STATIC LOAD TEST ON LADTECH'S HIGH DENSITY POLYETHYLENE MANHOLE ADJUSTING RISER RINGS ON COMPACTED CLASS 5 AGGREGATE BASE MATERIAL

AET Project No. P-0046496

Date:
September 23, 2025

Prepared for:

LadTech
902 Barton Avenue NW
Buffalo, MN 55313

Geotechnical ● Materials
Forensic ● Environmental
Building Technology
Petrography/Chemistry

American Engineering Testing
550 Cleveland Avenue North
St. Paul, MN 55114-1804
TeamAET.com • 800.792.6364

SIGNATURE PAGE

Prepared for

LadTech
902 Barton Avenue NW
Buffalo, MN 55313

Attn: Lindsay Schmidt and Dwight Wiedrich

Project Manager

P. Randy Tufts, P.E.
Principal Engineer
rtufts@teamAET.com

TABLE OF CONTENTS

1.0 INTRODUCTION

LadTech, Inc. (LadTech) designs and manufactures High Density Polyethylene (poly) manhole riser rings. LadTech asked American Engineering Testing, Inc. (AET) to perform a static load test in general conformance with the H-25 rating in AASHTO M306-10 specification on a configuration of HDPE riser rings placed on compacted MnDOT specified Class 5 aggregate base material to measure for permanent deflection.

2.0 METHODOLOGY

LadTech provided AET with a cast-iron manhole frame and cover, two ¼-inch high HDPE riser rings, and two 4-inch-high HDPE riser rings. This manhole frame and riser rings is referred to as the *riser assembly* or the *assembly* throughout this document. The nominal diameter of the riser assembly was 36 inches outside diameter and 27 inches inside diameter. The load test occurred on September 12, 2025, at the AET facility in Saint Paul, MN.

The riser assembly was assembled on 8-inches of compacted virgin MnDOT specified Class 5 aggregate base material (aggregate base), compacted to 100 percent of a Standard proctor value, which was supported by a steel plate. The manhole assembly was centered within a 4-foot-by-4-foot wood box, which confined the aggregate base. Figure 2.1 shows the riser assembly and aggregate base.

Figure 2.1: HDPE riser rings and casting on top of Class 5 Material

The cast-iron frame base was matched to the HDPE riser ring footprint, and the cast-iron cover was set into the frame. This is illustrated in Figure 2.2.

Figure 2.2: Riser rings on compacted Class 5 and cast-iron frame and cover

A 32-inch-by-32-inch steel plate was centered on the cast-iron manhole cover. A ram, spacer, and load cell were centered on the steel plate and connected to a hydraulic jack. The ram reacted off a steel reaction frame. The load cell was connected to a monitor that showed the load imparted on the assembly by the ram. The load was applied to the ram by a hydraulic jack. Figure 2.3 shows the components of the load test.

Figure 2.3: Riser ring assembly surrounded by load frame, bearing plate, load cell, spacer, deflection gauges, load-cell monitor, and hydraulic jack

Two deflection gages were stationed on the steel plate and measured deflection in the assembly. The deflection gauges were labeled:

a. North Gauge
b. South Gauge

Figure 2.4 shows the labeled deflection gauges. North indicates the gauge closest to the north side of the load frame. South indicates the gauge closest to the south side of the load frame.

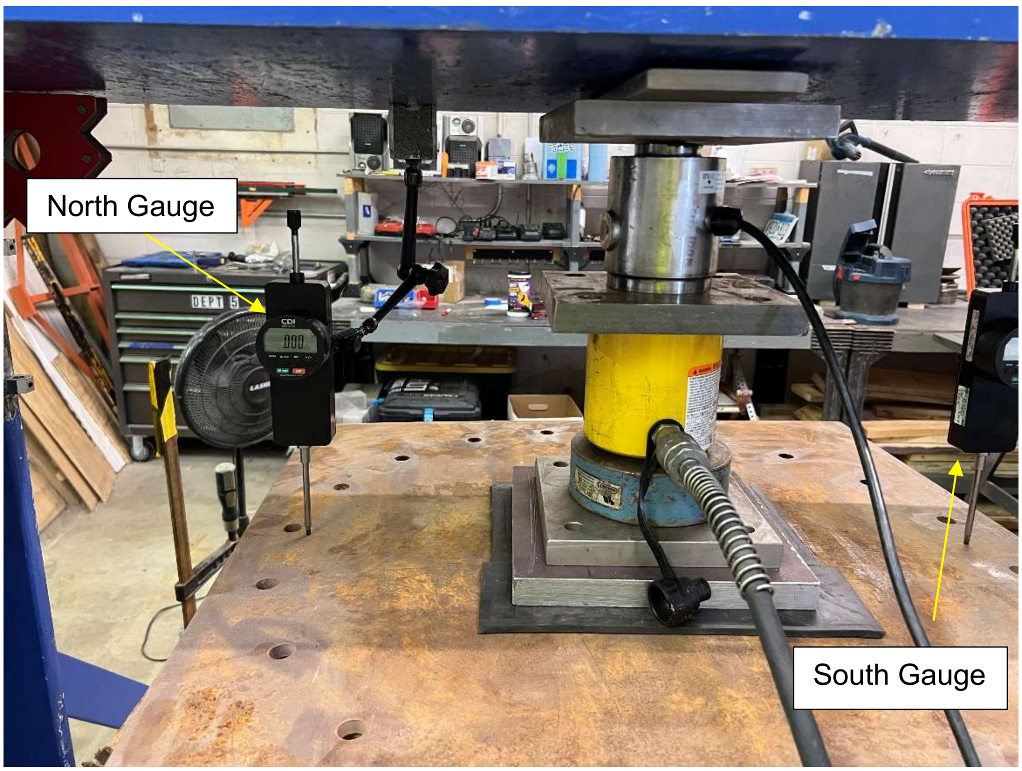

Figure 2.4: Labeled deflection gauges

A vertical load was imparted to the plate by a ram connected to a hydraulic jack. The load on the jack was controlled by a hydraulic pump operated by AET. The load imparted on the plate was measured by a load-cell that was connected to a monitor that indicated the applied load.

AET placed an initial load of 1,000 lbs. on the riser ring assembly to seat the load-cell. The load was removed, and the deflection gages were returned to zero. Load was applied to the riser assembly by the hydraulic jack at a rate between 100 lbs/sec and 1,000 lbs/sec up to 50,000 lbs. The 50,000 lbs. load was maintained for 1 minute and then released. The assembly was allowed to rest while the assembly equilibrated. After this waiting period, deflections were recorded. A final deflection reading was recorded to be 1/16-inch of permanent deflection. The assembly was disassembled so that AET could observe the riser rings for damage or permanent deformation.

3.0 RESULTS

The North and South Deflection Gauges measured an almost equal amount of deflection of 1/16-inch. The riser assembly was disassembled and AET inspected the two HDPE risers for permanent deformation or signs of damage. There was no observed perceptible permanent deformation.

4.0 CONCLUSION

AET load tested an HDPE riser rings and cast-iron manhole frame assembly. AET applied a 50,000 lb. vertical load to the unconfined assembly and measured permanent deflection. Deflection directly over the HDPE riser rings and cast-iron-frame was approximately 1/16-inch. This is less than the maximum allowed deflection of 1/8-inch of permanent deflection which means that the ring assembly meets the design requirements.

Following the static load test, the assembly was taken apart and the individual riser rings were inspected for signs of deformation or permanent deformation. AET did not observe any permanent deformation on the riser rings.

AET conducted similar load tests for LadTech in 1999 and 2010 including static load testing of several diameter riser assemblies, a cyclic load test, and load tests in high and low temperature environments, and load tests in confined environment. This load test was completed where the risers were in an unconfined environment. The unconfined environment was a base of compacted MnDOT specified Class 5 aggregate base material, which is the condition under which the riser assemblies perform in some field conditions. AET performed a static load test in general conformance with the H-25 rating in AASHTO M306-10 specification on a configuration of HDPE risers on compacted MnDOT specified Class 5 aggregate base material to measure for a permanent deflection of less than 1/8-inch and the assembly met the design requirements for these criteria.