

STORM RESISTANCE OF PRECAST CONCRETE STRUCTURES

Precast concrete structures are inherently resilient and provide excellent protection against high winds from tornados and hurricanes, storm surge, and flying debris. Precast concrete is often used in FEMA shelters, residential, institutional, public, government, commercial, industrial, and other structures providing protection, durability, and resiliency.

Precast concrete structures and architectural panels provide significant benefits in meeting wind-resistance requirements. A calculation for determining proper wind loads for precast concrete structures can be found in the “PCI Design Handbook” (MNL-120) available for purchase on the PCI Online Bookstore.

Impact testing of precast insulated sandwich wall panels show that precast concrete provides significantly more protection against flying debris, which often becomes projectiles or missiles during a tornado or hurricane than other building materials, such as wood, steel, brick and vinyl siding. Tests were conducted by the Precast/Prestressed Concrete Institute (PCI) and the Portland Cement Association (PCA) on various wall assemblies with the impact of a 2x4 wood stud traveling at 100 mph, the equivalent of wind-borne debris during a tornado or hurricane with 250 mph winds. Of all materials tested, only the precast concrete design stopped the debris from penetrating the wall, demonstrating the resiliency of precast concrete.

Precast concrete can also thwart storm water surges. Storm water carries loose debris that can act as a battering ram against a building. Precast concrete structures are much more capable of resisting these forces compared to other forms of construction. Scour, which results from water surging beneath a slab on grade or elevated second floor level, can be prevented by using precast concrete pilings or columns to create a stable soil foundation or elevated structure over a first-level garage. In addition, concrete is not susceptible to water damage. In flood-impacted areas, precast concrete structures are often salvageable.

Wind-borne debris penetrated this wood-framed home in Des Moines, IA in 2020

