TRENCHLESS TECHNOLOGY CENTER

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LEAK TESTING OF COMPOSITE MANHOLE LIDS

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Table of Contents

1. BACKGROUND.....3
2. LEAK TESTING 3
3. CONCLUSION AND CERTIFICATION.....6

1. BACKGROUND

The Trenchless Technology Center (TTC) at Louisiana Tech University was contacted by CAP (Composite Access Products) to perform testing for a comparison of its 24” and 30” composite polymeric manhole lid versus a typical cast iron manhole lid for inflow leakage. The AS3996 testing procedure provided to the TTC was used to carry out the leakage testing. The setups and results and described below.

2. LEAK TESTING

The leak testing was performed on April 19, 2023 in a water tank apparatus owned by the TTC capable of containing up to 12-inches of water head above the lid. Before placing the manhole ring and cover in the water tank, a gasket was placed on the base of the tank to prevent water from migrating beneath the ring (Figure 1).

Figure 1: Leak Testing Apparatus

Both the 24 and 30 inch manholes were then placed in the water tank and centered on top of the gasket. The lid was then tightened in place and the tank was filled with water to approximately 150 mm above the top of the manhole. The level of the water was maintained for 10 minutes while the leakage was measured. The test was then carried out with the two bolts removed, followed by all bolts removed.

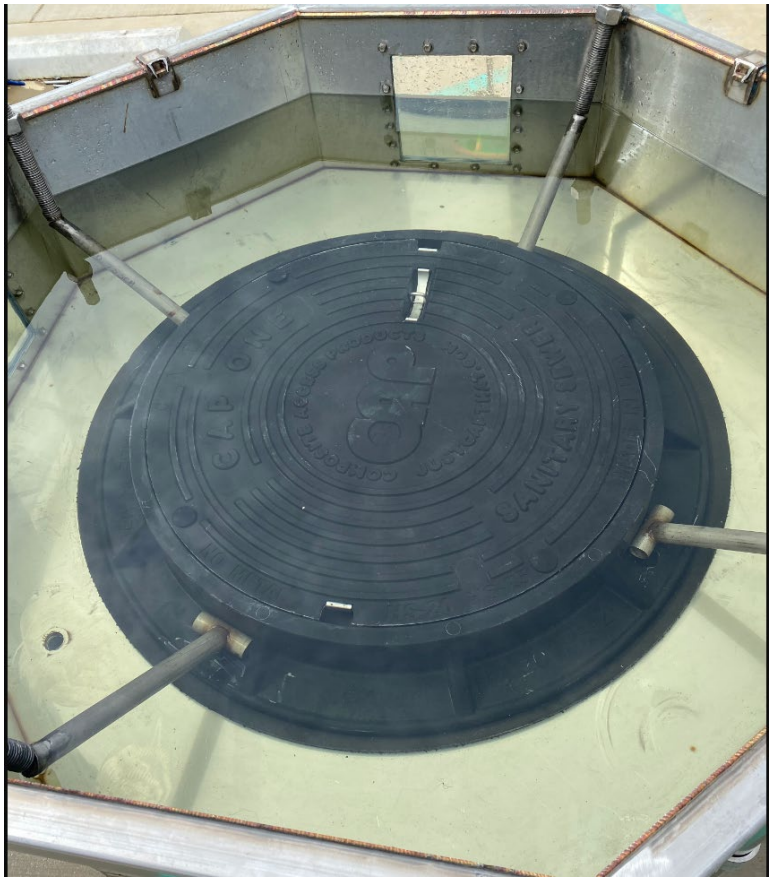

Figure 2: Leak Test at 150 mm

The table below represents the total leakage over a 10 minute period for both size manholes.

Leakage Data		
Bolts Removed	Flow Rate (gal/min)	
	24-inch	30-inch
0	0	0

Table 1: Flow Rate Data

The table confirms that there was no leaking from the manhole when the AS3996 testing procedure was followed.

A secondary leak test was performed out of curiosity. The same procedure was followed with a set number of bolts removed in each test. It should be noted that the dirt shield covers were not covering the holes of the bolts that had been removed.

Leakage Data		
Bolts Removed	Flow Rate (gal/min)	
	24-inch	30-inch
2	1.174	0.92
4	2.4855	4.8345

Table 2: Flow Rate Data (Bolts Removed)

The data shows that the 30-inch manhole leaked at a slightly lower flow rate than the 24-inch cap when there were two bolts removed but was larger when 4 bolts were removed. These discrepancies could be linked to gasket placement under the bolt holes on the sample.

For comparison, a cast iron manhole had been previously tested in a similar manner except for the duration (See Figure 3). Since the flow through the lid was so fast, the test was conducted over the course of 60 seconds rather than 24 hours. To prevent immediate leakage through the lid during water filling, a thin plastic sheet was placed over the lid and then removed prior to leak testing.

Figure 3: Cast Iron Ring & Lid Placed in the Water Tank

The manhole leaked very rapidly over the course of 60 seconds. The test was performed three times and each time between eight and 10 five-gallon buckets were filled with water. This is a leakage rate of approximately 45 gallons per minute on average (Figure 4).

Figure 4: Cast Iron Ring & Lid Leak Test

3. CONCLUSION AND CERTIFICATION

The leak testing done at the TTC showed the CAP system performed much better than a typical cast-iron manhole lid even without bolts. The 24-inch CAP lid only leaked between 1-2.5 GPM with all four bolts removed, and the 30-inch CAP lid only leaked between 1-5 GPM with all four bolts removed. The cast iron lid leaked approximately 45 gallons per minute.