantage. Before spending the capital on expensive coring equipment, though, ask the question: Do I need to turn product around in one day? Due diligence by

the designer, the contractor and the precaster can eliminate the need for short lead times. Of course, there will always be emergency situations and having the ability to core holes can be an advantage. It should also be noted, though, that short turn-around times don't necessarily mean better production efficiencies due to handling the product multiple times.

Initial set up of a coring machine and core bits can be expensive. However, once you have acquired all of the bit sizes you need they can be used for virtually any wall thickness and for both round and flat wall products. Aggregate type and density may be a factor in the life expectancy of your core bits and consideration should be given to the type of aggregates used in your geographic area. A residual waste plan should be implemented as well to handle the blanks and waste water associated with coring.

FORMED HOLES:

Formed holes can be broken into two categories: resilient connectors (flexible compression or boot connections) and grout-in or non-booted connections. Resilient connectors require the use of either a precision-molded, low-draft tapered hole former or a two-piece mandrel to hold the compression connector in place during casting. Forming holes during the casting operation eliminates the residual waste of coring and if a cast-in resilient connector is employed it eliminates the secondary operation and quality control (QC) procedures of installing the connector within the hole.

Connector placement is critical and requires proper production and QC attention. When using a low-draft tapered hole, placement of the connector is

sensitive, with too little or too much pressure on the expansion band possible. Most manufacturers offer an optional, ratchet-style expansion band that allows unlimited adjustments. Initial cost for forming holes is typically less than that of coring equipment and core bits; however, hole formers are required for each manhole diameter and for each hole size. Hole formers are available in various materials such as steel or fiberglass. They are available in all shapes to accommodate arched, elliptical, and box connections, as well as parallel formers to provide for offset connections – holes not intersecting perpendicular to the centerline of the manhole wall – in circular lift station applications.

All hole formers should be inspected on a regular basis and replaced or repaired as necessary. Use the NPCA Quality Control Manual to guide all equipment checks, including Standard 6.3.3.3, Dimensional Checks. Attempting to use a hole former beyond its useful life could lead to unnecessary repairs and/or product not meeting specifications.

GENERAL PRODUCTION AND HANDLING CONSIDERATIONS

When handling manhole products, daily wear and tear on equipment such as overhead cranes and lift trucks, as well as labor hours involved, need to be considered. When forming the holes, the base or riser section is ready for shipment and typically only requires one “touch” or “pick.” When coring the product, movement to and from production, storage, coring and possible pouring and forming of the invert can lead to three or four picks. This can also lead to a higher risk for damage during handling. This cost may be off-set by a dry-cast operation where mass production with little labor is required. Plant and yard size and layout should be considered as well.

Some manufacturers may use coring to their

advantage by not coring the holes and inverting the base until the contractor is ready to prevent unused product due to changes. When managed properly, this can reduce “bone yard” inventory and avoid confrontation about unused product.

Some specifying agencies require additional steel around the hole. If coring is used, extra time will be needed to mark the location of the added steel. This also eliminates precasters’ ability to stock blank bases or risers. When using hoop steel, design requirements under ASTM C-478, Section 14.5, must be followed and a second inventory with wire fabric cage or other acceptable reinforcement is needed for coring.

SUGGESTED PRACTICES:

When manufacturers have the capability of both coring and forming, they might consider forming the hole for the outlet pipe in all base sections. They can stock the blank bases with holes formed for the more common pipe sizes. If a larger connection opening is needed, they can simply core over the smaller hole. This will add to the life of the core bits.

CONCLUSION:

The decision on how to create openings in precast manholes is unique for each plant and requires specific equipment and attention to detail to ensure quality product. Whichever process is chosen, quality control procedures should always dictate that holes are the right size, free of burrs or defects and in the correct location.