



Neighbouring Sethi havelis may be used to understand the lifestyle of the rich merchants.



Neighbouring Sethi haveli.



Neighbouring Sethi haveli.



Neighbouring Sethi haveli.

Value

The restoration of the house by the government spearheads a movement for safeguarding the heritage of Peshawar Walled City. It is expected to provide the guidelines for undertaking such endeavours in the future.

The restoration/conservation of the *haveli*, as a first step is expected to accelerate the process of heritage safeguarding in the province. The example of the Sethi Haveli, as a comparatively low cost activity, due to the methodologies devised by the Foundation, is expected to be emulated across the province and nationally. The transparency with which all actions have been taken, and the financial records maintained, show that heritage requires dedication in a corruption-free manner. All those involved in the activity took the project as a challenge which must be fulfilled with integrity, honesty and dedication.

This is an example of how heritage work must be undertaken, to be carried out with commitment and devotedness, following international guidelines, in order that the integrity of the heritage site is maintained.

Context for Safeguarding

Urban Context

It is clear from the above discussion that the urban context in the form of the *Mohallah Sethian* is of national significance due to the following:

- The *haveli* is located in the midst of the Mohallah Sethian, which as mentioned earlier, is likely to have been part of a Mughal neighbourhood.
- The *haveli* was built fronting an important street that leads into the *mohallah* from the main road linking Gor Khattree with the *Ghanta Ghar* (Clock Tower), thus pointing towards its importance as a significant site.
- The cluster of the Mohallah Sethian itself represents medieval urban morphology, which is organic in character and common to many traditional historic towns of Pakistan.

Threats to Traditional Urban Environment

The *haveli* has been under threat for some time, not least because of the loss of many surrounding historic structures within the Mohallah Sethian as well as the main street that leads to the *mohallah*. The reconstruction of many of the houses has been insensitive, and without concern for compatibility with the original historic structures. The original facades,

that portrayed integrity of form and reflected the traditional lifestyle and concerns, have been replaced with disparate buildings built with reinforced concrete.

The streets were well designed to create a well knit community and walking spaces. The design of houses accommodated *deorbis* or porches, which were conducive to interaction among neighbours who were also once closely related family members. The slightly larger semi-private, semi-public spaces added to the urban quality for fostering interaction with passers by, and for children to play. The whole activity could be watched by women in the privacy of the connecting bridge, across the street at the upper level. It was thus that the ‘eyes on the street’ propagated by Jane Jacob, was provided more than a century earlier, through the introduction of this special urban form, the bridge, in a society fiercely mindful of providing privacy to its womenfolk.

Visual and Environmental Pollution

The entrance to the street, instead of being an edifying experience, is hugely disturbing because of the apathy and lack of care evident in all its parts. This is not surprising, since only 13 of the original traditional houses from a total of over two dozen are now extant, and, most of them are in an advanced state of deterioration and collapse. Where the entire neighbourhood reeks of neglect, it is the proliferation of hugely tangled electrical cables and wires that disturbs the most. Not only are they visually disruptive, they are also a source of threat to the historic fabric of the surviving houses.

The streets, although paved, are unkempt, with open drains and piles of garbage stacked around. With no attention to garbage collection, and with the water supply being contaminated by choked open drains, carrying sewerage, the entire *mohallah* requires rehabilitation.



Detail of shutters of neighbouring Sethi House



View of sky bridge from street.



Damaged condition of a neighbouring Sethi haveli.



View of neighbouring Sethi haveli.



DEVELOPING BASELINE
DATABASES



Damages to Non-historic section of the house.

DEVELOPING BASELINE DATABASES

CONDITION OF SETHI HAVELI AT THE OUTSET

When taken up for documentation and later for conservation, the Sethi Haveli appeared to be in a state of collapse. For several years the mansion had been occupied by multiple tenants, and to facilitate them, new kitchens and bathrooms had been added on different levels in a makeshift manner. On the first floor a school had been running for several years, and other tenants occupied other areas. The basement was largely used for storage and parts of it had been locked up for some time.

Recording Mechanism

The building structural system relies on thick brick masonry walls with timber framing, and roofs and floors built with timber joists closely



View from Level 3 showing internal courtyard and Level 4 Pardah Wall.

spaced together. There is extensive use of brick masonry arches and brick vaults in the basement. However, the superstructure relies almost entirely on timber joists. Although a comparatively simple structure, it has several intermediate levels where storage spaces have been built in. Similarly, there are slight differences in levels which had to be catered for when devising the numbering system. Whereas the structure is comparatively simple, it is in the ornamentation of the house, that provides a feast for the eyes, and a complexity of great proportion in the documentation of its fine features.

For measurements, the hand survey methodology was used. All primary and secondary building elements were hand measured with steel tape, string, pencil, architectural scale, right angle and plumb bob. As is to be expected the effort was time consuming. Even after the completion of 6 months which was the time estimated for complete and comprehensive documentation, it was found that several areas had been missed out. Some inter-floor levels that were used as stores had not been located during that time. Similarly, perhaps in view of the extremely ornate treatment of all surfaces, the decorative features were not fully recorded. These have subsequently been completed. Several templates were developed in order to maintain a full record of instructions and ongoing conservation:

- a. As-built Drawings; Detailed Documentation & Condition Survey
- b. Numbering System
- c. Daily Record
- d. Instruction Sheet
- e. Conservation Record

Condition Survey by Documentation Centre and Heritage Foundation of Pakistan

In order to develop a comprehensive study of the Sethi House, the first step was developing as built drawings of each level. The house was divided into 4 levels:

- Level -1** denotes the basements.
- Level 1** denotes the sunken open-to-sky, central courtyard.
- Level 2** indicates the many rooms that were on the ground floor and around the open-to-sky courtyard.
- Level 3** includes all the rooms on the first floor that were built around the *mungb* and the central roof terrace.
- Level 4** denotes the roof levels that were outlined by the *pardah* walls.



Mid-historic section before conservation work.



Roof 4/02 before conservation work.



Room 3/16 before conservation work.



Cracks showing structural failure in Mid-historic section



Room 3/01 during paint removal

Once each level was documented through drafting of plans and sections, the Foundation's numbering system was introduced according to which all rooms, elements and components were given unique numbers that could be used for identification throughout the conservation process.

Room numbers were devised to indicate the location of the room on a level, e.g. 3/01 where 3 denotes Level Three, while 01 specifies the location of the room. This numbering system is open-ended and additional rooms or spaces could be added to the list, if needed. The numbering system was useful, since errors in the drawing could be rectified at a later date. Hidden closets and niches, found embedded within walls, as well as inter-level spaces which had been missed, were added by the Foundation's teams from Karachi, who later carried out the condition survey.

Additionally, each element within a room was also identified and numbered. This not only allowed cross checking of the drawings for errors, but also helped to keep a detailed record of work being implemented on site, such as removal of paint from doors, replacement of knobs, handles, or the repairing of building crafts. The following numbers were designated to elements:

- (31) External Openings
- (32) Internal Openings
- (24) Staircases
- (76) Internal Niches
- (42) Internal Wall Finishes
- (36) Flooring
- (44) Ceiling /Roof Finishes

The condition survey report is divided into different sections, with each section based on a different level in the house. The report follows a reference drawing where the location of each element is marked. This drawing number is also mentioned in the database that has been prepared, along with the room number for ease of location. The individually numbered element can be easily identified on the drawing as well as on site, due to a thumbnail photograph which is available on the database. The condition survey report also mentions the condition of the element at the time of the survey. Conditions vary from D "Dilapidated" to F "Fair" and G "Good". It is important to note that the condition of the elements was noted before the conservation process, hence not many elements, could be noted as being in a good condition.

The database gives a brief description of the elements along with the materials used, as well as comments that were noted at the time of the survey. The description may vary from the many components of an opening i.e. ventilator, frame, door, shutters, glass panes, hinges and other hardware to the decorative building crafts that adorn an internal niche, such as mirror work, stucco tracery, or fresco. The additional remarks or comments give a brief statement on work that may need to be carried out or existing damage.

The condition survey report can be viewed as a baseline document that may be used to compare the condition of elements and rooms, before and after the conservation process. It is also useful in understanding the complexity of the restoration work. As mentioned earlier, the numbering system, that allocates a unique number, is used throughout the programme when devising work plans, conservation work and daily progress reports as well as for actual reference on site.

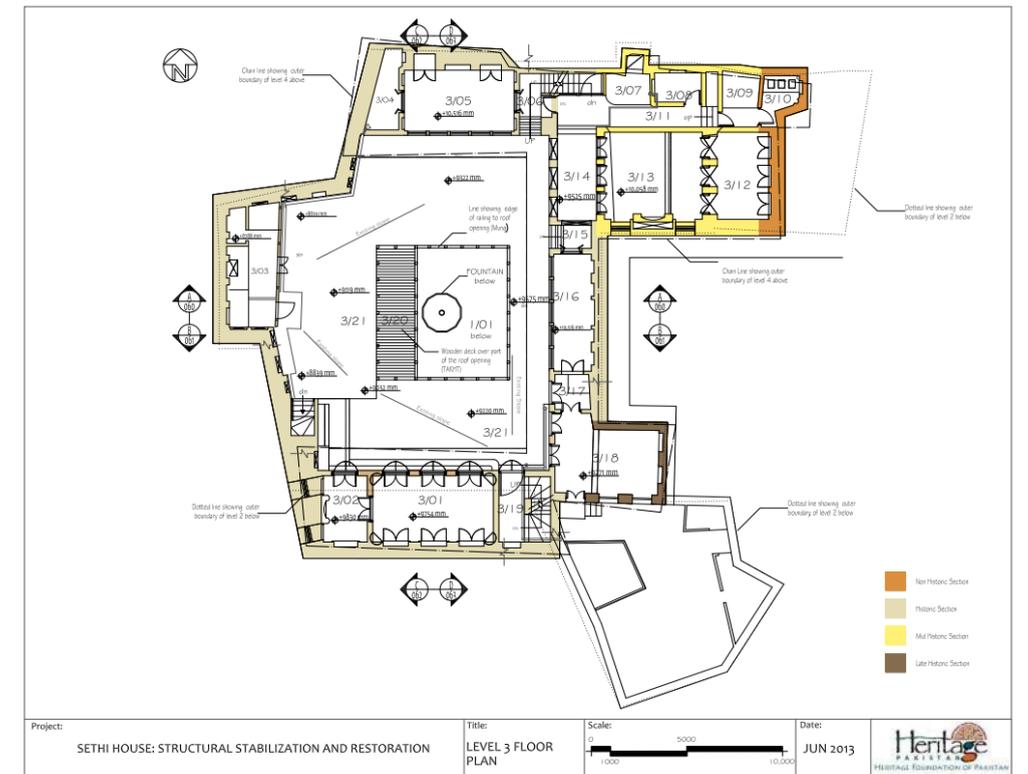
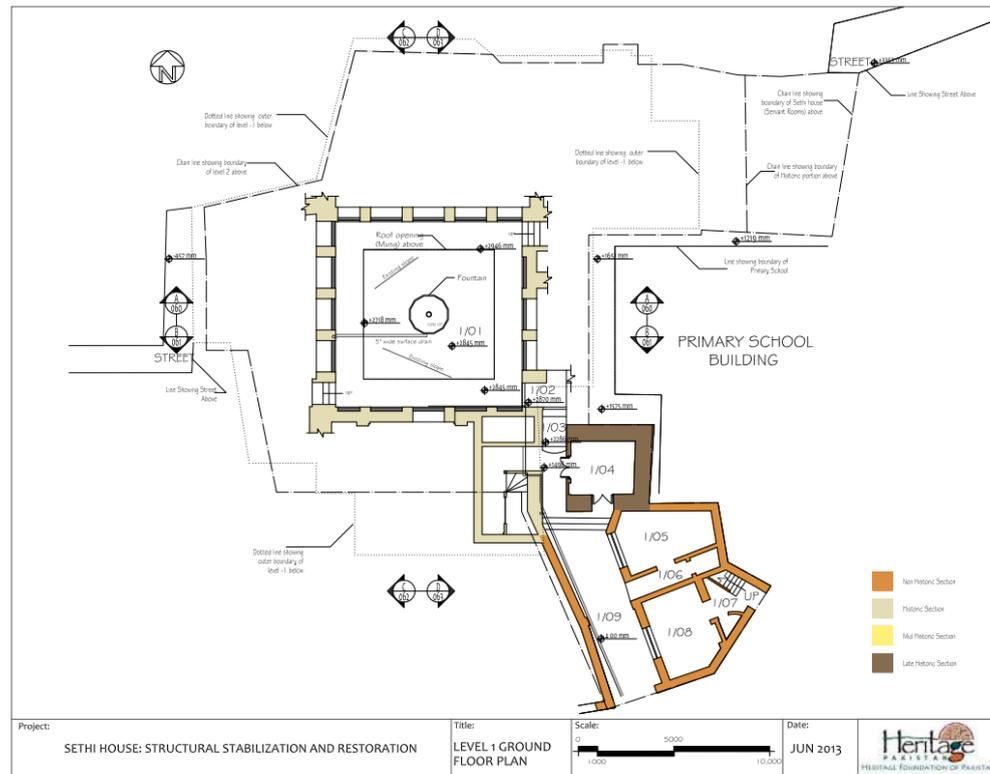
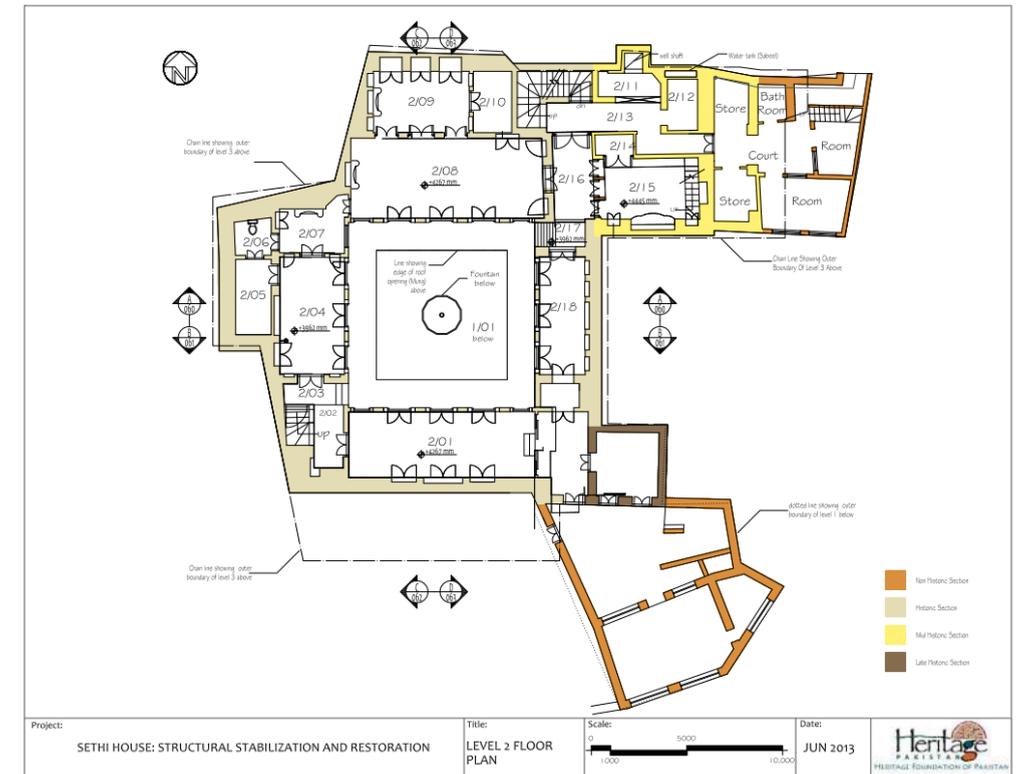
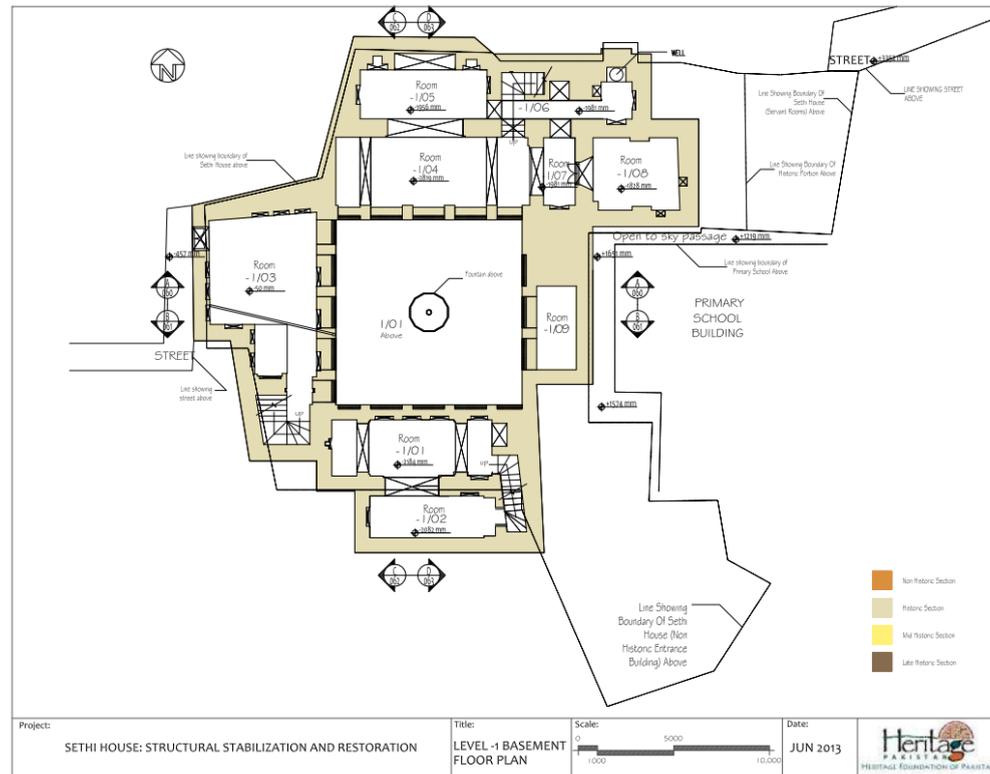
Other Investigations and Studies

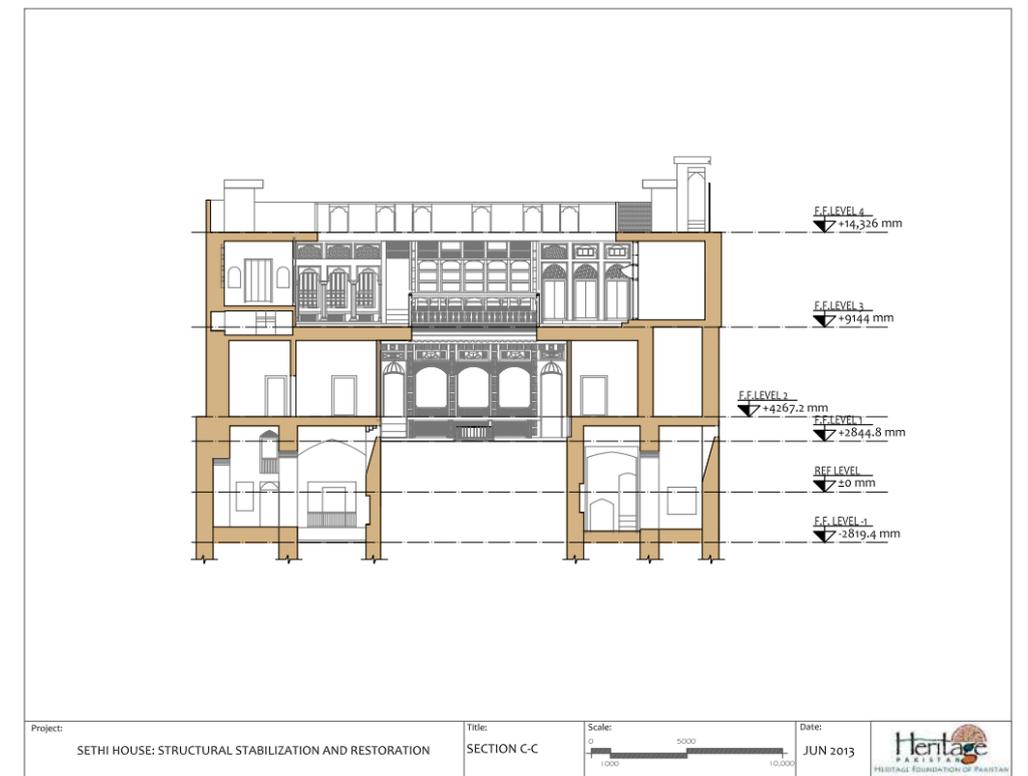
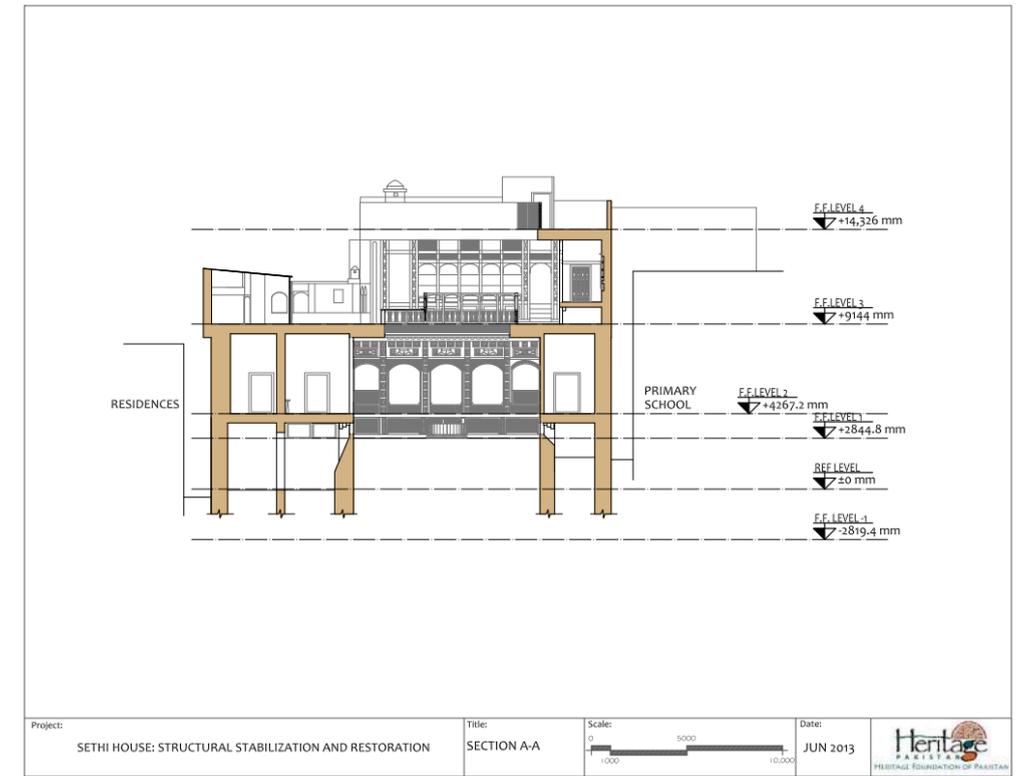
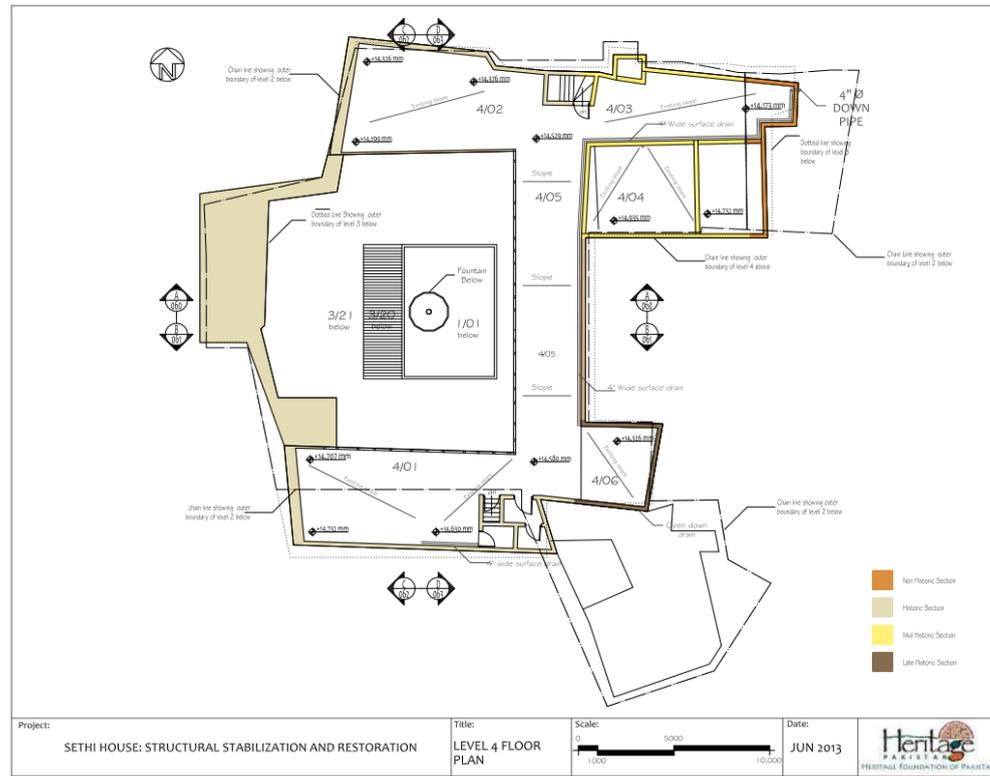
To determine the prevalent conditions of the structure, investigation pits were dug in different locations of the house. The pits determined the materials and the causes of damage. The Sethi House ceilings displayed signs of damage due to water seepage from the roofs, while walls showed signs dampness. Further investigations showed that the roofs were loaded with almost 3-4 feet of earth that had been deposited there during different periods as a measure to stop rain water seeping into the roof. The mud layers were not waterproof, and the dampness retained by the mud filling caused severe damage to the wooden beams and rafters that formed the roofing system. They were not only a source of damage to the remarkable *tarseem bandi* that adorned the ceilings, but were also causing point loads and damaging the walls. Cracks were being formed in walls while, as mentioned earlier, the water seeping through damaged woodwork and other building crafts.

A structural evaluation was carried out which identified the non-historic portion as extremely dangerous and requiring immediate demolition, meanwhile, the mid-historic portion which connected the historic and non-historic areas of the house, although in danger of collapse, would have to be saved through a carefully worked out stratagem.



Detail of Traseembandi in Room 2/01







Workers stabilizing wall adjacent to school building

Investigative pits dug in the foundations brought to light challenging issues. With the rising damp, the bricks in the foundations and along the base of walls were developing discolouration. The rising damp was also causing the earth underneath the flooring in the basements to swell up and form an uneven floor surface. Thus, geo-technical studies were carried out to understand the condition of soil and foundations. It was decided that the flooring would have to be removed and measures taken to reduce the rising damp from accumulating underneath the brick flooring. A building crafts inventory was also carried out, through which over a dozen unique rare craft treatments were identified. These included *ainah kari* (mirrored tracery), *munabat kari* (stucco tracery), *tarseem bandi* (wooden fretwork), and several *naqqashi* (fresco) applications, among others.

Evident threats

The studies showed that the *haveli* was under threat due to various reasons:

Structural Damage

By undertaking various studies the considerable damage to the structure was identified. It was clear that a great deal of stabilization and restoration effort would be required to make the building safe and habitable. Since the *haveli* was no longer in private ownership, as a public building and one that would be used by a large number of people, the stabilization strategy required concerted effort in order to withstand the large numbers of visitors that would be using it once the *haveli* was opened to the public.

- One of the new structures located in the east, a non-historic part, that had been poorly built, was a cause of great threat to the historic building. Because of the load it exerted, the mid-historic part appeared in a state of near-collapse, with huge cracks in the walls, which threatened the adjoining school structure where a number of children were studying.
- The adjoining structures of mid-historic and historic parts clearly showed signs of stress, with excessive leaning of walls and several large cracks disjoining many walls from one another.
- Roof water seepage had caused a great deal of harm to the historic portion of the structure. Due to lack of drainage, rainwater collecting on the roof and second floor roof terrace, had been seeping through the roof, and gradually causing deterioration and disintegration of timber roof and floor

members. Since there was no water proofing, no drainage, and no termite treatment, it was evident that the structural stabilization needed careful consideration.

- The collapse of a timber joist in the mid-historic part appeared imminent. Over the last many years, a gaping hole in the roof was the cause of this, since the rainwater was flowing freely into the room. As a result, the joist and adjoining structure were in a dangerous state.
- New constructions such as kitchen and bathrooms added extra loading as well as blockage to free drainage of sewage water. The ill planned extensions also damaged the *pardah* walls of the second floor.
- Investigations revealed a huge amount of earth filling. In the hope of controlling water seepage, over many decades the roofs were constantly treated to extra layers of soil, in the end, as much as 1m earth filling was removed from roof surfaces.
- The basements had been affected greatly due to the damage to superstructure caused by the loads being exerted by the non-historic portions. Substantial cracks were found in an area adjacent to the well.
- Staircases, although well constructed, showed signs of damage in the treads and particularly at the roof level, where the staircase towers (*mumti*) had either collapsed or were considerably impaired.

Damage to Secondary & Decorative Elements

Secondary elements, e.g. doors and windows were found to be in a comparatively better state of preservation, considering that no evidence was found of repairs and maintenance. Among the most difficult tasks was the removal of several layers of paint that had been applied over decades, and which concealed the original wood finish. The condition survey report records the nature of damage to each secondary element. Among these elements are also the *pardah* walls on the roof and the wooden framing around the courtyard. The wooden framing was almost all severely damaged and on the verge of collapse. Since in the recent past some new brickwork had been placed within the frames, it may have been a source of exertion on the fragile wooden framing.

In most parts that adjoined other houses, new brickwork walls had been constructed, with the original portion surviving only on part of the north and west boundaries.



Stucco Tracery and Mirror work



Decorative Elements

The worst sufferers were found to have been the decorative features. The artisan skill displayed in the *haveli* has been extraordinary, and the level and finesse of the crafts must be seen to be believed. However, due to the generally deteriorated state of the structure and vulnerability due to water seepage, many of the fine crafts had been greatly damaged, such as the *tarseem bandi* or wooden fretwork in the ceilings. Due to over-painting, a lot of fine fresco decoration had been lost, while the stucco work on the walls had also been greatly damaged due to this, and to careless use by the occupants over the last decades.

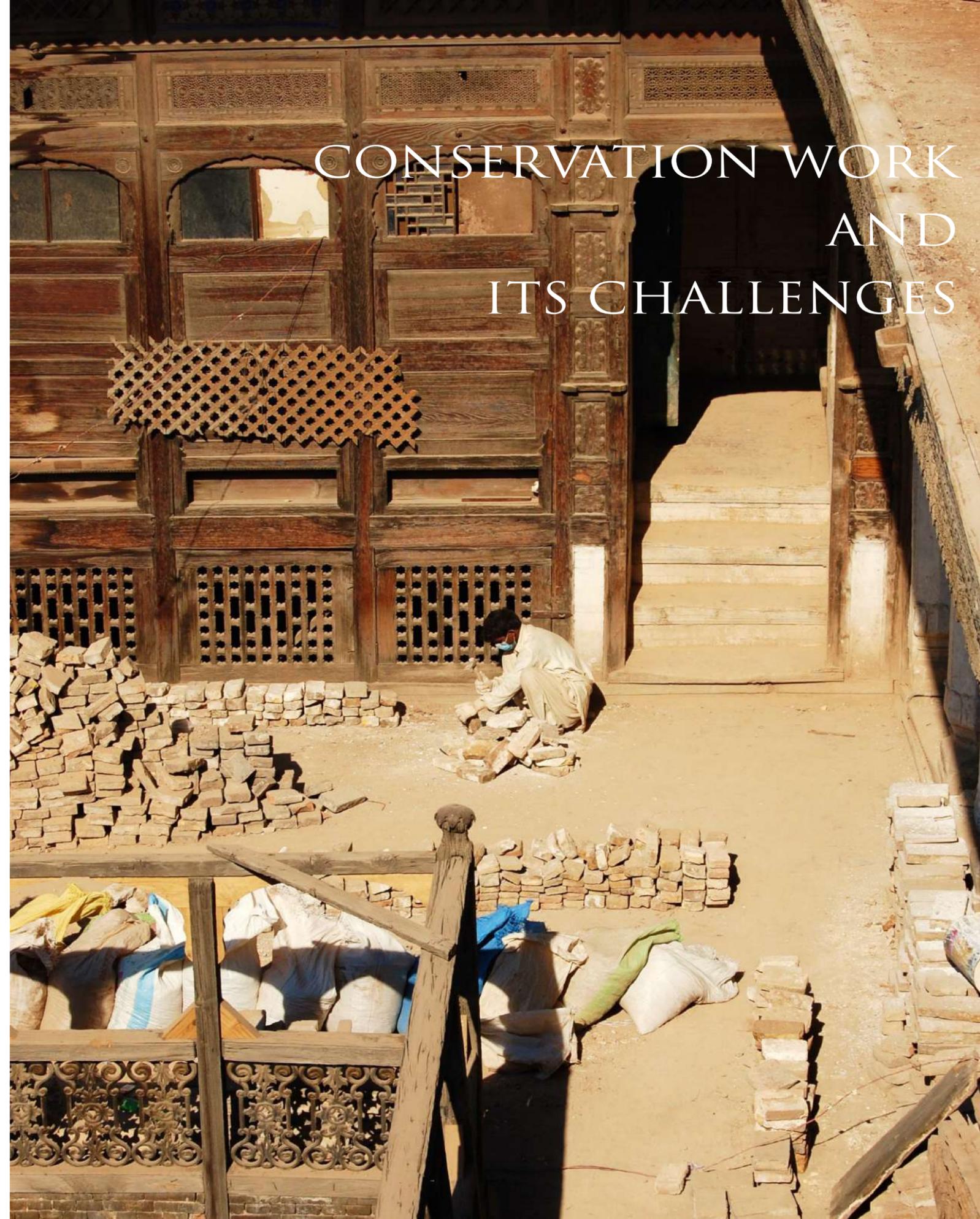
Recommendations

During the documentation and cataloguing of elements, possible restorative and type of repair work to each element were noted. These were listed as remarks in the condition survey report. They included repairs and restorative works such as removal of layers of paint from doors, windows, columns, walls, as well as from the magnificent building crafts that adorned the entire mansion; repairs to damaged *tarseem bandi* in ceilings; replacement of broken louvers and other damaged woodwork; repair to bricks and flooring *pucca qalai* (lime flooring).

Recommendations made by structural expert Engr. Amin Tariq included dismantling of the dangerous non-historic portion that was built during a later phase without adequate foundations. The non-historic portion was found to be tilting to a dangerous level and the cause of cracks in walls in the mid-historic portion as well. It was decided that during and after dismantling of the non-historic portion, the mid-historic section would be restrained with high tension cables to secure the structure. It was also decided that all cracks found in different sections of the building would be filled using lime and gypsum. This would prevent their further expansion.

Following the recommendations of the geo-technical expert Engr. Ejaz Shahid, it was decided that the flooring in the basement would be excavated, and bore holes would be drilled at regular intervals. These bore holes would then be filled with gravel stones and sand to discourage any moisture from seeping through. The flooring would then be replaced with the original salvaged bricks laid in the original pattern.

View of back street from Qadri Manzil.



CONSERVATION WORK AND ITS CHALLENGES

CONSERVATION WORK & ITS CHALLENGES

The work of conservation was undertaken in January 2011 by a dedicated team, the members of which had been trained in various aspects of historic conservation through conservation work at the Lahore Fort.

Roofing

The roofs of *Moballah Sethian* are all flat, this kind of roof being predominant in most traditional and historic towns, where roofs are used as an extension of living space. Thus, the roofs are highly usable spaces, which provide work spaces particularly for women and a place where children can play under the watchful eyes of their mothers. In the evening, it is here where under the open sky, and particularly during hot weather, that beds are pulled out and the terraces made into open air bedrooms.

The Sethi Haveli has an extensive roof space at all levels. The ground boasts an open-to-sky courtyard known as the *mungb*, the first floor provides an open-to-air terrace, while the top roofs provide an extension to the accommodation for day to day living of families, as mentioned earlier. However, it is the roofs that were found to be among the most critical from the point of structural safety.

As mentioned elsewhere, the roof had to be rehabilitated in sections in order to avoid inclement weather and rain penetration into ornamented ceilings. The exposure of highly damaged wooden rafters required immediate action in order to prevent collapse.

All roofs were found to have suffered extensively due to rains and insufficient drainage arrangement for prevention of water ingress.

Excessive filling of earth had to be removed from all parts of the roof, while highly damaged wooden roof rafters and other roofing elements had to be treated. Date palm leaves and *khajji* planks (date palm planks) were found in a deteriorated state above wooden rafters and below the earth filling, and these had to be removed.

The stacking of layers of earth had added to overloading of the historic structure, which in turn led to water retention in the roof. Over several decades the dampness had continued to seep in, so that when the roofs were opened up the moisture that had lodged there became clearly visible,

and it was found that many of the timber rafters and other roof elements had been almost entirely eroded.

Clearly, the roof had to be waterproofed and fully sealed on all sides, as well as being made structurally stable to bear live loads. The finishing of the floor surface of open-to-sky areas was required to be sturdy, and the flooring in these areas was found to be of brick, which was appropriate from the weathering and usage point of view. The ground floor courtyard flooring was found to be well laid and appeared to be the original paving, the entire pavement being divided into panels, where each panel is treated with finely laid narrow brick. On the upper levels, flooring was also composed of brick where the traditional *chauka* brick was employed. Special care was taken to take up the water proofing at least 300mm along the parapet, in order to protect the junction between the flat surface of the roof and the parapet.

Repairs and Replacement

From the outset, Hon. Project Director had given instructions that replacements would be only made where there was no other option available to make the structure stable and secure. Also, it was imperative that all additions should match the existing materials.

The treatment provided in stabilizing and waterproofing the roof was fully recorded, through preparation of drawings of the existing structure as well as those made of the interventions. All efforts were made to ensure that the characteristics of the original roof were maintained. At the same time, it was necessary that the roof water drainage should be carefully laid



Condition of roof before conservation.



Stacking historic bricks from different locations for reuse.



Clearing all unwanted material from roofs before beginning structural stabilization.



View from Level 4 of Sethi house.



Removal of bricks and compressed earth from roof.



Exposed deodar beams.



Restoration of Mid-Historic section Roof 4/03 and 4/04.



Workers applying anti termite layer on newly fixed planks.



Installing salvaged posts for internal purdah wall.

out, in order to avoid rainwater entering the masonry fabric. The slopes in some cases were changed so that they would be inclined towards the drains, discharging storm water into spouts and water channels along external walls and from there into the municipal rainwater disposal system.

Implementation

Detailed instructions were given to the site teams for implementation:

- Place supporting scaffolding below all roofs with great care in order not to damage the decorated ceilings below the roof.
- Remove all earth to relieve the structure of overloading.
- Remove all craggy and worn-out and planks from date palm trees as they were found to be highly damaged by dampness.
- Ensure that as many original rafters are retained as possible.
- Where full or part replacement of rafters was required, matching size of seasoned deodar wood to be used.
- Those with 30% damage were to be treated by adding pieces to original rafters.
- Rafters with 50% damaged parts to be reused after adding new pieces joined with *qalam* or carpenter’s joint.
- Only those that were unserviceable, with 80% or more damaged parts, to be removed and replaced with deodar wood.

Treatment

After cleaning the entire roof and removing all earth and dust, the entire wooden rafter structure including any bed plates etc., was strengthened and stabilized.

- All wooden rafters were examined for their stability and strength.
- 2 coats of anti-termite treatment with the German product BI flex, was applied to all rafters and other wooden members, this product having been tested in the Lahore Fort conservation.
- The entire surface was covered with new 3/4” seasoned deodar planks, to provide a level surface over wooden rafters.
- To avoid any danger of fire, cold application of bitumen @ 7 lbs. per sft. was applied over the deodar planks.
- The bitumen coat was covered with a 5 mm polythene sheet.
- Lime terracing consisting of 1:2:3 white lime (qalai or lime water), fine lime powder, coarse lime (*kankar*) was laid with min. 3” to max. 8” to provide the necessary pitch for drainage of water.
- A second layer of 5mm polythene sheet was laid over lime terracing.
- To provide insulation, a layer of 8mm material was laid above polythene sheet.



Workers replace masonry and fill cracks in damaged Mid-historic section.



Laying salvaged historic brick after cleaning and new waterproofing in Basement.



Conservation work ongoing on Level 3.



Workers erect scaffolding to begin restoration work on external walls.

- The entire roof was covered with brick tile paving size 6"x12"x12" and 8"x 4"x 2", laid in 1:3 white lime (*qalai* or lime water) and fine lime, laid on a 1" thick base. Brick paving was grouted in 1:1 white lime and fine lime powder.

It is to be noted that in view of the historic nature of the building, it was decided not to use any modern roof materials except for insulation, but to use traditional methodologies in order to avoid the effect of chemicals on the historic structure.

Foundations and Basements

The foundations of the historic structure are of brick masonry and go deep into the soil, well below the basements. The foundations were found to be constructed of Mughal bricks, leading to the assumption that the old foundations of an existing Mughal structure may have been used at the time of construction of the Sethi Haveli during the Sikh period.

The foundations have been checked for settlement, and no appreciable settlement of foundation was noticed during the geo-technical studies carried out on the historic structure.

Problems were noticed in the non-historic parts, which had shallow foundations and were not constructed on a basement.

Inspection

At the beginning of conservation work, a detailed study was carried out by Ar. Yasmeen Lari and Engr. Amin Tariq, in order to examine thoroughly various defects in the structure. Where the non-historic and mid-historic structures had excessive structural problems, the most important was the review of the state of the historic structure. Signs of moisture, presence of cracks, deflection of structural members, including buckling, crumbling mortar, wood in direct contact with earth etc., were explored and noted down. Among the issues that needed to be determined were those concerning the cracks and whether there was any further movement in them, or they had reached a state of equilibrium which meant that no further movement in them was likely to be encountered.

The foundations were examined for settlement, by making several bore holes and soil tests. The soil investigation was carried out by geo-technical expert Engr. Ejaz Shahid to determine whether there were any changes



Fixing purdah wall.



Cleaning tarseem bandi on sun projection.

in ground water levels, or earth movements etc. as well as lack of effective rainwater drainage on the structure. Another factor that was studied whether the addition to adjacent properties might have caused any damage or settlement of foundations in the historic structure. As there had been hardly any maintenance over several decades, lack of ventilation in the basement had added to gas retention below the floors, while dampness had continued to be retained in the basement walls due to lack of sunlight and absence of cross ventilation.

Implementation

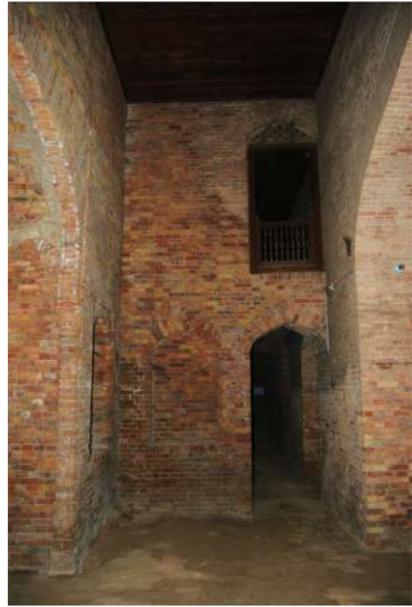
In order to provide the specified treatment to subterranean chambers, the following methodology was implemented.

- Careful removal of brick flooring from the entire basement area in order to carry out the underground treatment. All efforts were made to re-use as much of the brick material as possible.
- Careful removal of earth up to 12" depth of soil.
- According to the specified pattern, holes were made of size 6"x 6" and 4'0" depth.
- All holes thus created to be filled with pebbles 1"-2" dia.
- After the holes had been filled, a 6"-7" layer of sand was laid on the entire floor.
- A layer of 3" lime terracing was laid above the sand layer.
- 1" thick sub-floor of lime was laid, after which the brick tiles that had been removed were relaid.
- The old tiles were cleaned and their corners squared up before being re-laid.
- More brick tiles were procured from the market consisting of matching bricks from dismantled old buildings.

During the investigations by the experts, it was determined that repairs to the foundation masonry were not required; however, it was recommended that arrangements for storm water drainage should be made in order to drain rain water away from the foundations.

Mortars

Conservation work on masonry followed the guidelines developed for lime mortars. It was ensured that all masonry work exposed to extreme weather, whether in the lower foundations or in the superstructure was restored. No bituminous or cementitious material was used in the foundations as a method for waterproofing.



Double Basement Room 1/08.



Marks made for boreholes in the basement.



Relaying bricks after filling boreholes.



Restoration work in Basement.

Structural Systems

The structural system of the Sethi Haveli relies on masonry foundations. The superstructure also consists of brick masonry walls that are pierced with arched openings. The walls in the superstructure are a combination of wooden framing and brick masonry.

The floors on the upper levels were formed with timber joists and battens, while the superstructure above the foundations was constructed utilizing a timber frame with an infill of finely laid brick masonry. The floors and roofs were constructed by using heavy timber rafters and logs. The filling between the joists varied from wooden fillets to date palm matting, and was finished with earth filling and lime terracing, while in some places machine-sawn planks were also found. Bearing walls and partitions are placed on the sub-floor of each storey.

Due to the deteriorated state of the wooden members, all floors and roof wooden members were examined regarding their condition, and assessments made to determine whether original members were serviceable or not. Depending upon the condition of the members, action was taken either to re-use or to replace part or whole of the member.



View of city from Sethi House.

Repairs

In view of the highly damaged condition, it was decided first to accomplish structural soundness of the building, before undertaking works to secondary or decorative elements. Consideration was given to ensure that the existing structural system was augmented where necessary, particularly, where it was damaged or found inadequate. Replacement or removal of existing members was only carried out if they were damaged beyond repair.

During restoration work, replacement of specialized joinery was avoided, and skilled artisans were employed under the direction of the master artisan, to repair most of the woodwork. Only those pieces that had been lost completely were fabricated and fixed in original locations. As far as possible drawings were prepared before execution of work, in order that the new pieces would match the original evidence. All masonry work was restored, using matching mortar without the use of any ferrous metal parts. The work has been carried out by skilled artisans, fully familiar with the use of lime mortars.

As mentioned above, it had become clear at the outset that much of the damage had been caused due to water seepage into timber structural members. Accordingly, all earth filling that had been the cause of water retention was removed, and waterproofing protection provided to all open-to-sky roofs and terraces. This was considered essential in order to maintain the structural integrity of the historic mansion.

Brick Masonry

Walls were examined for cracks, brick spalling, stains, leaks, mortar erosion, local distress, leaning/bowing, efflorescence, blisters and loose or falling masonry fabric. The defects were highlighted and work undertaken according to the condition of the brickwork. It was considered important that the new mortar in masonry should match the historic mortar, which was found to be composed of lime. As noted earlier, among the reasons for deterioration of the masonry was lack of drainage and faulty water disposal. Accordingly, the use of all down pipes placed within the masonry fabric was discontinued, and all water directed towards drainage which would discharge the rainwater outside the building. Attempts were made to get the municipality to provide a rainwater disposal system, in order to draw water away from the historic walls and foundations. It is also expected that continued maintenance will ensure that the historic masonry fabric is kept in good condition to ensure water tightness,

Repairs and Replacement

In localized areas masonry repairs have been carried out to be as close to the original as possible in size, colour, texture, surface treatment and strength by re-using, as far as possible, the bricks found in the historic building. Similarly, mortars used have been of the same texture, colour, type of jointing and composition in order that the new mortar matches the qualities of the original.

Restoration

The restoration of missing elements has followed the evidence found in the building. For example major work of restoration has been carried out in the *pardab* walls, which are placed on the periphery of the roofs. One wall was found in its original condition on the north side of the roof. Accordingly, the restoration work carried out in the construction of the east and south walls followed the masonry and design found in the northern *pardab* wall. Similarly, after the demolition of the makeshift kitchen located on the west, the *pardab* wall on the first floor was exposed and was found to be in an extremely dilapidated condition. This wall was restored following the evidence found in the adjacent wall.



Salvaged brick being trimmed before reuse.

Masonry Cleaning

In Pakistan, most masonry walls are found to be full of grime, and cleaning of masonry is found to be extremely useful in preventing deterioration and in the restoration of original character. However, since it is essential that the 'patina' that has been acquired over time, is maintained, and as this has become part of the building's history, it is important that the cleaning should not produce the appearance of a new building. Accordingly, the cleaning of masonry was carried out by gentle means, by bristle brushes and Lizapol detergent and water. No chemicals have been allowed to be used in the cleaning of masonry.

Mortars and Re-pointing

The original mortars used in the historic building consist of lime mortars, which are highly elastic. Since cement based mortars cause rigidity, they can be extremely harmful when combined with the low strength bricks found in historic structures. Furthermore, the mortars are also required to be weaker than the masonry itself. Accordingly, it was decided to only use lime mortar in masonry, to match the original mortars and as far as possible to repair the masonry. Only when there was no other option was the original masonry removed, otherwise all repair has been carried out in situ, rather than by removing the original and relaying it.

Re-pointing has also been carried out when the mortar was found to have deteriorated significantly. A case in point is the brick masonry forming the base of the *mungh* railing on the first floor. This mortar in the masonry was highly eroded, and the portion was on the verge of collapse. The restoration has been effected by gentle removal of the brick, then re-using and laying it in the same manner as the original, using matching lime mortar. The jointing has been carried out so as to match the original bond and appearance.

Entrances and Windows

Due to major reconstruction, particularly at the front door location, the entire original house is no longer visible. It is also difficult to determine the original entrance door, because usually there should have been a *de-orbi*, which is no longer extant. The original entrance *de-orbi* or porch led to a small vestibule, which screened the courtyard or *mungh* from view. The present entrance door was a later addition and has now been replaced. The original doors leading to rooms from the *mungh* are beautifully crafted, though as in the case of the facades of most of the houses in the *moballah*,



Cleaning masonry.



Underpinning brick masonry



Filling missing bricks and re-pointing.



Removal of bricks to expose original openings.



Re-pointing mortar joints in niches.



During demolition of Non-historic front portion.

the external facades mostly present a blank face to ensure privacy of homes. Only some ventilators are found to be placed on facades which are at a high level so as not to provide a view inside the rooms. Most windows open inwards, either into the courtyard or onto open-to-sky terraces. Most of these are well crafted, many a time using coloured, frosted or figured glass. Directions had been given that no windows and doors must be changed, no alterations made, and only those pieces were to be replaced which had been lost. All doors and window panels and panes were to be secured if they were loose.

A major effort has consisted of removal of all the paint layers from wooden doors and windows. Repairs have been undertaken to replace broken or lost glass panes, and to repair any glazing beads to make the entire assembly secure.

Repair and Replacement

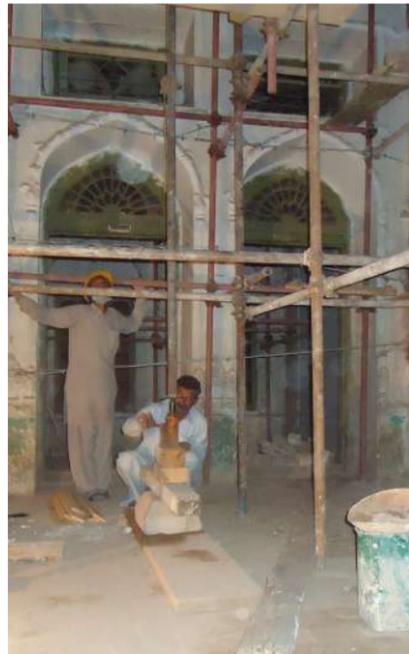
Instructions were given that only those joinery parts of doors and windows, and their beads and jambs should be replaced that are found in a highly damaged state. As much as possible, the original pieces were repaired and re-fixed securely. Attempts have been made to ensure secure fixing of all doors and windows, using matching hardware according to the evidence found in the *haveli* or in other houses in the *mohallah*.

Flooring

After repair of the roofing on level 4, the flooring was replaced with the original salvaged bricks that had been removed. The bricks were cut and their edges refined to ensure that no water would seep through uneven surfaces. The flooring on the terraces of level 3 was mismatched, with additions and changes and new layers placed there during later periods, as indicated by the investigation pits. Layers of concrete and mud filling rose up to over 3 feet and had to be removed. Once damaged rafters had been replaced and new waterproof layers were laid, it was important to relay the flooring keeping in mind a minimum drainage slope, to ensure that there would be no ponding. The flooring was finished with lime mud mortar and original 19th century bricks. After a series of test patches constructed to determine the best bonding technique, it was decided that the original patterns found in the *mohallah* would be used to maintain authenticity. On levels 1 and 2, uneven flooring due to dampness and moisture retention was a source of concern, hence it was decided that in the rooms with defective flooring this would be removed, repaired and then reassembled. Salvaged brick would be re-used as much as possible, and a slight incline would be maintained throughout to ensure proper drainage. The condition of the basement was found to be of great concern. Due to moisture and damp, and lack of proper ventilation the gas retained in there caused the surface to expand and crack. As mentioned earlier, the geo-technical expert's solution of filling bore holes with gravel and sand was carried out, and salvaged brick was re-used to finish the floor.

External Works and Courtyards

Later addition of rooms at the entrance and at the rear of the building had hidden the Sethi Haveli from view. Originally an entrance porch and courtyards would have been in existence, giving the women of the *zena-nakhana* (women's quarters) a place to greet their guests and assemble. Upon the dismantling of later non-historic portions the mansion now had a late-historic façade, which also required external work and a design for external courtyards.



Scaffolding to stabilize Mid-historic section of the house.



Arches exposed after demolition and removal of later-period brick masonry.

For the treatment of the spaces that had been created after the dismantling of dangerous portions of the house design solutions were drawn from surveys conducted in the Sethi Mohallah. Inspired by designs used in the neighbouring Nisar Sethi Haveli, the exterior courtyards at the front and rear of the house that have been created, should now be landscaped with benches and lamp posts. Greenery should be introduced in the form of creepers that would cover the new walls that have been revealed, along with the neighbouring school wall that has undergone repair. Pergolas or sunshades should be introduced to ensure that the creepers would not harm the mid-historic walls. Potted plants and pathways can be used to provide privacy and determine visitor movement, as well as providing spaces to sit and enjoy food and beverages. A ticketing and information area should also be created. The flooring has been so far finished with bricks on edge replicated from the interior courtyards, and can be continued as part of external pavement.

Dismantling Later Additions

The multiple tenancy in the historic house resulted in the additional kitchens and bathrooms, as these facilities led to water ponding on the terraces, and their sewerage and drainage pipes were a source of continuing seepage into the structure. Some appurtenances, particularly on Level 3 had concealed the highly decorated *pardab* wall, and these makeshift additions were also in a dilapidated condition.

Implementation

It was decided to remove the makeshift constructions and to rehabilitate the original *pardab* wall.

- The original open-to-sky space on the terrace was restored, thus reverting to its original character.
- Cracks in the wall, that had occurred in the southwest corner, were fixed.
- The blockage of water was removed and the original vertical rain water drain restored in order to facilitate quick water disposal from the terrace.
- The damaged stucco decoration on the *pardab* wall was restored.

Dismantling of Non-Historic Portions

Initial survey of the house indicated that the Sethi House construction had taken place in four stages. Accordingly, the structure was delineated in distinct portions of historic, mid-historic, late-historic and non-historic.



After demolition of Non-historic rear section.



After demolition of Non-historic front section.



Providing support to Historic section in the rear.



Rear Non-historic section showing damaged brick masonry.

The non- historic sections of the house stood at the front and rear of the building, and comprised rooms that were added largely to accommodate servants quarters.

These additions were poorly constructed and also infringed upon the open space that may have been extant in the original construction

Demolition Of Non-Historic Portion At South East

Among major demolition works was the pulling down of the 3-storey non-historic section blocking the front façade of the historic building. The reinforced cement concrete structure was in a dilapidated state and created an incongruent character as it abutted the adjacent, beautifully crafted façade of Nisar Sethi House.

Due to its poor construction and its negative impact on the streetscape, a decision was taken to demolish this non-historic later addition. However, since it abutted a new school building, it was important to take all precautions for the safety of both the historic structure and the school building.

Implementation

Demolition was carried out by hand tools and all possible care was taken not to damage the original structures. The steel procured from the demolition was utilized in the reinforced concrete foundations of the new wall constructed in the north-east.

Arrangement was made for constant removal of the debris, in order not to block the entry pathway or the public street.

The demolition of the non-historic portion revealed the late-historic façade. A spacious entry court has also been created which can provide the much needed breathing space in the area.

Dismantling of Non-Historic portion At North East

This new construction was extremely poorly built and was in a sad state of repair. It lacked proper foundations and the heavy roof loads had caused the building to sag and tilt. Evidence of the structural failure was visible in the form of deep cracks that appeared all along the rear of the house. Since the non-historic building abutted the mid-historic portion, it posed a grave danger to the latter. It was feared that if this portion was not removed, it would be a cause of irretrievable damage; on the other



During demolition of Non-historic section in the rear.



During demolition of Non-historic section in the rear.

hand if removed without due precautions, it was likely to de-stabilize the latter and thus cause its collapse.

After extensive studies were carried out by Engr. Amin Tariq, several precautionary steps were first put in place to avoid any mishap.

- The entire non-historic portion was provided support through scaffolding erected internally.
- Steel joists were used as diagonal anchors, firmly fixed in reinforced concrete pad foundations to provide support to the façade of the mid-historic parts.
- Steel ropes were used to tie the entire mid-historic section, to restrain it in its place in order to avoid any movement when demolition was initiated.

Implementation

The procedure for demolition was clearly spelt out and careful supervision was provided throughout during the time of dismantling, while the historic building was kept under careful watch for any movement. For-

tunately, the precautions that had been taken helped in maintaining the safety of the historic portion and no untoward impact was noted.

The area where dismantling was to take place was cordoned off and supported with steel scaffolding. A top down dismantling process was devised, where the scaffolding would be started from the ground up, to prevent damage to the rest of the building, while demolition would begin from level four. Workers were advised to take extreme precautions as they slowly began to dismantle the roof, followed by the walls. Challenges were tenfold, as dismantling had to be done with the utmost care so as to not damage the remainder of the building. As the demolition procedure progressed, the mid-historic section had to be closely monitored to ensure that the dismantling did not have a negative impact. After careful consideration, the structural engineer advised that the mid-historic section of the house should be stabilized before further dismantling took place.

Once the non-historic structure was removed, it exposed the dangerous private residential structure of the neighbour in the east. Contrary to all building regulations, the owners had raised another two floors above the original structure, these being poorly built had posed a great hazard to the occupants as well as to the historic Sethi House itself. Accordingly, a new strong wall had to be constructed to provide the necessary protection.

The removal of the non-historic section in the north east helped in restoring the original façade of the mid-historic portion, and also provided a breathing space in the form of an open-to-sky court, which has been landscaped so as to be used as a rear entrance or exit for visitors.

Stabilization of Mid-Historic Portion

The mid-historic section of the house consisted of rooms that were added during a later stage, presumably to provide accommodation for additional members of the household. These rooms were easily identifiable by the difference in the quality of the *tarseem bandi* and *chinikhana*, which were not as ornate as in the historic section but were well crafted. Unlike the non-historic part of the house, this portion had been constructed on stable foundations that were not causing further damage to the structure, and although in a highly dangerous condition, it was decided to stabilize this mid-historic portion at all cost. All precautionary measures had to be taken, keeping into consideration its own safety, and the safety of the original historic building as well as that of the new building of the neighbouring school.



Cracks display structural failure of Mid-historic section.



Restraining arrangement of Mid-historic section with cables and clamps.



Artisan applies brick and wooden planks to exposed roof.

The floor in Room no. 3/12, 3/13 displayed a marked tilt that illustrated the extent of damage that the attached non-historic part of the building was causing. Two major challenges with this structure were as follows:

- How to restrain it from moving during the time of demolition of the non-historic part.
- How to deal with major voids and cracks that had been created in the side wall and in the roof, making the structure likely to collapse.

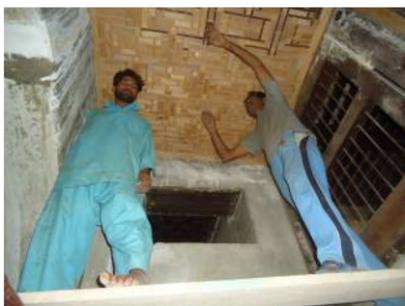
Implementation

a. Restraining Arrangement

- On Level 3, according to structural engineer's instructions 4 ropes were placed at 3'0" crs. to restrain the entire height. .
- Ropes were made of 8 mm thick steel and 3 strands were roped together, with U clamps and buckle clamps for tightening them.

b. Wall Voids on School side

- The crack was about 2'0" in width in a wall thickness that varied from 24" to 32" due to deformation.
- The entire wall of about 20' height had to be treated to achieve



Replacing damaged tarseem bandi.



Replacing damaged tarseem bandi.



Replacing damaged tarseem bandi.

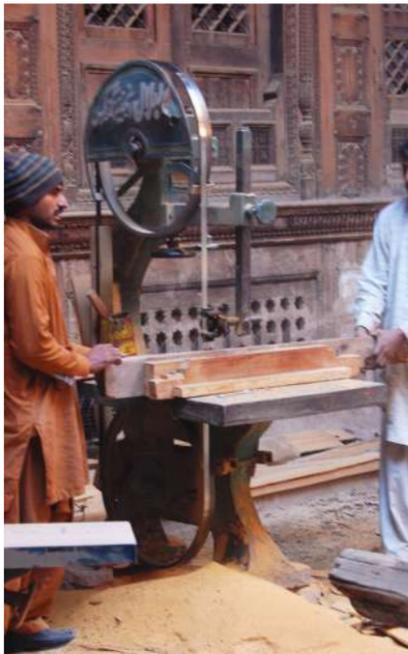
stability, particularly as the loss of brickwork had left only one brick thickness in the area suffering from excessively large cracks..

- The entire portion of the brick wall had to be carefully dismantled and brick masonry had to be relaid. Being in the upper part of the wall, it was an extremely critical area of work because of its height and the restricted working space.
- The window lintol in the form of deodar planks had also been severely damaged. and had to be replaced.
- The filling in the crack was carried out with gypsum and lime water, and it was performed in layers.

c. Near Collapse Roof

The void in the centre of the roof, due to the major cracking of the central wooden rafter, had to be rectified in order to provide protection from rainwater and further damage to the structure. The following procedure was carried out:

- Removal of the 5' high parapet wall.
- Removal of all roof tiles and earth filling to expose the structural members of the roof.



Artisans trim original posts of Purdah Wall to be reused.

- Placement of a new steel girder of size 4"x8"x5/8" on the top of the original broken wooden rafter.
- Placement of steel plates at the bottom of the timber rafter. Through this mechanism and with the help of bolts, the original broken timber rafter was gradually lifted in position.
- Placement of new seasoned deodar battens and planks deodar size 4"x 6" and 3/4" planks 8' long.
- The entire roof structure was rehabilitated along with termite treatment and water proofing.



Removal of flooring to reapply water-proofing courses at Level 3,



RESTORING BUILDING
CRAFTS



Artisan restores chinna kbanna.



Moulds prepared for chinna kbanna niches.



Master artisan prepares stucco tracery around chini kbana.

RESTORING BUILDING CRAFTS

Wooden Fretwork or Tarseem Bandi Ceilings

Among the most spectacularly executed artisanship is that seen in the wooden fretwork ceiling. In each room these ceilings are found, fixed to the floor or roof rafters and providing a false ceiling of great finesse and artistry. It appears that the work was carried out over several years and was perhaps executed by different artisans. The ceilings vary in the designs as well as in execution, some being more ornate than others, depending upon the importance of the room and its usage, but all displaying a great deal of artisan skill in execution.

These *tarseem bandi* ceilings are an integral part of the historic *haveli* and have to be maintained in as much of the original form as possible.

Inspection

The delicately carved wooden fretwork pieces were fragile, and thus vulnerable in case of water seepage or lack of care and maintenance. Except for a couple of rooms, parts of all other ceiling decoration were found to

be in a highly damaged state. It was clear that the ceilings had been among the most vulnerable portions of the historic house. Water seepage from different sources, for example, from choked and blocked drains, gaping holes in the roofs and general lack of maintenance had been highly detrimental to the delicate fretwork, much of which also was decorated with very fine and graceful fresco. Among the fears was also rot in the supporting wooden structure, infestation, fungi and even structural fatigue, which factors were thoroughly investigated. The structure was dealt with by removing layers of earth and other finishes from the top, to enable a thorough examination of the ceiling along with the supporting structure.

Repairs and Restoration

The repairs were carried out with a great deal of care. Initially, the quality and skill required for the artisanship was considered extremely difficult to find. For a time, it was thought that it was that the expected quality may not be possible to achieve. It was felt essential that only those who were highly skilled and had a thorough knowledge of practice, tools and woodwork would be engaged in the project. The master artisans, along with their highly trained workers, were able to produce samples that compared well with the original ones. No work was undertaken unless pieces from the original were carefully examined, and full scale drawings prepared of each piece, as well as of the entire ensemble. Samples were first prepared which were examined for any variations when compared with the original. If even slight differences were noticed, the master artisans were asked to repeat the sample, until an absolute match had been obtained. Thus, moulding profiles were prepared which were used as samples at the time of actual production for use at the site.

Wooden Fretwork along Balconies, Jharokas, Railings and Louvres

Multiple wood crafts were found in the house ranging from detailed fretwork and trellises to louvres and railings. Wooden members had suffered damage because of lack of maintenance, water seepage, relentless exposure to sunlight and a loss of protective polish.

Repair and Replacement

It was a challenge to fathom the complicated wooden joinries and crafting details that had been employed in different areas of the house. For weeks on end both architects and carpenters mulled over the complicated method by which the woodwork had been assembled. Once deciphered, it took sustained efforts on part of the artisans to replicate the intricate fretwork that adorned the courtyards on levels 1 and 3.



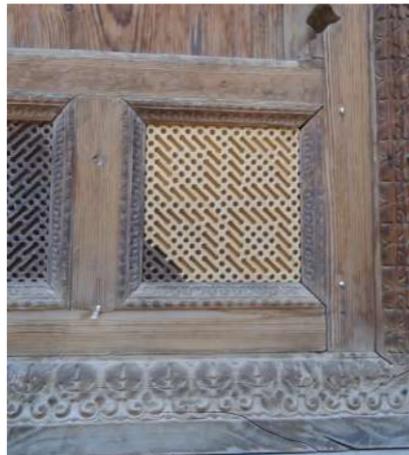
Artisans duplicate intricate tarseem bandi panels.



Artisans fabricate each tarseem bandi piece.



Intricate punjali being fabricated.



Replacing damaged punjali.



Samples of louvres that needed to be replaced in the *pardab* wall on Level 4 were developed after a survey conducted around the Sethi Mohallah. Each house displayed different designs, but since none of the *pardab* walls in the other houses were extant, it took the careful study of a number of samples before a final decision was reached. The louvres were polished and aligned so as to prevent any damage to the existing structure. Railings along the open-to-sky terraces were also repaired and replaced after various tests for colour matching.

Chini Khanas

Traditionally used to illuminate, as well as to serve as fireplaces in bedrooms and living areas, the *chini khanas* are one of the primary building craft specimens in the Sethi house. The *chini khanas* in each room have been treated uniquely, adorned with multiple crafts such as coloured or painted cut glass and mirror work, fresco and stucco tracery.

Repair and Replacement

Although many of the beautiful specimens were still intact, the stucco tracery that formed the cubbyholes had suffered damage that would require tedious repair. Some had been painted over with thick layers of enamel paint, which was painstakingly removed to expose the beautiful mirror work underneath. In many rooms the fresco that had once adorned the stucco could not be saved, as removal of paint layers would not save the fragile work underneath.

Stucco

Various forms and applications of stucco can be found at the Qadri Manzil Sethi Haveli, being applied to cornices, fireplaces and *chini khanas*. In various cases the surface of stucco has been painted over with vivid colours echoing local traditions. Where intricate tracery was found over mirror and glass work, the motifs were delicate and had suffered immense damage and discolouration.

Repair and Replacement

As part of the conservation work, building crafts were not restored to a great extent, but some sample work was undertaken in Rooms 2/01 and 2/04. Restoration of *chini khana* niches was undertaken. This involved a detailed study of existing evidence. The design of each element was clearly marked and drawn. After drawing, each niche to be constructed was drawn to full scale and a model prepared in silicone. The moulded

silicone was then filled with a mixture of gypsum, zinc, marble powder and other fine grain materials to manufacture the casts. Once each cast had been prepared, further details and intricacies were added by hand.

Painstakingly, where stucco tracery had to be repaired, artisans toiled over each inch of work by applying layer after layer, forming intricate brush strokes into flowered and geometric motifs.

Fresco

The walls of the most decorated rooms at the Qadri Manzil were adorned with varied applications of fresco work, as well as geometric panels outlined with stucco and painted over with fresco. Before the initial stabilization could be undertaken, all fresco work was recorded. Years of neglect and insensitive restorations had led to various rooms receiving coats of whitewash leading to the loss of frescos. Most *tarseem bandi* ceiling fretwork had also been treated with fresco. Although not all of the fresco has been restored, samples of cleaning and restoration have been conducted in Rooms 2/04; 2/09 and 2/21.



Intricate stucco work being conducted in Room 2/09

Replacing damaged tarseem bandi.



MAINTAINING INTEGRITY



Cleaning doors and windows.

MAINTAINING INTEGRITY

Policies need to be put in place which will ensure that the character of the Sethi Haveli is maintained. Since the house is closely interlinked with its setting, it is important to clean up the area and provide a suitable approach. The stabilization of the façades of remaining extant houses in the precinct need also to be taken up, in order to continue to provide the original traditional setting through which the house is viewed as a part of the cultural milieu of 19th and 20th century Peshawar.

Unfortunately, due to restricted spaces, it has not been possible to provide access to upper floors for visitors suffering from disabilities.

LEGAL PROTECTION

Legal protection must be provided to the entire precinct by declaring it the Sethi Virsa Shahr or the Sethi Heritage City.

- Declaration of status of Heritage District by Directorate of
- Archaeology.
- Allocation for stabilization of identified historic houses.
according to conservation studies by Directorate of Archaeology.
- Vehicle-free streets and designed pavements by Local
- Government.
- Regular Garbage collection and disposal by Local Government.
- Underground electric cables by power supply agency.
- Underground sewerage & water supply by Local Government.
- Landscaping by Local Government.
- Visitors tours, clean food stalls etc., by Tourism Department.



Enactment of Special Byelaws

The Declaration would allow for the following to be prerequisites in the district:

- Floor Area Ratio (FAR) restriction so that people are not tempted to destroy more original houses.
- Cleaning the facades and stabilization.
- Pedestrian, vehicle-free streets.
- Redesigned pavements.
- Regular garbage disposal.
- Underground electric cables.
- Underground system for sewerage and water supply.
- Landscaped areas.
- Visitors tours, clean food stalls etc.
- Rejuvenation of arts, crafts and traditions.
- Proper drainage in order to save the remaining houses, and Sethi House itself, from damage through seepage of water.

Visitors Management

Policies need to be put in place to restrict movement of visitors to desirable areas. These policies should take into consideration the risks to the historic fabric attached to visitors' movements. All visitors' facilities and the consequent arrival of larger number of visitors should be arranged in order to regulate their activities, which would maximize the retention of historic fabric and minimize any risk to its authenticity. Accordingly, all uses of this historic structure must be compatible with its original characteristics, and avoid any negative impact on its integrity.

Basements

The basements lend themselves for display of artefacts. However, if display arrangement is made, it should be accompanied by the provision of a sufficient number of guards.

One basement should be dedicated to the conservation process consisting of :

- a. Panels showing the process of conservation.
- b. Acrylic boxes with displays of different kinds, e.g. samples of different original materials and new materials used.
- c. Samples of artisanship old and new.
- d. Artefacts display, e.g. ledgers and other items that were found.

Basement 2

Gallery of images of Peshawar, biographies of notables of Peshawar.

Entry

On the side of the entrance door is a small room that is suitable as a visitor's information room. The tickets can be provided at the entrance in the small alcove that has become available in the wall attached to the school side wall. A room by the side of the entrance should be fitted up as a public toilet. There can be no such provision within the house.

Level 1

The courtyard lends itself admirably for assemblies. If any assemblies are gathered, they should be restricted to this area. Only small numbers of people should be permitted to go up at any one time.

Level 2

The rooms should be set up to showcase the traditional *undroon shabr* (inner city) living. All items such as chandeliers, carpets and *ghalichas* plus other items that were originally used, should be bought in order to set up various rooms.

There should be rope barriers at each door to prevent entry but to allow viewing from the doorway. This is essential as all the walls are ornamented and have been finished with stucco and fresco, which are likely to be damaged if visitors enter the rooms.

Level 3

The rooms should be set up in the same way as on Level 2. A similar arrangement for restricted entry of visitors should be employed.

Level 4

This level could be viewed from below, and there is no real need for visitors to go up there. Since the structure was originally designed for family members, a large number of visitors going up the staircase could lead to damage. As such it would be better to limit the access on the roof level.

Maintenance Procedures

- Careful watch over original location of cracks. This must be carried out every 3 months. If there is any evidence of movement, appropriate investigations must be carried out to determine the cause.



Doorways after restoration and repair

Scaffolding erected so artisans can remove prior interventions and expose original openings.



Regular cleaning and maintenance should be ensured

- Maintenance procedures for cleaning must be in place. Due to the varied ornamentation on walls and ceilings, which is extremely fragile in nature, special cleaning methodology must be in place in order to keep the building in an immaculate condition, without damaging or spoiling any of the decorative features.
- All roofs must be examined for leakage and to ensure that water is drained off expeditiously. Checking for choked or blocked drains and water pipes etc. must be carried out before each rainy season and ensure that there is no blockage of any kind whatsoever.
- Check all plaster work where filling has been carried out on original cracks. This is particularly necessary for the fillings in the mid-historic portion in the east section.
- Floors must be cleaned every day without damaging the tile work.
- Where lime concrete floors are used, they will be fitted with carpets, which should be cleaned every day.
- A maintenance register should be kept to record the dates of checking and presence or otherwise of either water leakage or crack appearance.
- A housekeeping manual should be maintained by the housekeeping staff. It should provide full information regarding regular cleaning and maintenance of the interiors. This should also provide detailed treatment to provide protection from visitor wear and tear.

Long Term Repair & Conservation Safety

A 5-10 year repair plan should be developed for the house and courtyard, in order that any repairs required are carried out expeditiously.

No electrical system has been installed in the house in order to provide protection from electric failures. Preferably, the system should be based on solar energy and efforts must be expended in order to keep all solar-charged panels in working condition.

Fire fighting equipment needs to be provided in the building and should be always maintained in working condition. Extra fire protection measures should be maintained along with after-hours watch arrangements. Hydrants need to be installed in the rear and front entry courts. All portable fire fighting equipment must be kept in good working order at all times.

Emergency Plan

A detailed emergency planning strategy should be put in place which should include the following:

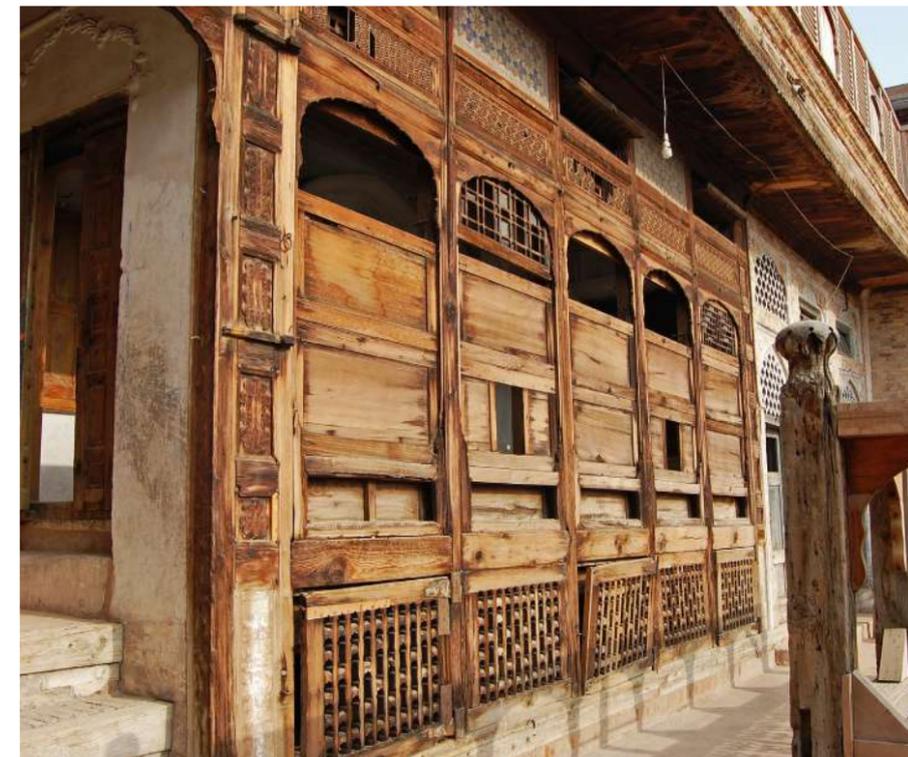
- A contents rescue plan and designation of safe storage areas
- Staff training procedures

Security

A detailed plan should be prepared to provide security measures for the house and its collections and displays. Security measures relating to the public during hours as well as security measures after visiting hours should be enforced.

Visitor Information

A series of visitors' flyers and booklets should be prepared in order to provide information regarding the salient features of the house. Mementoes and other items based on the crafts and other special features of the house should be developed. If sufficient numbers are available, they can lead to income generation for the upkeep of the house.



Basta windows on level 3 after cleaning.



View of internal courtyard after restoration



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