KZN Childrens Hospital Trust

KZN Children's Hospital

Nurses Quarters Concrete Repairs

REP/S/004

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1 Introduction

The purpose of this report is to inform master planning decisions for the Nurses Quarters which forms part of the KZN Children's Hospital Precinct. The report draws on numerous site visits conducted by Arup of the Nurses Quarters, and the experience gained during work on the main hospital building.

Currently the building is deteriorating at a rapid rate. Water is entering the building from large holes in the roof and through damaged plumbing.

2 Structure

The Quarters were constructed around 1920 and is thus 90+ years old. It is important to note that it is therefore a listed building, and all work carried out must have AMAFA approval prior to commencement. It is located in a harsh corrosive environment on the beach front, and has surpassed its design life (50 years). This building has fulfilled a vital role in the public health system for over 50 years and will need to continue to do so for at least another 50 years once the refurbishment is complete.

The Nurses Quarters is a three story building. The structure consists primarily of load bearing brick columns and walls, and reinforced concrete beams and slabs. The only vertical concrete structure is the columns on the East ground floor veranda. The roof consists of timber trusses clad with clay tiles.

The reinforced concrete in the facade has suffered considerable damage over the previous 90 years as can be seen in the figures 1-4 below.

Figure 1 Spalling rebar at bottom of slab over East entrance veranda

Figure 2 Window frame over East facade

Figure 3 Roof ring beam on North facade

Figure 4 Roof ring beam on East facade

All concrete in the facade will need to be replaced or repaired. Based on cost estimates of previous work in the precinct it would most likely be more economical to replace rather than to repair reinforced concrete elements. These elements include:

- Roof ring beam
- East facade window frames
- Any existing concrete above and below windows
- 1st floor slab over ground veranda on East facade
- Concrete columns on east facade veranda

It would most likely be more economical to remove the east facade over the veranda and the portion of the 1st floor slab over the veranda and then rebuild it. The second floor slab could be retained from a structural point of view.

One concrete element where it would be considered feasible to look into a repair option would be the underside of the 1st floor slab over the North Veranda.

All plaster should be removed from the building to expose any concrete elements and because it acts as a chloride and carbon sink which is detrimental to concrete and mortar.

From examining the structure it could be possible that the structure above the East veranda was not part of the original building as shown in Figure 5.

The steps recommended in this section are subject to information received by AMAFA.

Figure 5 Possible addition of structure not in original building marked in red

All concrete repairs and replacements are to be carried as per the methodology contained in memo RCR002 compiled by Arup.

3 Existing and Future Building Design Intent

The existing building was constructed to accommodate nurses who worked at the adjacent hospital. This means that it was designed to accommodate residential imposed loading which at the time of construction would most likely have been less than that prescribed by the building codes today. Over the last 90 years codes and regulations have been modified and enhanced and in the design process residential imposed loading is 150kg/m². Office imposed loading requires the structure to be able to resist 250kg/m².

The existing building is not flexible in that brick partitions play a structural role and their removal will require remedial works. Without existing drawings all walls will have to be assumed to be load bearing and replaced with steel beams if removed to redistribute loads. If the building is proposed for office use, the entire floor structure, and possibly foundations, will need to be significantly strengthened to accommodate the additional loading requirements.

Notwithstanding the above, the provision of AC plant and server rooms will require new structure to support, and the installation of service ducts will be difficult to install with very little flexibility in the current structure.

4 Conclusion

The Nurses Quarters were designed for residential purposes and thus the rooms are generally small. This makes reconditioning the building for uses other than residential very difficult. Changing the interior layout is further compounded by the lack of existing design information and partitions being load bearing and supporting the slabs and roofs. To achieve an open plan office environment it is envisaged that replacement if the current structure will be more economical and beneficial to the occupant.

While significant work will be required to repair the Nurses Quarters east facade the remaining facades are not envisaged to require too much in the way of remedial measures. The work will not be as extensive as that too the Children's Hospital because the amount of reinforced concrete in the facades is less.