Executive Summary for
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IDENTIFYING POTENTIAL COLLAPSE FEATURES UNDER HIGHWAYS

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The overall goal of this project was to develop a reconnaissance geophysical method for locating zones in coal mine regions where a highway has the potential for collapse. The zones identified by the reconnaissance survey would then receive detailed study by drilling and additional geophysical surveys to ascertain the need for remedial action. Phase 1 of the project progressed through planning, data acquisition, processing and interpretation. In 1998, two sites on Ohio Route 32 were studied: one in Jackson County and the other in Vinton County. The investigated geophysical tools included ground penetrating radar (GPR), gravity, P-wave and S-wave seismic refraction, seismic reflection, and surface wave studies. The site in Jackson County was given priority because of serious concerns about potential road failure. The study of this site was completed. Drilling and subsequent excavation revealed extensive collapsing shallow coal mines. At the Vinton County site, five holes had been drilled before the geophysical surveys commenced. These holes provided limited ground truth. No holes were drilled subsequent to the surveys. The geophysical evidence was less clear at this site because the steep bedrock topography and the highway construction produced highly variable subsurface materials.

The conclusions of these studies show that the most effective methods for locating potential collapse zones are: P-wave seismic refraction, S-wave seismic refraction, 2D-resistivity imaging, and surface wave profiling. These methods were pursued further in Phase II. The methods that showed less promise for this particular problem were: gravity, seismic reflection, ground penetrating radar, and spectral analysis of surface waves. In 1999, Phase II of the project was conducted in Perry County, Ohio along State Route 13. At this site, several abandoned mine workings are located below State Route 13. Based on results from the Jackson County site, seismic refraction and 2D-resistivity imaging were judged to have the greatest potential for differentiating the subsurface locations of abandoned mine workings from those of intact rock. Both seismic refraction and resistivity recorded anomalous data at roadway locations overlying mapped abandoned mine workings. Additional zones of possible unmapped mine workings were also identified. The Phase II plan was to drill holes at selected locations to verify the geophysical results. Due to the environmental concerns of drilling into the abandoned mines at this location, ODOT decided the risks of drilling were too high and drilling was not performed.

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