FORM 1B - NON-STRUCTURAL MITIGATION IN MUSEUMS
RAPID ROOM SURVEY / SUMMARY FORM

Name of the Museum:

Room Name	Application Process of the Mitigation Method								
	Easy			Medium			Difficult		
	Small	Medium	Big	Small	Medium	Big	Small	Medium	Big
TOTAL									
APPROXIMATE COST OF METHOD									
APPROXIMATE COST (TOTAL)									

B.U. K.O.E.R.I. Disaster Preparedness Education Program and Y.T.U. F.A.D. Museum Studies Graduate Program
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FORM 1C - NON-STRUCTURAL MITIGATION IN MUSEUMS
OBJECT RISK IDENTIFICATION FORM

INVENTORY NO: _____ **OBJECT / TECHNICAL RIGGING NAME:** _____

OBJECT / TECHNICAL RIGGING LOCATION / NO AT THE MUSEUM : _____

EXHIBITION / STORAGE METHOD: _____

SUGGESTED FASTENING METHOD (More than one method can be used):

☐ Specially produced mount	☐ Anchoring	☐ Security Film	☐ Base isolation
☐ Padding	☐ Boxing	☐ New shelving system	☐ Other

PRIORITY IN FASTENING: ☐ Low ☐ Medium ☐ High

PHOTOGRAPH

NOTES ON THE SUGGESTED FASTENING METHOD

	LOW PRIORITY	MEDIUM PRIORITY	HIGH PRIORITY
Material Property	☐ elastic and soft	☐ _____	☐ hard and fragile
Object / Tech. Rigging Condition	☐ strong, in good condition	☐ some parts are weak	☐ touchy and fragile
Number of pieces	☐ monolith	☐ several pieces, tight connection	☐ loose connections
Eccentric Element (projection,arm)	☐ none	☐ a little but small	☐ some and big
Proportion Height / Base	☐ base is larger than its height	☐ its height is equal to base	☐ its height is greater than its base
Weight Dispersion	☐ lower than 1/3 of height	☐ evenly distributed	☐ higher than 1/3 of height
Form of the Base	☐ flat and/or symetric	☐ a little unequality	☐ unequal or not flat
Stability (during shaking)	☐ stable and solid	☐ slight movement or rocking	☐ easily moved or rocked
Threat to Object/People Around	☐ none	☐ to objects around only	☐ to people and objects
Location / Accessibility	☐ easy to access	☐ a little difficulty in access	☐ difficult to access
Relocation	☐ easy, quick	☐ with some difficulty	☐ very difficult
Secondary Threats*	☐ none	☐ a little	☐ several or many
Importance Degree	☐ study pieces	☐ for display	☐ unique
Components that the object is on - in**	☐ low risk	☐ medium risk	☐ high risk
GRADING (number of signed boxes)	LOW PRIORITY	MEDIUM PRIORITY	HIGH PRIORITY
CONCLUSION			

*Secondary Threats : all of the objects that can fall down on it or collide it, glass that can be broken etc.
** These components can be pedestal, shelving systems, case, cupboards or other structures. The risks that they can have are; risk of toppling, to damage or to be damaged.

NOTE: Always choose the higher risk level when you come across two grades that are very close to each other.

N.B. THIS DOCUMENT WAS ADAPTED FROM AN UNIDENTIFIED SOURCE

REDUCING NON-STRUCTURAL RISK IN MUSEUMS

Challenges facing non-structural mitigation work at museums

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.

Some of the museum buildings in Istanbul are historical, therefore special permission is needed to fasten objects to the walls, ceilings and floor where these are assumed to alter or damage the structure. The temperature and humidity control are also difficult in historical buildings and extra space cannot be added. However, extra space is mostly needed as the collections are very large in most of the museums and the number is constantly increasing. The increase in the number of objects also cause changes at the exhibition and storage that also increases the cost of taking measures and the time period for taking measures. On the contrary, it is also difficult to obtain approval for decreasing the number of exhibited objects to prevent overcrowding in showcases. Decreasing the number also requires extra space in storage areas which as it is discussed, is not a possible solution for many museums under the existing circumstances.

Some of Istanbul Museums also face some bureaucratic difficulties. For instance, when the management changes, the agenda may also change modifying the priorities of the work to be done in the museum. Additionally, it may require time to obtain approvals for taking specific measures from the administrators of the institutions they are under.

In most of the Istanbul Museums, the limited budget is making actions like obtaining materials or assuring staff to focus on non-structural mitigation work difficult. The existing staff are overburdened and have insufficient time for any additional responsibility in most of the museums. Therefore, there is a need for additional staff who will focus working on the non-structural mitigation work. They also should be conscious and qualified professionals. However, these criteria limits to find qualified staff as the subject is yet new. It should be mentioned that there is a lack of volunteer system in most of the Istanbul Museums, which could help with duties of the existing staff.

There are also some aesthetic worries in taking measures. Some of the museum professionals believe that the measures taken change the value of the object as it is an addition to it. Additionally, museum staff is suspicious whether the methods would damage the objects and thus there is a need to research and design on the field which will take time. The measures will be subjective as they may be designed in several different ways according to the people working on it.

From the functional point of view, there are concerns like; necessity of taking measures in storage areas leaving the objects visible so that they are easily reachable when the researchers need access or making custom mounts not specific only to one object so that when there is a change in exhibition, it could fit to hold another one. On the other hand, mitigation measure work may make changes of exhibits and periodic care more time-consuming and it may pose additional risks to objects while mounting and unmounting. Museum staff would like to be sure about the specifications and limits of certain methods as there is a lack of research data or engineering knowledge.

There are also psychological and social worries about the subject. There are question marks like; whether the people's morale will be brought down, if earthquakes are always of concern or whether the museums will get the support they need from the community to undertake these measures. At some of the Istanbul Museums, we should emphasize that the necessity in strengthening the museum building structurally receives as a competing priority.

It is very important to form the earthquake consciousness among different groups in the society to be able to handle non-structural mitigation work and all of the challenges to be faced along the way.

Suggestions

For the existing situation, although there is mostly a problem with limited budget, it is possible to start with cheap and practical non-structural mitigation methods immediately. This action would further help to focus on the more complex methods afterwards. It is observed that there is relatively less difficulty in mitigating storage than exhibits, mostly 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, thus remembering that it is important to organize storage areas in a

way that the objects can be seen and identified easily which will provide easy access to the objects during research or display changes. It is also important to organize storage areas to be able to have easy and quick access in emergency situations. Additionally, specially-designed storage facilities protecting objects from fire and water as well as earthquake are extremely important.

There is a need to employ assistants to the curator, conservationist, restorationist, carpenter, etc. to focus working on non-structural mitigation against earthquake.

Mitigation efforts should be taken against earthquake not only in the exhibition galleries and storage areas, but also in offices, museum shops, exits, corridors, halls and other public service spaces. Measures should be checked periodically and should be continuous and routine. Additionally, special effort should be given during exhibition changes and cleaning. The quality of both application and material used are very important for both efficiency and effectiveness. Knowing which methods are appropriate for which objects is also important for the efficiency of the application.

For future applications, it is very important to design new museums bearing earthquake risks of both structural and non-structural components in mind thus avoiding the cost of doing this as an afterthought. Museums need new and wide storage areas both to store the existing objects in better conditions and to use for salvage operations after a disaster.

The protection of objects against earthquake needs to become a routine consideration at the beginning of acquisition, exhibition, and storage becoming as common as protection from fire and theft. When the expense of non-structural mitigation work become a line-item in the budget, it will speed up and encourage the necessary works to be done.

Standard Museum Emergency Plans should be adapted for each museum. Emergency planning is needed to develop safe and efficient procedures for evacuation of people and objects. Museum staff and tour guides should be trained in basic disaster awareness, structural and non-structural awareness, and community emergency response and the plan should be practiced in all museums.

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. This will also increase the potential for identifying and receiving financial support for this undertaking.

CONCLUSION

The need

In conclusion the project team's experience doing this research has led a number of points that may be important in accomplishing non-structural mitigation both in Istanbul's museums and in other places.

It seems important to develop some interdisciplinary teams that can undertake the extensive initial efforts of non-structural mitigation not for each museum in isolation, but across museums, in a consultative capacity. There is a clear need for professionals who will specialize in the subject of non-structural mitigation planning, problem-solving, training and implementation, and will accumulate and share the very specific knowledge needed for the future. Such groups working with each museum should, of course, include at least one lead member of the staff with the interest and authority to coordinate museum staff participation. Small teams within the museum, working with guidance and support from outside teams dedicated to this task may be an effective way to approach this comprehensive task. There are a number of distinct tasks that might be addressed by different multi-disciplinary teams:

- Structural safety investigation of museum buildings: The need for triaging buildings which may be structurally sound, may require modest or extensive retrofitting, or may in fact not be an advisable place to locate treasures.
- Non-structural mitigation assessment and planning: Risk identification, prioritization, budgeting, and action-planning.
- Scientific research on methods and materials for non-structural mitigation: This research should include both materials testing for safety and preservation of objects and shake-table testing and engineering calculations to determine: applicability and size/weight and configuration limitations of existing and new materials and techniques (in collaboration with exhibition designers).
- Implementation of non-structural mitigation measures: This includes work in exhibits and storage, mount-making, boxing, packing and other activities.

- Education: Update and deliver educational materials and programs, especially in relation to research on the subject worldwide
- Public relations, advocacy and promotion: Identification of sponsors and champions who will take on this mission until it becomes part of the ongoing work of all museums in seismic risk areas, and ongoing research

Regular and repeated training programs for people in various roles should include.

- Education to raise public awareness of the vulnerability of cultural heritage to natural disasters
- Education within tourism sector in order to raise interest and support from industry leaders and workers,
- Education of museum directors and staff, both decision-makers and project implementers to secure their understanding and commitment.
- Education of students, who study in related departments of universities (museologists, earthquake engineers, interior designers, architects, archeologists),
- Education of trade school students, skilled craftspeople and restorationists who will work on mount-making, packing for storage, and other applications. These individuals should be carefully selected for their meticulous care, maturity, and their awareness of the gravity of this responsibility

The project team recommends the following short-term projects.

- Preliminary research can be given to students from related departments of universities as homework, projects or theses
- 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 as necessary at the Directorate of the Central Laboratory for Restoration and Conservation.
- A multi-disciplinary group of people from various fields (museum studies, earthquake engineering, architecture, chemical engineering, etc.) and volunteers who want to become specialists in this subject is to be identified to support and to participate in local and international training programs
- Basic non-structural mitigation training available from Bogazici University Continuing Education Department and Kandilli Observatory and Earthquake Research Institute can be made available to all professional museum staff (administrators, curators, restorationists, preparators, conservationists, designers, etc)
- A mobile training and mount-making unit can be established to tour museums and provide on-site consultation and training on simple mitigation techniques and acrylic mount-making.
- One or two museums can be selected as demonstration sites to implement and showcase comprehensive non-structural mitigation, emergency planning, and staff training
- A variety of national and international governmental, non-governmental and private resources must be called upon to support this important work

The project team recommends the following long-term approach to assure ongoing leadership and attention to these tasks.

An institute, which will concentrate inter-disciplinary interest and 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

Achievements and the sustainability of the project

The need for a broad-base of ownership has been addressed by the development of several important new collaborative efforts.

- Several Istanbul Museums have already taken or began to take impressive measures on non-structural mitigation against earthquake and are continuing to be the leaders and the advocates for the action. These museums have provided project team with information and are continuing to encourage other museums by sharing information and provide collaborative impetus in applying non-structural mitigation measures, emergency planning and education
- Bogazici University, Kandilli Observatory and Earthquake Research Institute and Yildiz Technical University, Faculty of Art and Design, Museum

Studies Program directors have met and stated their commitment to working together on future projects. We are going through the process of developing official agreements with other universities to create wider collaboration.

- Two training programs in non-structural mitigation for museum collections have been integrated into lessons on Maintenance & Conservation and Collection Management at Yildiz Technical University, Faculty of Art and Design, Museum Studies Graduate Program.
- A slide presentation about non-structural damage mitigation in museums has been prepared in both English and Turkish, and will be shared over internet via web-site of Bogazici University, Kandilli Observatory and Earthquake Research Institute(KOERI), Disaster Preparedness Education Program (AHEP); www.ahep.org.

"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.

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