There is no question why cast-in-place concrete is one of the most commonly used building materials in the world. Economically, the cost of ready-mix concrete has historically stayed relatively low and stable. Aesthetically, concrete is one of the most adaptable materials across all architectural genres. Environmentally, concrete can be locally sourced resulting in low energy waste during the transport of materials. Concrete's strength, weight and resilience produce distinct advantages over other common construction materials. Most importantly, cast-in-place reinforced concrete is one of the safest structural materials available.

The heaviness of reinforced concrete helps it to withstand high winds conditions and when designed to also exhibit ductility it can tolerate strong seismic events. It easily meets strict fire codes because it can endure high temperature fires for long periods of time while still maintaining its structural integrity[1] and it displays great resistance to impact or explosion. Masonry structures have the highest chance of failure during a disaster. Unless a masonry building is reinforced, it has little resistance to seismic events, high wind loads, or explosions. Lightweight structures made from materials such as wood perform well under seismic conditions but are very dangerous during fires and are much more susceptible to uplift forces caused by high winds. Steel structures, despite being praised for their low weight-to-strength ratio, are also vulnerable to high heat fires and are not as efficient as reinforced concrete at distributing load during progressive collapse conditions. An important aspect to safety is a structure's ability to absorb small local failures without leading to large scale or global failures.

The 1968 collapse of the Ronan Point apartment buildings in London catalyzed the prioritization of resistance to progressive collapse among designers, engineers, and owners alike. Soon after this disaster "the American Concrete Institute introduced prescriptive provisions to enhance structural integrity against progressive collapse for reinforced concrete structures.[2]" Today, general building codes and standards have special provisions to increase structural integrity and to reduce the effects of progressive collapse of buildings due to unplanned loading or the loss of structural elements. Studies have shown that even old reinforced concrete buildings are capable of resisting collapse following the removal of select load bearing elements.[3] Results showed that Selective column demolition tests can help to gain an understanding of how load is redistributed throughout systems. Reinforced concrete structures were very effective at redistributing building loads to neighboring columns without causing large deformations.

As Engineers, it is our duty to hold paramount the safety of the public. The benefits of cast-in-place concrete, economically, aesthetically, and environmentally greatly incentivize its use. However, its resilience and integrity set it apart as the most widely applicable material in construction today.

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[1] "Concrete vs. Steel." Facility Management and Commercial Building Resource. Ed. Jana J. Madsen. Buildings, 01 June 2005. Web. 11 Apr. 2017.

[2] Sasani, Mehrdad, and Serkan Sagiroglu. "Gravity Load Redistribution and Progressive Collapse Resistance of 20-Story Reinforced Concrete Structure following Loss of Interior Column." ACI Structural Journal 107.6 (2010): 636-44.

[3] Sasani, Mehrdad, and Serkan Sagiroglu. "Progressive Collapse Resistance of Hotel San Diego." Journal of Structural Engineering 134.3 (2008): 478-88.