

## SCHOOL BOARD AVOIDS MINE STABILIZATION

MEA performed a subsidence engineering investigation of an existing vacated school property due to past mine subsidence. This school property is located in the East St. Louis Area. This one and two story school building was originally built in 1966 and was added on to in several phases up to 1987. In 2007 a significant portion of the school structure was subjected to sag subsidence. Movement and cracking were first observed in September 2007. About a month after subsidence was reported, the subsidence movements were monitored for about the next 12.5 years. During this period of time, about 0.63 ft of subsidence was measured at the southern end of the demolished section of the building. Given the rate of subsidence in the initial month was significantly more severe, the total subsidence experience at this southern building location was probably on the order of 2 ft based on our experience in the area.

As a result of this subsidence, the southern wing of the school was demolished due to the severe subsidence damage. Figure 1 shows the structure and the location of the sag subsidence and the demolished section of the building. At the time of this investigation, the school building was still abandoned.



FIGURE 1 LOCATIONS OF SCHOOL AND THE 2007 SAG SUBSIDENCE EVENT AND DEMOLISHED SECTION OF THE STRUCTURE

Figure 2 shows the existing school building area superimposed on to the mine map for below the site and the location of the sag subsidence. The room-and-pillar mine complex below the site operated between 1880 to 1946. The mine map indicates from about 50% to 68% of the coal was extracted from the mine. The coal which was mined is called the Herrin No. 6. Coal

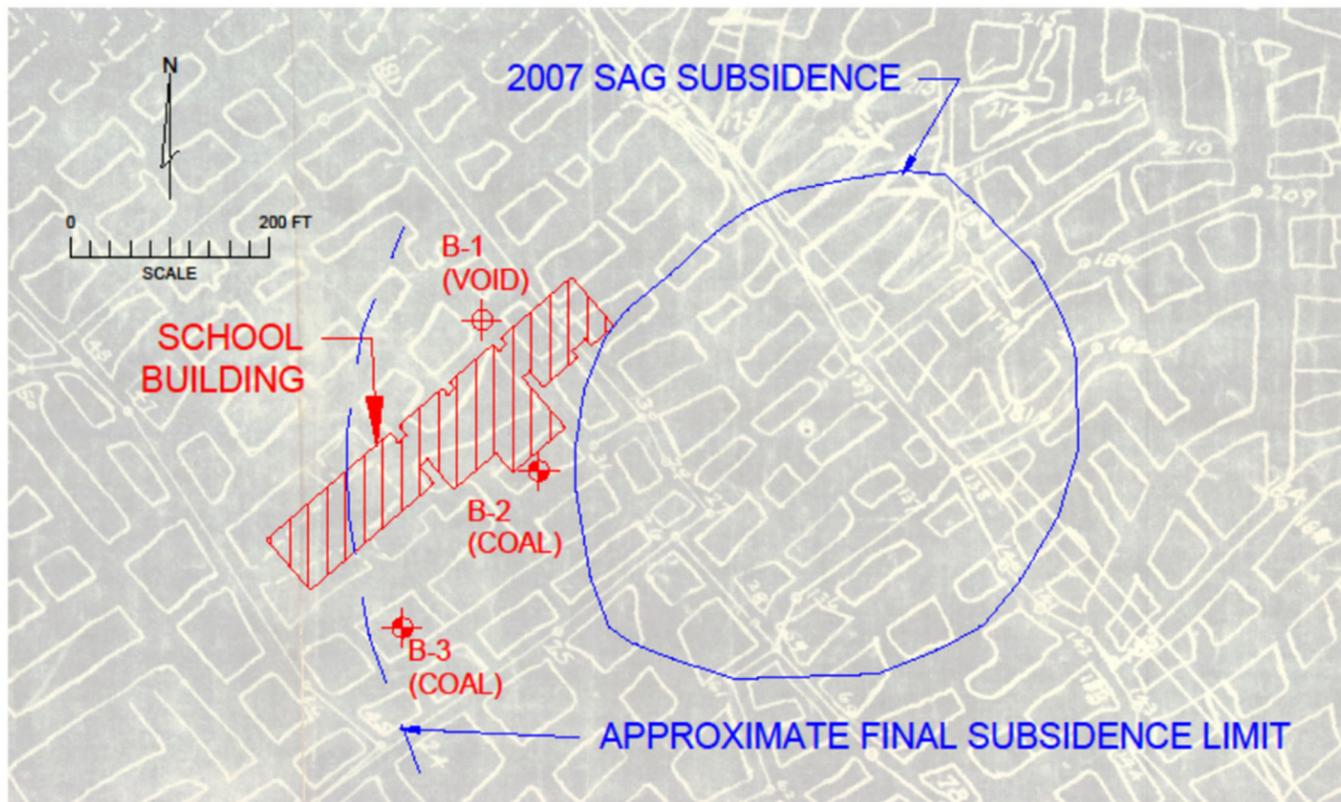


FIGURE 2 PRESENT SCHOOL BUILDING OUTLINE WITH MINE MAP SUPERIMPOSED AND LOCATIONS OF SUBSIDENCE AND MINE BORINGS PERFORMED

seam. The reported thickness of this coal seam throughout the mine complex ranged from 6 to 7 ft and ranged in depth from 110 to 125 ft.

Understanding the present state and projecting the future state of these abandoned workings was critical to assessing mine stability and thus the potential for future surface subsidence. In order to understand the existing mine stability conditions in the old workings beneath the site, three borings were drilled and sampled sufficiently into the mine floor. The three borings were drilled to depths of 135 to 143 feet where the mined-out coal was found from 105 to 112 feet deep. The location of these holes are shown in Figure 2.

From the rocks sampled from the roof and floor of the mine, laboratory testing was conducted in MEA's laboratory to determine the state of these rock which support the mine openings. With the use of advanced subsidence techniques, rock mechanics analyses were then performed to assess the stability on the mine structure. It was determined the stability of the mine roof and pillars as shown on the mine map should be stable in the long term. The mine investigation work also determined that the mine floor had significantly softened over time but was more likely than not to have sufficient long-term strength to support the bearing loads from the coal pillars. From these assessed mine stability conditions, the risk of surface subsidence, and the resulting damage potential were determined. Given the lower subsidence risk prediction assessed for the site, no mine stabilization measures were deemed necessary by the school board.

**Other MEA Publications that may be of Interest:**

[Engineering Update #14: Establishing Mine Subsidence Risk](#)

[Engineering Update #24: Anatomy of Mine Grouting Voids](#)

[Engineering Update #40: The Importance of Estimating Damage Potential](#)

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**FOR MORE INFORMATION:** There is a significant amount of additional information that is available on the above subject. For more information, please contact MEA at the address listed below.

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MARINO ENGINEERING ASSOCIATES, INC.

1370 MCCAUSLAND AVENUE, ST. LOUIS, MISSOURI 63117  
 PH: 314.833.3189 FAX: 314.833.3448  
<http://www.meacorporation.com>