No.

Japan International Cooperation Agency (JICA)

Centre for Earthquake and Environmental Studies of Tehran (CEST)

Tehran Municipality

The Study on Seismic Microzoning of the Greater Tehran Area in the Islamic Republic of Iran

Final Report

Main Report

November 2000

Pacific Consultants International

OYO Corporation

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PREFACE

In response to a request from the Government of the Islamic Republic of Iran, the Government of Japan decided to conduct " The Study on Seismic Microzoning of the Greater Tehran Area in the Islamic Republic of Iran" and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Itaru Mae of Pacific Consultants International, and composed of members of Pacific Consultants International, and OYO Corporation, four times between April 1999 and September 2000 to the Islamic Republic of Iran.

The team held discussions with the officials concerned of the Government of the Islamic Republic of Iran and conducted field surveys at the study area. Upon returning to Japan, further studies and analysis were made and the present report was prepared.

I hope that this report will contribute to the promotion of the seismic disaster management of Iran and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Islamic Republic of Iran for their close cooperation extended to the team.

November 2000

Kunihiko SAITO
President
Japan International Cooperation Agency

Mr. Kunihiko SAITO
President
Japan International Cooperation Agency
Tokyo, Japan

November 2000

Letter of Transmittal

Dear Mr. SAITO,

We are pleased to formally submit herewith the final report of "The Study on Seismic Microzoning of the Greater Tehran Area in the Islamic Republic of Iran".

This report compiles the result of the study which was undertaken in the Islamic Republic of Iran from March 1999 through September 2000 by the Study Team organized jointly by Pacific Consultants International and OYO Corporation under the contract with the JICA.

The Final Report is composed of the two volumes, "Main Report" and attached "Microzoning Maps".

In the main report, existing social and physical conditions of the study area are described and seismic damage analysis was carried out based on the potential big earthquakes. Necessary recommendations for the seismic disaster management and mitigation were also made. The Study Team developed a comprehensive geographic database (GIS) to support data analysis and presentation of the study results. "Microzoning Maps" were compiled out of this GIS data base in such a way that those who are interested in urban analyses, detailed disaster management, studies and planning for Tehran area may easily make use of the data base.

Finally, we would like to express our sincere gratitude and appreciation to all the officials of your agency, the JICA advisory Committee, the Embassy of Japan in I.R.Iran, and Ministry of Foreign Affairs. We also would like to send our great appreciation to all those extended their kind assistance and cooperation to the Study Team, in particular, relevant officials of Centre for Earthquake and Environment Studies of Tehran (CEST), the Iranian counterpart agency.

Very truly yours,

Itaru MAE
Team Leader,
The Study on Seismic Microzoning
of the Greater Tehran Area
in the Islamic Republic of Iran

Foreword

The Study on Seismic Microzoning of the Greater Tehran Area has successfully achieved its objective of reasonably estimating the magnitude of damage that may be caused by the occurrence of a scenario earthquake. The maximum damage, which was estimated by the Ray Fault model, is in fact of the most serious nature and magnitude that would likely amount to some 500,000 or 55 percent of collapsed buildings together with almost 400,000 human casualties. Should this scale of damages occur actually, probable economic loss, either direct or indirect, would cost not less than the national GDP.

It is safely construed that the Study gave a reasonable justification for the importance and significance of implementing appropriate disaster prevention and management measures for the City of Tehran where diverse national functions are concentrated. In this context, in order to substantiate the outputs of the Study, a Seismic Disaster Prevention and Management Plan needs to be formulated, aiming at providing a comprehensive yet viable framework for the implementation of the disaster prevention and management measures for the City of Tehran.

Apparently, urban disaster prevention and management is one of the most important administrative mandates of municipal governments, and hence, a Seismic Disaster Prevention and Management Plan is to be formulated under the initiative of the Tehran Municipality. We will be very much pleased if the Study of this time will be followed by the formulation of the Plan and its implementation, thus contributing to mitigating possible earthquake damaged in the future.

Lastly, we would like to express our sincere appreciation for the excellent coordination and cooperation extended by the Tehran Municipality, our counterpart agency CEST, and all other agencies an organisation.

November 2000, in Tokyo

Members' List of the Study on Seismic Microzoning of the Greater Tehran Area in the Islamic Republic of Iran

Administrative Body of JICA		
1	Mr. Takao KAIBARA	Director, First Development Study Division, Social Development Study Department (March 2000 - September 2000)
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6	Mr. Osamu NISHII	Soil and Natural Condition
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8	Mr. Kanao ITO	Urban / Regional Planning
9	Mr. Yasunori NAGASE	Lifeline Analysis
10	Mr. Ryoji TAKAHASHI	Coordinatior

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7	Mr. Ebrahim MALEKI	Geophysics/ Seismology

Coordination Committee Members		
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22	Mr. Hamid SIADAT MOUSAVI	Managing Director, Transportation and Traffic Co. Tehran Municipality
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25	Mr. Hadi ZAKER	Technical Director, Tehran GIS Center, Tehran Municipality

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ABBREVIATIONS

General

GTA	Greater Tehran Area
NTF	North Tehran Fault
PSA	Pilot Study Area
SHR	Shahran Station of Seismograph Observatory

Organisation

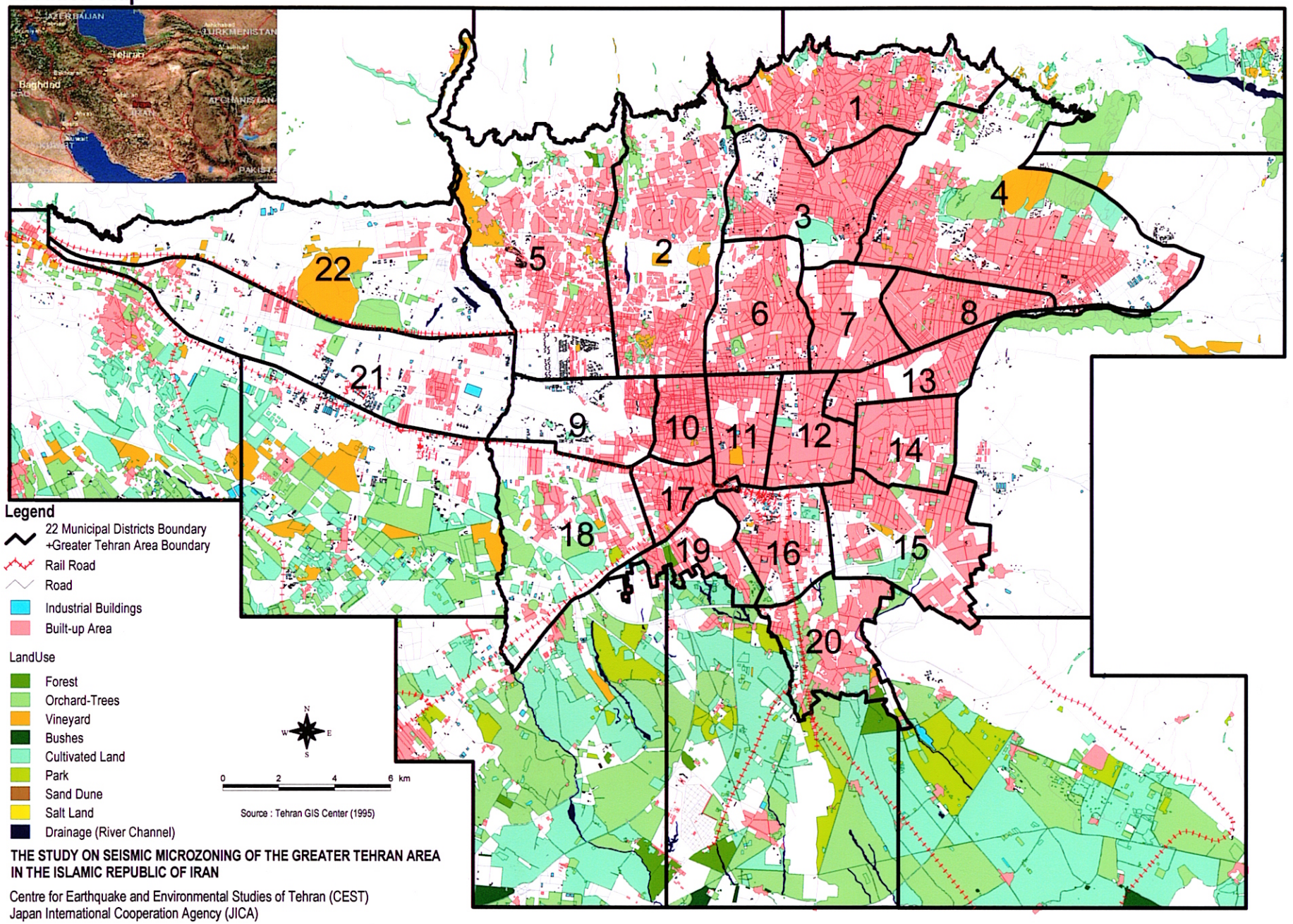
AEO	Iran Atomic Energy Organization
BHRC	Building and Housing Research Center, Ministry of Housing and Urban Development
CEST	Centre for Earthquake and Environment Studies of Tehran, Tehran Municipality
CUDPMP	Comprehensive Urban Disaster Prevention and Management Plan
DDTF	District Disaster Task Force
DTF	Disaster Task Force
EPD	Environmental Protection Department
FRO	Forestry and Rangeland Organization
GSI	Geological Survey of Iran
GSMSC	Geotechnical and Strength of Materials Study Center, Tehran Municipality
IESTU	Institute of Environmental Study Tehran University
IGTU	Institute of Geophysics, Tehran University
IIEES	International Institute of Earthquake Engineering and Seismology, Ministry of Culture and Higher Education
IMI	Institute of Meteorology Iran
IRHF	Islamic Revolution Housing Foundation
IRICB	Islamic Republic Iran Central Bank
JICA	Japan International Cooperation Agency
MCHE	Ministry of Culture/Higher Education
MDAF	Ministry of Defence and Armed Forces
MHUD	Ministry of Housing and Urban Development
MOA	Ministry of Agriculture
MOC	Ministry of Commerce
MOC	Ministry of Cooperative
MOE	Ministry of Energy
MOEF	Ministry of Economics and Finance
MOH	Ministry of Health
MOI	Ministry of Interior
MOJC	Ministry of Jihad of Construction

MORT	Ministry of Road and Transportation
MPTT	Ministry of Post, Telegraph and Telephone
NCNDR	National Committee for Natural Disaster Reduction
NDTF	National Disaster Task Force
PBO	Plan and Budget Organization
PDTF	Provincial Disaster Task Force
PMC	Police and Military Commanders
RCSI	Red Crescent Society of Iran
SDDTF	Sub-District Disaster Task Force
SSO	Social Security Organization
TETCO	Tehran Engineering and Technical Consulting Organization, Tehran Municipality
TGIS	Tehran GIS Center, Tehran Municipality
TV/R	Islamic Republic of Iran TV/Radio

Technical Terms

gal	Unit of acceleration, 1 gal equals 1 cm/s^2, 980 gals equal 1 gravitational acceleration
GIS	Geographic information system
JMAI	Japan Meteorological Agency Intensity (seismic intensity scale)
mb	Body wave magnitude
MMI	Modified Mercalli Intensity (seismic intensity scale)
Ms	Surface wave magnitude
Mw	Moment magnitude
N	Blow counts of standard penetration test
Neq	Equivalent SPT N value for 30cm penetration
PGA	Peak Ground Acceleration
RC	Reinforced Concrete
SPT	Standard Penetration Test
Vs	Shear wave velocity

Location Map



Legend

- 22 Municipal Districts Boundary +Greater Tehran Area Boundary
- Rail Road
- Road
- Industrial Buildings
- Built-up Area

LandUse

- Forest
- Orchard-Trees
- Vineyard
- Bushes
- Cultivated Land
- Park
- Sand Dune
- Salt Land
- Drainage (River Channel)

N W E S

0 2 4 6 km

Source : Tehran GIS Center (1995)

THE STUDY ON SEISMIC MICROZONING OF THE GREATER TEHRAN AREA IN THE ISLAMIC REPUBLIC OF IRAN

Centre for Earthquake and Environmental Studies of Tehran (CEST)
Japan International Cooperation Agency (JICA)

Chapter 1:

Introduction