

COMMON REPORTING SYSTEM FOR SEISMIC DAMAGE
FROM DESTRUCTIVE EARTHQUAKES

by
Heki SHIBATA¹⁾

INTRODUCTION

This brief article was written for the " PRC-US-Japan Trilateral Workshop on Engineering for Multiple Natural Hazard Mitigation ", which was held from Jan. 6 to Jan. 12, 1985 in Beijing, PRC. On the final day, we discussed on the final resolution for the coming future Workshops. One of the items discussed was " Common Reporting System for Seismic Damage ".

The author has been made the surveys on the " mode of failure " for the seismic design of industrial facilities since 1964, especially critical facilities such as nuclear power plants, petro-chemical engineering plants and so on.

OBJECT

Each country must report their experienced damages from each destructive earthquakes based on the pre-determined format. The purpose of this reporting system is to establish the world-wide data file on " Mode of Failure " of various structures including an under-ground structure.

MAJOR ITEMS FOR STUDYING UNDER THIS TITLE (PART I)

- i) Establishing the standard format for damage reports from various type of destructive earthquakes in various areas. This format must include their quantitative data. The drawings and photos of damaged facilities may be included. ["Facility" includes equipment, vessels towers, piping systems, under-ground structures and so on, as well as ordinary buildings, civil engineering structures]
- ii) Establishing the standard procedure of field surveys immediately after the event.
- iii) Establishing a standard technique to indentify the mechanism and cause of an individual failure in the field.
- iv) Establishing the standard items to describe the pre-earthquake history of the damaged structure.
- v) Establishing a common scale of the seismic intensity describing the total damage in a certain area, for example, 0.5 km × 0.5 km square mesh. This may be related to unify the Intensity Scale through the world.
- vi) Organizing a reporting system in each country, each province (or state). This is strongly required. Organizations of various kinds of industrial fields, national research institutes and universities must organize their own task-force to meet with their own purpose.

1) Professor,
Institute of Industrial Science, University of Tokyo

MAJOR ITEMS FOR STUDYING UNDER THIS TITLE (PART II)

- vii) Establishing a standard procedure to convert the obtained data in the field to adequate data formats to store in the data bank for future use including a stochastic analysis and other purpose described in the following item; viii).
- viii) Developing an analyzing system for such data obtained from field survey. This must be studied to meet the standard form of the "file" to meet the purpose of the use of condensed data. For example, new designing, strengthening, mitigating the consequence caused by partial failure, improving the rehabilitation procedure of damage structure.
- ix) Developing the receiving and filing system for data sending from fields and other countries.

MAJOR ITEMS FOR STUDYING UNDER THIS TITLE (PART III)

- x) Developing a movable laboratory equipped by some number of sets of instruments to consists engineering array for microzoning and also for observing change of vibration characteristics of major structures after the main shock.
- xi) Developing a movable office to judge the safety-degree of individual structures in-site after the earthquake, by processing qualitative data and quantitative data obtained in the field.

SOME REMARKS

After developing these data collecting and analyzing system, some trial uses should be made both for the previous earthquake data, and recent new earthquake results in the field. Based on such experiences, some parts of them are common through three countries, but other parts may be followed to the situations of individual countries.

Damage report above-mentioned must include those on ground motion, liquefaction, fault movements and other natural phenomena as well as structural damages. Also, man induced hazards, spreading the related disasters and social reactions under and after the earthquake must be surveyed.

The quick judgement system on the safety degree on individual buildings must establish in parallel to the this system. Both are complimentary one for disaster mitigation, however, some portions may be common.

To establish a well prepared format in the item i) will be led by the various studies above-mentioned. Never-the-less, the early establishment of the international standard format will be beneficial for freely exchanging the data on seismic damages through not only three countries but also the world wide.

This short article was submitted to a group for the workshop, and is revised by the author for the Bulletin.