SEISMIC STRENGTHENING BY BASE ISOLATION
PARLIAMENT HOUSE
WELLINGTON
NEW ZEALAND

One of the most significant aspects of refurbishing Parliament Buildings in 1992 was to make Parliament House and the Library safe from earthquakes.

The main Wellington fault line is only 400 meters from these buildings. Since both have Historic Places Classification, permanent preservation of these buildings is required. Strengthening work at Parliament House involved adding supporting walls inside the masonry building. Use was made of internal open spaces to build this strengthening framework. Reinforced concrete beams were inserted into selected areas to prevent any twisting movement during an earthquake.

The first stage of this base isolation engineering involved digging a moat around the original foundations. Large blocks were cut our section by section. Extensive strengthening of existing basements walls was needed to spread the foundation load. The ground floor beams also required major strengthening to redistribute wall loads to the base isolator bearings which were then place into position.

The effect of all this engineering work was to create an extensively strengthened building supported by very solid foundations yet isolated from most of the ground movements during an earthquake.

Let's take a closer look at how the base isolators were installed and how they work. More than 400 bearings were placed into load bearing locations. During installation flat jacks were filled with an apoxy grout to place the bearings under pressure to support the weight of the building above. Each base isolator can stand a vertical weight of over 150 tons.

The next stage was to cut a cylindrical hole through the original foundations to allow access for a hydraulic arm with a large horizontal saw attached. These saw cuts removed slices of the original foundations effectively separating the building from its base, leaving the entire structure resting on the base isolators. Now let's look at how the base isolator bearings work during an earthquake. They consist of alternate layers of high-density rubber and steel plates surrounding an inner core of lad and are designed to move up to 30 cms in any horizontal direction during a quake of up to 7.5 on the Richer scale. This base isolation system was designed by Wellington engineer, Dr Bill Robinson, using computer aided design and local manufacturers. This technology is now used around the world.

Parliament Building has been refurbished and strengthened with a design life of 150 years. A geological investigation by scientists revealed that the likelihood of an earthquake between 7 and 7.5 on the Richter scale is predicated to occur about every 600 years. While there is up to a 50% chance of this happening the survey indicated that the fault had not moved during the past 350 years.

Today these historic Parliament Buildings are fully protected by an impressive engineering system. They have been modernised and refurbished while retaining their original character yet preserved for future generations to appreciate.

Visitor Services Section
Parliament House
Wellington
New Zealand