

# Highest Precast Structure in a Seismic Zone

The European Standards body CEN recently approved a set of guidelines dealing with civil safety issues such as the impact of earthquake, storm, and floods on buildings and bridges. These issues are particularly pertinent in the United States where the safety of high buildings is a live issue, particularly where seismic activity is concerned.

In San Francisco, architects Elkus Manfredi in association with Englekirk Consulting Engineers, recently completed the highest ever precast structure built in a seismic zone. Standing 39 storeys tall, the Paramount building is a mixed use retail/residential structure which has won much acclaim and recognition for its clever design. The project incorporates 486 luxury apartments, roof top pool area and an eight storey car park which caters for 350 cars. The building was rapidly constructed in 26 months by Pankow Residential Builders at a cost of €92.7 million.

According to the designers, this method of resisting earthquake forces, compared to other common structural steel or insitu concrete systems, significantly reduces damage to the key elements of a building frame. The curved hybrid precast moment frame bracing designed and built by Pankow, provides enhanced structural lateral-force resistance which is essential when designing in seismic zones.

The precast design is inherently different to design in steel or insitu concrete and that precast not only matches but can give superior structural performance to alternative forms of construction. To capitalise on the advantages of precast, a clear understanding of connections and jointing methods is critical. Precast elements, such as columns, beams, floors, roofs, service cores etc. can be connected in such a way as to maximise the control where the damage is most likely to occur which is at the joint. Tried and tested jointing methods are available in precast and the performance of various combinations of joint types is well documented.

Recent research in the United States has identified a number of key benefits of precast. The most significant benefits are that precast concrete is factory produced in a controlled environment, which speeds up the construction programme and precast elements have discrete

*The Paramount Building - San Francisco - 39 Storey Precast Structure*



*The Paramount Building San Francisco*

connection locations that can be designed to give a specified performance. The latter is a crucial factor in seismic zones, but is also relevant where damage can occur from explosion, impact or human error.

The Paramount building was constructed on a congested urban site using an innovative design approach to produce enhanced structural stability, reduce costs and speed-up delivery of a high-quality structure.