

2010

ISA KHAN'S ENCLOSURE CONSERVATION

Major conservation and landscape works aimed at restoring the architectural and historical character of the Isa Khan's and Bu-Halima's Complex are proposed in 2011 with World Monuments Fund's co-funding.

In 1920's major alterations were carried out here and included building the circular roadway after demolishing the Bu-Halima's garden enclosure walls. It is now proposed to undo this 20th century vandalism. Through 2010, an exhaustive condition assessment, measured drawing, archival research and detailed on-site discussions with experts have led to the preparation of a Conservation plan for this significant entrance zone to the World Heritage Site.

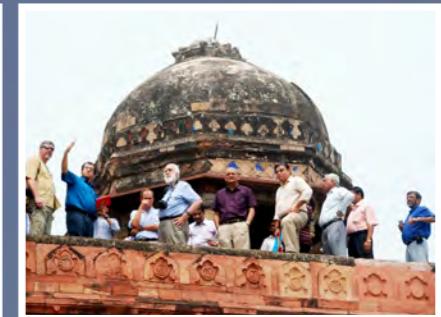
ISA KHAN'S COMPLEX



Conservation



3-D Laser Scanning



Discussions & Reviews



CONSERVATION

ISA KHAN ENCLOSURE- BU HALIMA COMPLEX

TASK:

To carry out Conservation and landscaping of the Isa Khan tomb enclosure and Bu Halima Complex that form the entrance zone of the World Heritage Site.

PURPOSE:

- To conserve and enhance the historic character of this historically and architecturally significant complex in keeping with national and internal conservation philosophy.
- To restore the landscape of this area, altered in the early 20th century thereby disfiguring the Mughal character of the complex.

ACTION TAKEN:

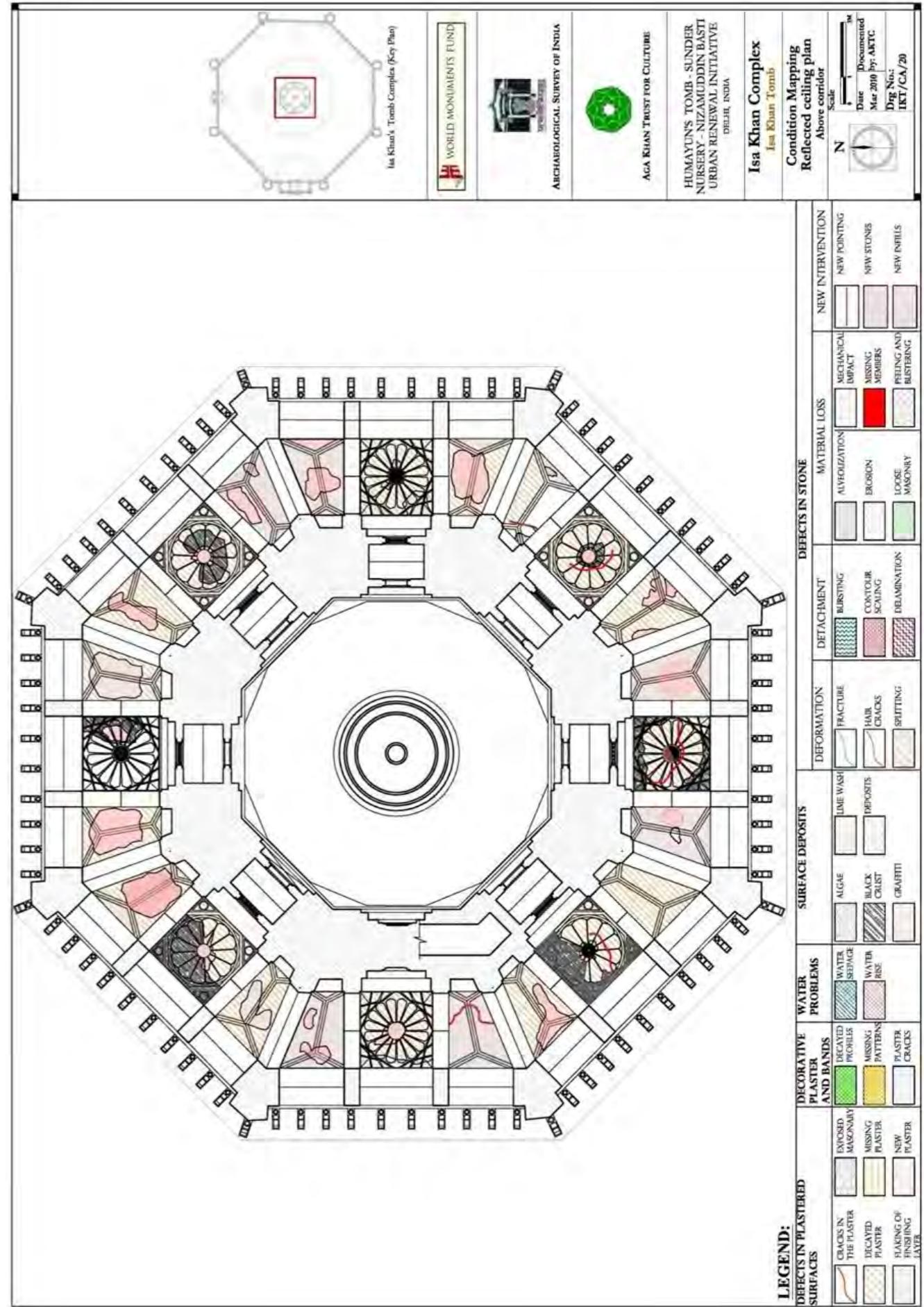
Documentation, 3D Laser Scanning

- Documentation works commenced in late 2009 using 3D High Definition Survey for the entire complex.
- Following the laser scanning, over 500 drawings including condition assessment have been prepared, documenting each detail, including ornamental plasterwork and ceramic tilework in detail.
- All external and Internal surfaces of all buildings have been scanned and data is registered.
- Architectural measured drawings, Condition Assessment drawings and Drawing indicating Conservation proposals now prepared for all buildings including enclosure walls of the complex.
- All the structural problems are marked on the drawings for the structural analysis of the monuments. Detailed structural Analysis is done by Stuart Tappin, Stand Consulting Engineers, UK



CONSERVATION

ISA KHAN ENCLOSURE



LEGEND:

CONSERVATION

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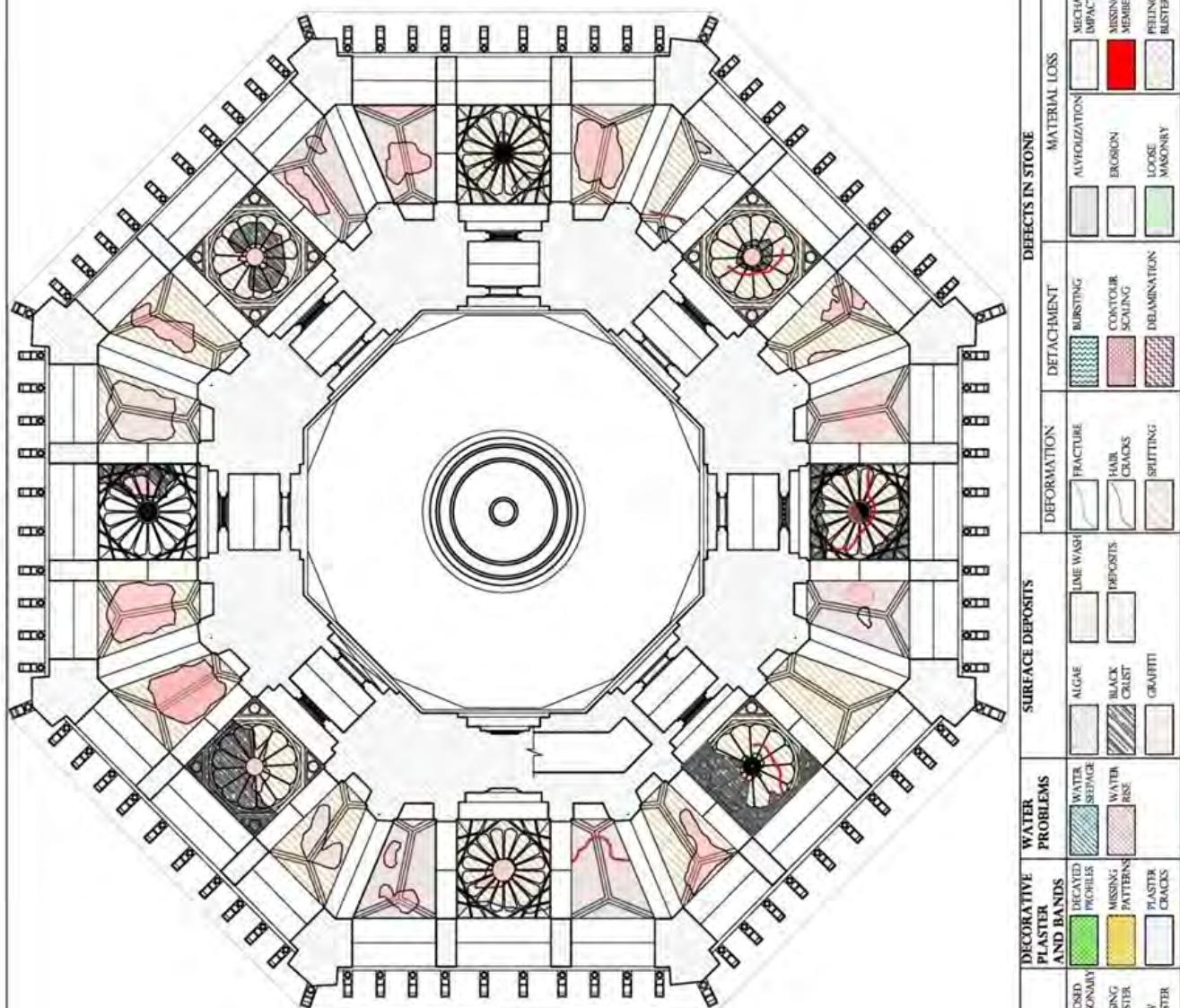
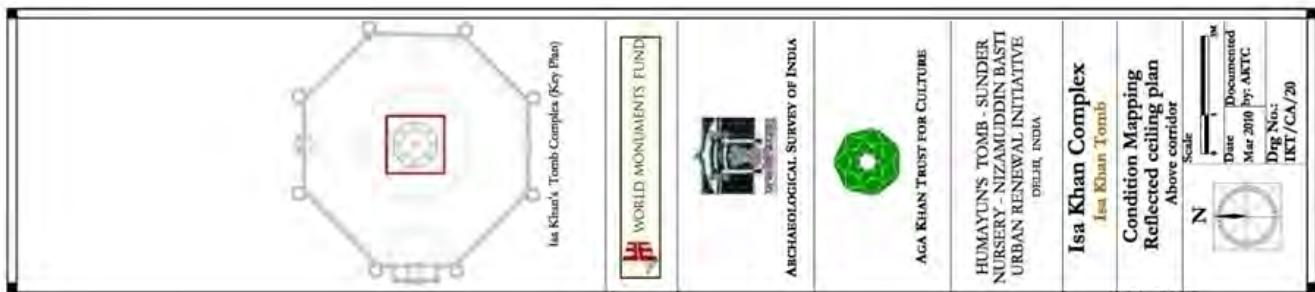
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CONSERVATION

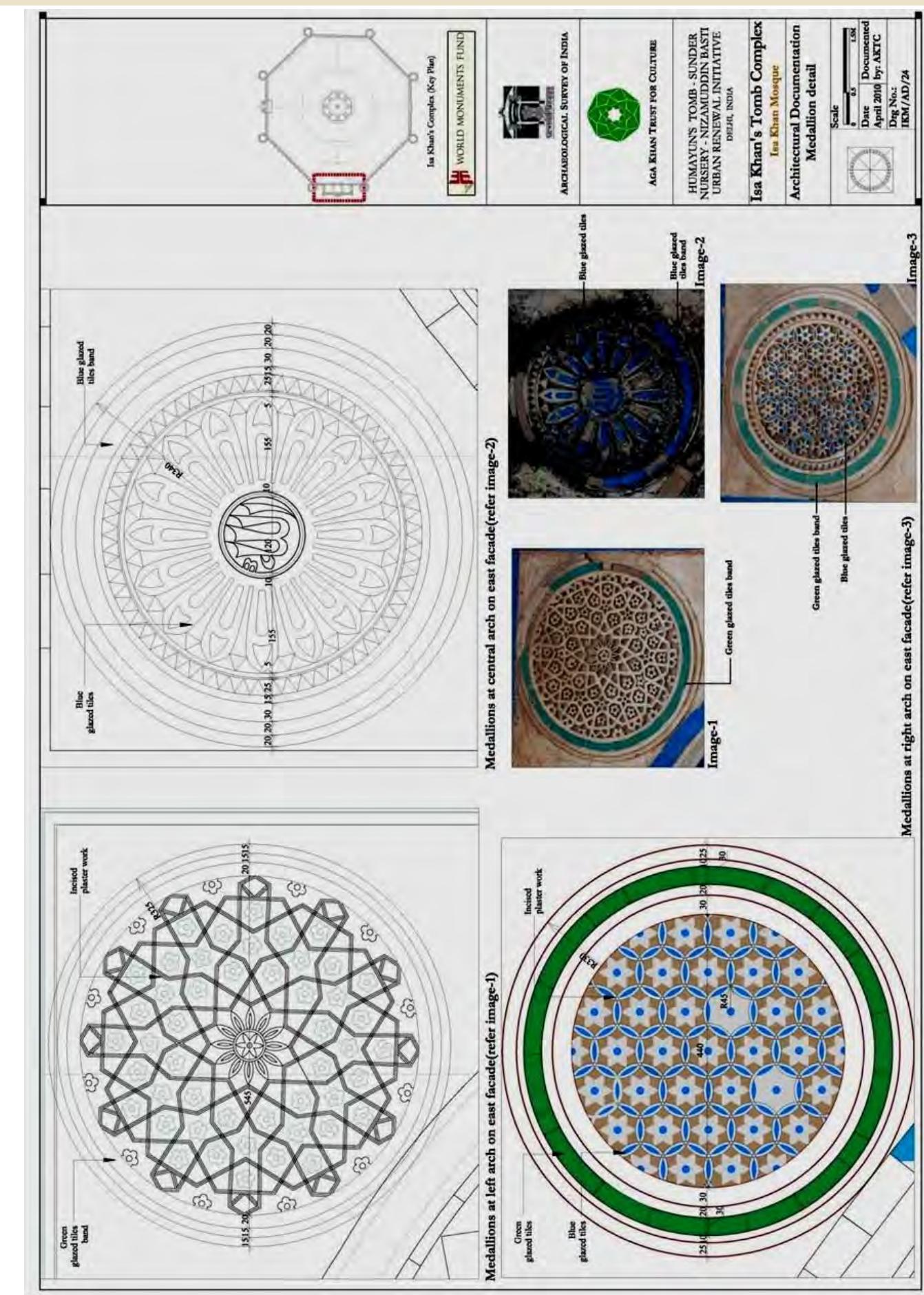
ISA KHAN ENCLOSURE



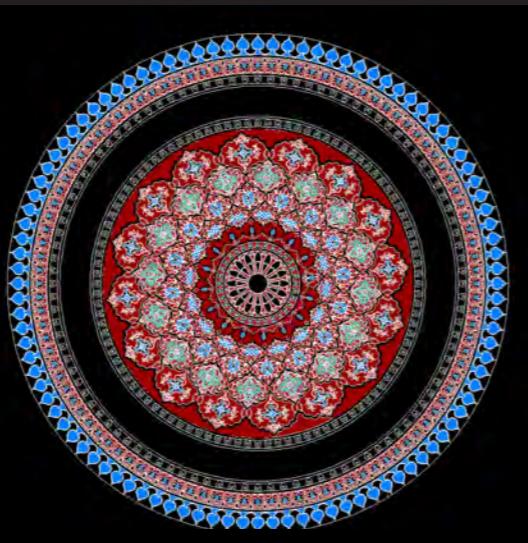
LEGEND:
DEFECTS IN PLASTERED SURFACES

CONSERVATION

ISA KHAN ENCLOSURE



DOCUMENTATION & CONDITION ASSESSMENT



Architectural drawing of the Isa Khan's tomb's ceiling prepared using the 3-D Laser Scanning data

Preparatory groundwork for conservation combined archival research, on ground analysis, documentation and structural assessment with state-of-the-art high definition surveys using 3D Laser Scanning and Ground Penetrating Radar Surveys (GPRS). The Conservation Plan prepared jointly by the ASI – AKTC team was submitted for peer review prior to commencing conservation works.



Ground Penetrating Radar Survey (GPRS) of the Isa Khan's Enclosure and the Bu-Halima's Enclosure





Preparatory groundwork for conservation combined archival research, on ground analysis, documentation and structural assessment with state-of-the-art high definition surveys using 3D Laser Scanning and Ground Penetrating Radar Surveys (GPRS). The Conservation Plan prepared jointly by the ASI - AKTC team was submitted for peer review prior to commencing conservation works.

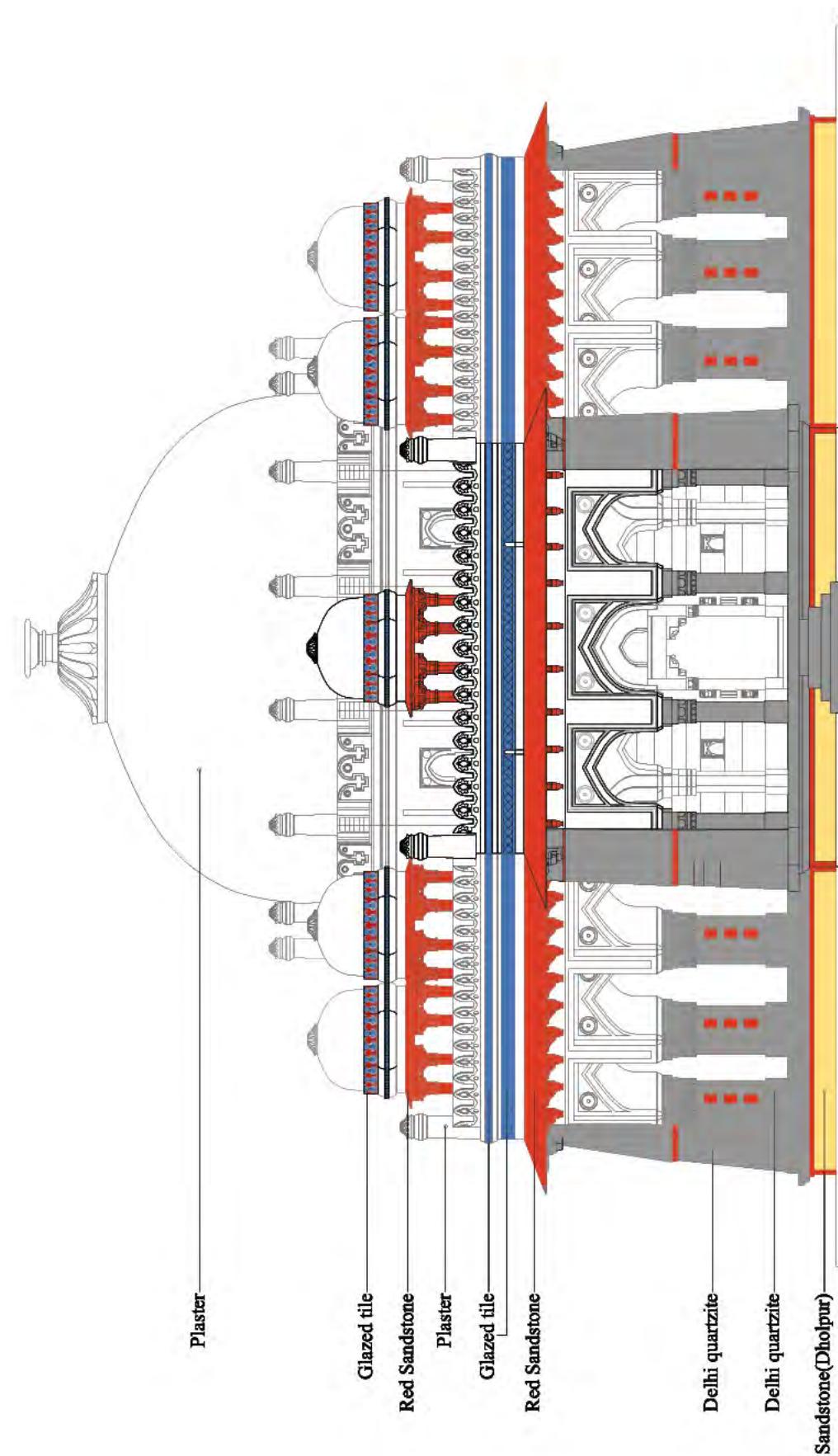
Ground Penetrating Radar Survey -GPRS

- Ground Penetrating Radar (GPR) survey has been carried out within and around the enclosure walls of Isa Khan's complex, Bu Halima Complex and open area with the entrance zone.
- This has enabled identification of underground archaeological remains which can be further investigated during the designing and execution of the works, especially the proposed interpretation centre.
- The portion of Bu Halima's Tomb enclosure wall demolished by the British to make a road in 1920's were discovered. It is proposed to complete the missing portion of the walls.

Conservation Plan

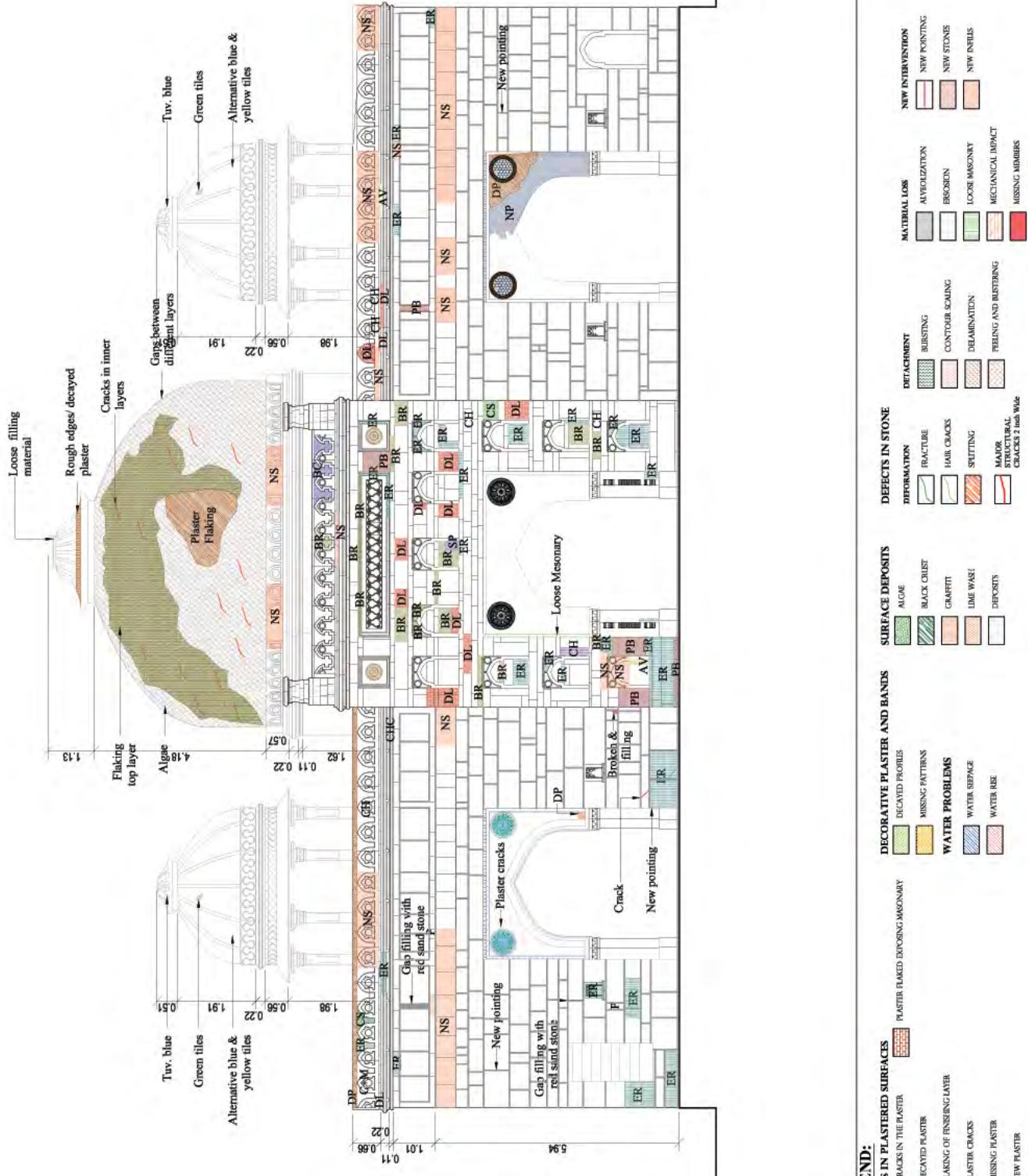
- Based on the archival research, GPRS studies, documentation and condition assessment a Conservation Plan was finalised in July 2010.
- The plan outlines a Statement of Significance for the two complexes and also details out proposed conservation philosophy.





CONSERVATION

ISA KHAN ENCLOSURE- BU HALIMA COMPLEX



LEGEND:

- | DEFECTS IN PLASTERED SURFACES | |
|-------------------------------|--|
| CHACKS IN THE PLASTER | |
| DECANTED PLASTER | |
| BLAKING OF FINISHING LAYER | |
| PLASTER CRACKS | |
| MISSING PLASTER | |
| NEW PLASTER | |

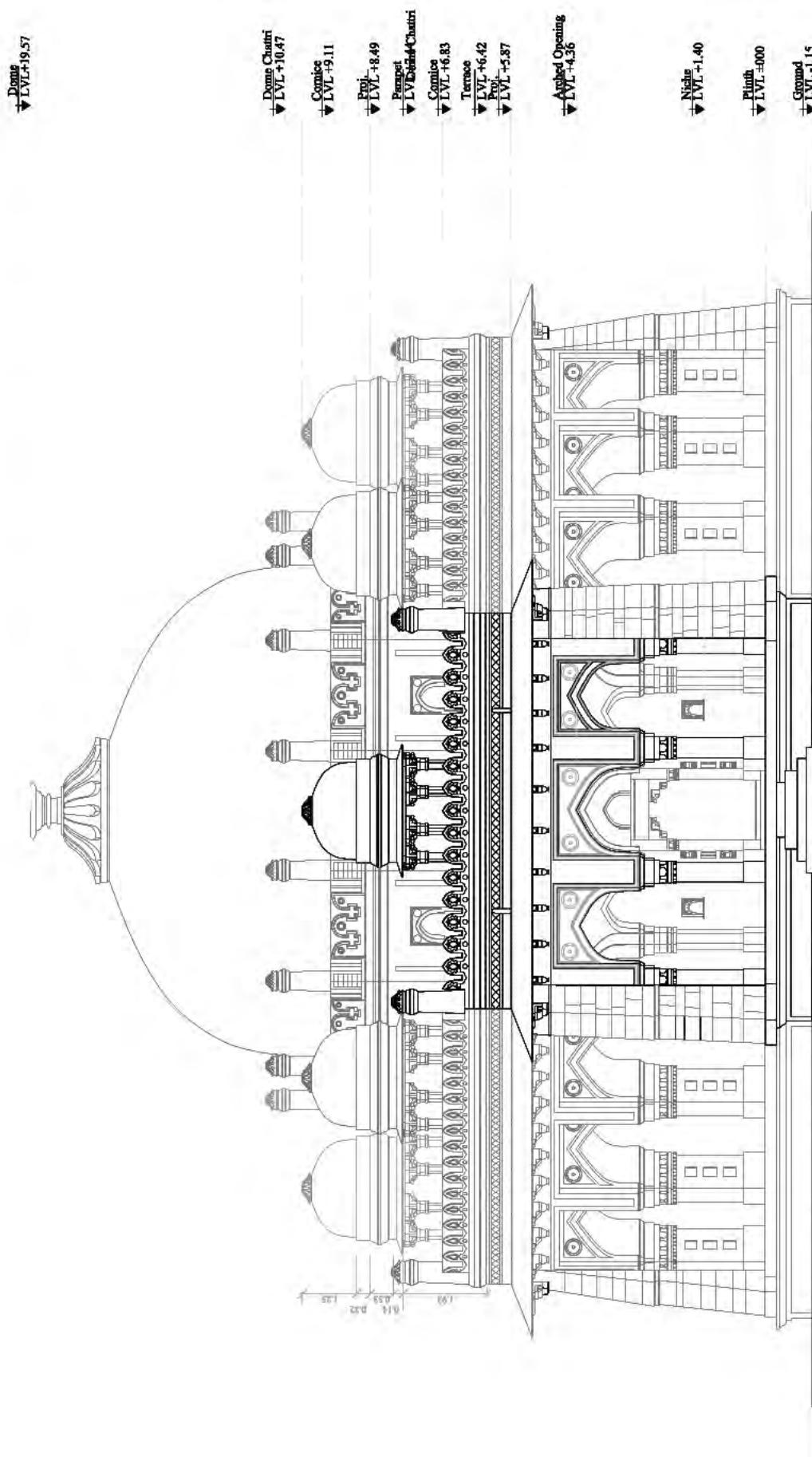
- | DEFECTS IN STONE | DEFECTS IN SURFACE DEPOSITS |
|---|-----------------------------|
| DEFORMATION | ALGAE |
|  | BLACK CRUST |
|  | GRAFTED |
|  | LIME WASH |
|  | DEPOSITS |
| STRUCTURAL
CRACKS 2 mm wide | |

- | DECORATIVE FEATURES | |
|---------------------|--------------------|
| | TILE BASE EXISTING |
| | NEW POINTING |
| | NEW STONES |
| | NEW NAILS |

NEW INTERVENTION	
	AUTHORIZATION
	EROSION
	LOOSE MASONRY
	MECHANICAL IMPACT
	MISSING MEMBERS

CONSERVATION

ISA KHAN ENCLOSURE- BU HALIMA COMPLEX



ISA KHAN'S MOSQUE



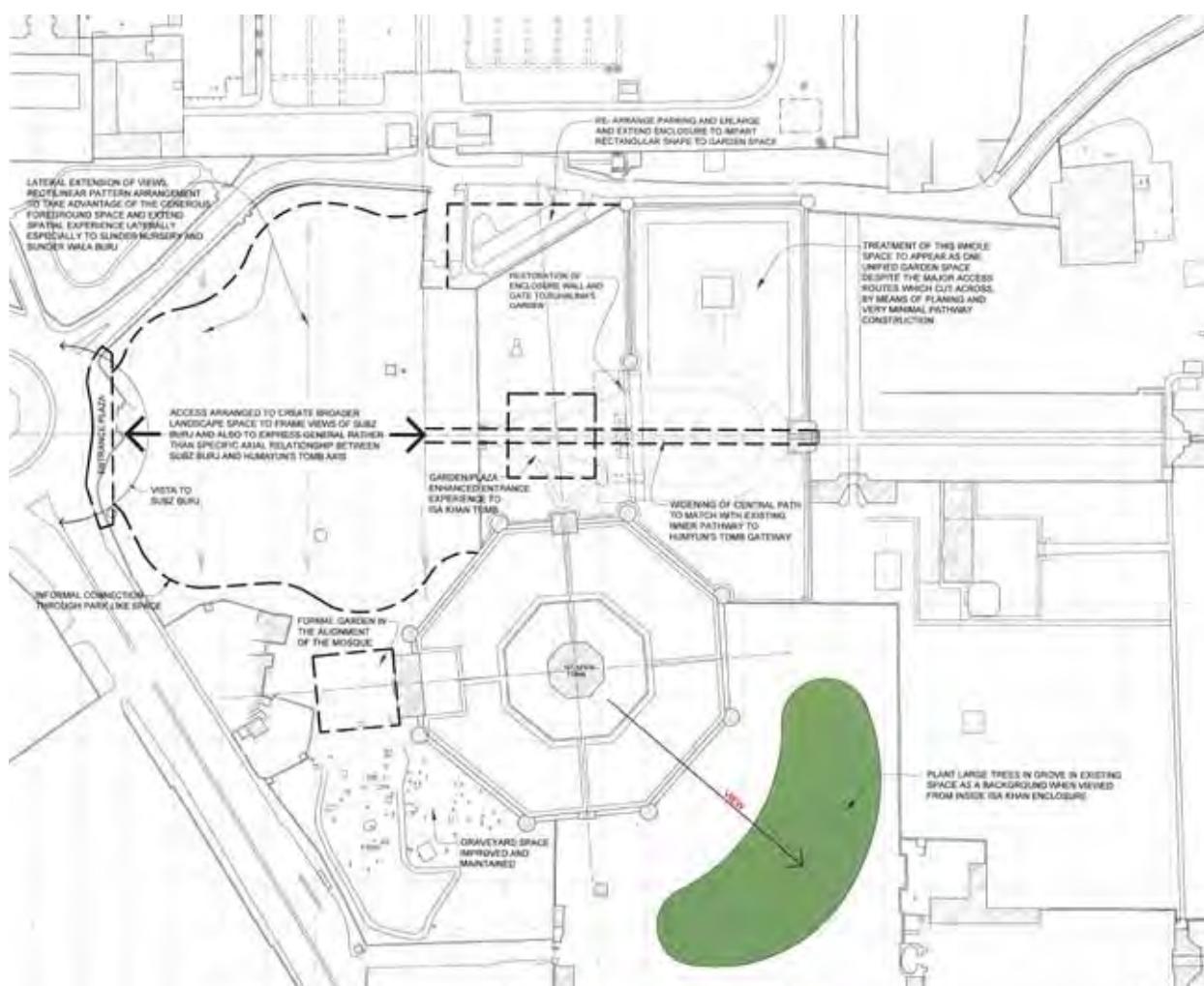
ISA KHAN ENCLOSURE- BU HALIMA COMPLEX



Landscape Plan

- Based on the study of archival material, results of GPRS, the flow of visitors and the conservation proposals including rebuilding missing portions of the Bu Halima enclosure wall, a landscape plan for the two complexes has been developed.

- The landscape plan aims to restore the Mughal layout and levels of the two complexes.
- It is also proposed to remove the vast quantities of Cement concrete paving that is found in the entrance zone and rationalise the pathway layout to enhance the historic character and visitor experience.
- Following trial trenches in the Isa Khan complex, it was discovered that roughly 3 feet of earth was to be removed from the outer half of the enclosure to restore original levels.



CONSERVATION

ISA KHAN ENCLOSURE- BU HALIMA COMPLEX

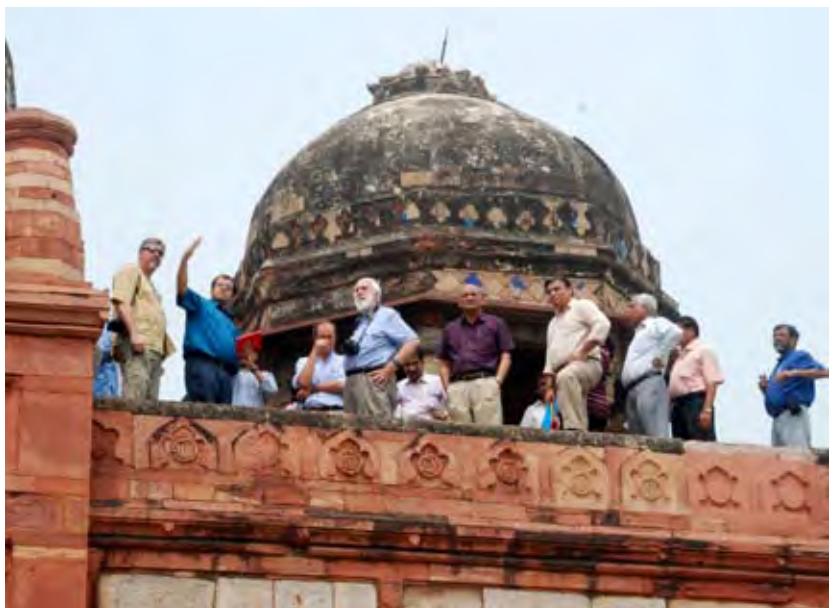


Peer Review

- The Conservation Plan and Landscape Plan were discussed in a peer review process in July 2010. Despite in-house expertise at the ASI and AKTC this was considered necessary to take national and international expert opinion in view of the major works proposed on this very significant site.
- Detailed Review with Dr. Herb Stovel, Mr.AKG Menon and ASI Core Committee on July 15, 2010 proposed conservation works of Isa Khan – Bu Halima Complex. Mr. Mark Webber of World Monument Fund and Ms. Amita Beg, Indian representative, WMF also joined the peer review.
- All the documentation works, condition mapping and proposed conservation works were shared and discussed during the review.
- The review was held over an entire day at site and all parts of the complex were inspected to understand the proposed conservation works in context of present status of the monument.
- All the open areas within the enclosures and around were evaluated and proposed landscape proposal was discussed.

NEXT STAGE:

- Permission is sought from ASI to allow the Isa Khan Complex to be closed to visitors for 6 months – one year to enable earth removal and conservation.
- Earth removal works at Isa Khan's Complex will commence as soon as the permission is received.



2011

Isa Khan's Tomb's Ceiling - Before Conservation



The highly ornamental ceiling of Isa Khan's Tomb had suffered severe decay due to neglect and water ingress. Also with the dome white-washed and cement plastered, it was too dark for the ceiling to be visible. Careful restoration of the ornamentation has been carried out by master craftsmen and the cement plaster replaced with lime plaster thereby significantly enhancing the historic character of the tomb chamber.

Isa Khan's Tomb's Ceiling - After Conservation



Isa Khan's Tomb

Detailed Conservation Process

Architectural Documentation

Condition Assessment

Peer Review

3-D Laser Scanning

3 years of research on historic tilework

Conservation Works Undertaken

Tilework on the facade and canopies

Original finial stone pieces were collected from site during excavation and from the debris; the finial has been re-constructed as per original details

11,440 Sq.m of Garden restored

3,25,000 Cu.Ft. of earth removed

5000 Man-days of work



Isa Khan's Tomb Garden

earliest sunken garden



Isa Khan Tomb-Garden

LANDSCAPE RESTORATION



TASK:

To restore the garden complex with a special emphasise on historic levels.

PURPOSE:

Restoration of the earliest known/surviving sunken garden and in turn the original/ historic setting of the mausoleum.

ACTION TAKEN:

Earth Removal

- While it was known from the onset that earth removal was required to restore original levels, the extent of earth removal required in the outer enclosure was understood only following the commencement of works on 1 January 2011.
- Exposing remnants of plasterwork on the central work and levels of the outer enclosure wall revealed that the outer enclosure of Isa Khan's Tomb-garden was about 1.5 m lower than the inner enclosure, making this the earliest surviving sunken garden in India.
- The inner enclosure – closer to the tomb and within the central wall now understood to be a retaining wall. – being substantially higher than the sunken garden of the outer enclosure.
- The level of the inner enclosure was determined with the plinth level stone on the tomb and with water outlets found in the central retaining wall (three on each side of the octagonal enclosure).
- Removal of earth was carried out under the supervision of an archaeologist and resulted in 12000 cum of earth removal to restoring the original levels. The earth was scientifically and manually removed, on head load, without use of any machinery to ensure preservation of any underlying archaeology.
- Earth removal required 5000 man-days of work.
- Earth removal led to the arched openings of the outer enclosure wall being revealed to their full height and extent.

"Generally, in all archaeological sites, the garden level goes higher along with the surrounding area. But at Isa Khan's Tomb, the garden level was lowered and restoration work in the interior boundary of the monument and other parts were undertaken," said Dr P B Sengar, Regional Director (North), ASI.

*Source : The Times of India,
Dust lifts from medieval grandeur,
24-October 2011*

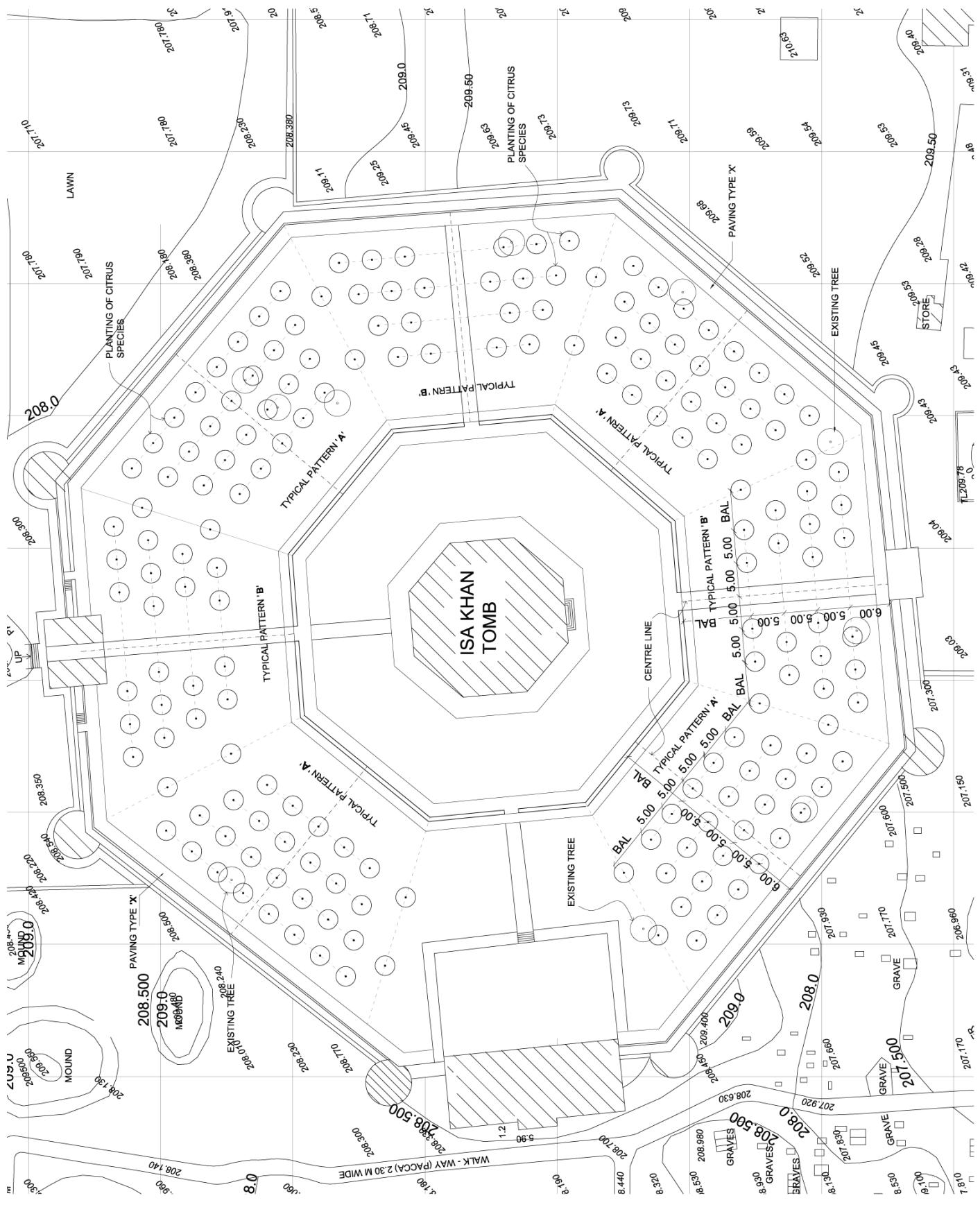
Antiquity

- Removal of earth revealed terracotta toys and stone fragments such as finials, columns, that had been lost from the buildings – both the gateway and the tomb.
- All objects discovered have been numbered and stored in an appropriate way for eventual presentation at the Site Interpretation centre
- All stone elements such as finials have been used as evidence to restore missing building elements.
- The large DQ stone column and capital of the gateway have been re-installed at the gateway.



Isa Khan's Tomb Garden

landscape plan





ACTION TAKEN:

Planting & Pathways

- It is recorded that sunken gardens allowed visitors to be standing at the higher tomb level to be at eye level with the citrus orchards that would have been planted in the sunken portions.
- The earth removal ensured that the large neem trees in the complex were retained and their no damage to their roots occurred by leaving a mound.
- Once levels had been finalised a citrus orchard based on an understanding of Mughal gardens has been planted in the outer enclosure.
- Ten foot wide pathways were proposed from the gateway to the tomb and similarly to all three remaining axis. Following a Core Committee decision it was agreed that the path width would be limited to seven-and-a-half feet.
- These principal pathways have been built in DQ stone.
- Plinth protection on both sides of the central retaining wall in lime concrete with a red sandstone edging as well at the outer garden wall have been provided. These will also serve as pathways.

Conservation of Central Retaining Wall

- The central retaining wall separating the outer and inner gardens was plastered with rich cement mortar.
- Archival images revealed that the wall was mostly rebuilt in the 1970's.
- Following removal of earth from the outer enclosure it was necessary for this wall to once again serve as a retaining wall. A structural analysis carried out of the wall revealed that mud mortar had been used in the 20th century repairs and poor construction.
- Partial collapse of the retaining wall occurred during the major rains of the monsoon season.
- The Core Committee decision was taken to ensure structural stability by dismantling weak portions and rebuilding with traditional materials.
- The corner turrets discovered in the earth removal were also agreed to build to top of wall height.
- Except for the south-east corner the upper portions of the entire wall required to be dismantled and rebuilt.

NEXT STEPS:

- Complete repairs to the central retaining wall.
- Built the plinth protection to the outer garden enclosure.

TASK:

Conservation on the tomb structure including restoration of the ornamentation.

PURPOSE:

Reviving the lost architectural integrity of the monument which is lost due to repair works carried out in the past century as well as restoring the significance of the structure – understood to emanate from the highly ornamental surface finishes.

ACTION TAKEN:

- An exhaustive documentation, condition assessment was prepared in 2010 and Conservation works commenced in early 2011 following a peer review of the Conservation Plan in July 2010.
- The tomb structure was considered to be structurally stable but had suffered from neglect and repairs using inappropriate repairs.
- At the onset plaster medallions on the domed surfaces of the verandah, external façade, were repaired by completing missing portions.
- Surviving decorative surfaces were cleaned by sandpapering later paint layers and weak portions were consolidated using lime grouting and mortar.
- An exhaustive documentation of tile patterns on the canopies was carried out as, fortunately, chemical cleaning carried out in 2001-2 and resulting in severe discolouration and dismantling of existing tiles, had not been followed by plastering as had been done at Akbar's Tomb in Sikandra.
- Several carved stone members of the finial of the main dome and canopies were discovered during the earth removal from the open area. All these pieces were assembled at the site to achieve the original profiles of finial based on archival images and site evidences.
- After careful documentation of the individual pieces, missing stone members are being prepared as per original design by the stone craftsman using traditional tools and techniques
- Finial of one canopies have been fixed in position and discussed at the Core Committee meeting.

"Centuries of dust and soot had covered the ceiling of the tomb. When it was scraped clean, an exquisitely ornamented ceiling revealed itself. All this has been a laborious task. The biggest challenge was to undo the inappropriate alterations of the 20th century and match the original work with superior craftsmanship," Rajpal Singh, chief engineer, AKTC.

*Source : The Times of India,
Dust lifts from medieval grandeur,
24 - October 2011*



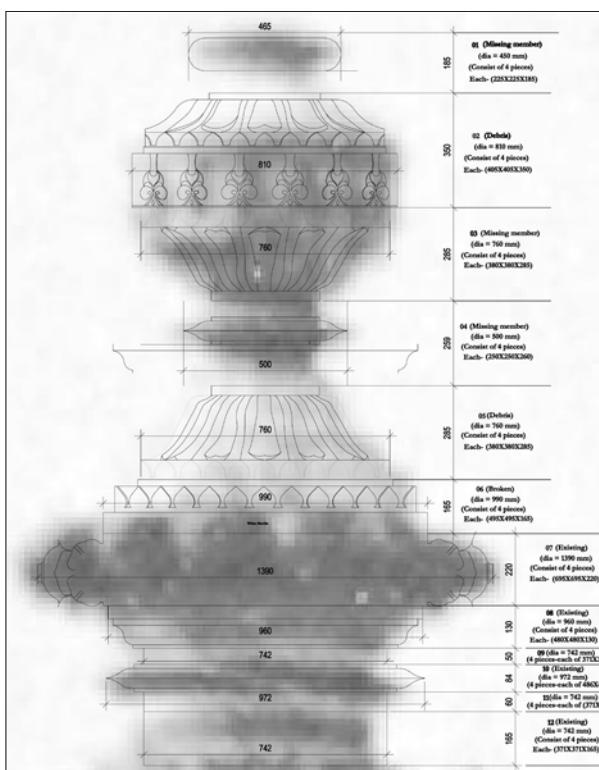
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- The stone finial on the central dome weighed over a tonne. The final delicate carving on the marble pieces requires to be carried out on the top of the dome to ensure no cracking during lifting and placement. Scaffolding erected with lifting mechanism to lift the heavy stones which are now being carved in-situ.
- The interior tomb chamber was very dark with the ornamentation on the ceiling of the dome barely visible.
- The highly ornamental ceiling has been cleaned – mainly sandpapering - and missing portions restored. This was followed by the removal of limewash and cement mortar from the inner surface of the dome and replaced with lime mortar and a final layer of lime punning was also applied.
- The interior wall surface comprising of dressed ashlar masonry blocks has also been cleaned using water and brushes.
- With the internal surface of the dome now being restored to its original white and the wall surfaces cleaned the interior chamber is well lit naturally and the decorative ceiling clearly visible. It was originally considered that artificial illumination would be required to allow visitors to see the ceiling – this is no longer required.

Scientific clearance of earth revealed several architectural fragments including the missing portions of the finial. These were carefully compared with archival photographs prior to new pieces being carved on the basis of the original ▼

NEXT STEPS:

- The Dome and canopy finials have to be installed.
- The missing tilework on the canopies needs to be carried out – this would be undertaken by the end of 2012 as over a year is required to prepare the tilework.



Isa Khan's Mosque



Isa Khan Tomb-Garden

CONSERVATION OF THE MOSQUE



TASK:

Conservation on the mosque structure including restoration of the ornamentation.

PURPOSE:

Reviving the lost architectural integrity of the monument which is lost due to neglect and repair works carried out in the past century.

ACTION TAKEN:

- An exhaustive documentation, condition assessment was prepared in 2010 and Conservation works commenced in early 2011 following a peer review of the Conservation Plan in July 2010.
- Conservation works at the mosque commenced in late 2011 with the removal of cement plaster from the domed ceilings and re-plastering in lime mortar.
- A lime punning layer is presently being applied to this surface.
- Cleaning of stone surface on the internal wall surface has been carried out.
- A well has been discovered on the plinth of the mosque and already desilted to a depth of 6 m.

NEXT STEPS:

- To re-open presently blocked openings on the north and south and replace with stone lattice screens.
- To de-silt the well to its original depth.
- To reopen blocked staircase in the south end.
- To restore tilework on the façade and the canopies.

As with the Isa Khan's Tomb, the interiors of the mosque also required cleaning of the stone surfaces and re-plastering with lime mortar following the removal of cement plaster ►



Isa Khan's Gateway



Isa Khan Tomb-Garden

CONSERVATION OF THE GATEWAY



Following structural repairs to the domed ceiling, the battlemented parapet wall was re-built using traditional materials, tools and building techniques ▼

TASK:

Conservation on the gateway including repair of the collapsed eastern and central bay on the internal side..

PURPOSE:

Ensuring long term preservation by carrying out repair works to partially collapsed portions and to ensure visitor health and safety of visitors.

ACTION TAKEN:

- The study of the gateway revealed that 20th century repairs on the external façade have obliterated original details and it is difficult to carry out repairs to the external façade without resorting to conjecture.
- During the earth removal the missing column supporting the collapsed central and eastern bays of the internal verandah was discovered as was the decorative DQ stone capital.
- The conservation works on the Isa Khan Enclosure's Gateway started with the anastylosis of the column discovered during earth removal followed by the rebuilding of the collapsed domed ceilings.
- The stone masonry domes have been finished with lime plaster.
- The random rubble stone masonry battlemented parapet have been rebuilt following the profile of the surviving portions.
- Missing red stone brackets and chajjas have been prepared as per original sectional details and have been fixed on the inner facade.

NEXT STEPS:

- Terrace and the upper chamber will now be repaired
- The repairs on the external façade need to be agreed upon and carried out.



2012

ISA KHAN'S TOMB-GARDEN

Isa Khan's Tomb is of an architectural style that was used for royal tombs through the 15th century rule of the Sayyid and Lodi dynasty. Marked by deep arcaded verandahs, the significance of the structure lies in the profuse ornamentation and its original setting remaining intact.



Watercolour illustration by Himanish Das

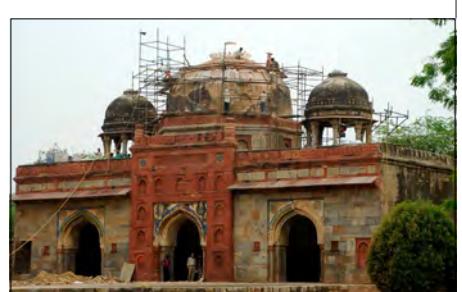
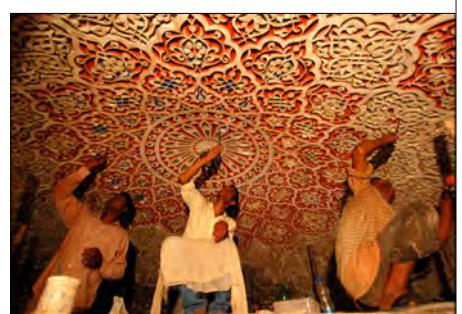
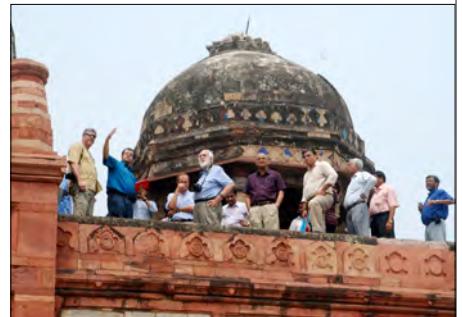
Emperor Humayun's garden-tomb was built by Indian and Persian craftsmen on a scale far grander than any tombs. The monumental scale achieved here was to become the defining feature of Mughal architecture.

Adjoining Humayun's Tomb are several Mughal-era garden-tombs - Nila Gumbad, Isa Khan's enclosure, Bu Halima's tomb, Batashewala Complex, among others. In the larger Nizamuddin area, there are over 100 monuments, dating from the 13th century onwards, making it one of the densest ensembles of medieval Islamic buildings in the world.

Built in the style developed in the early 15th century in Delhi for royal tombs of the Sayyid and Lodi dynasties, Isa Khan's Tomb Garden pre-dates the building of Emperor Humayun's tomb by two decades. The structures are considered significant for the high level of ornamentation – glazed tiles, plasterwork, stone elements such as finials and lattice screens – much of which had sadly been lost, either removed for the antique market in the 20th century or left to deteriorate.



Scan the code to watch an interview by Mr. Mark Weber, World Monument Funds talking about the conservation works at Isa Khan's Tomb - Garden





11 ISA KHAN'S TOMB - GARDEN

Garden Restoration

The enclosed tomb-garden stands at the entrance zone of the Humayun's Tomb complex however inappropriate alterations and unplanned planting in the garden had disfigured the original intention which required to be restored together with the buildings that stand here. The discovery of original levels makes Isa Khan's tomb garden the earliest surviving sunken garden of the Persian tradition.

▲ The discovery that the outer garden was originally four feet below the levels of the garden that surrounds the tomb required 125,000 cubic feet of earth to be manually removed to restore historic levels. This revealed several hundred terracotta objects, in addition to architectural elements, as well as the arcade of the enclosure wall, which is now once again visible as intended

ACTION TAKEN:

Garden Levels

- Though it was known from the onset that the garden was historically lower than found at the commencement of works, the discovery that levels were over 1.2 m lower was surprising.
- The increase in levels is considered to be on account of demolition of a settlement here in the 1920's and regular import of good earth for horticulture purposes.
- In 2011, over 12000 cum of earth was manually removed under the supervision of an archaeologist to restore levels to similar to original levels and allow the intention of the 16th century builders.
- Original levels could not be reached owing to the presence of large trees that would have been threatened with collapse if any further earth removal had taken place.

Conservation of garden retaining wall

- The Isa Khan's tomb garden was discovered to have an inner garden in the immediate setting of the tomb and a lower outer garden, both separated by a masonry retaining wall.
- On original garden levels being restored and cement plaster being removed from the retaining wall, the wall exhibited severe stress and portions began to collapse.

- Structural analysis revealed that large portions of the wall were built in mud mortar and were built of rubble. An archival research that followed revealed that the wall was completely rebuilt in the mid 20th century.
- Large portions of the wall were completely dismantled to ground level and rebuilt on the original foundations. This reconstruction also included rebuilding the corner bastions that were revealed during the earth removal exercise.
- 530 cum of random rubble stone masonry thus required to be reconstructed in lime mortar. It was agreed not to plaster the wall and leave the masonry exposed.



Plinth protection & Pathways

- For visitor access, pathways have been built in the cardinal directions in Delhi Quartzite. Though it was suggested that the pathways have a width of 3 m the narrower width of the staircase at the gateway was considered more appropriate by the ASI Core Committee.
- These pathways meet the plinth protection built for the arcaded outer enclosure wall and the plinth protection on both sides of the inner retaining wall.
- In total, 1120 meter of the plinth protection of up to 2m width has been constructed.



▲ 11,440 Sq.m of Garden restored
- 3,25,000 Cu.Ft. of earth removed -
5000 Man-days of work went into the
discovery of this earliest known sunken
garden of India

Planting

- In keeping with traditional design for sunken gardens, which were irrigated by flooding and planted with fruit trees, the outer garden has been planted with a citrus grove.
- This will eventually allow visitors standing on the upper levels to be at eye level with tree-tops.
- The inner garden is merely grassed to provide a clear line of visibility.

Isa Khan's Tomb - Garden: Now
Restoration of the earliest known/
surviving sunken garden and in turn
the original/ historic setting of the
mausoleum ▼



12 ISA KHAN'S TOMB - GARDEN

Enclosure Wall Conservation

The tomb-garden is enclosed by an octagonal enclosure wall with circular bastions at each end of the octagon.



ACTION TAKEN:

- The original profile of the arcade of the enclosure wall was visible on the removal of 1.2 m of earth that had substantially covered the arcades
- Following the removal of the earth the floor of the arcade required repair by removing the dead lime-concrete and replacement with a new layer of lime concrete.
- At several points it was considered necessary to grout the masonry with lime mortar using manual pressure.
- The wall surfaces have been repointed in lime mortar, with 6000 sqm of the external wall surfaces requiring this treatment.



▲The octagonal internal retaining wall allowed the outer garden to serve as a typical Persian sunken garden, irrigated with flooding. The purpose of the wall and its extent was revealed after the removal of earth. Since it was in a poor state, almost 70% of it required to be reconstructed to once again serve as a structural retaining wall.

Restoration works underway on the enclosure wall of the Isa Khan's Tomb - Garden ►

13 ISA KHAN'S TOMB - GARDEN

Conservation of the Mausoleum

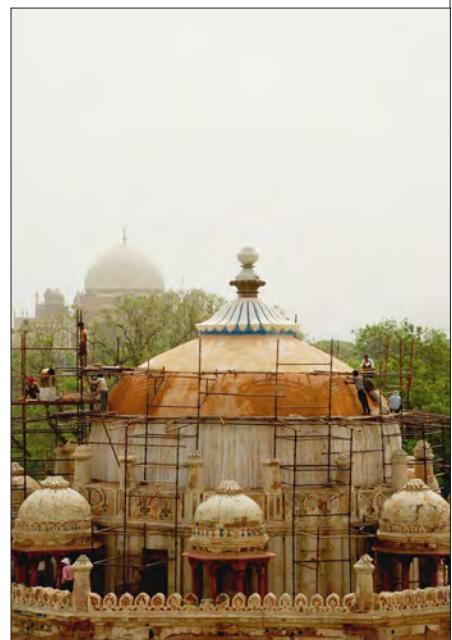
The mausoleum, pre-dating Humayun's Tomb by almost two decades, follows an architectural style used during the Sayid & Lodi dynasties for royal mausoleum. Following exhaustive documentation, research and analysis, it was realised that the significance of Isa Khan's Tomb lies in the profuse ornamentation that once covered the structure. Conservation works aim at structural repairs as well as restoring much of the ornamentation – plasterwork, stone elements and glazed tiles to the structure.

ACTION TAKEN:

- Major conservation works to the principal tomb chamber have been carried out and included removal of all cement plaster and its replacement with lime plaster.
- The ornamental ceiling of the dome required extensive careful restoration and with the final application of lime punning as well as cleaning of stone surfaces with water and soft brushes the quality of the interior space has improved dramatically.
- Decorative medallions in incised plaster works on the external façade as well on the veranda ceilings have now been carefully conserved with missing portions restored following original patterns and designs. In the one instance where evidence of original pattern was not available, this has been left blank. All the work done based on the existing designs, no conjecture were followed.
- The external surface of the central dome has been restored as per original material and finish. Cement plaster and decayed lime plaster works with multiple cracks have been replaced with new layer of lime plaster along with the finishing layer of lime punning prepared from matured lime putty and the marble dust.
- During the conservation works, original remains of the turquoise blue glazed tiles were discovered around the stone finial of the central dome which was covered underneath the new plaster layers. After removing the added layers, original glazed tile work of the finial have been restored using matching glazed turquoise blue tiles prepared on site.

NEXT STAGE

- The conservation works would be completed in 2013 which includes decorative plaster works on the external wall surfaces and terrace.
- Restoration of the original glaze tile works on the eight canopies as well as their stone finials would be completed in year 2013-2014.

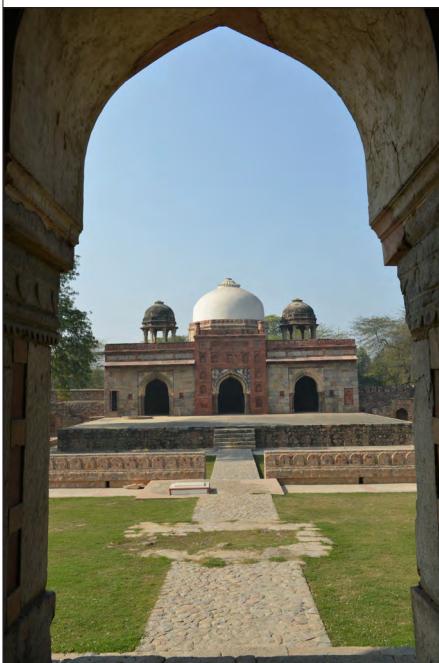


▲ Conservation works on the tomb have included major structural repairs on the dome, restoration of the ceiling and the finial. Restoration of the tilework will carry on through 2013

14 ISA KHAN'S TOMB - GARDEN

Conservation of Isa Khan's Mosque

Within the tomb-garden stands an imposing mosque on a raised plinth. As with the other structures in the complex, the mosque suffered on account of inappropriate repairs as well as loss of architectural elements such as the tile-work on the canopies.



▲ Major roof repairs and stitching of cracks in the dome were required to halt water penetration from the roof. The internal wall surface had to be re-plastered in lime mortar after the removal of cement plaster.

ACTION TAKEN:

- Following extensive documentation in 2010, conservation works carried out in 2012 included re-plastering the central dome after removing cement plaster and deteriorated lime plaster.
- With the dome re-plastered thus removing vegetation growth filling in of cracks on the plaster surfaces and removal of decayed materials the water ingress could be halted and the internal surfaces replastered and the stone surfaces cleaned.
- All the internal and external wall surfaces of the mosque had cement mortar in the joints which needed to be carefully removed. Cement pointing of the internal wall surfaces has now been replaced with lime mortar pointing.

NEXT STAGE

- The external wall surfaces would be conserved including stone replacement, repair of the decorative plaster works, parapet and terrace repair works.
- The glazed tile works of the two canopies and the east external facade would be restored as per original design and patterns. The work would commence in 2013.
- The northern and southern openings in the mosque would be considered to be re-opened by removing the masonry and replacing with sandstone lattice screen.



15 ISA KHAN'S TOMB - GARDEN

De-Silting Historic Wells

During ongoing conservation works, a well was discovered within the enclosure. Clearly, having been filled up once the water was not available, the well seemed to be a significant structure of the tomb-garden and required desilting and major conservation works.

ACTION TAKEN:

- During the conservation works of the mosque, a well was discovered on the platform of the mosque which was filled in past century.
- The well has now been excavated. This required a very complicated process wherein two men were taken to the bottom on ropes and excavated material listed up in buckets pulled up to the surface.
- During the excavation works it was realised that major wall portions of the well had caved in and which is what probably led to the well being filled in the first instance.
- Caved in portions were carefully conserved with underpinning with random rubble masonry.



▲ De-silting of historic wells in the project area, and removing decades of rubble and deposits from them

16 ISA KHAN'S TOMB GARDEN

Conservation of the Gateway

On the northern end of the complex is a gateway which allows entry to visitors. The outer façade of the gateway has suffered from inappropriate past repairs to an extent that the original details have been obliterated. The internal portion had mostly collapsed with the western bay still standing. Conservation works aimed at structural repairs and restoring the architectural integrity to the extent possible.



October, 2010

ACTION TAKEN:

Following reconstructing the collapsed central and eastern bay in 2011, the conservation works on the gateway in 2012 included restoring the eaves as well as the battlemented parapet.



August, 2012

The Gateway: Now

The two collapsed internal bays have now been reconstructed on the basis of the surviving western bay. The reconstruction was possible as the missing column was found embedded in the earth. ►



17 BU-HALIMA'S TOMB - GARDEN

Garden Restoration

Bu Halima's tomb garden, also dating from the 16th century, stands abutting Isa Khan's Tomb at the entrance zone of the Humayun's Tomb complex. In the 1920's portions of the enclosure wall were demolished to make a circular roadway thus destroying the character of the enclosure as well as disfiguring the historic character of the site with vast quantities of cement concrete.

ACTION TAKEN:

- Clearance of earth revealed the foundations of the demolished portions of walls to be merely 10-15 cm below existing ground levels.
- Random rubble masonry wall was built on the original foundations matching the height of the standing portions of the enclosure wall.
- A bastion built in the 1920's when the wall was demolished was retained as part of the enclosure.
- Though photographic evidence of an arched gateway in the western stretch existed, the ASI Core Committee was of the opinion that this arched opening not be reconstructed.
- The 10 m wide cement concrete roadway has been dismantled and a central pathway matching the width of the pathway leading from Bu Halima Gateway to West gateway of Humayun's Tomb has been built in sandstone.
- This central pathway allows a gradual slope thus removing the steps and ensuring easy access for those using wheelchairs.
- The new levels have also ensured that 40 cm of Bu Halima gateway buried below concrete is once again revealed to its original character.
- In order to minimise removal of earth from within the enclosure, secondary pathways aligned almost along the British era retaining walls have been built and also serve as a retaining wall, both on the northern and southern sides.

NEXT STAGE:

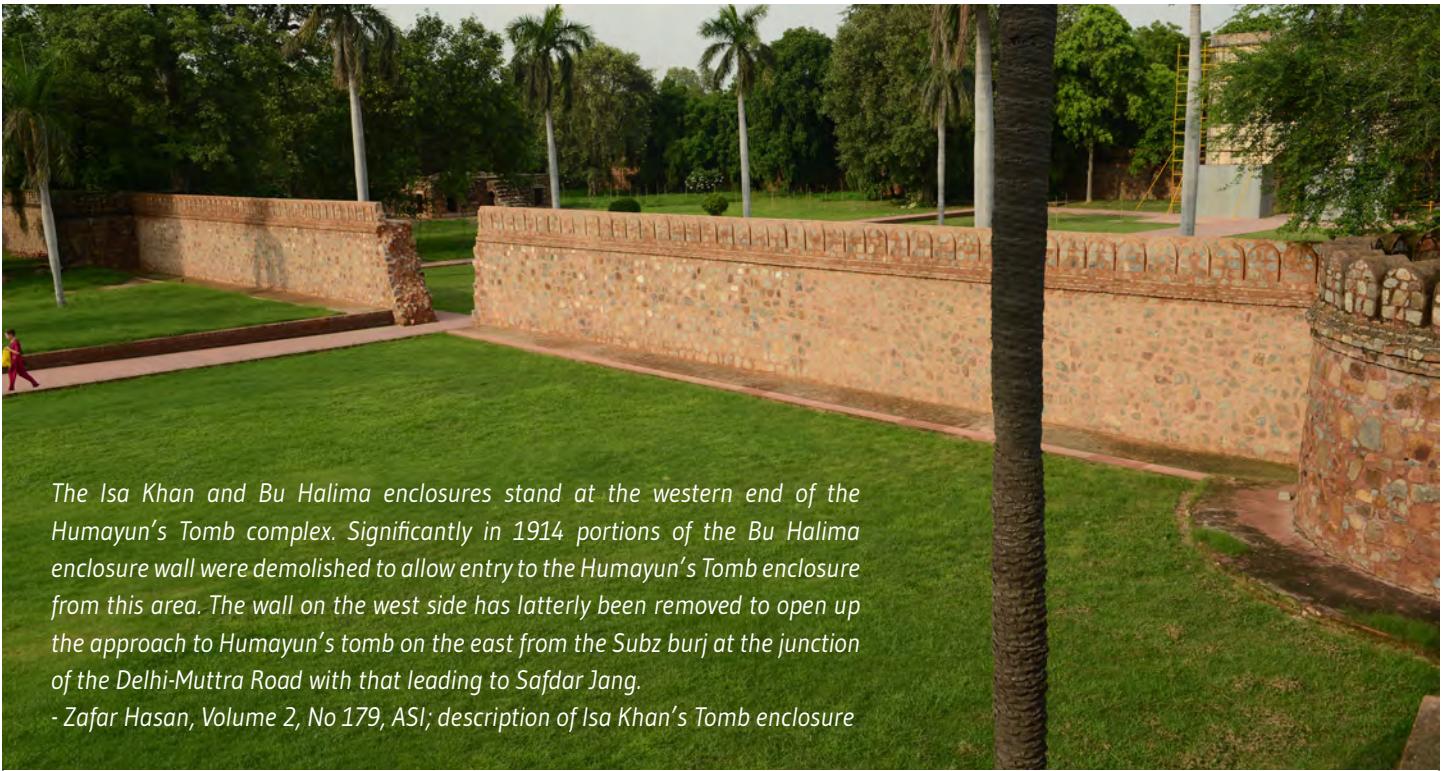
- The grading and pathway works will be completed in early 2013.
- In spring 2013 a citrus orchard will be planted in this garden enclosure.
- Plinth protection along the enclosure walls is planned.



Bu-Halima Tomb - Garden ▲

Early 20th century British-era carriageway disfigured the historic character of Bu Halima's Tomb - Garden and the entrance zone of the World Heritage Site. Works underway on the landscape and restoration of the enclosure wall

2013



The Isa Khan and Bu Halima enclosures stand at the western end of the Humayun's Tomb complex. Significantly in 1914 portions of the Bu Halima enclosure wall were demolished to allow entry to the Humayun's Tomb enclosure from this area. The wall on the west side has latterly been removed to open up the approach to Humayun's tomb on the east from the Subz burj at the junction of the Delhi-Muttra Road with that leading to Safdar Jang.

- Zafar Hasan, Volume 2, No 179, ASI; description of Isa Khan's Tomb enclosure

10 GARDEN RESTORATION

As with Emperor Humayun's Tomb, Bu Halima's Tomb also stands within a walled garden. Almost half of the western side of the enclosure walls (comprising almost 15% of the total length of walls) were however demolished in the early 20th century to make a road. Garden levels have since also been considerably altered leading to the gateway flooring being almost 50 cm lower than the garden on its west leading to immense water-logging, besides altering original relationship.

ACTION TAKEN:

- As part of the landscaping works, the levels of the area on the west of the gateway were lowered to ensure the historically appropriate relationship between the gateway and its settings restored. Retaining walls in brick masonry were erected on the either side to minimise earth removal in view of large trees.
- Planting layout was carried out in the Bu-Halima's Garden Tomb, after the complete reconstruction of the missing wall in 2012. Orchards of peach trees are now grown in the complex.
- Sandstone pathways have been laid in the garden and as plinth protection along the entire internal length of the enclosure wall.



(Above) Early 20th century British-era carriageway which disfigured the historic character of Bu Halima's Tomb - Garden and the entrance zone of the World Heritage Site has been demolished and original landscape restored



12 ISA KHAN'S GARDEN-TOMB

Isa Khan's Tomb is of an architectural style that was used for royal tombs through the 15th century rule of the Sayyid and Lodi dynasty. Conservation works at Isa Khan's Tomb commenced in January 2011 following a year long documentation exercise, peer review and approval of the Conservation Plan.

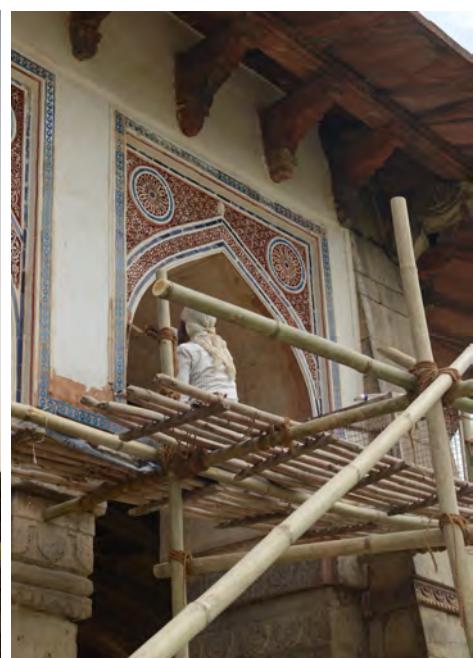
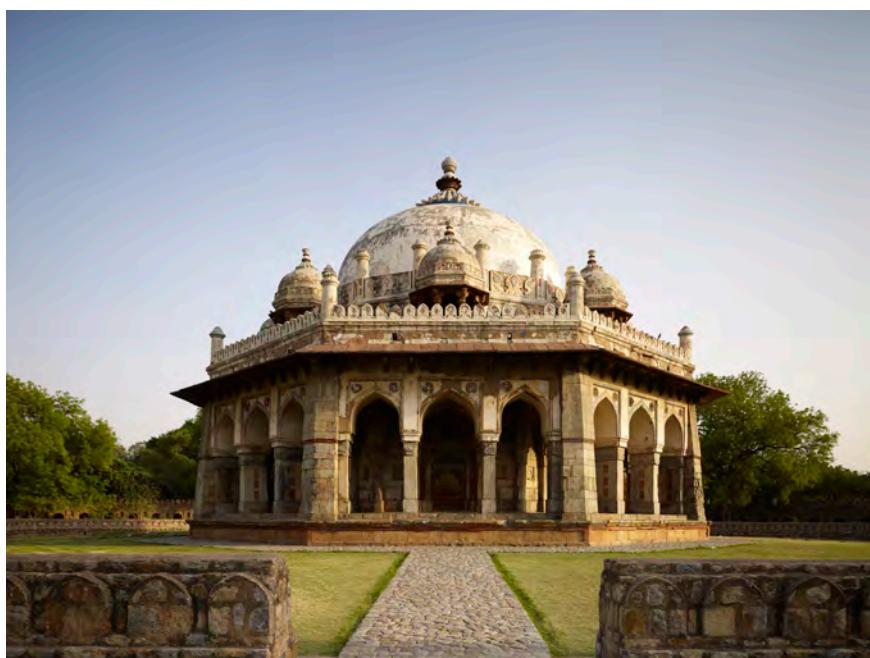
LANDSCAPING ISA KHAN ENCLOSURE FORECOURT

Only a narrow winding pathway led visitors to the Isa Khan's Tomb prior to the recent project. A sensitively designed landscape scheme has now been implemented that has since led to most visitors led towards the Isa Khan Tomb enclosure.

ACTION TAKEN:

- One of the inappropriate 1920 intervention lead to the demolition of the portion of the enclosure wall of Bu- Halima Garden tomb, which was the construction of an oval shaped roadway destroying the character of the enclosure as well as surrounding areas and severely disfiguring the historic character of the site.
- This carriageway also disturbed the forecourt of Isa Khan Enclosure by muddling up the ground levels and pathways leading to the complex.
- This early 20th century British-era carriageway built in cement concrete is now removed and red sandstone pathways are laid.
- Also aesthetically built retaining walls are made to retain the original levels of the forecourt.
- The steps leading to the complex are repaired according to the original levels.
- It was then finished by providing the Plinth protection along the enclosure wall.
- A wide sandstone pathway now leads to Isa Khan's tomb enclosure.

(Below) Isa Khan's Garden - Tomb after the conservation and landscape works





OPENING CEREMONY

ACTION TAKEN:

- After the major conservation works carried out for over two years with the co-funding by the World Monuments Fund, the opening ceremony of the 16th century Garden Tomb Complex of Isa Khan was held on the occasion of World Heritage Day on 18th April 2013.
- The conservation works were preceded by almost a year long highly scientific documentation like 3D Laser Scanning, architectural documentation, condition assessment and archival research. It revealed the exquisite ornamental crafts on the ceiling, facades and canopies of the monument.
- Major conservation works carried out in two years were:
 - a. The entire Tomb chamber was **re-plastered** including restoration of the decorative ceiling. The **retaining wall** of the Tomb required to be largely reconstructed due to structural failure. The **finial** of the Main dome was rebuilt in the basis of the remains found in the excavation and archival research.
 - b. Major **structural repairs** included stitching of cracks in the dome, re-plastering central dome, relaying the roof layer, re-plastering internal wall surface of the mosque. A **well** was discovered on the plinth of the mosque and was de-silted to its original depth.
 - c. Portions of the **Gateway** had collapsed and required to be rebuilt using original stone columns discovered during the Garden restoration.
 - d. The **enclosure walls** were repaired where it was in a deteriorated condition and the entire wall was carefully re-pointed.
 - e. Over 1,25,000 cu. feet of earth was removed from the **Garden** manually to restore original levels. The Garden has now been planted with citrus species favoured by the Mughals.
- More than 2000 school children from 25 schools were present and were given guided tours by the staff of Aga Khan Trust for Culture explaining the conservation works and architecture of the complex.
- **The tomb was unveiled by the Secretary- Culture, President and CEO of World Monument Fund and Director General, Archaeological Survey of India (Above).**

2014



(Left) Isa Khan's Mosque in 2011, before conservation;
 (Right) Various stages of tilework restoration on canopies and finial



08 Isa Khan Garden - Tomb Enclosure

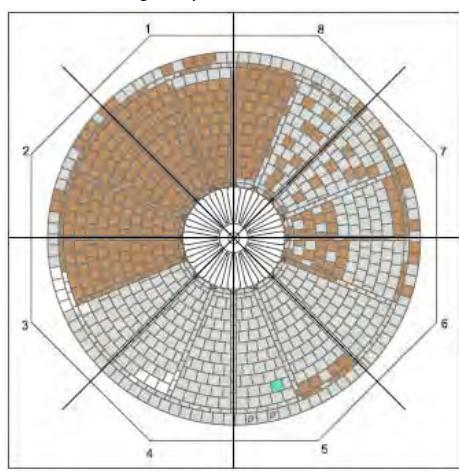
The Isa Khan complex comprises of a walled enclosure within which is located a mosque and an octagonal Tomb. The borders of arches and medallions are beautifully ornamented by decorative plasterwork and glazed tiles of different colours. In the tomb, parapet above the chajja has extensive tile work on the *kanguras* (battlements) and borders. The eight *chattris* or canopies supported by columns of red sandstone were all covered with glazed tile work. The portions of original tile decoration are still preserved on the east façade of the Mosque with blue, yellow and green as the most prominent colours. The profuse ornamentation is a significant element and a clear demonstration of the development of architectural style for an octagonal mausoleum used by Sayyids and Lodhis.

Restoration of the Tilework at Isa Khan Mosque

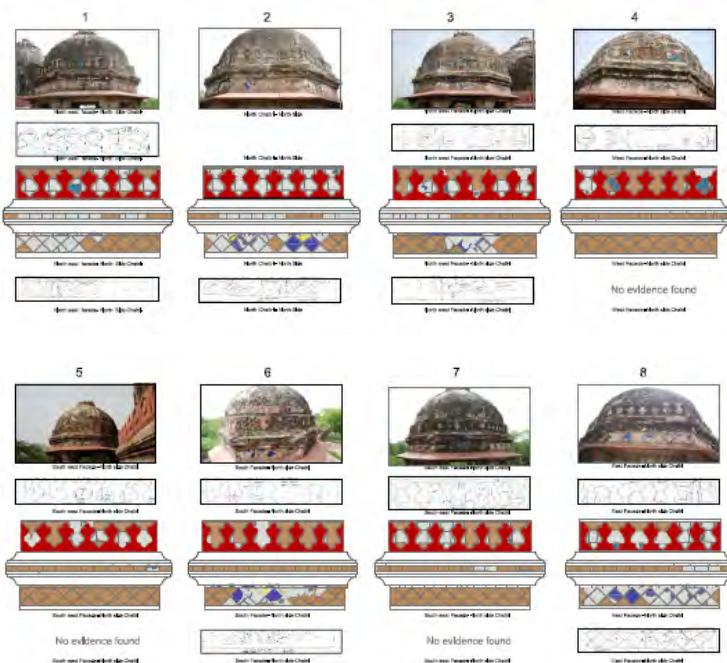
Action Taken:

- The tile research project was started by AKTC in 2008 after it was determined that each of the monuments in the project area were adorned with tilework to some extent. After years of extensive research and experimentation, matching glazed tiles are now prepared in-house.
- After the extensive conservation works were completed at the Isa Khan's complex in 2013, a detailed documentation and condition mapping, covering each tile remain was done to understand the original layout as well as the current status of the glazed tile work.
- Each tile pattern was manually traced in situ and then converted into working drawings. A detailed photo documentation record was also collected.
- The conservation philosophy of retaining the maximum historic fabric was followed and the tiles will be put back where they are completely missing.
- Based on this, a precise quantification of the tiles was done and required materials were procured.
- The tile restoration works were carried out on the canopies of Isa Khan Mosque and they are restored by master craftsmen under the full time supervision of Engineers and art conservator.
- The tile restoration works on the canopies and façade of the mosque is now complete.
- The estimated number of tiles required for the tile restoration in Isa Khan Tomb is approximately 12000 and approximately 50% tiles have already been prepared. The tiles vary in shapes and sizes and therefore most of the tiles are individually prepared. The new tiles will exactly match with the original tile in colour, texture, sectional specifications, mineral specifications, shape (floral, triangle, flower etc.) and size.

(Right) Detailed documentation of all canopies to carefully record existing tiles and discern original patterns



Northern Chattri Dome Top View:
Existing Condition





Procedure

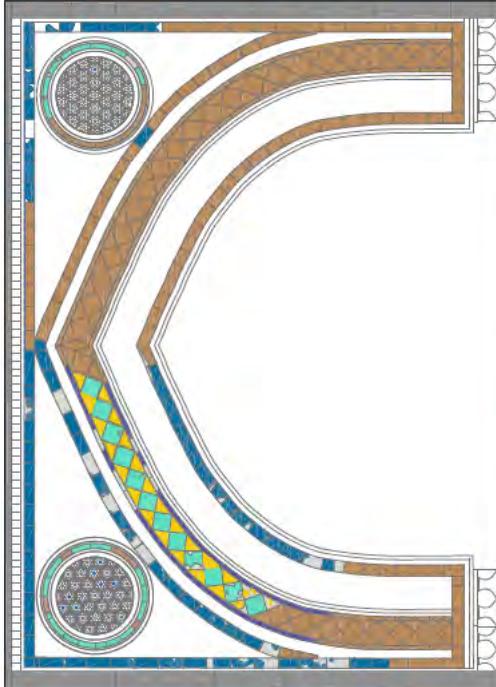
Turquoise tiles have been created to replace those tiles that were missing from the arches. Any tiles, either colored or just the base, that still ease on the arches prior to the conservation work will not be removed or replaced. Only missing tiles will be replaced. Also, any ceramic glaze that has been later applied over tile bases will be removed.

201

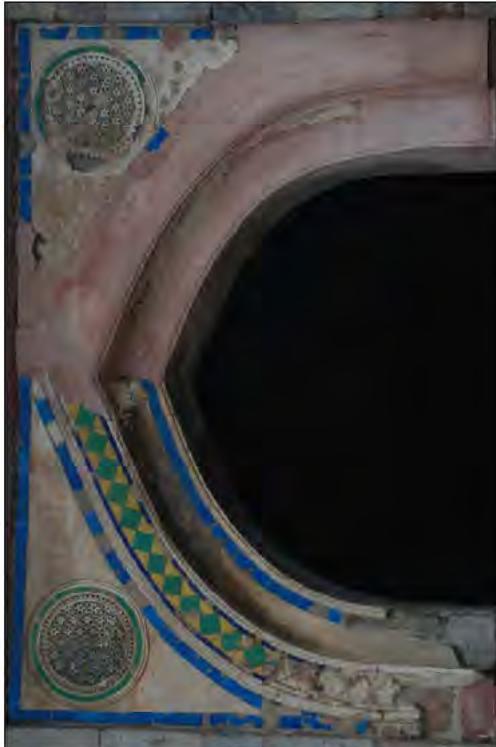
201

The legend consists of a vertical column of colored squares next to their corresponding names:

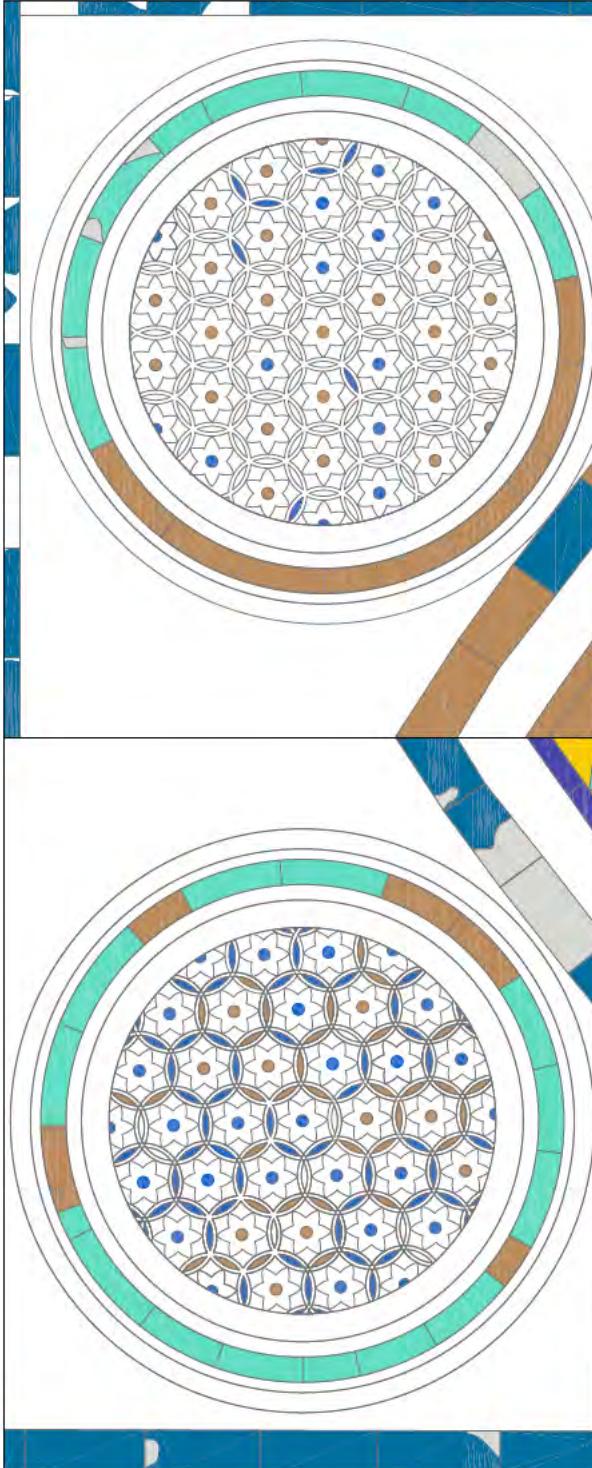
- Cane**: Red/Orange
- Tie Base Fusing**: Blue
- Tie Glass Binding: Top/Bottom**: White
- Tie Glass Binding: White**: White
- Tie Glass Binding: Creme**: Light Blue
- Tie Glass Binding: Green**: Teal
- Emery**: Tan/Light Brown
- Tie Glass Binding: Yellow**: Yellow
- Orange Tie Pattern: Large**: Orange
- Orange Tie Pattern: Small**: Darker Orange



Arch Elevation



Right-Angle Images



Right Arch Medallions

Scale:	as / shown	
Date:	Documented by: ASTC	Jan. 2012
Drg. No.: IJKM/CA/BIA		



N

Scale:

as / shown

Date: Documented

Jan. 2012 by: AKTC

Drg No.:IKM/CA/01A

**Condition Assessment
Right side Arch**

