

0206花蓮地震中高樓建築物倒塌之勘察

鍾立來 翁樸文 蕭輔沛 邱聰智 沈文成 李翼安 黃世建

國家地震工程研究中心

趙汶欣

國立臺灣大學土木工程學系

楊耀昇

永安土木技師事務所

邱建國

國立臺灣科技大學營建工程系

摘要

2018年2月6日花蓮地震，中高樓建築物倒塌，導致十多人喪生其中。回顧二年前(2016年2月6日)美濃地震，中高樓建築物同樣崩塌，造成超過一百人死亡。在此二次地震中，若能預防中高樓建築物致命之破壞模式，即能大幅降低人員生命之損失。因此，有必要進行勘察，蒐集相關資料，供日後詳細之探討，釐清肇因，提出對策，排除不幸事件再度重演。由勘察中發現，倒塌之中高樓建築物皆為1999年以前興建，從現行之規範檢討之，若干耐震細節(如柱主筋於同一高程全部搭接、橫向鋼筋緊密度不足、90度彎鉤等)，確實不符。低樓層柱量、牆量不足，形成軟弱底層，亦為倒塌之可能原因。由鄰近災損點之測站，地震紀錄具近斷層之特性，有別於設計反應譜，若干地震紀錄之反應譜，於週期一秒附近之內涵豐富，落在中高樓建築物基本振動週期之範圍內。經初步勘察及地震紀錄之分析，從現行之規範觀之，耐震容量不足，耐震需求過高，兼而有之。確切之原因，尚待進一步之探討。

關鍵字：0206 花蓮地震、中高樓建築物、倒塌。

Reconnaissance on Collapse of Mid- to High- Rise Buildings in 0206 Hualien Earthquake

Lap-Loi Chung Pu-Wen Weng Fu-Pei Hsiao Tsung-Chih Chiou

Wen-Cheng Shen Yi-An Li Shyh-Jiann Hwang

National Center for Research on Earthquake Engineering

Wun-Sin Jhao

Department of Civil Engineering, National Taiwan University

Yao-Sheng Yang

Yong An Professional Engineering Firm

Chien-Kuo Chiu

Department of Construction Engineering, National Taiwan University of Science and Technology

Abstract

Subjected to the 0206 Hualien earthquake, more than 10 people lost their lives due to collapsed buildings, mid- and high-rises. Two years ago, of the 2016 Meinong earthquake, more than 100 people were killed due to toppling of mid- to high-rise buildings. The reconnaissance after the Hualien earthquake found that the collapsed mid- to high-rise buildings were constructed before 1999. From the viewpoint of current seismic design codes, seismic detailing (lap splice, spacing of transverse reinforcement, hook) was not satisfied. From seismic records collected by the stations near the disaster sites, some of the response spectra are different from the design ones. Rich content near the period of 1 second was found, conforming to the range of the fundamental vibration period of mid- to high-rise buildings. From this preliminary reconnaissance, deficiency in seismic capacity and exceedance in seismic demand meeting the current seismic design codes are the possible reasons of the collapses of mid- to high-rise buildings.

Key Words: 0206 Hualien earthquake, mid- to high-rise buildings, collapse.