

INSPECTION AND CONDITION ASSESSMENT REPORT ON A LEAKING ROOF ON A SINGLE STOREY STRUCTURE BELONGING TO AFRICAN ANGEL

1.0 Introduction / Background

On October 23, 2021, upon a request by the Management of African Angel, a Team conducted a comprehensive inspection on the roofing structure of a building observed to leak during heavy rains. The three-member team comprising, a Civil Engineer, a Building Technician and a Quantity Surveyor, undertook the inspection to unravel the root cause(s) of the observed leakage and assess the condition of the building structure following the prolong periods of the leakage from the roof into the building.

The general scope of the team's inspection and assessment of the condition of the building in question included but not limited to the following:

1. A careful visual examination of the entire long span aluminium roof covering to establish possible or potential areas permitting the ingress of rainwater
2. A thorough visual inspection, including the assessment of the efficacy of the existing roofing drainage system.
3. Establish the functional integrity of the roofing system
4. Assess the condition of internal installations following the persistent ingress of the rainwater
5. Establish the structural integrity of the building structure as a whole
6. Make appropriate cost-effective recommendations to prevent future leaking within the building.
7. Provide high level cost estimates for the implementation of the appropriate recommendations

2.0 STRUCTURE AND SITE LOCATION

The building is a single storey, constructed from 100mm thick sandcrete blocks, finished off by acrylic paint. The base of the building and the walls making up the roof parapet is rough cast plaster finish. The internal ceiling of the building is made of treated plywood. The building, per the information received from the Management, serves as a dormitory for the boys in the cottage.

The building is located in Lashibi, a town located within the Greater Accra Region. It is sited on a fenced plot that has two other buildings all serving the

particular needs. The road leading to the orphanage is an untarred dusty road.

Below is a google map view of the Cottage showing the building that experiences the leakage from heavy rains



3.0 METHODOLOGY

The method adopted primarily by the Team in unravelling the cause of the leakage was via physical visual inspection. The visual inspection afforded the team the opportunity to establish obvious deteriorations in the building from the leakages. The inspection also focused in establishing whether the roof covering of the building was not the key contributor to the observed ingress of the rain water.

The inspection was conducted in the company of the Proprietor of the Institution. Further facts about the building that could not be established from the inspection but that was required to draw conclusions were sought from the Proprietor.

4.0 ASSESSMENT/ OBSERVATIONS

Enumerated below are the observations made by the Team during the visual inspection of the building:

1. There were evident that some repair works had been undertaken on the long span aluminium roofing sheet. The extent of the repair was a clear indication of an exercise that was to arrest leakage from the sheets.
2. The drainage channel along the peripheral of the roof was choked with sand. The situation had resulted in the accumulation of pockets of water which was contributing extensively to algae growth. Pic. #3 shows the extent of siltation within the channel
3. The roof is gabled at either ends with a shallow pitch from the ridge forming a double slope. Surprisingly the edge clearance of the roof from the base of drainage channel is quite low.
4. The drainage pipes were observed to be free of debris or other unwanted materials that could potentially be blocking the pipes.
5. Extensive decay of the plywood ceiling in many areas of the room. Pic. #4 shows the degree of decay in the ceiling of the building.
6. The extent of the leakage, could potentially, have an effect on the electrical wiring within the building. As a safety precaution, Management of the facility at the time of the inspection had switched off power to the building.

5.0 CONCLUSIONS

The building is structurally sound. There are no visual indications or physical signs that the integrity of the building is compromised or stand the chance of being compromised by the adverse conditions observed by the Team.

The following conclusions can be drawn on the state of the building with respect to the observations that were made by the Team.

1. The pitch of the existing roofing sheet installations was shallow and that can potentially cause ingress of rain water if there is any minor defect in the integrity of the sheets. However, with a video of the leaking roof made available to the team at the time of the inspection, it was obvious that the extent of the leakage was not through the roofing sheets.
2. The location of the building, abet, the untarred sandy road was contributing to the deposition of the sand and silt within the roof drainage channel. Unfortunately, the lack of a routine cleaning maintenance of the roof has exacerbated the degree of deposition of the sand. The effect is the impediment of free flow of rainfall into the roof drainage pipes. The resultant consequence is the quick accumulation of water within the channels, overtopping the upstand and subsequently flowing into the building.
3. The extensive decay of the plywood ceiling is the result of the rainwater ingress. The plywood, obviously, apart from having aged is also persistently soaking the leaking water and is thus experiencing a rapid decay.
4. The decision by the Management of the Orphanage to curtail the usage of power within the building is laudable. There is a very high likelihood of water trapped within some of the conduits holding the electrical installations.

6.0 RECOMMENDATIONS

Based on the Teams observations and subsequent conclusions and upon discussions with the Proprietor of the Facility, we recommend the following measures on the building, categorized into two options:

Recommended Option 1: Removal of the Existing Hidden Roofing System and Adopting a Concept of Roofing the Entire Building

Option 1 would require activities that would include but not limited to the following:

1. Carefully removing the aged and deteriorated long span aluminium roofing sheet from the building

2. A thorough assessment the integrity of the existing wooden trusses, rafters, purlins, etc, primarily with attention on whether they have not decayed from the observed leakage. The wood if found to be structural sound can be re-use for the new roofing concept.
3. Careful and well supervised demolition of the parapet wall
4. Careful demolition of some internal wall partitions and introduction, by way of construction, of new structural elements within the building to support a new roof truss system.
5. Re-roofing the entire building

A Bill of Quantities prepared by the team estimates that an amount of **GHS78,000.00**, constituting the cost of materials and workmanship, would be required to undertake the above recommendations under Option 1.

Recommended Option 2: Removal of Existing Hidden Roofing System and Providing a Concrete Slab Over the Building

Option 2 is essential to allow for the provision of an additional floor which would allow for the creation of rooms for the children if needed in the near future.

The activities required to undertake this option would include but not limited to the following:

1. Carefully removing the long span aluminium roofing sheet from the building
2. Demolition of the parapet wall under careful supervision by an expert Structural Engineer
3. Carful demolition of some internal wall partitions and introduction, by way of construction, new structural elements including but not limited to columns and beams, within the building to support the reinforced concrete slab.

Based on the Teams Bill of Quantities it is estimated that an amount of **GHS140,000.00**, constituting the cost of materials and workmanship, would be required to undertake the above recommendations under Option 2.



Pict. #1: Inspection of the Roofing Sheet



Pict. #2: Discussions by the team on Site Observations

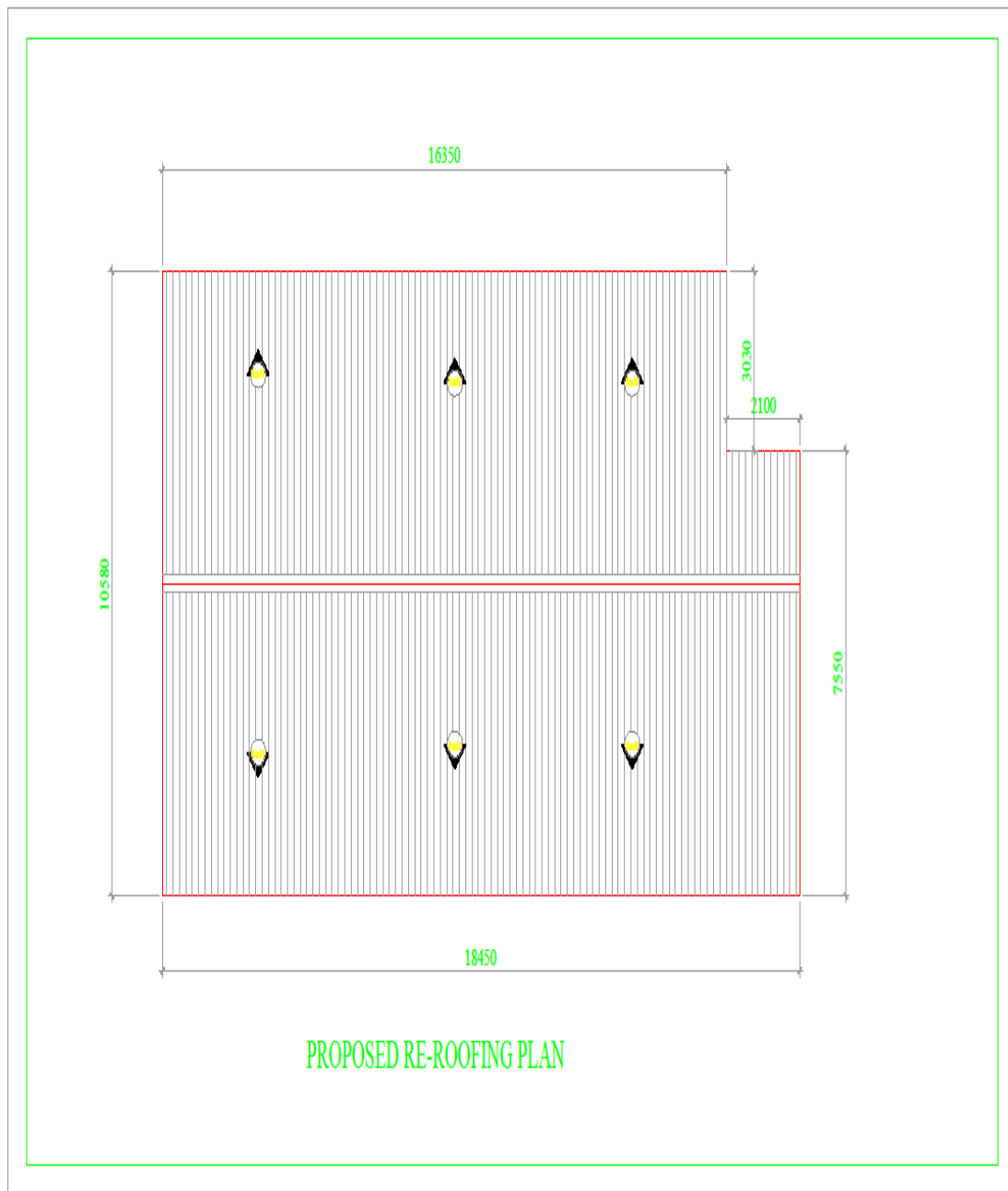


Pict. #3: Silt Deposit within Roof Drainage Channel (Algae Growth due to dampness in the drainage)

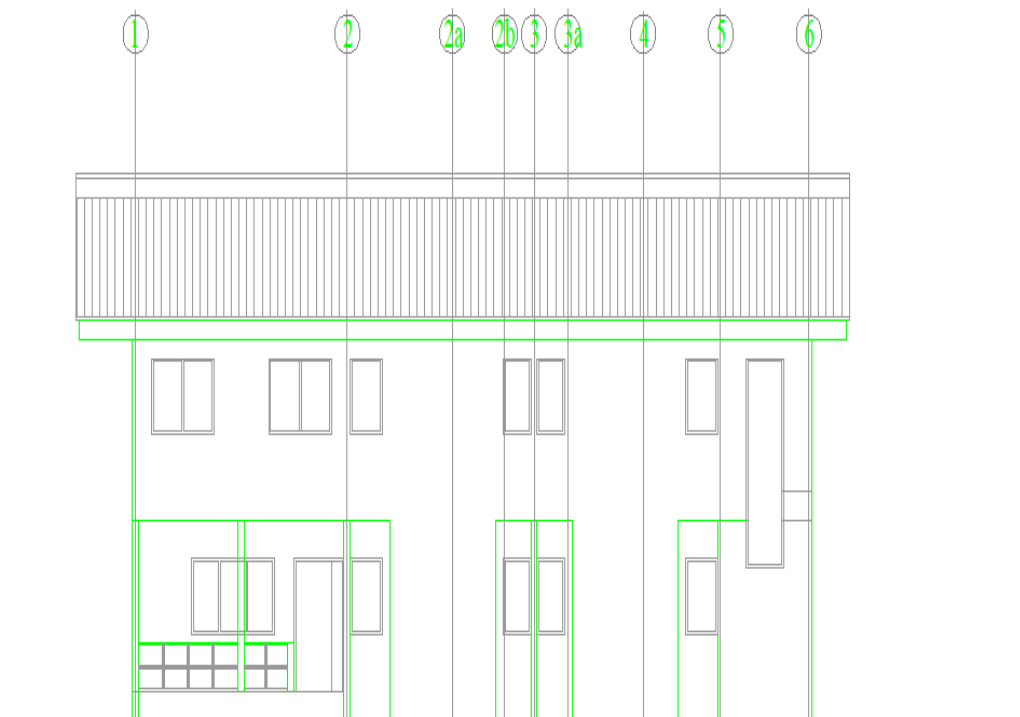


Pict. #4: Visible Deterioration in the Plywood Ceiling

Attachment 1: Proposed Roofing under Recommended Option 1

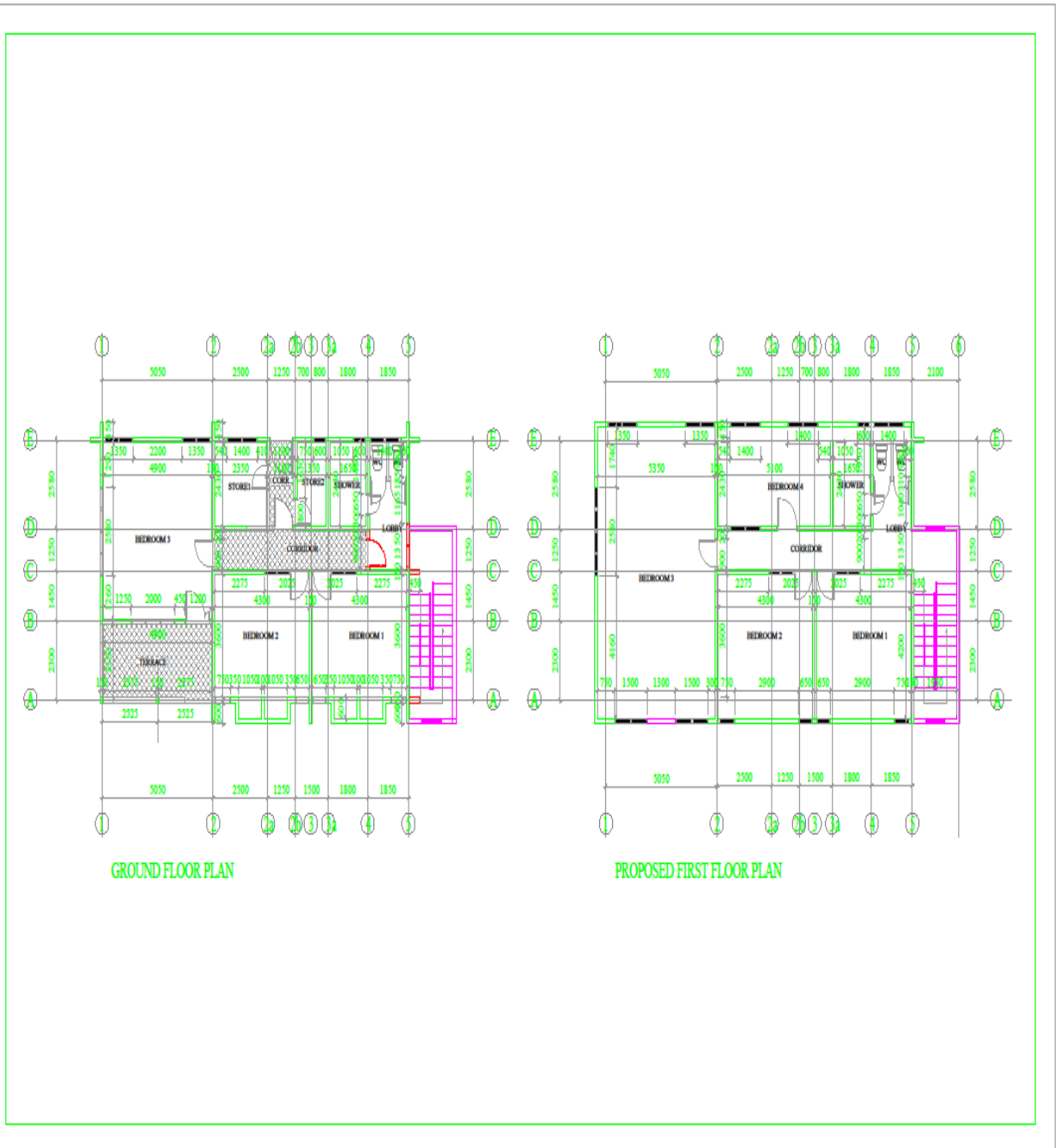


Attachment 2: Proposed Roofing under Recommended Option 1 – Front Elevation



FRONT ELEVATION

Attachment 3: Existing Floor Plan and Proposed Floor Plan under Recommended Option 2



Attachment 3: Bill of Quantities for the two Options

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