FAMILY OF CURVES – ONE-POINT METHOD FOP FOR AASHTO T 272

Scope

This procedure provides for a rapid determination of the maximum density and optimum moisture content of a soil sample, utilizing a family of curves and a one-point determination in accordance with AASHTO T 272-10. This procedure is related to the FOP for AASHTO T 99/T 180.

One-point determinations are made by compacting the soil in a mold of a given size with a specified rammer dropped from a specified height. Four alternate methods – A, B, C, and D – are used and correspond to the methods described in the FOP for AASHTO T 99/T 180. The method used in AASHTO T 272 must match the method used in the FOP for AASHTO T 99/T 180.

Apparatus

See the FOP for AASHTO T 99/T 180.

Sample

Sample size determined according to the FOP for AASHTO T 310. In cases where the existing family cannot be used a completely new curve will need to be developed and the sample size will be determined by the FOP for AASHTO T 99/T 180.

Procedure

See the FOP for AASHTO T 99/T 180.

Calculations

See the FOP for AASHTO T 99/T 180.

Maximum Dry Density and Optimum Moisture Content Determination

1. If the moisture-density one-point falls on one of the curves in the existing family of curves, the maximum dry density and optimum moisture content defined by that curve shall be used.

2. If the moisture-density one-point falls within the family of curves but not on an existing curve, a new curve shall be drawn through the plotted single point, parallel and in character with the nearest existing curve in the family of curves. The maximum dry density and optimum moisture content as defined by the new curve shall be used.

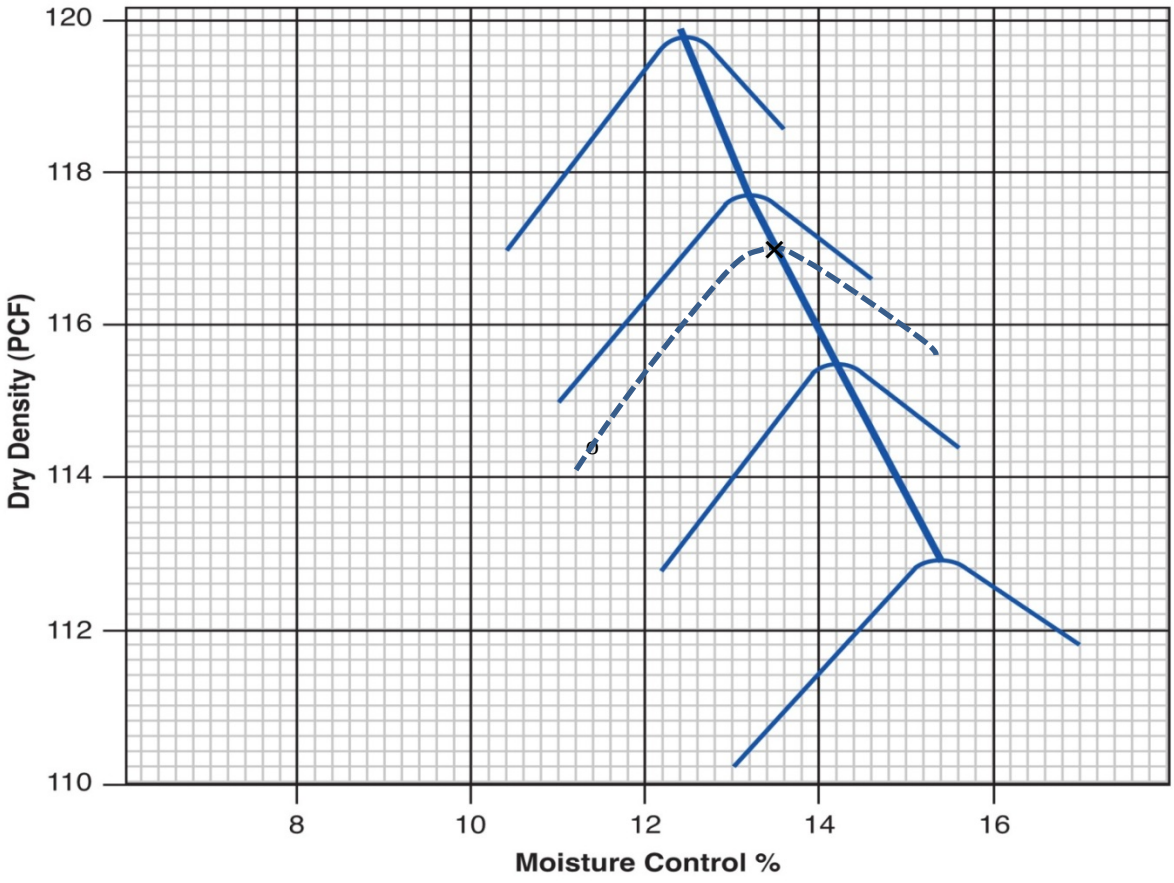
3. The one-point must fall either between or on the highest or lowest curves in the family. If it does not, then a full curve must be developed.

4. If the one-point plotted within or on the family of curves does not fall in the 80 to 100 percent of optimum moisture content, compact another specimen, using the same material, at an adjusted moisture content that will place the one point within this range.

5. If the family of curves is such that the new curve through a one-point is not well defined or is in any way questionable, a full moisture-density relationship shall be made for the soil to correctly define the new curve and verify the applicability of the family of curves.

Note 1: New curves drawn through plotted single point determinations shall not become a permanent part of the family of curves until verified by a full moisture-density procedure following the FOP for AASHTO T 99/T 180.

EXAMPLE



Example

A moisture-density procedure (FOP for AASHTO T 99/T 180) was performed. A dry density of 114.4 lb/ft^3 and a corresponding moisture content of 11.4 percent were determined. This point was plotted on the appropriate family between two previously developed curves.

The "dashed" curve beginning at the moisture-density one-point was sketched between the two existing curves. A maximum dry density of 117.0 lb/ft^3 and a corresponding optimum moisture content of 13.5 percent were estimated.

Report

- Results on forms approved by the agency
- Maximum dry density to the closest 1 kg/m^3 (0.1 lb/ft^3)
- Optimum moisture content to the closest 0.1 percent

PERFORMANCE EXAM CHECKLIST

FAMILY OF CURVES - ONE-POINT METHOD
FOP FOR AASHTO T 272 (T 99)

Participant Name _____ Exam Date _____

Record the symbols "P" for passing or "F" for failing on each step of the checklist.

Procedure Element	Trial 1	Trial 2
1. One-point determination of dry density and corresponding moisture content made in accordance with the FOP for AASHTO T 99?	_____	_____
a. Correct size (4.75 mm / No. 4 or 19.0 mm / 3/4 in.) material used?	_____	_____
2. If damp, sample dried in air or drying apparatus, not exceeding 60°C (140°F)?	_____	_____
3. Sample broken up and an adequate amount sieved over the appropriate sieve (4.75 mm / No. 4 or 19.0 mm / 3/4 in.) to determine oversize (coarse particle) percentage?	_____	_____
5. Sample passing the sieve has appropriate mass?	_____	_____
6. Layer of soil (approximately one third compacted depth) placed in mold with collar attached?	_____	_____
7. Soil compacted with appropriate number of blows (25 or 56)?	_____	_____
8. Material adhering to the inside of the mold trimmed?	_____	_____
9. Layer of soil (approximately two thirds compacted depth) placed in mold with collar attached?	_____	_____
10. Soil compacted with appropriate number of blows (25 or 56)?	_____	_____
11. Material adhering to the inside of the mold trimmed?	_____	_____
12. Mold filled with soil such that compacted soil will be above the mold?	_____	_____
13. Soil compacted with appropriate number of blows (25 or 56)?	_____	_____
14. Collar removed without shearing off sample?	_____	_____
15. Approximately 6 mm (1/4 in.) of compacted material above the top of the mold (without the collar)?	_____	_____
16. Soil trimmed to top of mold with the beveled side of the straightedge?	_____	_____
17. Mass of mold and contents determined to appropriate precision?	_____	_____
18. Wet density calculated from the wet mass?	_____	_____
19. Soil removed from mold using a sample extruder if needed?	_____	_____
20. Soil sliced vertically through center (non-granular material)?	_____	_____
21. Moisture sample removed ensuring all layers are represented?	_____	_____

OVER

Procedure Element	**Trial 1**	**Trial 2**
22. Moist mass determined immediately to 0.1 g?	_____	_____
23. Moisture sample mass of correct size?	_____	_____
24. Sample dried and water content determined according to T 255/T 265?	_____	_____
25. One-point plotted on family of curves supplied?	_____	_____
26. One-point falls within 80 to 100 percent of optimum moisture content in order to be valid?	_____	_____
27. If one-point does not fall within 80 to 100 percent of optimum moisture content, another one-point determination with an adjusted water content is made?	_____	_____
28. Maximum dry density and corresponding optimum moisture content correctly estimated?	_____	_____

Comments: First attempt: Pass____Fail_____ Second attempt: Pass_____Fail_____

Examiner Signature _____WAQTC #:_____