

Large-Scale Laboratory Testing of Geosynthetics in Roadway Applications Project Annual Update

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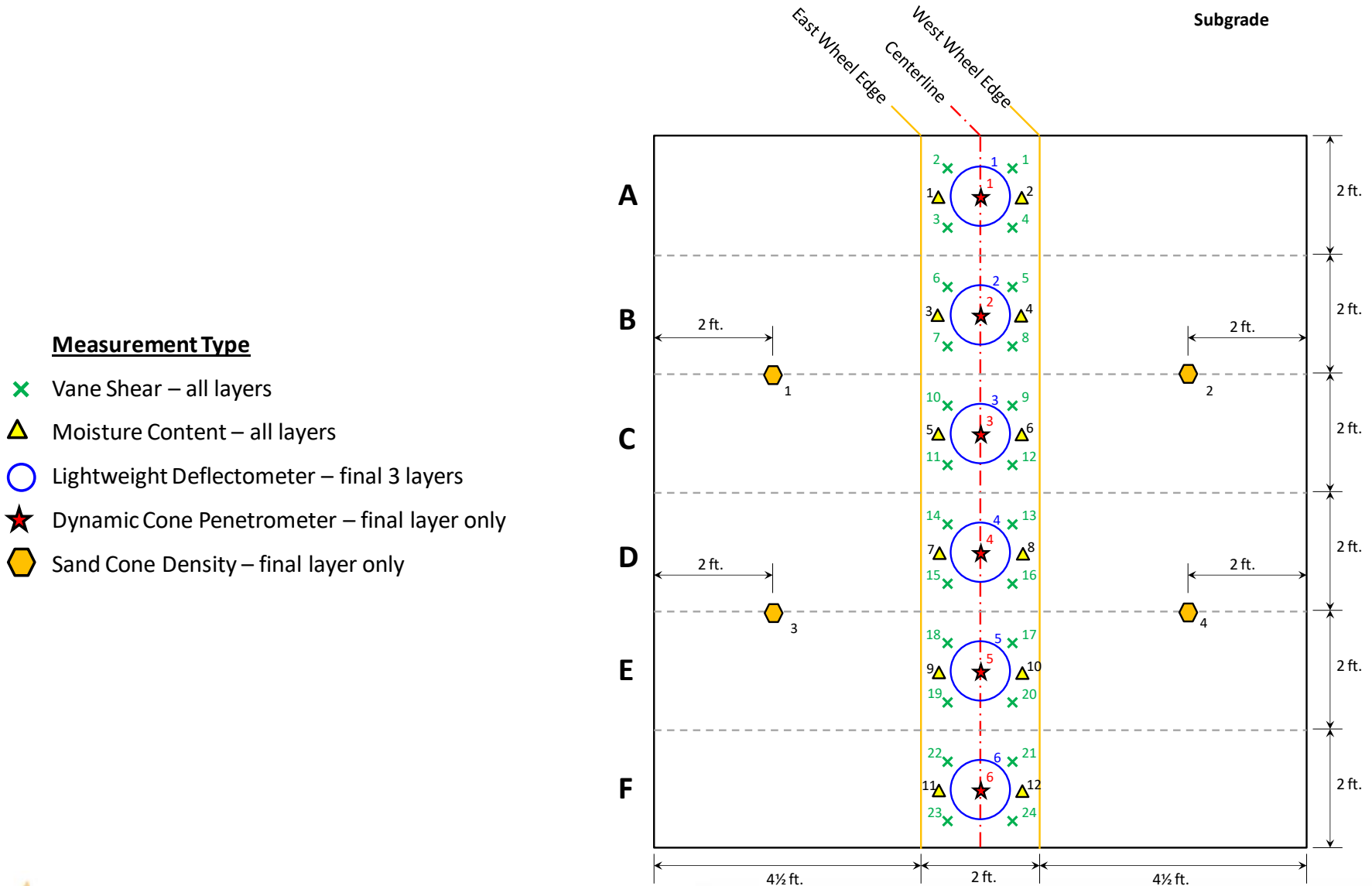
Tasks

- Task 1: Literature review (completed 7/31/2018)
- Task 2: Test section planning and design (completed 1/30/2019)
- Task 3: Test section construction and trafficking (completed 1/15/2020)
- Task 4: Analysis and synthesis of results (in-progress)
- Task 5: Reporting (in-progress)

Task 3

- Test section construction and trafficking
 - Construction through base course given at 3-22-2019 project update meeting
 - Construction originally completed 6-15-2019
 - Rutting reached 20 mm in 4000 passes
 - Majority of deformation in the base layer
 - Requested a project extension to reconstruct base and HMA layer, approved on 7-30-2019
 - Reconstruction completed 10-1-2019

Subgrade Measurements



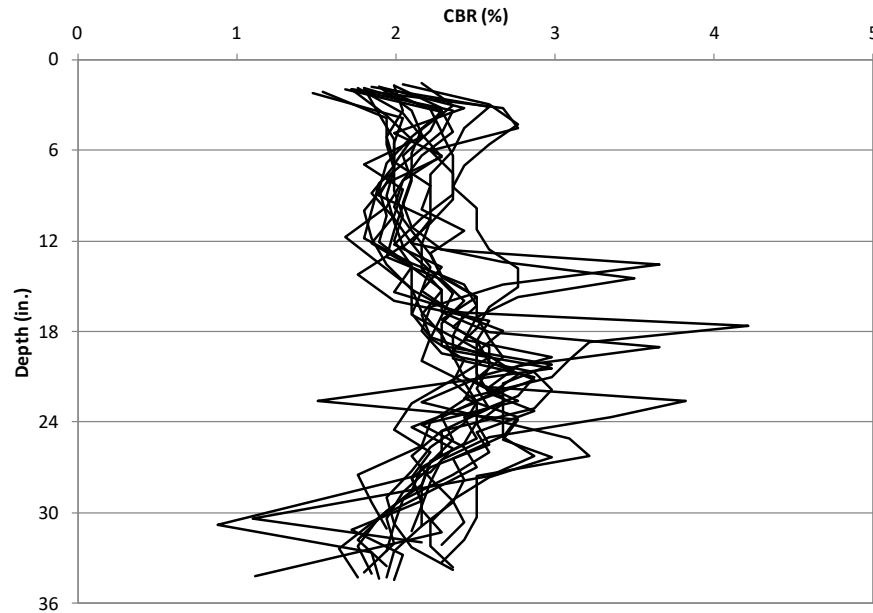
Moisture Content

- 72 measurements per test section
- Average values
 - Test Section 1 = 27.7%
 - Test Section 2 = 27.7%
 - Test Section 3 = 27.7%
- Range of layer averages: 25.8 – 28.7 %

Vane Shear

- 144 measurements per test section
- Average values
 - Test Section 1 = 107.4 kPa
 - Test Section 2 = 104.3 kPa
 - Test Section 3 = 105.1 kPa

Dynamic Cone Penetrometer








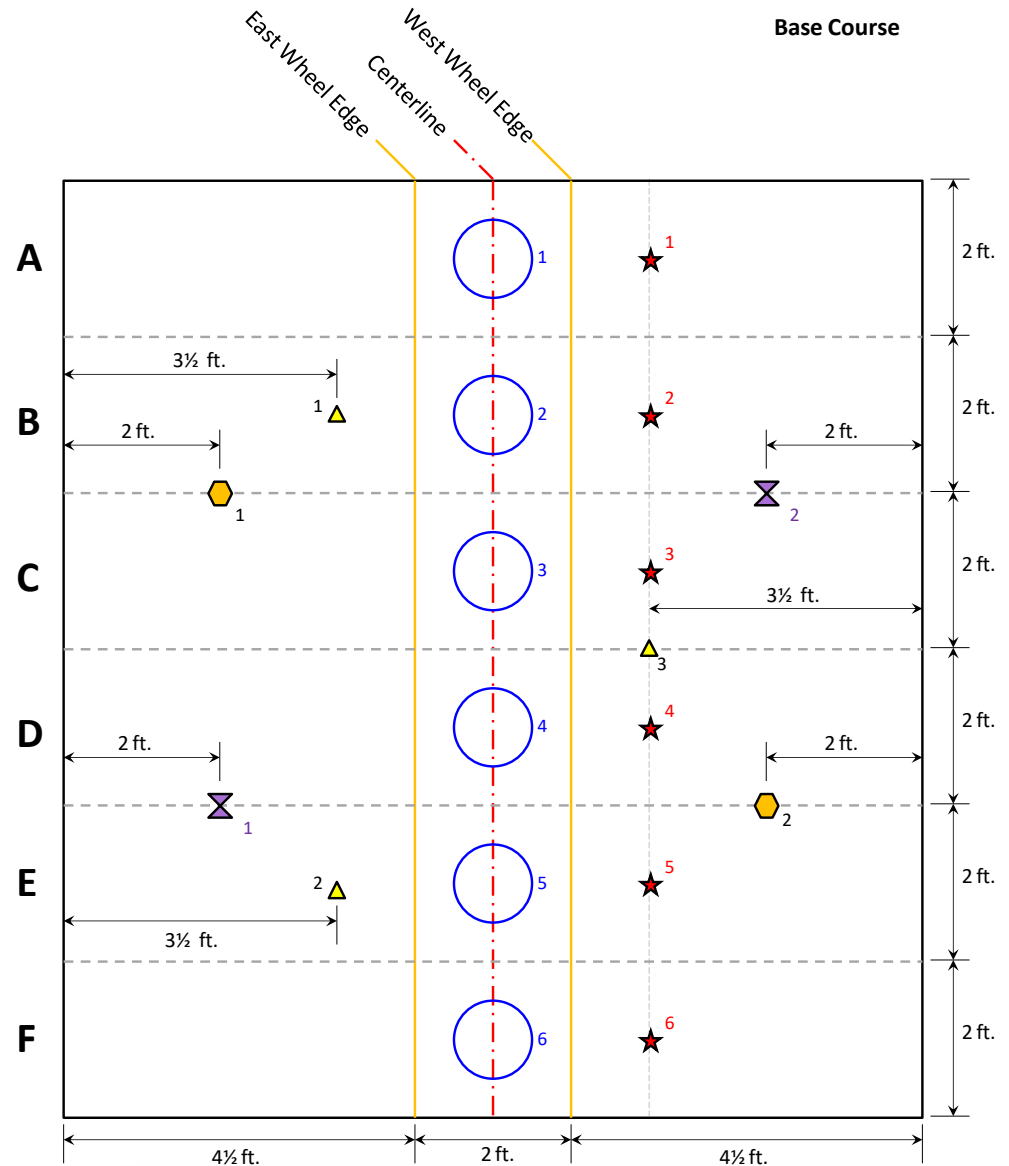
- Avg. per test section
 - Sect. 1 = 2.27
 - Sect. 2 = 2.27
 - Sect. 3 = 2.24

Base Course Measurements

Base Course

Measurement Type

-  Moisture Content – all layers
-  Lightweight Deflectometer – all layers
-  Dynamic Cone Penetrometer – final layer only
-  Nuclear Densometer – final layer only
-  Sand Cone Density – final layer only



Dry Unit Weight

Layer [†]	Average Dry Unit Weight (lb/ft ³) and Percent Compaction		
	Test Section 1	Test Section 2	Test Section 3
3 (nuclear)	137.5 (100.6%)	136.9 (100.1%)	137.7 (100.7%)
3 (sand cone)	137.7 (100.7%)	138.7 (101.5%)	137.5 (100.6%)
2	137.7 (100.7%)	137.9 (100.9%)	136.5 (99.9%)
1	136.0 (99.5%)	135.5 (99.1%)	137.4 (100.5%)
[†] Layer 1 is the bottom base layer, and Layer 3 is the top layer.			

Dynamic Stiffness (LWD)

Layer [†]	Average Dynamic Stiffness (MN/mm ²)		
	Test Section 1	Test Section 2	Test Section 3
3	123.63	115.54	122.42
2	24.25	19.63	23.77
1	19.40	15.98	17.85
† Layer 1 is the bottom base layer, and Layer 3 is the top layer.			

HMA



HMA

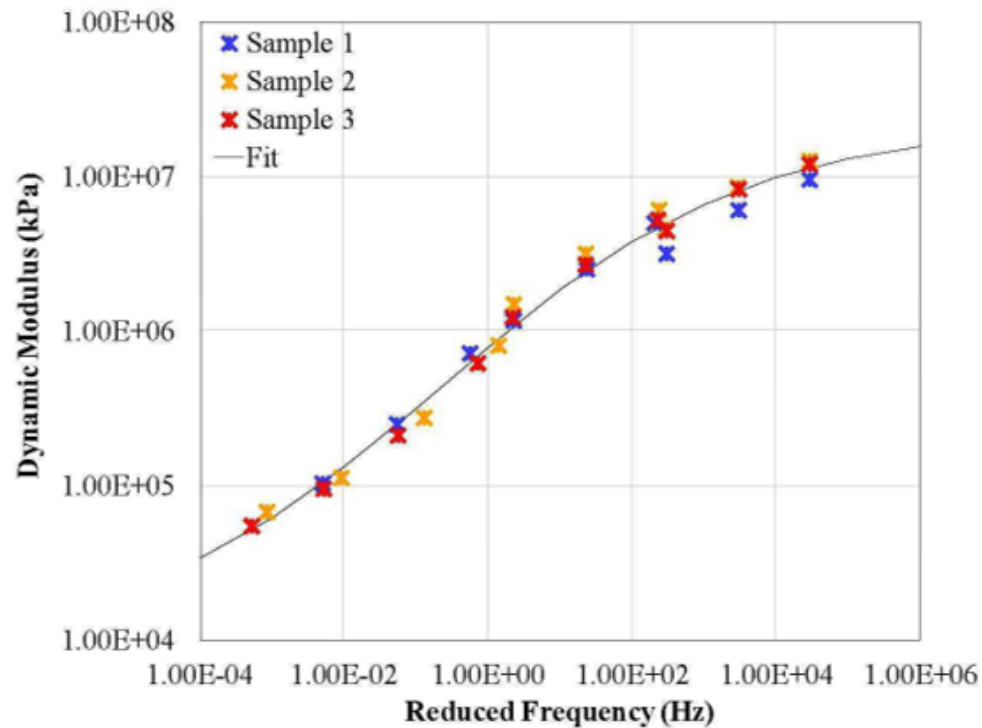


HMA

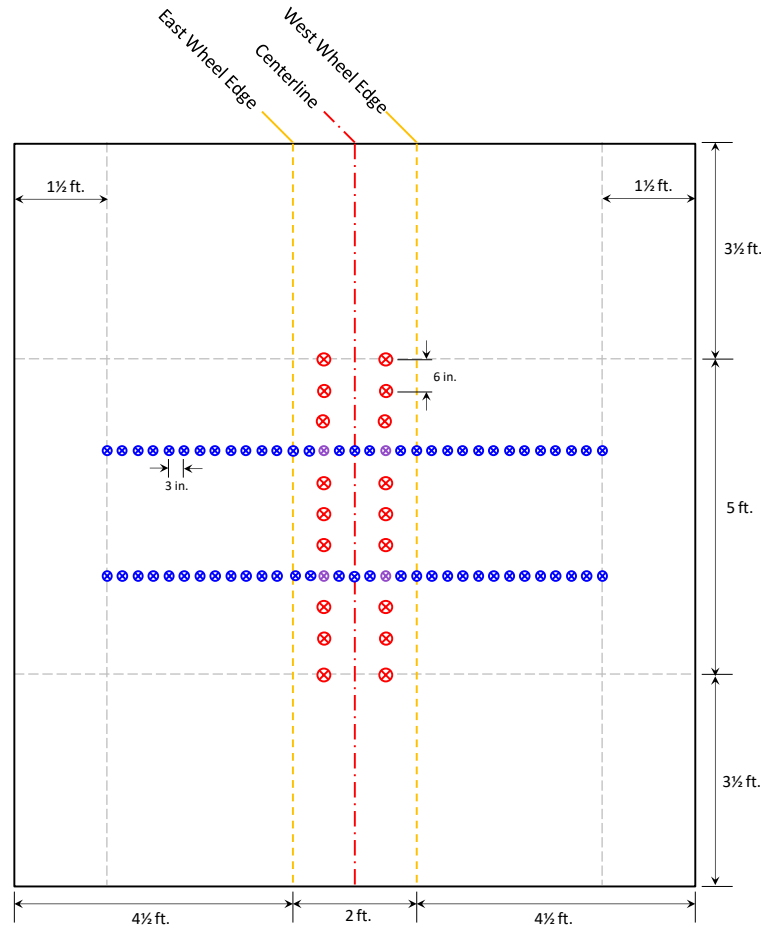


HMA

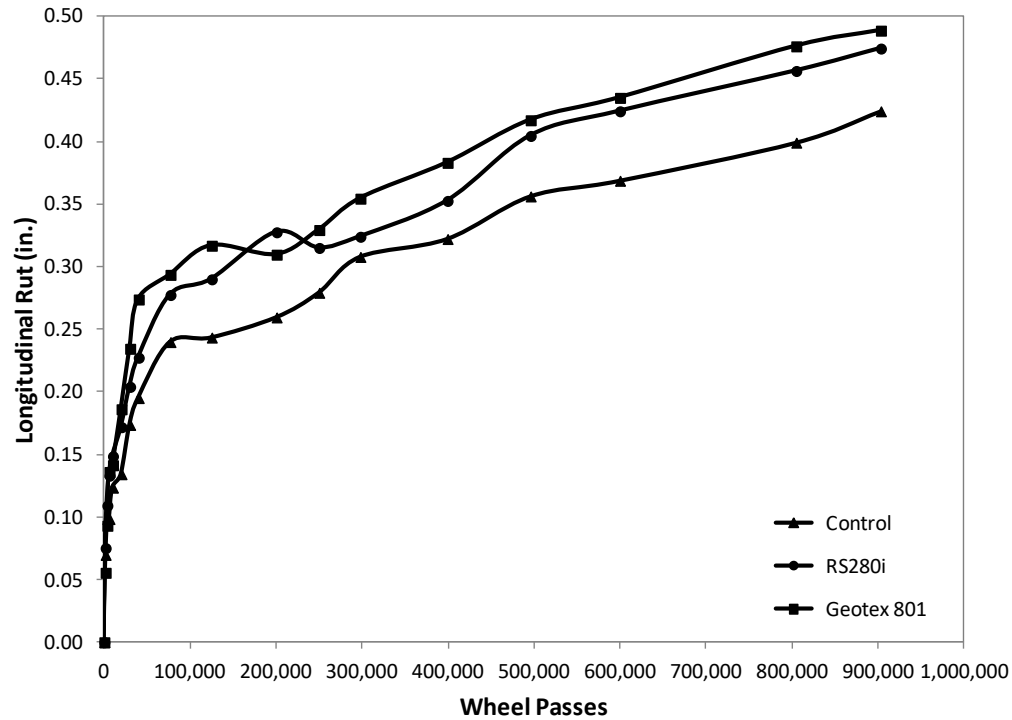
Nuclear Density	Average Density and Percent Compaction		
	Test Section 1	Test Section 2	Test Section 3
Density (lb/ft ³)	137.8	139.4	140.8
Percent Compaction (%)	90.1	91.2	92.1



Trafficking Measurements



Rutting Results



Task 4: Analysis and Synthesis of Results

- Examining forensic data to help explain results
- Run spreadsheet program and compare to results
- “A cost/benefit analysis will be conducted using the results obtained and cost information provided by MDT”.

Task 5: Final Report

- Final report prepared through Task 3.
- On track for delivery of final report by November 30, 2020 for project end date of December 31, 2020.

Discussion