A Study of Highway Subsidence due to Longwall Mining using data collected from I-79

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Objective
The objectives of this project are to determine which of the existing models for subsidence prediction gives the best results, and to investigate the possibility of modifying these models if necessary.

Problem Statement
PennDOT District 12 has invested heavily in collecting geological and subsidence information from longwall mining under Highway I-79. The subsidence from Emerald and Cumberland mines located under this highway is substantial. A better understanding and the ability to predict the spatial and temporal patterns, as well as the potential magnitude of the mining-induced subsidence is crucial to the safety of the operation of highways under the jurisdiction of District 12.

Work in Progress
The following tasks will be accomplished:
1. Perform a literature review and evaluation of the geological material that will be used for the subsidence evaluation.
2. Investigate the subsidence profile change with time and progress in space with respect to mining schedule.
3. Obtain subsidence profiles based on geological characteristics of the ground above the mentioned mines using the Surface Prediction Deformation System (SDPS) model developed by the Office of Surface Mining and Virginia Polytechnic and State University.
4. Determine the validity of the SDPS model by comparing the measured subsidence profiles with the ones predicted by the model; investigate other existing models and compare them with SDPS.
5. Using the recommended prediction model, predict subsidence profiles for additional coal panels.
6. Submit a draft final report that summarizes all findings.
7. Submit a final report.

Results
A thorough review of the models for subsidence prediction with emphasis on models developed with data from the Northern Appalachian Coal Region has been completed.

While working on task 2, the University of Pittsburgh team has developed a procedure to transform raw data so that the progress of subsidence as a function of space and time can be quantified. Consistent patterns in subsidence magnitude and profile shapes along with extensive data have made it possible to envision a general prediction model for the District 12 region that can be utilized by PennDOT for future planning as mine panels continue to be mined out under I-79.