

PROPOSAL FOR THE CONSERVATION OF THE TOWER OF BELEM

Lisbon, Portugal



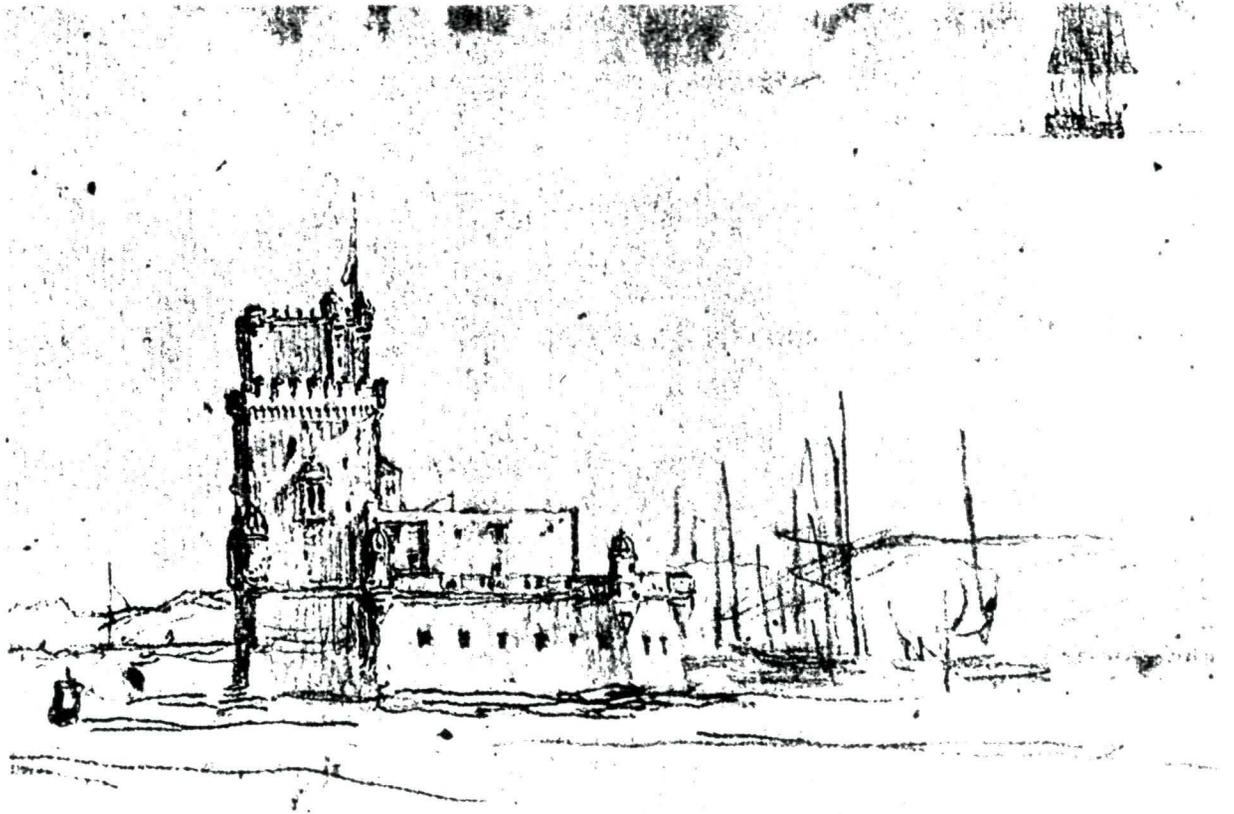
WORLD MONUMENTS FUND

**PROPOSAL FOR THE CONSERVATION OF
THE TOWER OF BELEM**

Lisbon, Portugal

WORLD MONUMENTS FUND
New York

April 1993



noël N° 2 tour de Belém, du côté de l'ouest.

Tower of Belém in an eighteenth-century drawing.

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OVERVIEW

The following *Proposal for the Conservation of the Tower of Belém* is the result of a week-long planning session that took place in Lisbon, Portugal, during February 8-12, 1993. The planning session followed a series of preparatory meetings and discussions between WMF representatives and members of the staff of the Secretaria de Estado da Cultura of Portugal held during the past year.

The planning session was jointly organized and led by Mr. John Stubbs, Program Director for WMF and Dra. Isabel Cruz de Almeida, Director of the Jerónimos Monastery. Members of other public and private institutions participated and greatly helped to make the meeting successful. They were: Eng. J. Rui Mascarenhas and colleagues from the Instituto Português do Património Arquitectónico e Arqueológico; Dra. Ana Mantua and Dr. Lino Rodrigo of the Jerónimos Monastery; Prof. Luis Aires-Barros and his collaborators at the Instituto Superior Técnico; Arch. João de Almeida and his colleagues from ARQUI-III; Arch. Francisco Caldeira Cabral; and WMF consultants Mrs. Jane Clark Chermayeff, Dr. A. Elena Charola and Arch. Cristina Lodi Dias.

It is hoped that the present document can serve the following functions: provide information regarding the conservation proposal, assist in fundraising and establish a methodology for addressing the conservation challenges of other monuments of the Portuguese heritage.

The Tower of Belém is one of the three fortresses planned by King João II of Portugal to protect the port of Lisbon that were ordered by the end of the 15th century. The first two, at Cascais and Caparica, Trafaria, were completed before the King's death in 1495. The Tower of Belém, which his successor Manuel I did not consider a priority, was ordered in 1513. The design and construction of this fortress was executed by Francisco Arruda and his brother Diogo, under the direction of the Master of Works Boitaca, architect of the Jerónimos Monastery. Construction began in 1514 and was concluded by 1519.

The structure consists of a two-level bulwark and a four-level tower. It served as a fortress until 1580, and later became a state prison during the Spanish occupation. At that time, the tower was enlarged to house more soldiers. It was restored in the 19th century and used as a lighthouse and telegraph station. In 1984, the Tower of Belém and the Jerónimos Monastery were put on the World Heritage List maintained by UNESCO.

The Tower of Belém, the Jerónimos Monastery and the Chapel of Saint Jerome, which formed an ensemble from the time of their construction, represent archetypes of the Manueline style. The Manueline style can be defined as the expression of the Portuguese Renaissance centering around the discovery of the New World, in a manner similar to the focus of the Italian Renaissance on the rediscovery of the ancient world. The architecture of these buildings reflects the grand period in which Portugal was the first commercial and maritime power of Europe.

The Tower of Belém, constructed of Lioz limestone, is a structurally sound building. Nonetheless several problems have developed over the years due to air pollution and the harbor winds, which render this otherwise resistant limestone susceptible to deterioration. For example, the architectural sculptures at the base of the turrets have deteriorated severely due to their exposed location. These figures should be replaced by replicas while the original sculptures can be used as permanent exhibition features in the tower. The stone surfaces of the tower are sound. They mainly require cleaning to remove lichen stains and black crusts caused by air pollution. Only in some localized areas are specific conservation treatments considered necessary. The most critical problems lie in the sealing of leaks, fixing of drains and general repointing of the building.

Another problem is the change of the interior climatic conditions in the bulwark since the installation of the plastic roof over the opening of the inner lightwell in 1982. If the plastic roof over the lightwell in the bulwark is removed, another solution to keeping rain out of the building interior needs to be found. The possibilities include a removable cover over the opening, and/or glass doors between the columns at the floor level of the open space. When completed, the changed climate conditions should be monitored to assure that they are adequate for the conservation of the building and its contents. The present windows and doors need to be replaced and toilet and other support facilities, located in rooms under the bulwark, also require improvements.

The tower is currently used for temporary exhibitions, concerts and official receptions. It is also frequently visited by foreign and native tourists. A coherent interpretation program should be developed for visitors. It is necessary to better interpret the evolution of the tower over almost 500 years as a monument and its role in the defense of the entrance to the Tagus. A permanent exhibition is planned to address these two issues, identifying the pioneering design of its many military devices and the various changes made over time to accommodate modified or new uses. For example, displays in the basement rooms within the bulwark will illustrate the former use of the space as a magazine and later as a dungeon.

Improved lighting, windows and doors will provide an appropriate environment for temporary exhibitions on some of the floors in the tower. Installation of audiovisual systems and climate control is also being considered. The addition of a small souvenir shop with items exclusive to the history of the tower is proposed as part of the interpretation scheme. The planned displays will not compromise the continued use of the tower for concerts or special events.

ACKNOWLEDGMENTS

The planning session that took place in Lisbon from February 8th to 12th, 1993; resulted from discussions and preparatory meetings between WMF representatives Ms. Bonnie Burnham and Mr. John Stubbs, Mme Isabelle de Broglie (WMF Europe) and members of the staff of the Secretaria de Estado da Cultura of Portugal. These planning sessions and the publication of this Report were made possible through a grant from the Samuel H. Kress Foundation. Transportation to the conference for the American and French participants was generously provided by TAP Air Portugal.

Special thanks are due to Dra. Isabel Cruz de Almeida, Director of the Jerónimos Monastery, who hosted the meeting at the Tower of Belém and the Jerónimos Monastery.

Mr. Luis Farinha dos Santos, President of the Associação World Monuments Fund (Portugal), is gratefully acknowledged for identifying this initial project in Portugal for WMF and for facilitating the joint project to date. Special thanks are also due to Sylvia Tait for coordinating all organizations involved.

Thanks are also due to the members of the Instituto Português do Património Arquitectónico e Arqueológico, Eng. J. Rui Mascarenhas, Arch. Benjamin Araujo, and Arch. Luis Marreiros, for their helpful comments, suggestions and collaboration in preparing the present material.

To be specially thanked are Dra. Ana A. Mantua, Assistant to the Director and Dr. A. Lino Rodrigo, Museologist of the Jerónimos Monastery, who prepared much of the material used during the discussion. Leut. Colonel Nuno Varela Rubim, though not present at the session, is thanked for making available his research of historical information related to the military use of the tower.

Arch. João de Almeida and his colleagues from ARQUI-III provided valuable help in formulating the global rehabilitation scheme for this monument. Francisco Caldeira Cabral prepared a schematic landscape design proposal to improve the setting of the Tower.

Prof. Luis Aires-Barros and his team of doctoral students are acknowledged for the long years of research and analyses on stone deterioration and microclimate influence which permit sound proposals regarding conservation treatments to be applied.

Last but not least, the American consultants who participated in the session and who produced the present document, Mr. John Stubbs, Mrs. Jane Clark Chermayeff, Dr. A. Elena Charola and Arch. Cristina Lodi Dias are herewith acknowledged. Rebecca Anderson of the World Monuments Fund assisted in preparing this document for publication.

The planning session enabled an international and interdisciplinary group of professionals to work together to develop a conservation proposal for the restoration and rehabilitation of a monument that symbolizes the rich cultural heritage of Portugal. It is hoped that this proposal will raise international support for conserving and presenting this monument which, in turn, will lead to the preservation of other Portuguese architectural landmarks.

Illustration Credits

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1. BACKGROUND

Location
Historical Sketch
Uses over Time
Historical Significance



1. BACKGROUND

Since October 1992 the Portuguese Ministry of Culture, the Administration of the Tower of Belém and the Portuguese Association of the World Monuments Fund have endeavored to develop a coordinated restoration and rehabilitation program to present the Tower of Belém as a historic monument containing an active museum.

This document presents guidelines for the elaboration of a detailed Restoration and Rehabilitation Plan for the Tower of Belém.

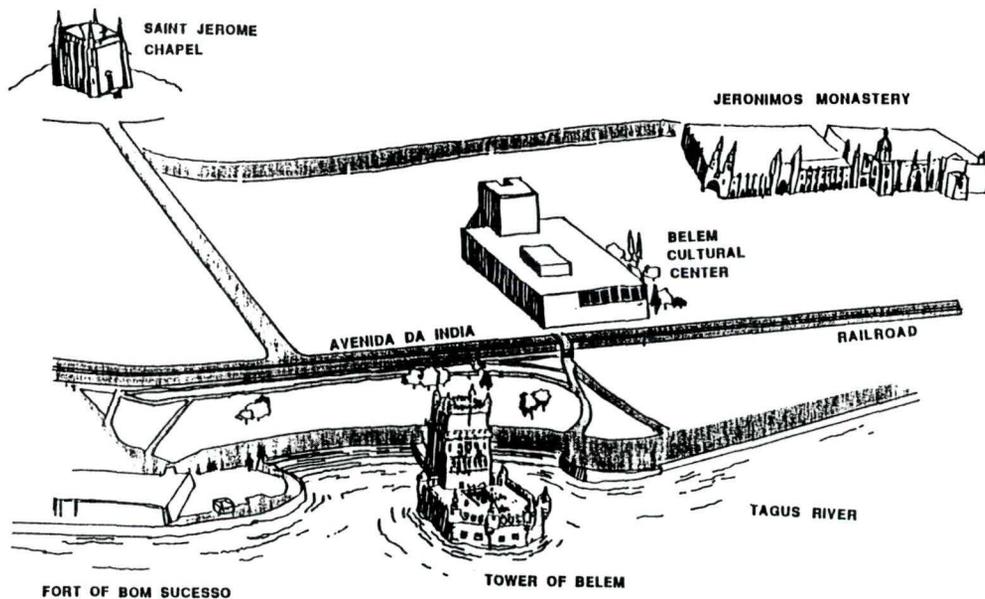
This document is intended to serve the following purposes:

- to provide clear and concise plans of action for the restoration, rehabilitation, interpretation and preservation of this monument;
- to complement an application to the Ministry of Culture for permission to execute the project;
- to help raise the necessary funds to carry out the project; and
- to provide a project methodology prototype that may be used in planning the preservation of other Portuguese monuments, such as the Jerónimos Monastery.

LOCATION

The Tower of Belém is located about four miles from the historical center of Lisbon. It was built on some surfacing rocks near the Restelo beach where the Tagus River widens into the estuary. At the time of its construction in the 16th century, it was near the middle of the river. Due to the silting up of the river over the centuries the tower is now practically on the shore.

The tower is in the district of Belém—Portuguese for Bethlehem—which is also known as Restelo. Until the late 19th century, the district was the last neighborhood before the mouth of the Tagus River. This district has become one of the most active cultural spaces in Lisbon in the past ten years. The use of this neighborhood for cultural events has increased public interest and attracted more people to this historical area.



LOCATION SCHEME

HISTORICAL SKETCH

The construction of the Tower of Belém was ordered in 1513 by King João II of Portugal as part of a strategic plan for the defense of the Lisbon Port. At the time, this harbor accommodated the intense activity of the important Portuguese sea trade. The defense plan proposed the construction of three fortresses: the bulwark of Caparica on the left bank of the Tagus River, the Cascais bay fortress on the right bank, and the bulwark of Restelo, later known as the Tower of Belém, to be erected over the former beach of Restelo rocks. King João II died before the building of the third fortress, which was completed by his successor D. Manuel I in 1519.

During the 15th and 16th centuries, the beach of Restelo was one of the departure points for the journeys to discover new lands in Africa and a sea passage to India. The wealth and cultural ideas brought back from the New World were first applied in the district, as exemplified by the construction of the Jerónimos Monastery and the Tower of Belém. The great new wealth motivated King Manuel I to protect and encourage the arts and sciences, giving rise to a unique period in the Portuguese history of art.

The tower's architectural form, whose decorative elements were inspired by marine elements and motifs borrowed from Africa and the Far East, expresses the adventures of Portuguese explorers and their discoveries in the 16th century. This monument, the Jerónimos Monastery and the Chapel of Saint Jerome became archetypes of the "Manuelino" style. According to Prof. Reinaldo dos Santos, one of the most outstanding scholars in the field, this style expresses the Portuguese Renaissance as centered upon the discovery of the New World, in much the same way as the Italian Renaissance discovered the Ancient World.

Francisco Arruda, appointed Master Builder for the Tower of Belém, was called back from North Africa where he had built several fortresses. He started the construction under the supervision of Mestre Boitaca, the kingdom's Master Builder, who at the time was also in charge of building the Jerónimos Monastery. The architectural form of the tower and its fine proportions, as well as the Islamic orientalism evident in its decorative elements, indicate the contribution Arruda made to the design.

USES OVER TIME

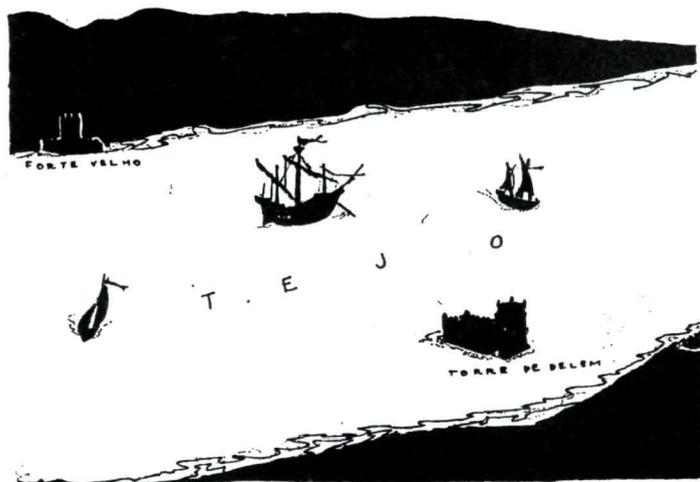
The different uses given to the fortress over the centuries are outlined below:

- The Tower of Belém served as a fortress until 1580.
- The tower was mainly used as state prison after 1580, when the Duke of Alba took Lisbon while Felipe II of Spain postulated for the throne of Portugal. It was enlarged to house more soldiers, for which purpose the upper part of the tower was dismantled.
- In 1782 it was connected to the newly constructed Fort of Bom Sucesso by a wall equipped with cannons. The tower was no longer surrounded by water.
- Under the reign of Queen Maria II the tower was restored in 1846 . New sculptural elements, such as the niche and statue of the "Virgin of the Grapes" on the bulwark terrace, were added to the original structure.
- From 1865 it was used as a lighthouse. The beacon was placed on the south end of the bulwark terrace.
- In 1940, during the government of President Salazar, major alterations were made to Lisbon's waterfront, which included the tower.
- In 1982, for the activities of the XVII European Exhibition of Art, Science and Culture, alterations that were introduced included the plastic roof over the lightwell in the bulwark. An artificial lake was built on the land side of the tower so that the structure would stand in water during low tide.

HISTORICAL SIGNIFICANCE

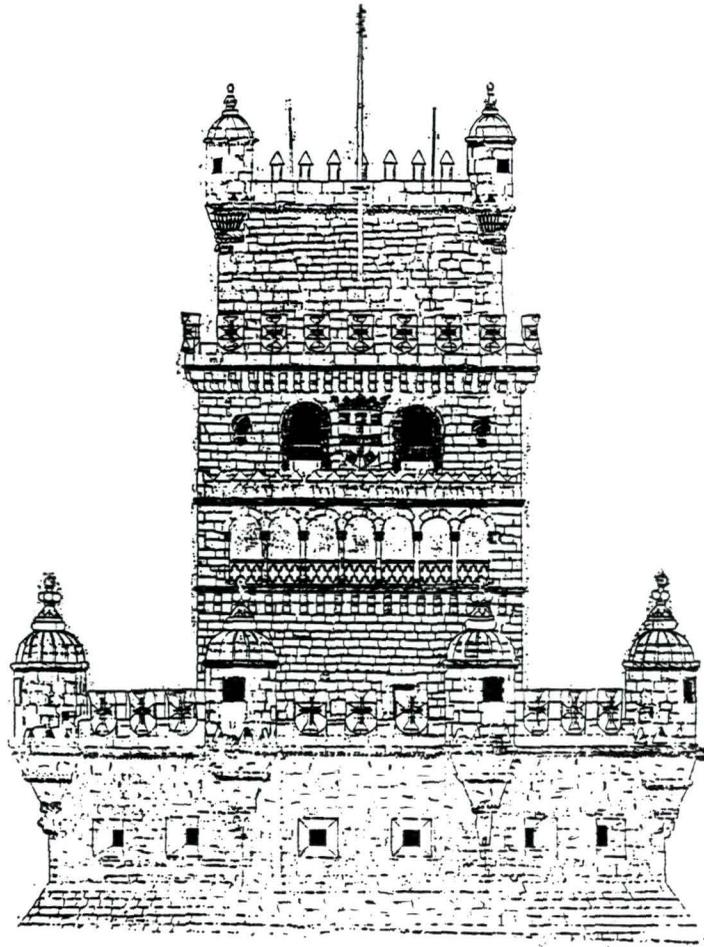
The architecture of the Tower of Belém reflects the historical period when Portugal was the preeminent trading and seafaring nation in western Europe. The public attachment to this monument has grown over the years, giving it a special significance to the Portuguese cultural identity. It has increasingly become a type of cultural icon, whose image has been appropriated for such purposes as the perfect romantic setting, the image of an old Lisbon in films and use in promotional publications. The tower is also considered a mandatory stop for every visitor to Lisbon.

Due to its historical and architectural significance, and the role it plays in the Portuguese cultural identity, the Tower of Belém was registered by UNESCO as a World Heritage site along with the nearby Jerónimos Monastery.



2. ARCHITECTURAL DESCRIPTION

General
Exterior Conditions
Interior Conditions
Site Conditions



2. ARCHITECTURAL DESCRIPTION

GENERAL

The Tower of Belém is composed of two combined masses consisting of a tower and a projecting polygonal shaped bastion to the south. Round bartizans accentuate the corners at various levels in the building, enhancing its composition. The location of this monument on the edge of the Tagus River enhances the character of the site.

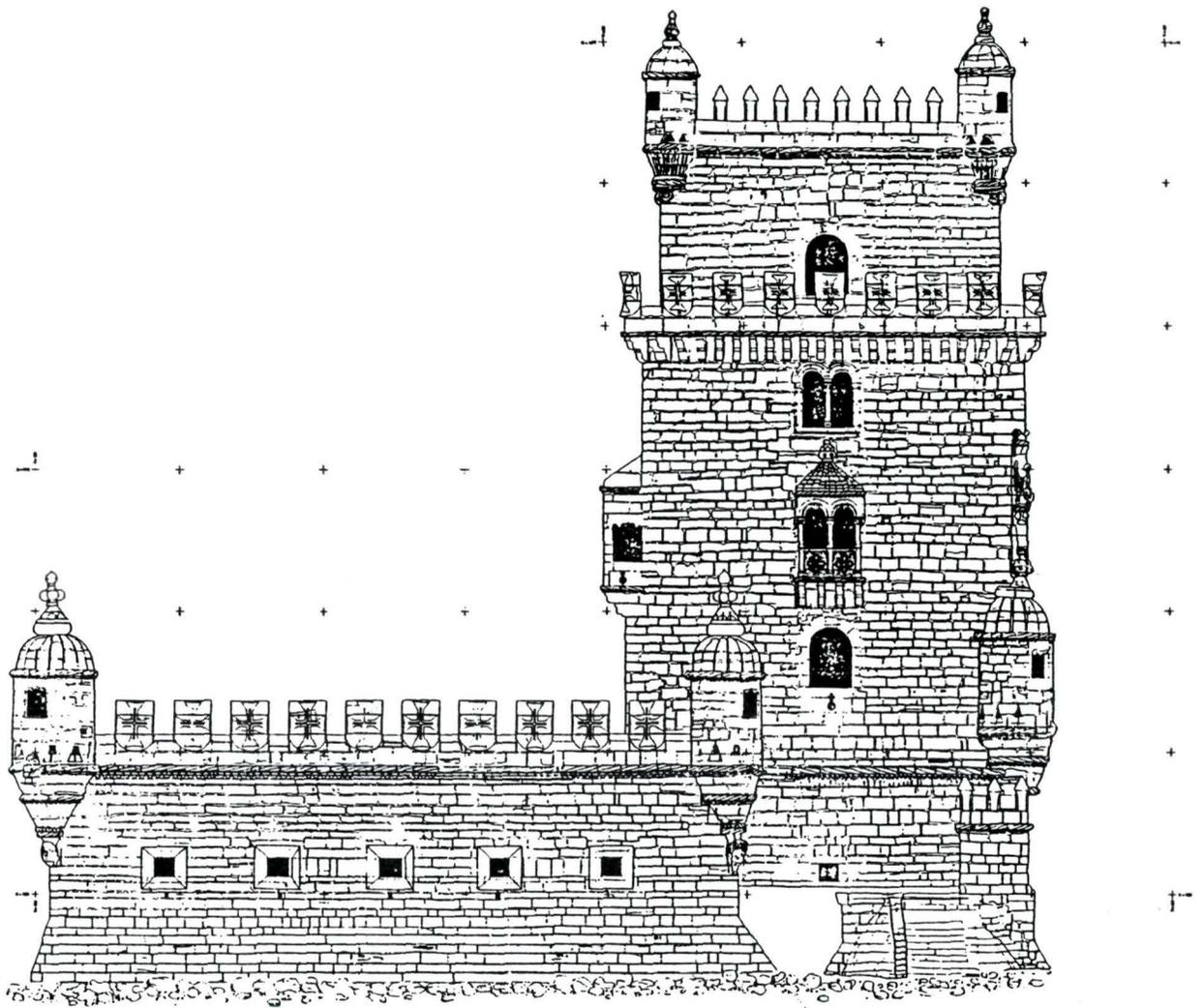
An unusual feature for a military building is the sculptural ornamentation and delicate stone work decorating the fortress. Curious details can be found in the stone carvings. Among the mythical figures at the base of the bartizans is a rhinoceros, which can be interpreted as an allusion to the 15th and 16th-century Portuguese encounters in the New World.

The entrance to the fortress is located at the northeast corner of the bulwark and leads directly into the ample interior space of the bulwark. On the north side, an open staircase leads to the terrace of the bulwark from where steps lead into the south side of the tower.

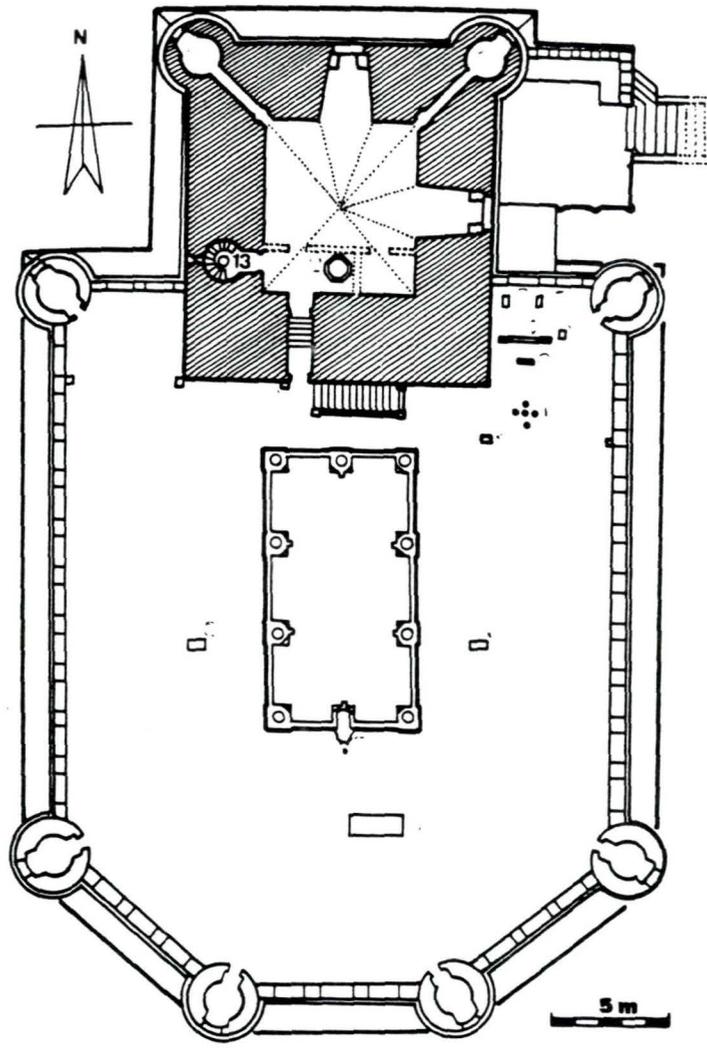
The square tower is approximately 30 meters high and 15 meters wide. It has five levels, the last one corresponding to a terrace which provides a superb view of the Tagus River and adjacent neighborhoods. Pointed merlons ornament the parapet, which has bartizans at each corner.

A spiral staircase, which accesses the different levels of the tower, starts at the first floor room—the "Governor's Hall"—where the octagonal head of the fortress' original water supply cistern is found.

The second floor room is called the "King's Hall." This room has an opening on each of its four walls. The opening on the south wall leads to a long balcony that runs the breadth of the tower and overlooks the bulwark terrace. The other three openings lead to smaller balconies.



Photogrammetric record of the east elevation, Tower of Belém.



Plan of tower and bulwark.

The third floor room is the "Audience Hall." Both this room and the one previously described one had vaulted ceilings decorated with elegant ribbing and sculptured details, which are presently covered with a white-painted stucco. Only these rooms have a fireplace in one corner.

The fourth floor room has openings that lead to a fortified parapet encircling the tower and resting on great corbels. The merlons on this parapet are decorated with a shield bearing the Cross of the Order of Christ.

The terrace of the bulwark has a central opening surrounded by a decorated parapet, which corresponds to the bulwark lightwell below. A niche with the image of the "Virgin of the Grapes," also called "Our Lady of the Good Success," was added to the courtyard parapet on the south side during the 19th-century restorations. The perimeter of the bastion terrace is fortified with merlons rising above a rope molding.

There are two stories in the bulwark: a basement and the first floor. The basement consists of a large hall with a low ceiling and smaller rooms to the south. The vaulted stone ceiling is presently covered by white painted stucco. The smaller rooms, with floors carved on the bedrock below the water level, were used as magazines. Originally the only way to reach these rooms was through openings located in their ceilings which corresponded to the bulwark floor, but were not connected to the basement hall. From the 17th to the 19th centuries these magazines were used as dungeons. In recent times the toilet and other support facilities have been located in the basement.

The first floor of the bulwark has a polygonal shape, with the perimeter wall (3.6 meters thick) symmetrically interrupted by 18 arched embrasures that once served to position the cannons. The rectangular courtyard opens towards the center of the bulwark and is surrounded by an arcade and stone piers. The piers, which have gargoyles attached to them, extend above the upper terrace parapet in the form of pinnacles.

EXTERIOR CONDITIONS

While the stone exterior of the fortress is generally in good condition, there are a number of conservation problems. The terraces of both the tower and the bulwark are susceptible to drainage problems. Cracks and fissures in the stone, as well as the missing joints between the building blocks and the roofs of the bartizans, contribute to water infiltration. All of these must be addressed as a first measure for protecting the building.

The locally quarried Lioz limestone is generally crystalline and is composed almost exclusively of calcium carbonate. It has very low porosity, a high compression strength and is highly durable.

The calcareous nature of the stone makes it susceptible to dissolution by any acidic agent, such as acid rain. This dissolution process is most apparent in the carved details decorating the tower, such as the sculpted figures under the bartizans.

Gypsum crusts form in areas protected from direct exposure to running water as a result of the dissolution reaction. The color of these "black crusts" results from the trapping of dark air pollutants within the crust as it grows.

The distribution of the black crusts is a function of the local microenvironment. Thus, on the interior, protected side of the balconies' balustrades the one on the north has the heaviest crust deposit. The west side is next in severity, while the east side has the lightest deposit. This reflects the effect of the prevailing wind from the sea in the rainy season (autumn and winter) from NW-W-SW, which during the dry seasons (spring and summer) blows from any quadrant except the NW-N-NE.

Stains on the walls can also be caused by the growth of bio-organisms: algae, lichens, mosses and higher plants. The latter take root especially in the roof areas, both of the balconies and the bartizans. They can do more damage, and at a faster rate, than the lower plants which pose mainly an aesthetic problem.

INTERIOR CONDITIONS

The tower's different uses over the years brought little change to the original interior layout, except for the basement where public facilities and services were introduced some ten years ago. In the tower, the interior partition of the first floor was removed and the vaults of the basement and of the tower rooms were covered with a portland cement plaster. The accurate study of all these changes needs to be completed to serve as the basis for the future museum design plan.

Inside the structure the stone exhibits no problems, except in localized areas where water infiltration has occurred. This is generally due to failures in the original water drainage system and/or lack of sealant between joints. The water movement between and within stone blocks gives rise to efflorescences and staining.

The most noticeable feature is the accumulation of dust on the stone. The walls also need some repointing to replace the poor workmanship of previous interventions.

The most critical situation is at the bulwark first floor, where the placing of a plastic dome over the courtyard and the sealing of the small opening with glass plates has significantly changed the interior environment.

Stone was used as the original flooring material in accordance with the practical needs of the military functions of the fortress. The Lioz limestone was used in patterns and sizes ranging from large rectangular blocks to square shapes. In some cases, such as the "Governor's Room" in the tower, a two-colored pattern is used, following traditional Portuguese designs. As is the case elsewhere, repointing of the joints and general cleaning are needed.

The wood frames of the windows show an advanced state of decay. A better design should be developed for the recently replaced doors of thick glass, which do not serve their function appropriately. It is recommended that this design be more compatible with the historic fabric of the building.



Detail of bio-growth (lichens, mosses and higher plants) at a balcony roof.



South balcony showing black gypsum crusts.



Plastic roof at the bulwark courtyard.

SITE CONDITIONS

The Tower of Belém property extends north on the land side to the highway Avenida da Índia, to the Fort of Bom Sucesso to the west, and to a block characterized by commercial and institutional buildings to the east. The landscape in the area is composed of a large lawn, with stands of trees and crossed by walkways and a road along the water edge.

A wooden bridge currently connects the tower's island to the land. It extends to the stone pavement, which with its steps and shape suggests a half arena theater. A drawbridge still provides access to the building, but its machinery is in need of repair.

The landscape and site configuration, carried out in the 1940s, present the following major problems for the tower's environment:

- disturbing noise from the heavy traffic flow on the roadway,
- traffic and parking of cars on the tower stone pavement approach,
- accumulation of litter in the lake formed by the existing moat, which was originally conceived to retain water around the tower during low tide,
- poor condition of the wooden bridge structure,
- no markers indicating the monument's historical significance, or providing directions for visitors, and
- lack of coordinated easy pedestrian access from nearby cultural institutions, such as Jerónimos Monastery and the Belém Cultural Center.

3. SCHEMATIC SOLUTIONS

Stone Conservation
Architectural Plan
Building Systems Upgrading
Landscape Proposal



3. SCHEMATIC SOLUTIONS

In the spirit of the UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (1972) and guided by the recommendations of the 1964 Venice Charter, the methodology for the proposed definitive *Restoration and Rehabilitation Master Plan for the Tower of Belém* will initially require completion of the archival investigation of the building's history.

This conservation proposal defines the intervention needed to restore the building to a stable condition. It proposes the conservation of the stone masonry, which now needs treatment (repointing, localized cleaning and consolidation), as well as the replication of specific carved stone elements.

Rehabilitation of the tower as a museum should successfully integrate new design into the historic fabric of the building . The landscape rehabilitation proposal considers improvements that will enhance the beauty and character of the area surrounding the tower.

STONE CONSERVATION

Exterior

The stone of the tower has resisted natural and anthropogenic weathering factors fairly well. To ensure the future preservation of the structure, the following conservation program needs to be carried out.

Based on a first preliminary survey of the building the following conditions have been established:

- the sculptured figures are significantly eroded,
- the joints between blocks are deteriorated,
- the terraces and turret-roofs leak,
- some architectural details, especially the ribs of the vault over the south balcony, are in a friable condition,
- presence of biological growth, both higher and lower plants, and
- presence of black gypsum crusts.

This survey also served to identify the type of intervention needed:

- replacement of the sculptured figures with cast copies,
- repointing of the building,
- sealing of fissures and cracks, especially on the terraces and turret roofs, to avoid leaks,
- localized consolidation of highly deteriorated stone,
- removal of any biological growth as well as of the stains resulting from that growth,
- application of a biocide to retard regrowth,
- removal of the black crusts, and
- localized application of a hydrophobization agent, especially for sculptured details.

Before any conservation measure is finally selected a condition survey needs to be carried out. This can be accomplished following the Italian Recommendations for Conservation Testing Procedures (NORMAL 1/88). The resulting survey will document the state of conservation of the stone and organize the information so as to facilitate decisions for any needed intervention.

In-situ testing of intervention procedures needs to be conducted before the actual implementation. The following points need to be tested:

- materials for the casting of molds as well as those for replicating the sculptures,
- composition of repointing mortars,
- cleaning procedures for biological stains and black crusts,
- biocides, beginning with those based on quaternary ammonium compounds,
- stone consolidation products, beginning with those based on ethyl silicate, and
- hydrophobization products, beginning with those based on polysiloxanes.

Analysis of the state of conservation survey will determine which areas need to be treated and to what an extent. In-situ testing will determine how the treatment should proceed. The final intervention will be based on the results of these procedures.

Interior

Since the interior stone exhibits limited problems, documentation can be restricted to the affected areas. This work, however, has to be meticulous and the localization of the damaged areas within the building must be adequately identified and described.

The sources of the infiltration that caused the interior stone damage must be identified and repaired before any treatment is carried out. Once they have been duly recorded and documented, the areas of infiltration require cleaning. Analysis of the salts present and their concentration is then needed to ensure adequate removal. Poulticing will remove the salts and periodic further analysis will evaluate the success of this procedure.

A decision can be made regarding the future treatment of the exposed stone vault surfaces only after careful examination and analysis. To determine the state of conservation of the underlying stone, samples of portland cement on the interior vaults have to be analyzed. This will help to determine the procedure for removing these ceiling finishes.

ARCHITECTURAL PLAN

The plan for the architectural intervention should be based on the requirements of the new museum program. Any introduction of design elements, however, should be compatible with the original fabric of the monument. Whenever possible, the construction should be removable rather than permanent.

The major issue in this plan is the treatment of the bulwark courtyard, which is presently covered by a plastic dome. Because this roof caused environmental changes in the interior space of the bulwark, its removal is considered essential. Since a permanent exhibition is planned for the interior of the bulwark, the courtyard cannot be left open. Two solutions are under consideration:

- installing a removable covering to prevent rain from falling into the courtyard area, and/or
- closing the spaces between the courtyard pier arches with glass doors which could be opened to provide natural ventilation.

In both cases, the following issues have to be addressed:

- the drains to handle the rain water collection, and
- the small bulwark windows, now sealed with glass, which should provide cross-ventilation.

The optimal solution should achieve the following objectives:

- the correct climatic conditions for the conservation of the proposed permanent exhibition (replicas of the original cannons),
- an adequate climatic environment for the visiting public, and
- the required acoustic conditions for the concerts held in the bulwark.

Other points in the architectural plan are:

- repair of windows and doors in order to establish adequate operation,
- inspection of miscellaneous metal work such as railings, grills, etc., to determine their condition and any required action,
- introduction of a small storage space in the bulwark basement,
- upgrading toilet facilities,
- improving the existing box office, and
- introduction of a small souvenir shop, independent of the box office.

The souvenir shop could be installed in the bulwark's last two embrasures, at the opposite end of the entrance. An alternate solution would be to install a small kiosk on the pavement in front of the tower.

BUILDING SYSTEMS UPGRADING

The building's systems—lighting, plumbing, communication lines—need to be upgraded, as indicated schematically below:

- The lighting of the tower's interior requires improvement. The present incandescent lamps of low performance and short life span need to be replaced and fitted in equipment with a good light emission control (generally for indirect lighting). New power supply fixtures will also be necessary to support various cultural events, such as exhibitions, performances, etc. The exterior lighting of the facade facing the river should be redesigned to complement the one recently installed for the facades facing the land.

- All the rainwater drains have to be checked for their proper functioning. A drainage system for the bulwark courtyard has to be devised in accordance with the treatment developed after the removal of the plastic roof.
- The plumbing system requires upgrading. This principally comprises modification of the water feeding pipe in order to reduce its visibility and its impact on the monument exterior. Installation of new pumps will improve the waste-water drainage system.

LANDSCAPE PROPOSAL

The plan proposes improving the existing conditions of the water area immediately surrounding the tower and landscaping the adjacent grounds to enhance the overall character of the monument.

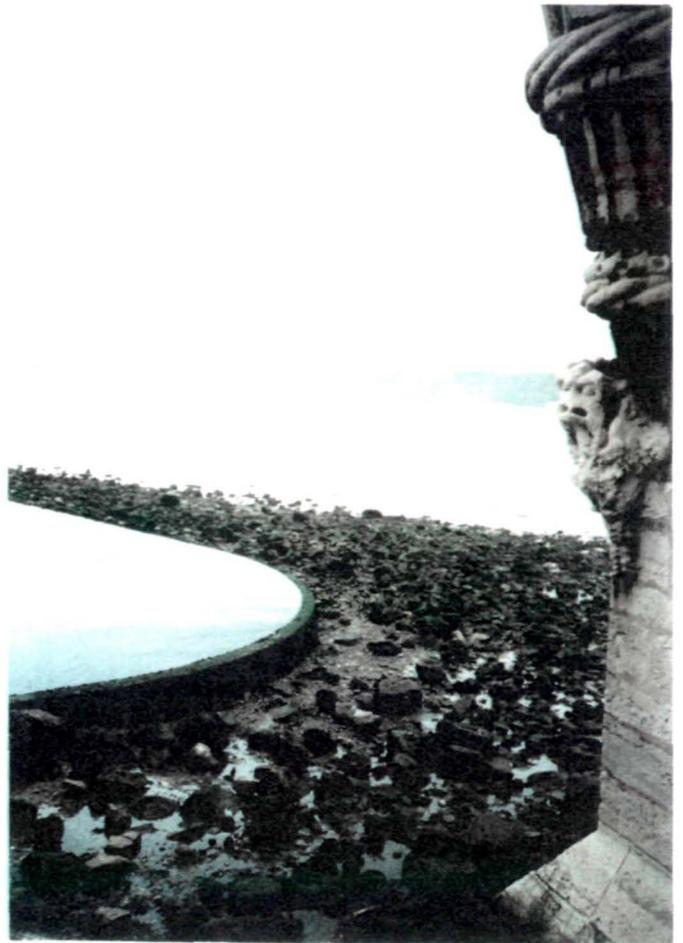
The plan can be divided into the following stages:

- improvement of the "lake" around the tower, to prevent the present situation of garbage accumulation and the formation of dry areas between the tower and the main body of the river,
- improved management of tourist traffic to the tower,
- improved directional markers and information plaques,
- providing an alternate parking space to avoid the congestion of cars and buses in the esplanade in front of the tower,
- development of a sound barrier that will also reduce the visibility of the highway and the train tracks located to the north of the tower grounds,
- restoration of the existing Camões Garden located by the Fort of Bom Sucesso, and
- possible introduction of "theme gardens" related to the new plant species introduced during the 15th and 16th century.

"Lake" at west side of the tower.

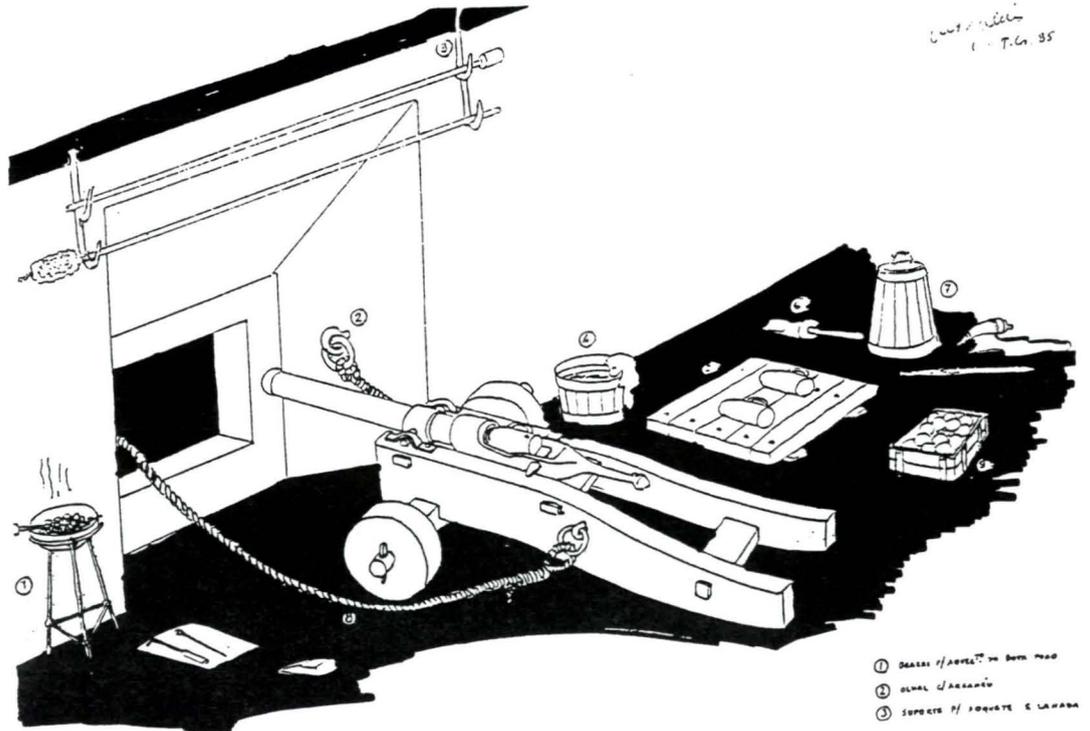


East part of "lake" showing its artificial edge and the river channel beyond.



4. INTERPRETIVE PLAN

Plan Outline
Plan Development
Recommendations for Implementation



4. INTERPRETIVE PLAN

The planning process for the interpretation of the Tower of Belém outlines the need for a continued effort to create a full interpretive plan for the site. In light of the 1994 deadline for completion of at least portions of the project a limited scope of work for the interpretive program and a Communications Design Team is proposed. The involvement of the World Monuments Fund, the Associação World Monuments Fund (Portugal) and the continued participation of the Secretary of State of Culture, ensures that extensive modifications can be made in the exhibitions and improvement in visitor orientation. The quality of the planning and subsequent design decisions will be of fundamental importance to the success of the entire project.

PLAN OUTLINE

The interpretive plan is the official guideline for resource managers which sets forth the policies concerning philosophy, development, and operation of the historic site. The plan is a working document which serves as a guide for making decisions concerning communications, exhibitions and architectural/engineering interventions. It encourages continuity of sound interpretive principles and provides an orderly, cohesive system of interpretive facilities and services within the site's administration. The interpretive plan, with estimated budgets, broad schematics, and work plan, is a document to generate interest and support for the site.

The planning team of the World Monuments Fund, under the guidance of the Director Dra. Isabel Cruz Almeida, began to develop an interpretive plan for the site on the final day of the workshop in Lisbon. The outline developed during this initial appears in Appendix A.

PLAN DEVELOPMENT

To further develop this outline into a working interpretive plan it may be helpful to break down the outline into three sections: philosophy, development and operation.

The interpretive plan is not a complicated document, but it should have sufficient detail to be entirely clear to those who may read it. This is essential, for it will be used as a reference by others.

The philosophy or "policy for interpretation" section of the plan contains:

- a. Interpretive statement defining basic values to be used for the tower's interpretation. These values will determine the scope of the plan to be presented.
- b. Statement summarizing objectives of the tower's interpretive program, defining the major interpretive goals that the site hopes to accomplish.
- c. Factors influencing selection of interpretive means, including the environment and the visitor.
- d. Analysis of present interpretive program.
- e. Proposed program facilities and activities for the future.

The development section of the plan contains:

- a. Analysis of present interpretive program and proposed program with details for facilities and activities.
- b. Content of proposed program.
- c. Studies supporting the interpretive program including a chronological framework for the tower's history. This framework should include: military history, socioeconomic history and architectural changes/interventions.
- d. Review and analysis of visitor profile and annual attendance figures.
- e. Schematic plans showing designated interior and exterior areas.
- f. Staffing requirements: present and future.

The operation section of the plan is slightly more complicated and requires the assistance of additional professional estimates. The components of this section of the plan are:

- a. Phased implementation of plan.
- b. Selection and identification of proposed working team to accomplish the plan.
- c. Cost estimates for the proposed program and plan.

RECOMMENDATIONS FOR IMPLEMENTATION

Ideally the interpretive plan would be produced well ahead of the fiscal year in which implementation is required. This allows for thorough review by concerned groups, particularly exhibit designers, landscape architects, and engineers. It also helps to organize support from administrators and community groups.

It was clear from the February workshop that the Tower of Belém project will involve planning and design of interpretive galleries and exhibitions on a scale and at a speed which is, perhaps, unprecedented. Such a situation can be handled in many ways. This proposal for proceeding recommends the following approach:

1. Complete sections of the interpretive plan upon which conceptualization, a design, and intervention decisions can be made. Then continue to develop the full interpretive plan.

These tasks are described in the preceding section of this report titled:
Development of the Plan.

2. Establish realistic priorities and budget restrictions of the short term scope of work while long term planning is still in process.

During the development phase of the interpretative plan all methods of presentation should be considered, making a sound decision based on potential visitor use in relation to interpretive effectiveness, resource impact and cost. These considerations can include but not be limited to: visitor guidance or orientation displays, graphic identity, permanent exhibitions, handouts, media presentations, written and audiovisual aids, educational materials, demonstrations, interpretive tours, and other outreach activities and strategies.

This section of the Proposal for Proceeding does not take the place of a planning process which facilitates choices and produces a working document for consideration of all involved parties. It does provide recommendations for a limited scope of work that could be achieved in a "fast track" situation by late 1994. Based on work begun with the planning team under the guidance of the Director/Curator, and the assumption of certain continued interpretive planning the recommended interpretive scope of work is to produce a limited orientation program and display, a series of permanent exhibitions, and a single visitor handout.

Scope of Work for Limited Interpretation

The orientation and permanent exhibitions are to be dedicated primarily to the 16th-century form and function of the tower with complementary materials illustrating its impressive role over the centuries in the identity of Portugal. Artifacts and graphic panels will present the tower and its importance generally throughout the age of discovery and more specifically in the defense of the City of Lisbon. These exhibits will be located in four areas: the bulwark; the dungeons; the first two floors of the tower (The Governor's Room and the King's Hall); and the terrace.

The bulwark area will house three elements: the orientation exhibition, a permanent exhibition, and a gift shop.

The orientation exhibit is the place where visitors "meet the Tower of Belém." Here the tone of the exhibits is established, the interpretive themes are stated, curiosity is awakened, and directions for the visit are made clear.¹

The permanent exhibition in the bulwark will consist mainly of 16th-century artillery reproductions and related artifacts. Archival research has uncovered plans of the tower, and one remaining cannon that will be used as a model to accurately reproduce the artillery originally installed in the tower. These large pieces of artillery will be animated with a display of related artifacts such as firing paraphernalia reproductions of contemporary drawings concerning range and special characteristics of the artillery, as well as a model depicting the defenses of the City of Lisbon.

¹Depending on the outcome of further interpretive planning, permanent orientation signage located outside the tower may prove to be desirable. This signage would provide a brief historical and architectural background of the tower. It would serve to supply information for large groups of tourists who may not be accommodated or may not choose to go into the tower.

A modest gift shop with items relating to content themes of the tower will be included on this level.

A portion of the dungeon area below the bulwarks will be refitted as the original prison. Graphic panels will aid in interpretation.

The first and second floors of the tower will address the architectural, military, and sociopolitical evolution of the tower from the 16th through the 20th century, with suggestions of its central importance in the future of Portugal. This evolution will be viewed from an architectural as well as a symbolic or iconographic perspective.

Also under consideration for permanent exhibition on one of these floors is a display of the original stone carved figures from the exterior of the tower. These figures may be removed from the exterior because of conservation considerations.

The third and fourth floors of the tower will be available for temporary exhibitions related to the overall interpretation of the structure.

The final section of the permanent installation is proposed for the terrace. Graphics would highlight the Manueline-style Chapel on axis with the tower, the Jerónimos Monastery, the ruins of the old tower across the river and other relevant historical features. Brief selections from *The Lusitades* could be incorporated into these graphics.

3. Augment the present in-house staff with outside design, implementation and supervision advisors called a Communications Design Team.

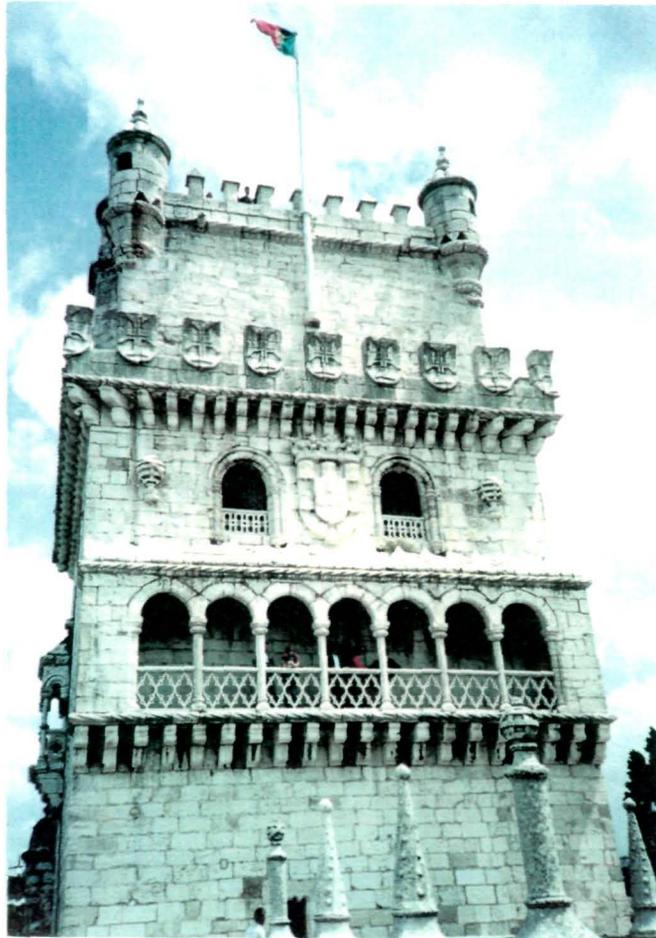
Some of those advisors were present at the February meetings. The final composition and role of the advisors must be clearly defined. Further it should be forcefully stated that: the curator must retain absolute control over the informational content of all exhibits, and that the quality of design of the interpretive offerings is fundamental to the success of the whole project.

This group of advisors required to "fast track" the project can be referred to as the Communications Design Team. The terms of reference for such a team include:

- a. The Communications Design Team will be responsible for the conception, development, and detailed design of all exhibits at the tower which are affected by, or considered part of, the World Monuments Fund project. [At this time temporary exhibitions are excluded.]
- b. The Curator will be regarded as an integral part of the Communications Design Team for the purposes of design of each exhibit. The Curator will retain absolute control over the integrity of the informational content of the exhibit.
- c. The Communications Design Team will be responsible for the conception, development and design of the entire visitor guidance or orientation program of the tower, including orientation displays and graphics, permanent exhibitions, a single visitor handout, and a gift shop. [Media presentations, and written and audiovisual aids normally involved in the full interpretive program are excluded.]
- d. The Communications Design Team will also be available for assistance, as requested and as authorized, in areas of overlapping knowledge such as educational and outreach programs, general graphic and audiovisual advice and inputs to human factors aspects of architectural design.
- e. The Communications Design Team will coordinate its efforts very closely with those of the architects and of the architect's subconsultants, each side being careful to maintain a continuous and clear definition of scope of responsibility as the general design concepts unfold.

5. IMPLEMENTATION PLAN

Project Organization
Project Schedule
Budget Cost Estimate
Financial Development Strategy



5. IMPLEMENTATION PLAN

The outlined Project organization, its schedule and budget, will be adjusted and refined as the project develops.

PROJECT ORGANIZATION

The project for the Restoration and Rehabilitation of the Tower of Belém can be divided into three consecutive phases:

- Phase I: Project Identification
- Phase II: Project Planning
- Phase III: Project Implementation

Phase I: Project Identification

The first phase began about ten years ago when an assessment study of the use of the Tower of Belém as a museum space was begun. This has been carried out by a multidisciplinary team of Portuguese professionals. It considers the initial archival research and the preparation of proposals for the necessary rehabilitation work on the tower to adapt it to the envisioned role of the tower as a monument and museum. The results of these studies were summarized in a document which served as the basis for the discussions during the planning session.

The approval of the present report by all parties involved in this project will mark the end of this first phase.

Phase II: Project Planning

The second phase can be divided into two parts: preliminary planning and final project planning. Preliminary planning, which will define the precise scope of the project or alternate development scenario, ends with the approval of an advanced set of planning architectural and engineering documents by the SEC-IPPAR (Secretaria de Estado da Cultura and Instituto Português de Património Arquitectónico e Arqueológico). The second part consists of developing final contract (bid) documents and will be carried out by Portuguese professionals, advised by specialists from the World Monuments Funds, coordinated by the Director/Curator of the Tower of Belém and under the supervision of IPPAR professionals.

Phase III: Project Implementation

Project implementation can be divided into four parts, which will be executed according to the following tentative schedule:

- A. Exterior Works (June '93 to May '94)
 - Stone Cleaning
 - Stone Conservation and Repairs
 - Copies of Selected Stone Sculptures
 - Bridge and Lake Improvements
 - Project Promotion (Temporary Exhibition, etc.)

- B. Interior Works (August '93 to May '95)
 - Architectural Interventions
 - Building Systems Upgrading
 - Interior Stone Cleaning and Conservation

- C. Interpretive Program (August '93 to May '95)
 - Permanent Exhibition Installation

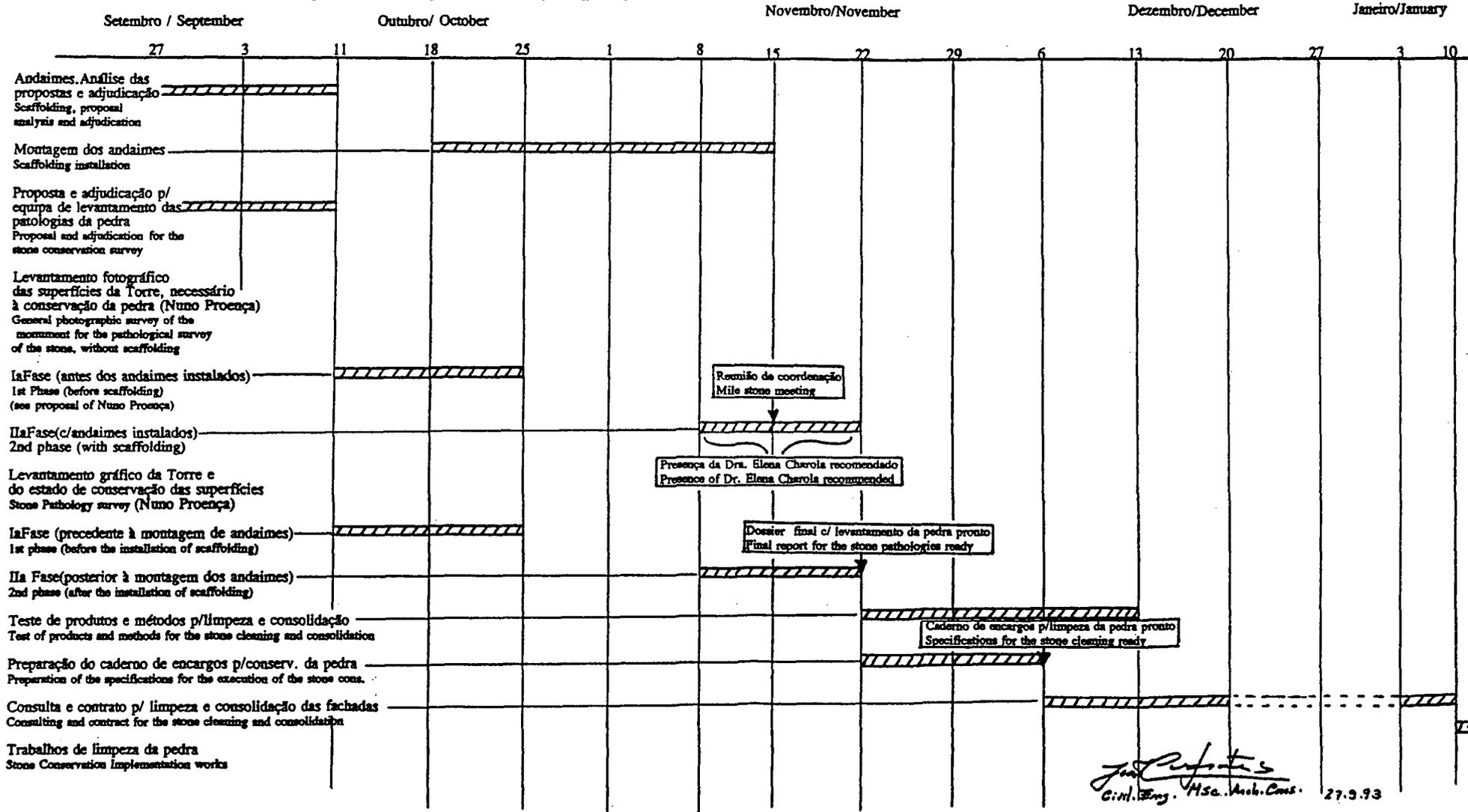
- D. Landscape Works (May '94 to May '95)

On-site management is a key factor in the implementation of the outlined project. This is particularly important if the project is to be kept within the proposed schedule and budget.

Schedule Plan

Calendarização dos trabalhos de instalação de andaimes, actualização do levantamento arquitectónico e do levantamento das patologias:

Table of time / schedule for the installation of scaffolding, actualization of the graphical survey and pathology survey



BUDGET COST ESTIMATE

	Subtotal	Total
EXTERIOR WORK		
• Stone cleaning, repointing and repair	284,000.	
• Stone sculpture replication	100,000.	
• Windows, replacement of selected doors	16,000.	
• Water drainage improvements	40,000.	
		\$ 440,000.
INTERIOR WORKS		
• Interior finishes restoration	150,000.	
• Courtyard restoration: removal of acrylic dome & new enclosures.	40,000.	
• Basement rehabilitation (new storage room & toilets rehab.)	20,000.	
• Box office rehabilitation	8,000.	
• Miscellaneous metals: railings, etc.	6,000.	
• New souvenir shop.	30,000.	
		\$ 254,000.
MECHANICAL / ELECTRICAL / PLUMBING		
• Ventilation	30,000.	
• Electrical/ communications & lighting	80,000.	
• Plumbing	20,000.	
• Security	10,000.	
		\$ 140,000.
SPECIALTY ITEMS		
• Permanent exhibition	100,000.	
• Gun replicas	130,000.	
• Model	20,000.	
		\$ 250,000.

	Subtotal	Total
EXTERIOR SITE WORK		
• Bridge improvements	15,000.	
• Lake improvements	50,000.	
• Landscape works	200,000.	
		\$ 265,000.
PROJECT INTERPRETATION		
• Temporary exhibition	70,000.	
• Book, video, brochures	120,000.	
		\$ 190,000.
PROJECT PLANNING		
• Architectural & engineering design	80,000.	
• Stone conservation tests & survey	20,000.	
• Interpretive program	30,000.	
• Landscape design	70,000.	
• Int'l consultants & WMF coordination	150,000.	
		\$ 350,000.
	Subtotal	\$ 1,889,000.
Contingency (10%)	188,900.	
I.V.A. (16%)	302,240.	
	TOTAL	\$ 2,380,140.

* Excludes: escalation and temporary exhibitions installation.

FINANCIAL DEVELOPMENT STRATEGY

General Strategy and Timing

The Tower of Belém is perhaps the most prominent cultural symbol in Portugal, a quintessential demonstration of Lisbon's architectural elegance and a constant reminder of the important and dynamic role that Portugal played in the European Age of Exploration. The restoration of the tower will place this well known and well loved symbol in its deserved central place in the nation's cultural life.

The restoration of the Tower of Belém is timely in the context of two important European and world events in the coming years: Lisbon will be the Cultural Capital of the European Economic Community in 1994; and the 1998 Expo "The Oceans" celebrates the five centuries since Vasco da Gama's journey to India. The Expo will be held to the north of the tower site, outside Lisbon. Associação WMF (Portugal) and the Portuguese government share an interest in completing the restoration of these two major edifices in conjunction with these important events. Given the magnitude of the project and the short time available, the proposed restoration must proceed in stages as follows:

Stage I. [Phase II & Phase III A] Exterior conservation of the tower, planning for the complete restoration treatment, installation of an interpretative exhibition about the restoration process.

Cost estimate: \$600,000

Deadline: May 1994.

Stage II. [Phase III B & C] Interior restoration of the tower, site improvement, installation of a permanent exhibition on the history of the tower.

Cost estimate: \$1.8 million

Tentative Schedule: June 1994 - May 1995.

To date, only Stage I has been approved. Funding is pledged for this phase of work by the Panatlântica Holding, S.G.P.S., S.A., the holding company of the Grupo Atlântica (\$200,000) and the Portuguese government (\$200,000). These funds will be paid to the Associação WMF (Portugal), which will be created officially in April 1993. The remaining funds are to be raised from sponsors outside Portugal.

Subsequent to Stage II (the completion of the tower restoration and installation of an interpretative exhibition) Associação WMF (Portugal) may continue to work with the Portuguese government to improve the tower's site and link it to other cultural

facilities nearby which are closely associated historically with Belém. Any subsequent work beyond Phase II would be the subject of a new plan and strategy.

Potential Funding Sources

Foundations and Individual Contributors. U.S. and European foundations, as well as individual contributors who have an interest in Portugal, will be approached for the funding to activate the research and planning phases of the program and to support exhibition, publication, and interpretation activities. The emphasis of fundraising during the spring and summer of 1993 should be on the identification of a group of contributors who will participate at the level of \$5,000 to \$100,000 to match the funds provided by WMF Portugal and the Portuguese government.

Funding target for Stage I: \$200,000

Corporate Sponsors. Within the full-scale project there are many opportunities for sponsorship of discrete parts of the project. The completion of Stage I will provide an opportunity to announce corporate sponsors for future phases of work, as well as to recognize the participation of those who have contributed to the initiation of the project. A fundraising brochure should be prepared as soon as a final budget and plan are developed, to outline major gift opportunities.

Funding target for Stage II: \$1.8 million

Long-term Funding

If Associação WMF (Portugal) continues its participation in the restoration of the tower and monastery beyond Stage II, significant revenues could be generated through licensing of authorized products, through visits to the tower after its restoration, and through the sale of publications, slides and other educational materials. The possibility should be explored during 1993 of developing a licensing and concession agreement with the Portuguese government, to benefit future phases of work, or future projects of Associação WMF (Portugal).

Ideally a management study to determine optimum visitor levels, recommend admission fees, and possible revenues, should be developed as part of the Stage I research.

6. APPENDICES

A. Interpretive Plan Outline

B. Bibliography

C. Participant Directory

D. Reference Material

APPENDIX A

Tower of Belém Interpretive Plan Outline

- I. Goals
 - Identity
 - National importance (especially for Lisbon)
 - Relationship to the Portuguese world
 - International monument
- II. Objectives
 - Relate Tower of Belém to the Monastery & Chapel
 - Present original function and architecture of building
 - Present evolution of building: form & function
 - Symbolic presence: evolution
 - Present architectural style: Manueline
 - Offer educational services
 - Consolidate tourist and visitor services
- III. Audience
 - Tourists
 - School groups
 - Portuguese families
- IV. Graphic Identity & Signage
 - Logo
 - Interior signage
 - Street signage
 - Banners
- V. Museum Offerings
 - Exhibitions
 - Permanent exhibitions
 - Temporary exhibitions
 - Exterior panels or wayside exhibits
 - Electronic Communications
 - Audio tours
 - Interpretive computer programs (Apple pilot)
 - Printed Materials
 - Poster
 - Brochures
 - Teacher materials
 - Book
 - Postcards
 - Models
 - Children's publications

- VI. Supporting Studies and research
 - Military history
 - Socioeconomic history
 - Architectural changes and interventions

- VII. Public relations
 - Liaison with:
 - Tourism industry
 - Local associations
 - Professionals
 - General public
 - School system

- VIII. Educational Services
 - School visits
 - Teacher training
 - Workshops
 - Demonstrations

- IX. Special Events
 - Government functions
 - Concerts
 - Lectures
 - Performances
 - Openings
 - Conferences

- X. Retail Services
 - Gift shop in the tower
 - Exterior

- XI. Staffing Requirements
 - Administrators
 - Security
 - Maintenance
 - Summer guides
 - Educators

- XII. Visitor Services
 - Toilets
 - Food and beverages
 - Maintenance
 - First aid

APPENDIX B

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APPENDIX C

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APPENDIX D

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