Chapter 1:

Introduction

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In response to the request by the Government of the Islamic Republic of Iran, the Government of Japan conducted " The Study on Seismic Microzoning of the Greater Tehran Area" (hereinafter referred to as " the Study") in the Islamic Republic of Iran. The Japan International Cooperation Agency (hereinafter referred to as " JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, dispatched a Study Team to Tehran on April 12, 1999 to conduct the Study in accordance with relevant Japanese laws and regulations. The Study was also undertaken in accordance with a Scope of Work agreed upon by the Centre for Earthquake and Environmental Studies of Tehran (hereinafter referred to as " CEST") and JICA.

CEST acted as the Counterpart Agency, representing the Government of Iran in coordination with other related governmental agencies and organisations. The duration of the Study, up to the official submission of the Final Report in December 2000, was approximately 18 months.

1.1. Background of the Study

The Greater Tehran Area is located at the foot slope area of the Alborz Mountains, which form part of the Alps-Himalayan Orogenic Zone. This zone is one of high seismic potential with many peculiar active faults. The urban area of Tehran has been developed on alluvial layers, accumulated on hard rock through complex geological formations. According to historical seismic data, Tehran has suffered from several strong earthquakes with return periods of 150 years. The city of Manjil, located 200 km west of Tehran, suffered from a strong earthquake in 1990, which killed approximately 14,000 people. Seismologists believe a strong earthquake will strike Tehran in the near future because the city has not experienced a disastrous earthquake since 1830.

Urban development has been rapidly progressing in Tehran without the development of proper disaster prevention systems against potential earthquakes. It is urgently necessary to prepare a regional/urban earthquake disaster prevention plan in order to mitigate possible seismic damages in Tehran.

1.1.1. Study Objectives

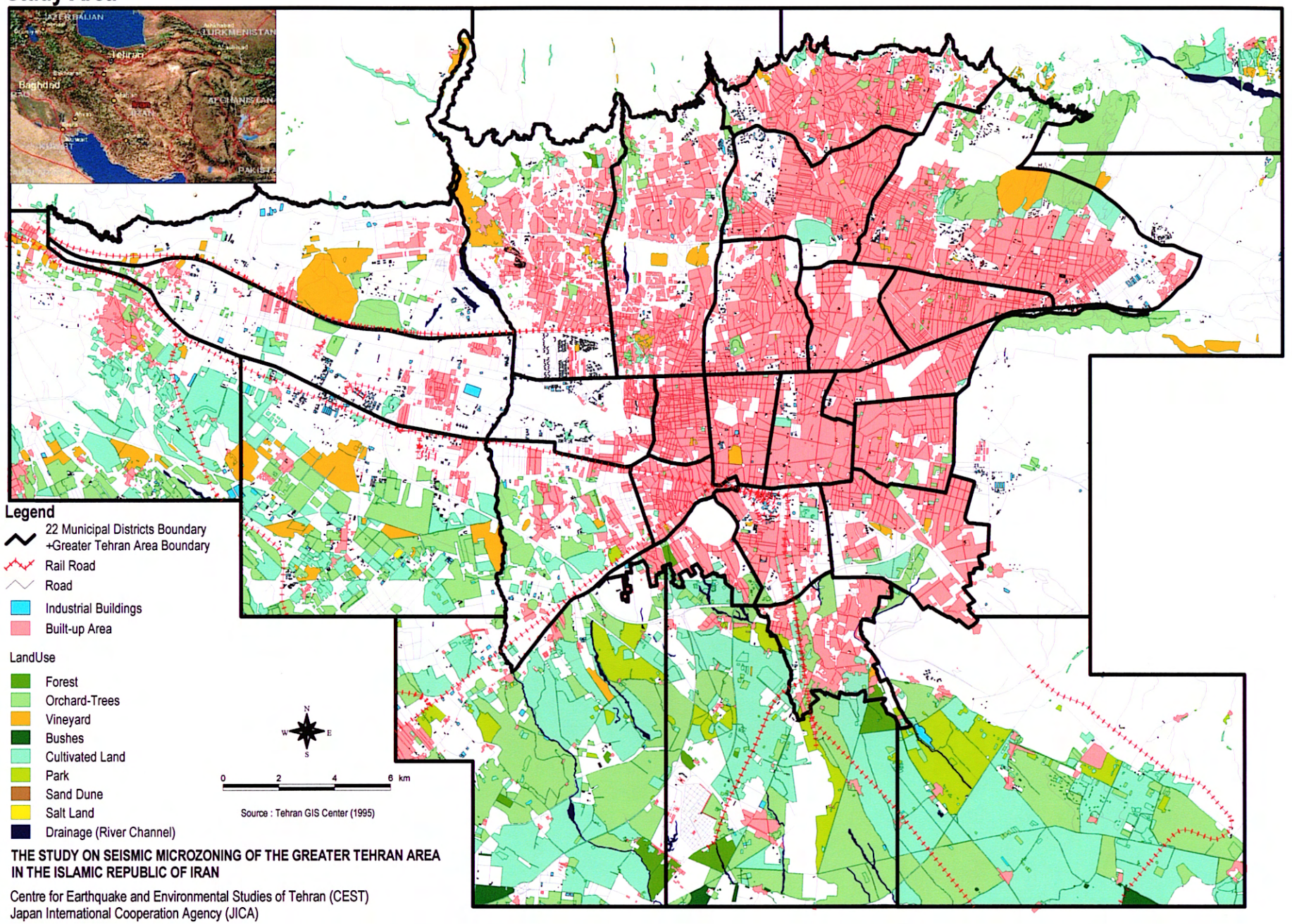
The objectives of the Study are 1) to compile seismic microzoning maps which can serve as a basis for the preparation of a regional and urban seismic disaster prevention plan of the Greater Tehran Area and 2) to make recommendations for the mitigation of seismic disaster.

1.1.2. Study Area

The Study Area covers the Greater Tehran Area, including the Tehran Metropolitan Area, which consists of 22 districts. (See Figure 1.1.1)

Figure 1.1.1

Study Area



1.2. Basic Approach and Methodology of the Study

The seismic microzoning was carried out based on the following approach and methodology.

1) The seismic microzoning was conducted using Japanese state-of-the art technology. Specifically, the analytical methods applied in this Study were based on Japanese urban disaster experience.

2) While it is important to apply global knowledge, theories and experiences, more emphasis was placed on the existing Iranian knowledge and experiences. Detailed seismic studies had been conducted by Iranian researchers and engineers, and these results were incorporated in the Study. Furthermore, basic data for the seismic micro-zoning were collected from various research organisations, universities and public institutes.

3) Cooperation between the Study Team and local Iranian counterparts was very important in obtaining effective output. Mutual understanding was developed through seminars, meetings and discussions. For example, the objectives of field investigations to be conducted by the Study Team were developed and finalised based on discussions with related organisations, universities and public institutes.

4) The results of the microzoning shall be utilised for future urban development planning and urban disaster prevention planning in Tehran. The following matters were taken into consideration:

- Adoption of clear, practical, state-of-the art methods;
- Unified and integrated analysis methodology;
- Utilisation of existing GIS data files; and
- Harmonisation with existing plans and programs.

5) Knowledge of earthquake engineering in Iran is extensive. Therefore, technical transfer was focused on the following three items:

- Introduction of knowledge and experiences in Japan;
- Practical execution technique of the micro-zoning; and
- Interpretation method of the micro-zoning results.

1.2.1. Tasks of the Study

In order to achieve the objectives of the Study, the following tasks were carried out:

Step 1: Existing data collection, analysis and evaluation to identify the study issues;

Step 2: Geological Investigation;

Step 3: Analysis of ground conditions and seismicity;

Step 4: Seismic damage analysis and compilation of seismic micro-zoning maps; and

Step 5: Overall evaluation and preparation of recommendations.

General workflow of the Study is shown in Figure 1.2.1

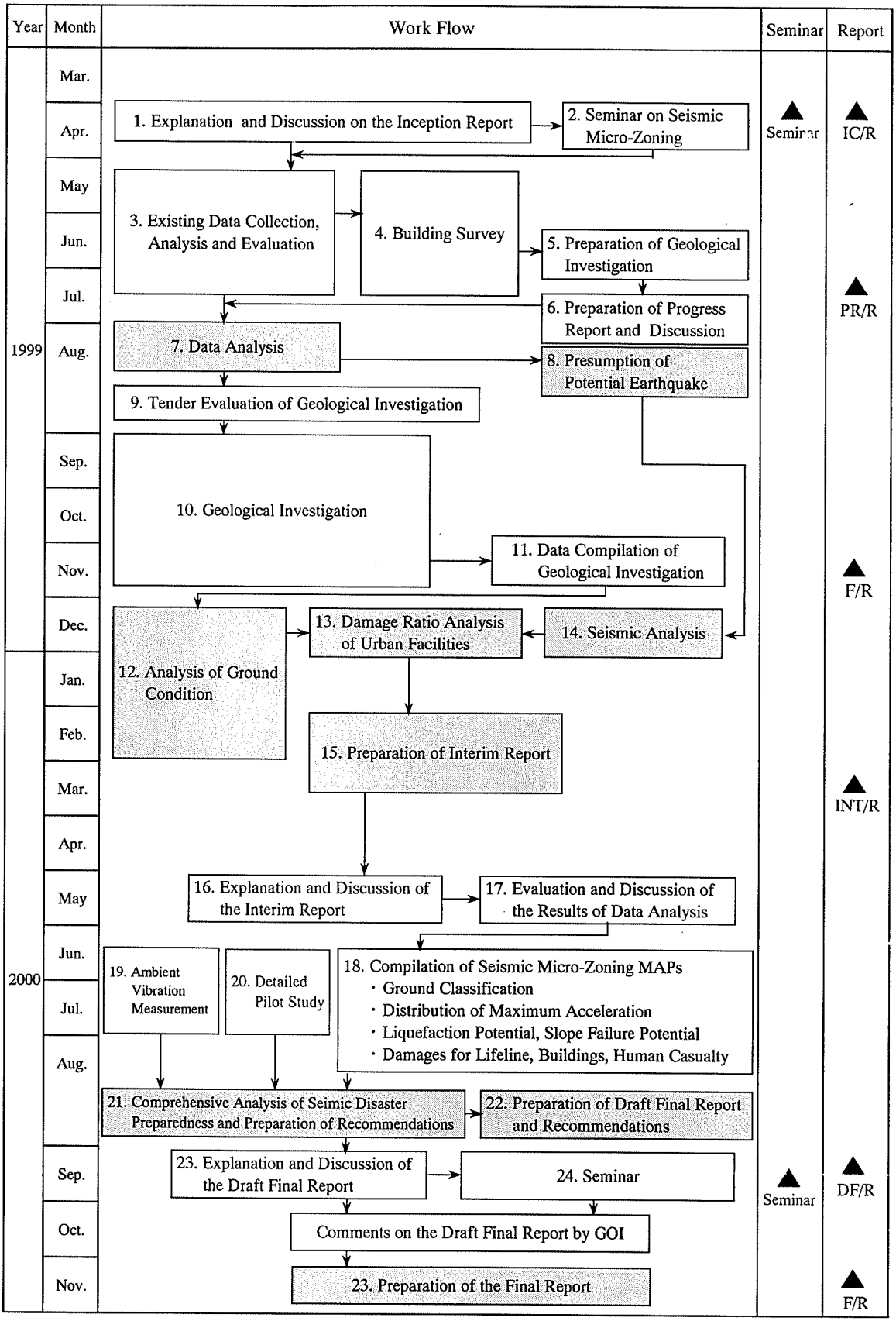


Figure 1.2.1 General Workflow of the Study

1.3. Study Organisation

Figure 1.3.1 and Table 1.3.1 show implementing organisation and member list of the study.

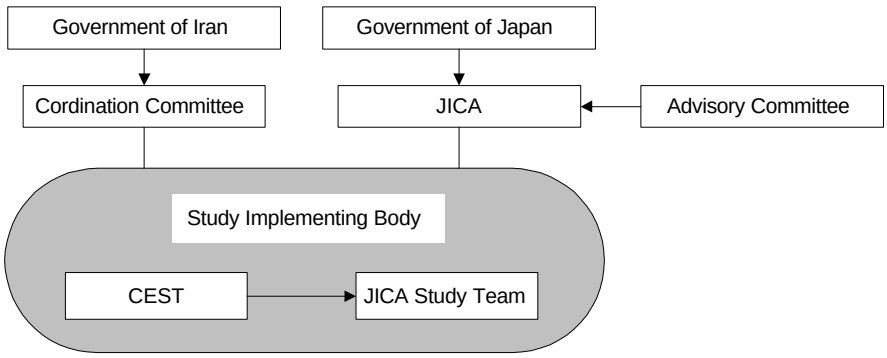


Figure 1.3.1 Study Organisation

Table 1.3.1 Member List of the Study

Administrative Body of JICA		
1	Mr. Takao KAIBARA	Director, First Development Study Division, Social Development Study Department (March 2000 - September 2000)
2	Mr. Toshio HIRAI	Director, First Development Study Division, Social Development Study Department (October 2000 –November 2000)
3	Mr. Hidenori KUMAGAI	Deputy Director, First Development Study Division, Social Development Study Department
4	Mr. Susumu YUZURIO	Staff, First Development Study Division, Social Development Study Department

JICA Advisory Committee Members		
1	Dr. Kimiro MEGURO	Associate Professor, INCEDE, Institute of Industrial Science, University of Tokyo
2	Dr. Shin KOYAMA	Chief Researcher, International Institute of Seismology and Earthquake Engineering, Building Research Institute, Ministry of Construction
3	Mr. Yoshihisa KIMURA	Development Cooperation Department, Economic Cooperation Bureau, Ministry of Foreign Affairs
4	Mr. Norio ANAMURA	Deputy Director, International Affairs Division, Ministry of Construction

JICA Study Team Members		
1	Mr. Itaru MAE	Team Leader
2	Mr. Noboru IKENISHI	Deputy Team Leader / Urban Disaster Preparedness
3	Mr. Shukyo SEGAWA	Earthquake Engineer
4	Mr. Satoshi NAKAMURA	Geotechnical Engineer
5	Mr. Yutaka KOIKE	Geophysical Exploration / Soil Dynamics
6	Mr. Osamu NISHII	Soil and Natural Condition
7	Dr. Akio HAYASHI	Structural / Seismic Behavior Engineer
8	Mr. Kanao ITO	Urban / Regional Planning
9	Mr. Yasunori NAGASE	Lifeline Analysis
10	Mr. Ryoji TAKAHASHI	Coordinatior

CEST (Counterpart) Study Team Members		
1	Mr. Fareed MEHDIAN	Architecture and Urban Planning, Executive Director
2	Mr. Ali A. MOINFAR	Structural and Earthquake Engineering, Consultant
3	Mr. Ahmad NADERZADEH	Structural and Earthquake Engineering, Head, Earthquake Division (Study Manager)
4	Mr. Ali R. SABETI	Environmental, Head, Environmental Division
5	Mr. Ali NAIIERI	Seismology/ Geology
6	Dr. Kayumars EMAD	Structural Engineering
7	Mr. Ebrahim MALEKI	Geophysics/ Seismology

Coordination Committee Members		
1	Mr. Ali R. KHOROOSHI	Vice Deputy for Development and Engineering Executive, Tehran Municipality
2	Mr. Mesbah ANSARI	Japan Desk Deputy for Far East and Oceania, Ministry of Foreign Affairs
3	Mr. Mohammad T. ARAGHI	Managing Director, Iran National Gas Co.
4	Mr. Mohammad BAYAT	Deputy Director, Fire Fighting Organization, Tehran Municipality
5	Mr. Sadreddin BARZI	Deputy Manager, Study Department, National Disaster Task Force, Ministry of Interior
6	Mr. Hamid DAMAVANDI	Head, Technical Department, Tehran and Suburbs Railway Co.
7	Mr. Bizhan DAFTARI	Managing Director, Tehran Province Red-Crescent Society
8	Dr. Jamshid FARJOODI	Assistant Professor, Faculty of Engineering, Tehran University
9	Dr. Behrooz GATMIRI	Assistant Professor, Tehran University
10	Dr. Manuchehr GHORAISHI	Deputy Director for Geological and Explorations Department, Geological Survey of Iran
11	Dr. Hamid GHAFFARZADEH	Deputy Director, Planning Department, UNDP Office in Tehran
12	Dr. Fariborz GROUHI	Expert, Health and Medical Care Center, Ministry of Health
13	Dr. Mohammad K. HAFIZI	Head, Exploration Department, Institute of Geophysics, Tehran University
14	Mr. Reza JAMAL	Manager, Emergency services, Tehran Electricity Co.
15	Mr. Kayvan KAYVANPAZHOUH	Expert, Urban Development Deputy, Ministry of Housing and Urban Development
16	Mr. Morteza MIRAKHORI	Expert, Urban and Rural Development, Management and Planning Organization
17	Mr. Amir H. MAZIDI	Deputy, Technical Department, Tehran Water and Sewage Co.
18	Mr. Hassan NAJAFI	Deputy, Planning and Engineering, Iran Tele-Communications Co.
19	Mr. Ghavam SHAF'ATI	Head, Fire Fighting and Safety Department, Petroleum Products Distribution Co.
20	Mr. Mehrdad SABET	Head, Geotechnical and Strength of Materials Study Center, Tehran Municipality
21	Mr. Mohammad H. SHAHIDI	Expert, Sabzineh-Rah Transportation Consulting Co.
22	Mr. Hamid SIADAT MOUSAVI	Managing Director, Transportation and Traffic Co. Tehran Municipality
23	Mr. Ahmad SAFAYI-NIK	Director, Building and Housing Department, Statistics Center of Iran
24	Dr. Habibollah ZANJANI	Head, Social and Cultural Department, Urban Development Research Center, Ministry of Housing and Urban Development
25	Mr. Hadi ZAKER	Technical Director, Tehran GIS Center, Tehran Municipality

Chapter 2:

Geographic Database Development