

APPENDIX I

REGULATION FOR BUILDINGS TO BE CONSTRUCTED IN DISASTER AREAS

PART : I

GENERAL PROVISIONS

Section 1 - Scope of the Regulation

1.1 - This Regulation, promulgated in accordance with Paragraph 3 of Act 7269 -as revised by Act 1051- , applies to all buildings, governmental or private, in disaster areas as determined and declared in accordance with Paragraph 2 of the above mentioned Act. The technical conditions regarding the construction of new buildings or structural modification, or expansion, or major repairs of the existing ones shall conform to the provisions set forth in this Regulation.

1.2 - The materials and workmanship of buildings to be constructed in disaster areas, shall conform to the applicable Turkish Standards and to the "General Technical Specifications" of the Ministry of Public Works.

Section 2 - Sites on which building construction is prohibited

2.1 - No new buildings or dwellings shall be constructed, nor shall existing ones be repaired, on a site determined and declared as prohibited for construction, in accordance with Paragraph 14 of Act 7269 -as revised by Act 1051- . Furthermore, no buildings or dwellings shall be constructed on artificial fills with a past of less than 30 years, unless sufficient soil compaction is provided.

2.2 - No new buildings or dwellings shall be constructed, nor shall the existing ones be repaired on sites affected by at least one of such hazards as avalanche, rockfall or landslide, and furthermore determined and declared as a disaster area through a decree, depending on Paragraph 2 of Act 7269 -as revised by Act 1051- .

PART : II

PROTECTION FROM FLOOD AND FIRE DISASTERS

Section 3 - Protection from flood disaster

3.1 - At a site determined and declared as flood disaster area through a decree, in accordance with Paragraph 14 of Act 7269 -as revised by Act 1051- , new buildings may be constructed or existing buildings may be repaired, provided that the site is not prohibited for construction, and furthermore the provisions set forth in

the following Subsections (3.1.1), (3.1.2), (3.1.3), (3.1.4) and (3.1.5) are complied with.

3.1.1 - In those portions of buildings that may come into direct contact with water, no natural or artificial building material unable to withstand the effects of water shall be used (e.g. adobe, timber, tuff, gypsum, or wall with mud mortar etc.) .

3.1.2 - Those portions of buildings extending from the foundations up to at least 0.30 m above the water level -determined as highest possible- , shall be built of stone masonry with a mortar of 250 kg/m³ cement content, or of cyclops concrete with a 150 kg/m³ cement and 1/3 coarse aggregate content, or of other material with higher durability.

3.1.3 - Necessary precautions shall be taken where the possibility exists that the foundation soil be flooded.

3.1.4 - Those building portions subject to structural modification, or expansion, or major repair work shall be so treated in such a way as to increase the flood durability of the whole building.

3.1.5 - No storage, or laundry, or shelter spaces shall be built so as to be left under the water level, determined as highest possible.

Section 4 - Protection from fire disaster

4.1 - At a site determined as fire disaster area, in accordance with Paragraph 14 of Act 7269 -as revised by Act 1051- , the following precautions shall be taken as a minimum, in buildings to be constructed or repaired, until the relevant Turkish Standard comes into effect.

4.1.1 - Timber or other inflammable materials shall not be employed in the exterior walls of buildings arranged in rows.

4.1.2 - The thickness of the exterior wall of the chimney, resting on the roof slab, shall be at least one brick length (19 cm as to the relevant Turkish Standard) . In working halls and in centrally heated buildings, the thickness shall be no less than 1 1/2 brick length (29 cm as to the relevant Turkish Standard) . The chimney shall in no case come into contact with any timber elements, furthermore a clear space of at least 5 cms shall be provided between the chimney and any timber elements. Exterior surfaces of chimney shall be plastered and the joints between bricks or blocks shall properly be filled with mortar, using forms of planed timber or sheet metal. One of the non-flammable materials such as common brick, concrete block or similar shall be employed in construction of chimneys .

4.1.3 - The chimney top shall be at least 0.75 m above the level at which it intersects the roof covering.

4.1.4 - Beams and columns susceptible to fire damage in multistory steel frame structures, shall be protected by a covering of suitable non-flammable material.

Preventive and protective measures shall be taken where accumulation of inflammable materials or vapors is possible.

4.1.5 - Timber frame buildings shall not be built in rows. The faces of an individual timber building shall be at a clear distance of 5.00 m from the nearest boundary of the relevant land plot.

4.1.6 - In case where buildings adjoin, a fire shield shall be provided in between, along the common boundary, starting from the roof slab level and reaching to a height 0.60 m above the roof surface, the top line being parallel to the line of maximum slope of the roof. The shield shall be a wall of masonry or another similar non-flammable material, with a thickness of at least one brick length (19 cm as to the relevant Turkish Standard) , and be plastered on both sides.

4.1.7 - Those building portions subject to modification, or major repair work, or renovation, shall be so treated in such a way as to increase the fire resistance of the whole building.

PART : III

PROTECTION FROM EARTHQUAKE DISASTER

Section 5 - Applicability

5.1 - The provisions applicable to engineering structures such as dams, bridges etc., and to those types of buildings not presently covered by this Regulation, -from the point of their structural conditions and design principles- shall be determined by the relevant Ministries that are presently involved in the management of such construction work.

5.2 - The earthquake danger zones referred to herein, are those indicated in the "Map of Earthquake Danger Zones in Turkey", prepared by the Ministry of Reconstruction and Resettlement, and put into effect by the decree 7/5551, dated December 23, 1972 , depending on Paragraph 2 of Act 7269 -as revised by Act 1051- .

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Section II - Adobe buildings

II.1 - Scope and general provisions

Buildings with foundations and, if any, basement walls of stone masonry, and with bearing walls made of adobe, either of individual blocks or cast-in-situ , shall hereafter be referred to as adobe buildings.

Adobe buildings may be constructed only in one story configuration, provided

that the construction rules in specifications relevant to masonry buildings are adhered to, unless the contrary is prescribed in this Regulation. The story height shall not exceed 2.70 m , nor shall the height of the basement, if any, exceed 2.40 m .

The plan layout of adobe buildings should preferably be a rectangle, and the bearing walls both in longitudinal and transversal directions shall be arranged symmetrically about the two principal axes. Any deviations from symmetry shall be kept within negligible limits. Partial basements should preferably be avoided.

11.2 - Foundations

11.2.1 - The foundation walls, in all earthquake zones, shall be made of rubble stone masonry, utilizing cement mortar, or cement reinforced lime mortar -in the quality corresponding to a volumetric ratio that cement:lime:sand = 1 : 2 : 9 - . The thickness shall be at least 0.50 m and the wall shall rise to a height at least 0.50 m above the ground level.

11.2.2 - The foundations shall be constructed at a depth below the frost level, but in no case shall they be shallower than 0.80 m .

11.2.3 - In buildings with a basement, the thickness of the foundation walls shall be 0.60 m , with a corresponding thickness of 0.50 m for the basement walls. These walls shall be made of rubble stone masonry, utilizing cement reinforced lime mortar -in the quality corresponding to a volumetric ratio that cement:lime:sand = 1 : 2 : 9 in the first degree earthquake danger zone, and in the quality corresponding to a volumetric ratio that lime:sand = 1 : 3 in second, third or fourth degree earthquake danger zones.

11.3 - Bearing walls

11.3.1 - The materials

The production of adobe blocks shall be performed in accordance with the provisions in the specifications relevant to masonry buildings.

The rubble stone masonry walls shall be constructed utilizing cement reinforced lime mortar -quality described above- , whereas the adobe walls shall be constructed utilizing the same mixture used in producing the adobe blocks, as mortar. Moisture insulation shall be provided at the joint between the stone masonry and the adobe wall.

11.3.2 - Wall thicknesses

11.3.2.1 - The thickness of rubble masonry walls of the basement, if any, shall be no less than 0.50 m .

11.3.2.2 - Exterior and interior bearing adobe walls shall have a thickness of at least $1\frac{1}{2}$ and 1 adobe length, respectively. The main and complementary adobe block dimensions shall be 0.30 m X 0.25 m X 0.15 m and 0.30 m X 0.15 m X

0.15 m , respectively.

11.3.3 - Stability and openings in walls

11.3.3.1 - Stability

a) The stability of the bearing walls against lateral loads, shall be provided by the adjoining perpendicular walls. The thickness of such a wall shall be no less than an adobe block length.

b) The free span of the bearing wall, measured between the axes of the stabilizing walls, shall not exceed 4.50 m .

c) Utmost care shall be exercised in the construction of chimneys. In case the material of the chimney is different from adobe, a construction joint shall be provided, and the chimney shall be constructed in such a way so as not to disrupt the continuity of the bearing walls.

11.3.3.2 - Openings in the bearing walls

a) A solid wall portion of at least 1.00 m length shall be provided, between the door or window opening and the corner of an exterior bearing wall.

b) The distance of the side of an opening in the bearing wall to the nearest intersection with the perpendicular wall, shall be at least 0.50 m .

c) Door openings in the walls shall be no larger than 2.10 m X 1.00 m . No more than one door opening shall be provided in any portion of the bearing wall, between two adjoining perpendicular walls.

d) Window openings in the bearing walls shall be no larger than 1.40 m X 0.90 m .

e) A solid wall portion of at least 0.60 m length shall be provided between two consecutive door and/or window openings. In case where this is not possible, two 0.10 m X 0.10 m timber studs shall be provided at each side of the opening - a total of four studs - , furthermore they shall be connected to the lintel at the window top and to the bond beam right below the window.

11.4 - Floors

Floors shall be made to rest on and be connected securely to the bond beams between the foundation or basement walls, if any, and the adobe walls.

11.5 - Bond beams and lintels

11.5.1 - Reinforced concrete or timber bond beams shall be provided on foundation or basement walls, if any, of 0.15 m height and with a width not less than the wall thickness. In case the bond beam is made of reinforced concrete, the cement

content shall be no less than 250 kg/m^3 and the beam shall have a longitudinal reinforcement of 4 bars of 10 mm diameter. They shall be laterally tied by stirrups of 6 mm diameter, spaced at 0.25 m .

In case where the bond beam is made of timber, it shall consist of two 0.10 m X 0.10 m asphalt treated longitudinal members, connected to each other laterally by nailing 0.05 m X 0.10 m pieces, at every 0.50 m . The space in between, shall be filled with crushed stones.

11.5.2 - In adobe walls timber bond beams, similar to those in 11.5.1 , shall be provided right below and above windows, along the walls, and also on the wall tops, on which ceiling beams or roof trusses rest.

11.5.3 - In regions where cane grows, the bond beams -except those of base beams, the roof beams and except door and/or window lintels- may be made of canes, spaced 0.05 m apart and tied together at every 0.50 m by thin wires.

11.6 - Roofs

11.6.1 - Roofs of adobe buildings shall have eaves of at least 0.50 m , beyond the external walls. Due care shall be exercised to make the roof a light one. Necessary precautions shall be taken in the construction of bearing adobe walls, so that the bearing characteristics are not impaired by external -atmospheric- actions.

11.6.2 - No flat earth roofs shall be constructed in the first or second earthquake danger zones. The thickness of the earth layer shall not exceed 0.15 m in third or fourth degree earthquake danger zones.

Section 12 - Repair and renovation

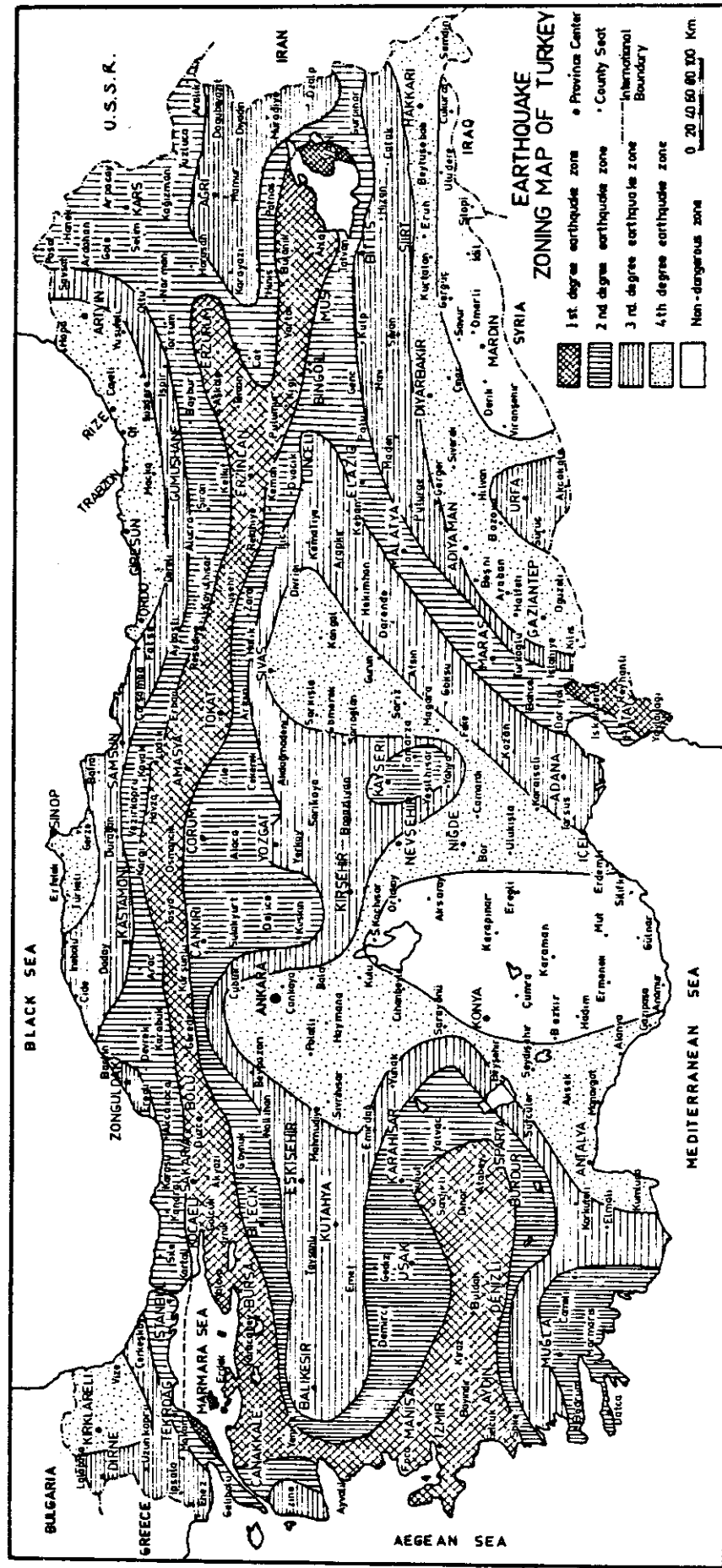
12.1 - The repair work of structures damaged by earthquakes shall be conducted through the proper design work performed adhering to the provisions prescribed in this Regulation, and further approved by the related building authorities, in order to provide sufficient strength against future earthquakes.

12.2 - Those buildings and portions thereof, in earthquake danger zones, subject to modification, expansion, or renovation, shall be so treated in such a way as to incorporate sufficient earthquake resistance through proper design work performed adhering to the provisions prescribed in this Regulation, and further approved by the related building authorities.

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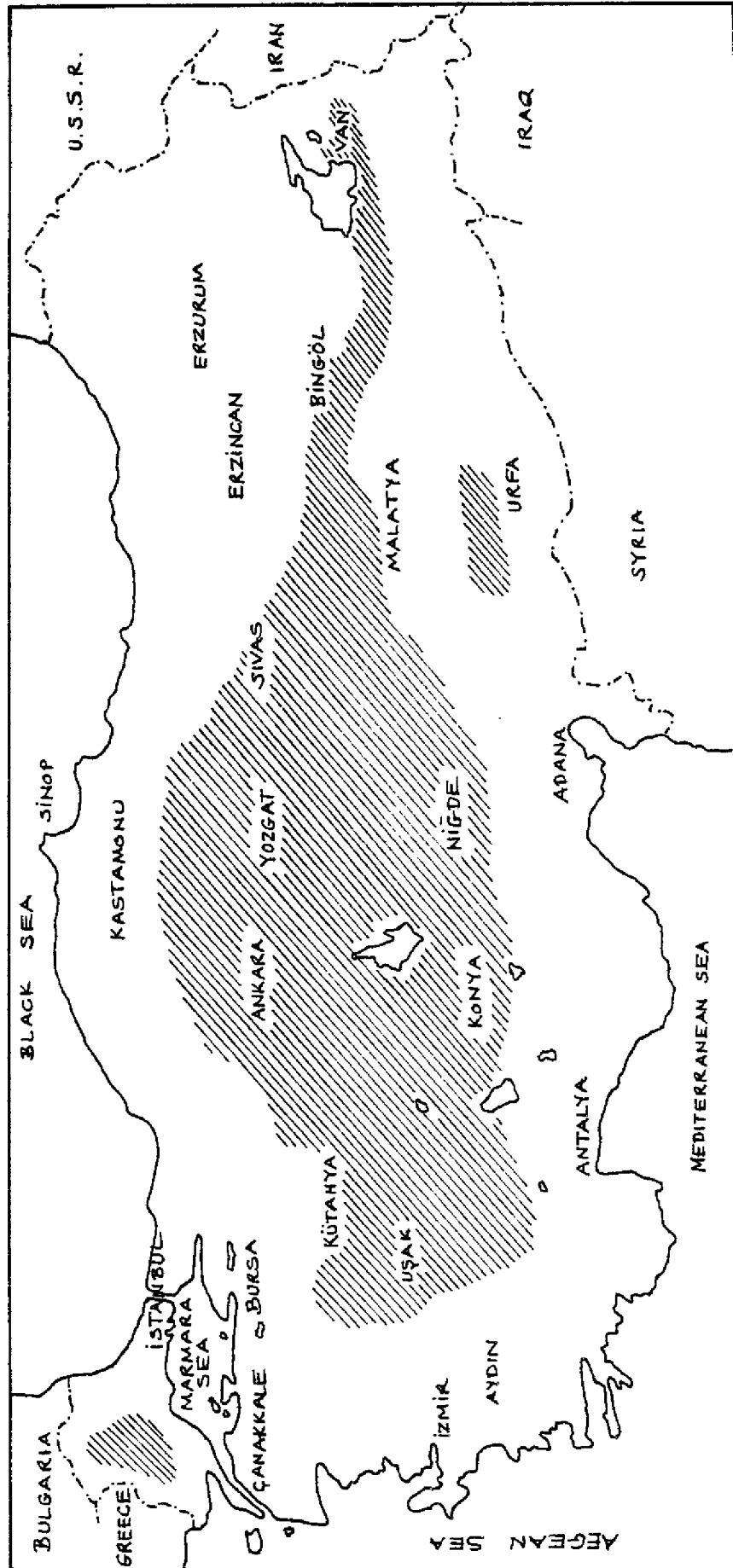
APPENDIX 2

MAP OF EARTHQUAKE DANGER ZONES IN TURKEY



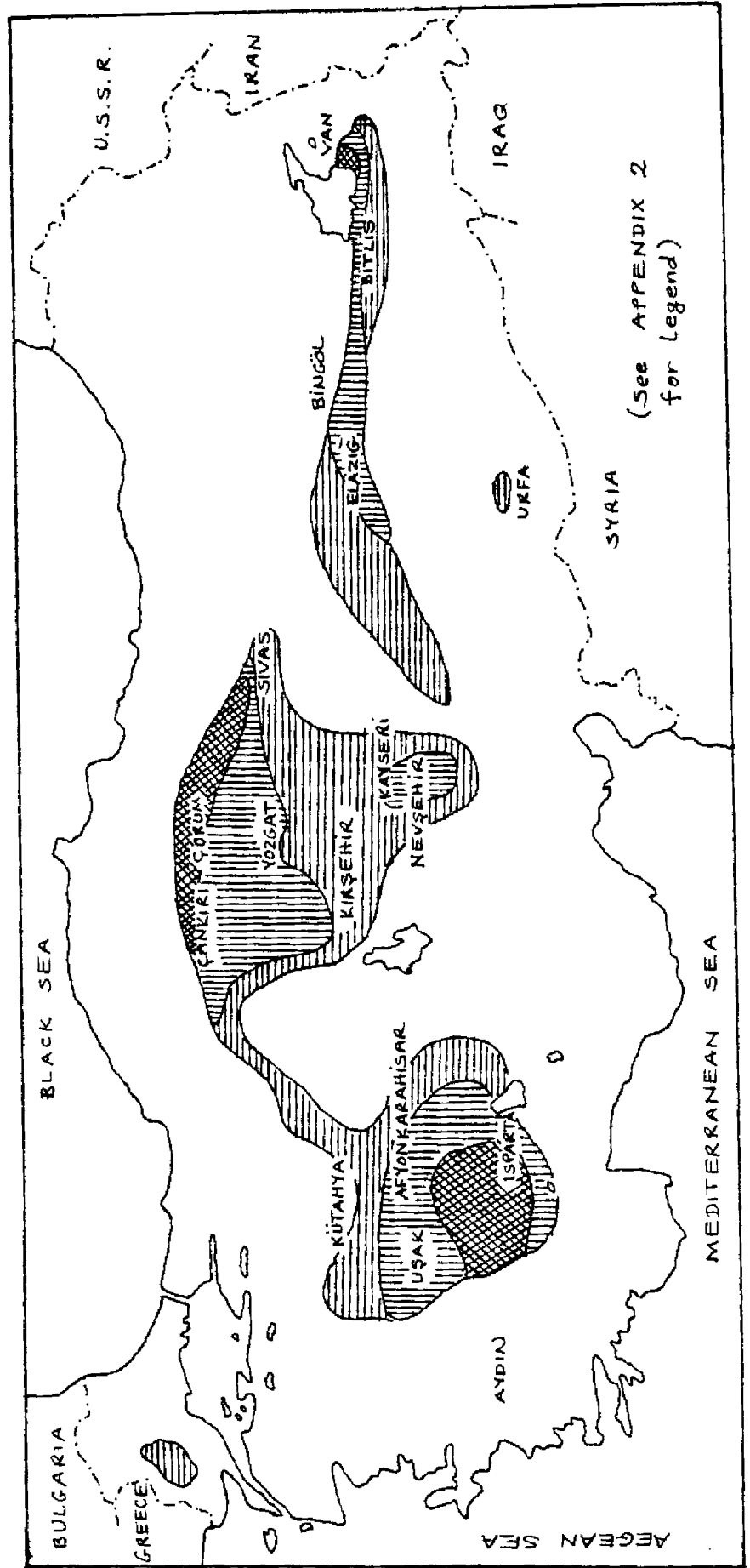
APPENDIX 3

MAP OF TURKEY, SHOWING THE AREAS WHERE ADOBE BUILDINGS DOMINATE



APPENDIX 4

MAP OF TURKEY, SHOWING THE AREAS WHERE DOMINATING ADOBE BUILDINGS
ARE UNDER MAJOR EARTHQUAKE DANGER



REFERENCES

1. "Regulation for Buildings to be Constructed in Disaster Areas" (in Turkish), Ministry of Reconstruction and Resettlement, (presently in effect, through the Decree 7/5551, dated Dec. 23, 1972), Ankara, Turkey (1972) .
2. "Map of Earthquake Danger Zones in Turkey", Ministry of Reconstruction and Resettlement, (presently in effect through the Decree, promulgated in the Official Gazettee No. 15260, dated June 9, 1975), Ankara, Turkey (1975) .
3. Country Monograph of Turkey (in English), (submitted in Intergovernmental Conference on Assessment and Mitigation of Earthquake Risk, Paris, Feb. 10-19, 1976), Ankara, Turkey (1976) .
4. Alkut Aytun, et al, "Problems Experienced in Implementing Earthquake Code Requirements in Turkey" (in English), Proc. CENTO Conference on Earthquake Hazard Minimization, (July 22-27, 1968), Ankara, Turkey (1968) .