ACRP Problem Statement No. 14-02-03  
Recommended Allocation: $250,000

Hard and Soft Ground Sound Absorption Methodology for AEDT/INM

ACRP Staff Comments: The proposed research could be incorporated into Problem Statement 14-02-14, which seeks to develop a prioritized list of potential improvements to AEDT and to provide detailed documentation of select near-term, high-priority improvements. If this effort is kept separate, the funding level should be increased to $350,000.

TRB Aviation Group Committees Comments: ENVIRONMENTAL IMPACTS OF AVIATION: Support, though this should be direct FAA-funded research. The proposed research appears focused, useful, and achievable with fairly accessible land use tools. Normally should be funded by FAA.

Review Panel Comments: Recommended. Ground composition is fairly crudely handled in noise modeling currently, especially sound propagation over water. This research would address a long-standing model gap.
1. **Problem Statement Title:**
Hard and soft ground sound absorption methodology for AEDT/INM

2. **Background:**
When conducting a FAR Part 150 noise analysis, airports are required to use the Federal Aviation Administration’s (FAA) Integrated Noise Model (INM), soon to be replaced with the Aviation Environmental Design Tool (AEDT). AEDT and INM use the same noise modeling methodology for modeling noise in the vicinity of airports; this method assumes “soft” ground sound absorption in the calculation of lateral attenuation, based on SAE-AIR-5662 “Method for Predicting Lateral Attenuation of Airplane Noise” (2012).

In reality, areas around airports are often covered with a variety of different ground types, including “hard” or reflective ground (such as large areas of pavement or water). Hard ground can have a significant effect on the noise level around an airport due to decrease in ground absorption effects. By ignoring hard ground effects and effects from multiple different ground types (or mixed ground effects), noise analyses may under-predict the noise due to aircraft operations in the vicinity of airports.

Research is needed to improve ground absorption methodology to allow for the modeling of hard, reflective and mixed ground effect in AEDT/INM. Having this method will help analysts more accurately model aircraft noise levels in the vicinity of airports.

3. **Objective:**
To develop a method for modeling hard and soft ground absorption of aircraft noise in AEDT/INM.

4. **Proposed Tasks:**
This research should include the development of a method to model variable ground absorption effects in AEDT/INM, implementation guidance, validation data set identification, and a sensitivity analysis.

5. **Estimated Funding:**
The estimated funds necessary to accomplish the objective are $250,000.

6. **Estimated Research Duration:**
The estimated duration necessary to accomplish the objective is 18 months.

7. **Related Research:**
Initial research into the development of a method for modeling the hard and soft ground sound absorption of aircraft noise was conducted by the John A. Volpe National Transportation System Center and was documented in “Lateral Attenuation of Aircraft Sound Levels over an Acoustically Hard Water Surface: Logan Airport Study” (Fleming, Noise Control Engineering Journal, V.50, 2002). Further research into modeling ground absorption effects was conducted by SAE A-21 Committee “Aircraft Noise Measurement and Aircraft Noise/Aviation Emission Modeling” during the development of SAE-AIR-5662, but was not implemented in the final document. Development of a ground absorption methodology for AEDT/INM that accounts for hard, soft and mixed ground types should make use of these findings.

8. **Process Used to Develop Problem Statement:**
This problem statement is the product of the TRB Committee ADC40 “Transportation-Related Noise and Vibration” aircraft subcommittee, and discussions held at FAA Tools workshops.

9. Person Submitting Problem Statement and Date
This problem statement was submitted on March 14, 2013.

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