Texas Department of Transportation

ATTENTION: TP&D, DESIGN, CONSTRUCTION, MAINTENANCE AND TRAFFIC OPERATIONS ENGINEERS

MEMORANDUM

SPECIAL PROVISION AND/OR SPECIFICATION CHANGE MEMORANDUM 15-12

TO: District Engineers **Date:** March 14, 2012

FROM: John F. Obr, P. E.
Construction Division Director

SUBJECT: Statewide Special Provision 132---007 (04), "Embankment"

The above-referenced special provision has been approved for statewide use and is optional for all projects using Item 132 beginning with the May 2012 letting.

This special provision revises Article 132.3., Section D., Compaction Methods, by adding language that affords the contractor the option to use a computer-generated density curve.

Please disseminate this information to your Transportation Planning & Development, Construction, Maintenance, and Traffic Operations Engineers.

cc: TxDOT Specification Committee
Federal Highway Administration
Associated General Contractors

SPECIAL PROVISION

132---007

Embankment

For this project, Item 132, "Embankment," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 132.3 Construction, Section D. Compaction Methods. The first paragraph, last sentence, is replaced by the following:

> Compact embankments in accordance with Section 132.3.D.1, "Ordinary Compaction," or Section 132.3.D.2, "Density Control," as shown on the plans. Section 132.3.D.3, "Density Control by Computer-Generated (CG) Curve," may be used by the contractor as an option for density control.

Article 132.3 Construction, Section D. Compaction Methods, is supplemented by the following:

3. Density Control by Computer-Generated (CG) Curve. At the Contractor's discretion, a CG curve may be used for density control. The option to use a CG curve for density control is not available for soils with a PI greater than 35; follow the requirements of Section 132.3.D.2, "Density Control."

Compact each layer to the required density using equipment complying with Item 210, "Rolling." Determine the maximum lift thickness based on the ability of the compacting operation and equipment to meet the required density. Do not exceed layer thickness of 12 in. loose or 10 in. compacted material, unless otherwise approved. Maintain a level layer with consistent thickness to ensure uniform compaction.

When using this method, provide CG field moisture-density curves and CG Tex-114-E moisture-density curves based on the input parameters specified in Table 3 for each source and type of material or when directed by the Engineer. The CG field dry density (D_{fcg}) must be greater than or equal to the CG Tex-114-E maximum dry density (D_{acg}). The Engineer will obtain independent soil samples and use Tex-114-E to determine the maximum dry density (D_a) and optimum moisture content (W_{opt}) each time a new curve is submitted. Provide access to the computer program used to generate the curve, when directed.

Table 3
Computer Generated Lab and Field Compaction Curve Input Criteria

Input Variables	Test Method
Liquid Limit, %	Tex-104-E
Plasticity index (PI), %	Tex-106-E
Soil gradation	Tex-110-E, Tex-111-E
Soil classification	Tex-142-E
Compaction roller brand, type, and model	N/A
Loose lift thickness, in.	N/A
Soil specific gravity	Use 2.65 for soil type SC. Use 2.68 for soil type CL. Use 2.69 for soil type CH.

Provide a compaction control report showing all input and output parameters and CG compaction curves, including:

- CG Tex-114-E laboratory maximum dry density (D_{acg})
- CG Tex-114-E laboratory optimum moisture content (W_{optcg})
- CG field maximum dry density (D_{fcg})
- CG field optimum moisture content (Wf_{optcg})
- Graph of CG laboratory and field compaction curves and the "Zero Air Voids Line"
- Minimum number of roller passes to achieve the required density and moisture content.

Meet the requirements for field maximum dry density (D_{fcg}) and field optimum moisture content (Wf_{optcg}) specified in Table 4, unless otherwise shown on the plans. Use only the roller specified as an input parameter for the CG curve to meet density requirements.

Table 4
Field Density Control Requirements

Description	Density	Moisture Content
	Tex-115-E	
PI ≤ 15	≥ 98% D_{fcg}	≥ Wf_{optcg}
15 < PI ≤ 35	≥ 98% D_{fcg} and ≤ 102% D_{fcg}	≥ Wf_{optcg}

Each layer is subject to testing by the Engineer for density and moisture content. During compaction, the moisture content of the soil should be above CG optimum moisture content but should not exceed the value shown on the moisture-density curve, above optimum, required to achieve 98% dry density.

When the CG field maximum dry density (D_{fcg}) is not achieved, perform the following steps in order:

- Verify that construction controls including lift soil properties, minimum number and uniformity of compactor passes, lift thickness, and moisture content are correct.
- If needed, rework the lift with the corrected controls using the original CG curve.
- Generate a new CG field compaction curve based on actual in-place soil properties and rework the lift.

- Rework the material using non-CG Tex-114-E moisture-density curve.

When required, remove small areas of the layer to allow for density tests. Replace the removed material and recompact at no additional expense to the Department. Proof-roll in accordance with Item 216, "Proof Rolling," when shown on the plans or as directed. Correct soft spots as directed.

Article 132.3 Construction, Section E. Maintenance of Moisture and Reworking. The first sentence is replaced by the following:

Maintain the density and moisture content once all requirements in Table 2 or 4 are met.