

# INDIAN ARCHAEOLOGY 2007-08

## - A REVIEW



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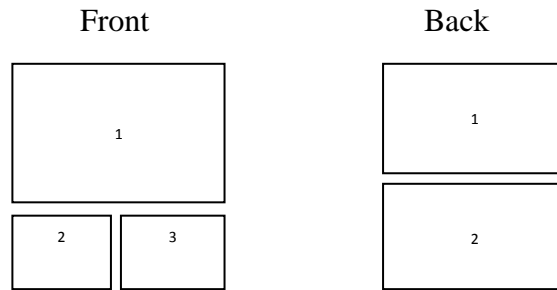
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**Front Cover:** 1: *Farmana: remains of a planned settlement, Mature Harappan*

2: *Ghorakatora Stone sculptures*

3: *Garhgaon Raja's Palace- Pottery*

**Back Cover:** *Bastion wall, Noormahal Sarai, Noormahal, before and after conservation*

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## PREFACE

I take the privilege to present the issue of *Indian Archaeology 2007-08 – A Review*, before the scholars and general readers.

This issue includes information on archaeological research undertaken during the year 2009-10 throughout the country including explorations, excavations, epigraphy, numismatics, outstanding discoveries, palaeobotany, museums, structural/chemical conservation, publications as well as landscaping work by the Archaeological Survey of India and other organizations. I thank all the contributors and heads of archaeological organizations in States, Universities, Museums and Research Institutes including our own colleagues in the Survey for their cooperation in bringing out this publication in its present shape. In editing this vast material, some errors might have crept in for which I must tender my apologies. However, in respect of information furnished by the respective contributors, the responsibility lies with them only.

I am grateful to Dr. Satyabhama Badreenath, Regional Director (South), Dr. D.N. Dimri, Director (Publications) and his team in the Publication Section especially Ms. Anchal Sharma, Stenographer for formatting and designing the volume and also making it press-ready in the record time.

Last but not the least, I would be failing in my duty, if I do not mention my gratitude to Shri C. Dorje, former Joint Director General, Archaeological Survey of India for going through the final manuscript and suggesting necessary corrections.

Date ...../...../2016  
New Delhi

(Rakesh Tewari)  
Director General  
Archaeological Survey of India

## CONTENTS

I.	Explorations and Excavations	.....	1
	Andhra Pradesh, 1; Assam, 14; Bihar, 23; Chhattisgarh, 43; Goa, 43; Gujarat, 44; Haryana, 70; Jammu and Kashmir, 80; Jharkhand, 81; Kerala, 82; Maharashtra, 85; Meghalaya, 96; Sikkim, 96; Odisha, 97; Punjab, 98; Tamil Nadu, 99; Uttar Pradesh, 106; Uttarakhand, 127		
II.	Epigraphy	.....	132
	Arabic and Persian Inscription, 131 Rajasthan, 131; Tamil Nadu, 131; Uttar Pradesh, 132		
III.	Numismatics and Treasure Trove	.....	135
	Uttar Pradesh, 135		
IV.	Other Important Discoveries	.....	137
	Goa, 137; Karnataka, 137; Madhya Pradesh, 138; Uttar Pradesh, 138		
III.	Palaeobotanical and Pollen Analytical Investigations	.....	140
	Gujarat, 140; Uttar Pradesh, 141		
IV.	Museums	.....	143
V.	Architectural Survey	.....	147
	Temple Survey, North, 147		
VI.	Preservation of Monuments	.....	148
	Monuments of National Importance, 148 Agra Circle, 148; Aurangabad Circle, 184; Bangalore Circle, 189; Bhubaneswar Circle, 196; Chandigarh Circle, 211; Chennai Circle 228; Dehradun Circle, 240; Dharwad Circle, 248; Goa Circle, 255; Guwahati Circle, 259; Hyderabad Circle, 264; Kolkata Circle 269; Mumbai Circle, 275; Raipur Circle, 287; Srinagar Circle, 293; Thrissur Circle, 295; Vadodra Circle, 300		





# INDIAN ARCHAEOLOGY 2007-08 – A REVIEW

## I. EXPLORATIONS AND EXCAVATIONS

### ANDHRA PRADESH

#### 1. EXCAVATION AT BUDDHIST SITE, ALLURU, DISTRICT KRISHNA

The Hyderabad Circle of Archaeological Survey of India; under the direction of D. Jitendra Das and assisted by D. Kanna Babu, Ch. Babji Rao, T. Chenchu Ratnam, A. Suresh, V. Kanaka Raju, N. Subba Rao, Ch Vijayanand, K. Veeranjanyulu, K.V.V.S.N. Murthy and Nagabhushana Sastry and D. Vishweswara Rao, M. Yesu Babu (Research scholars) carried out scientific clearance at the Buddhist site of Alluru, (16° 46' 17" N, 80° 26' 16" E) in District Krishna, with the objective of exposing the buried structural and other archaeological remains. The Buddhist site is located about 12km north east of Kanchikacherla on NH 9 and on the west side is the Kanchikacherla-Madhira road at Alluru. The site which was excavated in 1926 and several amateur excavations prior to protection itself and till the construction of fencing and had also fallen a prey to vandalism. The growth of vegetation all around the area totally covered the features of the site. The scientific clearance work was taken up on all sides of the stupa in order to expose the remains of the stupa and other structures around it (Pl. 1A).

Subsequent surface exploration which had given a fair picture of the stupa architecture and also brought the evidence of other structural remains around it. The scientific clearance had resulted in the exposure of hitherto covered up *Mahastupa* features like the spokes, drum walls along with remains of four *ayaka* platforms on all cardinal directions, *pradakshinapatha* and remains of brick and lime plastered railing (Pl. 1B). The *Mahastupa* measures about 12m in diameter from its centre up to the drum wall. The *ayaka* platforms measure 4.5m x 0.7m with a maximum 10 brick courses. The stupa has 16 spokes each measuring 0.6m in thickness. The central part of the stupa is disturbed at the point from which the spokes radiate at a distance of 4.42m and is marked by another brick radial wall of 0.6m thick and the drum wall which is 3.70m runs at a distance of 12m from the centre. Further, remains of lime plastered brick gateways in front of the *ayaka* platforms and across the *pradakshinapatha* have also been exposed. The exposed evidence suggests that the stupa had gateway entrances on all four sides of which traces on the south eastern and north eastern sides were completely lost (Fig. 1). The scientific clearance has also brought to light evidence pertaining to two phases of *pradakshinapatha*. The earliest one was of lime concrete, rammed

Plate 1



A

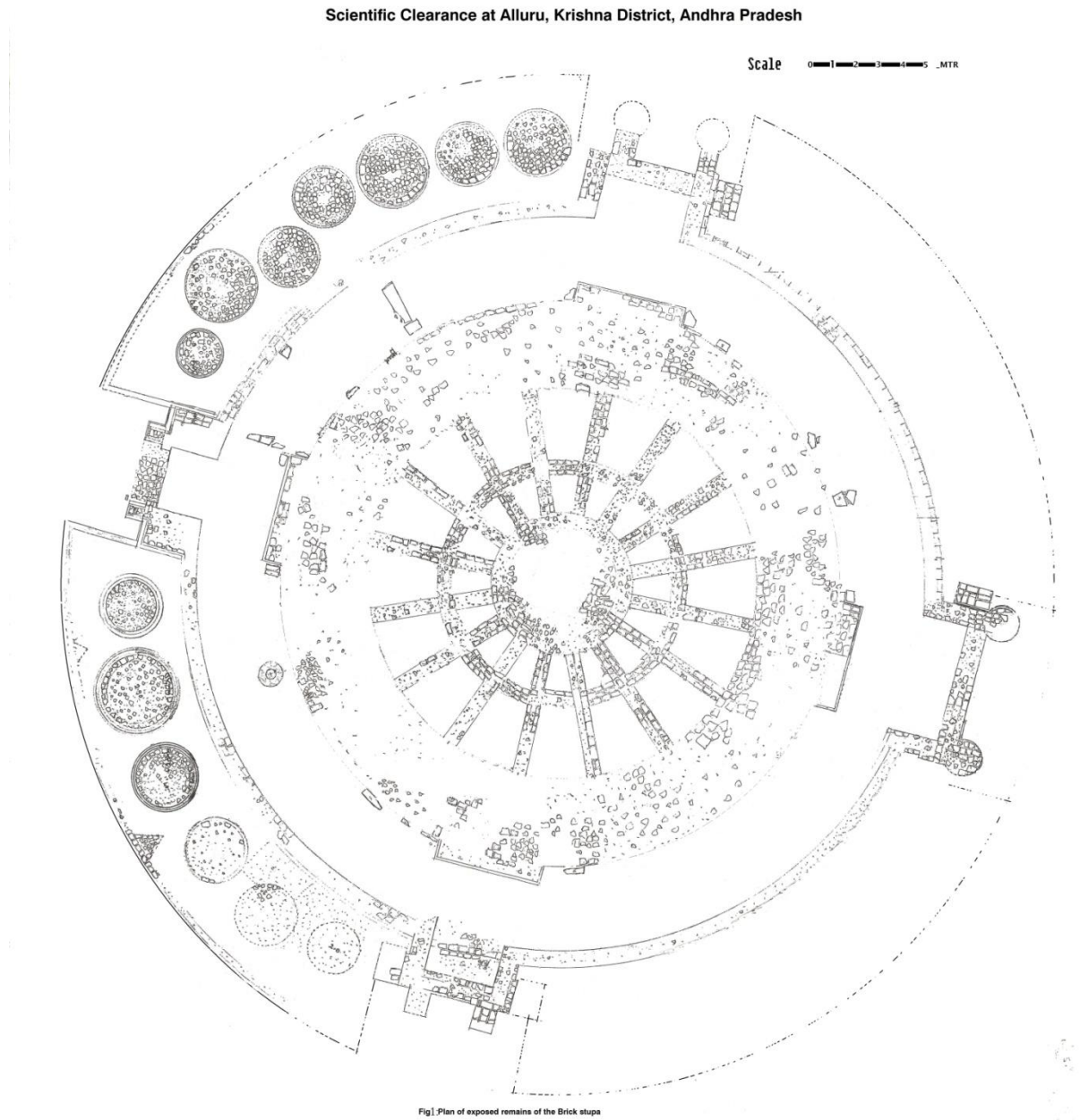


B

Alluru: A; general view of the site and B; plan of the exposed stupa.



**Fig. 1**



Alluru: Plan of the exposed Brick Stupa.

and then plastered and the later one (above 90cm) was stone flooring in Kadapa stones. The evidence also suggests that during the 2<sup>nd</sup> phase, the stupa was provided with four lime plastered brick gateways in front of the *ayaka* platforms in the same axis. Further, in place of railing pillars, a brick railing in recessed intervals were provided and lime plastered brick votive stupas were built around the railing (wall?) externally (Pl. 2A). In all remains of 13 votive *stupas* were exposed on the south eastern and south western sides of the *Mahastupa*. All these votive stupas aligned almost parallel to the railing. Of these, 7 are located between the northern and western gates (north western side) and 6 between western and southern gates (southwestern side) of the stupa. Presumably, once, all the sides of the *Mahastupa* were surrounded with votive stupas. Due to quarrying of earth and robbing activities at the site, the evidence of votive *stupas* was damaged and got lost on the north eastern and south eastern sides. All the votive stupas measuring between 1.9m to 3m diameter were invariably built of brick and covered with lime plaster. The floor (about 3m wide) over which these votive stupas were built was also lime plastered (Pl. 2B).

The systematic process of debris clearance on the west and south west of *Mahastupa* resulted in the unearthing of 3 brick *chaityagrihas*. Amongst them, two *chaityagrihas* were of huge dimensions measuring 25.5m x 9.42m and 24m x 8.75m respectively and the third one was smaller in size with available traces measuring 12.8m x 6.7m and the wall thickness was

1.9m. Amongst them the larger *chaityagriha* (Chaitya 1) was located on the south western side of the stupa. It was made of brick and apparently lime plastered. The exposed remains consist of the three lowest courses only. Evidently the *chaitya* was lime plastered. The wall thickness of this structure is 2.20m. The main entrance is marked by a four faceted elongated projection on the eastern side and the circular brick platform (of stupa) on the western interior is marked by a circular brick platform/pedestal of 3.6m diameter, and was probably meant for a statue of Buddha. The open interior floor space measures 22m x 5.5m. Another noteworthy feature of this stupa *chaitya* is that it was provided with one more entrance measuring about 4.3m x 3m on the northern side (Fig. 2 & Pl. 3). A feature of such double entrances for a *chaitya* is a rare phenomenon in the Buddhist architecture of known Buddhist sites in Andhra Pradesh and can probably be attributed to the post *stupa* phase. The second *stupa chaitya* (Chaitya 2) remains were exposed on the northern side of the larger *chaitya* located to the west-north-west of the main stupa. This *stupa chaitya* was evidently raised over an earlier *chaitya* on its northern wall. The remains of the earlier *chaitya* was not fully intact and even the full dimensions are not possible to arrive at. However, it measures 24m length and 8.75m width and the thickness of the wall is 2.20m. The *chaityas* are east west oriented with entrance from the east and measures 12.8m x 6.7m (Pl. 4A). Near the boundary wall, on the western side of the stupa were exposed remains of lime plastered



A

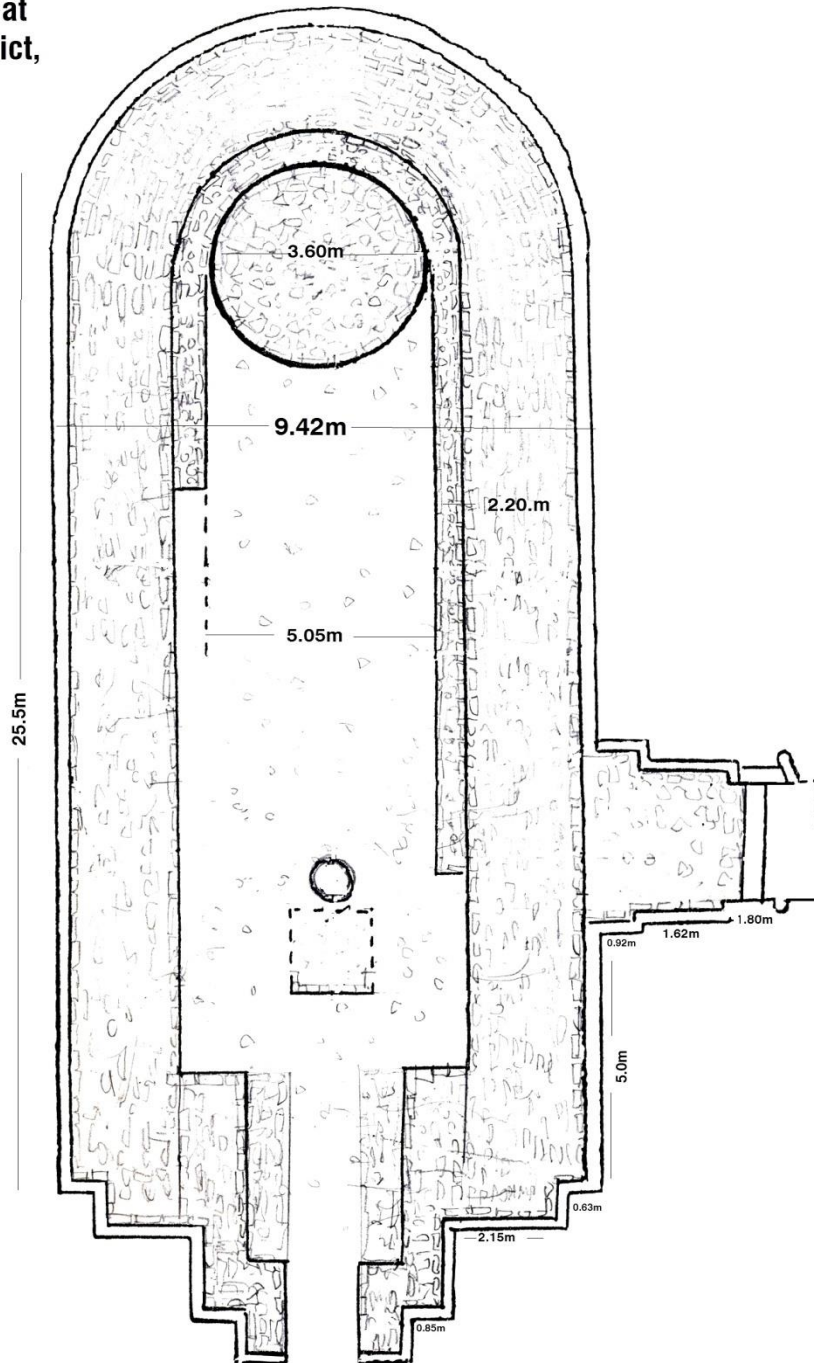


Alluru: A; view showing remains railing and B; remains of the lime plastered brick votive stupas.



**Fig. 2**

**Scientific clearance at  
Alluru, Krishna District,  
Andhra Pradesh  
2007-08**



**Fig.2. plan of exposed large brick stupa**



Alluru: remains of large stupa *chaitya* during excavation.

brick monastic cells and other structures. Evidence of post holes was also noticed in the structural activity of brick chambers (Pl. 4B). The other important finds include fragments of stone pillars, red ware pottery of medium to coarse fabric that includes a huge storage jar with stamped decoration exposed insitu in the *pradakshinapatha* area of the stupa (Pl. 5A). The shapes met with include vase, *handi* and spouted vessels and few beads, besides substantial numismatic evidence pertaining to Satavahana and post Satavahana periods. The surface evidence including numismatic (Pl. 5B) also indicates the different phases of the Buddhist establishment at the site and also that Buddhism had received prolonged patronage.

## 2. EXCAVATION AT BUDDHIST SITE, KODAVALI, DISTRICT EAST GODAVARI

The Hyderabad Circle of Survey, under the direction of D. Jitendra Das and assisted by Ch. Bobji Rao, A. Suresh, V. Kanaka Raju, N. Subba Rao, Ch. Vijayanand, Ch. Peddintlu, T. Chenchu Ratnam, K.V. Ramana and N. Surya Rao carried out scientific clearance at the Buddhist site of Kodavali, Gollaprolu Mandal, East Godavari district. As the Buddhist site located on the hill-top was thoroughly vandalized over a long period affecting the archaeological significance of the site and the remains got disturbed and lost due to ravages of nature too. The scientific clearance works was taken up at the site with the objective of exposing the buried features of the structural and other archaeological remains at the site and thereby provide a facelift to it.

The *Mahastupa* is situated atop the hill and the upper portion of the *stupa* has got damaged and the structural fragments are scattered on the flat eastern side and as such details of it is not available. The clearance of debris consisting of earth deposit was carefully undertaken from the east-west direction. The scientific debris clearance resulted in tracing the lower courses of the main *stupa*, over a square shaped platform of dressed stone. The *stupa* had approx a diameter of 12m and had a dressed stone drum wall and filled with followed by RR masonry. (Pl. 6). It had a stone paved *pradakshinapatha* around it, of which a major part is lost (Pl. 7). Further below a square stone platform measuring 25 m x 25 m was exposed and over this the *stupa* was raised. There is evidence suggesting entry to the platform through a flight of steps (Pl. 8A). The remains of votive *stupas* on the eastern side of *Mahastupa*, were exposed which were also fashioned with similar dressed stone as the main *stupa* (Pl. 8B). Of the total nine votive *stupas* noticed, one smaller votive *stupa* has three courses of stone intact while the other eight have barely the lowest course intact. Further east of the votive *stupas*, on the ground level, remains of pillars in the form of small fragments belonging to a large pillared hall were exposed. The probable number of pillars could be 16 and approximate dimensions of this hall could be 20 x 20m (Pl. 9A). As the pillars were fragmentary in nature, the original length of pillars could not be ascertained. Remains of brick monastic cells have also been exposed on the eastern periphery of the site to the east of the large pillared hall. The available





A



B

Alluru: A; exposed remains of double *chaityas* and B; plastered brick chambers, western side of the *stupa* and *chaityas*

Plate 5



A



B

Alluru: A; close view of the storage jar and B; lead coins of Satavahana and post Satavahana period





A



B

Kodavali: A; general view of *stupa* and B; exposed remains of *stupa* and large square platform.

Plate 7



A



B

Kodavali: A-B; close view of the exposed dressed stone pavement around the *stupa*





A



B

Kodavali: A; close view of exposed remains of square stone platform and B; votive *stupa*.

traces of the monastic cells (numbering about 13) measure about 40m in length. The site is completely vandalized (Pl. 9B). Some fragments of stone caskets, stone fragments of *chhatra* (umbrella) and other structural fragments indicate the amount of vandalism and damage done to this Buddhist establishment (Pl. 10). Red ware fragments mostly of bowls, vases and carinated *handi* shapes in medium fabric were found. A small stone fragment having a label inscription of four and half *Brahmi* characters datable to circa 2<sup>nd</sup> century CE was found at the site.

## ASSAM

### 3. EXCAVATION AT GARHGAON RAJA'S PALACE, GARHGAON, DISTRICT SIVASAGAR

The Guwahati Circle of the Survey under the direction of S. K. Manjul, assisted by Arvin Manjul, Sanjay Panda, T.K. Srivastav, Jitumani Das and Rekha Das carried out excavation at Garhgaon Raja's Palace, Garhgaon (26° 56' 5'' N; 94° 44' 53'' E). The site is situated about 15km east of Sivasagar and about 3km north of the nearest Nazira town. The site was selected to know the hitherto unknown cultural sequence of the palatial complex, known as Garhgaon Raja's Palace or Ahom Raja's Palace (Kareng-ghar) which was built during the time of the Ahom king Rajeswara Simha on the ruins of old impermanent structures. Keeping this objective in mind, two areas, GRG and GRG-I were selected for excavation. GRG area is situated towards the south-western portion of the palatial complex and it was selected because more

structural remains were encountered in this part of the complex during surface study. The mound GRG-I was situated towards south-eastern portion of the palatial complex in the form of a mound and was selected because brick alignments were visible on the top of the mound. Only the south-western part of GRG-I mound was excavated. Due to shortage of time only 15cm digging has been undertaken, which revealed three courses of a brick structure with evidence of brick jelly, lime and shell (Pls. 11-14A).

During the course of excavation three layers were encountered. Layer 1 is semi compact, with silt and greyish brown in colour. It contains brickbats and pot-sherds. The upper part of the layer is heavily eroded and disturbed. Here the quantity of pot-sherds is larger than brickbats (Pl. 14B). Layer 2 is comparatively compact in nature and yellowish brown in colour and coarse grained in texture. It contains pot-sherds and brickbats. In comparison to layer 1, the quantity of pot-sherds is less than the brickbats (Pl. 15A). Layer 3 is compact and yellowish in colour. It contains very less amount of pot-sherds and brickbats in comparison to layer 1 and 2 (Pl. 15B).

During the course of excavation a huge burnt brick wall running in north-south orientation was partially exposed. Only the foundation of the structure is found and is contemporary to layer 2. The exposed structure measures 11.75m in length and 2.65m in width. The structure is mainly made of brickbats and is supported on both sides by bricks-on-edge (26 x 21.5 x 3cm). The width of the middle portion of the structure is 1.90m and in between this





A



Kodavali: A; close view of exposed remains of pillared hall and B; brick monastic cells on the eastern side of the site.



Plate 10



A



B

Kodavali: A-B; fragments of stone caskets.



A



B

Garhgaon Raja's palace: A; exposed trenches and B; brick structure and wooden post.



Plate 12



A



B

Garhgaon Raja's palace: A; exposed wooden post and hearth and B; in-situ pots.



A



B

Garhgaon Raja's palace: A; antiquities and B; painted pot-sherds.



Plate 14



A



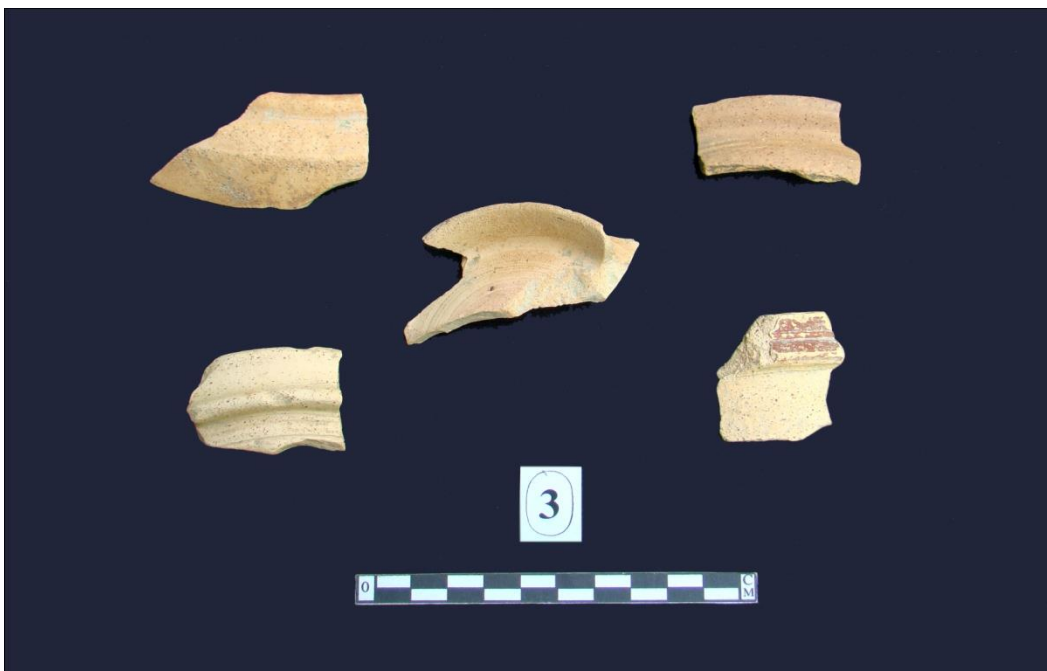
B

Garhgaon Raja's palace: A-B; Pottery.





A



B

Garhgaon Raja's palace: pottery of A; layer 2 and B; layer 3.

middle portion and the bricks-on-edge supporting there is a gap of 43cm which is rammed with brick jelly.

A circular hearth with elongated mouth has been exposed, which is sealed by layer 2 and is contemporaneous to layer 3. The hearth measures 90cm in length, 65cm in width with an inner space of 40cm. The arm of the hearth measures 14cm in width. Evidence of lime floor is also found in patches.

Besides, remains of two huge circular wooden posts have also been exposed during excavation. The extant diameter of the posts is 25cm. On the basis of structural remains at the site, the excavations at Garhgaon Raja's Palace can be divided into three structural phases.

Phase-III, the latest one, is represented by the two wooden posts, which were erected by digging post holes over the brick structure. Phase-II is represented by the brick wall & debris of brick structures. Phase-I is represented by the hearth below the brick wall and debris of brick structure with evidence of lime floor in patches.

The ceramic industry of the site is dominated by red ware, buffish red ware and few grey wares, which is available in medium and coarse fabrics and is occasionally applied with slip. All the potteries are found to be wheel-turned, though quite a percentage of hand made potteries is also found. The clay is not well levigated and contains small particles. The texture of the pottery varies from fine to coarse and the fabric varies from medium to thick. All the potteries are well fired but

devoid of any metallic sound. Few sherds are found to be painted in chocolate colour. The paintings are executed on the surface and are represented by combination of horizontal bands and short vertical lines or strokes. The pigment used is maroonish chocolate. From the shapes of the pottery it can be presumed that the painted as well as plain wares were meant for common household use. All the three layers yielded bowls with footed discular flat base, externally pointed and internally grooved, splayed and featureless rim, vases with high and corrugated splayed neck. Layers 1 and 2 had lids with conical short and domed knob and spouted pots having conical spouts. While in layer 1 the smoking pipes were of medium fabric it was of fine fabric in layer 2. In addition layer 2 yielded jars of different sizes and drain pipe of red ware and medium fabric.

The antiquities unearthed were terracotta dabbers in pieces, terracotta bird (?) figurine and iron nails.

The excavation at Garhgaon Raja's Palace proves that there were structural activities prior to the present brick edifice. The exposed huge brick structure running in north-south direction is probably related to the extant palatial building. The three structural phases mentioned earlier probably belong to a single period when the site was occupied for palatial activities. Further excavation of the site will throw more light on it.

Besides, sporadic explorations was also carried out in and around Garhgaon Raja's Palace and in Charaideo (26° 56' 35'

N; 94° 52' 45'' E) area of District Sivasagar by and as a result, three fortifications around the present palatial building at Garhgaon were traced and as per literary record of the Ahoms these fortifications were named as Bajgarh, Bhitorgarh and Itagarh. The moat around Garhgaon and remains of the brick gateway was also found.

In Charaideo area remains of a brick temple with stone pillars and pillar basement was discovered, which probably were the remains of the Lankuri Dol constructed during the time of the Ahoms between 1228 and 1826 CE (Pl. 16).

### BIHAR

#### 4. EXCAVATION AT BEGAMPUR, DISTRICT NALANDA

The excavation was started at Begampur (:25° 08' 25" E; 85° 26' 55" N) to establish the cultural sequence, its town planning, settlement pattern of the site, connection with ancient Nalanda Mahavihar and dating of the area in association with Nalanda under the direction of P.K. Mishra and assisted by N.G. Nikoshey, Sujeet Nayan, J.K. Tiwari, Abdul Arif, Neetesh Saxena, Dhananjay Kumar, M.K. Brahmchari and O.P. Pandey of Excavation Branch-III of the survey (Pl.17).

On the basis of ceramic assemblage, antiquities and other material culture recovered from the excavation, the following tentative chronology is suggested.

Period I : Pre-Gupta Period.

Period II : Gupta and post  
Gupta Period.

Period III : Late Medieval Period.

Structural activities of Period I was traced in trench YA<sub>1</sub> x III at a depth of 5.45m with the finding of a burnt brick wall - 1.30 m long and having 6 courses of bricks. It was seen attached to the north-eastern section of the square. The width of the wall could not be traced. The same structure was in continuous use in the later periods also. Bricks used in this period measures 38 x 24 x 55 (Pl.18A).

Structural remains of Period II were traced in trenches YB<sub>3</sub> x III, A<sub>1</sub> x II, YA<sub>1</sub> III and XA<sub>1</sub> II/III. In the first trench at the depth of 5.77m, corresponding to layer 9, three successive mud floors with ashy patches were traced with pot-sherds of red ware and 5 aligned vases of red ware were exposed in which 3 vases were found empty and covered with brick-bats. It could probably have been used for storage of water. Three other vases were also found on the northern side at the same level. Some other brick activities were also traced in the south-east corner of the square.

In quadrant III of trench YA<sub>1</sub> at a depth 2.49m and in layer 6, some brick activities were traced. Four brick courses of the structure were exposed in the south west corner of the quadrant. A single course of burnt brick wall, of 86cm length and 50cm width was noticed alongside the section facing north at the depth of 2.76m. At a depth of 2.89m a rammed floor of pot-sherds and brick bats was also found with the brick structure. At a depth 3m, a fragment of stone votive stupa with floral decoration on it was also found.

Plate 16



A



B

Lankuri Dol: A; stone pillar and B; pillar base.





A



Begumpur: A; aerial and B; view of mound after excavation.

In trench A<sub>1</sub> x II at a depth 3.20m, a 4.20m long brick wall with a width of 55cm and having 2 courses of brick has been traced in layer 7 and a mud floor with remains of hearth of diameter 30cm was exposed at the same level. Some other brick activities were also traced in trenches YA<sub>1</sub> x III and XA<sub>1</sub> x II/III.

Mud mortar was used as a binding material in all the structures. Bricks measuring 31 x 21 x 5cm, 28 x 23 x 5cm, 25 x 21 x 5.5cm and 23 x 19 x 5cm were used in this period.

A burnt brick wall (16.55x0.85m) of the Period III was exposed at the southern part of the mound running east to west. It has been traced in trenches A<sub>2</sub>, XA<sub>2</sub> and XB<sub>2</sub>. The maximum height of the brick wall was approximately 1.70m and it was exposed in trench XA<sub>2</sub> x IV.

Structures of this period were found forming a rectangular shape and divided into three cells and no connection has been found with the bastion situated in the south-west corner of the mound. Few other structural remains were also exposed in the trenches XA<sub>1</sub>, A<sub>1</sub>, YA<sub>1</sub> and YB<sub>3</sub>.

The ceramic assemblage can be classified into red ware, dull red ware, red slipped ware, dull red slipped ware. A few black slipped ware and grey ware potsherds have been also discovered. The shapes and types of pottery in all the wares are very limited and are mainly utilitarian types of pots such as bowls both deep and shallow. Other important shapes are basin, channel basins, spout-pots, vases and storage jars found mainly in dull red ware of coarse

gritty fabric, prepared by clay mixed with very coarse grained sand. These pots are not well baked as a result it produces a very dull sound. Majority of the pots and sherds are wheel turned, but big storage jars, vases, *handi* and water vessels are partly wheel turned and partly hand made. Incising, stamping, notching and applique decoration are also found in some of the pots and sherds.

In artifacts the important antiquities unearthed were terracotta gamesman, beads, birds, human and animal figurines, terracotta plaque, stopper, armllet, sling-balls, hopscotches, rattle handle, iron ring and nails, terracotta mould of horse, moulds, sealing (Pls. 18B-20). One of the most important antiquities discovered at the site was a fragment of sealing with Brahmi script having a three line inscription “*Sri Sakkraditya [kara saka]....., Chaturddisaryya [danaya]....., nama. ya.....*” in characters of about the 7<sup>th</sup> century CE and on its left a running deer is seen and the other two sealings are almost worn out.

##### 5. EXCAVATION AT DAMAN-KHANDA, DISTRICT NALANDA

The excavation Branch-III of the Survey, under the direction of P.K.Mishra, assisted by N.G.Nikoshey, Jalaj Kumar Tiwari, Neetesh Saxena, S.P.Gupta, O.P.Pandey, Dhananjay Kumar and Raman Kumar carried out a small scale excavation at north-west of the village Daman-khanda situated 1km north of the ruins of the ancient Nalanda Mahavihar in the periphery of village Begampur. The objective of this





A



B

Begumpur: A; structural remains, Period II and B; terracotta sealings.

Plate 19



A



B

Begumpur: A; terracotta moulds and B; silver armlets.





A



B

Begumpur: A; terracotta pendants and B; terracotta human figurines.

excavation was to trace out the extension on ancient Nalanda Mahavihar. The excavation revealed remains of Buddhist temple, fragmentary architectural and sculptural remains. On the basis of ceramic assemblage, antiquities and other material culture retrieved from the excavation the following tentative chronology is suggested.

Period I: Northern Black Polished Ware culture (600 to 200BCE).

Period II: Gupta and Post-Gupta period (400 to 800 CE)

Period III: Pala period (800 to 1200 CE).

No structural remains of Period I was found during excavation. A terracotta ring well of the Period II at the depth 1.50m was exposed which started from the layer 5 and continued to layer 7. The diameter is about 0.90m and the height 1.05m, having seven rings, and the width of each ring is 0.17m. In Period III remains of rammed floor of brick bats was exposed in the trenches A<sub>1</sub> x II/III and A<sub>2</sub> x I at a depth of 0.45m. Rammed floor was made after leveling the surface and paving with brick bats. A three course brick structure was also noticed in the south-east corner of trenches A<sub>1</sub> x II. A 3.15 x 2.00m burnt brick platform was noticed in the north-east corner of the trench A<sub>2</sub> x II, and two miniature stone stupas were also exposed in the same trench. Evidence of lime-surkhi floor was also noticed. A headless stone image of Buddha in a niche was also exposed in the trenches A<sub>2</sub> x IV. Debris of brick structures and decorated stucco plaster was encountered in layer 2. It indicates that a religious brick structure or temple might have existed near the site. It

has been decorated with stucco plaster, as seen from evidence as at the temples of Nalanda Mahavihara (Pl. 21).

The ceramic assemblage of Period I is marked by the degenerated Northern Black Polished Ware, black-and-red ware and red ware. It disappears by layer 6 and 7. Layer 6 contains the pot-sherds of red ware, black polished ware, black and red ware and few sherds of degenerated Northern Black Polished Ware. Important shapes of red ware are vases, basin, dishes and lipped basin. Main shapes of black-and-red ware are deep bowl and basin. Layer 7 contains a very few tiny pot-sherds of red ware with sand particles and stone pebbles. Layer 8 is completely riverine deposit of sand.

Pottery of Period II does not have much difference in shapes and is denoted by layer 4 and 5. Ceramics of both layers are quite similar with each other. Pot-sherds of red ware and few grey ware sherds and some ill fired red ware sherds were encountered in this period. Important shapes of this period were bowls vases, lamp, spouted pots, lid, miniature pots, channeled basin and basin.

Period III corresponding to layer 1, 2 and 3, is characterized by red ware pottery having red slipped outer surface and notched design on a few pot-sherds. Important shapes in this period are bowls, vases, lid and storage jars.

The antiquities recovered during this small scale excavation include terracotta human and animal figurine, wheel, ear-lobe, stopper, sling ball, dabber and beads. Three inscribed terracotta sealings were of



A



B

Daman-khanda: A; remains of floor made of brick jelly and B; pavement of brick-bats.



Buddhist creed bearing the inscription, “*ye dharma hetu.....*” in characters of about the 10<sup>th</sup> century CE. The other two were fragmentary worn out. Small stone sculptures of Buddha in *bhumisparsa* and *dharmachakrapravartan* pose and Vishnu in *samabhanga* pose were also found. Nail and nail parer are among the iron objects. Bone point and fragments of votive stupas made of stone were also the noteworthy findings (Pl. 22).

## 6. EXCAVATION AT GHORAKATORA, DISTRICT NALANDA

The Excavation Branch-III of the Survey, under the direction of P.K.Mishra, assisted by Nikoshey, Jalaj Kumar Tiwari, Abdul Arif, Neetesh Saxena, Dhananjay Kumar, Subodh Prasad Gupta and O.P.Pandey conducted excavation at Ghorakatora. (25<sup>o</sup>01'37" N; 85<sup>o</sup>31'31" E).

The mound having an area of approximate 22.7 acres is situated on the south-western corner of the village **Giriyak**. It was divided into grid pattern (23 quadrants of 7 squares, each measuring 10 x 10m) and taken up for digging (Pl. 23).

On the basis of ceramic assemblage, antiquities and other material culture recovered from the excavation, the following chronology is suggested.

Period I : Chalcolithic Culture (c. 1500 BCE- 800 CE)

Period II : N.B.P.W Period (c. 800 century BCE to 200 CE).

Period III : Sunga-Kushana Period (c 200 BCE to 300 CE).

Period IV : Gupta and Post Gupta Period (c 400 CE to 800 CE).

Period V : Pala Period (c 800CE to 1200 CE).

Period I representing Chalcolithic culture is noticed just above the natural soil composed of yellowish compact earth. Some burnt daubs found indicate reed impression. The palaeo-ethno botanical remains like rice (*oryza sativa*) grains, horse-gram (*dolichos biflorus*) seeds and cotyledon parts, black-gram (*vigna mungo*) seed and cotyledons, solanaceae member seed, Euphorbiaceae member seeds, acanthaceae (L) and apiaceae (R) member seeds, legume parts, barley (*hordeum vulgare*) grain, euphorbiaceae member (living) seed and some fruit remains, calcified/mineralized seed identified by the Birbal Sahni Institute of Palaeobotany, Lucknow, were recovered from the Chalcolithic level (Pl. 24A).

No structural remains of Period II were found. Mixed material of the Chalcolithic period and Northern Black Polished Ware period was noticed in square XA<sub>7</sub>, quadrant II over the natural soil.

Burnt brick structures of various phases were encountered in almost all the trenches which were found damaged mainly due to large scale vandalism and brick robbing in the past. Three rooms of a house complex measuring 2.5 x 2.2m, 1.5 x 1.9m and 1.6 x 1.9m made of burnt brick belonging to Period III was noticed in square A<sub>4</sub> quadrant IV (Pl. 24B).

A 2.85m long wall running in north south alignment and a wall in east west





A



B

Daman-khanda: A; stone votive stupa and B; remains of decorative stone pieces.

Plate 23



A



B

Ghorakatora: A; general view of the site and B; a section facing west trench A4 quadrant 4.





A



B

Ghorakatora: A; trench A' Qt. I and B; workshop of artisan, trench A1 Qt. 4, Period V.



direction running to a length of 1.65m and with a width of 38cms was found in square A<sub>1</sub> quadrant I belonging to Period IV. A brick wall in north south alignment having a width of 60cm and of 18 courses has been traced up to 10m. in square A<sub>4</sub> quadrant I & II. Another brick wall in north south alignment having a width of 60cm and of 11 courses was traced up to 4.2m in the same trench. These walls formed a house complex and belong to Period IV.

A massive wall belonging to Period V having a width of 81cm and length of 11.3m was found in square A<sub>2</sub> quadrant IV, A<sub>2</sub> quadrant III and B<sub>2</sub> quadrant IV and the continuity of the wall could be seen extending in B<sub>2</sub> quadrant III, B<sub>2</sub> quadrant IV. A parallel brick wall of length 10.5m and width 55cm was found in square A<sub>1</sub> quadrant I A<sub>2</sub> quadrant II and B<sub>2</sub> quadrant I. Another parallel wall of length 2.5m and width 60cms was noticed in square A<sub>2</sub> quadrant II and it could be traced in square B<sub>2</sub> quadrant I, B<sub>2</sub> quadrant II and C<sub>2</sub> quadrant I. A wall having an alignment in north south direction was found in square A<sub>1</sub> quadrant II having a width 80cm and it was traced in the form of a ghost wall in square A<sub>1</sub> quadrant II A<sub>2</sub> quadrant III A<sub>2</sub> quadrant I and they intersected each other at right angle with the main wall in square A<sub>2</sub> quadrant I.

A workshop of an artisan was found in square A<sub>1</sub> quadrant IV having a brick paved work shop with a stone anvil in the middle and an earthen pot at the north east corner of the quadrant. An unfinished basalt stone block was also recovered near the workshop in square A<sub>2</sub> quadrant II.

Various storage jars of this period in square A<sub>2</sub> quadrant II, B<sub>2</sub> quadrant I, II and III and C<sub>2</sub> quadrant III were found. A storage jar filled with *cowries* and covered with lid was found in square B<sub>2</sub> quadrant I (Pls. 25-26A).

Two rooms were also traced with ruins of wall and ghost walls in square C<sub>2</sub> measuring 4.5 x 3m each.

Successive floors of Period V made of brick bats or rammed brick jelly were also traced in square A<sub>1</sub> Quadrant. II and III, B<sub>2</sub> Quadrant I,II and III, A<sub>2</sub> Quadrant II and C<sub>2</sub> Quadrant II and III.

Chalcolithic pottery can be classified as black-and-red ware, black ware, black slipped ware and red ware. Typical black-and-red ware yielded from the excavation may be compared to Chirand and Sonpur. The fabric of this ware is coarse to fine variety. The types include dish-on-stand, vases, bowls, dish, basin, lipped basin, storage jar, *handi* with carination on the shoulder, long necked jar, suspended jars and perforated basins

The ceramic assemblage of Period II is marked by black and red ware, NBP ware, black ware, black slipped ware, grey ware and red ware. The shapes are vases, bowls, dish, lid-cum-bowls etc. Deep bowl, basin and dish were some of the common types in the black and red ware which belong to the pre-NBP phase. A good number of painted pot-sherds were found in red and grey ware. The designs consisted of loops and intersecting loops, vertical strokes from different angles and matted. The painting was mostly in cream pigment on the outer



A



B

Ghorakatora: A; structural remains and B; storage jar filled with cowries, Period V

surface of the pot. Dish and bowls were generally painted on the inner surface. The painted sherds of grey and red ware may be compared with those found from Sonpur, Kausambi and Vaishali.

Pottery of Period III and IV have similar shapes and can be classified into red ware and grey ware. Red ware is found in slipped and dull variety. The fabric ranges from course to fine. The types include vase, bowls, basin, *handi*, *tawa* with lug handle, storage jar, spouted vessels, etc. (Pl. 26B).

Red ware is the dominating pottery of Period V. Most of the sherds are well fired and almost devoid of any surface treatment but a few of them are treated with red slip. The fabric ranges from course to medium. The types include vases with narrow mouth, vases with wide mouth, carinated *handis*, bowls, lamps, lids, basins and storage jars. Few sherds of glazed ware were also recovered from the upper level.

About three hundred antiquities including terracotta, stone, metal, glass, iron, bone and shell objects were recovered.

Among the interesting finds from the Chalcolithic strata mention may be made of polished stone celts, fragment of stone quern, pestle, sling ball, terracotta beads, hop-scotches, pottery wheel, bone points and a fragment of copper antimony rod.

The antiquities of Period II – V include terracotta objects like human and animal figurine, beads, stoppers, gamesman, hop-scotches, sling balls, wheels, discs earlobes, amulet, bangle, dabber, rattle, seal, sealings skin rubber, flesh rubber. Terracotta

seals and sealings were found in the excavation, but are mostly broken. One sealing bears the *sadar chakra* symbol, another remarkable sealing shows a deity in sitting posture having indistinct objects in the hands and flanked by a tree and basil is depicted on the right side below the tree. In the lower field which is separated by a line a one line faint inscription “*Avisi Vaishvani*” is found in characters of about the 5<sup>th</sup> century CE. In another sealing a peacock is shown in upper field and a one-line inscription is seen in the lower field in characters of about the 5<sup>th</sup> century CE. A fragmentary sealing also shows a faded two line inscription “*kanha..., kaha...*” in characters of about the 12<sup>th</sup> century CE (Pls. 27-29).

Beads of semiprecious stone, pestle mortar, plaques, sling balls, bead sharpener, fragments of sculptures, core, celt are the stone objects. Fragments of spearhead, bell, ring and utensil made of iron are also found.

Among the copper objects coins, bead, bell, rings are noteworthy. A bronze image of crowned Buddha is seen seated on the lotus pedestal and in *bhumisparsa mudra*. It is a rare example of its kind among Buddhist art of Nalanda. On stylistic ground it may be dated to 10<sup>th</sup> century CE. Small stone sculptures of Ganesa, Vishnu and Tara are also noteworthy findings of this period. Most of the coins recovered are weathered, deformed and corroded. Fragment of shell bangle, bone bangle, glass bangles are among the other miscellaneous objects.





A



Ghorakatora: A; storage jar and B; structural remains, Period III and IV, trench A<sub>4</sub> x III.

Plate 27



A



B

Ghorakatora: A; stone sculptures and B; terracotta sealings.





A



B

Ghorakatora: A; terracotta human figurines and B; copper and bronze objects.



Plate 29



A



B

Ghorakatora: A; terracotta ornaments and B; general view of the excavation.

### CHHATTISGARH

#### 7. TIVARA DEV VIHARA, SIRPUR, DISTRICT MAHASAMUND

In continuation of previous year's work further scientific clearance was carried out to completely expose the stone structure. The work has exposed the structure measuring 7 m x 16m which can be assigned to 7<sup>th</sup> century CE.

#### 8. HARSHAGUPTA VIHARA, SIRPUR, DISTRICT MAHASAMUND.

Scientific clearance was under taken in front of Harshagupta Vihara to ascertain if any structure is buried here also. A similar stone structure like Tivara Dev Vihara with a *chandrasila* fixed at the western side entrance door of the monastery.

#### 9. SASAI VIHARA, SIRPUR, DISTRICT MAHASAMUND

Scientific clearance was carried out at the western side fortification wall with the aim to expose the possible main entrance to the structure of the monastery locally known as Sasai Vihara meant for female nuns. The western arm has revealed thirteen courses of stone masonry to a length of 8.50m, width of 4.03m and height of 1.30m Further the work has revealed a rectangular bastion with fifteen courses of stone masonry with a schist stone base measuring 7.20m in length, 5.75m .in width and 1.60m in height. The fortification walls can be assigned to 7<sup>th</sup> century CE.

### GOA

#### 10. EXCAVATION AT CHURCH OF ST. AUGUSTINE, OLD GOA, DISTRICT NORTH GOA

In continuation of last year's scientific clearance/excavation under the direction of N. Taher assisted by Abhijit Ambekar further work was taken up in two pockets. One, to the entrance of the main church to trace the front approach i.e. steps leading to the monument and the second was to the exterior that is outside the church behind the sacristy and the refectory of the convent exposed earlier.

The excavation at the entrance to the main church yielded the original steps leading to the monuments. Besides a drain measuring 9 meter long, 10cm deep and 37cm wide cut into basalt stone running parallel to the wall was also exposed.

The second objective of this season's work was to expose the structures adjacent to the Sacristy and Refectory. The excavation exposed various structures which are varying from the main church complex. These structures were made of irregular shapes of laterite stone blocks. The structures exposed were a well, lime making area, temporary dwelling for workers, drains and a quarry for laterite slabs.

All these structures were enclosed by a wall measuring 8.3m long made of irregular laterite stones. There are several unfinished structures in the form of compartments within the enclosed area and these compartments were used by the

workers for the regular maintenance of the complex and the main structure was for friars and novitiates.

A huge number of pottery mainly porcelain was collected from these compartments. The shapes include different sized dishes, bowls, plates, vases etc with the design in blue colour on white background. Large amount of pottery suggests that this area might have been used to throw waste in later period before the complex was abandoned.

## GUJARAT

### 11. EXCAVATION AT KANMER, DISTRICT KACHCHH

The last season's work at Kanmer (23°23'N; 70°52'E), was continued with the following objectives to develop a better understanding of the stratigraphy of Kanmer, a multicultural site and to understand the possible planning of Harappan settlement in the fortified area. The excavation was carried out under the direction of J.S. Kharakwal, Y.S. Rawat and Toshiki Osada assisted by Rajesh Meena, Suresh Meena, Hansmukh Seth, Asif Hussain, Pankaj Goyal, Tilok Thakuria, Lal Chand Patel, Krishna Pal Singh, Bhim Raj Varhat, Sachin Dikshit, Digvijay Chauhan, Rita Chauhan, Rashmi Salvi, Rohit Menaria, Sanjeev Kataria and Hitesh Bunkar.

In the last season the following cultural sequence was identified:

Pd I: KMR I

Pd II: KMR II

Pd III: KMR III

Pd IV: KMR IV

Pd V: KMR V

The earlier trenches dug in the south central, south eastern and north eastern areas of the mound were extended to establish a stratigraphical sequence and to develop a better understanding of the layout of residential structures and its related crafts, if any. In the south central area, trenches Z 29 and Z 30 yielded a continuous cultural sequence as cited above and confirmed the identification of different cultural periods. KMR III i.e., late phase of the Harappans or post urban deposit was poorly represented in the south central portion.

Towards the end of KMR II B the width of northern arm of the fort wall was narrowed down by shifting its inner face about 10m further north and this has been identified as the third major structural phase of the fort wall. This new inner face was exposed in trenches Y 15 and Z 15 up to a length of 8.50m. Its extant height measured 1.15m with 5 stone courses. It was made up of large stone blocks some of which measured about 80cm in length and 35cm in height. In trench Z 15 it was found connected to a north-south oriented retaining wall (5.40m long) forming a right angle. Only seven courses of the retaining wall measuring to a height of 1m are extant. At its southern end it turns towards east and joins another wall (2.50m long) roughly oriented NNW-SSE. It was suspected to be a corner of an inner bastion.



As many as three structural phases were partially exposed in the central area in trenches Z 29 and Z 30. Besides, two residential complexes were partially exposed in the south eastern area of the site. Each of these major structural phases has sub phases suggesting constant addition or alteration by successive occupants. The few partially exposed structures of these phases revealed that most of them were largely disturbed or destroyed by the activities of the subsequent occupants of the site. All these structures belong to the urban phase deposit.

The earliest residential structure at Kanmer, was oriented in NNW-SSE direction at a depth of 3.80m in the north eastern half of trench Z 30. It was exposed up to a length of 2.20m. As many as four different floor levels were identified underneath this structure (at a depth of 4.50m). Interestingly, the successive floors extended towards north.

The second structural phase was identified in the same trench (Z 30) overlying the first one. It was represented by a partially exposed room (4.80m x 3.00m) with a platform (1.53m x 1.23m) on the street (?) or open space to its north. The walls of this structure join each other at right angles and are made of stone. Yellowish sand was used as binding material. The extant height of its northern wall measured 88cm (6 courses) whereas the height of the western wall measured 45cm (4 courses). A platform seems to have been provided at the entrance of the house. A medium sized jar found placed near its outer north-eastern corner appears to be a sullage jar. Hence the

supposed street or open space was further exposed to a width of 7m (N-S). It was found continuing further towards west. The layout of the structures of the inner fort was based on the orientation of the main fort and a planned settlement is noticed.

A few more trenches such as GG 29, 30, FF 29, 30 and EE 29 and 30 were laid in the south eastern area of the mound this season to understand the partially exposed large structural complex near the south eastern corner of the fort. Several circular pits were exposed just below the surface, which yielded layers of sand and ash, medieval pottery and charred grains. Therefore these pits were identified as silos and were assigned to cultural period V of Kanmer. Underlying these pits was found a few weak structures with one or two courses. These structures perhaps belonged to the historical phase as some of them were partially destroyed by later pits. These structures were found in FF 30, EE 30 and 29 whereas the pits were somewhat evenly distributed throughout the exposed area.

Like other parts of the mound the dark greyish layer, represented by layer 2 in this area, was found overlying the Harappan remains. In the northern half of GG 29, in layer 3 was exposed a circular platform made of stones, the diameter of which was found to be 1.50m and appeared to be a floor level inside a house. However the exact use of the circular structure is not known. On the southern side of this circle were discovered two medium sized pots of coarse red or gritty red ware. In the north western corner of the same trench was discovered a highly

burnt red patch in a small area (60 x 40cm) on the floor of a house. The eastern and southern walls of this house were also partially exposed in the same trench.

In the southern half of FF 29 half a dozen stone structures, possibly belonging to an equal number of houses in layer 3 were recorded. Some of them were destroyed by later pits. Among these at least four walls appear to be superimposed on the older ones suggesting stratigraphically a succession of structures in the south eastern area. These walls have survived with courses ranging from 3 to 5, with length varying from 1.50 to 3 m. Based on stratigraphy it appears that there were two successive structural phases perhaps comprising of 4 rooms.

The additional portion of the outer arm was exposed to a length of 28m. The addition or riveting was mostly made of semi dressed stones of average size of about 30x 25 x 8cm. However, some of the stone blocks were quite large as they measured 60x 10 cm and were mostly used in the lower portion of the wall. The outer arm of the fort was built with better dressed stone blocks compared to those used for addition or riveting. Therefore the original wall looks very impressive. The fort wall near the north eastern corner has survived up to a height of about 9.50m and it was plastered on top with white clay.

To develop better understanding of the inner corner a few trenches (Z 16, 17, 18; AA 16, 17, 18) were opened. On removing the humus in these trenches it was realised that this whole area was perhaps

used as dumping area by the Historic people as it yielded large amorphous shaped burnt patches. In fact it seems that the Historic people dug into the core of the Harappan fort wall and made a few pits and hence the historical material was found resting directly on the Harappan fort wall. In this area layer 2 represented a break between the Harappan and Historic deposit. The nature, colour and matrix of this layer were found identical to layer 6 in the central part of the mound.

In layer 3 a retaining wall measuring about 1m in height and oriented roughly east-west, was partially exposed, against which was found a floor level. To the east of this floor level was found a residential structure, oriented roughly north-south, which was partially exposed (up to a length of 3.50m) in trenches AA 16 and AA 17. It has survived up to a height of about 1m with seven courses. The southern wall of this house oriented roughly east-west has survived up to a length of 3.40m. From the floor levels fragments of dish on stand, jar and gritty red ware, besides featureless bowls were recovered. Most of this material was ochreous. Thus on the basis of stratigraphy and ceramic assemblage the aforesaid structures and floor levels and pottery was assigned to cultural period KMR III.

The inner arm of the fort wall was exposed in AA 16 and Z 17 up to a length of 10m. As many as 13 courses of this face were exposed, which measured a total height of about 2m. The entire deposit against the inner arm appears to have been thrown from the top of the fort wall.

A bulb shaped plan of a furnace with a central cylindrical hollow column (diameter 31cm, depth 35cm) was exposed (Pl. 30A) in trench Z17 about 10m west of the north eastern corner of the fort. It was built close to the inner face of the wall and was oriented in NNW-SSE direction. It measured 1.40m (N-S) and 96cm (E-W). The clay walls of the furnace were barely 4cm thick and the area between the column and outer clay wall was found completely filled with ash. The column with an opening only from top was found filled with whitish ashy material. The burnt red colour of the cylindrical column, the outer clay wall and the earth around the furnace indicate that the temperature raised in the furnace may have been more than 700° C. Indications are that the heat generated in the furnace also damaged the face of the fort wall. A small square (90 x 90cm) platform made of flat stones just to the east of the furnace also seems to be associated with it. This platform was prepared on a floor level. A thick cubical sandstone block was found lying on the eastern margin of the floor to which was found sticking some whitish substance identical to what was found inside the column. Several tubular faience beads were recovered from the furnace area and near the square platform. Therefore, it is likely that this was a faience bead making furnace. This furnace was found sealed by layer number 4. This layer consists of several heaps of ash which was possibly thrown from the top of the fortification wall and also belonging to KMR II B phase. The furnace seems to have been built during the initial stage of this phase.

A large variety of minor objects such as beads of terracotta, paste, semi precious stones, gold, shell; seals, seal impressions, terracotta cakes, dices, gamesman, amulets, bead polishers, drill bits, rough-outs (Pl. 30B) and weights (Pl. 31A) have been discovered. Many of these objects appeared at the site in KMR I e.g., terracotta and shell bangles, steatite beads, blade and bladelets of agate and local chert. Besides these, a few beads of faience and blades of Rohri chert were also found in this level. It seems that they belonged to the subsequent levels and are now found in this level due to local disturbance. Terracotta cakes were found distributed throughout the deposit in the urban phase deposit (KMR II). They are smaller in size in the beginning and gradually their size increases during the later part of the urban phase (KMR IIB). A few of them were also discovered in the upper levels with KMR III deposit. Amongst minor objects, the most abundant are beads. The most striking discovery of the site appears to be the discovery of a seal impression, which appears to be sort of identity symbol perhaps used by Harappans during their long distance trade. It has a perforation (diameter 4.15mm) which is slightly off the center. On the obverse is depicted a unicorn, besides a few Harappan letters. Beads of semi precious stone like carnelian, agate, lapis lazuli, chalcedony, serpentine and bloodstone were found. The site yielded raw material of agate which were chipped, rough outs, grinded, unpolished bead blanks and in various shapes such as cylindrical, disc type, bi-conical, truncated bi-cone, circular, barrel, globular, circular, flat bi-cone and diamond.



The beads of carnelian are disc type, globular, bi-cone and tubular and etched ones. These beads were drilled after polishing as the find of many broken but polished examples would indicate. In KMR III the quality of surface treatment of such beads was inferior. A few examples of shell, bone and metal ones have been found from KMR II and KMR III. All these findings indicate that a variety of beads were manufactured at the site. Apart from lapis lazuli/sodalite, the remaining raw materials were perhaps brought from nearby Mardhak Bet, about 20km NE in the Little Rann and its adjacent areas.

The ceramic assemblage was mainly represented by red ware right from the beginning, which was treated with a slip of different colours like red, chocolate, buff, cream, black and reserve. Except for black slip and finer variety of reserve slip (grey variety), all other types were introduced at the site right from the beginning. Both fine and coarse varieties remained in use throughout the habitation. The coarse variety (Pl. 31A) accounts for a small percentage of the assemblage in the early levels and it

gradually increased in the subsequent phases with a mat surface. Besides red ware, reserve slipped with grey core, black-and-red, buff ware was some of the other types used. The fine variety of red ware (in case of bowls, dishes and medium sized jar/pots) was very often treated either with red slip or with chocolate slip or sometimes with both. In the lower levels (KMR I and KMR II A) the slip was uniformly applied on external surface whereas in the later levels, often the outer surface appears to have been moistened with slip (Pl. 32). Sometimes slip was not applied to the entire outer surface rather wide panels were prepared all round the body leaving major area without any slip. Though pottery was fired at high temperature, it seems that uniform firing was not maintained in all the types. Towards the end most of the pottery types appear ochreous. It is not ascertained if this kind of character is a result of poor firing technique. In a few medium sized jars Harappan letters were either inscribed or written in some colour (Pl. 33).

The radio carbon dates of Kanmer received so far are given in table.

### <sup>14</sup>C dates of Kanmer

No	Trench	Depth (cm)	Layer	Lab Ref. No. BSIP	<sup>14</sup> C date (yrs BP)	Calibrated date (BP)	Calibrated date (BCE/CE)	Sample from cultural deposit
1	Y-30	930	19	BS-2619	4190±80	4838-4573	2888-2623 BCE	KMR I
2	R-21	466	7	BS-2627	3870±100	4344-4262	2470-2149 BCE	KMR II B
3	HH-30	280	3	BS-2628	3610±90	4080-3735	2130-1785 BCE	KMR II A

## EXPLORATIONS AND EXCAVATIONS

4	GG-31	224	2	BS-2692	810±90	726-722	1224-1239 CE	KMR V
5	S-21	350- 380	6	BS-2618	1250±80	1277-1062	673-888 CE	KMR IV

### 12. EXPLORATION IN DISTRICT BANAS KANTHA

The problem oriented exploration was carried out by the Excavation Branch of the Survey, under the direction of S.N. Kesarwani, assisted by R.N. Kumaran, Bipin Chandra, N.B. Soni, J.B. Makwana, Partha Dhara, Subhash Chand,

K.R.Malavya, Bipin Rohit, M.N.Rawal, H.R.Tadvi, G.B.Variya and Kuman Singh in Banas Kantha district. The taluks of Deesa and Dantiwada was partly but systematically surveyed, where a total number of fifty four villages of archaeological interest (Fig. 4) were brought to light in the course of exploration. The details of the sites are as under:

<i>Site / Village</i>	<i>Taluk</i>	<i>Cultural Assemblage</i>
Agdol, 24°24'N; 72°16'E	Deesa	Chalcolithic Microlithic blades, Medieval bricks and potteries.
Amarasiya, 24°13'30"N; 72°13'E	Deesa	Chalcolithic Microlithic blades and potteries.
Bhadath 24°22'N; 72°13'50"E	Deesa	Chalcolithic Microlithic blades, debitage of quartz and carnelian, unfinished tools and potteries and Medieval Saptamatrika sculpture.
Bhiladi 24°11'N; 70°00'E	Deesa	Medieval well made up of dressed and decorated stone slabs and sculptures.
Chandrajji Gorja 24°19'N; 72°16'E	Deesa	Chalcolithic broken chert blade, black and red ware, grey ware, black slipped ware and red ware and painted sherds.
Chartale. 24°20'N; 72°16'E	Deesa	Chalcolithic chert blade and potteries like grey ware, black and red ware, white painted black and red ware, red ware and black ware, Early Historic bricks and Medieval potteries
Davas, 24°18'N; 72°13'E	Deesa	Chalcolithic Microlithic blades, core and debitage of quartz and potteries.
Dhanpura 24°23'N; 72°15'E	Deesa	Chalcolithic Microlithic blades of quartz and jasper and potteries.
Dharanva 24°13'N; 71°54'E	Deesa	Early Historical bricks and red ware, grey ware etc.

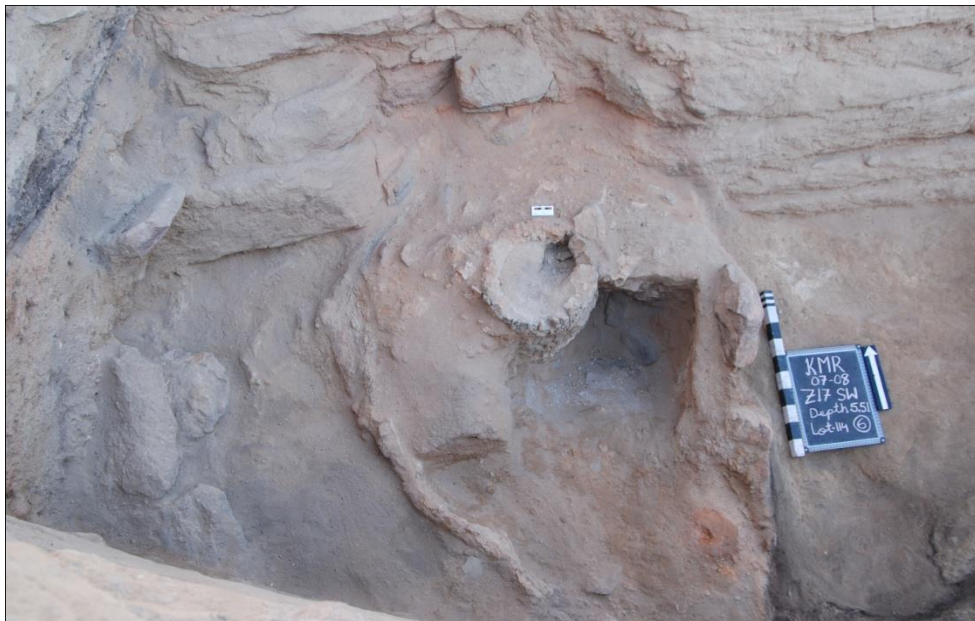
Easar Dhani 24°18'15"N; 72°13'45"E	Deesa	Chalcolithic Microlithic blades and potteries.
Gadada 24°22'N; 72°17'E	Deesa	Fortification wall of a medieval settlement exposed due to civic work
Genaji Gorla 24°19'30"N; 72°14'E	Deesa	Chalcolithic Microlithic blades and potteries, Early Historic broken animal figurine
Ghada 24°23'15"N; 72°15'15"E	Deesa	Chalcolithic Microlithic blades and potteries, Early Historic broken animal figurine.
Jalota 24°15'N; 72°56'E	Deesa	Medieval well and painted red and grey ware
Juna Deesa 24°13'N; 72°09'E	Deesa	Early Historic bricks and potteries, Medieval structures (Pl. 34A) and potteries like red ware, grey ware, black ware and glazed ware and architectural members of a temple
Kotha 24°24'N; 72°17'E	Deesa	Chalcolithic Microlithic blades.
Kumpat 24°13'N; 72°06'E	Deesa	Grey ware, red ware and black ware. Historical structure with five courses probably well / step well (just below the modern temple) & Medieval potteries.
Mahadeviyo 24°17'30"N; 72°13'15"E	Deesa	Chalcolithic Microlithic blades and potteries and Medieval bricks.
Malgadh 24°14'N; 72°9'E	Deesa	Early Historic brick wall with four courses (Pl. 34B), Historical well & potteries like grey ware, red ware, black and red ware and painted red ware.
Meda 24°24'N; 72°18'E	Deesa	Chalcolithic Microlithic blades.
Nesada 24°9'N; 71°56'E	Deesa	Early Historic bricks & potteries, red ware and scattered temple remain.
Peplu 24°12'N; 71°56'E	Deesa	Medieval well with decorated stones and scattered red, painted red, grey, black ware, bricks and four hero stones.
Rabari Gorla 24°20'N; 72°14'E	Deesa	Chalcolithic Microlithic blades.
Rajpur 24°14'30"N; 72°14'E	Deesa	Medieval potteries.
Ranpur Athamnavas 24°16'N; 72°15'20"E	Deesa	Medieval potteries.
Ranpur Ugamnavas 24°17'N; 72°16'20"E	Deesa	Medieval mound with red ware, painted red ware and black ware, bricks and inscribed hero stone.



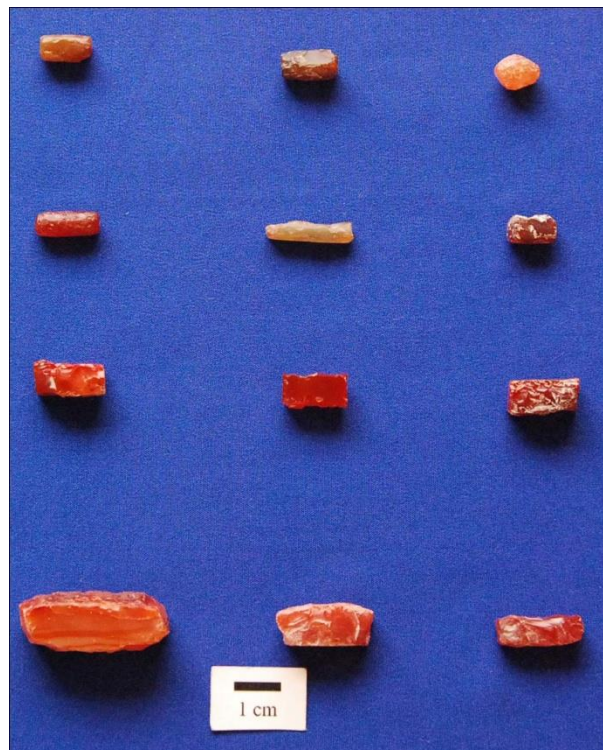
## EXPLORATIONS AND EXCAVATIONS

Ranpur Vanchala 24°16'30"N; 72°15'30"E	Deesa	Chalcolithic – grey ware, red ware, black ware, white painted red ware and broken stone quern.
Talepura 24°23'45"N; 72°14'30"E	Deesa	Medieval potteries.
Thervada 24°23'N; 72°13'45"E	Deesa	Chalcolithic black and red ware, grey ware, black ware and red ware and Medieval hero stones (Pl. 35A ) and architectural members of temple including sculptures and pillars.
Vadaval 24°13'N; 72°13'15"E	Deesa	Chalcolithic Microlithic blades and cores, Medieval Jain temple and loose sculptures.
Akoli 24°30'N; 72°25'E	Dantiwada	Circular stone structure, hero stone, red ware, ochre colour ware, red / pink ware, grey ware, incised grey ware, black & red ware.
Atal 24°23'N; 72°21'E	Dantiwada	Early Historic and Medieval red ware
Bhilchar 24°27'N; 72°27'E	Dantiwada	Chalcolithic pottery like black on red ware, red ware, dull red ware, mica dusted red ware.
Dantiwada 24°35'N; 72°33'E	Dantiwada	Mesolithic tools, fluted cores and flake tools.
Dhaneri 24°51'N; 72°01'E	Dantiwada	Medieval well and silver coin, red ware, grey ware and incised grey ware, loose sculptures, inscription & temple remains.
Gangudara 24°24'N; 72°25'E	Dantiwada	Medieval potteries.
Godh 24°18'45"N; 72°16'30"E	Dantiwada	Early Historic bricks, Historical potteries and a loose Sculpture of Lakshmi (?) and Medieval well and potteries like red ware, black ware, grey ware, black and red ware, glazed ware and late Medieval hero stone
Hudakul 24°30'N; 72°21'E	Dantiwada	Microliths, unfinished flakes and Chalcolithic potteries like grey ware, black and red ware etc.
Jegol 24°23'N; 72°25'E	Dantiwada	Broken sculpture probably Lajja Gauri, stupa like brick structure, black ware red ware, grey ware.
Kuchwada 24°45'N; 72°26'E	Dantiwada	Medieval temple remains.
Kutiya 24°30'N; 72°20'E	Dantiwada	Medieval bricks and potteries like black on red ware, grey ware and red ware.
Magudi 24°23'N; 72°19'E	Dantiwada	Stone house structure, medieval brick roof tile, grey ware and red ware
Marwada	Dantiwada	Historical potteries and Medieval brick structural remains

24°22'N; 72°22'E	ada	on top of hill & two natural rock shelter with supporting of brick wall, bastion and potteries like grey ware, red ware and red slipped ware
Mauludi 24°23'N; 72°18'E	Dantiw ada	Ganesa sculpture, brick bats and potteries like red slipped ware, red ware, grey ware, black burnished ware, black on red ware (criscross), spout and hop-scotch.
Moti Magudi 24°23'N; 72°13'E	Dantiw ada	Red slipped ware, red ware, painted red ware and grey ware.
Nandotra Brahman Vas 24°20'N; 72°15'E	Dantiw ada	Chalcolithic pottery, Medieval pottery, brick & coin and structure
Nandotra Thakur Vas 24°20'N; 72°20'E	Dantiw ada	Stone flake, stone structure & Chalcolithic potteries like grey ware, black and red ware, red ware and Medieval pottery & brick.
Nani Bhakhar 24°15'50"N; 72°17'E	Dantiw ada	Seven natural rock shelters and a natural pond, large number of cup marks, Early Historic bricks, Historical potteries like (Pl. 35B) red ware, black ware, grey ware and black and red ware and broken human figurines, Medieval potteries and bricks.
Odhava 24°23'N; 72°26'E	Dantiw ada	Medieval loose sculptures, disturbed brick structures with brick size 23x18x5cm; 22.5x16x4.5cm, potteries like red ware, black & red ware, black on red ware.
Pathawada 24°48'N; 72°30'E	Dantiw ada	Unfinished core tool, Early Historical pottery, Historical well, Medieval structure and temple and potteries like red ware, grey ware, ochre colour ware, black on red ware.
Rajkot 24°28'N; 72°26'E	Dantiw ada	Red, dull red ware
Ranitook 24°22'N; 72°20'E	Dantiw ada	Early Historic and Medieval red ware
Ratanpur 24°20'N; 72°22'E	Dantiw ada	Black on red ware, red ware and red slipped ware
Sikariya 24°18'N; 72°10'E	Dantiw ada	Medieval pottery, brick.
Vagoria Bhakari 24°31'N; 72°21'E	Dantiw ada	Microliths, unfinished flakes, Chalcolithic pottery, Medieval pottery, brick bats & roof tiles.
Vir Bhakri (Vagor) 24°30'N; 72°20'E	Dantiw ada	Stone tools, Microliths, cores, flakes, black on red ware, grey ware, chocolate slipped ware, red ware, glazed ware and stone structure.



A



B

Kanmer- A; kiln with central column from KMR IIb and B; bead rough outs of carnelian.



Plate 31



A



B

Kanmer- A; Harappan weights and B; coarse pottery (gritty type) from KMR IIb.



A



B

Kanmer: Harappan pottery from A; KMR IIb and B; KMR IIa.



Plate 33



A



B

Kanmer: A and B; Harappan letters inscribed in pot-sherds from KMR IIa



Fig. 4

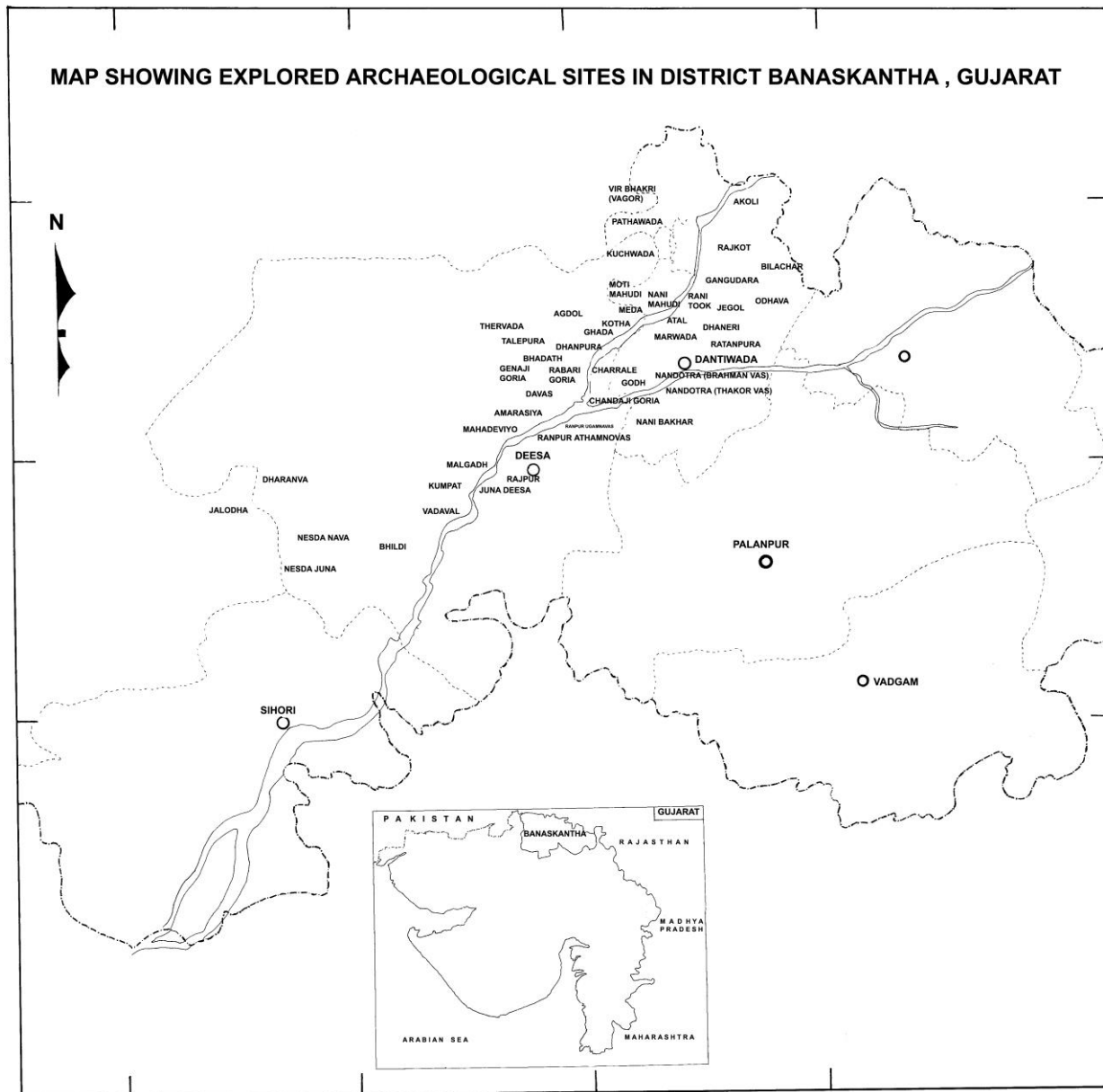


Fig. 4; Map showing explored archaeological sites in District Banaskantha, Gujarat.

Plate 34



A



B

Juna Malgadh: A; lime plastered medieval floor and B; early historic structure.



A



B

A; Thervada: inscribed herostone and B; Nani Bhakhar: general view of mounds.



### 13. EXCAVATION AT SHIKARPUR, DISTRICT KUTCHH

The Department of Archaeology and Ancient History of the Maharaja Sayajirao University of Baroda carried out first season's excavation at Shikarpur. Shikarpur is one of the southern most villages in the Bhachhau taluka of Kutchh district. The Harappan site at Shikarpur, locally known by the name *Valmio Timbo* (23°14'15"N; 70°40'39"E), is located about 4.5km south of the village at the edge of the narrow creek extending eastward from the Gulf of Kutchh. It is a reasonably large and rectangular mound measuring approximately 3.4 hectares covering the entire elevated portion of a large stabilized sand dune. The overall height of the mound is about 7.5 to 8.00m from the surrounding ground, which is at about 8.00m MSL. It is located between two other important Harappan sites: Bagasra, about 20km south across the Gulf of Kutchh in Rajkot district and Kanmer about 35km northeast in Kutchh district. The Harappan site at Dholavira is about 70km further north from the site. Although, the site was excavated earlier in 1987 to 1989 by the Gujarat State Archaeology Department. Therefore, the site was taken up for re-excavation due to its strategic location with a view of establishing the cultural sequence as well as the settlement features in terms of economic activities carried out at the site.

A thorough examination of the surface features indicated extensive narrow ridge-like feature running all around the site suggesting a thick protective wall around the settlement. The survey also revealed a

number of Classical Harappan artefacts, especially pottery and triangular terracotta cakes, spread rather evenly on the surface. In addition, the surface assemblage included small quantities of the Anarta pottery of north Gujarat and the Sorath Harappan pottery of Saurashtra.

In view of the above surface observations, excavations were taken up in nine trenches each measuring 5x5m. Among these, six trenches are in the southern edge of the mound. They are all aligned in a straight line extending from the southern fortification wall towards the centre of the settlement in the north. The remaining three trenches are laid across a rain eroded gully in the western edge of the site. Excavations in these western trenches proceeded in a stepped fashion by cutting and scraping the gully sections that revealed stratigraphic context of the early habitation deposit quite easily.

The excavations revealed a total of 6.40m deposit showing a three-fold sequence in the Harappan occupation at the site. The early phase – Phase I – entirely belonging to the Classical Harappan is represented by about 3.00m cultural deposit at the site. Harappan occupation in this phase starts with structures built of mud-bricks showing the Harappan ratio in their size. The early building activity is followed by a series of structures with mud-brick paved floors in subsequent layers. Mud-bricks of different composition and colour were used in different stages of construction in this phase. Structures made of stone slabs were rare. Open hearths and fire-places

perhaps associated with craft activity also were reported from this phase. In addition to the Classical Harappan pottery, the ceramic assemblage in this phase included a few sherds of the Anarta pottery of the north Gujarat Chalcolithic sites right from the earliest level. Other artefacts found in this phase are a large Rohri chert fluted blade, core and number of long blades (Pl. 36A), several terracotta cart-frames and wheels, terracotta bangles, terracotta bull and other animals and human-like figurines. A female figurine belonging to this phase found in the trench Es4 is particularly noteworthy. Although partially broken off below the knee and above the chest, the figurine is remarkable for its modeling as well as the graphic rendering of the female genital which is often not the case in the Harappan female terracotta figurines (Pl. 36B), several semiprecious stone beads and equal number of bead rough-outs are reported from this phase along with small semi-cylindrical drill points. Faience and steatite beads are relatively rare; so are shell bangles and ladles. Among the copper implements a large celt found in the upper layers of this phase is the most important one (Pl. 37A). One of the terracotta sealings with the impression of a square unicorn seal recovered from the trench Fp1 may also belong to the uppermost deposit of this phase. As it is partly broken, only a small portion of the impression of the inscription in Indus characters is visible at present on this sealing. Another interesting artefact recovered from this phase is a small pentagonal steatite tablet engraved with a series of five concentric circles arranged around a central one forming a floral pattern

(Pl. 37B). It has two small holes at the centre to thread it and tie it around using a string.

This phase is followed by Phase-II which is distinguished by the preponderance of the Sorath Harappan pottery. The total habitation thickness of this deposit at the site may be around 1.40 to 1.60m. Although a few isolated Sorath Harappan pot-sherds have started occurring in the middle levels of the Phase I itself, it is only in the later deposits that they are found in abundance. The end of Phase I in most of the trenches at the site is followed by a thick and relatively sterile deposit composed of structure collapse and filling. The actual regular Phase II habitation deposit starts from this level onwards. This phase also shows the extensive use of locally quarried stone slabs for the construction of structures. A row of four structures/houses belonging to this phase was exposed in trenches Et4, Et3, Et2 and Es4. Each of these houses has a semi-circular or square hearth and a large pot buried adjacent to it. A proper planning of the settlement and the division within is apparent from the alignment and regularity of these structures. In spite of this, the upper part of the deposit is indiscriminately mixed with ash and domestic waste suggesting little concern for waste disposal during this phase. In fact, the ashy deposit is more than one meter thick and is a predominant feature of this phase.

The artefacts from this phase incorporated both the Classical Harappan and the Sorath Harappan and a few Anarta potteries. The Classical Harappan is

Plate 36



A



B

Shikarpur: A; chert core and blades and B; terracotta female figurine.





A



B

Shikarpur: A; copper celt and B; engraved pentagonal steatite tablet.

represented by all the characteristic vessels as well as painted and incised decorations on them. The Sorath Harappan is represented by convex sided bowls, stud-handled bowls, pots with square and rectangular rims, dishes and dish-on-stand with thick rim features, coarse wares with burnished features etc. These vessel forms and decorations on them are comparable to the pottery reported from Rojdi A and B, Kuntasi I, Bagasra III and Rangpur IIA and IIB. Other artefacts such as Rohri chert blades, shell bangles, semiprecious stone beads, copper implements, terracotta toy-cart frames and wheels, terracotta bangles and beads and terracotta triangular cakes are all reported from this phase too.

Phase II at the top is followed by the Phase III deposit representing the last phase of the Harappan occupation at the site. Habitation debris of this phase is thin and patchy and is generally confined to the top 10 to 20cm from the surface as well as in ashy pits. The deposit is marked by the complete absence of the Classical Harappan artefacts. The pottery of this Phase is primarily the Sorath Harappan that included concave sided bowls, medium size pots with slightly elongated and constricted neck and beaded rim, dishes with drooping rim, small lamps with incurved rim, etc. These are comparable to the pottery reported from Rangpur IIC, Rojdi C and Bagasra IV; and belong to the Post-Urban Phase of the Harappa culture. Very few artefacts except pottery have been reported from this phase suggesting the decadent stage of the Harappan economy. Structures belonging to this phase are also meagre, except for the

remains of a few flimsy, circular or apsidal stone structures found in the trenches Et2 and Et1. They are built by reusing the stone slabs from the structures of preceding phase. It appears the site was abandoned soon after the Phase III occupation and was never occupied in later periods of history.

In addition to this the excavations have revealed a portion of the fortification wall in the southern edge of the site in the trench Fp1. Entirely made of mud-bricks, this was the north-looking inner-face of the main southern wall. The history of construction of this wall is still not very clear as the excavation in this trench could not reach up to the bottom of the wall. The excavated part of the wall is about 2.00m high and has 15 vertical courses of bricks. Bricks of different colour, composition and size were used in the construction of the wall. The exposed part shows two stages of construction and a massive repair work that was carried out in the early stages of the Phase II occupation at the site. An intensely burnt fire-place was found adhering to this wall at a depth of about 2.00m in a stratum that was prior to the repairs. This perhaps may be associated with some craft activity carried out at this part of the settlement in the Phase-I.

#### 14. EXCAVATION AT VADNAGAR, DISTRICT MEHSANA

In continuation of the previous year's work, the Department of Archaeology, Gujarat, conducted further excavations at Vadnagar in District Mehsana under the direction of Y.S. Rawat assisted by D.K. Rathod, Shishir Jain, Dilip

Kushwaha, Bhimraj Barhat, Ritesh Makwana, Vinod V, R.B.Patel, P.B.Otia and Mukesh Thakore. Further excavation was resumed at two previous locations viz. Ghaskol Darwaja and Durga Mata Mandir area that were excavated last year. In addition to these two, a new area known as Khari Kui within the fortification (near Primary School-3) was taken up for excavation in order to understand the town planning of successive periods. This new area is located in the south central part of the town to the south of the Darbar-Gadh and north of the Durga Mata Mandir, and presumably has more deposit.

Further excavation was resumed in this area which lies about 40m north of the Ghaskol Darwaza on the southern margin of the town. In the previous season, an area of 25m x 25m comprising of six trenches numbered as A1, B1, C1 from west to east direction and A2, B2 and C2 from north to south direction were excavated to varying depths. A maximum depth of 8.15m and 7.20m was reached in two small areas falling within the trenches A1 and A2. But the virgin soil could not be reached due to high water table. The excavated trenches have yielded cultural material of the following four cultural periods.

Period I : Pre- Kshatrapa Period

Period II : Kshatrapa Period

Period III : Post- Kshatrapa & Maitraka  
Period

Period IV : Rajput Period (Chavada-Solanki)

Besides, the previous season's excavation had brought to light a large

structure which was partially exposed up to a length of about 16.80m from east to west and about 8.00m from north to south in trenches A2 and B2. The extant height of the structure measured 3.30m including foundation. The average breadth of the walls of this construction is 72cm. This construction was found consisting of deep chambers built along the interior of its four peripheral walls. Two such chambers were exposed completely along the northern wall which measured 4.10 x 1.70m and 3.42 x 1.70m in length and breadth respectively. Burnt bricks which were used in the construction of the structure measured 44 x 27 x 7cm, 42 x 27 x 7cm and 40 x 26 x 7cm. Stratigraphical position of the building suggested that it was built during the initial stage of Period II. A 1.50m deep foundation trench was found cut into the preceding deposit (i.e. Period I) to build this massive structure. This structure has certain unique features such as a 10cm deep horizontal recess provided along the length of every wall externally as well as internally at a height of 1.60m from the floor level. Interestingly the recess in the walls oriented in east-west direction is slightly at higher level (i.e. one brick thickness) than the recess in the walls oriented in north-south direction which indicates that two different levels have been maintained intentionally. A series of square/rectangular holes passing through the wall is found at the top of these recesses in each wall. The holes do not follow a regular pattern but are provided after some interval. This arrangement of recesses and holes to inter-connect all the chambers with one another indicates that this structure was meant for some special



purpose, which is yet to be understood. Another interesting feature noticed is that the exterior surface of the walls is smooth and perfectly finished but the interior are uneven and not well finished. All the chambers exposed so far have been found without any entry.

In view of the above, to understand this unique structure, the area of excavation was further extended towards south and west in trenches A-2, A-3, B-3 and C-3. In all, seven quadrants were opened in order to expose the remaining southern portion of the structure as well as to understand the arrangement of the chambers along the southern wall. Excavation revealed that the upper deposit in this area had been very badly disturbed due to regular human activities and erosion. The upper 0.70m to 1.20m thick deposit seems to be of recent origin and consists of only aeolian sand and recent garbage. Underlying this deposit was found a lot of debris comprising mainly brick bats mixed with sand and pot-sherds which conceal several ghost walls within. In trench A3, a chamber set along the western wall and the south-west corner of the structure has been partially exposed. It has been noticed that the walls have been robbed off in the later period. These walls have been found at various depths from north to south. In northern side these walls have been noticed at a depth of 1.25m while the south western corner has been traced at a depth of 3.30m. After exposing the south-west corner, the structure measured 14.05m from north to south. Hence the external dimension of the structure at present seems to be 16.80 x 14.05m east to west and north to south

respectively. Excavation has also confirmed that this structure consists of multiple chambers set along each peripheral wall in such a way that a large open area measuring 7.20sq.m is created almost in the center. Each wall has been provided with a set of two or more chambers and they are separated from each other by a 0.95m to 1.00m wide and 2.45m to 2.64m deep open space. In other words, the set of chambers on each side is separated from the other by a 2.45m to 2.64m long and about 0.97m to 1.01m wide gully at the four corners of the central open square. This arrangement looks like a *swastika* design, wherein the chambers form the arms of the *swastika*. This kind of arrangement seems to be very special and to some extent comparable to the ground plan of a few Buddhist monasteries reported from central India. However, only further excavation may reveal the exact nature and purpose of the structure, as the south east corner along with the chambers is still to be exposed. Whether it was a monastery (or a granary, a waste water treatment plant, or a hydrological structure?) is yet to be ascertained. Though the main building appears to be square in plan, there is an extended portion on the west side with a deep chamber. This chamber measured 1.00m NS x 2.35m EW with a depth of 3.35m below the recess.

The partially exposed shallow tank like structure in the trench B2, which showed a long succession of gradual raisings, has been exposed completely. It measures about 6.00sq.m. It is made of burnt bricks of assorted sizes, which range from 44 x 26 x 7cm to 36 x 23 x 7cm. It

appears that the central open space of the preceding period structure, described above, was chosen for the construction of this tank. The brick masonry externally shows very poor workmanship. It also shows phases of successive activity. It indicates that the construction could have been carried out from the inner portion of this tank like structure (?). Proper floors seem to have also been provided at the bottom of the tank after each level of activity. The south western corner at the bottom of the tank like structure in the latest period is found linked with a small brick drain which joins it from the southern side. The drain measured about 23cm in depth and 10cm in width and is found running first towards west up to a length of 7.15m and then turning towards north. Preliminary observations indicate this tank like structure could have been used as an industrial tank probably for dyeing or similar purpose.

Removal of a baulk, between trenches A-1 and A, also brought to light two massive brick constructions at a depth of 1.75m, comprising of walls of successive phases. These walls which were oriented in east west direction appear to be the outer walls of two separate buildings. They were constructed at a distance of 0.60m from each other. The west side wall has been exposed up to a length of 7.40m with an extant height of 2.70m. The wall on the eastern side, as the stratigraphy indicates, seems to be of a slightly later phase and has been exposed up to a length 1.50m but found continuing further east. The breadth of both of the walls measures 70cm. It seems that these buildings remained in use for a long period;

and hence show successive phases of activity and alterations. The walls of succeeding phase are found raised directly on the preceding one. Interestingly, these constructions are found raised on a preceding mound which seems to be sloping down towards west! This evidence indicates that a major change in town planning took place at this particular stage.

Excavation of Ghaskol area provided a rich yield of antiquities. A large number of terracotta sealings with short Brahmi legends have been recovered from the post Kshatrapa period deposit which is under study. One of the sealings bears the name *ra swa ti ne ta* (ra-swa-ti-net) in Brahmi characters of 1<sup>st</sup>-2<sup>nd</sup> century CE style. Besides, coins of Kshatrapa kings, and those of Shrava Bhattarak (398-415? CE) have been found and recorded. The most significant findings of the current season include a broken crescent shaped stone plaque depicting the tale of a monkey offering honey to Lord Buddha a sand stone human head sculpted in the Gandhara art style terracotta human head pendants, probably, some of them could have been used as cult objects as they depict a dreadful face with a trident on its forehead; and two NBP like sherds one inscribed with *Shakasya* and another with *Dham*.

Durgamata Mandir area lies in the south central part of Vadnagar town close to the southern fortification. It is equidistant from the Pithori and Ghaskol gate which are provided to the southern fortification. This area was chosen for excavation in order to know the internal growth of the settlement

in relation to the growth of the fortification and also the planning of the area. The open plot chosen for excavation falls in the area which was originally occupied by a community of potters. Some of them are still living there since the last 200 years. In the previous season, four quadrants of two trenches (square grid of 10mx10m) were laid here in north-south orientation to study the top of the fortification wall and the cultural deposit accumulated against it. The topography of the area shows a south- north slope that descends down from the top of the southern fort wall. Externally the wall seems to be damaged considerably.

The previous excavation had revealed a huge, 1.95m high dump consisting mainly of pot-sherds lying at the top of the wall. The extant wall top is found paved with square tiles of recent times and could have served as an open courtyard to a house located in the north. A few walls of the house, mainly their foundation have also been exposed. Excavation further down through a 7m thick deposit revealed two major construction phases of the fort wall. In both the phases the wall maintained a battered face. On the basis of its brick sizes it has been ascertained that the lower part of this wall up to 2.65m from the base could belong to the Kshatrpa period while the upper plastered face seems to have been constructed during the Chalukyan and subsequent periods. This is corroborated by an inscription of the Chalukyan King Kumarpala's (12<sup>th</sup>-13<sup>th</sup> century CE) time locally found at the Arjunbari gate of the town which records that the king renovated the dilapidated fort in the 12<sup>th</sup> century.

Remains of residential houses belonging to 19<sup>th</sup>-20<sup>th</sup> century are found at a distance of 5-60m to the north of the fort wall. There are enough evidences to suggest that the area between the wall and the fort, originally a street, was being used as dumping ground or backyard during the last period.

The last season's trenches were extended further towards west and north side. In all six quadrants were operated in trenches A-1 and XA-2 to know the relationship between the settlement and the fort wall. Among these only in trench A-1/I a depth of 14m was reached whereas the other trenches were excavated up to varying depths: A-1/III 4m, A-1/II 9.20m, A-2/I and A-2/IV 6.40 to 7m respectively and trench XA-2/II-III up to 6.20m. The excavations revealed that the upper 0.80m to 1.00m deposit belongs to very recent activities mainly related to pottery making and dumping of broken and waste material. It has also been noticed that when these activities started there was still a deep depression in which could be associated with the ancient street which once ran along the fort wall. This depression at places was more than 6m deep and the latest inhabitants used it as a dumping ground. Hence, this large ditch is found filled with the materials that have been found in the topmost 1m deposit.

The Trench A-1/I which is located about 15m north of the fortification was excavated up to a depth of 14m. Although the cultural remains were found continuing further down, the excavation could not be continued due to high water table. In all 35



strata have been identified and these deposits are so far divisible tentatively into seven cultural periods including the recent one on the basis of ceramics, antiquities, artifacts and structures. The lower 8.5m deposit at this site is comparable with the excavated deposit of Ghaskol area, confirming further the results of the last season's work. The upper 5.5m deposit represents the cultural accumulation of three periods beginning with the Islamic rule in Gujarat i.e. around the beginning of 14<sup>th</sup> century CE and continued through Maratha and Colonial periods.

The most significant remains in this trench are an east-west oriented wall which reveals at least seven successive phases of activity during different periods in the history of Vadnagar. The extant combined height of these structures measured 8.5m. In all 129 courses of kiln baked bricks have been counted from the bottom of the excavation to the extant top. Of these, the lower 76 courses showing five distinct phases of successive constructions belong to Kshatrpa and pre-Kshatrpa periods, whereas the upper 53 courses represent two distinct phases of successive constructions made during the Maitraka and Rajput Period. The above mentioned wall has been exposed up to a length of 3.8m in the trench A-1/I but found continuing further east in A-1/II and beyond. In the trench A-1/I this wall takes a turn at right angle towards north forming the south western corner of a large residential block. Surprisingly each successive wall follows the exact orientation of the wall of its immediate preceding phase. This type of continuity of construction of

one wall after another during the above mention periods of history indicates that the town planning of Vadnagar from the early centuries of Christian era did not deviate much until 13<sup>th</sup> century CE.

The structural remains of succeeding periods show lack of planning and also lack of concern towards maintenance of the fortification. The houses were built closer to the fort wall by encroaching upon the earlier streets. This evidence also points towards the fact that during these periods Vadnagar was a prosperous town and it was administered by a powerful central authority. The following periods saw considerable deterioration in planning possibly due to decline in economy and exodus of people to some other places.

The deposit of each cultural period yielded a good quantity of contemporary antiquities. Silver and copper coins recovered from different strata have been helpful in ascertaining the date of the deposit. The bricks sizes are also found varying from one period to another. The measurements show that there is a gradual decrease in overall sizes of bricks from Kshatrpa period to Maratha period, the former being the largest and the latter being the smallest.

Among the antiquities mention may be made of a few coins of the Islamic period, terracotta sealings with legends in Brahmi characters and one bearing a seated bull and legend in Brahmi of the Maitraka period, copper coins of king Sarva Bhattaraka, a terracotta standing figurine of

Buddha in *abhayamudra*, a bracelet of shell carved with a couple and an elephant alternately and beads of semiprecious stone and terracotta. Another interesting find is a fragmentary piece of a carved shell bracelet depicting a seated couple and an elephant after alternate interval.

Khari Kui is located on the southern margin of the town about 60m north of Durga Mata Mandir. It is a large open area (50m NS x25m EW) surrounded by residential buildings and as per the owners it is laying abandoned for the past 75 years. Here in a north south slope which lies in the middle level of the town's contour five trenches have been laid in horizontal method of excavation. In all fifteen quadrants were subjected to probe and digging took place up to various depths only in upper levels of deposit. The maximum depth reached 7-10m in the quadrant marked as XA.1/III. Structural remains of four cultural periods beginning with pre- Chaulukyan period and ending with the Maratha period have been exposed in these trenches. The available evidence suggest that previously a street was passing through this area, possibly, connecting the Darbargadh (Royal Enclosure) in the north and the main street running along the fortification in the south. On the east side of this street a row of houses in ruins has been noticed. These houses exposed on the upper most level seems to belong to late 19<sup>th</sup> century and in their construction small *lakhauri* bricks as well as rubbles robbed off from earlier phases have been found reused. The floors of houses were found paved with both brick-

on-edge as well as horizontally laid square brick.

## HARYANA

### 15. EXCAVATION AT MADINA, DISTRICT ROHTAK

The Department of History of M.D. University, Rohtak and Deccan College, Pune, under the direction of Prof. Manmohan Kumar and Prof. Vasant Shinde assisted by Vivek Dangi, Sajjan Kumar and Vijay Kumar conducted archaeological excavations at Madina, (76°25'11.8"N ; 29°12'00"E), which is 15 km east of the Meham town and about the same distance from the district headquarters Rohtak on National Highway (NH) 10. Initially this site spread over an area of 2 hectare, but now only less than half.

The excavations at the site was undertaken to identify whether there is any linkage between Late Harappan and Painted Grey Ware cultures. The total deposit of the site is 1.40m and sixteen trenches measuring 5 x 5m were laid. Consequent upon the excavation 8 habitational phases were encountered.

Phase-1: The total deposit of this phase is 30 cm and layer 9 is associated with this phase. Grey ware, painted grey ware (10%) along with associated red ware, and a faience bangle were found. One floor level is noticed as also post holes dug into the natural soil giving an idea about circular huts.

Phase-II: Layer (8), is compact in nature and light yellowish in colour with a thin deposit of 13cm. Only one floor level is identified. Pottery found in this phase includes both of grey and red ware tradition. 40 % of the grey ware and 60% of painted grey ware is of medium fabric. The thickness of the ware ranges from 2.91 and 3.20mm. The associated red ware is both handmade (10 %) and wheel-made. The handmade pottery is very thick and of coarse fabric. Some sherds of Late Harappan tradition were also found in this phase.

Phase-III: Layer (7) with a deposit of 10 cm had two floor levels, both compact but the first one brownish and the other greyish. The grey ware pottery has 70% grey ware, 28% PGW and 2% chocolate-coloured ware. The thick variety of grey ware constitutes 10 % while medium and fine constitute about 80 % (average thickness is 3.76mm) and 10 % (average thickness 3mm) respectively. No paintings were found on the fine variety. This phase yielded a terracotta toy-cart wheel, and disc having notches around its circumference, bi-conical and *ghata*-shaped beads, one bone point and faience bangle pieces (including one heart-shaped).

Phase-IV: layer 6, having about 15 cm thick deposits with two floor levels represents this phase. Of the two floor levels, the earlier one is compact yellowish in colour, while the later one is also compact but is of dark brownish in colour. This phase represents the full development of the PGW from the simple grey ware tradition. The array of the wares includes grey ware (40 %), PGW (30 %), black slipped (8 %) and the black ware

(22 %). The grey ware of this phase is mostly of medium variety. The PGW is of thin variety having paintings on both interior and exterior. The black slipped ware is of medium to thick fabric and the only shape represented in this ware is the bowl. The black ware is of medium fabric and has bowls and dishes as common shapes. Of the total red ware, only 5 % is of the Late Harappan tradition while the rest is of the PGW tradition. The red ware is made of poor levigated clay having grain husk and straw mixed in it. The firing of the pots is inadequate as is reflected in the core of the sherds, which is either smoky or grey in colour. Of the total red ware 15 % is handmade, while the major bulk of the ceramic is slow wheel made (65 %). About 20 % is thrown on fast wheel. The colour of this ware varies from pale red to ochre. Jars, basins, vases, water vessels, storage jars etc. are the common shapes of this ware. The Late Harappan ware is made of well levigated clay and is well fired. The common shape in this ware is the vase. Only two *ghata*-shaped beads were found in the layer of this phase.

Phase-V: Layer (5), having two floor levels with a deposit of 12 cm, represents this phase. The earlier floor is a compact greenish ashy one and has ochre rammed flooring. The later floor level is brownish in colour mixed with *kankars*. The pottery includes grey ware (50 %), PGW (40 %), chocolate-coloured ware (8 %) and black ware (2 %). Pottery of the Late Harappan tradition is about 5 % of the total red ware. Mostly dishes and dish-on-stand are represented in this ware. Faience bangle



pieces (heart-shaped), a broken jasper pendulum or bead, one complete bone point, etc., were found in this phase. One unidentified copper object is the only metal object found. Apart from these, eight pottery discs were found, of these three are of grey ware, one of medium red ware, four of coarse red ware and two discs are made of the Late Harappan pottery.

Phase-VI: The total deposit of this phase is 20cm and Layer (4) belongs to this phase. The structural activities in this phase are attested by the discovery of three floor levels and postholes in a regular pattern. The earliest floor level is of brownish colour and mixed with *kankars*. The middle floor level is brownish, compact, while the latest floor level is greenish ashy and also is compact. The pottery of this phase is both red ware and grey ware. The red ware is both handmade (43.47%) and wheel-made (56.53%). Of the handmade pottery, 40% is of coarse thick fabric, while 60% is of coarse medium fabric. The wheel-made pottery has two distinct traditions - the Late Harappan tradition (5%) and the red ware industry which is generally found associated with the PGW and grey ware. The PGW is of thin fabric and consists of 25.92% of total grey coloured assemblage. It is generally 2.0mm to 3.0mm thick. An iron arrowhead was found in this phase. Hop-scotches made of pot-sherds are the only other antiquities belonging to this phase.

Phase-VII: This phase marks the mature phase of the settlement at this site. The average deposit of this phase layer (3) is 20cm. The rectangular huts having sloping

thatched roofs were in use as attested to by the impression of bamboo, reed, etc., on the roofing material. Strangely they did not construct the mud walls but used mud and reed screen plastered with mud as a substitute for the walls. This is evident from a large number of burnt clay lumps having impressions of bamboo, wood and reed. The kitchens were just outside the huts and have mud windscreens. The *chulhas* or oven was 'U'- shaped, while the hearths (*haras*) were of an oval shape. Near the *chulhas* (mostly north-south orientation), postholes and a thin mud-lined structure were found. There are instances of change of orientation of these *chulhas*. The kitchens generally have small round mud seats for sitting. This phase has the evidence of two structural sub phases. The former floor level is compact brownish ashy colour, while the latter is a compact greenish one having a mixture of *kankars*. The ceramic assemblages of this period include red and grey ware. The red ware includes pottery of the Late Harappan tradition as well as that generally found with the PGW. Of the total red ware 2 % of the pottery is of the Late Harappan tradition, which is made of well-levigated clay and is well fired. This phase has yielded a large number of antiquities. The common ones are *ghatas* shaped beads, bone points (tanged variety), sling balls, terracotta disc having notched designs, ivory bead, copper antimony rods, copper beads, iron arrowheads and points. Interesting is the discovery of a pear-shaped painted pot having two holes. This was perhaps a conch or a musical instrument (Fig. 5). A few antiquities of the Late Harappan tradition were also found. These include three pottery

Fig. 5

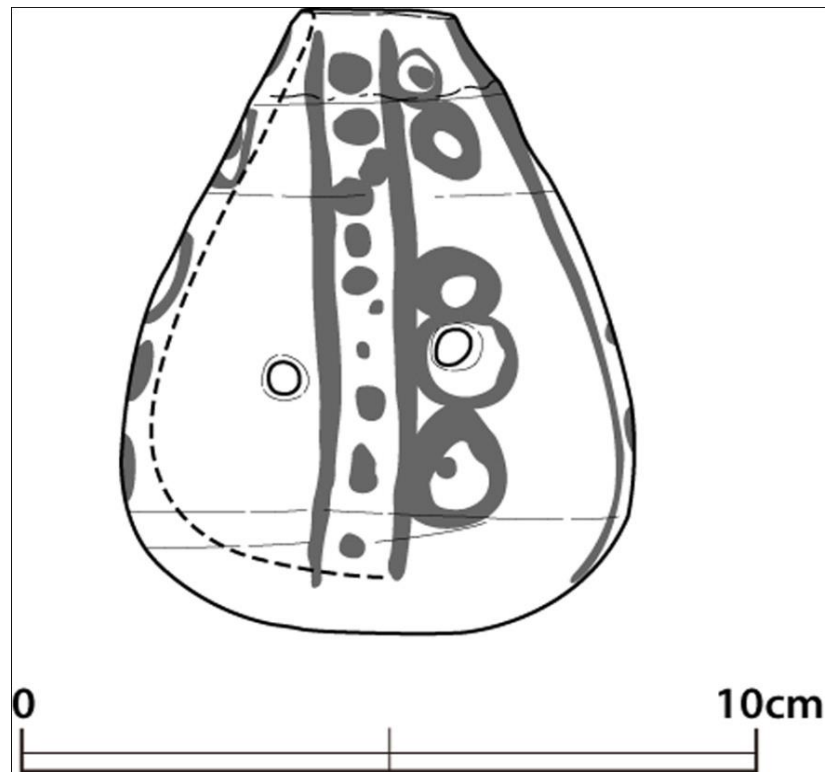


Fig. 5; Madina: conch or a musical instrument.

discs made of the Late Harappan pottery, terracotta animal figurines representing bull, toy cart wheel with single hub, etc. The discovery of a terracotta seal having an emblem is significant.

Phase-VIII: Layers (1) and (2) represent the latest phase at the site and total deposit of this phase is 20cm. The PGW culture was at its zenith during this phase. Two floor levels, the former being compact ashy soil of grayish colour and the latter compact mixed with *kankars*, were found in the layers of this period. The huts of this phase may have had thatched roofs. A typical hut had two big postholes supporting beams and two smaller beams on both sides as is reflected in the presence of smaller posts (two on each side). These huts had walls made of split bamboo screen plastered with mud on both sides. The kitchens were just outside the huts where the hearths were covered with small roof to protect them from wind and rain. The sides of the kitchens had a thin mud wind-screen (3cm thick). Orientation of the huts was generally directed from north to south. Interesting is the discovery of a big pit, which has postholes on the edges. This was perhaps used for dwelling purpose. The pottery of this phase is both of the red and grey ware variety. The red ware pottery is both handmade (33.70%) and wheel-made. The common shapes in the red ware are big basins and storage jars. The wheel-made pottery is generally of medium fabric and forms 29.42% of the total pottery assemblage. Common shapes of this ware are storage jars, basins, bowls, small, to medium vases, etc. A *lota* with flat base found in this phase has holes in the bottom.

Such pots are usually used for preparing *jalebis* in the rural area today. Fine red ware was also encountered which forms 1.02 % of the total wheel-made red ware assemblage. This type of pottery is of thin fabric and mostly small vases are represented in it. Black-and-red ware (0.42%) was also found in layers of this period, along with pottery of the Late Harappan tradition (1.36%). The grey ware (69.09%) shapes include bowls, dishes and miniature jars and pots, dishes, bowls and miniature bowls having paintings on both sides with black colour were found. Occasionally white and chocolate colours were also used. The antiquities belonging to this phase include terracotta beads, bi-conical beads of pre-Harappan tradition, tubular bead, areca nut-shaped beads (two), etc. Typical *ghata* shaped beads are quite impressive. The stone sling ball found from the site can be classified into the missile category. Bone points of this phase include nine tanged and one socket variety. Some points have grooves and incised designs. Terracotta discs, one each of grey colour and red colour which is decorated, one stone disc and a large number of discs made of potsherds were found. Out of 217 pottery discs, 13 are made of the Late Harappan pottery, 25 are of the grey ware and one of the PGW, 168 of coarse fabric red ware and 20 of medium fabric red ware. The items of ornaments found in this phase include six pendants (including two grey ware pottery), two terracotta bangle pieces, one ear-stud of grey colour, three faience bangle pieces (of the Late Harappan tradition), one tubular agate bead, one carnelian bead and one marble bead. Shell and bone was also used for preparing bangles as is evident from the



discovery of such objects. The inhabitants of this phase were well versed with metallurgy. Copper antimony rod, fishhook, scooper along with iron arrowheads (three) and small iron rod (one) were found. The discovery of large number of iron slag points to local manufacture of iron objects. The animal figurines found in this phase are quite interesting. Of the three figurines, one represents the hind portion of a bull figurine and two caparisoned horses with riders, one male (bigger in size) and other one female (smaller in size). The horses have a long tail and an aperture indicating the nose. A few toy-cart wheels were also found, which include one single-hub wheel. Apart from this, two toy-cart wheels made of red ware were also found. Other antiquities include marble weight (200 g), stone querns and marbles, touchstone and a pottery arrow head.

### 16. EXCAVATIONS AT FARMANA, DISTRICT ROHTAK

The Deccan College, Deemed University, Pune continued excavation at the Harappan site of Farmana in Rohtak District in collaboration with the Research Institute for Humanity and Nature, Kyoto, Japan and the Department of History, M.D. University, Rohtak. The excavation was directed by Vasant Shinde, Toshiki Osada and Mahmohan Kumar. They were assisted by Akinori Uesugi, Amol Kulkarni, Nilesh Jadhav, Jyotiram Deshmukh, Kanti Mumar Pawar, Gauri Bedekar, V. Sharada, Ayumu Konaskawa, Vivek Dangi, K. Malap, V. G. Vishwasrao and Anupama. The ancient site (29° 02' 22"N; 76° 18' 02"E) that falls in the jurisdiction of three different villages-

Farmana, Seman and Bhaini Chandrapal (Badi Bhaini) all in Mehem block of Rohtak district is locally known as *Daksh Khera*. Since major portion of the sites lies in the jurisdiction of Farmana village, it is also treated as a part of that village. The work carried out last year at this site had produced two-fold cultural sequence namely, Period I- Pre-Harappan Hakra Tradition (c.3500-2600 BCE) and Period II- Mature Harappan (c. 2500-2000 BCE). The work was planned this year with the following aims and objectives to reconstruction of Holocene climatic sequence and study the impact of climatic fluctuations on the formation and developmental processes of the culture in the study area; to understand regional variations of the Harappan culture in the Ghaggar basin and study the role of the regional cultures in the development of the Harappan elements in this region; to study cultural processes from the Pre/Early to the late phases of the Harappan culture; and to study socio-economic organizations of the Harappans in this region.

The ancient site at Farmana is today survived in three terraced levels and therefore for the sake of convenience, it was divided into three Localities. The highest portion of the site survived over an area of half hectare is treated as Locality 1, the middle level all around Locality 1 is Locality 2 and the lowest level which is maximum in terms of area is Locality 3. In order to fulfil the objectives of this year's research, two localities were selected for excavation; one 5 x 5m trench in the Locality 3 to the north of the Trench 3 dug last year (2006-07) and 40, 5 x 5m trenches

in Locality 1 to the western side of the area excavated last year. The large area (40 trenches horizontally laid out) of Locality 1 was selected for excavation with a view to understand the town-planning of the Mature Harappan phase at the site so that many aspects of the Harappan culture could be studied. The Mature Harappan cemetery of the site of Farmana, located at a distance of 950 m from the datum point, was discovered this year accidentally. The remains of human skeletons were brought to the notice when the owner of the land had undertaken deep ploughing with the help of tractor. In all seven human burials were exposed this year. The following is the cultural sequence at Farmana (Pl. 38 ).

**Period I- Hakra Tradition (c.3500-2600 BCE):** An oval pit-dwelling with a few post-holes along its periphery was fully excavated this year. It is dug into the natural soil by the first occupants of the site as it is sealed by the last habitation layer (8) at the site. It is oriented 40° southwest-northeast. The pit is 3.20m long and 1.50m in width in the middle. It is 8cm deep. The sides are perfectly vertical and the bottom flat. Almost all the Hakra Tradition sites excavated in this region have yielded similar kind of evidence of structural activities. The Hakra phase is characterized by the presence of different ceramic wares like mud appliqué, incised, chocolate slipped, periano reserve, grooved, painted black-on-red, grey, etc.

**Period-II- Mature Harappan (c.2500-2000 BCE):** Large, horizontal area excavated in the Locality 1 has unearthed part of the well

planned Mature Harappan settlement at Farmana. All the structures of this period are now made of sun-dried mud bricks in the typical Harappan ratio of 1:2:4. The part of a typical chess-board type plan was excavated. To the west of the structural complex 1 excavated last year, was found the main street running in slightly northwest-southeast direction, which is perfectly parallel to the outer wall of the structure complexes excavated so far. To the west of the main street were excavated three more structure complexes, all parallel to the Main Street and parallelogram on plan; structure complex 3, just opposite to the west of structure complex 2 and separated by the main street, is the largest amongst all of the structure complexes excavated at Farmana so far. This structure complex, oriented parallel to the main street, consists of many rooms, 22 of which of different sizes and shapes have been excavated so far. Some of the rooms are square and some rectangular on plan. Many rooms of this complex continue towards north and western sides, which are not dug yet. On the basis of contents these rooms could be inferred to have been used for a variety of purposes such as dwelling, storage, cooking and craftmanufacture. This structure complex has an opening near the south western corner in the form of a “L”-shaped passage. The rooms identified as dwelling have larger space and well made floors, rammed and plastered. The storage rooms are either small in dimension or contain storage pits. The kitchen part of the structure complex usually contains a rectangular fire-place and one or two medium to large size pots close to it. The entire complex was built around the



Farmana: remains of a planned settlement, mature Harappan.



open courtyard located in the centre. The structure complex has not been excavated to its entirety as it extends both in the western and northern sections. The excavated portion of the complex was inhabited by at least seven different families. They may belong to one large extended family or closely related to each other.

To the south of the structure complex 3 in a slightly northeast-southwest direction is a small lane (No.1), on the southern side of which is yet another structure complex (No.4), same in alignment as that of structure complex 3. It is also parallelogram on plan and consists of numerous rooms, nine of which have been excavated so far. Major portion of this complex continues in the unexcavated portion of the mound towards south. Like in the case of the structure complex No. 3, the rooms of this complex were used for different activities. On the basis of storage and cooking facilities, these nine rooms were occupied by three different families. To the west of the Lane No. 1 lies yet another complex; this is only partially excavated this year. These structure complexes have mostly rectangular fire places or ovens. Some of the fire places could be associated with domestic activities whereas some could be with industrial activities.

The seven human burials excavated in the Farmana Harappan Cemetery (FHV) this year were partially damaged by the plough share (Pl. 39). The usual orientation of the burials is in north-south direction, but there are a few examples in northwest-southeast direction. There are three types of

burial customs noticed at Farmana- primary, secondary and symbolic. They all have perfectly rectangular pits. The primary burials are those where the entire dead body was placed in north-south direction in a supine position with the head towards the north and the legs towards the south. In the case of secondary burials, the dead body appears to have been kept open and a few bones were collected and buried in a pit ceremoniously sometime later. The symbolic burial was devoid of any skeleton as the dead body may not have been retrieved. Almost all the burials contain grave goods consisting of a number of pots such as beakers, goblets, dishes, dish-on-stand, S-shaped jars, lids and small globular pots, the number of which varies from burial to burial. Besides, some contain ornaments such as steatite, jasper and carnelian beads and copper and shell bangles. The presence of burial goods in burial pits clearly suggests their belief in life after death.

The pottery from the Mature Harappan phase shows regional variation of the Harappan culture in the Ghaggar basin. Since the early phases like Hakra and Siswal have contributed to the development of the Mature Harappan phase, there is continuity in the ceramic traditions from the early levels. Besides, the typical Mature Harappan sturdy red ware is found in large quantity. This is one of the finest wares, made from very fine clay and perfectly fired. The outer surface is treated with either slip or wash of red or variants of red colour. Typical Harappan shapes like dish-on-stand, goblets, S-shaped jars, perforated jars, beakers are in small quantity in the



Farmana: human burials, mature Harappan.

collection. They are decorated with simple linear or curvilinear geometric patterns in black colour. Motifs like *pipal* leaf, intersecting circles, fish and fish-scale patterns, complex geometric patterns, etc. are rare.

The material remains found at Farmana include a large number of well made triangular and circular terracotta cakes, *mustikas*, copper spearhead, arrowhead, bangles, terracotta bull figurines, spindle whorls, bangles, steatite seal with zebu bull and a few Harappan letters engraved on it, terracotta sealing impressed with unicorn and Harappan letters etched carnelian and bone beads, paste beads, shell beads and bangles, faience bangles and beads and Harappan letters engraved on pot-sherds are some of the important finds at Farmana. It should be mentioned here that this is the only Harappan site which has produced the evidence of etched bone beads. The analysis and classification of structures, artefacts and ecofacts are in progress.

## JAMMU AND KASHMIR

### 17. SALVAGE ARCHAEOLOGICAL OPERATION AT SITE - TIBBA NAME SHAH. DISTRICT JAMMU

Srinagar Circle, of the Survey, under the direction of R. Krishnaiah and assisted by A. K. Khanna, M. K. Joshi, Prakash Kumar, Balbir Singh Jamwal, Gulzar Singh, R. K. Koul and Kuldeep Singh carried out a small scale excavation at site "*Tibba Name Shah*" (32° 44'; 74° 44') in Marh Block, Tehsil and District Jammu with the aim to establish the nature and sequence of cultural

deposits and correlate it with other sites of Jammu under Salvage Archaeological Operation. During trial trench excavation 4 quadrants, each quadrant measuring 4.25 x 4.25m were excavated. Quadrant-3 of square A-1 was excavated up to 2.13m. During the excavation large quantity of pot-sherds were encountered. Most of them are red ware wheel made, well levigated and fired and medium to coarse in fabric. Some of them have black painted floral and geometrical pattern designed on the outer surface. The shapes of pottery were mainly bowls, dishes, basins, lamps, vases, storage jars, lids, spouts etc. Antiquities found included beads of terracotta and semiprecious stone, bangle fragments of copper, animal figurines of terracotta. On the basis of collected antiquities and pot-sherds its manufacturing technique, shape and size the site can probably be assigned to the historical period. Further excavation may reveal more details about the archaeological potential of the site.

### 18. AKHNOOR FORT, AKHNOOR, DISTRICT JAMMU

Srinagar Circle, of the Survey, under the direction of R. Krishnaiah and assisted by A.K. Khanna, M. K. Joshi, Prakash Kumar, Balbir Singh Jamwal, Gulzar Singh and Surender Bhat carried out scientific clearance at the site of the fort at Akhnoor with a view to expose the buried structures inside the southern gateway area.

During excavation, in all 43 quadrants of 14 squares, each square measuring 10 x 10m was excavated. Remains of two bastion entrances were noticed one in Qdt.1 of Sq.A4 measuring



1:20m wide and another in Qdt.4 of Sq.D2 measuring 0.80m wide with steps leading to the top of the bastion. Adjoining the southern fortification wall five square cells were exposed measuring 3x3 m<sup>2</sup> facing north in Qdt.1 of Sq.B4, Qdt.3 & 4 of Sq.A4, Qdt.1&2 of Sq.XA4. Two rectangular rooms probably later additions were also noticed adjoining the cells. The first room complex measuring 7.20 x 6.50m (inner side) was noticed in Qdt.1, 2&3 of Sq.A3, Qdt.4 of Sq.B3 and has two entrances each measuring 1.30m and facing north. Second room complex measuring 6.50 x 5.50m (inner side) having one entrance with a width of 1.30m facing north was exposed in Qdt.1&4 of Sq.A3, Qdt.2 of Sq.XA4 and Qdt.3 of Sq.XA3. The walls were made of burnt bricks with mud mortar.

During excavation the entrance of southern gateway with a width of 2.90m was exposed. The extensively damaged entrance pathway ramp running towards north-south with a brick-on-edge paving in lime was exposed. The ramp is provided with a retaining brick wall on either side and plastered in fine lime plaster. The entrance gateway is having two guard rooms on either side in Squares of B2, B3, C2 and C3. A three tier eastern guard room is noticed in Qdt.3&4 of Sq.C2 and Qdt.1&2 of Sq.C3. On the ground floor there is a rectangular room measuring 4.30 x 2.70m having the entrance in the middle of western wall with trefoil arch connected to the ramp pathway. There is a staircase in the north to approach the first floor. On the first floor there is a guard room measuring 9.70 x 3.60m (inner side) having a window and also niches with

trefoil. A partly lime concrete plastered floor is noticed adjoining the fortification wall. A flight of steps have been noticed in the north wall to approach the upper floor. The walls made of burnt bricks with mud mortar inside and outer side are plastered with lime mortar.

The western two tier rectangular guard room having trefoil entrance facing east towards entrance pathway is seen lying in Qdt.3 of Sq.B2, Qdt.1, 2, 3 & 4 of Sq.B3. On the ground floor a rectangular room measuring 6m x 2.75m and steps in the north leading to the first floor is seen and a guard room on the first floor measuring 9.70m x 3.60m (inner side) having trefoil niches & trefoil window with lime concrete plastered floor adjoining the fortification wall has been exposed.

Two outlets have also been encountered in Qdt.4 and Qdt.3 of Sq.B1 with a width of 1m each running towards the entrance pathway. All exposed structures were buried under the debris of the super structures. No antiquities or pottery were noticed during the scientific clearance.

All the exposed structures were documented and simultaneous conservation work has been carried out whenever necessary. The work has to be further continued.

### **JHARKHAND**

#### **19. EXPLORATION IN WEST SINGBHM, DISTRICT JHARKHAND**

In continuation with previous works,

Prehistory Branch of the Survey undertook Singhbhum district during this session under the direction of D Bhengra, assisted by Gajanam Katade, Anil Kumar, K M Girhe, R.K. Dwivedi, P L Janabandhu and P S

exploration and excavation in West Pashime, Foreman. Exploration on the banks of the river Sanjay yielded the following sites with prehistoric tools:

<i>Sl. No.</i>	<i>Site</i>	<i>District</i>	<i>Nature of remains</i>
1	Dalki (22° 33'; 85° 38')	West Singhbhum	Lower Paleolithic tools
2	Otadire (22° 34'; 85° 39')	West Singhbhum	Lower Paleolithic tools

In course of exploration on the banks of the river Sanjay, a trial trench was also taken up at Lotapahar. Two neolithic celts and a polished roller were found during previous exploration (59-60, pp. 13-14) and in the excavation undertaken earlier yielded both geometric and non-geometric microlithic tools (1966-67, pp.7). A trench measuring 3x3 m. was taken up for trial excavation. A compact slightly yellowish riverine deposit was excavated upto a depth of 2.65m and bedrock of slate was seen at the bottom. In course of excavation some middle and upper Palaeolithic tools were recovered. Apart from this the team had also explored Lupungutu near Chaibasa, on the bank of Roro River, which was earlier reported by Prof. H D Sankalia in "Pre and Protohistory of India and Pakistan". During the exploration the team had collected Lower and Middle Palaeolithic tools like handaxe, scrapers, etc.

The excavation of Kadanad was taken up with a view to understand the material culture, distribution, settlement pattern and chronology of megalithic culture in Central Kerala in particular and Kerala in general. The cist burials in Kadanad are located in three different localities viz; Mattathilpara (KND-I), Inchukavu (KND-II) and Kurumannu (KND-III) in the revenue limits of Kadanad village. These megalithic sites are located about 56km north east of the district headquarter Kottayam.

The Megalithic sites KND-I and KND-II were found in disturbed and partially exposed condition. KND-I consists of two cist burials and KND-III consists of a four cist burials arranged side by side in north south orientation. KND-II yielded single transepted dolmenoid cist having traces of cairn packing on the west. All the cists burials are oriented in east west direction. The associated burial goods and ceramics were found in KND-III.

**KND-I:** The site locally called 'Mattathilpara' is located about 8 km north

## KERALA

### 20. MEGALITHIC SITE, KADANAD, MEENACHIL TALUK, DISTRICT KOTTAYAM

of KND-II and KND-III, and is approachable by road from Neelur to Karimkunnam junction. The megaliths at Mattathilpara consist of two cist burials arranged side by side in east west direction. Cist-I was partially disturbed and its port hole on the west was visible. Horizontal method of excavation was followed by laying trench 5 x 5m at the site. Cist -I was located on the north of this group and measured 203 x 111 x 154cm and Cist-II on the south measured 176 x 152 x 155cm. Eastern orthostats of Cist-I and orthostats of Cist-II were partially broken and had fallen inwards. The maximum depth of the trench was 170cm. Porthole orthostat on the west of both the cists were approached by a passage chamber measuring 1 x 1 x 75cm. Cist- II has a stone paved floor at a depth of 135 cm from the ground level. Except some fragments of red ware and black ware, no other burial goods were collected from both the burials.

**KND-II:** This site is located 8 km south-east of the KND-I and can be approached from the Neelur to Melukavu route.

The site has been subjected to cross section method of excavation to expose a transepted dolmenoid cist with cairn packing. The orthostats on the northern, southern and eastern sides are almost intact except the western one, which is broken. The transected cist has two portholes on the west. The average dimension of the cist is 290 x 195 cm. The northern orthostat measures 300x28x190cm, the southern one is 275 x 23 x 200cm and the eastern one is 300 x 26 x 200cm. No antiquities were collected except fragments of pottery. They

are mainly of red ware, black ware and small sherds of black-and-red ware.

**KND-III:** A group of four cist burials were found side by side in east west direction and all are deviated towards north. These burials are situated 2km south west of KND-II. At least one orthostat of all the cists was in partially disturbed condition. The site has a natural slope from east to west. All the cists are arranged in east west direction having the porthole orthostat in the west. To reveal full extension and nature of the burial two 10 x 10 m trenches were laid according to the grid pattern. During the excavation all the four cists were exposed. Among the four cists, Cist-II (256 x 182 x 172cm) and Cist-III (230 x 170 x 180cm) are the larger ones. All the burials contained burial goods consisting of antiquities and black-and-red ware sherds along with iron objects except skeleton remains. Orthostat of Cist -I and Cist-II (Pl. 40) are arranged in clockwise direction but that of III and IV are in anticlock wise direction. The porthole orthostat of all the cists are located in between the northern and southern orthostats.

All the cists were rich in pottery however majority of them were in highly fragile condition. Cist-I, Cist-II and Cist-IV had single urns. Cist-II consisted of two urns of red ware. Other ceramics in the burials include bowls of black-and-red ware, vases of red ware, miniature pots, ring stands, etc. Among the 25 types of pottery yielded from Cist -IV ten were ring stands. Cist -III, Cist -II and Cist-I contained 12, 18 and 6 pottery types respectively. All the potteries were



Plate 40



A



B

Kadanad: KND-III, A; cist-I and B; cist-II.

highly fragile, coarse in fabric and ill fired (Pl. 41).

Excavation has yielded varieties of beads in chert, quartzite and carnelian. Only one etched bead of carnelian has been found from the urn in Cist-I. The etching was done in white colour. It is a long barrel shaped bead with zig-zag lines enclosed within a singular marginal line on either side. Other beads include barrel shaped, cylindrical and long pendent types. Iron implements from KND-III are unique and well preserved. They include dagger, spear head, sword, long rod, and long rod with curved edges, hoe, axe etc. An iron rod with hilt handle on one end and curved long projections on the other end from Cist-I is unique type found in the Kadanad Megaliths. The iron implement with a hilt was kept in a vertical position as the hilt of the rod rested over the rim of black-and-red ware and other end was facing the floor.

### MAHARASHTRA

#### 21. EXCAVATION, CHAUL, DISTRICT RAIGAD

A team comprising Abhijit Dandekar, Sachin Joshi and Shivendra Kadgaonkar undertook exploration and excavation at the archaeological site of Chaul, District Raigad. This work was undertaken in continuation to the ongoing research on the west coast of Maharashtra to understand long distance trade between India and Europe in the Early Historic and Medieval periods. A small trench was laid on top of a small hillock opposite the Hingalaj Mata temple hill. It was important

to see nature of the structure on the hill top as the road on which is situated on a main trade route starting from the port at Chaul going to hinterland. Previous explorations carried out on the hill have yielded pottery and roof tile, indicating some structural activity at the top. A small trench of 3m x 3m was taken which was eventually extended on the southern side by 1m. Although the deposit was very small, i.e. 15cm, it gave evidence of a structure. A big spread of roof tiles of the medieval period was cleared (Pl. 42A). A few antiquities such as glass bangle fragments and nails were recovered. Ceramic assemblage comprised monochrome glazed ware, Chinese blue-on-white porcelain and coarse red ware of the medieval period.

A partial skeleton which was sandwiched between the roof tiles was also recovered. A few teeth and fragments of long bones were the only retrievable parts of the skeleton.

Along with this a Ground Penetrating Radar Survey (GPRS) was also conducted at the site which has revealed possibility of a large structure.

#### 21. EXPLORATIONS AT DAHANU-CHINCHANI, DISTRICT THANE

Sachin Vidyadhar Joshi of Deccan College, Post-Graduate and Research Institute, Pune along with the research-team comprising of Abhijit Dandekar and Shantanu Vaidya conducted archaeological explorations at Dahanu-Chinchani. Exploration was carried out at different parts of Chinchani village - at Demanbhat,



Plate 41



A



B

Kadanad: KND-III, A; cist-III and B; cist-IV.



## EXPLORATIONS AND EXCAVATIONS

Chandigaon, Varor. Detailed study of survey maps, satellite imagery and Resistivity survey were useful in locating the archaeological deposit of the Late Medieval periods. Chinchani is situated between the north bank of the Chinchani-Tarapur creek and the south bank of the Varor creek. Demanbhat is 4 km from Chinchani village and at the left bank of Varor creek. Exploration was carried out at Demanbhat (19° 53' 58.8" N; 72° 40' 56.6"E) as Late Medieval monochrome ware, blue-on-white

porcelain was found at the site in surface collection so the area was selected for resistivity survey (Pl. 42B). Uniform readings were found in the Resistivity survey. This uniformity in the reading indicates that there is no structure in the ground because current flows very easily and no resistance is observed in the readings. Then small exploratory trenches were taken at this locality to conform to the readings and cross check if any underground structure is noticed. Reading is as follows:

0	2	4	6	8	10	12	14	16
2								
4	20.09	23.86	31.9	32.15	32.65	34.28	34.28	31.63
6	23.73	31.14	31.4	36.92	35.16	33.91	32.15	36.95
8	19.34	27.75	29.13	36.42	37.8	36.8	32.53	29.45
10	23.48	25.62	33.03	33.66	35.16	36.04	37.68	35.35
12	20.09	27.63	28.00	33.15	33.78	31.77	29.89	34.11
14	20.09	26.13	32.02	29.64	30.52	30.39	33.15	32.25

Low resistance values do not yield any archaeological structures.

A small exploratory trench (2 x 2m) was dug up to about 1m depth where hardened sand/ beach rock locally known as *karal* occurred. The general description of the trench is as follows:

Layer 1: It is a thick compact, dark brown clayey silty soil with a lot of root activity. The thickness is from 18cm to 22cm in the western section. Bangles, glass beads and bones are found in this layer.

Layer 2: It is formed by light brown sand containing some clay. The number of potsherds decreased rapidly from Layer 1 to Layer 2.

Layer 3: It is a thick, 30cm, even layer of white sand. Very few potsherds were found in this layer.

Layer 4: Thick layer of beach rock from 88cm.

A habitational deposit of 13<sup>th</sup>–15<sup>th</sup> century has been located at Demanbhat. It comprises of the monochrome ware of blue, green and grey glazes, the Chinese blue-on-white pottery, glass beads, bangles and 3 medieval coins. The habitation of the Mauryan period was found only in the Bhandar-Aali area of Chinchani, the Early Medieval settlement was located at Chandigaon and now the evidence of the Late Medieval habitation was found at the mouths of Chinchani-Varor creeks.

Plate 42



A



B

A; Chaul: trench opposite Hingalaj Mata temple and B; Chinchani: electrical resistivity survey being carried out.

Although it was possible to locate the port activity at Dahanu-Chinchani – Varor, further detailed survey is required for understanding the extent of habitation.

### 23. EXCAVATION AT JUNNAR, DISTRICT PUNE

The excavations at the site of Junnar were continued for third consecutive year by Deccan College, Post-Graduate and Research Institute, Pune, with a view to understand the cultural sequence prior to the Satavahana levels and excavating brick structures to study their functional aspects. The excavation was directed by Vasant Shinde and Shrikant Jadhav and they were assisted by Abhijit Dandekar, Shrikant Ganvir, Shahida Ansari, M.D. Kajale, Shushma Deo, Arti Deshpande-Mukharjee, P.P. Dandwate, Girish Mandke, Satish Naik, B.B. Dighe, Kanti Pawar, Jyotiram Deshmukh, K. Malap and all the Post-Graduate and PG. Diploma students of the Institute. In order to achieve the aims of the excavations, three trenches (D14 (NE- SE-SW, E14- SE (new), SW (old quadrant), NW (New) Index trench F14- SE quadrant New trench) were excavated to the south and west of the area excavated last year. The following two structures were excavated in the Satavahana levels during the course of excavation this year (Pl. 43).

Only the southern wall of this structure, which was noticed last season, was excavated. It falls in trenches E14 (SE-SW) and F14 (SE). It is sealed by layer (12). The part of the inner filling of the structure made of alternate layers of black clay and stone paring is excavated in NW

quadrant of trench E14, which is 65 cm thick. On top of this filling was laid a proper 15 cm thick living floor made of clay (silt) mixed with small brick bats and powder, which was rammed hard and the top surface plastered. The southern wall is exposed to a length 8.15m. The western end extends further straight. The eastern end turns towards north, but the corner has been badly damaged. In all seven post-holes are visible along or on the wall, of which four can be associated with this structure and the rest later. Four courses of brick have survived to a thickness of 35cm. The bricks are arranged in a header and stretcher method. The average brick size is 30 cm in length, 8 cm thick, and 24cm in width. The foundation (filling) of the structure was first made over which was placed a brick wall.

Immediately to the east of the burnt brick wall (No. 3) was discovered yet another structure made of burnt bricks. This rectangular and multi-roomed structure is partially excavated. It is contemporary with structure No. 3. It appears that the structure collapsed after it was destroyed by fire. Parts of southern and eastern walls have been excavated in this trench. The southern wall has survived to a total length of 2.20m and is 37 cm wide. It runs exactly in east-west direction. Two brick courses have survived to a thickness of 21cm. The upper course is 7cm inside the edge of the lower course. The brick size measures 56 x 30 x 07cm. At the western end of the wall is located a small circular (10cm) post-hole. It accommodated a rectangular pillar, the mark of which is still survived after the post was destroyed by fire. It appears that there was a room on the



Plate 43



Junnar: terracotta human figurine, Satavahana period

southern side of this wall as a small portion of the wall of that part running in north-south direction has been excavated. It is exposed to a length of 50cm. It is 36 cm in width and survived to a thickness of 14 cm. This wall is perpendicular to the southern wall and the post-hole is located exactly in the junction.

The eastern wall of the main structure, running in north-south direction, is exposed to a length of 4.17m towards the north from the junction with the southern wall. It has survived to a width of 27cm and a thickness of 32cm. Three brick courses have survived and they are arranged one above the other in a step manner. It should be mentioned that similar construction method was noticed at the Satavahana site of Siddhapur in Solapur district.

The fallen debris of the structure consists of roof tiles, brick bats and pottery. Outside the structure immediately to its north is located a fire place, roughly squarish in shape with rounded corners. It is a shallow pit (10cm deep) measuring 60 x 60cm. the edges of the pit are made of brick bats plastered with clay. The smooth sides and bottom are burnt black in colour. It could have been used for roasting meat.

The Index trench (F14) was excavated to a depth of 9.25 m. The natural soil is not yet reached. Layers (16) and (17) excavated beneath the Satavahana structure levels are loose in composition and contain brick bats; the only difference is in their colour. Layer (16) is light brown in color and layer (17) is slightly dark. These layers

most probably belong to the Pre-Satavahana levels as the pottery found in them is much finer compared to the typical Satavahana pottery.

On the basis of ceramic assemblages and the structural remains, the Satavahana level can be divided into two phases; Early (100 BCE- 100 CE) – (characterised by the presence of huge structures of fine burnt bricks, fine pottery, evidence for regional and international contacts) and Later phase (100 CE- 200 CE) – (characterised by economic decline represented by their flimsy mud structures and coarse pottery).

The excavations have yielded from the Satavahana levels numerous glass beads and bangles, shell beads and bangles, terracotta human and animal figurines, arecanut-shaped beads, doll-shaped pendants, legged querns, pounders, miscellaneous iron and copper object, etc.

### **23. EXCAVATION AT KHOLAPUR, DISTRICT AMRAVATI**

The site of Kholapur (20° 57' N 77° 31' E) is situated on the right bank of river Purna about 30km west of Amravati, a district place in Vidarbha region of Maharashtra. The ancient habitation is spread over an area of more than hundred acres including present village surrounded by partly intact mounds. A limited excavation was initiated as a part of UGC sponsored project under the direction of B.C. Deotare assisted by research staff – Satish Naik, Gurudas Shete and Srikant Pradhan; research students - Reshama Sawant and Nilesh Jadhav, Astha

Dibyopama and Kanchana Bhaire of the Department of Archaeology, Deccan College, Post-graduate and Research Institute, Pune. The site is well connected by II in order to know the basic stratigraphic sequence of the site.

The excavation is confined to a single trench at both the localities. The trench at locality-I measures 4x4 m of which the southern portion of 2 x 4m was excavated. The virgin black cotton soil in this trench is struck at the level of 2.5m. The red ware, red slipped ware, chocolate or brown ware, black-and-red ware and micaceous ware is the characteristic pottery of this trench. The chocolate ware in some cases turned into black. Micaceous ware is characterized by fabric containing small mica grains. The sherds decorated with moulded designs on red slipped ware and graffiti marks on black-and-red were also noticed. Delux pottery like thin black ware and red polished ware is also found which is identical to Bhon suggestive of Gangatic plain and Gujarat coastal contact. Tiles are found in profuse quantity at all levels of this trench. The broken brick pieces are also recovered along with tiles. The brick structure having wedge-shaped (29 x 25 x 16 x 6cm) and rectangular (45 x 23 x 8cm) bricks in haphazard pattern is found at the depth of 70cm in the south-east corner of this trench. Half of the western part of the trench at the depth of 130 cm is struck with floor laid with rammed bricks and covered with hard compact yellow silt. Terracotta antiquities such as beads (areca nut, round, round and flat collar shaped), *triratna* pendants, drop pendants, a human figurine,

road to Amravati and surrounding nearby towns like Bhatkuli, Daryapur, etc. Owing to the vast nature of the habitation, two trenches were taken initially in locality I and amulet, molded ear studs with intricate design, wheels, discs, rod and animal figurine have been recovered from this trench. The other specimens are shell ring, bangles, carnelian beads and metal fragments of iron, copper and lead are common throughout the levels of the trench.

Another trench measuring 3 x 3m at the highest point of mound 1 of Locality-II was laid with a view to have a fair idea of stratigraphic sequence. The total thickness of habitation deposit at this mound is around 3.5m. The upper one meter deposit is identical to the above described trench of Locality-I in terms of antiquity recovery and nature of deposit like brick, tile pieces, etc. This one meter deposit is separated from lower levels by a uniform black-brown layer (around 10cm thick) of organic rich material through out the trench and most probably spread all over the mound. Below the lower level of black-brown organic rich layer, two pieces of jet black Northern Black Polished (NBP) ware and Punch Marked coin of locally issued type with the symbol of elephant (in middle), wheel, tree in railing, another unidentified animal and triangle headed standard flanked by tourine symbol (on four corners) on obverse and flat on the reverse were recovered. Tiles and bricks are totally absent throughout the lower levels of above described black-brown layer. The other antiquities in lower levels up to bottom of virgin soil are terracotta discs, gamesman, drop pendants, weight and beads, carnelian



beads, iron and copper fragments and ear stud of black glass (obsidian?).

The deposit of Locality-I and upper one meter deposit of Locality-II can be placed to c. 3<sup>rd</sup> century to c. 1<sup>st</sup> century BCE (Pre-Satavahana phase) on the basis of identical material culture from Bhon, the site around 90 km west of Kholapur in downstream of the Purna river. The bricks and tiles, black ware imported from Gangatic valley, un-inscribed die-struck coins and moulded terracotta antiquity are identical characteristic feature of this period. These characteristic features of Pre-Satavahana period are totally missing in lower 2.5m deposit of Locality-II thereby confirming this lower deposit most probably belongs to the Mauryan and Iron Age. The initial tentative observations based on the recovery of antiquities and stratigraphic sequence from both the trenches suggests that the site was occupied from c. 6<sup>th</sup> - 5<sup>th</sup> century BCE and continued up to 1<sup>st</sup> century BCE. Extent wise this seems to be one of the largest Early Historic settlement site in central India in general and Vidarbha in particular.

### **25. EXPLORATIONS IN THE RIVER BHIMA AND ITS TRIBUTARIES IN DISTRICTS PUNE, SATARA AND SOLAPUR**

Sushama Deo along with Sheila Mishra, P.P. Joglekar and Arati Deshpande-Mujherjee carried out explorations in an unnamed small tributary of river Nira in Satara district.

While investigating the Nira and its tributaries for understanding Quaternary

environment near the habitation site of Shirwal which was earlier reported (Joglekar et al. 2004) microliths along with laterite pellets were found. The site is located on 8 m thick quaternary deposit. The entire 8 m thick exposed section of the gravel shows that the stream was ephemeral during the initial phase and became perennial to semi-perennial with relatively deeper water level and again turned shallow and short lived in the upper part. At present these changes in hydrological conditions of the stream can not be time bracketed due to lack of any material useful for absolute dating, though tentatively it can be placed in the late Pleistocene. Stabilization of the gravel fill terrace must have taken place sometime during the Early Holocene (definitely before 2500 B.P. as the Early Historic habitation has taken place on the stabilized surface).

The Quaternary sections which were reported earlier (2005-06) were revisited and also examined the newly exposed sections at Khavaspur, Dahiwadi, Mhaswad. Compact yellow-silt was observed in many sections (especially in dug wells) which is typical of river Man alluvium and soil samples were collected for further work. Field work was carried out in the adjoining basin of River Krishna in Satara District or comparative study. At Pandharwadi near Bavdhan, Wai Medieval pot-sherds were found from the field which is on the bank of Bavdhan nala a small tributary of the river Krishna. At Lohare few microliths were collected from the field.

### **26. PALAEONTOLOGICAL EXPLORATIONS IN THE MANJRA VALLEY, DISTRICT LATUR**

The fossil site of Harwadi (18° 27.409' N; 76° 35.833'E) is located 14km north of the city of Latur on the left bank of river Manjra, Taluk Renapur, District Latur. A large number of well preserved fossilized remains of several large mammalian taxa have been discovered in the ancient alluvial deposits along the left bank of the Manjra. A wide spectrum of fauna namely tiger, rhinoceros, horse, elephants, hippopotamus, deer, ox, buffaloes, black buck, horse, turtle and a large number of gastropods have emerged as a single unit fauna from the bone bed, representing one of the best fossil concentrations (in terms of species diversity) in Peninsular India. C14 dates of 22k, 26ka and 34ka on molluscan shells, litho-stratigraphy and animal species found assign the deposits to the Late Pleistocene period with time range of about 50ka.

As the site will be submerged permanently under the dam by the middle of next year, salvage work was undertaken in the field season of 2007-08. All the geo-coordinates were re-examined using GPS and entire fossil bone bed was mapped for the purpose of GIS mapping. This primarily aims at multi-layered documentation to understand the dynamics of fluvial dispersal and formation of a fossil record. A few complete bones and teeth of horse, cattle, elephant, deer and a molluscan assemblage were collected *insitu* from Harwadi. Stratigraphical integrity of fossils has been the focus of field taphonomy and a set of parameters regarding the taphonomic and geological data sheets were prepared for understanding the formation of the bone bed. Visits were also made to Tadola and

Wangdari to re-look at the exposed Quaternary formations and a few fossils were also collected from these two already known sites from the upstreams of the Manjra valley. A visit to the vicinity of Osmanabad was also undertaken to look for the evidence of prehistoric presence of early man. The present survey and select exposure of sections have provided us with a good number of sedimentological, molluscan and fossil sampling that will be subject to extensive geochemical and sedimentological analyses. Following stratigraphical succession appears to be confined only to the spread of a over 350 meters on the left bank of Manjra, which was re-examined with a view to designate fossil association to litho units.

Black Cotton Soil 0-1m

Non-calcareous dark brown sandy silt 1-3m

Fissured clay 3-5m

Calcareous yellowish brown sandy silt 5-6m

Cemented sandy pebbly gravel (rich fossil horizon) 6-9m

Cross-bedded loose sandy pebbly unit 9-10m

Palaeocene-Cretaceous Deccan Trap 10m---

In the light of many poignant questions that, i) what controlled the animal movements in the region, ii.) why are all the skeletal elements accumulated in a single locale that stands as the only *insitu* occurrence in the entire Manjra valley and lastly iii.) How many depositional events or

a single event does this assemblage represent (time averaging)? Interesting picture has begun to emerge over the past five year's field work and lab investigations, which will help in addressing these issues in future. Hence, it is necessary that another extensive field investigation undertaken during 2008-2009, that may turn out to be perhaps the last one before the submergence.

### **27. EXCAVATION AT MORGAON, DISTRICT PUNE**

The excavation of the Palaeolithic (acheulian and microlithic) site of Morgaon (15° 17' N; 74°18' E), District Pune, Maharashtra was jointly directed by Sheila Mishra and Sushama Deo of the Department of Archaeology, Deccan College, Pune. The objective of the excavation was to understand the stratigraphic relationships and mapping of geological units at Morgaon and to further clarify the relationship between the tephra and artefact horizon. Tephra is exposed in the second nala close to the river while artefacts were excavated from sediments exposed in the first nala, around half a km from the river. The artefact horizon overlies and underlies black fissured clay in the first nala which is the unit found overlying the tephra where the tephra occurs, wherein it is considered that the artefact horizon overlies the tephra. In this field season, in the second nala an exposure was located where a thin tephra horizon is seen with the artefact bearing gravel below it. It was therefore decided to excavate a trench to further confirm the association.

The trench exposed the tephra within the black fissured clay horizon. The black fissured clay above the tephra shows development of calcrete nodules and these nodules have migrated by soil processes to the horizon just above the tephra, so that the horizon above the tephra almost resembles a calcrete gravel. No tephra "re-working" was seen above the tephra horizon. Below the tephra layer, however it was interesting to observe, while digging, that lumps and traces of tephra continued to occur, right upto bedrock which was found around a metre below the tephra. In the cleaned section it could be observed that the tephra has been transported to lower horizons by bioturbation. Tubes filled with tephra were seen from the bedrock upwards. A second series of bioturbation features were seen in burrows below the tephra horizon. The gravel exposed on bedrock in the nala did not continue into the section, but interestingly enough some pebbles from this gravel were found on bedrock below the black fissured clay which was the tephra horizon. This indicates that the gravel underwent a phase of erosion before the deposition of the black fissured clay. This gravel is the cobbly pebbly gravel which also contains lateritic pebbles. This gravel, then, is shown here to pre-date the tephra. This gravel is considered to be the oldest unit and artefacts associated with it show abrasion similar to the pebbles within it. This unit was exposed during the excavations (2002-2004) when 19 artefacts were recovered from it. No tools were now recovered from the gravel itself although 3 artefacts were found eroding from the nala deposits. However these artefacts were not



abraded and resembled in condition the artefacts from the uppermost gravel of the earlier excavation.

As the objective of establishing the stratigraphic relationship of the tephra to the tool bearing horizon was still incomplete after the first trench, a second trench was excavated around 10 m away, where the tephra horizon was not visible. In this the tephra horizon was not present, but the underlying bioturbated horizon with tephra was found. This showed that the tephra had been present, but the horizon has been eroded away. Below the bioturbated horizon of the tephra, gravel was found. This gravel has a “reddish” patina and is the horizon of a large number of well made finished cleavers which were previously collected from this nala, including this exposure itself. This gravel directly rests on bedrock. In this trench the horizon below the tephra was not black fissured clay but the pinkish/yellowish compact silt, which is considered to be the second oldest horizon around Morgoan. The second trench therefore established not only that the earliest gravel is pre-tephra, but that even the later Acheulian gravel is also pre-tephra. Unfortunately no attempts to date the tephra have been successful so far: instead, it is useful in showing that the tephra cannot belong to the Youngest Toba eruption, but must belong to an older eruption. Palaeomagnetic studies (Sangode et al 2007) confirm this as they show that the fissured clays associated with the tephra are of the Matuyama period so the tephra must be

either OTT (Oldest Toba Tephra) or HDT (Harangaol Dactite Tuff). While the OTT is just slightly older than the Bruhnes-Matuyama boundary, the HDT has been dated in ODP 758 core in the Indian Ocean to 1.2 myr.

## MEGHALAYA

### 28. EXPLORATION IN UMIAM RIVER VALLEY, DISTRICT KHASHI HILLS, MEGHALAYA

Prehistory Branch of the Survey carried out exploration work in the Umiam River Valley, district Khasi Hills, during the session under this direction of D. Bhengra, assisted by Rajeev Dwivedi, Gajanan Katade, Anil Kumar, K.M. Girhe, R.K. Dwivedi, P.L. Janabandhu and P.S. Pashine. Extensive exploration in the Umiam River Valley yielded two palaeolithic sites.

## SIKKIM

### 29. EXPLORATIONS IN SOUTH AND WEST SIKKIM DISTRICTS

In continuation with previous year's work Prehistory Branch of the Survey undertook exploration in South and West Sikkim districts of the State during the session 2007-08 under the direction of D Bhengra, assisted by Rajeev Dwivedi, Gajanan Katade, Anil Kumar, K.M. Girhe, R.K. Dwivedi, N.K. Nikje and P.S. Pashine. Exploration yielded two sites with neolithic tools, details of which are as under:

## EXPLORATIONS AND EXCAVATIONS

<i>Sl. No.</i>	<i>Site</i>	<i>District</i>	<i>Nature of remains</i>
1	Soshing (Kyosing) (27°16'; 88° 23')	South Sikkim	Neolithic celt
2	Gezing (27°17'; 88° 17')	West Sikkim	Neolithic celt

### ORISSA

#### 30. EXCAVATION AT SISUPALGARH, DISTRICT KHURDA

In the fourth season of the excavation, two localities were chosen for investigation. One of the area for investigation was on the northern part of the site on the exterior part of the rampart wall. The trench was laid near the area of the 2007 excavations. Another area of investigation was on the central part of the site where thirteen monolithic laterite standing pillar were standing on a slightly elevated mound. At this location on the mound, three independent trenches were opened. The research work is a joint venture directed by Rabindra K. Mohanty of the Department of Archaeology, Deccan College Pune and Monica L. Smith of the Cotsen Institute of Archaeology at the University of California, Los Angeles (USA) with the cooperation from Archaeological Survey of India. The purpose of the excavation in this area was to examine the possibility of extent of the early occupation beyond the rampart; to look for datable material from the lower levels to understand the beginning and growth of the city; to unravel the associated architectural remains to which the pillars belong; and to find out the date, purpose and nature of this unique architecture and its relationship with

the neighbouring domestic architecture.

In continuation to the last season's work on the northern rampart, the trench was laid on the northern (exterior) face of the rampart measuring 2 x 4m. After 4.7m of excavation in this area, the lower trench walls became unstable and water was seen coming into the bottom of the trench as was the case in the previous season. At this juncture the excavation was abandoned. Pottery continued to be found even in the lowermost strata of this excavation, including fragments of the type known as "knobbed ware" towards the bottom of the sequence. Probably there are some more occupational deposit below the abandoned level.

In the central pillar area, the excavations consisted of three separate trenches. In the area of the standing pillars, several long trenches were laid across the architectural features to examine the layout and configuration of the monumental architecture. The remains of pillar bases, fallen pillars and fragments representing 18 previously-unknown pillars were exposed. The configuration of the structure appears to include a huge monumental architecture spread in a large area. There are many more pillar and pillar bases which were not exposed and the area. The configuration of these pillars for the present suggest a long entryway of paired monumental pillars of

72-74 centimeter diameter. On either side there is a pillared bay or long pillared corridor. On the western side of these rows of pillars a second, related structure was seen consisting of pillars measuring 60-62 centimeters in diameter. These pillars were surrounded by a curved wall that suggested a circular or apsidal structure of at least two structural/building phases.

Two other trenches in the pillar area were placed to investigate elevated areas on the part of the mound away from the pillars. One of these trenches located in the centre of the mound contained the remains of three square rooms made of laterite blocks. The rooms had interior diameters measuring 2.1 x 2.6m, 2.35 x 2.45m, and 2.35 x 2.5m. One of the rooms was excavated completely, revealing up to seven courses of laterite blocks. Below these blocks were alternating thin layers of grey clay and laterite gravel. At 50 cm below the bottom of the laterite walls was found a clutter of bricks suggestive of a lower structural layer. The other trench in the western portion of the mound revealed a large structure of laterite blocks consisting of multiple small rectangular rooms, some of which measured

as small as 0.8 x 3.05m. These laterite structures were made of one or two courses and except for the small room size had a great similarity to habitation architecture elsewhere in the site. At 1.95m below modern ground surface another level of architecture consisting of bricks was recovered. However, in this area the water table was quickly met with although cultural layers continued downwards.

The finds from the pillar area consisted mostly of much abraded pottery and some iron nails, with very little diversity in pottery shapes compared to the habitation areas. There were virtually no other antiquities found in this area, supporting the interpretation of this pillar zone as a very special-purpose use zone.

## PUNJAB

### 31. EXPLORATIONS IN DISTRICT FIROZPUR

65 villages were explored in Tehsil Abohar and Fazilka of District Firozpur, and 18 villages yielded remains of antiquarian importance.

<i>Sl. No.</i>	<i>Name of village</i>	<i>Tehsil</i>	<i>Nature of Antiquarian Remains / Sites</i>
1.	Azimgarh 30° 07'N; 74° 12'E	Abohar	<i>Chhatri</i> (British Period)
2.	Kandwala Amarkot 30° 03'N; 74° 10'E	Abohar	Mosque (British Period)
3.	Khuyansarwar 30° 07'N; 74° 04'E	Abohar	Mosque (British Period)
4.	Gidranwali 30° 05'N; 74° 00'E	Abohar	Mosque (British Period)
5	Haripura 30° 08'N; 74° 02'E	Abohar	Mound (Historical Period)



## EXPLORATIONS AND EXCAVATIONS

6	Danewala Satkosi 30° 10'N; 74° 02'E	Abohar	Haveli (British Period)
7	Danger Khera 30° 12'N; 74° 10'E	Abohar	Haveli (British Period)
8	Panjkosī 30° 10'N; 74° 03'E	Abohar	Gateway (British Period)
9	Rohranwali 30° 13'N; 74° 12'E	Abohar	Samadhis (late British Period)
10	Patti Taza 30° 13'N; 74° 14'E	Abohar	Chhatris (late British Period)
11	Kundal 30° 13'N; 74° 17'E	-do-	Haveli (late British Period)
12	Doraha (Banwala 39 Hanwanta) 30° 22'N ; 74° 3'E	Fazilka	Gate (late British Period)
13	Benganwali 30° 21'N; 74° 05'E	-do-	Samadhis (late British Period)
14	Kandwala Hazirkhan 30° 10'N; 74° 13'E	-do-	Mosque (late British Period)
15	Ghillu 30° 15'N; 74° 07'E	-do-	Mosque (late British Period)
16	Jhumianwali 30° 15'N; 74° 12'E	-do-	Samadhis (late British Period)
17	Koharanwali 30° 18'N; 74° 15'E	Fazilka	Mosque (late British Period)
18	Mammukhera (Khatwan) 30° 17'N; 74° 10'E	-do-	Mosque (late British Period)

### TAMIL NADU

#### 32. EXCAVATION, SALUVANKUPPAM, DISTRICT KANCHIPURAM

In continuation of the last season's work, Chennai Circle of the Survey resumed excavation at Saluvankuppam, under the direction of Sathyabhama Badhreenath assisted by K.P.Mohandas, H.Raghavendra and Muthuswamy, with the objective of tracing the extension of the buried structures of the ruined Subramanya temple (Pl. 44A). The present work has revealed, a *balipitha* made of brick plastered with lime on the

northern side and two ring wells with 13 numbers of terracotta rings running to a depth of 2.40 meters on the north-east and north-west corner respectively. On the northern side another terracotta ring well was exposed which has 22 rings running to a depth of 5.5m. On the southern end stone blocks forming a platform, probably an entrance from the southern side was exposed. The earth around the stone spear was removed and a brick platform was exposed and probably on this the spear was placed (Pl. 44B). One copper tripod lamp stand (Pl. 45A) and a ritual lamp (Pl. 45B) were found from the floor level of the

Plate 44



A



B

Saluvankuppam: A; view of exposed structures and B; stone spear on brick platform.





A



B

Saluvankuppam: A; copper tripod and B; copper ritual lamp.



western cloister *mandapa*. Two beads were found while clearing the earth from the cloister *mandapa* on the north eastern side.

**33. EXCAVATION AT DANSBORG FORT  
TARANGAMPADI (TRANQUABAR),  
DISTRICT NAGAPATTINAM**

Archaeological excavation was jointly carried out at Fort Dansborg, Tarangampadi by Chennai Circle of Survey Department of Archaeology, Government of Tamil Nadu and National Museum of Denmark, Denmark. The objective of this joint venture was to locate, identify and verify the vestiges of the old moat with a drawbridge as recorded in some of the old drawing and related archival materials, to understand the original plan of the fort with the moat and to evaluate the reasons for abandoning the moat which was filled up in the subsequent periods in a phased manner.

Before commencing the joint project an “MOU” was signed on 1<sup>st</sup> February, 2008 between the three agencies. The excavation team included K.P. Mohandas from of the Survey T. Subramanian and S.Vasanthi from the Department of Archaeology, Government of Tamil Nadu. Tarangambadi, the town along the east coast of Tamil Nadu in Nagappattinam District is about 35km south – east of Mayiladudurai, 45 km south east of Chidambaram and 32km and 7km north of Nagappattinam and Karikal (Karaikal) towns respectively. Tarangampadi also known as ‘Tranquebar’ is geographically located at 11° 05' N; 79° 50' E. Tarangambadi is situated 15 km south of the celebrated ancient port Kaveripoompattinam (Poombuhar). The

earliest reference to Tarangambadi occurs in a 14<sup>th</sup> century inscription of a later Pandyan King mentioning the place as ‘Sadaganpadi’ in the Masilamani Natha temple at Tarangambadi itself. Tarangambadi was already a commercial port attracting traders from different countries even before the Danish settled here. The Danish East India Company established in Denmark in 1616 by the king, had deputed a Danish Admiral Ove Gedde as its ambassador to India. In 1620 the Danish Admiral arrived at Tarangambadi, and after negotiations with Nayak Raghunatha in Thanjavur a treaty was signed. According to the treaty the Danish had monopoly regarding trade with Europe and were allowed to build a fort at the village of Tarangamadi. Thus the Danish settlement in Tarangambadi came into existence and the Danish East India Company operated their trade through this port. The Danish company constructed a fort called Dansborg and a fortification wall around the town. The Danish settlement in India was transferred to the British East India Company through a treaty signed on 22<sup>nd</sup> February, 1845. Now, the fort is under the protection of Department of Archaeology, Government of Tamil Nadu.

The excavation was limited to the northern side of the fort at the front of the main gate and on the western side (Pl. 46A). The excavation was carried out by laying five trenches, TGI-1-TGI-5 in a north - south alignment (Pl. 46B). The excavation revealed a bridgehead in front of the gate, which no doubt was probably the bridgehead built when the gate was relocated. The bridge is assumed from the excavations to



A



B

Tranquebar: A and B; view of excavation in Dansborg fort.

be of same width as the entrance gate i.e., 6.75m. The bridgehead extended to a distance of 5.30mts from the gate on the northern end of the bridge. The western side of the wall has a slope of 15 degrees and has fine lime plastered surface. An inner moat wall was found 3.25m from the fort wall. It is 60cm wide and built of bricks. The bridgehead and the moat wall appear to have been constructed at the same time as the two walls are bound together (Pl. 47A). The cracks seen in the moat wall is due to the inherent weakness and seepage of water causing damage to the wall. This had resulted in them taking a decision to fill up the moat to safeguard the fort. From a distance of 5.30m i.e., at the end of the bridgehead and extending to a distance of 8.10m from the gate towards south is a brick wall of a later stage. This wall built flush with the bridgehead has the same sloping with only the outer brick laid in mortar without lime plaster. Inside the wall were filled layers of clay mixed with sand as foundation for the brick pavement above. This wall might have been the gap for the drawbridge which was later abandoned and a wall was constructed to connect the bridgehead and the bridge. The probable reason to abandon the use of the drawbridge is the shifting of the warehouse, the church and the Governor's bungalow outside the fort complex.

It is at a distance of 18.50m from the gate that the northern bridgehead is found. Here the western side is well preserved whereas the eastern side is found to be damaged. The width of this bridgehead is same as on the southern side and also the

wall surface is lime plastered and has a slope of 15 degrees. The moat is found to be 13.20m wide. The three bridge pillar basement of 1.9m width each with a gap of 1.40mts between them might have had arched pillars for the bridge as seen through one of the old drawing which matches to this the most (Pl. 47B).

The existence of an ornamental gate on the southern end of the bridge as viewed from one of the old drawings was confirmed through the findings of two stucco fragments from the moat filling on the northern end of the bridgehead. One of the stucco pieces is a belly portion with fish scale design of a mermaid and the other is a piece of the hand rest of an architectural member. Both these pieces are similar to the one depicted in the drawing. The blackish layer running throughout the section might have been the bottom of the moat after 1775 when the moat was half filled up. The layers below are of different character and show that a lot of rubbish materials like building debris have been thrown into the moat for filling it up. Later, the moat was filled up completely and at that time the bridge was fully demolished and the ground leveled up. This step was taken probably to safeguard and protect the fort wall from all sides.

Only a provisional conclusion regarding the cultural traits could be arrived at since the deposits are not of habited material and are only dumped materials thrown into the moat at different periods. The artifacts like the smoking pipes, porcelain wares and glass pieces are basically of Danish origin. There are also





A



B

Tranquebar: A; remains of bridgehead and B; moat wall.

sherds of pottery of local make which was in use for day to day life.

The pot-sherds included red ware, black ware, glazed ware, Chinese porcelain ware and English stone ware. The local wares represented are the red ware and black ware and are mainly pots and jars. The glazed and Chinese porcelain wares include bowls, plates, cups. The English stone ware has thick section used for jars. Glass bottles of green and black colors were also found. The bottom and the neck part of the bottles were in significant numbers. Clay smoking pipes of Danish origin formed the major part of the antiquities found during excavation. In some of the pipes there are letters and symbols engraved on it.

#### **34. EXCAVATION AT SEMBIAN KANDIYUR, MAYILADUTHURAI TALUK, DISTRICT NAGAPATTINAM**

Systematic archaeological excavation at Sembian Kandiur ( $11^{\circ} 06' N$ ;  $79^{\circ} 34' E$ ) situated on the bank of the river Vikrama nadi (Tributary of River Cauvery), was conducted by the Tamil Nadu State Department of Archaeology under the guidance of Sitharam Gurusurthy, assisted by S.Vasanthi, S.Selvaraj and P.Gouthamaputhiran, G.Muthuswamy, and unearthed antiquities pertaining to Megalithic period. Totally four trenches were laid at the potential sites and named as SKR-I to SKR-IV.

In the course of excavation potteries namely black and red ware, black ware, red slipped ware and coarse red ware were collected in good numbers. Big and small

pots, lids and plates were commonly found in the excavation. Thirteen graffiti marks were observed on the pottery collected at Sembian Kandiur. Iron objects viz. nails, knives, hip-hops made of terracotta and stones were also recovered from the trenches. Besides this, eight urns occurring in a row were also exposed during excavation, in Trench No.2. A celt commonly found in the urn burials in Tamil Nadu was also unearthed from Trench No.3.

On the basis of the rich yield of antiquities, it is ascertained that Sembian Kandiur was inhabited by the Iron age people 2000 BCE and, a single cultural habitation was established.

### **UTTAR PRADESH**

#### **35. EXCAVATION AT AHICHCHHATRA, DISTRICT BAREILLY**

The site Ahichchhatra ( $28^{\circ} 22' N$ ;  $79^{\circ} 08' 12'' E$ ) lies between the Ramganga and Ghagan River, 11 km north of Aonla, a tehsil headquarter in district Bareilly. The site is traditionally associated with the story of the great epic Mahabharata when it was believed to be the capital of Northern Panchala. Chinese Traveller Hiuen Tsang visited Ahichchhatra in 7th Century CE and has left behind vivid account of the site. The earlier excavations by Cunningham had resulted in the unearthing of a relic casket in the solid brick wall of the stupa; by Rai Bahadur K.N. Dikshit revealed nine periods of occupation dated from before 3<sup>rd</sup> century BCE to 1100 CE, including two terraced brick temples (Temple 1 and 2) and monastery area and a pair of highly artistic

life size terracotta figures of Ganga and Yamuna; by N.R. Banerjee revealed a cultural sequence from OCP, PGW to medieval period. A small scale excavation in 2003-04 concentrated in two places, one to the west of Temple 2 and the other at the gateway in the north fortification wall.

The present excavation at Ahichchhatra under the direction of D.N. Dimri, assisted by A.K. Tiwari, Bhuvan Vikrama, Arakhita Pradhan, K.B. Sharma, Y.P. Agarwal, O.B. Khobragade, C.B. Singh, Lochan Singh and Prem Singh was carried out with the objectives to cross check the result obtained through Ground Penetrating Radar System carried out earlier in collaboration with IIT, Kanpur under the MoU signed between ASI and IIT, Kanpur; and to reveal the cultural sequence and extension of the settlement outside the fortification wall in the western side.

The excavation was started at the eastern most extension of the mound ACT-V and later on extended to ACT-IV, ACT-VA and ACT-IVA. A total number of 34 trenches have been opened till now. The three trenches excavated on mound ACT-V revealed Kushana deposit followed by Sunga and Mauryan period antiquities. However due to limited area of excavation it was not possible to ascertain regular habitational deposit of the Sunga and Mauryan periods. The total cultural deposit in this mound is 3.5 metres of which approx 2 metres belong to the Kushana period. The most significant find from this mound was the evidence of a large number of conical crucibles, vitrified at various degrees; at times copper ingots attached to the crucibles

were also found (Pl. 48-49A). Evidence of broken furnace and slag material are also found. In another trench, large number of earthen pots along with few terracotta dabbers both broken and intact was encountered. Presence of pre-firing deformed and out of shape pots are also significant. The above mentioned artifacts suggest that this particular area was used as a workshop both for copper as well as pottery manufacturing during the Kushana period. A few large pits cut into the natural soil in various phases were also noticed during the excavation. Generally these pits contained ashy deposit, however, some antiquities including semi precious stone beads, bone points, terracotta figurines; stone objects etc were also found from pits. This further suggests that this area was used as workshop and these pits were used for dumping of wastage.

The mound ACT-VA measuring about 30 m x 30 m lying in between ACT-IV and ACT-V was subjected to excavation to confirm the result of the GPR survey carried out by IIT, Kanpur and also to know the nature of deposit and settlement. The preliminary study of GPR Survey carried out by IIT, Kanpur indicates that there are structures all around the mound with a depression in the centre. However, the excavation carried out so far could not substantiate the result of GPR survey and require further investigations. The excavation in this mound revealed a cultural deposit of about 4.15m. The surface study of the mound indicates that the ancient structural material was robbed at several places by villagers. Total five trenches were excavated in this area revealed several



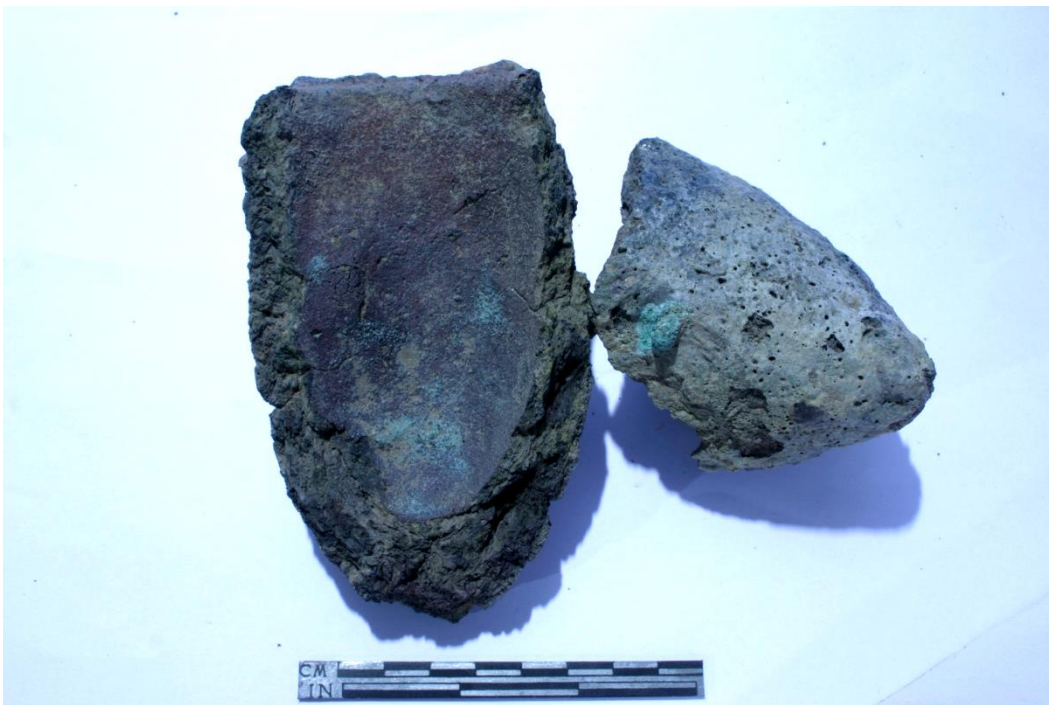
structural phases of probably later Gupta or Post Gupta period. The exposed structures include a massive brick structure with offset and steps on the north side (Pl. 49B). The northern arm of the structure is partially exposed. Large number of moulded bricks and brick tile fragments are found from the debris lying near the steps. The size of the moulded bricks was 36 x 20 x 5cm while brick tiles measures 23.5 x 20 x 2cm. Beside, a channel like structure made of 40.5 x 24 x 4.5cm sized brick measuring 3m length and 1.09m width with a gap of 25cm in between is also exposed partially. Moulded bricks are also used here. The antiquities discovered from the mound include fragments scrubber, animal figurine, sling balls, bangle, hopscotch, toy cart wheel in TC, fragments of stone pestle, bead of semi-precious stones ie. carnelian, agate, and beads of paste and glass. In addition to this fragmentary terracotta plaque of Mahisamardini Durga and terracotta plaque of female figurine were discovered. Noteworthy finding from this mound is a copper coin of Panchala king Achyut along with few other coins. A few sherds of red polished ware are found to the north of the massive brick structure.

Mound ACT-IV is one of the highest mounds in this area having cultural deposit of about 5m. The excavation in this area revealed structural remains of two periods one of later Gupta and other to Post Gupta. However, the large quantity of carved bricks of Gupta period found from the collapsed debris suggest that some additions and alterations, repairs were made to the classical Gupta structure during the later

Gupta and post-Gupta times. Excavations revealed several structural activities of both the periods (Pls. 50-51A). Mention may be made of two brick structures one measuring 13 x 9m and the other 7 x 5m constructed during the later Gupta period. However, some addition and alteration to these structures were made during the Post Gupta period. These structures were made of various size bricks i.e. 40 x 25 x 7 or 6cm and pointing was with mud mortar. Another important finding from the mound is the discovery of a well cut into the natural soil through the Kushana deposit (Pl. 51B). The well with inner diameter of 1.1 m and outer diameter of 1.6m is made of wedge shaped bricks (25 x 20cm & 15 x 6.7cm) with mud mortar. 62 bricks courses of the well are exposed so far. In the periphery of the mound below the deposit of rolled down debris, regular levels of about 2m thick Kushana deposit was encountered. Here also due to limited area of excavation, no proper plan of Kushana structures could be traced. Several pits dug into natural soil sealed by Kushana deposit filled with ash were encountered. Most of the structures at the mound have been heavily robbed and at many places they are represented only by the ghost evidences, however, a plan of a structural complex is discernible. A variety of ceramics have been recovered from the excavations at the mound (Pl. 52A). The other noteworthy antiquities from the mound include a terracotta human head from ACT-IV (Pl. 52B) and semi-precious stones like carnelian, agate, quartz beads (Pl. 53A) and beads of fiancé and paste (Pl. 53B).



A



B

Ahichchatra: A; deposit of crucibles and waste and B; conical based crucibles from ACT-V.



Plate 49



A



B

Ahichchatra: A; copper sticking to crucibles and B; massive brick structure on mound ACT-VA.





A



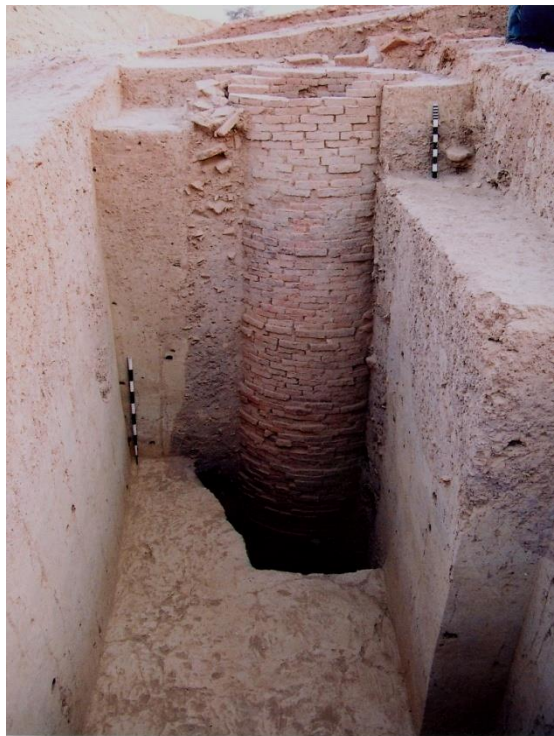
B

Ahichchatra: A; view of brick structure, ACT-IV and B; general view of a large structure complex on mound ACT-IV.

Plate 51



A



B

Ahichchatra: A; view of a cell and B; exposed well in ACT-IV.





A



B

Ahichchatra: A; earthen pots and B; terracotta head from ACT-IV.



Plate 53



A



B

Ahichchatra: A; beads of semi-precious stone and B; beads made of faience and paste.

Immediately outside the west gate of the fortified city, a small mound (ACT-IVA) rising to a height of 3 m from the surrounding fields (Pl. 54A) was also excavated. Six trenches in this were opened. The excavation revealed a rectangular platform of square bricks (brick size: 35 x 35cm) surrounded by brick paving. Three chambers measuring 5 x 6m were exposed. The extant portion of the platform was overlaid with collapsed brick structure probably of a temple (Pl. 54B). The moulded and carved bricks used for construction suggests that the structure was built during later Gupta period. During the course of excavation several sandstone chips of human body like faces/heads have been found. However, negligible amount of potsherds have been noticed from this area. Due to limited area of the excavation the detail of the extension of the structure could not be traced.

### **36. EXPLORATIONS IN DISTRICT GORAKHPUR**

Ambika Prasad Singh, Regional Archaeological Officer, Gorakhpur, of the UP State Archaeology Deptt., Govt, of Uttar Pradesh, undertook exploration in and around Gorakhpur district.

During the course of exploration Sarai was located at mohalla Basantpur in Gorakhpur City popularly known as Basantpur Sarai. The inn (C. 18th-19th Cent. AD.) is enclosed with high enclosure walls having bastions on its four corners. A mosque as well as cells and verandas are built in the inner part of the Sarai. The massive main gate, decorated with

denticulated arches, adds to the beauty of the inn (Sarai).

A mound known as Bhuladih, was explored about Six Km to the north of Babhanan Railway Station, in district of Basti. The potsherds collected from the mound mainly are of red ware belonging to Maurya, Sunga, Kusana, Gupta and medieval period.

A Siva temple, located at village Bhasma, about 22km east of Gorakhpur city, is note worthy. The east facing temple, erected in C. 17th-18th century AD, consists of a Sivalingam in its sanctum, a part of marble images of Ganesa, Parvati and Kartikeya. An Arbi (7) inscription is fixed in the south wall of the sanctum. The shoulders of the sanctum wall is carved with the designs of leaves and flowers, etc.

A mound, known as Taldih, was explored at village Bagharai, six km west of Koriram and 36km from Gorakhpur. The ceramic assemblage of the mound, is represented mainly by the red ware belonging to sunga, Kusana, Gupta and medieval period.

Remains of medieval sculptures, and a temple (modern) was found at village Gorsaira, three km North east of Jhangahan and 36km from Gorakhpur. Parts of Parikhanda and a standing image of sadasiva (?) adorned with Jatajuta, necklace Karnakundela and anklets, etc. are very artistic in view of Pala art.

### **37. EXCAVATION AT BULANDKHER (SAQIPUR), GAUTAM BUDDHA NAGAR**

The Department of Ancient Indian

Plate 54



A



B

Ahichchatra: A; mound Act-14 and B; collapsed/slumped wall with carved brick frieze *in situ*.



## EXPLORATIONS AND EXCAVATIONS

History, Culture & Archaeology, Banaras Hind Universtiy conducted a limited excavation at Bulandkhera (Saqipur), Gautam Buddha Nagar under the direction of Ravindra Nath Singh with assistance from Ashok Kumar Singh, Santosh Kumar Singh, Harindra Prasad Ram, Arun Kumar Pandey, Barun Kumar Sinha, Ram Badan, Shiva Kumar and Heera Lal of the Department.

The site of Bulandkhera (29°, 00' 206" N; 77° 29' 057" E) is situated between Dadri-Surajpur on Noida road at a distance of about 1.5km from the ancient site Gulistanpur from where Harappan and Painted Grey Ware has been reported earlier (Pl. 55). The ancient mound of Bulandkhera is situated on an old dried channel of water and divided in two parts. Ten trenches, measuring 3 x 3m were laid in order to revealed sequence in this region.

The excavation revealed sherds of Red ware with painting with horizontal band in black colour, Ochre Coloured Pottery, Painted Grey Ware, Black and Red Ware, Black slipped ware and Grey Ware. Excavation also revealed fine quality of Painted Grey Ware (with paintings) and Black and Red Ware. A solitary example of bone point and a dabber were also found (Fig. 6 & Pls. 56-58).

BSW=Black slipped ware; B&RW= Black & red ware;  
NBPW= Northern black polished ware, RW= Red 'ware

### Chirgaon Development Block

<i>District</i>	<i>Village</i>	<i>Cultural Assemblage</i>
<b>Jhansi</b>	Amara	Ancient mound with BSW, B&RW, RW and iron implement and a late medieval Garhi.

Although, the mound is full of different varieties of potteries but habitational deposits have been washed away hence no stratified deposit could be recovered. However, the potteries were recovered mostly form small pits just below the humus.

### 38. EXPLORATIONS OF DEVELOPMENT BLOCK CHIRGAON OF JHANSI DISTRICT

Regional Archaeological Unit, Jhansi of U.P.State Archaeology Department undertook village to village exploration of Development Block Chirgaon of Jhansi district (Uttar Pradesh).

Dr. Suresh Kumar Dubey, Assistant Archaeological Officer, Regional Archaeological Unit ( U.P, State Archaeology) Jhansi explored **102** villages and their hamlets as well as valleys of the river Berwa, Pakunj and its tributaries pertaining to the above mentioned Development Block under the 'direction of Dr.Rakesh Tewari, Director, U.P.State Archaeological Department. The exploration revealed **Pre-historic site, mounds, temples, stone sculptures, Garhi, Havalie stepped well** and other archaeological remains from the following villages:

Aopara	Fragmentary pieces of stone sculptures of medieval period and a two hundred old brick built Hanuman temple.
Bakuan Kurd	Fragmentary pieces of stone sculpture of medieval period.
Bangara	Stone image of Hanuman a Sati-patta and fragmentary pieces of stone sculpture of medieval period.
Bangari	Brick temple of Ram-Janaki and stone sculpture of a Hanuman of late medieval period.
Baral	Remains of stone temple and three Siva-ling of medieval period.
Barei	Fragmentary pieces of stone sculpture of medieval period, ruins of a Garhi, stone image of Anjanimata and Veer-patt.
Basanpara	A mound with RW.
Bavari	Stone image of Hanuman, Sati-patt and Argha of late medieval period
Bharatpura	A mound with R W, fragmentary pieces of stone sculptures and Shiva-ling of medieval period".
Bervai	Mutilated image of Hanuman and Ganesa of medieval period.
Bithari	Fragmentary pieces of stone. sculptures and Siva-ling of medieval period ; two <i>Sati-patt</i> and image of Hanuman of late medieval period.
Chandavari	A mound with RW, remains of stone temples of medieval period, fragmentary pieces of stone sculptures and a <i>Sati-patt</i> .
Chelara	Stone images- of <i>Nr-Singh Vishnu</i> , Ganesa, female deity of medieval period and images of Hanuman and Anjanimata of late medieval period.
Chhirona	Remains of stone temple and image of Hanuman of medieval period.
Chirgaon	Thirty mutilated stone sculptures in a personal collection of medieval period, ruins of a <i>garhi</i> and <i>Ram-Janaki</i> temples of late medieval period.
Dabra buzurg	Fragmentary pieces of stone sculptures of medieval period stone image of Hanuman and Badvali of late medieval period.

## EXPLORATIONS AND EXCAVATIONS

Devara	A mound with RW.
Dedar	Mutilated stone sculpture of Ravananugrah, Mahishdsurmardini, remains of brick based stone temple of medieval period.
Deval	A mutilated stone image of serpent-God, rock cut image of Hanuman, Anjanimata and fragmentary pieces of stone sculptures of medieval period, a mound with red ware and a stone sculpture of Hanuman.
Dhabara	Fragmentary pieces of stone sculptures of medieval period a late medieval Bavali.
Dhirona	Remains of stone temple, fragmentary pieces of sculptures of medieval period, stone image of Hanuman.
Dhwani	A mound with RW, brick temple and a Siva-ling of late medieval period.
Dineri	Stone sculpture of Hanuman of late medieval period.
Gadhuka	Temple, four <i>Sati-patta</i> , a <i>Veer-patta</i> and four Kolhus of late medieval period.
Ghusgawan	A mound with B&RW, BSW, RW, brick temple of late medieval period.
Girari Khera	A mound with RW, stone image of Hanuman, Sati-patt, and two Kolhu of late medieval periods.
Itwa	Remains of stone temple and sculpture of Hanuman of medieval period.
Kalothara	A mound with RW.
Kalyanpura	A mound with R W, stone sculpture of Hanuman and Anjanimatii of late medieval period.
Kharesar	Microlithic tools remains of stone temple and Fragmentary pieces of stone sculptures of medieval period, an image of Hanuman and three <i>Sati-patt</i> of late medieval period.
Khillavari	A Bavali of late medieval period.
Khiriyaaram	A mound with B&RW, BSW, NBPW, RW and semi-fossilized bone with cut- marks and iron -slag.
Kukargaon	A mound with BSW, B&RW, RW, remains of stone temple, sculpture of Vishnu of medieval period, images of Anjanimata,



	Hanuman, <i>Veer-patt</i> , <i>Sati-patt</i> , <i>Panch Siva-ling</i> and iron-slag in large quantity.
Ludhiai	Stone sculpture of Hanuman, fragmentary pieces of stone sculptures of medieval period and a <i>Sati-patt</i> and <i>Kolhu</i> of late medieval period.
Luhargaon	A mound with R Wand remains of stone temple with images of Hanuman, Anjanimata and Serpent goddess; adhithan and other remains granite temple of medieval period.
Maheba	A mound with RW, stone image of Anjanimata, <i>Sati-patt</i> and two <i>Kolhu</i> , late medieval period.
Mavar	Stone image of Hanuman of medieval period.
Mora Kalan	Remains of stone temple of medieval period and a stone sculpture of Hanuman of late medieval period.
Murei	Stone image of <i>Anjanimata</i> , <i>Ganesa</i> , <i>Nandi</i> , <i>Parvati</i> and <i>Panch-Siva ling</i> in late medieval period.
Nandpura	Stone image of Vishnu riding on horsed faced Garun, Siva-ling, remaining stone temple and fragmentary piece stone sculpture of medieval period <i>Sati-patt</i> and four <i>Kolhus</i> of medieval period.
Nari	Fragmentary pieces of stone sculpture and Siva-ling of medieval period stone image of Anjanimata Hanuman of late medieval period.
Pachar	Stone temple and fragmentary pie stone sculptures of medieval period
Pacchargarh	A mound with RW and stone sculpture of Hanuman of late medieval period.
Pahari Buzurg	Mutilated stone image and a <i>Siva-ling</i> of medieval period.
Pahari Khurd	Stone sculpture of Hanuman of medieval period.
Patti Kumhara	Fragmentary pieces of stone sculptures of medieval period and an image of Anjanimata of late medieval period.
Pavai	Remains of Stone temple and an image of Hanuman of medieval period.
Phool Khiria	Stone Bavali of medieval period.

## EXPLORATIONS AND EXCAVATIONS

Pipara	Remains of stone temple, images of Mahishasurmardini, Hanuman, Anjanimata and seven Kolhu of medieval period.
Rampura	Stone sculpture of Vishnu of medieval period, ruins of a Garhi, remains of <i>Haveli</i> and a brick built grand temple of <i>Ram-Janki</i> containing wall paintings related with <i>Pauranic</i> stories .
Ramnagar	Middle Paleolithic tools.
Saigaon	A mound with RW.
Sarol	Fragmentary pieces of stone sculptures of medieval period three late medieval <i>Kolhu</i> and a <i>Sati-patta</i> .
Sikari	A mound with RW, fragment of stone sculptures of medieval stone image of Hanuman and sculpture of late medieval period.
Simathari	Remains of stone temple of medieval period, three stone Sati-patt medieval period.
Sitaora	A mound with RW and a stone sculpture of Mahishasurmardhini of medieval period,
Ujjain	Ancient mound with BSW remains of stone temple, sculpture Vishnu, Hanuman, Durga, A , fragmentary pieces of stone and <i>veer-patt</i> of medieval period

### 39. BRIEF REPORT OF THE EXCAVATION AT JAJMAU, KANPUR DISTRICT

The Archaeological excavation was conducted at Jajmau, District Kanpur (U.P.) by Shri Ramvinay on behalf of the U.P. State Archaeology department under the general direction of Rakesh Tewari. Jajmau is situated on the right bank of river Ganga. The national highway no.2 divides this ancient mound in to two parts. A portion of mound has been removed during the constriction of National Highway. Therefore, excavation of the site was taken up as Salvage operation. The proposed area for excavation was divided in to two parts i.e. location I and location II, with a depression in between.

The following five-fold cultural periods comprising ten habitational layers have been ascertained during the course of excavation.

Period I      Pre N.B.P. W. period represented by black slipped ware, black -and-red ware and Grey ware.

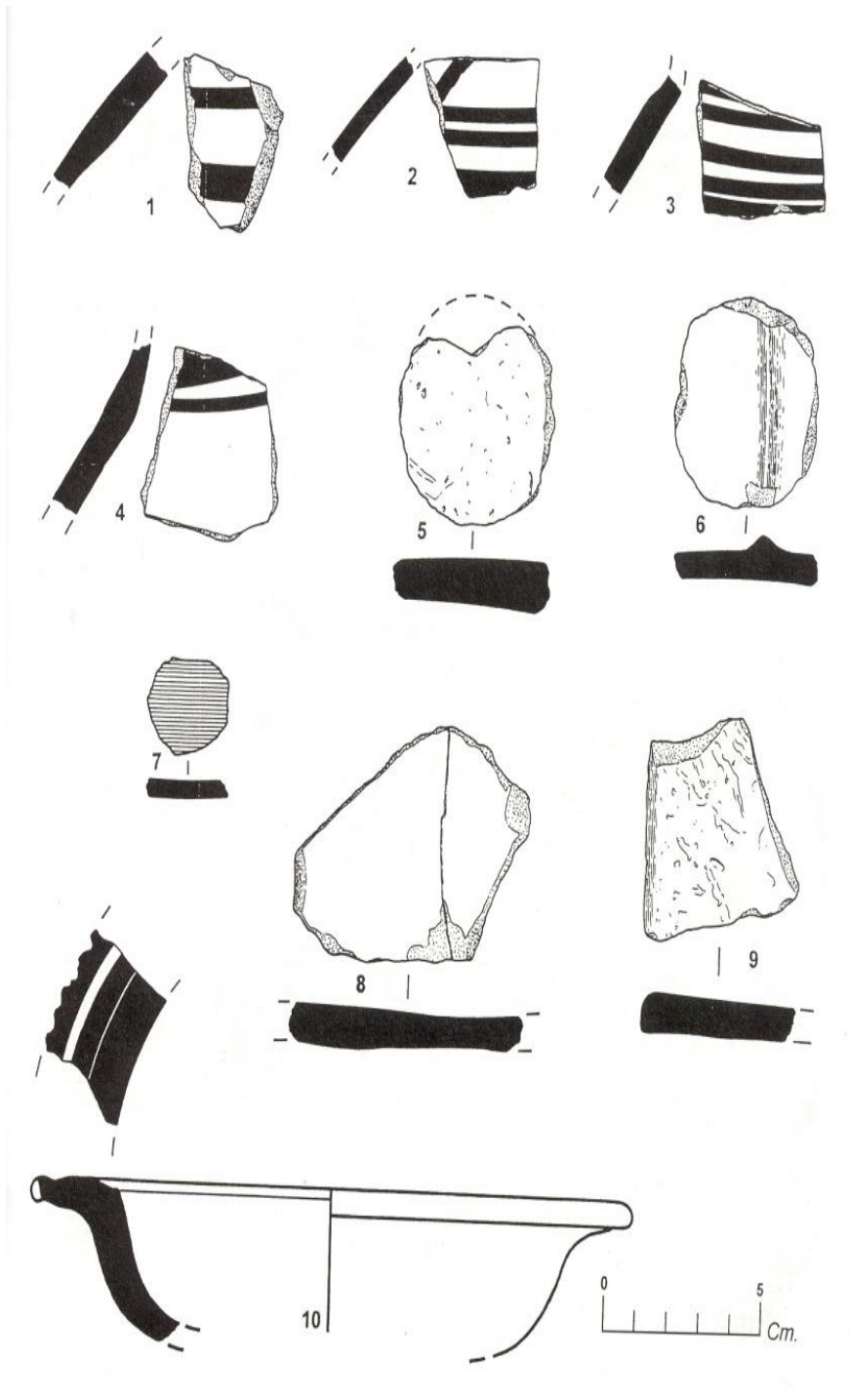
Period II      N.B.P.W. period.

Period III     Sunga and Kushan period.

Period IV     Gupta Period.

Period V      Medieval period.

Fig. 6



5. 1-10 Black-painted red pottery from Buland Khera.

Bulandkhera: potteries recovered during explorations.





A



B

A; Bulandkhera and B; Gulistanpur: general view of mound.

Plate 56



A



B

Bulandkhera: A; general view of excavated trenches and B; PGW potteries recovered during explorations.





A



B

Bulandkhera: A and B; potteries and bone point recovered during excavations.



Plate 58



A



B

Bulandkhera: A and B; potteries recovered during excavations.

**Period I** is characterized with the appearance of black slipped ware with pedestal bowl and disc based bowls, convex sided dishes. Associated ceramic traditions include red ware, black-and red-ware and gray ware. Residential remains were marked in the form of post-holes and clay lumps bearing reed impressions which indicate that the dwelling of this period were made of wattle and daub.

**Period II** is marked with the appearance of N.B.P.W. along with the contemporary red ware, black-and-red ware and gray ware. The brick structures appear in the middle and late phase of this period. The measurements of the bricks are normally 42x24x07cm, 38x23x07cm, 35 x23 x06cm. The post holes were marked at the top surface of the brick structures. The wooden posts fixed in such holes would have supporting super structure. The chambers with mud floor and entrance have also been marked. Apart from the above mentioned findings other noteworthy antiquarian remains include a hoard of punch marked coins kept inside an N.B.P.W. vessel, few bone points, ivory objects, terracotta bangles, etc. have also been recovered.

**Period III** is characterized with the appearance of red ware bowls with in-turned rim, sprinklers, inkpot type lids and high necked jars, some of the pot-sherds bear stamped designs, terracotta human mention amongst other associated finds. The residential remains were in the form of burnt brick structures along with the terracotta tiles. A massive brick structure has been brought to light from the

late phase of Period III which is about 19m long and comprises of 39 courses of burnt bricks. It is suggested that this structure would have been a revetment.

**Period IV** is represented by the presence of red ware pot-sherds comprising water vessels, bowls with straight rim, button knobbed lids, molded terracotta human figurines, iron objects, terracotta bangles and terracotta beads. Residential remains of this period are made of broken bricks or brick bats of the preceding periods.

**Period V** is marked with the appearance of Lakhauri bricks and glazed ceramics containing knife edged bowls of red ware, a structure made up of Lakhauri bricks appear like a street constructed in between the two residential complexes.

## UTTARAKHAND

### 40. EXPLORATIONS IN YAMUNA AND TONS VALLY OF UTTARAKHAND

Syed Jamal Hasan assisted by Madan Singh Chauhan, Shri Manoj Kumar Saxena, Niraj Kumar Verma, Nikita Chandra, and Devdhar Dubey, carried out exploration in Yamuna and Tons Valley of Uttarakhand and brought to light the following sites;

#### 1. TWO NAULLAS AT BHIKIYASEN, JAGESHWAR, DISTRICT ALMORA

There are two *naullas* located in the forest in the Danya-Jageshwar route and about, 4km away from the Jageshwar group of temples. One of them is similar to the *naulla* at Baleshwar, Champawat. The other

one is reconstructed from the old members.

## 2. BURIAL SITE, NEAR VILLAGE LAWADI, DISTRICT DEHRADUN

The site is located (Lat. 30° 45' 44" N and Long. 78° 04' 13" E) on hill slope to the right bank of *Rikhnad gad* a rivulet which empties into the Yamuna river at an elevation of about 1134m from MSL. During agricultural operations 10 -15 coffin like structures with human bones and pots were noticed. Four iron objects (two chisels, one spear and one arrow head) were also recovered from the site. The remains of few coffins in the section with some bone fragments are still intact and can be seen. The size of the coffin varies from 15 x 40cm (50cm deep in the section), 40cm width and 60cm deep in the section. The height of the coffins as seen in the section is approximately 30-40cm. These burials are in secondary context while the fragments of the pots suggest the existence of pot burials in the area along with chambered burials. The presence of iron implements in association with the site suggests the presence of Megalithic culture in and around the vicinity of Lakhamandal around 2<sup>nd</sup> century BCE to 2<sup>nd</sup> century CE.

## 3. COPPER COIN HOARDS, VILLAGE RADU, DISTRICT DEHRADUN

The find spot Sakuna-Kuanda Kheda lies at (30° 55' 25" N; 77° 49' 28" E) at an elevation of 1494m from MSL, just 1 km on road before the village Radu. The copper coin hoard was found during road cutting near village Radu. The site is about 12m from Tiuni on Tiuni – Quanu road, and to

reach the site one has to take a diversion upwards from this road. 2579 copper coins of tribal rulers of the region like the 'Yaudhiyas' and 'Kunindas' were found during road widening along with copper vessel, an earthen pot and a copper/ bronze dish.

## 4. HAVELI AT TIMLI, DISTRICT DEHRADUN

The Village Timli (30° 22' 21" N; 77° 43' 18" E) is known for the *haveli* of Ch. Bhagwan Singh. It was built in 1914 by the Hon'ble Justice Ch. Bhagwan Singh during colonial rule. The façade of the *haveli* is decorated with floral and geometrical designs. There is an old temple inside the *haveli* which existed prior to its construction and also has three *samadhis* in the vicinity of the *haveli* which belongs to the relative of Ch. Bhagwan Singh the founder of the Timli Riyasat.

## 5. CHURCH AND CEMETERY, VIKAS NAGAR, DISTRICT DEHRADUN

There is a church located in the town (30° 28' 01" N; 77° 46' 23" E) at 490m from MSL of the colonial period probably built just after the mutiny of 1857 and belongs to Diocese of Agra. There is a *cemetery* located 500 mtrs away from the church having the graves of Britishers who died after mutiny 1857-1947.

## 6. ROCK SHELTER NEAR KUKREDA, DISTRICT UTTARKASHI

The Rock shelter is lies (30° 57' 45" N; 77° 53' 55" E) near Kukreda Village



containing the Painted Sankh (conch *Lipi*) inscriptions in two phases. The first phase represented by black colour and the second phase represented by red colour. The second phase is overlapping with the former one.

### 7. ANCIENT SCULPTURES, DUNKARA, VILLAGE DISTRICT UTTARKASHI

The village of *Dunkara* lies (30° 55'35" N; 78° 07' 55") at an elevation of 1680m. One has to climb nearly 1km from *Dhikal* village on the way to Gundiya. In this village near the water source (*Naula*) a fine sculpture of Lakshminarayan and the image of Surya (c12-13<sup>th</sup> century) was found by the villagers and are presently lying in a small wooden temple. Four armed Vishnu seated in *lalitasana* with two armed goddess Lakshmi shown seated on the lap of Vishnu. Vishnu's right upper arm holds *chakra*, upper left arm holds *gada*, right lower arm rests on the breast of Lakshmi and left lower arm is in *varada mudra* holding *akshamala*. Vishnu is crowned with a small *kiritmukuta* and a short and long necklace. Garuda is shown below the deity and there are two female devotees seated with folded hands. There is one female and two male attendants in standing posture on either side flanking the main deity. There are flying celestials with garland above the deity and three seated deities are seen above the shoulder and head, each one holding *chakra* in right and *gada* in left arm. The standing image of Surya has long shoe and is holding full bloomed lotus bud in both arms. The body is not proportionate and the nose is flat and eyes are bulging. Surya is adorned with short and long necklace and *yajnapavita*, and *vaijyantimala*. Aruna is also shown standing

with a chariot drawn by three horses. Dandi and Pringal are seen standing by the side of the image. Surya is shown wearing long gown like cloth covering the knees.

### 8. KAMLESHWAR TEMPLE, DISTRICT UTTARKASHI

The temple (30° 56'55" N; 78° 07' 28"E) popularly known as Kamleshwar is constructed in the forest area in village Raun Gaon of Purola on the right bank of Kamal River a tributary of Yamuna at an elevation of 1912m MSL. It is located on the hill and about 2km from the village Raun. The temple is covered with tin shed and a big linga is installed in the sanctum. A few sculptures; like Vishnu, Ganesha and Surya etc. are lying in the temple premises along with some fragmentary sculptures of late medieval period.

### 9. DUNDA DEVTA TEMPLE, VILLAGE PAURA, DISTRICT UTTARKASHI

The temple of a local God known as Dunda Devta (30° 55' 21" N; 78° 06' 21" E) is located in Paura village having the images of Siva-Parvati and Ganesa. In the same village there is a sacred place called *Thaat* where a 2 feet high sculpture of Vishnu is the main attraction besides a few fragmentary sculptures.

### 10. SUKESHWAR TEMPLE, SUKDALA, DISTRICT UTTARKASHI

The village Sukdala lies (30° 54' 46" N; 78° 05' 30" E) on the way to Purola – Mori at an elevation of 1456m from MSL. The Sukeswar Mahadev temple of the

village is embellished with some sculptures. In the *Thaat* (the sacred place) the sculpture and lingas are fixed on the wall. A large number of recovered sculptures were taken away by the villagers of nearby areas for worship.

**11. ANCIENT SHRINES, BADRALI, DISTRICT UTTARKASHI**

The remains of an ancient shrine was found at village Badrali ( $30^{\circ} 54' 30''$  N;  $78^{\circ} 06' E$ ) which lies on elevation 1435m from MSL. The site is located on the left bank of river Kamal. The presence of a *linga* in the village and two pillars of a miniature shrine, one *linga* and two architectural fragments on the right bank of the river near the pedestrian bridge are noteworthy.

**12. SANKHA LIPI (INSCRIPTION) HUDOLI, DISTRICT UTTARKASHI**

A rock shelter is noticed ( $30^{\circ} 49' 58''$  N;  $78^{\circ} 05' 59''$  E) on the left bank river Kamal near the pedestrian bridge leading to Thadung village. It has a two line inscription in *sankha lipi* character of late Gupta period in black colour.

**13. SHANKHA LIPI (INSCRIPTION) IN ROCK SHELTER IN VILLAGE THADUNG, DISTRICT UTTARKASHI**

The high rock shelter is located by the side of the village Thadung on the right bank of River Kamal. The ceiling of the shelter contains a painted two line *sankha lipi* (inscription) in black colour. Besides that few fragmentary sculptures are kept in the temple compound of the village.

# EPIGRAPHY

## ARABIC AND PERSIAN INSCRIPTIONS<sup>1</sup>

### RAJASTHAN

#### 1. INSCRIPTION OF RAJA OF BHARATPUR, DISTRICT BHARATPUR

The epigraph was copied from the façade of the Jami Masjid at Bharatpur and is composed in Persian verse. It records the construction of Jami Masjid on the orders of Raja Balwant Singh Brij of Bharatpur State for the Muslim soldiers of the royal force, at Bharatpur. The date of its construction recorded both in a chronogram as well as in figures is AH 1261 (1845 CE). The epigraph beautifully executed in Nastaliq style of calligraphy is composed by poet Mujeeb who happens to be the composer of the chronogram of its date.

#### 2. MISCELLANEOUS INSCRIPTIONS FROM HINDAUN, DISTRICT KARALI

Two Persian epitaphs were copied from Kasabpada graveyard in Hindaun. The first one is from the sarcophagus of a grave which mentions the demise of one Qasim Khan in AH 1207 (1793 CE). This Persian

record also contains first creed of Islam i.e. *kalima* as invocatory beginning.

The other epitaph from the same place records the death of Mir Qadir Ali, son of Saadat Ali in AH 1245 (1829 CE). The deceased has been mentioned as being a native of village Piran (?) in Punjab.

One more interesting epigraph is in English from Hindaun which is of the time of Jaipur State. It registers the participation of the State in the First Great War with a large contingent of 14000 men, out of which 2000 gave up their lives between 1914 and 1919.

### TAMIL NADU

#### 3. INSCRIPTIONS OF NAWABS OF ARCOT, FORT MUSEUM, DISTRICT CHENNAI

Museum in Fort Saint George, Chennai has in its collection a good numbers of porcelain crockery pieces

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1. Information from Dr. G.S. Khwaja, Director (Epigraphy)/I/C, Arabic & Persian Inscriptions, assisted by Dr. M.A.Zeya of the Epigraphy Branch, ASI, Nagpur. This Branch copied and examined 114 Arabic and Persian inscriptions during this year out of which few important ones are being highlighted here.



imprinted with the royal emblem and names of the Nawabs of Arcot. Of them a few important ones are highlighted here. One plate contains title of Nawab Walajah I (1749-1795) as *Amir-ul-Hind*. It is undated. Another such plate contains the title of Nawwab Umdatul-Umara Walajah II (1795-1801) as *Amir-ul-Umara, Madar-ul-Mulk Bahadur*. This is also undated. One dish with provision for hot water bears the name of Nawab Azam Jah Bahadur *Amir-ul-Hind*. This is dated AH 1236 (1820 CE). One serving spoon contains name of the Begam. It reads: *Malika-i-Zaman, Rabia-i-Dauran, Hadrat Nawwab Begum Sahiba Qibla Madazilluha al-Ali* AH 1239 (1823CE). Another plate contains name of Nawab Husain Dost Khan Bahadur and date AH 1248 (1832 CE). One more plate bears the name of another lady of the royal house Nawab Mahal Begum, with date AH 1249 (1833 CE). One pot contains the name of Nawab Azim Jah Munawwar Khan Bahadur with his title *Amir-i-Arkat-i-Hind* and date AH 1309 (1891CE). There is another pot imprinted with the same name but of a different date i.e. A.H. 1310 (1892 CE). Two soup spoons bear the name of Begum Rahmat-un-Nisa who is designated as the Princess of Arcot with date AH 1310 (1892 CE). One more plate contains the name of Nawab Siraj-ud-Daula Bahadur of Karnatik with date AH 1264 (1847 CE). Nearly all the inscriptions are in Persian and written in *Nastaliq* style of calligraphy except one which is in *Thulth*. These pieces of crockery hints at the fine taste of Nawabs of Arcot for the European table wares, as many of these articles bear mention of their having been manufactured in England.

## UTTAR PRADESH

### 4. MUGHAL INSCRIPTION FROM AGRA FORT, DISTRICT AGRA

This beautifully executed long Persian record of the time of Mughal Emperor Shah Jahan is nothing but a eulogy of the pavilion of *Diwan-i-Khas* written with in the Agra Fort. It states that this beautiful royal pavilion built by the Emperor is loftier than the skies in dignity. The date of its construction recorded in a chronogram is AH 1046 (1636-37 CE). The Persian verses, of a high literary degree, are inlaid in the marble in equally beautiful *Nastaliq* style of calligraphy which adds elegance to the building. The panels of verses written in *Nastaliq* style are decorated with medallions in which names of Allah, Prophet Muhammad and four caliphs are written in *Thulth* style. The name of the calligrapher is not known, but the high degree of calligraphy hints at the artist being from the Shirazi stock (Pl. 59A)

### 5. EPITAPH FROM FATEHPUR SIKRI, DISTRICT AGRA

One epitaph from the courtyard of *dargah* of Hadrat Salim Chishti registers in Urdu verses and prose the death of a saintly person Qamar-ul-Islam in AH 1323 (1905). It also mentions the name of his son and spiritual successor Shaikh Zahir Ahmad Pirzada Faridi Chishti who obviously set up the epitaph.

### 6. KHALJI INSCRIPTION RAPRI, DISTRICT FIROZABAD

This historically important epigraph is from the central *mihrab* of the old Idgah. Its Persian text running in four lines assigns the construction of this auspicious structure, during the time of Sultan Ala-ud-Din Khalji (1295-1315 CE) to Malik Kafur, the local governor, in AH 711 (1312 CE). The text of the epigraph contains the name as well as full titles of the Sultan as '*Sikandar-uth-Thani, Ala-ud-Dunya wad-Din Abu'l-Muzaffar Muhammad Shah as –Sultan*'. The importance of this record lies in the fact that the builder of this structure is none other than the illustrious General of Sultan Alau-ud-Din Khalji who played an important role in the Sultan's military campaign in southern India. This epigraph indicates that after returning from south India Malik Kafur reached the village of his fief and constructed an Idgah there. The style of calligraphy is typical bold *Naskh* conforming to the Sultanate period whereas the date is written in words, the then pattern of recording the events (Pl. 59B).

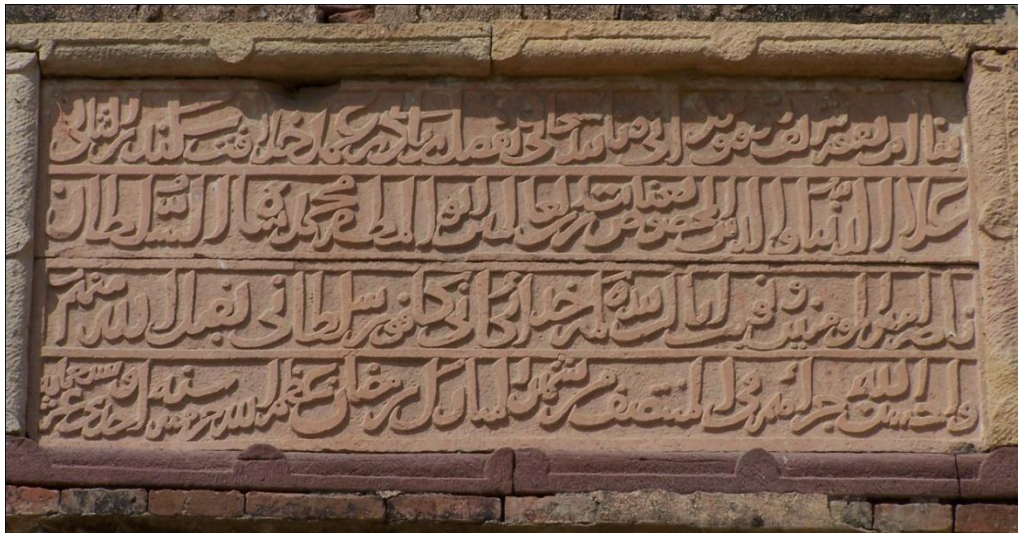
### 7. MISCELLANEOUS INSCRIPTIONS RAPRI, DISTRICT FIROZABAD

One inscription has been copied from a grave on the bank of Yamuna which records, in Persian verses, the demise of one Jan Muhammad at a very young age. It further states that the deceased possessed many qualities like bravery and sincerity. The last hemstitch contains the chronogrammatic phrase which yields AH 969 (1561-62 CE) the year of his death. The verses are executed in beautiful *Naskh* style of calligraphy in relief.

Another bilingual inscription from the same place is a headstone from the Muslim graveyard which records the construction of the tomb of one Himmat Khan, son of Najabat Khan, who had served Louis Verrieres, a foreign officer, for 45 years and died at the age of 55 years in 1906. The sons of Louis Varriers built the tomb in his memory. The text is written in English followed by its Persian version.



A



B

Agra: A; persian inscription of Mughal emperor Shah Jahan, from Diwan-i-Khas and B; persian inscription of Sultan Ala-ud-din Khalji.



## III NUMISMATICS AND TREASURE TROVE

### UTTAR PRADESH

#### 1. MUSLIM COINS FROM KATHUDA, MEERAPUR, DISTRICT MUZAFFARNAGAR

Agra Circle of the Survey has received 13 metal coins belonging to Islamic period, from P.S. Meerapur, District Muzaffarnagar (Pl. 60). These coins have been recovered from the

house of Nazabir Hussain S/o. Late Zair Hussain of Kathuda, P.S. Meerapur.

#### 2. BRITISH COINS FROM FALUDA, DISTRICT MEERUT

Agra Circle of the Survey received 05 metal coins of British period from Police Station Faluda, District Meerut. These coins found while digging the foundation of a house were recovered by the Police.

Plate 60



A



B

Agra: A and B; Meerapur coin reverse.

## IV OTHER IMPORTANT DISCOVERIES

### GOA

#### 1. HILL STONES AT CASA DE POLVORA, PANELIM, GOA

Under the guidance of N. Taher, assisted by Rohini & Abhijit Ambekar, trial trenches were taken at the site which was known as gun powder factory of the Portuguese period. Panelim or Panvel is a small village situated mid way between Panaji and Old Goa beyond Ribander. The site was also known as Casa de Polvora (house of powder) where the Portuguese established their gun powder factory. This factory was established with the aim to produce three types of gun powder viz. for warfare, pyrotechnic and for hunting.

There were 13 huge mill stones at the site of which one is broken. All these mill stones were documented smallest mill stone has a diameter of 1.55m and 0.38m thickness, whereas the biggest mill stone has a diameter of 2.50m, and 0.44m thickness. All these mill stones have square sockets in the centre and few of them have grooves. The purpose of the square sockets was to fix the wooden shaft to it so that while grinding the gun powder, the shaft would not slip from the mill stone.

### KARNATAKA

#### 2. KEERTINARAYANA TEMPLE, TALAKAD, DISTRICT MYSORE

In continuation to the trial trench excavation for the study of the foundation of the temple, a trench measuring 15.10 x 5.70m, was laid in the northern *maha-mandapa* region and the excavation to a depth of 1.60m, was carried out below the *pada*-mouldings of the dismantled temple. Since sand and boulder filling was encountered at strata (4), the area of excavation was restricted to 2.10 x 2.00m. The first three layers from the top had compact clayey soil mixed with brickbats, potshards, pebbles, river sand, small nodules and sand strips mixed with boulders alternatively. The composition of the fourth layer was that of loose riverine sand mixed with huge boulders, used as cushion filling. The above foundation filling was found continuing to a depth of 2.60m from the present ground level. In the trench laid near the northern *mukha-mandapa*, nine numbers of precious ruby stones were found at a depth of 4.30m (layer 5), probably placed as part of the rituals in the *Bramha-sthana* (centre) at the time of construction, as per the prescription in the *Mayamata*.

It is observed, further that the deposit of Chola-Ganga habitation in the first four layers was disturbed by the structural activity of the Hoysala period. Layer 6 yielded small quantities of black and red



ware of megalithic affinity. Layer 7 is represented by a sandy deposit. The trench was dug up to the depth of 7.50m. The natural soil was encountered at the depth of 5.10m and the antiquities retrieved from the excavation included terracotta figurine, copper objects, copper coins, black and red ware pottery, beads etc., of historical period.

### 3. VISHNU TEMPLE II, VENKATAPURA, DISTRICT BELLARY

While removing the debris in front of Vishnu temple II, mutilated stone sculptures of Alvar and Garuda (unfinished) were found and while exposing the plinth of the same temple the objects made of gold were retrieved, which include “*Rasi-panams* or *Belekasu*” – lowest denomination of gold coins; ribbon shaped, golden girdle of processional deities; a unique golden honey-bee studded with precious gems - the first of its kind in the medieval context of Karnatak; golden *Lakshmi-padaka*- an ear ornament; and a gold chain with an ordinary pendent.

## MADHYA PRADESH

### 4. PALAEOOLITHIC SITE, BALAMPUR GHATI (BALAMPUR), DISTRICT RAISEN

Narayan Vyas of the Temple Survey Project (Northern Region) of the Survey noticed a Palaeolithic site at Balampurghati

near Balampur village. The Lower Stone Age tools collected from the section, as well as on the surface represented by handaxes, cleavers, etc. and these were made on flakes.

### 5. ROCK PAINTINGS, SATDHARA, DISTRICT RAISEN

Narayan Vyas, L.K. Bhagchandani and Sanjay Shrivastava of the Temple Survey Project (Northern Region) of the Survey, a group of rock shelters with paintings near the Buddhist site at Satdhara (23°29'N; 77°39'E). The paintings depict the war scene, hunting, animals, human figures etc. in red ochre and white colour. On stylistic basis these paintings belong to the Chalcolithic and Historical period.

## UTTAR PRADESH

### 6. JAINA TIRTHANKARA IMAGE FROM AGRA

A chance discovery of a marble image of Jaina Tirthankara Rishavanatha from the S.N. Medical College campus, Agra was reported. The seated Tirthankara image measuring 75cm in height and 60cm in width has two inscriptions in Devnagari of which one is dated to *Samvat* 1688 (Pl. 61). At present it is kept in Santinatha Digambar Jain temple, M.D. Jain Inter College, Agra.



Agra: image of Jaina Tirthankara, Rishavanatha.

# V PALAEOBOTANICAL AND POLLEN ANALYTICAL INVESTIGATIONS\*

The present report incorporates the work done at Birbal Sahni Institute of Palaeobotany, Lucknow, during 2007-08; on the botanical remains recovered from the excavations at ancient Kanmer, District Kachchh, Gujarat; ancient Sanchankot/Ramkot, District Unnao and Indor-Khera, District Bulandshahr in Uttar Pradesh.

The excavation of the Harappan site Kanmer, a joint venture of the Institute of Rajasthan Studies, JRN Rajasthan Vidyapeeth, Udaipur (Rajasthan), the Gujarat State Department of Archaeology (Gujarat) and the Research Institute for Humanity and Nature, Kyoto (Japan), was carried out systematically under the supervision of J.S. Kharakwal. Botanical remains were collected by water floatation during the course of the excavations in 2006 by Anil K. Pokharia.

Excavations at Sanchankot were conducted during 2005 by the Department of Ancient Indian History and Archaeology, Lucknow University, Lucknow under the direction of D.P. Tewari. Systematic floatation recovery of botanical remains

from this site was put into effect by Chanchala Srivastava.

Archaeo-botanical material from Indor-Khera, District Bulandshahr was collected during 2006 by the excavation team from the Department of History, AMU, Aligarh under the direction of Jaya Menon.

## GUJARAT

### 1. KANMER (23°23'N; 70°52'E) DISTRICT KACHCHH

Kanmer locally known as Bakar Kot is located close to the Little Rann in Rapar taluka of District Kachchh. The site has yielded Early, Mature and Late Harappan pottery, chert blades, beads, seals and shell bangles identical to well known Harappan sites. Archaeo botanical samples from this Harappan settlement datable to 2800-1500 BCE were analysed. The finds include the remains of *Hordeum vulgare* (Hulled barley), *Triticum aestivum* (Bread wheat), *Triticum sphaerococcum* (Dwarf wheat), *Oryza sativa* (Rice), *Sorghum bicolor* (Jowar-millet), *Pennisetum typhoides* (Pearl

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\*Contributed by Chanchala Srivastava and Anil K. Pokharia, Birbal Sahni Institute of Palaeobotany, Lucknow-226 007.



millet), *Pisum arvense* (Field-pea), *Lens culinaris* (Lentil), *Macrotyloma uniflorum* (Horse-gram), *Vigna radiata* (Green-gram), and *Sesamum indicum* (Sesame). In addition to cereals, pulses and an oil-seed; a fibre-crop is represented by the presence of seeds of Cotton (*Gossypium arboreum/herbaceum*) in the collection. Associated with these crop remains as an admixture, the remains of the seeds and fruits of weeds and other wild taxa have also been identified as *Vicia sativa*, *Setaria* cf. *glauca*, *Chenopodium album*, *Ziziphus nummularia*, *Trianthema triquetra*, *Trianthema portulacastrum*, *Citrullus* cf. *colocynthis*, *Coix lachryma-jobi* and *Polygonum* sp.

## UTTAR PRADESH

### 2. SANCHANKOT/RAMKOT (26°59'10"N; 80°19'150"E) DISTRICT UNNAO

Morphological investigation of seed and fruit remains' samples continued from ancient site at Sanchankot/Ramkot from cultural horizon of Painted Grey Ware, Northern Black Polished Ware, Sunga and Kushana Periods (approx. 1000 BCE to 300 CE) to build up plant economy practised by the ancient settlers and the ecological conditions in this region in the past. The site exhibits ancient plant economy comprising of the field-crop finds belonging to cereals- *Hordeum vulgare* (barley), *Oryza sativa* (rice), *Echinochloa crus-galli* (sawan), *Paspalum scrobiculatum* (kodon-millet), *Setaria* sp. (italian millet) and *Sorghum* sp. (jowar millet); pulses- *Lens culinaris* (lentil), *Lathyrus sativus* (khesari/grass-pea), *Pisum arvense* (field pea), *Vigna radiata*

(green gram), *Vigna mungo* (black gram), *Macrotyloma uniflorum/Dolichos biflorus* (horse-gram/kulthi), *Vigna aconitifolia* (aconite/moth bean); along with seeds of oil yielding plant- *Brassica juncea* (field brassica); *Ziziphus* sp. (jujube fruit-stones), seeds of *Annona squamosa* (custard apple) and Leguminous fruiting pod; seeds of cotton (*Gossypium* sp.) and silk-cotton (*Salmaalina malabarica*) fibre-crops. The remains of custard apple (*Annona squamosa*) from Kushana levels (100-300 CE) reveal the new evidence from this region in Ganga plain.

Almost similar assemblage of weeds and wild taxa as recorded in the 2006-'07 session has been encountered again in association with field-crop remains, belonging to wild grasses viz., *Andropogon* sp. (Blue stem grass), *Dactyloctenium aegyptium* (Crow-foot grass), *Eleusine indica* (Goose grass), *Panicum* sp. (Panicum grass), *Poa* sp. (Blue or Meadow grass); sedges viz., *Cyperus* sp. (Flat sedge), *Elaeocharis* sp. (Spikerush sedge), *Fimbristylis* with three species (Fimbristylis sedge), *Scirpus* sp. (Bulrush), *Scleria ciliata*; other finds are of *Desmodium gangeticum* (Tick-clover/Savivan), *Indigofera* sp. (Indigo), *Indigofera hirsuta* (Hairy Indigo), *Medicago* sp. (Blue alfalfa), *Melilotus alba* (Sweet clover, Safed Senjhi), *Asphodelus tenuifolius* (Piazi), *Verbascum thapsus* (Mullein), *Vicia sativa* (Common vetch), *Amaranthus* sp. (Pigweed), *Celosia* sp., *Chenopodium album* (white Goose-foot, Bathua), *Commelina benghalensis* (Day-flower faint), *Trianthema portulacastrum* (Lalsabuni), *Solanum* sp. (Night-shade); *Polygonum barbatum*, *Rumex*

*dentatus* (Labbibi, Khat-palak), *Sida* sp., and some Convolvulaceae member.

*Dactyloctenium aegyptium* and all the sedges, *Commelina benghalensis*, *Trianthema portulacastrum* may have been the weeds in summer group crops like rice where as *Indigofera hirsuta*, *Melilotus alba*, *Vicia sativa*, *Amaranthus* sp., *Chenopodium album* represent the weed components in winter field crops like wheat and barley in the ancient plant economy. *Verbascum thapsus* (Mullein) is an occasional member along water channels whereas *Polygonum barbatum* and *Rumex dentatus* represent moist and swampy localities in the region of ancient habitational settlement site.

### 3. INDOR-KHERA (28° 14' 55"N; 78° 12' 32"E) DISTRICT BULANDSHAHR

The ancient site is situated on the western bank of the Chhoiya river/also called Nim Nadi in the Debai taluka of District Bulandshahr. Morphological investigation of botanical remains from this ancient multi-period (Painted Grey Ware, Northern Black Polished Ware & Sunga to Kushana) site received from Jaya Menon, Dept. of History, AMU, Aligarh) is being carried out (material.

The investigation of botanical finds has revealed well-preserved cultivated species of *Ziziphus mauritiana* (Jujube) in dominance along with fruit remains of *Emblica officinalis* (amla), *Mangifera indica* (mango), *Syzygium cumini* (jamun), etc.; other finds are of cereals like *Oryza sativa* (rice), *Hordeum vulgare* (barley), *Triticum aestivum* (bread wheat), *Triticum sphaerococcum* (dwarf wheat); *Paspalum scrobiculatum* (kodon millet), pulses of *Lens culinaris* (lentil), *Vigna mungo* (black gram), *Vigna radiata* (green gram), *Lathyrus sativus* (grass-pea) and *Macrotyloma uniflorum/Dolichos biflorus* (horse-gram); seeds of *Gossypium* sp. (cotton) and *Salmaalina malabarica* (silk-cotton) fibre plant, etc. A number of weeds and wild taxa have also been encountered in association with field crop remains like common-vetch (*Vicia sativa*) and sedges like *Carex* species. The find of holy beads of Rudraksha (*Elaeocarpus sphaericus/ganitrus*) of Himalayan origin from the Kushana levels in this region of Ganga plain is a significant one. A well settled agricultural practice was observed by the ancient settlers along with the know-how for medicinal plants like *amla* and *jamun*.

## VI MUSEUMS

### 1. TAJ MUSEM, TAJ MAHAL, AGRA

Sixteen objects which are in fragile condition were chemically treated through the Science Branch Laboratory at Dehradun.

### 2. ARCHAEOLOGICAL MUSEUM AT JAGESHWAR, ALMORA

The *astadhatu* (metal) sculpture of Pon Raja (Pl. 62A) was displayed in a wooden showcase with bullet proof glass alongwith four stone sculptures on a wooden pedestal in the central hall. Close circuit cameras with necessary controlling system have been fixed in the galleries for better security of the museum.

### 3. ARCHAEOLOGICAL MUSEUM, AIHOLE

The work of re-modeling the Aihole valley model and construction of stone pedestal to display the stone sculptures in the open-air gallery is completed. A stone pathway over PCC bed is being laid in the remaining portion of the open-air gallery and painting to the sandstone veneered pedestal in the galleries and the exterior wall surface of the museum building is in progress.

### 4. ARCHAEOLOGICAL MUSEUM, BADAMI

Construction of false ceiling and electrification in POP in Gallery 1 is

completed. Providing iron grills in the open corridor of the extended part of the museum building for the safety and security of the displayed objects is completed. Colour wash to the museum building, gallery and sandstone veneered pedestals is in progress.

### 5. ARCHAEOLOGICAL MUSEUM, BIJAPUR

The work of providing vinyl flooring to the remaining galleries in the first floor of the museum is completed. Solar street lights were fixed at vantage points around the museum for additional safety and security. The manuscripts, paintings, photographs, etc in the reserve collection were placed in new polythene covers as the old ones were damaged. Background cloth has been provided to three showcases in which Bidri ware, brass and other metal objects are displayed. The sculpture and carved architectural members kept in reserve collection were cleaned.

### 6. COOCH BEHAR PALACE MUSEUM, COOCH BEHAR

CCTV cameras have been installed for additional security.

### 7. ARCHAEOLOGICAL MUSEUM, MATTANCHERRY, KOCHI

The first phase of the reorganization of the museum gallery has been completed.



Two rooms display the history of Kerala and one hall display the Royal Portraits of Kochi Maharajas and their ivory palanquin (PI 62B). As part of reorganization of museum the floor area was strengthened by replacing the damaged teak wood beams and planks with new ones and by finally applying a wood preservative coat.

The reorganization of Phase II i.e. Exhibits on the life style of Kochi Raja's work is in progress.

#### **8. ARCHAEOLOGICAL MUSEUM, KONARK,**

The existing damaged mosaic floor of the museum building which showed scratches and crevices was relaid with vitrified tiles to provide an improved look to the galleries, verandah, porch and office rooms. Trilingual labels for displayed antiquities in galleries of museum were newly fixed as the existing ones were much damaged. The show cases of the galleries were provided with a new back ground with a texture with mosaic globules (heritage mosaic) with mounting and pasting. Further, improved lightings were also provided to showcases. The sliding doors with glass and with aluminium framed doors were newly provided to all the doors of four galleries. Minor repair and painting of the museum compound wall as well as repairing and painting of window frames were also done. Covering and sealing the skylights of museum building were also successfully attended to.

In addition to the existing thirty pedestals, thirteen more masonry pedestals for installing archaeological fragments/sculptures were constructed in

front of museum. In order to strengthen security, the existing narrow and damaged apron around the museum was widened and relaid with terracotta texture like tiles to facilitate the free movement of security staff members. New halogen light arrangement was provided to the museum complex for the better security in night times. Lightening conductor to the reserve collection building was installed. Aqua-pure (Kent R.O. machine) for safe drinking water as amenities for visitors was installed inside the museum.

#### **9. ARCHEOLOGICAL MUSEUM, LOTHAL**

P.V.C ceiling has been provided in all galleries of the Museum. P.O.P models of acropolis and other excavated areas of Lothal has been retouched and covered with aluminum frame and acrylic sheet in the central gallery. Two numbers of translights were provided in the galleries. The work of digital documentation of antiquities is in progress.

#### **10. HAZARDUARI PALACE MUSEUM, MURSHIDABAD**

As a part of additional security measures CCTV cameras with recording facility and a high sensor door frame metal detector were installed. The wooden floor in the reserve painting room, western part of ball room and old mirshamani room were repaired and polished and the old mats were replaced. The wooden furniture (20 pieces) were repaired and polished for better upkeep and the silver throne was provided with glass encasing. Improvement of electricity and lighting arrangements in the museum

galleries has been done. To disseminate information on the galleries and protected monuments, two touch screen kiosks and information boards were installed. The existing ticket counter was upgraded. The old books (500 numbers) and manuscripts of the library were bound for better upkeep and preservation. The record room furniture was repaired to ensure better storage of paper documents and records.

### **11. ARCHAEOLOGICAL MUSEUM, OLD GOA**

Audio guided devices were introduced in the museum. Extended labels were provided in the Portrait Gallery to upgrade the details about the contributions of each Governors and Viceroy. The architectural members and sculptures scattered around Church Complex were top and pasting of texture inside for the background. Columns inside the galleries have also been veneered with sun-mica matching the renovated showcases. Vitrified tile flooring has been done in these two galleries enhancing their beauty. Four invertors have been installed in four galleries as power back up. Some antiquities

displayed in series by preparing laterite stone pedestals. The damaged wooden rafters used in preparation of Coins and Currency showcase were replaced by new ones and conventional lighting was also provided. The damaged wooden flooring of Portrait Gallery was replaced with the new wooden flooring. The low intensity Tinko lights with Philips fixtures were fixed in the Portrait Gallery earlier. However some old tube light fixtures still existed. So the New CFL boxes were fabricated, similar to the existing boxes and fixed in the Gallery 6.

### **12. ARCHAEOLOGICAL MUSEUM RATNAGIRI**

Showcases of Gallery 3 and 4 have been redesigned by providing *chala*-shaped

of Ratnagiri site kept so far under the custody of the circle have been taken over and some of the antiquities of the reserve collection have been accessioned. Two toilet blocks of the museum have been thoroughly renovated providing better visitor amenity.

Plate 62



A



B

A; Archaeological Museum: Jageshwar, image of Pona Raja and B; Mattancherry Museum: Portrait gallery.



## VII. ARCHITECTURAL SURVEY

### TEMPLE SURVEY (NORTHERN REGION)

Temple Survey (Northern Region) of the Survey under Narayan Vyas, carried out documentation of Kachhapghata temples in Gwalior region in a phased manner. In the first phase a detailed study and documentation of Kachhapghata temples in Kadwaha (24<sup>0</sup>55'N; 77<sup>0</sup>55'E), District Ashoknagar of Madhya Pradesh was started.

Kadwaha (ancient Kadambguha) is most developed centre of Kachhapghata temple

architecture. There are more than twenty temples and other remains located here. The important and largest temple in this group is known as Murayat, and was built in *circa* eleventh century CE. The temple consists of a *pancharatha* sanctum, *antarala* and *mandapa* on plan. Kadawaha is also rich for sculptural wealth. Most of the walls of the temples are highly decorated with two friezes of sculptures. Noteworthy among them are male and female deities, *astadikapalas*, *apsaras*, etc.

# VIII PRESERVATION OF MONUMENTS

## MONUMENTS OF NATIONAL IMPORTANCE

### AGRA CIRCLE

#### UTTAR PRADESH

##### 1. AGRA FORT, AGRA, DISTRICT AGRA

At Angoori Bagh complex the work of racking out decayed carved plasterwork was taken up and re-plastered matching with the original wherever necessary. The damaged and broken *muttaka* and *jali* railing of red sand stone in the upper storey were also replaced (Pl. 63).

In continuation of previous year's work, to the 3<sup>rd</sup> complex of Mina-Bazar, the old cement plaster which was provided by the Army in the past was racked out from walls, ceiling and cells and the exposed area was conserved by underpinning and recessed pointing (Pls. 64-66). The work is in progress. The moulding below the parapet has been restored.

The dead lime concrete of the *masjid* complex was racked out and a new one matching with the original was re-laid. The marble *chhajja* stones were restored with new ones. The bulged out marble *gola galta* stone was also replaced. The broken *kangoora* stones of the parapet wall were conserved by restoring the decayed, broken and missing one

The water moat near Amar Singh Gate was de-silted and the damaged *lakhauri* brick flooring was reset after providing proper foundation, and recessed pointing in open joints with lime mortar was also attended too. The paved pathways from Amar Singh gate to *Diwan-e-Am* was repaired by replacing the old decayed and worn out red sand stone slabs. The fortification wall from Amar Singh gate to south-western corner was repaired by underpinning, plastering, restoring of red sand stone flooring, laying lime concrete and providing veneer stones wherever missing/ broken.

##### 2. AKBAR'S TOMB, SIKANDARA, DISTRICT AGRA

The eastern gate of the tomb complex was taken up for repair. The dead and decayed plaster of the mainarch was removed and re-plastered matching to the original. Similarly, the old and decayed plaster of the first floor has also been removed and re-plastering work is in progress. Missing stone *jali* and inlay pieces at the gate has been provided (Pls. 67-68).

The work of repairing the marble storey of main mausoleum by replacing the bulged or broken and missing white marble *chhajja*, *jali* and wall veneering *biri* of different size



A



B

Angoori Bag: before and after conservation, broken red sand stone jali railing, Muttaka,



Plate 64



A



B

Agra fort: before and after conservation of Meena bazar 3<sup>rd</sup> Complex,



A



B

Agra fort: before and after conservation of gate of Meena bazar 3<sup>rd</sup> Complex,



Plate 66



A



B

Agra fort: before and after conservation of interior of the verandah of Meena bazar 3<sup>rd</sup> Complex,





A



B

Sikandara: before and after conservation of eastern gate, Akbar's tomb.

Plate 68



A



B

Sikandara: during and after conservation of northern façade of eastern gate, Akbar's tomb.

and recessed pointing with special lime mortar is in progress.

The old compound wall was also repaired by way of underpinning, pointing and water tightening wherever necessary after dismantling the old decayed plaster on top of the wall and *kangooras* (Pl. 69).

### **3. BARAH KHAMBA AT TAJ GANJ, AGRA, DISTRICT AGRA**

The base & platform of monument was exposed after removal of debris. The modern boundary wall to the west of the monument was removed. The red sand stone members of *gola, galta, dab, veneers, dasa*, base, pillars & pillar cap have been replaced after removing the damaged stone members as per the original. The brackets and *chhajja* stones were restored as per the original. A boundary wall was provided around the monument as a part of visitor management (Pl. 70).

### **4. BEGUM'S MASJID OF THREE LOFTY DOMES, AONLA, DISTRICT BAREILLY**

The mosque was covered with rank vegetation which had led to the development of wide cracks and decay of plaster. The parapet walls were missing at several places. The arches on the basement of the mosque were partly buried and remaining structure was on the verge of collapse. The vegetation growth over the body of the superstructure was removed. The buried portion of the arches was exposed; the dead plaster of the roof and exterior of dome was removed and re-laid. The missing parapet walls were restored, the open joints of the ceilings and roof were repaired and water tightened (Pl. 71). The repair of the side wall and cells of mosque is in progress.

### **5. CHINI KA ROUZA, AGRA, DISTRICT AGRA**

The arches of this structure are plastered with cement. To restore the aesthetics of the structure, the cement plaster was removed from the eastern arch of the masouleum and the area was replastered in lime mortar matching with the original. The damaged stone blocks of the floor around the mausoleum were replaced and the cement pathway was redone with red sandstone slabs. The collapsed portion of the boundary wall on the riverside was also repaired.

### **6. ELEVEN STEPS AT KACHHPURA, AGRA, DISTRICT AGRA**

In continuation to last year, the work of the replacing the weathered veneering stones of the well was completed. The walls around the well were also repaired by way of pointing, sealing of joints and water tightening (Pl. 72).

### **7. FIROZ KHAN'S TOMB, AGRA, DISTRICT AGRA**

The damaged plaster of the ceiling of the dome and small arches was removed and the same was re-plastered. The debris within the compound was removed and original level was exposed. The original compound wall was conserved by removing the dead plaster and re-plastering with lime plaster after attending to pointing work.

### **8. GREAT IDGAH, AGRA, DISTRICT AGRA**

Old and bulged red sandstone *pan-patti* design, depressed moulding *dasa* and *dab* and quid were removed and provided with new one as per the original wherever required. A pathway in red sandstone and an apron around the mosque was also provided.



Plate 69

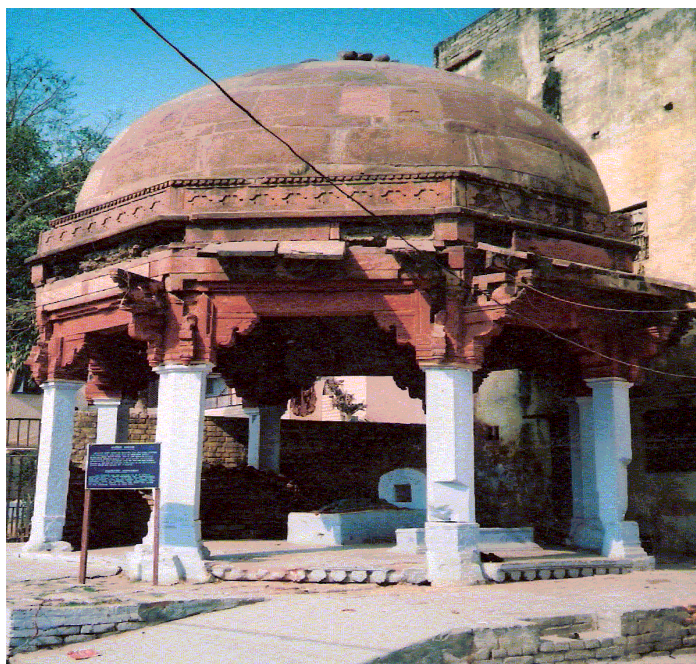


A



B

Sikandara: before and after conservation of compound wall of Akbar's tomb.



A



B

Tajganj: before and after conservation of Bara Khamba.



Plate 71



A



B

Aonla: before and during conservation of Begums' masjid.





A



B

Agra: before and after conservation of eleven steps at Kachhpura.

**9. GROUP OF MONUMENTS, FATEHPUR SIKRI, DISTRICT AGRA**

The worn out flooring of the *dargah* complex was re-laid with a new one wherever required. At the Jodha Bai complex, the worn out flooring was re-laid and the damaged red sand stone *dasa* stone with *pan patti* design was replaced. The flooring of the upper storey of the complex was also re-laid wherever necessary. In the *hammam*, the flooring of the verandah was re-laid and the damaged flagstone of the toilet and the ventilator was provided afresh matching with the original. The random rubble stone masonry wall of the *hammam* was recessed pointed in composite lime mortar and the damaged red sand stone *dasa* was replaced with new one. The damaged red sandstone flooring of the Mariam Palace, Meena Bazar and *Diwan-I-Khas* was replaced with new one. The fallen portion of the city wall from Agra Gate to railway line was restored. The missing and fallen portion of the Chandrapol gate and Delhi gate was restored in random rubble masonry (Pl. 73).

**10. HUMAYUN'S MASJID, KACHHPURA, DISTRICT AGRA**

The dilapidated seven arches of the mosque at Kachhpura built by Humayun, was restored. Stone paving was also provided to the rear side of the mosque.

**11. JASWANT SINGH KI CHHATRI, RAJWARA, DISTRICT AGRA**

The original plinth level of the structure was exposed while removing the accumulated earth, the remains of fountain along with cascades with inter connecting channels were traced which revealed that there

existed a garden all around the Chhatri. Traces of the wall of the garden have now been exposed at several points and the work is in progress.

**12. KOS MINARS ON MATHURA DELHI ROAD IN MATHURA DISTRICT**

Ten Kos Minars situated between Mathura to Kotban on the border of Haryana state and in dilapidated condition were repaired by underpinning in brick masonry with lime mortar wherever necessary, and by removal of the dead plaster and replastering matching with the original. Most of the Minars were provided with small boundary all around for its protection.

1. Kos Minar in the beginning of Dig road, on the Mathura Dig road
2. Kos Minar, Mile 3, Furlong 5.175 from the boundary, Mathura-Delhi road
3. Kos Minar, Mile 11, Furlong 5 (west of Chamah village), Mathura-Delhi road
4. Kos Minar, opposite to mile 13, Furlong 1 from road, Mathura-Delhi road
5. Kos Minar, Mile 116, 400 yards from road, Mathura-Delhi road
6. Kos Minar, Gohari
7. Kos Minar, Mile 19 Furlong 1, Chhata (Pl. 74)
8. Kos Minar, Mile 24 Furlong 3, Chhata
9. Kos Minar, Mile 26, Furlong 7, Chhata
10. Kos Minar, Mile 29 Furlong 4, Chhata (Pl. 75)

**13. MADAN MOHAN TEMPLE, BRINDAVAN, DISTRICT MATHURA**

The temple has been constructed on a mound. To control erosion activity on the river side, a retaining wall was constructed





A



B

Fatehpur Sikri: before and after conservation of city wall near Delhi gate.



Plate 74



A

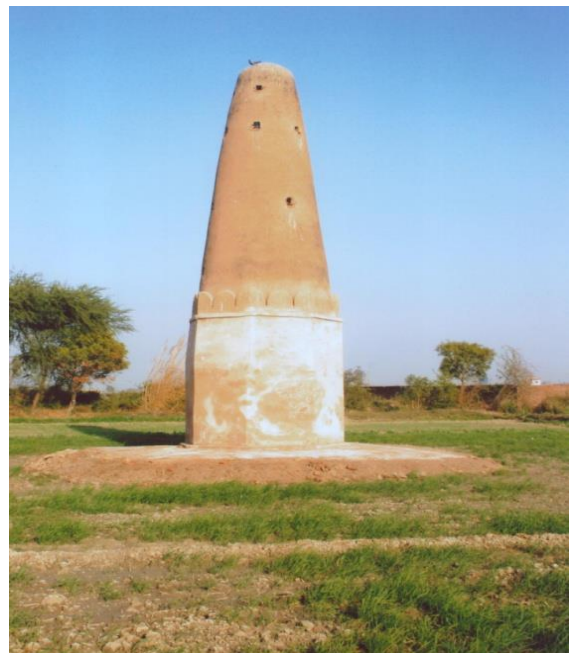


B

Chhata: before and after conservation of Kos minar, Mile 19 Furlong 1.



A



B

Chhata: before and after conservation of Kos minar, Mile 29 Furlong 4.

over a period of time. The available evidence suggests that small brick built cells of various dimension were constructed along the retaining wall and was probably meant for meditation. The use of *lakhauri* bricks further suggest that cells had remained in used till Mughal period. The entire retaining wall along with cells had collapsed and the core of the mound was exposed threatening the survival of the monument. It was therefore, essential to restore the missing and collapsed wall at the earliest. The buried portion of the remaining walls at lower level was exposed and the entire retaining wall was repaired by using available bricks in traditional mortar. Some bricks of similar size were also collected from nearby area. The remains of cells in various levels were also repaired (Pl. 76).

**14. R. C. CEMETRY, SARDHANA, DISTRICT MEERUT**

In continuation to last year's work, this year the open joints on the roof of tombs were sealed by way of racking out the dead material and re-laying with lime mortar. The broken red sandstone *jali* of south window of main tomb was replaced with new one as per the original (Pl. 77). An approach road connecting the various graves within the enclosure was provided.

**15. ROMAN CATHOLIC CHURCH, SARDHANA, DISTRICT MEERUT**

The decayed lintels on the east side were replaced by new steel girder. The other works included underpinning; plastering and water tightening of the roof.

**16. SADIQ KHAN AND SALABAT KHAN'S TOMB, AGRA, DISTRICT AGRA**

The buried portion of the periphery of the structure was exposed and brought to its original level. M.S. angle iron grill fencing over dwarf wall (with brick tile masonry) has also been provided.

**17. TOMB OF SHAH PEER, MEERUT, DISTRICT MEERUT**

The tomb was in dilapidated condition with the pillars in brittle condition and the *chhajja* stone were missing at several places. To support the superstructure eight brick masonry pillar props were provided in the past. The brick pillars props were replaced by new pillars carved of similar material, dimension and design and were carefully placed one by one after providing proper support. The broken *chhajja* stones have been replaced with new ones (Pl. 78). The fragile *dasa* stones and missing at several places were replaced matching with the original. Providing red sand stone floor in front of the tomb is in progress.

**18. SITA RAMJI'S TEMPLE, SORON, DISTRICT ETAH**

The original ground level of the temple was exposed by removing the additional stone blocks that were provided in the past. A red sandstone pathway over lime concrete bed was provided from main road to the temple.

**19. GROUP OF MONUMENTS, TAJ MAHAL, AGRA, DISTRICT AGRA**

In continuation of previous year's work, the restoration of missing inlay work, pinnacles at the top of the south gate, conservation of open terrace and staircase of southern side of the *siddi* gate were taken up. Underpinning with *lakhauri* brick were done





A



B

Madan Mohan temple, Brindaban: before and after conservation of brick walls and cells in riverside.

Plate 77



A



B

R.C. cemetery, Sardhana: before and after conservation of red sandstone jali.





A



B

Meerut: before and after conservation of Shah Peer tomb.



wherever necessary in the open terrace and staircase on the southern side of the gate. The red sandstone cyclopean intra dome of the gateway has been repaired as per original. The modern house abutting the southern gate as well as the adjoining wall of it was dismantled and the original *dalans* behind it was exposed.

The chambers of *dalan* were repaired as per the original (Pl. 79). Since the original level of the *dalan* is below the existing street level, provision for water harvesting through deep boring has been made. Subsequently, the existing booking counter and cloak room facility has now been shifted to the recently conserved one. The western, southern and eastern facade of the main entrance gate was conserved by replacing the damaged and worn out red sand stone members like *dasa*, *gola*, carved veneer and inlay panels etc. (Pls. 80-81).

The north-east *dalan* of the forecourt was conserved by way of racking out the cement plaster and re-plastering it with lime plaster. Damaged red sand stone flooring in the *dalans* was also repaired with new ones after proper documentation (Pl. 82). The ceiling of domes and corner of arches of the cells were also repaired as per original. Aprons were provided in front of north-east *dalans* as per pattern adopted inside the Taj complex (Pl.83).

The flooring of east and west *dalans* from main entrance gate, platform in front of the *dalans*, mosque and Mehman Khana and pathways from main gate to main mausoleum of Taj Mahal has been taken for repair by way of removing the old, worn out, damaged and broken stones after proper

documentation and replacing them with red sand stone flooring in lime mortar as per original pattern.

The carved veneer panels with floral pattern and the inlaid panels of the Mehman Khana were replaced wherever found missing/damaged. Missing inlay pieces of the wall panels in different shape and size in white and black marble have been restored as per the original (Pls. 84-85). The *dasa* with embossed carvings and flooring of Mehman Khana have also been conserved by replacing the old and damaged red sand stone slabs with new ones in original pattern. Similarly, veneer panels having carved floral pattern, *dila* with depression and inlaid panels of the mosque have been conserved wherever found damaged/missing.

The decayed and bulged *dasa* with floral pattern in the front veneer, dab, quid of red sand stone of the western side enclosure wall were restored as per original pattern (Pl. 86) and set in lime mortar by using copper dowels in place of iron. The broken and bulged stones from bastion have also been conserved by replacing with red sand stone members as per original.

The south-east and south-west *dallans* of the forecourt at Taj Mahal were conserved, by racking out the cement plaster and replacing it with lime plaster in the cells as per original and also in the ceiling of domes and corners of the arches. Red sand stone flooring in the *dallans* have been replaced with new ones after proper documentation. Aprons had also been provided in front of the south-east and south-west *dallans* as per pattern adopted inside the Taj Complex.



A



B

Taj Mahal, Agra: before and after conservation of Dalans and cells near the southern gate.

Plate 80



A



B

Taj Mahal, Agra: before and after conservation of decayed dasa panel of main entrance gate.





A



B

Taj Mahal, Agra: before and after conservation of missing inlays in turret of main entrance gate.

Plate 82



A



B

Taj Mahal, Agra: before and after conservation of damaged flooring of north-east dalan of Fore court.





A



B

Taj Mahal, Agra: before and after conservation of pathway and apron of north-east dalan of fore court.



Plate 84



A



B

Taj Mahal, Agra: before and after conservation of embossed and inlaid panel, Mehman khana.



A



B

Taj Mahal, Agra: before and after conservation of embossed and inlayed panel, Mehman khana.



Plate 86



A



B

Taj Mahal, Agra: before and after conservation of western enclosure wall.



Old, damaged and worn out red sand stone veneer and *dasa* having floral design on front edge had been replaced with new ones as per original (Pl. 87). The work is in progress.

Wooden ramps of temporary nature for physically challenged persons were provided up to the red sand stone platform. The work of extending the wooden ramp up to the Chameli farsh (Mehman Khana) is in progress. Besides, wheel chairs have already been provided.

Fatehpuri Mosque was also taken for conservation. The southern side of the mosque was damaged and full of debris all around it. Retaining walls have been provided on two sides. Old, damaged, worn out red sand stone members at the dab, quid, veneer panels, *jali*, *mutakka* were replaced as per original (Pl. 88). Pinnacles of white marble and red sand stone were restored wherever missing as per the original (Pl. 89). Grill fencing has also been provided over brick tile wall all around the mosque after removal of debris.

### **20. TEMPLE NO.1 AT AHICHCHHATRA, DISTRICT BAREILLY**

The excavated dilapidated temple site was covered with vegetation; brick walls of terraces at several locations had either collapsed or bulged out. The vegetation was removed from all around the structure. The bulged walls at different location were repaired by using the available material. The outer brick wall and the boxes were full of fallen debris and out of plumb. The debris was removed and the out of plumb wall taken out and reset again using the same material (Pl. 90). The fallen debris within

the boxes was also removed and these brought back to its original level. The work is in progress. It was decided to take up the detailed conservation of the excavated remains from the northern side in the 1<sup>st</sup> phase.

### **21. TOMB OF IKLAS KHAN, BUDAUN, DISTRICT BUDAUN**

The cracks of the roof and ceiling were repaired by using traditional mortar. The decayed plaster of the wall were removed and re-plastered. The interior of the tomb was restored to its original level by removing the accumulated earth and then was re-laid in lime concrete. The boundary wall of the tomb was also repaired at different places (Pl. 91).

### **22. TOMB OF IMADUL MULK ALIAS PISAN HARI-KA-GUMBAZ BADAUN, DISTRICT BADAUN**

Locally known as Panch peer, the dead plaster of the wall of this tomb was removed and the exposed *lakhauri* brick wall has been pointed with traditional mortar. The minarets were also repaired (Pl. 92). The modern paint on the dome has now been removed and its original colour was restored.

### **23. TOMB OF HAFIZ-UL-MULK RAHMET KHAN, THE ROHILLA CHIEF, BAREILLY, DISTRICT BAREILLY**

The main tomb of the monument was provided with R.C.C. roof supported with brick masonry pillar over the main grave and the subsidiary graves all around the main tomb were also damaged and sunken at several places. The compound wall both from exterior and interior was completely in

Plate 87



A



B

Taj Mahal, Agra: before and after conservation of southern side of the Fatehpuri mosque.





Taj Mahal, Agra: before and after conservation of Fatehpuri mosque, broken and decayed stones,



Plate 89



A



B

Taj Mahal, Agra: before and after conservation of Fatehpuri mosque, broken pinnacles.



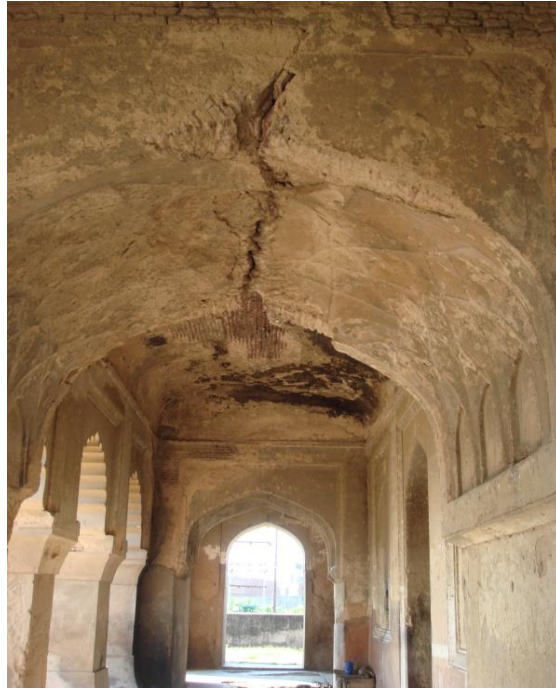
A



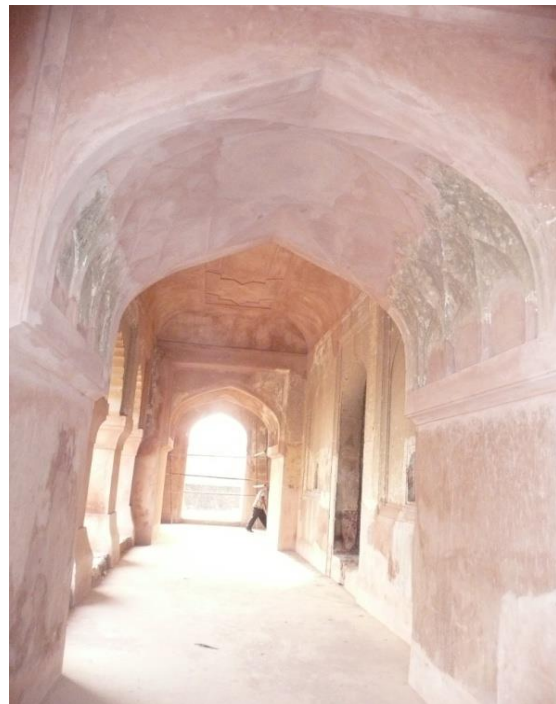
B

Ahichchhatra: before and after conservation of Temple-1.

Plate 91



A



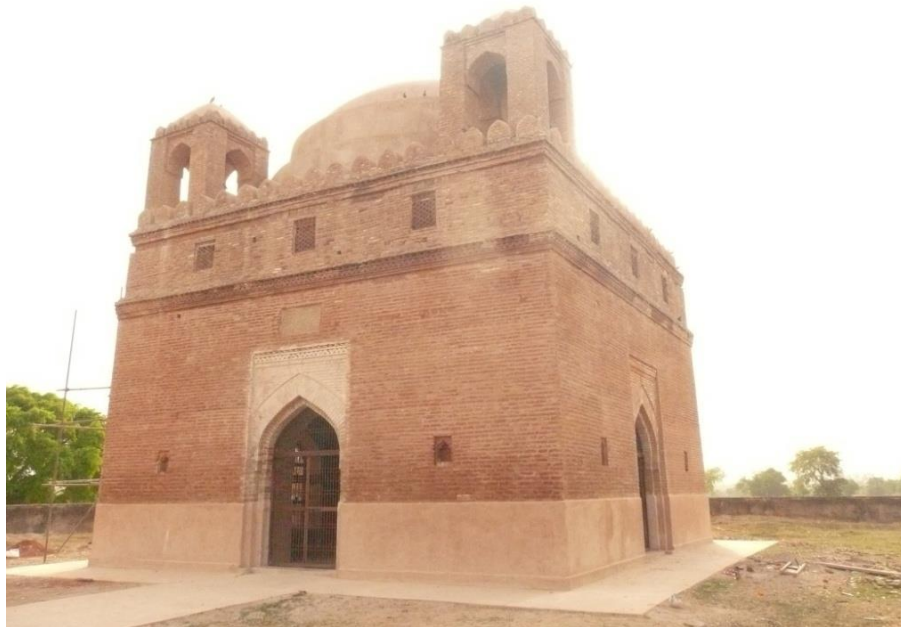
B

Tomb of Iklas Khan, Badaun: before and after conservation of cracked ceiling.





A



B

Badaun: before and after conservation of tomb of Imadul Mulk alias Pisan Hari-Ka-gumbaz.

dilapidated condition and on the verge of collapse. In 1<sup>st</sup> phase the compound wall, the subsidiary graves and sunken area and the remaining original structure of main tomb including the entrance was repaired (Pl. 93). An approach brick pathway from main road to the monument has been provided (Pl. 94). It has been proposed to restore the original dome and remove the R.C. roof in future in order to bring the monument to its original shape.

**24. TWO GATEWAYS AT JAJAU-KI-SARAI, JAJAU, DISTRICT AGRA**

The two dilapidated double storied gateways were taken up for conservation. While the southern one has been completed, the work on the western one is in progress. The damaged floor of lower verandas and cells of upper storey were re-laid in lime concrete. Terrace roof was also repaired with lime concrete layer after removing the dead one. Damaged and bulged out veneering red sand stone slabs and broken *kangooras* were replaced by new one.

**25. ULTAKHERA RAGHUNATHJI, HASTINAPUR, DISTRICT MEERUT**

Boundary wall was provided around the mound measuring 618 mts length in brick tile masonry work.

**AURANGABAD CIRCLE**

**MAHARASHTRA**

**26. AJANTA CAVES, AJANTA, DISTRICT AURANGABAD**

In continuation to the previous year, the work of providing chain link fencing on the top of the Ajanta Caves was carried out in

order to prevent trespassing into the archaeological area.

**27. ELLORA CAVES, ELLORA, DISTRICT AURANGABAD**

The caves at Ellora are located on the western scarp of the hill ranges and are separated at many points due to streams and shallow ditches. The visitors have to often take a circuitous route. In order to encourage better visitor experience and to integrate the natural setting in the visitor environment, it was decided to provide a pathway connecting these caves. The work of providing dressed stone pathway over a layer of cement concrete bed connecting the Caves 19 – 34 was taken up this year and the work is in progress. A pedestrian footbridge is also under construction over the stream to the right of Cave 16, which will connect the above pathway and complete the circular route for the tourists starting from Cave 1 to 34.

In continuation of last year's work, the archaeological area above the caves was provided with G.I. chain link fencing. The archaeological area in front of the caves was provided with grill fencing. Shallow rock-cut *kunds* (pits) in front of Jogeshwari and Ganesa group of caves were de-silted so as to have better water storage.

**28. BIBI-KA-MAQBARA, AURANGABAD, DISTRICT AURANGABAD**

The inner core of the Bibi-ka-Maqbara is built of the locally available basalt rock and the exterior surface is plastered with several layers of lime plaster and adorned with stucco designs. The disintegrated plaster on the outer face of the enclosure wall facing east was removed and the exposed surface



A



B

Bareilly: before and after conservation of tomb of Hafiz-ul-Mulk Rahmet Khan, the Rohilla Chief.



Plate 94



A



B

Baraaidly: before and after conservation of tomb of Hafiz-ul-Mulk Rahmet Khan.

was re-plastered with specially prepared lime plaster. Further, the decayed and peeled off lime plaster of the north-west minaret was removed and re-plastered. The ornamental designs on the bracket were also restored. The work of providing grill fencing over dwarf wall masonry all around the parking area was taken up and the work is in progress.

### **29. DAULATABAD FORT, DAULATABAD, DISTRICT AURANGABAD**

A portion of the fallen fortification wall near the eastern gate of the Mahakot was reconstructed by using available stones and new stones as per existing patterns. The core in between the wall was filled with stones in random rubble masonry set in lime mortar. The undulated and damaged steps leading from Ganesha temple to Baradari was dismantled carefully and was re-laid over the cement concrete bed for easy access. The work of reconstructing the breached wall of the *Kacheri* building by using available stones set in fresh lime mortar, water tightening the roof with brick jelly and lime after removing the pulverized lime concrete is in progress.

### **30. RETAINING WALL TO THE EAST OF ANDHERI, DAULATABAD FORT, DISTRICT AURANGABAD**

The fallen portion of the retaining wall to the east of Andheri and above the rock cut moat and adjacent to the pedestrian foot bridge is being reconstructed as per the original. The fallen and collapsed retaining wall to the northeast side of *Baradari* was reconstructed in UCR stone masonry.

### **31. PITALKHORA CAVES, DISTRICT AURANGABAD**

The work of providing railing along the steps leading to the caves from the parking area was completed. A drain in stone masonry on either side of the steps to drain out the rain water was also constructed.

### **32. LONAR GROUP OF MONUMENTS, LONAR, DISTRICT BULDHANA**

The documentation and condition mapping of temples of Lonar was completed. The work of restoration of the dislodged steps leading from Ganesa temple to lower crater is in progress.

### **33. MAHADEVA TEMPLE, PATNADEVI, DISTRICT JALGAON**

The work of laying stone slab apron all around the temple over a concrete bed layer to prevent stagnation of rain water and damage to original structure was completed. A hume pipe culvert over the small stream connecting the temple was constructed and a retaining wall on either side of the culvert was provided.

### **34. MUDHAI DEVI TEMPLE, WAGHALI, DISTRICT JALGAON**

In continuation of previous year work, a stone masonry retaining wall on the southern side of temple was constructed to stop the erosion on the river side.

### **35. BALESHWAR AND LAKSHMINARAYANA TEMPLES, PEDGAON, DISTRICT AHMEDNAGAR**

G.I. chain link fencing was provided over the enclosure wall of the protected area to prevent trespassing and threat to the monument.

**36. OLD TEMPLE, KOKAMTHAN, DISTRICT AHMEDNAGAR**

A chain link fencing over a dwarf stone masonry wall was provided around the temple.

**37. ANCIENT SITE, DAIMABAD, DISTRICT AHMEDNAGAR**

The work of providing G.I. chain link fencing over a dwarf masonry wall around the protected area is in progress.

**38. TEMPLE OF DEVI, MANDAVAGAON, DISTRICT AHMEDNAGAR**

The area around the temple was provided with G.I. chain link fencing over a dwarf masonry wall.

**39. DAMDI MASJID, AHMEDNAGAR, DISTRICT AHMEDNAGAR**

The work of construction of stone masonry enclosure wall around the mosque is in progress.

**40. MALLIKARJUNA TEMPLE, GHOTHAN, DISTRICT AHMEDNAGAR**

The work of providing G.I. chain link fencing on angle iron post over a dwarf masonry wall was completed.

**41. SHIVA TEMPLE, PARNER, DISTRICT AHMEDNAGAR**

The work of providing chain link fencing over dwarf masonry wall is in progress.

**42. MAHADEVA TEMPLE, DEOTHAN, DISTRICT NASIK**

The work of providing G.I. chain link

fencing around the protected area is in progress.

**43. HINDU TEMPLE AT AMBEGAON, DISTRICT NASIK**

The erection of chain link fencing around the protected area over a dwarf stone masonry wall was completed.

**44. GONDESHWAR MAHADEV TEMPLE, SINNAR, DISTRICT NASIK**

The area around the temple was enclosed by providing G.I. chain link fencing on angle iron posts over a dwarf masonry wall.

**45. CAVES AT ANKAI, DISTRICT NASIK**

A G.I. pipe railing to the steps leading to the caves was provided. The bulged out retaining wall on the north side of Caves 1 to 9 was dismantled and reconstructed after strengthening the foundation. A G.I. pipe railing over the dwarf masonry wall was erected in front of Cave 1 to 9 for safety of visitors.

**46. BALLARSHA FORT, BALLARSHA, DISTRICT CHANDRAPUR**

In continuation to last year, the work of reconstruction of missing inner veneering wall on the eastern side of the fort with new stones after strengthening the foundation was taken up. The work is in progress.

**47. PATUR CAVES, PATUR, DISTRICT AKOLA**

The work of erecting, chain link fencing over a dwarf wall around the caves is in progress.



### 48. BHANDAK FORT, BHADRAVATI, DISTRICT CHANDRAPUR

In continuation of previous year, the work of reconstruction of missing inner veneering wall on the western side of the fort with new stones after strengthening the foundation is in progress.

## BANGALORE CIRCLE

### KARNATAKA

### 49. FORT, DEVANAHALLI, DISTRICT BANGALORE

The disturbed, out of plumb and fallen portion of the fort wall on the western side has been reconstructed with available stones and the core filled with lime mortar mixed with brick bats.

### 50. VITHALA TEMPLE, VENKATAPURA, DISTRICT BELLARY

Debris accumulated along the enclosure wall at north-east was cleared to expose the plinth portion. The out of plumb and over hanging architectural members in the north-eastern side of the enclosure wall has been dismantled, documented and reconstructed to its original position and alignment.

### 51. ZANANA ENCLOSURE, KAMALAPURAM, DISTRICT BELLARY

The out of plumb *prakara* wall in the north-eastern side of the *Zanana* enclosure has been dismantled and reconstructed with available stone as per the original.

### 52. KRISHNA TEMPLE, KRISHNAPURA, DISTRICT BELLARY

The out of plumb, dislodged and disturbed steps of *Lokapavani* tank has been

dismantled. The tank was de-silted and rolled boulders found therein were removed. The flight of steps has been restored as per the original.

### 53. DOUBLE STORIED MANDAPA, VENKATAPURA, DISTRICT BELLARY

The out of plumb, dislodged and over hanging architectural members were carefully dismantled after removing the decayed weather proof course over the *mandapa* with proper documentation.

### 54. VISHNU TEMPLE III, VENKATAPURA, DISTRICT BELLARY

The out of plumb, over hanging architectural members of the main entrance and enclosure wall were dismantled and restored as per the original.

### 55. ACHYUTARAYA TEMPLE, VENKATAPURA, DISTRICT BELLARY

The out of plumb pillars, beams and over hanging roof members of the kitchen (*paka-shala*) has been dismantled and restored as per the original by using available stone members.

### 56. DANNAYAKA ENCLOSURE, KAMALAPURA, DISTRICT BELLARY

The out of plumb fortification wall at north west has been dismantled after proper documentation and reconstructed in its original position. During the clearance of the debris accumulated over to a depth of 2.80m, a shrine with a sanctum and a *mandapa* was exposed outside the restored enclosure wall.

### 57. RAMESHWARA TEMPLE, NARASAMANGALA, DISTRICT CHAMARAJANAGAR

The dilapidated *Saptamatrika* shrine was completely dismantled up to the foundation and after relaying the foundation in size stone masonry, the structure was rebuilt using the same pillars, beams and roof slabs and new stones wherever missing. The sculptures of *saptamatrikas* were repositioned as per the original over their respective pedestals (Pl. 95).

**58. BHOGANANDEESVARA TEMPLE, NANDI, DISTRICT CHIKKABALLAPUR**

The damaged and deteriorated brick lime concrete over the *mahadvara- mandapa* and other sub-shrines were removed and was provided with fresh weather proof course (Pl. 96).

**59. FORTRESS AND TEMPLE ON THE HILL, CHITRADURGA, DISTRICT CHITRADURGA**

A platform in front of Ekanatheshvari temple has been restored. The fallen fort wall was reconstructed and the top surface has been water tightened in the northern side of the fortification. The missing portion of the retaining wall of the moat has been reconstructed in between the third and fourth gateways. Earth work excavation has been carried out inside the moat for collecting the stone members and leveling the undulated areas in between the third and fourth fortifications.

**60. KALLESVARA TEMPLE, BAGALI, DISTRICT DAVANAGERE**

Repairs were carried out to the tank bund on the southern side of the temple. During the course, the buried portion of the sub-shrine like Veerabhadreswara was exposed. Many architectural units that were used for constructing the tank bund were carefully

retrieved and used for reconstruction after documenting them.

**61. PARSVANATHA BASADI, HALEBID, DISTRICT HASSAN**

The out of plumb and collapsed stone veneering of the wall of the temple on the western and southern sides was reset to plumb with suitable core filling in brick and lime concrete (Pl. 97).

**62. HOYSALESHWARA TEMPLE, HALEBID, DISTRICT HASSAN**

The dead lime concrete over the leaky roof of the twin temple has been removed and water tightened by providing a fresh course of surkhi mixed with lime mortar (Pl. 98).

**63. AMMAN SHRINE KESHAVA TEMPLE, BELUR, DISTRICT HASSAN**

Fresh weather proof course was provided to the leaky roof of the shrine after careful removal of the damaged and deteriorated brick and lime concrete (Pl. 99).

**64. SADASHIVA TEMPLE, NUGGEHALI, DISTRICT HASSAN**

The disturbed, fallen and out of plumb enclosure wall has been dismantled after proper documentation and restored as per the original using available stones. The out of plumb watch tower has been dismantled and restored with available stones followed by the proper documentation.

**65. CHATURMUKHA BASADI, KARKALA, DISTRICT SOUTH CANARA**

The dead concrete over the roof of the Chaturmukha basadi has been removed and



A

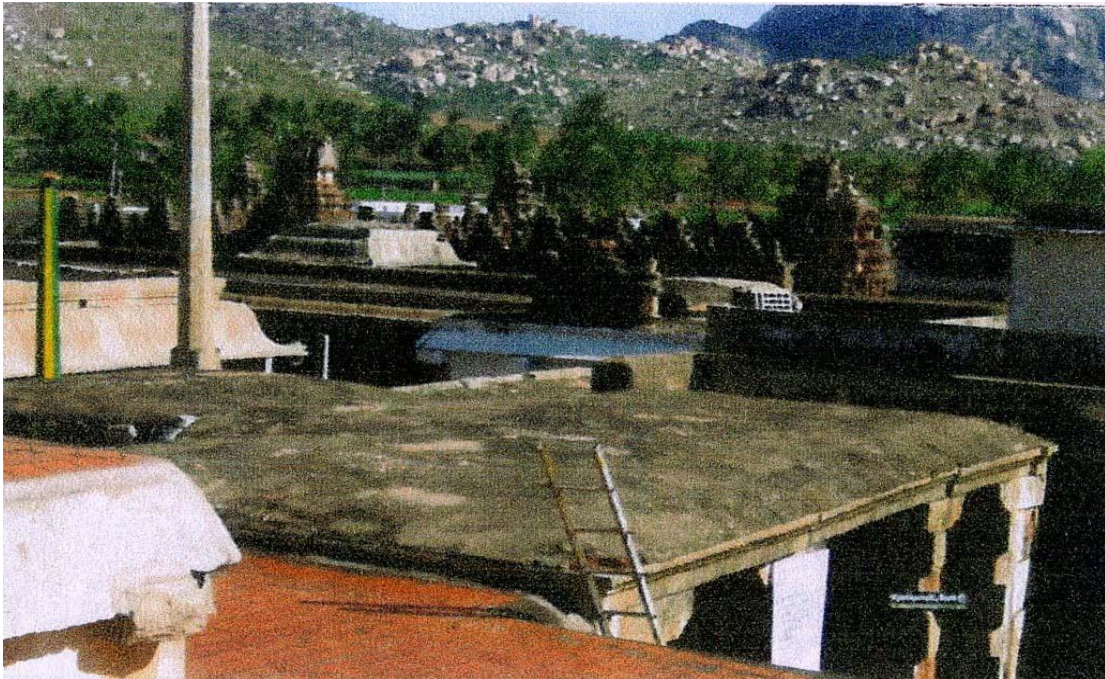


B

Narasamangala: before and after conservation of Rameshwara temple.



Plate 96



A



B

Nandi: before and after conservation of Bhoganandeshvara temple.





A



B

Halebid: before and after conservation of Parsvanatha Basadi.

Plate 98



A



B

Halebid: before and after conservation of Hoysaleswara temple.





A



B

Belur: before and after conservation of Rangnayaki Amman shrine, Kesava temple.

fresh weather proof course of lime concrete has been provided to arrest leakage.

**66. TRIPURANTESVARA TEMPLE, BELLIGAVI, DISTRICT SHIMOGA**

The dismantled out of plumb entrance *mandapa* and *garbha griha* of the temple has been restored as per the original (Pl. 100).

**67. FORTRESS AND RENUKA TEMPLE, CHANDRAGUTTI, DISTRICT SHIMOGA**

The out of plumb fortification on the slope of the hill towards the south eastern side of the temple has been reconstructed. The ancient steps near Sula Beerappa shrine were re-laid as per the original (Pl. 101).

**68. TEMPLE AND INSCRIPTION, UDRI, DISTRICT SHIMOGA**

The entire monument was dismantled after removing the heavy growth of tree roots and other vegetation and after proper documentation the same was reconstructed same after strengthening the foundation. A retaining wall on northern side of the Ishwara temple has been constructed to arrest soil erosion and to prevent damage to the monument (Pl. 102).

**69. ANANTA PADMANABHA TEMPLE, KARKALA, DISTRICT UDUPI**

Fenced the protected area with crimped mesh over a dwarf wall around the temple and the fallen *prakara* wall has been restored as per original.

**BHUBANESWAR CIRCLE**

**ODISHA**

**70. NILAMADHAVA AND SIDDHESVARA TEMPLES, GANDHARADHI, DISTRICT BOUDH**

In continuation of previous years work the restoration of missing and damaged platform on the north side on which the temples stand is in progress by way of replacing the damaged stone blocks with original fallen sand stones available at the site (Pl. 103).

**71. PASCHIM SOMANATHA, BHUBANESWAR AND KAPILESVARA TEMPLES, BOUDH, DISTRICT BOUDH**

Relaying of the damaged stone apron around the group of temples with new sand stone blocks matching the monument has been taken up and the work has been completed. The renovation work of the kitchen has been completed by way of plastering and replacing the damaged roof with new G.I. sheets over the M.S. pipe frame work. The decayed door and window frames have also been replaced with new *sa* wood frame. The laying out of the approach pathway and sand stone flooring around the minor shrines within the complex has been completed.

**72. KEDARESVARA MAHADEVA TEMPLE, CHOUDWAR FORT, DISTRICT CUTTACK**

In continuation of previous year's work, the structural repair to the main temple has been completed by way of removing the broken and damaged stone members from the top to the ground level and re-fixing the collected stone blocks from the site with traditional combined lime mortar as per original (Pl. 104).





A



B

Belligavi: before and after conservation of Tripurantresvara temple.



Plate 101



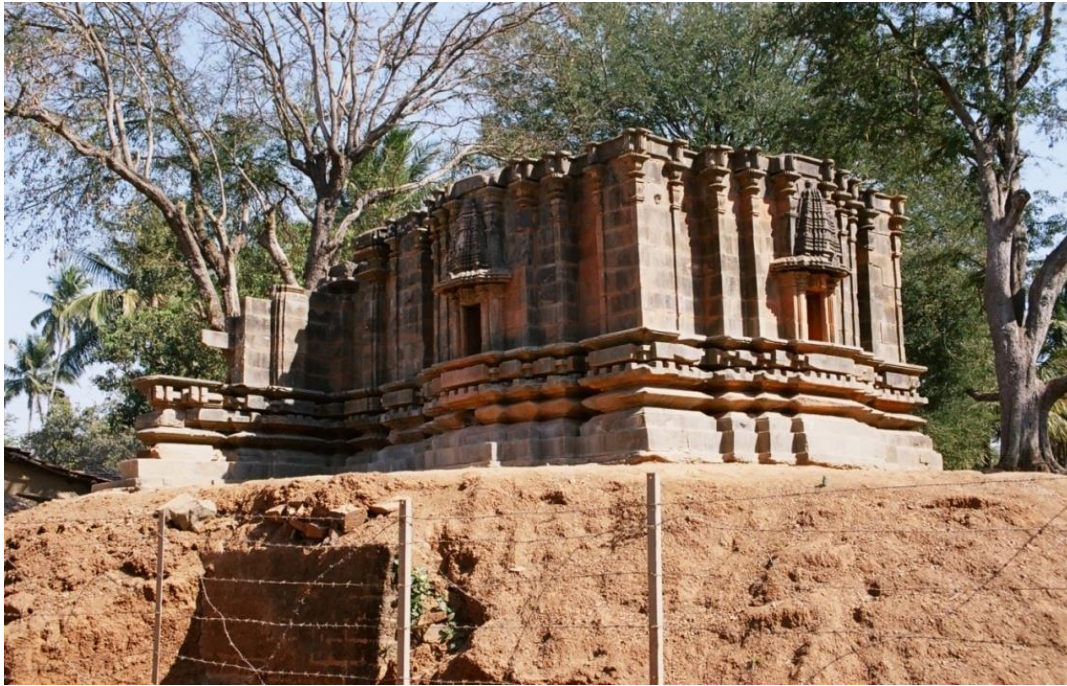
A



B

Chandragutti: before and after conservation of fortress and Renuka temple.





A



B

Udri: before and after conservation of temple and inscription.



Plate 103



A



B

Gandharadhi: before and after conservation of Nilamadhava and Siddhesvara temples.





A



B

Choudwar fort, Badhi: before and after conservation of Kedaresvara Mahadeva temple.

**73. EXCAVATED REMAINS, BADHI, CHOUDWAR FORT, DISTRICT CUTTACK**

In continuation of previous year's work the conservation work of the excavated remains of Badhi has been completed by way of pointing, sealing the joints, resetting the architectural members in their original places with traditional lime mortar. The temple remains which have been brought to light during the previous year's conservation was also restored by way of sealing the joints, recess pointing with traditional combined lime mortar as per the original and the work has been completed (Pl. 105).

**74. BARABATI FORT, CUTTACK, DISTRICT CUTTACK**

Restoration of the inner moat wall in eastern and southern sides are in progress by way of tracing the alignment of the wall below the water level, after desilting and collecting the original fallen stone members from the moat, The work of providing stone paved approach pathway has been resumed by way of laying dressed khondalite stone blocks matching the original structure and the work is in progress.

**75. DURGA TEMPLE, BAIDESWAR, DISTRICT CUTTACK**

The work of providing stone pavement around the temple has been completed. Water tightening to the roof of *sikhara* has been completed by way of pointing, joint sealing and grouting with traditional combined lime mortar as per the original.

**76. EXCAVATED BUDDHIST SITE, LALITAGIRI, DISTRICT CUTTACK**

The conservation work of the excavated votive stupas in the proximity of the *chaityagriha* has been taken up by way of re-fixing the dislodged architectural members in their original position with traditional combined lime mortar and the work is in progress. Water tightening to the *chaityagriha* has been completed by way of pointing, joint sealing and plastering with traditional lime mortar. Repair to the enclosure wall of the *chaityagriha* has also been undertaken by way of resetting the out of plumb bricks to their original position with traditional lime mortar and the work is in progress (Pl. 106).

**77. SIMHANATHA TEMPLE, GOPINATHAPUR, DISTRICT CUTTACK**

The work of providing stone flooring around the temple has been completed by way of relaying dressed sand stone blocks matching the monument. Water tightening to the roof of the *jagamohana* has also been completed. Repairing of compound wall has been completed by way of plastering and colour washing.

**78. KANAKESVARA MAHADEVA TEMPLE, KUALO, DISTRICT DHENKANAL**

In continuation of previous year's work, the sunken floor was relaid with old stone blocks/new stone blocks on a sand cushion. The work has been completed in north-east corner of the floor. The work of construction of boundary wall within the protected area has been completed by way of constructing dwarf wall with iron grill. Besides, structural repairs to the main temple and other sub shrines have also been taken up by way of pointing, sealing the joints and grouting and the work is in progress.



A



B

Choudwar fort, Badhi: before and after conservation of excavated temple remains.





A



B

Lalitagiri: before and after conservation of *Chaityagriha*.

### **79. CHANDRASEKHARA JEW TEMPLE, KAPILAS, DISTRICT DHENKANAL**

In continuation of previous year's work, the ancient steps leading to the hill top has been restored by way of replacing the damaged stones with new ones and pointing with traditional lime mortar. The work is in progress. Damaged entrance door of main temple has been replaced with new one as per original. Besides construction of the periphery wall over the hill top has also been partially completed.

### **80. ANNAKOTESVARA TEMPLE, LATADEIPUR, DISTRICT DHENKANAL**

Laying of khondalite stone apron around the temple has been completed.

### **81. ANANTASAYI VISHNU, SARANG, DISTRICT DHENKANAL**

To prevent the water thrust of Brahmani river, construction of a random rubble masonry retaining wall (groyne wall) is in progress around the reclining sculpture.

### **82. KAPILESVARA MAHADEVA TEMPLE, HATUARI, DISTRICT DHENKANAL**

To prevent the water thrust of Ramiala river, construction of random rubble masonry retaining wall (groyne wall) has been taken up around the island temple and the work is in progress.

### **83. BHUBANESVARA MAHADEVA TEMPLE, BALIA, DISTRICT JAGATSINGHPUR**

The laying of khondalite stone apron around the temple has been completed. Besides, an approach road to the temple has also been

completed by providing a culvert for easy movement of the visitors.

### **84. EXCAVATED BUDDHIST SITE, UDAYAGIRI-2, DISTRICT JAJPUR**

The conservation work of Monastery 2 has been completed by way of resetting the damaged and out of plumb walls to their original position with traditional lime mortar. The conservation work of the shrine complex has been undertaken by way of resetting the damaged out of plumb walls to their original position with traditional lime mortar. Resetting of the excavated brick structures of shrine complex is also in progress (Pl. 107).

### **85. EXCAVATED BUDDHIST SITE, RATNAGIRI, DISTRICT JAJPUR**

Repair work of votive stupas at Mahakala temple area have been taken up by replacing the damaged bricks with new ones and water tightening them by way of pointing, joint sealing with the traditional lime mortar. The work has been completed. The work of providing retaining wall on either side of the approach road from ticket counter to the Monastery 1 has been taken up and the work is in progress. Besides, the work of providing a drain at the eastern side of the protected area is also taken up for draining out the rain water.

### **86. VARAHANATHA TEMPLE, JAJPUR, DISTRICT JAJPUR**

In continuation with the previous year's work, the renovation work of *rosaghara* was completed. The conservation work of the sub-shrine adjacent to main temple has been



Plate 107



A



B

Udayagiri – 2: before and after conservation.



taken up by way of dismantling and resetting the bulged and out of plumb stones to their original position with traditional lime mortar and the work is in progress.

### **87. MINOR SHRINE OF TRILOCHANESVARA TEMPLE, JAJPUR, DISTRICT JAJPUR**

The laying of khondalite stone apron around the minor shrine within the complex has been completed.

### **88. SUBHASTHAMBHA, JAJPUR, DISTRICT JAJPUR**

The construction of dwarf wall along with security grill around the monument and the laying of stone apron around the monument has been completed.

### **89. JAGANNATHA TEMPLE, JAJPUR, DISTRICT JAJPUR**

Restoration of *snanamandapa* within the temple complex has been completed with the available old and new stones in traditional lime mortar as per original.

### **90. ASURGARH FORT, ASURGARH, DISTRICT KALAHANDI**

In continuation with the previous year's work, the construction of random rubble stone retaining wall on the western side was taken up to prevent further erosion of rampart wall due to flood water. The work is in progress.

### **91. LINGARAJA TEMPLE COMPLEX, BHUBANESWAR, DISTRICT KHURDA**

The Ugrasena temple located to the north of Lingaraja temple has been conserved after

exposing its plinth and repairing the same by way of providing a guard wall, grouting, pointing and replacing the damaged stones with new ones. Repairing the original stone apron around the temple has also been completed. Repair to the Bhubanesvari (Gopaluni) temple, located to the north of Lingaraja temple has been completed by way of pointing, sealing the joints and grouting. The damaged floor of the courtyard in the western side of Lingaraja temple, south side of the kitchen and the area around the Ladukesvara temple area, Vishnu temple, Labanesvara temple, Agnisvara temple and Kalpatarubata has been restored by way of laying new dressed sand stones in traditional lime mortar. A dilapidated minor shrine within the complex has been conserved after dismantling the bulged out architectural members after proper documentation and resetting the same in their original place in traditional lime mortar as per original. The work of providing apron and guard wall around Bhairavi temple has been completed with the available old stone members at the site. The resetting and pointing work to the laterite wall near Vishnu temple and *prakara* wall of Parvati temple has been completed with the help of traditional lime mortar. The restoration work of missing plinth portion of Agnisvara temple has been completed with the help of the collected laterite blocks. Pointing and sealing the wide joints to wall and floor of Dhenkisala room near kitchen has been completed. Painting work to all doors, windows, wire mesh ceiling of main temple and other sub shrines in the complex has been completed.

### **92. JAMBESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

In continuation to the earlier year's work, repair to the *sikhara* of the main temple has been resumed by way of pointing, sealing the joints and grouting. The work has been completed. Repair to the damaged entrance steps of the *jagamohana* has been completed by way of relaying with available sand stones. The conservation work of the *natamandapa* and buried miniature shrines have been completed by way of exposing their plinths and replacing the damaged architectural members with new ones with traditional combined lime mortar. The work of providing apron around *natamandapa* has been completed by way of laying dressed sand stones to arrest the seepage of rain water to the foundation. The conservation work of the steps of the *natamandapa* has been completed by way of replacing the decayed architectural members with new ones, pointing; grouting and joint sealing with traditional combined lime mortar. Relaying of the damaged floor of *jagamohana* has been completed by replacing damaged stones with new ones. *Chandrasila* stone has been re-fixed to the entrance of the *jagamohana*. The water tightening to the *jagamohana* and main temple has also been completed by way of pointing, sealing, the joints, grouting with traditional combined lime mortar.

**93. PAPANASINI TANK, BHUBANESWAR, DISTRICT KHURDA**

In continuation with the earlier year's work, resetting of the dilapidated steps on the north has been resumed by way of relaying the old stone blocks available at the site as per the original alignment with traditional lime mortar and the work is in progress. The conservation work of the wall on the south

has also been taken up by way of recess pointing and joints sealing with traditional combined lime mortar to arrest the seepage of rain water to the structure. The work has been completed. Fixing of M.S grill barricade all around the tank has been completed.

**94. MAKARESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

The conservation work of dilapidated doorjambs has been completed by restoring it with the available old stone blocks at the site.

**95. RAJARANI TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

The work of providing sand stone flooring around the temple has been completed. The stone built signage for the temple has been fixed in front of the gate.

**96. EXCAVATED SITE SISUPALGARH, BHUBANESWAR, DISTRICT KHURDA**

In continuation with the earlier years work, the structural repair to the western entrance gateway and gate way flank top staircase has been resumed by way of resetting the damaged and worn-out laterite blocks, pointing, sealing the joints with traditional combined lime mortar. The work has been completed.

**97. BHASKARESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

In continuation with the earlier year's work, the work of providing approach pathway has been completed by laying dressed sand stone

blocks with lime mortar. Besides, structural repair to the main *deul* has also been completed by way of recess pointing, sealing, the joints with traditional combined lime mortar.

### **98. SISIRESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

Water tightening to the *deul* and *jagamohana* by pointing, sealing the joints with traditional lime mortar has been completed.

### **99. VAITAL DEUL, BHUBANESWAR, DISTRICT KHURDA**

Structural repair to the main *deul* and *jagamohana* by pointing, sealing the joints with traditional combined lime mortar to arrest the seepage of rain water has been completed. Besides, to prevent the stagnation of rain water inside the complex a water pump has been installed.

### **100. RAMESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

In continuation with the earlier year's work, the restoration of retaining wall to the west and the south sides of the tank has been completed by way of laying dressed laterite stone blocks. Construction of *rosaghara* is in progress.

### **101. BRAHMESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

The conservation work of subsidiary shrines within the complex has been completed by way of pointing, joint sealing and grouting with traditional combined lime mortar.

### **102. UDAYAGIRI AND KHANDAGIRI CAVES, BHUBANESWAR, DISTRICT KHURDA**

The construction of dwarf wall with matching coarse rubble stones in the front portion of Udayagiri is in progress. Signage to the Hathigumpha inscription of Kharavela and apsidal structure has been provided. Repair to the side guard wall leading to apsidal structure with repair to the steps with laterite stones and traditional lime mortar has been completed.

### **103. ANANTAVASUDEVA TEMPLE, BHUBANESWAR, DISTRICT KHURDA**

Structural repair to the main temple has been completed by pointing, sealing the joints with traditional combined lime mortar to arrest the seepage of rain water

### **104. DAKSHYAPRAJAPATI TEMPLE, BANPUR, DISTRICT KHURDA**

Resetting of the fallen/damaged architectural members to the north and south side *parvadevata* niches has been completed by way of dressing *khondalite* stone blocks. Besides, repair to *rosaghara* and boundary wall has also been completed (Pl. 108).

### **105. ANCIENT SITE, HARIPURGARH, DISTRICT MAYURBHANJ**

In continuation of earlier year's work, structural repair to the Jagannatha temple is resumed by way of resetting the bricks, core filling, pointing to the joints with traditional



Plate 108



A



B

Banapur: before and after conservation of *Parsvadevata* niche, Dakshyaprajapati temple.

combined lime mortar as per original. The restoration work of the missing *sikhara* of the temple and laying of brick apron around Rasikraya temple has been completed. Restoration and consolidation to the excavated structures within the complex is in progress with the help of special size brick, tile and traditional lime mortar.

### **106. SUN TEMPLE, KONARK, DISTRICT PURI**

In continuation of the earlier year's work, repair to the old damaged floor on the northern side of the main temple was completed. The work of shifting and assembling of fallen architectural members of the main temple on the new constructed platform is in progress. The work of providing stone flooring and edging around the Chhayadevi temple has been completed by way of laying dressed khondalite stones. The old drainage system behind the brick temple has been revived by desilting and necessary repair works. Stone edging work around the *natamandapa* and *jagamohana* is in progress. The repair work of the kitchen area has been completed by way of replacing the missing and damaged laterite/khondolite blocks with new ones, pointing and sealing the joints with traditional lime mortar. Structural repair to the sunken platform within the complex is in progress (Pl. 109).

### **107. JAGANNATHA TEMPLE COMPLEX, PURI, DISTRICT PURI**

In continuation of the earlier year's work, repair to the *garbhagriha* was taken up during Ratha Yatra when the presiding deities were shifted to Srigundicha temple.

As per the recommendation of the Technical Expert Committee and Temple Administration, few damaged flag stone on the floor of *garbhagriha* were replaced with new chlorite stones as per original. Besides, minor repairs were also attended to. The work of providing khondalite stone flooring in north-east corner of the temple is in progress. The work of replacing marble plaques inside court yard with new khondalite stones are in progress for smooth movement of the pilgrims. Repair to the *kurmibedha* has been resumed by way of pointing, sealing the joints and grouting with traditional lime mortar. The damaged stones are also being replaced and work is in progress. Besides, repairing work to Ganesa temple, Bata Jagannatha temple, Narasimha temple, Uttarayani temple and Ramachandra temple are in progress by way of replastering, pointing, sealing the joints and grouting with the traditional combined lime mortar (Pl. 110).

## **CHANDIGARH CIRCLE**

### **HARYANA**

### **108. SHEIKH CHILLI'S TOMB, THANESAR, DISTRICT KURUKSHETRA**

Loose and bulged out lakahuri tiles and brick masonry of the outer face of the eastern fortification wall was taken out and restored the same matching with original. Besides the damaged floors of the museum/office rooms were replaced with the brick tiles on edge.

### **109. HARSH KA TILLA, THANESAR, DISTRICT KURUKSHETRA**

Remains of excavated structures were

Plate 109



A



B

Sun temple, Konark: before and after conservation of the damaged floor on the northern side.





A



B

Puri: before and after conservation of Jagannatha temple complex.

restored as per original pattern and protection wall in brick masonry was provided around the excavated remains and MS grill was provided over it.

**110. NABHA HOUSE, THANESAR, DISTRICT KURUKSHETRA**

Western wall of Nabha House was restored matching with the original and MS grill fencing was provided over dwarf wall around it.

**111. SOLDIERS GRAVE, KARNAL, DISTRICT KARNAL**

Some graves were restored in lime surkhi mortar as per original, brick on edge pathway was provided and plastering of the boundary wall was completed.

**112. GHARAUNDA SARAI, GHARAUNDA, DISTRICT KARNAL**

The façade of the monument was conserved by taken out of bulged out tile/brick masonry and restored the same with lime mortar. An apron of brick on edge was laid around the monument (Pl. 111).

**113. WAR MEMORIAL SITE, KALA AMB, DISTRICT PANIPAT**

Pathway was restored by red sandstone flooring over lime - surkhi concrete

**114. TOMB OF KHAWAJA KHIZIR, SONEPAT, DISTRICT SONEPAT**

Pathway was provided by relaying brick tiles on edge and restored the boundary wall around the monument (Pl. 112).

**115. KABULI MOSQUE, PANIPAT, DISTRICT PANIPAT**

A boundary wall in tile brick masonry and lime surkhi mortar was provided around the monument.

**116. ANCIENT MOUND, AGROHA, DISTRICT HISSAR**

The gateway of the fort has been restored and apron has been provided around it. Outer enclosure wall of the stupa has been restored and work of providing pathway is in progress (Pl. 113).

**117. FEROSH AH PALACE, HISSAR, DISTRICT HISSAR**

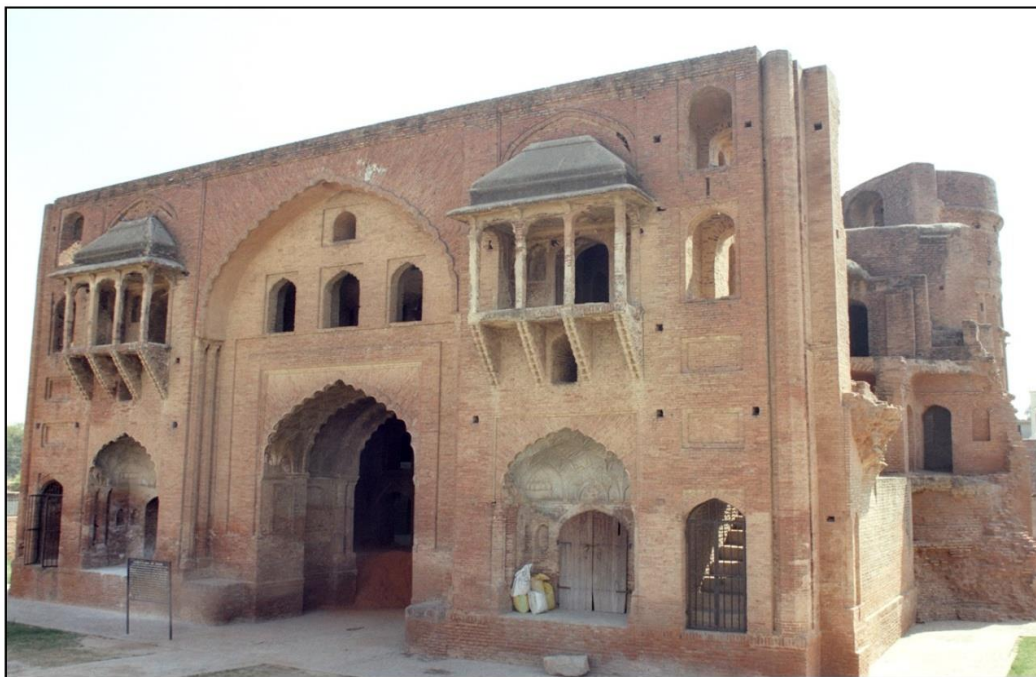
The work of providing lime terracing has been completed and MS grill was fixed over the gates/openings. The restoration of western and eastern fortification wall in RR stone masonry is in progress (Pl. 114).

**118. PRITHVI RAJ FORT, HANSI, DISTRICT HANSI**

The conservation work of the outer fortification wall of the fort was taken up by underpinning with lakhauri/country/tile brick masonry in lime surkhi mortar. The work is in progress (Pl. 115).

**119. SHIVA TEMPLE, KALAYAT, DISTRICT KAITHAL**

The retaining wall of the *samadhi* of Chiman Baba in Siva temple complex was restored in *lakhauri* brick/masonry after providing solid foundation stitching cracks and pointing. The restoration work of out of plumb/fallen *lakhauri* brick masonry is now in progress.



A



B

Gharunda: before and after conservation of gateway of old Mughal sarai.



Plate 112



A



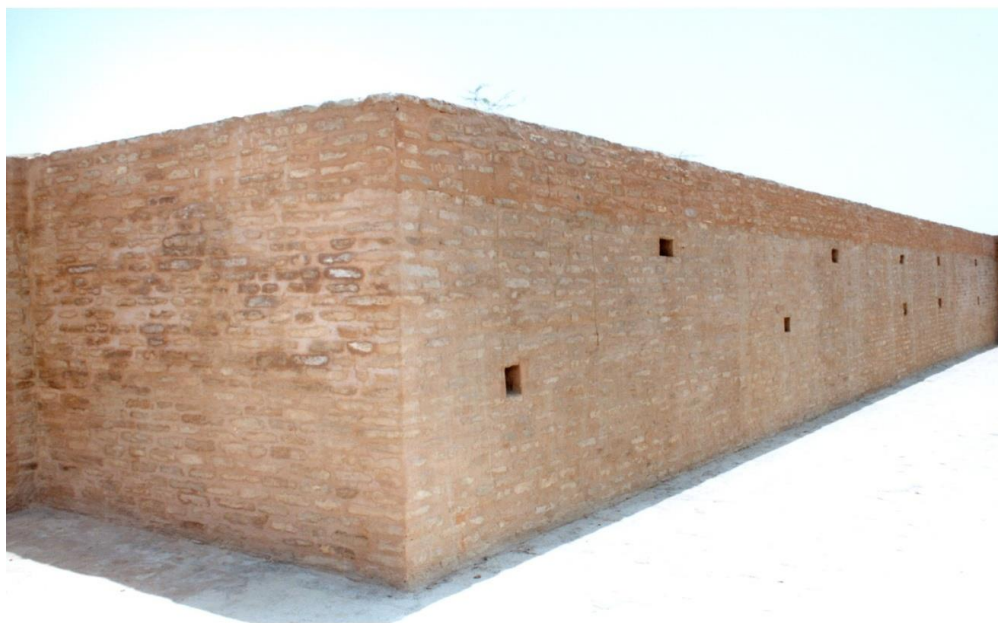
\*

B

Sonepat: before and after conservation of Khawaja Khizir tomb.



A



B

Agroha: before and after conservation of Buddhist stupa.



Plate 114



A



B

Hissar: before and after conservation of Ferozshah palace.





A



B

Hansi: before and after conservation of Prithviraj Chauhan fort.

**120. SURAJ KUND, LAKKARPUR, DISTRICT FARIDABAD**

The foundation of the platform of the tank was strengthened and stairs of the tank were consolidated by providing RR stone masonry after taking out damaged and decayed material. The work is in progress (Pl. 116).

**121. JAL MAHAL, NARNUAL, DISTRICT MAHINDERGARH**

The foundation of the Jal Mahal was consolidated by providing RR stone masonry in lime *surkhi* mortar. The work is in progress. MS grill was fixed on the masonry wall. The area surrounding the monument was cleared of debris.

**122. IDGAH COMPLEX, JHAJJAR, DISTRICT JHAJJAR**

The compound wall of the Idgah No. 1 was restored as per original after consolidating its foundation and it was provided with sand stone flooring. The monument was further strengthened with RR stone masonry and pointing. MS grill fencing was provided around the monument.

**123. KOS MINAR, DHEERPUR, DISTRICT KURUKSHETRA**

The boundary wall of the Kos Minar was repaired by underpinning the missing brick work. Plastering of the Minar was completed.

**124. KOS MINAR, ADHAUN DISTRICT KURUKSHETRA**

The boundary wall of the Kos Minar was restored by underpinning, and stitching the cracks in brick masonry. Plastering of the boundary wall was completed.

**125. KOS MINAR, BHAWANI KHERA, DISTRICT KURUKSHETRA**

The boundary wall of Kos Minar was restored by underpinning and plastering of the boundary wall was completed.

**126. KOS MINAR, ZAINPUR DISTRICT KURUKSHETRA**

The boundary wall of the Kos Minar is restored and plastered and grill fencing was provided over the boundary wall.

**127. KOS MINAR, AMIN, DISTRICT KURUKSHETRA**

The boundary wall of the Kos Minar was repaired by underpinning the missing brick work. Plastering of the Minar was also completed.

**128. KOS MINAR, JAWAHAR, DISTRICT SONEPAT**

The boundary wall was restored as per original by underpinning and plastering.

**129. KOS MINAR, AMBALA CITY, DISTRICT AMBALA**

The boundary wall of the Kos Minar was restored by underpinning and plastering. Grill fencing was provided over the boundary wall.

**130. CHOR GUMBAD, NARNAUL, DISTRICT MAHENDRAGARH**

The fallen brick masonry of outer and inner facade of the monument was restored and plastering in lime *surkhi* mortar as per original is in progress (Pl. 117).





A

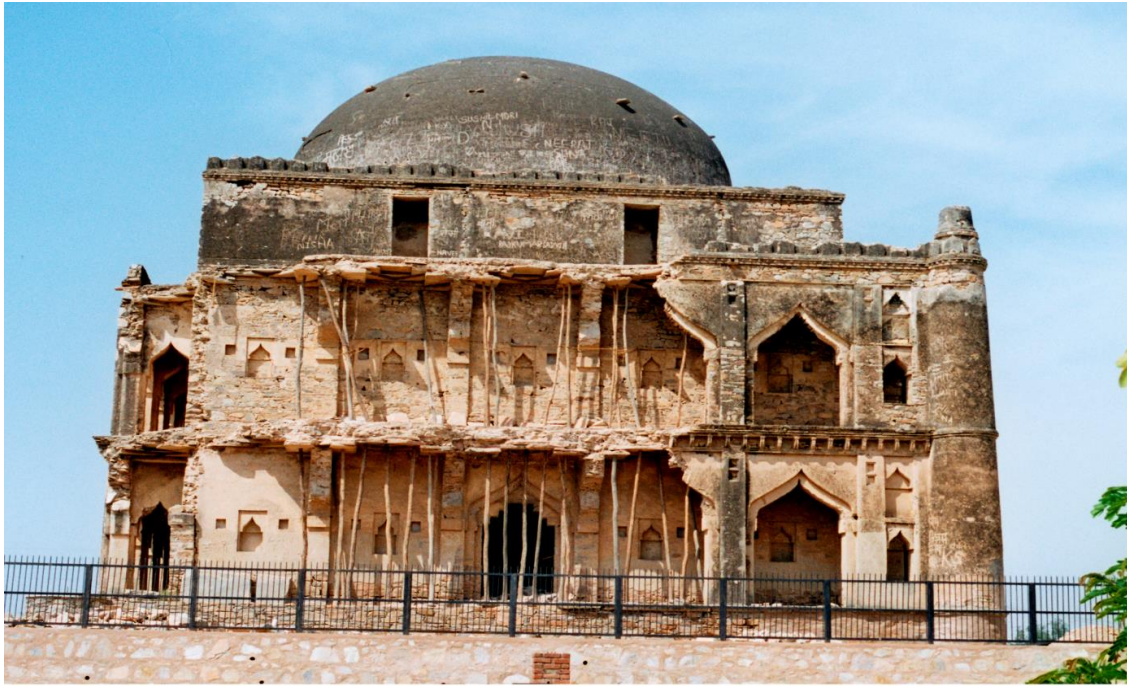


B

Faridabad: before and after conservation of Surajkund.



Plate 117



A



B

Narnaul: during conservation of Chor gumbad.

### 132. SHEESH MAHAL, FARUKHNAGAR

Badly damaged outer and inner façade of Sheesh Mahal was restored by stitching cracks, providing *chhajja* and plastering in lime surkhi mortar matching with the original is in progress. The stone water channel in front of the monument was exposed (Pl. 118).

### 133. BUDDHIST STUPA, CHANETI DISTRICT YAMUNANAGAR

Missing and fallen structure of recently exposed two tiered circular base of Buddhist stupa was restored in brick masonry in lime surkhi mortar as per original. Besides brick tiles were partially relaid over exposed drum of stupa after water tightening. The work is in progress (Pl. 119).

### 134. EUROPEAN CEMETRY, AMBALA CANTONMENT, DISTRICT AMBALA

The damaged graves were repaired by uprooting the vegetation growth, and replacing the missing brick works. The work is in progress (Pl. 120).

## PUNJAB

### 135. DEODI RAMBAGH GATE AMRITSAR, DISTRICT AMRITSAR

Red sandstone flooring was provided around the *deodi* and in the central pathway. Doors and windows were provided in the cells, decayed plaster of the outer facade of the eastern and southern side of the *deodi* was removed and re-plastered matching with the original (Pl. 121).

### 136. SUMMER PALACE COMPLEX, AMRITSAR, DISTRICT AMRITSAR

Outer and inner façade of the watch towers was re-plastered with lime *surkhi* mortar after replacing cement plaster besides plinth protection was provided all around the towers. Doors were provided to watch towers. Conservation of *hammam* was carried out after replacing the cement plaster from the inner side of the *hammam* with lime plaster. Doors were provided to the *hammam*. Baradari Complex was restored after resetting the structure. Grill fencing was provided all around the Baradari Complex. The structure was strengthened by pointing of the joints.

### 137. GATEWAYS OF SARAI, AMANAT KHAN, DISTRICT AMRITSAR

The western gateway of the *sarai* was attended to by stitching the cracks, underpinning the fallen patches, removal of debris. Cells located within the western gateway were consolidated by pointing and underpinning. Besides plinth protection was provided around the western gateway.

### 138. GATEWAY OF OLD SARAI, FATEHABAD, DISTRICT AMRITSAR

The eastern gateway was repaired by pointing and underpinning of the wall. Cracks were stitched with the *lakhauri* brick masonry in lime surkhi mortar.

### 139. DAKHNI SARAI, NAKODAR, DISTRICT JALANDHAR

Cells located in northern side of the western gateway were consolidated by underpinning and pointing besides brick on edge flooring has been provided.



Plate 118



A



B

Farukhnagar: before and during conservation of Sheesh mahal.





A



B

Chaneti: during conservation of Buddhist stupa.



Plate 120



A



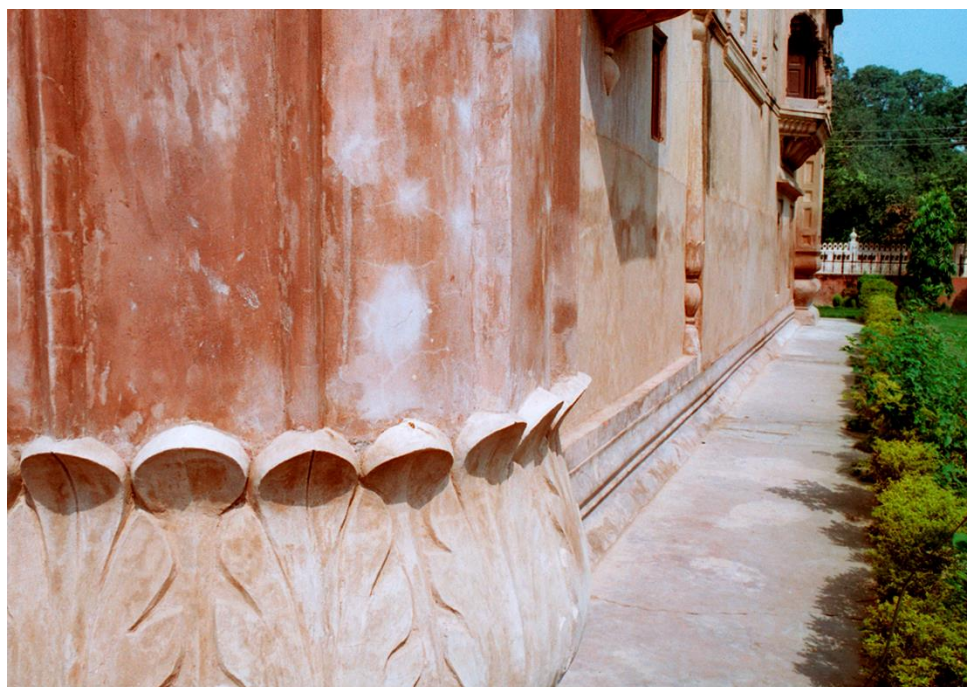
B

Ambala: during conservation of European cemetery.





A



B

Amritsar: before and after conservation of Deodi Rambagh gate.



**140. NOOR MAHAL SARAI, NOORMAHAL, DISTRICT JALANDHAR**

The missing and damaged portion of the cells located in the southern side of the *sarai* was restored in *lakhauri* bricks in lime surkhi mortar matching with original. The missing portion of eastern enclosure wall was undertaken for restoration. Brick flooring over lime concrete bed was laid in the cells (Pl. 122).

**141. ANARKALI BARADARI BATALA DISTRICT GURUDASPUR**

Missing patches on the outer boundary wall was restored matching with the original. Plinth protection was provided around the Baradari and missing steps of tank was replaced. The sunken and pulverized flooring of the plinth was repaired by laying lime concrete and tile bricks flooring, edging was taken up and has been completed.

**142. BHATINDA FORT, BHATINDA, DISTRICT BHATINDA**

The damaged bastion, located in the south-west corner of the fort was taken up for restoration and completed (Pl. 123).

**143. NALAGARH KOTHI, ROPAR, DISTRICT ROPAR**

Boundary wall around the site was constructed over lime cement concrete foundation. The broken well was restored by pointing with lime surkhi mortar.

**144. KOS MINAR, LASKARI KALAN, DISTRICT LUDHIANA**

Boundary wall with lime cement mortar was constructed all around the Kos Minar and

MS grill fencing was provided over the boundary wall. Platform was restored with lime mortar and an apron laid over it. Re-plastering of Kos Minar was completed

**145. KOS MINAR, SANEWAL, DISTRICT LUDHIANA**

Boundary wall in lime surkhi mortar around the Kos Minar was completed and MS grill fencing was provided over the boundary wall. Platform was reinforced with lime mortar and an apron was laid. Re-plastering of Kos Minar was also undertaken.

**CHENNAI CIRCLE**

**TAMIL NADU**

**146. RAMPART WALLS, FORT ST. GEORGE, DISTRICT CHENNAI**

Water tightening the terrace of the rampart wall on the western side and northeast corner has been completed. The work of removing silt, debris from the moat on the eastern side and reconstruction of fallen portion of fortification wall on the north east corner has been carried out. The northeastern portion of the fort has been fenced.

**147. CLIVE'S BUILDING, FORT ST. GEORGE, DISTRICT CHENNAI**

The work of carefully dismantling and removing the badly leaking Madras terrace roof on the eastern side of first floor and relaying the same has been completed. Providing false ceiling using aluminum channels and thermo cool sheets and fixing PVC marble sheets to the reception and lobby of Clive building have been completed.



A



B

Noormahal: before and after conservation of Noormahal sarai.



Plate 123



A



B

Bhatinda: before and after conservation of Bhatinda fort.



**148. ST.MARY'S CHURCH, FORT ST. GEORGE, DISTRICT CHENNAI**

The clock on the on the church tower was repaired.

**149. BLOCK NO. XXXVI/6 (FORT MUSEUM), DISTRICT CHENNAI**

The damaged mesh on the balcony on the eastern side of the first floor of the museum was replaced.

**150. DHARMESVARA TEMPLE, MANIMANGALAM, DISTRICT KANCHIPURAM**

Fencing on the south and west side of the temple has been completed. Fixing of gates and painting of wooden members have been completed.

**151. RUINED DUTCH FORT AND CEMETERY, SADRAS, DISTRICT KANCHIPURAM**

The work of laying chain link fencing to the protected area has been completed.

**152. SHORE TEMPLE, MAMALLAPURAM, DISTRICT KANCHIPURAM**

The work of laying stone pavement from 2nd entrance to the monument has been completed. The work of laying chain link fencing on the north and west sides of the temple have been carried out.

**153 TIRUPULISWARA TEMPLE, VAYALUR, DISTRICT KANCHIPURAM**

The work of laying chain link fencing to the protected area has been completed.'

**154. TIGER HEAD ROCK CUT CAVE, SALUVANKUPPAM, DISTRICT KANCHIPURAM**

The work of laying chain link fencing on the eastern side has been completed.

**155. MEGALITHIC CISTS AND CAIRNS, SANUR, DISTRICT KANCHIPURAM**

The work of providing fencing to the protected area is in progress.

**156. FORT RAJAGIRI, GINGEE, DISTRICT VILLUPURAM**

The work of strengthening the inner and outer moat wall on the northern and southern side of the Rajagiri fort entrance was carried out. The re-construction of the fallen /breached inner fortification wall on the eastern side was carried out and the terrace was water tightened (Pl. 124).

**157. SIVA TEMPLE, FORT GINGEE, GINGEE, DISTRICT VILLUPURAM**

The work of laying chain link fencing on the northern, western and part of the and eastern side along with gates on the northern western sides has been carried out.

**158. ROCK-CUT CAVES, NARASAMANGALAM, DISTRICT TIRVANNAMALA**

The work of providing fencing to the protected area is in progress.

**159. FORT AND RAMPART WALL, VELLORE, DISTRICT VELLORE**

Conservation of the breached lower moat wall as per original on the northern, north-western side has been completed. The

Plate 124



A



B

Fort Gingee: before and after conservation of eastern fortification wall.

conservation of brick platform over the lower moat wall on the southern side was completed.

### **160. ROCK, SCULPTURES AND CAVES, VILAPAKKAM, DISTRICT VELLORE**

The work of providing fencing on southern and part of western side has been completed and entrance gate has been provided.

### **161. NATURAL CAVERNS KNOWN AS VIRUPAKSHI GUHA AND SKANDASHRAM, TIRUVANNAMALAI, DISTRICT TIRUVANNAMALAI**

The breached compound wall on the eastern and southern side was conserved and provided with barbed wire fencing. The work of laying the pathway in front of Virupakshi cave and Skandashram has been completed. The Virupakshi cave has been water tightened and patch plastering the interior walls has been completed.

### **162. NITISVARASWAMY TEMPLE, SRIMUSHNAM, DISTRICT CUDDALORE**

The work of conserving the damaged vaulted roof of open pillared *mandapa* has been completed. The work providing stone flooring to *mukhamandapa*, *navagraha mandapa* and *madapalli* was completed.

### **163. SIKKANATHASVAMI TEMPLE, KUDUMIANMALAI, DISTRICT PUDUKKOTTAI**

The work of water tightening the terrace of the thousand pillared *mandapa* in northern and southern wing has been completed. The laying of the stone flooring in the southern side of the *mandapa* is completed (Pl. 125).

### **164. AGASTISVARA TEMPLE, VELLANUR,**

## **DISTRICT PUDUKKOTTAI**

Water tightening the leaky terrace of *Amman* shrine and conserving the undulated old stone flooring of the open pillared *mandapa*, *ardhamandapa*, *madapalli* has been completed. Removing of accretionary brick wall around *Amman* shrine for exposing the original features of the pillars and conserving the broken beams, ceiling slabs and undulated stone flooring of the main shrine, *mukhamandapa* and *garbha griha* have been completed (Pl. 126).

### **165. ROCK CUT SIVA CAVE TEMPLE, KUNNANDARKOIL, DISTRICT PUDUKKOTTAI**

The work of strengthening the damaged *prakara* copping after carefully dismantling the out of plumb portion on the eastern and southern side has been completed. Water tightening the terrace of the *Amman* shrine and *mukhamandapa* has been completed.

### **166. ROCK-CUT CAVE, NARTHAMALAI, DISTRICT PUDUKKOTTAI**

The work of water tightening the leaky terrace of the Main shrine, *mukhamandapa* and *Amman* shrine has been completed. Conserving the undulated stone flooring near sub shrines has been completed (Pl. 127).

### **167. STONE AND BRICK FORT, TIRUMAYAM, DISTRICT PUDUKKOTTAI**

The work of conserving the fort wall on the eastern side of the south gateway *mandapa* and fallen brick merlons of the fort wall has been completed. The work of conserving the broken beams and ceiling slabs of the south gate way *mandapa* and water tightening the



Plate 125



A



B

Kudumiyamalai: before and after conservation of Sikkathaswami temple.



A



B

Agastisvara temple, Vellanur: before and after conservation of terrace of Amman shrine.



Plate 127



A



B

Narthamalai: before and after conservation of terrace, Rock cut Cave.



same has been completed (Pl. 128).

### **168. SRI UTHMANDANESWARA TEMPLE, KEELATHANYAM, DISTRICT PUDUKOTTAI**

Dismantling the out of plumb structural members like *sikhara* stones, inner and outer veneers stones, outer ornamental stones, ceiling slabs, pillar, pillar capitals, pillar base stone and undulated stone flooring and conserving the same have been completed.

### **169. SRI BHUMISWARA TEMPLE SEVALUR, DISTRICT PUDUKOTTAI**

The protected area of the temple was fenced and the brick masonry parapet wall around the open wall has been reconstructed.

### **170. SRI SIVA AND VISHNU TEMPLE AT TIRUMAYAM, DISTRICT PUDUKOTTAI**

The area around Ganesha shrine has been laid with stone flooring apron to prevent seepage of water.

### **171. ROCK CUT BAS RELIEF OF JAIN IMAGE WITH INSCRIPTIONS AT KEELAKKUIKUDI, DISTRICT PUDUKOTTAI**

Grill railing has been fixed in front of the Jaina bas relief to prevent vandalism and safeguard the image.

### **172. BRIHADISWARA TEMPLE, THANJAVUR, DISTRICT THANJAVUR**

The work of resetting the out of plumb structural members of northern corridor after strengthening the foundation and mending the *adhithana* mouldings of *mahamandapa* is in progress.

### **173. BRIHADISVARA TEMPLE, GANGAIKONDACHOLAPURAM, DISTRICT ARIYALUR**

The work of mending *adhithana* mouldings of *mahamandapa* on northern side and conservation of the *prakara* wall on the southern, northwestern and western side has been completed (Pl. 129).

### **174. AIRAVATESVARA TEMPLE, DARASURAM, DISTRICT THANJAVUR**

The work of conserving the northern corridor after strengthening the foundation and water tightening the terrace of cloister *mandapa* has been completed.

### **175. APATHSAHAYESWARA TEMPLE, SENDAMANGALAM, DISTRICT VILLUPURAM**

The work of conserving *adhithana* mouldings on southern and western side of the corridor and conserving the *prakara* wall has been completed.

### **176. FORT AND TEMPLE ON THE HILL, SANKARI, CHINNAKAVANDANUR, DISTRICT SALEM**

Pointing the stone joints and strengthening the bastion on the rear side with earth filling and water tightening the top portion of bastion has been completed (pl. 130).

### **177. PATHALESVARA TEMPLE, BRAHMADESAM, DISTRICT VILLUPURAM**

Conserving the *patasala mandapa* after strengthening the foundation is in progress.

### **178. BRAHMAPURISWARA TEMPLE, BRAHMADESAM, DISTRICT VILLUPURAM**

The work of water tightening the terrace of the *natyamandapa* and laying of stone

Plate 128



A



B

Fort, Tirumayam: before and after conservation of entrance gateway.



A



B

Brihadisvara temple, Gangaikondacholapuram: before and after conservation of adhisthana.



flooring in the inner *prakara* has been completed.

**179. REMAINS OF THE FORT WITH THE BUILDINGS THERE ON, ATTUR, DISTRICT SALEM**

Construction of random rubble masonry dwarf wall around the Mahal building for fixing chain link fencing and laying of tiles over the flooring of *Darbar* hall have been completed.

**180. HILL FORT, NAMAKKAL, DISTRICT NAMAKAL**

The merlons were strengthened by plastering the damaged portions. The work of laying floor was also completed.

**181. SUGRISWARA TEMPLE, SIRCARPERIYAPALAYAM, DISTRICT ERODE**

The work of reconstruction of *prakara* wall on eastern side and plastering the same has been completed.

**PONDUCHERRY**

**182. VARDARAJA PERUMAL TEMPLE, TIRUBHUVANAI, PUDUCHERRY**

Brick flooring around the main shrine, front *mandapa*, *Alwar* shrine and Amman shrine was completed.

**DEHRADUN CIRCLE**

**UTTARAKHAND**

**183. SUN TEMPLE, KATARMAL, DISTRICT ALMORA**

The weathered and out of plumb four

miniature shrines in front of the main shrine of the complex and *sukanasika* of the main shrine were dismantled and re-set as per the original after strengthening the foundation. The resetting work of southeast corner of the main shrine has been completed and copper dowels were also used in place of iron ones. The badly damaged walls of the *mandapa* have been restored and the wooden members have been replaced (pl. 131).

**184. JAGESHWAR TEMPLE (PHULAI GUNTH), ALMORA, DISTRICT ALMORA**

The unauthorized gateway constructed by the temple committee at the lower level of the entrance of the compound was demolished and ramp with steps was provided on either side up to ground level of the temple for convenience of devotees/tourists and disabled persons.

The restoration work of Bhairav Temple has been completed.

**185. DANDESHWAR TEMPLE (KOTULI AND CHANDHOK GUNTH), JAGESHWAR, DISTRICT ALMORA**

The construction of dwarf wall in the front side of the compound is in progress. Gate and wicket gate in cast iron has been provided and a ramp and steps are being constructed.

**186. MRITYUNJAYA TEMPLE, DWARAHAT, DISTRICT ALMORA**

The dismantling and resetting work of Bhairav Temple after strengthening the foundation was completed. In this process the rusted iron dowels were replaced by copper dowels. Some of the veneering stones were provided to the *garbha-griha* of



A



B

Fort, Chinnakavandanur: before and after conservation of fortification wall.

Plate 131



A



B

Sun temple, Katarmal: before and after conservation.



the subshrine attached to the Mrityunjaya temple. The *mandapa* was dismantled and reset. Patal stone flooring was provided in front of the main temple.

### **187. GUJARDEV TEMPLE, DWARAHAT, DISTRICT ALMORA**

The construction work of dwarf wall with M. S. railing around the protected area of compound has been completed and M.S. grill gate has been provided. Patal stone pathway work from main entrance to the shrine has been completed for the convenience of visitors.

### **188. BADRINATH GROUP OF TEMPLE, DWARAHAT, DISTRICT ALMORA**

The store has been renovated and converted into Sculpture Shed and sculptures have been properly displayed.

### **189. MANIYAN GROUP OF TEMPLES, DWARAHAT, DISTRICT ALMORA**

Dwarf wall was constructed around the protected area and M.S.Grill has been provided over the dwarf wall only on the front side.

### **190. GROUP OF TEMPLES, BAIJNATH, DISTRICT BAGESHWAR**

Dismantling and re-setting of the out of plumb, damaged and weathered veneering stones of the three shrines near the main shrine of the complex have been restored as per the original, after strengthening the foundation. All the rusted Iron dowels were also replaced by copper (pl. 132).

### **191. GROUP OF BALESHWAR TEMPLES, CHAMPAWAT, DISTRICT CHAMPAWAT**

The missing members of the plinth collected from buried earth near the temple and some new members (plain) have been replaced. The original plinth and wall of the temple was restored after dismantling the accretionary verandah attached to entrance of the shrine and the recovered members were also placed in its position including the original pillars of the *mandapa*.

Grills have been provided to the arches of the verandah of the *samadhi* to safeguard the selected sculptures found from the buried field for better security (pl. 133).

### **192. BRITISH CEMETERY, ROORKEE, DISTRICT HARIDWAR**

The detached head tomb-stones cross and cenotaphs of different materials of the graves especially on the left side of the inner compound have been restored and an apron was provided around each of the graves. Chain fencing has been provided on either side of the inner pathway leading from the entrance to the other corner. The pointing work of the boundary wall with white matching pigment has been completed.

### **193. KALINGA MONUMENT, KARANPUR, DISTRICT DEHRADUN**

Dwarf wall with M. S. railing has been provided to the eastern and western sides of the compound as well as to the terrace A low level retaining wall has been provided just behind the memorial to give further support to the upper retaining wall.

### **194. RUDRANATH TEMPLE COMPLEX, GOPESHWAR, DISTRICT CHAMOLI**

All the wide cracks of the *sikhara* have been stitched. The works like pointing and water

Plate 132



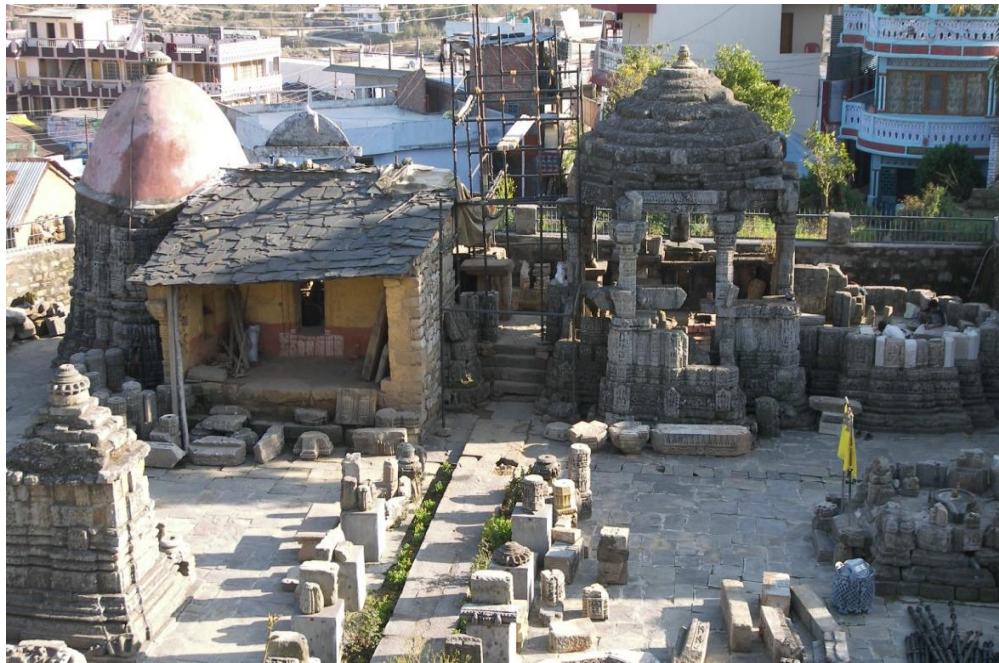
A



B

Group of Temples, Baijnath: before and after conservation.





A



B

Group of Baleshwar temples, Baleshwar: during and after conservation.



tightening with composite mortar have been undertaken wherever necessary to the *sikhara* of the main temple.

The undulating floor of the outer courtyard of the palace has been restored by relaying the same with new flag stones of local variety. Selected sculptures were displayed on wooden pedestals in a room with defused light systems.

**195. SIVA TEMPLE AND IMAGES IN ITS VICINITY AT LAKHAMANDAL, DISTRICT DEHRADUN**

After debris clearance and exposure of more temples, the construction of retaining wall towards hill side is in progress. The rusted gates of the compound have been replaced with cast iron gates.

**196. THE INSCRIBED ROCK EDICT OF ASOKA, KALSI, DISTRICT DEHRADUN**

The CR stone masonry dwarf wall with railing towards Amla Road side has been completed up to the end of the protected limit of the site. The badly damaged boundary wall towards village side has been completely demolished and a new dwarf wall with MS railing as per the existing design of the complex was provided. The recently fallen portion of the retaining wall of the inner compound towards hill side has been restored.

**197. TEMPLE SACRED TO MAHASU, HANOL, DISTRICT DEHRADUN**

After strengthening the foundation, the dilapidated basement of the *kothar* has been fully dismantled and reset. The rotten wooden beams and rafters of the *kothar* (granary) of the compound have been replaced with new ones of similar design.

**198. TWO TEMPLES- PANDUKESHWAR, DISTRICT CHAMOLI**

The badly damaged *bhogshala* of the compound has been shifted from its original position as the said structure was constructed on the remains of temple without knowing its importance. During reconstruction of the *bhogshala* the rotten wooden beams and rafters were replaced by new ones matching with the original.

**199. FORT AND OTHER STRUCTURES, CHANDPUR, DISTRICT CHAMOLI**

In continuation of previous year's work the remaining exposed structures (cells) were conserved to a height of about one meter. On clearance of the dumped debris a few more cells were discovered (pl. 134).

**200. EXCAVATED SITE GOVISHANA, KASHIPUR, DISTRICT UDHAM SINGH NAGAR**

A dwarf wall with MS railing has been provided towards Drona Sagar (water tank) and some part of north-eastern side as per the demarcated area of excavated site. Railing with MS round bar grill has been also provided just behind the Tatambari Baba Temple complex and also steps on either side of the wall for the convenience of visitors.

**201. TEMPLE AND IMAGES IN ITS VICINITY AT LAKHAMANDAL, DEHRADUN**

In continuation of previous year's clearance work the shrines (3nos.) seen in the section below the foundation of the retaining wall towards hill side was fully exposed. Remains of four miniature shrines dedicated to Siva in receding order were found just



A



B

Fort and other structures, Chandpur: before and after scientific clearance.

behind the Jaya- Vijaya images (*dwarapala*) of the compound. Near the *kuti* of the *sadhu* three more miniature shrines parallel to the plinth of the bigger structure was exposed.

## DHARWAD CIRCLE

### KARNATAKA

#### 202. GROUP OF TEMPLE COMPLEX, AIHOLE, DISTRICT BAGALKOT

Dismantling and reconstruction of damaged and sunken portion of the fortification wall with available and new stones for missing portion including consolidating the foundation near the Durga temple; debris clearance and reconstruction of damaged fortification wall near Mallikarjuna temple; dressing sandstone blocks of missing fortification wall, reconstruction of the same as per original and laying stone pavement over the undulated pathway near Lower and Upper Shivalaya; dismantling the out of plumb portion of the fortification wall in front of Cave no 3 and the wall in between the two bastions near the caves and reconstruction of the same near the Agastya Tirtha tank; laying the foundation of the fallen fortification wall on northern side and replacing the missing portion near the Malegitti Shivalaya is in progress

Reconstruction of missing portion of the western and northern side walls Mallikarjuna group of temples is completed and reconstruction of dismantled dry rubble stone wall with lime mortar is in progress.

Earthwork excavation for foundation and laying cement concrete for the construction of compound wall Veniargudi Complex is

completed. The work of reconstruction of missing portion of the sub-shrine is in progress.

The work of reconstruction of dismantled portion of the sub-shrine of Basavanna or Arali Basappa Temple as per original is in progress. Dismantling the dislodged and out of plumb portion of the ancient gateway is completed.

Laying kerb stones along the paving of Ishwarlinga Temple is in progress. Reconstruction of the dismantled portion of the plinth and wall is in progress. The sunken stone apron around the monument has been removed and re-laid over a firm concrete bed (pl. 135).

Reconstruction of dismantled stone members of ancient stepped well on eastern side of Jyotrilinga group of Temples is in progress.

The dislodged dry masonry wall of Konthigudi Temple was dismantled and construction of rubble stone masonry for foundation work is completed. Undulated stone pavement around the monument is being re laid. Construction of veneering wall around the monument with sand stone slabs is in progress.

The barbed wire fencing was removed and construction of compound wall of Tarabasappa Temple is in progress.

#### 203. GROUP OF TEMPLES ON THE NORTHERN AND EASTERN SIDE OF LAKE

Dismantling the out of plumb and sunken portion of the platform and reconstruction of the same is in progress.





A



B

Ishwarlinga temple, Aihole: before and after conservation.

**204. TANK WITH COLONNADES AT BANASHANKARI TEMPLE, CHOLACHAGUDDA, DISTRICT BAGALKOT**

Dismantling and reconstruction of out of plumb portion of the wall towards the northern side of the temple is in progress.

**205. CONSTRUCTION OF BOOKING COUNTER AND CLOAK ROOM AT PATTADAKAL, DISTRICT BAGALKOT**

Earthwork excavation for construction of booking counter and cloakroom is in progress. Dressing of sandstone blocks and construction of the booking counter including preparation of sandstone *jali* for the booking counter is in progress.

**206. BHUVARAHA NARASIMHA TEMPLE (LAXMINARAYANA) TEMPLE, HALSHI, DISTRICT BELGAUM**

Resetting the temple as per original and construction of compound wall with laterite blocks is in progress.

**207. CHAUKHANDI OF HAZARAT KHALLILULLA SHAH, DISTRICT ASHTUR**

The out of plumb wall in the complex has been dismantled and reconstructed as per the original and de-watering and de-silting the ancient well is in progress (Pl. 136).

**208. SOLA KHAMBA MOSQUE, BIDAR, DISTRICT BIDAR**

The damaged plaster of the external portion of the dome was de-plastered and re-plastering of the same in lime mortar is completed.

**209. ALI BARID TOMB AND MOSQUE, BIDAR, DISTRICT BIDAR**

Lighting conductor has been provided to the Ali Barid Tomb, Ameer Barid and Tasime Barid monuments.

**210. GAGAN MAHAL, BIDAR, DISTRICT BIDAR**

The damaged roof weathering course of the roof has been removed and re-laid in lime mortar. Construction for raising the height of the wall in trap stone is completed. Fixing of M.S. Grill with mesh to the openings in order to avoid entry of pigeon and other birds is completed. De-plastering the interior wall surface and re-plastering the same is in progress.

**211. TARAKASH MAHAL, BIDAR, DISTRICT BIDAR**

Re-plastering the damaged plaster of interior wall is completed and fixing MS grill with mesh to the openings is in progress.

**212. MADARASA MAHMUD GAWAN, BIDAR, DISTRICT BIDAR**

The damaged floor has been re-laid and the arch opening has been strengthened with RCC.

**213. FORT BIDAR, DISTRICT BIDAR**

Fencing the archaeological area towards southern side of the fort wall, construction of compound wall with matching stone masonry is completed. The Avval Taluka Nizam Adalath building was provided with MS grill, collapsible gate and GI tube gate.

**214. AIN-UL-MULK'S TOMB, BIJAPUR, DISTRICT BIJAPUR**

Reconstruction of the missing portion of ancient platform and earthwork excavation for laying concrete bed and construction of compound wall is in progress.

**215. GOLGUMBAZ, BIJAPUR, DISTRICT BIJAPUR**

Raising the height of compound wall and





A



B

Hazrat Khalilulla Tomb, Bidar: before and after conservation of Stepped Tank.3



fixing M.S. grill over it, on the eastern side of fort wall is in progress. Earthwork excavation, for exposing the ancient fort wall and reconstruction of the same is in progress. Dismantling the fallen and out of plumb portion of the wall and reconstruction as per original is in progress.

**216. GATE & WALLS OF CITY AND CITADEL, BIJAPUR, DISTRICT BIJAPUR**

Dismantling out of plumb portion of the wall and reconstruction of the same is in progress. Construction of the fallen fortification wall is in progress.

**217. SANGEETH-NAARI MAHAL, BIJAPUR, DISTRICT BIJAPUR**

Raising the height of ancient wall by using RR masonry on the northern side of monument as per the original is completed.

**218. MALIK-E-MAIDAN CANNON, BIJAPUR, DISTRICT BIJAPUR**

Earth work excavation for providing stone flooring over a concrete bed and dressing of trapped stone is completed.

**219. ALI-II ROUZA, BIJAPUR, DISTRICT BIJAPUR**

Construction of compound wall and fixing of MS grill is completed

**220. IBRAHIM ROUZA, BIJAPUR, DISTRICT BIJAPUR**

De-plastering the dead lime-plaster of the wall surface and ceiling and re-plastering the same is in progress. The trap-stone flooring has been laid over a concrete bed with neat finishing. Raising height of existing compound wall and fixing of MS grill for security measures towards northern and eastern side is completed. Earthwork

excavation for laying cement concrete to parking area is in progress.

**221. MAHADEVA TEMPLE, ITTAGI, DISTRICT KOPPAL**

After scientific debris clearance, the steps of the tank adjacent to the temple is being strengthened by core filling the rear side of the steps and by re-fixing the old blocks and fixing new dressed members wherever missing. The work is in progress.

Dressing of granite stone blocks from all sides of Pushkarni (well) and re-fixing the same on eastern and northern portion is in progress.

Dismantling the dislodged portion of the sub shrine wall, laying of concrete for strengthening the foundation and core filling with rubble and dressing of stone-slabs for the missing portion is in progress. Reconstruction of the dismantled portion of the *mandapa* and restoring the *sikhara* with dressed stone blocks for missing portion is in progress.

Dismantling the western portion of the rubble wall and dislodged portion of the stepped well is in progress.

**222. DODDA BASAPPA TEMPLE, DAMBAL, DISTRICT GADAG**

Earthwork excavation and leveling of the undulated surface for laying garden and for laying water pipeline is in progress. Strengthening of foundation of *mandapa* in UCR masonry over firm concrete bed up to plinth level is completed.

**223. BASAVANNA TEMPLE, TAMBUR, DISTRICT DHARWAD**

Construction of damaged compound wall in

UCR rubble masonry over a concrete bed is in progress. Leveling the undulated portion at the southwest corner portion and dressing of schist stone slab for the construction of veneering wall is in progress.

### **224. BANASHANKARI DEVI TEMPLE, AMARGOL, DISTRICT DHARWAD**

Dismantling the dislodged and out of plumb wall and stocking the useful material for re-construction of the same is in progress.

### **225. GROUP OF MONUMENTS, LAKKUNDI, DISTRICT GADAG**

Earthwork excavation for digging the foundation and laying cement concrete and constructing the granite rubble wall with stone veneering is in progress. Dressing of granite stone slab, earthwork excavation for foundation and construction of veneering wall for the toilet block is in progress.

Leveling the ground and laying of pipeline for the supply of water and rearranging the garden around the Jaina temple is completed.

### **226. GREAT MOSQUE WITHIN INNER FORT, GULBARGA, DISTRICT GULBARGA**

De-plastering and re-plastering of exterior wall of great Mosque in lime mortar is in progress (pl. 137).

### **227. MUKTESHWARA TEMPLE, CHOURDANPUR, DISTRICT HAVERI**

Schist stone slabs have been laid over the CC bed all around the Veerabhadreswara shrine.

### **228. GALGESHWARA TEMPLE, GALAGANATHA, DISTRICT HAVERI**

Dismantling the dislodged wall of sub-shrine of Homeshwara and stocking the useful material for re-construction of the same is in progress. Earthwork excavation for leveling the undulated area toward south side of the monument is in progress.

### **229. SIDDESWARA TEMPLE, HAVERI, DISTRICT HAVERI**

Providing dressed schist stone veneer slabs for the wall in front of the temple and MS grill and gate over the compound wall is completed.

### **230. BILLESHWARA TEMPLE, HANGAL, DISTRICT HAVERI**

Providing apron all around the temple, construction of steps in rubble stone masonry and laying CC bed for the approach road is in progress.

### **231. NAGARESWARA TEMPLE, BANKAPUR, DISTRICT HAVERI**

Dressing of schist stone-slab and paving is done wherever necessary over CC bed and fixing of kerb stones on the north, south and east side is in progress.

### **232. SOMESWARA TEMPLE, HARLAHALLI, DISTRICT HAVERI**

Re-construction of the dismantled sub shrine as per original and dressing of stone blocks for construction of outer veneering wall of the shrine and earthwork excavation toward south of the temple is completed.

### **233. SARVESHWARA TEMPLE, NAREGAL, DISTRICT HAVERI**

Dressing of schist stone slabs for using coping over the compound wall is in progress.

Plate 137



A



B

Gulbarga: before and after conservation of great Mosque, Inner fort.



### **234. CHANDRANATHA BASADI, HADUVALLI, DISTRICT UTTARA KANNADA**

Providing concrete coping over the laterite masonry compound wall including fixing of chain link mesh welded to M.S. angle frame and M.S. angle iron fixed in the wall and painted neatly is completed.

### **234. RATNATRAYA BASTI, BILAGI, DISTRICT UTTARA KANNADA**

Providing and laying rubble stone pitching to the sloppy ground on the rear side of the Basti is in progress.

### **235. VIRUPAKSHA TEMPLE, BILAGI, DISTRICT UTTARA KANNADA:**

Laterite stone compound wall has been constructed to enclose the area with coping over it.

### **236. CHATURMUKHA BASTI, GERASOPPA, DISTRICT UTTARA KANNADA**

Construction of compound wall in laterite stone to enclose the area is in progress.

### **237. SHANTAPPA NAIK TIRUMALA DEVASTHANA, MUDBHATKAL, DISTRICT UTTARA KANNADA**

The broken and damaged roof slabs were replaced.

### **238. FORT, MIRJAN, DISTRICT UTTARA-KANNADA**

The out of plumb moat wall on the northern side and bastion on the north-west corner has been dismantled and reconstruction of the same is in progress. The work of dismantling the bulged out portion of the platform and removing the debris by earthwork excavation to expose the original structure for re-construction of the same is in progress. The work of reconstruction of the terraced platform using dressed laterite masonry is in progress.

### **239. MADHUKESHWARA TEMPLE, BANAVASI, DISTRICT HAVERI**

Construction of compound wall in schist stone and laying of pathway and kerb stones was carried out.

## **GOA CIRCLE**

### **GOA**

### **240. FORTIFICATION WALL OF AGAUADA FORTRESS (LOWER), CANDOLIM, DISTRICT NORTH GOA:**

Strengthening and under pinning of bastion by removing eroded laterite stone and replacing with seasoned laterite stone by using renderol plug rapid cement and pointed the stone joints using lime mortar with chloride resistance (pl. 138).

### **241. SE' CATHEDRAL, OLD GOA, DISTRICT NORTH GOA**

The dead and damaged plaster of the bell tower was removed and replastered with combination mortar as per existing pattern. The damaged windows were replaced with new ones as per existing pattern (pl. 139).

### **242. CHURCH OF ST. AUGUSTINE, OLD GOA, DISTRICT NORTH GOA**

The exposed wall top was water tightened and pointed in combination mortar. The walls on western side was reconstructed by using old stones and restored as per original (pl. 140).

### **243. CHURCH AND CONVENT OF ST. FRANCIS OF ASSISI, OLD GOA, DISTRICT NORTH GOA**

The damaged wall plaster of the sacristy was

Plate 138



A



B

Lower Fort, Aguada: during strengthening and underpinning.



A



B

Se' Cathedral: during and after conservation of Bell tower.



Plate 140



A



B

Old Goa: during clearance of St. Augustine complex.

### **241. SE' CATHEDRAL, OLD GOA, DISTRICT**

removed and replastered with combination mortar as per the original.

### **244. CHAPEL OF ST. CATHERINE, OLD GOA, DISTRICT NORTH GOA**

The damaged plastered surface was removed, replastered and white washed. The compound wall was colour washed.

### **245. CHURCH OF OUR LADY OF ROSARY, OLD GOA, DISTRICT NORTH GOA**

The damaged Manglore tiles on the roof were replaced with new ones and the doors and windows were painted.

### **246. BASILICA OF BOM JESUS, OLD GOA, DISTRICT NORTH GOA**

The damaged AC sheet roof was replaced with new sheets and the damaged floor tiles were replaced with new tiles wherever necessary. The quadrangle was whitewashed.

### **247. CHURCH OF ST. CAJETAN, OLD GOA, DISTRICT NORTH GOA**

The area was leveled in front and a new compound wall was constructed as per the existing pattern. The front façade was replastered wherever damaged and the cracked portion was mended with mesh and covered with combination mortar.

## **GUWAHATI CIRCLE**

### **ASSAM**

### **248. ANCIENT TOMB, JOGIGOPHA, DISTRICT BONGAIGAON**

Plain cement concrete work over the surface of the approach pathway is in progress.

### **249. CACHARI RUINS, KHASPUR, DISTRICT CACHAR**

Fixing of MS grill over the dwarf wall, plastering and painting of the same, water tightening to the temple of Ranachandi after removing the dead plaster, laying of approach pathway and reconstruction of ancient wall with special size bricks is in progress.

### **250. DEVIDOL, GAURISAGAR, DISTRICT SIVASAGAR**

Pressure grouting and pointing of the stone masonry of the main temple and relaying of brick-on-edge apron around the temple has been completed.

### **241. GROUP OF FOUR MAIDAMS, CHARAIDEO, DISTRICT SIVASAGAR**

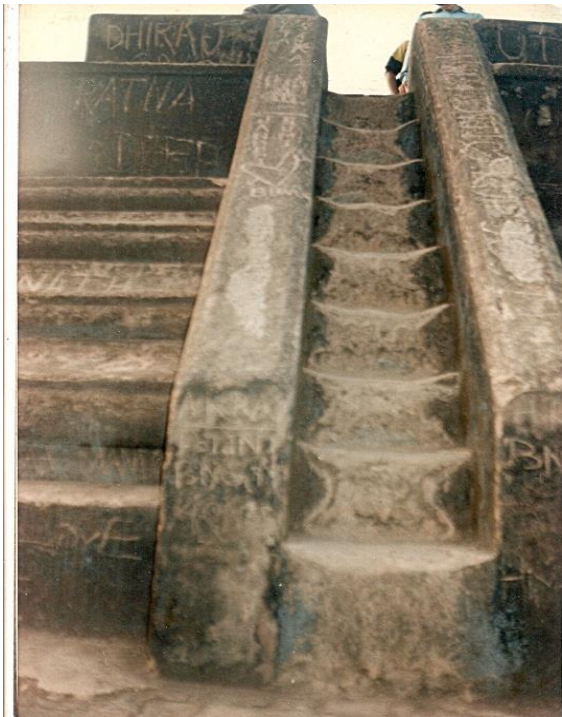
Earth cutting on both sides of the excavated *maidam* is in progress. Repairing of the toilet block and laying of approach pathway to it has been completed.

### **252. GURHGAON RAJA'S PALACE (AHOM RAJA'S PALACE), GURHGAON, DISTRICT SIVASAGAR**

The relaying of the damaged floor with brick jelly and finished with lime-*surkhi*, providing brick-on-edge apron around the monument and pointing of the brick pathway have been completed. Conservation of the staircase was also attended to. Construction of a toilet block for the visitors is in progress (pl. 141).

### **253. HAYAGRIVA MADHAVA TEMPLE, HAJO, DISTRICT KAMRUP**

Plate 141



A



B

Garhgaon Raja's palace: before and after conservation



re-plastering of the brick coping wall of the main entrance with lime-*surkhi* and dismantling of the ancient stone steps on the western side entrance of the temple and resetting of the same is in progress. Providing proper drainage facility and laying tiles in the newly constructed toilet block for the visitors has been completed (pl. 142).

### **254. KARENGHAR OF THE AHOM KINGS (TALATALGHAR), DISTRICT SIVASAGAR**

Vegetation clearance of the site has been carried out and construction of verandah in the newly constructed toilet block for the visitors has been completed.

### **255. RANGHAR RUINS, JOYSAGAR, DISTRICT SIVASAGAR**

Relaying of brick jelly flooring and new brick-on-edge apron after raking out the damaged concrete floor and removing the old apron was completed. Construction of toilet block for the visitors is in progress (pl. 143).

### **256. SIVADOL, SIVASAGAR, DISTRICT SIVASAGAR**

Pointing and sealing of the joints of the stone masonry of the main temple, pointing of the brick-on-edge apron around the monument and painting of the roof truss of the *mandapa* of the main temple have been completed. Repairing of the ancient boundary wall is in progress.

### **257. SRI SURYAPAHAR RUINS, DISTRICT GOALPARA**

RR stone masonry and PCC work over the platform in front of *Dashabhuja* is in

progress. Construction of visitors' lobby in the Archaeological museum has been completed.

## **MEGHALAYA**

### **258. STONE MEMORIAL OF U-MAW-THODUR-BREW, DISTRICT JAINTIA HILLS**

Re-setting of menhirs in proper manner and clearance of vegetation inside the monument has been carried out. Construction of RR stone masonry wall with MS grill fencing over it is in progress.

## **TRIPURA**

### **259. ANCIENT MOUND CALLED THAKURANI TILLA, JOLAIBARI, DISTRICT SOUTH TRIPURA**

Vegetation clearance inside the monument has been carried out and construction of sculpture shed is in progress.

### **260. ANCIENT MOUND CALLED SHYAM SUNDAR TILA, JOLAIBARI, DISTRICT SOUTH TRIPURA**

Resetting of the exposed brick structure with special size bricks and water tightening of the same has been completed.

### **261. ANCIENT REMAINS AT BAKSHANAGAR, DISTRICT WEST TRIPURA**

Water tightening of the upper surface of the exposed brick structure with special size bricks and combination mortar has been completed. Construction of compound wall, approach pathway and earth filling to low land area and leveling of the same has also been completed.

Plate 142



A



B

Hayagriva Madhava temple, H ajo: before and after conservation.



A



B

Ranghar Ruins, Joysagar: before and after repairs of the flooring.



**262. SCULPTURES AND ROCK-CUT RELIEFS OF THE UNAKOTITIRTHA, UNAKOTI, DISTRICT NORTH TRIPURA**

Providing of RCC hand railing for easy approach to visitors, repairing of brick steps and construction of RR stone retaining wall is in progress.

**HYDERABAD CIRCLE**

**ANDHRA PRADESH**

**263. THOUSAND PILLAR TEMPLE COMPLEX, HANUMKONDA, DISTRICT WARANGAL**

In continuation to the major conservation work of dismantling and resetting the *kalyana mandapa* of Rudreswara temple complex popularly known as the Thousand pillar temple, consequent to the dismantling of the *kalyanamantapam* architectural members, earth work excavation was completed. The foundation was scientifically examined by a group of experts from NIT, Warangal and in order to give more stability and strength to the super structure, granular pile foundation method was suggested.

**264. WARANGAL FORT, WARANGAL, DISTRICT WARANGAL**

Debris clearance was carried out at the Venkateswara swamy temple, Warangal to expose the buried structures. The fallen debris and the damaged lime concrete of the brick *sikhara* were cleared so as to undertake conservation. MS grill fencing was provided around the Jangamayya temple over a newly constructed dwarf wall.

**265. RAMAPPA TEMPLE, PALAMPET, DISTRICT WARANGAL**

A path way was provided from the main entrance up to the temple and also connecting the newly constructed toilet blocks for the visitors.

**266. GOLKONDA FORT, DISTRICT HYDERABAD**

The dead lime concrete over the roof of Dad Mahal was removed and fresh lime concrete was laid. The original steps which were filled with accumulated debris was exposed and conserved as per original and MS railing was provided to the steps. After scientific clearance, some of the exposed structures such as chambers, walls and cisterns on the western side of the Ranimahal complex was strengthened and conserved (pls. 144-145).

**267. VEERABHADRA SWAMY TEMPLE, LEPAKSHI, DISTRICT ANANTPUR**

The damaged and fallen portion of the outer *prakara* was strengthened and conserved using the original stone slabs. The damaged flooring around the temple was relaid with stone flooring. The damaged roof of *Yagnasala* and that of a small shrine located on the western side of the temple was repaired, consolidated, water tightened and conserved. The boundary of the temple complex on the western side was provided with fencing over a dwarf wall. The uneven earth floor around the monolithic bull was leveled and stone paved flooring was provided for the easy movement of the visitors (pls. 146-147).

**268. SIDDHESWARA TEMPLE, HEMAVATHI, DISTRICT ANANTAPUR**

The broken beam of *mukhamandapa* was conserved by mending the broken beam using steel and epoxy resin. The temple



A



B

Dad Mahal, Fort, Golkonda: before and after conservation



Plate 145



A



B

Rani Mahal, Fort, Golkonda: before and after conservation of terrace garden area.





A



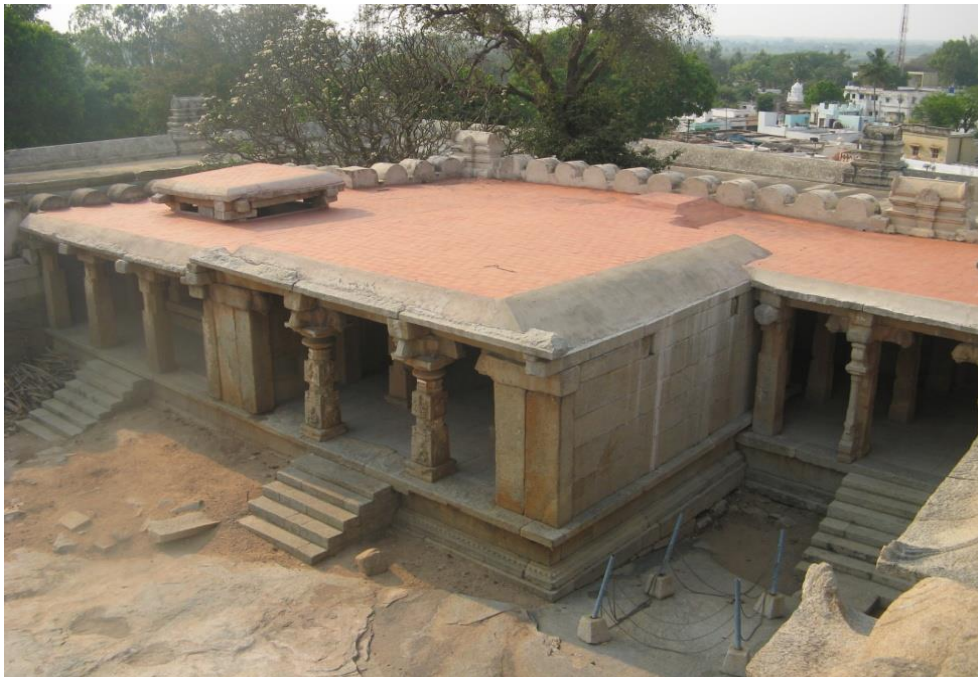
B

Veerabhadra swamy temple Lepakshi: before and after conservation of north-western corner.

Plate 147



A



B

Veerabhadraswamy temple, Lepakshi: before and after conservation.



exteriors, roof and external wall of the main entrance (outer wall of cloister *mandapa*) was conserved (pl. 148).

### **269.. BUDDHIST CAVES ON THE HILL TOP, GUNTUPALLI, DISTRICT WEST GODAVARI**

The work of construction of retaining wall in front of the caves and laying lime concrete floor in front of the large monastery and GI railing along the approach steps was completed.

### **270. BUDDHIST STUPA ATOP THE HILL, JAGGAYYAPETA, DISTRICT KRISHNA**

Accumulated debris in front of the *stupa* on the eastern side was carried out leading to the exposure of the remains of couple of stone votive *stupas*.

### **271. BUDDHIST REMAINS GUMMADIDURRU, DISTRICT KRISHNA**

The main entrance was provided with an iron grill gate and the northern side of the site was fenced with diamond mesh fence over a dwarf wall.

### **272. BUDDHIST REMAINS, GHANTASALA, DISTRICT KRISHNA**

The lower drum wall and spokes were conserved using ancient size bricks.

### **273. BANDAR FORT, MACHILIPATNAM, DISTRICT KRISHNA**

The fallen wall portion on the northern and eastern side of the belfry compound was restored and brick pathways were provided over a concrete bed.

### **274. LOWER FORT, CHANDRAGIRI, DISTRICT CHITTOOR**

Approach pathways were provided connecting the temples of Vishnu, Subrahmanya and Shiva after acquiring the land from local donors. While laying the pathways terracotta ring wells were exposed.

The debris was cleared at these temples. Vegetation and debris was cleared around the Raja Rajeswari temple (pl. 149).

### **275. CHENNAKESAVARA SWAMY TEMPLE, SOMPALEM, DISTRICT CHITTOOR**

The protected area was provided with a dwarf wall and fenced.

## **KOLKATA CIRCLE**

### **WEST BENGAL**

### **276. ADINA MASJID, PANDUA, DISTRICT MALDAH**

Underpinning brick work and water tightening to top of east-side wall, pointing to the inner and outer walls of east and north side, restoration of missing portions to veneering stone work to open arch ventilator below Badshah ki takht, replacement of the damaged portions of wood work by new ones at Badshah ki takht and preservation and restoration of ornamental plaster to arches on the same area have been done.

### **277. ANCIENT MOUND, BHARATPUR, DISTRICT BARDDHAMAN**

The protected area has been fenced with M.S. grill over a low dwarf wall.

### **278. CHIKA MOSQUE, GAUR, DISTRICT MALDAH**

The bulged out portions of the west and south walls have been restored. The exterior



Plate 148



A



B

Siddheswara swamy temple, Hemavath: before and after conservation.



A



B

Shiva temple, Chandragiri: after debris clearance of lower fort.

wall surfaces have been pointed and the top portion of the brick pillars have been water tightened.

**279. CURRENCY BUILDING, DALHOUSIE SQUARE, KOLKATA**

The roof of the northeast corner of the eastern wing has been repaired after removing vegetation growth, filling and grouting of the cracks and water tightening the same in lime concrete. Later additions not matching with the original were dismantled. The wall surface of the rooms running east to west were re-plastered after removing the dead plaster and were colour washed. The ceiling of cast iron sheet was repaired. Rolling shutters of windows on north side (1<sup>st</sup> floor) room have been repaired and made functional. Doors and windows repaired and replaced wherever missing or damaged beyond repair.

The damaged floor on the western wing (second floor) has been repaired and missing marble floor tiles were restored. The missing doors and windows restored with frames and shutters as per original. The damaged interior wall surface has been re plastered and colour washed.

**280. DUPLEIX PALACE, CHANDANNAGAR, DISTRICT HUGLI**

Public amenities like toilet blocks and drinking water facilities have been upgraded.

**281. FIROZ MINAR, GAUR, DISTRICT MALDAH**

An octagonal shaped brick-on-edge pathway was laid around Firoz Minar to facilitate visitors' movement. The inner and outer

walls of the Minar have been strengthened. Drinking water arrangements were made at the site.

**282. HAZARDUARI PALACE & IMAMBARA TOGETHER WITH ADJACENT AREA, KILLA NIZAMAT, DISTRICT MURSHIDABAD**

The interior walls of the ball room on the second floor works has been re plastered and colour washed. The roof on the western side has been repaired by replacing the wooden beams and barghas and by laying fresh lime concrete. Surface drains were provided around the Palace building and the approach pathway has been upgraded.

Public amenities like toilet blocks, ticket and publication counter were upgraded matching international standards.

**283. IMAMBARA, KILLA NIZAMAT, DISTRICT MURSHIDABAD**

The work of removing damaged old plaster from wall surfaces of mosque on western wing and replastering done in lime sand mortar as per original followed by colour wash with lime, resurfacing the domed roof of mosque and its adjoining area, repairs to floor by removing old and damaged base concrete and relaying the same with fresh lime concrete and top finishing with marble top as per original.

**284. COOCH BEHAR PALACE, DISTRICT COOCH BEHAR**

The damaged roof on the southern and northern side of the central dome was water tightened and the portion over the metal dome of the Durbar Hall was conserved. M.S. grills of appropriate design were fitted to large wall gaps around the dome of Durbar Hall. Missing/damaged ornamental



battlements atop the parapet walls on roof were restored. Pathways and proper drainage was laid on the western side. Fencing has been carried out on the western and partly on the southern side.

### **285. KRISHNA CHANDRAJI TEMPLE, KALNA, DISTRICT BARDDHAMAN**

The damaged roof has been relaid in the original pattern using special bricks and by replacing the beams and bargahs. Removing the dead plaster and re plastering of three rooms in the temple and colour washing the same was completed. The wooden doors and windows were repaired and painted afresh. The damaged flooring was relaid.

### **286. KURUMBERA FORT, GAGANESWAR, DISTRICT PASCHIM MEDINIPUR**

The stone masonry walls were strengthened.

### **287. LUKOCHURI GATEWAY, GAUR, DISTRICT MALDAH**

The inner walls of both the wings of the gateway were strengthened and chain link fencing over dwarf-wall from Lukochuri gateway to Quadam Rasul on western side mosque has been constructed.

### **288. MOUND NEAR BAISGAZI WALL, GAUR, DISTRICT MALDAH**

The missing portion of the wall was restored and the structure on the north-west, south-west and west side of excavated site was water tightened. The brick wall on the west, north-west and south-west portion of excavated area was strengthened and proper drainage was provided to the excavated area.

### **289. MURALI MOHAN TEMPLE, BISHNUPUR, DISTRICT BANKURA**

The stone masonry walls of the temple were strengthened. The area in front of the temple was leveled and laid and the apron around the temple and the brick pathway was repaired. The damaged fencing was repaired. Drinking water facilities were provided.

### **290. OLD BUILDING OF THE ASIATIC SOCIETY, KOLKATA**

The damaged roof was relaid in lime concrete. The interior wall surface of the Persian library building and adjoining area was replastered in lime mortar. The damaged wooden doors and skylights were refixed to their original position.

### **291. RASMANCHA, BISHNUPUR, DISTRICT BANKURA**

Fencing of the protected area was done with GI net over brick masonry wall.

### **292. TEMPLES OF BANDYOPADHYAY FAMILY, PATHRA, DISTRICT PASCHIM MEDINIPUR**

The brick walls of the Kachharibari including the ornamental brick pillars (near Temples of bandyopadhyay family and Sarbamangala temple) were strengthened with special size bricks in lime surki mortar as per original.

### **293. TOMB OF ALIVARDI KHAN & THE TOMB OF SIRAJ-UD-DAULAH, KHOSBAG, DISTRICT MURSHIDABAD**

The brick work has been restored in the area

outside boundary walls. The walls of the mosque were re plastered and given colour wash. Proper drainage was provided to the domed roof. The pathway was relaid.

**294. TOMB & MOSQUE OF MURSHID KULI KHAN, SABJIKATRA, DISTRICT MURSHIDABAD**

Pointing in the core lines of mosque outer walls and domes with plastering, brick work etc. at south and west sides with necessary chain link fitted in the outer fenced area.

**295. WARREN HASTINGS HOUSE, BARASAT, DISTRICT NORTH 24 PARGANAS**

Structural strengthening to brick walls by underpinning, stitching cracks, core filling etc. and relaying of collapsed roof in lime concrete over layers of brick-tiles laid in lime surkhi mortar and supported by wooden beams and burgahs as per original have been done.

**296. 26 SHIVA TEMPLE, KHARDAH, DISTRICT NORTH 24 PARGANAS**

The works of carefully taking out cracked and bulged portions of ornamental /curved brick wall surfaces and resetting those using similar bricks and mortar after consolidating the cores of those walls by grouting etc, gently taking out damaged old plaster from exterior wall surfaces and replastering in similar lime mortar as per original, repairing the doors including necessary replacement of wooden members in frames and shutters in four temples of 26 Shiva temples in the complex have been completed. The damaged portions of the boundary wall of the complex and the roof of the ancient

priest quarters, kitchen etc. within the complex were repaired.

**297. 108 SHIVA TEMPLE, KALNA, DISTRICT BARDHAMAN**

The western side of the complex has 40 temples and the works carried out here include the restoration of the existing drainage system, replastering the inner walls of the temples and relaying the old and damaged floor of the temples in lime mortar.

**SIKKIM**

**298. RABDENTSE SITE OF ANCIENT CAPITAL OF SIKKIM, DISTRICT WEST SIKKIM**

The north eastern corner of the eastern wall was strengthened by providing necessary buttress and by grouting and water tightening the core and open joints. Micro vegetational growth on the wall surfaces were cleaned wherever required and a coat of water repellent applied to prevent further growth as well as to prevent ingress of rain water into the structures. Damaged and partly settled stone floors were repaired by resetting the existing old stones.

Railings and fencing provided as an enclosure to the site after stabilizing the slope by stone pitching as a safety and security measure. Damaged pathways repaired and relaid. Visitors' facilities upgraded and existing sculpture shed improved by providing appropriate pedestal for storing/displaying sculptural stone pieces found at site.

**MUMBAI CIRCLE**

**MAHARASHTRA**

**299. KORLAI FORT, KORLAI, DISTRICT RAIGAD**

At the Church in the Fort, the work of laying stone steps from the entrance to the fort on the eastern side and a pathway on the western side of the entrance is in progress (pl. 150).

**300. KOLABA FORT, ALIBAG, DISTRICT RAIGAD**

The reconstruction of the fallen eastern side fortification wall using the available cyclopean stone in combination mortar up to 2.00m height after removal of debris and core filling the breached of fort wall is in progress.

**301. ELEPHANTA CAVES, GHARAPURI, DISTRICT RAIGAD**

The restoration of the pillars after removal of the damaged RCC pillars by using MS rod with epoxy coating and matching oxides and colours have been attended to. A RCC canopy has been provided on the western side of main cave for diverting and channelizing the rain water so as to control erosion of the cave by rain water (pls. 151-152).

**302. SION FORT, SION, DISTRICT MUMBAI**

Providing steps and laying pathway leading to the ancient Portuguese structure and also providing retaining wall and side wall to stop the erosion of the adjacent area of the fort.

**303. JOGESHWARI CAVES, MAJAS, DISTRICT MUMBAI**

In continuous to the previous year's work, the pathway leading to the western entrance from the road side was paved with dressed stone slabs and a side drain covered with dressed stone blocks was constructed to drain out rainwater.

**304. KHIDRAPUR TEMPLE, KHIDRAPUR, DISTRICT KOLHAPUR**

The old dislodged and damaged/out of plumb eastern side compound wall was dismantled and re-constructed as per original and the upper surface of the wall was water-tightened in lime concrete (pl. 153).

**305. PANHALA FORT, PANHALA, DISTRICT KOLHAPUR**

The reconstruction of the fallen bastion behind the Teen Darwaja has been attended to. The parapet over the fort wall was re-constructed as per the original (pls. 154-155).

**306. VIJAYDURG FORT, VIJAYDURG, DISTRICT SINDHUDURG**

Providing and laying pathway leading from the main entrance to the main gate and the work of plastering and water tightening on the top of the rampart with proper slop to drain out water was done (pl. 156).

**307. SINDHUDURG FORT, MALVAN, DISTRICT SINDHUDURG**

Improving the existing pathway leading to the different temples inside the fort and water-tightening the top of the rampart has been completed (pl. 157).



Plate 150

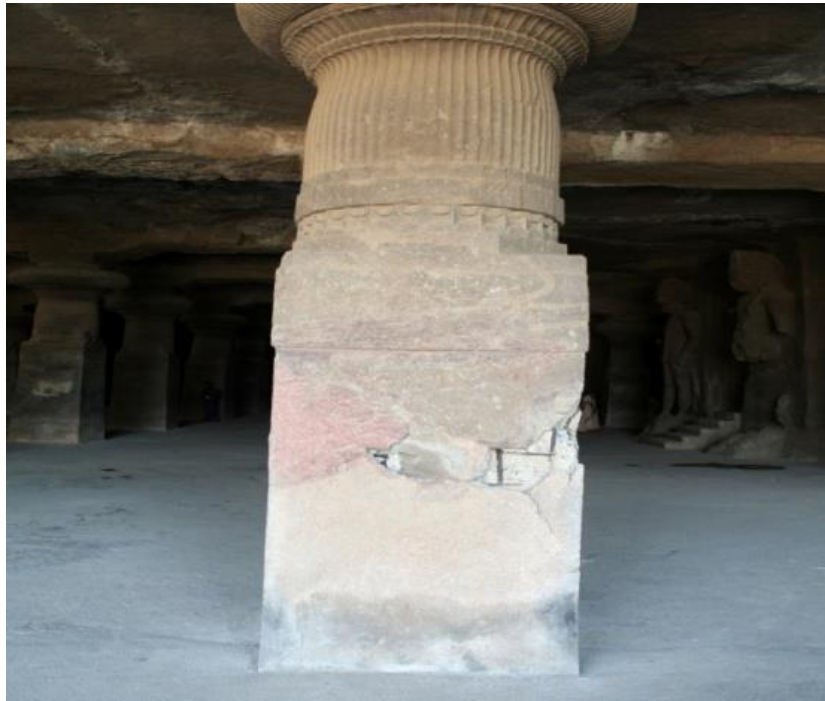


A



B

Korlai fort, Korlai: before and after conservation



A



B

Elephanta Caves, Gharapuri: before and after conservation.

Plate 152



A



B

Elephanta Caves, Gharapuri: before and after conservation





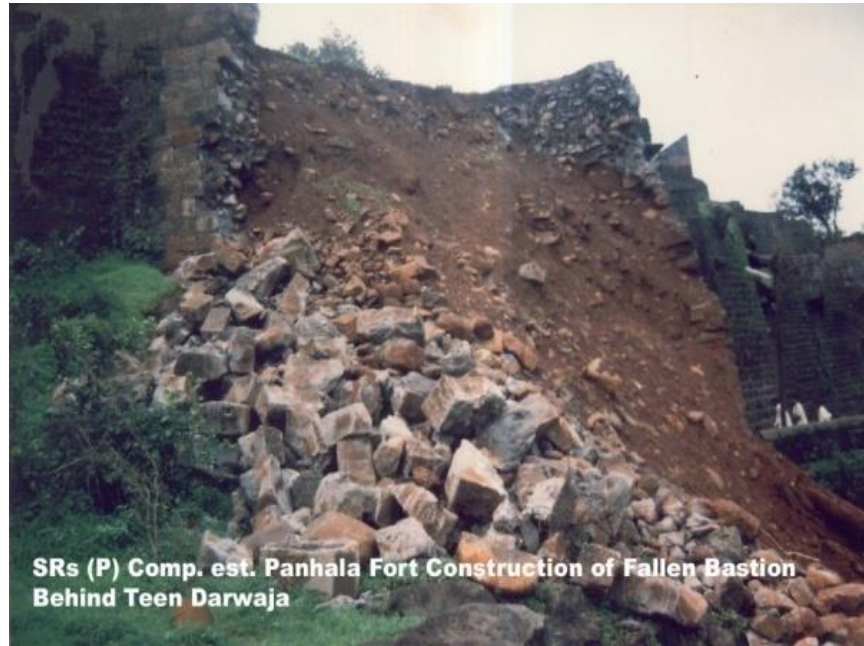
A



B

Khidrapur temple, Khidarpur: before and after construction of wall.

Plate 154



A



B

Panhala fort: before and after conservation.





A



B

Panhala fort: before and after conservation.



Plate 156



A



B

Vijaydurg: before and after conservation.



A



B

Agakhan Palace: before and after conservation.

**308. JUNNAR CAVES, JUNNAR, DISTRICT PUNE**

In continuation of previous years' work, widening of the retaining and parapet wall in front of the Ganesa caves has been under taken for safety and easy movement of the pilgrims/visitors and the work is completed.

**309. SHANIWARWADA, PUNE, DISTRICT PUNE**

A wooden railing was provided around the fountain namely Pushkarni, Hazari Karanja and middle Chowk as per the original in Burma teak with wooden post. The damaged and decayed wooden *chhajja* was repaired and the leaky roof of the Nagarkhana was water tightened. The ramparts were also water tightened and the ancient drain was covered with roughly dressed stone slabs (pl. 158).

**310. FORT, SHIVNERI, JUNNAR, DISTRICT PUNE**

In continuation of the previous year's work under the Civil Deposit work funded by the Maharashtra Government, various conservation and environmental development works like reconstruction of the fallen fortification wall adjacent to the Hathi Gate as per the original pattern and filling the undercut cavities of fortification wall and water-tightening of the roof of the Shivai Gate has been completed. The reconstruction of the fallen Minars and the arch of Kamani Masjid (mosque) was also taken up and completed.

**311. ROCK CUT CAVES, SHELARWADI, DISTRICT PUNE**

Providing and laying pathway from the foot of the hill up to the caves and construction

of parapet wall alongside the pathway has been completed.

**312. TOMBS OF KOKARI GUMWAJ, RAJAPURI, DISTRICT RAIGAD**

Stone flooring was laid after providing proper cushion in the Gumwaj.

**313. JANJIRA FORT, RAJAPURI, DISTRICT RAIGAD**

The vegetation growth in the walls of the King Palace was removed and repairs to the damaged steps and pathway leading to the Flag post was completed.

**314. KUDA CAVES, KUDA, DISTRICT RAIGAD**

The retaining wall in front of the caves was reconstructed.

**315. CAVES, PALE, DISTRICT RAIGAD**

In continuation of previous year's work, the construction of parapet wall alongside the pathway is in progress.

**316. CAVES, PALE, DISTRICT RAIGAD**

In continuation of previous year's work, the construction of parapet wall alongside the pathway is in progress.

**317. JHABRESHWAR MAHADEV TEMPLE, PHALTAN, DISTRICT SATARA**

Chain link fencing with dwarf wall has been provided on the Eastern and Western side of the temple (pl. 159).

**318. OLD TEMPLE OF SARKARWADA LOCALLY KNOWN AS PARASNATH TEMPLE, VELAPUR, DISTRICT SHOLAPUR**





A



B

Shaniwar Wada (Nagarkhana): before and after conservation.

Plate 159



A



B

Jhabreshwar temple: before and after conservation .



Chain link fencing with MS Grill has been provided on the East and West side of the temple.

### **319. OLD DOUBLE STORIED TEMPLE (LOCALLY KNOWN AS NACHNICHA MAHAL), VELAPUR, DISTRICT SOLAPUR**

In continuous to previous year's work the work of providing chain link fencing over dwarf wall has been provided on the southern and eastern side of the ancient tank and temple has been completed. Water tightening of the Devi temple and reconstruction of fallen portion of the temple has been attended.

### **320. TEMPLE OF HARANARESWAR & ARDHANARINATESHWAR, VELAPUR, DIST SHOLAPUR**

In continuous of the previous year work the chain link fencing over dwarf wall has been completed.

### **321. OLD TEMPLE AND VIRAGALS, VELAPUR, DISTRICT SHOLAPUR**

Chain link fencing over dwarf wall and MS Grill gate at main entrance has been provided.

### **322. FORT, BASSIEN, DISTRICT THANE**

The Bell Tower of the Gonsalo Garcia Church at Bassien for was conserved by under pinning, filling the masonry joints with brick jelly concrete, laying stone slab flooring and water tightening of the Pillared Hall. Under the Civil deposit work funded by the Maharashtra Government, the Church of Nossa Senhora Da Vida was conserved with the restoration of fallen stone masonry wall and water tightening the same (pl. 160).

A floor of brick jelly concrete was laid. G I chain link fencing was provided in front of the Church complex. The fallen stone masonry wall of the Dominican Church and Convent was restored and a floor of brick jelly concrete was laid (pl. 161).

### **323. TEMPLE OF AMBARNATH, AMBARNATH, DISTRICT THANE**

In continuation to the earlier work, the replacement of the damaged barbed wire fencing with grill fencing over a stone masonry dwarf wall has been completed. The extension of the stone pavement in the outer courtyard of the temple on the northern, eastern and southern sides has been completed. The existing dilapidated store room in the south - western corner was removed and the work of re-erecting a shed to house the loose sculptures has also been completed. The reconstruction of the retaining wall on river side has been completed and the garden was laid on the northern and eastern side of the temple complex (pl. 162).

## **RAIPUR CIRCLE**

### **CHHATTISGARH**

### **324. HANDRADITYA TEMPLE, BARSOOR, DISTRICT DANTEWADA**

In continuation of earlier works, a pathway has been provided within the premise for easy approach to the monument. In addition to this environmental development has been carried out.

### **325. GANESA STATUE, BARSOOR, DISTRICT DANTEWADA**

M.S. grill has been mounted over the



Plate 160



A



B

Bassien fort, Nossa Senhora: before and after conservation of Da Vida.



A



B

Dominican Church, Bassian fort: before and after conservation.



Plate 162



A



B

Temple of Ambarnath: before and after conservation.



existing compound wall to provide safety and security in the monument.

### **326. DANESWARI TEMPLE, DANTEWADA, DISTRICT DANTEWADA**

In continuation of earlier works, the entire structure was strengthened, and the structural voids were filled with cement slurry and water tightening of the roof was carried out. Besides for the safety and security of the monument a compound wall has been constructed.

### **327. KARLI MAHADEV TEMPLE, SAMLOOR, DISTRICT DANTEWADA**

For easy accessibility to the monument an approach road has been provided from the main entrance and the monument.

### **328. KAMA MEMORIAL, DHILMILI, DISTRICT DANTEWADA**

For the safety and security of the monument, a dwarf compound wall has been provided within the protected limits.

### **329. BHAIRAMDEV TEMPLE, DANTEWADA, DISTRICT DANTEWADA**

In continuation of earlier works, providing and fixing of M.S. grill over the existing compound wall was completed. Besides, an apron around the temple has been re-laid with new members after removing the damaged stones.

### **330. MAMA BHANJA TEMPLE, BARSOOR, DISTRICT DANTEWADA**

In continuation of earlier works, resetting of the damaged apron all around the temple was completed.

### **331. SHIVA TEMPLE, DEOBOLODA, DISTRICT DURG**

G.I. pipe railing has been provided around the tank to avoid any mishaps as well as to keep the tank water neat and clean.

### **332. SITA DEVI & SATI PILLAR, DEORBIJA, DISTRICT DURG**

Retaining wall has been provided along the edges of the pond to avoid any mishaps as well as to develop the monumental area. Grill fencing has been provided over the existing compound wall.

### **333. BRICK MOUND 2, GARH DHANORA, DISTRICT KANKER**

M.S. grill has been mounted over the existing compound wall to provide safety and security in the monument premise.

### **334. DURGA TEMPLE, CHAITURGARH FORT, DISTRICT KORBA**

After dismantling the out of plumb and bulged *mandapa*, pillars have been reset to their original positions, followed by providing the lintels, beams, *chhajja* stones and roof slabs. Over the roof lime surkhi concrete has been provided. Stone apron all around the temple has been provided to avoid water stagnation in the surrounding and also to facilitate easy movement of visitors.

### **335. HARSHAGUPTA VIHAR, SIRPUR, DISTRICT MAHASAMUND**

In continuation of earlier works, in addition to underpinning, core filling and water tightening of structures all around the monastery, restoration of brick walls on the

exterior side near the entrance with traditionally prepared lime mortar was carried out.

**336. TIVARDEV VIHAR, SIRPUR, DISTRICT MAHASAMUND**

In continuation of earlier works in addition to underpinning, core filling and water tightening of structures all around the monastery, restoration of walls on the exterior side near the entrance was carried out with the help of specially prepared bricks matching to original shape and traditionally prepared lime mortar. M.S. grill has been mounted over the existing compound wall to provide safety and security in the monument premise.

**337. RAMA TEMPLE, SIRPUR, DISTRICT MAHASAMUND**

In continuation of earlier works, restoration of walls was carried with bricks and traditionally prepared lime mortar. Besides resetting, brick veneering, underpinning and water tightening of structures was carried out. M.S. grill has been mounted over the existing compound wall to provide safety and security in the monument premise

**338. PADMAPANI VIHAR, SIRPUR, DISTRICT MAHASAMUND**

After dismantling the bulged and out of plumb brick walls restoration was carried out with specially prepared bricks matching to original shape and traditionally prepared lime mortar. The flight of steps leading to the monastery was also conserved. To drain out rain water from the surroundings particularly during rainy season drains have been provided.

**339. SHIV TEMPLE 4, SIRPUR, DISTRICT MAHASAMUND**

Restoration of the excavated brick structure of the priest house with specially prepared bricks matching to original shape with traditionally prepared lime mortar was carried out. For the safety and security purpose a low height compound wall with chain link fencing has been provided around the monument.

**340. LAXMAN TEMPLE, SIRPUR, DISTRICT MAHASAMUND**

Iron grills were fixed over the compound on the east side of temple. Besides, laterite stone apron has been provided at the basement all around the temple.

**341. EXCAVATED STRUCTURE (SRP-21), SIRPUR, DISTRICT MAHASAMUND**

For the safety and security of the monument grill fencing has been provided over the dwarf compound wall.

**342. EXCAVATED STRUCTURE (SRP-22), SIRPUR, DISTRICT MAHASAMUND**

For the safety and security of the monument grill fencing has been provided over the dwarf compound wall.

**343. EXCAVATED STRUCTURE (SRP-16), SIRPUR, DISTRICT MAHASAMUND**

For the safety and security of the monument grill fencing has been provided over the dwarf compound wall.

**344. EXCAVATED STRUCTURE (SRP-17), SIRPUR, DISTRICT MAHASAMUND**

Underpinning and pointing to the peripheral wall was carried out besides providing stone apron around the monument.

### **345. EXCAVATED SHIVA TEMPLE NO. 6, SIRPUR, DISTRICT MAHASAMUND**

For the safety and security of the monument grill fencing has been provided over the dwarf compound wall.

### **346. MONASTERY NEAR SCHOOL, SIRPUR, DISTRICT MAHASAMUND**

Dwarf wall with grill fencing has been provided for safety and security of the monument.

### **347. BALESHWAR MAHADEV TEMPLE SIRPUR, DISTRICT MAHASAMUND**

Dwarf wall with grill fencing has been provided for safety and security of the monument.

### **348. MAHADEV TEMPLE, NARAYANPUR, DISTRICT RAIPUR**

After dismantling the damaged stone apron it has been reset it back as per the original to avoid water stagnation around the monument.

### **349. SITA BAREE, RAJIM, DISTRICT RAIPUR**

A dwarf wall with grill fencing has been provided for the safety and security of the monument.

## **SRINAGAR CIRCLE**

### **JAMMU & KASHMIR**

### **350. AKHUN MULLA SHAH MOSQUE, DISTRICT SRINAGAR**

The ashlar stone masonry wall from south side has been restored as per original.

### **351. GROUP OF TEMPLES AT NARANAG, DISTRICT SRINAGAR**

Ancient retaining wall in R. R. masonry from north side of the pond has been restored.

### **352. SHANKRACHARYA TEMPLE, SRINAGAR, DISTRICT SRINAGAR**

Construction of retaining wall in R.R. masonry and laying of devri stone flooring in combination mortar has been done.

### **353. SUGENDESHA TEMPLE PATTAN, DISTRICT BARAMULLA**

Chain link fencing has been provided over a dwarf wall in rubble stone masonry in combination mortar from the northeast side.

### **354. CHAITYA MONASTERY AND STUPA AT PARIHASPORA, DISTRICT BARAMULLA**

MS grill fencing over dwarf wall in rubble stone masonry in combination mortar has been provided from the east side.

### **355. PRATAPSWAMIN TEMPLE TAPPER, DISTRICT BARAMULLA**

Chain link fencing over dwarf wall in rubble stone masonry in combination mortar has been provided from the south west.

### **356. MUGHAL ARCADE AT VERINAG, DISTRICT ANANTNAG**

The canal has been desilted and a pathway leading to the south side has been provided as per original pattern.



**357. BUMZUVA CAVE, BUMZUVA, DISTRICT ANANTNAG**

A grill gate was provided to the cave and the missing portion of the steps was restored. A balustrade in MS railing was provided to the steps.

**358. SUN TEMPLE MARTAND, DISTRICT ANANTNAG**

Chain link fencing over dwarf wall in R. R. masonry with combination mortar on south and east side has been provided.

**359. SHIVA TEMPLE KAKPORA, DISTRICT PULWAMA**

Restoration of main steps and landing of the temple in ashlar stone masonry with combination mortar has been completed.

**360. ANCIENT STUPA AT MALANGPORA, DISTRICT PULWAMA**

Scientific earth work excavation was undertaken and completed to expose the buried structures.

**361. PALACES AT RAMNAGAR, DISTRICT UDHAMPUR**

The ancient support wall and steps on the south side and the stone flooring around the *Nawa mahal* has been restored. Plastering of the walls of the Dewan-i-Am palace (both plain and ornamental mouldings) in lime *surkhi* plaster has been done. The wooden *chajja* and door in the west side of the Palace has been provided as per the original pattern.

**362. DERA TEMPLE MANWAL, DISTRICT UDHAMPUR**

Side steps leading to ancient well and the highly ornamental and moulded ashlar stone masonry of the niche portion of main temple has been restored.

**363. AKHNOOR FORT, AKHNOOR, DISTRICT JAMMU**

The exposed gateway has been strengthened by pointing in lime *surkhi* mortar.

**364. ANCIENT SITE AMBARAN, DISTRICT JAMMU**

Chain link fencing over dwarf wall in R. R. masonry with combination mortar has been provided.

**365. GROUP OF TEMPLES AT KIRAMCHI, DISTRICT UDHAMPUR**

Stone pathway in combination mortar from south side including steps in ashlar stone masonry has been provided.

**366. LEH PALACE, DISTRICT LEH**

Missing and decayed deodar wooden windows, skylight, wooden beams, brackets, pillars, poplar poles, twigs, laying of mud concrete on floors and roof of the Palace has been restored.

**367. BUDDHIST MONASTERY, DISTRICT LEH**

Slate stone flooring in the courtyard / terrace of the monastery as per original pattern has been provided.

**368. BUDDHIST MONASTERY, THIKSEY, DISTRICT LEH**

Retaining wall in rubble stone masonry in combination mortar from northeast and the western side has been provided.

### 369. SHEY PALACE, SHEY, DISTRICT LEH

Laying of poplar poles and twigs, beams, brackets and posts on floors of the Palace including replacing of damaged wooden members in balconies, windows, doors as per original pattern has been provided.

### 370. BUDDHIST MONASTERY, LAMAYURU, DISTRICT LEH

Retaining wall of main monastery in rubble stone masonry with mud mortar, wood work and ornamental twigs with local grass in missing portion of parapet was provided. The sun dried brick masonry was strengthened and covered with mud plaster as per original pattern. Rubble stone masonry in mud mortar for retaining wall of main monastery has been completed.

## THRISSUR CIRCLE

### KERALA

### 371. ST. FRANCIS CHURCH, KOCHI, DISTRICT ERNAKULAM

The damaged old M.P tiles and reapers from the roof of the altar of the church were removed after thorough documentation. The old planks were repaired wherever possible and the totally damaged ones were replaced with new teak wood planks, and finally wood preservative oil was applied over the teak wood members. Over them ridge tiles were fixed (PI 163).

### 372. VADAKKUMNATHA TEMPLE, THRISSUR, DISTRICT THRISSUR

The restoration work of the western *gopuram* is in progress. The damaged / rotten roof members of the upper *tala* of the

*gopuram* such as rafters, beams, wall plates, vertical members etc were replaced with new teak wood members as per original design and clues. The reusable members were thoroughly repaired and strengthened by inserting new wooden pieces and joists etc. The architectural members of the uppermost roof such as wall plates beams, rafters were erected in its original position as per documentation carried out. Over the erected roof rafters of the *gopuram* repairing with new teak wood rafters has been carried out. Wood preservative oil was applied to all the architectural members of the upper *tala* of the *gopuram*. Mangalore pattern tiles were fixed on the roof of the *gopuram* uppermost tire in its original pattern and elevation (PI 164). Plastering work with special hand-ground lime mortar in the wall of upper *tala* wall is in progress. Replacement of old wooden members in the lower and middle *tala* with new ones as per original is in progress. The totally damaged pillars were replaced with new carved wooden pillars in lower and middle *tala* in place of damaged and missing members with original feature and old clue and design is in progress.

### 373. SIVA TEMPLE PERUVANAM, DISTRICT THRISSUR

The white wash and dead plaster from the outer wall of the lower *tala* of the Madathilappan shrine was carefully removed and replastered by using special hand-ground lime mortar as per old design and clues. The out of plumb laterite compound wall on the western side has been reset after proper documentation. The damaged laterite stones have been replaced with new stones. The foundation of the wall has been strengthened properly.

Plate 163



A



B

Kochi: before and after conservation of St. Francis Church.





A



B

Vadakkumnatha temple, Thrissur: before and after conservation.

**374. SRI RAMA TEMPLE, THRIPRAYAR, DISTRICT THRISSUR**

The damaged / rotten wooden roof members like rafters, planks were replaced with new teak wood members as per existing designs and clues while some of the members were repaired and strengthened. All the new members/ repaired members have been refixed properly in the existing alignment. The damaged copper tiles for the roof have been replaced with new ones while the old copper tile have been repaired /strengthened. They were laid over the wooden members as per the existing pattern and design. The decorated brass knobs have been provided as per the existing design in the bottom portion of the rafters.

**375. BEKAL FORT, PALLIKKARE, DISTRICT KASARGOD**

The damaged/undulated laterite stone wall top portion of the rampart side wall from bastion 2 to 5 have been removed and the same have been reset properly with combination mortar including replacing the damaged /broken old stones for proper strengthening. Laterite stone wall joints have been recess pointed with combination mortar in order to prevent growth of vegetation.

**376. ST. ANGELO FORT, KANNUR, DISTRICT KANNUR**

Approach pathway from the eastern part of the fort has been paved with laterite bed and pointing the top with combination mortar. The laterite side wall of the drainage at the entrance to the moat was strengthened (Pl. 165).

**377. TELLICHERRY FORT, TELLICHERRY, DISTRICT KANNUR**

The damaged /dead plaster has been removed from the walls in the unit – I building and fresh lime plastering work was carried out. The damaged/ rotten roof members were replaced with new teak wood members. The entire roof wall with new tiles/old tile was relaid. The flooring has been relaid .The walls have been plastered and finally painted.

Approach pathway in front of entrance has been laid in laterite. Periodical cleaning and repairing work of Unit building-III is in progress.

**378. PALAKKAD FORT, DISTRICT PALAKKAD**

The rampart wall all-round have been water tightened with new /old laterite stones in combination mortar. The damaged roof in front of the Anjaneya sub-shrine has been replaced with new roof. The work was completed.

**379. ANJENGO FORT, ANJENGO, DISTRICT THIRUVANANTHAPURAM**

Laying laterite apron on the northern side of the outer fortification was completed.

**380. ANCIENT SITE, KATTAKAMBAL, DISTRICT THRISSUR**

The fallen portion of the laterite compound wall of the site was been reconstructed.

**381.KUDAKKALPARAMBU, CHERAMANGAD, DISTRICT THRISSUR**

The laterite pathway has been laid from the entrance to the site. Solar light arrangements have been made inside the site. An iron safety mesh was provided to the well inside the fort.





A



B

St. Angelo Fort, Kannur: before and after conservation.



**TAMIL NADU**

**382. SHRI. BHAKTAVATSALA TEMPLE, SERMADEVI, DISTRICT TIRUNELVELI**

The heavy leaky weathering course materials were removed from the terrace of *mandapas*. Further the roof has been water tightened with fresh lime concrete and then laid with country tiles and the top plastered with suitable colour toning. The rubble masonry revetment wall was constructed near the river bed to prevent sliding of earth and also to prevent river water entering inside the monument area during rainy season.

**383. VALISVARA TEMPLE, TIRUVALISVARAM, DISTRICT TIRUNELVELI**

The out of plumb veneer stone *thirumadil* compound wall of the temple was carefully dismantled after thorough documentation. The earth work has been carried out for laying proper foundation to the wall. Further the stone veneer wall has been reconstructed as per the original including replacing the missing and damaged stones. The stone joints have been recess pointed. The missing portion of *thirumadil* wall of the temple has been reconstructed with neatly dressed stones as per existing design.

**384. BHAGAVATI TEMPLE, CHITRAL, DISTRICT KANYAKUMARI**

The damaged brick floor in the Jain bas-relief of the temple was removed and stone flooring was provided over a bed of brick jelly concrete and the stone joints were pointed in combination mortar.

**385. SRI PARTHASARATHI AND KRISHNA TEMPLE, PARTHIVAPURAM, DISTRICT KANYAKUMARI**

Wood preservative oil was applied to the wooden members such as rafters, beams and pillars of the temple.

**VADODRA CIRCLE**

**DAMAN AND DIU**

**386. CHURCH OF OUR LADY ROSARIO, MOTI DAMAN, DAMAN**

The work of refixing of loose /out of plumb wooden sculptures on the wall of the church has been completed.

**387. ST.TIAGO BASTION & RUINED CHAPEL INSIDE THE FORT AT DIU**

The work of constructing bela stone masonry supporting wall in LSS mortar with inside hearting on the sea side has been completed. The work of stone flooring and plastering inside the chapel and laying of Mangalore tile roof has also been completed.

**388. ST.PHILIP & ST.NICHOLAS BASTION INSIDE THE FORT AT DIU**

The work of dismantling & reconstruction of weathered bela stone masonry with newly dressed bela stone in LSS mortar of St.Nicholas Bastion is in progress.

**389. ARMOUR HOUSE AND PATHWAY INSIDE THE FORT, DIU**

The work of dismantling and reconstruction of fallen and missing bela stone masonry wall of the Armour House with inside hearting in LSS mortar has been completed.

Proper stacking of guns & construction of steps to the entrance room has also been completed.

### **GUJARAT**

#### **390. JAMI MASJID, DISTRICT AHMEDABAD**

The work of dismantling out of plumb ashlar stone masonry such as capitals, *chhajja*, pillars etc after numbering & stacking carefully for reuse, reconstruction of broken ashlar stone masonry “*jali work*” set in lime, surkhi and sand mortar using fresh Dhrangadhara stone duly dressed and carved as per original and resetting of the fallen stone *kanguras* and providing and reconstructing brick masonry wall has been completed.

#### **391. SAIYED USMAN TOMB, DISTRICT AHMEDABAD**

The work of dismantling the broken, cracked, shaken and leaning architectural members such as layers of corbelled dome, lintels, capitals, arches and columns etc was carried out after numbering & stacking the materials systematically. Reconstruction of damaged inner chamber of the tomb consisting of *kumbhis*, columns, capitals, lintels etc with proper moulding and re-erection of *chhajja* as per original was completed.

#### **392. SARANGPUR GATE, DISTRICT AHMEDABAD**

The work of resetting the dismantled architectural members using new Dhrangadhara stones after replacing the damaged stones duly carved as per original is in progress.

#### **393. GREAT MOSQUE, SARKHEJ, DISTRICT AHMEDABAD**

Carried out the work of dismantling damaged sand stone flooring & providing Dhrangadhara stone flooring in lime, surkhi mortar and providing & laying lime concrete on roof terrace including ramming, curing, finishing and the work of excavation & leveling of ground for laying apron on rear side of great mosque. The work has been completed.

#### **394. BAHLOL KHAN GHAZI'S MOSQUE, DHOLKA, DISTRICT AHMEDABAD**

The work of dismantling and providing ashlar stone masonry wall on the south west corner wall of the mosque and the work of providing M.S.Grill fencing over brick masonry dwarf wall is in progress.

#### **395. BRICK DOME NEAR PANCHMAHUDA KI MASJID, CHAMPANER-PAVAGADH**

Rank vegetation was removed and the work of providing chain link fencing over R.R.stone in foundation and brick masonry wall has been completed.

#### **396. BRICK DOME NEAR VADA TALAV, CHAMPANER-PAVAGADH**

The work of providing chain link fencing over R.R stone in foundation and brick masonry dwarf wall has been completed (pl. 166).

#### **397. CITADEL WALL, CHAMPANER-PAVAGADH**

The work of reconstruction of fort wall in ashlar stone masonry towards eastern side & providing R.R masonry in lime and sand mortar in core is in progress (pl. 167).

Plate 166



A



B

Champaner-Pavagadh: before and during conservation of brick dome.





A



B

Dholka: before and after conservation of Citadel wall.

**398. KABUTARKHANA PAVILION,  
CHAMPANER-PAVAGADH**

The work of providing chain link fencing over dwarf masonry wall has been completed (pl. 168).

**399. KAMANI MASJID, CHAMPANER-PAVAGADH**

Thick vegetation around the monument was removed and the work of reconstructing ashlar stone masonry towards northern and southern side wall and fixing of base stone is in progress (pl. 169).

**400. KEVDA MASJID, CHAMPANER-PAVAGADH**

The work of providing and fixing *chhajja* stone after dressing and moulding was carried out. Stone edging to pathway, providing brick masonry wall around the platform with R.R stone hearting on southern and eastern side of the platform with steps on the eastern side and repairing of brick masonry wall of old well were completed (pl. 170).

**401. MAKAI KOTHAR, CHAMPANER-PAVAGADH**

The work of providing barbed wire fencing with M.S.grill door and window has been completed.

**402. NAGINA MASJID, CHAMPANER-PAVAGADH**

The work of providing *chhajja* stones on first floor of the mosque and ashlar stone masonry above *chhajja* with moulding etc as per original on the eastern side and water tightening of the domes of the Nagina Masjid has been completed. The work of providing missing *chhajja* stone to the

Cenotaph has also been completed (pl. 171).

**403. PATAI RAVAL PALACE, CHAMPANER-PAVAGADH**

The work of providing ashlar stone masonry in lime mortar to the damaged eastern side steps has been completed and the work of reconstruction of R.R.Masonry wall of southern side of the palace is in progress.

**404. SEVEN ARCHES, CHAMPANER-PAVAGADH**

The work of providing R.R stone masonry in lime mortar in fort wall & dressing of ashlar stone for arches is in progress.

**405. DWARKADHISH TEMPLE COMPLEX,  
DWARAKA, DISTRICT JAMNAGAR**

The work of laying base concrete and fixing of baradia stone flooring in open yard of temple complex has been completed.

**406. MAHAKSHTRAPA INSCRIPTION,  
DWARAKA, DISTRICT JAMNAGAR**

The work of providing mandapa with available carved stone members over the stone inscription has been completed.

**407. SUN TEMPLE, NANI GOP, DISTRICT JAMNAGAR**

The work of constructing bela stone masonry dwarf wall for providing chain link fencing over bela stone dwarf wall after dismantling the old damaged barbed wire fencing has been completed.

**408. ANCIENT SITE, VALLABHIPUR,  
DISTRICT JAMNAGAR**

The work of providing barbed wire fencing around the site has been completed.



A



B

Kabutarkhana pavilion: before and after conservation.



Plate 169



A



B

Kamani masjid: before and during conservation.



A



B

Kevda masjid: before and after conservation.



Plate 171



A



B

Nagina masjid: before and after conservation.



### **409. RAO LAKHA CHHATRI, BHUJ, DISTRICT KACHCHH**

The work of excavation with P.C.C in foundation for providing R. R stone masonry wall for chain link fencing is in progress.

### **410. EXCAVATED SITE, KOTADA (DHOLAVIRA), DISTRICT KACHCHH**

The work of providing chain link fencing with dwarf masonry wall on the eastern & northern side has been completed.

### **411. SIVA TEMPLE, KOTAL, DISTRICT KACHCHH**

The work of providing compound wall around the protected area and strengthening the damaged plinth around the temple has been completed.

### **412. SITLAMATA TEMPLE, PILUDARA, DISTRICT MEHSANA**

The work of dismantling the bulged and out of plumb ashlar stone masonry wall of temple and resetting the same as per original and providing chain link fencing over dwarf wall around the monument has been completed (pl. 172).

### **413. KHAN SAROVAR GATE, DISTRICT PATAN**

The work of pointing the wall and reconstruction of *kanguras* has been completed (pl. 173).

### **414. RANI-KI-VAV, DISTRICT PATAN**

The work of providing R.R stone pitching on both sides of the slope of Rani-Ki-Vav, fixing of M.S.grill, providing stone pathway

and steps and construction of toilet block is completed (pl. 174).

### **415. TORANA, VADNAGAR, DISTRICT PATAN**

The work of providing Dhrangadhara stone flooring, steps and fixing of grills over dwarf masonry wall is completed.

### **416. FATEH BURJ, VYARA, DISTRICT SURAT**

The work of construction of brick masonry dwarf wall with chain link fencing is in progress. The work of water tightening of the roof of the Fateh Burj has been completed.

### **417. OLD DUTCH & ARMENIAN TOMBS, DISTRICT SURAT**

The work of removing debris and earth accumulated inside the Dutch Cemetery to expose the original architectural features is in progress.

### **418. BHAU TAMBEKARWADA HAVELI, DISTRICT VADODARA**

The work of removing damaged wooden members of 2<sup>nd</sup> & 3<sup>rd</sup> floor, providing new teak wood member with anti termite treatment, laying weathering course on the roof terrace with brick bats & lime concrete and plastering the top with combination mortar, curing and applying French polish on teak wood members like beam and rafter has been completed. The work of providing wooden grill on two floors has also been completed.

### **419. VADODARI GATE, DABHOI, DISTRICT VADODARA**

Plate 172



A



B

Sitlamata temple: before and after conservation.



A



B

Khan Sarovar gate: before and after conservation.



Plate 174



A



B

Rani-Ki-Vav, Patan: before and after conservation.

## ***PRESERVATION OF MONUMENTS***

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The work of removing grill fencing and providing chain link fencing over the brick masonry dwarf wall around the monument has been completed.

### **420. SCULPTURE SHED, DABHOI, DISTRICT VADODARA**

The work of construction of sculpture shed has been completed.

### **421. ANCIENT SITE, KAYAVAROHAN, DISTRICT VADODARA**

The work of chain link fencing over dwarf wall with concrete and R.C.C pillar has been completed.





## IX ARCHAEOLOGICAL CHEMISTRY

### ANDHRA PRADESH

#### 1. SRI VEERABHADRA SWAMY TEMPLE, LEPAKSHI, DISTRICT ANANTAPUR

In continuation to the previous year's work, the conservation and restoration work was taken up on the paintings executed on the ceiling of Vishnu shrine and stone surface of pillars. The paintings executed on the lime plaster over granite slabs, ceiling pillars were having accumulation of dust, dirt, soot, cobwebs, insects nests, accretions loss of adhesion of plaster at some places, along with presence of lime deposits, oil stains, greasy matter, superficial dust, and dirt on the stone pillars. Superficial accretions were removed mechanically using sable hair brushes. The soot and dust accretions were removed chemically using a mixture of 2-ethoxy ethanol, toluene (sulphur free) and tri ethanol amine. The tenacious accretions were further cleaned using a mixture of methanol and Iso-propanol. On account of the tenacious nature of the accretionary deposits, the application of the mixture of solvents had to be resorted to 3-4 times for their complete removal. Further, any remnants left on the surface were removed mechanically with the help of artist brush and cotton swabs. The work is still in progress.

Another work taken up at the same temple was for the removal of lime, oil stains, greasy matter, settled dust, etc., from the pillars, removal of ingrained dirt from the

prakara wall besides micro-vegetational growth, soot, etc. from the stucco structures. Besides, chipping of exfoliation of stone surface, mainly on the north wall inscriptions, east wall and a stretch of rocky outcrop present in the foreground of the east wall was strengthened. The superficial dust, dirt, insect nests, cobwebs, micro-vegetational growth was removed as per the procedure mentioned above. The entire chipped surface was given strength using an ethyle silicate based stone strengthener. All the treated exterior surfaces were given a coat of 2% Sodium penta chlorophenate as fungicide and the mixture of Silicone based Wacker BS 290 and mineral turpentine oil as a protective coat.

#### 2. SRI CHINTALA VENKATARAMA SWAMY TEMPLE, TADIPATRI, DISTRICT ANANTAPUR

The conservation treatment and preservation work has been taken up for the removal of micro-vegetational growth, tenacious coats of lime/cement flow marks, red ochre and stains and dust and dirt deposition from the exterior and interior surfaces of different *mandapas* mostly of granite with limited use of sand stone. The thick and tenacious coats of lime and red ochre were removed by chemico-mechanical means using 3-5% acetic acid in aq. medium. Micro-vegetational growth was removed using a mixture of liquid ammonia (3%) and non-ionic detergent, followed by brushing with different type of brushes. A final wash with

dilute ammonia solution and then with plain water was given to remove all the residual chemicals. The entire cleaned exterior surface was given fungicidal treatment with a coat of 2% sodium penta chloro phenate followed by application of a silicone based water repellent Wacker BS-290 in mineral turpentine oil on the dried surface.

### **3. SRI BHEEMESWARA SWAMY TEMPLE, DRAKSHARAMA, DISTRICT EAST GODAVARI**

In continuation to the previous year's work, the conservation treatment and preservation work has been taken up for the removal of micro-vegetational growth from exteriors and lime, soot and oil accretions from interior part of west *gopuram* in which the dressed khandolite is the building material. During previous year the scientific conservation was carried out to the cloister of the main temple and inner *prakara* wall. The micro-vegetational growth was removed with the mixture of ammonia and. An aq. solution of glacial acetic acid was used chemico-mechanically for the removal of lime deposits followed by thorough washing with dilute ammonia solution for neutralization of acid remnants. Subsequently, the surface was subjected to thorough washing with plain water. All the treated dried exterior surfaces were given a coat of 2% Sodium penta Chlorophenate as a fungicide in aq. medium and a water repellent treatment of Wacker BS 290 and MTO as a protective coat.

### **4. SRI BHAVANARAYANA SWAMY TEMPLE, BAPATLA, DISTRICT GUNTUR**

In continuation to the previous year's work, the eastern and western exterior surfaces,

open *mandapa* and interior pillars, ceilings and east wall of this temple comprises of granite stone, was taken up for chemical conservation treatment work. The main conservation problem of this temple was micro-vegetational growth along with deposition of dust, dirt, lime coats, oil stains, greasy matter, soot etc. on the exterior surfaces. For the removal of micro-vegetational growth 3 % liquid ammonia and non-ionic detergent followed by soft brushing with nylon brushes was carried out. For the removal of accretions from the intricate carvings and designs tooth brushes and cotton swabs were also used. The coats of lime and cement were removed chemico-mechanically using 3-5% solution of glacial acetic acid in aq. medium and 5% Sodium thiosulphate. The soot and oil smears were removed using tri ethanol amine. The greasy matter deposited on the interior surface was removed by using the clay pack technique with Fuller's Earth. The western exterior surfaces were given a coat of 2% Sodium penta chloro phenate as fungicide. On the cleaned and dried surface water repellent coat was given using Wacker SMK 1311 in water as a protective coat.

### **5. CHARMINAR, DISTRICT HYDERABAD**

During the period under review the chemical conservation work was taken up on the northeast - southeast, southeast- southwest, southwest- northwest, northwest- northeast *minarets* and *masjid*. Since these minarets have brick work overlaid with lime plaster, extra care was taken to avoid any abrasive action for the removal of micro-vegetational growth, deposits of ingrained dust and soot. The accretionary deposits were removed in

different stages like using mixture of liquid ammonia and non-ionic detergent 1 for the removal of micro-vegetational growth, followed by fuller's earth technique using 3% solution of ammonium carbonate and ammonium bi-carbonate mixture for the removal of remnants of accretionary deposits. After thorough washing the cleaned areas were given fungicidal treatment using a coat of 2% sodium penta chloro phenate solution in aqueous medium, followed by application of Wacker BS-290 in MTO as a protective coat on the dried surface.

#### **6. GOLCONDA FORT, DISTRICT HYDERABAD**

In continuation to the previous year's work, the conservation work was taken up on the south and east wall of Rani Mahal, made up of granite stone with lime plaster. The main conservation problems were micro-vegetational growth and lime coats on exteriors. The micro-vegetational growth was removed chemico-mechanically using a mixture of ammonia and non ionic detergent, by brushing with nylon brushes of different types. The lime coats were also removed chemico-mechanically, using 3% aqueous acetic acid solution followed by thorough washing with dilute ammonia solution for neutralizing the remnants of acids. The treated surface was then thoroughly washed with plain water followed by a fungicidal treatment using 2% aqueous sodium penta chloro phenate. Finally, the entire cleaned and dried exterior stone surface was given a water repellent treatment with silicone based water repellent Wacker BS-290 in mineral turpentine oil.

Wacker SMK 1311 with water was applied on the lime surface as a protective coat.

#### **7. BEECH GHANTKI BURZ, DISTRICT KURNOOL**

In continuation to the previous year's work, the conservation treatment work was taken up for the removal of micro-vegetational growth on the stucco and brick surfaces, lime wash accretions, bird droppings, scribbling on walls. Sand stone is the major building material with usage of considerable part of slate stone for steps and its surrounding walls and stucco on the parapet walls.

The micro-vegetational growth was removed by using a mixture of ammonia and teepol, followed by thorough washing with distilled water. The lime and red ochre accretions were removed chemico-mechanically using 5% aq. acetic acid repeatedly until complete removal of accretions followed by thorough washing with the plain water. The acid remnants on the wall were neutralized by aq. solution of dilute ammonia. The entire cleaned exterior surfaces were given a coat of 2% aq. sodium penta chloro phenate as fungicide. Finally, the dried exterior surfaces were given a water repellent treatment using Wacker BS-290 in mineral turpentine oil. The work is still in progress.

#### **8. UMAMAHESWARA SWAMY TEMPLE, YAGANTI, DISTRICT KURNOOL**

The exterior and interior surfaces of *gopuram*, *chhajja* and sculptures of this temple comprising of granite stone, were taken up for the chemical conservation treatment work. The main conservation problem of this temple was micro-



vegetational growth along with deposition of dust, dirt, thick lime coats, etc., on the exterior surfaces. For the removal of micro-vegetational growth 3 % liquid ammonia and non-ionic detergent followed by soft brushing with nylon brushes was carried out. For the removal of accretions from the intricate carvings and designs tooth brushes and cotton swabs were also used. The coats of lime and cement were removed chemico-mechanically using 3-5% solution of glacial acetic acid in aq. medium and 5% Sodium thiosulphate. Exterior surface was given a coat of 2% Sodium penta chloro phenate as fungicide. On the cleaned and dried surface water repellent coat was given using Wacker BS 290 in MTO as a protective coat. The work is in progress.

### **9. GROUP OF TEMPLES, ALAMPUR, DISTRICT MAHABOONAGAR**

In continuation to the last year's work chemical conservation work was taken up for the removal of micro-vegetational growth, lime coats, cement flown marks from the exteriors and bat's excreta and lime coat from the interiors of the temple. Sandstone and granite are the main components of these monuments. The micro-vegetational growth was removed, using a mixture of 3% liquid ammonia and non-ionic detergent, followed by brushing with nylon brushes of different shapes and sizes. The thick lime coats were removed chemico-mechanically using 3-5% solution of glacial acetic acid in aq. medium. For the removal of bat's excreta mixture of liquid ammonia and non-ionic detergent along with 5% ammonium carbonate and ammonium bicarbonate in 1:1 ratio in aq. medium were used followed by thorough washing with the

plain water to ensure elimination of the remnants of chemicals from the stone surface. The entire treated and dried surface was given a coat of 2% sodium penta chloro phenate as fungicide. On the stone surface a preservative coat of Wacker BS 290 and MTO was applied as protective coat. The work is in progress.

### **10. SRI MUKHALINGESWARA SWAMY TEMPLE, SRIMUKHALINGAM, DISTRICT SRIKAKULAM**

The interiors of the temple constructed in khondalite stone was taken up for chemical conservation and preservation work for the removal of superficial dust, dirt, insect nests etc., lime patches, oil stains, greasy matter etc., from the stone surface. Superficial dust, dirt, insect nests, cobwebs etc., were removed superficially using soft nylon brushes. Ammonia and non-ionic detergent was used for the removal of accretions and Ammonium carbonate and bicarbonate mixture also used for the removal of hard accretions. Clay pack technique was used for the removal of soot and tarry matter from the stone surface. As the treatment carried out was to the interiors, no fungicide and protective coats were given to the cleaned surface.

### **11. BUDDHIST ROCK-CUT STUPAS, SANKARAM, DISTRICT VISAKHAPATANAM**

Scientific conservation work was taken up for the removal of micro-vegetation growth, lime coats, etc., from the *stupas* made of khondalite stone and other building structures. The micro-vegetation growth was removed using a mixture of ammonia and non-ionic detergent, followed by gentle brushing with different sizes of nylon

brushes. For the removal of fungal growth, Sodium-carbonate and Bi-carbonate was applied by chemico-mechanical means. The surface was then given a wash with dilute oxalic acid solution for neutralizing the remnants of basic solvents present, if any. This was followed by a thorough wash with plain water. The entire cleaned exterior surface was given a coat of 2% Sodium penta chlorophenate as fungicide in aq. Medium and a mixture of Wacker BS 290 and MTO as protective coat.

#### **12. KUSH MAHAL (SHITAB KHAN PALACE) AND LOOSE SCULPTURES, FORT WARANGAL, DISTRICT WARANGAL**

In continuation to the previous year's work the chemical conservation treatment and preservation work was taken up for the removal of micro-vegetational growth, lime and other calcareous deposits from the exterior and interior surfaces of south, east, west sites and loose sculptures in the interior of the Fort using aq. ammonia and non-ionic detergent. The lime and red ochre coats were subjected to the chemico-mechanically cleaning, using 3% Glacial acetic acid in aq. medium. Repeated applications of acetic acid had to be followed for complete removal of remnant coats. The surface was then washed with aq. ammonia solution for neutralization of acid remnants, followed by thorough washing with plain water. All the treated and dry exterior surfaces were given a coat of 2% aq. Sodium penta chloro phenate as fungicide followed by application of silicon based water repellent Wacker BS-290 Mixed with Mineral Turpentine Oil o. The work is still in progress.

#### **13. BUDDHIST REMAINS, GUNTUPALLI, DISTRICT WEST GODAVARI.**

In continuation to the previous year's work, the conservation treatment has been taken up for the removal of hardened lime accretions and micro-vegetational growth on part of exterior surface of Dharmalingeswara cave and large monastery.

The thick and tenacious coats of lime were subjected to mechanical treatment using needles and nylon brushes, so as to reduce their thickness. The micro-vegetational growth was removed using a mixture of aq. ammonia and teepol, followed by brushing with different types of brushes with soft bristles. 3% solution of glacial acetic acid was applied chemico-mechanically for the removal of remnants of lime deposits. Brushing with nylon brushes, in between, helped in dislodging the lime deposits from the surface completely. A final wash with dilute ammonia solution was carried out for the removal of acid remnants, if any. All the treated exterior surfaces were given a coat of 2% aq. sodium penta chloro phenate as fungicide followed by application of silicone based water repellent Wacker BS-290 with mineral turpentine oil as a protective coat.

### **ASSAM**

#### **14. GOLA GHAR AND RANG GHAR, JOY SAGAR, DISTRICT SIBSAGAR**

The chemical conservation and preservation work was taken up for the removal of thick micro-vegetational growth, cob web, birds excreta etc., from the brick structured temple which is lime plastered and for the strengthening of loose plaster. In order to remove heavy microbiological growth and

other accretionary deposits, ammonia and non-ionic detergent was used followed by thorough washing with plain water. The cleaned surface was then given fungicidal treatment with 5% aq. solution of santobrite, to arrest the fresh growth of micro-vegetation. Finally, the dried surface was given a water repellent treatment using two coats of silicone based Wacker BS-290 in mineral turpentine oil. Strengthening of loose plastered surface was carried out with the help of ethyle silicate based stone strengthener Wacker OH-100.

### **15. MASONARY REMAINS OF BAMUNI HILLS, DISTRICT TEZPUR**

Chemical treatment and preservation work was taken up for the removal of micro-vegetational growth, dust, dirt, and bird's excreta from the carved surface of stone and loose sculptures. In order to remove heavy microbiological growth and other accretionary deposits, ammonia and non-ionic detergent was used followed by thorough washing with plain water. The cleaned surface was then given fungicidal treatment with 5% aq. solution of santobrite, to arrest the fresh growth of micro-vegetation. Finally, the dried surface was given a water repellent treatment using two coats of silicone based Wacker BS-290 in mineral turpentine oil.

### **16. RUINS AT SIGRI HILLS, DISTRICT TEZPUR**

During the period under review the chemical treatment and preservation work was taken up for the removal of micro-vegetational growth, dust, dirt, from the remains of a group of ancient temple comprising door frame, pillars, ceiling etc. The selected

remains were initially cleaned with liquid ammonia and non-ionic detergent mixture in 3:1 ratio. The superficially cleaned surface was then given fungicidal treatment using 5% solution of santobrite followed by application of Wacker 290 in mineral turpentine oil two coats (1:14) as preservative. The work was completed.

### **17. BORDOL TEMPLE, BISWANATH, DISTRICT TEZPUR**

The brick walled temple with lime plastered surface dedicated to lord Shiva was subjected to chemical treatment and preservation for the removal of micro-vegetational growth, dust, dirt, and bats excreta etc, using 5% liquid ammonia and non-ionic detergent mixture. The cleaned and dried surface was given fungicidal treatment by using 5% solution of santobrite followed by application of preservative coat of Wacker BS 290 in mineral turpentine oil.

## **BIHAR**

### **18. VIKRAMSHILA UNIVERSITY, ANTICHAK, DISTRICT BHAGALPUR**

The ancient brick structural remains of Vikramshila excavated site such as ruined entrance gate, the votive stupas and adjoining structures were subjected to chemical conservation treatment in order to eradicate micro-vegetational growth, superficial accretionary deposits, bird's droppings etc. using aqueous ammonia solution and teepol followed by thorough washing with the plain water. The cleaned surface was then given a fungicidal treatment with 5% aq. Solution of santobrite to arrest the fresh growth of micro-vegetation. Finally, the dried surface was



given water repellent treatment using Wacker BS 290 in mineral turpentine oil.

**19. MONASTERY COMPLEX NO. 6, NALANDA, DISTRICT NALANDA**

The ruined brick structure of monastery no.6 was subjected to very careful cleaning for the removal of biological accretions and growth using chemicals and soft brushes. At some places consolidation treatment was also given to impart strength to deteriorated brick structure using an ethyl silicate based stone strengthener Wacker OH-100. Finally, fungicidal treatment using sodium penta chloro phenate (5%) followed by preservative coat of Wacker BS-290 in mineral turpentine oil was given to reduce ingress of moisture as well as recurrence of biological growth.

**20. HASAN SHAH SURI'S TOMB, SASARAM, DISTRICT ROHTAS**

The sand stone tomb with lime plastered domes, *minar* and minarets was subjected to chemical conservation treatment in order to eradicate micro-vegetational growth, superficial accretionary deposits, bird's droppings etc. using aq. Ammonia solution and teepol followed by thorough washing with the plain water. The cleaned surface was then given a fungicidal treatment with 5% aq. Solution of santobrite to arrest the re-growth of micro-vegetation. Finally, the dried surface was given a water repellent treatment using Wacker BS 290 in mineral turpentine oil.

**CHHATTISGARH**

**21. SHABARI TEMPLE, KHAROD, DISTRICT JANJGIR-CHAMPA**

The chemical conservation work was taken up for the removal of heavy micro-vegetational growth on the exterior surface of the *sikhara* and sanctum walls of the temple made up of brick, and the platform, plinth and the *mandapa* made up of sandstone blocks and lime mortar.

The cleaning of the surface was carried out by using liquid ammonia solution 4% and non-ionic detergent with the aid of soft nylon brushes. For biocidal treatment, 2% solution of Sodium penta chloro phenate in de-ionized water was applied by paint brushes over the cleaned surface. Finally, Hydrophobic treatment was given to the treated surface by applying a silicone based water repellent Wacker BS-290 solution in mineral turpentine oil.

**22. KESHAV NARAYAN TEMPLE, SHEORINARAYAN, DISTRICT JANJGIR-CHAMPA**

Keshav Narayan temple is a living temple. Mainly bricks were used as building material however the door jamb is built of sand stone. The remains of the lime plaster at many places suggest that temple might have been plastered all over the surface. The highly porous surface of brick walls of the monuments and high humid conditions in the region provides very conducive conditions for the growth of micro-vegetation. The cleaning of the surface was carried out by using liquid ammonia solution 4% and non-ionic detergent with the aid of soft nylon brushes. For biocidal treatment, 2% solution of Sodium penta chloro phenate in de-ionized water was applied by paint brushes over the cleaned surface. Finally, to impart the water repellency to the surface

silicone based water repellent Wacker BS-290 was applied over the dried surface in suitable concentration.

### **23. HARSH GUPTA VIHAR, SIRPUR, DISTRICT MAHASAMUND**

In continuation to the previous year's work, the chemical treatment, consolidation, restoration and preservation of this Gupta period Buddha Vihar was taken up for the removal of micro-vegetational growth, dust, dirt, and soot deposits, stains of acrylic paint and lime wash coat etc.

The cleaning of the surface was carried out by using liquid ammonia solution 4% and non-ionic detergent with the aid of soft nylon brushes. The removal of thick layer of lime from the surface was carried out using very dilute acetic acid solution followed by complete neutralization by ammonia solution. For biocidal treatment, 2% solution of Sodium penta chloro phenate in de-ionized water was applied with spray pump over the cleaned surface. The weathered sculptures were consolidated by using Wacker OH-100. The restoration work of some of the sculptures was also carried out. Finally, Hydrophobic treatment was given to the treated surface by applying a silicone based water repellent Wacker BS-290 solution in mineral turpentine oil.

## **DELHI**

### **24. BHURE KHAN'S TOMB, SOUTH EXTENSION, DELHI**

In continuation to the previous year's work, the chemical treatment, and preservation of exterior of Bhure khan tomb was carried out. The entire surface of monument is affected

with thick growth of micro-vegetation and other accretionary deposits like dust, dirt, soot, bird excreta and other atmospheric pollutants. The quartzite stone surface was badly affected with iron stains due to rusting of iron dowels. The chemical treatment of sandstone and lime plaster surface for the removal of superficially adherent dust, dirt, smoke and soot pollutants was done with a mixture of 5% ammonia solution and 2-5% teepol non-ionic detergent. Lime plaster surface was subjected to bleaching powder treatment. The fragile sandstone surface was consolidated with an ethyl silicate based stone strengthener Wacker OH-100. After chemical treatment fungicide sodium penta chloro phenate was applied all over the surface and finally preserved with a coating of Wacker BS-290 diluted in mineral turpentine oil as water repellent on lime plaster and stone surface. The work is in progress.

### **25. RAMPART WALL, RED FORT**

In order to improve its aesthetic appearance the chemical conservation treatment of rampart wall under the flag mast facing Chandni chowk is taken up every year as a regular conservation measure before 15<sup>th</sup> August. For the removal of superficial accretion of dust, dirt, micro-vegetational growth and particulate matters etc. 2-5% aqueous solution of ammonia and rankleen neutral was used for chemical cleaning. The calcareous deposits were removed chemico-mechanically by using dilute acetic acid followed by thorough washing with plain water. Metallic pinnacles (9 nos.) situated at Lahori gate were chemically treated in the laboratory of the office for the removal of

superficial accretionary deposits and retouched by using golden powder in varnish. Two standing elephants at the Hathi gate were cleaned with aqueous ammonia and rankleen neutral solution to remove dust, dirt and stains of birds' excreta. Cracks in their teeth were treated and filled followed by the application of a fine coating of colour in varnish and thinner on the surface of elephant figures.

The huge brass gate at the entrance of the Meena Bazaar was chemically treated using 3-5% alkaline solution of Sodium potassium tartarate (Rochell's salt) and preserved by using dilute solution of lacquer varnish in turpentine oil. The brass gate situated in Meena Bazaar were also chemically treated for the removal of surface accretions dust, dirt, rust, birds' excreta and coating of old varnish.

#### **26. QUTB MINAR, QUTB COMPLEX, NEW DELHI**

The sandstone surface of Qutb Minar was affected with dust, dirt, smoke and soot pollutants. At its lower area, a corner portion of sandstone surface was chipped-off at places. The chemical treatment of sandstone surface was carried out with a mixture of 5% ammonia solution and 2-5% rankleen neutral non-ionic detergent for the removal of superficially adherent dust, dirt, and smoke soot pollutants. Iron stain marks were removed by oxalic acid. Clay pack treatment was given to remove hard accretionary deposits of dust, dirt, soot and atmospheric pollutants from sandstone using fuller's earth with 5% sodium carbonate. Sandstone with flaking, scaling and exfoliating surface was consolidated with an ethyl silicate based

OH-100 stone strengthener. After chemical treatment fungicide sodium penta chloro phenate was applied over the dried and cleaned surface. Finally it was preserved with a coating of Wacker BS-290 diluted in mineral turpentine oil as water repellent on the sandstone surface.

#### **27. NAJAF KHAN'S TOMB, NEW DELHI**

The exterior sandstone surface of the Najaf Khan's tomb is affected by the deposition of dust, dirt, smoke and soot and other pollutants. Portions of sandstone surface on the top edges of four walls were observed to be fragile at many places. The lime plaster grave on the raised platform was covered with micro-vegetational growth and thick deposition of other pollutants. Marble and sandstone graves in the core area were covered with dust, dirt, soot and tarry matter. The chemical treatment of sandstone, lime plaster and marble surface was carried out using a mixture of 5% ammonia solution and 2-5% rankleen neutral non-ionic detergent for the removal of superficially adherent, dust, dirt, smoke soot pollutants. Lime plaster surface of the dome was subjected to bleaching powder treatment. Clay pack treatment was given to remove hard accretionary deposits of dust, dirt, soot and atmospheric pollutants from marble/ sandstone surfaces using fuller's earth with 5% sodium carbonate. Sandstone with flaking, scaling exfoliating surface was consolidated with an ethyl silicate based OH-100 stone strengthener. After chemical treatment fungicide sodium penta chloro phenate was applied all over the surface except marble surface and finally preserved with a coating of Wacker BS-290 diluted in



mineral turpentine oil as water repellent on lime plaster and sandstone surface.

### **28. GHIYA-SU-D-DIN TOMB, TUGHLAKABAD, NEW DELHI**

The marble dome and exterior of the red sand stone surface of the walls of Ghiya-su-d-din tomb was affected with dust, dirt, cobwebs, soot, tarry matter and other atmospheric pollutants. Portion of sandstone surface were observed to be fragile at different places and had iron stains. The chemical treatment of sandstone and marble surface was carried out using a mixture of 5% ammonia solution and 2-5% rankleen neutral non-ionic detergent for the removal of superficially adherent dust, dirt, and smoke soot pollutants. Iron stain marks were removed by oxalic acid. Clay-pack treatment was given to remove hard accretionary deposits of dust, dirt, soot and atmospheric pollutants from marble surface of dome and walls using fuller's earth with 5% sodium carbonate. Red sandstone with flaking, scaling exfoliating surface was consolidated with OH-100 stone strengthener. After chemical treatment fungicide sodium penate chloro phenate was applied all over the surface except marble surface and finally preserved with a coating of Wacker BS-290 diluted in mineral turpentine oil as water repellent on sandstone surface only.

### **29. BADE KHAN'S TOMB, NEW DELHI**

The chemical treatment and preservation work of Bade Khan's tomb was taken up for the removal of tremendous growth of micro-vegetation along with thick layer of dust, dirt, soot bird excreta and other atmospheric pollutants. The quartzite stone surface is

observed to be affected with iron (brown) stains due to rusting of iron dowels. The chemical treatment of sandstone and lime plaster surface was carried out with a mixture of 5% ammonia solution and 2-5% rankleen neutral non-ionic detergent for the removal of superficially adherent dust, dirt, and smoke soot pollutants. Lime plaster surface was subjected to bleaching powder treatment. After chemical treatment fungicide sodium penta chloro phenate was applied all over the surface except marble surface. Finally, the entire dried surface was preserved with a coating of Wacker BS-290 diluted in mineral turpentine oil as water repellent on lime plaster and stone surface.

### **30. JAMA MASJID, DELHI**

The chemical treatment and preservation of the main gate was carried out. The brass surface is covered with thick layer of soot, dirt, tarry matter, bird excreta and dust. The chemical cleaning of brass surface is being carried out with renkleen neutral solution to remove dust and dirt. Clay-pack treatment was given to the brass surface with fuller's earth mixed with sodium bicarbonate and aqueous basic sodium potassium tartarate for the removal of tarry matter and organic matter deposited on the surface. Dry dusting of wooden surface was carried out using acetone-soaked cotton. The work is in progress.

## GOA

### **31. BASILICA OF BOM JESUS, OLD GOA**

In continuation to the previous year's work, the chemical conservation and treatment work was taken up for the removal of micro-vegetational growth and salt deposition on

the exterior laterite walls of the Basilica. The surface accretions such as dust, dirt, birds' excreta and micro-vegetational growth were removed chemico-mechanically using 2-3% aqueous solution of ammonia and non ionic detergent and gentle brushing with nylon brushes followed by thorough washing with plenty of water. Paper pulp treatment was given to the infested areas in order to extract soluble salts from the stone fabric. The surface was then washed with de-mineralized water for the removal of bits of paper pulp sticking to the surface. A 2% solution of sodium penta chloro phenate in distilled water was applied on the cleaned surface as fungicide. After consolidation of extensively deteriorated portion using an ethyl silicate based stone strengthener Wacker OH-100, Wacker BS-290 diluted in mineral turpentine oil was applied on the entire cleaned and dried surface as a water repellent.

### 32. CHURCHES, OLD GOA

In order to control vigorous termite activity against wooden objects and artifacts kept in different churches of Old Goa termiseal treatment is also being given apart from plinth treatment of the monuments with Immidachloprid which acts as neurotransmission disruptor. The work is in progress.

### 33. OUR LADY OF ROSARY CHURCH, OLD GOA

The chemical conservation work of the gates, made up of basalt blocks of the church was taken up for the removal of micro-vegetational growth, dust, dirt, birds excreta and salt. Superficial dust, dirt and birds

excreta were removed by brushing with soft brushes. For micro-vegetational growth and other similar accretions 2-3% aq. solution of ammonia and 1% non-ionic detergent were used with gentle brushing with nylon brushes followed by thorough washing with plenty of water. Removals of deposited salts were carried out using paper pulp treatment. Paper pulp was soaked in distilled water and was applied over the salt affected areas and removed after it is dried. This process was repeated till the area is free of salt. A 2% solution of sodium penta chloro phenate in distilled water was applied on the cleaned surface as fungicide. After consolidation of extensively deteriorated portion using an ethyl silicate based stone strengthener Wacker OH-100, Wacker BS-290 diluted in mineral turpentine oil in 1:13 ratio was applied on the entire cleaned and dried surface as a water repellent.

## GUJARAT

### 34. CITADEL WALL OF FORT, PAVAGADH, DISTRICT PANCHMAHAL

In continuation to previous year's work, the chemical treatment work for the removal of micro-vegetational growth dust, dirt and bird droppings on the sandstone citadel wall (east side) and Mandvi gate was carried out. The micro-vegetational growth and other accretions were removed using 3% aqueous solution of ammonia and teepol. The entire clean surface was given fungicidal treatment using 2% aqueous solution of sodium penta chloro phenate followed by a protective coat of water repellent using Wacker BS-290 in mineral turpentine oil.

### 35. SAT KAMAN, PAVAGADH, DISTRICT PANCHMAHAL

In continuation to previous year's work, the chemical treatment work was taken up for the fort of Sat Kaman situated at the end of the Sadan Shah Fort and right side of the Budhiya Darwaza. The sandstone surface was covered with dust, dirt, micro and micro-vegetational growth and trees. For the removal of plants and trees paraquatdichloride, a contact herbicide, mixed with distilled water in appropriate ratio was sprayed and injected as per requirement. After fifteen days the dry plants and trees were removed mechanically. The infested surface was treated with 2-3% aqueous solution of ammonia and non-ionic detergent. The cleaned surface was subjected to fungicidal treatment by using 2% solution of sodium penta chloro phenate. The cleaned surface was preserved with Wacker BS-290 in mineral turpentine oil.

### 36. JUNAGARI JAIN TEMPLE AND KANKESHWAR MAHADEV TEMPLE, VASAI, DISTRICT JAMNAGAR

The two temples of sandstone showed signs of erosion due to weathering effects. Due to the growth of micro flora like algae; moss and lichens etc., a blackish layer had been formed. These accretionary deposits were removed by using 2-3% solution of ammonia and teepol. The cleaned surfaces were subjected to fungicidal treatment with 2% sodium penta chloro phenate in distilled water. After drying, the surface was preserved with Wacker BS-290 in mineral turpentine oil.

### 37. TOMB OF MOH.BEGDA, SARKHEJ, DISTRICT AHMADABAD

The marble tomb of Sultan Moh.Begda has delicate carvings. The glaze lime plastered sandstone surface of the monument was covered with soot deposit, dust, dirt and biological growth and a thick coat of lime wash on the interior as well as exterior side. The marble surface of the tombs was covered with dust and dirt, soot and yellowing of marble was also observed due to be burning of incense sticks. Pulverization was noticed in some of sandstone *jalis*. The consolidation of pulverized stone *jalis* was carried out by spraying an ethyl silicate based stone strengthener OH-100. The dust, dirt and micro-vegetational growth was eradicated by using a solution of ammonia and teepol. The lime wash was removed by using 2-3% solution of glacial acetic acid followed by thorough washing with plain water. The cleaned and dried surface was given fungicidal treatment with 2% solution of sodium penta chloro phenate in distilled water. Finally the fungicidal treated and dried surface was preserved with Wacker BS-290 and mineral turpentine.

### 38. DWARKADHISH TEMPLE, DWARKA, DISTRICT JAMNAGAR

The sandstone temple of Dwarkadhish temple is situated on the coast. Due to climatic effect the stone interior surface of the *sabhamandapa* of the main temple was pulverized. The walls of the verandah and pillars had become greenish black due to the deposition of micro vegetational growth on the surface. The consolidation of stone surface was carried out by spraying an ethyl silicate based stone strengthener OH-100. The dust, dirt, and micro vegetational growth were removed by using 2-3%



solution of sodium penta chloro phenate in distilled water. After drying, the surface was preserved with Wacker BS-290 in mineral turpentine oil in appropriate dilution.

**39. KHAJURI MASJID AND KABUTAR KHANA, PAVAGADH, DISTRICT PANCHMAHAL**

The monuments were covered with dust, dirt and micro-vegetational growth, which were eradicated by using a mixture of 2-3% solution of ammonia and non-ionic detergent. The cleaned surface was given fungicidal treatment with 2% solution of sodium penta chloro phenate in distilled water followed by application of a silicone based water repellent Wacker BS-290 in mineral turpentine oil in appropriate dilution.

**40. TAMBEKARWADA, VADODARA, DISTRICT VADODARA**

Tambekarwada is renowned for its beautiful tempera wall paintings executed on the walls, wooden pillars and ceilings of 1st and 2nd floor, depicting Mahabharata scenes, Brahmanical Gods and Goddesses, Maratha-British battle scenes and Krishna image from Dwarka and Dakor, etc. The paintings at some places were losing its binding with base and in some places infestations of termite activities were observed. The paintings were also covered with dust, dirt, soot and superficial accretions.

To arrest the termite activity from the ground, plinth treatment was given to the entire building with imidachloroprid. The old preservative was removed by toluene. Thereafter, the accretions were removed by using a mixture of organic solvents in

appropriate proportions. The work is in progress.

**41. SIVA TEMPLE, KOTAI, DISTRICT BHUJ**

The walls are adorned with figures of gods, goddesses, *apsaras* and griffins. The monument's exterior walls are built with soft yellow stone and are highly eroded due to vagaries of winds and weather and its proximity to the desert. The growth of micro-vegetation on the exposed surface had caused extensive damage to sculptural and stone elements of the monuments. A blackish layer had been formed as a result of deposition of algae. Consolidation of stone surface was carried out by spraying an ethyl silicate based stone strengthener OH-100. The infested surface was treated with a mixture of 2-3% solution of ammonia and non-ionic detergent. The cleaned surface was given fungicidal treatment with 2% solution of sodium penta chloro phenate in distilled water followed by application of a silicone based water repellent Wacker BS-290 in mineral turpentine oil in appropriate dilution.

**42. LAKULISA TEMPLE, PAVAGADH, DISTRICT PANCHMAHAL**

The sand stone monument was covered with dust, dirt, micro-vegetational growth; bird droppings and thick coat of lime wash on the interior of the temple. The monument's exterior wall and sculptures showed pulverization at some places due to the vagaries of wind and weather. Consolidation of stone surface and sculptures was carried out by spraying an ethyl silicate based stone strengthener OH-100. Dust, dirt and micro-vegetational growth were eradicated by

using a mixture of 2-3% solution of ammonia and non-ionic detergent. Lime wash on the interior side was removed by using 2-3% solution of acetic acid followed by thorough washing with plain water to neutralize the acid effect. The cleaned and dried surface was given fungicidal treatment with 2% solution of sodium penta chloro phenate in distilled water. Finally the cleaned and dried surface was preserved by application of a silicone based water repellent Wacker BS-290 in mineral turpentine oil in appropriate dilution.

### **43. DUTCH CEMETERY, SURAT, DISTRICT SURAT**

The exterior and interior of the cemetery was decorated with fresco painting which was concealed under multiple layer of lime wash. On the exterior surface the paint layer was covered with dust, dirt, soot. In the interiors of the mausoleum, the multiple lime wash was removed by physico-chemical method to expose the paintings which were then cleaned with suitable mixture of organic solvents. The work is in progress.

### **44. LIMBOJI MATA TEMPLE, DELMAL, DISTRICT PATAN**

The 11<sup>th</sup> century temple was covered with dust, dirt, soot and micro-vegetational growth. Lime coats, soot and oily stains were present on the exterior and interior surfaces. The *sikhara* and exterior part of shrines showed signs of erosion due to vagaries of wind and weather. The consolidation of eroded portion was carried out by spraying an ethyl silicate based stone strengthener OH-100. The micro-vegetational growth was eradicated by using

a mixture of 2-3% solution of ammonia and non-ionic detergent. Lime wash was removed by using 2% solution of glacial acetic acid followed by thorough washing with plain water. The work is in progress.

### **45. VITTAL BHAI HAVELI, VASO, DISTRICT KHEDA**

Vittal Bhai Haveli, of brick and timber was badly affected by termite, insect and bats activity, soot and dust deposition on ceiling, designs, and micro-vegetational growth etc. To eradicate the insect activity, like, white ant, silver fish, termites etc and bats activity Insecticide Treatment was carried out in the entire area. It was done by using suitable insecticides, mixture of Pyrethrum extract in mineral turpentine oil and Termiseal in Kerosene in suitable proportion by spraying method in three regular intervals of two weeks each.

### **46. MAHATAMA GANDHI'S BIRTH PLACE, PORBANDER, DISTRICT PORBANDER**

Mahatma Gandhi's birth place is situated in the heart of the city and traces of mural painting are seen on the wall depicting flowers, birds, figures etc. Dasavatara and Ganesh paintings are seen in the puja room. The paintings are also prominently seen in the first room on the 2nd floor. There was termite activity on the rafters of ceiling of living room. The designs, carved on wood and stone structure were covered with green paint, yellow, distemper, concealing its beauty. The colour of the flower design and the background color was missing, and needed to be reintegrated. The flaking of paint was noticed on the south wall of the living room in 3rd floor due to ingress of moisture. Post termite treatment was done in

association with PCI for arresting the entry of termite from the surroundings. The spraying of insecticide was carried out on the wooden portions. Removal of distemper from carvings was carried out using suitable organic solvents. Removal of dust, dirt, and oily appearance on mural paintings was carried out using various organic solvents. Fixing the bulging portion on mural paintings was carried out by suitable adhesive. Finally the paint layer was preserved by 1% solution of PVA in toluene.

## HARYANA

### **47. JAL MAHAL (CONNECTING BRIDGE), NARNAUL, DISTRICT MAHENDRAGARH**

The walls, pillars and ceiling of the Connecting Bridge were thickly covered with the deposition of dust, dirt, and micro-vegetational growth which weakened and weathered the part of the monument. All superficial accretions and micro-vegetational growth were removed with suitable mixture of liquid ammonia and non-ionic detergent using soft nylon brushes. 2-3% aqueous solution of sodium penta chlorophenate was sprayed as fungicide over treated, cleaned and dried surface of the monument. Stone strengthener was used for consolidating the deteriorated and weathered portion of the connecting bridge. The entire treated surface was given water repellent treatment with two coats of Wacker BS-290 solution in mineral turpentine oil.

### **48. GUJRI MAHAL, HISAR, DISTRICT HISAR**

The Gujri Mahal was covered with thick deposition of dust, dirt, bird's and bat's excreta and micro-vegetational growth on the exterior and interior side. The stone and

plastered surface of the Mahal became weathered, weak and shabby due to the deposition of above said accretions. The stone and plastered surface was subjected to chemical treatment for removal of micro-vegetational growth and other accretions using aqueous ammonia solution and non-ionic detergent. The clean and dried surface was given fungicidal treatment with 2-3% aqueous solution of sodium penta chlorophenate solution. An ethyl silicate based stone strengthener OH-100, was used as a stone strengthener for consolidation of weak and weathered portions. Silicone based water repellent Wacker BS-290 in mineral turpentine oil in appropriate dilution was applied in two coats as preservative over the treated surface.

### **49. GATEWAY OF OLD MUGHAL SARAI, GHARAUNDA, DISTRICT KARNAL**

The Gateway of old Mughal Sarai, Gharaunda is mostly made up of Lakhori bricks and sand stone which was covered with thick deposition of dust, dirt, and bird's excreta and micro-vegetational growth. Superficial accretions and micro-vegetational growth were removed with soft nylon brushes using a mixture of liquor ammonia and non-ionic detergent. Fungicidal treatment was given with 2-3% aqueous solution of sodium penta chlorophenate on the chemically cleaned and dried surface of the monument. An ethyl silicate based stone strengthener OH-100 was also used for consolidating the weak and weathered portions of the gateway. Silicone based water repellent Wacker BS-290 in mineral turpentine oil in appropriate dilution in wet-n-wet was applied in double coats for



providing water repellency and preservation to the treated area.

### HIMACHAL PRADESH

#### 50. BUILDING MONASTERY, TABO, DISTRICT LAHAUL AND SPITI

The chemical conservation and consolidation work was carried out for the wall paintings and stucco figures in the anteroom of Du-Khang. In order to strengthen the painted plaster as well as the stucco figures, the crack on the paintings were filled up and missing portion of the stucco figures were conserved by suitable and compatible materials. After the process of strengthening and repair, chemical cleaning was carried out using mixture of organic solvents like alcohols, 2-ethoxy ethanol, Triethanolamine etc. The colour matching of the conserved and filleted area was carried out as per requirement and 1-2% solution of PVA solution in toluene was applied as preservative.

#### 51. PHOO GOMPHA TABO, DISTRICT LAHAUL AND SPITI

The chemical conservation and consolidation work was carried out on the painted surface of the murals. Murals were covered with mud streaks, dust, dirt smoke and soot. The problem of cracks and bulging were also observed on the murals of this Gompha. In order to strengthen the painted plaster, the cracks on the paintings were filled up and conserved with suitable and compatible materials. After the process of strengthening and repair, chemical cleaning was carried out, using mixture of organic solvents like alcohols, 2-ethoxy ethanol, Triethanolamine etc. The colour matching of

the conserved and filleted area was carried out as per requirement. 1-2% solution of PVA solution in toluene was applied as preservative. The work is still in progress.

#### 52. GAURI SANKAR TEMPLE, NAGGAR, DISTRICT KULLU

The chemical conservation and consolidation work was taken up on the exterior and interior stone surfaces of this monument for the removal of micro-vegetational growth, smearing of colours, deposition of soot, smoke, grease etc. Suitable organic solvents and aqueous solution of ammonia and non ionic detergent was used with mild brushing to facilitate the removal of biological growth as well as greasy and oily matter from the surface. Fragile, weak, weathered portion was consolidated with an ethyl silicate based stone strengthener Wacker OH-100 solution. The clean surface was given fungicidal treatment with 3% solution of sodium penta chloro phenate to reduce the reappearance of biological growth. Finally, water repellent treatment was given with Wacker BS-290 solution in mineral turpentine oil in two wet on wet coats.

#### 53. SIVA TEMPLE, JAGATSUKH, DISTRICT KULLU

The scientific conservation work of old Shiva Temple (exterior and interior) was taken up during the period. The entire temple area was covered with micro-vegetational growth, smearing of different colours, white patches, and deposition of soot, smoke and grease at most of the places. The deposits and accretions were removed by using suitable chemicals and organic solvents respectively. Weak and weathered

portion was consolidated with stone strengthener up to its saturation. Fungicidal treatment was given with 2-3% aqueous solution of sodium penta chloro penta on chemically treated, cleaned and dried surface. The dried stone surface was given tow wet-n-wet coat of preservative i.e. Wacker BS-290 with mineral turpentine oil.

**54. BASHESHAR MAHADEO TEMPLE AND ITS LOOSE SCULPTURES, BAJAURA, DISTRICT KULLU**

Chemical conservation of Basheshar Mahadeo Temple and its loose sculptures was carried out in the exterior as well as interior. A thick deposition of micro-vegetational growth, dust, dirt, soot and smoke was observed at most of the places of the temple. Besides this, the stone surface had suffered at several places due to weathering causing chipping and exfoliation. The interior portions of the temple had become dark black and oily due to burning of incense sticks, oil lamps and camphor etc. The accretion was removed by using a mixture of liquor ammonia and non-ionic detergent, turpentine oil, cellosolve and triethanolamine respectively. Weak, weathered and exfoliated stone was consolidated with stone strengthener. Fungicidal treatment was given to the chemically treated and dried surface followed by water repellent treatment with BS-290 in mineral turpentine solution.

**55. KANGRA FORT, KANGRA, DISTRICT KANGRA**

The compound wall (adjacent to temple and ruined structure of mosque) of sand stone was covered with extensive growth of micro-vegetation, dust, dirt, and other

ingrained accretion. The weathered and weak stone surface was consolidated with stone strengthener. The stone surface was subjected to chemical treatment for removal of micro-vegetational growth and other accretion using aqueous ammonia solution and non-ionic detergent. The clean and dried surface was given fungicidal treatment with 2-3% aqueous solution of sodium penta chloro phenate followed by preservation cum water repellent treatment.

**56. GAURI SANKAR TEMPLE, CHAMBA DISTRICT CHAMBA**

The temple was badly covered with micro-vegetational growth, dust, dirt, bird excreta and other ingrained accretion. Soot, smoke and oily matters were observed in the interior of the temple. As the entire stone surface of the monument was weathered, weak and exfoliated, it was consolidated with stone strengthener. The temple was subjected to chemical treatment with aqueous solution of different chemicals and organic solvents respectively for removal of micro-vegetational growth and other accretions. The chemically treated and dried stone surface was given fungicidal treatment with aqueous solution of sodium penta chloro phenate followed by water repellent treatment with Wacker BS-290 in mineral turpentine oil.

**JAMMU & KASHMIR**

**57. DEVI BHAGWATI TEMPLE, MANWAL (THALORA), DISTRICT UDHAMPUR**

At the Devi Bhagwati Temple, bird excreta, micro-vegetational growth dust, dirt, and other ingrained accretion were removed by using aqueous solutions of ammonia and

non-ionic detergent. Weathered and weak portion of the stone surface was consolidated with a solution of stone strengthener Wacker OH-100. Fungicidal treatment on chemically treated and dried stone surface was given by 2-3% solution of sodium penta chloro phenate. Wacker BS-290 solution in mineral turpentine oil was applied on the completely dried surface as water repellent coat.

## **KARNATAKA**

### **58. BHUVARAHA TEMPLE, HALSI, DISTRICT BELGAUM**

In continuation to previous year's work, the granite stone and lime mortar structure was taken up for conservation treatment and preservation work of the interior portion. General cleaning and removal of micro-vegetational growth, lime deposits/ coats and red ochre coats was carried out using aqueous ammonia and non ionic detergent (3-5% solution). For the removal of enamel paints 2% solution of sodium hydroxide was used. Removal of lime wash/coats was carried out using aqueous solution of acetic acid (2-3%). The deteriorated stones were strengthened using an ethyl silicate based stone strengthener OH-100. Fungicidal treatment was given using 2% aq. sodium penta chloro phenate solution followed by water repellent treatment using Wacker BS-290 (silane-siloxane mixture) and mineral turpentine oil.

### **59. BHUTHANATHA TEMPLE AND ADJOINING STRUCTURES (LOWER COMPLEX), BADAMI, DISTRICT BAGALKOT**

The exterior surface of the Bhuthanatha Temple (Lower complex) with small shrines

and adjacent *mandapas* was affected by dust, dirt, micro-vegetation growth and other accretionary deposits. In the *garbhagriha* and *sabhamandapa* (interior) lime accretion was found in excess. The stone had deteriorated and had become fragile in many places. The general cleaning and removal of micro-vegetation was carried out by using aqueous 3-5% ammonia (3 parts) and non-ionic detergent (1 part) mixture. The removal of lime accretion was carried out using 2-3% aqueous acetic acid solution followed by thorough washing with plenty of water. The weakened stone portions were consolidated by the application of ethyl silicate based stone strengthener Wacker OH-100. Fungicidal treatment was given using, 2% sodium penta chloro phenate on the exterior surface. Subsequently application of silicon based water repellent Wacker BS-290 mixed with Mineral Turpentine Oil was applied on the exterior surface.

### **60. KADASIDHESWARA AND JAMBULINGESWARA TEMPLES, PATTADAKKAL, DISTRICT BAGALKOT**

The chemical conservation work in these temples was taken up for the removal of micro-vegetational growth, bat's excreta, dirt and dust etc. on the surface of the monuments. In addition, lime patches were also observed in some parts. The exterior stones had deteriorated and were weak.

The general cleaning and removal of micro-vegetation was executed by using a solution of liquid ammonia and non-ionic detergent with an aqueous dilution of 3-5%. The lime coat was removed using 2-3% aqueous acetic acid followed by thorough washing



with plenty of water. The stones (entire exterior area) were consolidated using an ethyl silicate based stone strengthener Wacker OH-100. There after the entire exterior surface was coated with fungicide (2% aqueous sodium penta chloro phenate). Subsequently application of silicon based water repellent Wacker BS-290 mixed with Mineral Turpentine Oil and finally a water repellent coat was given.

**61. NADARGUDI, AIHOLE, DISTRICT BAGALKOT**

The structure at Nadargudi was covered with micro-vegetation, dust, dirt, bat's excreta and lime accretion in many places. The *vimana* and sidewalls were found to be in a weak condition. Removal of micro-vegetation and general cleaning was carried out using ammonia solution and non-ionic detergent with an aqueous dilution of 3-5%. The lime accretion was removed using 2-3% aqueous acetic acid. The deteriorated areas (*vimana*, wall all round *navaranga*, *garbhagriha* and common *navaranga* ceiling) were consolidated using ethyl silicate Wacker OH-100. There after the exterior surface was coated with fungicide (2% aqueous sodium penta chloro phenate). Subsequently application of silicon based water repellent Wacker BS-290 mixed with Mineral Turpentine Oil was done.

**62. ASAR MAHAL, BIJAPUR, DISTRICT BIJAPUR**

The three rooms in the first floor of Asar Mahal have beautiful paintings over lime-plastered walls, ceiling and lintels. Scientific conservation work has been carried out in continuation to the previous year's work. The first room carrying Krishna Leela

paintings was found covered with dust, dirt, and superficial accretions. It was treated with organic solvents (2 ethoxy ethanol, turpentine, triethanol amine, toluene, dibutyl phthalate, butyl lactate, n butanol etc.) for the removal of accretions and old preservative coats. Colour reintegration of lacunae has been carried out using poster colours. Finally, a preservative coat of 1% poly vinyl acetate in toluene (sulphur free) has been given to the treated areas. The work is in progress.

**63. AKKANA BASATI, SRAVANABELAGOLA, DISTRICT HASSAN**

The stone surface of the temple is covered with dust, dirt, soot, micro-vegetation and lime coat in many areas. The surface has deteriorated in some portions and is weakened in some other parts. Some of the exterior parts appear to be unevenly cleaned previously.

For removal of micro-vegetation and general cleaning dilute aqueous (3-5%) solution of ammonia and non-ionic detergent was used. For the removal of lime coat, dilute aqueous glacial acid was used. The stone strengthener, ethyl silicate Wacker OH-100, was applied on deteriorated stone surface till saturation. The work is in progress.

**64. KADAMBESWARATEMPLE, RATTIHALLI, DISTRICT HAVERI**

The Hoysala temple was found with accumulation of dust, dirt, micro-vegetation in many parts and with lime and salt accretions in some areas. Many portions on the exterior (walls all round) and interior (*garbhagriha*, *sukanasi*, *sabhamandapa* and common *navaranga*) was seen in brittle

condition. The removal of micro-vegetation and general cleaning is being done using dilute aqueous (3-5%) solution of ammonia and non-ionic detergent and for removal of lime coat, dilute aqueous glacial acetic acid was used. The stone strengthener, ethyl silicate Wacker OH-100 was applied on fragile/flaky surface till saturation. The completely dried exterior surface was given fungicidal treatment with 2% aqueous solution of sodium penta chloro phenate. Finally preservative/water repellent coat was applied using SMK-1311 in water. The work is in progress.

### **65. KOLARAMMA TEMPLE, KOLAR, DISTRICT KOLAR**

While the accretion on the exterior was less while the interior had lime coats, thick oily and soot accretions along with dust and dirt. The *Mahadwara* of the monument was found with fragile stones in many parts. The general cleaning and removal of micro-vegetation was executed by making use of solution-ammonia and non-ionic detergent in the ration 3:1 with an aqueous dilution of 3-5%. The lime was removed using aqueous acetic acid (2-3%). The fragile stones were consolidated using ethyl silicate Wacker OH-100. The soot and oily accretions in the interior were removed using the clay pack (with fuller's earth, sodium carbonate, sodium bicarbonate mixture) method. There after the exterior surface was coated with fungicide (2% aq. sodium penta chloro phenate) and was finally given a water repellent coat using Silane/Siloxane mixture in water (Wacker SMK 1311).

### **66. SOUMYA KESAVA TEMPLE, NAGAMANGALA, DISTRICT MANDYA**

The exterior of the monument was noticed to be covered with dust, dirt and micro-vegetation where as the interior was found with lime accretions, oily and soot accretions. Some portions of the monument were identified as having fragile and deteriorated stones.

## KERALA

### **67. BEKAL FORT, PALLIKARA, DISTRICT KASARGOD**

In continuation to the last year's work, the laterite stone blocks of Bekal fort were treated for the removal of dried thick micro-vegetational growth. To arrest it, 2% aqueous solution of Sodium penta chloro phenate was sprayed on fort walls followed by dry brushing with nylon brushes. Teepol and ammonia solution was used to clean the traces of micro-vegetational growth. Dried stone surface was once again given a fungicidal treatment with 3% solution of Sodium penta chloro phenate to check micro vegetational growth. Finally, on dried surface Wacker BS-290 in mineral turpentine oil was applied as water repellent treatment.

### **68. SRI VADAKKUNATHAN TEMPLE, DISTRICT TRICHUR**

In continuation to last year's, the chemical conservation work was continued for the removal of superficial accretions and old preservatives on the paintings of Sri Sankaranarayana shrine. For general cleaning, organic solvents viz. sulphur free toluene, ethoxy ethanol and small amount of N butyl amine and turpentine oil in different ratio was used as per requirement. The colour re-integration work was also attended

to where ever required. Finally, 1% solution of poly vinyl acetate in toluene was applied as preservative on the entire treated surface.

**69. ST. ANGELO FORT, KANNUR, DISTRICT KANNUR**

The chemical treatment and preservation of stable having lime plaster ceiling and arches was taken up for the removal of micro-vegetational growth by using dilute solution of nonionic detergent and ammonia. After removal of accretions and thorough washing with plenty of water, fungicidal treatment was given using 2% solution of Sodium penta chloro phenate. Finally, on cleaned and dried surface Wacker BS-290 in mineral turpentine oil was applied as water repellent. The work has been completed.

**MADHYA PRADESH**

**70. GHAUS TOMB, GWALIOR, DISTRICT GWALIOR**

The tomb of Mohammed Ghaus is a living monument and oil lamps and incense sticks are lighted inside the tomb for religious rituals, and the smoke and the soot of these lamps gets deposited on the inner surface of the tomb and also over the surface of the marble cenotaph inside the tomb. To eradicate the above mentioned deposits from the surface of the cenotaph it was subjected to clay pack treatment using fuller's earth. The additives sodium carbonate, sodium bicarbonate etc., were used where ever required.

**71. KANDARIYA MAHADEV TEMPLE, KHAJURAHO, DISTRICT CHHATTARPUR**

In continuation to last year's work, the exterior of the north-west face of the

*mahamandapa*, *mandapa* and *ardhamandapa* was subjected to eradication of micro-biological growth, dust and dirt. It was carried out using ammonia solution mixed with non-ionic detergent. The cleaned and dried surface was given fungicidal treatment with 2% solution of Sodium penta chloro phenate. Finally, Hydrophobic treatment was given to the treated surface by applying 2 coats of a silicone based water repellent Wacker BS-290 solution in mineral turpentine oil solvent (1:15) wet on wet.

**72. JAMI MASJID, MANDU, DISTRICT DHAR**

In continuation to the previous year's work, the cleaning of the wall surface of the mosque was carried out by using ammonia solution 4% and non-ionic detergent with the aid of soft nylon brushes. For biocidal treatment, 2% solution of Sodium penta chloro phenate in de-ionized water was applied with spray pump over the cleaned surface. Finally, Hydrophobic treatment was given to the treated surface by applying Wacker BS-290 solution in mineral turpentine oil solvent (1:15).

**73. BALJATI SHAH'S MOSQUE AND TOMB, DHAMONI, DISTRICT SAGAR**

Thick lime deposits from the sandstone surface were removed chemico-mechanically by using dilute organic acids and soft nylon brushes, followed by treatment with ammonia solution to neutralize the effect of acids left behind on the surface. For the elimination of dead and living micro-biological growth and other extraneous deposits a mixture of ammonia and non-ionic detergent was used with the aid of soft brushes. For biocidal treatment,



Sodium penta chloro phenate 2% solution in de-ionized water was applied with spray pump over the cleaned surface. Finally, Hydrophobic treatment was given to the treated surface by applying a silicone based water repellent wacker BS-290 solution in mineral turpentine oil solvent (1:15).

### **74. JAHAZ MAHAL, MANDU, DISTRICT DHAR**

The exterior surface of the palace was covered with deposits of the dead and living microflora along with the dust, dirt etc. The removal of the accretions and extraneous deposits from the surface of the monument was done using 4% ammonia solution and nonionic detergent. To the cleaned surface was applied 2% aqueous solution of sodium pentachlorophenate. Finally, to impart the water repellency to the surface silicone based water repellent resin [Wacker 290 BS] was applied over the dried surface in suitable concentration. The work is in progress.

### **75. JAVARI TEMPLE, KHAJURAHO, DISTRICT CHHATTARPUR**

The sculptures on the exterior surface of the monument constructed of sandstone was showing deterioration of varying degree all over the surface. The surface and platform wall of the temple was showing blackening due to the accretions. Hence, the platform wall was taken up for chemical treatment and preservation while the rest of the temple was taken up for the consolidation of building blocks of the monument.

First of all the entire exterior surface of the temple was cleaned to remove all the dust, dirt etc. from the surface, followed by the

application of an ethyl silicate based stone strengthener to consolidate the building blocks of the monument. After the consolidation, the surface of the temple was given hydrophobic treatment, by applying water repellent silicone resin [Wacker 290 BS] in wet on wet two coats.

The surface of the platform wall was cleaned using ammonia solution with non-ionic detergent followed by the application of aqueous solution of sodium pentachlorophenate for sustained biocidal action. Finally, the surface of the platform wall was given Hydrophobic treatment by applying water repellent [Wacker 290 BS] in suitable concentration.

### **76. PATALESHWAR AND JOHEELA TEMPLE, AMARKANTAK, DISTRICT SHAHDOL**

The tenth century temples are built of soft laterite stone, which is very porous and due to heavy rainfall these temples had heavy growth of microflora all over its exterior surface.

The accretions were removed by using 4% ammonia solution and nonionic detergent. For sustained biocidal action 2% sodium pentachlorophenate aqueous solution was applied over the cleaned surface using paint brushes. After cleaning and biocidal treatment the exterior surface was consolidated by an ethyl silicate base - OH 100 and finally preserved by applying water repellent [Wacker 290 BS] in suitable concentration.

### **77. HATHI DARWAZA, GWALIOR FORT, DISTRICT GWALIOR**

The chemical conservation work was taken up for the removal of dust, dirt and micro vegetational growth by using ammonia solution and nonionic detergent with aid of nylon brushes. Biocidal treatment was given to the surface by applying 2% sodium pentachlorophenate solution in water with the help of paint brushes. Finally Hydrophobic treatment was given to the treated surface by applying silicone based water repellent [Wacker 290 BS] in suitable concentration. The work is in progress.

#### 78. TEMPLE 31, SANCHI, DISTRICT RAISEN

Temple 31 near the main Stupa and some other smaller stupas, pillars Buddha sculptures and an incomplete stupa like all other structures at Sanchi are built of sandstone blocks. All these structures show blackening due to the growth of micro-flora on the exposed surface.

To remove the microbiological growth, dust, dirt etc. 4% ammonia solution and nonionic detergent was used with aid of soft nylon brushes. Biocidal treatment was given by applying 2% aqueous solution of sodium pentachlorophenate over the cleaned surface. Finally water repellency was imparted to the surface by applying Wacker BS-290 [a silicone based water repellent resin] solution in MTO solvent (1.15).

### MAHARASHTRA

#### 79. ELLORA CAVES, ELLORA, DISTRICT AURANGABAD

The conservation of stone sculpture and surface of Nandi *mandapa*, row of elephants, sub shrines, Kirthi *sthamb*, Dhawaja *sthamb*, façade of Cave 16 was

carried out to remove the cemented dust, dirt, bird excreta using 2-3% aqueous solution of ammonia and non-ionic detergent by gentle brushing with nylon brushes followed by thorough washing with cleaned water. Calcareous deposits from rock surface were removed with the help of 1-3% aqueous solution of acetic acid and 1% non-ionic detergent with gentle brushing using nylon brushes followed by thorough washing with clean water. Removal of dust, dirt and soot from mural paintings was carried out using suitable organic solvents like Methanol, Ethyl Methyl Ketone, Butanol and Butylamine mixture in suitable proportions. In order to stabilize the painted surface; consolidation, fixing/filleting work of loose painted plasters, cracks, holes etc. has been carried out using appropriate compatible materials and an ethyl silicate based consolidate WackerOH-100. The cleaned stone surface was given fungicidal treatment using 2% aqueous solution of Sodium penta chloro phenate. On the stone/sculpture surface in dry state water repellent treatment was given using Wacker -290 diluted in mineral turpentine oil as preservative.

#### 80. BIBI-KA-MAQBARA, AURANGABAD, DISTRICT AURANGABAD

The conservation treatment of metal plates, wooden doors and iron fittings was carried out to remove rusting on iron fittings, corroded copper plates on wooden doors and accretions of dust, dirt and hand grease on wooden doors. Plates of copper and its alloy on the wooden doors were chemically treated by applying 5 to 10% of alkaline sodium potassium tartrate solution till softening of incrustation and cleaning with

soft tooth brushes followed by washing with moistened cotton swabs and dried with Iso Propyl Alcohol.

Cleaning of iron fittings was carried out by applying reduction process i.e. by wrapping the objects in zinc sheet and then treating it in 10% hot caustic soda solution till reduction of the rust, followed by thorough washing with distilled water and dried with Iso Propyl Alcohol. Preservation of these metal objects was carried out using 1% polyvinyl acetate solution in Toluene.

For the cleaning of wooden doors a mixture of Toluene, IPA, acetone, acetic acid was used. Sodium penta chlorophenate and Beachwood Creosote oil in IPA as fungicide and insecticide was applied on the wooden surface 1% Polyurethane in MTO as preservative was applied on the wooden doors. The conservation of sand stone *jali*, marble slabs and stucco plaster was carried out for the removal of dust, dirt, bird excreta and accretions of suspended particulate matter on the stucco plaster, thick and tough deposits on the marble portion, microvegetational growth and consolidation of weathered stone *jali*'s. Superficial dust, dirt and other accretionary deposits were removed by gentle brushing. Removal of microvegetational growth was carried out by applying calcium hypo chlorite paste mixed with sodium penta chlorophenate followed by thorough washing with copious distilled water. This treated stucco plaster was cleaned by applying 1 to 2% aqueous solution of ammonia and 1% non-ionic detergent by gentle brushing with nylon brushing followed by thorough washing with distilled water. Consolidation of fragile

stuccos was carried out with the help of an ethyl silicate based stone strengthener Wacker-OH 100. Application of 2% aqueous solution of sodium penta chlorophenate was carried out over the dried surface as insecticidal treatment followed by preservative treatment by applying three coats of Wacker 290 diluted in MTO in dry state.

Sand stone *jali*'s were cleaned by using 1 to 2% aqueous solution of ammonia and 1% non-ionic detergent by gentle brushing with nylon brushing followed by thorough washing with distilled water followed by fungicidal treatment by applying 2 coats of 2% sodium penta chlorophenate and finally preserved with Wacker 290 diluted in MTO in dry state.

Marble portion of monument was treated by applying a homogenous paste of fullers earth mixed with 1% non-ionic detergent, a small quantity of sodium penta chlorophenate and traces of triethanolamine in order to soften the hardened sticky accretions. The paste was covered with polythene sheets for 24 hours for maximum adsorption. Paste was uncovered on being dried and removed off. The surface so obtained was thoroughly washed with copious distilled water. The process was repeated wherever required for complete eradication of accretions. The work has been completed.

### 81. AGA KHAN PALACE, PUNE, DISTRICT PUNE

The chemical conservation work was carried out to arrest the insect activity, termite colonies, birds dropping and pigeons nests. To check the insect activities, pigeon's



sittings and termite colonies, Ethoxide gas treatment was carried out in Room 3, 4 and Library. In Room 1 & 2 spikes fitted on Polycarbonated strips, arresting of birds by fitting the hydrolic hingest

The rock cut sculptures and stone surface (Cave 6 & 7) were subjected to the stone conservation treatment involving removal of superficial dust, dirt, bird excreta and other surface accretions in the interiors and thick growth of micro-vegetation in exterior of caves. A mixture of 2-3% aq. solution of ammonia and 1% non-ionic detergent was used for cleaning followed by thorough washing with clean water. Calcareous depositions were removed with the help of 1-3% aq. solution of acetic acid by chemico-mechanical means followed by thorough washing with clean water to neutralize acid effect. To eradicate the stains of bat excreta mixture of 5% solution of EDTA, 3% solution of ammonium carbonate, 5% solution of ammonia and few drops of Triethanolamine was used. The fragile portion and cracks were consolidated using ethylsilicate based stone strengthener, Wacker OH-100 and rock powder. A fungicidal treatment using 2% aq. solution of Sodium pentachlorophenate was given to the cleaned surface followed by application of a silicone based resin water repellent Wacker BS-290 diluted in mineral turpentine oil on the dried surface.

The insecticidal treatment to arrest the insect activity was carried out at these rock cut Cave 6 & 7 having interior mural paintings which executed on mud plaster. These caves were properly sealed with the use of plywood and wooden rafters to make them

air tight. Subsequently, after the fumigation process was over with etoxide gas for 36 hours, sealing was removed slowly and the remaining gas was removed by exhaust fan.

## **82. DAULATABAD FORT, DAULATABAD, DISTRICT AURANGABAD**

The surface dirt and accretions of the wooden doors of the fort were cleaned using a mixture of toluene, iso-propyl alcohol, acetone and acetic acid in appropriate proportions. The cleaned wooden surface was then subjected to fungicidal and insecticidal treatment using aqueous solution of Sodium penta chloro phenate and beach wood, creosote oil in iso-propyl alcohol respectively. Finally, application of polyurethane in turpentine oil was carried out on the entire dried wooden surface as a preservative treatment.

## **83. KANHERI CAVES, BORIVALI, MUMBAI**

The exterior carved basalt stone surface was cleaned and conserved by the removal of thick layers of micro vegetation, dust, dirt, birds excreta and other surface accretion by chemico-mechanical means using 2-3% aq. solution of ammonia and 1% non-ionic detergent with gentle brushing by soft nylon brushes followed by thorough washing with clean water. Calcareous depositions were removed with the help of 1-3% aqueous solution of acetic acid followed by thorough washing by cleaned water. The fragile stone portions were consolidated by using an ethyl silicate based stone strengthener Wacker OH-100. The cleaned area was then given a fungicidal treatment using 2% aqueous. solution of Sodium penta chloro phenate followed by application of a silicon based

water repellent Wacker BS 290 diluted in mineral turpentine oil on treated and dried surface.

### **84. MARKHAND DEV OF TEMPLE, MARKHAND, CHANDRAPUR**

The exterior carvings of this temple were cleaned and conserved with the removal of thick layers of micro vegetation, dust, dirt, birds excreta and other surface accretion by chemico-mechanical means using 2-3% aqueous solution of ammonia and 1% non-ionic detergent with gentle brushing by soft nylon brushes followed by thorough washing with clean water. Calcareous depositions were removed with the help of 1-3% aq. solution of acetic acid followed by thorough washing by cleaned water. The Nandi figure situated in front of temple was in two pieces having the weight of 5 tons each was joined using stainless steel pins and Epoxy resin. The exterior part of this figure was consolidated and re-integrated with stone powder and wacker OH-100 (ethyl silicate). For fungicidal treatment 2% aq. solution of Sodium penta chloro phenate was applied on cleaned area. Finally, entire cleaned and dried surface was given a preservative coat using wacker -290 in mineral turpentine oil.

### **85. AJANTA CAVES, AJANTA, DISTRICT AURANGABAD**

Periodical removal of dust and dirt from paintings and sculptures of different caves using soft brushes was done. Temperature and relative humidity were maintained regularly at Cave 1, 2, 16 and 17. Insecticidal treatment was also given on fortnight basis to the unpainted surface using

2% pyrethrum extract in solvent as a preventive measure.

In continuation to the previous year's work, the paintings on ceiling of Cave. 2 and 16 were subjected to conservation treatment for the removal of dust, dirt, soot accretions and old preservative coating from Cave 17 using mixture of suitable organic solvents in different proportions. The loose grains of white pigments etc. on the surface were consolidated and gaps were filled with suitable materials. After drying, the surface was scientifically cleaned with a mixture of suitable organic solvents followed by preservative treatment using 0.5-1.0% solution of polyvinyl acetate in toluene on the cleaned and dried surface.

In order to consolidate the sculptures of Cave 1,4, 5,9,19,26, and 27 an ethyl silicate based consolidate was infiltrated into the cracks, exfoliated and damaged portion by saline method in which the flow of consolidate was regulated as per the requirement.

The painted area in Cave 2, 6, 9,10,11,15 and 16 were consolidated using lime and mud plaster.

The basalt stone surface of the façade of Cave 4, 13, 26 and 27 has white depositions of salts, bat's excreta, dust, dirt and thick layer of micro-vegetational growth. This was removed using paper pulp and clay pack methods followed by thorough washing with distilled water to make it salt free. For the removal of micro vegetational growth aqueous solution of ammonia and non-ionic detergent with few drops of hydrogen peroxide was used. The entire cleaned and

dried surface was then given a silicon based water repellent treatment using Wacker BS-290 solution in mineral turpentine oil.

**86. SANGMESHVAR TEMPLE, DISTRICT JALGAON**

The temple constructed in basalt is having many big holes, cracks and fragile surface on exterior side with weathered stone sculptures. The consolidation and mending work was carried out with an ethyl silicate based stone strengthener Wacker OH-100 and lime with aggregates. A mild cleaning of the stone surface was carried out as per normal cleaning process where ever required. After drying, the whole cleaned surface was given silicon based water repellent treatment using Wacker BS-290 solution in mineral turpentine oil in proper dilution.

**ODISHA**

**87. SUN TEMPLE COMPLEX, KONARK, DISTRICT PURI**

In continuation of previous year's work, the conservation work was taken up in pillared *natamandapa* with in temple complex which is made up of khandolite stone and the masonry is ashlar. The preservation and conservation work was carried out for the removal of vegetational growth as well as surface accretionary deposits using 2% aqueous ammonia solution mixed with non-ionic detergent. The deposition of salts within the fabric of the stone was removed by repeated paper pulp treatment. Surface consolidation was carried out using Wacker OH-100 (Ethyl Silicate) where ever required. The cleaned surface was given fungicidal treatment using 2% aqueous

solution of Sodium penta chloro phenate to arrest further micro- vegetational growth. Finally, single coat of Wacker BS-290 as water repellent diluted with mineral turpentine oil was applied as preservative. The work is still in progress.

**88. JAGANNATH TEMPLE COMPLEX, DISTRICT PURI**

The *vimana* of the temple, was subjected to conservation treatment for the removal of surface accretions such as dust, dirt, micro-vegetational growth, deposition of soluble salts by using 2% liquid ammonia and non-ionic detergent solution. The stone surface of *vimana* was cleaned by repeated paper pulp treatment for the removal of soluble salts. The fragile stone portions of the wall of the *vimana* of the temple was strengthened by an ethyl silicate based stone strengthener Wacker OH-100. A fungicidal treatment was given with 2% Sodium penta chloro phenate on the entire cleaned surface.

Finally, the plastered surface from *beki* level to top of *vimana* was preserved by applying a coat of silicone micro-emulsion of Wacker SMK-1311 in distilled water and the dried stone surface was then given a protective coat of silicone resin based water repellent Wacker BS-290 diluted with mineral turpentine oil as a preservative.

**89. LINGARAJ TEMPLE COMPLEX, DISTRICT KHURDA**

In continuation of previous year's work, conservation treatment on the exterior sand stone surface of *jagmohana*, *bhogamandapa* and *natamandapa* of the temple along with sub shrines namely Biswanath temple, Gouri Sankar temple, Amaleswar temple etc. and



plastered surface of *kalasa* of *jagmohana* and roof of *bhogamandapa* and *natamandapa* was taken up for the removal of dry accretion and deposits of dust, dirt, red ochre patches and micro vegetational growth by using a mixture of 2% aqueous ammonia and non-ionic detergent in a chemico-mechanical way. The cleaned area was then given a fungicidal treatment using 2% aqueous solution of Sodium penta chloro phenate. The deteriorated stone portions were strengthened by using an ethyl silicate based stone strengthener Wacker OH-100. A silicone based micro emulsion of Wacker SMK-1311 in distilled water was applied on the plastered surface as a water repellent treatment whereas the entire treated and dried stone surface was given a single coat of silicone based water repellent Wacker BS-290 diluted with mineral turpentine oil as protective coat. The work has been completed.

### 90. BARABATI FORT, CUTTACK, DISTRICT CUTTACK

The main portion of the fort, made up of sand stone and some portion of the western side, made up of laterite and sand stone were subjected to the conservation treatment for the removal of surface accretion such as dust, dirt and micro-vegetational growth by using 2% aqueous ammonia solution and non-ionic detergent mixture. On the dried surface fungicidal treatment was given by spraying 2% aqueous Sodium penta chloro phenate solution. Finally, the dried stone surface was given a protective coat of silicone resin based water repellent Wacker BS-290 diluted with mineral turpentine oil.

### 91. JAGANNATH TEMPLE, JAJPUR, DISTRICT JAJPUR

The *vimana*, *jagmohana* and *bhogmandapa* of this temple made up of khandolite and sand stone are fully lime plastered while the platform of the temple is not plastered. The conservation work was carried out for the removal of micro-vegetational growth and superficial accretionary deposits by using 2% aqueous ammonia and non-ionic detergent.

Fungicidal treatment was given by spraying 2% aqueous Sodium penta chloro phenate solution on the entire cleaned surface. Plaster surface was preserved by applying single coat of SMK-1311 a water based water repellent, diluted with water.

Single coat of Wacker BS-290 diluted with mineral turpentine oil on the total stone surface, was applied as preservative.

### 92. JAMBESWAR TEMPLE, BHUBANESWAR, DISTRICT BHUBANESWAR

The conservation treatment was taken up on the exterior walls of the *vimana jagmohana*, and side temples, which were painted in various colours like red, yellow, gray, etc. The removal of surface accretions from the exterior walls of the *vimana*, *jagmohana* such as dust, dirt and micro-vegetational growth was carried out by using 2% aqueous ammonia and non-ionic detergent mixture. The weak stone surface (except sub shrine temples) were consolidated by using an ethyl silicate based stone strengthener Wacker OH-100 followed by fungicidal treatment using 2% aqueous Sodium penta chloro phenate solution on the cleaned and consolidated surface. Finally, a silicon based

water repellent Wacker BS-290 diluted with mineral turpentine oil was applied on the treated and dried surface as a protective coat. The work is in progress.

### PONDICHERRY

#### 93. SRI SIVA TEMPLE, SETHUR, DISTRICT KARAİKAL

The chemical treatment and preservation work was taken up for the removal of dust, dirt, oily accretions and micro-vegetational growth from the granite stone sculptures of Shiva temple and stucco *gopuram*. The work is still in progress.

### PUNJAB

#### 94. SARAI NUR MAHAL, NUR MAHAL, DISTRICT JALANDHAR

The superficial accretions and micro vegetational growth in the cells of inner Sarai Complex was removed using 2% aqueous mixture of ammonia and non-ionic detergent with the help of soft nylon brushes. The cleaned surface was given fungicidal treatment using 3% aqueous solution of Sodium penta chloro phenate. The weak and fragile portions of the wall were consolidated using a ethyl silicate based stone strengthener Wacker OH-100. Finally, a silicon based water repellent Wacker BS-290 in mineral turpentine oil was applied as a protective coat over the entire treated and dried surface.

#### 95. OLD SARAI, AMANAT KHAN, DISTRICT AMRITSAR

The gateway of old Sarai Amanat Khan is made up of bricks and lime plaster, decorated with glazed tiles, floral designs

and inscriptions etc. At few places, remnants of paintings were also visible on the lime plastered surface. The chemical conservation work was carried out using a mixture of aqueous solution of ammonia and non-ionic detergent for the removal of micro-vegetational growth and other accretionary deposits. The entire treated and non painted area was given fungicidal treatment with 3% aqueous solution of Sodium penta chloro phenate. The weak and fragile portions were consolidated using an ethyl silicate based stone strengthener Wacker OH-100. Finally, two coats of, a silicon based water repellent Wacker BS-290 in mineral turpentine oil in wet on wet was applied as a protective coat over the entire treated and dried surface. Painted area was cleaned with suitable organic solvents like Ethanol, Methanol, Turpentine oil and 2-Ethoxyethanol etc. followed by a preservative coat with 1% poly vinyl acetate solution in toluene (sulphur free).

#### 96. HAJI JAMAL TOMB, NAKODAR, DISTRICT JALANDHAR

The lime plastered brick tomb is decorated with mosaic work and conservation was carried out to remove the superficial dust, dirt and other accretionary deposits along with micro-vegetational growth by using suitable mixture of liquid ammonia and non-ionic detergent with soft nylon brushes. The 2-3% aqueous solution of Sodium penta chloro phenate was sprayed as fungicidal treatment over treated and dried surface of the monument. The deteriorated and weak portion of the monument was consolidated using an ethyl silicate based stone strengthener Wacker OH-100. The treated surface was given water repellent treatment

with two coats of Wacker BS-290 solution in mineral turpentine oil.

**RAJASTHAN**

**97. MANDLESHWAR MAHADEV TEMPLE, ARHUNA, DISTRICT BANSWARA**

In continuation to last year's work, the chemical conservation work was taken up for the interior and exterior surface of this temple for the removal of micro-vegetational growth and other surface accretions using 2-3% liquid ammonia solution with non-ionic detergent. Some of the main *sikhara* portion, made up of lime bricks was also cleaned gently followed by application of aqueous Sodium penta chloro phenate as fungicidal treatment on the entire cleaned surface. Finally, a silicon based water repellent Wacker BS-290 in mineral turpentine oil was applied as a protective coat over the entire treated and dried stone surface.

**98. JALESHWAR MAHADEV TEMPLE, MENAL, DISTRICT CHITTAURGARH**

In continuation to the last year's work the chemical conservation work was carried out in the interior portion of the *mandapa* of this temple. The hard lime deposition was removed with the help of 1-2% aqueous solution of glacial acetic acid by gentle brushing. After thorough washing and drying, the micro-vegetational growth was removed using 2-3% liquid ammonia with non-ionic detergent in aqueous media with the help of soft nylon brushes. The cleaned and dried surface was then subjected to fungicidal treatment using Sodium penta chloro phenate to arrest further micro-biological growth. Finally, a water repellent

treatment was given by applying a coat of Wacker BS-290 in M.T.O.

**99. RATAN SINGH PALACE, CHITTAURGARH, DISTRICT CHITTAURGARH**

In continuation to last year's work, chemical conservation work was carried out in the structures of the Palace complex to eradicate depositions of dried micro-vegetational growth, dust and dirt with the help of 2-3% liquid ammonia solution and non-ionic detergent. The lime depositions were removed chemico-mechanically by using 1% dilute acetic acid solution followed by thorough washing with clean water. The cleaned surface was then subjected to fungicidal and water repellent treatment.

**100. KALIKA MATA TEMPLE, CHITTAURGARH DISTRICT CHITTAURGARH**

The outer *sikhara* portion including *mandapa* on the southern and western side of this temple was taken up for the chemical conservation work. The micro-vegetational growth and other surface accretions were removed using 2-3% aqueous ammonia solution and non-ionic detergent. The cleaned and dried surface was giving a fungicidal treatment with 2% aqueous solution of Sodium penta chloro phenate and was finally preserved using a silicone based water repellent Wacker BS-290 in mineral turpentine oil. The work is still in progress.

**101. GOLE RAO TEMPLE 1, 2 AND 3 KUMBALGARH FORT, DISTRICT RAJSAMAND**

Chemical conservation work on Temple 1, 2 & 3 was taken up during the period under



review for the removal of micro-vegetational growth, dust, dirt etc. by using 2-3% aqueous solution of liquid ammonia mixed with non-ionic detergent, followed by a thorough wash with clean water. The cleaned and dried surface was then given a fungicidal treatment with 2% aqueous solution of Sodium penta chloro phenate. Finally, the cleaned and dried stone surface was preserved using Wacker BS-290 in mineral turpentine oil as water repellent treatment.

**102. JAIN TEMPLE 2 AND 3, PARSHAV NATH TEMPLE AND VEDI TEMPLE AT KUMBALGARH FORT, DISTRICT RAJSAMAND**

Chemical conservation work on Jain temple 2 and 3, Parshav Nath temple at Kumbalgarh Fort including boundary wall of Vedi temple was taken up for the removal of superficial deposits and micro-vegetational growth, dust and dirt etc. by using 2-3% aqueous solution of liquid ammonia mixed with non-ionic detergent, followed by a thorough wash with clean water. The cleaned and dried surface was then given fungicidal treatment by spraying 2% aqueous solution of Sodium penta chloro phenate. Finally, the cleaned and dried stone surface was preserved by using Wacker BS-290 in mineral turpentine oil as a water repellent treatment. The work has been completed.

**103. KUMBALGARH FORT, KUMBALGARH, DISTRICT RAJSAMAND**

In continuation to the last year's work, the inner face of Rampole with adjacent fort walls was treated for the removal of dirt, dust and micro-biological growth. 2-3% ammonia solution mixed with non-ionic

detergents was used to facilitate the removal of accretionary deposits. The cleaned and dried surface was then given fungicidal treatment with 2% aqueous solution of Sodium penta chloro phenate. Finally, the entire cleaned and dried surface was preserved with a silicone based water repellent Wacker BS-290 in M.T.O.

**104. BISALDEV TEMPLE, BISALPUR, TODA RAI SINGH, DISTRICT TONK**

In continuation to last year's work, the chemical conservation work was taken up for the removal of surface accretions such as dirt, dust and micro-vegetational growth using 2-3% aqueous solution of ammonia and non-ionic detergent. The cleaned surface was then given fungicidal treatment using aqueous solution of 2% Sodium penta chloro phenate followed by application of a preservative coat of a water based emulsion Wacker SMK 1311 as water repellent.

**105. KALYAN RAI TEMPLE, TODA RAI SINGH, DISTRICT TONK**

In continuation to last year's work, the chemical conservation work was carried out to eradicate micro-biological growth with the help of 2-3% ammonia solution mixed with non-ionic detergent by gentle brushing with soft nylon brushes. The cleaned surface was then given fungicidal treatment with 2% aqueous solution of Sodium penta chloro phenate to arrest further micro-biological growth. The cleaned and dried surface was preserved with a silicone based water repellent Wacker BS-290 in M.T.O.

**106. PIPAJI TEMPLE, TODA RAI SINGH, DISTRICT TONK**

In continuation to the last year's work, the chemical conservation work was taken up for the removal of surface accretions such as dirt, dust and micro-vegetational growth by using 2-3% aqueous solution of ammonia with non-ionic detergent. The cleaned surface was then given a fungicidal treatment using aqueous solution of 2% Sodium penta chloro phenate followed by application of a preservative coat of Wacker SMK 1311 in water.

### TAMIL NADU

#### 107. SRI BRIHADISHWARA TEMPLE, THANJAVUR, DISTRICT THANJAVUR

In continuation to the last year's work the chemical preservation work to main *vimana* was taken up for the removal of surface accretions viz. micro-vegetational growth, dust, dirt, bird's excreta etc. For the removal of surface accretions mixture of non-ionic detergent and ammonia solution was used. After removing the accretions completely the area was washed with plenty of water. 2% solution of Sodium penta chloro phenate was applied as fungicide and finally the cleaned and dried surface was preserved with a silicone based water repellent Wacker BS-290 in M.T.O. One panel of Nayaka painting which was superimposing the painting of Chola period was also stripped and mounted on epoxy panel. To prevent the growth of micro-organisms over the stucco worked Keralantaka *gopuram*, 2% solution of Sodium penta chloro phenate followed by Wacker SMK 1311 in water was applied on chemically treated surface. The stone sculptures, walls and doorjambes below the stucco *vimana* covered with dust, dirt and other accretions was chemically treated with

non-ionic detergent and ammonia solution. After cleaning, the area was washed with plenty of water. 2% solution of Sodium penta chloro phenate was applied as fungicide and finally on dry surface Wacker BS-290 in M.T.O. was applied as preservative. Vandalism marks over the Maratha paintings in the open *mandapa* on the west side were also chemically cleaned.

#### 108. GROUP OF MONUMENTS, MAHABALIPURAM, DISTRICT KANCHIPURAM

The granite stone sculptures of Arjuna's penace, Krishna *mandapa*, Varahi *mandapa*, Ganesa *Ratha*, Pandava cave, Trimurthi cave, and Rayar *gopuram* was chemically treated for the removal of dust, dirt and micro-vegetational growth by using ammonia and non-ionic detergent solution. After removing the accretions completely the area was washed with plenty of water. 2% solution of Sodium penta chloro phenate was applied as fungicide on dried surface. Finally, cleaned and dried surface was preserved with a silicone based water repellent wacker BS-290 in M.T.O.

#### 109. JALAKANTESHWARA TEMPLE, VELLORE, DISTRICT VELLORE

In continuation to last year's, the conservation treatment work for the remaining portions of this temple made up of granite stone, was taken up for the removal of dust, dirt and micro-vegetational growth. Aqueous ammonia and non-ionic detergent solution was in general used for cleaning followed by application of 2% aqueous Sodium penta chloro phenate as fungicide on the exterior portions. The fragile stone portions were strengthened by

applying an ethyl silicate based stone strengthener Wacker OH-100. Finally, water repellent treatment was given to the dried surface using a silicone based water repellent Wacker BS-290, diluted with mineral turpentine oil.

**110. ROCK CUT JAIN TEMPLE, SITTANAVASAL, DISTRICT PUDUKKOTTAI**

In continuation to the last year's work, the paintings at Sittanavasal were treated with organic solvents like Sulphur free Toluene, Ethoxy ethanol and turpentine oil for the removal of dust and old preservative. Finally, fresh 1% solution of Poly Vinyl Acetate in toluene was applied as preservative. The Jain beds were also treated with non-ionic detergent and ammonia solution for the removal of vegetation growth, dust and dirt. Finally, fungicide and preservative coating was applied.

**111. SRI SUBRAMANYASWAMY TEMPLE, AND JAIN CAVE, VALLIMALAI, DISTRICT VELLORE**

The conservation treatment of the granite stone sculptures, walls and pillars of Subramanyaswamy temple and Jain cave of Vallimalai were taken up for the removal of dust, dirt, lime wash and micro-vegetational growth. Dilute acetic acid solution was used for the removal of lime wash accretions. Non-ionic detergent and ammonia solution was used in general for the removal of dust, dirt and micro-vegetational growth followed by application of 2% solution of Sodium penta chloro phenate as fungicidal treatment on the exterior portions. Over the exterior surface water repellent treatment was given by using a silicone based Wacker BS-290, diluted with mineral turpentine oil.

**112. SRI VARADARAJA SWAMY TEMPLE, SANKAGIRI, DISTRICT SALEM**

In continuation to last year's work, the remaining *mandapas* were taken up for the preservation work. For removal of lime wash accretions dilute acetic acid solution was used and for the removal of dust, dirt and micro-vegetational growth mixture of aqueous ammonia and non-ionic detergent was used. Application of 2% aqueous solution of Sodium penta chloro phenate as a fungicide was given on the exterior portions. Finally, over the exterior surface water repellent treatment was given using silicone based Wacker BS-290, diluted with mineral turpentine oil.

**UTTARAKHAND**

**113. GROUP OF TEMPLES, SUN TEMPLE, KATARMAL, ALMORA, DISTRICT ALMORA**

In the group of sandstone temples, chemical treatment and preservation work was carried out for the removal of thick micro-vegetational growth, loose dust and dirt etc. The micro-vegetational accretions were eradicated by treating with 2-5% aqueous ammonia solution and a small quantity of non-ionic detergent. The entire treated surface was given a coat of 2% solution of Sodium penta chloro phenate as fungicidal treatment. Finally, over exterior surface water repellent treatment was given using silicone based Wacker BS-290, diluted with mineral turpentine oil.

**114. MRITYUNJAY GROUP OF TEMPLE, DWARAHAT, ALMORA, DISTRICT ALMORA**

At the Mrityunjay group of temples, the loose dust and dirt was brushed off using soft nylon brushes. The micro-vegetational



growth along with grime was eradicated by treating with 2-5% aqueous ammonia solution and a small quantity of non-ionic detergent. The interior portions were treated by applying the paste of fuller's earth containing traces of cellosolve and some organic solvents in suitable proportion in order to loosen the greasy and tough accretions. The paste so applied was covered with polythene sheets. After drying the paste was removed.

### **115. GROUP OF TEMPLES, GOPINATH, GOPESHWAR, DISTRICT CHAMOLI**

The exterior surface of the temples become black due to the deposition of dust, dirt and dried micro-vegetational growth. The interior surface appears black due to the deposition of soot and greasy matters due to the practice of lighting oil lamps. The dust and dirt was brushed off using soft nylon brushes. The micro-vegetational growth along with grime was eradicated by treating with 2-5% aqueous ammonia solution and a small quantity of non-ionic detergent. The interior portions was treated by applying the paste of fuller's earth containing traces of cellosolve and some organic solvents in suitable proportion in order to loosen the greasy and tough accretions. The paste so applied was covered with polythene sheets. After drying the paste was removed.

### **116. MAHASU TEMPLE, HANOL, DISTRICT DEHRADUN**

The chemical conservation work was taken up for the removal of thick deposition of micro-biological growth, dust and dirt from the exterior surface, deposition of soot, smoke, sticky oily and greasy matter from the interior surface and the silver plated

entrance doorway of the *garbhagriha* which has become oxidized. The exterior surface of the temple was treated with 2% aqueous ammonia containing a minute quantity of non-ionic detergent. Tough & sticky accretions were removed by applying ammonia solution and non-ionic detergent mixed with traces of hydrogen peroxide and triethanolamine. The lime wash, coat was removed by using solution of dilute acetic acid. The black accretions of interior surface were cleaned by clay pack technique. The paste was applied homogenously by using Fuller's Earth in distilled water containing sodium carbonate and cellosolve. The metallic surface (silver) was cleaned scientifically using mild solutions of oxalic acid, tartaric acid and ammonia. Scientifically treated exterior surface was subjected to biocide treatment. Two coats of 2-3% Sodium penta chloro phenate was applied on the dried surface. Finally, the dried surface was preserved with silicone based water repellent Wacker BS-290 diluted in M.T.O..

### **117. GROUP OF TEMPLES, ADI BADRI, DISTRICT CHAMOLI**

There was heavy deposition of dust, dirt and dried micro-vegetational growth on the exterior surface of the temples, while the interior surface of the temple became black due to the deposition of soot and smoke. To remove the micro-vegetational growth and other accretions 2-5% aqueous ammonia solution and non-ionic detergent was used. The interior portions were treated by using Fuller's Earth containing traces of Cellosolve and some organic solvents in suitable proportion in order to loosen the greasy and tough accretions. The paste so

applied was covered with polythene sheets. After drying the paste was removed with soft nylon brushes. Some weak portions of stone was consolidated using an ethyl silicate based stone strengthener Wacker OH-100. The treated surface was given fungicidal treatment using 2% Sodium penta chloro phenate. Finally, the cleaned and dried surface was preserved with a silicone resin Wacker BS-290 in M.T.O.

**118. SHRI GURU RAM RAI DURBAR, DEHRADUN, DISTRICT DEHRADUN**

Cleaning treatment, consolidation and preservation work was carried out on the mural paintings of the historical Shri Guru Ram Rai Durbar, Dehradun. The work is still in progress.

**UTTAR PRADESH**

**119. AKBAR'S MAUSOLEUM, SIKANDRA, DISTRICT AGRA**

In continuation to the last year's work, the conservation work was taken up for the removal of dirt, dust, smoke, tarry matters and micro-biological accretions, using clay pack method by applying a paste of Fuller's Earth containing traces of cellosolve and some other organic solvents in suitable proportions. The paste of Fuller's Earth was applied over the marble surface and then covered with polythene sheets. The surface was made free of this paste and thoroughly washed. Finally, the cleaned surface was treated with a paste mixture of lead oxide and tin oxide to retain its original lustre.

**120. MOTI MASJID, AGRA FORT, DISTRICT AGRA**

In continuation to the last year, chemical conservation work was taken up for the removal of dust, dirt, smoke, tarry matters and micro-vegetational growth from the marble surface of the mosque because the exterior marble surface of this mosque had turned pale and dark brown in appearance. It was cleaned by clay pack method by applying a paste of Fuller's Earth containing traces of cellosolve and some suitable organic solvents in appropriate proportion in order to loosen the greasy and hard accretions. The paste of Fuller's Earth was applied over the marble surface and then covered with polythene sheets. It was left for a day allowing for proper adsorption to take place. The surface was made free of this paste and thoroughly washed. The surface so cleaned was treated with a mixture of lead oxide and tin oxide to retain its lustre.

**121. FATEHPUR SIKRI, DISTRICT AGRA**

The work was continued on the red sand stone and lime plastered surface of the Hiran Minar for the removal of micro-biological growth and other accretionary deposits using 2-3% solution of aqueous ammonia and non-ionic detergent. The lime depositions were removed by chemico-physical methods. After chemical cleaning fungicidal treatment was given with 2% solution of Sodium penta chloro phenate on the exterior surface followed by preservative treatment with the application of two coats of a silicone based water repellent Wacker BS-290 diluted in M.T.O.

Work was continued on the exterior sand stone surface of Hathi Pole Gate and Water Tank for removal of micro-vegetational growth, dust, dirt and other superficial

accretionary deposits using 2% aqueous ammonia solution and appropriate quantity of non-ionic detergent. The cleaned exterior surface was then subjected to fungicidal treatment by applying 2-3% aqueous solution of Sodium penta chloro phenate followed by preservation with a silicone based water repellent Wacker BS-290 diluted in M.T.O..

The paintings on the interior portions of the Hakim Hamam were preserved and then fixing and fixing as per requirements was attended to. After retouching and colour reintegration, a coat of polyvinyl acetate in toluene was applied as a preservative.

### 122. R.C. CEMETERY, DISTRICT AGRA

The chemical conservation work was taken up for the tomb of Col. Hastings and other small tombs for the removal of micro-vegetational growth, dust, dirt and other tarry matters. Due to thick deposition of micro-vegetational growth the tomb has become blackish in appearance.

The loose dust & dirt was brushed off using soft nylon brushes from the exterior surface of the monument. The micro-vegetational accretions were eradicated by treating with 2% aqueous ammonia solution containing a little non-ionic detergent. The cleaned surface was given a coat of 2% Sodium penta chloro phenate as fungicidal treatment. The surface so prepared was preserved with silicone based water repellent Wacker BS-290 diluted in M.T.O.

### 123. KHUSROO BAGH TOMBS, DISTRICT ALLAHABAD

In continuation to the last year's work, the

chemical conservation work was taken up for the dome & *burjis* of the tombs situated in the Khusroo Bagh complex, for the removal micro-vegetational growth, lime patches and lime coatings, dust and dirt.

The loose dust & dirt was brushed off using soft brushes. The micro-biological accretion was eradicated from the sandstone and plastered surface using 3-5% aqueous ammonia solution adding a suitable quantity of liquid non-ionic detergent. The lime plaster surface was treated with bleaching powder. The treated sandstone & lime plastered surface was given biocide treatment by applying 2-3% solution of Sodium penta chloro phenate in water. Lime coating was removed by using 1% of acetic acid solution. The weak stone surface was consolidated using an ethyl silicate based stone strengthener Wacker OH-100. Finally, the above treated dried sandstone surface was preserved with a silicone based water repellent, Wacker BS-290 diluted in M.T.O.

### 124. SADAT ALI TOMBS AND MURSHID JADI, DISTRICT LUCKNOW

The Sadat Ali Tomb is built of lakhauri bricks using lime plaster as mortar. The chemical conservation work was taken up for the removal of thick growth of micro-vegetation, dust, dirt and other accretionary deposits over the sandstone and plastered surface.

The loose dust & dirt was brushes-off using soft brushes. The spores of deep-rooted micro-organism were killed by applied a coat of calcium hypochlorite paste on the lime plastered surface. The paste was



allowed to remain on the surface for at least 6-8 hours. The harmful, biological and micro-biological accretions were eradicated using 3-5% aq. ammonia solution adding a little of liquid non-ionic detergent with the help of soft nylon/coir brushes from plastered surface. The treated sandstone & lime plastered surface was then given biocidal treatment, by applying 2-3% solution of Sodium penta chloro phenate in water. Finally, the above treated surface, on being completely dry, was preserved with the wacker BS-290 diluted in M.T.O. in the ratio of 1 part of wacker BS-290 to 11 parts of M.T.O.

**125. MAKHDOOM JAHANIA, DISTRICT KANNAUJ**

The three tombs and one mosque, made up of red, yellow sandstone and one dome having plastered surface were taken up for the removal of micro-vegetational growth, dust, dirt and other accretionary deposits. The micro-vegetational growth was eradicated by treating with 2% aqueous ammonia solution containing a small quantity of liquid non-ionic detergent. The treated surface was given a coat of 2% Sodium penta chloro phenate. The weak stone surface was consolidated using an ethyl silicate based stone strengthener Wacker OH-100. Finally, the above treated dried sandstone surface was preserved with silicone based water repellent Wacker BS-290 diluted in M.T.O.

**126. R.C. CHURCH, SARDHANA, DISTRICT MEERUT**

The exterior surface of the twin towers of the Roman Catholic Church are lime plastered. The lime plastered surface of the

towers became black at many places due to the deposition of dust, dirt and dried biological growth. Due to these accretions the surface was imparting a very shabby and unpleasant look.

The loose dust & dirt was brushed-off using soft brushes. The spores of deep rooted microorganism were killed by applying a coat of calcium hypochlorite paste on the plastered surface. The paste was allowed to remain on the surface for at least 6-8 hours. The micro-vegetational growth was removed by using 3-5% aqueous ammonia solution adding an appropriate quantity of liquid non-ionic detergent with the help of soft nylon/coir brushes from plastered surface. The treated plastered surface was given biocide treatment, by applying 2-3% solution of Sodium penta chloro phenate in water. The weak stone surface was consolidated using an ethyl silicate based stone strengthener Wacker OH-100. Finally, the above treated dried sandstone surface was preserved with a silicone based water repellent Wacker BS-290 diluted in M.T.O. The metallic portion was cleaned using mild solution of oxalic acid, tartaric acid and preserved with solution of polyvinyl acetate in toluene.

**127. JAIN TEMPLE (EXTERIOR), DEOGARH, DISTRICT LALITPUR**

The exterior surface of the sandstone temple especially the *sikhara* portion is full of beautiful carvings. The chemical treatment work was taken up for the exterior surfaces of the temple which have become black due to the deposition of dust, dirt and dried micro-biological growth. The black depositions were very thick and badly

affected the beauty of carvings and images. There is a deposition of lime beneath the black depositions.

The dried vegetational growth and other black accretions were removed using 3-5% aqueous ammonia solution adding a small quantity of liquid non-ionic detergent with the help of soft nylon/coir brushes. The work is still in progress.

**128. LAL KHAN TOMB, DISTRICT VARANASI**

This tomb, having lime plastered domes and coloured tiles was subjected to chemical treatment and preservation for the removal of thick micro-vegetational growth, dust, dirt, smoke and bird's excreta by using 3% solution of ammonia and teepol. The cleaned surface was then given fungicidal treatment followed by application of Wacker BS-290 in M.T.O. single coat as water repellent treatment.

**129. PANCHAYATAN TEMPLE, ADJOINING VOTIVE STUPAS AND OTHER ANCIENT REMAINS, SARNATH, DISTRICT VARANASI**

Mostly brick structured and partially lime plastered Panchayatan Temple and other shrines of Sarnath excavated site was subjected to chemical treatment and preservation for the removal of micro-vegetational growth, bird's excreta and other accretionary deposits by using 5% solution of ammonia and non-ionic detergent. After cleaning the complete dried surface was given fungicidal treatment with 5% solution of Sodium penta chloro phenate to arrest the vegetational growth. Finally, the above treated and dried surface was preserved with silicone based water repellent Wacker BS-

290 diluted in M.T.O. in the ratio of 1:11. The work is still in progress.

**WEST BENGAL**

**130. BRGUNIA GROUP OF TEMPLE, BARAKAR, DISTRICT VARDHMAN**

The group of four temples (Kali, Ganesh, Shiv and Durga) is made up of sandstone and was subjected to chemical conservation and preservation work in order to remove micro-vegetational growth, dust, dirt and bird's excreta including strengthening of fragile and powdery carvings and sculptures. The surface was cleaned with the help of 5% aqueous ammonia solution and non-ionic detergent by gentle brushing with suitable nylon brushes. The weak stone surface was consolidated using an ethyl silicate based stone strengthener Wacker OH-100. The cleaned area was then subjected to fungicidal treatment followed by application of Wacker BS-290 in M.T.O. as preservative.

**131. GOPALJI TEMPLE, KALNA, DISTRICT VARDHMAN**

The brick structured lime plastered temple was subjected to chemical conservation for eradication of microvegetational growth and other superficial accretionary deposit from the surface of the shrine using a mixture of non – ionic detergent and aqueous Ammonia followed by fungicide treatment with 5% santobrite to arrest re growth. The cleaned and dried surface was then preserved by application of two coats of Wacker 290 in M.T.O.

**132. CHANDIDAS TEMPLE AT NANOOR, DISTRICT BIRBHUMI**

The lime plastered brick structures (group of four five shrines) was subjected to chemical treatment and preservation for eradication of moss, lichen, spider nets, bats excreta etc. The superficial surface of the shrines were cleaned with very soft nylon brushes using mixtures of Ammonia water and non – ionic detergent and after complete drying the surface was treated with 5% solution of santobrite to arrest re –growth and kill microspores, followed by application of two coats of preservative solution made up of Wacker–290 in M.T.O. The fragile and powdering terracotta surface was also strengthened with Wacker O.H-100 solution.

### **133. QUEEN VICTORIA MEMORIAL, KOLKATA**

Victoria Memorial Hall, Kolkata, a marble structure is situated in the heart of the city. Due to effects of various pollutants like smoke, dust, dirt and greasy matter, the colour of the marble surface has changed and it also shows signs of deterioration. In continuation to the previous year's work, the chemical conservation work was taken up on the exterior surface (made of rough coarse marble) on the south and north side and on the interior surface of the north west restoration room made up of marble and sandstone materials along with metal structures. The clay pack method was used for cleaning the marble surface by applying the paste of Fuller's Earth containing traces of Sodium carbonate, Sodium bicarbonate and Hydrogen peroxide in order to loosen the greasy and hard accretions. The sandstone surface was cleaned using a mixture of aqueous ammonia solution and non-ionic detergent followed by thorough

washing with clean water. The work is still in progress.

### **134. TREATMENT OF EXCAVATED OBJECTS AND MUSEUM EXHIBITS**

1. Antiquities of copper, silver, iron and lead coins from Daultabad Fort, Daultabad have been chemically treated and preserved. Wooden doors from Daultabad Fort were chemically treated and preserved.

2. One hundred fifty Antiquities from Aurangabad Circle were chemically treated and preserved.

3. Ancient metallic coins and an idol retrieved from Ahichchatra excavations and received from Agra Circle, Agra, have been chemically treated and preserved.

4. Forty three Antiquities made of iron, brass and silver and terracotta received from Excavation branch, Bhubaneswar have been chemically treated.

5. Fifteen of Antiquities mainly made up of terracotta and potteries received from Ropar Museum were chemically treated and preserved.

6. Chemical cleaning and analysis of metal antiquities received from excavation at Siswania, District Basti, Uttar Pradesh were carried out.

7. Chemical cleaning and preservation of marble sculptures from the Marble hall collection of President's Secretariat was carried out.

8. Seventeen museum objects (archival art materials) received from Taj Museum, Taj



Mahal, Agra, have been chemically treated and preserved.

9. Lime mortar samples used in construction of stupa collected from excavation site at Kanganahalli, (Sannati) in Chitapur Taluk of Gulbarga District, Karnataka, was chemically analyzed to determine its chemical composition.

10. Eleven mortar samples from Mahabodhi Temple, Bodhgaya, have been analysed to determine its chemical composition.

11. Six samples of mortar/mud plaster from Chauburji, Itmad-ud-dualla, Agra is being analyzed for determining its chemical composition.

12. Seven mud plaster samples from Ellora Cave Nos. 5 & 6 have been analyzed for determining its chemical composition.

13. Two metal samples (Brass) from Main Mausolium Door, Bibi ka Maqbara, Aurangabad have been analyzed for determining its chemical composition.

14. A Japanese painting received from Swami Rama Centre, Jolly Grant, Dehradun has been restored.

15. Four lime plaster samples from Bharat Mata Temple, Daulatabad Fort, Aurangabad were analyzed for determining its chemical composition.

16. Scientific and analytical studies of samples collected from Red Fort, Delhi with regard to preparation of comprehensive conservation management plan of Red Fort, Delhi is in progress.

17. Chemical treatment and preservation of Twenty Four lead coins received from the excavation site of Sannati, Chitapur Taluk, District Gulbarga, Karnataka, is in progress.

### MONITORING OF AIR POLLUTION

#### 1. AIR POLLUTION MONITORING AT TAJ MAHAL AND OTHER MONUMENTS, DISTRICT AGRA

The ambient Air Quality Monitoring Station (AAQMS) at Taj Mahal, Agra is monitoring and analyzing the presence of air pollutants such as sulphur dioxide ( $\text{SO}_2$ ), oxides of nitrogen ( $\text{NO}_x$ ) and suspended particulate matter (SPM) in the environs of Taj Mahal. Besides, these pollutants some environmental chemical activities such as dust fall rate and sulphation rate were also calculated in this laboratory in respect to Taj Mahal and Agra Fort, Agra.

Meteorological parameters which may affect the activity of the above cited pollutants viz. temperature, relative humidity, wind speed/wind direction, solar radiations and rain fall were also monitored.

#### (a) Chemical Parameters

i. Sulphur dioxide: The maximum concentration of  $\text{SO}_2$  was recorded as  $15.75 \mu\text{g}/\text{M}^3$  in the month of January 2007 whereas the maximum monthly average concentration was recorded as  $05.18 \mu\text{g}/\text{M}^3$  in the month of January 2007. The monthly annual concentration of  $\text{SO}_2$  for the period from April 2006 to March 2007 was measured as  $3.49 \mu\text{g}/\text{M}^3$ .

ii Nitrogen dioxide: The maximum concentration of  $\text{NO}_2$  was recorded as 23, 44  $\mu\text{g}/\text{M}^3$  in the month of May 2006 whereas

maximum monthly average concentration was recorded as  $13.19 \mu\text{g}/\text{M}^3$  in the month of December 2006. The annual concentration of  $\text{NO}_2$  for the period from April 2006 to March 2007 was calculated as  $7.02 \mu\text{g}/\text{M}^3$ .

iii. Sulphation rate: Sulphation rate is an important factor and is described as the rate  $\text{SO}_3/\text{m}^2/\text{day}$  in the month of April 2006 at Taj Mahal.

(b) Physical Parameters

Dust fall rate: Dust is a carrier of various pollutants present in the atmosphere. These particles can cause abrasion to the marble surface if it strikes with momentum. The maximum dust fall rate was recorded  $5.24 \text{MT}/\text{Km}^2/\text{month}$  in the month of May 2006 at Taj Mahal, Agra. Volatile matter of dust fall has also been estimated during the period.

Suspended Particulate Matter: The tolerable limit for SPM has been fixed as  $100 \mu\text{g}/\text{M}^3$  for the sensitive zone of the monuments. The maximum monthly average concentration of SPM was recorded in month of May 2006 as  $681.67 \mu\text{g}/\text{M}^3$ . The monthly annual average concentration of SPM for the period April 2006 to March 2007 was calculated as  $253.819 \mu\text{g}/\text{M}^3$ .

**METEOROLOGICAL PARAMETERS**

Wind speed and wind direction: Wind speed and wind direction have been monitored with the help of wind monitor (WM-200). During the period under review, light air (1-5 Km/hr) was recorded. In the months of April to June 2006, light to strong wind was recorded. The direction of wind flow was variable.

at which  $\text{SO}_2$  in the atmosphere gets converted into  $\text{SO}_3$ . This  $\text{SO}_3$  in turn transforms into sulphuric acid, which when it comes in contact with marble may cause its dissolution. The maximum sulphation rate was calculated as  $0.0288 \text{ gm}$

Temperature and Relative Humidity: The maximum temperature was recorded as  $43^\circ\text{C}$  in the month of May 2006 while the minimum temperature was recorded as  $4.4^\circ\text{C}$  in the month of December 2006. The relative humidity varied from 15% and 99% during the period under review.

Rainfall: The total rainfall recorded was  $459.5\text{mm}$  during the period under review. The maximum rainfall recorded was  $251.5\text{mm}$  in the month of July 2006.

**1. MONITORING OF AMBIENT AIR QUALITY AROUND CHAR MINAR, HYDERABAD**

Studies are being carried out to assess the levels of suspended particulate matter and important gaseous pollutant in the ambient air in and around Char Minar and their impact on the stability of structures.

Stone Conservation laboratory, Agra

To study the state of conservation of monuments and various conservation problems, Archaeological Survey of India with the collaboration of UNESCO has established a conservation laboratory at Agra Fort, Agra.

Petrological studies of stone samples received from different archaeological monuments situated at Hyderabad, Gopeshwar, Adibadri, Khajuraho, Gwalior

with the view to have complete information about the action of deteriorating agencies have been completed. A comparative study of weathered stone samples of Red Fort,

Delhi under the “Comprehensive Conservation Management Plan, Red Fort” was carried out in the laboratory.



# X ARCHAEOLOGICAL GARDENS

## ANDHRA PRADESH

### 1. AKKANNA MADANNA CAVE TEMPLE, VIJAYAWADA, DISTRICT GUNTUR

The area in front of the caves has been landscaped and a lawn has been laid.

## ASSAM

### 2. GOLAKGHAR SITE, JOYSAGAR, DISTRICT SHIVSAGAR

To meet the equipment a bore well of required size has been dug and suitable motor pump installed to meet out the water requirement for environmental development.

## BIHAR

### 3. EXCAVATED REMAINS, NALANDA, DISTRICT NALANDA,

As the existing garden was full of weeds, re-grassing of the area was taken up after appropriately preparing the area with earth and manure to the required depth.

### 4. EXCAVATED REMAINS, VIKRAMSHILA ANCIENT UNIVERSITY, ANTICHAK, DISTRICT BHAGALPUR

The open area of this excavated site was identified for laying of a garden. The area has been cleaned and

dug to the required depth and manure etc has been provided.

### 5. RELIC STUPA, VAISHALI, DISTRICT VAISHALI

The existing garden has been weeded and the area prepared and it has been re-grassed.

## KARNATAKA

### 6. HUCHHAMLLIGUDI TEMPLE, AIHOLE, DISTRICT BAGALKOT

A garden has been developed around the temple.

## KERALA

### 7. BEKAL FORT, BEKAL DISTRICT KASARAGOD

The second phase of garden activity at the fort was completed and an extensive garden has been laid.

## MADHYA PRADESH

### 8. KOSHAK MAHAL AT CHANDERI

The garden development work at Koshak Mahal has been taken up to improve the environment around the monument. For providing irrigation facilities a deep tube well has been installed and G.I. Pipe line has been laid out.

In this area plants like Thuja compacta, Aclypha, Thevetia etc. have been planted and at present a lush green lawn has been developed.

### ODISHA

#### 9. GROUP OF TEMPLE, BOU DH, DISTRICT BOUDH

Environmental development work, of laying of lawn, planting of shrubbery border, dot plantation, hedges along with movement pathways was completed and garden is being maintained in presentable condition. The sprinkler irrigation system has been installed at the site.

#### 10. ANCIENT MONUMENTS OF BARABATI FORTRESS, CUTTACK, DISTRICT CUTTACK

As per the directions of the court, the garden has been developed without disturbing the sport activities in the complex. A bore well of the required size of bore well has been dug and suitable motor pump installed to meet out the water requirement for environmental development. A portable sprinkler irrigation system has been installed for proper irrigation of the garden as well as to save the labour and time.

#### 11. MEGHESWAR TEMPLE POND TO BHASKARESWAR TEMPLE, BHUBANESWAR, DISTRICT KHURDA

A pipe line has been laid from Megheswar Temple pond to

Bhaskareswar Temple, to meet the water requirements of the vast garden area of Bhaskareswar Temple.

#### 12. CHOUDWAR FORT, CUTTACK, DISTRICT CUTTACK

As there is no source of water at the site for environmental development, a bore well of the required size of bore well has been dug and suitable motor pump installed to meet out the water requirement for environmental development.

#### 13. EXCAVATED REMAINS OF LALITAGIRI, DISTRICT CUTTACK

A bore well of required size has been dug and suitable motor pump installed to meet out the water requirement for environmental development.

### WEST BENGAL

#### 14. YELLOW MOSQUE, LALBAG, DISTRICT MURSHIDABAD

A sprinkler irrigation system has been installed at the site for proper irrigation as well as to save the labour and time.

#### 15. AZIM MUNNISHA BEGUM TOMB, AZIMNAGAR, DISTRICT MURSHIDABAD

A bore well of required size has been dug and suitable motor pump installed to meet out the water requirement for environmental

development. A sprinkler irrigation system has been installed at the site for proper irrigation as well as to save the labour and time.

**16. COOCH BEHAR PALACE, COOCH BEHAR, DISTRICT COOCH BEHAR**

A proper pathway has been laid in the garden area to provide the correct access to the Palace and also to prevent trespassing over the lawns. The pathways have been laid out in red murrum and edging has been done with bricks.





# **XI PUBLICATIONS**

## **PUBLICATIONS OF THE SURVEY**

**1. MEMORIES OF THE ARCHAEOLOGICAL SURVEY** – Two issues, No. 100, Tarkhanewala-Dera Chak 86' and No. 101, Bekal Excavation (1997-2001) under the series were brought out.

**2. GUIDE BOOKS UNDER WORLD HERITAGE SERIES** – three issues, Paragadh, Red Fort, Delhi and Taj Mahal were published.

**3. GUIDE BOOKS (REPRINTED)** – Lothal.

**4. BROUCHURES** – Ta-Prohm in English, French, Korean and Japanese were published.



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