

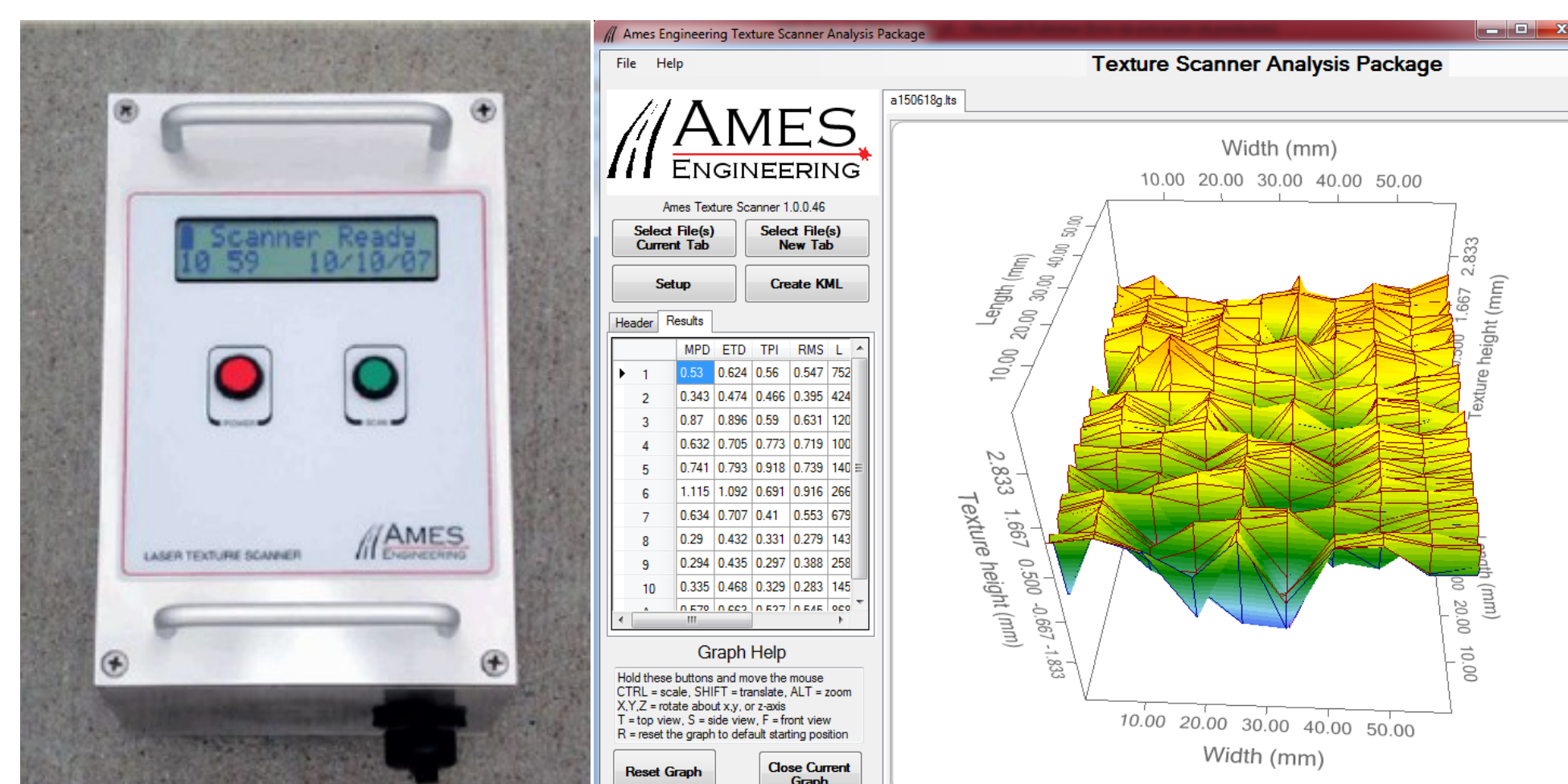
INTRODUCTION

- Recently, increased concern about the influence of high-way traffic noise on health and its negative financial effects has highlighted the need to design quieter pavement surfaces.
- Objective:* develop laboratory procedure to measure noise generated by surfacing materials.

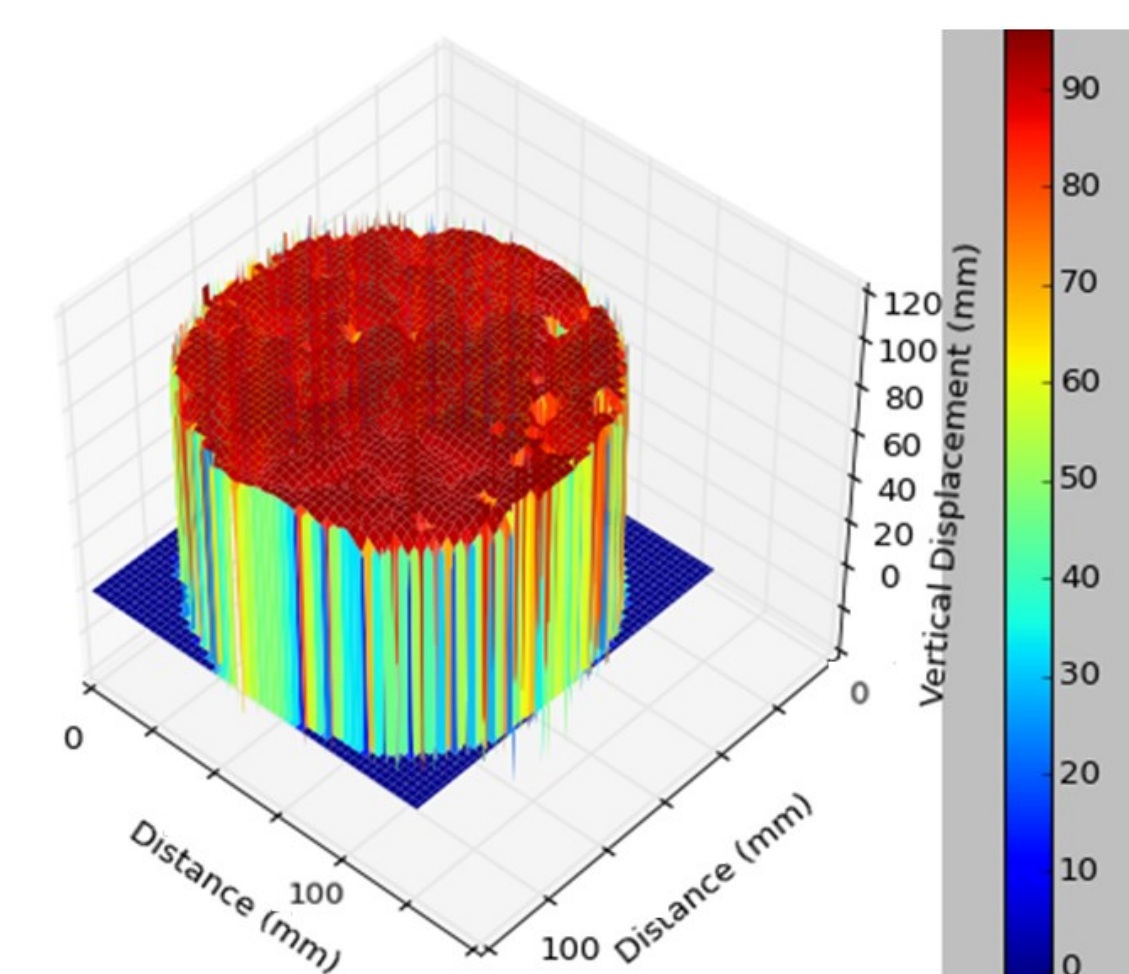
LABORATORY PROCEDURE

SPECIMEN PREPARATION

- Texas or Superpave gyratory compactor.
- Macrotexture measurement:
 - Ames laser texture scanner (LTS)
 - 3D laser displacement sensor (LDS) from Keyence.



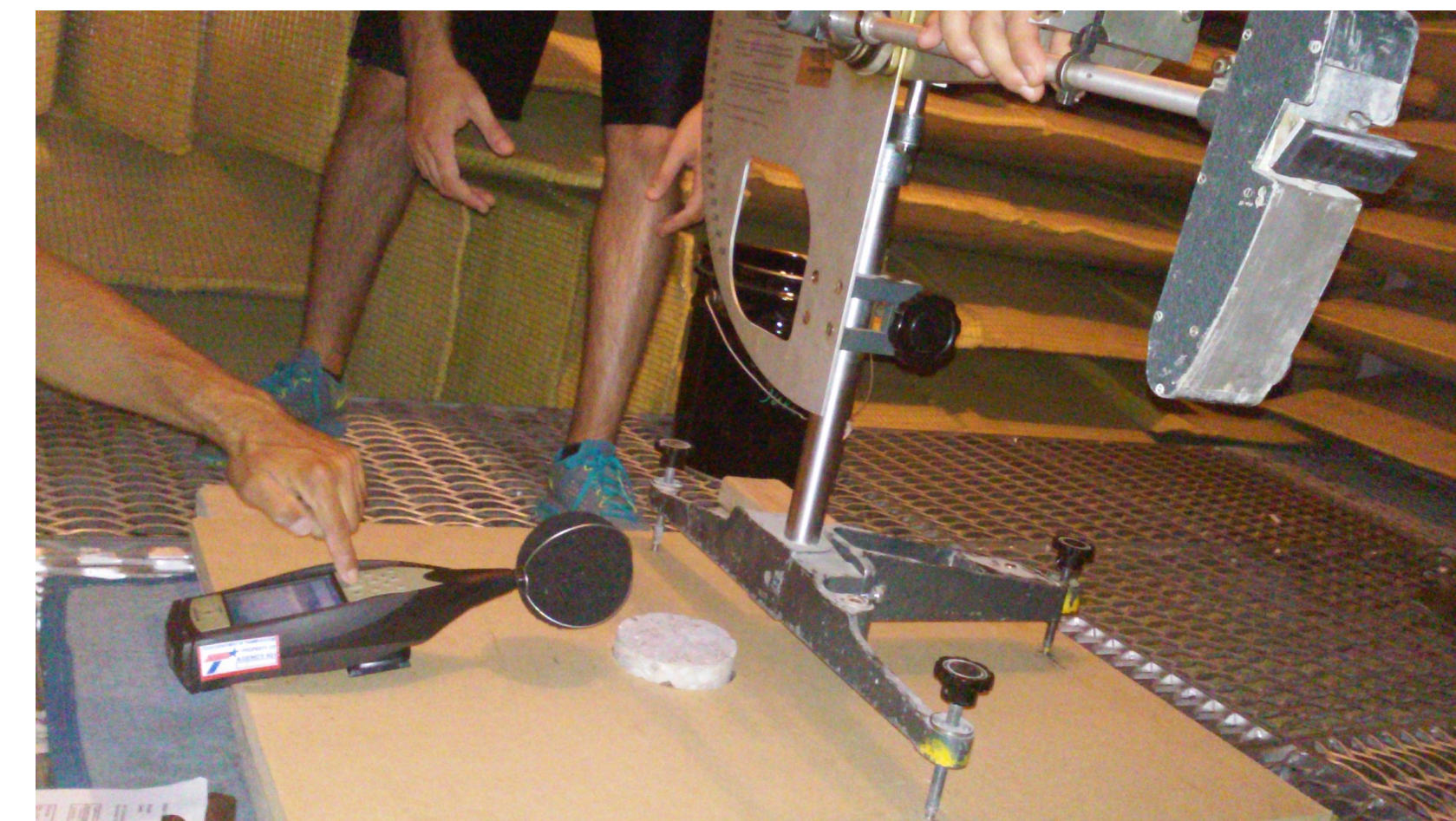
Ames laser texture scanner



LDS scanned specimen

NOISE MEASUREMENTS

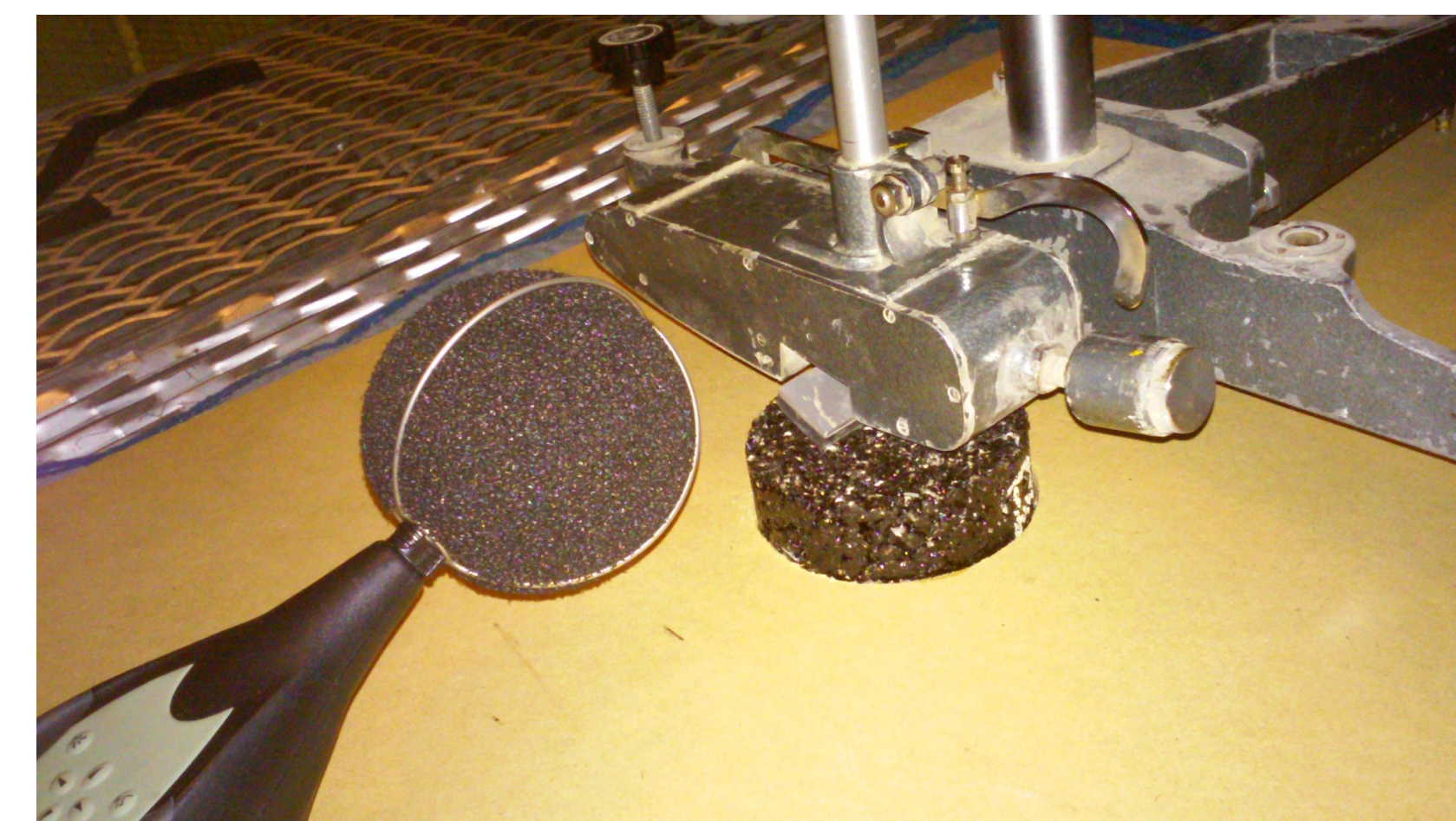
- Modification of the standard ASTM E303 procedure: Measuring Surface Frictional Properties Using the British Pendulum Tester (BPT).
- The noise generated as the rubber slider of the BPT comes into contact with the surface of the specimen is recorded with a sound pressure level meter in a process similar to wayside noise measurements in the field.



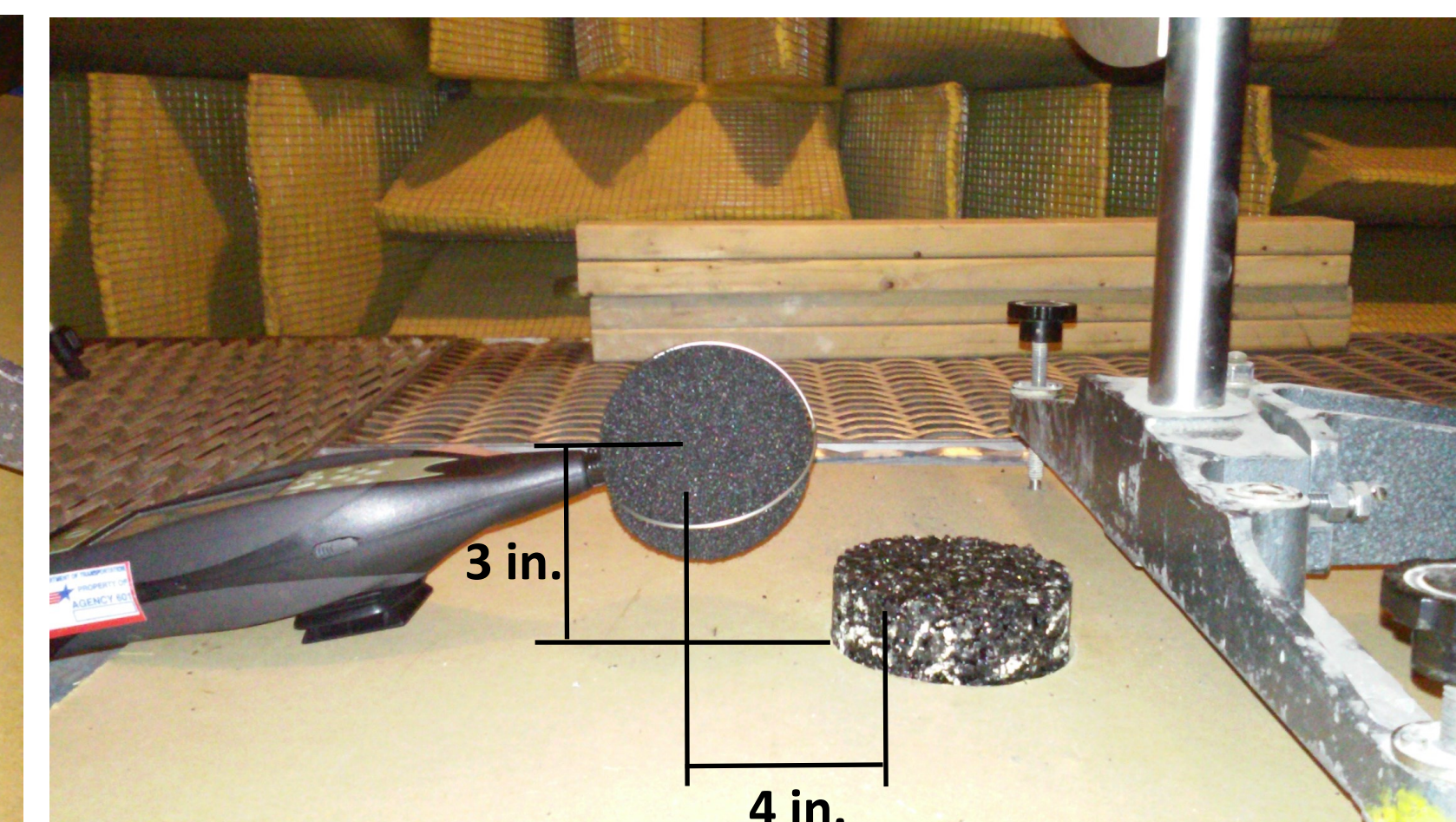
BPT noise setup



Side view of test setup



Head in contact with specimen

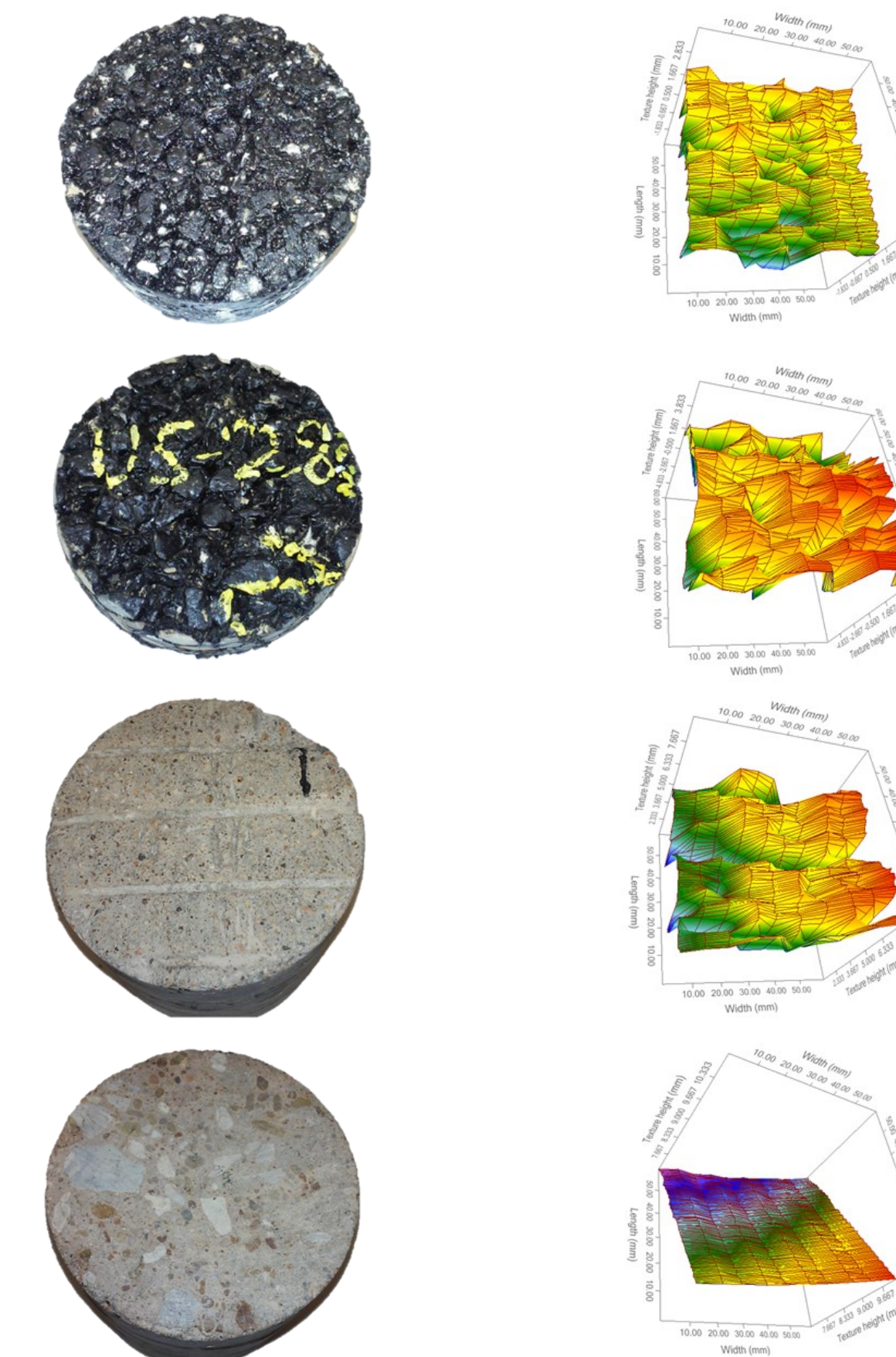


Sound meter position

PRELIMINARY TESTS

Tests using the procedures as outlined were performed to observe the accuracy and sensitivity:

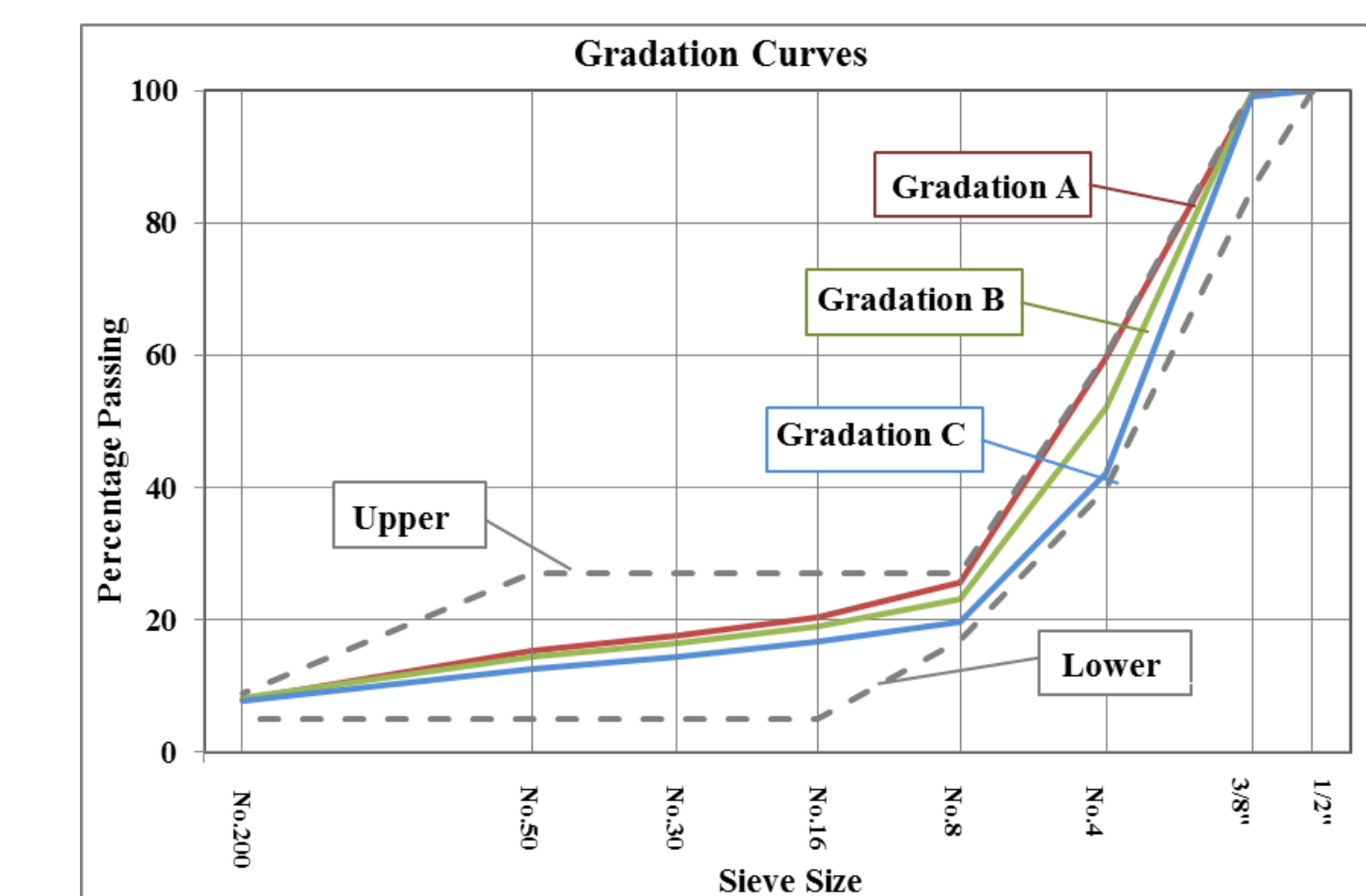
- Thin Overlay Mix TOM**
MPD: 0.578 mm
Noise: 83.7 dBA
- Porous Friction Course PFC**
MPD: 2.010 mm
Noise 84.2 dBA
- Concrete Transverse Tinning**
MPD: 1.001 mm
Noise: 91.9 dBA
- Concrete Smooth Surface**
MPD: 0.038 mm
Noise: 88.5 dBA



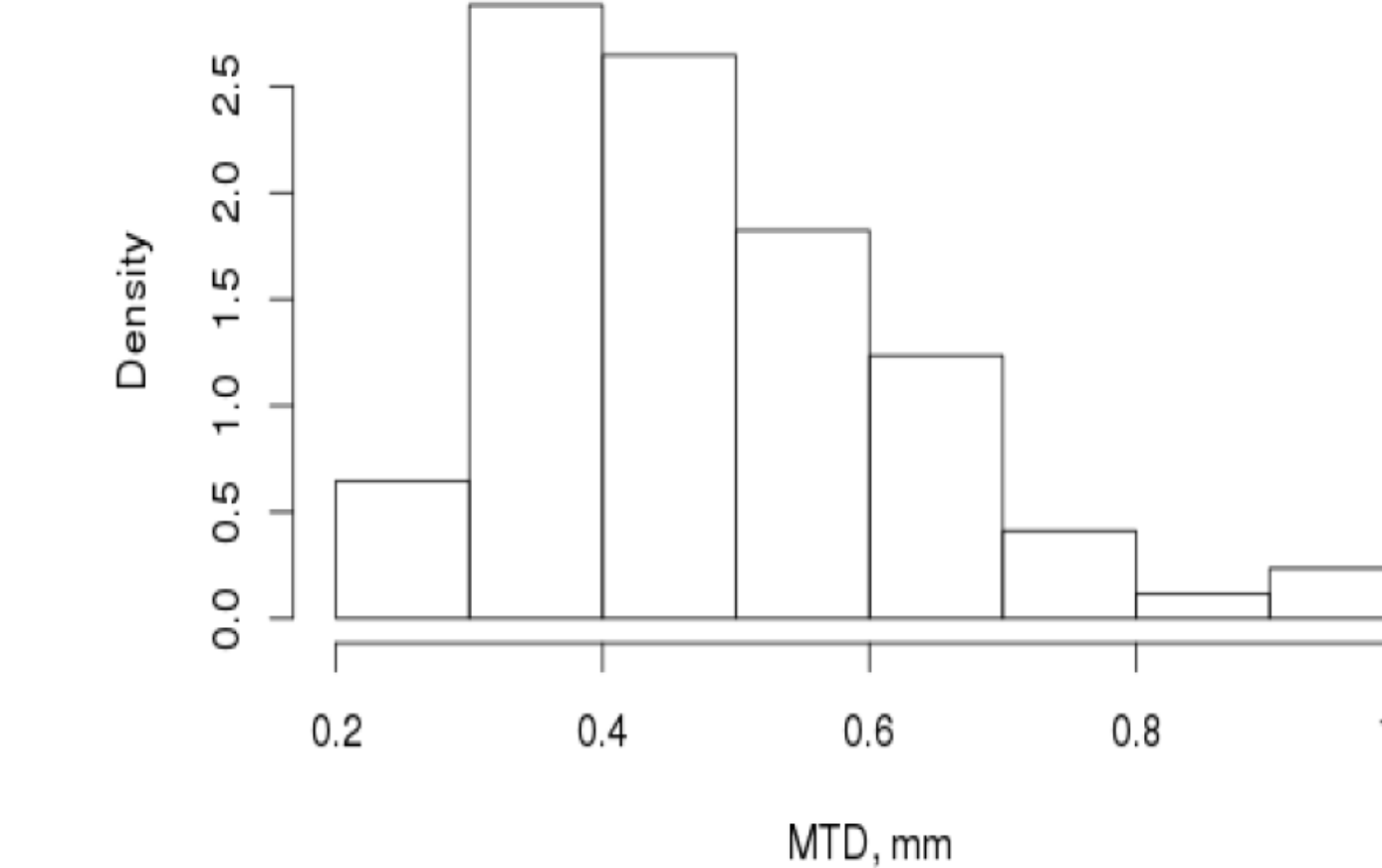
LABORATORY NOISE TESTING

A laboratory experiment was designed to assess the noise sensitivity of TOM to variations in gradation and asphalt content.

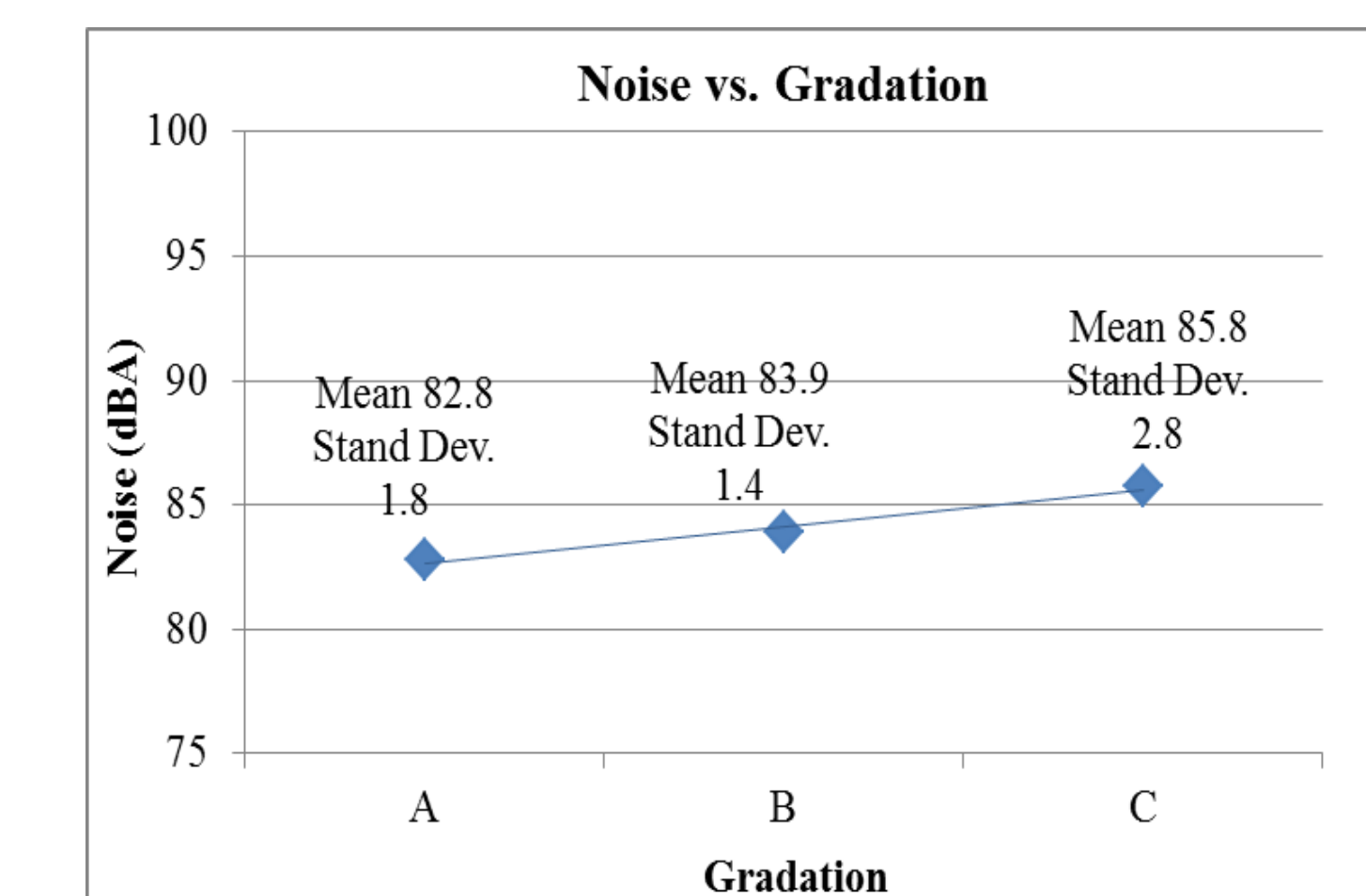
This experiment provides TOM mixtures that vary quite significantly in terms of composition but which still meet standard TxDOT gradation specifications for TOM.



Gradation curves



Macrotexture variability



Noise vs. Gradation

CONCLUSIONS

- This procedure provides a direct measurement of the noise at the surface of the tested specimen and was found to be repeatable and correlated well with relative noise levels of corresponding mixtures tested in the field using the on-board sound intensity (OBSI) method.
- Low macrotexture reduces tire-pavement impact noise.
- TOM design was insensitive to variations in asphalt content and gradation.

