About The Project

This 16th century tomb of the Kokaltash family is of a unique design and plan inspired by the Iranian garden pavilions and later used for the Diwan-i-Khas and Diwan-i-Am at the Red Fort. The structure is set in its own enclosure and comprises of 25 domed chambers supported on 64 marble columns. Repairs commenced in 2011 and eight domes had been repaired by 2012. Each dome required complete dismantling of the marble blocks followed by repairs to marble and masonry prior to restoring blocks to their original position.

Archaeological Survey of India

Aga Khan Trust for Culture

Conservation works co-funded by
Embassy of the Federal Republic of Germany

Nizamuddin Urban Renewal Initiative

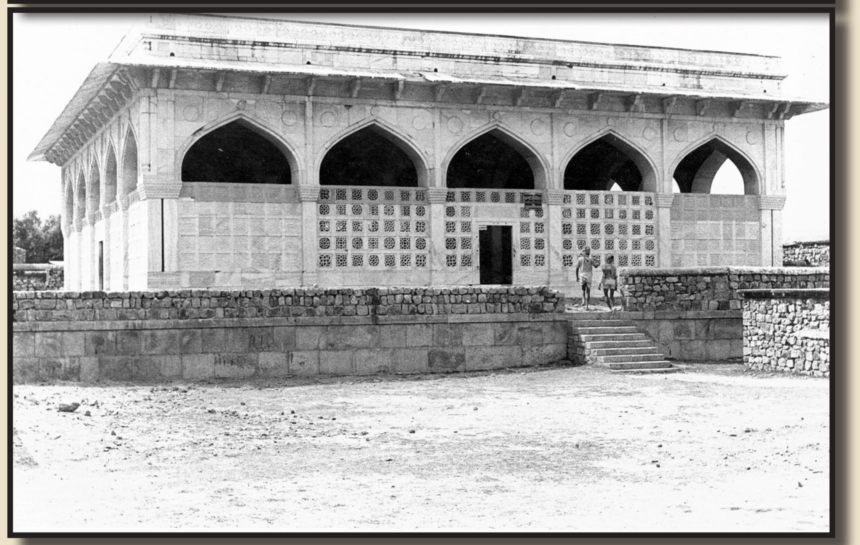
a *People* Public - Private Partnership

Archaeological Survey Of India - South Delhi Municipal Corporation - Central Public Works Department
Aga Khan Foundation - Aga Khan Trust For Culture

For more information, visit: www.nizamuddinrenewal.org or www.facebook.com/NizamuddinRenewal

HISTORICAL SIGNIFICANCE

Chausath Khamba is the tomb of Mirza Aziz Kokaltash, son of Atgah Khan and Jiji Anga and was built in the year 1623-24 A.D . He was the great Mughal Emperor Akbar's foster brother, and thus was known by the name 'Kokaltash' - meaning foster brother. In the 16th year of his reign Akbar conferred upon him the title of Azam Khan. He later settled in Ahmedabad (Gujarat) where he died in 1623 AD. His remains were brought to Delhi and buried near the tomb of his father, Atgah Khan and Sufi saint Hazrat Nizamuddin Aulia.



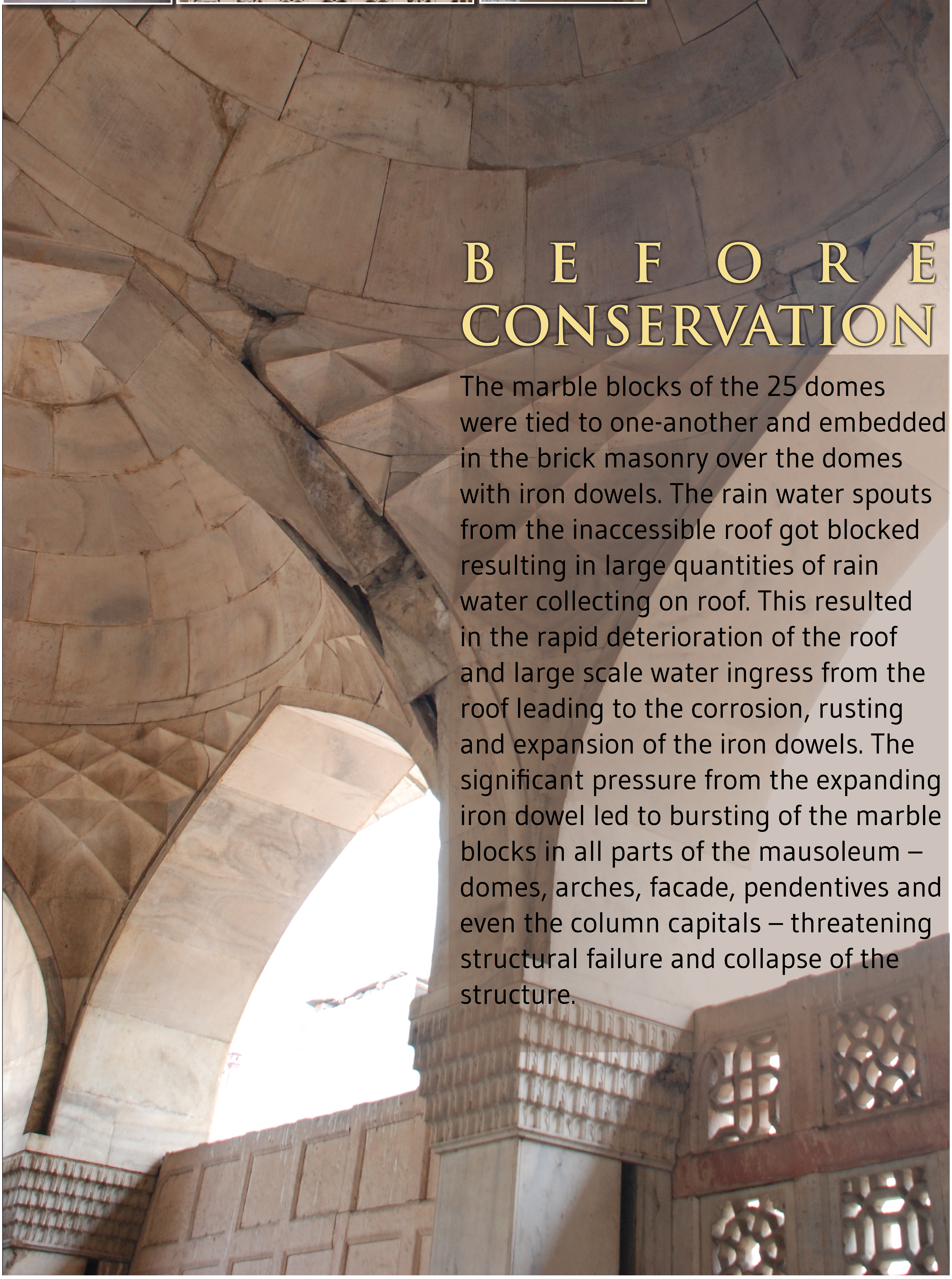
ARCHIVAL RESEARCH

Studies were carried out to achieve better understanding of the historic fabric of the building and its relation with one of oldest precinct in Delhi. Architectural data was collected from Zafar Hasan's – "Monuments of Delhi (Vol. 2) DELHI ZAIL listing" ,Carr Stephen's - "The Archaeology and Monumental Remains of Delhi" and Ebba Koch's - " Mughal Architecture" and classified for further referencing timeline of the monument was established and all archival paintings and images were collected and compared for evidences.

Material Deterioration due to past repairs in white cement – masking the damage but allowing the deterioration to accelerate

Chipping of Marble elements like domes, arches, facade, pendentives, jaalis and column capitals

Rusting of iron dowel due to water seepage led to bursting of the marble



BEFORE CONSERVATION

The marble blocks of the 25 domes were tied to one-another and embedded in the brick masonry over the domes with iron dowels. The rain water spouts from the inaccessible roof got blocked resulting in large quantities of rain water collecting on roof. This resulted in the rapid deterioration of the roof and large scale water ingress from the roof leading to the corrosion, rusting and expansion of the iron dowels. The significant pressure from the expanding iron dowel led to bursting of the marble blocks in all parts of the mausoleum – domes, arches, facade, pendentives and even the column capitals – threatening structural failure and collapse of the structure.

in 2008

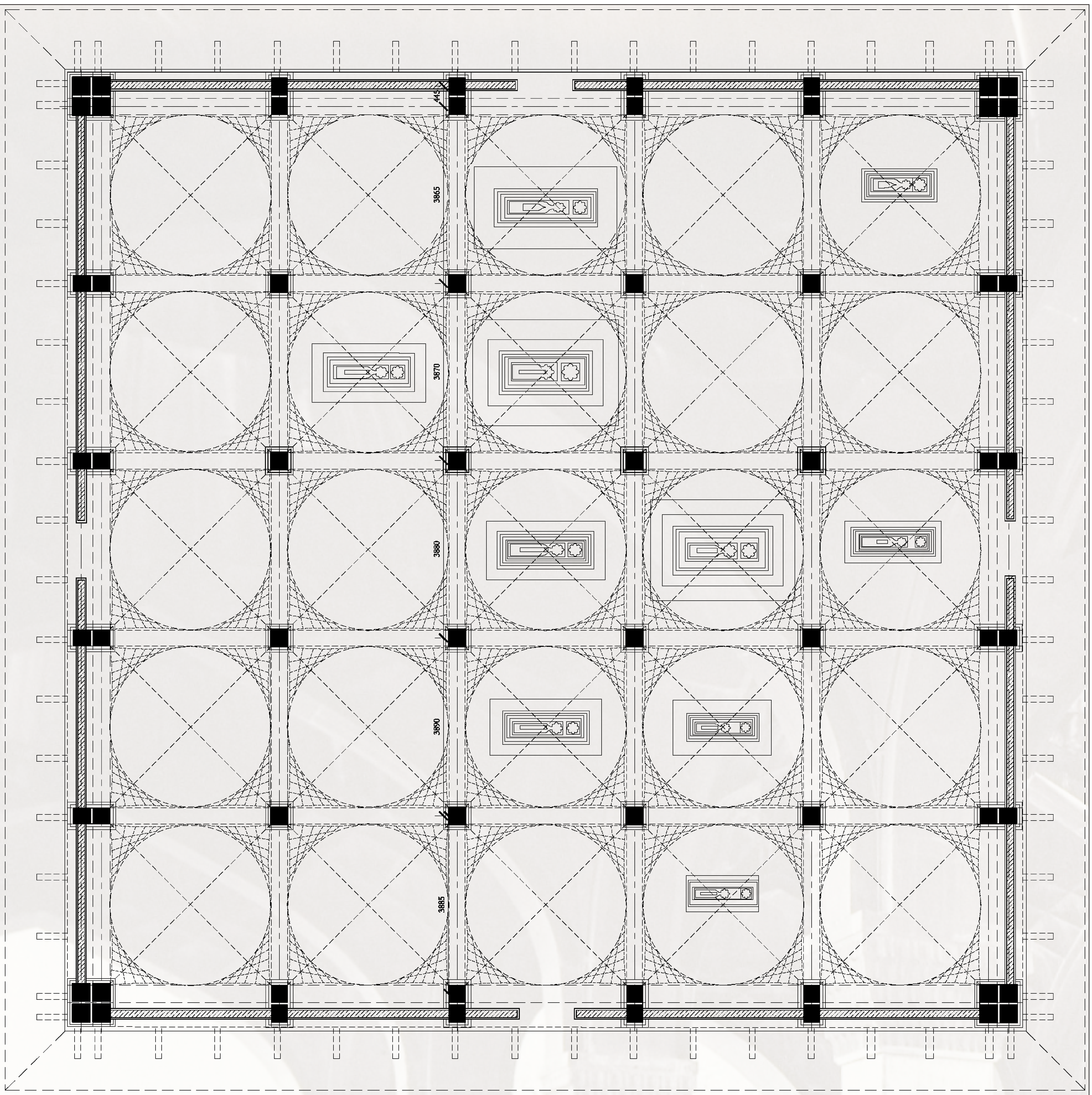
in 2009

Jashn E Khusrau in 2010

THE SETTING

The masonry wall built in the 1980's to limit access to Chausath Khamba was dismantled and replaced with a transparent fence using motifs from the decorative lattice screens of the mausoleum.

The forecourt itself was paved with stone in a manner that not only enhanced the historic character but also allowed the creation of a performance space for concerts and cultural festivals. Twice a year the Urs ceremony of Hazrat Nizamuddin Auliya and his favourite disciple, the Sufi poet Amir Khusrau is held at the Urs Mahal built within the enclosure in the mid-20th century. It is proposed to install a permanent exhibit in this space.

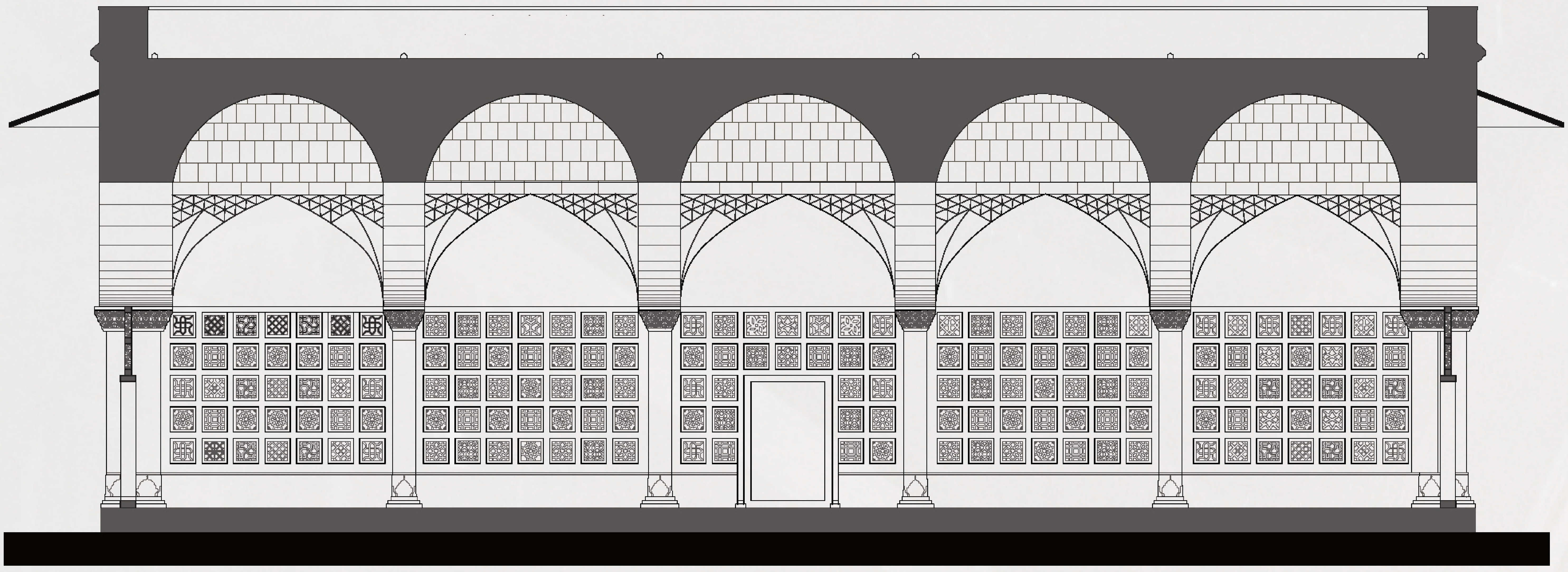


(Above) Reflected ceiling plan of Chausath Khamba

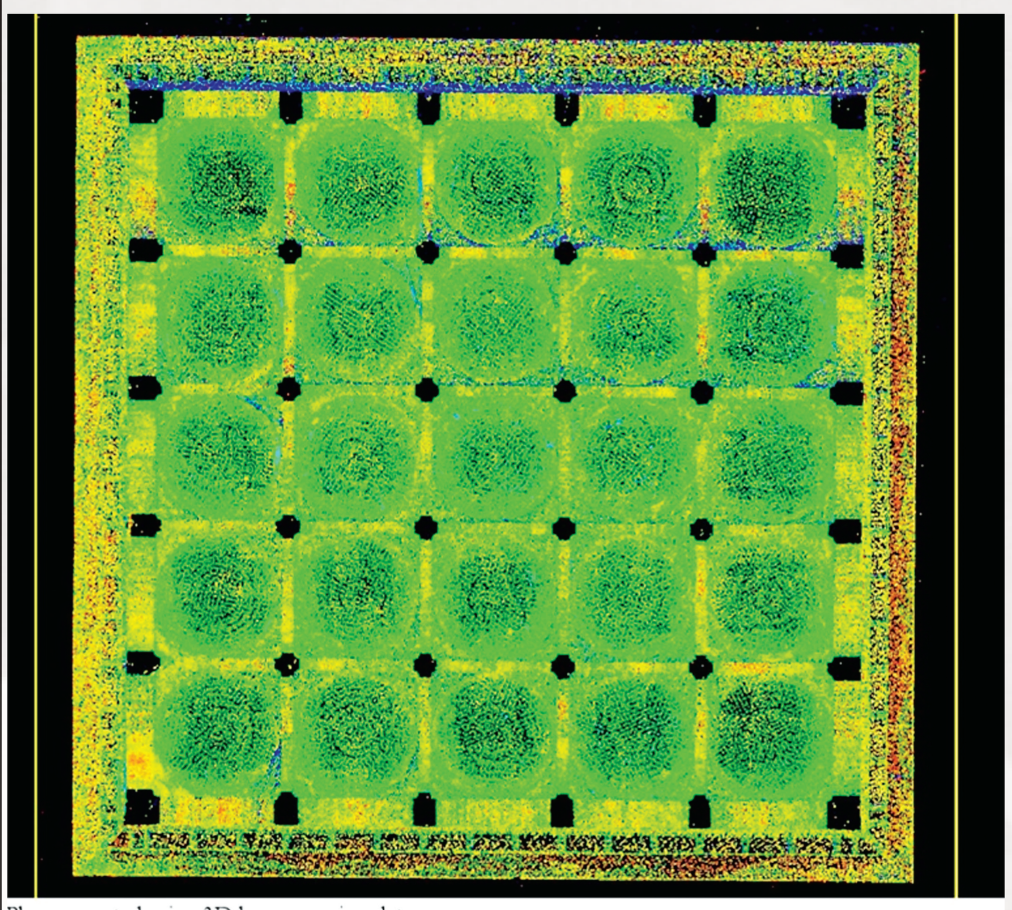
Stone-by-Stone condition assessment of the domes, exterior and interior façades of the monument was done manually on the images by visual inspection of each stone its defects and its causes. Past, yet recent, repairs at Chausath Khamba included filling cavities created by broken marble edges with white cement. This needed to be carefully removed.

Each stone was closely inspected to list required repairs by indenting or to assess if it is not possible to repair and requires replacement.

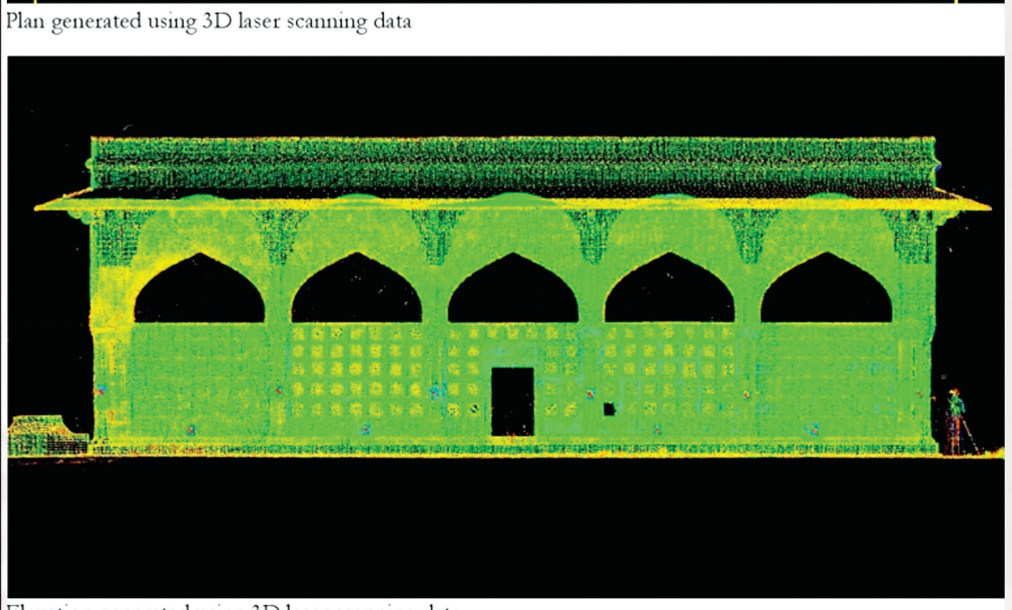
DOME NO:	% OF WHITE CEMENT FILLING (DOME)	% OF WHITE CEMENT FILLING (PENDENTIVE)	NO. OF CRACKS	NO. OF STONES WITH BURSTING
1	5.5	5.8	28	8
2	4.4	2.2	18	2
3	3.2	2.4	4	6
4	2.9	5	9	3
5	2.8	5.4	4	-
6	4.1	3.1	1	-
7	4.1	2.2	3	1
8	1.5	1	3	2
9	5.12	2.7	13	3
10	2.9	2.8	25	7
11	3.3	1	23	15
12	6.4	3.1	4	3
13	2.8	1.6	3	2
14	2.6	1.3	2	2
15	4.1	4	4	3
16	3.5	1	3	-
17	1	1.1	2	-
18	2.8	1.3	7	-
19	3.1	1.7	5	-
20	1.5	2	8	4
21	2.3	1	9	8
22	1.1	1	2	5
23	2.2	2	2	3
24	2.4	1	3	1
25	1.1	1	7	1



DOCUMENTATION



Plan generated using 3D laser scanning data

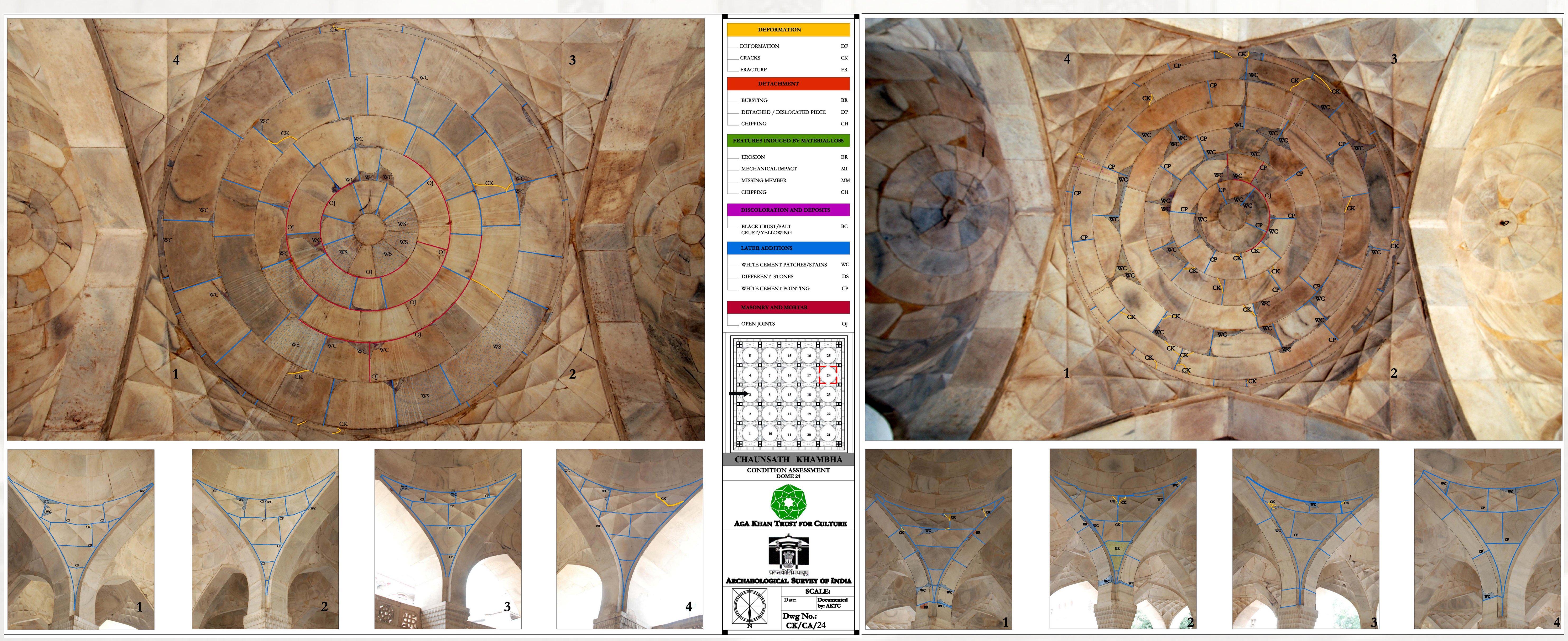


Elevation generated using 3D laser scanning data

(Above) 3D Laser Scan images; and (Below) Condition Assesment drawings of Chausath Khamba

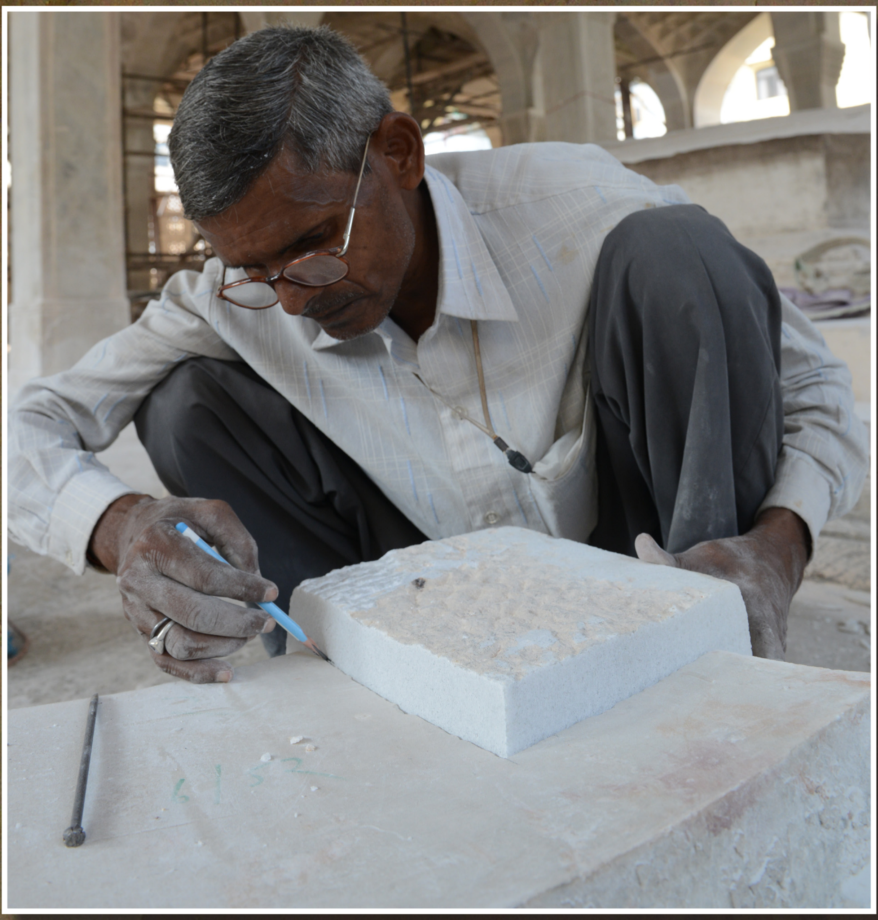
A high definition survey, using 3D laser scanning technology, was carried out on the structure as a precursor to conservation works. This was followed with a stone-by-stone assessment of the entire structure to map the profile and defects on each individual stone coupled with photo and video documentation. To complete a structural analysis pits were dug to study the foundations – which were surprisingly found to reach a depth greater than five metres.

Archival research revealed sketches dating from the early 19th century, descriptions and a continuous record of photographs from the mid 19th century.



Various stages of conservation of one dome:
Numbering each stone; Dismantling the marble blocks and repairing of cracks in the masonry; and Repair of marble blocks with indents of matching stone where these had burst by master craftsmen using tools, techniques used by the original builders and Re-installation of marble blocks in the original location.

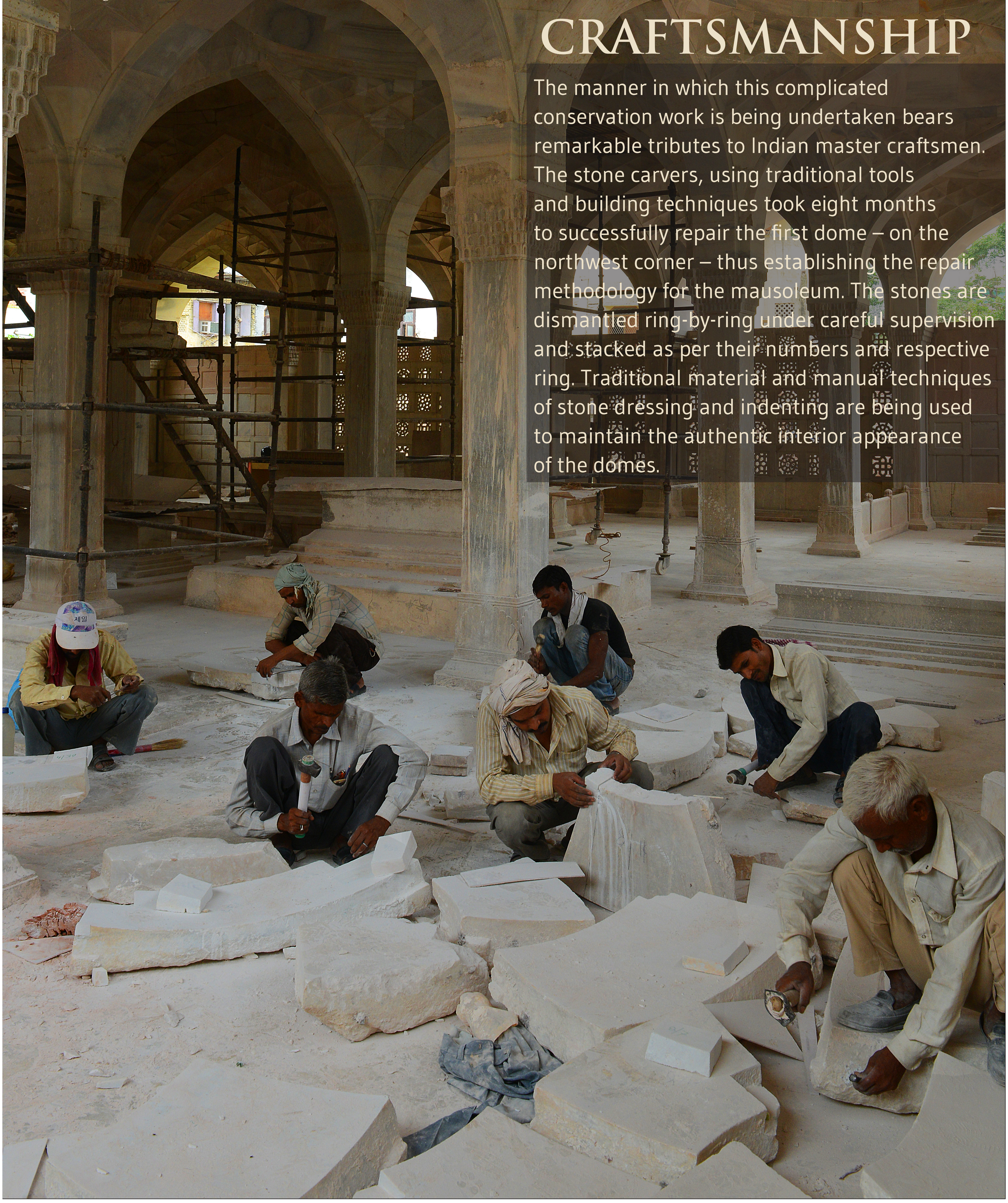
After removing the white cement from the broken joints, tell tails were fixed over the joints for structural monitoring for further observation by trained conservation architect and engineers.
Each stone weighs from 200 to 350 kilograms and requires 4 to 5 persons to remove and stack the stone. The stones being structural stones and are interlocked with each other. Proper precision needs to follow while removing the stone without damaging the stone.
Shifting of stones from the scaffolding has to be done with great care with the help of rope and requires 4-5 persons without damaging the edges of the stone.
The corroded Iron dowels are then removed carefully without damaging the stone and then replaced with stainless steel dowels. The process was constantly supervised by conservation architect and site engineer.



The removed stones are further closely inspected before indenting repair. After examining, the stone decision on repair methodology is taken. The process is time consuming as each stone is unique in terms of its size and curvature on both the axis.

CRAFTSMANSHIP

The manner in which this complicated conservation work is being undertaken bears remarkable tributes to Indian master craftsmen. The stone carvers, using traditional tools and building techniques took eight months to successfully repair the first dome – on the northwest corner – thus establishing the repair methodology for the mausoleum. The stones are dismantled ring-by-ring under careful supervision and stacked as per their numbers and respective ring. Traditional material and manual techniques of stone dressing and indenting are being used to maintain the authentic interior appearance of the domes.



TERRACE

The masonry above the domes had 1 metre deep and 4″ wide cracks through which the water was seeping inside the building. These cracks were required to be repaired urgently to stop further deterioration.

The 230 mm thick layer of cement concrete from the roof was removed without disturbing the underneath structure and pressure grouting was done to repair the network of cracks in the roof which were approximately 2 meters in depth. A new layer of lime concrete with additives like Jaggery and Bael fruit pulp (*Belgiri*) was laid maintaining the original slope levels. Clogged water spouts were opened to avoid rain water from stagnating.