

The effects of earthquake and fire on urban development and formation of traditional timber building features throughout the history of Istanbul; sample buildings located in the district of the historical peninsula

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Abstract Earthquakes and fires have been the worst two troubles that enrich both the city and timber architecture formation throughout the history of Istanbul. This paper has written to emphasize the importance of these catastrophes destroying the urban texture of the city constantly and the administrative decisions that caused changing the urban texture and structural systems have taken according to these disasters in a historical point of view.

Keywords earthquake, fire, building regulations, urban design, timber construction

1. INTRODUCTION

Istanbul, because of its location in Turkey along the Mediterranean fault line and its branches, has undergone numerous intense, destructive earthquakes. The timber buildings have been the most important factor that allows the city resisting against earthquakes due to the light weight and ductility of timber material. However, the flammable properties of wood contributed to many disastrous fires that destroyed thousands of buildings in countless neighbourhoods and settlements. For this reason, governments have made mandatory the construction of masonry buildings with construction regulations and prohibited wooden buildings. On the other hand, devastating earthquakes, which occur in every 50-100 years, have caused destruction of the masonry buildings and governments compelled to construct timber structures because of the high earthquake resistance.

2. SEISMIC STRUCTURE and EARTHQUAKES in ISTANBUL THROUGHOUT the HISTORY

The city of Istanbul locates on North Anatolian Fault Line which is one of the most important fault line on earth. The Northern branch of the fault passes through 10 km down of Istanbul extends to Greece and Italy. The city of Istanbul has confronted with destructive earthquakes that the first one was in A.D. 32 (BU. Dept. of Earthquake Eng. 2003) and the last one in A.D. 1999 according to the

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records throughout history (Dışkaya 2004). It is understood that the city and its masonry monuments such as Hagia Sophia collapsed many times in its history because of earthquakes.

3. FIRES in ISTANBUL THROUGHOUT the HISTORY

The fire had been one of the first order of importance non-natural disaster that destroyed districts, neighborhoods, streets and timber buildings totally on the city of Istanbul's history. Fires have played a guiding role like earthquakes on management decisions for "ebniye regulations"³ and reorganization of the city.

4. EARTHQUAKE and FIRE RELATED ZONING REGULATIONS

Because of the fire-and earthquake related disasters were constantly changing the structure of city and a very large repair costs for the government and public many circulars and rules (specifications and regulations) have published by government. It has seen that with these arrangements the timber constructions made compulsory due to the earthquakes and masonry constructions due to the fires in historical process.

As the population of the city grew during the 18th and 19th century, the construction of attached buildings became necessary. Alternative plans for buildings were adopted and the structural merits of buildings began to change. When fire broke out in attached buildings, it spread more quickly and affected a wider area. Building brick firewalls to serve as masonry separators was as a means of preventing the spread of fire to other timber buildings. During the 19th century urban planners instituted a grid plan for the city, rid its neighbourhoods of dead-end streets and made roads wider (Denel 1982) according to the new building regulations. Appearance of buildings in the city texture were detached and attached. Detached houses were mansions, waterside residences within their own gardens and generally were taking places in the islands, the Bosphorus and the inner parts of the Anatolian peninsula. The attached houses had fire walls between them and these generally were taking place in historical peninsula, Üsküdar, Eyüp and Galata districts.

5. CONCLUSION

Istanbul is a city has been at the center of attraction of many cultures with its geographical and climatic condition throughout history. The formation of the preparation conditions of timber buildings: population and settlement, the effects of natural or human resourced disasters on urban and structural formation such as earthquakes and fires, the effects of zoning regulations depending on the disasters on urban fabric, formation of timber building character aimed to be investigated in this paper. This is because all the developments in the history of mankind are actually based on the dynamics and effects of social dimension has been emphasized. Despite changing floor heights and proportions of buildings with the structural regulations, declining section sizes of timber with increasing poverty, it is seen that the invariable construct of the timber structures has been identically same even if there is minor differences.

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³ "Ebniye nizamname"s: Building regulations; construction rules determined by government.