



# PRESERVATION OF TOMBS OF SULTAN IBRAHIM & AMIR SULTAN MUHAMMAD, WHS MAKLI

## 1<sup>ST</sup> CONSULTATIVE COMMITTEE MEETING

### *Folio XI –Material Treatments and Guidelines*



## BASELINE DATA & RECORDING

- 1. Photographic Documentation** - *this will provide the visual documentation of the structure before any work has commenced and will record the situation at the time of the initiation of conservation work. It will be beneficial for recording the 'before conservation' stage of the project.*
- 2. Drawings** - *this will provide the drawings of the structure with details of damages, previous interventions and dimensions of the structure. In case of the tomb of Sultan Ibrahim HF has created a detailed 3-D 'point cloud mapping' of the tomb recording in detail every marking and damage on the structure along with providing dimensions and architectural features for plans and elevations.*
- 3. Conservation Records** - *these will be records of conservation work carried out using HF's formats. Daily photography of the conservation work and marking on drawings will be carried out. This documentation will recording the 'conservation process' and will aid in providing the 'before & after' analysis.*

# CLOSING / SECURING OPENINGS

## **Securing Openings / Access Points**

**After documenting the historic structure all openings of the tomb should be secured.**

**Steel mesh should be replaced in the window / ventilator frame.**

**Door opening of Tomb of Sultan Ibrahim need to be secured but should not hinder visual access to the internal space, fitted with steel mesh to stop wasps, birds and bats going into the interior space but should still provide visibility and access to sunlight..**

# MAKING TEST PATCHES FOR POINTING

## Things To Remember

- **Prepare for Test Patches**
- **All the required material should be labeled and available on site**
- **All the tools should be available on site**
- **All the safety equipment should be available on site**
- **Wet the surface with water spray before any work.**
- **Check the water consistency of the mortar after every batch is made and before its application.**
- **Make steps in the prepared mortar with trowel.**
- **If the mortar retains the shape of steps then the water consistency is OK.**





# MAKING TEST PATCHES FOR PARAPET WALL

## TEST PATCH No. 1

### STEP 1: Dry Cleaning

Clean the surface and its surrounding area thoroughly with a nylon bristle brush.



### STEP 2: Dry Cleaning

Clean the joints carefully with small brushes, specially the deep masonry joints. The recommended brushes are the oil painting brushes.



Flat Head

Fan Head

Angle Head



# MAKING TEST PATCHES FOR PARAPET WALL

## TEST PATCH No. 1

### STEP 3: Marking & Surface Wetting

- Mark the surface with a lead pencil or chalk.
- Wet the surface before applying the mortar is essential to avoid dry surface absorbing water from new mortar.



### STEP 4: Mortar Application & Dating

- Prepare Mortar 1 - 2:3:4 (Lime:PotteryDust:HillSand)
- Apply the mortar within the marked area.
- Mark the date of the test patch visibly on the mortar..
- Cure the test patch for atleast four days.





# MAKING TEST PATCHES FOR PARAPET WALL

## TEST PATCH No. 1



### **Decision:**

**It was decided that the brick parapet wall is only of two courses of brick and the mortar is disintegrating leaving the brick loose.**

**The application of the top layer will not be beneficial until these two layers are consolidated.**

**The mortar used for this layer will be used to consolidate the two brick courses of the parapet wall making it strong and water resistant.**

# TEST PATCH FOR GRAFFITI REMOVAL – BAKING SODA

## TEST PATCH NO. 2

### STEP 1: Cleaning

- Dry clean the surface with a cloth.
- Wet the surface before and its surrounding area with a water spray and then wipe it to remove excess water.



### STEP 2: Application of Baking Soda

- Prepare a whitish paste with Baking Soda and water.
- Apply using a cloth and leave for 5 minutes.
- Rub the solution off with a damp cloth. The graffiti has faded.





# TEST PATCH - GRAFFITI REMOVAL WITH BAKING SODA

## TEST PATCH No. 2

### STEP 3: Graffiti Removal

- Apply the Baking Soda paste on the graffiti and leave for 5 minutes.
- This time rub with a soft brush instead of cloth.
- First rub in horizontal direction and then in vertical direction.



### STEP 4: Graffiti Removed

- The graffiti has been completely removed.



# TEST PATCH - REPOINTING IN ALCOVE

## TEST PATCH No. 3a - South West (Elevation 022) (22.6c)

### STEP 1: Area Selection

- Select an area of original brick work and mortar.
- Dry clean the area with a nylon bristle brush.
- Clean the deep masonry joints with a small brush.



### STEP 2: Mortar Removal & Wetting

- Remove all the loose and disintegrated mortar.
- **REMEMBER - NO unnecessary removal required.**
- Wet the area with a water spray.





# TEST PATCH FOR REPOINTING - SW ELEVATION 022

## TEST PATCH No. 3a - South West (Elevation 022) (22.6c)

### STEP 3: Mortar Preparation

- Prepare two different mortars selected from the samples prepared earlier.
- Mortar 2 - 1:4 (Lime : Hill Sand)
- Mortar 3 - 1:1:4 (Lime : Crushed Glass : Hill Sand)



### STEP 4: Mortar Repointing - 1<sup>st</sup> Course

- In small layers start filling in the mortar joints.
- **REMEMBER - Do Not cover the original mortar where it is strong.**
- In the first course the re-pointing style is flushed point-ing with the same level as the brick face.





# TEST PATCH FOR REPOINTING - SW ELEVATION 022

## TEST PATCH No. 3a - South West (Elevation 022) (22.6c)

### STEP 5

#### Mortar Repointing - 2<sup>nd</sup> & 3<sup>rd</sup> Course

- In these masonry courses the repointing style is flushed pointing with the mortar level recessed back 1 part of an inch from the brick face.



### STEP 6

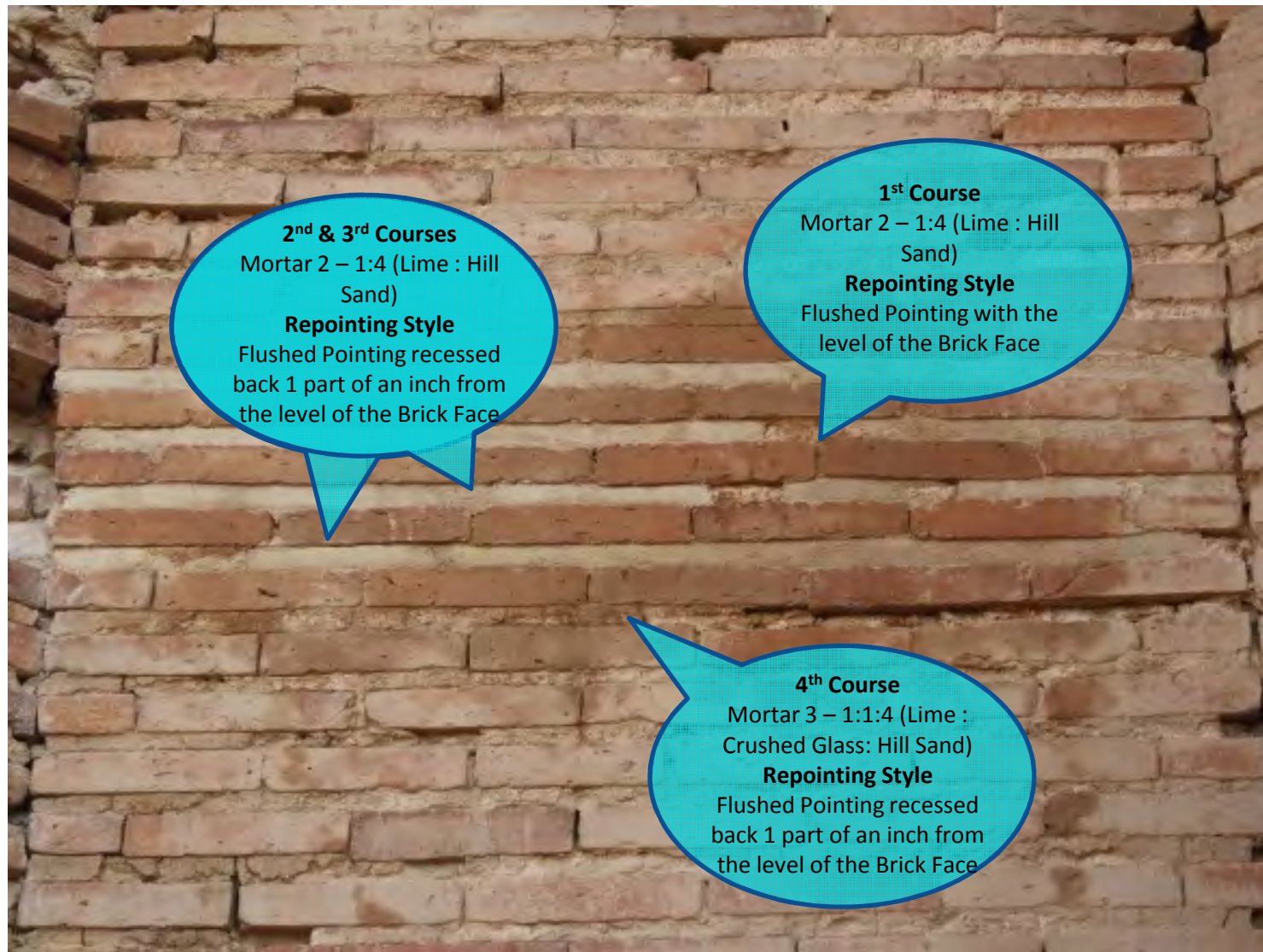
#### Mortar Repointing - 4<sup>th</sup> Course

- In the fourth course the repointing style is flushed pointing with the mortar level recessed back 1 part of an inch from the brick face.
- Mortar 3 - 1:1:4 (Lime : Crushed Glass : Hill Sand) is used for this layer.



# TEST PATCH FOR REPOINTING - SW ELEVATION 022

## TEST PATCH NO. 3





# TEST PATCH FOR REPOINTING - SW ELEVATION 022

## TEST PATCH No. 3a - South West (Elevation 022) (22.6c)

### STEP 7: Curing

- Water the prepared test patch.
- Cover the area with wet jute attached with bamboo sticks.
- Periodically wet the jute for atleast four days for proper curing.



### STEP 8: Examination of Test Patch

- Remove the jute and let the test patch dry.
- Observe color of re-pointing.
- It was observed that the mortar was of a greyish hue.
- **Two more samples of different mortars were decided to be applied.**





# TEST PATCH - REPOINTING IN ALCOVE

## TEST PATCH NO. 3b - South West (Elevation 022) (22.6c)

### STEP 1: Area Selection

- The area selected for this test was underneath the previous test patch for better comparison.
- Dry clean the area with a nylon bristle brush.
- Clean the deep masonry joints with a small brush.

### STEP 2: Mortar Removal & Wetting

- Remove all the loose and disintegrated mortar.
- **REMEMBER - NO unnecessary removal required.**
- Wet the area with a water spray.



# TEST PATCH FOR REPOINTING - SW ELEVATION 022

## TEST PATCH NO. 3b - South West (Elevation 022) (22.6c)



### STEP 3: Mortar Preparation

- Prepare two different mortars selected from the samples prepared earlier.
- Mortar 4 - 1:1:4 (Lime : Brick Dust : Hill Sand)
- Mortar 5 - 2:3:4 (Lime : Pottery Dust : Hill Sand)
- Wet the surface and its surrounding area before the application of any mortar



# TEST PATCH FOR REPOINTING - SW ELEVATION 022

## TEST PATCH NO. 3b - South West (Elevation 022) (22.6c)

### STEP 4: Mortar Repointing

- Fill Mortar 4 with a repointing style of Flushed Pointing with the mortar level recessed back 1 part of an inch from the brick face.



### STEP 5: Mortar Repointing

- Fill Mortar 5 with a repointing style of Flushed Pointing with the mortar level recessed back 1 part of an inch from the brick face.





# TEST PATCH FOR REPOINTING - SW ELEVATION 023

## TEST PATCH No. 4 - West (Elevation 023) (23.1b)

### STEP 1: Cleaning

- Select the area having original bricks
- Clean the area and wet it using spray water.
- Apply mortar 6 - 2:3:4  
Lime : Pottery Dust : Hill Sand)
- Apply mortar 7 - 1:2:4  
(Lime : Pottery Dust : Hill sand)



### STEP 2: Mortar Repointing

- Repoint the bricks with Struck Pointing Style, mortar recessed back 2 to 3 parts of an inch from the brick face.

# TEST PATCH FOR REPOINTING - SW ELEVATION 023

## TEST PATCH No. 4 - West (Elevation 023) (23.1b)



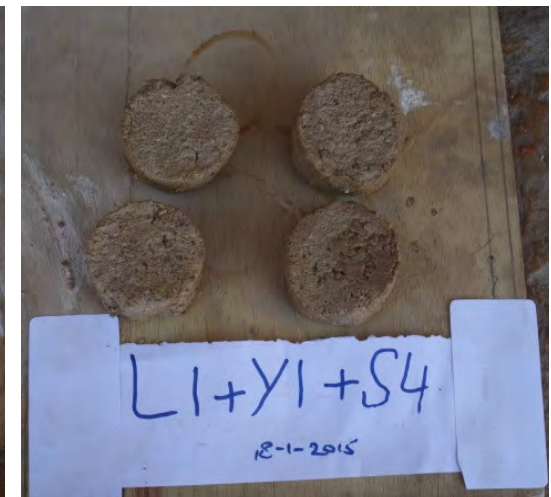
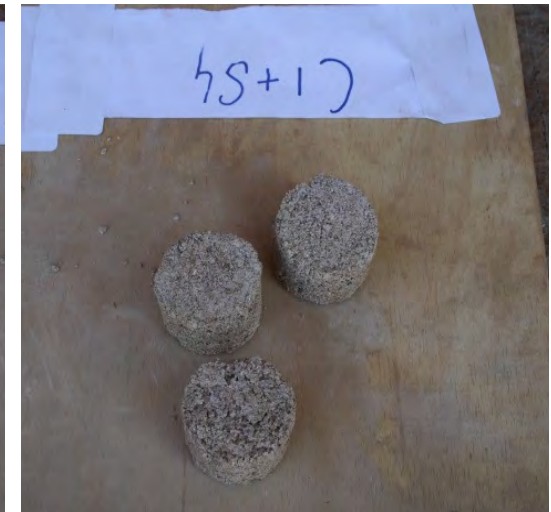


# TEST PATCH - MORTAR FILLING IN STONE FLOORING

## TEST PATCH NO. 5

### STEP 1: Preparation of Test Mortars

- A number of mortars with various ratios were prepared for this test patch.
- Four mortar samples were selected.





# TEST PATCH - MORTAR FILLING IN STONE FLOORING

## TEST PATCH NO. 5

### STEP 2: Selection of Test Mortars

- When placed on the dry stone flooring, two mortars were finalized for this test patch.



# TEST PATCH - MORTAR FILLING IN STONE FLOORING

## TEST PATCH NO. 5

### STEP 3: Surface Preparation

- The area which was out of the way of work was selected for this test patch.
- Dry cleaning of the area with brushes to remove dust and loose particles.



### STEP 4: Wet Cleaning

- Wet cleaning of the area with water and Lisapol detergent.
- Use brush to scrub the floor gently.





# TEST PATCH - MORTAR FILLING IN STONE FLOORING

## TEST PATCH NO. 5

### STEP 5: Dry the Surface

- Dry the clean surface from any standing water.
- Let it stay for 5 minutes before applying any mortar.



### STEP 6: Mortar Preparation

- Prepare Mortar 8 - 1:2:4 (Chirolī Lime : Yellow Stone Crush : Hill Sand)
- Prepare Mortar 9- 1:1:4 (Chirolī Lime : Yellow Stone Crush : Hill Sand)



# TEST PATCH - MORTAR FILLING IN STONE FLOORING

## TEST PATCH NO. 5

### STEP 7: Floor Filling with Mortar 8

- Fill the joints of the stone with mortar 8.
- The filling should not be higher than the edge of the stone.



### STEP 8: Floor Filling with Mortar 9

- Fill the joints of the stone with mortar 9.
- The filling should not be higher than the edge of the stone.





# TEST PATCH - MORTAR FILLING IN STONE FLOORING

## TEST PATCH NO. 5

### STEP 9: Curing

- The finished patch needs to be cured for at least 4 days.
- Cover the test patch with wet jute and put bricks at the corner to secure the jute and the area.



# TEST PATCH – MUD EDGING OF KASHI WORK

## TEST PATCH No. 6 - East Elevation (027) (27.4d)

### STEP 1: Preparation of Mortar 10

- Prepare the Mud Mortar - 1:1:8 (Mud : Straw : Cow Dung)



### STEP 2: Area Selection

- Select an area which is easily accessible and where *Kashi* tiles are loose.
- Clean the area using nylon bristle brush.
- Wet the area with water spray.





# TEST PATCH – MUD EDGING KASHI WORK EAST ELEVATION

## TEST PATCH No. 6 - East Elevation (027) (27.4d)

### STEP 3: Mortar Application

- Apply the mortar 8 at the edges of the *Kashi* tile work.
- Apply a gentle pressure so that the mortar penetrates into the cracks at the base of the tile.
- Secure the mortar and make a smooth edging around the edge of the tile.
- Apply water for curing.



# TEST PATCH – CLEANING INTERIOR STUCCO

## TEST PATCH NO. 7 Section 011 (33.1f & 33.1g)

### STEP 1: Safety

- Wear safety helmet.
- Secure the scaffolding before climbing.

### STEP 2: Cleaning

- Dry clean the area of stucco work with a cloth
- Wet clean the area with a damp cloth. Observe if any stucco paint is getting off.
- Put some Baking Soda paste on the cloth and rub it on the stucco surface.
- Observe if the surface gets clean or the paint gets removed.





# TEST PATCH – CLEANING INTERIOR GLAZED TILES

## TEST PATCH NO. 8 Section 012 (31.2c)

### PROCESS

- Select a tile which is surrounded by other old tiles for better comparison.
- Dry clean the surface with cloth
- Wet clean the surface with damp cloth
- Put baking soda paste on the cloth and gently rub on the tile surface
- Clean the surface with damp cloth to observe the difference.
- The white glaze of the tile is disintegrating and hence only gentle cleaning should be carried out.



# TEST PATCH – ROOF MORTAR LAYER TESTING

## TEST PATCH NO. 9



## PROCESS

- Select an area which is original part of the roof floor.
- With a sharp tool create a crack in the surface and dig till it is soft.
- Clean the area with a brush for better visibility.
- It was observed that 1 inch of mortar layer covered the surface.
- Below this surface is the brick placed randomly.
- Close the opening with Mortar of ratio 1:4 (Lime : Hill Sand)

