Method A: Measuring the Depth of HIPR by Difference in Elevations

a. SCOPE

This test method describes the procedure for determining the depth of HIPR.

b. APPARATUS

b.1. Miscellaneous spoons, brushes, shovels and spatulas

b.2. Engineers level

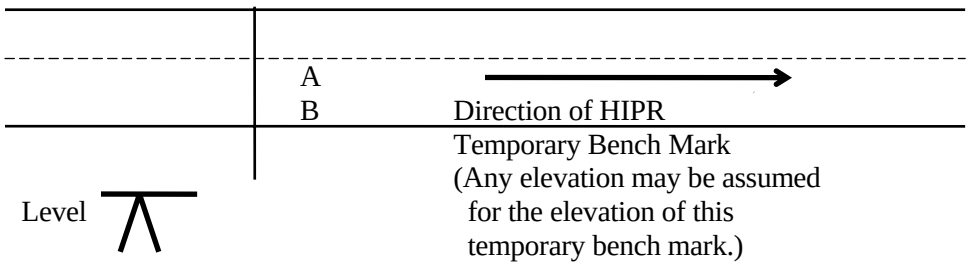
b.3. Level Rod

b.4. Equipment for reference elevation points (cloth or steel tape, rope, string, etc.)

c. TEST PROCEDURE

c.1. Before heat application, obtain initial roadway surface elevations to the nearest 0.005 ft (1 mm) at two or more points (See Figure 1). These points shall be established on a line transverse to centerline. These points shall be referenced so they may be re-established after the HIPR Process and before the compaction process.

Figure 1. Example for Establishing Points and Elevations.



A, B.... Elevation Points - randomly vary their location across the roadway. Check a minimum of 2 points.

c.2. After HIPR, re-establish the original elevation points. Below these points; remove the HIPR and overlay, if any. Care shall be taken to remove only the new overlay and/or HIPR.

c.3. Re-establish the original elevation points and determine the final elevation at the bottom of the HIPR.

d. CALCULATIONS

d.1. Calculate the average depth of HIPR using all elevation points at this transverse location.

e. REPORTING

e.1. Report the average depth of HIPR for each transverse location to the nearest 0.01 ft (5 mm).

f. FREQUENCY

f.1. Tests will be performed at the frequency necessary to control the production rate.

f.2. Rate of 3 per hour (initial hour of each day's operation)

f.3. Minimum rate of 1 per hour remainder of day.

Method B: Measuring the Weight of HIPR by Unit Area

a. SCOPE

This test method describes the procedure for determining the weight of HIPR of a required area.

b. APPARATUS

b.1. Miscellaneous spoons and brushes.

b.2. A 12 in (300 mm) square template.

b.3. Sample pans

b.4. A balance with a capacity of at least 25 lb (12 kg), conforming to AASHTO M 231 Class G 5.

c. TEST PROCEDURE

c.1. Place the 12 in (300 mm) square template on the HIPR. Press downward and tap the sides until the template is fully seated, completely through the uncompacted HIPR.

c.2. The HIPR confined by the template shall be carefully removed by spooning into a container. A brush with stiff bristles may be used to gather all loosened material. Care should be taken to preserve all particles and to remove only particles dislodged by the HIPR operation.

c.3. Weigh the material retained in the container to the nearest 0.01 lb (5g).

d. CALCULATIONS

d.1. The weight per unit area of HIPR is determined by the following formula:

$$W_A = \frac{W_T}{A_T}$$

where: W_A = lb/ft^2 (kg/m^2) of HIPR

W_T = Weight of material removed from the template

A_T = Area of the template = 1.0 ft^2 (0.1 m^2)

EXAMPLE:

$$W_A = \frac{17.54\ \text{lb}}{1.00\ \text{ft}^2} = 17.54\ \text{lb/ft}^2 \quad \text{(ENGLISH)}$$

$$= 17.5\ \text{lb/ft}^2$$

$$W_A = \frac{7.96\ \text{kg}}{0.09\ \text{m}^2} = 88.44\ \text{kg/m}^2 \quad \text{(SI)}$$

$$= 88.44\ \text{kg/m}^2$$

e. REPORTING

e.1. Report the lb/ft^2 (kg/m^2) of HIPR (W_A) to the nearest 0.1 lb/ft^2 (0.01 kg/m^2).

f. FREQUENCY

f.1. Test will be performed at the frequency necessary to control the production rate.

f.2. Rate of 3 per hour (initial hour of each day's operation).

f.3. Minimum rates of 1 per hour the remainder of the day.

Method C: Measuring the Depth of HIPR using a Stab Rod

a. SCOPE

This test method describes the procedure for determining the depth of HIPR using a stab rod.

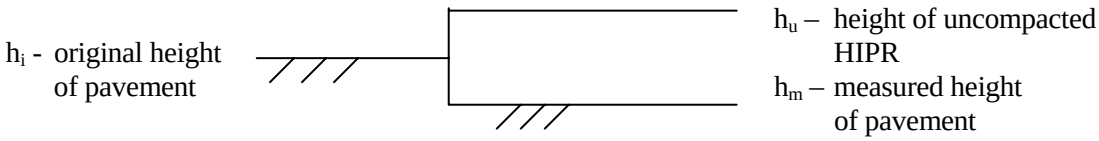
b. APPARATUS

b.1. Stab rod which consists of a solid metal rod tip with an adjustable washer for establishing the proper height of the uncompacted HIPR.

c. CALIBRATION

c.1. Calibrate the stab rod in the following manner at the beginning of each day’s production.

c.1.a. Take elevations as described in Method A (steps **c.1**. through **c.3.**). Prior to removing the HIPR in Method A, step **c.2.** stab the HIPR with the stab rod until the tip rests on the material directly below the HIPR. The washer shall be loosened prior to the stab and then tightened once the stab rod has fully penetrated the HIPR. Measure and record the distance from the tip of the stab rod to the bottom of the washer. This is the height of the uncompacted HIPR (h_u). Continue using Method A, steps **c.2.** through **e.1.** to measure and record the depth of the HIPR (h_m).



c.1.b. Calculate the depth that the washer should be set (h_s) for the design HIPR depth (h_d) using the following equation:

$$h_s = h_d * h_u / h_m$$

c.1.c. Repeat steps **c.1.a.** and **c.1.b.** within 1000' of the previous calibration location. Average the four h_s values.

d. TEST PROCEDURE

d.1. Set the washer on the stab rod for the calibrated height, h_s.

d.2. Stab the uncompacted HIPR as stipulated in **f. FREQUENCY**. Be sure to stab at least three times across the pavement width.

e. REPORTING

e.1. Report any findings that show the average depth to be less than specified in the design (contract documents).

f. FREQUENCY

f.1. Test will be performed at the frequency necessary to control the production rate.

f.2. Minimum rate of 3 longitudinal locations per hour.