MEYERTON WASTEWATER TREATMENT PLANT:

Preliminary Structural & Visual Assessment

30 September 2022

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1. Introduction

Following the request from the Department of Water and Sanitation (DWS), for the assessment of the outstanding work to be done in relation to the completion of the Meyerton Wastewater Treatment Plant within the Midvaal Local Municipality (MLM), GIBB Architecture and Engineering (Gibb) appointed SDM Engineering and Project Management to carry out a detailed assessment of the structures (concrete, masonry, timber and structural steelwork) to assist Gibb, to compile an Assessment Report on the integrity of the structures for the scope of work.

The scope of this report is limited to the visual inspections of the structures designed by Gibb, which were accessible during the site inspection.

The inspections were conducted on 2022-09-20 and 2022-09-21, by Structural Engineer Katlego Thakadu.

2. Site Plan and Buildings

The site plan below highlights, outlined in red, the buildings and structures designed and signed off by Gibb in the original design, that were inspected during the site inspection:

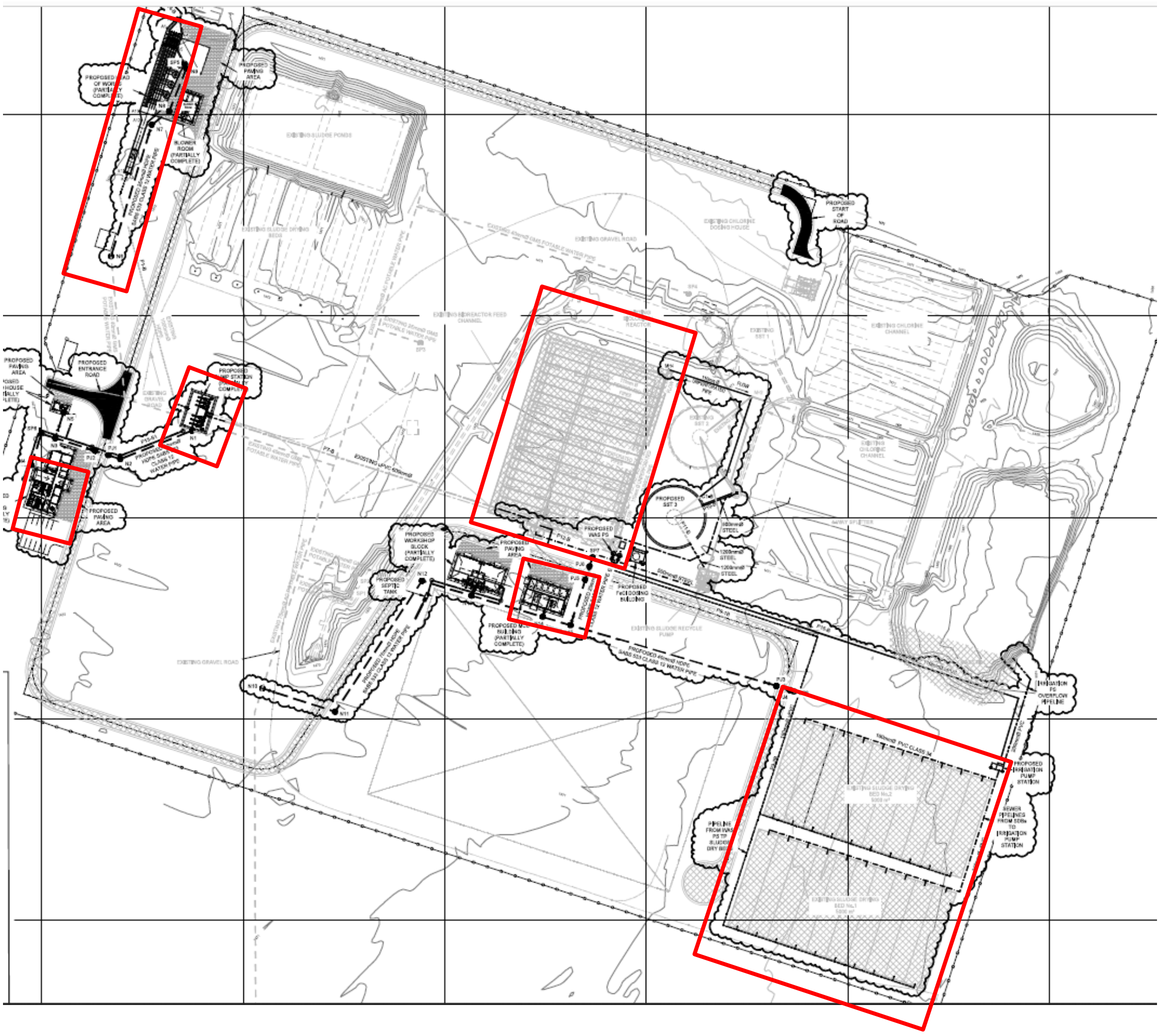

Figure 1 - Site Plan of Gibb Designed Buildings and Structures

3. List of Inspected Buildings

The assessment will be for the following buildings & structures as identified by the client:

i. Header of Works
ii. Raw of Water Pump Station
iii. Biological Reactor
iv. Sludge Drying Beds
v. Admin Building
vi. MCC Building

4. Condition of the Structures

i. M01 – Header of Works

a) Layout and Section

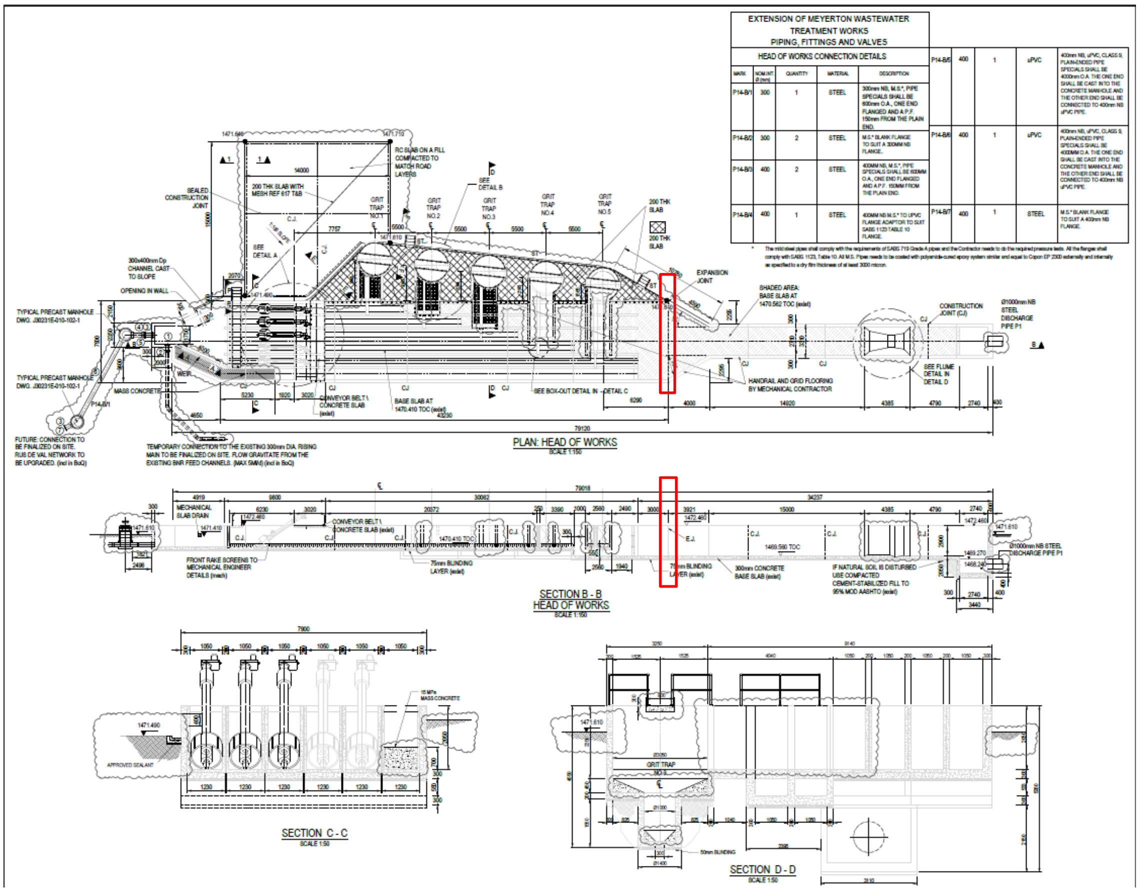

Figure 2 - Layout and Section for Header of Works

b) Description

The Header of Works is a pre-treatment facility that screens the raw, domestic wastewater, to prevent coarse solids, such as plastics, rags, and other waste, from entering a sewage system or treatment plant. Large solids get trapped by inclined screens. The structure also features three grit chambers, to ensure that subsequent treatment technologies are not hindered or damaged by the presence of sand: the grit chambers (or sand traps) allow for the removal of heavy inorganic fractions by settling. The structure specifies vortex chambers to allow heavy grit particles to settle out, while the lighter-principally organic particles-remained in suspension, with gravity flow to the raw water pump station.

The structure is a reinforced concrete structure with a 300mm thick surface bed and 2900 mm high walls. There are five channels, which direct flows to the grit chambers, with a sixth overflow channel to be used in the event of an emergency. Four of the five grit chambers had been partially constructed, by the previous contractor, with some of the walls left incomplete or in need of remedial work. The structure was 80-85% complete at the time of the inspection.

c) Findings

i. Reinforced Concrete Foundations

A special focus, in terms of likely distress due to the inadequacy of the foundation was conducted on the as-built structure, however, no settlement cracks were observed on the perimeter of the structure during the site inspection as shown in Figure 3 below.

Figure 3 - Perimeter View of the Header of Works

ii. Surface Bed

The 300mm surface bed generally displayed no major defects throughout the structure: however, a significant gap was identified in what was observed to be an expansion joint, as indicated on drawing number J40073/010-201 Rev 0 and outlined in red in Figure 2. Vegetation had in fact begun to grow through the joint, as shown in Figure 4.

Further investigation, by specialists, is required to determine the accuracy of construction of the joint, and a resealing using an approved sealant would be required to prevent the outflow of raw sewage underneath the structure.

Figure 4 - Vegetation outgrowth through expansion joint on the surface bed

iii. Reinforced Concrete Walls

The reinforced concrete walls displayed significant signs of inadequate quality of workmanship, honeycombing and incorrect rebar placement. In addition, there are sections of the structure that remain incomplete, with the rebars exposed, and showing signs of corrosion, as well as damage to water-stops due to UV-light rays, and incorrect placement of rebars.

Rebar scanning, by specialists, is required to confirm the placement of rebar within the as-built wall sections as well as corrosion testing of the rebars that have been exposed to external elements, to confirm their suitability for continued use.

Figure 5 - Crack along a specified expansion joint on the RC Wall

In Figure 5, a crack along the wall at the specified expansion joint, further investigation must be conducted to confirm the suitability of construction, as per construction drawings and the sealing to prevent sewage outflow. In addition, Figure 5 shows that none of the ferrule tube holes has been closed post stripping of the shutters, whereas some of the tie-rods we cast without a ferrule tube and are thus stuck in the concrete walls.

Remedial work will be required, by the incoming contractor, to prevent any deterioration of the structure due to corrosion of the exposed tie-rods.

Figure 6 - Signs of concrete remedial works on the Jet Air Grit Trap Walls

In Figure 6, it is evident that substandard shuttering had taken place resulting in a shutter(s) moving during casting, hence the contractor started to remediate by removing the excess concrete; however, the contractor did not complete the works before leaving the site. In addition, exposed rebars and a dilapidated water-stop can be observed in Figure 6, and the face of the walls indicates rebar corrosion over time, through the ferric oxide stains, outlined in red on the figure, as the structure has been exposed to weather elements since construction ceased.

The integrity of the reinforcement will have to be evaluated, by specialist, to determine the level of corrosion of the rebars as opposed to the original diameter in each instance. All damaged water-stops are to be replaced, by the incoming contractor, before concrete casting can continue.

Figure 7 – Sub-standard wall casting and jointing observed around the perimeter of the structure

In Figure 7, sub-standard workmanship can be observed around the perimeter of the structure, with emphasis on the kicker wall that is that is cast on top of the surface bed. There is evidence of sub-standard joint preparation, and the poor finishing can be observed around the perimeter of the structure at the base of all perimeter walls.

In addition, a cast-in tie rod can be observed in Figure 7, whereas in most sections, unsealed ferrule holes can be observed around the structure.

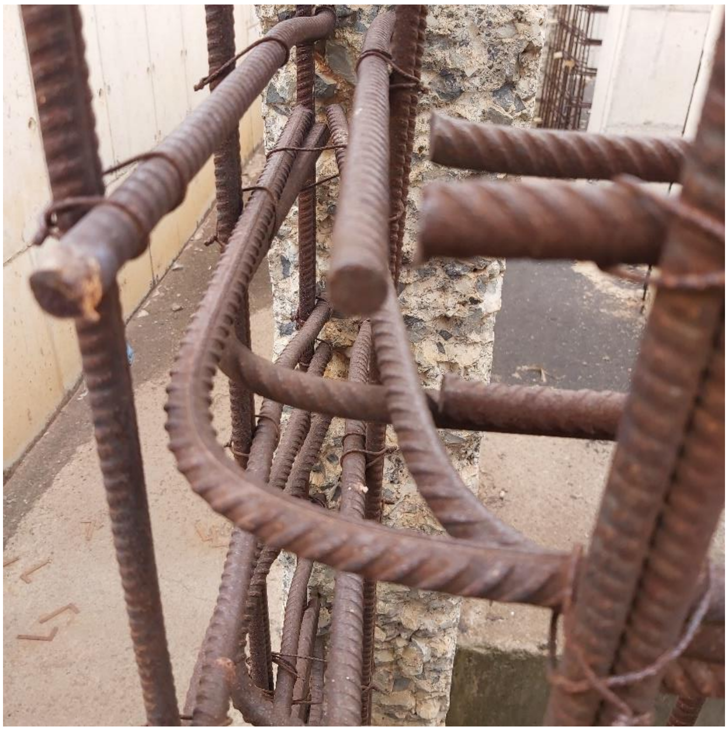

Figure 8 - Incorrect placement of reinforcement bars

In Figure 8, It is evident that the reinforcement placement on this existing wall, does not confirm to the reinforcement arrangement drawings, as there are discrepancies in how the rebar was arranged, which will hinder the effective distribution of loads throughout the wall. In addition, Inadequate concrete cover is also observed, and this is of major concern in a sewage retaining structure, in view of the acidic properties of raw sewage.

Specialist investigations are required to provide rebar protection recommendations to ensure that the structure can meet the minimum design lifespans.

iv. Platform Suspended Slabs

The 200mm thick suspended platform slabs display the extent of the lack of workmanship and quality control. Platform slabs were misaligned and show signs of the segregation of concrete at joints, due to bleeding of the concrete during casting. Organic (timber) material was observed to have been cast into the slabs which is also of concern, especially considering the inherent negative impact on the long-term durability of concrete sections with cast-in organic material that was decay-prone.

Figure 9 - Timber material cast into concrete within the platform suspended slabs

In Figure 9, a piece of timber material can be observed within the suspended slab. As highlighted above, this presents long-term durability concerns as the organic material will decay over time, thus leaving a cavity within the concrete section, and rendering it vulnerable to ingress of sewage water, thus shortening the design lifespan of the element.

Further investigation is required to confirm the extent of intrusion of the segment of organic material, as well as a determination of the remedial works that would be required to mitigate the effects of the presence of organic material.

ii. M02 – Raw Water Pump Station

a) Description

The raw water pump station consists of a significant substructure and a superstructure. The substructure is in terms of a reinforced concrete construction, comprising of two chambers with a 500mm and 600mm thick surface beds, respectively. The inlet chamber, comprising of the 500mm thick surface bed, and 450mm thick reinforced concrete walls had not been constructed at the time of the inspection.

The pump chamber, consisting of the 600mm surface bed and 400mm thick RC walls, was already in place, at the time of the inspection. However, no means of accessing the basement had been installed at the time of the inspection. The superstructure, comprised masonry, with a 230mm brick wall comprising of an external face of face brick and internal face of a Non-Plaster Face (NFP) brickwork. The reinforced concrete columns had been cast to the bottom level of the ring beam, and the structure was 50-65% complete at the time of the inspection.

b) Layout and Section

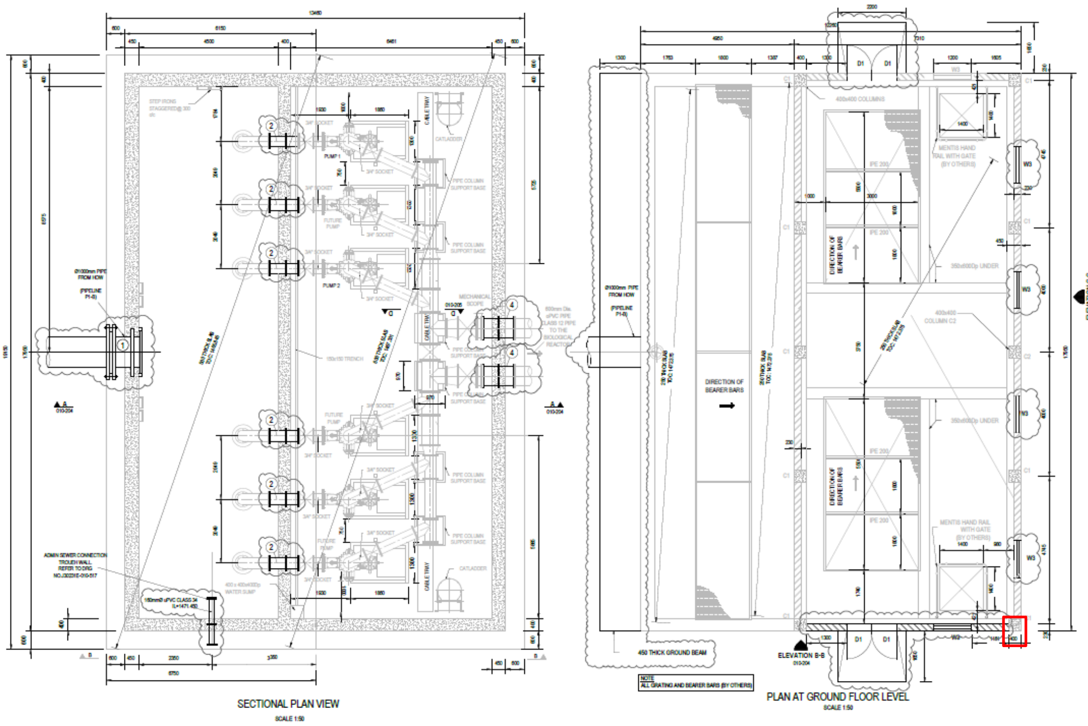

Figure 10 - Raw Water Pump Station Layout

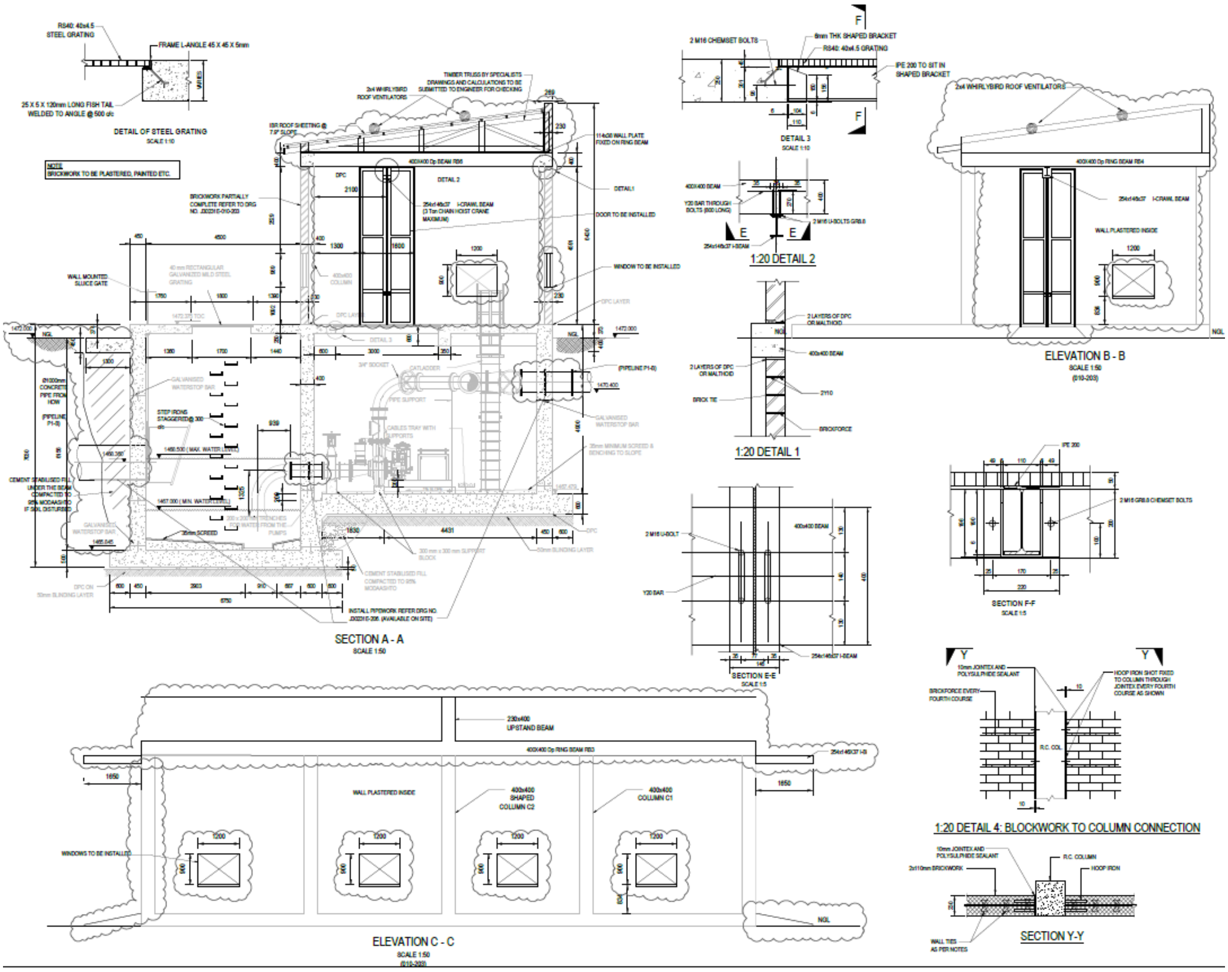

Figure 11 - Raw Water Pump Station Section

c) Findings

i. Reinforced Concrete Foundations

A special focus, in terms of likely distress due to the inadequacy of the foundation was conducted on the as-built structure, however, no settlement cracks were observed on the perimeter of the structure during the site inspection as shown in Figure 11 .

However, only one section was exposed during the site inspection, and the remaining sections of the basement had been backfilled. Therefore, more sections of the remaining structure must be exposed to allow for a thorough inspection of the basement walls.

Figure 12 - Basement of the Raw Water Pump Station

ii. Surface Bed and Plinths

The surface bed is enveloped by the basement walls and there were no means to safely access the basement and inspect the surface bed. Further, there was rainwater ponding on the surface bed, as the superstructure was not covered at the time of the inspection, as shown in Figure 13.

A thorough investigation must still be undertaken once, adequate access inside the structure has been arranged.

Figure 13 - Ponding water on the basement surface bed of the raw water pump station

iii. Reinforced Concrete Walls

As shown in Figure 11 and Figure 12, the basement reinforced concrete walls are inaccessible due to the topography and the lack of means of access into the basement of the structure: hence, a thorough inspection could not be completed.

A detailed investigation is required, after safe access can be provided, to assess the condition of the basement walls.

Exposed rebar can be observed in Figure 12, as per the construction drawings. From the construction drawings, it is evident that this was intended to serve as continuity reinforcement for the suspended slab on the adjacent chamber: however, since construction ceased, the rebars have been exposed to all weather elements.

A detailed investigation on the extent of corrosion of the rebars is required, to determine the suitability of the reinforcement, in terms of the design specifications.

iv. Platform Suspended Slabs

The platform suspended slabs displayed no major structural distress, however, cracks were observed spreading from the corners of the open sections of the suspended slab, as shown in Figure 14

A detailed investigation is necessary, to verify, firstly, the presence of reinforcement, at the corners of the open sections, of the suspended slab. Secondly, to ensure that the reinforcement used, conforms to the specified reinforcement on the construction drawings.

Figure 14 - Cracks propagating from the corners of open sections of the slab

v. Reinforced Concrete Columns

The reinforcement concrete columns displayed no significant deformations/defects during the inspection. However, poor workmanship was observed on interfaces between the consecutive cast-sections: there are signs of bleeding that occurred during casting, possibly due to inadequate shuttering and sealing.

Figure 15 - Concrete Columns for Raw Water Pump Station

vi. Reinforced Concrete Ring Beam

The 400mm wide by 400mm deep ring beam has not been cast, however, some noticeable defects need to be rectified before construction can continue. Firstly, the transfer rebars from the column, outlined in red in Figure 10 above and Figure 16 below, are placed in the incorrect position, hence this will need to be rectified before the cage assembly for the beam.

Figure 16 - Transfer rebars from column to 400mm x 400mm deep Ring Beam

vii. Masonry

No major defects were observed on the masonry, however, there is a lack of workmanship as seen in Figure 17 below. This is also evident in Figure 16 shown above. However, an investigation is required to confirm the provision of brick-force. This may be remediated, by the incoming contractor, with plaster, for aesthetic purposes.

Figure 17 - Mansory from Raw Water Pump Station

iii. M03 – Biological Reactor

a) Layout and Section

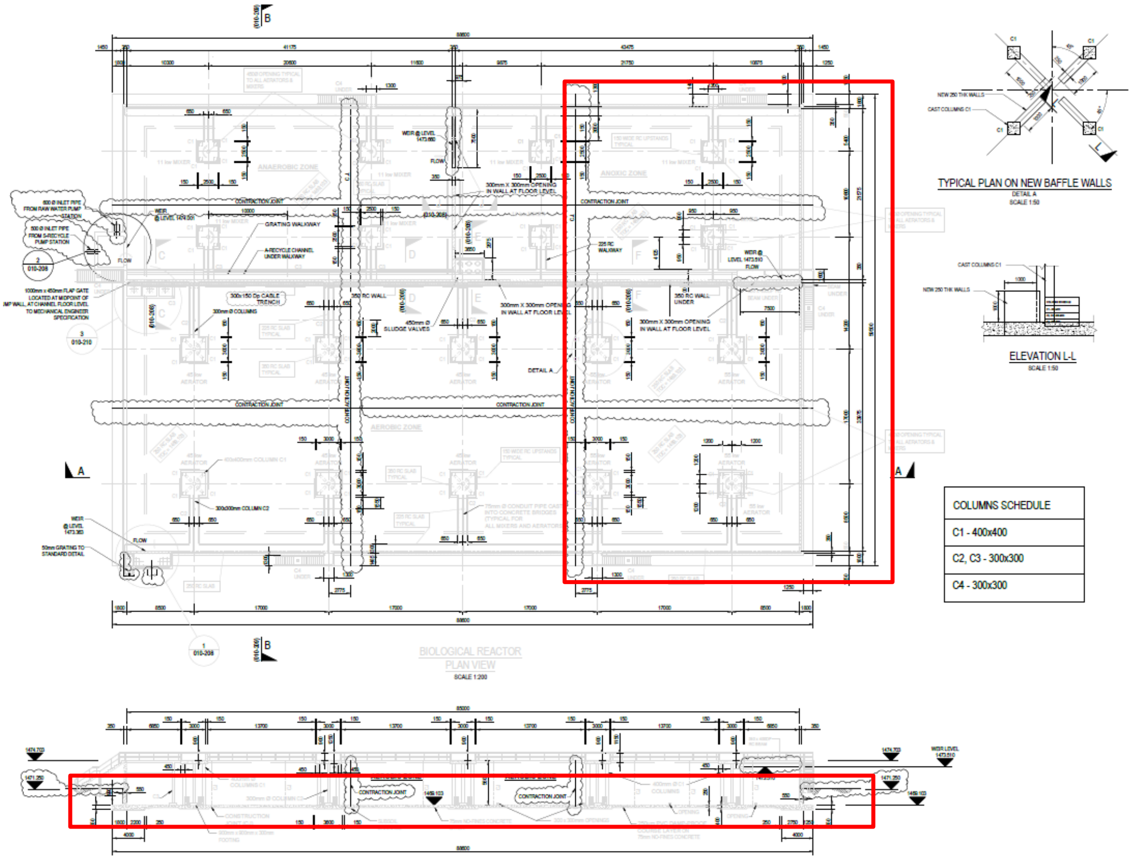

Figure 18 - Biological Reactor Section and Layout

b) Description

The biological reactor (anaerobic and aerobic digestion reactors), takes advantage of the ability of certain micro-organisms (including bacteria) to assimilate organic matter and nutrients dissolved in the water for their own growth, thus removing soluble components in the water. Soluble organic matter is assimilated by microorganisms as a carbon source. After this operation, the biomass produced from the supernatant is then separated by decantation.

The biological reactor is a reinforced concrete structure with a raft foundation of varying thicknesses of 500mm to 250mm internally. The reinforced concrete walls are approximately 5700mm high, with a width, of 500mm for the perimeter walls and 350mm thick for internal walls. The structure has 1250mm bunded platforms, supported by 400mm by 400mm wide, reinforced concrete columns, that house the pumps for the mixers located below the bunded structures. There are suspended platform slabs that provide access to the pumps. The structure was 95% complete at the time of inspections.

c) Findings

i. Reinforced Concrete Foundations

A special focus, in terms of likely distress due to the inadequacy of the foundation was conducted on the as-built structure, however, no settlement cracks were observed on the perimeter of the structure during the site inspection as shown in Figure 19 below.

Figure 19 - Perimeter of the Biological Reactor

ii. Surface Bed

The reinforced surface bed of the biological reactor displayed no major deteriorations or defects, for the section of the biological reactor, outlined in red, on the layout drawing in Figure 18, the remaining sections could not be inspected due to lack of adequate safe access into the other sections of the reactor.

Figure 20 - View of the Biological Reactor Section Outlined in Red on the Layout

In Figure 20, the presence of vegetation on top of the surface bed needs to be investigated further to determine if this is due to joints which are inadequately sealed or because of the accumulation of soil on top of the surface bed. Thus, in addition to the provision of safe access into the structure, cleaning of the debris on the surface bed must be completed for detailed investigations can occur.

iii. Reinforced Concrete Walls

The reinforced concrete walls displayed significant construction defects, including honeycombing, poor off-shutter finished, and the ferrule holes have not been sealed. Significant vegetation is obstructing inspections of the as-built structure, with emphasis on the interface between the surface bed and the walls, as shown in Figure 21.

Figure 21 - Honeycombing on the Biological Reactor Reinforced Concrete Walls

In Figure 21, it is evident that the contractor attempted to conceal these defects with a cement mixture, post-casting.

These inefficient remedial works must be cleaned to assess the extent of the defect, to ensure that the right remedial works are scoped and implemented, to prevent deterioration.

Figure 22 - Substandard Concrete Joints Observed on the Biological Reactor Reinforced Concrete Walls

Substandard concrete casting joints were observed around the perimeter of the structure, as shown in Figure 22. This is of concern on a water (sewer) retaining structure, as this may be a possible seepage point, whereas there may be excessive crack depth propagation if there are significant defects within the joint. Further investigation is required to confirm the suitability of the joints to the original design requirements.

iv. Reinforced Concrete Columns

The mixer platform reinforced concrete columns displayed no significant signs of defects, however, there were corrosion stains on some platform columns, as shown in Figure 23. The source must be confirmed once safe access into the structure is provided, as the visual inspection was conducted from a vantage point above the existing steel mezzanine platform adjacent to the area, outlined in red in Figure 18, on the layout.

Figure 23 - Platform Columns and Suspended Slabs in the Biological Reactor

v. Platform Suspended Slabs

The platform suspended slabs displayed no significant signs of defects, as shown in Figure 23, however, further investigation is required as the visual inspection was conducted from a vantage point above the existing steel mezzanine platform adjacent to the area, outlined in red in Figure 18, on the layout. Access must be first provided to ensure that there is a safe means of accessing all platform suspended slabs for further investigation.

vi. Structural Steel Platform

The structural steel platform, outlined in red in Figure 19, was inspected and found to be unstable. The key defects were loose handrailing, missing steps and excessive vibrations when used by several people. The galvanised handrailing had been cut and welded on site, with no remedial corrosion protection conducted, hence severe corrosion was observed.

The structure must be demolished, refurbished, and redesigned into a mezzanine platform with independent column supports.

iv. M04 – Sludge Drying Beds

a) Layout and Section

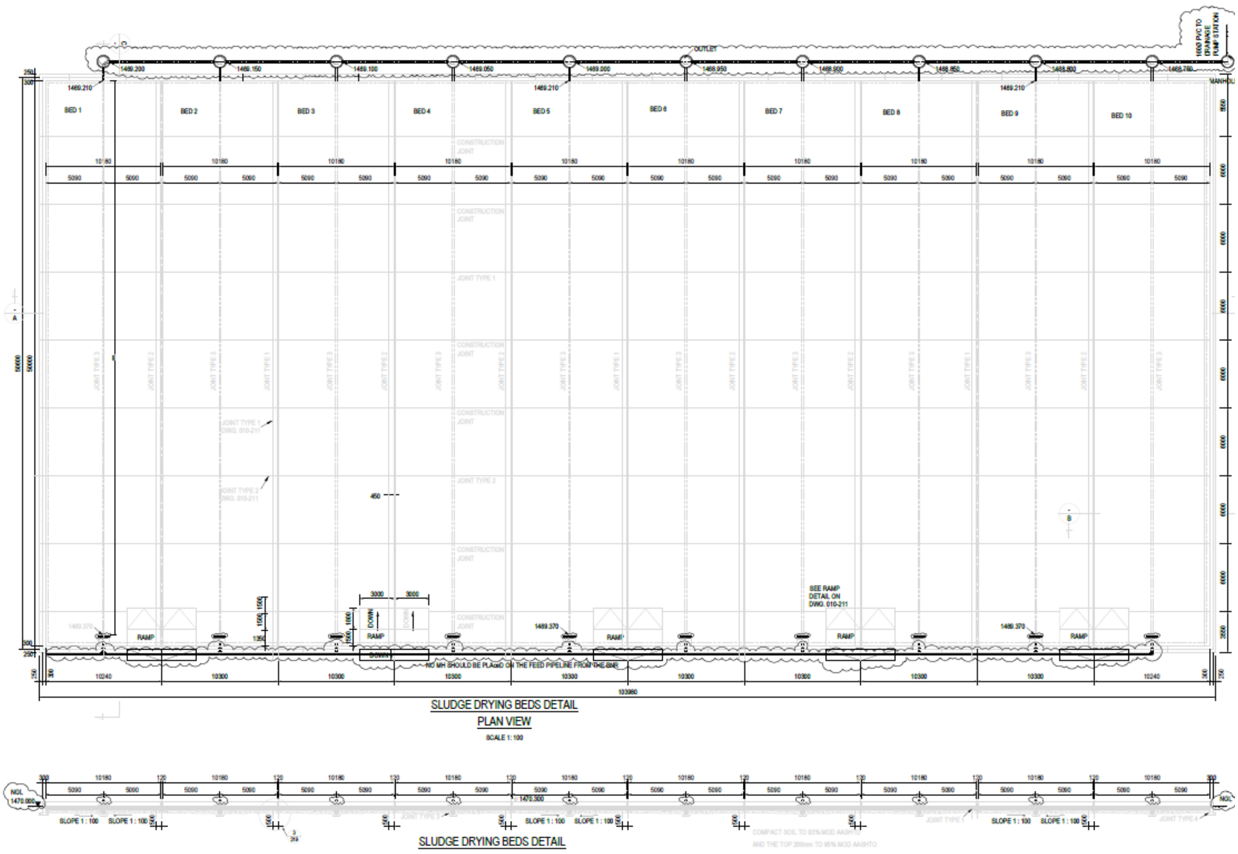

Figure 24 - Sludge Drying Bed Layout and Section

b) Description

Digested sewage sludge is usually dewatered before disposal, and the dewatered sludge still contains a significant amount of water—often as much as 70 percent—but, even with that moisture content, the sludge no longer behaves as a liquid and can be handled as a solid material.

Sludge-drying beds provide the simplest method of dewatering. A digested sludge slurry is spread on an open bed of sand and allowed to remain there, until dry. The drying takes place by a combination of evaporation and gravity drainage through the sand. A piping network built under the sand collects the water, which is pumped back to the head of the Works.

The sludge drying beds are reinforced concrete structures comprising of 800mm wide x 200mm thick strip foundations that support a wall that is 980mm high and 300mm thick upstands.

The base of the structure is a 200mm surface bed that is supported by a backfill that, according to the design, would have been compacted to 93% MOD AASHTO, with a perforated drainpipe located at the centre.

The drying beds were observed to be complete but there were soil heaps and vegetation outgrowths within the drying bed.

c) Findings

i. Reinforced Concrete Foundations

No settlement cracks were observed on the perimeter of the structure during the site inspection as shown in Figure 25 below.

Figure 25 - Sludge Drying Bed

ii. Surface Bed

The surface bed was completely covered in soil and vegetation, as shown in Figure 25. The area therefore needs to be uncovered just to confirm if the drying beds were backfilled with sand. This would need to be reclaimed and the surface bed inspected.

iii. Reinforced Concrete Upstands

The concrete partition upstands were partially covered by soil and vegetation, as shown in Figure 25. It is evident that the vegetation had previously been burned instead of being rooted out, thus concrete integrity investigations are required along the perimeter of the structure to confirm conformance to the original design strengths of the concrete members.

v. M05 – Administration Building

a) Layout and Section

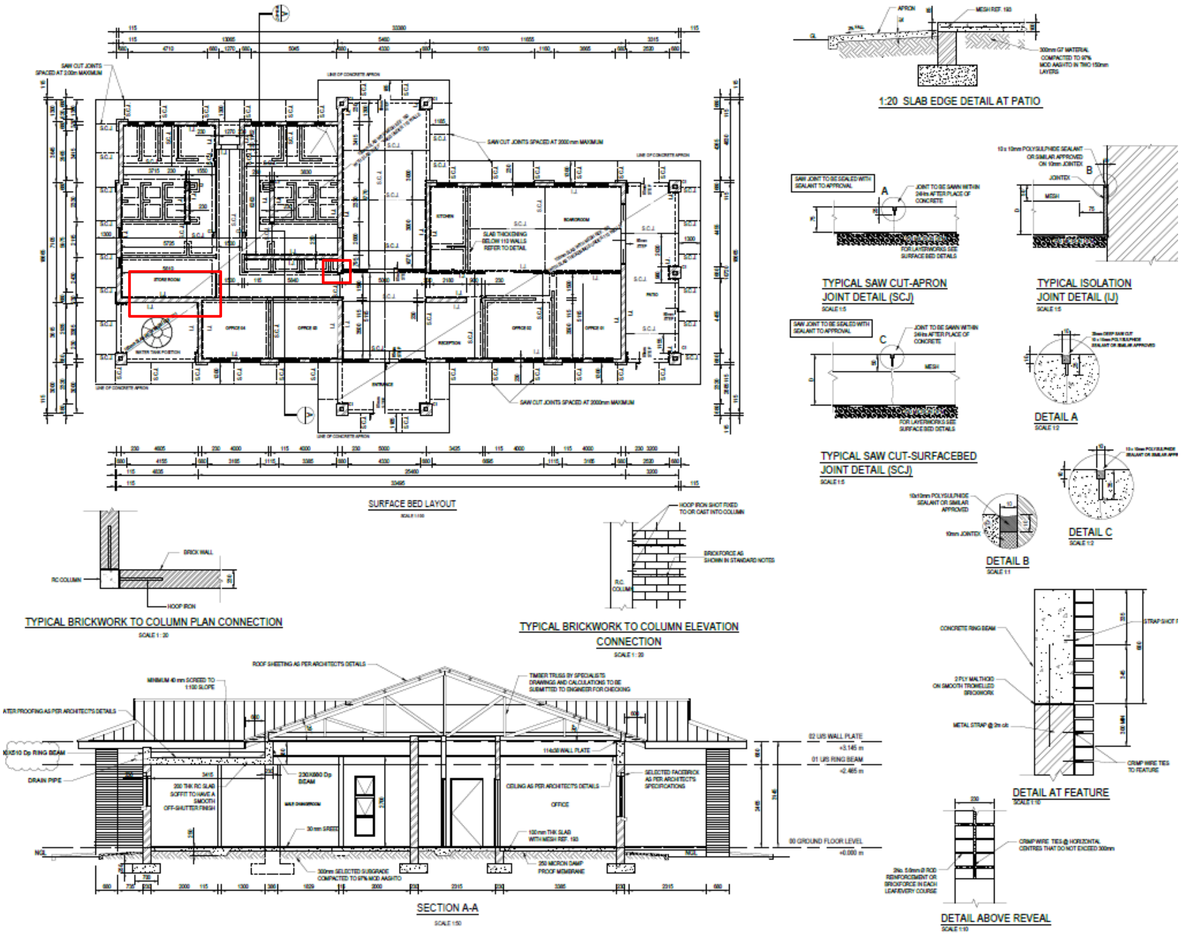

Figure 26 – The Administration Building: Layout and Sections

b) Description

The administration building is an office building that will house the plant operators, maintenance staff and plant management for the daily operation of the wastewater treatment plant.

The structure comprises of a 700mm wide by 250mm deep strip footings that support a 230mm brick wall. A 100mm thick surface bed is specified, with a 250mm slab thickening at the sections supporting the internal brickwork.

The structure has a grid of 230mm by 230mm reinforced concrete columns that support sections of the 230mm wide by 680mm deep ring beam, which in turn, supports the loading from a timber truss roof.

The roof is cladded with an IBR sheeting which is insulated internally, the structure was 95% complete at the time of inspection.

c) Findings

i. Reinforce Concrete Foundations

No settlement cracks were observed on the perimeter of the structure during the site inspection as shown in Figure 27 below.

Figure 27 - Perimeter View of the Administration Building

ii. Surface Bed

The surface bed was tiled at the time of the inspection, hence the quality of the finishes could not be verified : this is shown in Figure 28 below.

There were however no defects in evidence, as woud begin to point to the inadequacy of the underlying surface bed.

Figure 28 - Tiled Surface Bed for the Administration Building

iii. Reinforced Concrete Columns

The reinforced concrete columns displayed no defects at the time of the inspections. The quality of the finishes, however, could not be confirmed as the internal faces of the administration building had been plastered the time of inspection.

iv. Reinforced Concrete Beams

The external concrete ring beam displayed no major signs of deterioration: there were, however, some signs of poor concrete quality control at the beam-to-wall interfaces, and signs of bleeding during construction were visible as shown in Figure 29.

Figure 29 - Beam-to-Wall Interface of the RC Ring Beam of the Administration Building (external)

Figure 30 – Beam-to-Wall Interface of the RC Ring Beam of the Administration Building (internal)

In Figure 30, we observe that there is a visible crack on the underside of the ring beam, at the section outlined in red in Figure 30. The depth of the crack could not be determined as the members had been plastered, A detailed assessment must therefore be conducted to assess the severity of the defect, and to arrive at a conclusion regarding the underlying cause as well as the remedial actions required.

v. Reinforce Concrete Suspended Slabs

Figure 31 - Reinforced Concrete Suspended Slab of the Administration Building

The reinforced concrete suspended slab displayed no significant defects, as shown in Figure 31: however, a 30mm – 40mm plaster had fallen off due to adequate provision to support the significant mass of plaster, this must be remediated, for aesthetic purposes.

vi. Masonry

The external masonry displayed no major defects, as shown in Figure 32. The finishes were adequate, but standard ‘house-keeping’ requirements relating to cleaning and jointing had clearly not been upheld

Figure 32 - External Brickwork for the Administration Building

Figure 33 - Internal Firewall for the Administration Building

In Figure 33, poor and inadequate workmanship is observed for the firewall: this is located in the storeroom, and is outlined in red in Figure 26. This wall has to be demolished and redone, under strict supervision, to ensure the that the work conforms to SANS 10400: Part K.

vii. Roofing

There were open sections on the roof of the Administration Building, as shown in Figure 33. The timber trusses have been exposed to weather elements, and this is of concern, as the timber's inherent properties will deteriorate when exposed to differential wetting and drying. The trusses must therefore be inspected by a Timber Specialist and declared fit for use before the structure can be handed over.

vi. M06 – MCC Building

a) Layout and Sections

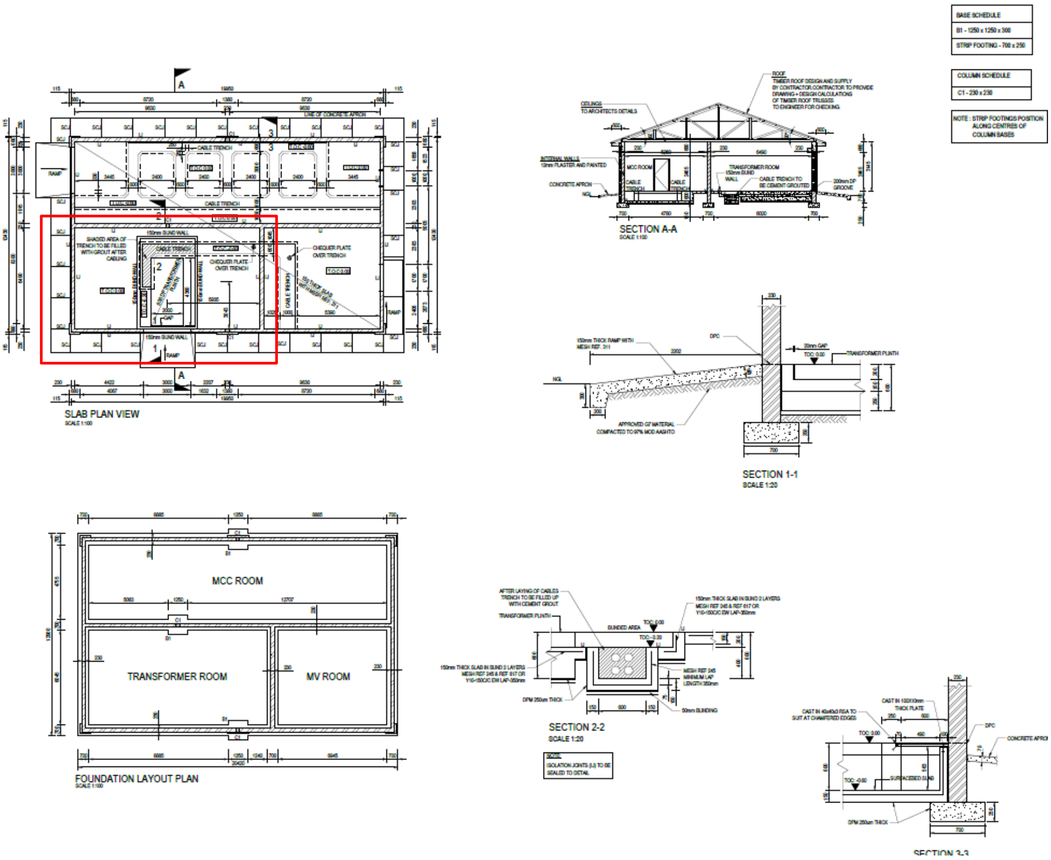

Figure 34 - MCC Building Layout and Sections

b) Description

The MCC building is a centralised control room for the distribution boards that feed the localised distribution boards, for the supply of power for the daily operational requirements of the various mechanical components installed on the wastewater treatment plant. The structure comprises of a 700mm wide by 250mm deep strip footings that support a 230mm brick wall.

A 150mm thick surface bed is specified, with no slab thickening specified, for the sections supporting the internal brickwork.

The structure has a 230mm wide load-bearing brick wall that supports the 230mm wide by 680mm deep ring beam, which in turn supports the loading from a timber truss roof. The roof is cladded with an IBR sheeting which is insulated internally. The structure was 95% complete at the time of inspection.

c) Findings

i. Reinforce Concrete Foundations

No settlement cracks were observed on the perimeter of the structure during the site inspection as shown in Figure 35 below.

Figure 35 - Perimeter View of the MCC Building

ii. Surface Bed

The reinforced surface bed of the MCC building displayed no major deterioration or defects for the section of the building, outlined in red, on the layout drawing in Figure 34. But the remaining sections could not be inspected due to lack of access to the other sections of the building.

However, as shown in Figure 36 below, the screeding of the surface bed was till outstanding

Figure 36 - MCC Building Surface Bed and Cable Trench

iii. Reinforced Concrete Beams

The external concrete ring beam displayed signs of distress, as shown in Figure 37 below. There are vertical cracks aligned to the spacing of the roof timber trusses. A detailed investigation, including coring and rebar scanning, is required to assess the construction quality and accuracy in relation to the original design.

Figure 37 - Perimeter View of Brickwork and RC Ring Beam of the MCC Building

iv. Masonry

The external masonry displayed no major defects, as shown in Figure 37. The finishes were adequate, but standard house-keeping requirements relating to cleaning and jointing

Figure 38 - Internal Brickwork for the MCC Building

In Figure 38, poor and inadequate workmanship is evident from the entrance of the transformer room of the MCC Building. This wall needs to be remediated to ensure that the work conforms to SANS 10400: Part K.

v. Roof Ceiling

Figure 39 - Open Section on the Ceiling and Roof of the MCC Building

There was a hole, on the ceiling of the MCC Building, as shown in Figure 39. The timber trusses have been exposed to weather elements, which is of concern, as the timber's inherent properties deteriorate when exposed to differential wetting and drying. The trusses must therefore be inspected by a specialist and declared fit for use before handing over the structure.

5. Overall Visual Assessment of As-Built Structures

This report proceeds the initial site inspection conducted. It has however, highlighted in section 4 of this Report, that some of the structures, could not be fully assessed due to the lack of safe means of access: hence, this Report does not yet represent a full and comprehensive assessment. Further inspections are to be undertaken once the necessary access has been arranged.

Overall, for the already constructed works, a significant lack of contractor's construction planning and skilled workmanship was observed. Examples in this regard relate to the finishes shown in section 4. It's recommended that this is addressed in all subsequent contractual appointments, and thorough due diligence of the experience of the construction team, of all prospective contractors, must be done before the appointment. This needs to align closely with the requirements of SANS 1200, SANS 2001, SANS 10400 and ISO 9001.

These must be fully addressed upfront of the before remaining construction of the residual sections of the plant to mitigate the durability deterioration of the structures during operation, all towards the intended lifespan of the plant being achieved.

Specialist investigations are highly recommended to provide a comprehensive and deterministic assessment of the plant. These are necessitated by the observed poor workmanship, to ensure that the design assumptions were met.

Effectively then, it will only be after the remaining sections have been fully inspected and a due assessments conducted, that the full Report will be presented on the overall integrity of the in-situ structures, in comparison to the original designs conducted by Gibb.

Below is a summary of the recommendations for each of the buildings/structures inspected:

Table 1 - Summary of Recommendations for Further Investigations for Inspected Structures

Structure/Building	Structural Component	Recommendation
i. Header of Works	Surface Bed	1. Coring of a representative sample of the surface bed to confirm the concrete strength in relation to design requirements. 2. Exposing of the expansion joint to assess the condition of the joint and provide specialist recommendations on the sealing of the joint, all to prevent future sewer seepage.
	Reinforced Concrete Walls	1. Coring of a representative sample of the RC Wall to confirm the concrete strength in relation to design requirements. 2. Exposing of the construction joints and the consecutive concrete-pour joints to assess the condition of the joints and provide specialist recommendations on the sealing of the joint, all to prevent future sewer seepage.

		3. Sealing of open ferrule holes by an approved sealant to forestall sewer intrusion. 4. Rebar Scanning on the affected sections with incorrectly placed rebars: this will be to ensure the consistency of rebar placement along the walls. 5. Reinforcement Corrosion Assessment to ensure that the steel on site was suitable for use before construction work could continue
	Platform Suspended Slabs	1. Coring of a representative sample of the suspended slab to confirm the concrete strength tests and design requirements. 2. Assessment of the extent of intrusion of organic elements into the concrete to assess the necessary remedial interventions to be undertaken.
ii. Raw Water Pump Station	Surface Bed and Concrete Plinths	1. Coring of a representative sample of the surface bed to confirm the concrete strength in relation to design requirements.
	Reinforced Concrete Walls	1. Coring of a representative sample of the RC Wall to confirm the concrete strength in relation to design requirements. 2. Exposing the consecutive concrete- pour joints to assess the condition of the joints and provide specialist recommendations on the sealing of the joint, to prevent sewer seepage. 3. Sealing of open ferrule holes by an approved sealant to prevent future sewer intrusion. 4. Reinforcement Corrosion Assessment to ensure that the steel on site was suitable for use before construction work could continue 5. Removal of vegetation and backfill around the structure to assess the full RC Basement.
	Platform Suspended Slab	1. Coring of a representative sample of the suspended slab to confirm the concrete strength in relation to design requirements. 2. Rebar Scanning on a section with propagating cracks, from the corners of the open section, to ensure the right

		reinforcement had been placed as per the rebar drawings.
iii. Biological Reactor	Surface Bed	1. Coring of a representative sample of the surface bed to confirm the concrete strength in relation to design requirements. 2. Exposing the expansion joint to assess the condition of the joint and provide specialist recommendations on the sealing of the joint, to prevent future sewer seepage. 3. Access to be provided to complete the visual assessment with Specialists.
	Reinforced Concrete Walls	1. Coring of a representative sample of the RC Wall to confirm the concrete strength in relation to design requirements. 2. Exposing the construction and consecutive concrete-pour joints to assess the condition of the joints and provide specialist recommendations on the sealing of the joint, to prevent sewer seepage. 3. Sealing of open ferrule holes by an approved sealant to prevent future sewer intrusion. 4. Reinforcement Corrosion Assessment to ensure that the steel on site was suitable for use before construction work continues.
	Reinforced Concrete Columns	1. Coring of a representative sample of the RC Columns to confirm the concrete strength in relation to design requirements. 2. Access to be provided to complete the visual assessment with Specialists.
	Platform Suspended Slabs	Access is to be provided to complete the visual assessment with Specialists.
	Structural Steel Platform	1. Steel structure to be demolished, refurbished, and rebuilt as a mezzanine platform with individual column supports.
iv. Sludge Drying Beds	Surface Bed	1. Vegetation and soil to be removed to assess the surface bed together with a Specialist.
	Reinforce Concrete Walls	1. Vegetation and soil to be removed to assess the surface bed together with a Specialist.

v.	**Administration Building**	Reinforce Concrete Columns	1. Thick plaster to be removed to assess the state of the RC columns.
		Reinforced Concrete Beams	1. Thick plaster to be removed to assess the state of the RC beam at the section of the crack.
		Masonry	1. Firewall to be demolished and rebuilt to SANS 10400: Part K specifications.
		Roofing	1. The trusses must be inspected by a Specialist and declared fit for use before handing over the structure.
		Roof Slab	The plaster is to be removed and redone to a 10mm screed
vi.	**MCC Buildings**	Surface Bed	1. Surface bed to be screeded as per the Architectural Drawings.
		Reinforced Concrete Beam	1. Coring of a representative sample of the RC beam to confirm the concrete strength and design requirements. 2. Rebar Scanning on a section with propagating cracks, to ensure the right reinforcement had been placed as per the rebar drawings.
		Masonry	1. The entrance to the transformer room is to be remediated to ensure that the work conforms to SANS 10400: Part K.
		Roofing	1. The trusses must be inspected by a Specialist and declared fit for use before handing over the structure.

6. Specialist Investigations Required

The following Specialist Studies are required by others to produce a comprehensive final Assessment Report:

1. Reinforcement Scanning Report
2. Concrete Coring and Strength Verification Tests
3. Reinforcement Corrosion Assessment
4. Timber Trusses Assessment Report
5. Geotechnical Investigations and Soil Sampling
6. Leak Assessment of Critical Structures

7. Document Approval

VISUAL ASSESSMENT REPORT ISSUED BY SDM ENGINEERING AND PROJECT MANAGEMENT ON: 2022-09-30

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