



PLAN FOR 3-D FULL-SCALE EARTHQUAKE TESTING FACILITY

K. OHTANI

Disaster Prevention Research Division,
National Research Institute for Earth Science and Disaster Prevention, Japan

Abstract

Based on the lessons learnt from the Great Hanshin-Awaji Earthquake, National Research Institute for Earth Science and Disaster Prevention plan to construct the 3-D Full-Scale Earthquake Testing Facility. This will be the world's largest and strongest shaking table facility. This paper describes the outline of the project for this facility. This facility will complete at early 2005.

1. BACKGROUND

The Great Hanshin-Awaji Earthquake (January 17, 1995) gave us serious damages. Many people lost their life or injured by the earthquake. Many buildings and other structures were destroyed.

Especially modern society, which consists of the advanced, complex facilities and concentrated population and functions, has proved to be weak against natural disaster.

To contribute immensely to reducing earthquake disaster, it is indispensable to perform seismic tests on real-size objects and large-scale model of structures. Through, these tests we can elucidate the process of structure destruction and minimize its damage.

On this purpose, we plan to construct the 3-D Full-scale Earthquake Testing Facility, which can be expected to promote the international cooperation.

2. OUTLINE OF THE FACILITY

(1) Specification of facility

The facility (3-D Full-scale Earthquake Testing Facility) can simulate the earthquake grand motion as same size as the Great Hanshin-Awaji Earthquake.

• Main specifications

Dimensions of shaking table			20m × 15m
Maximum model weight			1 200 ton
Maximum displacement	horizontal	X:	± 100 cm
		Y:	± 50 cm
Maximum velocity	vertical		± 50 cm
	horizontal	X:	200 cm/s
		Y:	100 cm/s
Maximum acceleration	vertical		70 cm/s
	horizontal	X,Y:	0.9G
	vertical		1.5G

(2) Planed construction period: 1998 ~ 2004 (Japanese fiscal year base)

(3) Major research subjects

Liquefaction of sand layer

Reinforced concrete building

Bridge

Liquid tank

Behavior of structure while liquefaction

Interaction between non-liquefied ground and structure

(4) Usage

The facility will be available for use to domestic and international research organizations and researchers.

3. DEVELOPMENT OF TECHNIQUE FOR VIBRATION SYSTEM

Prior to construction of the 3-D Full-scale Earthquake Testing Facility, four years project for horizontal and vertical vibration system and the prototype of the facility has been developed since 1995.

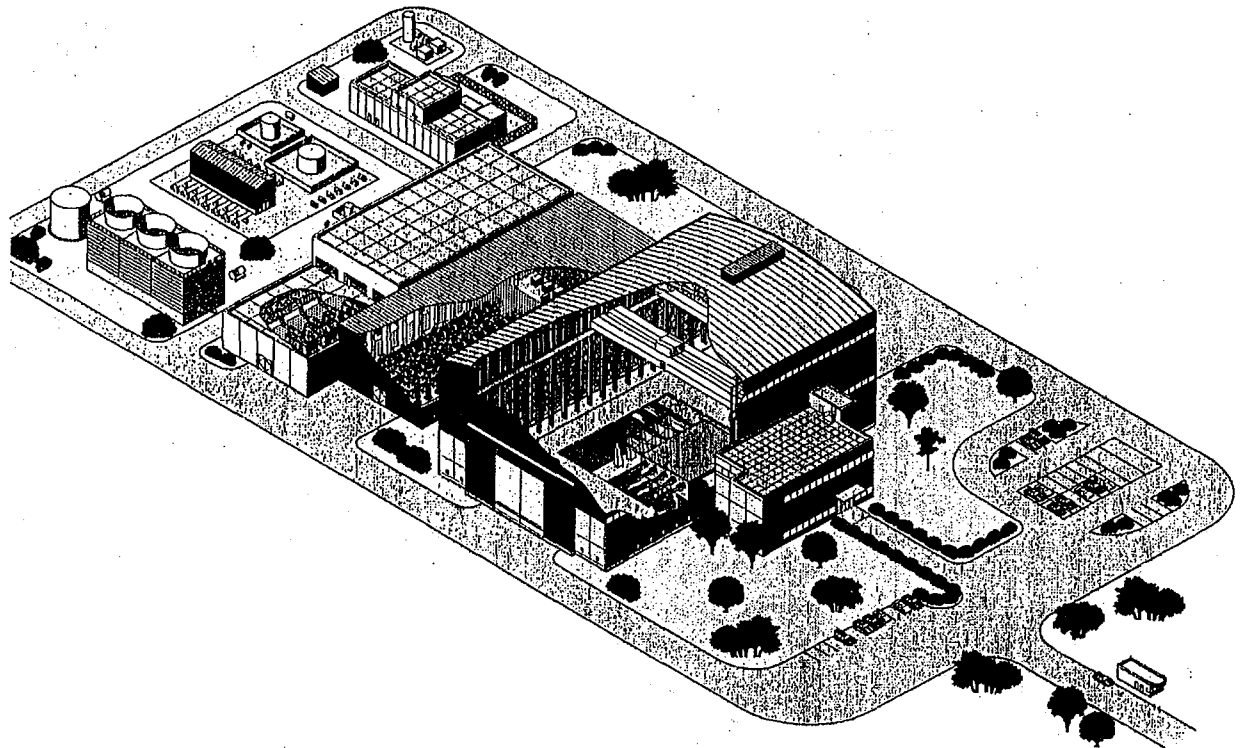


FIG. 1.

- Main Specifications -

Item	Horizontal X	Horizontal Y	Vertical Z
Table Size	20 m x 15 m		
Driving Method	Accumlator Charge / Electro-Hydraulic Servo Control		
Maximum Test Weight	1200 tonf		
Maximum Acceleration (at Max. weight)	0.9 G	0.9 G	1.5 G
Maximum Velocity	200 cm/s	100 cm/s	70 cm/s
Maximum Displacement	± 100 cm	±50 cm	±50 cm
Maximum Overturning Moment	≥ 15,000 tonf · m (at Az=1G)	≥ 15,000 tonf · m (at Az=1G)	—

FIG. 2. 3-D full scale earthquake testing facility — main specifications.

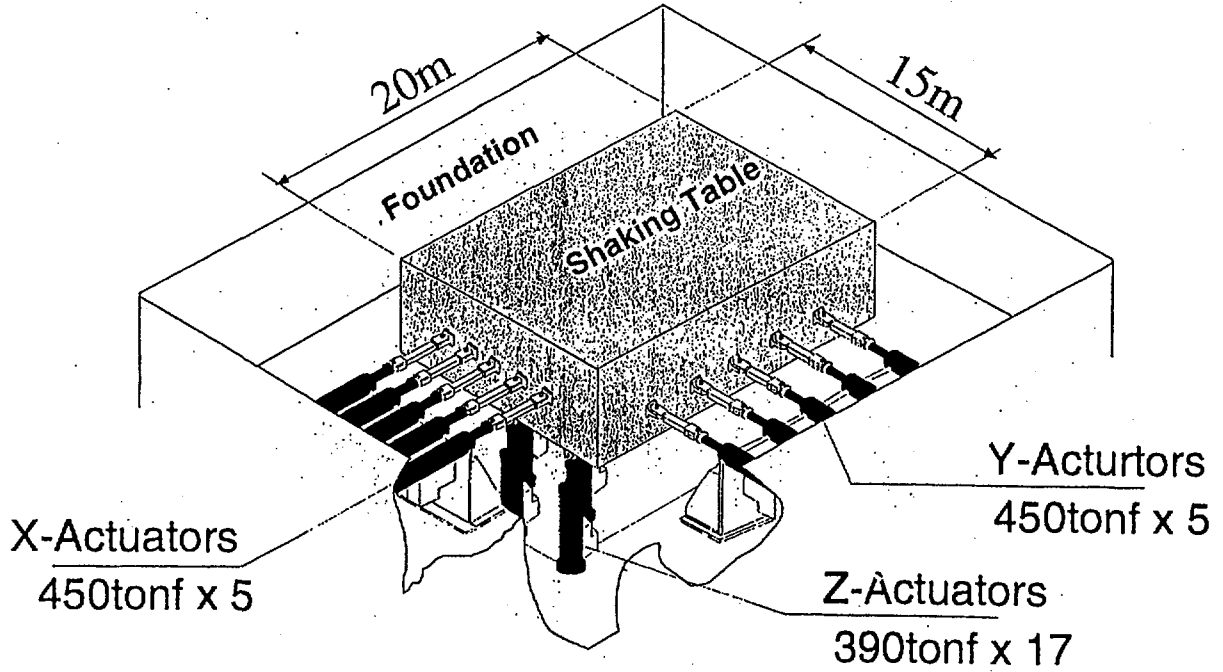


FIG. 3. 3-D full scale earthquake testing facility — outline of main part.