Testing of Zurn Trench Drains

We tested two trench drain models, the Z-888-18 HI-CAP and theZ-888-36 HI-CAP. The 18-HI-CAP is shown in cross section in Figure 1 and the cross section of the 36-HI-CAP is provided in Figure 2. The as-cast length of both drains was 6 feet 8 inches.

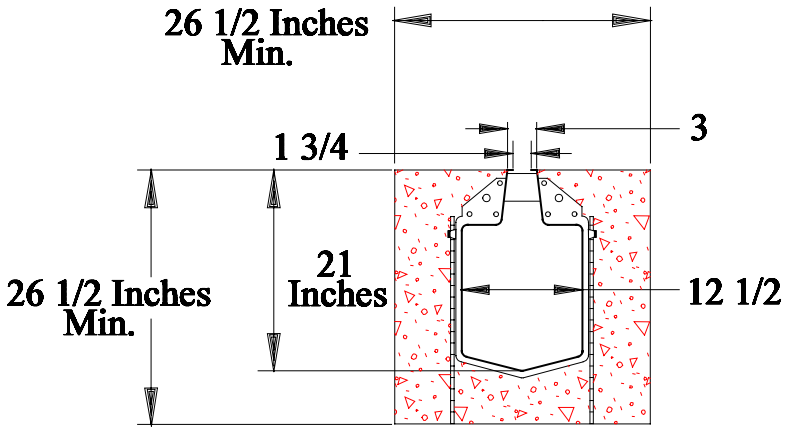

Figure 1

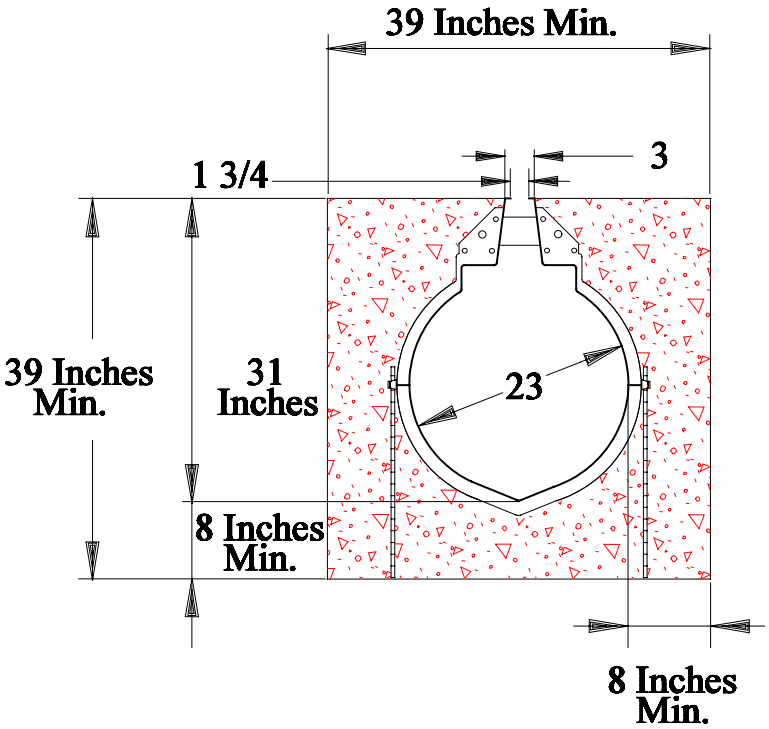

Figure 2

The test setup is shown in Figure 3 and Figure 4. The drain was place in the center of a sand filled box stiffened at mid-height with threaded rods acting as tiebacks. The box was 10 feet long, 6 feet wide and contained compacted sand 2 feet deep.

Figure 3

Figure 4

The sand was compacted from the surface with a walk behind vibratory compactor. The purpose of the sand box was to provide realistic support conditions for the trench drains. Previous testing had been conducted using two supports similar to a beam test. These discrete supports were believed to impose a more severe stress condition than these drains would experience in the field.

To simulate the worst case loading anticipated, a neoprene pad was cut down to a 10-inch by 20-inch rectangle to simulate the AASHTO LRFD Bridge Design Specifications for a wheel load. It was determined that for acceptance the drain would be required to resist, without visible cracking, a load of

1.7 * 1.3 * 16 kips = 35.36 kips

where:

1.7 is the AASHTO LRFD Live Load Factor
1.3 is the AASHTO LRFD Live Load Impact Factor
16 kips is the AASHTO LRFD specified wheel load

The load was applied by an MTS hydraulic actuator. Figure 5 shows the neoprene load pad along with the steel plates that were used to distribute the load.

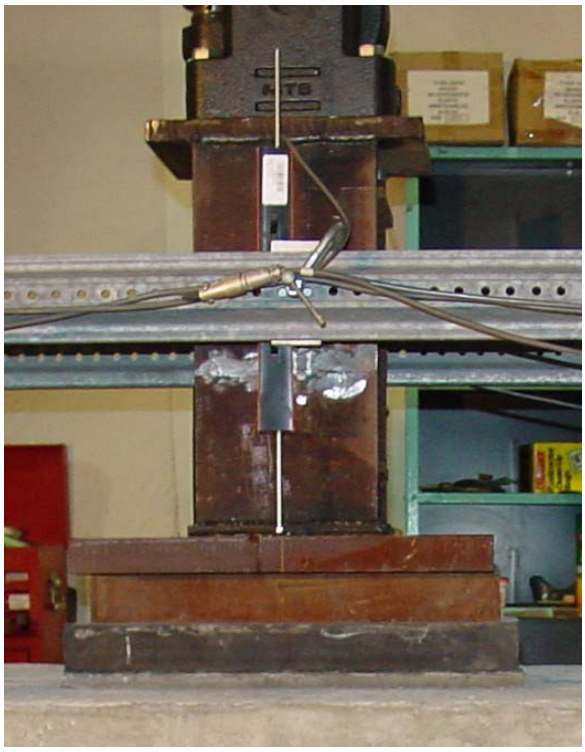

Figure 5

The drains were loaded with the load pad centered over the grate and offset as well as placed at the end. The three pad locations are shown in plan view in Figure 6.

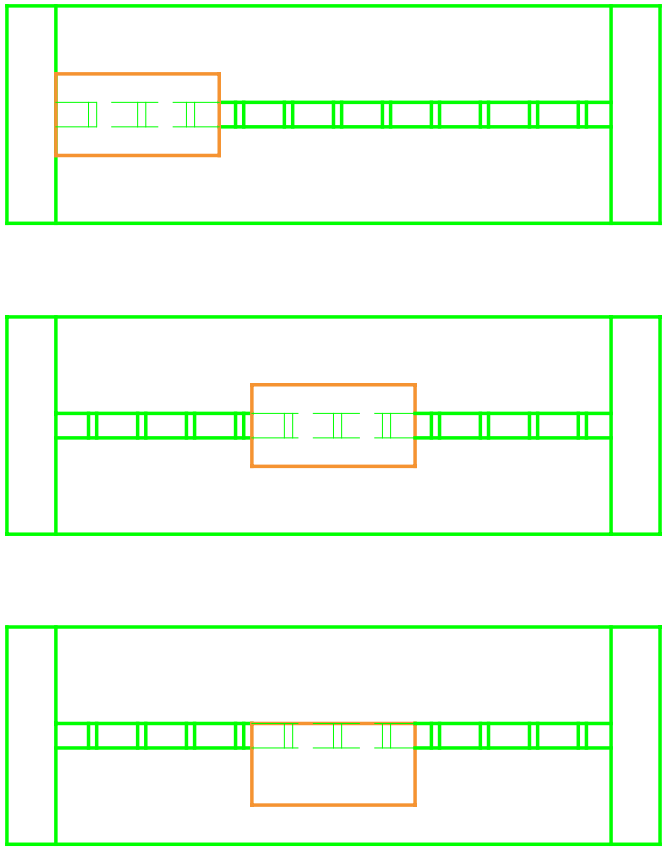

Figure 6

The maximum capacity of the load actuator was 50 kips. In all tests the load was applied at a rate of 0.5 kips per second to the maximum of 50 kips. In none of the tests did any of the drain structures show any visible distress or cracking.

The concrete used to construct the drain structures was a Florida Department of Transportation Class I mix with a required f'c at 28 days of 2500 psi. The mix provided specified 379 pounds of cement, 110 pounds of fly ash and 263 pounds of water per cubic yard. In all cases this mix exceeded the specified minimum strength in less than10 days after casting. The lowest concrete strength for a drain structure at the time of testing was 3150 psi. For some tests the concrete strength exceeded 4000 psi at the time of testing.

As stated before the trench drains performed well to the extent that their capacity exceeded the required capacity by at least 40 percent. How far beyond this load they are capable of sustaining was not determined. The drains were not tested under fatigue and they were not tested with the grates that would be required where traffic is expected. It is anticipated that the grates could provide additional structural capacity and therefore no detrimental structural impact would be expected with the use of the grates. Based on the results of these tests, it can be concluded that both of the trench drains evaluated are structurally adequate for use with normal traffic conditions.