

Ronan Point, Canning Town, London, May 1968

- 4 died with crushing injuries





Partial collapse of
Ronan point.

Upper floor panels
have collapsed after
gas explosion blew
out large wall
panels. Floor panels
can be seen
hanging down.



The Incident

- Ronan Point was a 200 ft high block of flats which featured the Larsen Nielsen prefabricated housing system used for local authority housing as part of a nation-wide slum clearance programme.
- Initially developed in Denmark in 1948 it featured external and internal walls and floors formed by large panels, approximately 150-175mm thick, of steel reinforced precast concrete.
- The external wall panels relied mainly on friction to hold them in place and the only load action considered in the design was wind load.
- A gas explosion occurred at 05.45 on Thursday 16 May 1968 in a one-bedroom flat on the south-east corner of the 18th floor of the block. Four people lost their lives from multiple crushing injuries in the ensuing collapse.





Aerial view of
collapsed corner
of Ronan Point



The explosion scenario

- The cause of the explosion was a broken joint in the connection of the town gas supply to the gas cooker which allowed gas to flow at an estimated rate of 120ft cubed an hour through open doors and accumulate in the flat, and this was ignited when an attempt was made to light the cooker.
- Following the explosion a small fire was caused as gas flowed out of the severed gas supply pipe but this fire was confined to the flat.
- The explosion blew out the internal walls of the flat and also, unfortunately, the load-bearing external flank walls of the living room and bedroom, which left the floor above unsupported and this collapsed.
- The weight of this part of the building as it fell caused a progressive collapse of the sitting rooms in the remainder of the south-east corner down to podium level. Mercifully most tenants were still in their bedrooms at the time of the explosion; only the sitting room floors collapsed.
- Tenants made their way out of the building by the stairs as the lift had been damaged in the explosion.
- Walls and floors in corner of upper stories have collapsed like a pack of cards



Ronan Point – Public Inquiry findings

- The report of the Inquiry showed that:
- the joint between the flank walls and floor was weak and mainly relied on friction and dead load to hold the walls in place
- the potential problem of a 'pack of cards' type of collapse had been identified a little earlier in an international CEB report dated March 1967 dealing with large panel structures
- building bye-laws applied in the Inner London area in which Ronan Point was located and these did not require progressive collapse to be considered, but nor did building regulations which applied in the rest of England and Wales, and the designers had not considered the possibility.
- the likely pressure resulting from the explosion was in the range 3-12 psi which was normal for domestic gas explosions
- the wind pressure assumed by the designers to act on the 200 ft high building was only 24 psf, corresponding to a wind speed of 63 mph. Research, current at that time, showed that at 200 ft above ground level a wind speed of 105 mph could occur once every 60 years.
- These loads were much in excess of what Ronan Point was designed for, and all such high rise buildings required remedial work for reasons quite apart from fire. Internal explosion could be considered similar to negative wind pressure.



Ronan Point – Public Inquiry findings

- Greater wind pressures should be allowed for and this would have a beneficial effect on resistance to explosion.
- A study of the statistics revealed that in a block the size of Ronan point, with 110 flats and a life of 60 years, there was a 2% risk that a serious gas explosion causing structural damage would occur in one of the flats during the life time of the block. Thousands of system built blocks already existed and it was essential to do remedial work of joint strengthening throughout the country
- High blocks of flats built in frame construction were not likely to suffer progressive collapse, but future large panel construction could be designed to avoid progressive collapse.
- The effect of fire on the thermal movement, especially out-of-plumb effects on the external walls, of large panel construction with poor joint strength should also be considered.
- Following this report the building regulations were amended to provide for structural continuity for buildings above a certain height. All the existing stock of system built high rise buildings were assessed for progressive collapse and modified accordingly, and fire tests were carried out by BRE to examine the instability effects of thermal movement (Cooke and Pigott)

