

NON-STRUCTURAL MITIGATION AGAINST EARTHQUAKE: A CASE STUDY OF ISTANBUL MUSEUMS

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1. Introduction

The exposure of the Marmara and Aegean regions of Turkey to a major and devastating earthquake in the future is now a deterministic rather than probabilistic reality. An earthquake will put the rich and irreplaceable cultural heritage of world civilizations exhibited and stored in Istanbul Museums at great peril. The tourism sector in the Marmara Region rests heavily on preservation of this cultural heritage. Protecting this heritage and the tourism sector that depends on it, involves disaster preparedness education, business resumption planning and most importantly seismic mitigation of the collections themselves.

2. Information about Istanbul Museums

There are approximately 200 public museums in Turkey, administered by the General Directorate of Cultural Assets and Museums, Republic of Turkey, Ministry of Culture and Tourism. Additionally, 98 museums in Turkey are under various other public and private institutions, agencies and foundations with oversight by Republic of Turkey, Ministry of Culture and Tourism.

Istanbul, the most populous city in Turkey, has approximately 50 public and private museums which daily host thousands of visitors.

The content of Istanbul Museums' collections are classified as follows: history, ethnography, art, textile, archaeology, industry and technology, military, aviation, calligraphy and decorative arts (T.C. Kultur Bakanligi, 2002).

3. Description of the Project

The project entitled "Seismic Conservation of Historical and Cultural Treasures of a World City: Sizing the Need and Formulating an Action Plan for the Museums of Istanbul, Turkey", was carried out between July and December 2003 in cooperation with Bogazici University, Kandilli Observatory and Earthquake Research Institute, Disaster Preparedness Education Program and Yildiz Technical University, Faculty of Art and Design, Museum Studies Graduate Program. Research support was provided by the World Bank's ProVention Consortium "Applied Research Grants for Disaster Risk Reduction" Program. The geographical coverage of the pilot project was Istanbul, a hub of civilizations city connecting two continents, Asia and Europe, rich with a wide range of cultures and religions.

4. Project Objectives

The Museum Seismic Conservation Pilot project aimed to research the needs, priorities and feasibility of taking non-structural mitigation measures to protect the cultural heritage of Istanbul Museums; to make the knowledge about disaster preparedness focusing on non-structural mitigation more widely available in order to protect lives and prevent injuries to

museum visitors and staff; to preserve the cultural heritage for future generations; to protect business continuity in the tourism sector. Since Istanbul leads the nation in many respects it is expected that its best practices in seismic preservation will be emulated by other cities of Turkey and throughout the region.

5. Project Methodology

Step 1: Compilation of the examples of earthquake damage and best practices in non-structural mitigation field from national and international area.

Step 2: Preparation of an educational slide presentation explaining non-structural hazards and mitigation methods for museum collections on display and in storage. This presentation, "Earthquake Preparedness in Museums - A Non-Structural Look," was designed to be shared at a seminar for museum directors and staff.

The first version of this educational presentation to be released to the public will rely solely upon visuals to communicate the underlying message of "what can kind of damage can an earthquake cause to museum displays and collections in storage" and "what kinds of things can be done to protect objects on display and in storage."

Step 3: Organization of an educational seminar for museum directors and staff. Educational seminar, "Non-structural Mitigation For Earthquake Protection in Museums", was held in cooperation with Republic of Turkey, Ministry of Culture and Tourism, and Istanbul Provincial Directorate of Culture and Tourism hosted by Topkapi Palace Museum for museum administrators, museum professionals and conservationists.

The aim of the seminar was to define the non-structural risks, to increase awareness of the threats to cultural heritage, to provide examples of possible mitigation methods that can be applied both in exhibition galleries and in storage areas, and to share the activities, successes and challenges faced by Istanbul Museums that have already begun this work. 61 people attended to the seminar from 31 different museums and organizations. Seminar participants responded positively to the opportunity, commenting that:

- The educational package presented at the seminar helped both to refresh current knowledge on the subject and also to get new information.
- The presentation of some of the Istanbul Museums on what they have undertaken since the devastating 1999 earthquakes provided information and encouraged others to start taking measures.
- Discussions on what needs to be done next and the opportunity to think through the challenges this work will encounter is very helpful.

Step 4: Development of "Non-structural Hazard Survey Forms" to help in identifying, rapidly quantifying and prioritizing the risks in the exhibition galleries and storage areas. The method used in the forms begins with categorizing the measures into three categories; easy, medium and hard to apply. The project team developed three survey forms:

- Rapid Room Survey Form was developed to quickly and easily separate the objects that need to be mitigated into easy, medium or difficult methods. The reason for this is to focus on the easy methods that can be realized quickly and help taking action.
- Rapid Room Survey Summary Form can be used to summarize the data obtained from rapid room survey, consider the results museum-wide and determine the

approximate cost for the mitigation methods. This is a tool for museum administrators to use in planning and budgeting.

- Object Risk Identification Form can be used to help in making decisions about how to secure objects that can not be secured by an easy method. When medium or difficult methods are required, it becomes important to examine each object individually (Marshall; Osaka / Kobe Earthquake, Research of Museums - Report 1, 1995; Osaka / Kobe Earthquake, Research of Museums – Report 2, 1996; Podany, 2001a; Podany, 2001b; Podany, 2001c; Tufan, 2001). During the seminar, these forms were introduced to the museum professionals and their feedback was asked.

In addition to, the project team developed “Museum Information Form” to collect information from museum administrators about management and budget, museum building, museum collection, disaster experience and preparedness to provide a context for the conservation tasks.

Step 5: Exhibition galleries in 14 museums and storage areas in 6 museums were visited and surveyed to test survey forms and to quickly identify and quantify risks and potential approach. The museums were selected according to the following criteria:

- The institutions they work under: To reflect variation in management; budget, staff and technical possibilities.
- Collection content: To reflect different requirements for non-structural mitigation.
- Museum type: To reflect a range of palace museums, monumental museums, house-museums with different exhibition and storage conditions.
- Number of visitors: Those museums whose contribution to the local economy seems significant (Atagök, 1999).

Step 6: Preparation of project report to inform both authorities and advocates for cultural heritage preservation.

6. General Observations

Non-structural risks were evaluated from the perspective of the potential risks to visitors, staff, and the collections themselves. The most common risks observed chiefly in the 14 selected museums are:

- Risks of broken glass
- Risks of free-standing objects and riggings on the floor
- Risks within showcases
- Risks of hanging objects
- Risks from the ceiling of the building

Some challenges are faced when undertaking non-structural mitigation work for the protection of people and objects. They differ from museum to museum according to their administrative status, physical conditions, earthquake consciousness of the museum staff and their collection content. These are as follows:

- Museum building
- Number of objects
- Exhibition galleries / storage areas conditions
- Management /Bureaucracy
- Budget

- Number of staff
- Aesthetic concerns
- Functional concerns
- Psychological and social concerns
- Earthquake consciousness

7. Recommendations for Mitigation Methods

For exhibition galleries;

- Fastening showcases
- Mount and monofilament
- Museum wax
- Sand and/or lead bags
- Base isolation

For storage areas;

- Adequate anchors and bracing
- Restraints tied across open shelving
- Boxed or containerized objects
- Padding between objects
- Securing large objects
- Mechanical latches

8. Project Results

- It is possible to start with cheap and practical non-structural mitigation methods immediately. This activity would help to focus on the more complex methods to follow. There is relatively less difficulty in mitigating storage areas than exhibition galleries because the mitigation measures do not need to include aesthetic considerations. Therefore, some exhibits might be protected by decreasing the existing number of same type of objects on display, and boxing these safely in storage, remembering to organize storage areas in a way that the objects can be identified and accessed easily.
- Knowing the quality of both application and materials used and which methods are appropriate for which objects are very important for both efficiency and effectiveness.
- There is a need for more scientific research in the field of non-structural mitigation on chemical testing of existing materials and shake table testing of mitigation methods.
- There is a need for wider education in the field. People from various fields in the tourism sector, museum staff, students, skilled crafts people and restorationists are some groups that can be trained.
- It is important to publish the research and work realized in this field in order to be able to put the subject on the agenda of scientific field and of public opinion.

9. Project Achievements

- A slide presentation about non-structural mitigation in museums is prepared in both Turkish and English, and will be shared over internet via the web site of Bogazici

University, Kandilli Observatory and Earthquake Research Institute, Disaster Preparedness Education Program (<http://www.ahep.org>).

- J.Paul Getty Museum experts will continue to support the project team to develop the educational slide presentation for self-study.
- Approximately 200 CD's containing the presentation, project report and former documents from J. Paul Getty Museum experts are developed and distributed to the institutions the museums work under, to be further distributed to the museums in Turkey.
- Two lessons in non-structural mitigation for museum collections have been integrated into courses on Maintenance & Conservation and Collection Management at Yildiz Technical University, Faculty of Art and Design, Museum Studies Graduate Program.
- A Memorandum of Understanding has been signed between four universities, Bogazici University, Istanbul Technical University, Mimar Sinan Fine Arts University and Yildiz Technical University in Istanbul to work together for the protection of cultural heritage against earthquake risk.

10. Possible Future Projects

- The technical specifications and limits of existing methods should be experimentally researched with shake-table testing. New methods should also be investigated in this manner.
- Sources for purchasing non-structural mitigation materials in local markets should be researched and chemical content of these materials should be tested.
- A multi-disciplinary group of people from various fields and volunteers who want to become specialists in this subject should be identified and supported to participate in local and international training programs.
- A mobile training and mount-making unit could be established to tour museums and provide on-site consultation and training on easy and moderately difficult mitigation methods.
- One or two museums can be selected as demonstration sites to implement and showcase comprehensive non-structural mitigation, emergency planning, and staff training.
- An inter-disciplinary center to consolidate interest, expertise and workspace for research-development, education, consulting, technical support, specialized and temporary storage, and salvage operations after disaster can be created for long-term systematic implementation and extension of these lessons throughout Turkey and the region.

11. Conclusion

After the 1999 earthquakes, several Istanbul Museums have already taken or began to take impressive measures for non-structural mitigation against earthquake and are continuing to encourage other museums as leaders and advocates for action by sharing information and provide collaborative impetus in applying non-structural mitigation measures.

"Seismic Conservation of Historical and Cultural Treasures of a World City: Sizing the Need and Formulating an Action Plan for the Museums of Istanbul, Turkey" is a pilot project implemented in the field of cultural heritage protection in connection with museology and earthquake preparedness. This project's results are believed to provide a basis for the

forthcoming projects and have important influence for museums in Turkey and all developing countries throughout the world (Ertürk et al., 2004).*

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