Demolition by Implosion
Nurses Home, St Vincents Hospital, Dublin

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Synopsis:
On Sunday 21st January 2001 the Nurses Home at St Vincent's University Hospital was demolished by controlled implosion. This presentation will cover the technical and practical events leading up to the demolition, the implosion itself and the aftermath,
an additional three floors on the internals of each gable end.

This would have the effect of removing all support in the gables at every second level leaving only the external wall not blasted.

Test Blast

After soft stripping the building and removing all asbestos products, a test blast was carried out to establish the correct amount of explosives to be used and also to verify the proposed debris containment system. The first test blast removed the section of wall completely but was considered to be more powerful than necessary and could potentially give rise to an unacceptable increase in air over-pressure with the risk of possible window damage. It was therefore decided that a second test blast would be carried out with a charge weight reduced by some 25%.

The second test blast successfully removed the load-bearing capacity of the member with significantly reduced levels of air over-pressure.

The test blast also demonstrated that the proposed containment system was effective.

Having successfully carried out the test blast, the method statement and exclusion zone were finalised and the building was prepared for demolition.

Preparatory works

On non-blast floors the reinforcement in the columns on one side was exposed and cut. This would assist in encouraging the columns to fall once the building was mobilised. On blast floors all non load-bearing walls were completely removed and the columns and walls were drilled and charged with explosives.

Blast protection was installed to every structural member containing explosives. All windows were removed from the building to ensure that as the structure collapsed glass would not be ejected onto the surrounding landscaped areas. As a secondary protection, chain link was installed at all windows on blast floors and a geo-textile curtain was wrapped around the outside of the building.

A non-electric system of initiation (Nonel) for the explosives was used. This was chosen for its absolute reliability, its waterproof qualities and also its insensitivity to stray electrical currents and radio frequency-induced excitation.

Demolition Day

On the day of demolition a pre-arranged plan and sequence of events was implemented. An exclusion zone of approxi-
mately 100 metres was enforced around the building and the countdown commenced. At 9.30am precisely, the building was detonated and began to move exactly as designed.

At 9.30am plus two seconds the building stopped, leaving a structure with four complete floors with the exception of the gable removed and the internals of both gables destroyed at every second floor to collapse.

The wall nearest to the hospital remained almost intact although it had dropped two storeys.

The gable at the opposite end of the building had also collapsed two storeys but it had failed at several other levels and appeared to be propped at one corner even though that corner was badly disrupted.

The collapse was designed to bias the structure away from the School of Nursing and although the building had failed to collapse the bias was evident.

A Method Statement and amended sequence of events was produced and discussed with the client (RJA representing the client). This outlined the approach that would be taken to demolish the structure and addressed such issues as: traffic management, hospital functions and timetables, site security. It was agreed that work would commence on bringing the building down at approximately 3.30pm when the hospital would cease using its operating theatres which had been in use since the previous attempt. During this time a long reach excavator with a pulverisor attachment and a crane with a demolition ball were brought onto site.

When the hospital gave the go-ahead the long reach excavator was used to remove approximately 60% of the gable that was obviously providing very little or no support to the structure. It was then possible to establish with certainty that it was the corner of the gable that was providing support to the building.

The long reach excavator was then withdrawn from the area and the crane complete with demolition ball was erected and brought into position. Again, during this time the hospital continued to function.

It was agreed with the hospital that the final phase of the works could commence at 9pm. The crane driver was instructed to strike the gable end towards the corner that was furthest from the School of Nursing. It took in the region of 30 strikes with the demolition ball to weaken the corner sufficiently enough to allow it to move. The result was virtually instantaneous. The building moved in the direction in which it was biased and collapsed as originally intended all be it some 12 hours later. There was no damage to SVUH, the School of Nursing or the nearby road.

Within two hours SVUH was fully operational. The site was fenced off and security put in position for the night ready for work to begin on clearance of the site the following morning.

The Object of the Exercise

The object of the exercise was to demolish the structure quickly and safely. To cause as little disruption as possible to the hospital and its patients, to avoid damage to the operating theatres and other essential parts of the hospital and to avoid disturbance to the nearby residents due to noise and dust etc.

Conclusions

The technique as proposed was appropriate given the constraints. The gable wall structures should have been more extensively pre-weakened. When dealing with unusual structures equipment for use in the contingency plan should be available on-site in the event of a problem thereby reducing the overall time to complete the works.