APPENDIX 1

An Outline of Law No. 7269 on

Measures and Assistance to Be Put into Effect

Regarding Natural Disasters

Affecting the Life of the General Public*

Date of Promulgation: 25 May 1959
Amended by Law No. 1051: 17 July 1968

* This translation is selective and incomplete

Article 1: The provisions of this act are to be put into effect when it is determined that structures or public facilities are damaged, or are likely to be damaged, and life of the general public is affected because of disasters such as earthquakes, fires, floods, landslides, rockfalls or avalanches.

The Ministry of Public Works and Settlement determines whether disasters are of a magnitude to affect the life of the general public. The governor (s) of the province (s) where the disaster occurs is (are) empowered to take immediate measures in compliance with the provisions of this act.

Article 2: Boundaries of the area affected by floods are determined by the ministry responsible for the General Directorate of State Waterworks; for others the Ministry of Public Works and Settlement does this task and the Council of Ministers promulgates the boundaries. Governors are charged with declaring the directives of the Council of Ministers.

Article 3: Technical requirements for all public and private buildings to be reconstructed or repaired in the declared disaster areas are determined by means of a regulation chartered by the Ministry of Public Works and Settlement.

Article 4: Relief organization and programs shall be jointly drafted by the Ministries of the Interior, Public Works and Settlement, Health and Social Walfare and Agriculture, Forests and Rural Affairs. This regulation shall carry stipulations for a program on relief, care of the injured, temporary shelter, burial, fire extermination, debris removal and food facilities for the affected population.

Article 5: The Ministry of Public Works and Settlement is empowered to establish institutions to investigate the required measures, cooperate with other ministries and institutions, provide instruction and publications on the effects of natural disasters with the aim of long-term protection of life and property.

Emergency Powers Given to Civilian Authorities

Article 6: Following occurrence of the natural disasters, governors and

township administrators are empowered to charge duties to all males between 18-65, impound or lease with no restriction all means of transport, whether public or private, including construction machinery, execute all procurements or rentals required for emergency cure, relief, feeding and sheltering, occupy temporarily all property regardless of owner. Duration of such powers is 15 days from the termination of the effects of the natural disaster.

Obligations

Articles 7-11: Commanders of armed forces units within or close to the area of the disaster shall abide by all requests made to them by governors or township administrators at times of peace without waiting for orders from their superiors. Observation stations are under obligation to inform civilian authorities of probable future disasters. Consignment of all goods shall be made by whatever means are available, and payment for such services shall be made subsequently. All persons involved in all efforts in rescue, sheltering, relief, extinguishing, consignment or distribution shall be provided with medical assistance if they are incapacitiated in such work. Work up to 3 days shall not be compensated with pay.

Compensation, Premium and Advance Payments

Article 12: The Ministry of Public Works and Settlement shall submit to the approval of the Council of Ministers the principles regarding awarding of premium or advance payments equal to three months' salaries to individuals, both civil servants and others, who serve with distinction during relief work or who are employed by local municipality administrations.

Technical Work in Disaster Areas

Articles 13-15: The Ministry of Public Works and Settlement shall charge technical groups with the task of assessing the state of damage in all public or private buildings, or the condition of the land as a basis of subsequent action. Temporary housing may be constructed, rented or purchased to shelter persons who have been or are likely to be affected by the disaster. Financial assistance may be provided when it becomes understood that such measures can not be executed rapidly. Such payments shall

not be considered indebtment.

Designated areas within the disaster area boundaries shall be closed to further construction if the Ministry of Public Works and Settlement decides that existing construction plans should be changed totally or partially. If such plans are required, they shall be completed within 5 months.

Relocation of Communities from Disaster Areas

Article 16: A joint committee consisting of representatives of the Ministries of the Interior, Finance, Public Works and Settlement Health, Agriculture. Forests and Rural Affairs Education, Industry and Trade and Rural Affairs decides on this matter, and the implementation is done by the Ministry of Public Works and Settlement upon approval of the Council of Ministers.When such relocation is effected within municipal boundaries, no approval of the Council of Ministres is required; instead the Ministries of the Interior and Public Works and Settlement jointly implement such decisions.

Value Assesment, Parcellation and Distribution

Articles 17-32: Value of all real estate within the boundaries of the damaged area, and land which will be set aside for construction will be assessed for value. Cadastral applications will be determined jointly by the Ministry of Public Works and Settlement and the General Directorate of Deeds and Cadastral Affairs. All public lands shall be made available at no cost to the Ministry, when such land is not available lands or buildings may be purchased or expropriated within existing regulations. Where no public housing shall be constructed, land can be donated to individuals who guarantee to complete their buildings within determined periods; such persons are also eligible to receive technical assistance, materials and loans. The Ministry of Public Works and Settlements builds public facilities (roads, water distribution network, electricity and sewage system) for such buildings.

Expenditures for actual construction of buildings and their lands constitute the cost of such buildings. All other expenditures related to mapping, construction planning, design, investigation and infrastructure

facilities in water, electricity etc. are not considered within the sums of indebtment. Construction credits may also be made available to individuals whose economic and social activities are disrupted because of the disaster according to principles established by the Ministry of Public Works and Settlement.

Accumulation of the Disasters Fund, Assistance from the Fund and Principles of Expenditure

Articles 33-46: A fund shall be instituted to meet expenditures in accordance with this Act. When money in the fund is not sufficient, the Ministry of Public Works and Settlement is empowered to execute commitments for up to three years. The fund is to be spent for constructing or repairing the following items: facilities for roads, water distribution, and sewage systems, design of cadastral maps, construction plans, purchase of land, building, construction materials, motor vehicles, equipment and machinery, salaries, forming joint ventures with companies dealing in housing construction. A set of instructions shall be drawn up regulating such expenditures. The minimum tariffs are used for all transportation of goods and materials required for purposes of this law. Forest products are made available on a priority basis. The Ministry of Public Works and Settlement is empowered to import, on a priority basis, prefabricated houses, tents, materials of construction, machinery, motor vehicles, equipment and other requisites or spare parts. No customs duties shall be levied againts such imports.

All financial contributions made to the national or local aid committees are exempted from duties, and are tax deductible.

Articles 47-49: Penalties

Articles 50-51: Miscellaneous requirements.

APPENDIX 2

National Plan of Turkey for Earthquake Risk Reduction during IDNDR

PRIMARY OBJECTIVES FOR THE REDUCTION OF THE EARTHQUAKE DISASTER

A - Identification of Hazard and Risk

1. Increased emphasis and priority will be given to studies on the seismicity and active recent tectonics of Turkey. Information and experience on these subjects will be collected.

2. The current earthquake zones map will be revised in conformance with the state-of-the-art.

3. Micro-zoning surveys will be encouraged for areas where important structures will be built or where settlements are to be established. Standart guidelines will be developed for these studies.

4. Priority will be given to counter measures intended for reducing earthquake damages during regional and urban planning work, legislation in these areas will be reviewed and the necessary legal arrangements realized.

5. Vulnerability and damageability analyses for different building types and urban settlements will be developed and models will be constructed for probable degrees of damage and economic loss.

B - Monitoring, Prediction and Early Warning Systems

1. The existing seismographic network will be upgraded and expanded so that all earthquakes with magnitude 3 or greater will be immediately recorded and the seismic parameters determined accurately and quickly.

2. The number of currently deployed strong motion accelerographs will be increased to 250 and a rapid program will be undertaken in order to equip such significant engineering structures as tall buildings and dams with these devices.

3. The information processing center established within the Earthquake Research Division of the General Directorate of Disaster Affairs will be expanded so that a standardized database exists for earthquake records of all types and that this information can be transmitted to all users.

4. Special-purpose strong ground motion networks will be established at pilot sites in eastern and western Anatolia for the purpose of providing basic data for soil-structure interaction, ground amplification and attenuation characteristics.

5. The scope of multidisciplinary pilot studies for earthquake prediction presently underway in north-western Anatolia will be widened to include seismic gaps in the east and southeastern parts Anatolia where different stress patterns and

rupture characteristics exist.

6. A Scientific Advisory Board will be formed under the coordination of the Ministry of Public Works and Settlement in order to evaluate results of the prediction studies and develop implementation recommendations.

7. On a countrywide scale "Early Earthquake Disaster Information Centers" will be put up so that a quick and effective rescue and relief work may be undertaken.

C - Short-Term Protective Measures and Preparedness

1. Pilot exercises will be performed and guiding booklets will be prepared so that existing "Province-Level Rescue and Relief Plans" will be made more realistic and directly applicable. Annual drills will be organized to review these plans and improve them.

2. Legistlation and organizational matters will be reviewed concerning management of long-term disaster planning and preparedness. Central coordination bodies which function only after an earthquake happens will be replaced by bodies which meet regularly even in the absence of disaster and manage and improve these policies.

3. Alternative communication networks will be utilized so that a rapid flow of information and communication is possible even as existing networks may in fact themselves be inoperative.

D - Long-Term Preventive Measures

1. The earthquake-resistanct building construction code currently in effect will be constantly updated in keeping with developments in earthquake engineering.

2. A guiding seismic design code will be developed for special engineering structures.

3. Legislation in building inspection will be reviewed with the intent of implementing a realistic control system including building or earthquake insurance.

4. Critical engineering facilities including dams, bridges and transformation switches will be evaluated under a special program and those that are judged be unsafe will be strengthened and retrofitted.

5. Essential facilities such as hospitals, fire stations, water disribution networks, post and telecommunications systems which must be in operation immediately after earthquakes will also be assessed for seismic strength and those which are judged to be inadequate will be retrofitted or repaired.

6. A new program will be initiated for replacement or repair of hazardous rural houses in high seismic risk areas and determine the corresponding priorities.

7. Central plants producing good guality concrete will be encouraged as incentive and support for ensuring the use of better concrete in buildings.

8. Further emphasis will be placed on instrumental determination of the seismicity for damsites during the planning phases and the improvement of seismographic networks in the vicinity of existing ones.

E - Public Education and Information

1. Emphasis and priority will be accorded to large scale public education programs in earthquake-resistant construction practices and efforts will be made to ensure that such information is made available to even remote areas through proper cooperation and coordination.

2. Assistance provided to citizens who build their own homes or to local workers and builders will be enhanced through training courses, the training of technicians who will be providing such training themselves will be given priority.

3. Mass media means (TV, radio, etc.) will be utilized fully to inform comminities in easily undenstandible terms about earthquakes and associated forms of natural disasters.

4. "National Congresses on Natural Disasters" will be organized regularly to inform the public at large in Turkey about research, application, know-how and experience concerning disasters.

5. Education and research in seismology and earthquake engineering will be encouraged in universities providing training in the fields of earth sciences, civil engineering or urban planning. Support will be provided for improvement of laboratory and experimental facilities.

6. Means of international cooperation will be investigated so that experience and information on earthquakes in other countries may be imported to Turkey and errors committed elsewhere may be avoided and accumulated knowledge be fully used.

7. National and international projects by educational and research institutions aimed at reduction of earthquake damage will be encouraged and supported.

8. A wide spectrum of statistical data on earthquakes and other disasters will be collected and periodically published.

ANNEX 1

Group Exercise 1

Loss Estimation for Erzurum Province

Introduction

Erzurum is situated in the North-Eastern plateau of Turkey at the foothills of Palandöken Mountains; its elevation is 2000 m above see (Figure 1). According to the 1990 census the provincial population is 865 175, size 25 066 km2, and population density 35 persons/km2. Erzurum is the provincial center; 14 sub-provincial centers of habitation are linked to it administratively. The number of cities with municipalities is 25, and the total number of villages in the province is 1034.

Earthquake Hazard

According to the current earthquake zones map, 25 percent of the province's land area falls within First Degree Zone (I > IX), 51 percent within Second Degree Zone (I > VIII), and 24 percent within Third Degree Zone (I > VII). North-Eastern Turkey is under a compressive stress regime since the Cretaceous, and there exist numerous faults extending in the Northeast-Southwest direction with left or right-lateral displacements. Earthquakes which could potentially effect the province, and past earthquake epicenters along these faults are shown in Figure 2.

The Scenario Earthquake

The most important earthquake which could occur within the province and cause the greatest destruction within the city proper can be associated with the Dumlu Fault Zone. This zone consists of numerous smaller faults intersecting each other obliquely, and has been determined to have a length of 250 km.

In describing the scenario earthquake, the assumption was made that 1/5th of the overall fault length, or 50 km would rupture, with the closest distance to the city 10 km. The magnitude assigned to the event is 7.2, with an epicentral intensity of IX MSK. Past observations in Turkey [4] indicate that for strike-slip earthquakes, the rate of intensity attenuation parallell and perpendicular to the fault lineament are in a ratio of 2.5 to 3. Given this information the isoseismals for this hypothetical earthquake as shown in Figure 3 have been drawn. The probability of occurrence of this earthquake within the next 25 years has been calculated as 0.2.

Loss Estimates

Table 1 contains the cumulative information concerning the following components: population of all administrative centers, the total number of buildings as derived from building census figures, as well as their typological breakdown, and the expected number of damaged buildings within each category dependent on the postulated intensity. The percentage distribution of the existing building stock is given in Figure 4; the empirical

damageability or fragility curves for all of these types are shown in Figure 5. Loss figures are really a convolution of the hazard index (intensity), fragility, and number of the corresponding type of building. Of the existing building stock, 95 percent is between 1 - 4 stories tall, and the remaining 5 percent is 5 - 7 stories. No building taller than 7 stories exists in the region. These buildings are predominantly square or rectangular in plan (99 percent).

In Table 2 we show the number of human losses and homeless persons. In calculating these figures the lower and upper bounds of the estimates have been based on 3 or 10 percent of collapsed or heavily damaged buildings [2]. Again on the basis of past observations the number of injured have been estimated to range between a minimum of 3, and a maximum of 5 times the number of fatalities. In calculating the estimated minimum number of persons made homeless by the postulated earthquake, the number of collapsed or heavily damaged houses has been multiplied by 5.5, which is the size of the average household. The upper estimate has been derived by adding medium-damage houses to the above figure.

Direct Economic Losses

Subsequent to the occurrence of the scenario earthquake, the 29 127 heavily damaged or collapsed houses will have to be replaced, and the 27 520 medium damage, and 30 004 slight damage houses repaired. According to 1991 construction costs index, the cost per m2 of a brick masonry or reinforced concrete building is about 1 million TL, or $ 200. A minimum size of 75 m2 would be required by the average family comprising 5.5 members. This translates into 75 million TL per family, or $15 000. The cost of replacing the whole 29 127 houses would then become 2.25 trillion TL, or $450 million.

Assuming a central damage ratio of 30 percent for describing medium damage, 25 million TL or $5000 per house would require the expenditure of 700 billion TL or $140 million for repairs. The corresponding figures for slight damage (central damage ratio 5 percent) are 110 billion TL, or $22 million.

In summary, the restitution of the housing stock alone would require 3 trillion TL, or $600 million.

Erzurum province is relatively underdeveloped, so we may assume an average loss per family of household goods and livestock worth 30 million TL ($6000). This implies a total accumulated loss of 1.7 trillion TL ($340 million). Assuming that the cost of temporary accommodation per family for one year is 10 million TL ($2000), another 290 billion TL ($58 million) would be required for this purpose.

An earthquake of this size calls for rescue and relief activities costing a minimum of 5 billion TL ($1 million). The

repair of infrastructure or lifeline facilities such as water supply networks, electric powerlines, roads, communications facilities etc. would require an estimated 50 billion TL ($10 million). The total directly attributable losses would therefore amount to 5 trillion TL, or $1 billion. Treatment of injured persons, loss of production and services, induced unemployment etc. are very difficult to estimate, and have not been included in the figures above.

In summary, then, the total direct cost to the nation's economy of the scenario earthquake would be 1.3 percent of the GNP. The percentage breakdown of the losses among the components enumerated above is displayed in Figure 5.

Table 1. Assessment of Vulnerability

COUNTY SEAT	Pop.	Total # of Houses	Stone Masonry	Adobe	Brick Masonry	Wood-Frame	R/C Frame	Collapse+ Heavy Dam.	Medium Damage	Slight Damage	Felt Intensity
Erzurum	307411	37612	24784	1192	6389	39	5208	22007	10409	3573	IX
Askale	47081	2918	944	918	908	7	141	113	460	806	VI
Cat	25840	3766	3684	4	26	6	46	368	1108	1304	VI
Hinis-Karacoban	62661	8485	6406	782	273	761	263	328	995	3171	V
Horasan	59730	7990	7370	312	151	1	156	743	2265	2737	VI
Ispir-Pazaryolu	52267	9516	7218	1041	158	735	364	371	1126	3599	V
Karayazi	45649	4719	4605	15	64	0	35	230	692	2080	V
Narman	24989	4324	3821	12	344	101	46	382	1173	1425	VI
Oltu	43232	7394	5228	346	263	461	1096	265	801	2546	V
Olur	18452	3940	459	2157	129	1122	73	45	156	856	V
Pasinler	60616	8086	5833	821	1155	1	276	1607	2991	1807	VII
Senkaya	36343	6618	6490	7	19	60	42	325	974	2931	V
Tekman	34004	4700	3070	3	2	1603	22	307	1034	1448	VI
Tortum-Uzundere	46900	8463	7980	245	148	20	70	2036	3344	1721	VII
TOTAL	865175	118531	87892	7855	10029	4917	7838	29127	27528	30004	

Table 2. Human Losses

COUNTY SEAT	Total Pop.	Loss of Life Min.	Loss of Life Max.	Injuries Min.	Injuries Max.	# of People Made Homeless Min.	# of People Made Homeless Max.	# of People Made Homeless Total
Erzurum	307411	660	2201	1980	3300	121038	178288	307467
Askale	47081	3	11	9	15	621	3151	3810
Cat	25840	11	37	33	55	2024	8118	10278
Hinis-Karacoban	62661	10	33	30	50	1804	7276	9203
Horasan	59730	22	74	66	110	4086	16544	20902
Ispir-Pazaryolu	52267	11	37	33	55	2040	8233	10409
Karayazi	45649	7	23	21	35	1265	5071	6422
Narman	24989	11	38	35	55	2101	8552	10792
Oltu	43232	8	26	24	50	1457	5863	7428
Olur	18452	1	4	3	5	247	1105	1365
Pasinler	60616	48	161	144	240	880	25289	26762
Senkaya	36343	10	32	30	50	1787	7144	9053
Tekman	34004	9	31	27	45	1688	7375	9175
Tortum-Uzundere	46900	61	204	183	305	11198	29590	41541
TOTAL	865175	872	2912	2618	4370	152236	311599	474607

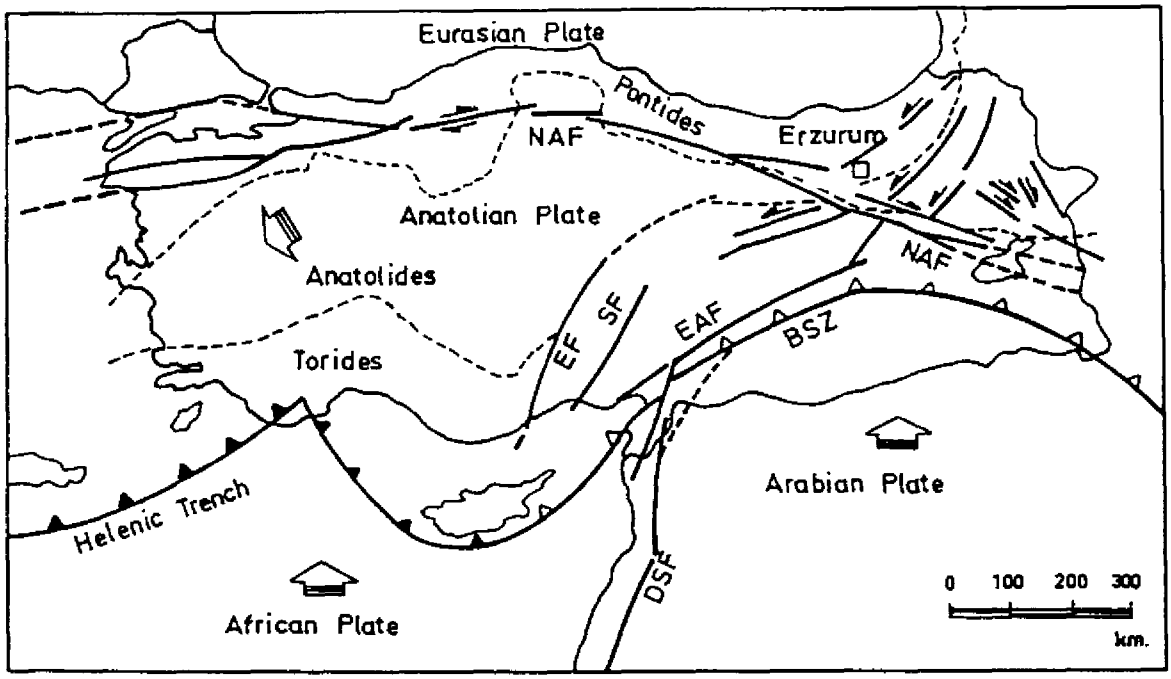
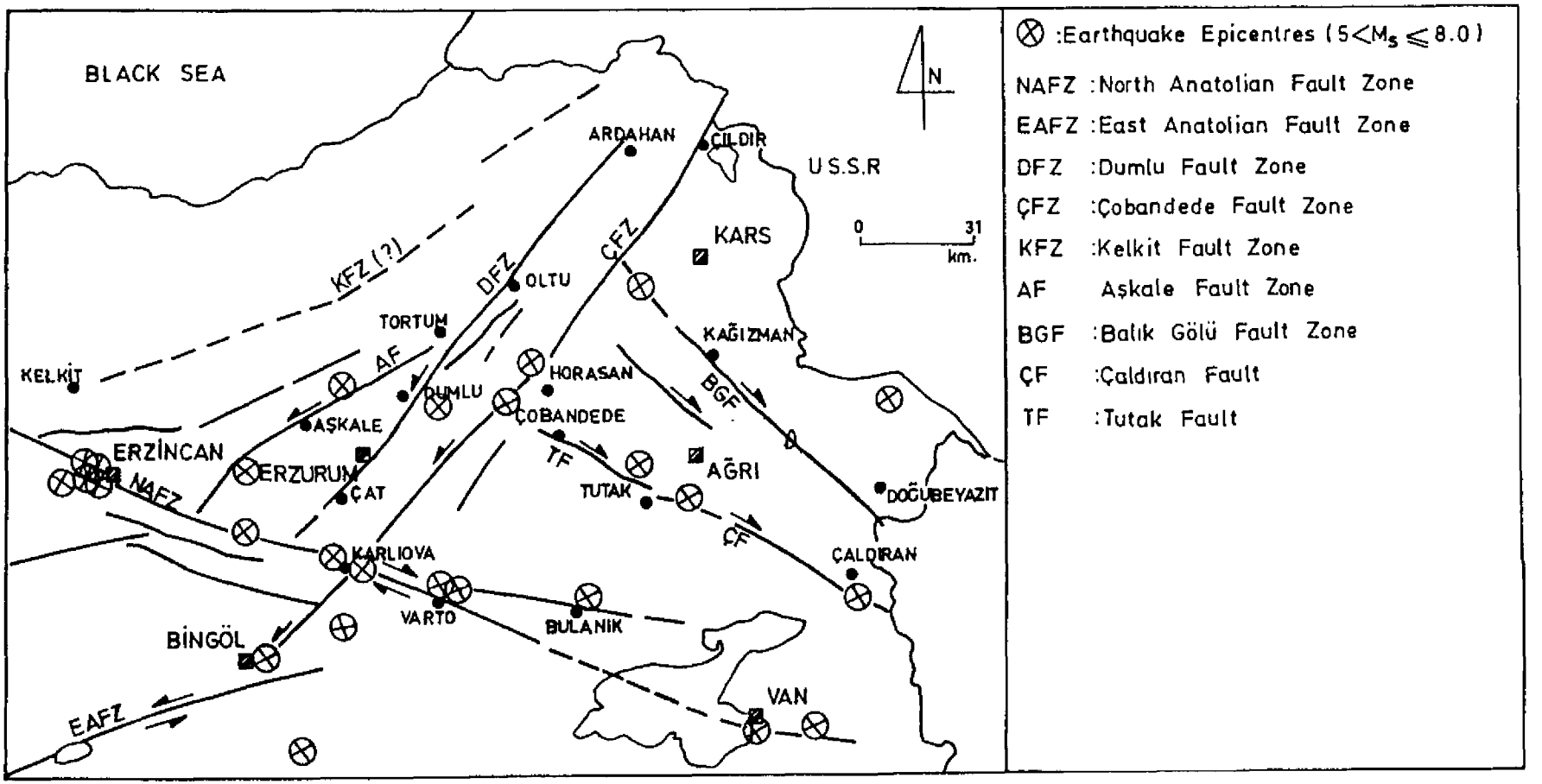


Figure – 1. Schematic Tectonic Elements of Türkiye and Erzurum Province

Key to lettering:

NAF : North Anatolian Fault Zone, BSZ: Bitlis Suture Zone, DSF : Dead Sea Fault Zone, EAF : East Anatolian Fault Zone, EF: Ecemiş Fault, SF : Sarız Fault

Figure 1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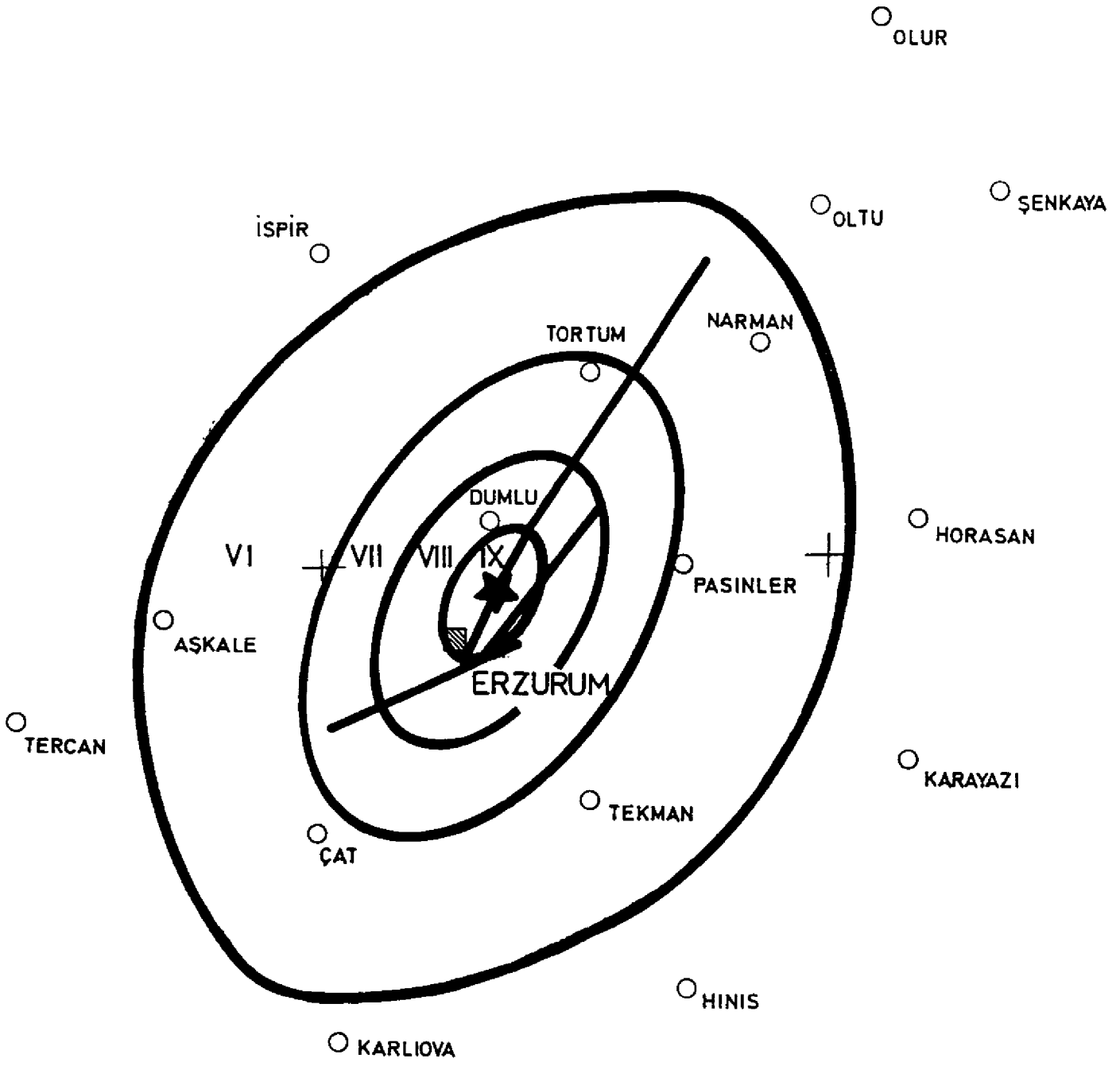
EAFZ
⊗ :Earthquake Epicentres (5<Ms ≤ 8.0)
NAFZ :North Anatolian Fault Zone
EAFZ :East Anatolian Fault Zone
DFZ :Dumlu Fault Zone
ÇFZ :Çobandede Fault Zone
KFZ :Kelkit Fault Zone
AF Aşkale Fault Zone
BGF :Balık Gölü Fault Zone
ÇF :Çaldıran Fault
TF :Tutak Fault

Figure 2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Hypothetical Epicenter
Dumlu Fault Zone
Scale 1/1000 000

Figure 3

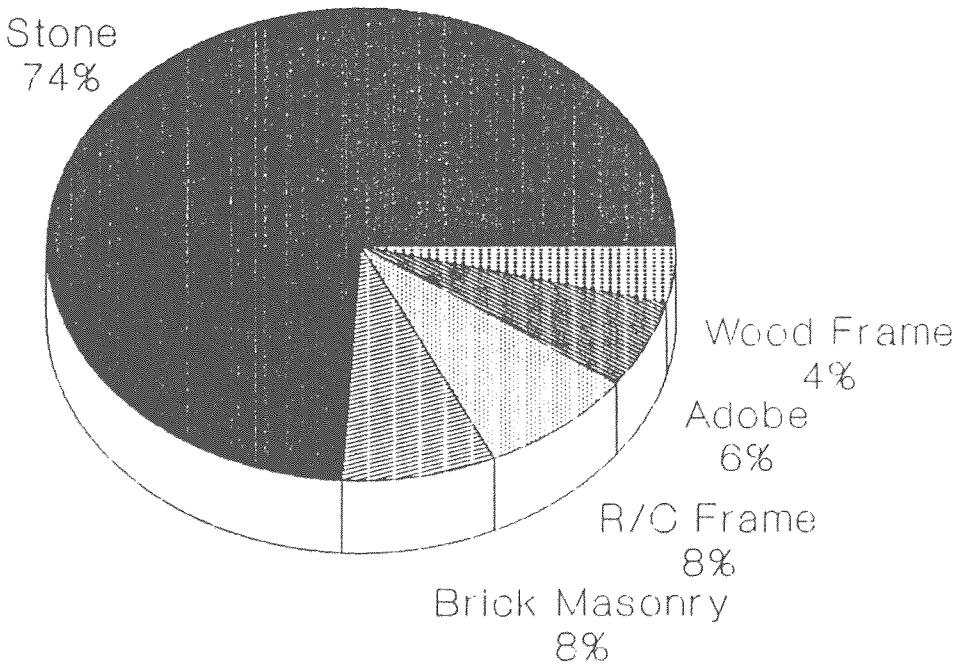
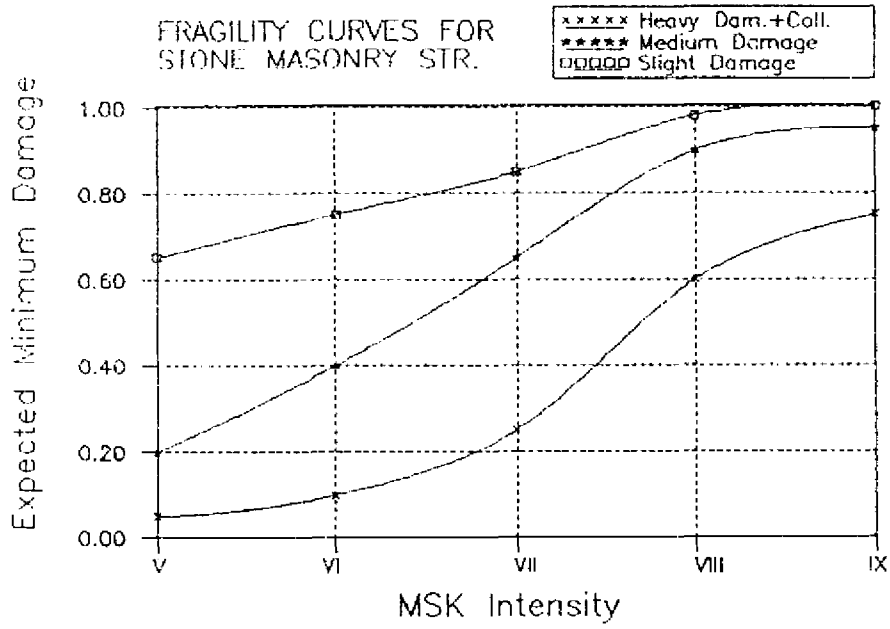


Figure 4:The Percentage Distribution of Housing Types.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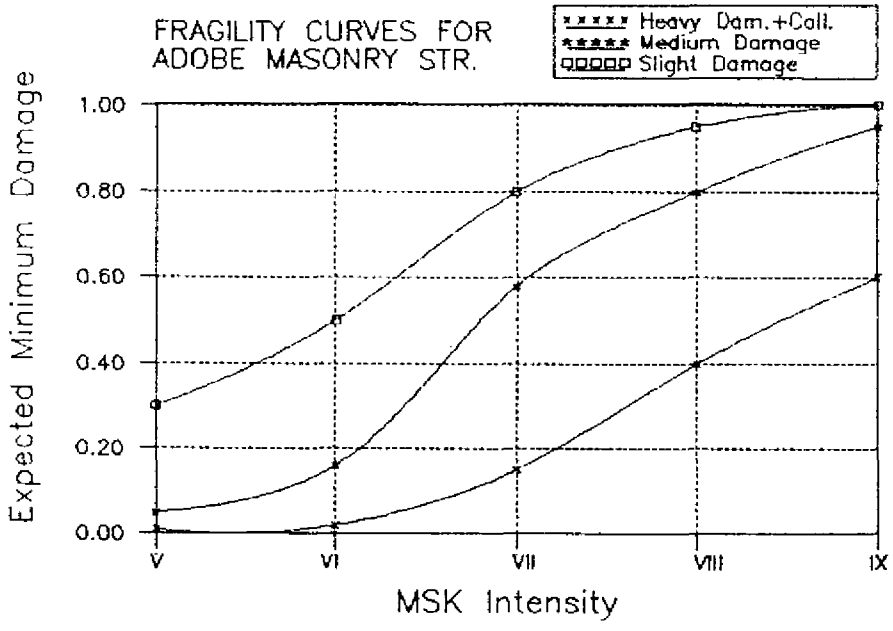
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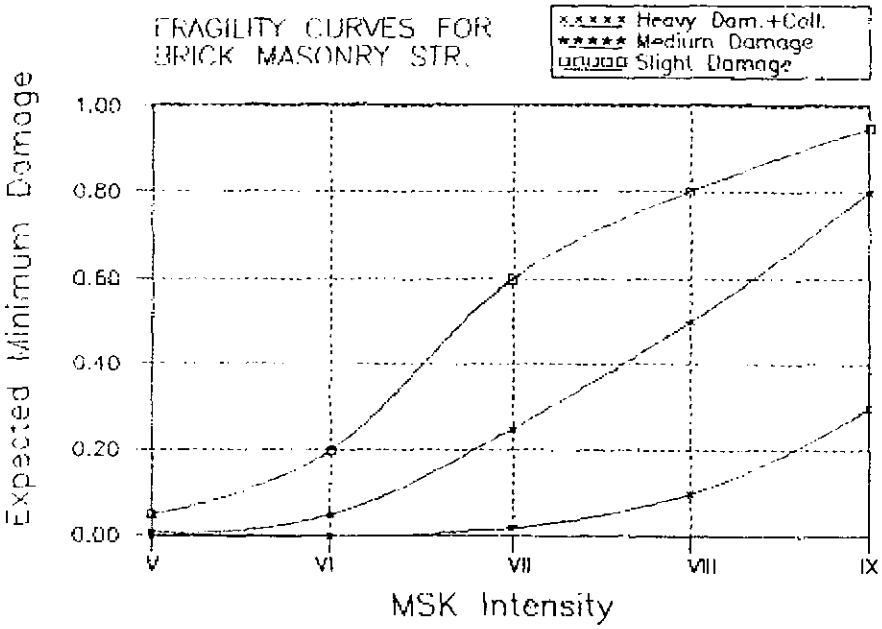
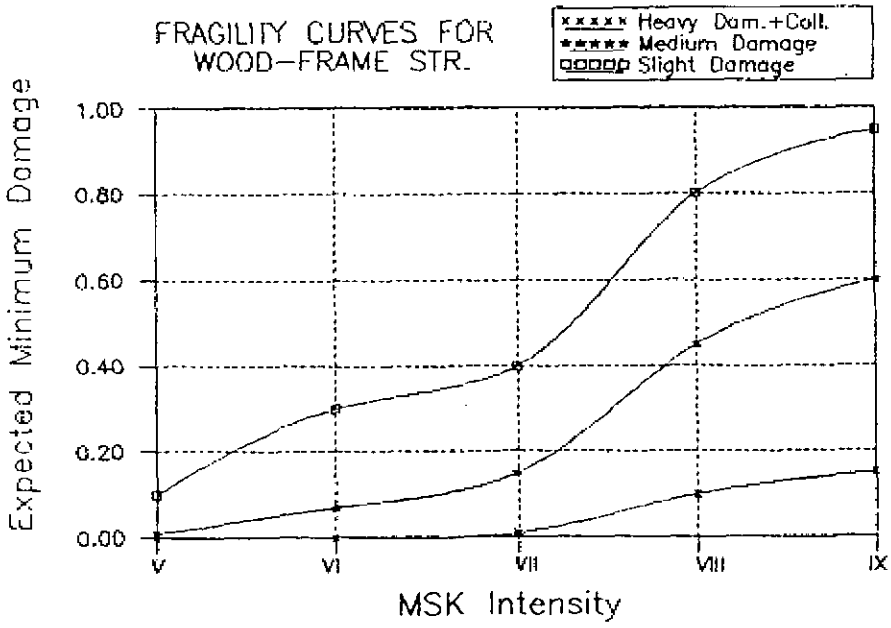
Figure 5





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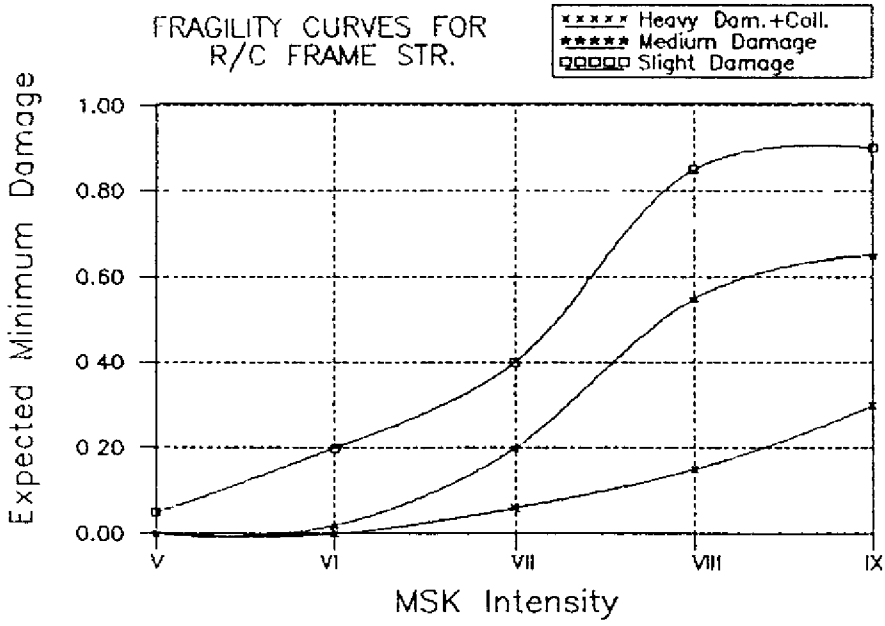

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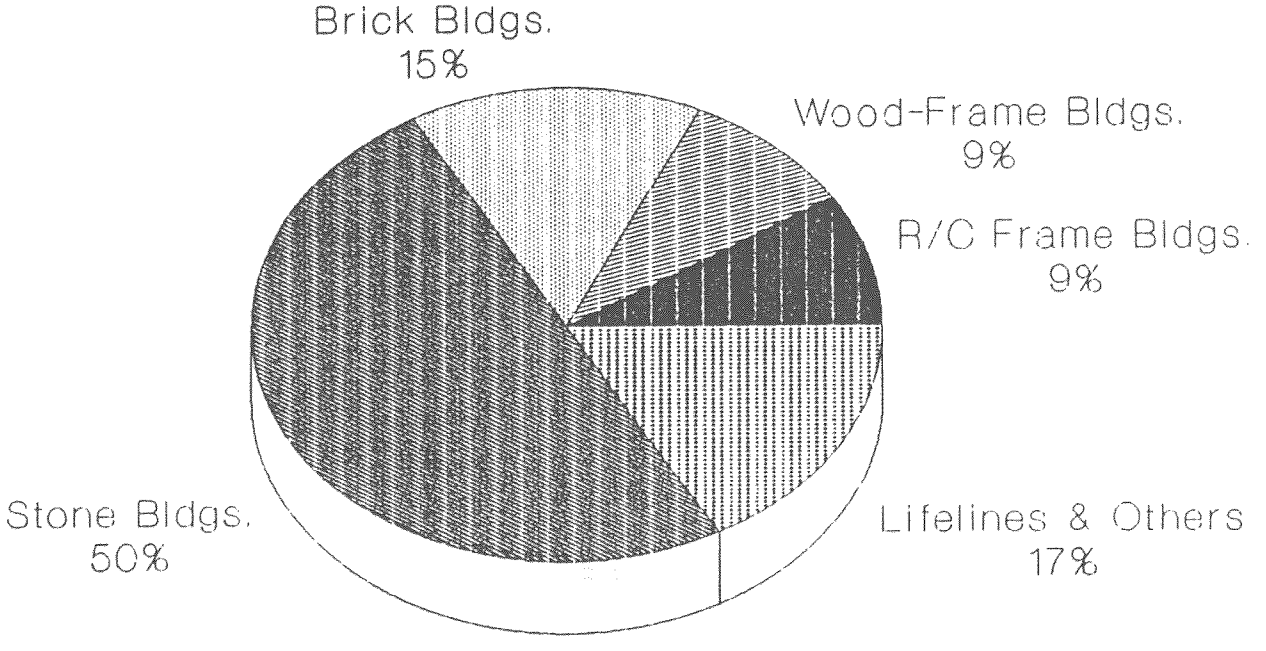

Figure 6: The Reasons for Direct Losses.

ANNEX 2

Group Exercise 2

Co-operative Project Proposal for Seismic Risk Reduction and Disaster Management Strategies in Eastern Turkey

GROUP EXERCISE TWO

CO-OPERATIVE PROJECT PROPOSAL ON "SEISMIS RISK REDUCTION AND DISASTER MANAGEMENT STRATEGIES IN EASTHERN ANATOLIA, TURKEY"

I. Introduction

Earthquakes are a major hazard throughout Turkey. During this century, over 70.000 people have been killed and 350.000 buildings have been destroyed by earthquakes in Turkey.

On the basis of the applicable official earthquake hazard zoning map of Turkey and the results of 1985 census, % 92 of the total surface area and % 95 of the population of Turkey are in different earthquake hazard zones.

Composite hazard mapping of the country to identify region and cities of high potential loss shows that the single area most at risk from heavy earthquake losses is Eastern anatolia.

From examination of past earthquake damage statistics, Eastern Anatolia had % 700 more deaths and % 200 more destroyed buildings with the same epicentral intensity than Western Turkey.

The reason that Eastren Anatolia is more vulnerable to earthquakes than elsewhere is that the building stock of the area is still predominently ownerbuilt traditional structures of weak rubble stone masonry with mud mortar having thick walls ($\sim$ 80 cm) and thick earthen roofs ($\sim$ 50 cm).

The region consists of 13 provinces with a 6.5 million population and 160.000 km2 surface area. Approximatly % 75 of population are in first and second degree earthquake zones according to offical earthquake hazard zoning map of Turkey.

From examination of past seismic activities and assuming poissonian behavior of the data, there exists % 63 propability of having one earthquake of magnitude 6.3 and above every year in the region.

Over the next 25 years, it is expected that the region will experience about 40 small ($M < 5.0$) earthquakes, 30 moderate ($5.0 < M < 6.0$) earthquakes and at least 8 large earthquakes ($6.0 < M < 7.0$). It is also possible that within 25 years, Eastern Anatolia will experience a very large magnitude earthquake ($7.0 < M < 8.0$) which would have disastrous effects.

II. Objectives of the Project

The main objectives of the Project are the following:

1. To assess and develop hazard, vulnerability and risk model for the region.

2. To formulate appropriate disaster mitigation policies for the region including strengthening techniques for different building types and microzoning studies in provincial centers, such Erzurum, Erzincan and Van provinces of the region.

III. Project Activities

Since 1984 a lot of activities had been carried out individually in the region.

Those are;

a) Neo-tectonic and Fault Strain Rates studies,
b) Compilation of Historic and Instrumental earthquake Catalogues,
c) Seismicity of the region,
d) Identification of the earthquake source zones,
e) Attenuation relationships for the different source zones,

for the hazard assessment.

a) Inventories for the building types,
b) Surveying on plan and structural typologies building stooks,
c) Studies of observed vulnerability,
d) Experimental test program for theoretical Vulnerability,
e) Damage, Distance, Intensity model for different building types,

for the vulnerability assessment.

a) Studies on loss estimation model,
b) Scenarios of future earthquake losses,
c) Strengthening metodologies for different building types,
d) Experimental studies on strengthened buildings,
e) Cost effectiveness of strenghening,

for the risk assessment and risk reduction.

At this moment, this wide ranging and regional scale studies will be analized and synthesized and the studies are being reduced to provincial scales. Also a computer program will be developed for the use in the hazard, vulnerability and loss fonctions for the region.

Pilot studies of hazard, vulnerability and risk assessment including microzoning studies are being planned for Erzurum, Erzincan and Van provinces of the region.

At the final stage, formulation of appropriate disaster mitigation policies including land use, strengthening metodologies for existing buildings and preparadness will be developed.

IV. Institutional Framework

Earthquake Research Department of General Directorate of Disaster Affairs of the Ministry of Public Works and Settlement will be Lead agency of the project.

Earthquake Engineering Research Department of Middle East Technical University, Earthquake Research Institute of Erzurum Atatürk University, Civil Engineering Faculty of Istanbul Technical University and Turkish National Committee for Earthquake Engineering will be main research institutions and organisations of the project.

Project will also be open to other institutions in the country and inter-country participation.

V. Duration and Sources of the Project

Duration of the project will be 3 years. Total cost of the project will be 1.500.000 US dollars.
Two third of this total will be covered by National sources. One third is being expected from other sources including SEISMED future sources.