



PERMANENT HOUSING PRODUCTION PROCESS AFTER 17 AUGUST 1999 MARMARA EARTHQUAKE IN TURKEY

Nilufer TAS ¹, Murat TAS ² and Nilay COSGUN ³ ✉

¹ *Department of Architecture, Faculty of Engineering and Architecture, Uludag University, Gorukle-Bursa 16059, Turkey
E-mail: nilufertas@uludag.edu.tr*

² *Department of Architecture, Faculty of Engineering and Architecture, Uludag University, Gorukle-Bursa 16059, Turkey
E-mail: murattas@uludag.edu.tr*

³ *Department of Architecture, Faculty of Architecture, Gebze Institute of Technology, Gebze-Kocaeli 41400, Turkey
E-mail: nilaycosgun@gyte.edu.tr*

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ABSTRACT. In recent years, one of the biggest investments and projects that developed in Turkey is in permanent housing. The emergency case experienced after the 17 August 1999 Marmara Earthquake featured the permanent housing need; thus, within the meaning of Disaster Law, a large number of housings were to be built in designated residential areas in various provinces. Once a building has been designed, impediments that arise either cannot be fixed any longer or require an extra cost to be fixed. In order to create a high quality built environment, production process of constructions as a long lasting effect becomes important. This study examines how the production process of the permanent housings to be built in Turkey after 1999 Marmara Earthquake was managed considering the current legal framework. In this context, the aim is to state how permanent housings are produced and determination of the points seen as problems by the builders (contractors) and occupants through this process. The main concern is to determine the outcomes that could act as answer to problems that might arise in permanent housing production after a probable earthquake. The obtained information is thought to act as reference in the practices of meeting permanent housing need that will arise after disasters.

KEYWORDS: Earthquake; Post-earthquake accommodation need; Permanent housing; Permanent housing construction process; Turkey

1. INTRODUCTION

Epicenter of the earthquake occurred on 17 August 1999 with an intensity of 7.4 was on the North Anatolia Fault Line, 12 kilometers southeast of Izmit. 17,840 people were killed and 43,953 were injured. According to the loss assessment state, the 17 August 1999 Marmara Quake damaged 244,383 buildings in to-

tal, 213,843 of which were housing and 30,540 were office buildings. The number of housing and office buildings that were collapsed, seriously and moderately damaged was 154,511 (Turkish Prime Ministry Crisis Management Center, 1999).

The reasons of the increase in destructive results of earthquakes can be listed as industrialization and rapid population increase as a

consequence, uncontrolled constructions, ignorance and lack of knowledge. This earthquake became a turning point at which work that had been done to reduce earthquake damage earlier in Turkey was tested in the most serious way ever. Apart from the damage on built physical environment, the earthquake, owing to its magnitude, led to social and economic problems both in the earthquake area and across the country. Devastating effects of the earthquake were the highest on housings. In order to cover the big housing deficit, operations were carried out not only at the level of housing units but also at city level. The permanent housing to be built after the earthquake had to be produced within a certain period of time and in many regions/cities. New urban living areas were constructed.

In order to form a quality built environment, it is vital that design and construction phases of the housing be managed in the best way, arising demands be taken into consideration and possible restrictions (environmental, legal and

technological) be considered. Researches on the issue draw attention to the fact that after the earthquake, the degree of success in the production process of the housings is directly related to the planning and preparations done by relevant organizations before the earthquake (Sey and Tapan, 1987). ‘Permanent Housing’ defined by Disaster Legislation (Disaster act No 7269) is a part of the reconstruction process in Turkey. The perception and editing of post-disaster reconstruction within the legal framework also directly affects the character of spatial arrangements.

One of the most important features of 17 August Marmara Earthquake is that it affected a vast area and urban centers. The earthquake affected an area of nearly 64 thousand square kilometers (Turkish Prime Ministry Crisis Management Center, 1999). The cities of İstanbul, Kocaeli, Sakarya, Bolu, Bursa, Zonguldak, Eskişehir and Yalova were significantly affected by the earthquake (Figure 1).

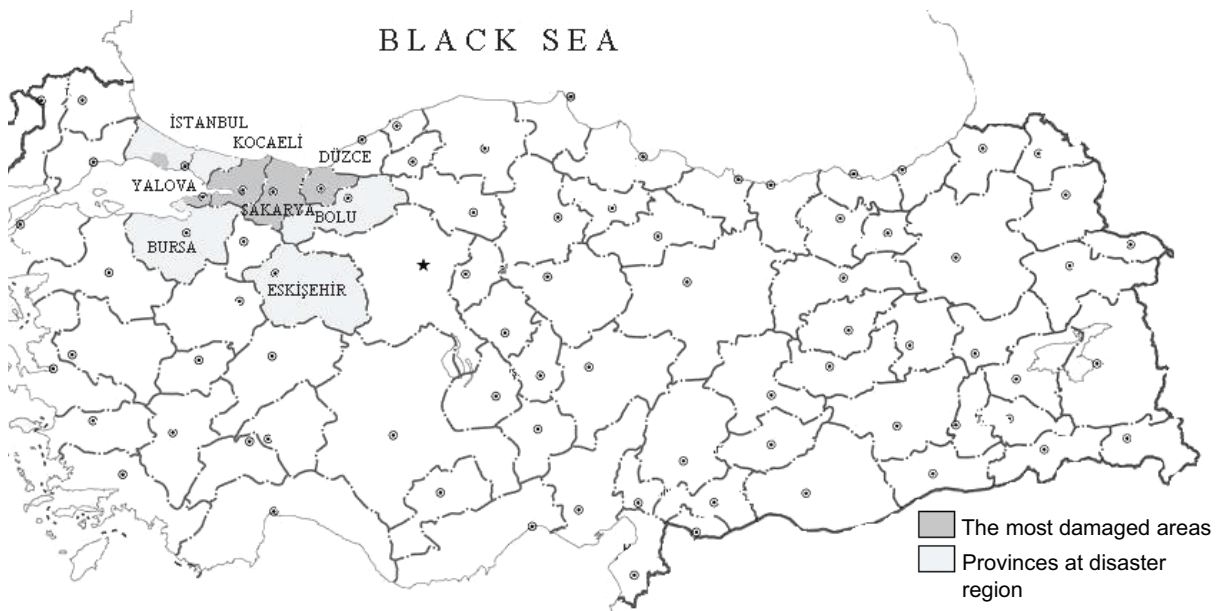


Figure 1. Location of provinces damaged in 17 August 1999 Marmara Earthquake

Loss of lives and properties were the biggest in Kocaeli, Sakarya and Yalova. Most of these cities are country's major industrial centers. After the earthquake, there arose the need to construct many temporary or/and permanent housings. The production process, from the beginning to the end, and allocating to the rightful owners of especially the permanent housings was a significant experience. Meeting the housing need of earthquake survivors, a universal problem, is an issue requiring multi dimensional expertise. Meeting the housing need adequately and effectively according to the predetermined plan will accelerate the social, cultural and economic recovery after the earthquake. Producing housing of standards in accordance with economic conditions of the country is an issue to be focused on for a country in crisis.

2. STUDY METHOD

This study examines, considering the current legal framework, how the administrative work on the planning, design and construction process of the housings constructed after the Marmara Earthquake was carried out in Turkey. The information obtained from the literature researches on this subject was reinforced with the comments from the occupants and contractors that took part in permanent housing production in Kocaeli, where permanent housing applications were intense after 1999 Marmara Earthquake, and thus introducing the administrative problems in the permanent housing production process and the resulting troubles.

The outcomes that could act as data on the solution of problems that might arise in the production of permanent housings to be built after a probable earthquake are being determined. The obtained information is thought to act as reference in the practices of meeting permanent housing need that will arise after disasters.

3. PROVIDING POST-EARTHQUAKE ACCOMMODATION NEED

People who have lost their housing as a result of the earthquake experience living in housings of various qualities in a short period of time, which is fairly difficult for those who are weak emotional and in terms of objectivity. There are four different housing obtaining stages in the recovery process in which housing need is met after earthquake (Quarantelli, 1995; Wu and Lindell, 2004):

- Emergency sheltering (immediately after the earthquake, in a few hours),
- Temporary sheltering (one or two days later),
- Temporary housing (in a few weeks),
- Permanent housing (in about a year).

Permanent housing is the last stage of post-earthquake accommodation and is the long-term housing (FEMA, 1998). Furthermore, it makes up an important part of post-earthquake reconstruction process (Lagorio, 1990).

Although the difficulties faced while realizing housing reconstruction projects in the post-disaster situation are similar to the ones met in many low-cost housing projects in developing countries, the post-disaster situation adds to these existing challenges. Additional challenges are:

- The scene is generally very chaotic and resources are limited, with simultaneous projects being launched by numerous local and international organisations for housing and infrastructure repairs, for livelihoods creation, and for a range of other social programmes,
- Projects must be completed in a short time to foster recovery and to satisfy donors who want to see results,
- The post-disaster period is generally considered as good opportunity to increase the level of development and reduce vulnerability to future disasters, which means projects must be implemented with sustainability in mind (Bolin and

Stanford, 1991; Quarantelli, 1995; Ghafory-Ashtiany, 1999; Sey, 1999; Montoya and Masser, 2005; Davidson et al., 2007; Johnson, 2007).

There are different approaches to housing delivery and reconstruction in the literature. These approaches can be explained briefly as in the following:

- Bottom-up or community based approaches: providing opportunity for communities and users to play a role in the decision-making and management, these approaches are much more successful in terms of developing appropriate technology for local socio-cultural and economic conditions (Harris and Giles, 2003; Lizarralde and Davidson, 2001). Lizarralde and Davidson (2001) also indicate that this approach helps to build self-reliance into the affected communities and is usually supported by the so-called 'enabler' policy, with almost total reliance on aided self-help reconstruction.
- Conventional top-down or technology-based approaches: Using official paths of governments, banks, developers and observing formal norms for building standards and land-use management, conventional top-down approaches emphasize standardization and technology-oriented solutions to get the job done quickly and economically (Keivani and Werna, 2001; El-Masri and Kellet, 2001). However, usually supported by a 'provider' policy, with great reliance on the import of dwellings from the developed donor countries, top-down solutions have been found to neglect cultural and local conditions because of the urgency to supply housing rapidly (Lizarralde and Davidson, 2001).

With permanent housing, the act of meeting the post-earthquake basic housing need turns into the expectation of built environments where people are provided with the normal social living environment that they had

before the earthquake (Taş et al., 2007). It is important to construct the housings in a short time using the scarce resources at hand (material, equipment, labour, funds, etc.). Johnson et al. (2005) state that post-disaster housing involves strategic and tactical decision-making resembling procurement: organizing programs of work, allocating resources, initiating and carrying out projects, and sharing responsibilities between the survivors and the experts (Dikmen, 2005). There are a series of technical preparations that must be fulfilled in order to provide housing to earthquake survivors in a short time. Providing resources, determining appropriate areas by means of geological researches, preparation of settlement plans, making production programs, design-procurement-production-control process for structures, allocating the housings to earthquake survivors, property transfers and charge transactions are jobs which require experience and prior preparation (Balamir, 2002). Organizing the post-earthquake construction production implementations before the earthquake ensures economical results. A long permanent housing construction process after the earthquake prolongs the life time in the temporary shelters. Moreover, programs created in haste after an earthquake result in keeping the solutions to the problems for a later date and production of housing with low quality construction standards without making use of local construction industry and local economy (Coburn and Spence, 1992).

4. PERMANENT HOUSING CONSTRUCTION PROCESS

Meeting the accommodation-housing need after earthquake was adopted as the state's main duty in Turkey by 'Disaster Law' No 7269. According to the current legal regulations, post-earthquake reconstruction works are authorized to Ministry of Public Works and Settlement (MPWS). Under Law 7269, the duties listed below are allocated to MPWS:

- Identification of rightful owner to be helped,
- Determining the new settlement areas,
- Map purchase, expropriation and preparation of development plans,
- Execution of construction work.

MPWS, after each earthquake, sets up different organizations in earthquake areas according to the magnitude and outcomes of the earthquake in order that work will be expeditiously conducted and completed. Loss adjustment, proprietary rights, site selection

and work on temporary and permanent housing after Marmara Earthquake were executed with the scheme shown in Figure 2 (Turkish Court of Accounts, 2002). Accordingly, the Earthquake Area Disaster Construction General Coordination was set up as a new regulation in order to be able to execute an effective application in permanent housing production stage and to deal with the problems instantly; and the Project Management Unit was set up for the construction of the permanent housings financed by external sources.

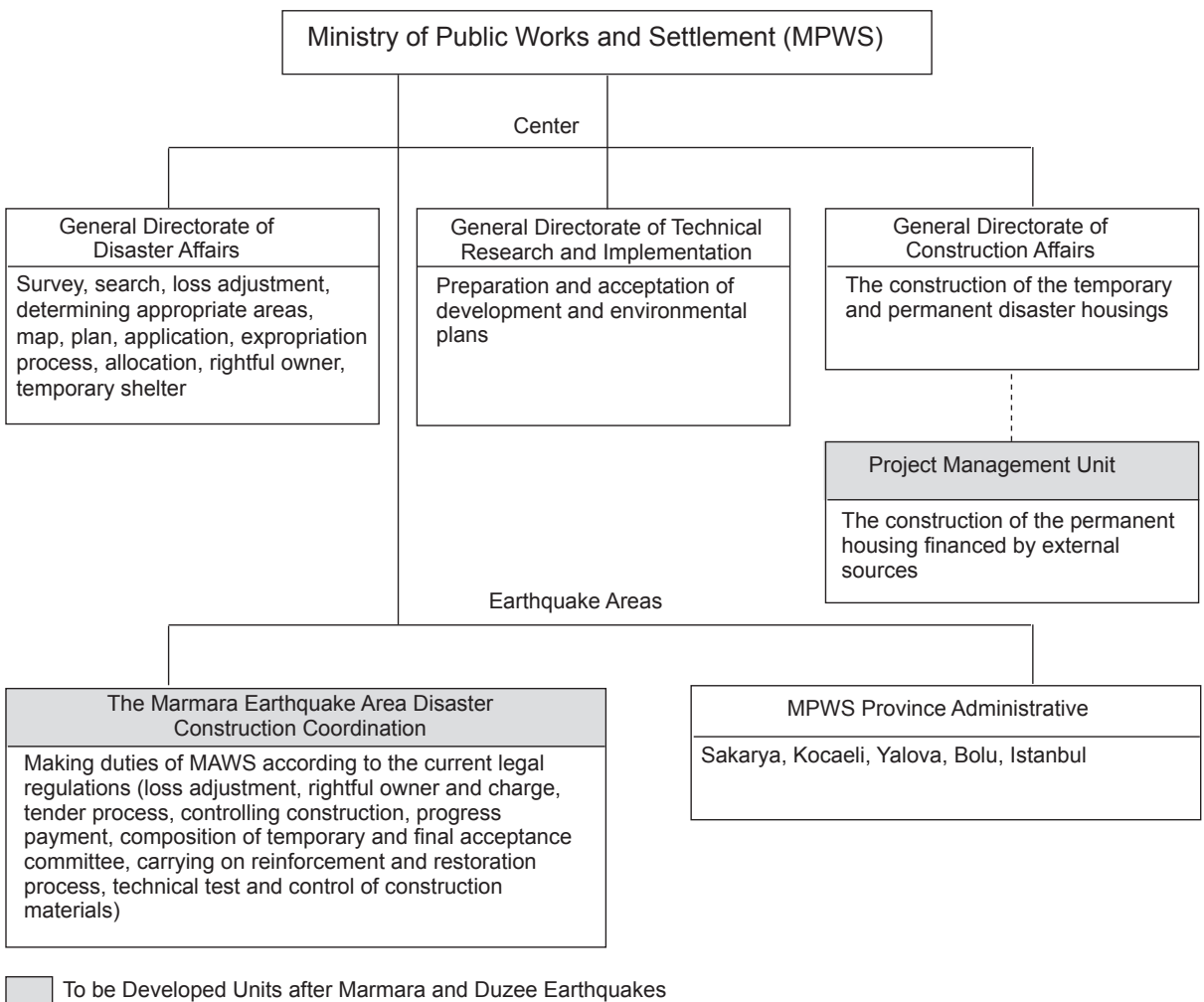


Figure 2. MPWS organization scheme after Marmara and Düzce earthquakes (Turkish Court of Accounts, 2002)

In order to provide permanent housing, MPWS is authorized to conduct one or several of the following ways (Ergünay, 2000):

- Building new constructions through tender,
- Building new constructions by the Ministry as a trust,
- Building new constructions with the assist those building their own homes method.

17 August 1999 Marmara Earthquake differs from the earlier ones both in its magnitude and in that it occurred in vast and urban areas. After the earthquake, a total of 43,053 permanent housings were constructed in various provinces and regions, in 27 different settlement areas. MPWS got 26.161, Prime Ministry Project Implementation Unit (PIU) 14.462 and various organizations 2.250 permanent housings constructed (Turkish Ministry of Public Works and Settlement General Directorate of Disaster Affairs, 2006)

One of the most important components while covering the housing need after the earthquake is the way of providing finance for the housing (UNDRO, 1982). To provide funding for the construction of permanent housing after 1999 Marmara Earthquake, financial support was received from:

- World Bank,
- European Investment Bank,

- Council of Europe Development Bank,
- National resources,
- The donations of private sector and foreign aid.

Prime Ministry PIU was responsible for constructing the housing to be constructed with the loans from World Bank and European Investment Bank, and Project Management Unit, established within MPWS, was responsible for constructing the housing to be made with the credit from Council of Europe Development Bank (Turkish Court of Accounts, 2002) (Figure 3). Permanent housing areas after 1999 earthquake are shown in Figure 4.

4.1. Site selection of permanent housing areas

In order to produce permanent solutions to the accommodation problems of survivors after the 17 August 1999 Marmara Earthquake, the first step was to determine the ‘residential development areas’ and to prepare the “1/25.000 scale Environmental Plan”. Environmental plans were a significant means to control and direct the post-earthquake reconstruction process. In environmental planning, the fact that the cities damaged by the earthquake are of different characteristics differentiated the required area sizes and the planning approaches in the designated urban development areas (Bozkurt, 2001).

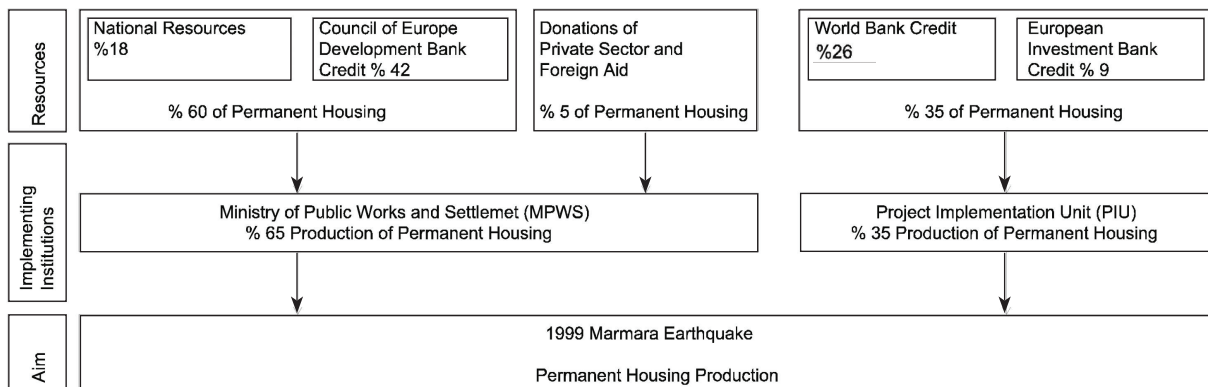


Figure 3. Marmara earthquake permanent housing production model

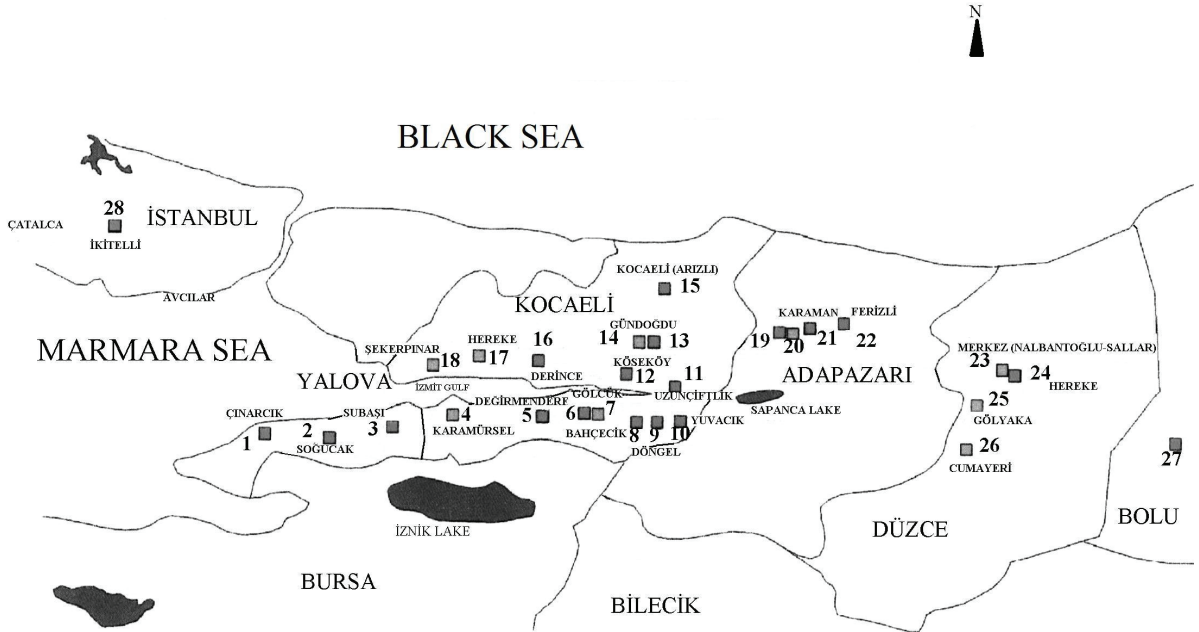


Figure 4. 1999 Marmara earthquake permanent housing settlements (MPWS + PIU)
(Turkish Ministry of Public Works and Settlement, 2000)

In Environmental Plans, on the whole, decisions were set to ensure resettlement of earthquake survivors, resettlement of earthquake survivors, establishment of relations with existing residential, reduction of disaster risk, establishment of the settlements on solid ground areas. With development plan notes, implementations of the plan were directed by highlighting features such as the data on the distance between the masses, fire precautions, developed policies relating to urban environment, structure type, typology and construction system within the framework of disasters and development legislation (Turkish Ministry of Public Works and Settlement, 2000).

4.2. Obtaining permanent housing construction projects (practices by MPWS and PIU)

Post-earthquake permanent housing production is carried out with different alterna-

tive approaches in the world. These approaches are:

- Giving the finished housing to the occupant by the government or charity organization,
- Giving the constructed core housing to the occupant and allowing the occupant to develop it according to their needs over time,
- Organizing the occupants with training and material aid and helping those who build their own homes (Sey, 1999).

The methods used by MPWS to make up for housing shortage that emerged after 17 August 1999 Marmara Earthquake are:

- Giving the finished housing to the occupant by the government or charity organization,
- Helping those who build their own homes,
- Providing housing loan to be used throughout the country (Turkish Prime

Ministry Crisis Management Center of Turkey, 1999).

In order to realize the permanent housing construction projects with limited resources and in a short time, it is a must to understand the kind of organizational form, main functions of those serving in these project organizations and the form of relationships between them. When commencing a construction, the construction project acquisition model must be specified. Basically, three types of contextually different project acquisition models exist (Gould and Joyce, 2000; Çıracı, 2007):

- Design - tender - construct project acquisition model (traditional project acquisition model),
- Design-construction project acquisition model,
- Production management project acquisition model.

Traditional project acquisition model was applied in the permanent housing project implementation process after the 1999 Marmara earthquake. The traditional project acquisition model has three main participants; owner, designer and contractor. The most basic feature of this model is that project implementation

process is performed as sequential. First, property owners get the project prepared, and then tender the project on design and specifications. Finally, the building is constructed by the constructor (Çıracı, 2007). In permanent housing production, MPWS conducted the work as the building owner. After the earthquake, MPWS received plan, project production and supervising services from consulting firms for the first time unlike previous applications. Construction of the permanent housing projects prepared by consulting firms was carried out by contracting firms (Figure 5).

Permanent housing production process commenced with its tender to contracting firms under the Decree Law No. 574 Dated September 1, 1999. The tender was announced on December 23, 1999. 21 companies made their bids on January 5, 2000. After pre-selection and evaluation, agreements were made with 5 firms through ‘bargaining’ on January 28, 2000. After the tender is awarded on February 5, 2000, the construction was completed in a very short and tight time (Erten, 2002).

The documents of tender for the permanent housing construction to the contractor firms were prepared by MPWS.

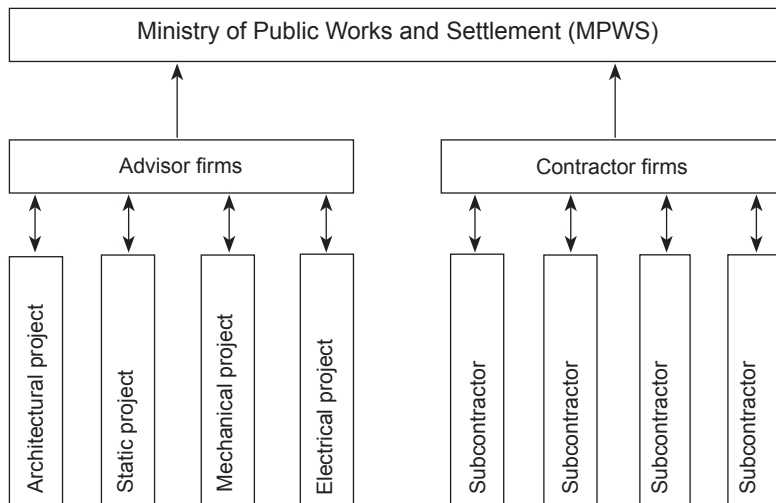


Figure 5. 1999 Marmara Earthquake permanent housing project acquisition model

Marmara earthquake zone was divided into five regions for permanent housing applications. These regions are: Bolu, Düzce, Sakarya, Kocaeli and Yalova. In order to increase participation, housing tenders were divided into three work groups according to the number of housings to be tendered. The group with 650 or higher number of housings to be tendered are defined as group A, the ones with 350-600 housings were defined as group B, and those with 150-300 housings were defined as group C.

Tender for the 15,460 housings that were awarded in the first stage and to be realized with the loan provided by Council of Europe Development Bank was announced in May 2000. MPWS received the bid envelopes for housing groups in June 2000. All permanent housings to be built were awarded by 'Sealed Bids' to the firm with the lowest bid on the basis of 'Turnkey Lump Sum Price'. Date of completion was set as 150 days after site delivery date (Turkish Ministry of Public Works and Settlement, 2000).

MPWS looked for certain criteria while selecting the Consulting Firm. These are:

- To have at least five years of actual activity in Consulting and Supervizing services,
- To have carried out mass settlement projects of an area of at least 150 000m² in the last five years,
- Partners and subcontractors to have experience in development plan and ground survey,
- To have employed at least ten employees such as engineers and urban planners in the past two years,
- The project coordinator to be a civil engineer or an architect who has 15 years of experience in the business and have worked in a similar work area for 5 years,
- The person responsible for preparing the development plan to be a B Certificate holder urban planner or a professional

architect who has at least five-year work experience and has created a development plan for a settlement area of at least 50 Ha.

Description of the specifications of work to be done and the responsibilities were determined between MPWS and the Consulting Firm. Obligations and specifications of the work of Consulting Firms are as follows according to MPWS Emergency Housings Project Tender Specifications:

- Geological studies and ground surveys (MPWS carried out observational survey by using 1/100,000 scale geological maps, and created geological maps based on 1/5,000 Master Development Plan and 1/1000 Constructional Development Plan. Consulting Firms' duties are to carry out island and parcel based drilling and to prepare geotechnical reports),
- Preparing and executing development plans for new settlements. (Some of them were prepared by consulting firms. Constructional Development Plans needed reviews as specially ground conditions and number of rightful owners changed, and they were finalized by MPWS),
- Project Design Services (Architectural Preliminary and Constructional plans, Landscaping plans),
- Construction supervising services (ensuring communication and coordination between MPWS and contractor firms, monitoring and following the accuracy of correspondance and documents, monitoring the progression of work, monitoring the work's compliance with projects, contracts, specifications and standards, making necessary changes, preparing the reports on contract tasks, sharing the responsibility for the scale, shape and reliability of all kinds of work with the contractors, calculating the contractor's demand for extension and notifying MPWS, regulating progress payments, setting provisional and final acceptances, working out final accounts).

According to the loan agreement with World Bank, project execution activities carried out by Project Implementation Unit (PIU), which is affiliated to Prime Ministry and is within Housing Development Administration, were carried out under the name of Marmara Earthquake Emergency Reconstruction Project (MEER) (Marmara Earthquake Emergency Reconstruction Project MEER, 1999) in accordance with the Decree Law No 580 Dated October 13, 1999 and the credit loan agreement signed with the World Bank. Main objectives of MEER Project are: to improve living conditions and economic development in areas affected from the earthquake, to reduce probable disaster loss with more effective measures that can be taken against natural disasters that may occur and to create an institutional framework that will provide risk management. Date of commence was December 1999 and date of completion was December 31, 2006 (Marmara Earthquake Emergency Reconstruction Project MEER, 1999).

PIU tendered residential area planning for permanent housing, housing designs, construction and supervising services seperately to different consulting firms; unlike applications

carried out by MPWS. Preliminary projects were prepared by PIU. Design and application criteria were determined according to the project that was prepared. PIU prepared the projects in accordance with specifications and contracts of FIDIC (International Federation of Consulting Engineers). Projects were awarded to contractors in April 2000. Land expropriation, approval of development plans that were prepared, delivery of the housings to rightful owners were committed by MPWS.

To make sure the donated housings constructed by voluntary organizations are of the same standards as the ones constructed by MPWS, supervision of infrastructure and projects of donated housings were carried out by MPWS. In the construction process, those in charge of technological work in Earthquake Area Disaster Construction General Coordination supervised both the consulting firms and the contractor firms in order to obtain the products defined by the projects and contracts at the prescribed time, cost and quality (Turkish Ministry of Public Works and Settlement, 2002). Sheltering stages and the related work carried out after 17 August 1999 Marmara Earthquake are given in Figure 6.

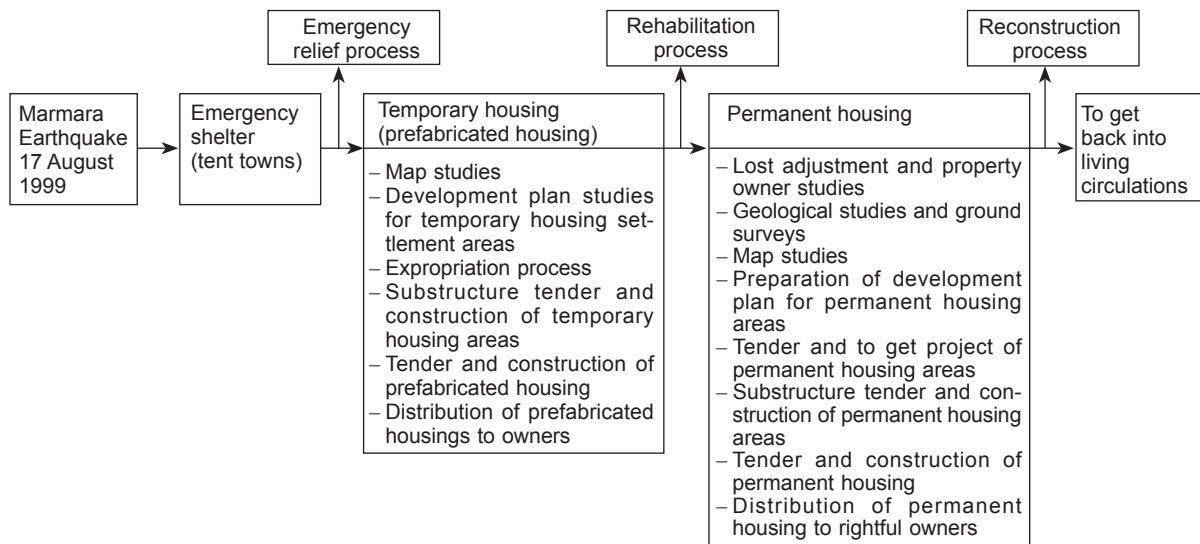


Figure 6. Sheltering stages carried out after 17 August 1999 Marmara earthquake

4.3. Distribution of permanent housing construction projects to rightful owners

In Turkey, of those whose housing or office were destroyed or severely damaged in the earthquake, the ones who do not own another undamaged housing of their own or their spouses, will become 'rightful owners', if they request; thus, constructions are built for them and they are granted loans under Disaster Law. MPWS is responsible for such applications. Work on ownership rights was carried out by MPWS according to the post earthquake damage assessment studies (Turkish Court of Accounts, 2002). Distribution of permanent housings to rightful owners was carried out by Public Works and Settlement Departments under Governorships. Housing patents were issued to rightful owners. According to law, housings are to be repaid by installments over 20-30 years and interest-free. The first installment for mortgage debt was scheduled to be paid two years after signing the mortgage agreement with the related bank; as for the debt free of mortgages, the first installment was scheduled to be paid two years after signing the simple bond. Housing costs did not include substructure and land cost, and the value of the housing owned before the earthquake was discounted from the debt. In this way, almost all the cost of housing is paid by the government.

4.4. Legal changes made after the earthquake

Until 1999 Marmara earthquake, post-disaster activities were, on the whole, identification of the rightful owners and construction of housing by using public resources. Deficiencies and needs that arose after 17 August 1999 Marmara earthquake, which affected a very large area, revealed that measures to be taken before the earthquake must be regarded as important as post-earthquake rescue and aid.

Due to the large-scale domestic and foreign borrowing after 1999 Marmara Earthquake, Disaster Law was amended and 'Compulsory Disaster Insurance' was introduced. In this context, damage on real properties that are uninsured or whose insurance premiums are not regularly paid will not be covered (Compulsory Earthquake Insurance Decree No 587, 1999). Furthermore, legal arrangements were made on 'Building Inspection' and 'Professional Competence' (Compulsory Earthquake Insurance Decree No 587, 1999; Building Inspection Law, 2001).

4.5. Drawbacks specified in terms of constructors and occupants

The fact that there were no preparations for the production of permanent housing available in Turkey, an earthquake zone, after the 1999 Marmara earthquake caused problems. After the earthquake, loss assessment offices were set up by MPWS and the damage was assessed in 20 days. However, many objections were raised against the first loss assessment, which were recognized in the second assessment. The outcomes were affected by the fact that the technical staff were not well-trained and that the criteria and forms used in assessment were inadequate (Turkish Court of Accounts, 2002).

Since a transfer from emergency shelter units straight to permanent housings was not possible, much permanent housing was produced (Cosgun and Arslan, 2003). Building much permanent housing by the government using public resources resulted in financial distress.

Ministry of Public Works and Settlement, unlike previous applications, received plan, project production and control services from consulting firms for the first time, which is the most significant feature of permanent housing production after 1999 Marmara earthquake.

However, the failure in achieving a full coordination among the institutions of MPWS after 1999 Marmara Earthquake led to a delay in completing the housings and increase in costs. MPWS set the completion day as 150 days after delivery of land. The housings aimed to be completed in November and December, 2000 could not be completed on the target date as expropriation process was prolonged and infrastructure was not completed on time. Consequently, price difference for consulting, control and engineering services had to be paid (Turkish Court of Accounts, 2002).

According to the World Bank loan agreement, permanent housing settlement area planning and project acquisition processes were carried out by different consulting firms by PIU. There were differences in quality and size between the housings built by MPWS and PIU. The housings constructed by Ministry of Public Works and Settlement and voluntary organizations are 99m², with 3 bedrooms and 1 drawing room. The housings built by Project Execution Unit are about 70–80 m², with 2 bedrooms and 1 drawing room. They are generally three storey buildings. Offering unequal options to rightful owners caused dissatisfaction (Taş et al., 2007). Lack of adequate cooperation and coordination between these two associations led to different housing quality and size (Turkish Court of Accounts, 2002).

All permanent housings to be built were awarded by 'Sealed Bids' to the firm with the lowest bid on the basis of 'Turnkey Lump Sum Price'. Awarding contracts in this way allows the contractor firms to calculate the possible expenses by looking at the completed Project. This method also ensures a good survey of the project and compliance with specifications. Especially in Turkey 'Turnkey Lump Sum Price' is used in many general agreements on public business. The contracts made with contractor firms defined the conditions in which time extension could be granted, and agreed that

no price difference would be paid as the tender was granted on the basis of turnkey lump sum price. However, in spite of this agreement, price differences were paid according to Cabinet decision. In other words, permanent housings could not be completed at target cost (Turkish Court of Accounts, 2002).

The most significant problem the consulting firms face in permanent housing project design process is the limited time for design (one month). Other issues emphasized by the contractors are MPWS's intervention in housing design and restrictions in the selection of building materials and components (Leaving documents in history: on permanent housing, 2003; Taş et al., 2010).

Not providing public participation in the selection of permanent housing areas was criticised by both the contractors and the occupants (Taş et al., 2007; Taş et al., 2010). It is a well known fact that ground condition heads the determining factors in the selection of permanent housing areas. Furthermore, in site selection public land was preferred in order to minimize the financial burden. Permanent housing area arrangements were carried out within the framework of the principles and rules of zoning legislation. On the whole, as planning density determined according to the housing need emerging after Marmara Earthquake did not achieve the sufficient density in permanent housing areas compared to the lands. It could not create a rich and vibrant city life in practice. Placement of roads and housing blocks without giving much thought to the relationships with topography affects the settlements adversely (Yurekli and Saylag, 2003).

Working on the permanent housing development plan in a hurry due to time constraints, and thus without sufficient detailing (such as island size, driveway and pedestrian lane layout) caused some problems to arise while working on the key plan (Leaving documents

in history: on permanent housing, 2003; Taş et al., 2010). Also, public areas such as parks, sports and recreation areas to be built in order to have a green environment were designed without considering the width and actual frequency of use. While this kind of space is expected to arouse life, it actually interrupted life and led to loss of liveliness in permanent housing areas (Yurekli and Saylag, 2003).

The design of permanent housing was created according to the principles and rules of earthquake regulations. As for the selection of construction technology/system, construction was accelerated due to time pressure and as construction sector in Turkey mostly prefers reinforced concrete system, 'tunnel formwork system' was used in almost the whole permanent housing. To facilitate construction permanent housing plan types were simplified and 'stability' and 'cost' became primary criteria in the design of housing.

Permanent housing constructed after Marmara Earthquake generally led to the emergence of similar residential areas regardless of local characteristics, physical conditions, social and economic structures of the cities. Permanent housing settlements in various cities, leading one being in Kocaeli, cannot be distinguished from one another. Obviously, they have the same plan and space features and do not have the identity of their own local features (local life style, local climate conditions). MPWS chose from architectural project types produced by consulting firms. This selection both reduced the number of types applied and to be built similar types through interventions (Leaving documents in history: on permanent housing, 2003). As a process, making the development plan in the first place and then placing these selected types in the area affected the work on the key plan adversely (island size, relationship with topography, pedestrian and vehicle traffic, etc.). The requested changes on urban development planning notes led to extension of time.

Limitation on the construction time led to some deficiencies in supervising. Consequently, there are complaints from the occupants resulting from disruptions in construction quality. The emergence of user dissatisfaction with the quality of construction despite the standards on building materials and elements set by the administration reveals that there were some problems in the selection and use of labour. Studies show that the issues described as negative by the users is poor construction material and labour (Taş et al., 2009; Taşpınar, 2003; Ozden, 2004).

The main problem faced in the production of permanent housing was limited time, which shows that pre-disaster planning and being prepared for the earthquake is a must (Taş et al., 2010). In the housing production process after 1999 Marmara Earthquake, to complete the construction in a limited time a large number of sub-contractors were needed. This reduced the usual profitability of construction work, and in some cases even resulted in the constructors' bankruptcy (Balamir, 2001).

5. CONCLUSION

The governments provide a variety of opportunities in terms of reconstruction and permanent housing production. Following the 1999 Marmara Earthquake the central government produced numerous permanent housing projects in various locations. The following points must be taken into account to be properly prepared to build permanent housing after a disaster:

- To minimize problems arising due to time constraints, effective strategies must be developed through comprehensive planning and organization. Achieving timely and accurate applications after the disaster depends on the preparations made previously. Local governments and non-governmental organizations along with specially central governments taking an

active role in pre-preparation process will increase the effectiveness of post-earthquake management activities and allow construction activities to be executed in a shorter period of time.

- An important issue in planning studies is to provide accurate and adequate information. Accurate determination of damage assessment and right ownership are critical to the determination of number of housings through time and cost planning. Therefore, so as to be able to conduct healthy ownership studies, urban information systems containing information on housing ownership and usage should be set up and gain function. In order to complete damage assessment in a shorter time and reduce objections, the staff in charge must be trained in advance and elaborate assessments forms must be prepared.
- Pre-construction activities (land supply process, infrastructure work, etc.) must be planned before the earthquake occurs in order to complete the housings at the prescribed time and cost and to use the sources more effectively.
- Permanent housing activities from the beginning- project design phase- should not only be managed by central management but with cooperation from local administrations.
- The criteria to take into consideration in emergencies which will require new housing areas and housings must be determined on local scale through studies to be carried out across the country. This will allow 'local lifesyle', 'local climatic conditions' and 'topograph' to be included in the application easily. Thus, settlements reflecting local character will be created.
- Occupants should be included in permanent housing production process in order to improve user satisfaction.
- A large number of sub-contractors carrying out permanent housing construction

might be a way to revive the depressed national economy; however, an effective control is needed so that construction standards will not go down and alterations after use will be at minimum. The fact that problems arose in the process in spite of the efforts to ensure effective control suggests that there were deficiencies in the organization after 1999 Marmara earthquake. Clearly defined organizational duties, powers and responsibilities will remove task overlaps, authority and responsibility uncertainties, and will improve construction quality.

- Receiving services from consulting firms under a contract and pursuing the criteria on receiving service will provide the integrity between pre-construction and construction activities and allow the use of existing experience of consulting firms. Supervising by consulting firms rather than central managements will improve construction quality.
- Receiving architectural project services other than that of consulting firms' will increase design diversity. Introducing the architects that create the design into construction process and thus making them decisionmakers to remove the arising problems will play an important role on the integration of design and construction. The experience will generate important data for improving the design and construction quality of future permanent housing.
- In order not to face problems with labour supply and quality, it is important for the contractors and labour involved in the building construction to specialize. Ensuring quality workmanship will allow the right use of materials and a shorter construction period. All the same, in order to prevent disruptions due to poor workmanship and material quality, standards should be set in the design and project phase, and to apply these standards, an effective control system should

be established and implemented.

- The experience gained in the post-earthquake permanent housing obtaining process will throw light on both the permanent housing applications after future earthquakes and earthquake safe urban renewal projects to be built in settlements with earthquake hazard.
- A documentation- archive system must be created so as to be able to use the experience and knowledge obtained from these researches.

After 1999 Marmara Earthquake, there were different issues for different disciplines to be learned from the experience and to be developed. One experience is permanent housing production. The experience gained from the earthquakes is important. Prior knowledge is required in order to plan life immediately after the earthquake. The obtained knowledge and experience should be used as main data to prepare for future earthquakes. With these data, related units will be able to use the time and resources effectively, produce quick and quality solutions and to develop applications that will provide economic ease, minimize the possible problems and improve satisfaction in permanent housing production.

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SANTRAUKA

NUOLATINIO BŪSTO STATYBOS PROCESAS PO 1999 M. RUGPJŪČIO 17 D. ŽEMĖS DREBĖJIMO MARMURO REGIONE (TURKIJA)

Nilufer TAS, Murat TAS, Nilay COSGUN

Nuolatinis būstas – tai viena sričių, į kurią Turkijoje pastaraisiais metais investuojama daugiausia, o projektai stambiausi. Po 1999 m. rugpjūčio 17 d. Marmuro regione įvykusio žemės drebėjimo susidariusi kritinė situacija buvo susijusi su nuolatinio būsto poreikiu. Tad tam skirtose įvairių provincijų gyvenamosiose zonose pagal stichinių nelaimių įstatyme apibrėžtą prasmę reikėjo pastatyti daug būstų. Pastatą suprojektavus, atsiradusių defektų arba nebeįmanoma pataisyti, arba jiems taisyti reikia papildomų išlaidų. Norint suformuoti kokybišką užstatytą aplinką, dėl ilgalaikio poveikio svarbus tampa statybų procesas. Šiame tyrime nagrinėjama, kaip, atsižvelgiant į esamą teisinę bazę, buvo valdomas nuolatinio būstų, kuriuos Turkijoje reikėjo pastatyti po 1999 m. žemės drebėjimo Marmuro regione, statybos procesas. Siekiama nurodyti, kaip statomas nuolatinis būstas, ir nustatyti, kuriuos aspektus statytojai (rangovai) ir gyventojai šiame procese laiko problematiškais. Svarbiausia nustatyti pasekmes, kurios gali būti atsakas į problemas, galinčias kilti statant nuolatinis būstus po galimo žemės drebėjimo. Manoma, kad gauta informacija bus galima remtis siekiant patenkinti nuolatinio būsto poreikius, atsirasiančius po stichinės nelaimės.