Sepulchre of

Mirza Jan Baba

Father of Isa Tarkhan the Second

Yasmeen Lari

2017

Cover image from SZ Lari Collection c. 1990s.

Heritage Foundation of Pakistan is a non-profit, non-government trust established to promote the conservation of cultural heritage in Pakistan. It is engaged in research and documentation of Pakistan's cultural property including historic monuments and urban historic architecture. By linking heritage with disaster preparedness and development, it provides large-scale humanitarian assistance and training in various parts of Pakistan.

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Foreword

The renowned necropolis of Makli with its thousands of graves and hundreds of inscriptions does not need much of an introduction. I still vividly remember a documentary on Makli which I watched in my childhood. The delicate stonemasonry impressed me a lot, and I al¬ways wished to visit the place one day. Many decades later, this dream came finally true.

Mirza Jan Baba, the conservation project of whose tomb is presented in this publication, was a member of the Tarkhan dynasty, which ruled from its capital Thatta over the southern part of Sindh in the second half of the 16th century. The reign of this royal family coincided with the rule of the famous Mughal emperor Akbar, who is, inter alia, known for his policy of religious tolerance and for his attempts to foster communal harmony. Mughal architecture was a blend of Muslim, Hindu, and Jain architectural elements and influences. Similar trends are also traceable in the funerary architecture at Makli, for instance, in the use of jharokhas, ornamental balconies, which are known from the architecture of Rajasthan.

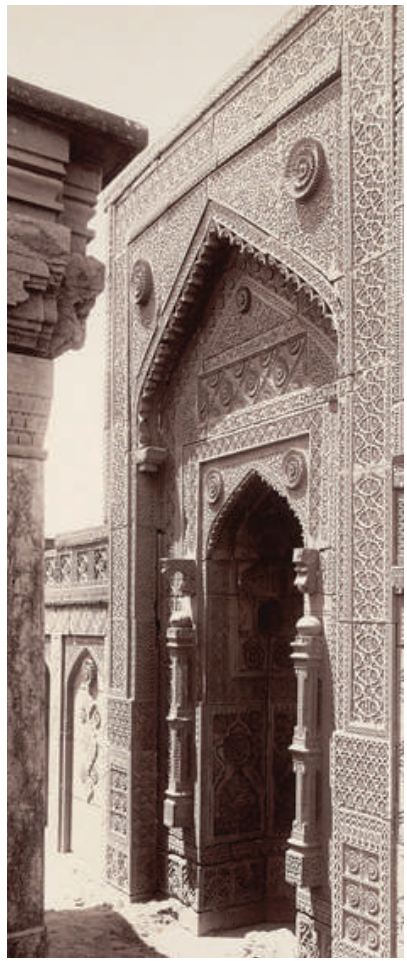
Makli is a highly important cultural heritage site for Sindh and the whole of Pakistan, and it is also a World Heritage Site. For many centuries, tombs have been erected as part of an elaborate memorial culture. The mausoleum named after Mirza Jan Baba, housing thirteen carved stone sarcophagi, should not only be preserved to commemorate several members of the Tarkhan family, but also to remind us of the vast history and cultural diversity of Sindh. With this objective, the German Foreign Ministry and the German Consulate General in Karachi have funded the conservation project carried out at the tomb of Mirza Jan Baba in the years 2015 and 2016 with 85,000 Euros.

Rainer Schmiedchen
German Consul General
Karachi, February 12, 2017

Preface

Makli necropolis, with its all-pervading silence of over one million graves, is awash with stillness and peace. Considered among the largest graveyards in the world, it is spread over 12 km, and carries testimony to remarkable cultural traditions of funerary architecture that span over 400 years. The site was inscribed on the World Heritage List in 1981. Where the scale alone is overwhelming, awesome are the centuries old ruins of sepulchers of rulers and princes, saints and mendicants, the profiles of these architectural edifices rising from the ridge. The site carries "spiritual and architectural magnificence not known to any other place in Sindh" indeed in Pakistan (Y. Lari & S. Z. Lari 1999).

Makli became a famous centre as an abode of some of the most significant saints of the subcontinent. The site embodies a culture of forbearance among people belonging to different religious orientations, and its architectural characteristics present an eclectic mix, amalgamating diverse Muslim and Hindu cultural traditions. Many are remarkable for devotional carvings of exquisite charm, presenting motifs drawn from Muslim inscriptions as well as non-Muslim imagery. The adornment of the necropolis by later rulers portrays the variations in architectural style, which unfolded under the Timurids.



19th c. image of the mihrab.

The Heritage Foundation has been engaged in research, documentation and conservation at the necropolis since 1988. Among the outputs has been a remarkable collection of archival images spanning over three decades by Suhail Zaheer Lari as well as his research on the history of Sindh in general and Makli in particular.

Due to dedicated work led by Yasmeen Lari, comprehensive catalogues of heritage assets have been prepared. The first-ever detailed map of the entire site has been finalized which is based on identification of 75 structures, 402 platforms and over two thousand graves, more than four hundred of them carved with elegant calligraphy and ornamentation.

For several years, the site has been neglected, and once magnificent structures are now in a state of degradation. It is for this reason that work has been undertaken by the Foundation on struc-

Cluster of tombs seen from the ridge. SZ Lari Collection, c. 1990s.

tures that were in an endangered state. These include the 16th c. Ashabi Mosque and Baoli (stepped water well) supported by Spiritual Chords (S. Africa) (2014), 15 th c. tomb of Samma Noble I supported by Prince Claus Fund (2012) and 16th c. tombs of Sultan Ibrahim and Amir Mohammad supported by the US Ambassador's Fund (2014-2017).

The 16th c. tomb of Mirza Jan Baba carries special significance in view of its elegantly carved stone structure. Due to the loss of domes, the graves and the zenana chamber have been extremely vulnerable. The present conservation, supported by the Government of the Federal Republic of Germany, has provided the opportunity to stabilize the structure and prolong the life of the original monument. I would like to thank Consul Generals of Germany Dr. Tilo Klinner for initiating the project and Mr. Rainer Schmidschen for his support during the project. We also thank

The tomb of Mirza Jan Baba is on extreme right.

the Government of Sindh for the permission to undertake the critical conservation work.

Thanks are due to S.Z. Lari Collection and Heritage Foundation for the images. The hard work of the Foundation's teams, headed by Mr. Naheem Shah in the field, Ar. Ashfaq Ahmad, and conservation consultant Ar. Saba Samee at the head office are deeply appreciated. Warm thanks are due to Mr. Saleem ul Haq, Director of Archaeology, Punjab, who made several visits during conservation work and has provided valuable insights and assistance in carrying out the work. We would like to thank Dr. Michael Jansen, whose visits have helped to bring clarity to the application of international guidelines and conservation principles. Thanks are also due to Ms. Noor Jehan Mecklai for her painstaking editing of the draft of this publication.

As always, Mr. Suhail Zaheer Lari's input, unravelling the historical events leading to the construction of monuments at Makli, has been particularly valuable. It is the historical sequence provided by him that has led to the understanding of the different stages in which the 16thc. sepulchre of Mirza Jan Baba was built.

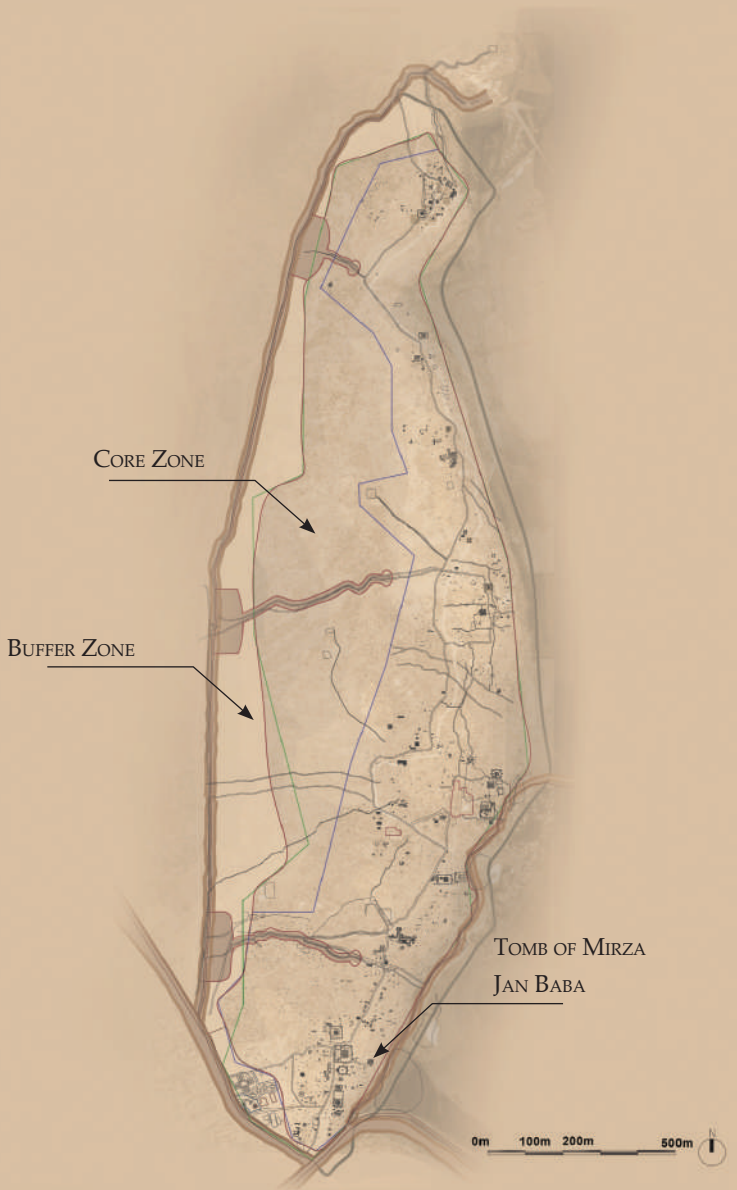
Yasmeen Lari *SI HI Fukuoka Prize Laureate*
Karachi, December 31, 2016

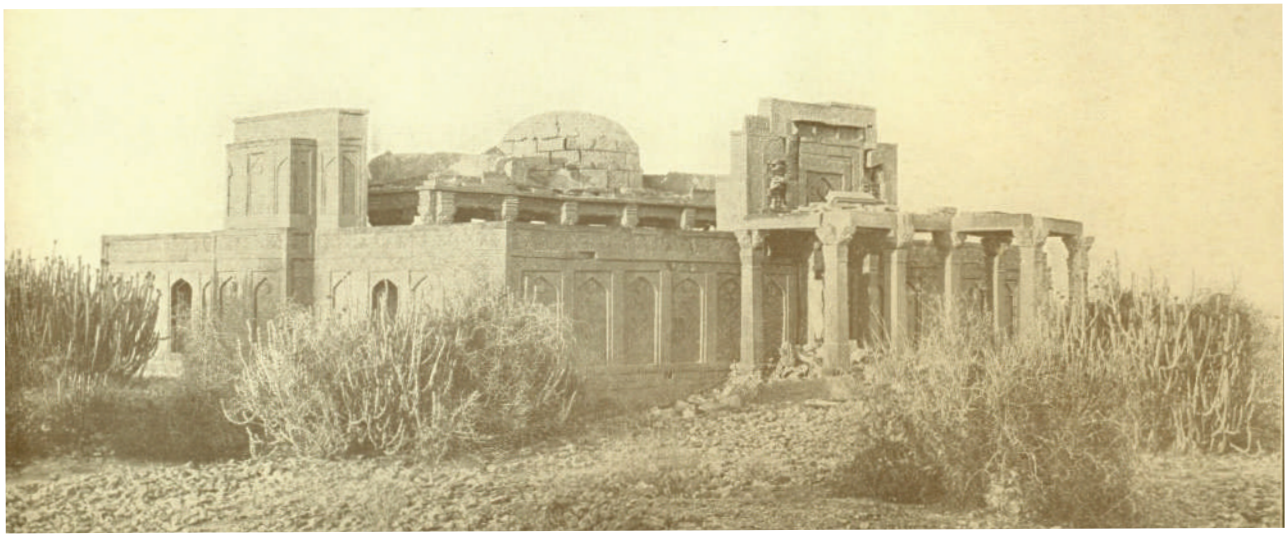
Map of Makli

Makli Site Map, prepared by the Heritage Foundation of Pakistan, showcases the location of the monuments that come under the World Heritage Site.

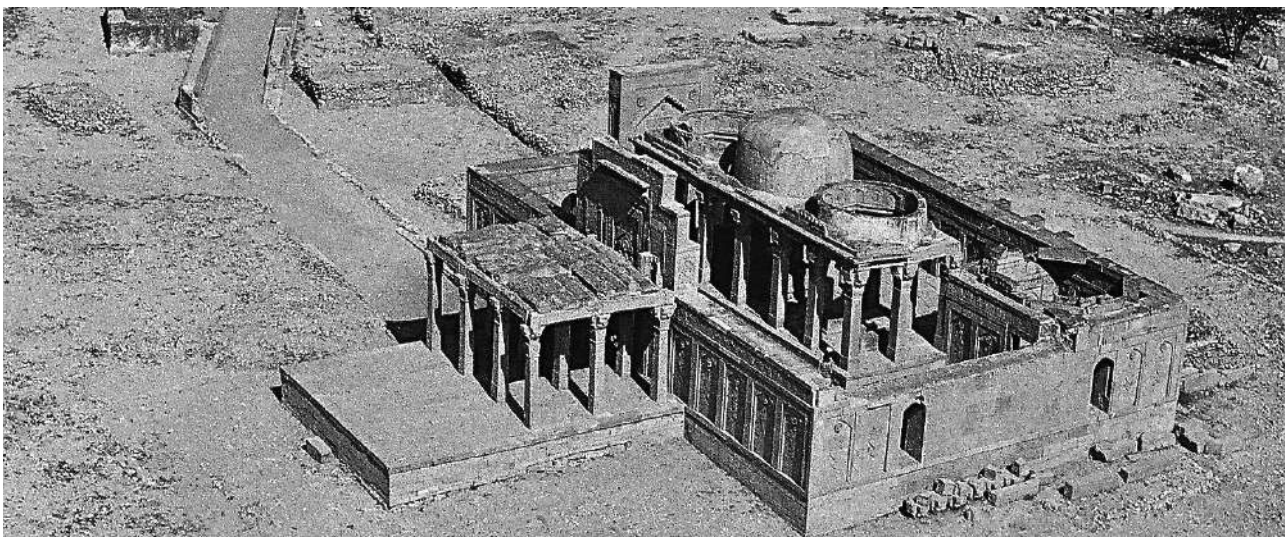
It includes 75 identified structures, over 402 platforms and innumerable single graves, belonging to the Sammas, the earliest local rulers of Sindh, along with the Arghun, Tarkhan and Timurid periods.

The map shows Makli necropolis in its entirety, in which the location of the sepulchre of Mirza Jan Baba is marked.





19th c. view from southwest.



SZ Lari Collection c. 1990s.

Introduction

The finely carved stone enclosure carries the remains of several members of the Tarkhan royal family of Thatta, including Mirza Jan Baba, after whom the mausoleum is now named. Jan Baba is the prince who, although not the eldest, had been his father's choice to become the ruler. His father, Mirza Isa Tarkhan I who had been brought up in the royal family, after his father and all his six brothers had been killed fighting the Uzbecks, established the Tarkhan dynasty in Lower Sindh with his capital in Thatta, after the ruling king, Shah Hasan Arghun, died in 1554 without a male offspring of his own.

Isa Tarkhan had been aware of the cruel streak in his eldest son Baqi and wished that the kingdom be kept away from his control. Mirza Baqi, being a favourite of his step-mother Mah Bega, received the reins due to her efforts and strategem. She kept secret the death of his father Mirza Isa (died 973 AH/1564-5 AD), until Muhammad Baqi arrived from Sehwan and was able to assume the reign and kingdom of his father.

During the early days of his rule, Baqi showed tolerance in order to pacify Arghun nobles, belonging to the earlier dynasty. However, once he had established himself firmly on the throne, he ordered a general massacre of the Arghuns. To make their slaughter

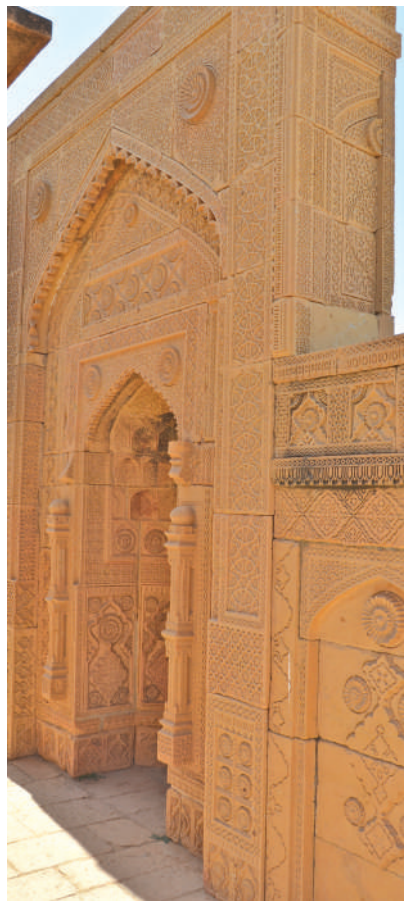
Ornamentation of the mihrab.

as complete as possible, he announced amnesty for all those who would kill the other Arghuns. Appalled by this action, his younger brother, the gentle Jan Baba and Baqi's own son-in-law Mirza Shadman Arghun, a cousin of the former Arghun ruler Shah Hasan rebelled. The Arghuns, who were now being hunted and being dispossessed of their property on the orders of Muhammad Baqi, joined the two rebels and together they attacked the new ruler. Muhammad Baqi escaped death in a night attack by the rebels, only because his wife Raiha Bega (granddaughter of Mah Bega), sacrificed her life when she threw herself on Muhammad Baqi, receiving the fatal dagger wound that was intended for the ruler.

View of tomb of Mirza Jan Baba from southeast.

In 976 AH/1568-9 AD, Muhammad Baqi sent his daughter, Sindhi Bega, with his step mother Mah Bega, mother-in-law Naheed Bega and his brother-in-law, Yadgar Miskin to the court of the Mughal Emperor Akbar in an attempt to develop relations with the local Timurid dispensation. On the way to the Mughal court they were met by Mirza Jan Baba, who persuaded them to use the bridal gifts and presents to raise an army against Muhammad Baqi. Mounted on an elephant, Mah Bega led the rebels, but was captured by Baqi's forces. Jan Baba and Yadgar Miskin fled to Kukralah to muster support, but met with disappointment as the local Raja did not provide any assistance.

Meanwhile Naheed Bega escaped to Bhakkar where she sought help from Sultan Mahmud Kokaltash, the ruler of Upper Sindh. When Mahmud made an advance with his army on Thatta, Baqi retreated to the safety of the Thatta island where he was able to mobilize his fleet to thwart the invaders' attempt at crossing the river. Two of his brothers-in-law, Faquir Muhammad Tarkhan and Sultan Muhammad Tarkhan lost their lives in the encounter while defending Thatta. Even though close to victory, Sultan Mahmud had to abandon the siege, having to rush to defend his northern frontier where an attack on Uchch had been mounted. Baqi's sister Agha Bega attempted to bring about a reconciliation between her brother and husband Yadgar Miskin with the help of the saint Sayyid Ali. Baqi cunningly used the opportunity, offered by the negotiations, to capture his brother-in-law Yadgar Miskin as well as his brother Jan Baba. He ordered



Double mihrab arrangement.

View of Graves Platform and Canopy.

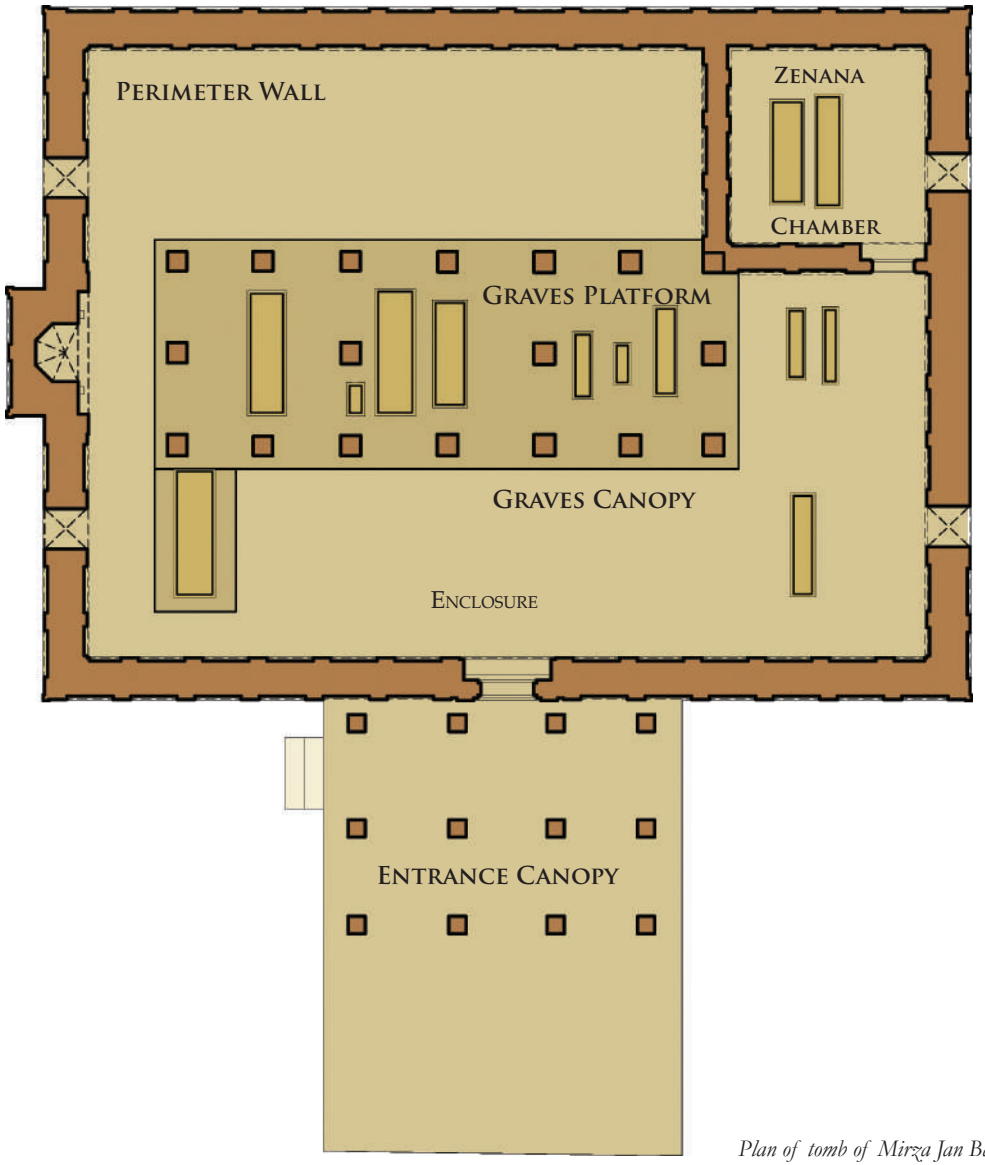
them to be put to death, and when his sister remonstrated, she was murdered along with her minor children. At the time Mah Bega was not put to death by Muhammad Baqi only because he had scruples about shedding the blood of a princess belonging to the Timurid royal family, who had also been the wife of the last two rulers of Thatta. But she was subjected to a more painful death when her life was imperiled through gradual starvation. The massacres perpetrated by Muhammad Baqi earned him the nickname "*Bloody Baqi*" or "*Khuni Baqi*."

For a long time, in British chronicles the tomb was referred to as Isa Khan's Zenana in images by William Robert Houghton (1858) and Henry Cousens (1898). However, later, when the inscriptions on the gravestones were deciphered, these were found to belong to Jan Baba and other family members who had been put to death by Muhammad Baqi. The 'Zenana' is a separate chamber carved out of the large enclosure. The cenotaph of Jan Baba contains verses from the Holy Quran, and a Persian inscription that reads '*Death discovered, Highness, Resident of Heaven, received in protection of gracious Lord, Mirza Jan Baba son of Mirza Isa Tarkhan year 978 AH*' The southern side contains the Persian chronogram, '*Jan Baba left from worldly home*.'

The sister of Jan Baba, along with her two minor children, is also buried on the east side of the main platform. The grave of the third child is below the platform on the east, and also contains the date 978 when *Bloody Baqi* had executed all the family members.

Void left by collapsed roof of Graves Canopy (left) and Zenana Chamber (right) can be seen.

In the Zenana Chamber two graves with refined carvings are found. Although there are no inscriptions, however, it can be inferred that this is where the Timurid princess Mah Bega, stepmother of Mirza Jan Baba, along with another royal female, is interred.



Plan of tomb of Mirza Jan Baba.

Architectural Configuration

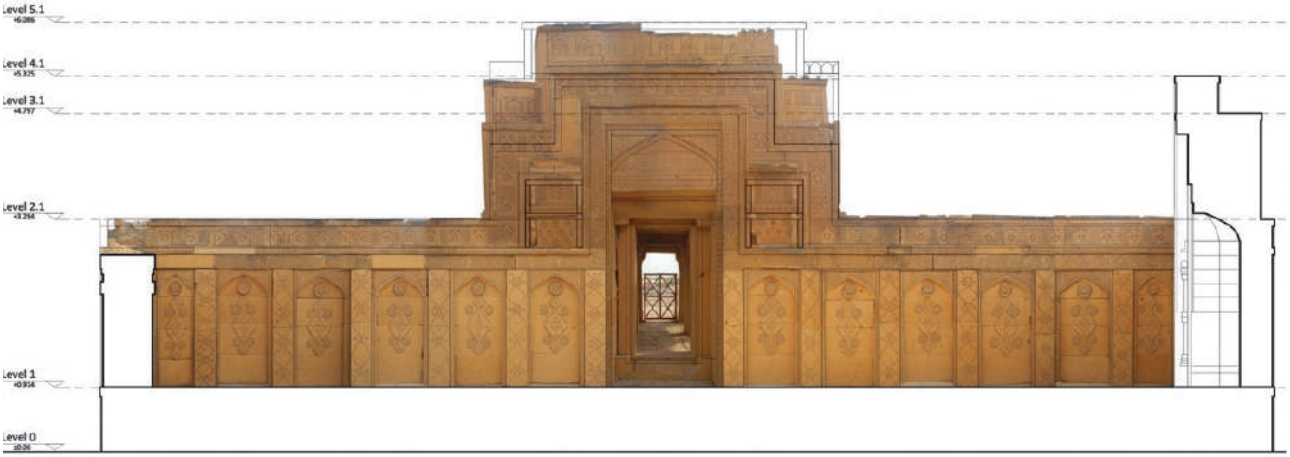
The sepulchre of Mirza Jan Baba is among a rare set of enclosures composed of carved stone panels that also contain canopies or pavilions in order to provide cover to the graves that are entombed within these compounds. The enclosure is reminiscent of the much larger mausoleum of Sultan Isa Tarkhan II, who constructed the tomb of his father, Mirza Jan Baba.

Originally the enclosure of the sepulchre was directly accessed from its gateway that punctures the southern perimeter wall. Today the southern entrance is arrived at through a canopy, which leads from an entrance platform 3'0" high.

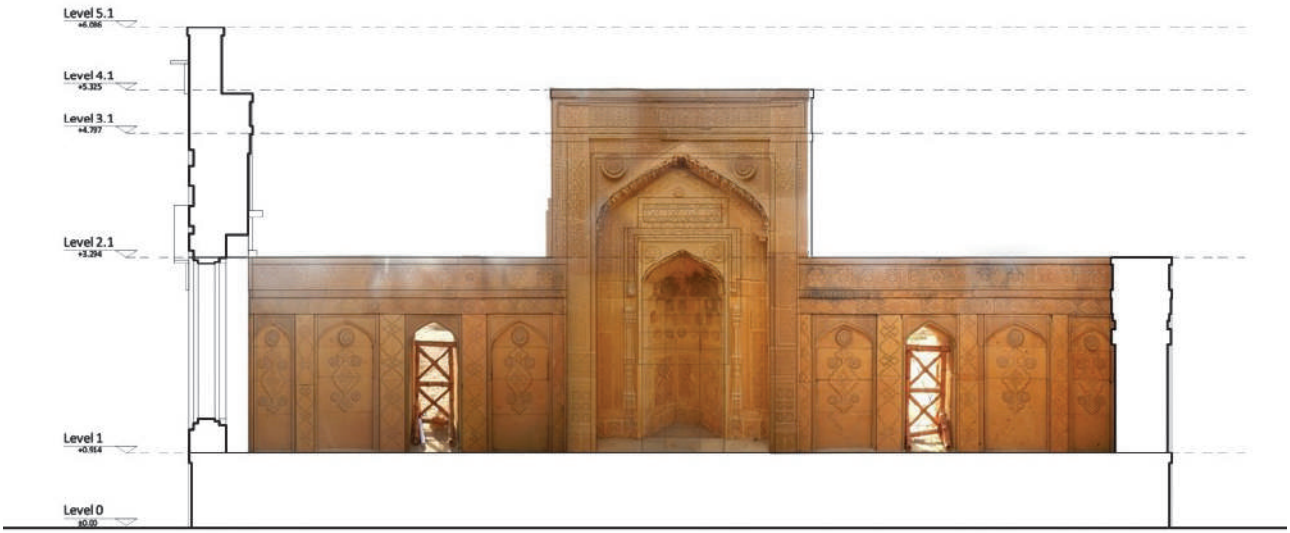
The steps to the entrance platform are oriented towards the Walkway in the west which had been built to provide direct access from the grand sepulchre of Jan Baba's son.

The core of the mausoleum is a platform size 13'x33' that carries the graves of the martyred royal family. The platform is built with simple dressed stones, carrying sarcophagi, exhibiting elegantly carved calligraphy in Persian and Arabic. Of the two graves in the central bay of the Graves Canopy, Jan Baba's grave is the one located on the west.

Highly decorated inner mihrab.



Internal South Elevation.



Internal West Elevation.

The enclosure, size 39′ x 52′, is encircled by 10′7″ high walls above the adjacent ground, composed of 5′6″ high and 2′6″ wide buff coloured stone panels. There are altogether 47 panels internally and 38 externally, with 6 internal panels enclosing the Zenana Chamber, one of them incorporating a doorway. From the 19thc. archival images, it is clear that some external panels of the eastern enclsoure had collapsed. At a later date, this portion was clearly rebuilt with ordinary dressed stones. However, internally the panels in this portion seem to have survived. Each panel internally and externally is ornamented with extremely refined carved motifs, exhibiting remarkable artisan skill.

Detail of exquisitely carved jharoka.

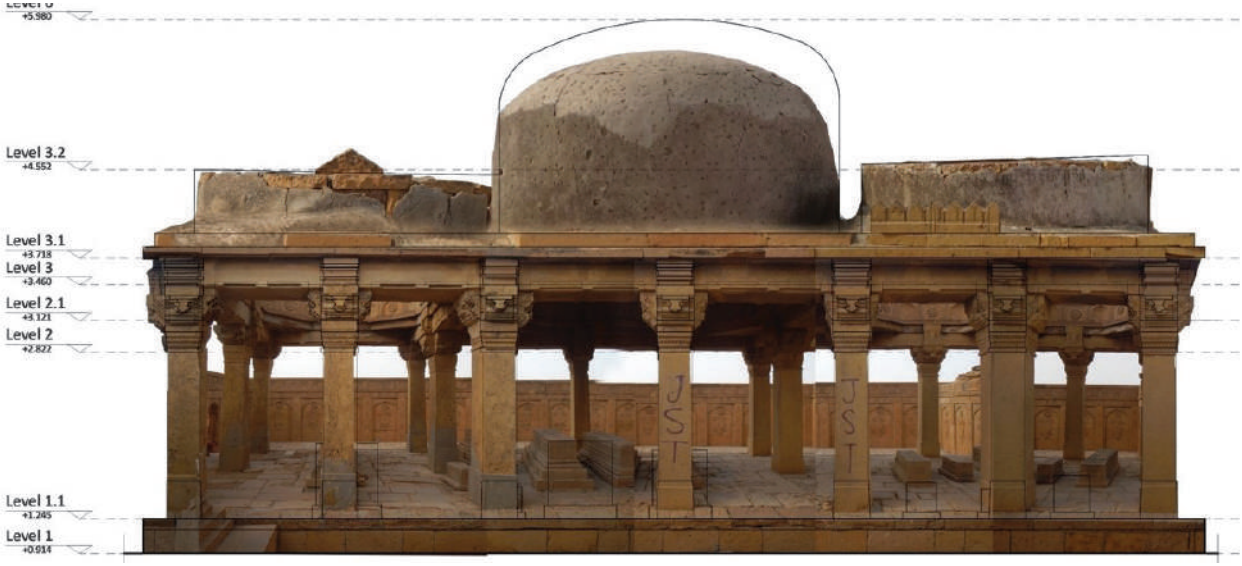
Its lofty giant gateway on the south, rises 17′ feet above the platform and 8′8″ above the enclosure walls. *Jharokas* (ornamental projecting balconies) with exquisitely carved elements flank the

Internal view from east with Graves Canopy on right.

main entrance internally and externally. The *jharoka* elements are in a highly damaged state, having lost their projecting sculptural parts. Even though a triple *mihrab* appears as early as the 15th c. tomb of the Samma ruler Jam Nindo or Nizam al Din, here it is a two-*mihrab* treatment. The most profuse ornamentation in the perimeter walls is reserved for the *mihrab* alcove that enunciates the *qibla* direction on the west. The giant wall of the outer *mihrab* rises 17'3" above the ground and 6'8"above the Perimeter Wall, and punctuates the western wall. While the entire wall is treated with elegant carving, it is the inner *mihrab* itself that was selected for the most profuse ornamentation.

View of double mihrab located on west.

Giant south gateway (on left) seen from the Enclosure.



South elevation of Graves Canopy. Scaled image superimposition.

Four cusped arch openings puncture the western and eastern perimter walls. These might have carried lattices, as seen in the tomb of Isa Tarkhan II, however, they are no longer extant.

The Graves Platform is provided cover by a pillared 3-bay structure built entirely with dressed and carved stones. The bays once carried 3 cupolas, only one of which is extant today. The rhythm of several pillars lining the perimeter of the canopy provides emphasis to the platform as the resting place of the royal family, the martyred members of Arghun and Tarkhan dynasties.

Graves Canopy. Decorative capitals and beams.

The 14″x13″ dressed stone pillars in the colonnade are spaced at 3′7″ to 4′8″centres on north and south, and 4′0″ to 5′2″ centres

(Above & right). Details of classsical Graves Canopy.

on east and west facades. The pillars incorporate bases with simple mouldings, and rise up to a height of 6′7″ below the capitals.

The well-carved capitals are designed in several stages. The lowest portion is composed of a finely carved floral pattern, above which are placed carved projecting brackets on all four sides. The protruding brackets carry stone beams 3′2″ long. The third stage of the capital is composed of simple mouldings, and is designed to carry the projecting roof above the stone beams. There is evidence of battlement *kanguras* which had once provided the termination to the flat roof portion encircling the cupolas.

View from north showing central extant cupola.

The classical colonnade is elegantly executed. It's refined simplicity and restrained demeanour are in contrast to the extravagant and elaborate carvings that would later be used in the mausoleum of Mirza Jan Baba's son, Isa Tarkhan II.

The transition from the square bays of the colonnade into octagons by employing triangular stone pieces at the corner of pillars can be seen in the extant central dome with a diameter of 10'. A unique cupola shape is achieved through the formation of concentric rings, converting the octagon into a 16-sided dome and gradually reducing in size until it reaches the top. The surviving concentric rings laid on the eight-sided base of the two collapsed domes point towards their form being similar to that

Concentric stone rings in extant cupola.

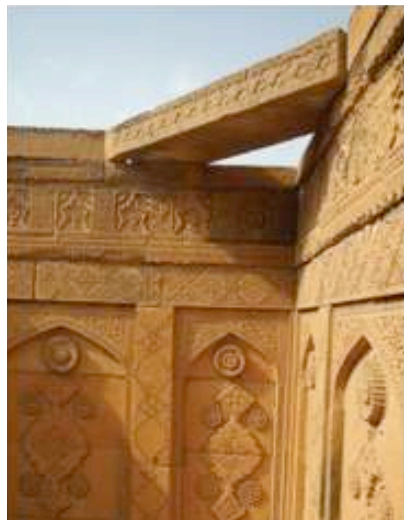
Graves Canopy. Voids show arrangement of phase of transition for cupolas.

of the central surviving cupola. The internal sizes vary from 9′5″ diameter in the west to 8′9″ in the east cupolas.

The zenana was delineated within the enclosure. It is a separate chamber of size 11′ x 11′, and houses the graves of imperial females. This is a secluded chamber that appears to have been topped by a cupola of 9′8″ diameter. Its roof having collapsed, the chamber was found in a highly damaged state. The roof void had left the interior features, and indeed the graves themselves, entirely at the mercy of the elements. The extant triangular pieces, laid diagonally in the corners, are similar to the arrangement for the cupolas in the Grave Pavilion. Thus, even though the lower course of stones had been lost or displaced, no doubt

Entrance doorway to Zenana Chamber seen from inside the Enclosure.

this chamber was covered by a cupola. This was confirmed from the faintly perceptible arrangement of a lower band of stones in a circular configuration seen in an 1858 image. It is because of this chamber that for over a century, the tomb was referred to as Isa Khan's Zenana.



Zenana Chamber. Extant triangular corner stone at the base of collapsed roof.

The southern giant entrance gateway puncturing the perimeter wall, mentioned above, is no longer fully visible as it is hidden by a pillared canopy. From the similarity of the motifs used in the capitals and bases of the pillars it can be surmised that the Entrance Canopy was built at the same time as the Graves Canopy. However, instead of the cupolas, this canopy carries a flat roof composed of stone slabs which were found in a highly damaged state. Carrying carvings in varied designs, these appear to have been reassembled at a later date with slabs purloined from other collapsed monuments. The pillar distance varies from 6′ to 5′6″centres, occupying a space of 17′6″ along the perimeter wall and extending 12′7″ towards the south. Only two bays of the Entrance Canopy

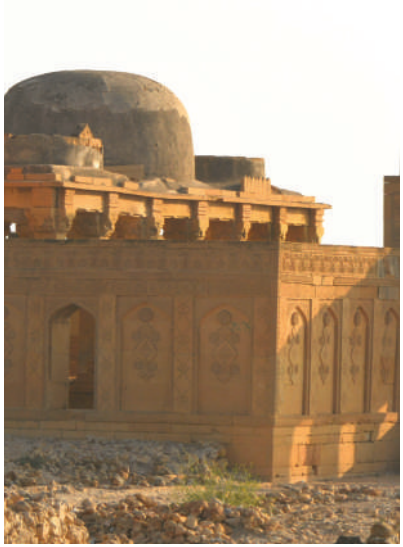
Entrance Canopy colonnade.

Walkway. Remnants of dwarf wall.

are extant, while the 20'x25'6" platform extends to twice its length. Any other bays that might have been built are no longer extant.

The walkway, which appears to have been constructed at a later date, provides direct access from the tomb of Isa Tarkhan II. It was found in a highly dilapidated condition, most of the carved stones having been lost, exposing the pathway to misuse and pilferage. The walkway is an important element that provides accent and significance to a tomb which was neither as baroquely ornate nor as lofty as the exalted sepulchre of Isa Tarkhan II, a ruler with high-ranking powers bestowed on him by the Mughal emperor. The loss of a major part of the walkway had undermined the value of his father's sensitively built tomb with its classical attributes. The 8' wide path extends to 91' length and once carried 3' high dwarf walls on its northern and southern aspects. An offset at the eastern end, provides a width of 12'9" close to the Entrance Canopy. The dwarf walls were composed of 4.5" thick carved stone slabs carrying simple ornamentation, and topped with 6" thick dressed stone slabs.

The conservation project was begun in December 2014 when the first studies were initiated. The entire project was concluded on 31st December 2016.

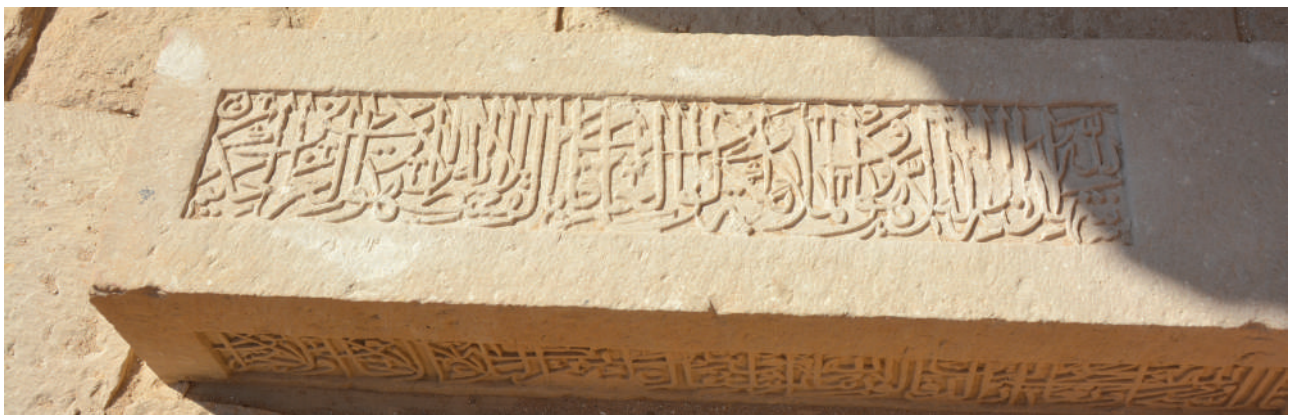


Perimeter Wall from southwest. Extant cupola and base only of the east cupola can be seen.

Project Background

The project consists of conservation of the Tomb of Mirza Jan Baba that includes the Graves Platform and Graves Canopy, Enclosure Perimeter Wall, Entrance Canopy or deorhi, the Zenana Chamber, and the highly damaged Walkway.

An application to the authorities was made at the inception. Although preparatory work could be started, however, all intrusive activities and studies could only be undertaken after formal permission was received on 21st January 2015. Accordingly, work on compiling base line data was begun in early February 2015. This extensive work yielded eleven folios that provided in-depth studies of the 16th century monument. The folios con-



Calligraphic panel on grave located on Graves Platform.

Phase I: Dcember 2014
- Mobilization

Phase II: Jan. '15. to Apr. '15
- Base Line Information
- Set Documentation Centre
- Geo-technical Study
- Structural Evaluation
- Condition Survey/Damage Assessment
- Physical Survey
- Photog. Documentation
- Testing and Analysis.

Phase III: May '15 to Dec. '16
- Conservation & Restoration

sisted of detailed documentation and analysis of related issues, along with preparation of samples of mortars for approval by the Experts Committee members.

The committee, chaired by Architect Yasmeen Lari, consisted of Mr. David Punzelt, Mr. Saleem ul Haq, Dr. Michael Jansen, Mr. Qasim Ali Qasim, Mr. Suhail Zaheer Lari, and Engr. Amin Tariq. The field team comprised Heritage Architect Ashfaq Ahmed, Project Manager Mr. Naheem Shah, and Heritage Consultant Ar. Saba Samee, along with several well trained master artisans proficient in their work with stone and bamboo.

The project period was divided into three phases:
Phase I was from December 2014 to January 2015, and consisted of mobilization, site organization and appointment of consultants.

Experts Committee meeting at Makli.

Experts Committee members visiting tomb of Mirza Jan Baba.

Phase II was from February to April 2015, during which time various studies and investigations were carried out.

Phase III consisted of conservation work from May 2015 to December 2016. This included conservation, structural stabilization, cleaning and consolidation, as well as restoration of external areas.

Several folios containing analysis, studies, samples record, and recommendations were prepared for discussion by the Experts Commitee members. After detailed discussions work was undertaken in the field according to guidance provided by the committee.

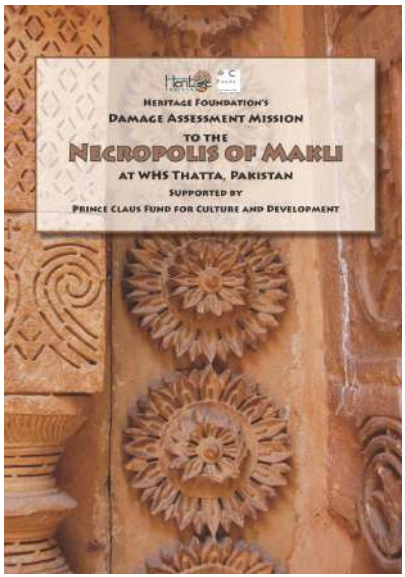
Several folios were presented to the Experts Committee members comprising baseline information and studies.

Conservation Work

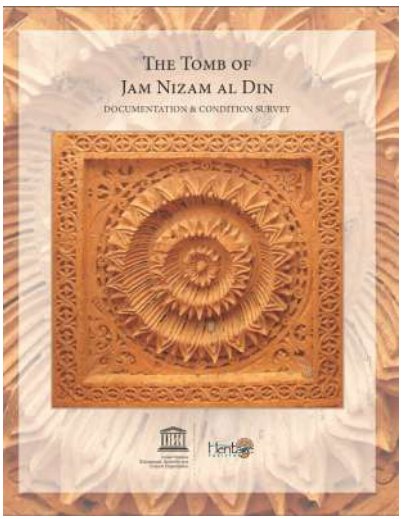
- Graves Platform
- Enclosure Perimeter Walls
- Zenana Chamber
- Graves Canopy
- Entrance Canopy (Deorhi)
- Walkway
- External Works

Documentation of graves sarcophagi and flooring.

Discussing condition of central extant dome.



First pictorial catalogue of WH Makli, 2011.

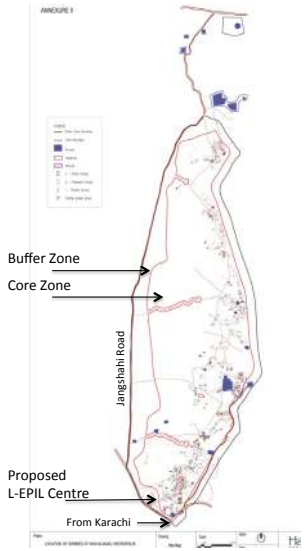


Documentation of tomb of Jam Nazam al Din, 2011.

Folio I consists of introduction to World Heritage Site which includes its history; the range of stone and brick monuments and their ornamentation, the work undertaken by Heritage Foundation of Pakistan since 1988 including conservation and stabilization of several historic structures, and publications related to different aspects of Makli, the endangered state of the site and the requirements of the World Heritage Centre to prevent the site's removal from World Heritage List.

Folio II provides information regarding the location and other details of the project. This includes the project period, project scope, outline of preservation/conservation work, and details of all folios.

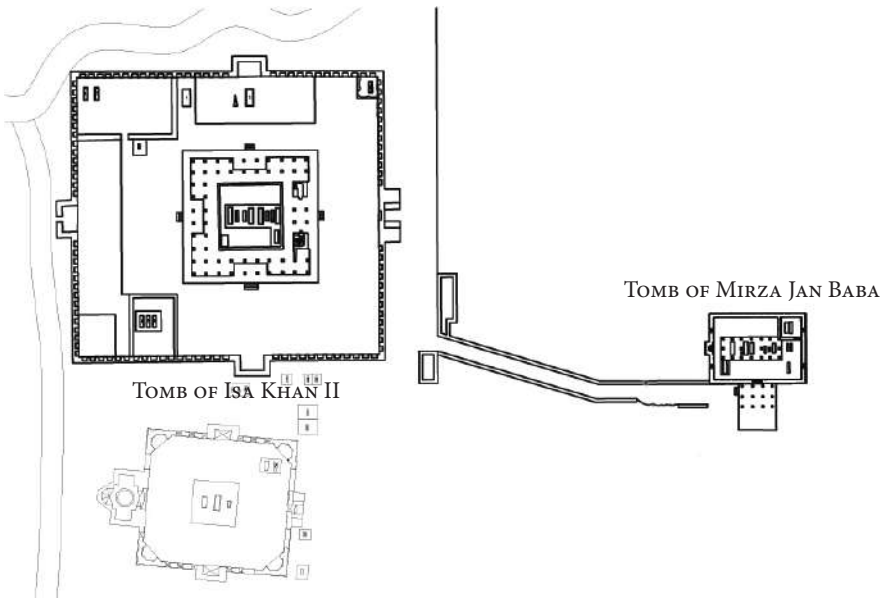
Page from National Register, WH Makli, 2014.



Site map delineating core & buffer zones 2012.

In **Folio III**, significance and the basis of Outstanding Universal Value (OUV) of the monument have been identified. The values are based on several international charters and recommendations by English Heritage and Getty institute etc.

Site Significance: Historical Value, Information/Education/Academic Value, Associative Value, Communal/social Value, Intentional/Purpose, Use Value, Commemorative/Symbolic Value, Social Value, Spiritual/Religious Value, Economic/Use Value, Non-use/Bequest Value.
Monument Significance: Artistic Value, Illustrative Value, Associative Value, Aesthetic Value, Design Value, Age Value.

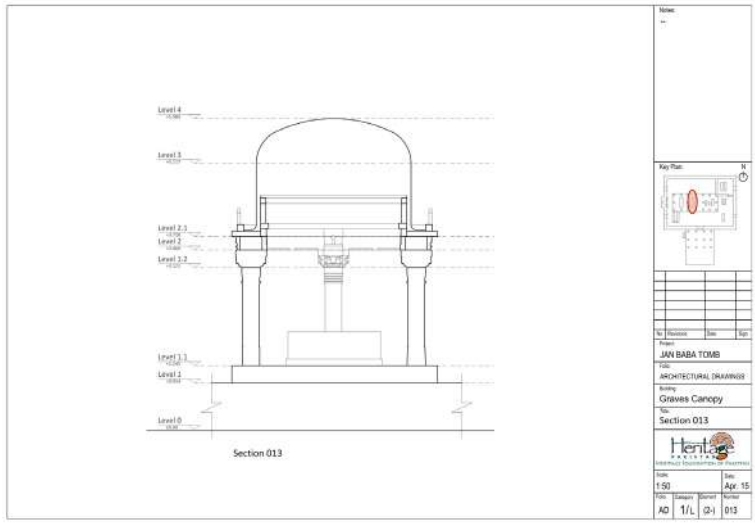


Site map showing relationship of tombs of Isa Tarkhan I (Left) and Mirza Jan Baba (right).

Details of Folios

- Folio I (ID): Introduction to WH Makli
- Folio II (AD): Introduction to Tomb of Mirza Jan Baba Project
- Folio III (SV): Significance & Values
- Folio IV (AD): Architectural Drawings
- Folio V (NS): Numbering System
- Folio VI (PD): Photographic Documentation
- Folio VII (SD): Image Superimposition
- Folio VIII (DT): Condition Survey and Damage Assessment
- Folio IX (CA): Consultants' Assessment
- Folio X (DT): Stone Damage Types
- Folio XI (DD): Area-wise Damage Details
- Folio XII:(EG): Guidance by Experts Committee

(Right). Folio IV. Specimen of 'As built' drawings.

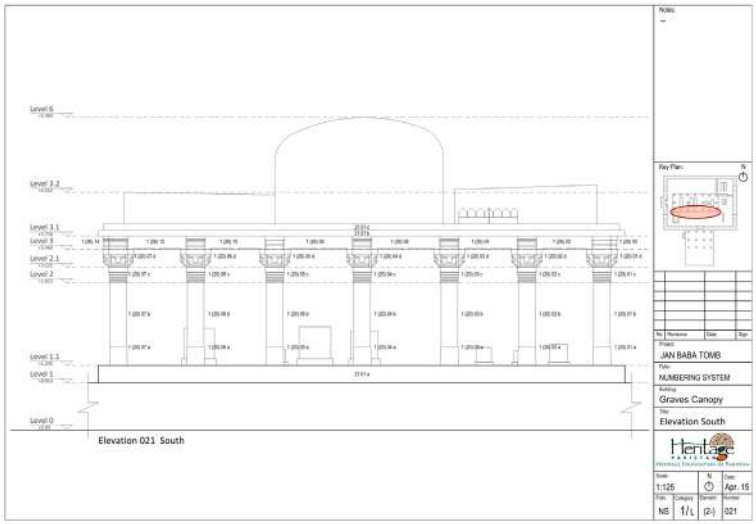


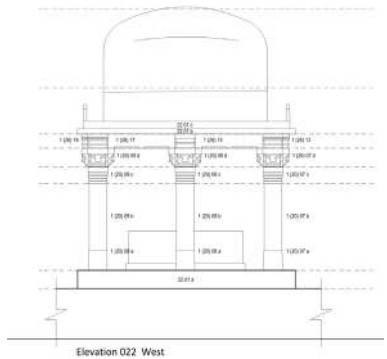
Folio IV comprises detailed 'As built' architectural drawings based on physical survey of the entire monument. These consist of plans, sections and elevations of all parts of the monument.

(Above). Example of image superimposition to scale from Folio VII.

Folio V provides unique numbering allocated for each component and element using detailed architectural drawings, along with a reference key. The numbering system was devised by Architect Yasmeen Lari in 2003 as UNESCO's National Advisor while documenting the World Heritage Lahore Fort.

Folio VI comprises systematic photographic documentation of all parts of the monument. It provides a comprehensive record of the original state of the monument when it was taken over for conservation.





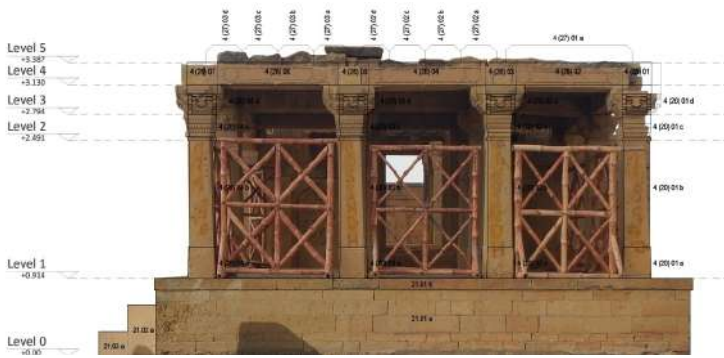
(Above and left). Elevations showing unique numbering system for all components, Folio V.

Folio VII is based on preparation of painstaking photographic superimposition including stitching of a large number of images. Photographic record has also been developed to show all parts of the monument.

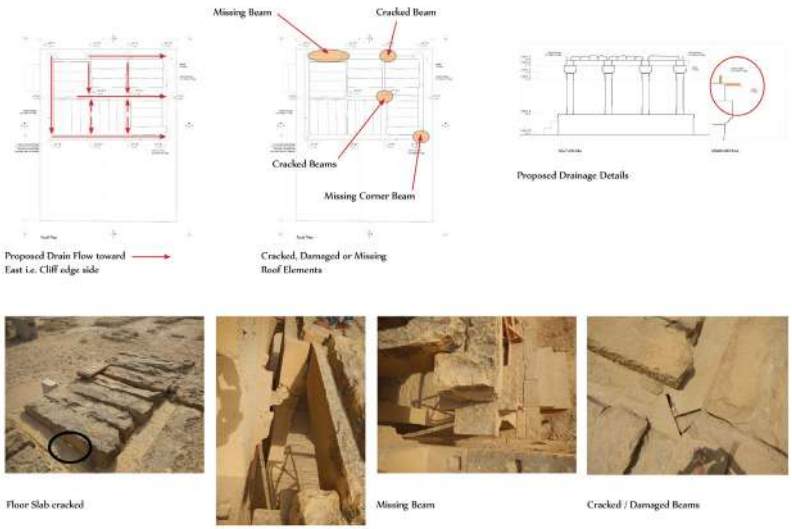
(Above). Folio VII. Scaled image superimposition

(Right) Folio VI. Photographic documentation.

Folio VIII comprises damage assessment of the entire structure including all elements and components of each part of the monument. This includes suggestions for interventions that were considered necessary in order to stabilize and conserve the monument.



(Right) Folio VIII. Damage Assessment.



(Left) Folio XII. Area-wise damage details.

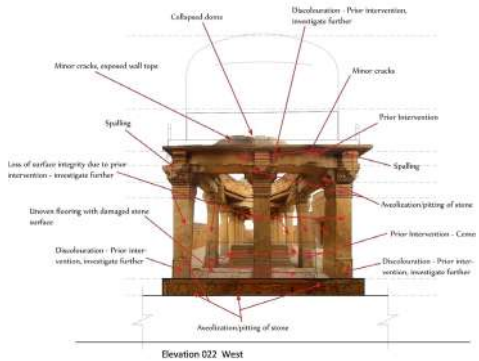
Folio IX contains structural evaluation and recommendations related to damage to stone surfaces, poor surface drainage, open joints, stabilizing of the central extant dome and treatment of two collapsed domes.

The structural study emphasized the vulnerable central bay of the Graves Canopy where evidence of settlement had been found.

For the geotechnical study investigation by drilling four bore-holes to 25′ depth was carried out. The soil composition was described in the report. The investigations confirmed that no ground water was found up to 50′ depth.

(Above) Folio IX. Geotechnical investigations.

(Right). Folio X. Analysis of stone damage. (Far right). Folio XI. Damages in each part of monument.



Folio X contains analysis of stone damage after careful examination in order to work out details for conservation.

Folio XI highlights damages found in each part of the monument, in the light of which conservation action is discussed.

Folio XII was compiled to include the guidance provided by the Experts Committee and the actions to be taken, along with principles of conservation to be followed.

Damage Assessment

The sepulchre of Mirza Jan Baba is among the most significant monuments at Makli built entirely in stone. The structural elements consist of finely dressed stones that are embellished with a repertoire of elegantly carved features.

The survey recorded high level of damage to the pillars situated on the northwest of the Graves Canopy, where the capitals had suffered from excessive disintegration. The defects were identified as scaling, weathering, blistering and suffering from advanced decay. The stones slabs at the edges of the graves platform were found to be in a highly damaged state.

Central bay of Graves Canopy.

In the enclosure Perimeter Wall, defects consisted of fracture, hairline cracks, star cracks, black crust formation, and discolouration along with widening of joints. Walls and pillars carried a high degree of soiling and graffiti. The flooring in all areas was found to have alveolization/ coving and differential erosion. Through an area-wise survey of damage, necessary treatments, following the principle of least intervention, were worked out.


Damaged stones of Permieter Walls.

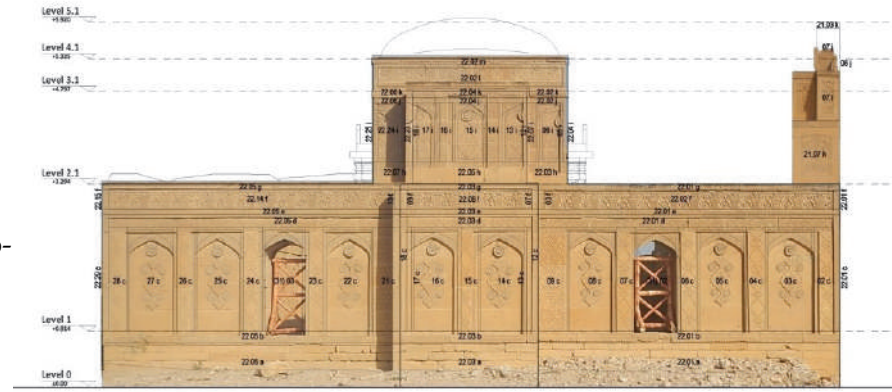
View from southeast corner of enclosure. Extant and lost cupolas can be seen in Graves Canopy.

Graves Canopy

The damage highlighted in Folio XI showed the condition of the extant central dome and surviving stone rings of two cupolas that had collapsed. The cracks in the plaster of the central dome were also noted. The internal condition of the central dome showed widening spaces between stone joints due to settlement of stone pillars located in the west of the central bay. The most affected stone pillars were found on the south western part of the Graves Canopy.

Enclosure Perimeter Wall

The perimeter wall, composed of dressed and carved stone panels, was found generally to be in a reasonable condition. However, among the major damages was the loss of small jharokas lining the two sides of the entrance gateway to the enclosure. Also highlighted was the Perimeter Wall on the east which was constructed with simple dressed stones, rather than the rhythm of panels composed of dressed and carved stones. The missing stones at the top of the walls were identified. Some evidence of battlement *kanguras* was found, but the majority had been lost.



West Elevation showing panels of Perimeter Wall.

Carved frieze stones above Perimeter Wall.

Zenana Chamber. Displaced lintol (above) and view into the chamber (far right).

Zenana Chamber

The Zenana Chamber had lost its roof; its diagonal and other stones had either been pilfered or were dislodged. These would require careful identification and fixing of many elements in their original postion.

Entrance Canopy

The study of the entrance canopy showed the varying designs on roof slabs which had been appropriated from elsewhere, and were in a highly vulnerable state. Due to open joints, water dripped into the stone structure, damaging the roof stones and pavers. The stone beams had suffered from high level of erosion and carried extensive cracks, while the top and edges of the slabs suffered from decay.

Zenana Chamber. Damaged state of flooring.

Other Issues

In view of lack of maintenance and the unguarded state of the monument over several decades, weather and vandalism had inflicted great damage to the monument.

Entrance Canopy. Ravaged roof slabs.

Site Preparation

As has been discussed earlier, the site has suffered excessive deterioration due to neglect and lack of maintenance. The imposing tomb of the son Isa Tarkhan II is well guarded with restricted entry; in comparison, the tomb of Mirza Jan Baba was open to visitors at all times and was thus susceptible to misuse.

When the mausoleum of Mirza Jan Baba was taken over for conservtion, it was in an extremely unkempt state. Stones and rubble were strewn around its periphery, and the graves were

North Perimeter Wall. Grave mounds exerting pressure on the monument wall.

View from southwest.

Interior view of Gateway.

in a dilapidated and impaired state intensifying the feeling of neglect. Most of the walkway that had been laid to accentuate the direction of Mirza Jan Baba's resting place was in a damaged state. Thick perimeter dwarf walls, defining the sides of the Walkway, were constructed with courses of carved stone on both its sides.

Because of its open, unguarded location, most of the valuable carved panels were no longer extant. Even the simple dressed coping slabs, could no longer be found. The area surrounding the monument presented a picture of desolation. From a distance its foresaken appearance held little interest for visitors, but, because of its abandoned state, it drew local youth who would drive their motorbikes at great speed on the Walkway, greatly damaging the ancient stone work.

View from west.

Even as the monument was taken over, traces of its misuse by drug addicts were found. And, intruders were found to have scaled the Perimeter Walls dislodging several stones.

Zenana Enclosure seen from west.

The Entrance Canopy located in the south was easily accessible, even though it was placed on a high podium. The gateway into the enclosure Perimeter Wall was without a door or barricade. As the openings in the western and eastern Perimeter Walls were shorn of any screen or lattice, these beckoned intruders to jump freely into the Graves Enclosure and Zenana Chamber.

As soon as permission from the authorities was received, steps were taken to forestall such damage in the future, and the monument was barricaded from unwanted visitations. Specially designed bamboo barriers were erected in all openings. In view

Barricades provided to prevent entry into Entrance Canopy.

Free-standing bamboo barricades.

of the fragile nature of the monument, the barriers were designed as stands and their bases were fitted with padding to prevent any damage to the flooring.

Thus, free-standing bamboo barriers were installed in all openings - seven in the Entrance Canopy arcade, and four in the cusped arched openings in the Perimeter Walls. These precautionary measures inhibited unwanted entry and helped to prevent further injury to the integrity of the fine 16th c. monument. The barriers were 6' high and were designed to fit into the openings, so that it was difficult for the more adventurous visitors to move them. After the site was taken over, extra security had to be arranged at night to safeguard it from intruders.

The other vulnerable points were the Graves Canopy and Zenana Chamber. The Graves Canopy had already lost 2 out of its 3 domes. Even the extant central dome was in a precarious condition and it was hoped that it would survive until steps for its protection had been taken. Being the only dome of its kind, it was essential to provide all safety measures, until studies had been carried out and its scientific stabilization could be assured.

The collapse of the two side domes had made the Graves Platform, which accommodated the historic graves, highly vulnerable. All measures were required in order to avoid further damage to the sarcaphogi and the platform itself.

Damage caused due to lack of roof in Zenana.

During the studies, settlement in the central bay of the Graves Platform was detected. This condition had been aggravated due to rain water which found its way into the flooring of the platform, endangering the pillars and the central dome itself. The tilting of pillars and the deformation of the beams spanning between them were also a cause for alarm.

The state of the sarcophagi was no better. Due to exposure to weather and subjected to willful wreckage, some of the graves had moved from their original position. Although the date could not be confirmed, new stone insertion below one of the graves was noted.

To provide protection to the remains of the valuable Graves Canopy, an elaborate bamboo roof was constructed. The temporary structure was built in a manner which would not

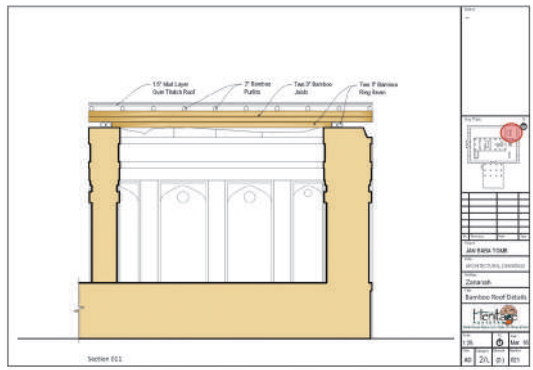
Temporary bamboo roof cover provided to Graves Canopy.

Protective measures during conservation.

Enclosure. Carefully placed supports for temporary bamboo roof over Graves Canopy.

damage any of the elements of the original canopy nor its fragile flooring.

During the construction of this temporary bamboo roof, the graves and flooring were covered with gunny bags to prevent any inadvertent damage. The erection of the temporary bamboo roof provided the much needed protection to the entire Graves Canopy ensemble and rescued the Graves Platform from further damage. As in the case of the Graves Platform where two cupolas had been lost, the Zenana Chamber's roof had also collapsed several decades ago. Because of the void in the roof, rain water had played havoc with the interior, and the chamber was in



Zenana Chamber. (Left) Flat bamboo roof constructed to provide cover. (Above) Section showing details of construction.

urgent need of cover. The evidence of a cupola was unclear at the time and it was decided to place a flat roof on the chamber. However, once evidence of stone rings for the original cupola was unearthed, the newly built bamboo flat roof was removed and a bamboo cupola constructed instead.

Other preparatory measures consisted of the removal of a large number of wild bushes that had encircled the monument. In addition to making the surroundings tidy, the area had to be made safe from snakes and insects which posed danger to the workers. It was also necessary to ensure drainage of rain water from the immediate vicinity of the monument. All stray carved stones

(Above and right). Carved stone pieces strewn around the site.

that were strewn around the tomb periphery were carefully and gently picked up and placed away from the tomb.

Extra debris collected over decades on the eastern side had also to be excavated and removed in order to ensure drainage away from the monument. In addition for draining storm water, plinth protection was constructed. The removal of rubble and pieces of carved and dressed stones that were abutting sides of the monument has been accomplished to provide a neat setting to the monument. The search for original pieces yielded a few stones that had become dislodged from the tomb and the walkway, which were fixed in their original position.

Conservation

The methodology laid down for conservation consisted of retaining all original evidence, even if in a highly damaged state. Following the principle of 'least intervention' no original part or element that was found, even in an excessively deteriorated condition, would be removed. Instead efforts would be expended on stabilization and consolidation, and on ensuring that all original elements are protected. Among the critical factors were the large number of stone pieces that had been affected by wind and rain. These have suffered from erosion and pitting resulting in loss of surface and formation of a net of cavities. There were also cases of spalling and despoilment of mouldings and protruding sculptural stone features.

UNESCO mission visitors.

German Consulate visitors.

The Experts Committee agreed that since maintaining integrity of the monument was of the utmost importance, in addition to 'least intervention', 'reversibility' principle should also be pursued. Following these doctrines, all original stone pieces, however damaged or deformed, have been kept intact. Where necessary these have been stabilized in their original location in order to ensure their survival.

In case of cement mix application found in some locations, if the cement mortar could be removed without damaging the original

Damaged state of flooring and sarcophagi on Graves Platform.

inner surface, attempt was made to remove it. In its place, in order to provide protection to the already damaged inner core, application of a weak mix of lime, sand and stone dust has been provided to achieve a compatible stone colour match. Such sacrificial layers were used for repairs in selected portions of the monument only, which was a treatment primarily for shielding the original elements from further decay.

Similarly, It was also agreed that no attempt should be made to replace damaged or lost parts. Building upon existing evidence, in some places new pieces have been used to make up the loss, but these are distinct from the original and can be easily identified. Procedure of marking with date and slight differences in the colour/texture has been maintained.

Only in a few cases an attempt would be made to make up lost stone pieces, however, in the case of the Walkway dwarf walls reconstruction would be undertaken. The Walkway had presented a disorderly and fragmentary outlook, negating the very purpose for which it was built. It had originally been designed as a ceremonial path that articulated the linkage between the-mighty mausoleum of Isa Tarkhan II with the comparatively restrained tomb of his father Jan Baba. Many dislodged pieces

View of highly damaged Walkway from east.

of the Walkway were retrieved from near and afar, in order to minimize the number of new stone slabs. For a major part of the route, evidence of alignment of the dwarf wall was visible above ground.

However, at the eastern end portion no indication was visible and surface excavation had to be carried out to establish the exact configuration.

Thus, the portion had to be completely restored, matching the existing consruction with compatible dressed stone slabs. Advantage of the reconstructed stone panels was taken to place the signage carrying history of the monument in this section.

Perimeter Walls. Naheem Shah providing guidance for scientific cleaning.

General Treatment

The mausoleum, being entirely composed of stone elements, among the most disturbing factors affecting its outlook was the soiling and graffiti. As a result this fine mausoleum presented a dilapidated and unkept appearance.

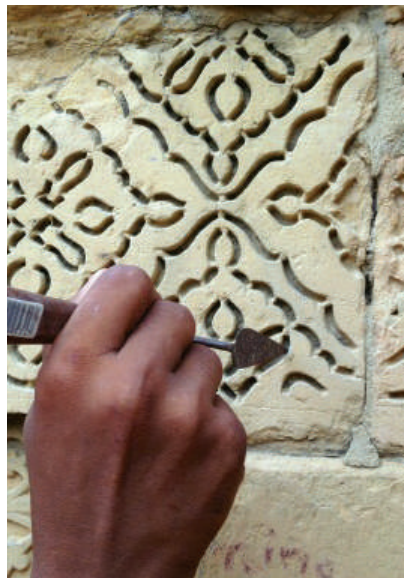
Several stone pieces were also found to be missing due to lack of maintenance and pilferage. A large number of open joints between stone slabs had led to constant ingress of water over several decades, causing inordinate damage to the structure. This included the collapse of three cupolas and the endangered state of the extant dome. The flooring, having been exposed to the weather for several decades, was in an equally degraded and vulnerable state.

Scientific Cleaning

In April 2015, teams consisting of the local youth hailing from the close-by mendicant community of the Makli Goth (village) were trained to take up the cleaning process. They carried out the work of removing all stains with great diligence. By creating a livelihood opportunity, the local community became engaged in heritage safeguarding, thus developing a stake in, and a sense of ownership for the historic site.

The cleaning process had to begin with a complete and thorough dry cleaning of all wall and roof surfaces. Being in an entirely exposed location, and since maintenance had been lack-

ing, dust had penetrated into the joints and, it seemed, into the very pores of anceint stones. The removal of dust accumulated in crevices was essential in order that at the time of wet cleaning the staining from loose dust would not ruin the surrounding stone surface. Although gentle hand washing was extremely time consuming requiring greater effort, it was important not to use any aggressive measures or apply any chemicals to the delicate stone surfaces. Even in the case of stubborn marks, labour intensive methods were applied gently in order to avoid inflicting any injury to the original stones. The wet washing itself was done in two stages. First a gentle washing was undertaken in order to remove all dust particles left over from dry cleaning. Later, a more diligent and thorough washing was carried out which consisted of gentle rubbing of all stone surfaces with *reetha* (soapnut) soap, that was produced by village women. For stubborn stains and soiling marks, scientific washing using a mix of Lisapol detergent and soapnut soap was carried out. Since soiling blackens the carved elements, special cleaning activity was undertaken by using tooth brushes to rub gently and clean the blackened surfaces, and extricate the dirt depos-



(Left & above). Gentle cleaning using tooth-brushes to remove dirt from crevices.

Using poultices to soften dirt.

(Above and far right) Removing stubborn graffiti from stone surfaces. Guidance being provided by Naheem Shah.

ited into the crevices. Black crust had formed in certain parts of the monument due to pollution. This was removed through a process of poulticing and gradual removal of the crust.

While the cleaning of dressed stone surfaces itself was time consuming, the removal of dirt from carved elements with deep indentations required a greater effort still. Poulticing was applied consisting of soft cotton soaked in warm water and left on the surface for at least 2 hours. Once the dirt had become soft, tooth brushes were used to remove the dust deposits, gently and gradually. In some stubborn cases slight scratchings also had to be used to remove the accretions from deeply carved motifs. It was made sure that great care was taken, both in soaking of stone and during the process of removal of dirt residue.

Since the graves carry exquisitely carved calligraphy and ornamentation, the work was taken up with a great deal of care using soft toothbrushes for removal of dirt and grime. The most challenging task in the cleaning was the removal of graffiti. Due

to paucity of guards, and unfortunate visitors' behavior, graffiti was seen on many surfaces of the monument. Although normally it is difficult to remove the marks made by markers etc., however, here too a combination of Lizapol and soapnut soap, applied gently but firmly was used, without inflicting any harm to the original surface of the stone. The strategem resulted in finally getting rid of the stubborn graffiti, that had marred the beauty of this remarkable monument. In several places remnants of loose cement plaster were found. Where cement repairs were difficult to remove and there was danger of causing damage to the original stone, these were left in their place. Any cement application that can be seen today in the monument is part of the interventions carried out in the past.

Thorough cleaning and pointing of joints.

Pointing Procedures

Among the most important aspects for conservation is to make the structure watertight. The ingress of water in any part of the monument would inevitably lead to deterioration and damage. Thus, a careful process of pointing all joints was devised and carried out meticulously with a great deal of care.

Strict SOPs (Standard Operating Procedures) were issued in English and Urdu in order that field staff is fully familiar with them and would ensure compliance by trained artisans.

It had been agreed that joints which were less than ¼" would not be treated, but would be provided a thorough cleaning. All

Loss of cupola making structure of Graves Canopy vulnerable.

joints which were greater than ¼" would be filled according to the laid down procedure. After scientific cleaning had been carried out the pointing process was begun in September 2015. Due to its extensive nature, work would be continued until almost the end of the project.

The final examination and checking of all joints was carried out in December 2016, and any joints that remained untreated were provided with pointing. The process of pointing was begun from the external surfaces of the Perimeter Wall. After all joints in the external wall had been treated, the teams moved to provide pointing to all internal surfaces, including the walls of the Zenana Chamber. Later joints in other elements e.g. pillars and capitals, upper parts of the canopies, as well as the cenotaphs were taken up for pointing. Becuse of the need for a large-scale appliction, the process consisted of carefully marking the area that required treatment in order not to miss out the pointing in the joints that had opened up and were in danger of being damaged through rainwater ingress.

Pointing in progress to seal all joints.

This procedure provided the necessary guidance to master artisans, and at the same time en-

East Perimeter Wall. As part of early 20th c. restoration, rebuilt portion of wall with simple dressed stones between openings can be seen.

sured that field staff would not miss any areas. Pointing was thus carried out very carefully by specially trained master artisans and in areas that had been identified. All pointing was deep struck and unobtrusive in order that the character of the monument is maintained, at the same time water ingress into the structure is prevented.

Missing Stones

A study was carried out for missing stones in the Perimeter Wall. While those in the lower parts of the wall would be made up with new dressed stones, duly marked with the date of intervention, any other stones, particularly those in the roof upstands could only be taken up after careful deliberation. It was finally decided to complete the rows at the top of walls and roofs with plain dressed stone pieces; however the *kanguras*, evidence of which was limited, would not be made up. In any case all existing battlement *kanguras* were stabilized in their place.

Master artisans dressing stones at HF's artisans atelier set up in buffer zone of WH Makli.

Dressing Stone Slabs

Although the condition of stones used in the mausoleum generally appeared to be in fair condition, in some parts considerable erosion or excessive damage was visible. Many stone pieces had been lost due to neglect or pilferage. As mentioned earlier, following the principles of least intervention and reversibility, it had been decided not to remove any of the original pieces.

Any new pieces would be added only when necessary and as long as they were distinguishable. Great care was taken in the selection of stone pieces which had to be compatible with the

original structure. These new pieces needed to be distinguishable but with comparatively little variation in order that the difference from the original was not visually disruptive.

The largest area where loss of stone slabs was evident, was the Walkway. Evidence of the stone dwarf wall was clearly visible, as some of the carved pieces were extant, and the pattern of laying could be seen. It required a major effort to restore the dwarf wall that lined the Walkway on both its sides.

Immediately after the Experts Committee meeting and after deciding that the walkway could be restored, work was begun on preparing the large number of stone pieces that were required for restoration.

It was decided that the new stone panels would be simple dressed stones, without any carving, in order that when seen alongside the original carved pieces, these would be distinguishable as a new intervention.

The dressing of large pieces of stone was a time-consuming activity and required painstaking effort. Master masons skilled in dressing stone slabs continued to work for 18 months to dress large pieces of the Walkway stones in order to match them with extant slabs. The fixing of huge stones was also an extremely demanding task.

Stone slabs being dressed.

(Right). Thorough cleaning deep joints of flooring to prepare for pointing in two to three layers.
(Below). Naheem Shah supervising application of pointing.

Stone Flooring

Stone flooring was used on the Graves Platform, inside the main enclosure, in the Zenana Chamber and in the Entrance Canopy. In all areas it was in a highly damaged state. Most of the joints had opened up which had exposed the flooring to constant water seepage. Although a drain existed in the enclosure and punctured it at floor level on the southern perimeter wall, it seems to have been blocked for several decades. The lack of drainage was among the causes that aggravated the dilapidated condition of flooring inside the enclosure.

It was thus important to ensure the sealing of all joints. Drainage of the flooring in the main enclosure was worked out and it was ensured that the floor was fully drained. Although initially it was thought that part of the flooring would have to be re-laid, it was later found that, after repointing, the paving could be maintained in its present condition.

(Far left and left). 'Before' and 'During' images of making up lost stones near drain in the enclosure.

INTERVENTIONS

General Treatment

Complete scientific cleaning as well as pointing internally and externally of the Perimeter Wall was carried out carefully, resulting in sealing all joints. Most of the stones acting as coping on top of the wall had been lost. Addition of coping/kerb pieces at the top of the wall was essential in order to prevent any water ingress into the core of the Perimeter Wall.

Accordingly, where considered necessary new dressed stones were placed. The new stone pieces were kept at a minimum.

Lime-sand plaster was also applied where necessary to ensure that rain water sheds off from the top of the wall and protection to the core of the stone wall is ensured.

Calligraphy identifying the grave of Jan Baba.

Internal view of South Gateway.

South Gateway & Mihrab (Apse)

The gateway that had been elaborately built with enlarged proportions had suffered from considerable damage. The *jharokas* or ornamental balconies, which flanked the profusely decorated main entrance to the enclosure were found in a highly impaired and mutilated state.

The once beautifully carved projecting features had been broken off as if deliberately torn down. Since insufficient evidence was available, it was considered best to stabilize them in their present condition. Although they appear incomplete, since the extant pieces are original, they lend grace and authenticity to the remarkable giant gateway.

The other giant wall feature punctuating the western façade of the Enclosure Perimeter Wall was in a comparatively better state. Its double *mihrab* arrangement, was in a fair condition except the inner *mihrab* that had been heavily stained.

The removal of black crust and stains required painstaking effort to remove the blemishes using gentle means, without resorting to chemical treatment. Pointing was carried out to the entire structure and all parts were stabilized.

Highly exposed areas such as the *mihrab* apse which carry intricate carving need to be provided maintenance on a regular basis to retain their elegance.

Graves Platform

The graves' sarcophagi, carrying elegant and refined carving articulating verses from the Holy Quran, were provided scientific cleaning with great care, using soft toothbrushes to remove all dirt from crevices. Unfortunately, no treatment could be applied to the despoiled corners of some of the panels. These damaged slabs are left in their original condition and the regrettable treatment meted out to them in the past is evident.

The stone flooring was in a highly impaired state due to the ingress of rain through the voids created by the collapsed cupolas. Due to the settlement in the flooring, the floor had also become uneven. The re-laying of the flooring was considered; however, when a trial was made by lifting one of the stone pavers by loosening a corner, the edges began to flake. It was clear that there would be considerable damage to stone pieces in case any removal was attempted.

Therefore, all the pavers were left in their original condition. However, pointing was carefully executed to ensure that all joints, even though wide and deep, are completely sealed.

The excessive depth of the joints, required cleaning them several times, before wetting and applying the pointing which was applied in two or three layers, depending upon the depth of the joint. This careful treatment was carried out in order to prevent any water seeping into the subfloor.

Saleem ul Haq and Yasmeen Lari checking the floor after removing the stone slab.

Grave with damaged base stones.

Arrangement for lifting being made.

Lifting the sarcophagus to reset eroded stones.

The condition of the filling below the stone pavers, was also examined. It was found that the subfloor filling was well packed and did not require any further treatment. The results of the instrumentation, that had been carried out over several months, also led to the conclusion that the structure had stabilized over time in its impaired state. Thus, the entire subfloor and flooring could be retained in their original state.

An element of concern was the misalignment of one of the graves where the base stones had been damaged. The entire sarcophagus was hoisted up with great care, and new stone slabs were inserted to stabilize it. This was a challenging activity as in case of any mis-step, the damage could be irretrievable.

The pavers at southern, western and northern edges had suffered from excessive erosion and were vulnerable to continuing onslaught from the salts- and sand-laden prevailing wind.

View of sarcophagus after resetting the damaged stones.

A time-consuming procedure was devised. The susceptible points consisting of a net of cavities and holes were injected with a syringe carrying a mix of lime/sand/stone dust mortar to prevent further degradation, without altering the character of the marred stone.

Except stabilization of the grave no other treatment was considered necessary, retaining the original form and condition of various elements.

Graves Canopy

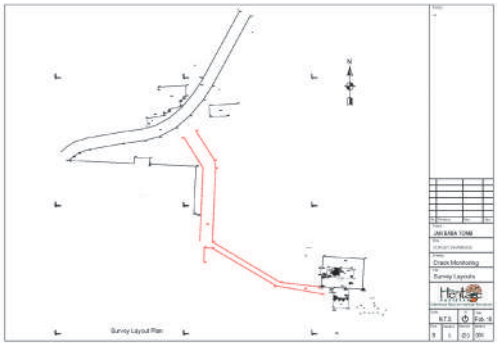
The Graves Canopy had suffered grievous harm over the years.

In addition to the pillars suffering from excessive erosion, the central bay had suffered from settlement and deflection of the stone beams. The safety and perpetuation of

Level of erosion in Graves Platform stones.

Injecting mortar in voids with sacarificial layer of lime and stone dust.

View of stone slabs after injection of mortar.

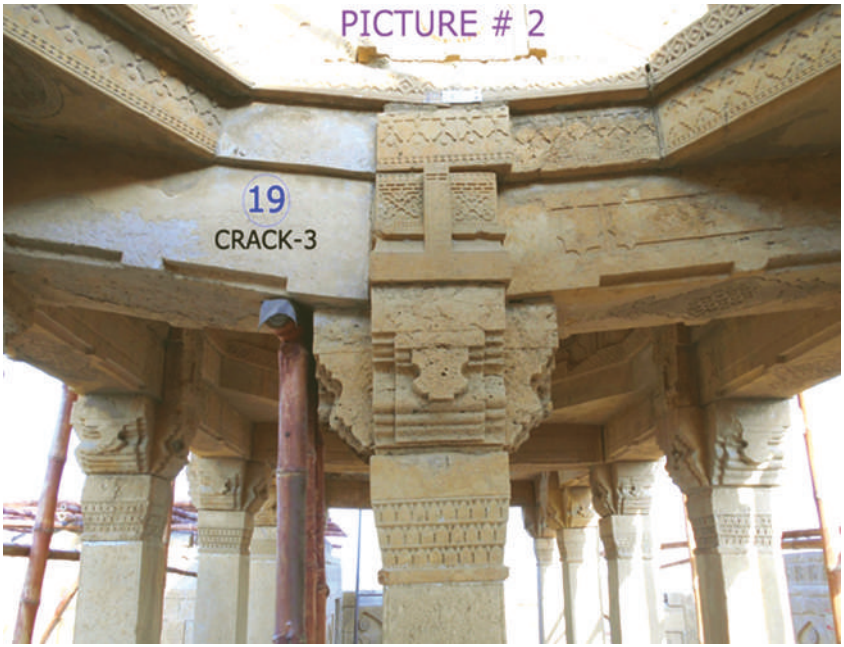


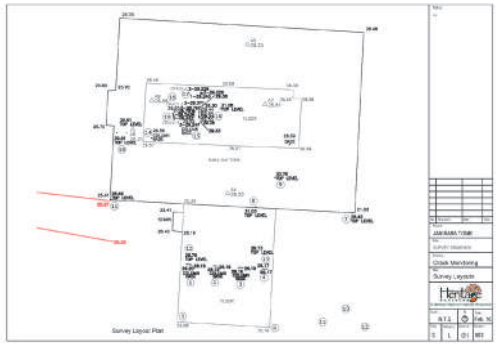
(Above). Survey drawing for road level and esablishing the datum.
(Right). Using instrumentation to determine movement.

Establishing datum at road level.

the cupola over the central bay was paramount, being the only complete evidence showing original technique of construction. In view of the voids created by the collapsed cupolas of the eastern and western bays, it required extreme care to save the extant central dome.

The settlement was evident in the tilt in the columns located on the west of the central bay, and in the deflection and misalignment of the stone beams and slight deformation of the cupola's profile. It is likely that the structural defect was caused by placement of one of the graves at a later date which might have





(Above). Recording crack monitor readings.
(Left). Establishing monitoring points.

been filled with loose earth. To determine conclusively regarding any movement in the structure, arrangements were made for regular scientific readings through Total Station measurements and placement of crack monitors. The appraisal enabled monitoing for movement in north-south and east-west directions, and a separate log, along with pictorial evidence, was maintained for the data. After carrying out the study for 10 months, it was concluded that there was no longer any movement in the structure, as the deformities appear to have stabilized over several decades. Accordingly, filling of open joints in the cupola would suffice for providing protection from the weather.

Placement of crack monitors for checking movement.

Central Extant Cupola

The treatment for the central surviving dome was a subject of much discussion. A favourite proposal was to take down the dome stone by stone and make up the gaps after re-assmebling them in an attempt to correct its deformation.

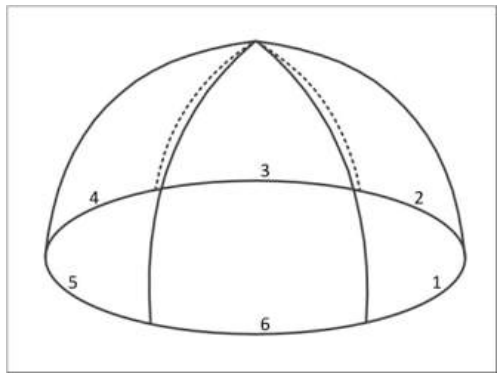
Stitched images. Entire extant dome.

After a detailed discussion by the Experts Committee it was decided that in order to maintain its integrity, the extant dome should not be dis-assembled. The slight deformation and the wide joints that had appeared over time should be accepted and no attempt should be made at aligning any part of the structure.

At first, grouting to fill the opened masonry joints with lime mortar was considered. Since some joints were very wide, small wooden pieces would be needed to secure the grout in the joints, which would need invasive fastenings which were not acceptable.

An option was to lay mortar in layers to achieve effective drying and curing, a process which would take far too long

with no surety of satisfactory results. Filling the masonry joints one row at a time following the concentric arrangement was also considered. This treatment would require scaffold/support to be moved continuously in circles, requiring extraordinary care not to endanger the sarcophagi directly below. For implementation a carefully deisgned schema was worked out consisting of treatment in alternate segments, completing each one from the bottom band to the top, and then left for curing. Thus, after completing segment 1, segment 3 was taken up, followed by work on segment 2, and then segment 4. The next was segment 6, ending the process at segment 5.



Division of cupola in segments for sequence of treatment.

This strategem ensured that the original dome remained safe and was not subject to any danger at any time throughout the implementation process. The treatment was rationalized, adopting different techniques for treating narrow and wide joint widths. The narrow joints were filled through and through by injecting mortar using a household icing gun. Once the joint was filled, pointing was applied following the normal pointing procedure.


Filling mortar in small joints with an icing gun.

Options of stone and terracotta tiles were considered as fillers for wide joints in rows

(Above). Stages of profiling terracotta for insertion in dome joints.

of concentric rings. When an attempt was made to insert a stone piece in one of the gaps, due to its rigid nature, it was found difficult to execute and might cause injury to the original stone pieces. Due to the problem in carving precise shapes for varying sizes of gaps, a perfect fit could not be achieved. In contrast, the easy workability and malleability of terracotta, was found to be highly suitable for profiling wedges for insertion. The advantages of terracotta included the difference in colour and texture that distinguished the intervention from the orignal stone.

Due to the ease of handling, the skilled artisans were able to carve the exact shape and contour needed for each location. Being weaker than stone, it was less likely to develop cracks in case of any movement in the structure, and was thus appropriate for conservation; being of lesser weight than any stone filling, it inflicted minimal weight on the structure. The entire work was carefully supervised. The intervention was carried out carefully by highly proficient master

artisans who followed meticulously the laid down procedures. Today, the colour of the terracotta brick insertions is distinguishable from the mellow colour of the original stone, while at the same time it blends well with the surrounding buff coloured stone pieces.

The treatment has stabilized the dome and made it weather proof. The work has been carefully monitored since its execution in August 2015 and no signs of cracks have appeared in 16 months. The profiled terracotta insertions are visually non-disruptive.

Images recording the process of profiled terracotta infills in large gaps in concentric rings of the extant cupola.

First trial dome on west bay under construction.

Loss of East and West Cupolas

The loss of east and west cupolas had left the graves sarcophagi, the most significant element of the ensemble, exposed to natural elements. The Experts Committee suggested exploring ways to provide cover to the graves and Graves Platform which had once been protected by domes. Although a flat roof would have been comparatively easy to install, a domical form, which was reversible would provide an appropriate termination to the entire ensemble. Thus, proposal of a bamboo dome was given serious consideration by the Experts Committee.

The decision to replicate the original form in bamboo in place of the lost cupolas, was a major intervention but it was easily reversible and was also easily discernible as a later addition. Another advantage was that it would impose minimum load on the historic structure. Although extensive expertise in bamboo construction was available with the Heritage Founda-

tion, until that time it had not undertaken any curved structures. The challenge was to build domes on top of the extant stone rings without inflicting any damage on the monument or compromising its integrity. For the first time, a trial to achieve curved bamboo shapes was successful and this created the confidence to create a domical form. The skeleton of an experimental bamboo dome structure was completed prior to the visit made by the UNESCO team in February 2016 for HF-UNESCO glazed tiles project. The team included Dr. Michael Jansen, who had provided guidance for the project as member of the Experts Committee.

Finishing new dome to match extant central dome.

It was found that bamboo structure could be built without causing any damage to the original extant stone pieces that lined the periphery of the void. The details of fixing had been worked out carefully and the new dome was therefore stable and strong. However, being the first attempt it was found that the exact profile of the dome had not been achieved and would thus have to be reconstructed. The dismantling of the bamboo dome was surprisingly easy and was achieved without harming the extant structure.

(Right) Ismail Baba constructing double bamboo skeleton with different internal and outer profiles.

With more confidence in achieving a polished output, bamboo domes were constructed on both western and eastern voids. The structures consist of inner and outer skeletons, resulting in two slightly different hemispherical forms that were tied together at intervals with stainless steel plates and bolts.

The forms were carefully developed from expolation of the remains of the collapsed dome and the shape of the surviving central cupola. The span of each dome is different which is reflected in slight variation of the profile of each cupola.

The joists of the bamboo skeletons were anchored carefully into bamboo reinforced lime concrete ring beams. Stainless steel netting was fixed to the external as well as internal skeleton frames

(Above). Construction with double bamboo skeleton to construct divergent internal and outer profiles.

to receive lime/sand/stone dust render, applied in two successive layers.

Simulating the original formation, the lightweight bamboo domes, which are reversible, now effectively shield the sacophagi and Graves Platform from further damage. At the roof level, no attempt has been made to add the *kangura* battlement pieces, since the new dressed kerb/coping stones making up the lost pieces of the bottom row are sufficient to prevent water ingress into the roof.

The stabilization of the extant central dome and the reconstruction of two lost domes with reversible bamboo has provided the much needed protection to the sarcophagi and Graves Platform.

Treatment with Sacrificial Layers

Generally, in many places use of cement was noted as part of interventions carried out at some stage in the past. Although the actual dates could not be determined, but it is likely to have been carried out during the 1960s by the custodians. Due to this treatment many pillars of the Graves Canopy presented an unsightly appearance.

'Before' and 'During' view of sacrificial layer to repair earlier cement intervention.

The matter of the removal of cement render and application of a sacrificial layer of lime/mud/sand was advised by the Experts Committee. Removal of the cement treatment was difficult, but could be performed in some cases if gently carried out over several days.

After testing with sample patches of lime/sand/stone dust mixes, a sacrificial layer was applied at deteriorated surfaces of the shaft to prevent further erosion of the inner core. However, wherever cement mortar had become brittle and likely to cause damage if removed, it was left alone.

The southwest corner pillar had suffered from excessive erosion where the entire protruding carved capital had become defaced. With painstaking action, using a mix of lime/sand/stone dust, the master artisans were able to replicate the intricately carved features of the capital. The reversible carving technique using sacrificial mortar will prolong the life of the inner core of the capital, at the same time keeping safe its original eroded sur-

Providing sacrificial layers to provide protection to inner eroded core. (Left) 'Before' and 'After' on posts. (Above). Before and 'After' on capitals.

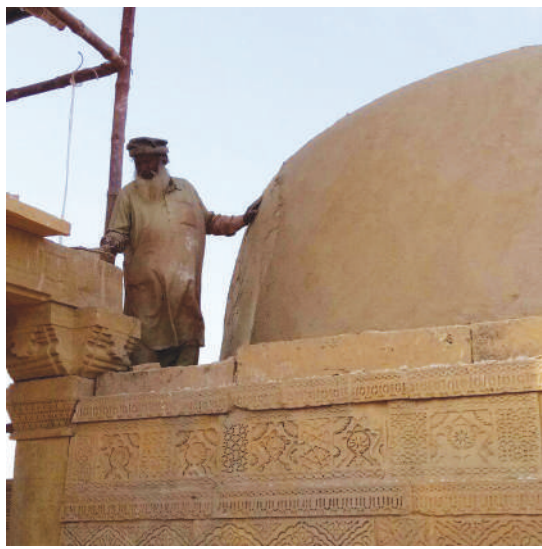
faces. Only those capitals have been restored that suffered from a high level of erosion. At the same time many others which were damaged, have been treated with injection of mortar with a syringe. The injection into the erosion-inflicted net of cavities has not materially altered their character, however, this treatment has provided protection from weathering for the next several years. This painstaking effort was necessary in order to retain the original character of the Graves Canopy at the same time adopt measures in order that the original stone surfaces are protected from further degradation.

Zenana Chamber. Placement of new stone pieces to form the base for bamboo dome.

Zenana Chamber

The chamber was found in a highly impaired condition. 19th c. archival images show the loss of part of the eastern wall, which may have caused the destabilization and failure of the chamber's roof. Over time the surviving roof stones had become displaced or dislodged. Due to the roof void, rain water had poured freely into the chamber, causing further harm to the interior paving and the sarcophagi. It was difficult to determine the form of the roof initially, except for the corner triangular stone pieces, which indicated a cupola that provided cover. A search for the missing stones was made in the vicinity and those that could be unearthed were used to complete the first row of stones. By stabilizing the triangular corner pieces the phase of transition was completed. Although a flat protective roof had been constructed earlier, however, after a careful study of a recently found 1858 archival photograph, the beginning of a cupola above the phase of transition was established. At this discovery, work on the cupola, similar to those constructed on the Graves Canopy, was begun and although much effort had been expended on the construction of the flat roof, it was dis-

Removing flat bamboo roof to be replaced by bambooo cupola.



(Above & right) Zenana Chamber. Stages of constructioin of 2-skeleton bamboo dome.

Placing new end pieces to make up loss of stones.

mantled with great care. A careful study of the other cupolas showed that the transition from an octagon to a 16 and 32 sided form was essential before the bamboo cupola could be installed. On new dressed stones a bamboo reinforced lime concrete ring beam has been fixed, above which has risen the double-skeletoned bamboo dome, duly lined with stainless steel netting finished with lime/sand plaster. Thus, a bamboo cupola similar to the two domes in the Graves' Pavilion, has been constructed, providing the Zenana Chamber with originally intended spatial character as well as much needed protection. The dislodged lintol of the door opening has been provided support by inserting thin slabs of dressed stone in the architrave. This unobtrusive intervention was carefully executed using stainless steel bolts in order to prevent the collapse of the wall masonry above the lintol.

Dmaged sarcophagi with elegantly carved verses from the Holy Quran.

Pointing in gaps of stone slabs of highly eroded roof slabs.

The highly damaged flooring of the chamber has been provided the same careful treatment as in other parts of the mausoleum. One of the graves that had shifted from its location, was carefully lifted and straightened out.

Gaps in roof slabs.

Entrance Canopy

Although 2 bays of the Entrance Canopy have survived, they were in a highly run-down state. In view of the slabs appropriated from elsewere, these were clearly reconstructed from the debris available at the time. The study of 19thc. archival photographs shows the derelict state of the site; but the entrance canopy structure appeared in a reasonable condition. Over the next century, its bays seem to have collapsed. At some stage the canopy was partially rebuilt, and using the surviving pillars of

Damaged stone riser at entrance to the canopy.

The damaged stone riser at entrance inverted to provide clean edge.

State of joints between damaged roof slabs.

two bays the roof was also completed, but using carved stone slabs from elsewhere. The poor condition of the roof was aggravated due to its exposed location in the southwest. Water seepage further wrecked the stone panels. The rehabiliation of the roof was undertaken through cleaning and repairs and a sloping lime mix water proofing layer was laid at the joints to ensure effective discharge of rain water. The stones edges visible on the west and south were also in a highly ruined state. As all vulnerable points have been sealed, with no danger of water ingress. these have been left without any attempt at renewing them or relaying them.

Walkway dwarf wall being restored.

Walkway

The Walkway, which had been shorn of most of its dwarf wall, presented an unkempt and dilapidated entry to the mausoleum. Since evidence for its alignment along with the size and construction of dwarf walls lining the Walkway was available, these were replicated to complete the pathway.

Many original pieces that had been dislodged from the Walkway walls were retrieved from near and far, in order to minimize the number of new stone slabs.

Evidence of dwarf wall being examined by Saleem ul Haq and Ashfaq Ahmad.

Dwarf wall being restored at east end.

The extant stone pieces were carefully stabilized, but in the new work, instead of carved elements, simply dressed stones, inscribed with the date of intervention, have been used. For a major part of the route, evidence of alignment of the dwarf wall was visible above ground. At the eastern end surface excavation had to be carried out to establish the exact configuration of the dwarf wall. This portion had to be entirely rebuilt, matching

Restoration of Walkway in progress.

Restored Walkway seen from east. The linkage between the lofty gateway of the tomb of Isa Tarkhan II can be seen.

the existing consruction with compatible dressed stone slabs, thus fulfilling the original intent. The terrain consisting of higher ground and several grave platforms surrounding the walkway did not allow any drainage along the north and south dwarf walls. Accordingly, for ease of drainage, the rain water is discharged towards the east to drain at the termination of the Walkway.

The entire Walkway floor has been levelled and covered with light aggregate, finally providing an orderly and impressive arrival experience.

Removing debris from north Perimeter Wall.

Grave platforms exerting pressure on north Perimeter Wall.

Water disposal passage along north Perimeter Wall.

Original platform being restored after removing the debris from north Perimeter Wall.

Graves on sides of the monument have been re-assembled in orderly fashion.

Grave Platforms & Mounds

Two grave platforms attached on the northern part of the enclosure wall imposed undue stress on the finely carved Perimeter Wall of the mausoleum. To relieve the pressure, the debris next to the Perimeter Wall was carefully removed. Exploratory excavation exposed the finely carved base of one of the platforms, while the other was found to be composed of rubble. The removal of the rubble detached the platforms, releasing earth pressure from the mausoleum wall.

This passage is being used to drain the rain water, and at the same time preventing seeping of water into the foundation of the historic wall. The provision of plinth protection has allowed clearing of bushes and extra stones that were strewn about in the vicinity.

View from southeast. After removing debris and placing unobtrusive plinth protection.

Clear bullet proof glass fixed in openings to prevent entry.

The clearing process has been particularly useful on the eastern side, and created neat surroundings for the mausoleum which was once strewn with rubble and wild growth.

Prevention of Garbage Close to the Mausoleum

Among the worst sights is the collection of plastic bags that fly in from all sides and clutter the site. As long as the site itself was untidy, with collapsed graves, and stone strewn in all directions, the plastic bags were just one more unsightly factor.

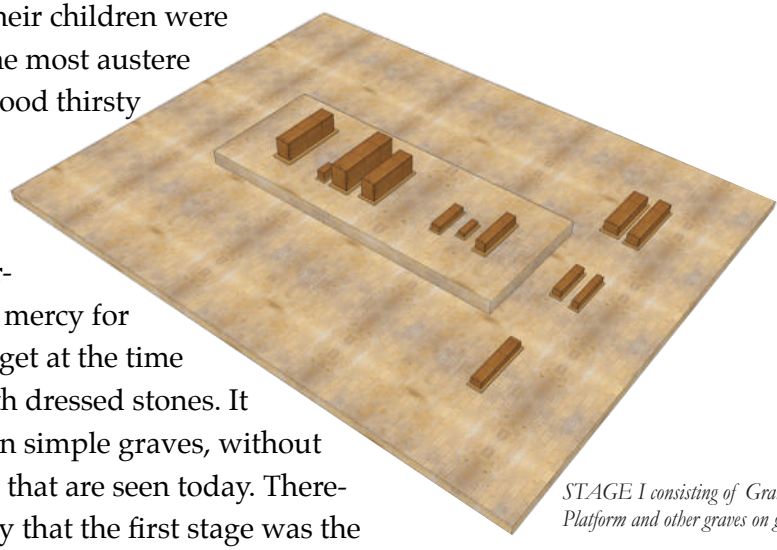
However now that the site around the mausoleum has been cleared up, and the conservation work is complete, it would be unfortunate if the plastic bags continued to mar the view of the mausoleum. It is hoped that the defined area will be kept neat and orderly to enable visitors to experience the impact of the classical sepulchre of Mirza Jan Baba, among the finest tombs found on the Makli Hill.

Monument Chronology

The mausoleum is witness to one of the most painful chapters in the annals of Sindh. The growth and extensions of the mausoleum can be ascertained from examining the sequence of various structural elements. The piecing together of the architectural clues with historical folklore results in an interesting chronology about the construction of the mausoleum.

Stage I

We know that Mirza Jan Baba and his sister and brother-in-law Yadgar Miskin Tarkhan along with their children were massacred by Mirza Baqi Tarkhan, the most austere ruler, who was well known for his blood thirsty character.



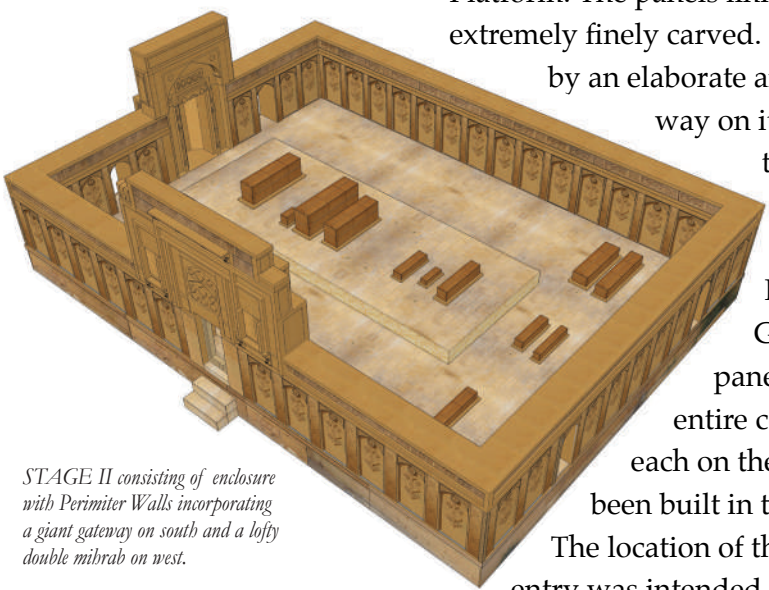
STAGE I consisting of Graves Platform and other graves on ground.

Since Mirza Jan Baba and his brother-in-law had lost the battle for sovereignty to Baqi Tarkhan, there was no mercy for them and the only abode they could get at the time would be a simple platform built with dressed stones. It is possible that they were all buried in simple graves, without the ornately carved stone sarcophagi that are seen today. Therefore it can be said with some certainty that the first stage was the construction of the platform.

Stage II

It is also known that Mirza Jan Baba's son, the great ruler Mirza Isa Tarkhan II, became powerful as he was also assigned as ruler of Gujarat by the Mughal emperor.

It was during the early days of his rule, that he took up the first stage at embellishing the grave sarcophagi and also built a perimeter wall to provide enclosure and privacy to the Graves Platform. The panels lining the perimeter of the enclosure are extremely finely carved. The Perimeter Wall itself is punctured by an elaborate and beautifully ornamented giant gateway on its south. Another defining point is the tall giant double *mihrab* structure carrying some of the most exquisite carvings. Thus, it can be speculated that the Perimeter Wall or the enclosure of the Grave Platform exhibiting finely carved panels belonged to the second stage. The entire courtyard with its four openings, two each on the east and west sides appear to have been built in the early period of Isa Tarkhan II's rule. The location of the gateway indicates that the original entry was intended from the south. Since the entire courtyard is elevated to 3' above the surrounding ground level, there must have been steps leading from the ground into the enclosure from the south but are no longer extant.

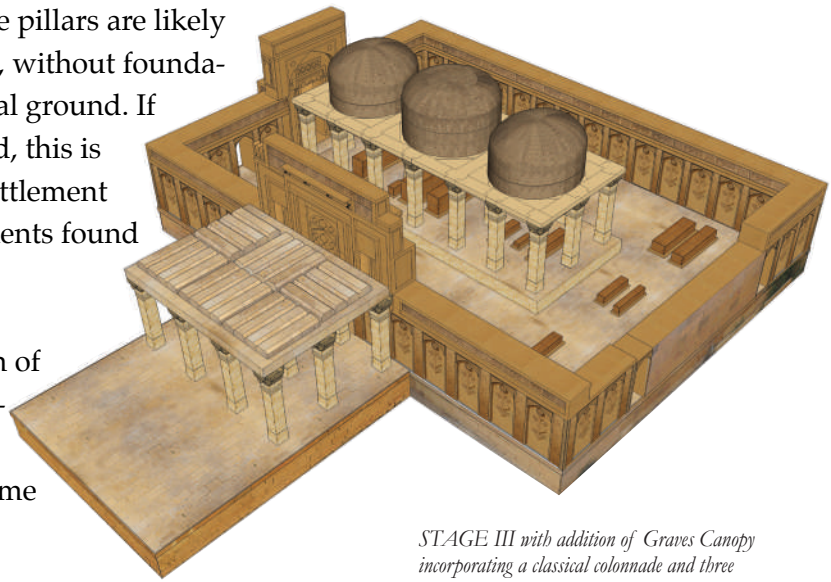


STAGE II consisting of enclosure with Perimiter Walls incorporating a giant gateway on south and a lofty double mihrab on west.

Stage III

It is likely that as Isa Tarkhan II consolidated his power base, he wished to make his father's mausoleum more elaborate. It is also likely that this desire became more firm as he embarked on the building of his own grand mausoleum. It was probably during this period that the Graves Canopy was constructed. The pillared canopy carried three cupolas to provide it with considerable importance. The colonnade pillars are likely to have been placed on the platform, without foundations being taken down to the natural ground. If this construction technique was used, this is thought to be one of the causes of settlement and deflection in the structural elements found in the central bay.

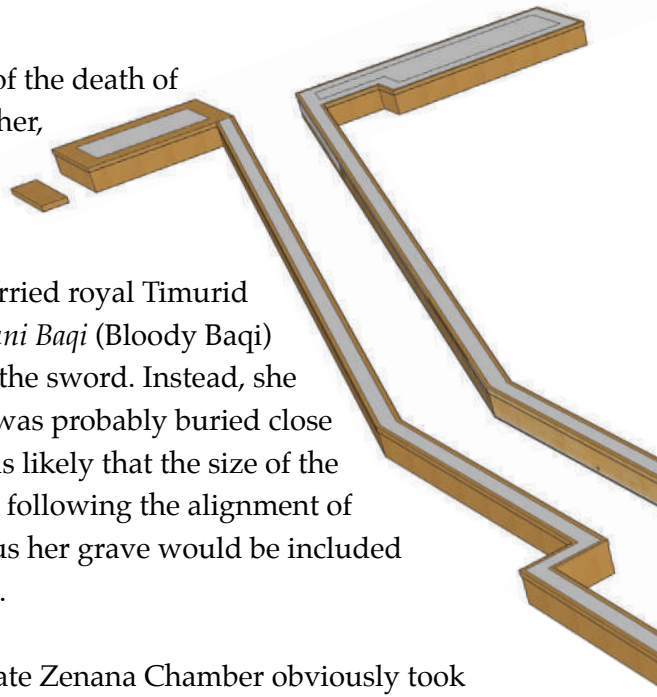
Since there is similarity in the design of the stone pillars, their base and capital design, it can be inferred that the Entrance Canopy was built at the same time as the Graves Canopy.



STAGE III with addition of Graves Canopy incorporating a classical colonnade and three cupolas to provide cover to Graves Platform. A similar colonnade of Entrance Canopy provides emphasis to the entrance platform.

The Entrance Canopy seems to have been built without regard to the elaborately constructed gateway. So much so that it actually conceals the beautifully ornamented *jharokas* that flank the main gateway.

Stage IV



We do not know the date of the death of Mirza Jan Baba's step mother, the Timurid princess, Mah Bega.

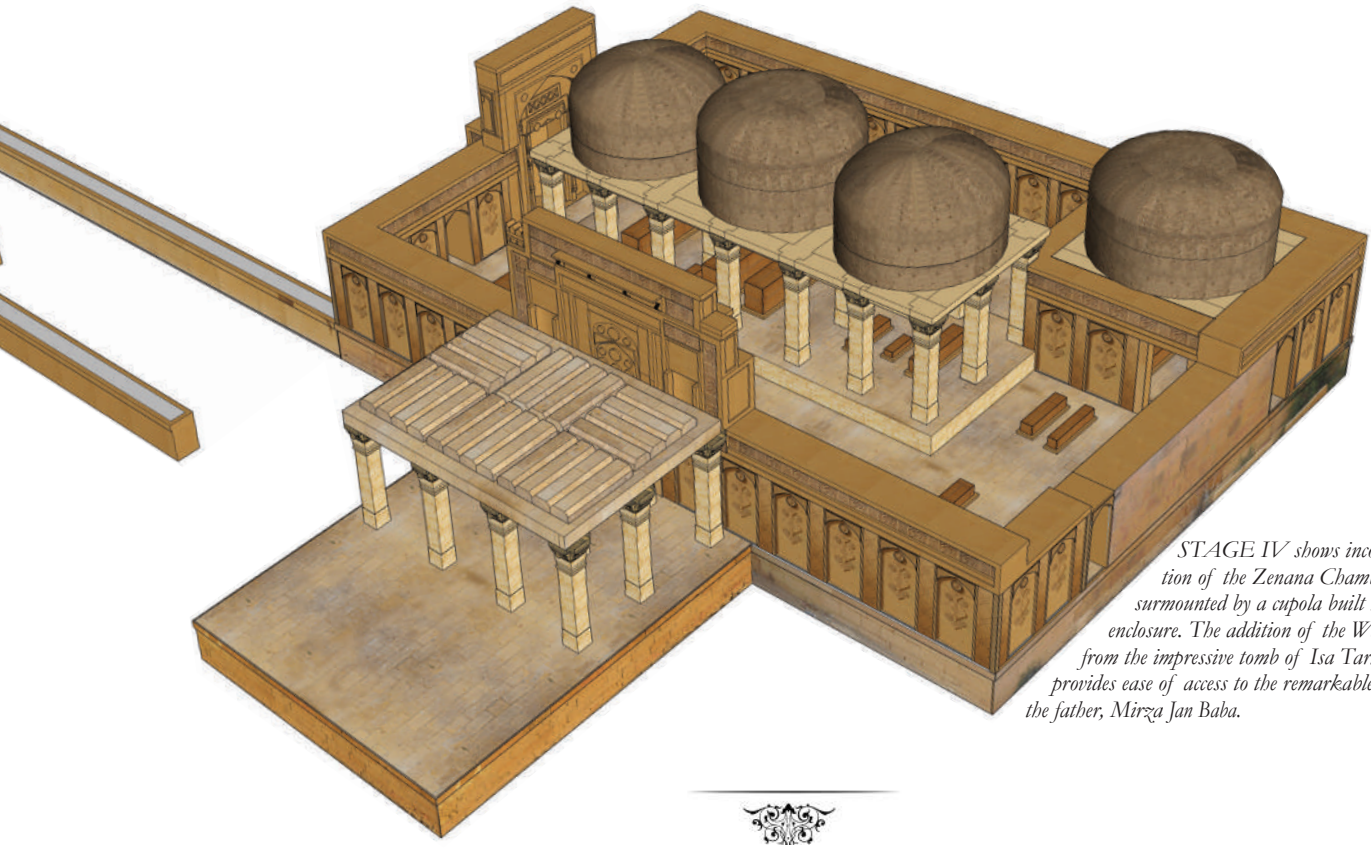
We know that since she carried royal Timurid blood, her stepson the *Khuni Baqi* (Bloody Baqi) did not wish to put her to the sword. Instead, she was starved to death and was probably buried close to the Graves Platform. It is likely that the size of the enclosure was determined following the alignment of the several graves, and thus her grave would be included within the enclosure walls.

The delineation of a separate Zenana Chamber obviously took place after the Perimeter Wall had been built. It is perplexing as to why the Perimeter Wall was not designed in the first place in a manner so as to carve out a compartment for her at the inception. The chamber panels were obviously a later addition, and the chamber is thus designated as Stage IV.

It is not known when the Walkway was built. But it is likely that once the grand mausoleum of Mirza Isa was well on its way, the mighty Tarkhan ruler wished that those coming to offer prayers for him should be able to also visit the mausoleum of his father

with ease. This desire may have been the motivation for his linking the two mausoleums.

The Walkway provides a grand entry and a sense of arrival for the comparatively simple and less elaborate structure of the mausoleum of Jan Baba. It is conjectured that it was probably finished last, and was among the most significant features to endow the sepulchre with prominence.



STAGE IV shows incorporation of the Zenana Chamber surmounted by a cupola built within the enclosure. The addition of the Walkway from the impressive tomb of Isa Tarkhan II provides ease of access to the remarkable tomb of the father, Mirza Jan Baba.

View from northwest. Work nearing completion.

Sepulchre of Mirza Jan Baba 93

View of Graves Canopy. Work nearing completion.