DOCUMENTATION & CONSERVATION REPORT
Edulji Dinshaw Building - Lady Dufferin Hospital

VOLUME I

STATE OF CONSERVATION REPORT

PROJECT TEAM

Prof. Dr. Anila Naeem
(In-charge Heritage Cell)

Ar. Farida Abdul Ghaffar
(Coordinator, Heritage Cell)

Ar. Tabish Tariq
Ar. Noman Mumbai
Ar. Akhtar Hussain Mirani
Ar. Sajid Khattak
Anila Rahim (CAD Operator)

September 2017 – January 2018

Prepared by: Heritage Cell, Department of Architecture & Planning
NED University of Engineering & Technology, Karachi

TABLE OF CONTENT

1. INTRODUCTION TO THE PROJECT:

The documentation project of 'Edulji Dinshaw Building' located within the complex of Lady Dufferin Hospital in Karachi, is the brain-child of Mr. Danish Zuby and Mr. Hadi Akberali who sought collaboration with Heritage Cell, Department of Architecture and Planning, N.E.D. University of Engineering and Technology (HC-DAPNED) for technical support to assist in envisaging this pioneering work. This first stage of the project has materialized with the generous financial support from Amreli Steels Ltd. It is a first time experimental endeavor of self-initiated cooperation; with a larger vision of supporting the idea of protecting built heritage of the city – which is otherwise under great threat of commercial and other prevailing pressures. Prior to initiation of this project several other options of sites in Karachi were explored, however, receiving a favorable response from the management of Lady Dufferin Hospital this particular option was taken up.

This report compiled and submitted in two volumes comprises of the work undertaken by HC-DAPNED team as step I and step II of the work. A thorough photographic documentation and detailed measured survey of Edulji Dinshaw Building (EDB) was undertaken during September – October 2017, followed by the preparation of drawings during November 2017 and finally the compilation of report during December 2017-January 2018. This first volume comprises of a brief background and historic profile of the site, followed by an analysis of the present 'state of conservation' of the building and concluded with some directional guidelines for the restoration and long term management/ upkeep of this historic property. Whereas, the second volume contains three sub-sections; the first having a complete set of measured drawings, the second having mapping of identified damages/ problems of the building and the third comprising an album of photographic documentation.

1.1 AIMS & OBJECTIVES

The project aims at developing an understanding of the site and its premises through comprehensive documentation of the oldest block in the hospital complex i.e. the Edulji Dinshaw Building, which is at present being under-utilized thus identified as under potential threat of falling victim to gradual decay. Parallel to the documentation process through measured survey of the site and an in-depth analysis of existing usage patterns; an archival research was also undertaken to chalk out the historical profile of this site and better understand its significance as an important historic landmark of the city. This two tier process provides a sound base to better achieve the primary objective of this project, which is to formulate long-term conservation strategy for the premises; including in its first stage a proposal for restoration of the EDB in consideration of an appropriate usage plan (developed in consultation with the hospital administration), and devise a guideline that helps the administration to better manage, maintain, utilize and celebrate this historic masterpiece of architecture to its utmost potential ensuring that the process of decay is contained to its minimum - prolonging the age of this city's historic landmark as much as possible.

1.2 OUTCOMES AND EXPECTED LEADS

The EDB documentation project in its first stage had a focused target of filling an existing gap; i.e. non-availability of drawings in any archives or records of the hospital administration. Through a process of on-site measured survey a complete set of precise documentation of EDB is produced including plans (site plan, plans of all floor levels and roof plan), elevations (front and rear), sections and partial sections across the two cardinal axes, and various details including flooring patterns, architectural features, door/ window/ ventilator details, patterns of grills and profiles of arched openings.

Parallel to the measured survey, through a systematic process of thorough photographic documentation the existing state and condition of the building has been recorded, capturing the various forms of observed decay and damages. Information collected through this process has resulted in the complete mapping of problems/ damages of materials and structure (See section II – volume 2). These two documentation sets have transpired an in-depth understanding of EDB's present condition, helping to identify the immediate measures that need to be undertaken for restoration or prevention of further decay of the premises.

Besides these immediate outcomes the produced documentation can also be further utilized for the following long term outcomes:

- A manual to guide proper conservation and maintenance of the historic structures within the hospital complex.
- A comprehensive Master Plan for the entire site, guiding directions for future developments and possible extensions, as well as better utilization of outdoor open spaces.
- An exhibit on permanent display for orientation and education of visitors on the historical and architectural significance of Lady Dufferin Hospital Complex.

2. THE SITE: LADY DUFFERIN HOSPITAL COMPLEX

The complex of Lady Dufferin Hospital is located inside the historic core of Karachi's inner city within the limits of an area known as the Jail Quarter (also known as the Wadhumal Odharam Quarter). The nearest major intersection from where the site can be approached is the M.A. Jinnah (Bunder) Road and Baba-i-Urdu (Mission) Road junction – however, the public access into hospital complex is from Chand Bibi Road (Princess Street). Being located within inner city core the site is surrounded with a number of historic properties; including the Civil Hospital Complex right across Baba-i-Urdu (Mission) Road **(Figure 1)**.

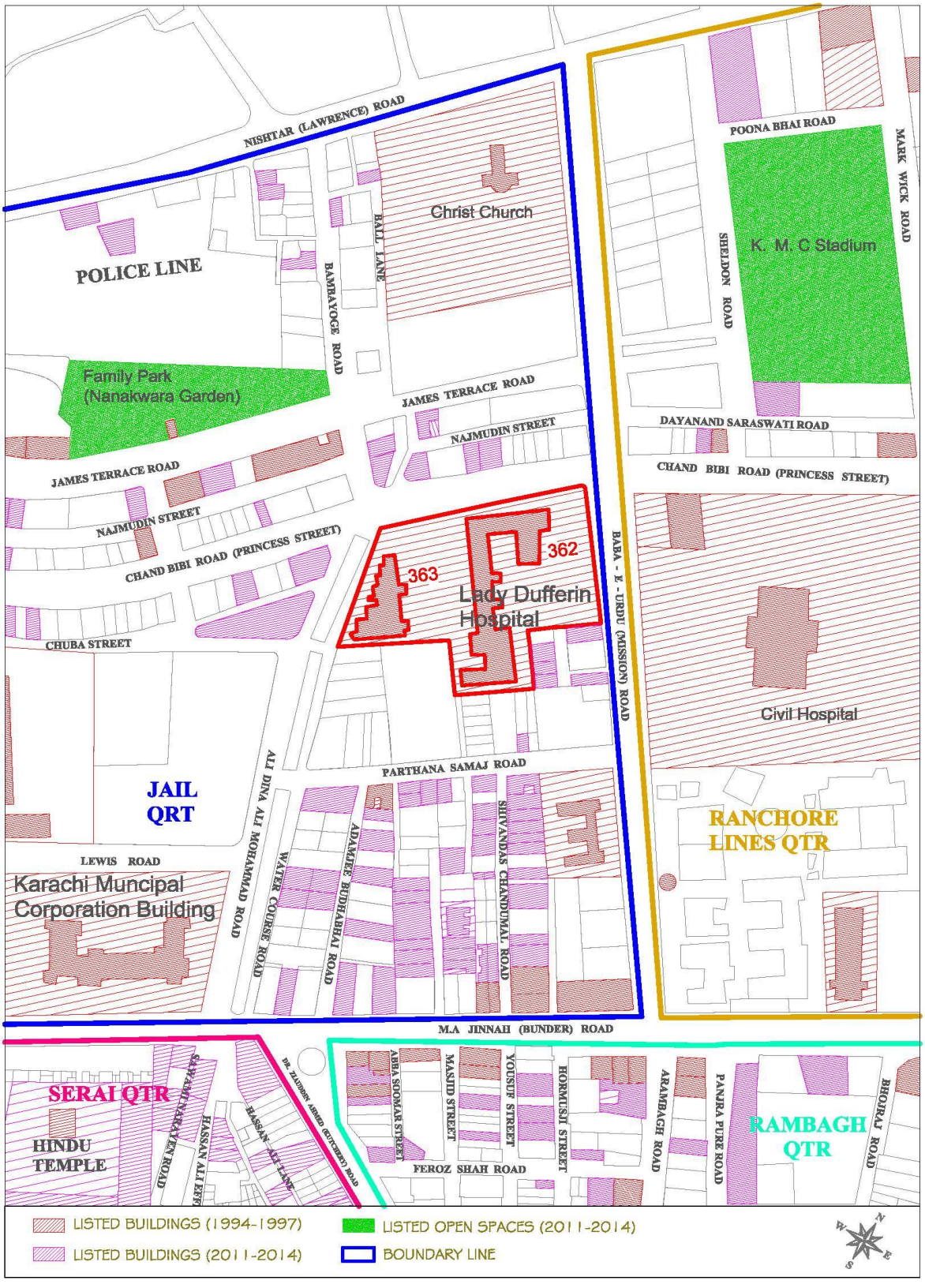

Figure-1 Location Map (Lady Dufferin Building)

2.1 DESCRIPTION OF THE HOSPITAL COMPLEX

The entire complex of Lady Dufferin Hospital is an ensemble of over ten different structures built at different times employing varying architectural vocabulary, to accommodate the growing needs and requirements of the hospital. Only three of these structures are of stone construction (two retaining their original shape and form; whereas the third being extensively altered with massive new construction behind the retained front façade. All other structures within the hospital complex are either RCC constructions or make-shift prefab structures **(Figure 2)**.

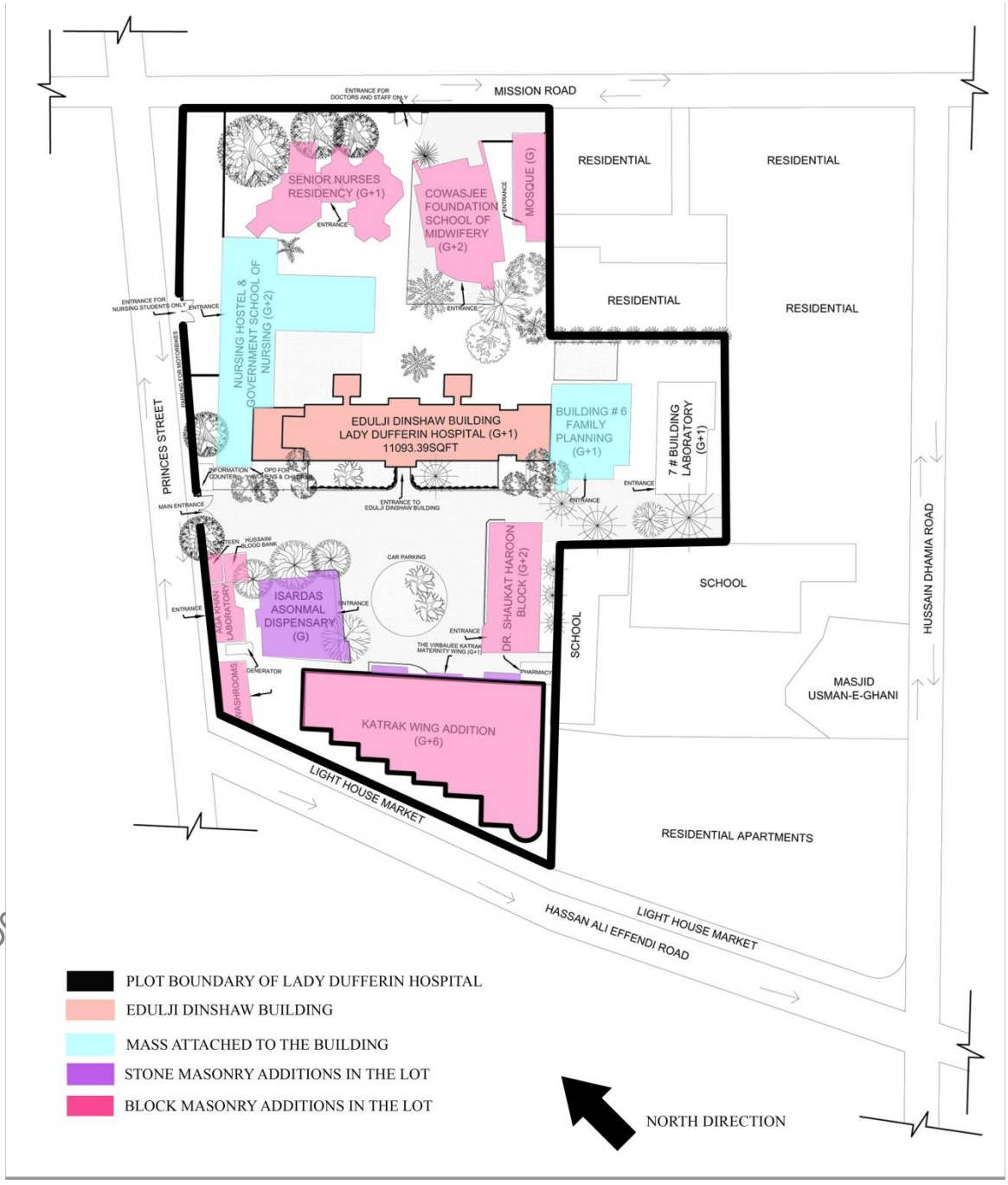

Figure-2 Site Plan (Lady Dufferin Hospital)

The primary public entrance of Lady Dufferin Hospital compound is from Princess Street. As one enters, immediately to the left is the oldest structure of the complex - the Edulji Dinshaw Building (EDB), running more than half way through the width of the site along NW-SE axis, almost dividing the plot into two portions. Immediately to the right of entrance are the two small structures for canteen and Blood Bank, with their immediately adjoining area developed as an outdoor waiting space that further extends with same activity inside the partially used stone structure of Isardas Asonmal Dispensary **(Figure 3)**. This single storey stone structure originally housed the Out Patient and Ultrasound Departments for decades until 2009, after which the OPD was apparently shifted.

Figure-3 Stone Structure (Isardas Asonmal Dispensary)

Right across the Edulji Dinshaw Building and adjoining the Isardas Asonmal Dispensary is the Virbaijee Katrak Maternity Wing stretching up to the far SW end of the property **(Figure 4)**. This G+6 structure presently has the most dominating presence in the entire complex, and perhaps also the most actively used area, extending capacity to a 300 bed hospital (Ahmed, 2015). The G+1 portion of front façade of this building is the only retained part of the historic stone structure of Virbaijee Katrak Maternity Wing. Opposite to Isardas Asonmal Dispensary

Figure-4 Massive New Structure behind Virbaijee Katrak Maternity Wing

and flanking the SE end of Virbaijee Katrak Materrnity Wing is the G+2 structure, named as Dr. Shaukat Haroon Block to recognize the services of this great humanitarian who reinforced the institution during 1970s, with dedication and zeal.

Enclosed within these four structures is the paved central open-space serving simultaneously as a courtyard, as well as circulation hub for both pedestrians and vehicles alike **(Figure 5)**. Over fifteen mature trees of various species (including Gulmohar, Champa, Amaltas, Mango, Neem and Pipal) provide ample shaded spots around the open spaces, giving respite to visitors from the scorching sun. This spacious open space of approximately 169ft. in length and 123ft. width provides an unobstructed visual panorama for the front façade of EDB.

Figure-5 Central Hub of Site

A similar open space (less maintained and unpaved) forms the back side of EDB **(Figure 6)** where the blocks for School of Nursing, Cowasjee Foundation School of Midwifery, residency for senior nurses and a small mosque are located. The Provincial Government School of Midwifery has its separate entrance from Princess Street. This back side has a direct access from the entrance lobby of EDB, connecting the front and back open spaces; and making this historic building as the central focus of the entire complex. Even though the rear elevation of EDB, opens on to an open space, it is partially obstructed with its two later period extensions, linked with main building via connecting bridge; one containing the record room and the other being used as toilets for the staff **(Figure 7)**. The two side elevations of EDB are completely obscured by later added blocks and extensions for OPD and family planning units respectively. A separate G+1 structure at the far eastern end has the laboratories. In between these structures there is a narrow open space that again connects the front and back side open spaces.

Figure-6 A View of Back Side of EDB

Figure-7 Extension Block linked with EDB

The overall relation of newer structures with the three historic stone structures indicates a lack of sensitivity towards these; apparently their construction was undertaken without much thought on developing a comprehensive and coherent Master Plan for the site. Similarly the tree plantation/ vegetation even though providing a serene environment do not reflect a well-planned landscaping scheme.

3. HISTORICAL PROFILE AND SIGNIFICANCE

Considering the conservative mindset of Indian society, where even till late 19th century the women were not prepared to receive treatment in general hospitals in the presence of male patients, Queen Victoria asked Lady Hariot Dufferin (wife of Viceroy of India) to help find a

solution and relieve the plight of Indian women. Lady Dufferin thus decided to create a fund dedicated to improving women's healthcare in India. Appealing to local philanthropists for donations into the 'Countess of Dufferin Fund' established in 1885, it became possible to establish hospitals across the sub-continent, exclusively serving women and children. Such hospitals were thus built in cities including Karachi (1898), Quetta, Shikarpur and Hyderabad, in today's Pakistan; and Delhi, Nagpur and Calcutta, in India.

For the Lady Dufferin Hospital, Karachi a princely donation of Rs.100,000/- was received in 1894 by the renowned philanthropist Mr. Edulji Dinshaw C.I.E., establishing this as a charitable institute (Lady Dufferin Hospital, 2016). The foundation stone of Edulji Dinshaw Building was laid by Lady Elgin (the Countess of Elgin and Kincardine) on 12th November 1894 (as evident from a plaque installed on the pillar of first archway on the left side corridor) **(Figure 8)**. A number of other plaques at the main entrance lobby of the building provide snippets of insights about various donors, and board of governors. The construction of EDB was completed in 1898, and with this the Lady Dufferin Hospital was inaugurated on 5th November of that year offering a facility of 192 beds (Ahmed, 2015; Smyth, 1919). Lady Dufferin Hospital was maintained from 'grants by Government, the Karachi Municipality, and the District Local Board, subscriptions, donations and the interest of the Reserve Fund'; managed by a 'Committee, of which the Collector of Karachi was the Chairman'; and employed a 'Lady Physician, the Matron and nursing staff at the hospital' (Smyth, 1919; p48).

Figure-8 Foundation Stone of Lady Dufferin Hospital

Besides Edulji Dinshaw Building, the other historic structures built within Lady Dufferin Hospital Complex include the Virbaije Katrak Maternity Wing, Isardas Asonmal Dispensary and an institute for the training of Indian midwives by the name Louise Lawrence Institute built with a sum of over Rs.75,000/- collected through popular subscription. 'The work of [this] institute comprised under four heads – (1) attending maternity cases among poor (2) training of midwives (3) partial training of *dais* and (4) lectures to married women' (Smyth, 1919; p48). Smyth (1919) has mentioned this institute as an integral part of the hospital complex.

The foundation stone of Virbaije Katrak Maternity Wing **(Figure 9)** was laid in August 1914, and the building was completed in June 1915 at a cost of Rs.70,000/-. Its opening ceremony took place on 6th January 1916. The architect of the building is recorded as Durcdas B. Advani and the Engineer in charge is S.G. Lyttle of P.W.D (Lady Dufferin Hospital, 2016). The original stone block of this building now only partially exists. Behind its front façade a massive G+6 structure has been added which now houses most of the activities of the hospital.

The Isardas Asonmal Dispensary **(Figure 10)** built in 1911 and renovated with the help of the Sind Flood Relief Fund at a cost Rs. 7,000/- in 1933, is located opposite to the Shaukat Haroon Block. It is a single storey structure, still intact in its original form however, since it is not in active use it lacks proper maintenance.

Source:http://arifhasan.org/images-gallery/historical-images-karachi-i/attachment/b-v-katrak-maternity-wing

Figure-9 Historic Image of Virbaije Katrak Maternity Wing

Figure-10 A View of Isardas Asonmal Dispensary

Recognizing the historical significance of this city landmark, the Department of Culture, Government of Sindh, under the Sindh Cultural Heritage Preservation Act 1994, declared the Lady Dufferin Hospital as a protected heritage property of Karachi bearing enlistment number 1997-170.

Prior to 2005 the Edulji Dinshaw Building served as the main block, however since the construction of G+6 new addition of Katrak Maternity Wing and shifting of all major activities and wards to this new extension, the oldest block of the hospital complex (EDB) now largely remains in disuse or used for storage purposes, and occasionally used by doctors and other staff members for office works.

4. DESCRIPTION OF EDULJI DINSHAW BUILDING

The construction of Edulji Dinshaw Building is of yellow Gizri limestone, having a load bearing structural system. The architectural vocabulary incorporates a blend of colonial and local tastes, incorporating features such as semicircular arches, pediment, pilasters, roundel, moldings, cornices, acroterian, stone tracery work, balustrades, etc. Designed in later Classical style, the central portion is a G+1 structure having a dominating central bay crowned with a triangular shaped gable marking the main entrance into the building **(Figure 11)**. Flanking the two sides of this impressive entrance are the two long wings of the structure, having an arcaded corridor with

(10'-3" high) semicircular arches at ground level and a combination of alternating triangular and segmental pediment headed openings on first floor. Both the sides have seven bays each, forming a symmetrical balance along central axis. The ground floor arches lack in ornamental detailing, adding to the simplicity of design. The arched corridors on both floors work very well for air circulation throughout the building. This same composition and architectural details are followed in the rear elevation. Beyond the seven equal bays on both sides, is the three bayed wing (seen as single storey mass in an undated historic picture). These two side wings are much altered due to later additions. The first floor addition, above the right side wing, and a single bay above the left side wing seem to be later additions, executed with the same architectural details and construction materials as in the original building. Both the side elevations are now completely obscured, however, in an undated historic image they are seen as topped with ornate gables and having hipped roof single storey wing on both sides. Bottle shaped stone balustrades are also seen in this picture, along the roof parapet. This parapet detail is now visible only on the first floor openings along the corridor **(Figure 12).**

Figure-11 Central Entrance of the Building

Figure-12 Use of C.C *Jalis* on at Front Façade

The EDB has a footprint of approximately 11,093.39 sq.ft. laid out as a symmetrical plan arrangement. The centrally placed entrance foyer links to the linear corridor on both sides (8'-0" wide and 64'-0" long) **(Figure 13)**, and connects to the upper floor through a centrally placed grand staircase **(Figure 14)** covering almost the entire span of the circulation lobby. Placed in this lobby are the marble sculpture busts of Edulji Dinshaw and Queen Victoria **(Figure 15)** placed on free standing pedestals.

The corridor on both sides directly connects to a large hall, and smaller rooms of equal size (14' x 20') – three along right wing and four along left wing. All the rooms and hall in both wings are flanked by corridor space on all three sides. The corridor on left side opens into statistics department, store room, supervisor room, housekeeping area and general store. Whereas, the corridor on right side links to the medical superintendent room, infertility clinic and admin section. The left wing corridor is blocked at the end, and access to women and children OPD section is provided from outside.

Figure-13 Linear Corridor Connected with Hall

The upper floor has a slightly different arrangement in its right and left wings. On the right side there are three spaces of varying sizes; whereas the left side also has three spaces and the end of corridor opens on to an open terrace. The first floor also has corridor running along the entire front and back side. The two added wings on the back side are later additions, having toilets and storage space. The corridor and lobby have colorful pigmented flooring tiles; square in shape with black borders **(Figure 16)** whereas pigmented flooring tiles, hexagon in shape are also found in infertility room, general store and medical superintendent room and housekeeping area **(Figure 17)**. OPD section for women also has variety of colorful pigmented flooring tiles **(Figure 18)**. There is a metal spiral staircase **(Figure 19)** at the back of infertility clinic which leads to the first

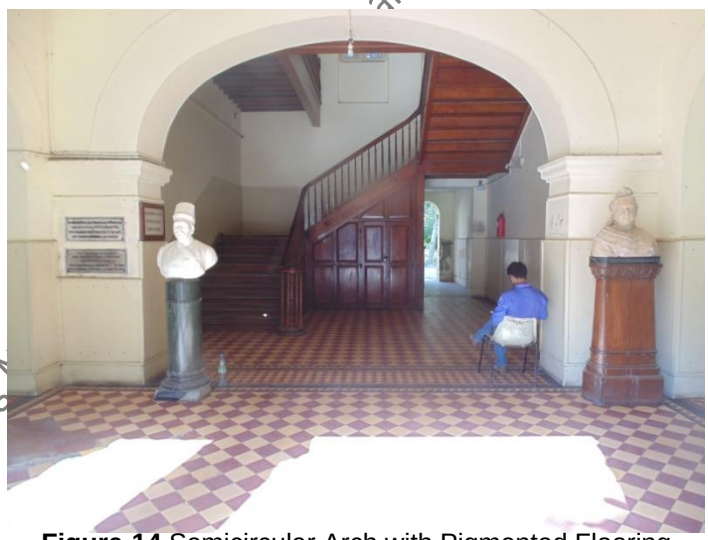

Figure-14 Semicircular Arch with Pigmented Flooring Tiles

Figure-15 Bust of Queen Victoria Placed at the lobby of Edulji Dinshaw Building

Figure-16 Pigmented Flooring Tile at Hall

Figure-17 Pigmented Flooring Tiles at Infertility Clinic

Figure-18 Pigmented Flooring (OPD) Section)

Figure-19 Spiral Staircase Leading to First Floor

floor at backside corridor of 'old ward number 4' - probably an emergency staircase now blocked by administration at first floor level. On reaching the first floor, the old signage marks 'Ward 3' on the left side having a large stitching room **(Figure 20)** and 'Ward 4' marked on right side; now stacked with surplus furniture **(Figure 21 a, b)**. The rooms of 'Ward 3' are used by linen staff whereas, rooms of 'Ward 4' are lying abandoned. There is a plaque attached outside room #3 of Ward 4 mentioning the words "renovated and refurnished by the American Women's Club in 1980-81". The left

Figure-20 Stitching Room on First Floor

Figure-21 a, b Ward 4 Interior View Stacked with Furniture

side of first floor at Ward 3 has a room called container room where huge amounts of medicines and other equipment are stored **(Figure 22)**. A door inside container room leads to the roof of first floor but it has been blocked. The terrace above OPD section for women and children can be accessed through a staircase in the OPD. Another staircase located in the Family Planning Block attached to EDB provides the only access to the roof. A roundel placed on the central gable has the logo of Lady Dufferin Hospital engraved inside it **(Figure 23)**.

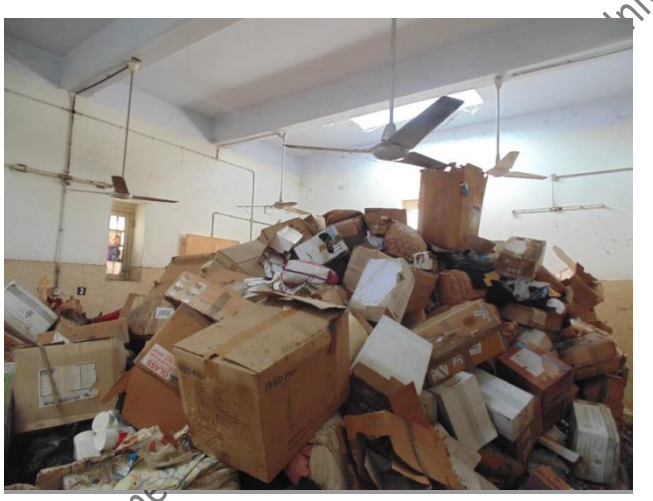

Figure-22 Container Room Filled with Medicines

Figure-23 Logo Engraved Inside the Roundel

5. ALTERATIONS IN EDULJI DINSHAW BUILDING

Most historic buildings undergo alterations to suit modern needs or to fulfill requirements for more space. The EDB has also been altered with major additions, particularly at its two ends, completely obscuring both side elevations. The rear elevation is also partially obstructed due to construction of two extensions linked with the building through bridges at first floor level. These

changes appear to have been carried out at different periods as evident through materials and techniques employed in construction of the additions or extensions. Besides the alterations impacting external appearance of the building there are several changes made inside as well. Both external and internal alterations are discussed in detail as follows:

5.1 ALTERATIONS TO BUILDING EXTERIOR

The overall appearance of EDB is substantially retained to its original character; however extensions, additions and repairs done to the building façade over the decades have resulted in changes that can be identified through comparison with available historic images of the building.

Figure-24 Covered Waiting Area at OPD Women Section

5.1.1 Extensions – OPD, Family Planning

The north-east elevation and corner of EDB is presently completely obscured by the extensions forming visibly impactful alterations to original structure. Here three small spaces are added at ground floor level, having access from outside; serving as extension of Women's OPD wing. The front elevation at this corner is also partially obscured at ground floor level due to the asbestos covered waiting area outside Women's OPD **(Figure 24)**. The south-west elevation is also completely obscured by a G+1 structure, used as family planning wing. This is internally linked with EDB at first floor level through connecting steps. The extensions at both ends are RCC structures, with simple façade details; not conforming with or complimenting the original architectural character of the stone structure. Both of these ends as seen in an undated historic image **(Figure 25)** are single storey portions, having timber roof of hipped profile covered with terracotta (*khaprail*) tiles.

Figure-25 Undated Historic Image of Lady Dufferin

5.1.2 Change of Roof Profile

The entire roof profile has been completely altered as evident from the undated historic image indicating a timber pitched roof profile, finished with terracotta (*khaprail*) tiles. The original roofing is now completely replaced with RCC slabs, punched with ten protruding skylights that provide natural light to first floor spaces. The extensions at two ends of the building have also resulted in the loss of ornate gable detail at the two side façades of central two storey high portion of EDB **(Figure 26)**. The pitched roof over the central gable is also replaced with a flat roof and an additional RCC water tank **(Figure 27)**.

Figure-26 Extension Blocking Side Façade

Figure-27 Gable Roof replaced with Flat Roof

5.1.3 Surface Treatments on Stone Masonry

For the construction of EDB, Gizri limestone of yellow coloring has been used. The general condition of stone masonry and decorative architectural details are mostly well preserved. However, repair and maintenance interventions do indicate in-coherence with original materials. The stone masonry is at places altered with different surface treatments, such as plastering over with cement or color Crete, or tile cladding **(Figures 28)**. These cosmetic surface treatments are

Figure-28 Surface Treatment in Stone

observed to be up to 7ft. height, apparently attempting to hide the deteriorated, discolored or damaged stone masonry at ground floor level, due to presence of moisture – either through rising dampness from underground water or leakages in plumbing installations.

5.1.4 Parapet Extensions/ Removals

The original bottle shaped stone parapet at roof level, clearly visible in the undated historic image of EDB has been completely replaced with a simple masonry parapet wall. In addition to the replacement of original parapet at roof level, the parapets of openings along first floor corridor are also altered by adding c.c. *jali* to increase their height **(Figure 29)**. In some of the openings there is a geometric patterned stone tracery, above which the c.c. *jali*is additionally added.

Figure-29 C.C *Jali* Closing Corridor Openings

5.1.5 Closing of Arched Openings

A few of the arched openings on ground floor, along front and back corridor are closed either with wooden trellis (*jaffry*) or simply with block masonry; particularly along back side corridor and near OPD in-charge room **(Figure 30)**.

Figure-30 Openings Closed with Masonry

5.1.6 Plumbing and Electrical Works

Some parts of the stone façade are defaced with exposed electrical wiring and insensitively installed drainage pipes at locations where toilets, washbasins, or other wet spaces are created. These do not only have a negative visual impact, but additionally been a cause of damage to building stone due to seepage and/or leakage of water, washing over or penetrating into the stone masonry. At some locations AC units are also installed on building façade **(Figure 31)** adding to the negative visual effect.

Figure-31 AC Unit Attached with Stone Wall

Electrical wiring clipped to the stone walls with iron nails also forms a visual eyesore, particularly along the arcaded corridor (and inside several rooms as well), where exposed wiring and fittings have been installed haphazardly **(Figure 32)**. Some wiring is also carelessly dangling front façade affecting aesthetics of the façade **(Figure 33 a, b)**.

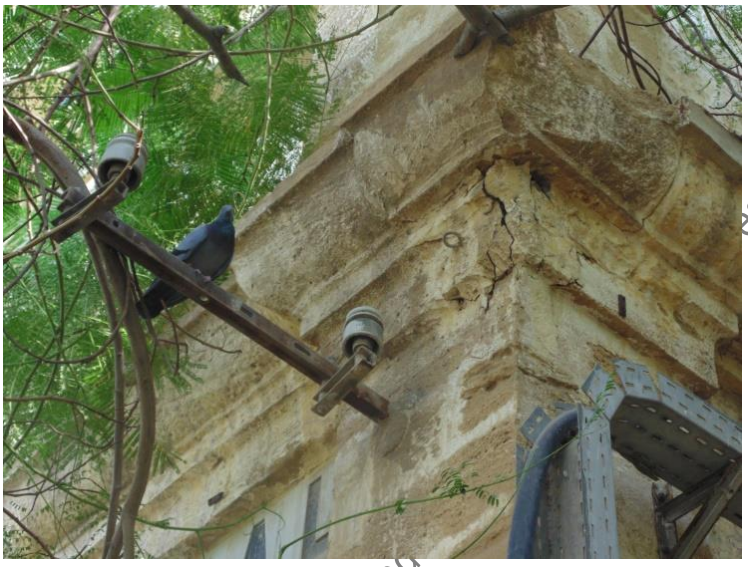

Figure-32 Exposed Electrical Wiring

Figure-33 a, b Exposed Wiring on Façade

5.1.7 Iron Nails on Façades

Iron clips, anchors or nails on front façade have also caused damage to stone walls, due to rusting and erosion of metal, leaving weeping rust stains causing discoloration of stone surface **(Figure 34)**.

5.2 ALTERATIONS TO BUILDING INTERIOR

Significant alterations are also observed inside the building, particularly on ground floor where the original layout is modified to create office spaces for administrative staff.

5.2.1 Subdivision of Rooms/ Spaces

Several later added full height block masonry partition walls or wooded partitions are added in the original floor layout, to create subdivisions of spaces. This is particularly the case at ground floor level where the larger halls on two sides of entrance lobby are subdivided to create statistics department, store room and supervisor room in one hall; whereas the medical

Figure-34 Iron Nails on Front Façade

officer's rooms and infertility clinic along with its ancillary spaces in the other hall. The front and back side corridors also have partition walls at various locations creating small enclosed spaces for accommodating toilets, storage or other service areas **(Figure 35)**.The first floor is less altered, having additional partition walls only at a few locations on back side corridor and only at one location in front corridor **(Figure 36)**.

Figure-35 Partition Wall Subdividing Spaces

Figure -36 Partition Wall at Backside Corridor

5.2.2 Wall Cladding and False Ceiling

Walls of several rooms and corridors have 2-3 inches thick wooden panels' cladding up to 5ft height **(Figure 37)**. Some of the rooms created by partitioning - including medical superintendent room, admin room and chief executive room have false ceiling, complete with ceiling lights - giving the look of a renovated interior **(Figure 38)**.

Figure -37 Wooden Paneling and Cladding

5.2.3 Altered Door and Window Openings

Besides some of the altered arched openings on the façade, a number of doors, windows and arched openings inside EDB premises are also altered by closing with block masonry or wooden boards/ partitions or shelves. Some of these closed openings also have AC units or exhaust fans installed in them. Some of these also have iron grills fixed on them **(Figure 39)**.

Figure-38 Renovated Interior with False Ceiling

Besides closing of original openings, some new door openings are also created to connect spaces **(Figure 40)**. And some of the original door openings are in disuse due to piles of stored furniture lying around **(Figure 41)**.

Figure-39 Iron Grills on Windows

5.2.4. Altered or Inappropriately Repaired Flooring

The original flooring of EDB's interior spaces is cc tiles, often with exquisite floral or geometric patterns or different colored pigmented tiles **(Figures 42)**. Most of the spaces still retain their original flooring, except for the few administrative offices on ground floor where flooring is changed to glazed ceramic tiles. A few of the spaces still retaining their original flooring have some damaged portions that are inappropriately repaired with cement mortar. Due to lack of proper maintenance some areas of original flooring give a dulled and soiled appearance. The variety of original flooring patterns are documented in detail through flooring drawings.

Figure-40 Addition of New Door

The above discussed alterations – additions or removals in original layout have taken place over the years to accommodate the growing needs, changing requirements and technological advancements that must have become necessary

Figure-41 Door Blockage with Furniture

Figure-42 Inappropriately Altered Geometric Patterns

for a smooth and efficient functioning of the hospital. However, since the majority of activities for which these changes were incorporated are now moved from this bock to the new six storey extension of Katrak Maternity Wing, many of these can be considered for reversal to original state as part of the restoration scheme developed for EDB.

6. DECAY/ DAMAGES TO HISTORIC MATERIALS

Through the detailed survey of EDB undertaken to record the decay, defects and damages to historic materials of construction, an in-depth understanding is developed on the negative effects of various interventions, weathering or climatic factors and general lapses in regular maintenance over a long span of time. A comprehensive mapping of damages and material decay as observed on exterior surfaces is provided along with an album of pictorial record in volume two of this report. However, a brief summary is added here to give an idea on the overall state of conservation of the property at present.

In comparison to many other historic structures, the present state of conservation of EDB is fairly good with no major structural defects or failures. Only minor cracks in few locations point towards structural defects. On the other hand the most prominent issues that need immediate attention are primarily related to stone masonry, caused by run-down plumbing, inadequate drainage systems, faulty electrical fittings, and other inappropriate interventions that have directly or indirectly affected the structure adversely. Following are some issues that need to be addressed appropriately to ensure better conservation of EDB.

6.1PROBLEMS IN STONE MASONRY

Stone is a natural, porous building material extensively used in the construction during the colonial period. The porosity allows water penetration that in turn acts as an engine of decay and damage. Repeated cycles of wetness and dryness in building material triggers a variety of processes leading to the erosion of stone's internal structure, thus resulting in various forms of deterioration/ disintegration. Both the front and rear façades of EDB show various forms of stone deterioration; including weathering or soiling.

6.1.1 Back Weathering, Scaling and Alveolar Weathering

The lower part of stone masonry on front and rear façades shows the most advanced deterioration, in the form of scaling, back weathering due to loss of stone elements depending on stone structure and alveolar weathering. These forms of deterioration are caused by climatic factors, as well as penetration of moisture or water into the building material. Since Karachi is a semi-arid region there is little rainfall, however, being near to the sea there is a high percentage of humidity in the atmosphere, along with salt content. Besides the damaging effects of atmospheric moisture content, the stone of EDB is mostly damaged due to water penetration from leaking drainage pipes and AC drains. The close proximity of plantation on the front as

well as back side of the building is also another major source of water damage due to regular watering of plants **(Figures 43)**.

The previous attempts at treating damaged stone surfaces (mostly with cosmetic approach) by applying a superficial layer; cement or color Crete, has proved to be ineffective as a remedial measure for prevention of further deterioration.

Figure-43 Exposed Plumbing, Water Pipes and AC Units

6.1.2 Black Crust and Soiling

The stone façades have signs of soiling, apparent by a darkened color of stone, due to dust accumulation, particularly along horizontal ledges including cornices or moldings. Places where moisture is trapped for longer periods also have black crust formations i.e. a layer of microbiological growth **(Figure 44)**.

Figure-44 Micro Biological Growths at the Rear Side of OPD

6.1.3 Moisture Stains

Moisture penetrating from a variety of external and internal sources has been a cause of damage to building stone. Besides natural sources such as the rain and ground water table, there are a number of internal sources, such as leaking plumbing pipes or AC drains. In EDB the pattern of moisture indicates localized sources of water penetration; rising damp is not much evident, however needs to check after removal of additional layers of cladding or covering materials on wall surfaces at ground floor level. In locations where cement plaster is applied the moisture stains have risen up to approx. 10ft height **(Figure 45)**.

Figure-45 Moisture Stains Inside the Corridor

6.1.4 Open Mortar Joints

Many areas of stone masonry have deteriorated areas of mortar joints, where lime mortar sealing the masonry joints has disintegrated leaving open mortar joints that allow deeper penetration of rain water inside the masonry **(Figure 46)**. Proper re-filling of these open mortar joints, using appropriate lime mortar, should be undertaken on an urgent basis to prevent further deterioration. A close visual inspection of stone masonry surfaces, also reveals that several open mortar joints have been repaired with cement mortar, however due to incompatibility of material the new mortar joints have again disintegrated **(Figure 47)**.

Figure-46 Open Mortar Joints on Record Room Block

Figure-47 Mortar Joints Filled with Cement Plaster on Rear Façade

6.1.5 Biological Growth

At locations where there is a constant presence of moisture, the growth of micro-biological film and higher plants such as weeds, tree plantlets, etc. is observed. On the rear façade, at the back of women's OPD there are more leaking drainage pipes thus more areas of damaged stone masonry **(Figure 48)**.

6.1.6 Bird Droppings

Due to presence of dense trees within the hospital complex there is a substantial presence of birds in the area which regularly perch on the building. Bird droppings are noticed on the outer surfaces of stone masonry particularly on the roof top on the acroterians **(Figure 49)**. Activities of pigeons are also noticed inside the building at the ground and first floor corridor **(Figure 50)**. Bird droppings are acidic and can cause damage to building materials if subject to prolonged exposure.

Figure-48 Micro Biological Growths at the Rear Side

Figure 49 Birds Droppings at Acroterian

Figure 50 Pigeons Activity Inside the Corridor of Ground Floor

6.2 STRUCTURAL DAMAGES

The condition of EDB is presently in very stable state, with no signs of any major structural failures. Only a few minor cracks in beams or walls were noticed in the corridor and at the linen section of first floor **(Figure 51)**. These can easily be catered to with minor repairs and consolidation treatments.

Figure-51 Cracks on the Walls of First Floor Corridor

7. GENERAL GUIDELINES FOR RESTORATION AND LONG TERM CONSERVATION POLICIES

Conservation of historic buildings is a continuous task, where the objective is to keep the building intact and surviving for the future generations to witness its true spirit and essence. A comprehensive action plan should be formulated for long term maintenance of historic properties which should also take into consideration training of the staff responsible for the regular upkeep. In addition the users should also be made aware and conscious of the historic significance and value of their premises so that they use it with more respect without causing damages to historic materials.

A conservation plan should be based on the following guidelines;

- Any later additions or phases of development in the life of the building should be respected as part of its history. Only those which deface damage or negate the fabric may be considered for removal.
- Use of any incompatible material should be discouraged. All repair and maintenance interventions should have sensitivity and respect towards original materials.
- The building and its surroundings should be treated as a comprehensive part of each other thus treated to complement one another.
- The guidelines, limitations and preventive precautionary measures for appropriate use of the premises should be conveyed to the users and maintenance staff, to ensure that after any restoration measures, proper care and continuous conservation is being done to maintain the site in an appropriate manner.

7.1 PROPOSED REMEDIAL MEASURES & RESTORATION INTERVENTIONS FOR EDB

The overall state of conservation of EDB can be classified as structurally stable and fit for use. However, due to underutilization during past few years it seems to be gradually declining in upkeep, with many spaces being turned into storage of discarded furniture or other materials. The alterations to the building have some negative impact on the historic property's original character, and this needs to be rectified to ensure that it is restored back to its full potential. In this section a primary approach is being chalked out for the general restoration of EDB, However a more comprehensive line of action should be outlined in the form a usage define design brief that ensures proper utilization of this historic structure. The remedies suggested here follow a sequence of first rectification or elimination of the source causing any problem and then approach repair and maintenance measures that will ensure the longevity of the building.

7.1.1 Prevention of Water Damage

The primary source of damage to stone masonry and other parts of the building is the water penetration through various sources including defective/ unmaintained plumbing and watering of plants. The first step would be to eliminate the sources of water intrusion. To achieve this objective all additional toilets and other service spaces having usage of water should be removed from the main building. If the decided usage requires any of such spaces these should be designed with proper details for plumbing and water drainage, both in terms of improved aesthetics as well as installation finesse.

The plantation placed very close to the building foundation needs to be relocated a little away from the building, with properly designed landscaping details, so that the watering process does not affect the building stone.

7.1.2 Removal of Inappropriate Additions and Repairs

All inappropriate alterations including material interventions for consolidation of disintegrating/ damaged stone must be removed; wherever possible without causing damage to the original fabric. Foremost in this are the massive later additions or extensions built at the two ends of EDB completely obscuring the side elevations. These are presently in use for various activities; thus would require further deliberations with the hospital administration to develop a gradually phased out restoration scheme.

The material interventions include color concrete, cement plaster or tile cladding on the pillars along the corridors and walls on ground floor, both on front and rear side. These surface treatments in many areas are detaching from the wall or crumbling/ chipping due to incompatibility with historic construction materials. In addition there are later added masonry walls subdividing the spaces or closing the arched openings/ windows or doors. All these later interventions should be removed to restore the original layout and ambiance of the building.
For removal of color crete/ cement/ tile layers care need to be taken not to damage the underlying stone masonry surfaces. It is recommended that all these works must be done by hand not using any heavily mechanized equipment.

7.1.3 Repair/ Sealing of Cracks or Open Mortar Joints

The front and rear façades of the building when closely inspected indicate few areas of open mortar joints, minor cracks or dislodged stone masonry blocks, and cavities/ holes drilled for some installations. These need to be re-fixed after investigating the reason for the damage and eradicating the cause. Initial mortar repairs must be done to seal all such openings before any cleaning of the entire façade is undertaken. These damages are not of severe nature thus can be rectified with simple interventions. It is recommended to use lime based fillers for the required repairs/ re-pointing of open mortar joints and minor cracks or gaps.

Mortar joints repaired with cement mortar fillings, and cement grouting applied for filling the cavities and holes at some locations during previous maintenance procedures, observed on both façades, should also be removed and repaired with appropriate lime based mortars. Generally all loose mortar shall be brushed off with hard brushes and the gaps or cracks shall be repaired with fine lime mortar of approved finish, color and quality (refer to Appendix II for details on preparation of lime mortar and suggested repairs).

The larger pieces of broken cornices and pediments or severely disintegrated stone blocks would require replacements, for which a similar stone should be used, cut out in similar design and detail, and installed using binding materials of similar composition as of the original. For purpose of clarity of identification these added pieces of stone can be marked with a date indicating the year of repairs.

7.1.4 Removal and Prevention of Biological Growth

Due to constant presence of moisture at many locations on stone masonry there is both micro and macro biological growth; particularly on the back façade (rear side of Women's OPD wing) and the south-east end of front façade. The primary source of water penetration in these areas is leaking plumbing pipes. After removal or appropriate re-fixing of plumbing (if needed) the masonry should be allowed to dry off clearly. Only after the problematic source of water is rectified then cleaning of surfaces soiled by organic growth can be carried out, using mild chemical treatments. First attempt at cleaning can be done with simple brushing and scrubbing with dry bristle or soft wire. The surface can also be washed by jetting with high pressure, low-volume water lance to soften the crusts. Areas with more adhering crusts can be cleaned with paper pulp treatments using mild chemicals (refer Appendix I for details).

Higher plants (macro-biological growth) can be pulled out and their roots sprayed with an appropriate weed killer – to ensure complete eradication of roots that may encourage future growths. Once the roots are dead a thorough cleaning should be done to remove plant residue and any gaps or cavities created due to the removal of plant growth should be repaired/ filled with lime mortar.

7.1.5 Cleaning of Stone Walls

A thorough cleaning of overall stone façade is recommended. This would involve removal of accumulated paint layers, washing of soiled areas where dirt accumulation has resulted in change of stone coloring; particularly on cornices, balustrades, *jalis*, windowsills or *chajjas*. The plinth base at rear side of the building also needs to be cleaned out from accumulating heaps of dirt.

A test patch is advised to ensure the right percentage of chemical concentration required to remove the adhering dirt. The first stage is to clean off dry and loose dirt particles using hard bristled brushes. A cautious approach needs to be taken to ensure that no loose particles of the stone are lost in the process. Any loose or detached pieces of stone, should be re-fixed or consolidated in place before the application of wet cleaning and washing procedures. Following dry cleaning process, the second step is to do a general washing of the entire stone surfaces with mild soap and distilled water. In the third stage cleaning procedure is applied for stubbornly adhering dirt patches and soiling. Poulticing (with ammonium bicarbonate solution) can be used for cleaning of areas with biofilm or black crust formations; whereas other types of stains such as beetle nut spits, rust stains from corroded iron, etc. would require treatments specific to these (refer Appendix I for more details).

7.1.6 Protective Coating

After satisfactory cleaning or necessary repairs of all surfaces a transparent protective coating may be applied as a preventive measure against future soiling of stone surfaces. A transparent water proof coating can be applied to minimize the penetration of atmospheric moisture contents,

and at the same time provide a protective layer against any adverse effects of dirt accumulation or other environmental pollutants. The choice of sealant should be based on following three factors; UV resistant, colorless and should not discolor/ disintegrate after weathering, and should not affect the breathing of porous stone. Sample test panels in discrete locations must be undertaken before application on the entire building.

7.1.7 Repair and Restoration of Woodwork

The original woodwork in EDB including the main staircase, doors, windows, etc. are all made of teak wood. Some of these have been altered or have broken/ missing elements (including glass panes, fittings, etc.). A few are also painted over. It is recommended that all woodwork should be restored to its original state. After all required repairs and scrapping off paint layers, the woodwork should be finished with clear lacquer polish/ varnish, to give an overall coherent look.

7.1.8 Proper installation of Ducting System and Wiring Conduits

A detailed plan for proper ducting system along with installation of AC units needs to be developed. This should include proper locations for the ACs, their drainage ducts and wiring conduits. It is recommended that the system should be worked out either on central air conditioning program or use split units. Window type units should not be used, as they cause defacing of building façades. Placement of the outdoor unit of the split AC should be done on the roof. The drained water from ACs can be collected, recycled and used for watering the plants.

The run off rain water from roof is presently drained through open spouts. It is recommended that a properly design rain water drainage is installed, so that the masonry surfaces do not get washed by flowing and splashing water.

7.1.9 Plumbing and Electrical Works

The haphazardly installed plumbing pipes at the building's rear side, the dangling wires on the building front façade and the faulty exposed electrical wiring in the building arcades need to be re-fixed in an organized manner. Proper PVC conduit channels must be used to conceal the electric wiring in a more aesthetic manner. The external light features mounted on the building for lighting at night should be replaced with more appropriate architectural lighting. It is recommended to mount the light fittings on the ground or around the building for evening lighting up of the complex and the historic façades.

7.1.10 Re-Painting of Interior Spaces

All interior walls and ceilings need a thorough cleaning up of accumulated paint layers that are chipping off the surfaces or blistering. These layers should be removed properly by scraping and sanding with a coarse grade emery paper. The surface will then be prepared for application of a fresh coat of paint. Since stone masonry buildings have gypsum or lime plaster allowing the walls to breathe; hence water based paints are recommended to be applied on the gypsum or lime

plaster surfaces to allow porosity and keeping the breathing process intact. Enamel or any oil based paints are not recommended as they seal the surfaces and make them impermeable.

7.1.11 Removal of Unnecessary Metal Clips/ Nails

Metal clips, nails, iron cramps or ties were observed on the elevations, often leftovers from previous installations or fittings. These cause damage to the stone due to stains of corrosion and rusting. All unnecessary iron insertions should be plucked off and the cavities and holes should be filled with lime mortar to prevent further harmful effects of water/ moisture penetration.

.

7.1.12 Cleaning and repair of Original Flooring

Most of the spaces have retained their original flooring, still intact in good condition. Only a few areas have damaged parts which can be repaired. The few renovated rooms on ground floor need to be checked if their original flooring is still retained underneath the newly installed glazed tiled. A policy decision will have to be taken for reinstallation or restoration of the original flooring in these areas. All original flooring requires cleaning and polishing.

Bibliography:

Ahmed, N., (2015);'Lady Dufferin Hospital – Documentation, Analysis and Design Interventions', M.Arch.research paper, Department of Architecture and Planning, NED University of Engineering and Technology, Karachi (Unpublished).

Lady Dufferin Hospital, (2016); 'Lady Dufferin Hospital – Over 119 Years of Commitment to Women and Children', http://www.ladydufferinhospital.org/briefhistory.aspx (accessed on 15 January, 2018.

Smyth, J. W., (1919) 'Gazetteer of Karachi District)

Yasmeen Lari & Mishail S.Lari, (2014); The Dual City of Karachi During the Raj, Heritage Foundation.

Peerzad Salman., (2001) Karachi Legacies of the Empire, Sindh Endowment Fund Trust.

APPENDIX I

CLEANING OF STONE SURFACES

The stone surfaces of the building show dust accumulation as well as soiling at various locations. To clean the entire façades, chemical cleaning by the following process is recommended.

Proposed method for cleaning of stone:

Step 1: Gently brushing off all loose particles; sand, dust, etc. Mapping of any loose fragments as well as dislodged pieces of stone should also be done at this stage. The particles or pieces of detached stone that are of substantial size should be examined for strength and if found in good state are recommended to be fixed to their original location by grouting and joining techniques.

Step 2: Temporary filling or repairing of the open mortar joints and decayed pointing are to be done before starting wet cleaning.

Step 3: Gently spray distilled water on the stone surfaces to be cleaned (starting from upper parts). Scrub with sponge or nylon brushes and rinse off the surface with spray of distilled water. Let the masonry dry off. If black patches of dirt or black crust are still observed then clean only these parts with an Ammonium Bicarbonate poultice, in the following way.

Step 4: Cleaning of soiling and black crust with ammonium bicarbonate solution. Before deciding upon the concentration of the solution to be used, treatment test samples should be done. The selected sample treatment areas should be characteristic of the deterioration or soiling found on the building. Sample areas should ideally be as inconspicuous as possible. It is recommended to adopt a sequential approach, starting with the least aggressive methods first and gradually increasing the applications until an acceptable level of cleaning is achieved.

If the biofilm is wet, it should be allowed to dry first. Dried bio-film will be brushed and surface applied with the ammonium bicarbonate poultice.

Preparation and Application of the Poultice:

- Prepare 10% solution of Ammonium Bicarbonate in water.
- Dissolve the particles thoroughly, and sieve the solution through very fine fabric (e.g. nylon stockings).
- Add paper pulp to the solution till it gives a thick paste.

- Brush off and clean the trial surface area.
- Take the pulp in hand and squeeze off extra solution, then throw on the surface and gently spread with fingers.
- Leave the poultice on surface, for a while, checking at each 10 to 15 minutes interval.
- Take off the poultice at a time when the desired level of cleaning is achieved.
- Brush the surface and wash off with water.

It is recommended that the sample cleaning should be started with the least concentration of solution i.e. only 10% with minimum time of application i.e. 15-30 minutes. If the crust does not remove then only the concentration and time is gradually increased. But the concentration of solution should never go beyond 30% as this is the level of saturated solution. In case the higher concentration solutions also do not work then a sample with very small percentage (only 5%) of EDTA (Ethylene-diamine-tetra-acetic acid) can be attempted.

Poultices should be prepared; first those with a solution in water of 10% ammonium bicarbonate then gradually increasing in concentration if the 10% solution does not give effective results. 25% ammonium bicarbonate up to 30% saturated solution of Ammonium Bicarbonate.

If the poultice is required to be left for a longer time span then it should be covered with a sheet of polythene and left for a few hours. It is then cleaned by a sponge, dipped in distilled water.

If algae persist in certain spots, these can be treated with biocide treatment. This is done with a solution of 10% benzyl chloride or 2% zefiran in water. But this should be done after the necessary repair works.

Step 5: Repair work, where deemed necessary should be undertaken after cleaning with poultice and before biocide treatment. The lime mortar used in all repair works must be prepared according to the specifications given in Appendix III.

- Re-pointing and filling of gaps with permanent lime mortar. The mortar is to be applied with metal spatulas, firmly pushed into the gap and further compacted with a hard sponge. The extra mortar on surface should be cleaned with a wet sponge.
- If there are any deeper cracks or fissures these should be filled with mortar using hydraulic lime.
- All horizontal surfaces of windowsills and cornices to be sealed, by covering the whole surface with a layer of lime mortar. Once the surfaces are sealed the water will drip over

the edges of these surfaces. These areas should be regularly monitored and repaired whenever required.

Step 6:

- If salts have penetrated inside the building, they will start to appear on surface in the form of efflorescence once the masonry is dry. These can be cleaned by paper pulp technique. This should be done after the problem of dampness penetration has been dealt with. First the building will be aired and allowed to dry completely. Salt deposits/salt crusts or efflorescence that appear on surface after drying, can be simply brushed off. The remaining salts can be cleaned with paper pulp technique. In this method, blotting paper sheets or paper pulp wetted with distilled water, are applied on areas that have crystallized salts. The paper is left to absorb all soluble salts, and then taken off. Repeat the process as many times as required till salt efflorescence does not appear any more.

APPENDIX II

LIME MORTAR TREATMENTS

Lime mortar treatments are to be done for damaged or decayed mortar joints, as well as for re-pointing and filling of gaps in masonry. It can also be applied as a protective layer on horizontal surfaces, for prevention against further deterioration. Lime mortar of specified composition should be used for this purpose.

It is observed that previous treatments of lime mortar are done along the junction of vertical and horizontal surfaces. The application of this repair mortar seems somewhat clumsy. The strength and porosity of these repair mortars need to be checked before a decision for their removal could be taken. If too porous and damaged/ cracked in most areas then it would be recommended to remove it from all places with gentle chiseling, hammering or scrapping. After a thorough cleaning of the loose mortar, all open joints and gaps in joints should be re-pointed with lime mortar. Loose stone fragments can also be consolidated by grouting with lime mortar.

Preparation of lime mortar for repair: The lime mortar to be used for repair works should have higher porosity and water absorption, whereas less density and strength than that of stone. According to a research done on repair plasters of historic buildings in Karachi by Arch. YasminCheema, it was found that these were lime plasters of a high water absorption capacity and porosity, and low density. Their binder-aggregate ratio was also different from the ones normally used. Generally, binder and aggregate ratio in mortar is 1:2 or 1:3. Whereas, laboratory tests of old plaster samples of British period repair lime mortar, show lime (binder): sand (aggregate) ratio of 3:1. This lime mortar has better cohesive properties, thus recommended for used in all repair works.

The lime mortar prepared for repair of joints, filling of gaps, and protective coating of horizontal surfaces should either have a ratio of 3:1 (lime : sand) or it should be 1:3 (lime : aggregate) in which two parts of the aggregate should be of crushed limestone of the same type as used in the construction of the building. This mortar should have higher porosity and water absorption capacity, whereas less density and strength, than that of stone used in the building.

In addition to this the mortar samples collected form the site should also be sent for an analysis of their composition and properties and the repair mortar prepared in accordance to the findings.