Performance Examination - Soils

Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils (ASTM D1883-16)

Candidate Name: _____ **NICET ID:** _____

Apparatus	Trial 1	Trial 2
Metal Cylindrical Molds		
Inside diameter: 151.74-153.06 mm (5.974-6.026 in.)		
Height: 177.34-178.26 mm (6.982-7.018 in.)		
Extension collar at least 50.8 mm (2.0 in.) high		
Perforated base plate with at least 28 holes - 1.59-mm ($^{1}/_{16}$-in.)		
Surcharge weights		
Annular surcharge weights		
Center hole Both Approx. 2 1/8 in. (53.98mm) diameter		
5 $^{7}/_{8}$-5 $^{15}/_{16}$ in. (149.2-150.81 mm)		
4.52-4.56 kg (total mass of 1 or 2 weights)		
Slotted surcharge weights: 5 ± 0.05 lbf (2.25-2.29 kg each)		
Metal spacer disk		
At least 5 $^{15}/_{16}$ in. (150.8 mm)		
Height: 61.24-12-61.5 mm (2.411-2.421 in.)		
Rammer As specified in D698 or D1557, calibrated according to D2168		
Expansion measuring apparatus		
Metal swell plate		
Fitted with adjustable stem		
5 $^{7}/_{8}$-5 $^{15}/_{16}$ in. (149.23-150.81 mm)		
Perforated with 1.6 mm ($^{1}/_{16}$ in.) diameter holes		
Tripod to support dial indicator		
Dial indicators		
Readable to 0.025 mm (0.001 in.)		
Metal penetration piston		
Diameter 49.50-49.76 mm (1.949-1.959 in.)		
At least 102 mm (4 in.) long		
Loading device		
Can load at a rate of 1.27 mm (0.05 in.) per minute within 20%		

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Apparatus (continued)	Trial 1	Trial 2
Uniform rate (not pulsating) and minimum capacity based on the following:		

Maximum Measurable CBR	Minimum Load Capacity (lbf)	Minimum Load Capacity (kN)
20	2,500	11.2
50	5,000	22.3
>50	10,000	44.5

Equipped with load-indicating device readable to 10 lbf (44 N) or less		
Soaking tank covers specimen and allows free access of water to the mold base		
Oven Maintains 110.5 °C (230.9 °F)		
Miscellaneous: Mixing pans, spoons, straightedge, filter paper, balances, etc.		
Sieves 2 in., ¾ in., and No. 4		

Procedures	Trial 1	Trial 2
Sample Preparation		
1. The sample prepared for compaction according to D698 or D1557, using 152.4-mm (6-in.) mold. If all material passes 19.0-mm (¾-in.) sieve, the entire sample used. If some +19.0 mm material, that material removed and replaced by the equal amount of -19.0 mm, +4.75 mm (No. 4) material from the unused sample		
Sample Preparation – Bearing Ratio at Optimum Water Content		
2. Control compaction test conducted with a sufficient number of test specimens to establish optimum water content, according to D698 or D1557		
3. If CBR is desired at 100% maximum dry unit weight and optimum water content, specimen compacted according to D698 or D1557, from soil prepared to within ±0.5% of optimum water content or If CBR is desired at optimum water content and some percentage of maximum dry unit weight, three specimens compacted from soil to within ± 0.5% of optimum moisture content using a different number of blows per layer for each specimen (number of blows per layer varied to bracket unit weights above and below desired value)		
Sample Preparation – Bearing Ratio at Range of Water Content		
4. Procedure same as that for Bearing Ratio at Optimum Water content, except each Specimen used to Procedure same as that for Bearing Ratio at Optimum Water content, except each specimen used to develop compaction curve penetrated		
5. Complete water content-unit weight relation for 25 and 10 blow per layer compactions developed and each compacted specimen is penetrated (all compactions performed in CBR molds)		

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Procedures (continued)	Trial 1	Trial 2
6. If specified unit weight is at or near 100% maximum dry unit weight, is compaction effort greater than 56 blows per layer included		
Sample Compaction Procedure		
1. Mold clamped to base plate and extension collar attached		
2. Spacer disk placed in mold and filter paper placed on disk		
3. Each sample mixed with water and compacted in a mold according to the desired method. Moisture content is taken according to one of the following: both, Un-soaked CBR moisture sample taken according to D698 or D1557		
4. Soaked CBR, Controlled Environment if the compaction process is conducted under controlled temperatures (65 to 75 °F, 18 to 24 °C) and processed soil is kept sealed during compaction, only one representative water content sample by D2216 required		
5. Soaked CBR, Uncontrolled Environment – sample taken at beginning and end of compaction, moisture determined according to D2216, and average value used (values should not differ by more than 1.5%)		
6. Extension collar removed and compacted soil trimmed even with the top of the mold using a straightedge		
7. Surface irregularities patched with small-sized material		
8. Spacer disk and base plate removed, and mass of mold and compacted soil determined		
9. Filter paper placed on the perforated base plate		
10. Mold inverted and placed on filter paper (compacted soil contacts paper)		
11. Base plate clamped to mold		
Soaking		
1. A swell plate placed on the sample in a mold		
2. Sufficient weights, at least 4.54 kg (10 lb), placed on a swell plate for the desired load		
3. Mold immersed in water, allowing free access of water to the top and bottom of the specimen		
4. Tripod and dial indicator placed on top of the mold and an initial reading is taken		
5. The water level in mold and tank maintained above the top of the specimen during soaking. Specimen soaked for 96 hours (4 days)		
6. Soaking period greater than four days may be required for some clays.		
7. Final dial reading is taken and percent swell calculated		
8. Specimen removed from the tank, water poured off the top, and allowed to drain downward for 15 minutes		
9. Surcharge weights, perforated plate and filter paper removed after draining		

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Procedures (continued)	Trial 1	Trial 2
Penetration Test		
1. Penetration piston seated after one surcharge weight (2.27-kg annular weight) has been placed on the specimen		
2. Piston seated with no more than 10 lb (44 N) load		
3. The remainder of surcharge weights, equal to that used during soaking, placed on the specimen		
4. Penetration dial indicator and load indicators set to zero		
5. Strain gauge (penetration gauge) not attached to the testing machine's support bars (legs)		
6. Loads applied to the piston so the penetration rate is 20% which is equivalent to 1.016 to 1.524 mm (0.04 to 0.06 in.) per minute.		
7. Loads recorded at penetrations of 0.025, 0.050, 0.075, 0.100, 0.125, 0.150, 0.175, 0.200, 0.300, 0.400 and 0.500 in.		
8. Max load and depth noted if it occurs for penetration of less than 0.500 in. (12.70 mm)		
9. Depth of piston penetration into soil measured with a ruler		
10. If measured depth does not closely match the depth of penetration gauge, cause determined and the new sample tested		
11. If using a soaked CBR, the water content of upper 25 mm (1 in.) of the sample determined, according to D698 / D1557 weighs at least 100 g for fine-grained soils or 500 g for coarse-grained soils		
12. Stress-strain curve prepared		
13. CBR values obtained in percent by dividing corrected load values at 2.54 and 5.08 mm (0.10 and 0.20 in.) by the standard loads of 1000 and 1500 psi (6.9 and 10.3 MPa), respectively, and multiplying those ratios by 100 If CBR is greater at 5.08 mm (0.20 in.) than at 2.54 mm (0.10 in.) penetration, is test rerun		
14. If check test gives similar results, the ratio at 5.08 mm (0.20 in.) penetration used		

First Attempt: Pass: _____ Fail: _____ **Second Attempt:** Pass: _____ Fail: _____

Exam Administration: Remote _____ In-Person _____

Comments:

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Examiner Name: _____ **Examiner Signature**: _____ **Date:** _____