Bureau of Material and Physical Research
Illinois Laboratory Test Procedure
Effective Date: April 2, 2012

Plastic Manhole Steps

This test procedure applies to Article 602.08 of the Standard Specifications for Road and Bridge Construction (current year issued).

1.0 SCOPE

1.1 The purpose of this procedure is to determine the impact resistance on a cast iron and/or plastic manhole step under specific conditions.

2.0 REFERENCE DOCUMENTS

2.1 AASHTO M 199 /ASTM C 478

2.2 ASTM C 497

3.0 PROCEDURE

3.1 The Bureau of Material and Physical Research will evaluate the effectiveness of cast iron and/or plastic coated manhole steps.

4.0 Number of Test Specimens

The Manufacturer shall provide a minimum of six (6) steps for impact testing to be considered for approval.

5.0 TESTING APPRATUS

5.1 A length of 8 *ft* (2.4 m*)* smooth metal rod suspended from the ceiling by a chain shall be used.

5.2 *Placement of Steps*

5.2.1 The manhole legs are inserted into 2 PVC pies having the nominal inside diameter of 3 in. (76 mm) and the length of the pipe shall be equal to 3 in. (76 mm).

5.2.2 The manhole legs are placed in the middle of the pipes and cast with high strength gypsum.

5.2.3 Fill in the PVC pipes with gypsum. The gypsum should cover the legs of the step at the point where it would be inserted into the manhole. Ref to Fig 1.

5.3 *Drying time*—The drying time and conditions of the specimens shall be 24 ±2 hours at 77±3° F (25±1.8° C).

5.4 The manhole step is attached into a 1 in. (25.4 mm) metal plate holding fixture of sufficiently strength to preclude any bending of the attachment and rung over the length of the attachment. Ref to Fig 2a-c.

5.5 *Tup* —The mass of the tup shall be 10 lbs**.**

5.6 *Tup Drop*

5.6.1 The tup shall be of sufficient length to provide for a fall of 7 *ft (2.1 m).*

5.6.2 Care must be taken to ensure that the tup falls freely; it must not "chatter" down the metal rod.

5.6.3 Impact each specimen only once

6.0 CONDITIONING

Three (3) steps with high strength gypsum are conditioned to 77±3° F (25±1.8° C) for 24±2 hours. Impact testing shall be performed after conditioning. Visual inspection shall be performed when completed.

Acceptance Criteria: No visual distress of reinforcement bars from impact.

7.0 COLD TEMPERATURE CONDITIONING

Three (3) steps with high strength gypsum are conditioned to 0±3° F (-17±1.8° C) for 24±2 hours. Impact testing shall be performed after conditioning. Visual inspection performed when completed.

Acceptance Criteria: No visual distress of reinforcement bars from impact.

8.0 TEST SPECIMENS

(1) Hold the rod perpendicular to the step and raise the tup to a distance of 7 *ft* (2.1 m) above the specimen, (2) release the tup allowing it to fall freely on the top side of the step tread and, (3) catch the tup on the first rebound. The impact force of the tup shall be 70 ft-lbs. Ref to Fig 3 for set up.

Acceptance Criteria: No visual distress of reinforcement bars from impact. No sign of shattering, cracking or splitting on the inside or outside created by the impact that is visible to a person with normal or corrected vision.

9.0 REPORT

9.1.0 The report shall include the following:

9.1.1 Complete identification of manhole step including source, model number, Size, average dimensions and color

9.1.2 Test temperature and conditioning procedure

9.1.3 Types of failure and any deformation observed

9.1.4 Date of test

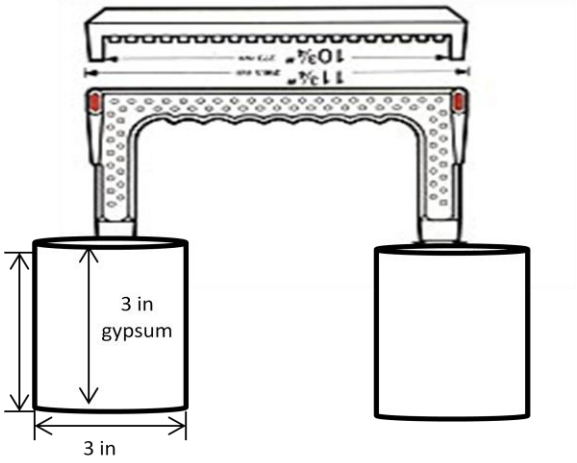

Figure 1. Manhole step with gypsum

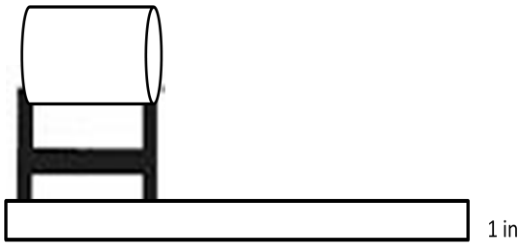

Figure 2a. Side View of Holding Device

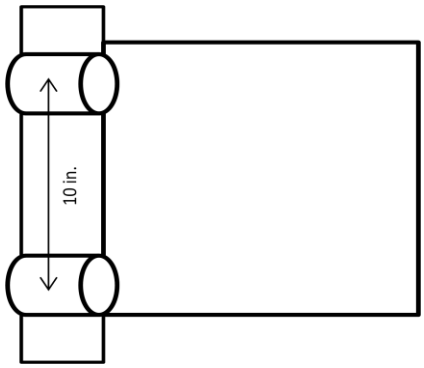

Figure 2b. Top View of Holding Device

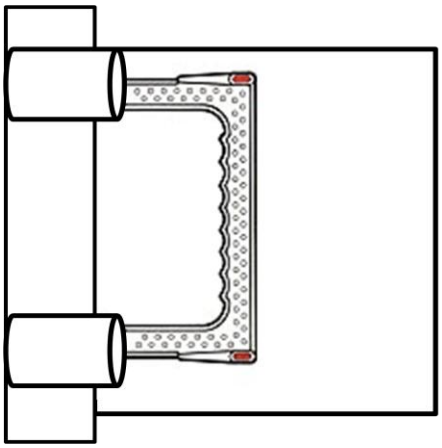

Figure 2c. Manhole Step Device

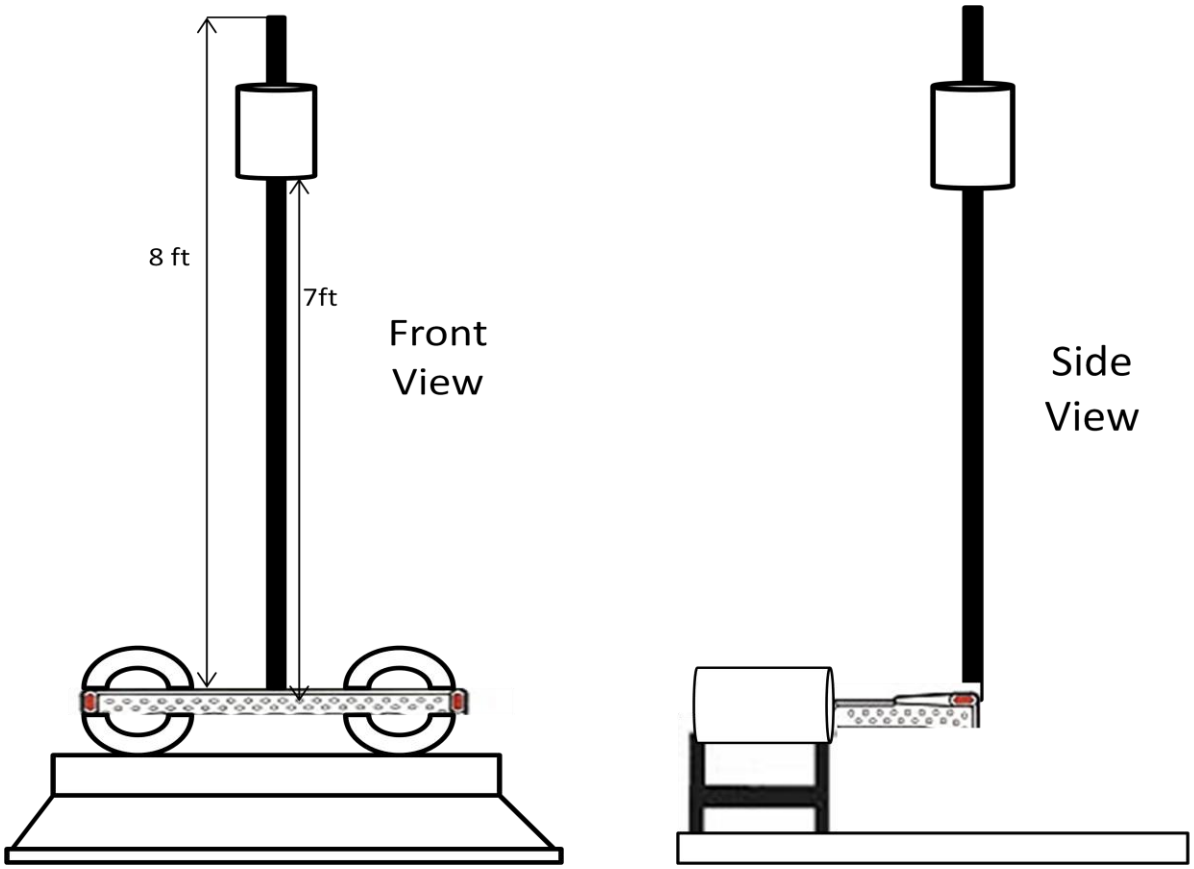

Figure 3. Set up Manhole Step Device