

BEHAVIOUR OF LIFTS – THE WELLINGTON EARTHQUAKE OF NOVEMBER 1, 1968

D. J. McKenzie*

FOREWORD

Reports were received that some lift counterweights were dislodged from their guides by the Wellington Earthquake of November 1, 1968.

The earthquake which occurred at 1.32 p.m., is estimated to have a magnitude of $M_L = 5\frac{1}{2}$, at shallow depth, and an epicentre about 20 miles S.E. of Wellington.

The Committee requested the administrative secretary to seek information from the Marine Department. A copy of his letter and the reply of the Secretary of Marine are given below.

"The Secretary for Marine,
Marine Department, Head Office,
Aurora House, Mayfair Centre,
62 The Terrace,
WELLINGTON.

27 June 1969.

Dear Sir,

It has been brought to our notice by an Insurance Assessor with considerable experience in surveying the results of earthquake damage, that in the 1st November, 1968, earthquake in Wellington, a pattern of damage was caused to lifts in this area. In particular many counter-weights were released from their guides and machine motors were displaced.

We would be interested to know if, as a result of this type of damage, your department has called for special precautions to be taken with existing and new lifts to prevent a reoccurrence under earthquake conditions in Wellington as well as other areas of New Zealand.

Our membership consists of engineers, architects, scientists, and insurance officers and we publish a Bulletin devoted entirely to all aspects of earthquake engineering. We would be most happy to publish your reply as this would be of considerable general interest."

*Chief Engineer Surveyor, Marine Department Wellington

"The Administrative Secretary,
The N.Z. Society for Earthquake Engineering,
P.O. Box 12241,
WELLINGTON.

Dear Sir,

EFFECTS OF EARTHQUAKE DURING NOVEMBER 1968 ON
LIFTS AND LIFT MACHINERY

In reply to your letter of 27 June and further to the interim acknowledgement of 3 July, I would advise as follows concerning the situation regarding lifts during the November 1968 earthquake.

Following receipt of your letter enquiries were initiated and it appears that the damage was greater than we were originally led to believe was the case, but it still was of a very small magnitude as explained in detail later on.

Of the 4 companies engaged in lift servicing and maintenance in the Wellington area the reports are as follows.

1. One company reported no damage or interruption in lift services due to the earthquake.
2. The second company reports one person trapped in a lift for a short time due to local power failure.

The maintenance and repairs team arrived and released the person from the lift and their subsequent check revealed no damage. The time from receipt of the call to the lift being restored to service would have been, they estimate, around 60 minutes and the person was released from the lift almost immediately on the arrival of the service team.

A second lift, some 36 years old, suffered damage when the lift counterweight came out of the guides.

In this case the lift car was empty, but the car and counterweight jammed and the lift machine continued running with subsequent rope and sheave damage.

3. The third company report that they have no record as to the numbers of persons trapped in lifts, but that all persons had been released within some 15 minutes of the calls being received.

The stoppages were all caused through power surges.

With 4 lifts the counterweights came out of the guides and they also make the observation that in this case all counterweights were on an approximate north-south axis.

Apart from a relatively small number of people trapped for a short time in the lifts and the four counterweights coming out of the guides no other damage was attributed by them to the earthquake.

They also note that their service team had further calls during the hours after the earthquake because low voltage overload relays kept tripping owing to power supply fluctuations.

4. This fourth company state that some persons were trapped in the lifts, but that the longest any person would have been trapped would have been approximately 20 minutes from the time of receipt of the call and again all stoppages occurred initially through power surges.

Some counterweights came out of the guides causing minor damage to the guide rail brackets or to the guide shoes.

A number of motor generator sets of the floating type were dislodged from their mountings, but these have or are being now fastened down.

It would seem from the replies received that all stoppages occurred initially through failure or surges in the power supply.

The number of lifts which suffered minor damage of a nature explained above would have been between 16 and 20 out of a total of some 780 lifts. This then would be approximately 2½% of the lifts in service operating in the greater Wellington area.

It would also seem from general comments received that the lifts which suffered minor damage in this earthquake have not given any trouble during past earthquakes and also that lifts which were damaged on previous occasions this time escaped damage.

The pattern of damage to lifts during an earthquake, therefore, would appear to be rather unpredictable.

Dealing now specifically with the points raised in your letter, no persons were injured or placed in any danger, although the fears of anyone who may have been trapped can be fully understood and appreciated.

The persons who were trapped were trapped because of surges in the power supply and the resulting minor damage was detected where it occurred by the service teams during the process of releasing the persons and generally checking the installation.

Some counterweights were displaced, occasionally only one shoe being effected and the resulting damage was slight.

No machine units or controller units were effected, but a small number of motor generator sets were displaced and these are being fastened down.

In the earthquake of November 1968 all persons were released from the lifts at a speed which we feel reflects some credit on the companies engaged in lift servicing and maintenance and all lifts were back in operation within a very short time. In fact, with four possible exceptions all lifts were operating later that same day.

Bearing in mind the total capital cost of the lift equipment involved we feel you would agree that the damage which occurred was negligible.

The Department has no immediate plans for making changes to its rules because of the above events, but would like to keep the situation under continuous review depending upon overseas trends and should your Society have any constructive comments to make, we will be pleased to receive them.

The Department has naturally experienced some difficulty in reconstructing the events which took place some 8 months ago, but we feel certain from the information given that it is factual and correct.

Yours faithfully,

R.N. KERR
Secretary for Marine

per:

(D.J. McKenzie
Chief Engineer Surveyor