

U.S. Fire Administration / National Fire Academy

Coffee Break Training

Topic: Construction Elements

Learning objective: The student shall be able to identify important elements that may affect structural performance.

Every structural firefighter should study this picture closely. It illustrates a number of critical structural elements that can influence a building's performance during a fire.

First, notice the large steel I-beam above the window that serves as a lintel. The lintel transfers the loads from above the window to the adjacent wall, and eventually to the ground. At the far right side of the I-beam there is only one wythe of brick on the perpendicular exterior wall. (The unpainted brick only rests in the web of the I-beam.) If the beam were to elongate due to heating, it could push the brick wythe outward and cause a collapse.

Second, there is a smaller I-beam resting on top of the steel I-beam lintel. Since it is smaller—having less mass—it will be affected more readily by heat, and elongate at a different rate from the larger beam.

Third, the building is constructed of unreinforced masonry. Look at how the brick courses are arranged above the steel. The alternating brick ends that are visible are a common indicator of unreinforced masonry construction.



Fourth, the oriented strand board (OSB) sheathing at the bottom of the photograph shows that there is combustible construction in this building; that is additional fuel for a fire.

Finally, if you look very closely at the lower right hand corner of the picture, you will see there are two courses of brick already detached from the mortar. Only gravity and the compressive forces from the bricks above them are holding them in place.

This photograph was taken at a “postfire” building reconstruction project. These hazards subsequently have been hidden behind a cosmetic façade. Don't wait for a fire in your response district to expose you to similar hazards. Study the buildings in your response area.