Procedure Checklist
FM 1 T-180: Moisture-Density Relations of Soils Using a 4.54 Kg (10 lb) Rammer
and a 457 mm (18 in.) Drop

		P	F	N/A
Sample Preparations				
1.	If sample is too wet, is it dried until friable under a trowel at 140°F (60°C) max			
2.	For **base or stabilizer**, particles greater than 3/4 inch crushed			
3.	Entire sample passed through mechanical crusher without separating materials one time			
4.	Pieces not reduced by mechanical crushing discarded			
5.	Material passed through a No 4 sieve			
6.	Percentage retained and passing is recorded			
7.	Continue on with step 13			
8.	For **subgrade**, material sieved using 2 in, 3/4 in and No. 4 sieves			
9.	Care taken to avoid reducing natural individual size of particles			
10.	Sample passed over 2 inch sieve and materials retained discarded			
11.	Sample passed over 3/4 inch then No. 4 sieve			
12.	Clay or silt aggregations broken down until they pass a No. 4 sieve			
13.	Percentages retained and passing determined on each sieve			
14.	Percent retained on 3/4 sieve recorded and preserved for oversized particle correction (required for over 5% retained on No. 4 sieve if using Methods A or B only)			
15.	Representative samples with mass approximately 11 lbs for Proctor or 12 lbs of LBR			
16.	Water added to specimens in increasing amounts so that the moisture contents vary by 1-2% moisture (Proctor samples) or by no greater than 1.5% moisture (for LBR samples)			
17.	Moisture contents should start approximately 4% to 8% below optimum and end 2% past optimum or approximately 3% below optimum (for non-cohesive well drained soils and end 1% past optimum			
18.	Each portion thoroughly mixed with water			
19.	Samples of mixtures placed in closed containers. (if standing time required or specimen pre-soaked)			
20.	Allowed to stand prior to compaction: A-3 = No requirement A-2-4 (non-plastic) = 3 hr. A-1, A-2-4 (plastic), A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 = 12 hr.			
Compaction Procedure				
21.	Sample mixed immediately prior to compaction			
22.	Note 6 applied to all soil types except A-3 and Non-Plastic A-2-4 unless noted otherwise			
23.	Spacer disc in mold (if used, required for LBR) and tare weight obtained			
24.	Collar attached			
25.	5 equal layers 1.1 ± 0.5 inches in height			
26.	Each layer compacted with 25 (Methods A or B of Proctor) or 56 (Methods C or D and LBR) uniformly distributed blows from the rammer			
27.	Mold resting on a uniform rigid foundation			
28.	Following compaction, collar removed			
29.	Soil carefully trimmed even with top of mold			
30.	Trimmed with the straight edge			
31.	Holes patched with smaller sized material (Method C or D and LBR only)			
32.	Mold inverted, spacer disk removed (if used, required for LBR) (may be done after step 33 if tare weight obtained without spacer disk in place)			
33.	Weighed to the nearest 1g or 0.005 lbs.			
34.	Mass of specimen (minus the mold) divided by actual mold volume			
35.	Recorded as wet density (w_1) in lbs/ft^3			
36.	Material removed from mold (Proctor only)			
37.	Representative moisture content sample taken from cut face after specimen is sliced vertically (Proctor only), or sample taken from mixing bowl prior to compaction (required			

	for LBR)			
38.	Moisture contents determined in accordance with T 265			
39.	Steps 21 through 37 repeated for each specimen prepared			
Moisture - Density Relationship				
40.	Moisture content = [(A - B)/(B - C)] x100 ____. To the nearest 0.1 % ____. Dry unit mass = $W_1/(w + 100) \times 100$ ____. To the nearest 0.1 lbs/ft³ ____. where; w = Percent moisture A = Mass of wet soil + tare B = Mass of dry soil + tare C = Mass of tare W_1 = Wet unit mass			
41.	Unit weight plotted as ordinates (vertical)			
42.	Moisture content plotted as abscissas (horizontal)			
43.	Smooth curve drawn through plotted points			
44.	Moisture content corresponding to the peak of the curve equals the "optimum moisture-content"			
45.	The oven dry density of the soil at the optimum moisture content equals the "maximum density"			
Report				
46.	Report includes: Corrected optimum moisture content to the nearest. 0.1%			
47.	Corrected maximum dry density, to the nearest 0.1 lbs/ft³			

Remarks: **Comparison Criteria: Max. Density within 4.5 PCF of the IA Result**
% Optimum Moisture within 15% of the average

Date: _____ Technician: _____ IA Observer: _____

Technician's E-mail Address: _____

Employer's/ Supervisor's E-mail Address: _____