PASSENGER RAIL AGENCY
OF SOUTH AFRICA

TECHNICAL SPECIFICATION

Project Name: Appointment of a Contractor for the Management, Procurement, Supply, Construction, Testing, Commissioning and Handover of various multidisciplinary renovations and upgrades at various train stations located in the Province of KwaZulu-Natal

Cluster 3: Durban Station

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Amendment History

Issue	*Date*	*Author*	*Reason*

SECTION 1 – INTRODUCTION

The specifications are contained in this document, on the design drawings and on the PRASA standard document 'Blueprint 2022'. Where the Contractor is of the opinion that there is a contradiction in any specification, it shall immediately bring this to the attention of the engineer, where after the engineer shall provide the necessary clarification.

SECTION 2 – ARCHITECTURAL SPECIFICATION

The reference code in the table below refers to the PRASA specifications document titled 'Blueprint 2022' which has been included as an Annexure to this document.

Table 1: Architectural Specifications

Specification
Floors
600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles, mineralised with 3mm grouting lines.
300 x 300 x 2,0mm thick semi-flexible vinyl floor tiles or similar approved.
600 x 600 x 20mm– Lava Stone - with 5mm grouting, sealed with manufacturer recommended sealant or similar approved.
200x100x80mm min thickness Premium Interlocking concrete paving blocks or similar approved.
Skirting
300mm high natural porcelain tile, bedded to wall with cement adhesive or similar approved.
Existing timber skirtings to be sanded down & varnished with Clear Woodcare Varnish or Woodgard Interior Double Life polyurethane varnish as per heritage requirements. New skirting profiles to be installed where necessary, to match existing. Eggshell finish or similar approved.
300 x 600mm & 600x600mm Full Bodied polished Porcelain tiles with 3mm grouting lines. Wall edge / corners to be finished with Stainless Steel Square Edge Trims.
Walls
600 x 600mm & 300 x 600mm Full Bodied Porcelain tiles with 3mm grouting lines. Complete with stainless steel square edge trim. Matt finish or similar approved.
300 x 600mm & 600x600mm Full Bodied polished Porcelain tiles with 3mm grouting lines. Wall edge / corners to be finished with Stainless Steel Square Edge Trims.
12mm one coat smooth plaster and painted with two coats acrylic paint or similar approved.
12mm one coat smooth plaster and painted with two coats or similar approved.
Flush jointed facebrick
Aluminium curtain wall partition with safety glass infills or similar approved.
Doors
New shop primed mild steel door frames to be sanded down, treated, and painted Gloss Enamel or similar approved.

All new aluminium door frames to be natural anodised aluminium or similar approved.
Existing external timber door frames to be sanded down & varnished or repainted with two coats of quality varnish as per heritage requirements or similar approved.
Paint all internal door leafs to be painted with new to match existing or similar approved.
Paint all external door leafs to be painted with new to match existing or similar approved or similar approved.
Manual Push-up Roller Shutters, for openings not exceeding 2,0m x 3,0m high or similar approved.
Solid steel doors for security and durability inclusive of supporting ironmongery or similar approved.
Solid flush panel door with hardboard both sides & 2 concealed edges to suite opening or similar approved.
Semi-solid flush panel door with hardboard both sides & 2 concealed edges to suite opening or similar approved.
Purpose made aluminium door frame to suite opening, safety glass infill or similar approved.
Windows
All new aluminium windows to be natural anodised aluminium or similar approved.
Existing Timber window frames to be sanded down & varnished or repainted with two coats of quality varnish as per heritage requirements or similar approved.
Existing steel window frames to be sanded down, treated and painted with new to match existing or similar approved.
General powder coating colour.
Bullet Resistant Pay / Transaction Windows including sales windows & information desk or similar approved.
Roller Blind installed into the Ticket Sales window, lowered down indicates Ticket counter not in use currently or similar approved.
Ceilings
600 x 600mm perforated lay-in powder coated aluminium ceiling tiles with acoustic backing laid on prepainted tees and adjustable hanger system.
1200 x 600 x 15mm thick acoustic ceiling tiles laid on prepainted tees and adjustable hanger system or similar approved.
1200 x 600 x 12,5mm vinyl faced ceiling panels laid on tees and adjustable hanger system or similar approved.
Flush plaster gypsum or Magna Board ceiling fixed to concealed suspended tee system skimmed and prepared to receive 2 coats quality PVA paint or similar approved.
Concrete soffits to be painted, rippel paint texture or similar approved.
15mm smooth plaster to underside of soffit & painted or similar approved.
Flush plaster fiber cement or Magna board ceiling fixed to concealed suspended tee system prepared to receive 2 coats external prepared quality PVA paint or similar approved.
Isoboard or similar approved extruded polystyrene over-purlin ceiling boards or similar approved.
Steel and other metal items
One coat of waterprime, one coat of universal undercoat, two coats of gloss Enamel as supplied or similar approved.
Roof
Chromadek Concealed fix Klip-Lok 700 roof sheeting or similar approved.
Aluminium gutters and down pipes.
Fiber Cement or Magna Board Fascia/barge.
Miscellaneous
Granite Tops or similar approved.

Office Worktops to client choice and approval.
Precast concrete-timber composite benches.
Street pre-cast concrete bins.
Sinks
Double stainless steel Kitchen Sinks or similar approved.
Small Kitchens / Kitchenette stainless Sinks or similar approved.
Stainless Steel Slop hopper / Mop Drip Sink or similar approved.
Ablutions fittings
Sloped Granite Slab basin to details document or similar approved.
Waterborne Wash Hand Basin with wall mounted push on demand tap – Vandal resistant or similar approved.
Drop-in vanity basin with push on demand tap - Vandal resistant or similar approved.
Wash hand basin with one taphole & pedestal or similar approved.
Wall mounted top inlet Urinal or similar approved.
Wall mounted top inlet Urinal or similar approved. (at least one urinal to be installed at lowered height for kids).
Vandal resistant WC pan or similar approved.
Paraplegic wall hung WC with back inlet flush valvet or similar approved.
Close coupled suite or similar approved.
Disabled Ablution Facility
Bathroom Butler Paraplegic Rails dog leg grab rail with 3 supports or similar approved with brushed stainless-steel finish, plugged and screwed to wall with stainless steel screws.
Bathroom Butler Paraplegic Rails flush valve grab rail with brushed stainless-steel finish, plugged and screwed to wall with stainless steel screws.
General
Refer to PRASA station design blue print annexure for furniture, accessories, supporting ironmongery and detailed signages.

SECTION 3 – STRUCTURAL SPECIFICATION

1. CONCRETE, FORMWORK AND REINFORCEMENT

This section covers the construction of all new reinforced concrete and associated concrete works requirements for the proposed construction of the security wall, as directed by the Engineer.

1.1. PARTICULAR SPECIFICATIONS

The following specifications shall apply:
NB: All in situ concrete work (mass and reinforced) shall comply with SANS Specification 1200G (“8 Measurement and Payment” is not applicable) supplemented by the clauses in this section. Where SANS Specification 1200G and the clauses in this section are in conflict the clauses in this section shall take precedence.

In addition the "Model Preambles for Trades" as recommended and published by the Association of South African Quantity Surveyors, 1999 Edition, shall be read in conjunction with and shall apply to all items in the Bill of Quantities not covered by the 'SANS Standardised Specifications' SANS 1200 Series.

Where the term “plain concrete” appears in SANS Specification 1200G it shall be read as “mass concrete”.

- SANS 1200 G Concrete
- SANS 2001: CC1 Construction Works: Concrete Works (Structural)
- SANS 1083: 2006 Aggregates from natural sources
- SANS 10100-2:2000 The Structural use of concrete – Part 2: Materials and execution of work.
- SANS 50197-1:2000 Cement – composition, specifications and conformity criteria. Part 1: Common cements
- SANS 1491-1:2005 Portland cement extenders – Part 1 Ground granulated blast furnace slag.
- SANS 1491-2:2005 Portland cement extenders – Part 2 Fly ash.
- SANS 1491-3:2006 Portland cement extenders – Part 3 Condensed Silica Fume

1.2. CEMENT

Common cements, complying with SANS 50197-1 shall be used for all concrete work. On no account shall masonry cements be used for concrete work, even if the strength designations are the same as for common cements.

The Supervisor for test purposes may require samples of cement from any one, or from every consignment. Cement in any consignment from which a sample may have been taken for testing shall not be used until it has been approved. Allowance must be made for possible delay in that tests may take 10 days to carry out.

Bags of cement shall be stacked in a waterproof, solidly constructed shed with a central door and a floor rendered damp-proof with a tarpaulin. The bags of cement shall be closely stacked (but not against walls) in order to reduce air circulation in such a manner that the cement is used in the order in which it was received, i.e. first in first out.

1.3. CRACKS

The crack must be sealed with a low viscosity sealant to prevent further corrosion to the reinforcing in the concrete or/and the brickwork following exposing the affected areas to identify the severity on each fracture.

Crack filling sealants/bonding agents or similar approved may be used to the manufacturer specification.

All paint or/and plaster cracks will require re-plastering and repainting to match existing finish

1.4. WATERPROOFING

The existing waterproofing must be removed and replaced with a 4mm bituminous agent and a two coat bitumen aluminium agent or similar.

All drainage ducts from the roof must be cleaned to ensure that there is no blockage.

1.5. ALKALI REACTIVE CONCRETE

Alkali Reactive Aggregates shall not be used in this project. The equivalent Na2O content of the concrete shall not exceed 2, 0 kg/m3 where % Na2O equivalent = % Na2O + (0,658 x %K2O)

1.6. AGGREGATES

Fine and coarse aggregate shall comply with the relevant clauses of SANS 1083. No aggregate shall be delivered for use in the works until approval is given.

1.6.1. Sand (fine aggregate)

The fine aggregates shall comply with the requirements of SANS Specification 1083. Other aggregates may be approved if they have a satisfactory history and / or test results.
No aggregate may be used until it has been approved. Samples having a mass of 25kg (16.5 litres) of the proposed aggregate to be used may be required by the Supervisor for test purposes. Samples having a mass of 25kg shall be forwarded every 3 months during concreting work and also if the source of supply is changed. Allowance must be made for possible delay in that the tests may take 14 days to carry out.

1.7. ADMIXTURES

Admixtures containing chlorides will not be permitted in reinforced concrete.

1.8. COVER BLOCKS

Cover blocks used to ensure the cover to reinforcement shall be made of cement mortar. Cover blocks shall be dense and have a minimum 28-day crushing strength of 30 MPa and shall be cured in water for at least 14 days before being used.
Cover/spacer blocks made of plastic will not be permitted.

1.9. CONCRETE QUALITY

Prior to the start of any concrete work on site, the Contractor shall submit a quality assurance plan which will ensure compliance with specification and provide acceptable documentary evidence that all specified operations have been carried out satisfactorily.

Where the minimum dimension to be placed during a single pour is larger than 600mm, and the cement content of the reinforced concrete exceeds the following:

- Cement Types I and II/ * S : 400 kg/m3
- Cement Types II/B-V and II/B-W : 450 kg/m3

The Project Manager may require that measures be instituted to reduce heat development in the concrete.

1.10. UNREINFORCED CONCRETE

Class A Concrete: Filling to cavity of hollow walls.

Unreinforced concrete cast against excavated surfaces: 15 MPa/19mm Concrete, Surface blinding under footings and bases.

1.11. REINFORCED CONCRETE

30 MPa/19mm Concrete:

- Foundation bases,
- Columns,
- Precast panels.

1.12. BATCHING

All cementitious binders shall be batched by full sack or by mass batching with approved precision weighing equipment.

All aggregates shall be precisely measured by mass using approved precision weigh-batching equipment, unless otherwise permitted by the Project Manager.

Should any variation in the composition of the aggregate become apparent, the Project Manager shall be notified and a further sample of aggregate submitted immediately for his approval.

1.13. CONCRETE PLACING

The size, shape and depth of any excavation shall be approved by the Project Manager before concrete is placed.

Unless otherwise permitted by the Project Manager, no concrete shall be placed until the fixed reinforcement has been accepted by him and confirmed in writing by way of a release certificate.

1.14. GROUTING

25 MPa non-shrink cementitious grout: Bedding approximately 25mm thick under base plate including chamfered edges all round.

1.15. CURING COMPOUND

Unless otherwise directed by the Project Manager, the curing compound shall be:

- An approved trafficable, resin-based, white pigmented, membrane forming for slopes flatter than 1:1.
- An approved clear, aesthetically acceptable, membrane forming for all other concrete surfaces, including beam and slab soffits.

The curing compound shall comply with specification ASTM C309, except that the maximum permissible water loss in the test shall be 0, 40 kg/m2.

Alternatively, the curing compound shall be acceptable if the treated concrete retains 90% or more of its mixing water when subject to the test set out in BS 8110 Part 1 – Chapter 6.6.

1.16. CURING COMPOUND APPLICATION

The total application rate of the curing compound shall be the greater of the supplier's specification or 0.90 l/m2. On textured concrete surfaces, the total application rate shall be 0.90 l/m2.

In cases of concrete surfaces with run-off problems, it may be necessary to apply more than one coat of membrane forming curing compound to obtain the specified total or cumulative application rate.

Curing in accordance with SANS 1200 G shall commence on all concrete surfaces as soon as it is practical in the opinion of the Technical Officer.

On unformed surfaces the curing compound shall be applied after finishing and as soon as the free water on the surface has disappeared and no water sheen is visible, but no so late that the liquid curing compound will be absorbed into the concrete.

On formed surfaces, the exposed concrete shall be wet with water immediately after the forms are removed and kept moist until the curing compound is applied.

Application of the curing compound shall begin once the concrete has reached a uniformly damp appearance with no free water on the surface.

Application of the compound may be done by hand or power spray.

The compound shall be applied at a uniform rate with two applications at right angles to each other to ensure complete coverage.

Pigmented compounds, without a thixotropic agent, shall be adequately stirred to assure even distribution of the pigment during application.

Unless otherwise directed by the Project Manager, the initial 24 hour curing of concrete surfaces not covered by formwork shall be carried out by ponding, covering with constantly wetted sand or mats, or continuous spraying in accordance with SANS 1200 G when the following climatic conditions occur:

1. Wind velocity greater than 5 m/s

and/or

2. Ambient temperature is above 25 °C

and/or

3. The relative humidity is below 60 %

If plastic shrinkage occurs, the concrete, while still plastic, shall be re-vibrated, floated and re-coated with curing compound as if no curing has previously taken place.

1.17. CURING PERIOD

The curing period for concrete containing only CEM 1 shall be 7 days.

The curing period for concrete containing CEM 1 plus cement extenders (MGBS, FA) shall be 10 days.

The curing period will start on completion of the concrete pour and for formed surfaces shall be included the time for which forms are still in place after the pour.

1.18. CONCRETE RECORDS

The Contractor shall maintain the following daily records for every part of the concrete structure and shall make these available at all times during the progress of the work for inspection by the Project Manager:

- The date and time during which concrete was placed
- Identification of the part of the structure in which the concrete was placed
- The mixed proportions and specified strength
- The type and brand of cement
- The slump of the concrete
- The identifying marks of test cubes made
- Curing procedure applied to concrete placed
- The times when shuttering was stripped and props removed
- The date of despatch of the cubes to the testing laboratory
- The test results

The records shall be delivered to the Project Manager each week except in the case of sub-standard concrete, when the Project Manager shall be informed immediately.

1.19. TOLERANCES

Deviations shall be within the limits listed in SANS 1200 G for degree of accuracy II unless otherwise specified.

1.20. TESTING AND MONITORING

Frequency of sampling and testing shall be as specified in SANS 1200 G

1.21. COST OF TEST

The costs of making, storing and testing of concrete test cubes as required under clause 7 'Tests' of SANS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the Project Manager. The testing shall be undertaken by an independent firm or institution nominated by the Contractor to the approval of the Project Manager (Test cubes are measured separately)

If the quantity of concrete from which samples were taken exceeds 40 m3, it shall be subject to the testing of a minimum of 3 sets of samples per day from each grade of concrete placed in each independent structure.

If the quantity of concrete from which samples were taken is less than 40 m3, it shall be subject to the testing of a minimum of 2 sets of samples per day from each grade of concrete placed in each independent structure.

If the Contractor disputes the results of the tests on concrete cubes, the concrete represented by the cubes will be considered acceptable if the Contractor, at his own cost, proves to the satisfaction of the Project Manager that the estimated actual strength of cores taken from the structure, determined in accordance with SANS Standard Method SM 856, is not less than the specified strength.

If the strength of the concrete fails to meet the acceptance criteria stipulated, the Project Manager may in his sole discretion and in addition to the options listed in SANS 1200 G:

i. Accept the concrete subject to approved remedial measures being undertaken by the *Contractor*; or

ii. Permit the concrete to remain subject to the payment of a penalty

The penalty referred to will be determined as follows:

Penalty = V x R x F

Where,

V = Volume (in the opinion of the Project Manager) of concrete of unsatisfactory strength represented by the test result.

R = Relevant scheduled rate

F = $$1-\sqrt{\frac{Average\ strength\ of\ \ unsatisfactory\ concrete}{Specified\ strength\ \ +\ \ 6\ MPa}}$$

Where the relevant scheduled rate (R) includes the cost of formwork or

F = $$1-\frac{Average\ strength\ of\ \ unsatisfactory\ concrete}{Specified\ strength\ \ +\ \ 6\ MPa}$$

Where the relevant scheduled rate (R) excludes the cost of formwork or where no formwork was involved.

1.22. FORMWORK

Rough formwork (degree of accuracy ii)

Rough Formwork to Sides:

- Strip footings.
- Bases.
- Rectangular columns in foundations.

1.23. REINFORCEMENT

High tensile steel reinforcement to structural concrete work:

- In various diameters and lengths
- Mild steel reinforcement to structural concrete work
- In various diameters and lengths
- High tensile steel reinforcement to structural concrete work
- Fabric reinforcement:
- Fabric reinforcement type as specified on structural drawings.

1.24. "NO FINES" CONCRETE

"No-fines" concrete, for grading flat concrete roofs and the like to falls, shall be in the proportion of 12 parts 19 iron cubical stone to 1 part cement mixed with 20 litres water per bag of cement and be laid to falls of not less than 15mm per linear metre for mastic asphalt and not less than 20mm per linear metre for sheet roof covering. For heavy load applications special mix designs may be required

1.25. STEEL WORK

Governing Codes and Standards

- ANSI/AWS D1.1 : Structural Welding Code - Steel
- BS-EN 287 Part 1 : Approval testing of welders/fusion welding
- BS-EN 288 Part 3 : Specification and approval of welding procedures for metallic materials
- BS 5135 : Metal arc welding of carbon and carbon manganese steels
- BS 4360/SANS 50025: Weldable structural steel

- BS 2573 Part 1 : Classification, stress calculations and design of structures
- BS 3923 : Methods for ultrasonic examination of welds
- BS 2600 : Radiographic examination of fusion welded butt joints in steel
- DIN 1026 : Metric channels
- ISO R657 : Angles
- SANS 10094 : The use of high strength friction grip bolts and nuts
- SANS 135 : ISO metric bolts, screws and nuts (hexagon and square)
- (coarse thread free fit series)
- SANS 136 : ISO metric precision hexagon-head bolts and screws, and
- hexagon nuts (coarse thread medium fit series)
- SANS 435 : Mild steel rivet

1.26. STRUCTURAL STEELWORK

The design of all structural steelwork shall be such as to provide a robust and rigid structure requiring the minimum of maintenance and providing a long service life. In the design of steel structures, due cognisance shall be taken of environmental and wind load conditions as specified in the main specification.

Due to the highly corrosive conditions experienced in South African coastal regions, the permissible stresses shall not exceed those set out in British Standard No. 2573.

All steel sections shall be manufactured in accordance with the following standards:-

i. BS 4360/SANS 50025 : Weldable structural steel

ii. BS 4 Part 1 : I and H sections

iii. DIN 1026 : Metric channels

iv. BS 4 Part 1 : Structural steel, hot rolled sections

v. ISO - R657 : Angles

vi. BS 4848 Part 2 : Hot finished hollow sections

vii. BS 6363 : Cold formed sections

viii. BS 29 : Forgings

ix.	BS 3100	:	Steel castings
x.	BS 1452	:	Cast iron

All steel plates and rolled steel sections used in the construction of the structures shall be of steel made by the open hearth process (acid or basic) and shall comply in every respect with BS 4360, "A" quality Structural Steel for Bridges and General Building Construction, Grade 43A or Grade 50B or SANS 50025 grade S355JR, where sections sizes allow. That is, the percentage of phosphorous and sulphur shall not exceed 0.06%.

The above is laid down as a standard, but tenders will also be considered for rolled steel not conforming strictly to the above standard. Full particulars of the guaranteed properties of the steel tendered for should in this case be furnished, i.e. chemical composition, tensile strength, yield point, reduction in area, bend tests, etc.

Forgings and drop forgings shall be free from flaws and surface defects of any kind and be accurately finished to the prescribed dimensions.

Steel castings shall be sound, clean and free from all defects and distortion of any kind and should, except where otherwise specified, conform with the conditions and tests specified in B.S. No. 3100/Latest Edition, for grades A, B and C according to requirements. They shall be thoroughly annealed and all working parts and bearing surfaces shall be machined and turned accurately with correct finish.

The dimensional and out-of-square tolerance as specified in the above Standards shall also apply to built-up components. Edge preparations, welding techniques, straight beds and material fit-up shall be considered when welded joints are designed.

The shape of all members and connections must allow easy accessibility for maintenance painting of all surfaces. No members shall comprise a double member which cannot be painted and maintained.

Structural details must be so designed as to eliminate or seal off any cavities or pockets where water or condensation could collect and promote corrosion. Horizontal members with upstanding flanges require special drainage.

All hollow sections shall be completely closed and airtight, and all welding is to be of such size and quality as to ensure complete airtightness. No tapping or drilling of holes into sealed sections will be permitted.

1.27. WELDING

All the provisions of BS 5135 shall be complied with as far as applicable.

Design of weld joints shall be such that crevices, overlaps, pockets, arc strikes and dead ends do not exist.

All joints shall be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into the tubular members by ensuring that each such tubular member is airtight. “Stitch” welding will not be permitted. Only continuous welding will be accepted.

Weld cracks, undercut, or pock marks will not be accepted.

All welds on the load bearing frame structure, containers, piping, pipe line flanges, etc., shall be continuous and shall be visually inspected for cracks and other discontinuities.

Welds on the main chords must be tested ultrasonically in accordance with BS 3923 or X-rayed in accordance with BS 2600 and those on minor joints by the dye-penetrant method. The equipment required for these tests must be supplied by the Contractor and the testing done at his cost.

Steel, except in minor details, which has been partially heated, shall be properly annealed. (Electrically welded structural members accepted.)

All brackets, clamps, lugs, straps, suspenders, etc. required for attaching mechanical and electrical equipment must be welded on prior to erection and special precautions must be taken not to damage welds or puncture tubes during erection.

The welding of all rails shall be done by an approved method.

Welding shall only be carried out by a coded welder according to SANS 10044, BS-EN 287 Part 1 and BS-EN 288 Part 3 or ANSI/AWS D1.1.

All parts to be welded shall be thoroughly cleaned and dried before welding. The welding will only be done in dry surroundings and all steps taken to prevent hydrogen embrittlement.

Where materials of different compositions are joined by welding, especially carbon steel to chrome steel, the filler welding method and post welding treatment shall be such that embrittlement and other degradation of both steel and filler is prevented.

It must be ensured that welded joints are ductile.

1.28. FASTENERS

All bolts, nuts and rivets shall be manufactured in accordance with the following standards:-

- SANS 135 : Commercial bolts and nuts Grade 4.6
- SANS 136 : Precision bolts and nuts Grade 8.8
- SANS 10094 : Friction Grip Bolts and nuts Grade General
- SANS 435 : Rivets

All friction grip fasteners shall be hot dip galvanised, including high tensile bolts (and their nuts and washers), structural rivets and Huck bolts.

All holding down bolts and nuts and brackets, as well as all fixing bolts, studs, nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

Bolts and set screws shall be locked in an approved manner and shall not be stressed in tightening to beyond the recommended loads.

The quality of friction grip bolts, nuts and washers, bolt lengths, sizes of holes, tightening standards, surface condition of clamped components, shop and site assembling and acceptance inspection of friction grip joints shall comply with the latest edition of SANS 10094. Certificates shall be supplied for all bolts of grade 8.8 and 10.9.

All bolt and rivet holes must be accurate to size and location, the centres of holes shall not be placed nearer the edge of a plate than 1.5 diameters with an extra allowance of 3mm for sheared edges. All holes in the structural work shall be drilled or otherwise punched to a diameter not exceeding 1,5mm less than the diameter of the finished hole on the die side, and afterward reamed out to the exact size.

Where possible the adjoining parts forming a connection shall be drilled or reamed together, with holes not exceeding 1.5 mm diameter the rivet or bolt for which it is made. No rough or broken edge shall be left around any of the holes.

For turned and fitted bolts, the holes shall be accurately drilled or reamed; the diameter of the hole shall not exceed the finished diameter of the bolt by more than 0,25mm.

The holes, after assembly of the parts, shall be true throughout the thickness of all the parts and perpendicular to the axis of the member.

Rivets shall be cup-headed or countersunk as required, unless otherwise specified. No rivet head shall contain less metal than does a length of the rivet equal to 1,25 times its diameter. All loose and defective rivets shall be cut and replaced by sound ones; also others when required for the purpose of examining the work. Rivets shall be driven with pressure tools whenever possible and pneumatic hammers shall be used in preference to hand driving.

All field rivets must be supplied with shanks of suitable length for pneumatic riveting.

Bolts shall be of such a length as to accommodate a full nut when tightening up, and project at least two thread pitches beyond the nut. Excessive projection of threads beyond the nuts should be avoided.

All bolts having countersunk heads shall have strong feathers forged on the neck and head to prevent turning and the bolt holes shall be cut to receive same. All nuts and bolts (excluding countersunk bolts) shall be furnished with circular washers of sufficient thickness, the outside diameter being at least twice the nominal diameter of the bolt, and washers fitted correctly.

Where bolt heads or nuts are seated on bevelled surfaces of beams or channel flanges, bevelled washers must be inserted.

1.29. JOINTS AND MATING SURFACES OF MEMBERS

Mating surfaces of members to be joined by high tensile steel bolts in friction grip shall be cleaned and primed as specified for the rest of the steelwork. Mating surfaces shall lay flat against each other to eliminate gaps which may allow ingress of water. After joining, the edges shall be sealed with an approved brand of Butyl/ Rubber sealing compound by means of a suitable caulking gun, or shall be seal welded.

Other joints shall be formed by one of the following methods:

i. The mating surfaces of members shall be blast cleaned, primed and protected prior to sub-assembly by the liberal application of caulking compound. While the compound is still wet, the members shall be bolted together and caulking compound which is squeezed out shall be completely removed.

ii. The mating surfaces shall be protected with the full corrosion protection system as specified, the surfaces joined together and the joint so formed shall be sealed with butyl rubber sealer.

iii. After being cleaned and primed the surface shall be joined together and the joint so formed shall be seal welded.

iv. The primer coating on mating surfaces must be applied not more than 4 hours after cleaning and the edges must be sealed within 3 weeks of assembly of the part.

1.30. FABRICATED PARTS

All fabricated parts shall be properly fitted during assembly to result in properly aligned equipment having a neat appearance. Fabrications of load bearing members shall have no abrupt changes in cross section and regions of severe stress concentration. All sharp corners accessible by personnel during erection or operation shall be ground, rounded, or removed by other methods. Burrs, welding spatter and stubs of welding wire shall be removed.

1.31. CORROSION PROTECTION

Scope

PRASA requires that the Contractor supply, install and guarantee a robust, climatically suited, grade corrosion protection system for use on all steelwork. The Contractor may select either a 3-Coat or 1-Coat system. The corrosion protection system selected for use shall be from an internationally recognised and reputable supplier. The selected corrosion protection system shall carry a minimum 5year guarantee, defined as a maximum of 1% of the total area of corrosion protection breakdown per year. The Contractor shall be required to repair yearly, any corrosion protection breakdown exceeding 1% of the total surface area. The paint supplier

shall carry the guarantee for the first 5years. A guarantee certificate, from the paint supplier, is required prior to the construction Works.

The final paint selection by the Contractor shall be approved by the Engineer before its application.

Typical Accepted Sequence of Corrosion Protection Application – 3 coat system

- High pressure wash, clean and remove oils and contaminants,
- Descale,
- Grit blast to SA 2 ½,
- Remove all slag and waste,
- Stripe coat using 1st coat primer: angles, stiffeners, edges, corners, welding seams and all areas inaccessible by spray painting,
- Spray 1st primer coat to all surfaces,
- Allow sufficient drying time,
- High pressure wash to remove dust before next coat application,
- Stripe coat using 2nd coat primer: angles, stiffeners, edges, corners, welding seams and all areas inaccessible by spray painting,
- Spray 2nd primer/intermediate coat to all surfaces,
- Allow sufficient drying time,
- High pressure wash to remove dust before final coat application,
- Stripe coat using final coat: angles, stiffeners, edges, corners, welding seams and all areas inaccessible by spray painting,
- Spray final coat to all surfaces

Paint specification – 3 coat system

- 1st Coat Primer to be 150 microns DFT,
- 2nd Coat Primer to be 150 microns DFT,
- Coat to be 160 microns DFT.

Paint Application

The application instruction covers surface preparation, application equipment and application details for corrosion protection to steelwork according to the requirements of IMO Resolution MSC.215 (82): Performance Standards for Protective Coatings on Steelwork.

- The steel surfaces shall be prepared so that the coatings achieve an even distribution at the specified nominal dry film thickness. Adequate adhesion ensured by removing weld spatter and any other surface contamination,
- All welding seams shall be partially dressed to remove irregular profiles,
- Surface pores, pits and craters shall be sufficiently open to allow penetration of the paint,
- Sharp edges shall be treated to a round radius of minimum 2mm,
- Before blasting any deposits of grease or oil must be removed from steel using a suitable detergent followed by fresh water hosing,
- Minor spots of oil grease may be cleaned with thinner and clean rags,
- Steel must be abrasive blast cleaned to SA 2 ½,
- Welds as well as shop primed areas with damage, burn marks and rust must be blasted to SA 2 ½,
- Surfaces with deposits of black iron oxides from gas cutting markings shall be cleaned by light abrasive sweep blast,
- Welds coated with temporary primer after welding must be cleaned by hard abrasive sweeping, preferably abrasive blast,
- Spot checks for possible salt contamination of the surfaces must be executed,
- Overlap zones must be treated with great care,
- Relative humidity shall be 85% or below, the steel temperature shall be 3-5 degC above the dew point,
- The paint layer must be applied homogeneously and as close to the specification as possible,
- The finished coatings must appear as a homogeneous film with a smooth surface. Any defects of bubbles, voids, visible abrasive residue shall be marked and appropriate repair affected.

SECTION 4 – ELECTRICAL ENGINEERING

1. GENERAL

The Contractor will be responsible for the stripping existing electrical installations, supply, delivery, installation, testing, commissioning and handing over in proper working condition of the complete upgrading of the new electrical installation, as specified in detail in these documents. Also included in the scope is the supply of as-built drawings, operating and maintenance manuals and on-site training of the Employer's staff.

The Scope of Work shall include the supply of all necessary required Equipment and Contractor's Personnel to properly perform the Contractor's obligations under the Contract, including:

a) Construction Site surveys (dimensional, layout, checking etc.);

b) ensuring that the completed Works shall comply with the Codes and Standards and any applicable statutory requirements;

c) selection of suitable Plant and Materials (where not already specified herein);

d) offloading of Plant and Materials at Site;

e) safety equipment (guards, notices, etc.;

f) construction, erection and the supervision of the Works;

g) specialist installation and installation supervision;

h) removal and disposal, as approved by the Employer, of all scrap and rubble generated by the Contractor within the Site to a demarcated area on the Site;

The Contractor must return all returnable documents on the attached specification of this document with the tender's returnable document.

2. LOW VOLTAGE SCOPE

The electrical work includes, but is not restricted to the following:

- Strip all existing electrical installation and redundant cables and hand them to PRASA and certain rubble is for disposal at Contractors cost
- Isolation, disconnect and make safe,
- The supply, delivery, installation, connections and testing of any material and equipment associated with the electrical supply connections to the buildings equipment's
- Supply, delivery, installation, connection and testing of busbars complete with housing

- The supply, testing and inspection at the manufacturer's premises, installation, connection, testing and commissioning of new distribution boards and switchgears
- Supply, delivery, installation and connection of all power and lighting, distribution, cabling, conductors i.e. socket outlets, light switches, isolators, etc.
- Supply, installation and connection of all circuit wire ways, cable trays, cable ladders, conduit, draw and outlet boxes and sleeves as per the drawings
- Supply, delivery and installation of earthing and bonding including clean earth for instrumentation system
- This includes the installation of a lightning protection system as per the drawings. A suitably certified Contractor shall install the lightning protection system and all earthing points shall be tested and the results recorded. All test results shall be submitted to the Project Manager in the form of a test report/certificate. Payment for this portion of the project cannot be made until the Project Manager has accepted the results of the tests
- Supply, delivery, installation and connection of all circuit wiring, cables and conductors;
- Provide labelling on distribution boards and equipment and cover plates as per specification
- Supply, delivery, installation and connection of all luminaries as per specification
- Connection of electrical power to all mechanical equipment / motors and systems
- Supply, installation, connection and testing of an earthing system entire installation including LV distribution boards providing clean earth for instrumentation
- Excavations for all cable trenches, compaction, backfill and making good of existing surfaces
- Co-ordination with PRASA (where applicable) and Municipality / supply authority representatives when required etc.
- Testing of all new installations in accordance with the latest requirements of SANS 10142, the Electrical Contracting Board of South Africa and the issue of a certificate of compliance test report for the electrical installation in the buildings
- Any other work deemed necessary by the Project Manager for the completion of the project.

3. MAIN DISTRIBUTION BOARDS / MAIN ELECTRICAL PANELS

3.1. GENERAL

The electrical panels shall be suitable for the coastal environment and prevailing climatic conditions on site and equipment shall be designed and manufactured in accordance with SANS 1973/60439. The equipment shall conform to SANS 60947 Parts 1 -7, and shall be

suitable for operation on supply voltages of 230/400 Volt at 50 Hz, AC. Reference must be made to the schematic/line diagrams, as well as to the following specific requirements.

The main distribution boards in the substations shall be of the free standing, floor mounted, multi-tiered, with individual main MCCB/Isolator for each motor starter, with front and back access, suitable for top busbars entries and bottom and top exit cable. The schematic drawings show the specific requirements applicable to each assembly.

The assembly shall be constructed of and manufactured from stainless steel grade 316 or as per single line diagram.

The minimum thickness of 2mm thick electrical panel.

The metal enclosures, internal panels and all equipment support frames shall be manufactured from the same type of plate stated above.

The degree of protection shall not be less than IP54 in accordance with SANS 1222 and capable of withstanding the temperature, humidity and coastal conditions. The assembly shall be fully vermin proofed.

A hot dipped galvanised steel base frame with predrilled holes for fixing the electrical panels to the floor shall be provided and removable lifting eyes with blanking off plugs shall be provided for lifting heavy assemblies. The panel shall be suitably braced to ensure rigidity. The method of preparing plate-work, priming and painting shall be in accordance with the standard painting specification.

The electrical panels are to be fully assembled in the manufacturer's factory for final acceptance tests. Where broken down for transportation to site, the electrical panels will be provided with all items required for re-assembly. Provision must be made for future extension at either side of the panels. All holes provided for such extension to be suitably plugged or covered.

The overall outside dimensions of the assembly shall be suitable for easy handling of the switchgear as indicated on the drawings.

All hinged front panels shall be fitted with stainless steel or heavy duty rustproof hinges of an approved manufacture with a 180° movement and shall be secured in the closed position by means of locking devices of approved quality. Hinged front panels in excess of 450mm height shall be secured at both the top and bottom. Lockable catches are required on all hinged front panels. All hinged front panels are to be fitted with earth straps.

Covers, other than the hinged type, shall be provided with chromium plated handles to facilitate removal. Removable covers shall be secured in position by means of patent screw locking devices approved by Engineer. All removable covers and hinged front covers shall have a neoprene or rubber gasket to ensure that the required IP rating of the panel is achieved.

All the equipment shall be mounted behind the hinged front panels and neat machine punched openings shall be provided for the purpose of operating handles etc. The drawings will detail the instruments required which will be flush mounted. The positions of instruments shall be such that the glass cannot be broken by other equipment when the hinged front panels are in the fully open position.

Cut outs which are provided for future equipment and instruments shall be neatly blanked off by means of removable dummy frames. Back plates shall be provided in all spare cubicles for the specified future starters.

To avoid damage to paintwork, screws, bolts, door lock, etc. must not be in direct contact with painted surfaces.

The Engineer shall approve the manufacturer's detailed working / shop drawings of the assembly before any fabrication commences. Any other construction or type of assembly proposed as an alternative to that specified must have the approval of Engineer in writing. The drawings will detail all dimensions of busbars, connections, electrical component make, type and rating. Positions and layout of busbars, earth bars and gland plates will be shown in front and side elevation drawings.

3.2. PAINT SPECIFICATION

All metal used for the fabrication of the board shall be painted, i.e. internally and externally. Baked enamel, electro statically applied powder coating or similar proven methods, other than standard enamel paint applied by brush, shall be used.

In general, the following standard colours shall be used, but the final colours are to be confirmed with PRASA and the Engineer.

- Non-essential sections Electric orange
- Essential sections Signal red
- Uninterrupted power (UPS) Purple.
- Instrumentation and control Blue.

3.3. EDGES

Care shall be taken to ensure that all edges and corners are properly covered, after all burrs and sharp edges have been removed.

3.4. SURFACE PREPARATION

Surface preparation shall comply with SANS 10064. Prior to painting, all metal parts shall be thoroughly cleaned of rust, mill scale, grease and foreign matter to a continuous metallic finish. Sand or shot blasting or acid pickling and washing shall be employed for this purpose.

The corrosion inhibiting process shall be suitable for the environmental conditions to be encountered on site and full details shall be provided at the time of tendering. Details of the chemical process employed and the method of application shall also be provided at the time of tendering.

3.5. FINISH ON STAINLESS STEEL

One (1) coat of suitable etch primer (15 microns). Apply epoxy polyester powder coat (60 microns final thickness). Steel shall be correctly pickled and passivated prior to being painted. Pickling and passivation shall be undertaken after basic manufacture of the Enclosure is complete.

3.6. BUSBARS

All busbars shall be manufactured from solid high conductivity copper and shall comply with the requirements laid down in SANS 1195. The completed busbar system shall be a standard modular system and shall have been tested to SANS approval and a certificate shall be made available confirming the full busbar technical description, current rating and fault rating together with full details of the test results. Busbars shall be designed to withstand a test voltage of 2.5kV AC for one minute.

The busbar assembly shall be rated in accordance with the specified ultimate projected fault level, which will be not less than the short-circuit stresses limited by the protective device(s) on the supply side of the busbars, as well as the specified continuous full load current, with a current density not exceeding 1,60 Amps per mm². The busbars shall withstand a fault current under test conditions of the specified fault level for 1 second. If a fault level is not specified, the busbars shall be tested at 20 times rated current for 1 second.

The fault current during tests shall be:

- between all three-phases
- any two phases
- neutral and the adjacent phase, and
- earth conductor and the nearest phase conductor.

The busbars shall be continuously rated for the specified current with a maximum temperature rise of 40°C relative to a peak ambient temperature of 40°C giving a maximum peak busbar temperature of 80°C.

Busbars shall be mounted in the top section of the assembly and shall be rigidly supported by means of approved insulated busbar clamps (at intervals not exceeding 500mm) to prevent damage resulting from the specified short circuit conditions.

The busbars shall run along the entire length of the assembly up to 76mm from either end. The phase busbars shall be identified in the phase colours red, white and blue.

The busbars shall be arranged horizontally with the longer side of the cross-sections in the vertical plane and one behind the other in the horizontal plane. The minimum clearance between live conductors and live conductors and earth shall be 40mm.

3.7. EARTH BUSBAR

A solid copper earth bar shall be provided inside each assembly at the back and along the entire length, at a height of approximately 500mm above floor level, or 200 mm above the gland plates. A bar is to be provided at the top of the assembly where top entries exist and this shall be solidly connected to the bottom earth bar.

The bar will be supported on robust spacers and will have a minimum clearance of 40mm to the sheet steel panel.

The earth bar shall have same size as the phase busbars and shall be drilled with the requisite number of holes for the individual connection of all cable ECC and other earth conductors.

The earth bar, busbar joints and cable terminations must not be insulated.

Stainless steel bolts and lock washers shall be provided through the earth bar at each earthing position and at least 5 additional holes will be provided for future connections, each being fitted with nuts and bolts as above.

The earthing positions shall be evenly spaced along the length of the earth bar and the bar must be clearly identified as the earth.

3.8. NEUTRAL BUSBARS

Neutral busbars in 3 phase, 4 wire supplies shall have a cross-section of the same area and size as of the phase busbars. Where single-phase circuits (e.g. lighting and general power circuits) are protected by single-phase circuit breakers or fuses, all neutral conductors shall be connected to a separate neutral busbar mounted in a suitable position. The cross-section of the busbar shall be at same as phase busbars and the busbar shall be long enough for the lug of each conductor to be bolted separately to the busbar. Only one neutral conductor is allowed per nut and bolt combination.

A separate neutral bar shall be provided for each earth leakage unit provided on the switchboard.

3.9. BUSBAR DROPPERS

All busbar droppers must be suitably supported (maximum spacing @ 500mm centres) and braced to suit the specified and/or projected short circuit conditions. They should be fully insulated and screened against accidental contact.

The droppers to the supply side of a single functional unit, as well as the components included in this unit, may be rated on the basis of the reduced short-circuit stresses occurring on the load side of the short-circuit protective device in this unit provided that these conductors are arranged such that under normal operating conditions an internal short-circuit between phases and/or between phases and earth is only a remote possibility, for example by being provided with adequate insulation or shrouding.

Particular attention shall be paid to the provision of adequate facilities for making off the main power supply cables. Attention must be paid to the vermin proofing of single core cabling.

Bunched cable connections will not be accepted between busbars and outgoing power circuit breakers, fuses or isolators.

3.10. BUSBAR CONNECTIONS

All connections and extensions to busbars shall be effected by means of stainless steel nuts, bolts and washers or cadmium plated, high tensile steel bolts and nuts which shall also be provided for future extensions. The minimum diameter of any hole will be 10 mm.

In exceptional cases a relaxation of SANS 1973 may be permitted to allow the drilling of holes, in which case the cross-sectional area as measured is to be reduced by the area of the holes.

3.11. EQUIPMENT

Unless otherwise stated on the drawings the latest version of the following minimum specifications shall be assumed for equipment to be installed in the switchboards:

SANS 60947 relates specifically to equipment for use at voltages up to 1000V AC.

All contactors and/or starters shall be protected with suitable back-up current limiting circuit breakers to protect the equipment against abnormally high currents or short circuits developing in the system.

The manufacturer will be required to ensure the correct co-ordination between circuit breakers, contactors and overload relays to comply fully with SANS 60947 Part 4, in order to achieve 'Type 2' co-ordination.

Unless otherwise stated, contactors and/or starters shall be rated for 10 million operations for making and breaking no-load currents to category AC3 as laid down in SANS 60158. Note that SANS 60947 requires equipment and wiring to be suitable for 7.2 x full load current for Direct-On-Line starters.

Each switchboard shall be provided with a means to isolate the incoming supply. This may be achieved by the use of an isolator, circuit breaker (fixed or draw-out), rated to make against the full system fault at the point and break the full load current. The incoming supply section containing switchgear, protection equipment, controls and instrumentation shall form a clearly labelled, self-contained unit behind one or more hinged panels. The operating handle of the isolator, circuit-breaker or fuse switch controlling the incoming supply shall protrude through the panel and shall be interlocked to ensure that the panel can only be opened when the supply is off.

Equipment that cannot be flush mounted on the panel, shall be mounted on a suitable metal chassis and shall protrude through a close fitting cutout in the panel. All protection relays contained in enclosed units with glass fronts shall be flush mounted on the hinged panels, contactors, thermal overload relays, etc. shall be mounted on a chassis behind the panel.

Access to the various starters shall be possible without isolation of the entire MCC, but the hinged front panels corresponding to each compartment shall be inter-locked with a local isolator in order that any compartment must be isolated before access to the equipment can be obtained. A mechanical device shall be incorporated in each isolation in the off position to provide a locking out facility during maintenance periods.

All over current reset buttons (22mm diameter) shall be mounted on the front panel enabling operators to reset the unit without having to open the panel.

Timers and relays controlling a starter shall be mounted in the compartment with the starter. All timers and relays must be clearly labelled with the identity given on the schematic diagrams.

Equipment to be supplied under this contract must be identical in all respects and it shall be possible to interchange such equipment should it become necessary.

All material and equipment must be suitable for 400/230V-supply voltage, 50 Hz supply frequency and must be approved by the Engineer. In addition all equipment shall be designed, manufactured and tested in accordance with the relevant IEC Standard Specification.

3.12. DERATING OF EQUIPMENT

Full cognisance must be taken of manufacturers derating tables for equipment located in enclosures and the rating of that equipment must be increased accordingly. In all such cases labels must be provided on the front of the associated cubicle stating the maximum permitted circuit loading.

3.13. CABLE TERMINATIONS

Due to the continuing miniaturisation of equipment, difficulties can be experienced in terminating power cables onto equipment terminals, particularly where more than one cable has to be terminated. The manufacturer shall ensure that suitably designed and rigidly braced

copper stubs are extended from such terminals to facilitate the termination of all cables. Flash barriers must be used between the phase terminals of circuit breaker equipment.

3.14. INSTRUMENTATION

All instruments shall be of a matching flush pattern. The single line diagram will indicate the ratio of CTs where required. The instruments shall be suitable for the environment in which they are installed. All instruments shall withstand a test voltage of 2kV for 1 minute and the terminals of all instruments mounted on hinged panels shall be shrouded.

Electrical panel shall be provided with digital meter to measure voltages, amperes, kwH, Hetz, etc. the meter shall be able to measure each motor power consumption.

3.15. PROTECTIVE DEVICES AND PROTECTION SETTINGS

The switchgear shall be provided with the specified protection and auxiliary relays, which must be of a modular pattern, readily accessible, replaceable and extensible.

The thermal overload releases and instantaneous magnetic short circuit trips are to be adjustable over the trip ranges as specified by Engineer.

The Contractor must allow to grade, set and test the protection devices for the main switch, bus section switches and each motor circuit.

3.16. PUSH BUTTONS AND INDICATING LIGHTS

These shall be 22mm diameter unless otherwise specified and shall be suitable for the environment conditions. Emergency Stop push-buttons shall be 40mm diameter “Twist to Release”

Indicator lamps may only be of the Cluster LED types. Where LED’s are specified as indicators on main supply voltages, a suitable current limiting capacitor and reverse voltage protection diode must be used. For low AC or D.C. voltages (±24V) a current limiting resistor will suffice.

3.17. SITE TESTS

After completion of erection, cabling and field wiring, the Contractor shall set all overloads, protection devices etc. and shall again carry out a full functional test to prove the correct operation of the entire electrical panel, including the simulation of all remote devices. A signed compliance certificate by the Contractor’s accredited person for the electrical panel and its installation shall be handed over to Engineer on Completion.

The tests shall be witnessed by the Engineer.

3.18. WORKMANSHIP GUARANTEE

A 12 month guarantee shall cover the sheet metal enclosures and all the equipment installed therein against faulty workmanship and materials. The guarantee period shall begin from the date the electrical panels are completely installed and accepted by Engineer.

3.19. SUB-DISTRIBUTION BOARDS

3.19.1. General

Sub-Distribution board shall comply with the requirements of the standard specifications of these documents or shown on the drawings. All sub-distribution boards must be dustproof with an IP54 rating and 1,6mm stainless steel and/or as per drawings specification. Floor standing distribution boards shall be have sheet of 2,0mm (minimum) stainless steel. They must have a proxy finish.

Distribution boards are to be manufactured by an approved switchboard manufacture and to have a SABS approved manufacturer circuit breakers and/or isolators (as per drawing) and lightning/surge arrestor. All DB's to have surge arrestors as per drawings. A thirty percent (30%) space must be included on all DB's.

Drawings of all distribution by the manufacturer shall be submitted by the Contractor to the Engineer for approval before commencement of manufacture of distribution boards. After construction all DB must be inspected by the Engineer before installation.

3.19.2. Installation of Distribution Boards

Distribution boards shall be installed in the positions as shown on the respective drawings. The Contractor shall ensure that the distribution boards with the necessary conduits, sleeves, and channels as required are placed in position and mounted when required, and he shall ensure that all equipment is installed in the correct positions. It must be emphasised that no chasing will be allowed in walls built with face-bricks on the side in which distribution boards and ancillary equipment are installed. In all such cases the Contractor shall place his equipment in its proper place for the building contractor to build.

The costs of any additional work caused by late, incorrect or defective positioning of equipment and/or material by the Contractor, shall be recovered from him.

The Contractor shall, while material and/or equipment forming part of the electrical installation are/is being built in, and have a competent representative present to ensure that no unnecessary stress is placed on the material that will influence subsequent installation of equipment. Care shall be taken that all equipment of the board fit properly in their respective position without distortion which can lead to a poor installation and appearance. All bolts, clamps and fasteners shall be examined and properly tightened.

The Contractor shall ensure that all circuit breakers and other equipment can be changed and replaced if and when required.

All support props and struts, packing pieces and material used by the board manufacturer to prevent damage during transit, shall be removed by the Contractor. The Contractor shall examine all boards and ensure that all equipment shown on the appropriate relevant drawings has been supplied and fitted.

Any conspicuous damage like scratches or chafe marks to paint work, shall be touched up with the same colour paint as supplied by the board supplier.

The mounting height of all distributions measured to the top of the edge of the board shall be 2 000 mm above finished floor level, unless otherwise specified or the position and circumstances dictate differently. The Contractor shall ensure that cables sleeves and provision for the entry of cables to distribution boards as shown on drawings are done properly and neatly.

All DB must have surge arrestors as specified on the drawing.

Exposed cables above or below the surface distribution board must be covered with a metal cover of the same colour as the DB.

All distribution boards shall have mechanical barrier which will separate supply from normal supply /generator supply from the solar system supply.

3.20. EARTHING

Earthing shall be done in accordance with the requirements of the standard specifications and those of the Supply Authority.

Earth system neutral and all non-current carrying metal parts of electrical equipment, conduit, cable racks, etc.

Earth metal parts of distribution boards, switch boxes, conduit, wash-hand basins, working surfaces, cable armouring and electrical equipment.

A separate isolated earth-bar shall be fitted in each distribution board for the dedicated computer socket outlets. These earth-bars shall be earthed with an insulated earth conductor to a separate earth spike from the main earth. The computer earth spike shall be inter-linked outside the building to an earth conductor, to the main earth spike of the building.

Additional Equipment

Install three phase lightning arrestor in the Distribution boards as per drawing.

3.21. LABELS

All distribution boards shall be marked as follows:

- Name and number of distribution board and Fault level rating of distribution board, example “DB - G, 5kA”;
- Origin of supply, and size of all cables, example “Supply from main DB - 25 mm² x 4c
- All circuit breakers shall have its current rating clearly indicated on the handle, or on the panel adjacent to the switchgear;
- All circuit breakers shall be properly labelled as to its service, as indicated on the drawings.

3.22. COLOUR CODING AND LABELLING OF THE DISTRIBUTION BOARD

The distribution board must be white in colour, with the following specification:

- Non-essential DB colour to be white with white colour face plate. The label will have black engraved letters on white ivorene label. Ivorene label super-glue or pop riveted to face plate or frame. Distribution board number as per drawing, e.g. DB-G. Content of internal label on face plate – DB number indication of a feeder source, size of a feeder cable, fault level rating of a distribution board and phase rotation direction. The label of a DB will be 6 mm label on face plate to be 3 mm. labelling of cables – all incoming and outgoing cables shall be labelled with ivorene labels indicating the size of the cable.
- Essential DB colour to be white with red colour face plate for sub-distribution boards.
- Essential DB colour to be electric orange with red colour face plate for main-distribution board.
- The label will have black engraved letters on red ivorene label. Ivorene label super-glue or pop riveted to face plate or frame. Distribution board number as per drawing, e.g. DB-E/G. Content of internal label on face plate – DB number indication of a feeder source, size of a feeder cable, fault level rating of a distribution board and phase rotation direction. The label of a DB will be 6 mm label on face plate to be 3 mm. labelling of cables – all incoming and outgoing cables shall be labelled with ivorene labels indicating the size of the cable.
- Uninterrupted Power Supply / Solar system boards - DB colour to be white with blue colour face plate. The label will have black engraved letters on white ivorene label. Ivorene label super-glue or pop riveted to face plate or frame. Distribution board number as per drawing, e.g. DB-U/G. Content of internal label on face plate – DB number indication of a feeder source, size of a feeder cable, fault level rating of a distribution board and phase rotation direction. The label of a DB will be 6 mm label on face plate to be 3 mm. labelling of cables – all incoming and outgoing cables shall be labelled with ivorene labels indicating the size of the cable.
- All distribution boards shall have mechanical barrier separating non-essential and essential sections of the electrical panel.

All Essential and UPS distribution boards, kiosks and low tension switchboards shall be equipped with LED indicators connected to the incoming supply and labelled alternative supply.

POWER SOURCE	NORMAL	ESSENTIAL	UPS
Colour of Electrical Panel	Distribution Boards in buildings White or Beige Outdoor Kiosks, and Low Tension Switchboards Electric Orange	**Distribution Boards in buildings** White or Beige Outdoor Kiosks, and **Low Tension Switchboards/ main LV room** Electric Orange	**Distribution Boards in buildings** White or Beige **Outdoor Kiosks, and Low Tension Switchboards/ main LV room Electric Orange**
Colour of Plate	**Distribution Boards in buildings** White or Beige **Outdoor Kiosks, and Low Tension Switchboards** Electric Orange	**Distribution Boards in buildings** Red **Outdoor Kiosks, and Low Tension Switchboards** Red	**Distribution Boards in buildings** Blue **Outdoor Kiosks, and Low Tension Switchboards** Blue
Label of plate	Black engraved letters on white Ivorene label. Ivorene label super-glued or pop riveted to face plate or frame.	White engraved letters on red Ivorene label. Ivorene label super-glued or pop riveted to face plate or frame.	White engraved letters on blue Ivorene label. Ivorene label super-glued or pop riveted to face plate or frame
Contents on external Label	Distribution Board Number as per example DB A	Distribution Board Number as per example DB/E-A / DB/E – 1	Distribution Board Number as per example DBAU / DB/U – 1
Contents of internal label of face plate	~~D~~istribution Board Number, Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction	Distribution Board Number, Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction	Distribution Board Number, Indication of Feeder Source, Size of Feeder Cable, Fault Level Rating of Distribution board, Phase rotation direction

POWER SOURCE	NORMAL	ESSENTIAL	UPS
Letter size	Label of Distribution Board : 6 mm Label on Face Plate: 3 mm	Label of Distribution Board : 6 mm Label on Face Plate: 3 mm	Label of Distribution Board : 6 mm Label on Face Plate: 3 mm
Labelling of cables	All incoming and outgoing cables shall be labelled with Ivorene labels indicating the size of the cable.	All incoming and outgoing cables shall be labelled with Ivorene labels indicating the size of the cable.	All incoming and outgoing cables shall be labelled with Ivorene labels indicating the size of the cable.

3.22.1. Balancing Of Load and Phases

In multiphase distribution boards, all single phase circuits shall be equally distributed over all three phases so as to balance the electrical load as far as possible.

Each type of sub-circuit shall separately be balanced over all three phases as far as possible.

3.22.2. Provision for Future Equipment

Where space is required for future switchgear, the panel shall be correctly punched for such future switchgear.

Approved blank-covers must be provided.

3.23. EARTHING

Earthing shall be done in accordance with the requirements of these documents and those of the Supply Authority.

Earth system neutral and all non-current carrying metal parts of electrical equipment, conduit, cable racks, etc.

Earth metal parts of distribution boards, switch covers, conduit, wash-hand basins, working surfaces, cable armouring and electrical equipment.

The current carrying capacity of earth conductors shall in general be not less than 50 % of that of the largest conductor which is protected, except that earth conductors smaller than 2,5 mm squared may not be used.

All luminaires shall be earthed to an earth conductor.

A specialist and approved lightning & earthing protection contractor will be appointed by the Contractor. A provisional amount for this work has been allowed for in the tender summary. The lightning protection system shall comply with the latest relevant requirements of the specification:

SANS 10313: Protection of structures against lightning.

3.24. CONDUIT AND FITTINGS

3.24.1. Flush In Walls, Floors and Concealed In Roof Spaces

Conduit fittings and their installation shall comply with these documents. All conduits shall be concealed by laying in concrete, chasing in walls or running in ceiling/roof spaces. All chase work and making good thereof shall form part of this contract.

Contractor is to install PVC conduits in all electrical installation. Conduits jointing to be done with couplings or approved jointing accessories for conduit jointing and contractor is to use glue to make sure that the jointing or connection of conduits is permanently fixed.

All conduit shall be painted and match the wall after installation where applicable.

3.24.2. PVC Power skirting

The Contractor shall be responsible for supply and installation of all power skirting complete with corner pieces, splices, end pieces, junction pieces, supply conduits, cover plates and power outlets as specified and indicated on the drawing.

The power skirting must comply with SANS 1197. The Contractor must ensure that the power skirting is installed to the satisfaction of the Engineer before commencing with the wiring of the power skirting.

Two compartments with two cover power skirting shall be supplied and installed as indicated in the drawings. The compartments shall be switched socket outlet (normal and dedicated), and data.

Power skirting and trunking shall be polyvinyl chloride (PVC) and white in colour.

3.25. COVERPLATES

Switched socket outlets and switches are mounted in hot deep galvanised wall outlet boxes and for blank cover plates they shall be white.

All cover plates shall be PVC and white in colour with 3mm engraved lettering indicating distribution board and circuit number.

Colour coding is to be done as per SANS standard, namely:-

- Normal /Non-essential Supply: white,
- Emergency/Essential Supply: signal red
- UPS supply: blue

3.26. CABLE SLEEVES

All cable sleeves inside the building and on the site across roads and under hardened surfaces shall be supplied and installed by the Contractor and shall form part of his contract.

Cable sleeves shall be made from PVC and shall be at least Class 34, unless otherwise specified and shall be installed at all entrances to building, road and street crossings and such other entrances to building, road and street crossings and such other places as may be specified elsewhere in these documents or shown on the drawings. Sleeves used at entrances to building shall be sealed at both ends after the cable has been installed. During installation and until final sealing is done, the sleeves shall be kept clean of debris and blockage by temporary plugs. Final sealing shall be done with a weak cement mixture. Sleeves for future use shall be likewise sealed.

The sizes and number of cable sleeves are indicated on the drawings.

Where the diameter of cable sleeves are such that it cannot be hidden behind a plastered slot in the wall, an acceptable and suitable cover shall be provided and screwed over the cable slot.

The Contractor shall ensure that the correct sizes, number and length of sleeves are supplied and installed so that the cables can be pulled-through and installed.

3.27. ARRANGEMENT OF CIRCUITS

The arrangements of the various circuits are indicated on the drawings, together with the required protection (switchgear), control and the type and number of wiring (conductor or cable) of each circuit.

All protection shall be done with moulded case circuit breakers (MCCB's) from a SABS approved manufacturer.

No mixing of different types, ratings and manufacture of switchgear shall be allowed.

The Contractor shall check and make sure that the conductors as given for the various circuits, comply with the requirements of the standard specifications of these documents, as well as those of the SANS Code of Practice, SANS 10142-1 as amended.

The Contractor shall ensure that all circuits are connected such that the load is equally balanced over all three phases.

3.27.1. Isolators, Circuit Breakers, Earth Leakage Relays and Surge Arrestor

Isolating switches, circuit breakers and earth leakage units shall comply with the relevant requirements and shall be of the SABS approved manufacture (commercial/industrial circuit breakers and switch disconnectors), or as may be specified elsewhere in these documents or shown on the drawings. The circuit breakers must be hydraulic magnet type.

3.28. SWITCHED SOCKET OUTLETS

Switched socket outlets (S.S.O) shall be 250V 16A 3 round pin, 3-pin and 2pin and dedicated switched socket outlet shall be 250V 16A 2 round pin and chamfered and shall be of approved manufacture and shall bear a SABS mark. The position of the sockets out will be 300 mm above floor finishing level (AFFL) or/and as per drawing. Sockets outlets with waterproof housing must be provided and must be installed as shown on the drawings be the same height of 300mm AFFL, or as specified on the drawing.

Labelling on the cover plate is to be engraved or with pop riveted to cover plate with black letters. Content on label shall be the distribution board number and circuit number feeding socket outlet, e.g. DBA/PD1/1. Each socket outlet on a circuit shall be labelled.

All s.s.o shall be wired with 4,0mm2 conductors that is red, white or blue for live circuits, black conductors for neutral and green for earth.

Dedicated switched socket outlet shall not be linked with earth leakage.

Cover plates for s.s.o shall be white plate with white or red toggle or blue plate as indicated on the drawing.

Cover plate for dedicated s.s.o shall be white with red toggle and chamfered earth or blue plate as indicated on the drawing.

POWER SOURCE	**NORMAL**	**ESSENTIAL**	**UPS**	**DEDICATED** This socket outlet shall be used for computer equipment only and shall not be on earth leakage units.
Cover Plate Colour	White	White	White	Red
Switch / toggle Colour	White	Red	Blue	Red

Label Type	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	White letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	White letters on blue Ivorene label or Blue engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.
Contents On Label	Distribution Board Number and Circuit number feeding the socket outlet as per example DBA/ P1/1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the socket outlet as per example DB/E-A/ P1/1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the socket outlet as per example DB/U – A / P1/1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the socket outlet as per example DB-A/ PD1/1 Each socket outlet on a circuit shall be labelled.
Letter Size	3 mm	3 mm	3 mm	3 mm
Earth Pin	Round	Round	Round	Chamfered
Female Socket	White	White	White	Red

3.29. LIGHT SWITCHES

Switches shall comply with the requirements of these documents, shall have a rating of not less than 16A 240V and shall be suitable to break the load which is typical of LED luminaries. Light switches shall be of approved manufacture and shall bear a SABS mark. The position of the light switch must be 1 200 mm above floor finishing level (AFFL) or/and as per drawing. Light switches with waterproof housing must be provided and must be installed as shown on the drawings.

Light switch cover plates are to be provided with an engraved label or pop riveted to cover plate with black letters. Content on label shall be the distribution board number and circuit number feeding light switch, e.g. DBA/L1/1. Each light switch on a circuit shall be labelled. All switch covers must be metal steel.

All lighting circuit shall be wired with 2,5mm2 conductors that is red, white or blue for live circuits, black conductors for neutral and green for earth.

Where applicable, lighting circuit shall be wired or connected with 2,5mm2-2core PVC/SWA/PVC Ecc copper cable. This shall be shown on the drawing.

POWER SOURCE	NORMAL	ESSENTIAL (Gen set)	UPS
Cover Plate Colour	White	White	White
Switch / toggle Colour	White	Red	Blue
Label Type	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	White letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	White letters on blue Ivorene label or Blue engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.
Contents On Label	Distribution Board Number and Circuit number feeding the socket outlet as per example DBA/ P1/1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the switch as per example DB/E-A / L1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the switch as per example DB/U – A / L1 Each socket outlet on a circuit shall be labelled.
Letter Size	3 mm	3 mm	3 mm

3.30. ISOLATORS

All welding/industrial isolators shall be 5 pin, 400V, 3-phase, neutral, earth and shall be weatherproof to IP65 standards. Other isolator (surface and or recessed) are 3-pole / 400V (32A, 60A, 100A); 1-pole (20A, 32A), etc. Colour to be as per the table below.

Isolators shall be connected with 16mm2-4core PVC/SWA/PVC ECC copper Cable or as per single line diagram.

All final connections shall comply with the requirements of SANS 10142-1.

Isolators shall IP65 weatherproof surface mounted isolators wall-mounted at ±1 300 m AFFL or as indicated on the drawing.

POWER SOURCE	NORMAL	ESSENTIAL (Gen set)	UPS
Cover Plate Colour	White	White	White
Switch / toggle Colour	White	Red	Blue
Label Type	Black letters on white Ivorene label or Black engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	White letters on red Ivorene label or Red engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.	White letters on blue Ivorene label or Blue engraved letters on cover plate. Ivorene label glued with super glue or pop riveted to cover plate.
Contents On Label	Distribution Board Number and Circuit number feeding the socket outlet as per example DBA/ P1/1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the switch as per example DB/E-G/ S1 Each socket outlet on a circuit shall be labelled.	Distribution Board Number and Circuit number feeding the switch as per example DB/U – G / S1 Each socket outlet on a circuit shall be labelled.
Letter Size	3 mm	3 mm	3 mm
Comments	n/a	Where red switches are not obtainable the illuminated type red switch may be used or a white switch may be used but the switch shall be tagged with a non-removable red sticker.	Where blue switches are not obtainable the illuminated type blue switch may be used or a white switch may be used but the switch shall be tagged with a non-removable blue sticker.

3.31. DESIGN DRAWINGS

The design drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power points, switches and light points that may be influenced by built-in furniture must be established on site, prior to these items being built in.

3.32. LOW VOLTAGE CABLE

The sizes and routes of low voltage cables are indicated on the drawings and in these documents.

Low voltage cables shall be PVC/SWA/PVC ECC type with copper conductors which shall comply with the requirements of SANS 1507 in those of the standard specifications, in all respects.

Cables shall bear the SABS mark. The supply, installation, termination and jointing of cables shall comply with SANS 10198 and with the requirements of these documents. No jointing will be allowed in cables unless authorised by the Engineer.

3.32.1. Earth Conductors

Earthing shall comply with the requirements of the Supply Authority and SANS 10142-1 as amended.

3.33. CABLE GLANDS

All cable glands shall be of the SABS approved IP 65 rated and shall conform to SANS.

3.34. MARKING

The Contractor shall mark & label of all substation equipment. Supply and install laminated single line schematic diagram of the LV reticulation and state the feeder. Labelling with ID codes of all LV & control cable ends at substation. Supply and install new OHS Act signage & fire & resuscitation notices on MV and metering/LV rooms of substation.

Cables shall be labelled at all terminations with suitable and approved labels (stainless steel Irvone white ivorene label written in black) indicating:

i) Origin and Destination; (e.g. from Meter room to DB - C)

ii) Cable size and no. of cores; (e.g. 16 mm2-4-core)

iii) Conductor type. (e.g. PVC/SWA/PVC Copper ECC cable)

3.35. CABLE ROUTES

The final cable routes shall be determined on site before installation commences. Concrete cable markers shall be installed along the cable routes where applicable.

3.36. CABLE TRAYS AND RACKS

All cable wireways, channels, trucking, ladders and trays shall be SABS manufacture and shall be hot deep galvanised steel finish.

All cable wireways, trunking, channels, trays, etc. shall be neatly and properly fixed, suspended, clamped or supported with hot deep galvanised steel finish mechanical support accessories specially engineered and manufactured as per detail specifications of the manufacturer.

All cable trays/racks/ladders exposed to view shall be provided with galvanised steel finish galvanised steel in-fill plates to prevent cables being visible from the bottom.

The Contractor shall note the minimum mounting height requirements of all ducting and wire ways.

Allowance must be made for the installation of a new heavy hot deep galvanised cable ladder that will support the cables as specified. This shall include all fixing materials, risers, bends and splice kits.

Description

Duty	:	Heavy
Material	:	hot deep galvanised
Span	:	6m with loading of 144 kg/m
Side rail	:	100mm high
Cross rung	:	150mm, 300mm,
Cable ladder width	:	As required + 20% spare capacity

3.37. LUMINAIRES

3.37.1. General

Luminaires which comply with the requirements of the standard and detail specifications of these documents shall be supplied and installed in accordance with these documents and/or drawings. The tender rates shall be for the type specified and if alternatives are offered it shall be under a covering letter submitted with the tender documents. The onus will be on the

Contractor to prove that the alternatives are in all respects equal or better to the types specified by means of a supplying SABS approved photometric data.

Luminaire positions indicated on drawings are diagrammatic, and all positions, spacing, etc. must be determined in accordance with drawing.

3.37.2. Fixing Of Luminaires

Luminaires shall be installed in the position(s) indicated on the drawings. Final positions shall be determined by the engineer when in doubt.

3.37.3. Supply and Installation of Luminaires

The contractor shall allow for ordering, receiving, packing out, storing, mounting/fixing and final connections, of all the luminaires indicated on the drawings, in his tender sum.

No luminaires shall be ordered prior to the Engineer's official written approval.

3.37.4. Damage to Luminaires

All luminaires damaged by the contractor or his staff before first delivery shall be replaced with new luminaires at his own cost.

3.37.5. SANS Specification

Luminaires shall comply with the relevant SANS specification where such specification exists and shall carry the SANS mark of approval.

Where a SANS specification does not exist for complete luminaires, the accessories and control gear shall be SANS approved and carry the SANS mark of approval.

3.37.6. Photo-Electric Daylight Sensitive Switch

Exterior lighting shall be controlled by a photo-electric cell mounted against the exterior of the building with the unit positioned so that the extraneous light shall not affect its operation.

The unit shall comprise a photocell, thermal actuator and change-over switch, rated at not less than ten ampere (20A). The cover of the unit shall be manufactured from a tough, destruction resistant material for protection against tampering. The cover shall have good weather proofing properties, be ultra violet resistant and shall not deteriorate when exposed to sunlight for prolonged periods. Switch contracts shall be silver plated and shall be capable of breaking the load associated with fluorescent lamp luminaires. Contact rating shall be not less than 10 A.

The operational level shall be factory preset for “ON” at a light level of approximately 54 LUX and “OFF” at approximately 108 LUX. Voltage variations shall not materially affect the operational levels.

A time delay of not less than 30 seconds shall be provided to prevent the unit from functioning due to lightning or other short period changes in illumination.

The unit shall be effectively safeguarded against surges by means of a suitable surge protector which shall preferably form an integral part of the unit.

Bypass switches shall be provided for exterior lights controlled via photocells so that testing and maintenance can be done at any time.

External lighting shall be controlled via a photo-cell mounted on a wall.

3.37.7. Schedule and Specification of Luminaires

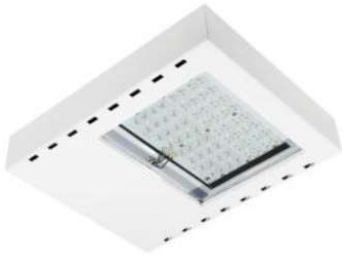
TYPE	DESCRIPTION	TYPE
A1	Surface mounted 50W / +/-5300lumen (4000K) LED light fitting 1200mm x 600mm. The luminaire must produce approximately 5300lumen, wattage may differ from supplier to supplier. The luminaire shall consist of a polycarbonate body and an opal diffuser. A standard (1-10v) dimmable driver shall be supplied with the luminaire. Must be 1200mm x 600mm on size. A surface mounted, hot deep galvanised steel and powder coated enclosure. The luminaire shall bear the SANS 60598-2-1 safety mark and shall have an ingress protection of IP20 in compliance with SANS 60598-2-1, certified by an SABS test report. Use of high efficiency LED’s >120 lumens per watt and CRI >80. The standard LED’s colour temperature provided shall be neutral white (4000K). The surface mounted LED fitting shall operate LED light sources of 50W/ +/-5300lm in ambient temperatures without reducing the LED lifetime of 50 000 hours, at a lumen depreciation of not more than 30% (L70).	
A2	Same as type A1 above, but shall have a back-up battery to operate for 1 hour. A self-contained emergency/standby integrated back-up power with a 4w max output power. The driver shall operate at a power factor of >0,94 and the total harmonic distortion levels are < 20% and do not cause interference on the electrical network.	

TYPE	DESCRIPTION	TYPE
A3	Surface mounted 30W / +/-3900lumen (4000K) LED light fitting 600mm x 600mm. The luminaire must produce approximately 3900lumen, wattage may differ from supplier to supplier. The luminaire shall consist of a polycarbonate body and an opal diffuser. A standard (1-10v) dimmable driver shall be supplied with the luminaire. Must be 600mm x 600mm on size. A surface mounted, hot deep galvanised steel and powder coated enclosure. The luminaire shall bear the SANS 60598-2-1 safety mark and shall have an ingress protection of IP20 in compliance with SANS 60598-2-1, certified by an SABS test report. Use of high efficiency LED's >120 lumens per watt and CRI >80. The standard LED's colour temperature provided shall be neutral white (4000K). The surface mounted LED fitting shall operate LED light sources of 30W/ +/-3900lm in ambient temperatures without reducing the LED lifetime of 50 000hrs, at a lumen depreciation of not more than 30% (L70). **The fitting shall be tested and comply with the requirements of SANS IEC 60598:1.**	
A4	Same as type A3 above, but shall have a back-up battery to operate for 1 hour	
A5	Surface mounted IP65 die-cast aluminium body luminaire 30W or +/-4440lm LED. Correlated colour temperature (CCT): Neutral white light (4000K) – 40W/ +/-4440lm. Operating hours 50 000 minimum. The luminaire must consists of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and is designed to operate LEDs of 30W. The luminaire must bear the standard code SANS 60598-2-1 safety mark. The body and diffuser must be designed in such a way to prevent collection of dust and moisture on the accessible surface of the body, thus also preventing any grip of the luminaire. The luminaire	

TYPE	DESCRIPTION	TYPE
	must be designed to allow entry of surface conduits via 20mm conduit or and 2,5mm 3 core cable threaded entries at both ends, as well as a 25mm hole in the centre of the back of the body. A silicone sponge gasket ensures reliable IP 65 rating. The one-piece, injection-moulded polycarbonate diffuser must be vandal resistant. It must be secured to the body by six stainless steel Allen head screws. The removable gear tray must be manufactured from stainless steel, powder coated white to optimise luminaire efficiency. All control gear components are mounted on the gear tray. The gear tray can be removed by loosening four Allen head screws in keyhole slots, which allow the gear tray to be relieved into a suspended position, ensuring ease of maintenance. All control gear components are removable and bear the relevant SABS mark. All screws, bolts and metal parts must be stainless steel or non-corrosive material. Mains connections are by means of a suitable screw terminal block with a wire clamping contact. The luminaire must have an electronic temperature monitoring prevents overheating of LEDs and power supply. Power factor ≥0,95. Uniform luminance with low glare due to prismatic diffuser design. Long service life: over 50 000 hours (L70B10). No ingress of dust and moisture into the LED and controller compartment - IP 65 **The fitting shall be tested and comply with the requirements of SANS IEC 60598:1**	
A6	Same as type A5 above, but shall have a back-up battery to operate for 1 hour	
A13	Surface mounted IP65 die-cast aluminium body rough-guard luminaire 30W or +/-4440lm LED. Correlated colour temperature (CCT): Neutral white light (4000K) – 40W/ +/-4440lm. Operating hours 50 000 minimum. The luminaire must consists of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate LEDs of up 30W. The luminaire shall bears the SANS 60598-2-1 safety mark. The body and diffuser shall be designed in such a way to prevent collection of dust on the accessible surface of the body, and also preventing any grip of the luminaire. The luminaire shall be designed to allow	

TYPE	DESCRIPTION	TYPE
	entry of surface conduits via 20mm conduit threaded entries at both ends, as well as a 25mm hole in the centre of the back of the body. A silicone sponge gasket ensures reliable IP 65 rating. The one-piece, injection-moulded polycarbonate diffuser shall be **vandal resistant**. It shall be secured to the body by six stainless steel Allen head screws and must have tamper-proof screws with centre-pin. The luminaire shall have a removable gear tray is manufactured from mild steel, powder coated white to optimise luminaire efficiency. All control gear components shall be mounted on the gear tray. The gear tray shall be removed by loosening four Allen head screws in keyhole slots, which allow the gear tray to be relieved into a suspended position, ensuring ease of maintenance. All control gear components shall be removable and bear the relevant SABS mark. All screws, bolts and metal parts are stainless steel or non-corrosive material. Mains connections are by means of a suitable screw terminal block with a wire clamping contact. Electronic temperature monitoring prevents overheating of LEDs and power supply.	
A14	Same as A15 type above, but shall have a back-up battery to operate for 1 hour.	
B1	**Bulkhead** LED 20W / +/-2300lumen (4000K) with electronic gear, rated IP65. The luminaire must produce approximately 2300lumen, wattage may differ from supplier to supplier. Surface mounted bulkhead luminaries complete with high-pressure die cast aluminium base, with trim ring casting mounted onto the base casting by stainless steel M5 Allen head screw, located outside lamp. With silicon sponge gasket. IP65 protection. Effective high-power LEDs, 4000K at a colour rendering index>80. Minimum 50 000 hours useful lifetime. SANS approved control gear bearing the SANS 60598-2-1 safety mark. With black base, opal diffuser.	
B2	Same as B1 type above, but shall have a back-up battery to operate for 1 hour.	
B3	Industrial bulkhead LED 32W / +/- 4400 lumen (4000K), rated IP66	

TYPE	DESCRIPTION	TYPE
	The luminaire shall be designed to operate LED light sources of 32W without reducing the useful lifetime of up to 50 000 hours, at a lumen depreciation of not more than 30% (L70). To maximize the reliability of the LEDs, the photometric engine and control gear compartment are completely sealed to IP 66. This shall ensures that the photometric performance is maintained over time. The body shall be manufactured from marine grade high-pressure die-cast aluminium (EN 1706 AC-44300). The luminaire shall be supplied with three mounting holes, or be supplied with no holes in the body, using mounting lugs instead, depending on site requirements. Electrical cable entry shall be via a compression type gland at the rear of the luminaire. The luminaire shall have a high-pressure die-cast aluminium decorative skirt assembly. The body can be shall be surface mounted. The diffuser shall be manufactured from non-discolouring injection moulded high impact acrylic. The prisms are restricted to the inside of the diffuser and are designed to provide a spacing to mounting height ratio of up to 8:1, whilst controlling excessive glare. The frame assembly shall be held to the body by four stainless steel M6 Allen head captive screws located outside the sealed lamp compartment. The control gear shall be mounted directly onto the body to provide optimum heat dissipation. All external screws, bolts and metal parts shall be stainless steel or non-corrosive material. The bulkhead to include guard wire and all other mounting accessories.	
B4	same as type B3 above, but with battery backup to last 1-hour as per specification	

TYPE	DESCRIPTION	TYPE
C4	LED lowbay 144W / +/- 21000 lumen (4000K) complete with aluminium body, IP66. Housing shall be marine grade high-pressure die-cast aluminium and protection glass Designed to operate LED light sources of 144W / in an ambient temperature (Ta) environment of up to 40°C. The luminaire must have a lifetime of 100 000 hours, at a lumen depreciation of not more than 30% (L70) at an ambient temperature (Tq) of 25°C. Luminaire shall have an easily accessible power supply/driver. Compartment. Glare-reduced light distribution, Flicker-free lighting. 5 year warranty.	 
C5	same as type C4 above, but with battery backup to last 1-hour as per specification	
C6	LED streetlight 80W / +/- 10000 lumen (4000K) with aluminium body, IP65. The luminaire shall consists of an LED engine, power supply and spigot compartment. This should allow the easy installation of the LED engine by means of a hinging action onto a spigot base casting, with incorporated levelling device. It shall be secured by stainless steel latches and an access screw. The LED engine, consisting of the LED light source and the power supply, to be easily replaced or upgraded. Both compartments shall be rated IP 65. Electronic temperature monitoring prevents overheating of LEDs and power supply, positioned directly next to LEDs (ThermiX®). The power supply shall be automatically disengaged when opening the luminaire. The luminaire housing must be manufactured of marine grade aluminium. These shall be installed on a hot dipped galvanised steel pole. Contractor to make allowance for pole mounting. The LED lifetime of 100 000hrs, at a lumen depreciation of not more than 30% (L70).	

TYPE	DESCRIPTION	TYPE
D1	12W / +/-2000 lumens LED down lighter recessed on ceiling. The luminaire consists of an LED engine and power supply. Shall have a design to operate LED light sources of 12W/ +/-2000lumen in an ambient temperature environment of up to 35°C, without reducing the LED lifetime of 50 000hrs, at a lumen depreciation of not more than 30%. The power supply shall be located outside of the luminaire housing. The luminaire shall be secured into the ceiling by means of two springs located on either side of the luminaire. Housing – Aluminium, Diffuser – Clear Glass. Neutral White (4000K), IP20. Electrical Safety Class (IEC), Class II.	
D2	Same as D1 type above, but shall have a back-up battery to operate for 1 hour.	
FL1	LED streetlight 180W / +/- 27000 lumen (4000K) with aluminium body, IP66. The luminaire shall have of an LED engine, power supply and spigot compartment. Must have easy installation of the LED engine by means of a hinging action onto a spigot base casting and with incorporated levelling device. It must be secured by stainless steel latches and an access screw. The luminaire must have pole mounted version. The LED engine, consisting of the LED light source and the power supply, shall be easily replaced or upgraded for future additions. Both compartments shall be rated IP 66. Electronic temperature monitoring prevents overheating of LEDs and power supply, positioned directly next to LEDs (ThermiX®). The power supply shall be automatically disengaged when opening the luminaire. The luminaire housing must be manufactured of marine grade aluminium. The LED lifetime of 100 000hrs, at a lumen depreciation of not more than 30% (L70). Contractor to make allowance for pole mounting.	

TYPE	DESCRIPTION	TYPE
OC	Occupancy sensor High performance relay for connecting all types of lights, e.g. including LED luminaires etc. Flexible and wide mounting methods: Flush mount with spring clip. High sensitivity to be provided with "no dead spot" zones in its 360 high intensity of detection. Must have a built-in red LED is used as an indicator for easy test operation and different operation modes clear identification. Manually switch on the loads by wire connected to an external N.C. type push button switch when the ambient light level exceeds the pre-set Lux value. Time delays: Smart Set (automatic), 30 minutes), walk-through, test-mode. To cover area of 25m2. To operate on a 230V. Built-in light level sensor;	

NB: All luminaires must have a 1,5mm2 cabtyre cable / conductor which is 1,5m long and must have 3-pin socket. The contractor shall install an unplugged socket for each internal luminaire on the trunking. All light luminaires / fittings must bear SANS approval.

3.38. Lighting Poles

The pole shall be manufactured from hot deep galvanised steel including the base plate. The filament winding shall be continuously applied with uniform tension onto a rotation mandrel, resulting in a minimum mass glass to resin ratio of 70:30, for optimum rigidity. The pole shall be seamless and circular in shape with a continuous taper of 16-18 mm diameter change per metre. A 80mm diameter hole shall be provided at 400 mm below ground level for the cable entry.

The pole surface shall be finished in a gel coat that complies with the requirements of SANS 141 and be applied to a uniform thickness of between 250 and 500 microns, achieving a smooth finish that provides a weatherproof, UV resistant, flame resistant and impact strong surface in the colour specified.

The minimum mechanical strength of the pole shall be designed for a fluctuating wind pressure of 500 Pa onto a wind surface area of 0.20 m² under which a maximum deflection of 5 % of its height above ground shall be permissible. The pole shall have a safety factory of 2.5 and be able to be manufactured to any other strength required.

An access door opening is required, the 250 mm x 80 mm cut-out shall be covered by an access door cover manufactured from glass filled nylon impregnated in the same colour as that of the surface coat. It shall be fixed securely by two M4 stainless steel captive Allen head screws that locate into M4 brass nut inserts embedded in the pole.

The pole shall be supplied complete with a hot dipped galvanised baseplate with a minimum size of 300 mm x 300 mm x 1.6 mm, two hot dipped galvanised steel M8 hook bolts and nuts, a hot dipped galvanised gland plate suitable for the incoming and outgoing cables complete with terminal block and mounting rail and a 5 A, 5 kA single pole miniature circuit breaker. The wiring from the MCB shall consists of 2,5 mm² 3c trailing cable and shall be taken up to the luminaire within the pole.

The supply cable to each pole shall be 2 x 16 mm² x 4-core ECC cable. A hole shall be provided at 0.4m below ground level for the supply cables.

Suitable brass terminal shall be provided within the pole and all earth conductors installed with the underground cables shall be connected to this terminal. The fitting shall be earthed to this terminal.

The pole shall bear the SANS 1749 mark and be manufactured by an ISO 9002 accredited factory.

Foundations

No foundations for the poles are required.

Erection

The pole shall be supplied complete with a hot dipped galvanised base plate with a minimum size of 300 mm x 300 mm x 1.6 mm, two hot dipped galvanised steel M8 hook bolts and nuts.

Final Colour

The final colour shall be black suitable for exterior.

3.39. EARTHING AND LIGHTNING PROTECTION

3.39.1. Earthing

The entire installation shall be properly and effectively earthed as prescribed in the Wiring Regulations and to the requirements of the relevant supply authority.

The plant earthing system and main earth bus bar shall be tested for 10 Ohm. If the amount not reach additional earthing equipment shall be installed by the Contractor. Earthing and bonding of the new transformer shall consist of 70mm² copper earth wire and 16mm diameter stainless steel core copper coated earth rods.

The earthing installation shall be integrated with the instrumentation system earth and all other services.

The Contractor, however, will be responsible for the equipotential bonding of installed equipment, e.g. transformers, mechanical equipment, pumps, electrical equipment, cable ladders etc.

The connections for the 70mm² multi-stranded conductors shall be based on M10, high tensile, stainless bolts and nuts or equivalent. The minimum size bolts permitted for connections below 70mm², i.e. 16mm², shall be M8.

The Contractor shall provide these as well as the 70mm² green/yellow insulated conductor from the main earth loop.

The main cable support system as provided by the Contractor may also be used to support these conductors in the most economical route.

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised for any other purpose.

It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on Goods and Materials that must be earthed where these are not provided. Unless earth conductors are connected to proper terminals, the end shall be tinned and lugged. Earth conductors for individual circuits branching from the ring main shall be connected to the common earth conductor by means of exothermic welds. Insulation tape shall be used to cover all exposed metal and a PVC cable tie strapped over the tape ends to prevent unwrapping. The common earth shall not be broken.

Earth conductors shall be connected to the earth rod by means of Exothermic Welds. Insulation tape shall be used to cover all exposed metal and a PVC cable tie strapped over the tape ends to prevent unwrapping.

All rods shall be threaded at either end so that extensions can be added to where deep driven installations are required. All connections shall be taped or waterproofed to ensure that corrosion does not affect the joint during the life of the installation.

The rods shall be supplied complete with a driving bolt for protecting the ends of the coupling whilst being driven into the ground.

The top of the rods, after installation, shall be 400mm below final ground level.

3.40. EARTHING & BONDING

The Contractor is to ensure that all earthing and bonding is carried out in accordance with SANS 10142, PRASA standard specifications and the local authority's requirements. The earthing installation is to be carried out by a specialist.

The Contractor should note that as this installation is a Class II Division 2, all metal parts, and equipment are to be earthed and bonded to eliminate static build up. An earth mat is to be

installed and the Contractor shall allow for a survey by a specialist and installation of it according to the relevant SANS code. The Contractor shall submit all test results to the Project Manager.

The Contractor shall install an earth point on all motors and metal structures in the PRASA buildings and or where applicable.

A schedule of the work shall be carried out by an Earthing Specialist.

Earthing shall be provided for the LV installation equipment.

The earthing shall be carried out by a specialist and comply with SANS 61024 Parts 1and 2.

3.41. LIGHTNING PROTECTION TESTING AND COMMISSIONING

The entire installation shall be tested and commissioned in the presence of the Engineer. On completion and handover "As Built" drawing and test results (COC) shall be handed over to the Engineer. The drawings shall depict the location on the earth rods and mats and their respective readings.

3.42. DRAWINGS

The Contractor produces the detailed layout design and individual wiring diagrams for each starter / panel in AutoCAD format fully in compliance with the Project Manager's requirements. All drawings are to be submitted for approval prior to the start of manufacture.

In addition, the Contractor submits all cable pulling schedules, termination schedules as well as lightning protection and earthing system designs, for approval. Any installation or manufacture of equipment prior to the approval of drawings is entirely at the Contractor's own risk. Similarly, the cable numbering systems, plant ID numbers and tag numbers will be in accordance with the Employer's requirements.

3.43. WORK REQUIRED IN THE COMMISSIONING OF PROTECTION EQUIPMENT

The commissioning of protection equipment for LV systems and electronics can be broken up into a number of broad categories.

- Panel tests and visual Inspection;
- Implementation of applicable technical instructions;
- Secondary tests;
- Primary tests;
- Review and submission of documentation;
- Energisation and on load checks;

- Sign off and handover of electrical and electronic plants for use and operation by the owner.

Each of the categories requires documentation to reflect that the test(s) required have been completed. The documentary evidence must include:

- The relevant equipment or panel name.
- The checks performed;
- The name of the person who performed the checks;
- The date on which the checks were performed;
- The signature of the person who performed the checks.

3.44. PANEL TESTS AND VISUAL INSPECTION

The purpose of this group of activities is to check and produce documentary evidence that:

- The panel and all contained equipment is visibly intact and mechanically sound,
- The panel and contained equipment has not been damaged in transit,
- The panel is wired according to the application drawings supplied, and that the design version between the equipment and the drawings is the same.
- The equipment contained in the panel corresponds in make, model and function to the application drawings.
- The panel and associated equipment is correctly earthed according to the SANS standards.

3.45. IMPLEMENTATION OF APPLICABLE TECHNICAL INSTRUCTIONS.

The purpose of this activity is to ensure that modifications to the protection panels required by approved technical instructions are implemented to the protection equipment prior to secondary injection. Documentation is to be in the form of the instruction with reference number, the name of the person who implemented the instruction and the date of implementation is required.

3.46. SECONDARY TESTS

This group of activities comprises the following:

- Application of settings of all protection devices.
- Relay characteristic tests and logic functions according to settings provided and manufacturer specifications.

- End to end checks for Impedance and current differential schemes.
- Supervisory controls, alarms, indications and analogue outputs are correct to the control centre.
- To ensure that test blocks and shorting strips function correctly.

3.47. PRIMARY TESTS

All primary tests must be according to relative SANS regulation.

3.48. NORMALISATION OF CIRCUITS

During the primary and secondary injection tests, the trip and alarm circuits are usually rendered inoperative by the removal of isolating links, relay trip latches and so on. It is therefore essential that, when the primary and secondary injection tests have been completed, the tripping and alarm circuits be checked. Certain settings may have been altered during testing and these have to be normalized. Certain protection functions may have been deactivated in order to test other complimentary functions and these have to be reactivated as per the settings and configuration documentation.

3.49. CONSOLIDATION AND REVIEW OF TEST RESULTS

The purpose of this group of activities is to consolidate the test results and;

- Ensure sure that all tests originally planned have been completed
- Ensure that all test results are consistent with reasonable Employer expectations
- Ensure that any defects have been addressed
- Ensure that the head of commissioning is satisfied that the equipment is ready to be made live and arrangements have been made with an authorized person and to clear all outstanding work permits.
- Complete the equipment test sheet that permits the equipment to be energised.
- Certificate of Compliance (CoC) must be issued will all other test results reports.

3.50. ENERGISATION AND ON LOAD CHECKS

There are some checks and tests that cannot be performed while the equipment is de-energised.

It must be stressed that the equipment cannot be considered to be completely commissioned until on-load checks have been completed and results documented.

The following checks are required:

- Correct phase rotation.
- Current measurement checks / on-load confirmation of CT ratios.
- On-load stability checks for differential schemes
- On-load directional checks for directional overcurrent and impedance relays.
- Confirmation of transducer loading if applicable.

On the successful completion of the on-load checks, a handover document / mechanism is required that indicates that the equipment has been fully commissioned.

3.51. TRAINING

3.51.1. Electrical Installations

Contractor shall train the PRASA staff on new equipment on how to operate the LV panel and other electrical related installations. Training shall include how to clear faults on the system once it has been attended to. Training to include all other electrical related issues that will be require by maintenance and operating PRASA staff.

3.52. FINAL DOCUMENTATION

The purpose of this phase of the process is to ensure that all documentation and test results are compiled and submitted to the Employer.

a) Handover Certificate: is to be signed by the Contractor and the Supervisor.

b) Completed Checklists: A hard copy of the all of checklists of completed activities to be forwarded to the Project Manager. All appropriate tests, dates, responsible persons and signatures are required. Electronic copies of scanned hard copy documents are also acceptable.

c) Commissioning Test Results: four sets of hard copies of the Commissioning Test Results, including hard copies of manuals, etc are required to be submitted to the Employer. Dates, responsible person's name and signatures are required. Electronic copies of scanned hard copy documents are acceptable. The above shall be included in the data packs to prove completion.

d) Proof that all applicable technical instructions have been implemented:

   i. Technical Instructions that may be applicable to the equipment concerned.

e) Proof of Applied Settings: All settings applied to all relays to be retrieved from the relays (downloaded) and hard or electronic copies to be forwarded to the Project Manager.

SECTION 5 – MECHANICAL ENGINEERING

1. DOMESTIC WATER RETICULATION

The wet services scope shall be limited to restoring the existing wet services in various facilities; all defective water piping and fittings shall be replaced and concealed as stated in this section.

1.1. DOMESTIC WATER PIPING

The following are applicable:

- Unless stated otherwise, the cold water reticulation shall be through plastic polymer piping.
- All Piping Shall be concealed inside the ceiling voids or chased on the wall for increased security.
- All Piping Shall be concealed inside the ceiling voids or crashed on the wall for increased security.
- All Plastic Piping should be protected from direct sunlight.
- Attention shall be given to the burning characteristics of plastic materials used in high fire risk areas or close to sources of heat that can impair their performance.
- Unless plastic pipes or fittings are suitably protected, they shall not be used in a position where the permeation of gas or any other substance can cause (or is likely to cause) contamination of the water in them.
- Piping systems manufactured from polyethylene shall comply with the requirements of SANS 4427-1, SANS 4427-2, SANS 4427-3 and SANS 4427-5.
- Piping systems manufactured from polypropylene shall comply with the requirements in SANS 15874-1, SANS 15874-2, SANS 15874-3 and SANS 15874-5. The working pressure (for cold water temperatures exceeding 20 °C) of polyethylene and polypropylene pipes shall be rated in accordance with the requirements in SANS 4427-1, SANS 4427-2, SANS 4427-3 and SANS 4427-5, and SANS 15874-1, SANS 15874-2, SANS 15874-3 and SANS 15874-5, respectively.
- PVC-U pipes and fittings that comply with the requirements of SANS 966-1; PVC-M pipes and fittings shall comply with the requirements in SANS 966-2 and PVC-O pipes shall comply with the requirements in SANS 16422.
- Plastics pipes and fittings for hot and cold water supply systems shall comply with one of the following standards:
    a. for PE-X (cross- linked polyethylene): SANS 15875-1, SANS 15875-2, SANS 15875-3 and SANS 15875-5;

b. for PB (polybutylene): SANS 15876-1, SANS 15876-2, SANS 15876-3 and SANS 15876-5;

c. for PVC-C (chlorinated polyvinyl chloride): SANS 15877-1, SANS 15877-2, SANS 15877-3 and SANS 15877-5;

d. for PE-RT (raised temperature cross linked polyethyelene): SANS 22391-1, SANS 22391-2, SANS 22391-3 and SANS 22391-5; and

e. PE-X Multi-layer piping systems: SANS 21003-1, SANS 21003-2, SANS 21003-3 and SANS 21003-5.

- The minimum rating of a polymer pipe used in hot and cold water systems in buildings is class 2, PN16 at 20 °C, 8 bar at 70 °C, and shall be marked as such on the pipe.
- Algae growth can occur in plastics pipes if there is any translucence. Plastic pipes on hot and cold systems shall only be used inside buildings.
- For pipes and fittings, guidance on the application of the system shall be found in SANS 4427-5, SANS 15874-5, SANS 15875-5, SANS 15876-5, SANS 15877-5, SANS 22391-5 and SANS 21003-5. Any plastic piping systems for hot water use shall be class 2 (70 °C operating temperature), and shall have a minimum operating pressure (M.O.P) of 600 kPa (6 bar) at 70 °C.
- For thermal expansion, loop requirements refer to specification.
- All water piping chassed on the wall shall be wrapped with Heavy brown paper as a sheath for expansion.
- Pipe supports should be so positioned that they should be at least 500mm away from a change of direction fitting i.e. tee, elbow, etc.

1.2. WASTE WATER PIPING

The following are applicable:

- Pipes, fittings, sanitary fixtures, and materials shall be selected to operate effectively under all normal conditions likely to be experienced in the specific installation for the anticipated life of such installation.
- Materials, pipes, components, and fittings that bear the certification mark of the SABS in respect of the relevant standard issued by the SABS are to be used.
- Plastics waste traps and rubber waste traps that comply with the relevant requirements of SABS 1321-1 and SABS 1321-2 shall be used.
- Pipe vent valves for supplementary or alternative venting of drainage installations, which comply with the relevant requirements of SABS 1532.
- uPVC pipes for use above ground, that comply with the relevant requirements of SABS 967.
- uPVC sewer and drain pipes and pipe fittings that comply with the relevant requirements of SABS 791.

1.3. JOINTING OF PIPEWORK AND FITTINGS

The following are applicable:

- Any jointing operation shall be performed in such a way as not to disturb the gradient of the line.
- Pipes shall be joined to one another in such a way that the continuity of the bore is maintained, and flow in the interior of the drain is not obstructed.
- Pipes and fittings to be jointed shall be internally clean, therefore no jointing material shall project inside the bore of the pipes, fixtures, or components, and burrs shall be removed from the ends of pipes, fixtures, or components, and measures shall be taken to prevent jointing materials from entering the bore of pipes, fixtures or components.
- All proprietary joints shall be made in accordance with the manufacturer's instructions. Joints between pipes, or between pipes and fittings, shall be appropriate for the materials from which such pipes and fittings are made, under normal working conditions, remain watertight to the standard set in 6.8.2, and be able to withstand, without leaking, the internal water pressure of 50 kPa and external water pressure of 30 kPa.
- In the assembly of sanitary pipework, the provision shall be made to accommodate any thermal or differential movement between the pipes and any building or ground, or other construction that forms part of the drainage installation.

Joints shall accommodate any pipe movement that takes place throughout the expected life of the drainage installation

1.4. VENT PIPES

Vent pipes shall be provided in the drainage system to prevent airlocks, and improve the smooth flow of the wastewater in the system.

1.5. ACCESS REQUIREMENTS

The wastewater drainage systems shall be furnished with mechanisms that enable ease o maintenance such as rodding eyes, inspection eyes, and manholes. The provision of these access mechanisms should be provided according to the table below:

Type of access	Minimum dimensions (mm)				
	Recommended max. depth to invert of drain	Internal dimensions		Nominal cover size	
		Rectangular length x width	Circular diameter	Rectangular length x width	Circular diameter
Rodding eye		Preferably the same size as a drain, but not less than 100 mm diameter			
Access fitting	600 except when situated in a chamber	150 x 100 or 225 x 100	150	150 x 100 335 x 100	150
Inspection chamber	1 000	450 x 450	450	450 x 450	450
Manhole		1 200 x 750	1 050	600 x 600	600

1.6. PROTECTION OF PIPING

During construction, all piping shall be protected from foreign matter entering completed pipe sections.

1.7. ISOLATION VALVES AND FITTINGS

Only SABS-approved valves and fittings shall be supplied and fitted on the domestic water system.

- Isolating valves
- Pressure-regulating
- Drain cock
- Vacuum breaker
- Safety valve T & P 400 kPa

Refer to the drawings for pipe schematics and sizes.

1.8. HOLDERBATS – TUBE SUPPORTS AND FITTINGS

The use of nails, wire, etc. as alternatives to the correct fixing will not be accepted.

1.9. DISSIMILAR METALS

The use of copper or other materials other than those in this specification will not be permitted. Use steel or galvanized steel supports. These are to be approved by the engineer before procurement.

1.10. ALLOWANCE OF EXPANSION

All support brackets or steel fixtures should be fixed to allow free movement of the pipe within the fixture. This is to allow for the expansion and contraction of the pipes during the operation of the system.

1.11. POSITIONING

Attention will be paid to the positioning of the supports. A fixture or support should be placed at least 500mm away from a change of direction fitting i.e., tee or elbow.

2. FIRE PROTECTION

The fire protection systems shall be limited to the provision and servicing of the existing fire hose reels, fire hydrants, hand-held fire extinguishers, and the provision of additional signage.

The areas that will be furnished with the new fire protection infrastructure/equipment shall be indicated on the fire protection layouts, which accompany this specification. The drawings show the additional fire protection features for the facilities. The layouts indicate the positions of the firefighting equipment, signage, and firewater reticulation network.

A specialist who has a proven record of accomplishment in this service shall do the servicing or installation of the fire protection equipment.

2.1. SHOP DRAWINGS

The contractor shall prepare workshop drawings for the entire installation showing all necessary sections, plans, details. Builders work, electrical requirements, mounting and hanging details, etc. The contractor will submit these drawings for approval.

2.2. VERIFICATION OF DRAWINGS AND DIMENSIONS

- Carefully check drawings to see that equipment and piping will fit into the spaces provided.
- Install equipment and piping so that no obstructions are caused.

- The location of equipment and piping shown on the engineer's drawings are approximate only. The actual final positions will be shown on the contractor's shop drawings.

2.3. EXCLUSIONS

- Forming holes in walls and making good thereafter.
- Concealing of piping.
- Access doors or panels in ceilings etc.
- Floor drains or any other drain points required for draining equipment.
- Supply and installation of electrical main cables.

2.4. SECURITY AND CLEANLINESS

The contractor and his workforce will have to comply with all security requirements instituted by the main contractor and the client.

The fire protection contractor shall ensure that his workforces are clean and hygienic and that all waste material from the installation is cleared away before the end of each working day.

2.5. FIREWATER PIPING

The fire protection system shall have an independent firewater reticulation system. All fire hose reels within this facility shall be connected to the underground HDPE firewater ring main. The ring main shall be 75-110mm Diameter HDPE Class 16 piping connected to the municipal main water supplies.

- All aboveground firewater piping shall be black mild steel.
- All steel Piping shall be SANS 1109-1.
- Joints between galvanized steel pipes and between galvanized steel pipes and fittings shall be
    - screwed joints that have pipe threads that comply with SANS 1109-1, where pressure-tight joints are to be made on the threads,
    - flanged joints using steel pipe flanges that comply with SANS 1123, or as otherwise approved.
- A suitable thread filler shall be used to obtain watertight joints where necessary, and exposed threads after jointing shall be suitably protected against corrosion.
- When joints are made by either screwed or cast-on flanges, the nuts shall be tightened in opposite pairs.
- Pipes shall not be welded or brazed unless galvanizing is done afterwards.

- The following shall be deemed to be acceptable:
    - malleable cast-iron pipe fittings that comply with the requirements in SANS 14;
    - ductile iron pipes that comply with SANS 1835;
    - steel pipes and pipe fittings with a nominal bore up to 150 mm that are suitable for screwing, in accordance with SANS 1109-1 pipe threads, and that comply with the requirements in SANS 62-2;
    - galvanized steel tubes, tubulars and fittings that have been galvanized in accordance with the requirements of SANS 32; and
    - Steel pipes and fittings that comply with the requirements of SANS 62-1, SANS 719, SANS 815-1 and SANS 815-2, as applicable.
- All steel tubing shall be joined using threaded steel fittings inline with SANS 62-2:2013.
- Prefabricated sections should be flushed before assembly, particularly in large projects where the system might stand before final flushing.

2.6. PROTECTION OF PIPING

During construction, all piping shall be protected from foreign matter entering completed pipe sections.

2.7. FIRE APPLIANCES AND FITTINGS

- The hose reels shall be “Everyway” hose reel complete with 30m rubber hose, chromium-plated stop cock, shut-off nozzle, and wall bracket.
- All hose reels for this installation shall be located at strategic points as indicated in the mechanical drawings accompanying this specification.
- A specially designed chamber shall be erected by the building contractor where these hose reels shall be installed. The chamber is to be furnished with glass doors on aluminium frames for visibility of fire protection equipment. In the event that the chamber is not practical, these fire appliances shall be secured directly against the wall.
- Fire extinguishers shall be installed in all buildings as indicated in the drawing and bill of quantities accompanying this specification.

2.8. FIRE PUMPHOUSE

The project scope is limited to the servicing of the existing pumping stations and not the provision of the new pumping stations.

2.9. HOLDERBATS – PIPE SUPPORTS AND FITTINGS

All firewater piping from the point of conversion underground from HDPE to black mild steel shall be clamped on the adjacent wall as it proceeds within each building. All horizontal piping runs within the ceiling void shall be supported as per specification.

2.9.1. Dissimilar Metals

The use of copper or other materials will not be permitted. Only galvanized steel supports are to be used. These are to be approved by the engineer.

2.9.2. Allowance of Expansion

All support brackets or steel fixtures should be fixed to allow free movement of the pipe within the fixture. This is to allow for the expansion and contraction of the pipes during the operation of the system.

2.9.3. Positioning

Attention will be paid to the positioning of the supports. As a general rule, a fixture or support should be placed at least 500mm away from a change of direction fitting i.e. tee or elbow.

- The use of nails, wire, etc. as alternatives to the correct fixing will not be accepted.

2.9.4. Guide to Maximum Spacing of Piping Supports

Pipe Nominal Size (mm)	Intervals for Vertical Runs (m)	Intervals for Horizontal Runs (m)
15,0	1,9	1,3
20,0	2,5	1,9
5,0	2,5	1,9
32,0	2,8	2,5
40,0	2,8	2,5
50,0	3,9	2,5
65,0	3,9	2,8
80,0	3,9	2,8
100,0	3,9	2,8
150,0	5,0	6,1

2.10. PAINTING

- The paint colour scheme shall comply fully with the Clause mentioned below under the Colour Coding clause.
- Paint all exposed metalwork and equipment which is not a specified manufactured product as follows:
- Thoroughly descale, clean, and degrease.

Black Metalwork

i) One coat of PA10 primer
ii) One universal undercoat
iii) Two coats of high gloss enamel to ensure complete corrosion protection.

Galvanised Metalwork

i) Degrease and prepare surfaces with a wash specifically designed for pre-treatment of galvanized iron.
ii) One coat of calcium plumbate.
iii) One universal undercoat.
iv) Two coats of high gloss enamel to ensure complete corrosion protection.

General Painted Equipment

i) Damaged and scratched paint surfaces shall be touched up with identical colour paint.
ii) Coldwater insulated piping shall be painted.
iii) Paint shall be of the highest quality and shall be applied strictly in accordance with the manufacturer's specifications.

Colour Coding

Colours as per the attached table "Colour Coding for piped Services" are to be used.

Colour Coding For Piped Services

Contents of Piping	**Proposed**
Hot Domestic Water	Brilliant Green (H10) Crimson (A03)
Cold Domestic Water	Brilliant Green (H10) Cornflower (F26)
Industrial Hot Water (i.e. Primary Circuit, Central Heating, etc).	Brilliant Green (H10) Golden Yellow (B49)
Firewater	Signal Red (A11)
Sewage	Black
LPG	Light Stone (C37)
Refrigerant	Light Grey (G29)
Diesel	Golden Brown (B13) White
Transformer Oil	Golden Brown (B13) Crimson (A03)
Fuel Oil	Golden Brown (B13) + Label

2.11. ELECTRICAL

- All electrical installations to conform to the following codes.
- The latest revision of SANS 10142 Code of Practice for the wiring of premises.
- The latest revision of SANS 101765
- Machinery and occupational safety regulations.

2.12. OPERATOR TRAINING

The contractor, manufacturing agent, or distributor shall include the services of a factory-trained field service representative to supervise the testing and commissioning.

2.13. MAINTENANCE INSTRUCTIONS

Three copies of the operating and maintenance manuals and “as-built” drawings (both hard copies on computer disc) shall be provided. Drawings stored on computer disc shall be in a format compatible with AutoCAD.

The manuals shall include the following:

i) Maintenance instructions for all components, troubleshooting guide part numbers of all replacement items, serial numbers of all principal pieces of equipment, etc.
ii) The names, addresses, and telephone numbers of manufacturers or their agents.
iii) A complete set of the “as-built” drawings folded to fit the manuals.

2.14. MAINTENANCE AND SERVICES

The Contractor shall be responsible for all maintenance and servicing of the installation during the 12 month guarantee period in accordance with the service schedules attached to this specification and such additional items as required by the manufacturer of the equipment shall be included.

Four (4) services are required during this period commencing three (3) months after the first delivery inspection and spaced approximately three months apart. The final service shall be carried out before the final delivery and expiry of the guarantee.

During the 12 month guarantee period the Contractor shall make good any defects due to inferior materials and workmanship and maintain all equipment in perfect operating condition.

The Contractor shall allow for all expendable materials necessary.

2.15. GUARANTEE PERIOD

- The CONTRACTOR shall unconditionally guarantee all new equipment for a minimum period of twelve (12) months from the date of hand over to the institution.

- If the CONTRACTOR or his supplier has a standard guarantee which exceeds the minimum warranty called for, the remaining portion of such an extended warranty must be ceded to the client.
- The guarantee shall cover the performance of the WORKS and any defects due to inferior materials and/or workmanship, fair wear and tear accepted, and the CONTRACTOR shall repair any such defects without delay.
- This guarantee shall include any losses such as water or any damage done to the building.
- If any such defects are not remedied without delay, the Secretary reserves the right to have such defect repaired at the risk and cost of the CONTRACTOR by another CONTRACTOR whom the Secretary deems to be proficient in the WORK. This is to be without prejudice to any rights the Secretary has against the installation CONTRACTOR or in such instances where he appoints another CONTRACTOR to remedy defects in the WORKS.

3. HVAC

3.1. PAINTING AND CLEANING

- Thoroughly clean and descale and paint all equipment, pipes, and metal parts with two coats zinc chromate, and two coats high gloss enamel. For galvanized surfaces use one coat of calcium plumbate, one universal undercoat, two coats of high gloss enamel.
- Factory painted equipment shall have scratched and damaged surfaces touched up with the identical colour paint. Paint shall be of the highest quality and shall be applied strictly in accordance with the manufacturer’s specifications.
- Damaged floors, walls, ceilings, etc. done by the HVAC contract, shall be repaired by him at his expense to the architects' specifications.
- Paint Colors will be approved by the engineer.
- During the progress of the work, the HVAC contractor shall carefully clean up after his men and shall leave the premises and all portions of the building in which he is working free from debris.

3.2. MECHANICAL VENTILATION SYSTEMS

The mechanical ventilation shall be through ducted systems. The mechanical extractor fans for the ablutions shall be concealed inside the ceiling void where possible. The axial flow fans performance parameters shall be shown on the mechanical HVAC layout. The fans shall operate on a timer during business hours and operate on motion sensors during none-business hours. These fans will be described and detailed on the bills of quantities and the HVAC drawings.

3.3. AIR CONDITIONING UNITS

In facilities with working air condition units, service shall be provide as per the manufacture's specifications.

In facilities with non-working air-conditioning units, new units with similar performance parameters shall be supplied. The most air-conditioning installations shall be inverter-based R32/R410-A with single-phase power supply air-conditioning units. The room temperature shall be regulated through a wired controller which will act as an input device, the set temperature should be regulated automatically irrespective of the heat load gain/loss in the building/dedicated HVAC zone. The temperature shall be monitored through sensors placed within the strategic points of the air-conditioned zone. These items are detailed on the bills of quantities and the HVAC drawings accompanying this specification.

3.4. DUCTWORK

All ductwork to be galvanized sheet metal and constructed to "SMACNA" standard for low pressure ducting. The insulation will be applied to the ducting with contact adhesive, applied to both the ducting and insulation left until touch dry, and then applied to the duct. The insulation must also be secured with nylon polyprop strapping and polyprop buckles.

3.5. REFRIGERATION PIPING

- All refrigerant tubing shall be of the seamless, dehydrated de-oxidized, refrigeration class copper tubing manufactured to ASTM B280-88 and ASTM B 743-88.
- Joints or connections in tubing up to 15mm O.D may be flared or welded and the tubing may be soft drawn.
- The Director will accept SABS "RC" and "RL" refrigeration class copper tubing.
- Fittings or flared joints or connections shall be equal and approved to those manufactured by Imperial Manufacturing Company. Flare nuts shall be of the short "frost-free" type.
- The tubing shall be run in a neat, straight, plumb, or parallel manner. Silver soldered or Silfos welded joints will only be acceptable and such joints shall be easily accessible for inspection purposes.
- Refrigerant tubing shall be supported at approved intervals, not exceeding one meter, and shall be given adequate gradient to ensure proper oil return. Hardwood treated timber batts and copper saddles shall be used to support the refrigerant tubing.
- The tubing shall be supported in such a manner that the suction line can be adequately insulated to prevent condensation drip.
- Tubing shall not be run in such a manner as to impede the removal of compressor heads, etc., and pipework shall not be run in positions where it will be subjected to mechanical damage.
- All tubing shall be accessible for repairs and shall be run in such a manner that it is not subjected to vibration from moving equipment.
- Refrigerant tubing may not be buried directly into wall or floor chases, however, suitable trunking or pipe ducts may be employed for this purpose.
- Where refrigerant tubing is to pass through walls, ceilings, or floors, neat metal or PVC sleeves shall be provided and installed. The sleeves shall finish flush with the faces of the walls, ceiling or floors shall be rodent-proofed after pipes, cables, etc., have been installed through them.

- Pipe sizes must be adequate to provide for the efficient operation of the system. The general specific rule is that the pressure drop in the suction line when operating at design pressures, shall not exceed 10 kPA from the compressor to the cooling unit. The pressure drop in the liquid line from the liquid receiver to the expansion valve is not to exceed 30 kPA. Tubing sizes and methods of installation shall be such as to ensure proper oil return to the compressor.
- All suction lines shall be neatly insulated to prevent condensation drip, by using good quality insulation.

3.6. CONDENSATE DRAIN PIPING

HVAC contractor to supply 25ø PVC class 10 or supplier approved insulated drain piping for air-conditioning systems.

The drain piping is to be insulated with 25mm thick insulation. This piping will be measured in the bills of quantities and positions indicated on the drawings, support this piping every 600mm with approved saddles.

3.7. ELECTRICAL

3.7.1. Site Wiring (Cable Tray and Cable Ladder)

- All references to cable trays in this document also refer to cable ladders.
- All cables are to be on a cable tray or cable ladder. The type of cable tray or cable ladder used must be approved in advance.
- Cable trays are to be hot-dip galvanized and are to be painted as follows:
  - Clean with Spick & Span galvanized iron cleaner.
  - Cold galvanize any cut edges
  - Prime with calcium plumbate paint
  - Paint orange
- Cable tray brackets are to be hot-dip galvanized, and painted in the same way as cable tray, except that they are to be black.
- As an alternative galvanized cable trays and brackets maybe plastic coated.
- Cable trays are not to be cut to form bends. Elbows and tees are to be factory-made items. Ascenders and descenders are to be beaten around a former.
- Cable trays may be horizontal or vertical unless the drawing is marked to the contrary.
- All take-offs from cable tray runs must be done using tees or bends.
- Cables must not be bunched on a cable tray.
- Only one layer of cables is permitted on cable trays.
- Cables may not cross over on cable trays.
- Here changes of size occur on a cable tray run, this must be done using bends and tees. Abrupt changes in size are not allowed.
- Cable trays must be spaced off the surface that they are fastened on.
- Do not short-circuit vibration isolators on machinery with cable tray.
- Cable tray brackets and supports must be of sufficient strength to prevent sagging, twisting, etc. particularly in the case of large cables.

- Cable trays and conduits are to be properly earthed to the switchboard earth bar.

3.7.2. Earthing

- All equipment is to be earthed.
- All earths are to be made off to the switchboard earth bar.
- The earthing strands in ECC cable, surfix, etc. are to be made off to the proper earthing points at both ends of the cable.

3.7.3. Making Off And Terminating Wires And Cables

- All site made holes in switchboards for glands etc. must be done with a chassis punch. Hole saws are not to be used. In the case of switchboards mounted outside, or in damp conditions, the cut edges of these holes must be treated with cold galvanizing and touched up with the correct colour paint.
- Where cables are made off into boards, this must be done carefully, offsetting the cables neatly and evenly, without cross-overs.
- All cable tails must have sufficient slack to allow tong testers to be used.
- Allow sufficient slack when making cable off to allow for adjustment of pulleys, removal of actuators, etc.
- No more than two lugs or two conductors without lugs are permitted in any terminal.
- Wires connected to numbered terminals are to bear the same number.
- All cables are to be numbered on both ends, directly above the gland shroud, with copper, brass, or stainless steel bands or strips with the number embossed or punched on the strip or band.
- All wires except as noted below are to have lugs crimped to the ends. Lugs on wires 6mm and under are to be insulated. Insulated bootlace ferrules are acceptable when the terminal is designed to accept them. The correct type of crimper is to be used. Ratchet crimpers only are to be used on insulated terminals. No exposed conductors are to be visible on wires which have insulated lugs.
- Single-core conductors are not to have crimped lugs but are to have insulated bootlace ferrules. Wires 10 mm and over which are secured into saddle or screw terminals are to be twisted and bound.

3.7.4. Conduits

- All conduit is to bear the relevant SABS mark.
- Conduits are to be run neatly and parallel to each other.
- Conduits are to be bent and offset with the correct tool. Wrinkling of the inside of bends will not be accepted.
- Through boxes, end boxes and fittings are to be made of the same material as the conduit, except that galvanized boxes and fittings may be used with black conduit.
- Inspection bends, tees, or couplings may not be used.

- All unwired conduits are to have draw-wires installed.
- Open conduit ends and boxes are to be sealed to prevent the ingress of debris.
- Cut conduit ends are to be properly reamed.
- Conduits must be made off to switchboards, boxes, trunking, etc using a coupling and male bush.
- Solid brass bushes must be used on the iron conduit, plastic bushes on the aluminum conduit, and brass or plastic bushes on the plastic conduit.
- Where the enameling or galvanizing of conduit has been removed by threading or tools, then the bare metal is to be painted with cold galvanizing paint.
- Conduit fixings are to be manufactured items designed for the fixing of the conduit. The method of fixing is to be approved before the construction commences.
- Metal conduit is to be fixed at a minimum of 2.0m, and plastic conduit 0.75m. Also, the conduit is to be fixed 150mm before and after each bend, offset, and box. Sagging between fixings will not be accepted.
- Drawer boxes are to be installed after two right-angle bends, or after 10.0m of a straight conduit.
- All plastic conduit joints and fittings are to be glued.

3.7.5. Trunking

- Trunking may not be cut to form bends. Distribution outlets, elbows, tees, ascenders, and descenders are to be factory-made items and must be radiused.
- Internal splices are to be used for joints.
- Sharp fastenings are not to protrude into trunking.
- All cut edges are to be smoothed, and no sharp edges are to be left inside trunking.
- All brackets are to be galvanized.

3.7.6. General

- All conductors are to be stranded.
  - All cables are to be PVC SWA PVC.
  - Screened cable for low voltage controls may be 0.5mm 2 OAM in conduit.
  - No surfix or similar cable may be used.
- All cable trays, ladders, conduits, surface mounted cables, trunking, etc. is to be run parallel to or at right angles to walls and other surfaces and may not be solid over expansion joints.
- Wall-mounted switchboards are to be spaced away from the wall 20mm.
- All cut ends of galvanized material are to be painted with cold galvanizing paint.
- All iron or steel material and fastenings exposed to damp conditions must be hot-dip galvanized. Electro-galvanized or cadmium-plated material will not be accepted unless suitably painted.
- All switchboards, isolators, terminal boxes, etc. located outside, or in any area subject to dampness, must be bottom entry only.

- All installations and wiring are to conform to the following:
  - The latest revision of SABS 0142 code of practice for the wiring of premises.
  - Machinery and occupational safety regulations.
  - Local authority regulations.
- Electrical Compliance Certificates as required by the latest revision of SABS 0142 are to be produced before power is applied to the installation.
- All cable and cable tray routes, wiring methods, etc. must be approved in advance.
- DO NOT alter wiring diagrams, switchgear selections, cable sizes, cable types, equipment positions, etc. without permission.

3.8. COMMISSIONING, ADJUSTING, AND BALANCING

- Equipment shall be commissioned and adjusted so that it will perform as specified and shown on the drawings. A letter from each supplier of equipment shall be sent to the Engineer stating that the equipment has been installed and commissioned entirely in accordance with the supplier's requirements and recommendations.
- The entire control system shall be adjusted and placed in operating by the supplier. Re-adjustments necessary to accomplish the specified results during the first year of operation shall be made without cost to the Employer.
- All duct systems shall be adjusted and balanced so that air quantities at outlets are as specified or shown on the drawings so that distribution from air terminals is free from draughts and uniform over the face of each air terminal.
- Adjustments shall be made so that splitters and volume adjusters close to air terminals will have the least pressure drop consistent with volume requirements. Additional pressure drop required for the balancing of shorter fans shall be obtained by adjustment of the dampers at branch duct take-offs. Adjustable fan drives shall be used for making final adjustments of total air quantities.
- Direct reading velocity meters may be used for comparative adjustment of individual air terminals, but air quantities in ducts that have velocities of 5,0m/s or more shall be measured by means of pitot tubes. Factory fabricated plugged or capped openings for pitot tubes shall be provided as required.
- The setting of dampers, splitters, and other volume adjusting devices shall be permanently inscribed so that they can be restored to their original positions if disturbed at any time.
- Where variable or constant volume regulators or similar devices are installed, the Contractor shall remove one device of each size from the installation as directed by the Engineer and shall send such devices to the CSIR or other approved body, for certification of the installation and shall form the basis for performance comparisons of other devices of the same size if required by the Engineer.
- A full air volume reading shall be taken on the site before the device being sent for certification and the Contractor shall ensure that all conditions necessary, for the correct operation of the device, prevail before the first site volume reading being taken.
- In the event of the installation being in operation at the time of such certification being required, the Contractor shall install devices of the same size as those on which such certification is taking place, to ensure continuity of operation of the installation.

- Fan performance on variable volume systems shall, in addition to any other tests required by the Engineer, be recorded when all variable volume devices are switched to their maximum design volume.

3.9. GENERAL

- The design of the air-conditioning and ventilation systems offered must comply with the :
  - National Building Regulations.
  - Any additional requirements of any local authority including fire and health.
  - All wiring to SABS 0142.

3.10. OPERATING AND MAINTENANCE MANUALS

- HVAC contractor to provide manuals with the following contents.
- Descriptive information, operating instructions, inspection and maintenance, reference documents, and equipment reference documents.

3.11. DRAWINGS AND AS-BUILT DRAWINGS

- Workshop drawings to be drawn on CAD by the HVAC contractor and submitted for approval to the engineer.
- These drawings will include all plans, sections, wiring, diagrams, builders' work, etc.
- At the end of the contract, these drawings will be updated and included with the O&M manuals as As-Built drawings.

3.12. MAINTENANCE AND OPERATING INSTRUCTIONS

- Three copies of the Operating and Maintenance Manuals and “As-Built” Drawings to be prepared and submitted to the Engineers Office for checking.
- All relevant names, addresses, and telephone numbers to be included in the manuals.
- The contract shall be considered incomplete until all tests have been conducted to the satisfaction of the Department and all drawings and manuals have been handed over to the Engineer.

3.13. MAINTENANCE AND SERVICING

- The HVAC Contractor shall be responsible for all maintenance and servicing of the installation during the 12 months guarantee period.

3.14. GUARANTEE PERIOD

- The HVAC Contractor shall unconditionally guarantee all newly installed equipment for a minimum period of twelve months (12) from the date of hand over to the Client.
- The guarantee shall cover the performance of the works and any defects due to inferior materials or workmanship. The Contractor shall repair any such defects without delay.
- If any defects are not remedied by the Contractor the Client reserves the right to employ another contractor to do repairs at the expense of the installation Contractor, during the guarantee period.

SECTION 6 – CIVIL ENGINEERING

1. SCOPE OF WORKS

1.1. GENERAL

The Contractor will be responsible for the construction and handing over of the stormwater infrastructure upgrades and occasional resurfacing. Also included in the scope is the supply of as-built drawings and on-site training of the Employer's staff.

1.2. SUMMARY OF SCOPE

The civils scope of work includes the following:

- Site establishment.
- Breaking of damaged surfacing in specific areas.
- Excavations to expose the existing stormwater pipes.
- Unblocking of existing stormwater drainage system.
- Importing of specified layerworks from commercial sources.
- Reinstatement of layerworks.
- Replacing of damaged asbestos suspended channels / box gutters with new aluminium channels.
- Replacing of corroded and blocked drain covers with new.

2. APPLICABLE STANDARD SPECIFICATIONS

All materials and workmanship shall conform to and comply with the following standards:

- SANS 1200 A : General
- SANS 1200 AB : Engineer's Office
- SANS 1200 C : Site Clearance
- SANS 1200 DB – Pipe Trenches
- SANS 1200 LB – Bedding (Pipes)
- SANS 1200 LE – Stormwater Drainage
- SANS 1200 GA : Concrete (Small Works)
- SANS 1200 MJ : Segmented Paving

- SANS 1200 MM : Ancillary Roadworks
- SANS 1200 MH: Asphalt Base and Surfacing

3. PARTICULAR SPECIFICATIONS

The list of particular specifications is as follows:

- PSA SANS 1200 A: General
- PSAB SANS 1200 AB: Engineers Office
- PSC SANS 1200 C: Site Clearance
- PSD SANS 1200 D: Earthworks
- PSDB SANS 1200DB: Earthworks (Pipe Trenches)
- PSG SANS 1200 G: Concrete
- PSGA SANS 1200 GA: Concrete (Small Works)
- PSL SANS 1200 L: Medium Pressure Pipes
- PSLB SANS 1200 LB: Bedding
- PSLD SANS 1200 LD: Sewer
- PSLE SANS 1200 LE: Stormwater
- PSDM 1200 DM : Earthworks (Roads, Subgrade)
- PSM 1200 M : Roads (General)
- PSME 1200 ME : Subbase
- PSMJ 1200 MJ : Segmented Paving
- PSMK 1200 MK : Kerbing, Channelling, Edge Beams, etc
- PSMM 1200 MM : Ancillary Roadworks

4. VARIATIONS AND ADDITIONS TO THE STANDARD SPECIFICATIONS

PSA SANS 1200 A: GENERAL

CONTENTS

PSA2 INTERPRETATIONS

PSA3 MATERIALS

PSA4 PLANT

PSA5 CONSTRUCTION

PSA7 TESTING

PSA8 MEASUREMENT AND PAYMENT

PSA2 INTERPRETATIONS

PSA2-1 Applicable edition of standards. (Sub clause 2.2)

Add at the beginning of Sub clause 2.2:

“Unless a specific edition is specified (see the List of Applicable Specifications)

PSA2·2 Definitions (Sub clause 2.3)

Add:

Roads/Site Roads: Site roads are defined by a network of public and non-public roads within the Site boundary providing access to the various buildings or areas. Any reference to roads, parking and paved areas for traffic shall be interchangeable.

Party, Parties and Third Party: 1Party11 and 'Parties" means the Client and the

Consultant and 'Third Party' means any other person or entity as the contract requires.

PSA2-3 Abbreviations. (Sub clause 2.4)

Add to Sub clause 2.4(b):

"MAMDD: Modified AASHTO maximum dry density”.

PSA2-4 Items In Schedule of Quantities. (Sub clause 2.8.1)

In the fourth line of Sub clause 2.8.1, after the word "specification", add:

"and or in the measurement and payment clause of the particular specification or

Project specification

PSA3 MATERIALS

PSA3-1 Quality. (Sub clause 3.1)

Add the following:

Where a material to be used in this Contract is specified to comply with 'the requirements of a SANS Standard Specification, and such material is available with the official SANS mark, the material used shall bear the official mark.

Whether or not the material bears the mark or is tested, any material found not to be in accordance with the specification shall be rejected and replaced by the

Contractor at his own cost.

Tenderers may be required, at their own expense to submit samples of the

Material offered to the Engineer for his approval and the material supplied under this contract shall be of a standard equal to that of the samples so submitted and approved. Samples will remain the property of the Tenderers, who shall remove them when called upon to do so by the Engineer.

Add the following new sub-clause:

PSA3-3 DELAY DUE TO SUPPLY OF MATERIALS

The Contractor shalt ensure that the work is not delayed due to the lack of materials on the site of the works, by placing orders with suppliers for the materials required under this contract as soon as possible after the acceptance of this tender.

The Contractor shall, by producing copies of written orders or written enquiries for supplies, prove to the satisfaction of the Engineer that any delay occasioned by non-availability of materials has been caused by the inability of suppliers to supply and not by his own lack of timely ordering or lack of exhaustive enquiry for supplies, before any extensions of the contract time will be allowed due to such delays.

PSA4 PLANT

Add the following new sub-clauses

PSA4-3 CONSTRUCTION PLANT

Construction plant shall be of a suitable type for carrying out the work for which it is required. Its capacity shall be sufficient to meet the requirements of the work within the contract time. It shall be kept at all times in full working order and repair.

PSA5 CONSTRUCTION

PSA5-1 Survey (Sub clause 5.1)

Add the following paragraph:

Tender drawings shall not be used for construction purposes. Construction drawings and additional detailed information will be made available to the Contractor as and when required.

PSA5-2 Setting out of the Works (Sub clause 5.1.1)

Add the following paragraphs:

The Contractor shall contract or employ a professional land surveyor and supporting team who will check the reference beacons. Agreement shall be reached with the Engineer on the values of the beacons to be used. It is the Contractor's responsibility to maintain and protect all reference beacons. The Contractor shall make available for the duration of the contract period, when required by the Engineer, one skilled and one unskilled survey labourer.

The contract will construct a limited number of official reference and level beacons on the site of the works. The Contractor shall place additional reference beacons on all sides of the work areas for accurate setting out and levelling purposes. These beacons shall be placed in concrete, marked and certified by a professional land surveyor. Beacons shall be check-levelled during construction to confirm the accuracy when instructed by the Engineer.

Prior to the commencement of construction, the Contractor shall measure the existing levels on the area of the works. All survey work to be carried out by a professional land surveyor. All earthworks quantities shall be certified correct by a professional land surveyor. All as built levels and dimensions shall be certified correct by a registered land surveyor.

The Contractor shall advise the Engineer of any conflict between the position of any part of the Works and an existing feature.

PSA5-3 Survey beacons. (Sub clause 5.1.2)

Add the following paragraph:

The Contractor shall search for, locate, protect and record all the beacons before any work commences.

PSA5-5 Protection of overhead and underground services (Sub clause 5.4)

Add the following paragraph

(i) Location and Protection

Various services are known to exist within the PRASA Umlazi Sub Corridor 1 rail reserve. No detection of underground services was carried out due to the nature of the work being more maintenance and refurbishment type. It is therefore the Contractor’s responsibility to ensure location and protection of services where excavations are to be carried out.

Any services or structures damaged during construction shall immediately be reported to the Employers Agent or Engineer, and as soon as possible after such damage a written report stating the exact circumstances of the occurrence shall be submitted to the Employers Agent.

All practical measures shall be taken to effect immediate repairs, either by contacting the relevant authority or, where instructed by the Engineer, the Contractor shall perform temporary repairs himself. All repairs the damaged services shall be done at the Contractor's expense.

PSA5-6 Dealing with water (Sub-clause 5.5)

Unless specified, the rates tendered and paid for excavation and the construction of any subsurface structure shall include for dewatering as may be necessary.

In addition to the items as set out in Sub-clause 5.5 the contractor shall also provide pumping equipment, pipes and other equipment as may be necessary to keep excavations dry at all times.

PSA7 Compliance to the quality control plan and testing

Add the following paragraphs:

Prior to the commencing of the Works, the Contractor is to produce and submit a quality control programme (QCP), and the associated approval forms, to the Employers Agent for acceptance. The QCP is to consist of a list of items, which are to be signed off by both the Contractor and Employers Agent on Site, to ensure that the Works on Site comply with the specifications.

The QCP shall incorporate the requirements of all relevant SANS 1200, project specifications and other specifications referred to.

The accepted QCP will not relieve the Contractor of any quality control and/or testing responsibilities stated in the relevant specifications.

Work must be signed off by both the Contractor and the Engineer before it can be processed for payment.

PSA8 MEASUREMENT AND PAYMENT

PSA8-1 Method of measurement, all sections. (Sub clause 8.1.1.)

In the second line of Sub-Clause 8.1.1, after the words "standardized specification or" add: "in the measurement and payment clause of the standard specification or".

PSAB SANS 1200AB: ENGINEER'S OFFICE

CONTENTS

PSAB3 MATERIALS

PSAB4 PLANT

PSAB5 CONSTRUCTION

PSAB8 MEASUREMENT AND PAYMENT

PSAB3 MATERIALS

PSAB3-1 Name board. (Sub clause 3.1)

Two name boards, manufactured as specified In Sub clause 3.1 and as shown on the tender drawings, shall be provided, and shall be erected plumb and level, in the position as directed by the Engineer.

The wording for the name boards shall be as ordered at the commencement of the Works.

PSAB3-2 Engineer's office. (Sub clause 3~2)

The Contractor shall provide two offices of 24m^2, of which one will be used as storage for samples. The erection position will be indicated by the Engineer.

All windows in the office shalt be fitted with burglar proofing over the entire glazed area, and with fly screens over the openings.

The Contractor shall maintain and service, as applicable the facilities specified in SANS 1200 A and PSAB.

The facility shall include:

a) furnished site offices with air-conditioning and a water connection and basin (1);

b) unfurnished site offices (1);

c) ablution facilities with flush unit linked to the sewer system, or chemical toilet if sewer system is not available;

d) shaded carport (2);

e) photocopy machine (See PSAB4-3);

f) wifi internet connection (See PSAB4-1);

g) survey equipment (See PSAB4-2);

h) a site instruction book (See PSAB 5-3);

i) protective clothing for 8 persons (excluding appropriate footwear);

j) safety equipment (including rotating amber constructions lights; and

k) emergency medical kit.

l) Electronic equipment for the Engineer (See PSAB4-3);

Unless specified otherwise, on completion of the Works, these facilities shall revert to the Contractor who shall remove them from the site. The term "use of the Engineer" will be deemed to include; as appropriate, use by the Engineer's staff and the Engineer's Representative and his staff.

Latrine and ablution facility for the engineer: The Contractor shall provide, maintain and service one ablution room for ladies and one ablution room for gents for the exclusive use of the Engineer. This room shall be constructed as specified for the Engineer's office but shalt be at least 4 m in size and fitted with one flush toilet and one hand washbasin.

Parking facilities: A lean-to carport with a solid roof for 2 cars giving protection from the sun, wind and rain, and with a ground surface that is neither dusty nor muddy, shalt be provided in a position adjacent to the Engineer's office for the exclusive use of the Engineer.

Insurance: The Contractor shall be responsible for insuring all equipment in the engineer's site office against theft and accidental loss for the contract period.

PSAB5 CONSTRUCTION

PSAB5-1 Name board. (Sub clause 5-1)

The name boards shall be removed by the Contractor before the issue of the

Certificate of Completion.

PSAB5-2 Survey assistants. (Sub clause 5.6)

In terms of Sub clause 5.5 two suitably trained and experienced workmen to be used

as survey assistants shall be made available to the Engineer during working hours as and when required.

PSAB5-3 Site instruction book

Throughout the construction p&riod the Contractor shall supply a carbon triplicate book as a site instruction book.

This book shall be kept on Site and shall be accessible to both the Contractor and the Engineer at all times. It shall be used:

i. By the Contractor for providing the Engineer with any information regarding the construction of the Works which may be requested and giving notification in writing of inspectlons, drawings, etc, required by the Contractor, and

ii. By the Engineer for the purpose of writing day-to-day instructions and confirming any verbal information or instructions given to the Contractor.

One copy of each site note issued shall remain in the book.

PSAB8 MEASUREMENT AND PAYMENT

PSAB8-2 Photocopying machine..... Unit: Sum

The Contractor shalt be responsible for the costs of supplying and all maintenance and servicing of the printer/scanner.

The rate shall cover the supply, maintenance and servicing for the full duration of the construction period.

PSC SANS 1200 C: SITE CLEARANCE

CONTENTS

PSC3 MATERIALS

PSC5 CONSTRUCTION

PSC8 MEASUREMENT AND PAYMENT

PSC3 MATERIALS

PSC3-1 Disposal of material (Sub-clause 3.1)

An existing dumpsite for spoil of material (soil, rock; masonry, etc as approved by the engineer, not organic or decomposable material) is not available. All materials from excavations or demolishing shalt be carted to commercial off-site dumpsites.

PSC5 CONSTRUCTION

PSC5-1 Areas to be cleared and grubbed. (Sub clause 5.1)

Only the approved minimum area required for the execution of the Works including areas on which material shall be stockpiled for later reuse or on which material shall be dumped and spread, shall be cleared and grubbed. The areas where work is to be carried out must be kept clean for the duration of the contract. All rubbish must be removed without delay and the site must be left clean and tidy on completion of the service.

PSC5-2 Conservation of topsoil. (Sub clause 5.6)

Topsoil up to a depth of 150 mm, if available shall be removed from the above specified cleared areas and stockpiled on approved sites for later reuse. Until required for spreading the stockpiles of topsoil material shall be stabilised by watering or other approved means.

When in the opinion of the Engineer, there is an insufficient quantity of topsoil available from the areas to be cleared the Contractor shall import topsoil from borrow areas designated by the Engineer.

PSC8 MEASUREMENT AND PAYMENT

PSC8-1 Clear and grub. (Sub clause 8.2.1)

Site clearance for pipe trenches will not be measured where such trenches lie within the carriageway of any road.

The rate tendered for clearing and grubbing shall cover the cost of disposal of the material by approved means at places approved by the Engineer.

PSC8-2 Removal of pipes. (Sub clause 8.2.7)

In addition to the requirements of Sub clause 8.2.7, the rate shall cover the cost of locating the pipeline and any additional costs of excavation and backfilling not covered by other normal rates for excavation and backfilling under SANS 1200 DB.

PSC8-4 Removal and conservation of topsoil. (Sub clause 8.2.10)

The rate tendered for the removal of in situ topsoil shalt, in addition to the items listed in Sub clause 8.2.10, also cover the cost of preparing the stockpile area, loading and unloading, and stabilizing and protecting the stockpiles of topsoil.

PSD SANS 1200 D: EARTHWORKS

PSD 1 SCOPE (CLAUSE 1)

PSD 3 MATERIALS (CLAUSE 3)

PSD 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES (Sub-Clause 3.1)

PSD 3.1.1 Method of Classifying (Sub-Clause 3.1.1)

The Contractor may use any method he chooses to excavate any class of material but his chosen method of excavation shall not determine the classification of the excavation. The Employer's Agent or his Representative will decide on the classification of the materials. In the first instance the classification will be based on inspection of the material to be excavated and on the criteria given in PSD 3.1.2 below. All material shall be considered to be soft material unless agreed and approved otherwise in writing with the Employer's Agent prior to excavation taking place.

In the application of this classification, no differentiation shall be made between " bulk" or "restricted" excavations.

PSD 3.1.2 Classes of Excavation (Sub-Clause 3.1.2)

PSD 3.1.2.1 Classes of Excavation: Conventional Construction

All material encountered in any excavations for any purpose including restricted excavation will be classified as follows:

a. Hard rock excavation

Hard rock excavation shall be excavation in material (including undecomposed boulders exceeding 0,15 cubic metres in individual volume) that cannot be efficiently removed without blasting or without wedging and splitting.

b. Soft excavation

Soft excavation shall be all material not falling into the category of hard rock excavation.

PSD 5 CONSTRUCTION (CLAUSE 5)

PSD 5.1 PRECAUTIONS

PSD 5.1.1 Safety

PSD 5.1.1.2 Safeguarding of excavations

The Contractor shall be responsible for all lateral support and the safe-guarding of all excavations, and all costs involved with the proper safeguarding of the excavations shall be included in the tendered rates.

PSD 5.2 METHODS AND PROCEDURES

PSD 5.2.2. Excavation

PSD 5.2.2.1 Excavations for General Earthworks and for Structures (Sub-Clause 5.2.2.1)

Working space of 1,0 m wide adjacent to the walls of structures has been allowed for in the Quantities. Any additional working space required by the Contractor, or over-excavation, shall be excavated, backfilled and compacted by the Contractor at his own expense.

PSD 5.2.2.3 Disposal (Sub-Clause 5.2.2.3)

Unless otherwise ordered, surplus and unsuitable material shall be removed from site and disposed of by the Contractor who shall, at his own cost, make all necessary arrangements for locating a spoil site and haulage.

The Employer's Agent may authorise or instruct that surplus and unsuitable material from excavations be placed as compacted fill on the Site in accordance with the relevant clauses of SANS 1200 D, or loaded, tipped and spread at a suitable disposal site, within the free-haul distance, approved by the Employer's Agent.

Where excavated material is disposed of on site or at a location designated by the Employer's Agent, the topsoil shall be stripped to a depth of 150 mm or as directed, stockpiled and reinstated to its original depth over the spoil. The spoil site shall be graded to smooth, free-draining contours.

PSD 5.2.3 Placing and Compaction

PSD 5.2.3.2 Confined Backfilling and Compacting Around Structures

Backfill against structures, within 1,0 m of the structure, shall be approved clean non-cohesive material, either selected material from the excavations or imported material, and shall be compacted to a minimum of 93% Mod. AASHTO density (100% for sand). Payment for this item shall cover all costs involved in supplying, loading, transporting, placing, spreading and compacting the imported material. The volume of backfill will be calculated on a 1.0m wide

area for workspace behind the structure walls, and the Contractor shall make provision in his rates for any additional material required for wider excavations.

PSD 8 MEASUREMENT AND PAYMENT

PSD 8.1 BASIC PRINCIPLES

Add the following:

Excavations

The Contractor shall determine at tender stage the appropriate method of bulk and trench excavation (plant, labour etc) and tender rates accordingly.

Generally, the excavations will be measured in the categories set out hereunder, i.e.

(ii) Cut to Fill, where the unit rate tendered shall be inclusive of all work and costs required for the bulk excavation of all materials from platform and excavation areas, the transport and placement of the material in the required fill areas, and compaction in layers not exceeding 150 mm to 93% Modified AASHTO density.

(iii) Cut to Stockpile where the unit rate tendered shall be inclusive of all works and costs required for the bulk or restricted excavation of materials which are suitable for placement in fill, the loading and transport to the designated stockpile site, and the maintenance of the stockpiles, as directed by the Employer's Agent.

(iv) Cut to Spoil where the unit rate tendered shall be inclusive of all works and costs required for the bulk or restricted excavation of materials which are in excess or are not suitable for placement in fill, the loading and transport and disposal thereof in accordance with PSD 5.2.2.3.

(v) Hand Excavations. Hand excavation rates will only be paid if ordered by the Employer's Agent in writing where the unit rate tendered shall be an extra-over rate for restricted excavation, which shall include for all additional costs involved in providing labour and hand tools required for excavations by hand.

Backfilling

Except for the cut to fill operations described above where measurement and payment of the filling and compaction is included under these items, all other fill construction works and backfilling requires fill material from borrow pits and stockpiles on site or from commercial sources, where the following additional items shall apply;

(a) Construction of fill platform and embankments; where the unit rate tendered shall be inclusive of all works and costs required for the loading and transport of fill material from the stockpiles or borrow pits on site, the placement of the material in the required fill areas, and compaction in layers not exceeding 150 mm to 93% Modified AASHTO density, as directed by the Employer's Agent.

(b) Restricted backfilling against structures; where the unit rate tendered shall be

inclusive of all works and costs required for the selection, loading and transport of

fill material from the stockpiles or borrow pits on site, the placement of the material in the 1,0m working space against structures, and compaction in layers not exceeding 150 mm to 93% Modified AASHTO density (100% for sand), as directed by the Employer's Agent.

(c) An Extra-over item to item (a) above shall be measured for final shaping and trimming of embankment sides.

(d) An Extra-over item to item (b) above shall be measured for imported material from commercial sources.

PSDB SANS 1200 DB: EARTHWORKS (PIPE TRENCHES}

PSDB1 SCOPE

Add the following:

The provisions of this specification shall apply mutatis mutandis to portal and rectangular precast concrete culverts.

PSDB3 MATERIALS

PSDB3.1 CLASSES OF EXCAVATION

Add the following:

The excavation of material will be classified as specified in Clause PSD 3.1. The method of excavation shall be determined at tender stage, and rates shall be tendered accordingly.

PSDB 5 CONSTRUCTION (CLAUSE 5)

PSDB 5.1 PRECAUTIONS (Sub-Clause 5.1)

PSDB 5.1.2 Stormwater, Seepage and Dewatering of Excavations (Sub-Clause 5.1.2)

In addition to the Contractor's responsibilities for dealing with water, which are deemed to be included in the rates tendered for the relevant payment items, the Employers Agent may order the Contractor to place a crushed stone bedding layer (minimum thickness 150 mm) on the trench bottom.

Should the trench bottom conditions remain unstable due to the nature of the soil and the degree of saturation, the Employers Agent may order the Contractor to install a geotextile membrane on the trench bottom prior to the provision of the stone layer. After placing the stone bedding, the geotextile shall be folded over the stone with a minimum overlap of 300 mm to form an enclosed drain. The specified bedding material shall then be used to bed the pipe.

The Contractor shall only provide and lay the stone bedding layer and geotextile after receipt of the written order to do so from the Employers Agent.

PSDB 5.2 MINIMUM BASE WIDTHS SPECIFIED

Replace the side allowance table in Clause 5.2 with the following:

External diameter of pipe barrel, mm		Side allowance on each side, mm
Over	Up to and including	
-	125	300 (refer to sub-clause (b))
125	710	300
710	1050	400
1050	2020	500
2020	-	600

Add the following to sub-clause 5.2(b):

The minimum base width for subsurface drains shall be 500.

Trench Depths

All trenches are to be excavated to a depth sufficient to accommodate the pipes at the levels and cover as shown on the drawings. Unless otherwise stated, a minimum cover of 700 mm will generally be required. Allowance must also be made for the required depth of pipe bedding.

PSDB 5.6 BACKFILLING

PSDB 5.6.3 Disposal of Surplus Material

Surplus material shall be disposed of off-site or spoiled on site, as directed by the Employers Agent.

PSDB 5.7 COMPACTION OF TRENCH BACKFILL (Sub-Clause 5.7)

PSDB 5.7.1 Areas not Subject to Traffic Loads (Sub-Clause 5.7.1)

Sand backfilling shall be compacted to 100 percent modified AASHTO maximum density.

PSDB 5.7.2 Areas subject to Traffic Loads (Sub-Clause 5.7.2)

The provisions of Sub-Clause 5.7.2 with regard to compaction of trenches shall be applicable to all trenches in road reserves. Sand backfilling shall be compacted to 100 percent modified AASHTO maximum density.

PSDB 8 MEASUREMENT AND PAYMENT (CLAUSE 8)

PSDB 8.3.2(b) Extra-over item (a) above for :

Replace (1) and (2) with the following :

(a) Hard rock excavation

(b) Hand excavation

Hand excavation and hard rock excavation will only be paid when written permission is obtained from the Engineer **prior** to the excavation operation commencing.

PSDB 8.3.4(c) Excavate by hand in all materials to verify existing services and backfill

Measurement shall be the cubic metres actually excavated by hand to expose the services or hand excavations as directed by the Employers Agent.

The rate shall cover the additional cost of care in excavation necessitated by the presence of the service.

Excavations by hand will only be paid upon written order by the Employers Agent to perform excavations by hand.

Item **Unit**

Excavate by hand in all materials to verify

existing services, or as directed by the Employers Agent and backfill..... m3

PSDB 8.3.5 Existing Services that Intersect or Adjoin a Pipe Trench

The rate for an item scheduled in terms of (a) and (b) shall in addition to items i) to iv) cover any additional costs in adhering to the requirements stipulated in the wayleave conditions, including excavation by hand if required.

Replace the dimension “200 mm” in the last sentence of paragraph (a) with “500 mm”.

PSDB 8.3.6 Finishings (Sub-Clause 8.3.6)

PSDB 8.3.6.1 Reinstate road surfaces complete with all courses (Sub-Clause 8.3.6.1)

Add the following:

The rates tendered shall cover all costs associated with carefully removing, storing and reinstating the respective items to the satisfaction of the Employers Agent. Should any material be damaged or stolen, the costs of replacing the respective material shall be borne by the Contractor.

The reinstatement of any material shall comply with the applicable specifications, as laid down in both SABS 1200 and the project specifications, and shall be deemed to be included in the rates. Any material that has been reinstated or reconstructed and does not comply with the applicable specification shall be reworked at the Contractor’s expense.

PSG CONCRETE (STRUCTURAL)

PSG 1 SCOPE

All concrete works are to be carried out in accordance with the requirements of SANS 1200 G. This includes the construction of all reinforced and plain concrete structures, foundations, chambers, thrust blocks, haunching and encasement to pipes.

PSG 3 MATERIALS

PSG 3.2 CEMENT

PSG 3.2.1 Applicable specifications

The Cement shall be OPC of strength class 42,5N or higher to SANS 50197-1.

All cement shall be to the Employers Agent's approval and have a guaranteed equivalent Na2O content of less than 0,5%.

For each cement consignment the Contractor shall furnish a certificate stating that the cement has been tested and analysed by the manufacturer and complies with the above requirements.

A similar procedure should be followed when use is made of Ready Mixed concrete.

PSG 3.2.3 Storage of cement

Cement shall be stored in such a way that the oldest cement is used first. Cement shall not be kept in storage for longer than 8 weeks.

PSG 3.5 ADMIXTURES

PSG 3.5.1 Approval of admixtures

Admixtures shall comply with the requirements of ASTM C 494.

PSG 3.9 JOINTS (New Clause)

The jointing materials shall be approved and as shown on the drawings or as scheduled.

All jointing materials shall be carefully stored and protected to avoid damage, distortion or contamination by other materials prior to use. They shall be applied by trained applicators, strictly in accordance with the manufacturer's instructions and as approved.

PSG 3.9.1. Primer

An approved primer fully compatible with and/or manufactured for use with the specified jointing or sealing compound shall be applied to the appropriate joint surfaces where so required.

PSG 3.9.2 Elastomeric sealant

Elastomeric sealants shall be polyethylene cured polyurethane "pouring grade" for horizontal joints and "gun grade" for vertical joints, conforming to the physical test requirements of SANS 110.

PSG 3.9.3 Joint fillers

Joint fillers shall be closed-cell expanded polyethylene having a density not less than 35 kg/m3, a tensile strength not less than 215 kPa and a minimum tensile elongation at break of 92%.

Fillers shall have a tear our strip for forming the specified recess for sealant where appropriated.

PSG 3.9.4 Swellable joint sealing profiles

Swellable joint sealing profiles shall be 'SikaSwell-P' or equal approved hydrophilic sealing profiles which swell on contact with water. The profile shall be fixed to the substrate with 'SikaSwell S-2' adhesive or an equal approved adhesive, compatible with the sealing profile used.

PSG 5 CONSTRUCTION

PSG 5.1 CONCRETE REPAIRS (New Clause)

Concrete repairs shall be carried out where specified to reinstate sections of degraded concrete or to finish off rough edge exposed by demolition.

PSG 5.1.1 Surface preparation

The surface to which repair mortar is to be applied shall be thoroughly cleaned by high pressure water jetting or by wire brushing and compressed air. The surfaces shall be free of loose material, laitance, dirt, grease, oil, rust etc.

In addition, the surface preparation shall comply with any additional requirements of the manufacturer of repair mortar to be used.

PSG 5.1.2 Application

The repair mortar shall be applied strictly in accordance with the manufacturer's instructions by trained applicators.

PSG 6 TESTS

PSG 6.1 FREQUENCY OF SAMPLING

Add: "One sample shall comprise three test cubes of concrete".

The cost of taking and crushing the concrete cubes shall be to the Contractor's account, including where check tests undertaken by the Employers Agent have failed.

Payment for the cost of taking and crushing concrete cubes shall be deemed to be included in the Contractor's rates for concrete.

PSLB SANS 1200LB: <u>Bedding (Pipes)</u> (Refer to SABS 1200LB)

PSLB 1 Selected granular material (Clause 3.1)

Notwithstanding what is stated in Clause 3.1, selected granular material need not be singularly graded, but the maximum particle size shall be 19mm and the material shall be non-plastic, with a compactibility factor not exceeding 0,4.

PSLB 2 Classes of Bedding (Clause 3.3)

Class of bedding for the type of pipes used on the Works shall be as follows:

Type of Pipe	Rigid or Flexible	Class of Bedding (SABS 1200LB)
Concrete	Rigid	B

PSLB 3 Bedding Materials (Clause 3.4)

It is expected that adequate quantities of suitable selected bedding materials will be available from trench excavations on Site. Provisional quantities of bedding material to be supplied from commercial sources have, nevertheless, been included in the Schedules, if a shortage of bedding material does arise.

The Contractor is required to deal selectively with materials from excavations and discuss with the Engineer, i.e stockpile good quality material and spoil poor quality material.

PSLC **Cable Ducts** (Refer to SABS 1200LC)

PSLC 1 Pipes for Cable Ducts (Clause 3.1)

The Contractor may be instructed to lay cable ducts for telephone, electricity or fibre.

Pipes for cable ducts shall be 5m long, various colours, uPVC or HDPE pipes, of internal diameter not less than 100mm.

PSLC 2 Trench Widths and Depths (Clause 5.1.1)

Notwithstanding what is stated in Clause 5.1.1, minimum trench width shall be 450mm and trench depths shall be such that the cover to all ducts is at least 900mm.

PSLC 3 Road Crossings (Clause 5.8)

Notwithstanding what is stated in Clause 5.8, ducts for telephone cables shall be laid to a distance of 1,00m from each road reserve boundary and ducts for electricity cable to a distance of 200mm behind the backs of kerbs.

PSLC 4 Kerb Markings (Clause 5. 10)

The positions of cable ducts across roads shall be permanently recorded on kerbs or channels on both sides of the road by means of 100mm high letters recessed cut into the front face of the kerbing. The letters 'T' and 'E' shall be used to denote telephone and electricity cable ducts, respectively. The letters shall be painted red. Alternatively custom marker blocks will be provided to the Contractor

PSLE **Stormwater Drainage (Refer to SABS 1200LE)**

PSLE 1 Concrete Pipes (Clause 3.1)

Precast concrete pipes shall be spun, reinforced pipes with ogee (interlocking) joints:

PSLE 2 Bricks (Clause 3.4.1)

Bricks shall be clay bricks complying with SABS 227 - 1970 Burnt Clay Masonry units "FACING" class, FBSE, with a smooth finish and water absorption, when measured in accordance with Clause 4.7 of SABS 227 - 1970, not exceeding 15%. Calcium silicate bricks will not be acceptable for use on the Works.

PSLE 3 Manholes (Clause 5.5.1)

Manholes shall, if not otherwise indicated, be constructed of brickwork.

PSLE 4 Manhole Covers and Frames (Clause 3.4.3)

Manhole covers and frames shall comply with the requirements of SABS 558 Type 2A, in the case of manholes in roads and in areas subjected to traffic loads, and type 6 in areas not subjected to traffic loads. Filled top types of covers shall be filled with concrete and steel trowelled to a smooth finish. All exposed iron surfaces of covers and frames shall be painted with an approved bituminous composition.

PSLE 6 Payment for Kerb Inlets and Manholes (Clauses 8.2.8 and 8.2.9)

The inlet sections of kerb inlets, excluding the manholes, will be measured and paid for per unit, depending only on their nominal lengths. Prices for inlet sections must allow for all labour and materials required for the complete inlet sections, including excavations, concrete aprons and floor, transition kerbs, brickwork, precast concrete cover slabs, steel pillars, etc.

Manholes, kerb inlet manhole chambers and outlet structures will be measured and paid for with separate items for excavation, concrete, formwork, brickwork, manhole frames and covers, etc.

PSMJ SEGMENTED PAVING

PSMJ 1 SCOPE (CLAUSE 1)

PSMJ 3 MATERIALS

PSMJ 3.1 UNITS

Add the following:

The Contractor shall obtain the necessary certificates from the supplier of concrete block paving units to ensure compliance with the latest SANS Specification (SANS 1058).

Paving units shall be 80mm interlocking concrete blocks Type S-A Class 40/2.6 SANS 1058 (colour grey).

PSMJ 5 CONSTRUCTION

PSMJ 5.4 LAYING OF UNITS

Unless otherwise specified, paving blocks shall be laid in a herringbone arrangement.

PSMJ 5.5 FILLING GAPS IN UNIT PATTERN

Add the following:

A header course shall be used on perimeters and adjacent to edge restraints. Concrete infill shall be avoided on perimeters and adjacent to edge restraints.

PSMJ 5.6 COMPACTION OF UNITS

PSMJ 5.6.1 General

Add the following:

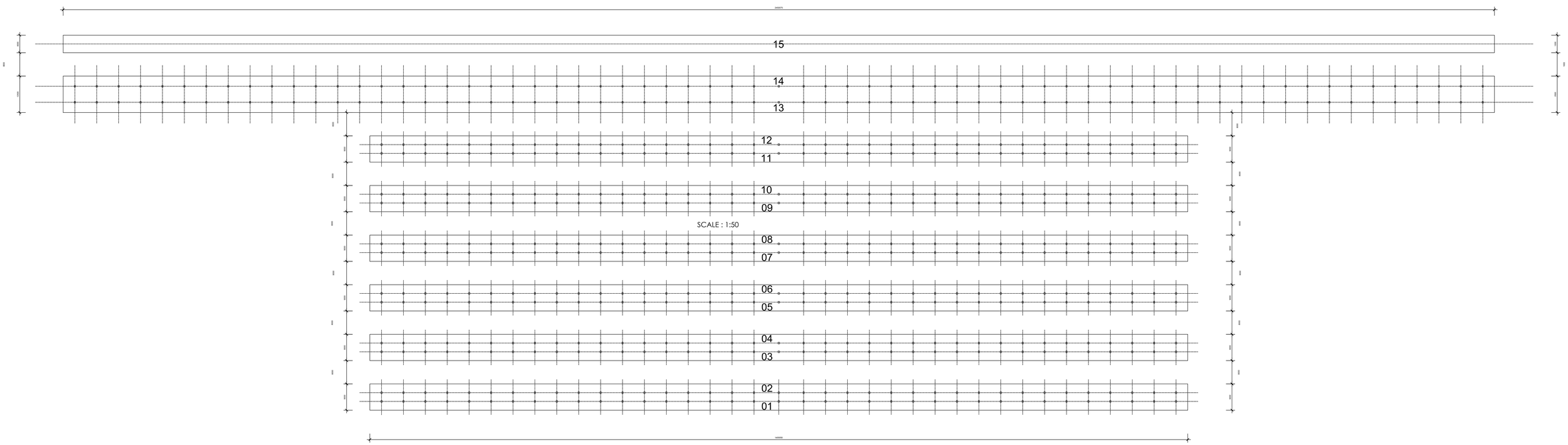
The compaction process shall be repeated after placement of jointing sand.

PSMJ 5.7 JOINT FILLING

Add the following:

Each day's production shall be completed up to the stage of placement of the jointing sand.

In cases of a loss of jointing sand after the initial jointing sand application, the Employers Agent may instruct the Contractor to carry out a re-application of jointing sanding.



SCALE : 1:50

PLATFORM PLANS
SCALE : 1:100
TOTAL AREA: 2735 m²

GENERAL NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS.
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6. STRUCTURAL WORKS IS TO BE CARRIED OUT IN ACCORDANCE WITH THE PROJECT SPECIFICATION AND THE RELEVANT S.A.N.S SPECIFICATIONS. ALL CONCRETE WORKS IS TO BE DONE IN ACCORDANCE WITH S.A.N.S 1200G AND EARTHWORKS IS ACCORDANCE WITH S.A.N.S 1200D.
7. CONSULT RELEVANT ARCHITECT'S, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS AND DETAILS AS RELEVANT FOR DRAINAGE, STORMWATER OUTLET, RWDPS AND HOLES AND SLEEVES FOR THESE SERVICES. NO HOLES ARE TO BE CORED WITHOUT ENGINEERS WRITTEN APPROVAL.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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prasa
PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	E. MGUZUMBANE	24/08/2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DURBAN STATION
AS BUILT: PLATFORM PLAN 1

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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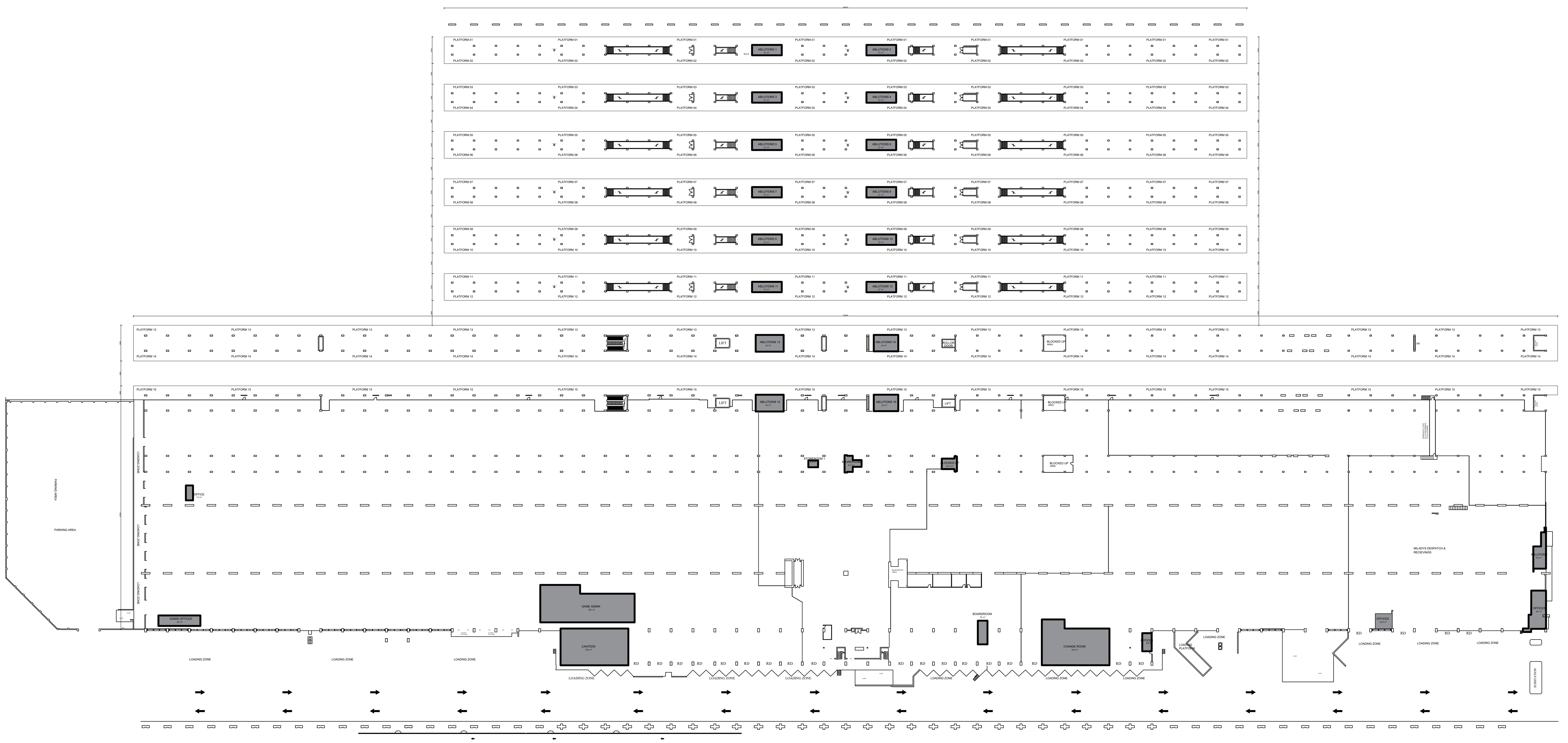

PLATFORM PLAN

SCALE : NOT TO SCALE

TOTAL AREA:23 825 m²

GENERAL NOTES:

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REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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prasa PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	S DLAMINI	22.08.22
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	22.08.22
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015 LODEMANN

PRASA MAINTENANCE/ALTERATIONS & ADDITIONS PLAN

DURBAN STATION

AS BUILT : PLATFORM PLAN

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
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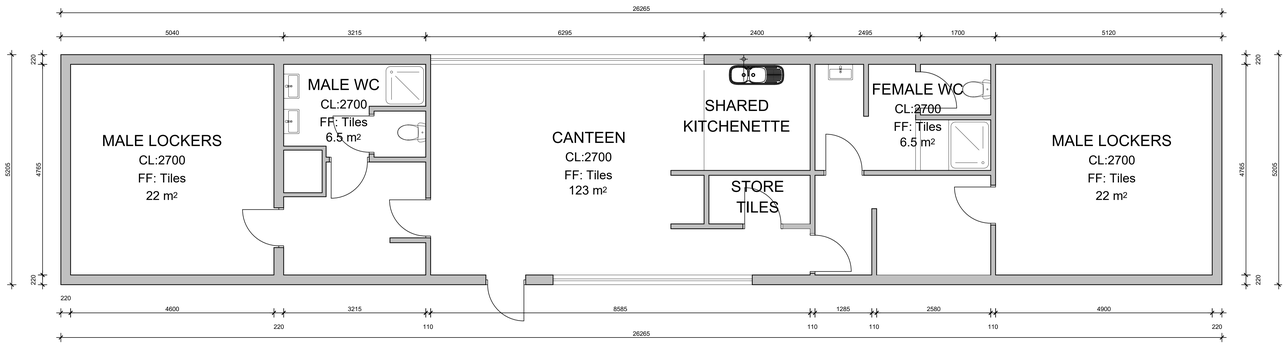
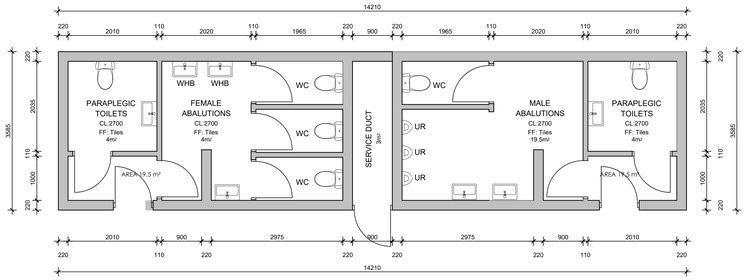
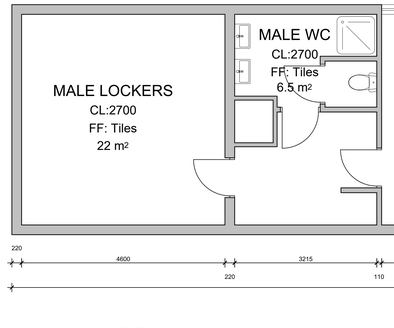


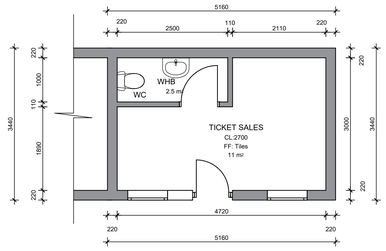
SECURITY
STAFF ROOM
SCALE 1:50
TOTAL AREA:136 m²



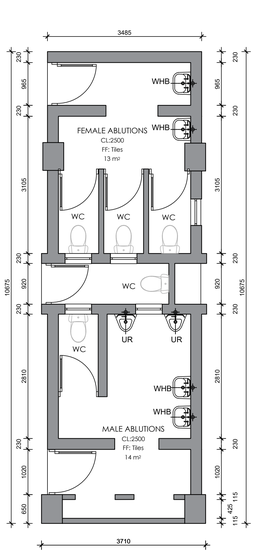
ABLUTIONS
SCALE 1:50
MTOTAL AREA:50m²



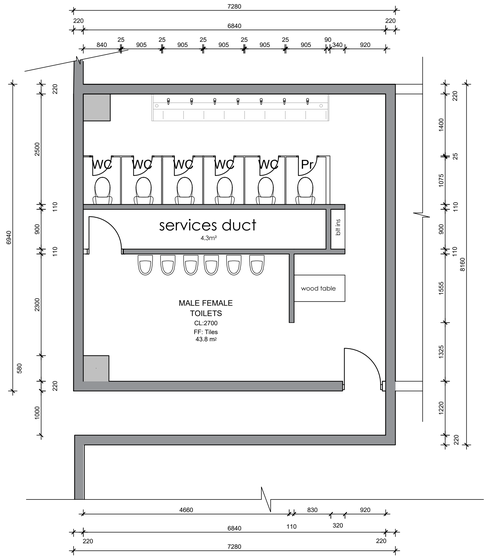
MANAGER'S OFFICE
SCALE 1:50
TOTAL AREA:28 m²



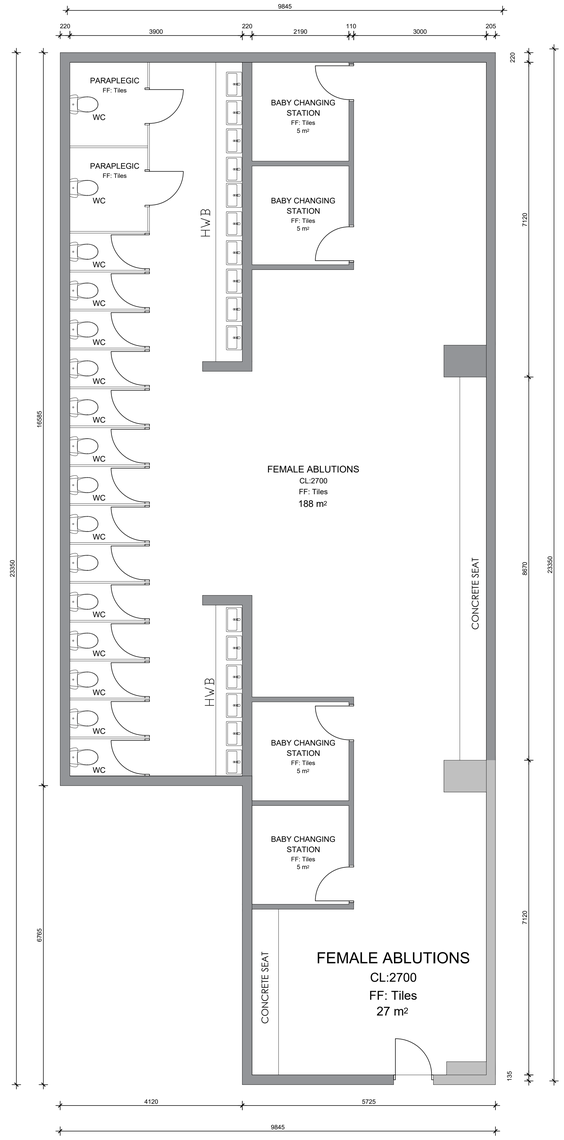
TICKET SALES
SCALE 1:50
TOTAL AREA:18 m²



ABLUTIONS 1
SCALE 1:50
TOTAL AREA:37 m²



ABLUTIONS 1
SCALE 1:50
MTOTAL AREA:50 m²



PUBLIC TOILETS
SCALE 1:50
TOTAL AREA: 202 m²

GENERAL NOTES:

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DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	E. Mguzumbane	24-08-2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24-08-2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

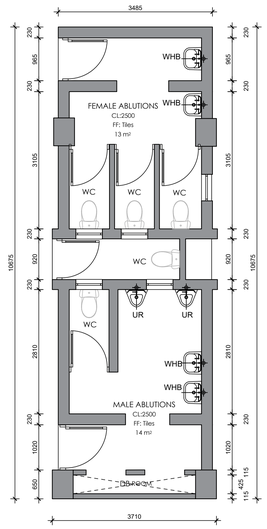
PRASA MAINTENANCE
PLAN/ADDITIONS & ALTERATIONS

DURBAN STATION
AS-BUILT: GROUND PLANS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1:50	24-08-22	1040-002-01-0003		1	A0	ISSUED FOR INFORMATION

REFURBISHMENT NOTES

1. REPLACE CORRODED SHEETING WITH NEW GRS 0.58mm CHROMADEK KLIP-LOK 700 ROOF SHEETING.
2. REPLACE MISSING/DAMAGED FASCIA/BARGE BOARDS WITH NEW FIBRE CEMENT BOARDS ,TO BE PAINTED AND MATCH EXISTING.
3. REPLACE DAMAGED RAINWATER GUTTERS & DOWNPIPES WITH NEW SEAMLESS ALUMINUM GOODS.
4. REPLACE DAMAGED CEILING PANELS WITH NEW TO MATCH EXISTING /SIMILAR APPROVED.REFER TO CEILING LAYOUT.
5. SCRAPE OFF DAMAGED EXISTING WALL FINISHES AND APPLY NEW PLASTER WHERE AFFECTED.NEW PAINT TO BE APPLIED IN ACCORDANCE TO TECHNICAL SPECIFICATIONS & PRASA BLUE PRINT.ALL STRUCTURAL AND NON-STRUCTURAL CRACKS TO BE DEEMED TO SATISFY ENGINEERS' RECOMMENDATION.
6. CONCRETE FLOORS TO BE PRESSURE WASHED.
7. REPLACED DAMAGED FLOOR FINISHES WITH NEW TO MATCH EXISTING IN ACCORDANCE TO TECHNICAL SPECIFICATIONS & PRASA BLUE PRINT.REFER TO FLOOR FINISH LAYOUT.
8. EXISTING STAIRCASE TO BE REFURBISHED, MADE GOOD, REPLACE DAMAGED FLOOR FINISH WITH NEW NON-SLIP TILES TO MATCH EXISTING. BALUSTRADES TO BE REFURBISHED AND STAIRCASE TO COMPLY WITH SANS10400 PART "M" .
9. REPAIR/REPLACE ALL DAMAGED DOORS/ROLLER SHUTTERS AND SUPPORTING IRONMONGERY WITH NEW TO MATCH EXISTING.
10. REPAIR/REPLACE ALL DAMAGED WINDOWS AND SUPPORTING IRONMONGERY WITH NEW TO MATCH EXISTING.GLAZING TO COMPLY WITH SANS 10400 PART N.
11. DAMAGED SPEED GATE CHAIRS/FURNITURE TO BE REPLACED WITH NEW TO MATCH EXISTING.
12. REMOVE ALL DAMAGED/DETERIORATED FITTINGS & FIXTURES,REPLACE WITH NEW SABS APPROVED GOODS IN RELATION TO TECHNICAL SPECIFICATIONS & PRASA BLUE PRINT.
13. REPLACE DAMAGED CARPENTRY WORKS WITH NEW,IN ACCORDANCE TO PRASA BLUE PRINT.
14. NEW SIGNAGES,BINS AND BENCHES AS PER TECHNICAL SPECIFICATIONS & PRASA BLUE PRINT.



ABLUTIONS 1
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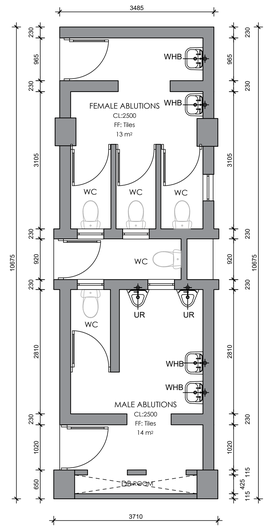
TOTAL AREA:37 m²



ABLUTIONS 2
SCALE 1:50
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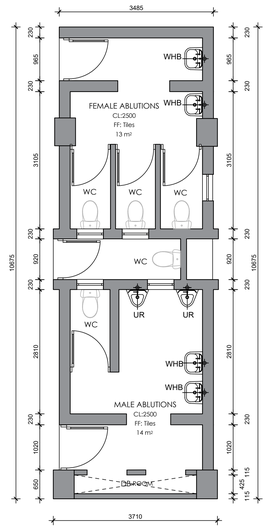

ABLUTIONS 3
SCALE 1:50
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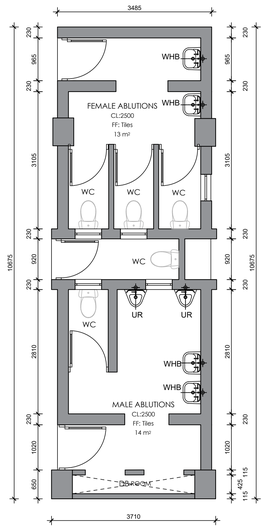

ABLUTIONS 4
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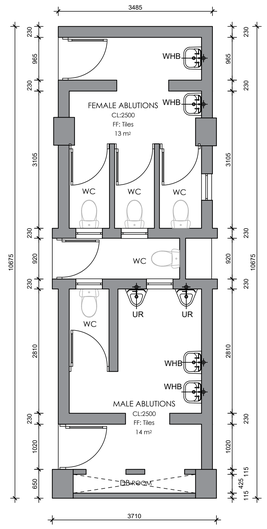

ABLUTIONS 5
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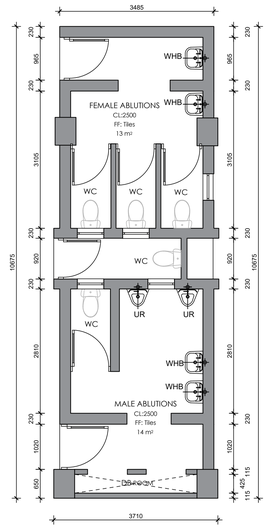
TOTAL AREA:37 m²



ABLUTIONS 6
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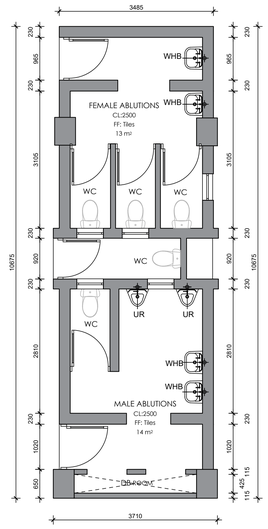
TOTAL AREA:37 m²



ABLUTIONS 7
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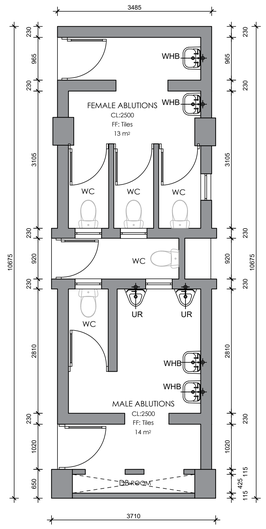
TOTAL AREA:37m²



ABLUTIONS 8
SCALE 1:50
TOTAL AREA:37m²

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NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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CLIENT

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MAIN CONSULTANT

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CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24-08-2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

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1:50	24-08-22	1040-002-01-0004		1	A0	ISSUED FOR INFORMATION

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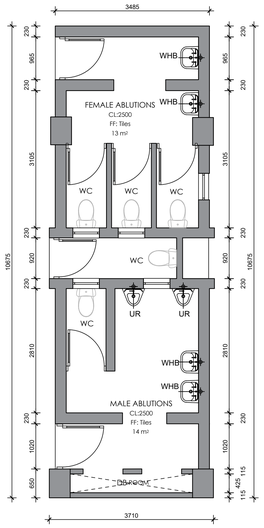

ABLUTIONS 9
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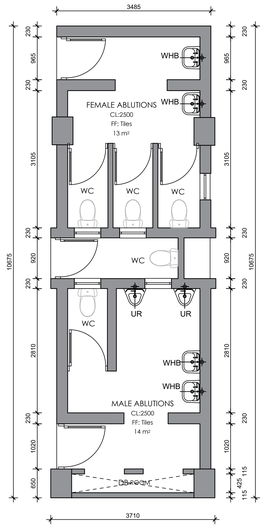

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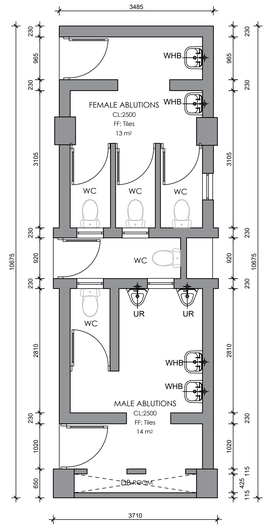

ABLUTIONS 11
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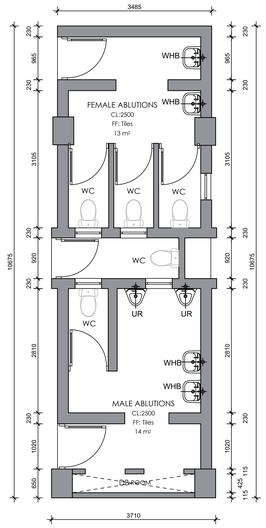
TOTAL AREA:37 m²



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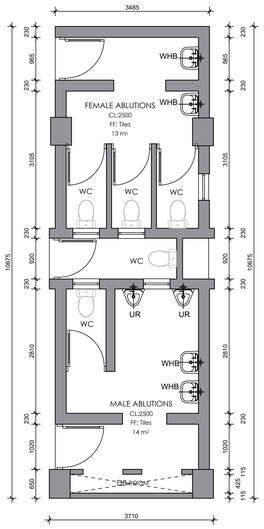

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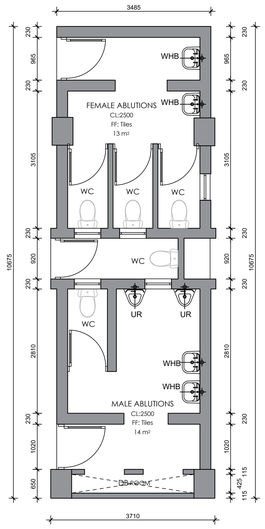
TOTAL AREA:37 m²



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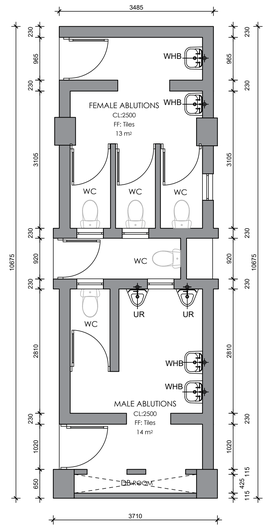

ABLUTIONS 15
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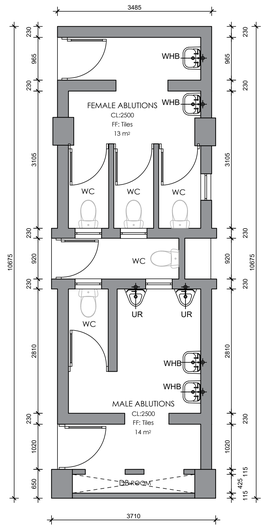

ABLUTIONS 16
SCALE 1:50
TOTAL AREA:37m²

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NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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MAIN CONSULTANT

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DRAWN	E. Mguzumbane	24-08-2022
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ENG. COORD		
ARCHITECT	M. MADIBA	24-08-2022
ELEC. ENG.		
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PROC. ENG.		

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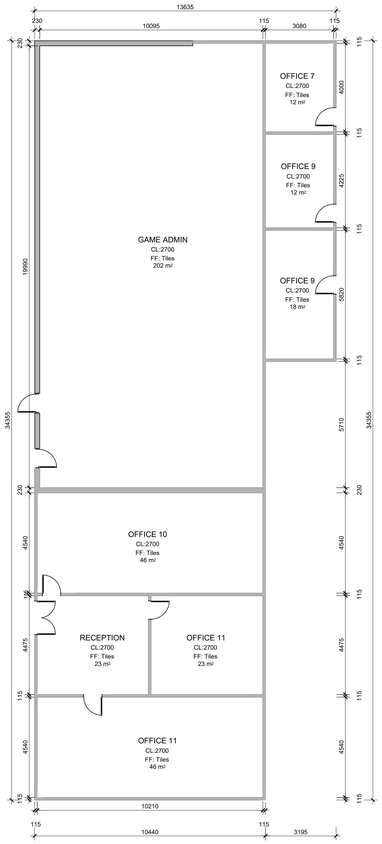
AS-BUILT: GROUND PLANS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
1:50	24-08-22	1040-002-01-0005		1	A0	ISSUED FOR INFORMATION



GAME ADMIN
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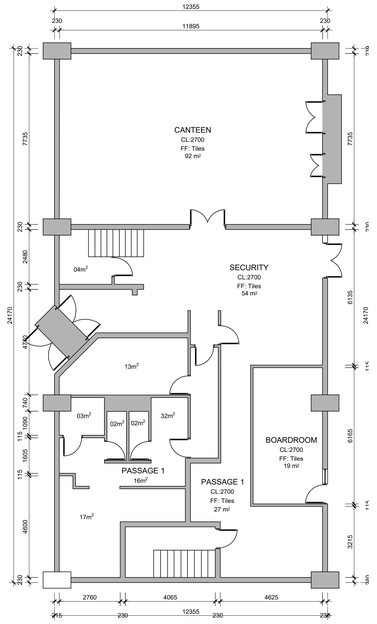
TOTAL AREA:405 m²



CANTEEN
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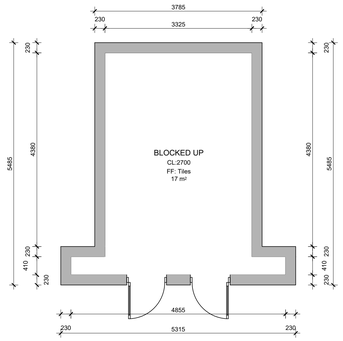

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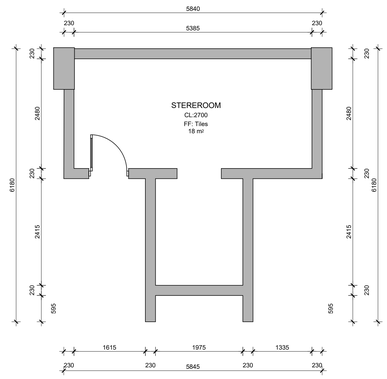

STOREROOM 1
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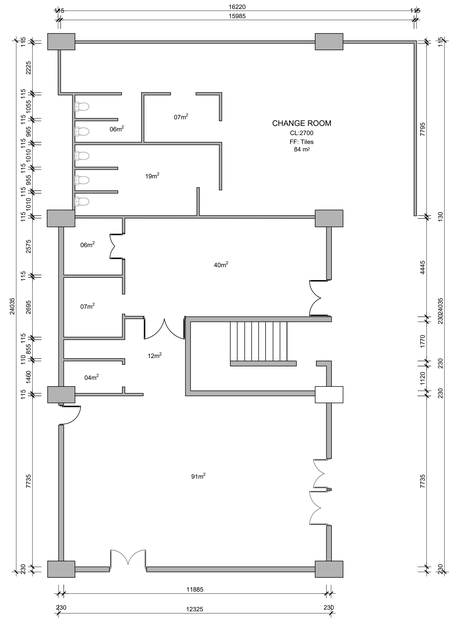
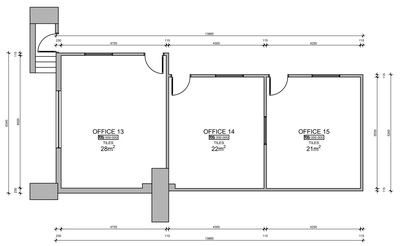
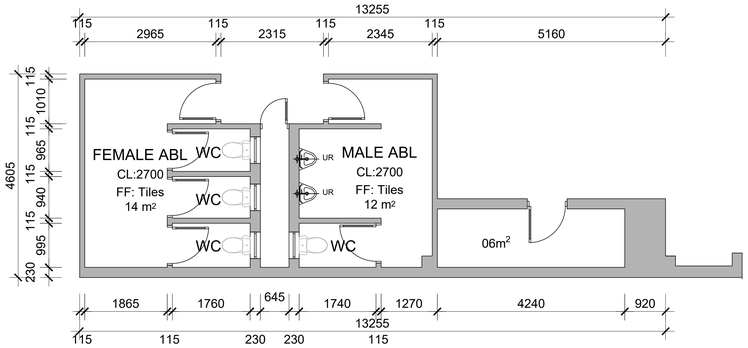


CHANGING ROOM
SCALE 1:50
TOTAL AREA:322 m²

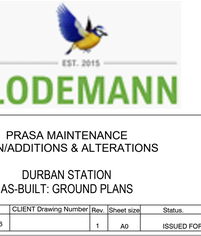


OFFICE BLOCK
SCALE 1:50
TOTAL AREA:78 m²

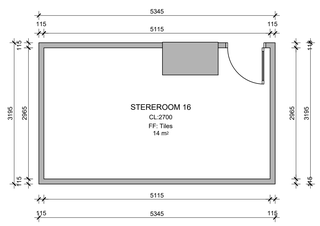


STAFF ABLUTIONS
SCALE 1:50
TOTAL AREA:37 m²

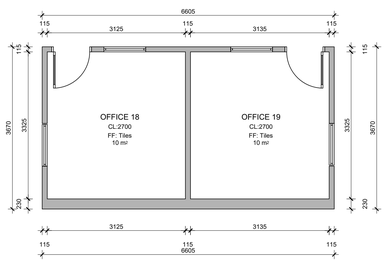
OFFICEC 5
SCALE 1:100
TOTAL AREA:37 m²



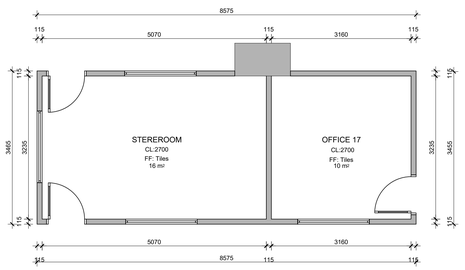
ADMIN OFFICE BLOCK
SCALE 1:100
TOTAL AREA:63 m²



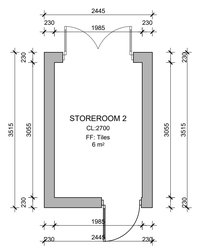
STOREROOM
SCALE 1:50
TOTAL AREA:17 m²



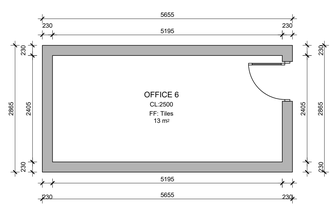
OFFICE 18 & 19
SCALE 1:50
TOTAL AREA:24 m²



BOARDROOM
SCALE 1:50
TOTAL AREA:30 m²



STOREROOM 2
SCALE 1:50
TOTAL AREA:8.5 m²



OFFICE 6
SCALE 1:50
TOTAL AREA:16 m²

GENERAL NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS.
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6. STRUCTURAL WORKS IS TO BE CARRIED OUT IN ACCORDANCE WITH THE PROJECT SPECIFICATION AND THE RELEVANT S.A.N.S SPECIFICATIONS. ALL CONCRETE WORKS IS TO BE DONE IN ACCORDANCE WITH S.A.N.S 1200G AND EARTHWORKS IS ACCORDANCE WITH S.A.N.S 1200D.
7. CONSULT RELEVANT ARCHITECT'S, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS AND DETAILS AS RELEVANT FOR DRAINAGE, STORMWATER OUTLET, RWDPS AND HOLES AND SLEEVES FOR THESE SERVICES. NO HOLES ARE TO BE CORED WITHOUT ENGINEERS WRITTEN APPROVAL.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

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prasa
PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	E. Mguzumbane	24-08-2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24-08-2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE
PLAN/ADDITIONS & ALTERATIONS

DURBAN STATION
AS-BUILT: GROUND PLANS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
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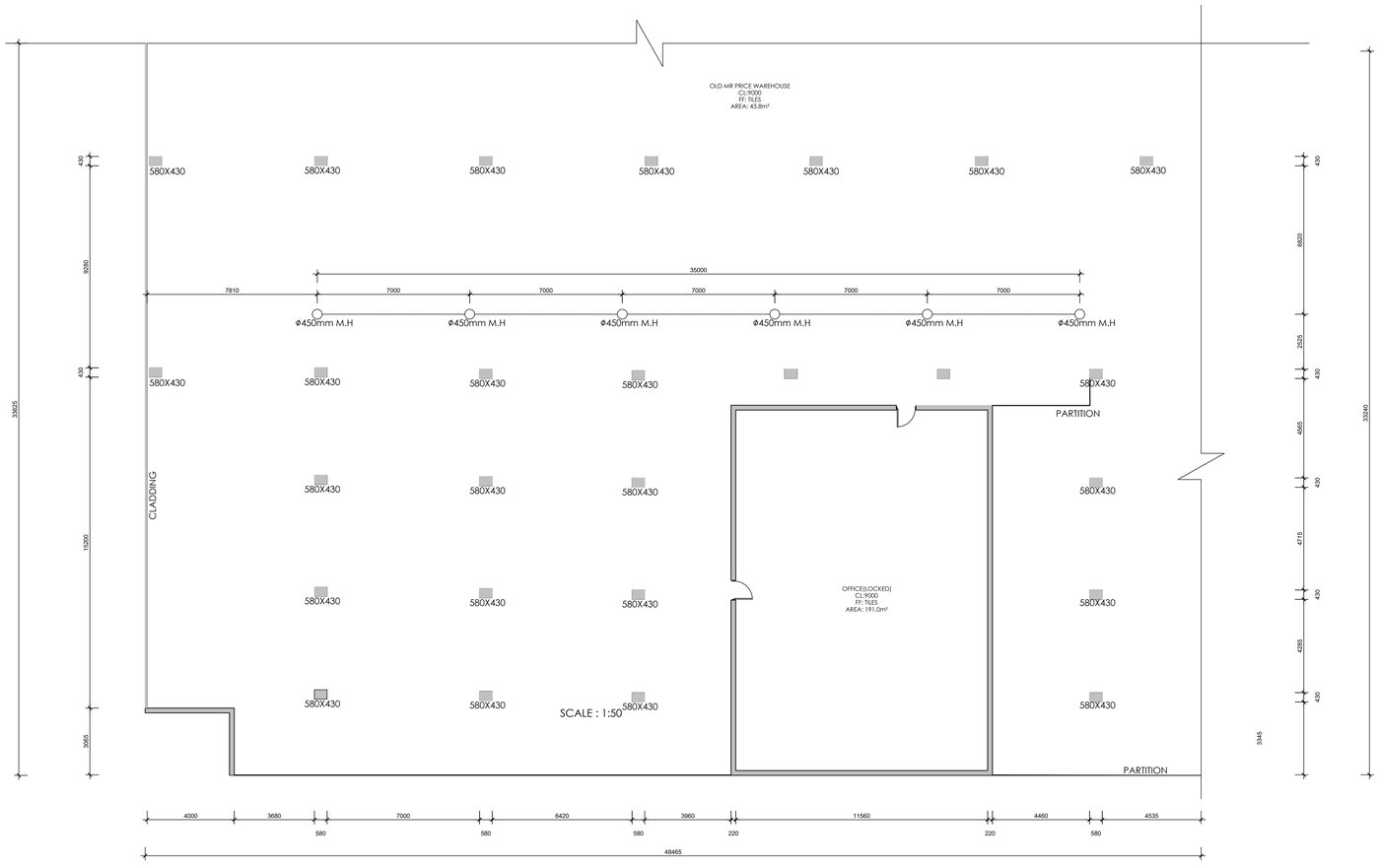

OLD GAME WAREHOUSE

SCALE : 1:100
TOTAL AREA: 191m²

GENERAL NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS.
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CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	E. MGUZUMBANE	24/08/2022
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ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

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PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DALBRIDGE STATION
AS BUILT: GAME WAREHOUSE

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
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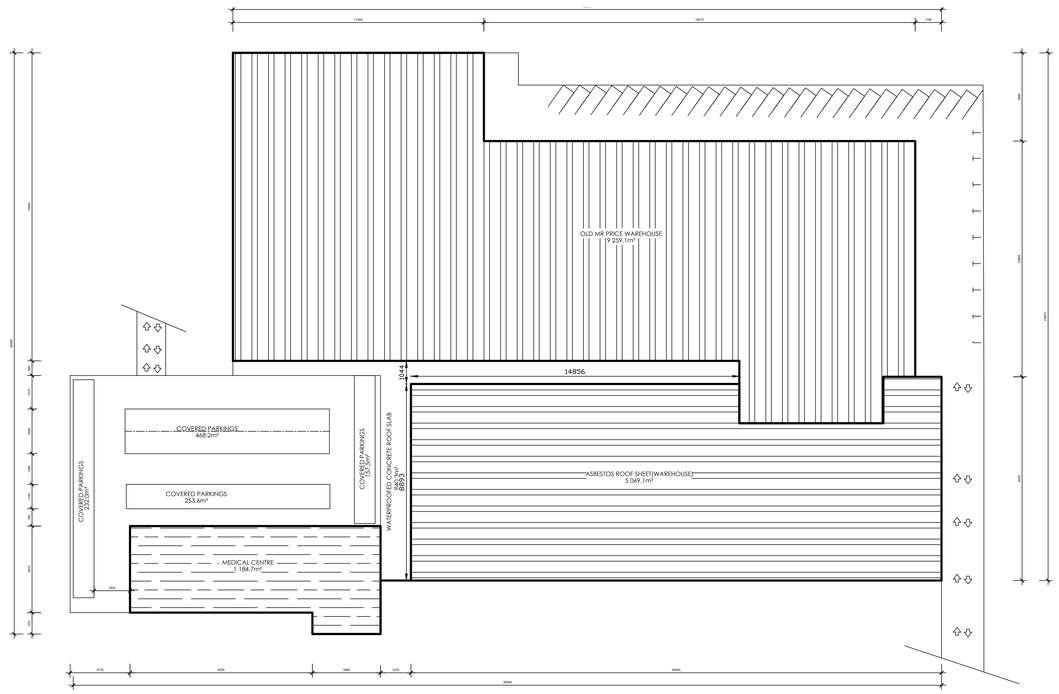
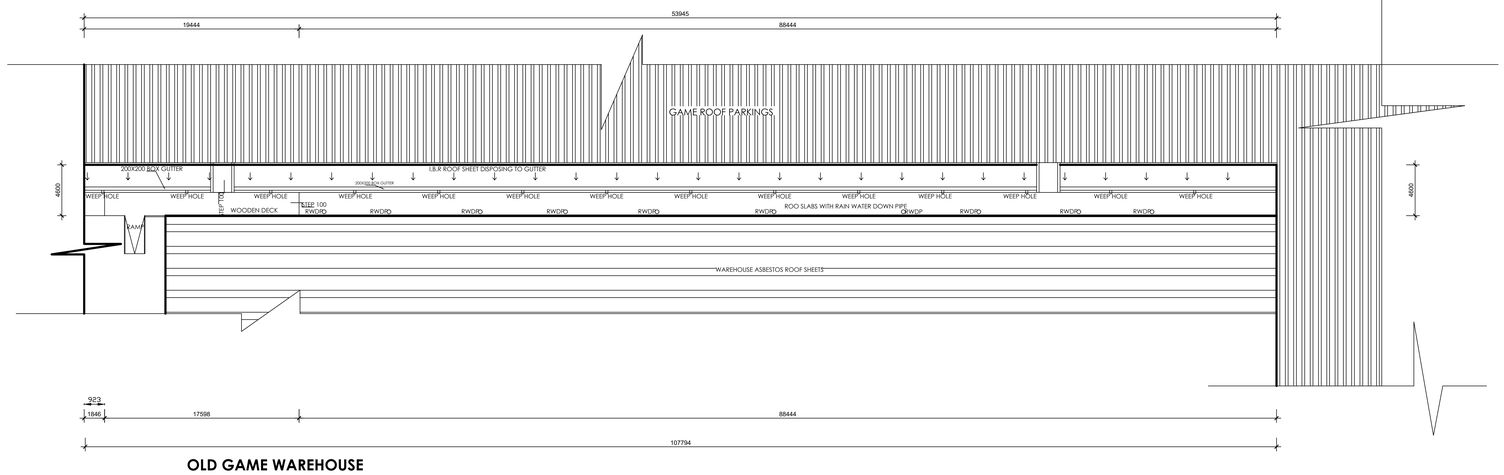


OLD GAME WAREHOUSE
ROOF PLAN
SCALE : 1:100
TOTAL AREA: 2 735m²



OLD GAME WAREHOUSE
ROOF PLAN QUAY SIDE
SCALE : 1:100
TOTAL AREA: 2 735m²

GENERAL NOTES:

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CLIENT

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MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	E. MGUZUMBANE	24/08/2022
CHECKED		
ENG. COORD		
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ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

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PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DALBRIDGE STATION
AS BUILT: GAME WAREHOUSE

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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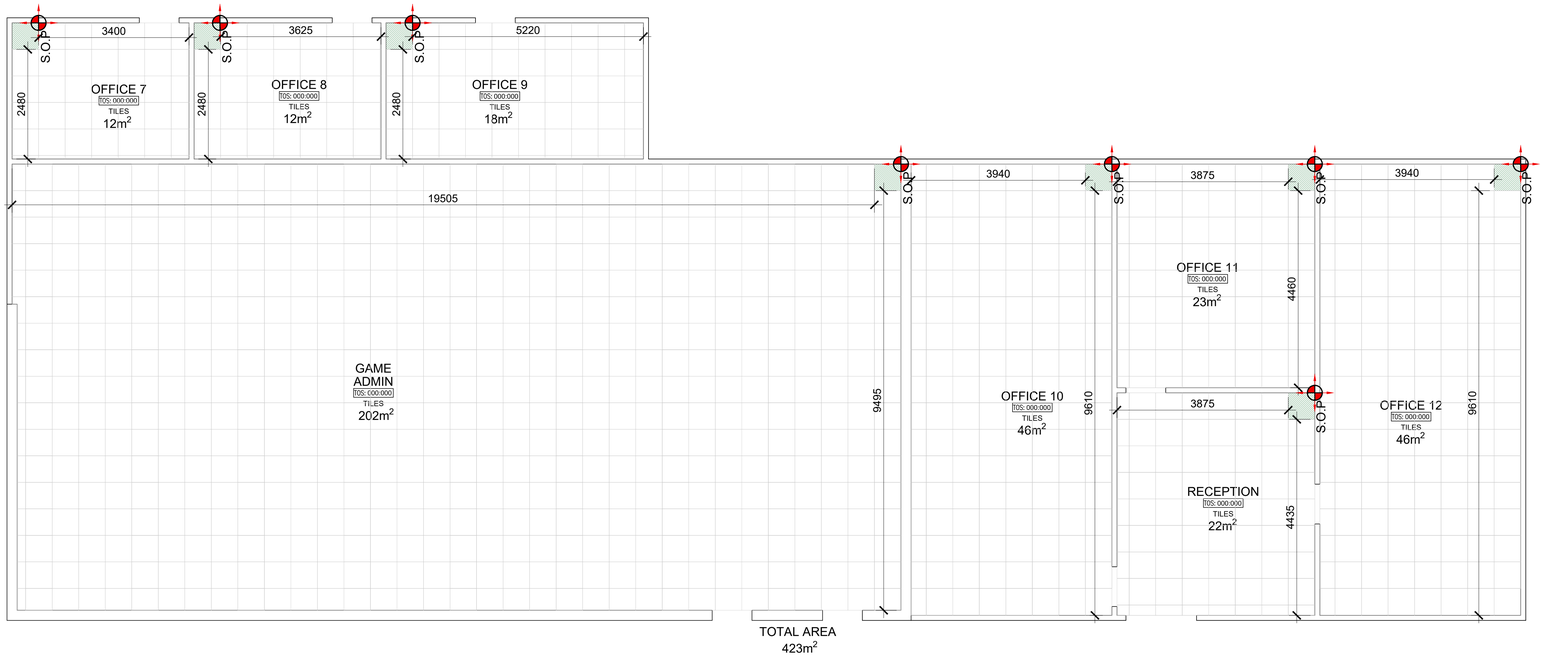
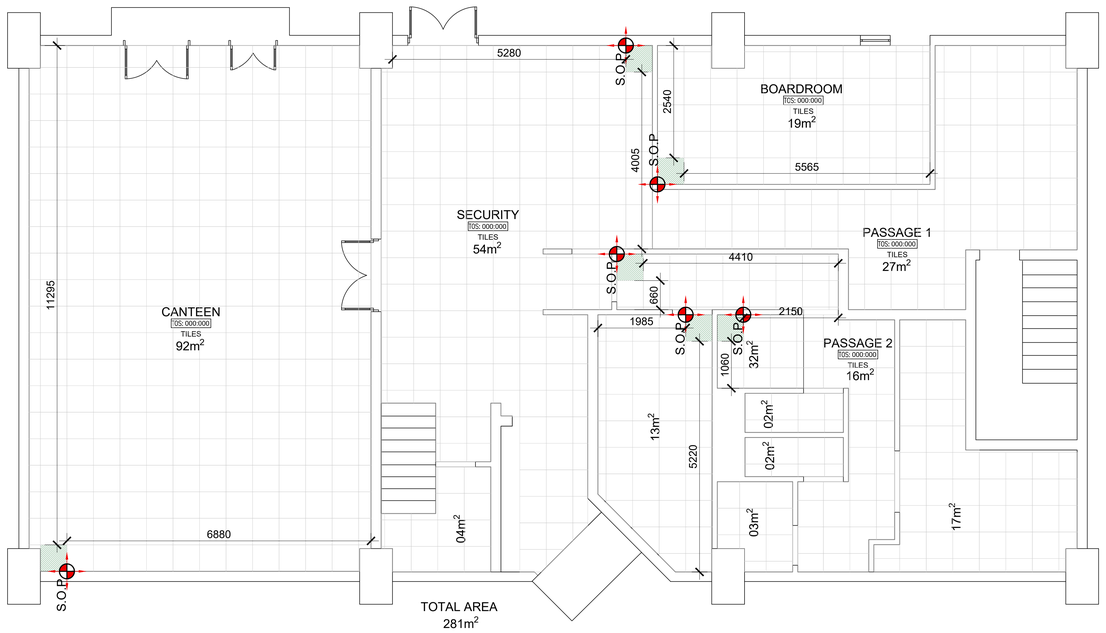
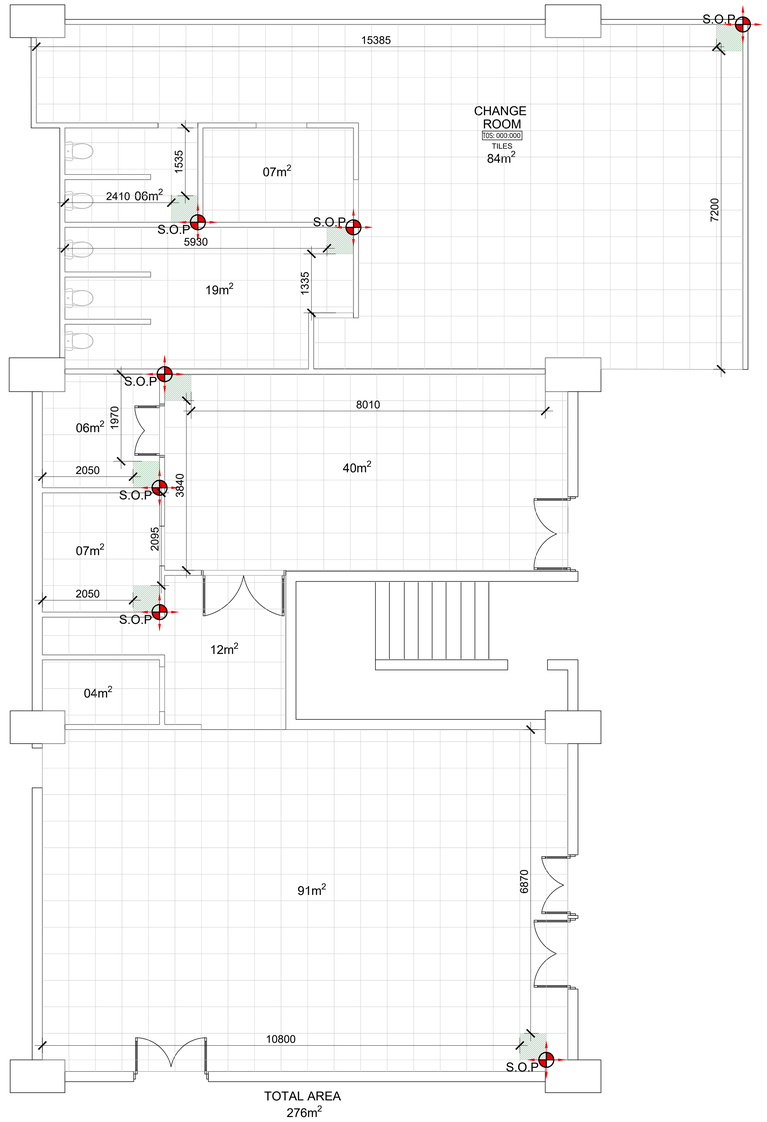


GAME ADMIN
FLOOR FINISH PLAN
SCALE : 1:50



CANTEEN
FLOOR FINISH PLAN
SCALE : 1:50



CHANGING ROOM
FLOOR FINISH PLAN
SCALE : 1:50

FLOOR LEGEND	
FINISHES SCHEDULE	DESCRIPTION
600x600 Porcelain floor tile	600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles honeraised with 3mm grouting lines from Union Tiles, Tilespace, JNB Ceramica or Tiletonia . Natural finish. Full bodied porcelain tiles, size 600 x 600mm x 10mm fixed to internal floor screed with TAL tile adhesive (elsewhere specified) mixed with TAL bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with TAL tile grout, excess grout on the surface to be cleaned with water as work proceeds.
600x600 Porcelain floor tile	600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles honeraised with 3mm grouting lines from Union Tiles, Tilespace, JNB Ceramica or Tiletonia . Natural finish. Full bodied porcelain tiles, size 600 x 600mm x 10mm fixed to internal floor screed with TAL tile adhesive (elsewhere specified) mixed with TAL bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with TAL tile grout, excess grout on the surface to be cleaned with water as work proceeds.

FLOOR FINISH NOTE :
ALLOW RETURNS/MENTS OF 80% OF THE TOTAL AREA FOR DAMAGED FLOOR TINISH.

GENERAL NOTES

- ALL DIMENSIONS ARE INDICATED IN MILLIMETRES AND MUST BE CONTROLLED ON SITE. THIS DRAWING MUST NOT BE SCALED. ONLY FIGURED DIMENSIONS MAY BE USED.
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- THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH STRUCTURAL, CIVIL, ARCHITECTURAL, AND MECHANICAL DRAWINGS.
- ALL ELECTRICAL INSTALLATIONS ARE TO COMPLY WITH SANS 10142-1, AND LOCAL MUNICIPAL BY-LAWS.
- COPYRIGHT IS RESERVED ON ALL DRAWINGS AND DESIGNS.

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DRAWN	Mlamuli Bhengu	24/08/2022
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MECH. ENG.		
STRUCT. ENG.		
CIVIL ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

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PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DURBAN STATION
FLOOR FINISHES

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
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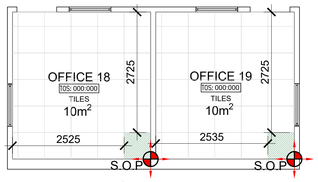
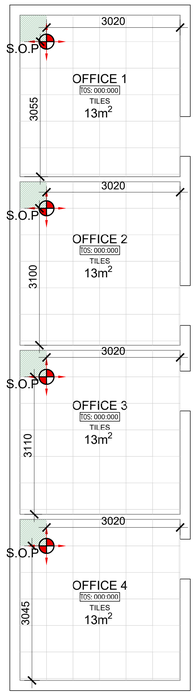


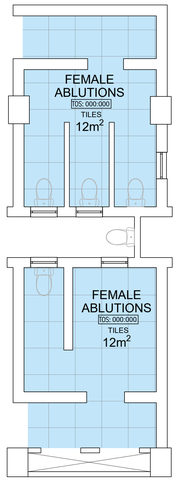
TOTAL AREA
20m²

OFFICE 18 & 19
FLOOR FINISH PLAN
SCALE : 1:50



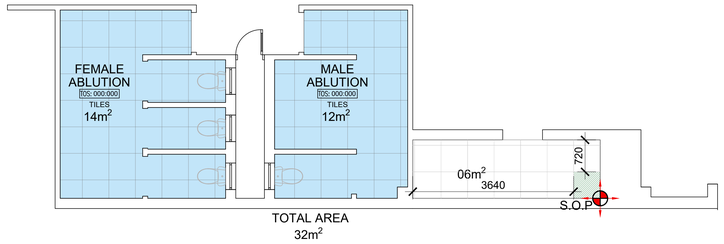
TOTAL AREA
52m²

ADMIN OFFICE BLOCK
FLOOR FINISH PLAN
SCALE : 1:50



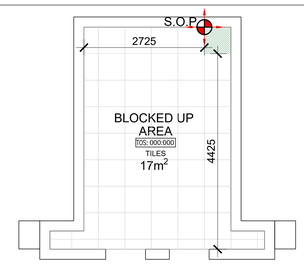
TOTAL AREA
24m²

PUBLIC ABLUTIONS
FLOOR FINISH PLAN
SCALE : 1:50



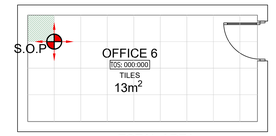
TOTAL AREA
32m²

STAFF ABLUTIONS
FLOOR FINISH PLAN
SCALE : 1:50



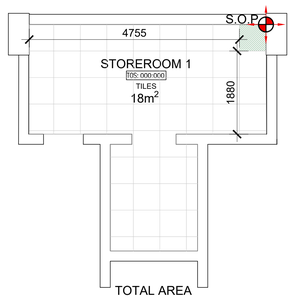
TOTAL AREA
17m²

BLOCKED UP AREA
FLOOR FINISH PLAN
SCALE : 1:50



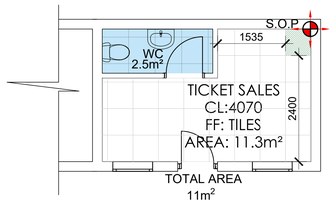
TOTAL AREA
13m²

OFFICE 6
FLOOR FINISH PLAN
SCALE : 1:50

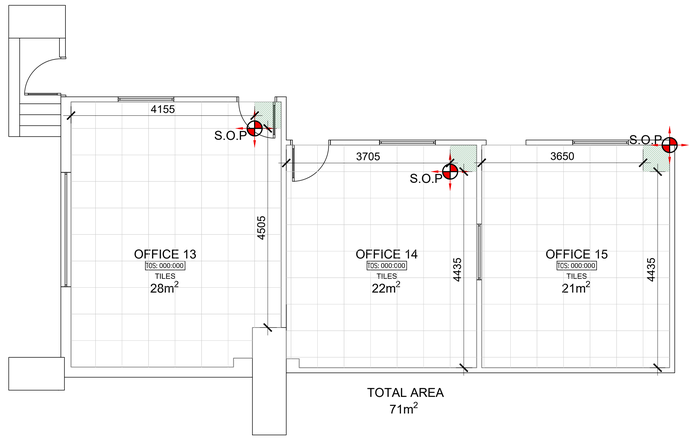


TOTAL AREA
18m²

STORE ROOM 1
FLOOR FINISH PLAN
SCALE : 1:50

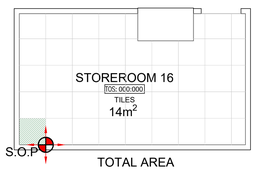


TOTAL AREA
11m²



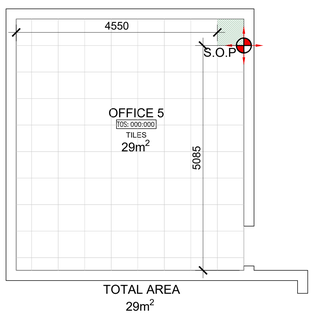
TOTAL AREA
71m²

OFFICE BLOCK
FLOOR FINISH PLAN
SCALE : 1:50



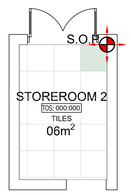
TOTAL AREA
14m²

STORE ROOM
FLOOR FINISH PLAN
SCALE : 1:50



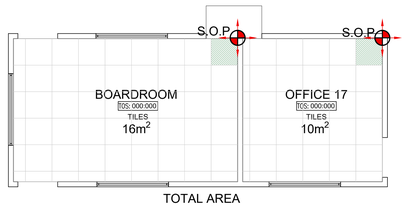
TOTAL AREA
29m²

OFFICE 5
FLOOR FINISH PLAN
SCALE : 1:50



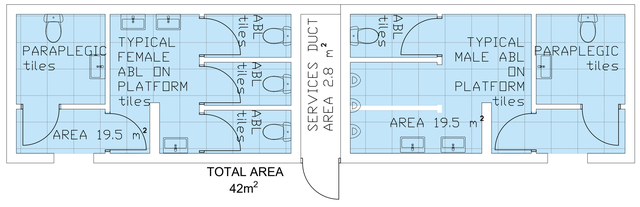
TOTAL AREA
06m²

STORE 2
FLOOR FINISH PLAN
SCALE : 1:50



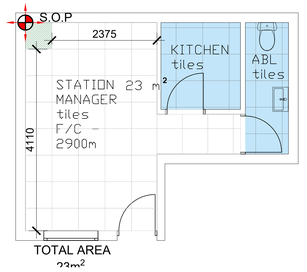
TOTAL AREA
26m²

BOARDROOM
FLOOR FINISH PLAN
SCALE : 1:50



TOTAL AREA
42m²

GROUND FLOOR ABLUTIONS
FLOOR FINISH PLAN
SCALE : 1:50



TOTAL AREA
23m²

GROUND FLOOR OFFICE MANAGER
FLOOR FINISH PLAN
SCALE : 1:50

FLOOR LEGEND	
FINISHES SCHEDULE	DESCRIPTION
600x600 Porcelain floor tile	600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles, mmeathred with 3mm grouting lines from Union Tiles, Tilespace, ,INB Ceramice or Tiletonia . Natural finish. Full bodied porcelain tiles, size 600 x 600mm x 10mm fixed to internal floor screed with TAL tile adhesive (datasheet specified) mixed with TAL bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with TAL tile grout, excess grout on the surface to be cleaned with water as work proceeds.
600x600 Porcelain floor tile	600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles, mmeathred with 3mm grouting lines from Union Tiles, Tilespace, ,INB Ceramice or Tiletonia . Natural finish. Full bodied porcelain tiles, size 600 x 600mm x 10mm fixed to internal floor screed with TAL tile adhesive (datasheet specified) mixed with TAL bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with TAL tile grout, excess grout on the surface to be cleaned with water as work proceeds.

FLOOR FINISH NOTE :
ALLOW REFURBISHMENTS OF 80% OF THE TOTAL AREA FOR DAMAGED FLOOR FINISH.

GENERAL NOTES

- ALL DIMENSIONS ARE INDICATED IN MILLIMETRES AND MUST BE CONTROLLED ON SITE. THIS DRAWING MUST NOT BE SCALED. ONLY FIGURED DIMENSIONS MAY BE USED.
- ALL DISCREPANCIES ARE TO BE VERIFIED WITH THE CONSULTANT PRIOR TO THE COMMENCEMENT OF WORK .
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- COPYRIGHT IS RESERVED ON ALL DRAWINGS AND DESIGNS.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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prasa
PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT		
TITLE	NAME	DATE
DRAWN	Mlamuli Bhengu	24/08/2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY	
NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DURBAN STATION
FLOOR FINISHES

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
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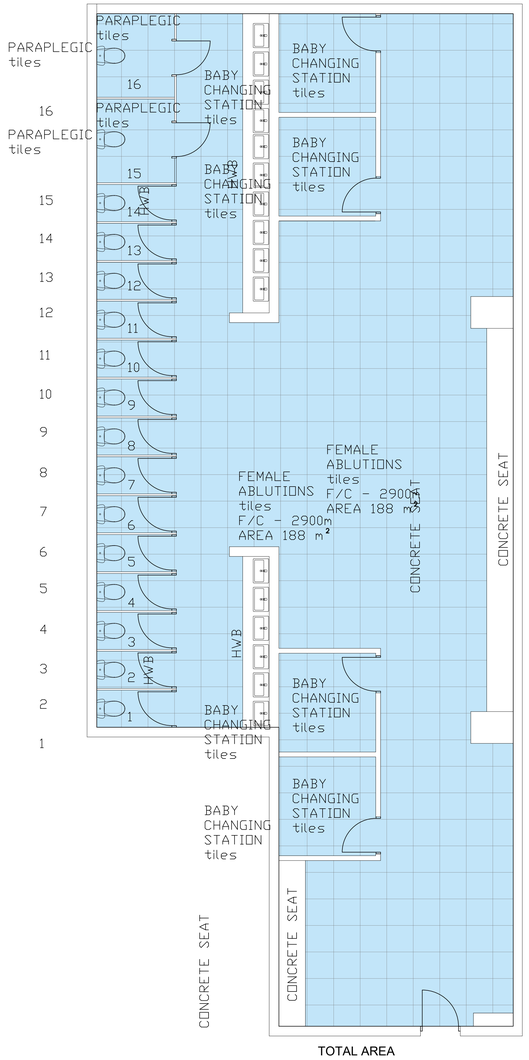
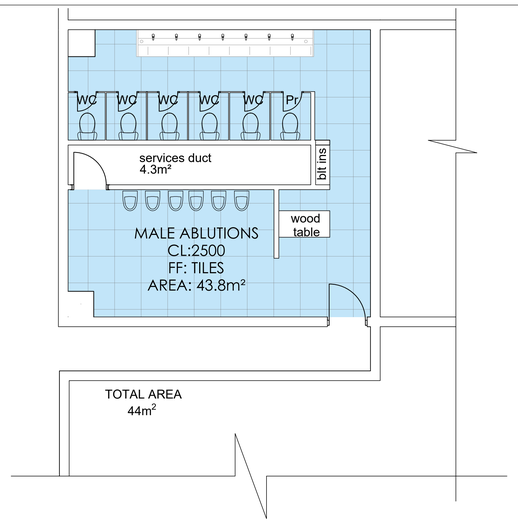
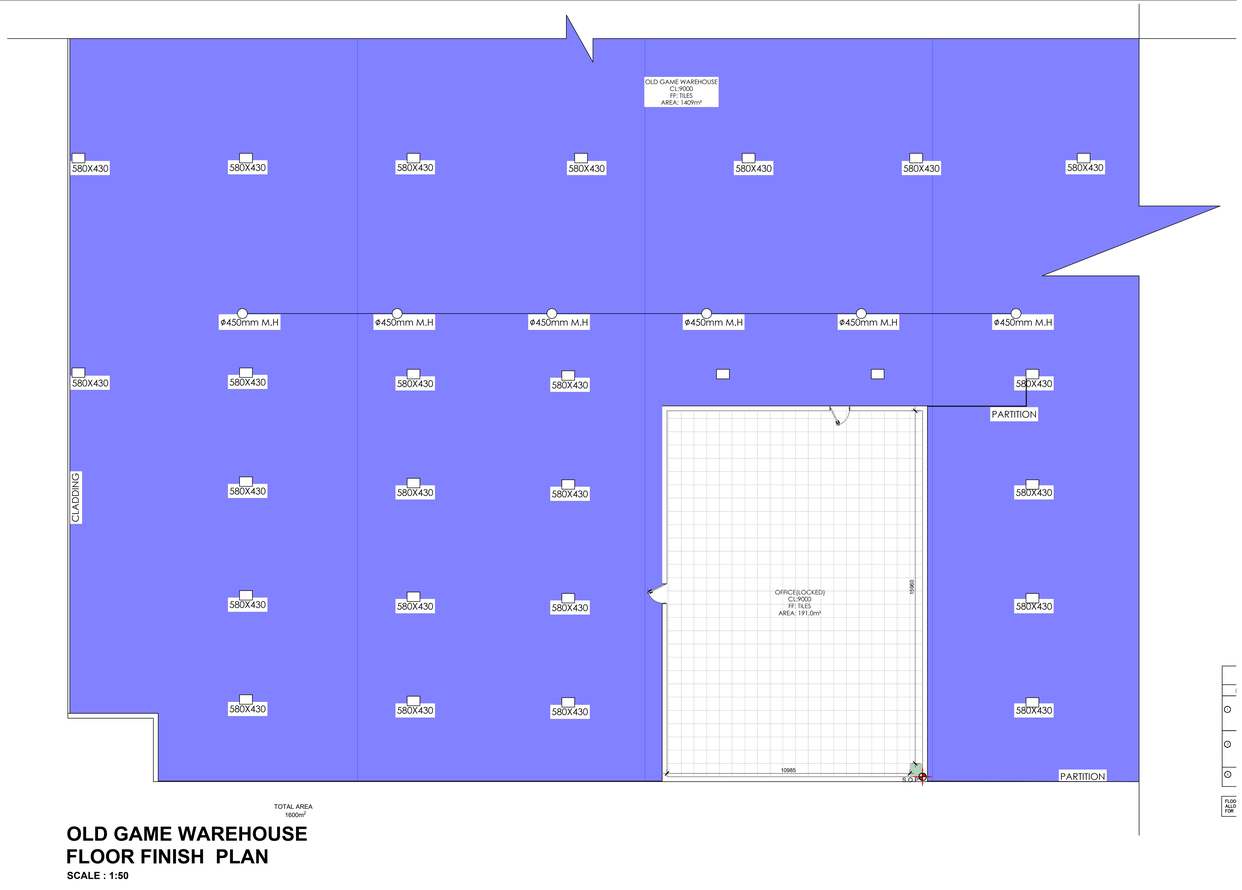




GROUND FLOOR MALE ABLUTIONS FLOOR FINISH PLAN

SCALE : 1:50



OLD GAME WAREHOUSE FLOOR FINISH PLAN

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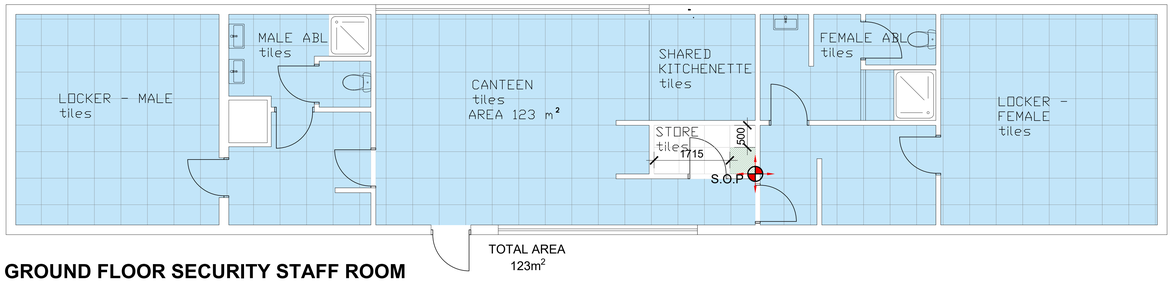
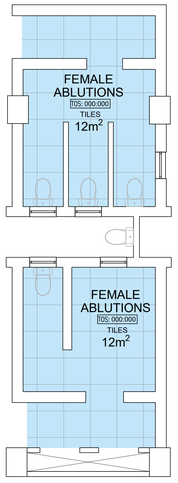


GROUND FLOOR SECURITY STAFF ROOM FLOOR FINISH PLAN

SCALE : 1:50



OFFICE 18 & 19 FLOOR FINISH PLAN

SCALE : 1:50

FLOOR LEGEND	
FINISHES SCHEDULE	DESCRIPTION
600x600 Porcelain floor tile	600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles, mineralised with 3mm grouting lines from Union Tiles, Tilespace, JNB Ceramica or Tiletrix. Natural finish. Full bodied porcelain tiles, size 600 x 600mm x 10mm fixed to internal floor screed with TAL tile adhesive (elsewhere specified) mixed with TAL bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with TAL tile grout, excess grout on the surface to be cleaned with water as work proceeds.
600x600 Porcelain floor tile	600 x 600mm min R9 preferably R10 slip rated Full Bodied Porcelain tiles, mineralised with 3mm grouting lines from Union Tiles, Tilespace, JNB Ceramica or Tiletrix. Natural finish. Full bodied porcelain tiles, size 600 x 600mm x 10mm fixed to internal floor screed with TAL tile adhesive (elsewhere specified) mixed with TAL bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with TAL tile grout, excess grout on the surface to be cleaned with water as work proceeds.
50mm SOFFIT	Refurbish/repair asphalt finishes where damaged with similar approved. Power floated surface bed as per Engineer's specification.

FLOOR FINISH NOTE
FLOOR REQUIREMENTS OF BOX OF THE TOTAL AREA FOR DAMAGED FLOOR FINISH.

GROUND FLOOR PUBLIC ABLUTIONS FLOOR FINISH PLAN

SCALE : 1:50

GENERAL NOTES

- ALL DIMENSIONS ARE INDICATED IN MILLIMETRES AND MUST BE CONTROLLED ON SITE. THIS DRAWING MUST NOT BE SCALED. ONLY FIGURED DIMENSIONS MAY BE USED.
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REFERENCE DRAWINGS

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MAIN CONSULTANT		
TITLE	NAME	DATE
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CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY	
NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DURBAN STATION
FLOOR FINISHES

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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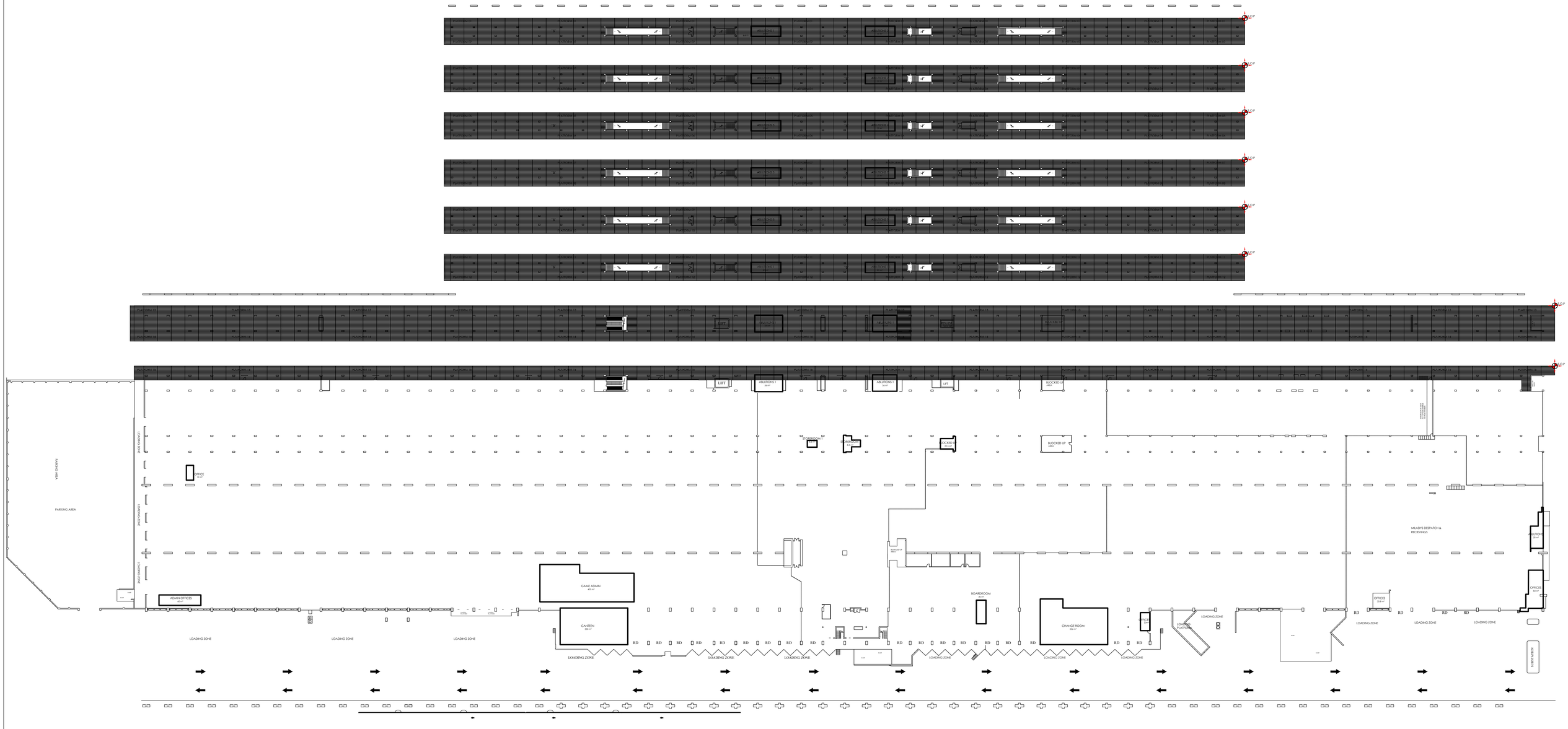

PLATFORM CEILING PLAN

SCALE : N.T.S

CEILING LEGEND	
FINISHES SCHEDULE	DESCRIPTION
Aluminum Ceiling Tiles	new aluminium ceiling panel to match existing or similar approved

CEILING NOTE:
ALLOW REFURBISHMENTS OF 80% OF THE TOTAL AREA FOR DAMAGED CEILING.

GENERAL NOTES

- ALL DIMENSIONS ARE INDICATED IN MILLIMETRES AND MUST BE CONTROLLED ON SITE. THIS DRAWING MUST NOT BE SCALED. ONLY FIGURED DIMENSIONS MAY BE USED.
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PRASA MAINTENANCE PLAN/
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DURBAN STATION
FLOOR FINISHES

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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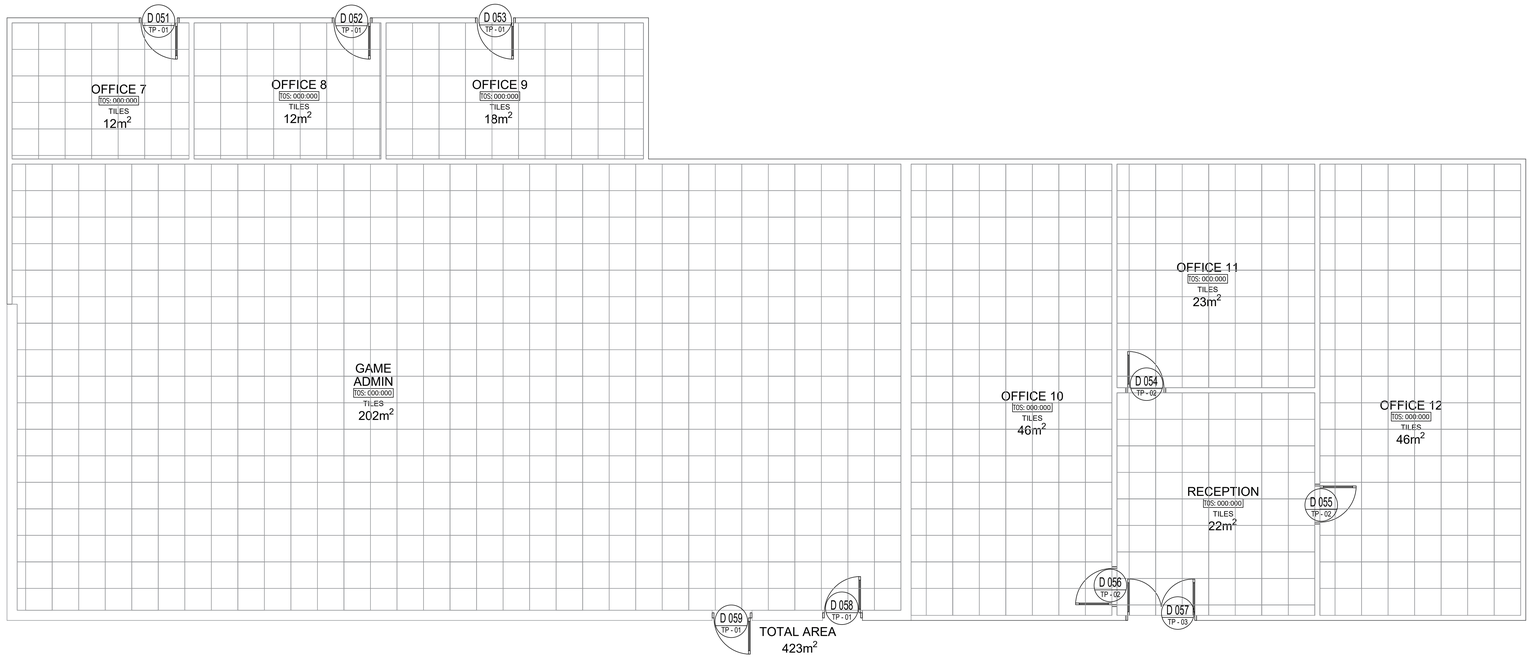
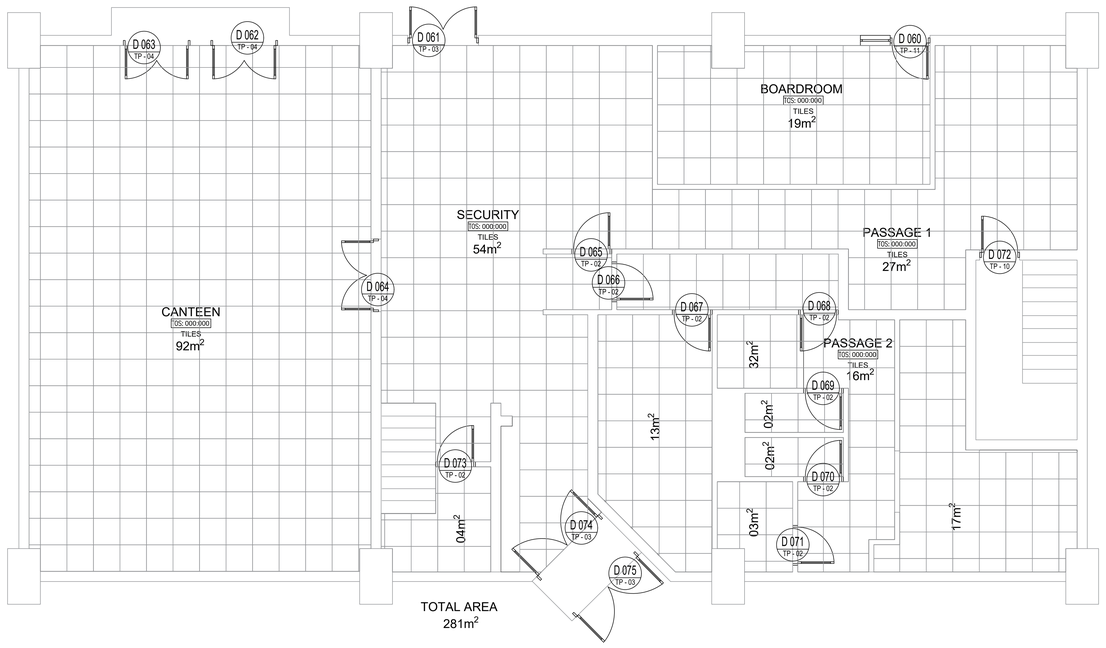


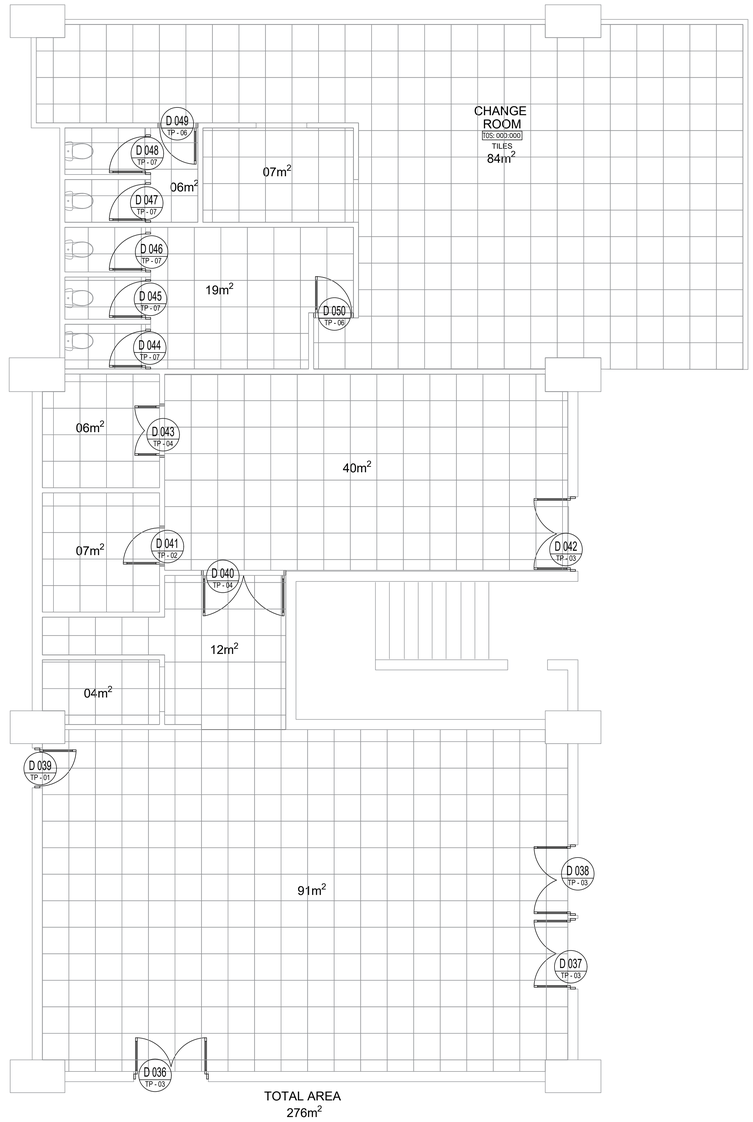
GAME ADMIN
WINDOWS & DOORS
REFERENCE PLAN

SCALE : 1:50



CANTEEN
WINDOWS & DOORS
REFERENCE PLAN

SCALE : 1:50



CHANGING ROOM
WINDOWS & DOORS
REFERENCE PLAN

SCALE : 1:50

WINDOW NOTE:

- ALL EXISTING DAMAGED STEEL AND TIMBER WINDOW FRAMES TO BE REMOVED AND REPLACED WITH NEW ALUMINUM FRAMES. TO MATCH EXISTING ALUMINUM FRAMES COATED WITH MATT DARK UMBER GREY ANP 3057.
- ALL EXISTING WINDOW STEEL FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT. IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL NEW ALUMINUM WINDOW FRAMES TO BE NATURAL ANODIZED ALUMINUM, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL EXISTING TIMBER WINDOW FRAMES TO BE SANDED DOWN & VARNISHED OR REPAINTED WITH TWO COATS OF QUALITY VARNISH AS PER HERITAGE REQUIREMENTS.
- ROLLER BLIND INSTALLED INTO THE TICKET SALES WINDOW, LOWERED DOWN INDICATES TICKET COUNTER NOT IN USE CURRENTLY.
- BULLET RESISTANT PAY / TRANSACTION WINDOWS INCLUDING SALES WINDOWS & INFORMATION DESKS.
- EXISTING EXTERIOR WINDOW SECURITY BANDIT BURGLAR GUARDS TO BE REFURBISHED. ALL DAMAGED TO BE REMOVED AND REPLACED WITH SIMILAR APPROVED.

DOOR NOTE:

- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED STEEL AND TIMBER DOOR FRAMES TO BE REMOVED AND REPLACED WITH NEW FRAMES, WHERE NECESSARY. TO MATCH EXISTING. STRICTLY REFER TO ARCHITECTS BEFORE ANY DOOR FRAME REMOVAL.
- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED DOORS TO BE REMOVED AND REPLACED WITH NEW DOORS TO MATCH EXISTING.
- ALL NEW INTERNAL AND EXTERNAL STEEL DOOR FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT. IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL NEW ALUMINUM DOOR FRAMES TO BE NATURAL ANODISED ALUMINUM, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL EXISTING INTERNAL AND EXTERNAL TIMBER DOOR FRAMES TO BE SANDED DOWN & VARNISHED OR REPAINTED WITH TWO COATS OF QUALITY VARNISH AS PER HERITAGE REQUIREMENTS.
- PAINT ALL INTERNAL DOOR LEAFS TO BE PAINTED WITH PLASCON OR DULUX TRADE PEARLGLO EMULSION PAINT.
- PAINT ALL EXTERNAL DOOR LEAFS TO BE PAINTED WITH PLASCON PROFESSIONAL OR DULUX TRADE GLOSS ENAMEL PAINT.
- EXISTING SECURITY BANDIT GATES TO BE CLEANED AND REPAIRED. PROPOSE NEW GALVANIZED STEEL SECURITY GATES WHERE NECESSARY ACCORDING TO THE CLIENT.

GENERAL NOTES

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CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	Miamuli Bhengu	24/08/2022
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ENG. COORD		
ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

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NAME	DATE
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REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DURBAN STATION
WINDOWS AND DOORS REFERENCE PLANS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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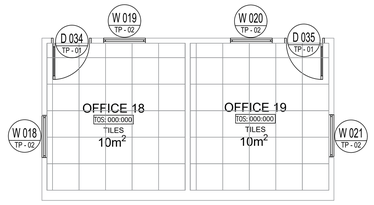
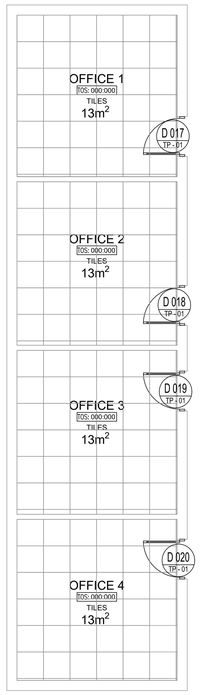


TOTAL AREA
20m²

OFFICE 18 & 19 WINDOWS & DOORS REFERENCE PLAN

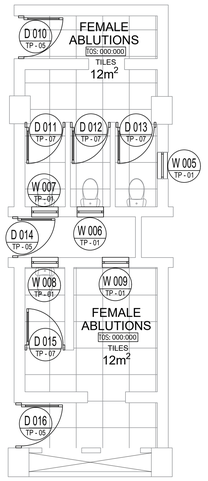
SCALE : 1:50



TOTAL AREA
52m²

ADMIN OFFICE BLOCK WINDOWS & DOORS REFERENCE PLAN

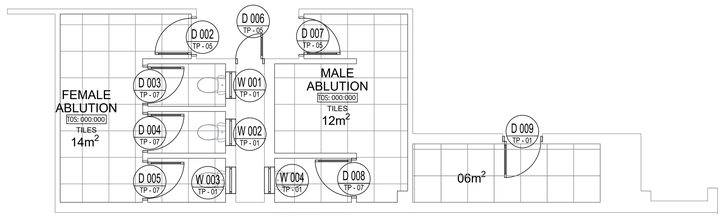
SCALE : 1:50



TOTAL AREA
24m²

PUBLIC ABLUTIONS WINDOWS & DOORS REFERENCE PLAN

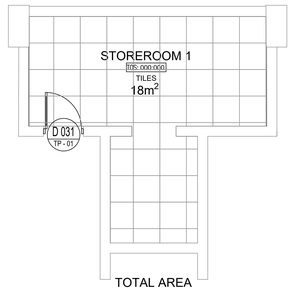
SCALE : 1:50



TOTAL AREA
32m²

STAFF ABLUTIONS WINDOWS & DOORS REFERENCE PLAN

SCALE : 1:50



TOTAL AREA
18m²

STORE ROOM 1 WINDOWS & DOORS REFERENCE PLAN

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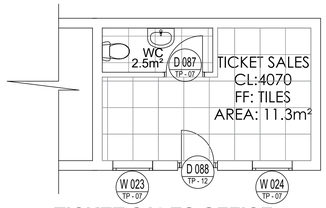

TICKET SALES OFFICE WINDOWS & DOORS REFERENCE PLAN

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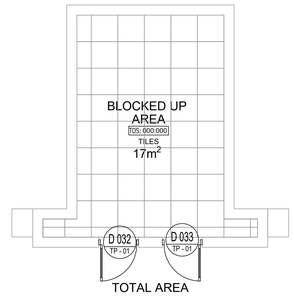
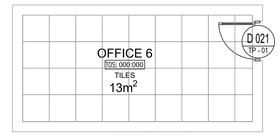


TOTAL AREA
17m²

BLOCKED UP AREA WINDOWS & DOORS REFERENCE PLAN

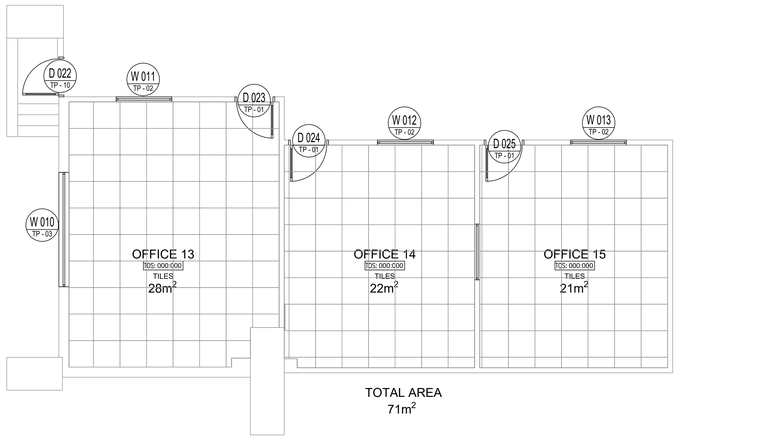
SCALE : 1:50



TOTAL AREA
13m²

OFFICE 6 WINDOWS & DOORS REFERENCE PLAN

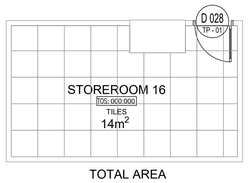
SCALE : 1:50



TOTAL AREA
71m²

OFFICE BLOCK WINDOWS & DOORS REFERENCE PLAN

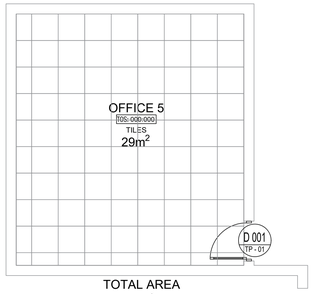
SCALE : 1:50



TOTAL AREA
14m²

STORE ROOM WINDOWS & DOORS REFERENCE PLAN

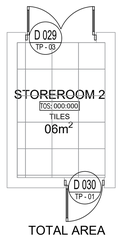
SCALE : 1:50



TOTAL AREA
29m²

OFFICE 5 WINDOWS & DOORS REFERENCE PLAN

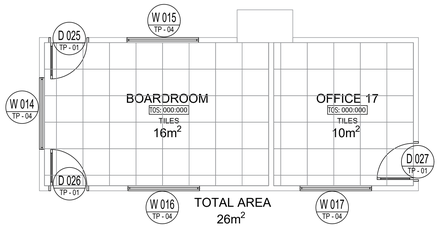
SCALE : 1:50



TOTAL AREA
06m²

STORE 2 WINDOWS & DOORS REFERENCE PLAN

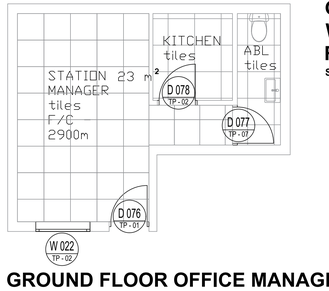
SCALE : 1:50



TOTAL AREA
26m²

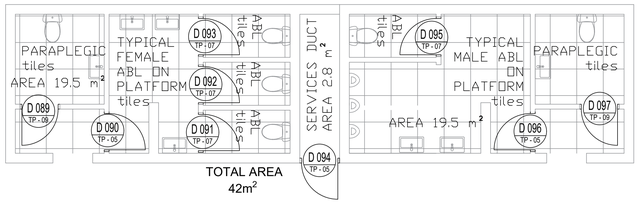
BOARDROOM WINDOWS & DOORS REFERENCE PLAN

SCALE : 1:50



GROUND FLOOR OFFICE MANAGER WINDOWS & DOORS REFERENCE PLAN

SCALE : 1:50



TOTAL AREA
42m²

GROUND FLOOR ABLUTIONS WINDOWS & DOORS REFERENCE PLAN

SCALE : 1:50

WINDOW NOTE:

- ALL EXISTING DAMAGED STEEL AND TIMBER WINDOW FRAMES TO BE REMOVED AND REPLACED WITH NEW ALUMINUM FRAMES, TO MATCH EXISTING ALUMINUM FRAMES COATED WITH MATT DARK UMBER GREY ANF 3057.
- ALL EXISTING WINDOW STEEL FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL NEW ALUMINUM WINDOW FRAMES TO BE NATURAL ANODIZED ALUMINUM, IN ACCORDANCE TO PRASA BLUE PRINT
- ALL EXISTING TIMBER WINDOW FRAMES TO BE SANDED DOWN & VARNISHED OR REPAINTED WITH TWO COATS OF QUALITY VARNISH AS PER HERITAGE REQUIREMENTS.
- ROLLER BLIND INSTALLED INTO THE TICKET SALES WINDOW, LOWERED DOWN INDICATES TICKET COUNTER NOT IN USE CURRENTLY.
- BULLET RESISTANT PAY / TRANSACTION WINDOWS INCLUDING SALES WINDOWS & INFORMATION DESKS.
- EXISTING EXTERIOR WINDOW SECURITY BANDIT BURGLAR GUARDS TO BE REFURBISHED. ALL DAMAGED TO BE REMOVED AND REPLACED WITH SIMILAR APPROVED.

DOOR NOTE:

- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED STEEL AND TIMBER DOOR FRAMES TO BE REMOVED AND REPLACED WITH NEW FRAMES, WHERE NECESSARY, TO MATCH EXISTING. STRICTLY REFER TO ARCHITECTS BEFORE ANY DOOR FRAME REMOVAL.
- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED DOORS TO BE REMOVED AND REPLACED WITH NEW DOORS TO MATCH EXISTING.
- ALL NEW INTERNAL AND EXTERNAL STEEL DOOR FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT, IN ACCORDANCE TO PRASA BLUE PRINT
- ALL NEW ALUMINIUM DOOR FRAMES TO BE NATURAL ANODISED ALUMINIUM, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL EXISTING INTERNAL AND EXTERNAL TIMBER DOOR FRAMES TO BE SANDED DOWN & VARNISHED OR REPAINTED WITH TWO COATS OF QUALITY VARNISH AS PER HERITAGE REQUIREMENTS.
- PAINT ALL INTERNAL DOOR LEAFS TO BE PAINTED WITH PLASCON OR DULUX TRADE PEARLGLO EMULSION PAINT.
- PAINT ALL EXTERNAL DOOR LEAFS TO BE PAINTED WITH PLASCON PROFESSIONAL OR DULUX TRADE GLOSS ENAMEL PAINT.
- EXISTING SECURITY BANDIT GATES TO BE CLEANED AND REPAIRED. PROPOSE NEW GALVANIZED STEEL SECURITY GATES WHERE NECESSARY ACCORDING TO THE CLIENT.

GENERAL NOTES

- ALL DIMENSIONS ARE INDICATED IN MILLIMETRES AND MUST BE CONTROLLED ON SITE. THIS DRAWING MUST NOT BE SCALED. ONLY FIGURED DIMENSIONS MAY BE USED.
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DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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prasa
PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT		
TITLE	NAME	DATE
DRAWN	Mlamuli Bhengu	24/08/2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY	
NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE PLAN/
ADDITIONS & ALTERATIONS

DURBAN STATION
WINDOWS AND DOORS REFERENCE PLANS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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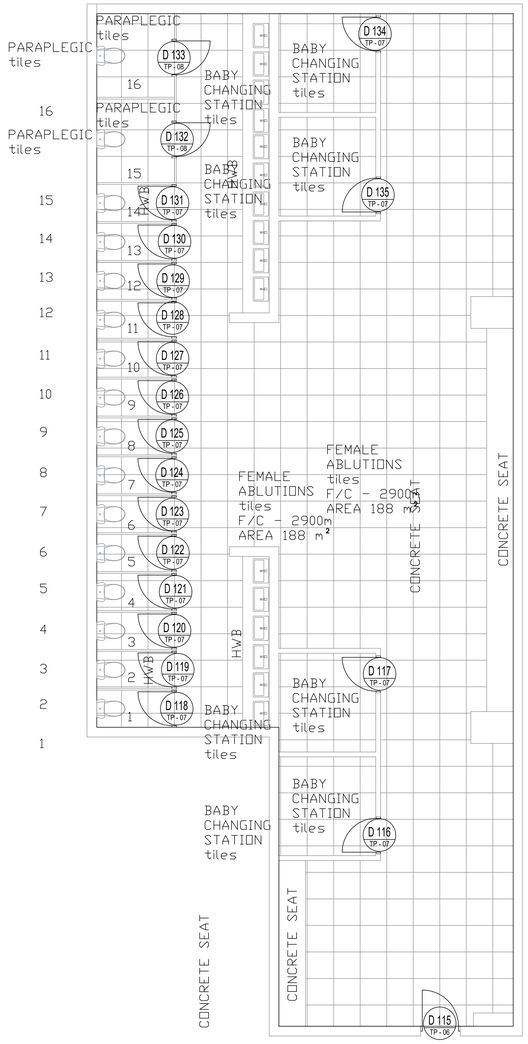
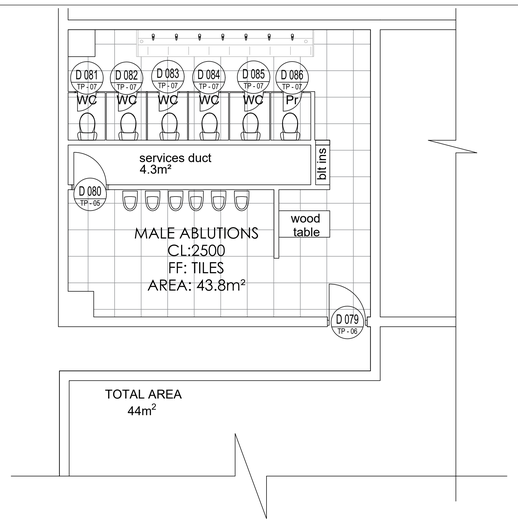


TOTAL AREA
117m²

GROUND FLOOR PUBLIC ABLUTIONS WINDOWS & DOORS REFERENCE PLAN

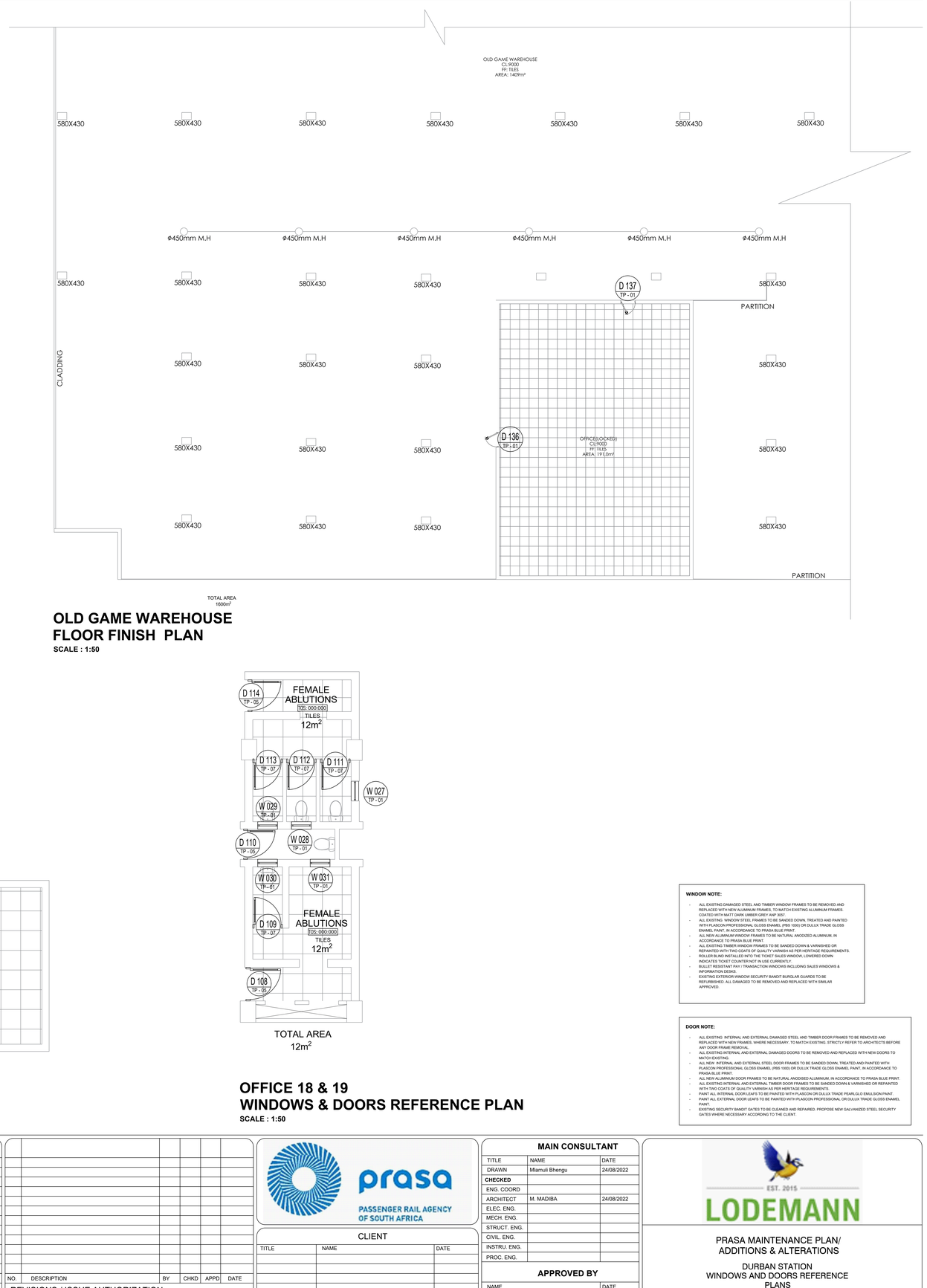
SCALE : 1:50



TOTAL AREA
44m²

GROUND FLOOR MALE ABLUTIONS WINDOWS & DOORS REFERENCE PLAN

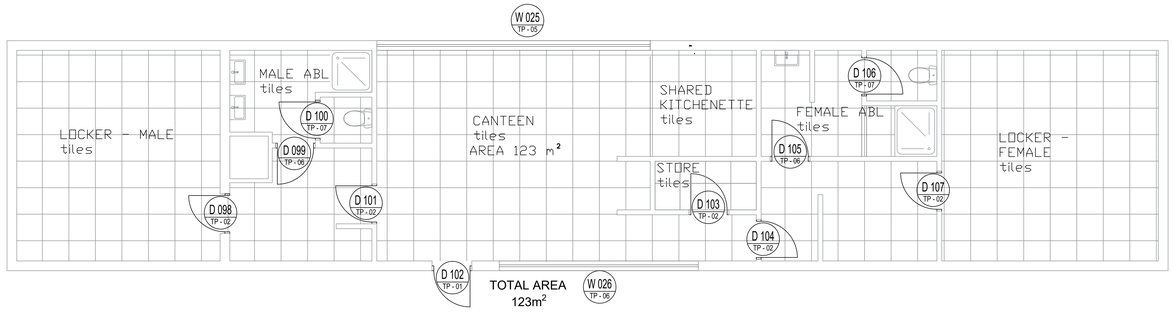
SCALE : 1:50



TOTAL AREA
1600m²

OLD GAME WAREHOUSE FLOOR FINISH PLAN

SCALE : 1:50



TOTAL AREA
123m²

GROUND FLOOR SECURITY STAFF ROOM WINDOWS & DOORS REFERENCE PLAN

SCALE : 1:50

TOTAL AREA
12m²

OFFICE 18 & 19 WINDOWS & DOORS REFERENCE PLAN

SCALE : 1:50

WINDOW NOTE:

- ALL EXISTING DAMAGED STEEL AND TIMBER WINDOW FRAMES TO BE REMOVED AND REPLACED WITH NEW ALUMINUM FRAMES, TO MATCH EXISTING ALUMINUM FRAMES COATED WITH MATT DARK UMBER GREY ANP 3057.
- ALL EXISTING WINDOW STEEL FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT, IN ACCORDANCE TO PRASA BLUE PRINT.
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- ROLLER BLIND INSTALLED INTO THE TICKET SALES WINDOW, LOWERED DOWN INDICATES TICKET COUNTER NOT IN USE CURRENTLY.
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- EXISTING EXTERIOR WINDOW SECURITY BANDIT BURGLAR GUARDS TO BE REFURBISHED. ALL DAMAGED TO BE REMOVED AND REPLACED WITH SIMILAR APPROVED.

DOOR NOTE:

- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED STEEL AND TIMBER DOOR FRAMES TO BE REMOVED AND REPLACED WITH NEW FRAMES, WHERE NECESSARY, TO MATCH EXISTING. STRICTLY REFER TO ARCHITECTS BEFORE ANY DOOR FRAME REMOVAL.
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- ALL NEW ALUMINIUM DOOR FRAMES TO BE NATURAL ANODISED ALUMINIUM, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL EXISTING INTERNAL AND EXTERNAL TIMBER DOOR FRAMES TO BE SANDED DOWN & VARNISHED OR REPAINTED WITH TWO COATS OF QUALITY VARNISH AS PER HERITAGE REQUIREMENTS.
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- PAINT ALL EXTERNAL DOOR LEAFS TO BE PAINTED WITH PLASICON PROFESSIONAL OR DULUX TRADE GLOSS ENAMEL PAINT.
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DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	Mlamuli Bhengu	24/08/2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	24/08/2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015
LODEMANN

PRASA MAINTENANCE PLAN/ ADDITIONS & ALTERATIONS

DURBAN STATION
WINDOWS AND DOORS REFERENCE PLANS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status
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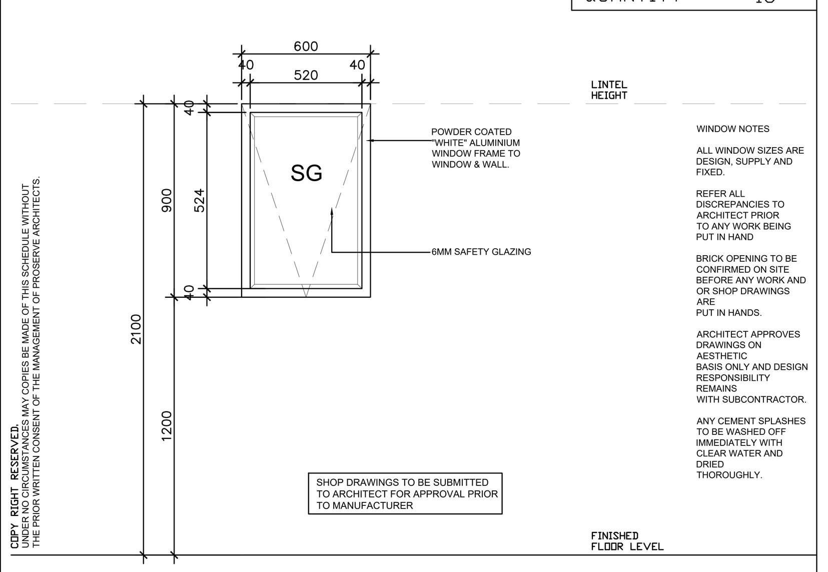
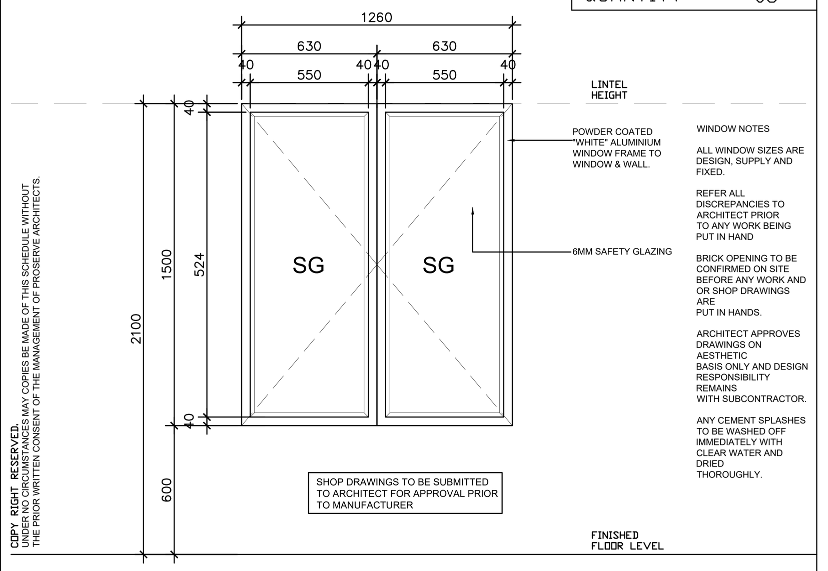
WINDOW SCHEDULE — WINDOW TYPE 01 — QUANTITY 13



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 1 TOP HUNG OPENING OUT CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	ABLUTIONS

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

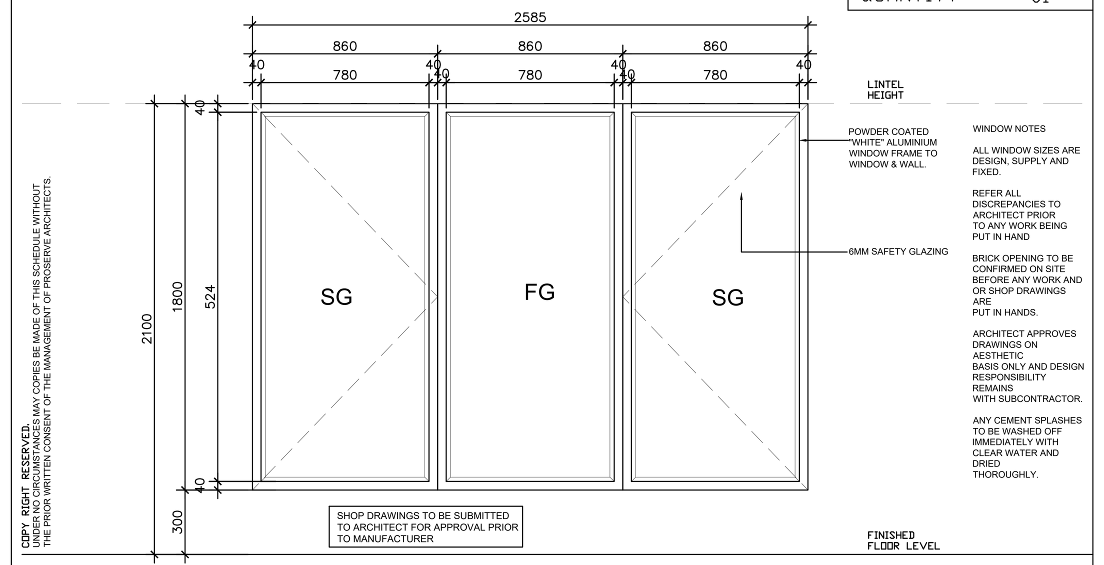
WINDOW SCHEDULE — WINDOW TYPE 02 — QUANTITY 08



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 2 SIDE HUNG OPENING OUT CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	OFFICES 13, 14, 15, 18, AND 19
	STATION MANAGER OFFICE

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

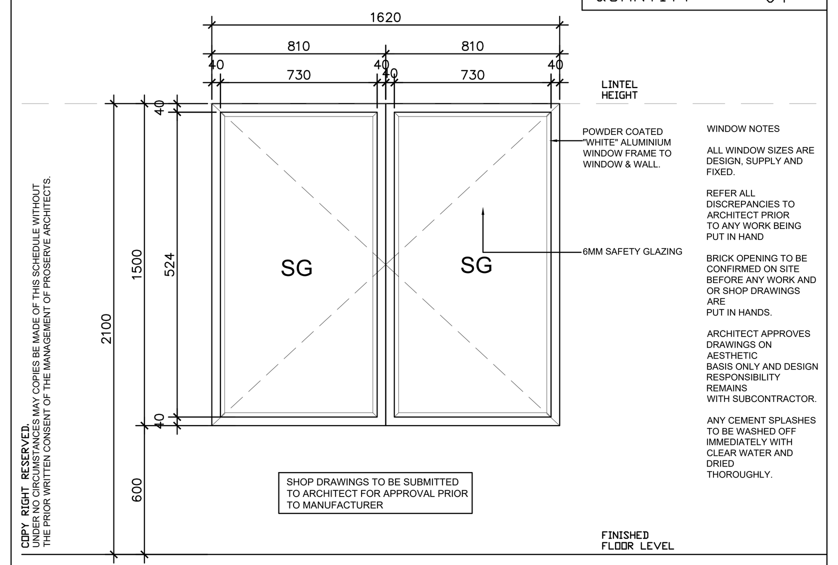
WINDOW SCHEDULE — WINDOW TYPE 03 — QUANTITY 01



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 2 TOP HUNG OPENING OUT CASEMENT AND ONE FIXED CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	OFFICE 13

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

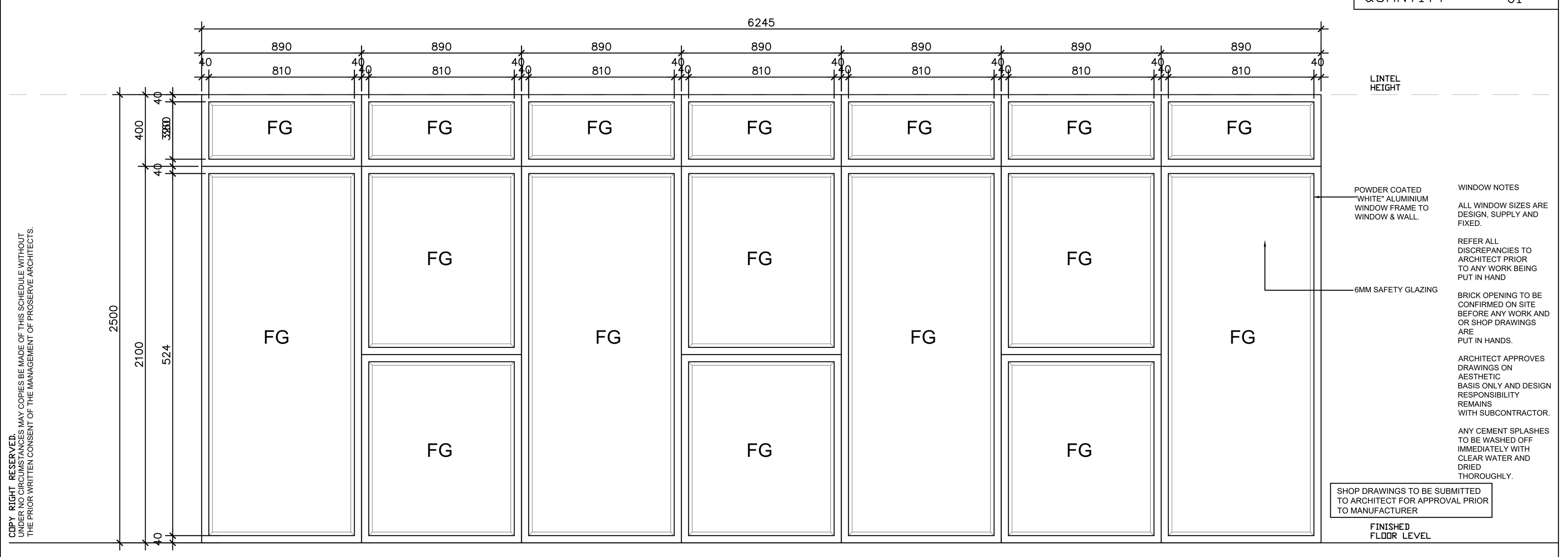
WINDOW SCHEDULE — WINDOW TYPE 04 — QUANTITY 04



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 2 TOP HUNG OPENING OUT CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	BOARDROOM

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

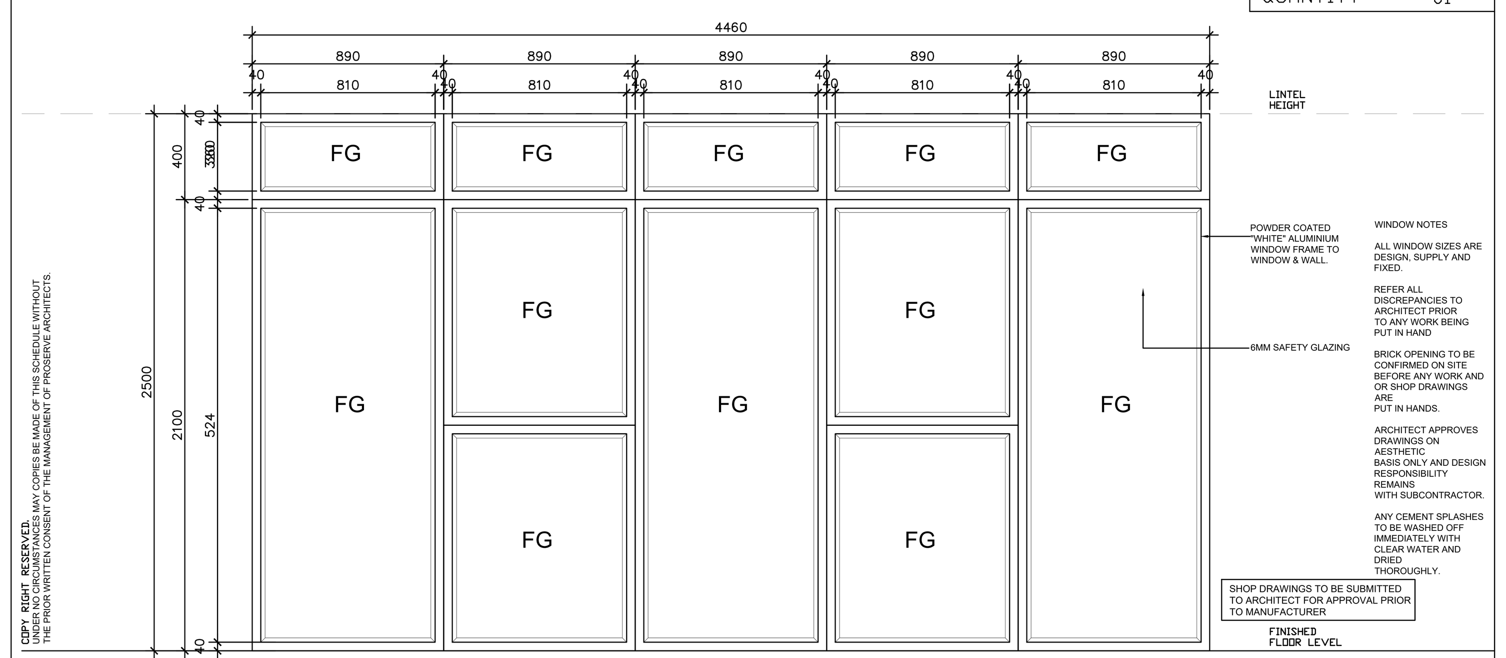
WINDOW SCHEDULE — WINDOW TYPE 05 — QUANTITY 01



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 17 FIXED CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	CANTEEN

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

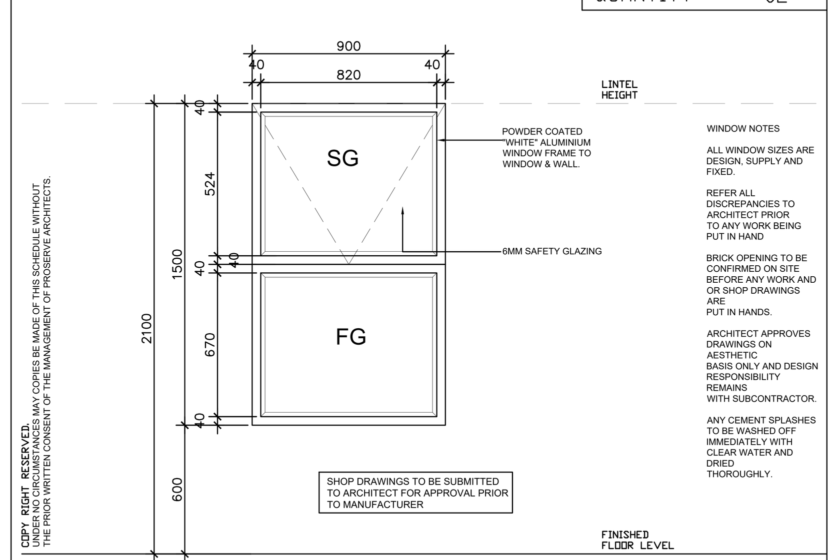
WINDOW SCHEDULE — WINDOW TYPE 06 — QUANTITY 01



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 12 FIXED CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	CANTEEN

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

WINDOW SCHEDULE — WINDOW TYPE 07 — QUANTITY 02



DESCRIPTION :	NATURAL ANODISED ALUMINIUM WINDOW CONSISTING OF 1 TOP HUNG OPENING OUT CASEMENT AND ONE FIXED CASEMENT.
	TO BE SUPPLIED WITH ALL BUILDING-IN LUGS. PERIMETER OF WINDOW TO BE SEALED WITH SILICONE.
GLASS :	6mm CLEAR SAFETY GLAZING THROUGHOUT AS PER PART N- GLAZING OF SANS 10400.
GLAZING :	REFER TO GLAZING / MANUFACTURER'S SPECIFICATIONS
IRONMONGERY :	AS PER MANUFACTURERS SPECIFICATIONS
FURNITURE :	BLACK NYLON HANDLES. SAMPLE TO BE SHOWN TO THE ARCHITECT FOR APPROVAL.
LOCKSET :	ALL OPENING SECTIONS TO BE FITTED WITH APPROVED LOCKING MECHANISM
HINGES :	PROJECTION HINGES.
OTHER :	ALL GLAZING TO COMPLY WITH PART 'N' OF THE SANS 10400
POSITION :	TICKIT SALES OFFICE

GLAZING AND SIGNAGE PANELS ARE TO BE DETERMINED PER STATION

WINDOW NOTE:

- ALL EXISTING DAMAGED STEEL AND TIMBER WINDOW FRAMES TO BE REMOVED AND REPLACED WITH NEW ALUMINUM FRAMES, TO MATCH EXISTING ALUMINUM FRAMES. COATED WITH MATT DARK UMBER GREY ANP 3057.
- ALL EXISTING WINDOW STEEL FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL NEW ALUMINUM WINDOW FRAMES TO BE NATURAL ANODIZED ALUMINUM, IN ACCORDANCE TO PRASA BLUE PRINT.
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- ROLLER BLIND INSTALLED INTO THE TICKET SALES WINDOW, LOWERED DOWN INDICATES TICKET COUNTER NOT IN USE CURRENTLY.
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- EXISTING EXTERIOR WINDOW SECURITY BANDIT BURGLAR GUARDS TO BE REFURBISHED. ALL DAMAGED TO BE REMOVED AND REPLACED WITH SIMILAR APPROVED.

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DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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CLIENT LOGO

prasa PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE
	PRASA	08.07.2022

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	MLAMULI BHENGU	26.08.2022
CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	26.08.2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

EST. 2015 LODEMANN

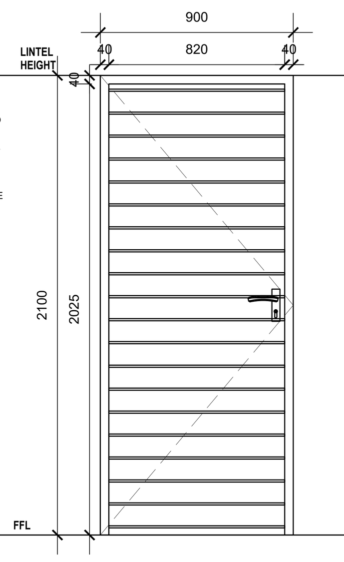
PRASA MANTAINANCE/ ALTERATIONS &ADDITIONS PLAN

DURBAN STATION
WINDOW SCHEDULE

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1:50	08-07-22	1040-002-01-0016		1	A1	ISSUED FOR INFORMATION

TP-01

ISSUE FOR INFORMATION



DOOR NOTES

ALL DOOR SIZES ARE DESIGN, SUPPLY AND FIXED.

REFER ALL DISCREPANCIES TO ARCHITECT PRIOR TO ANY WORK BEING PUT IN HAND

BRICK OPENING TO BE CONFIRMED ON SITE BEFORE ANY WORK AND OR SHOP DRAWINGS ARE PUT IN HANDS.

ARCHITECT APPROVES DRAWINGS ON AESTHETIC BASIS ONLY AND DESIGN RESPONSIBILITY REMAINS WITH SUBCONTRACTOR.

ANY CEMENT SPLASHES TO BE WASHED OFF IMMEDIATELY WITH CLEAR WATER AND DRIED THOROUGHLY.

ALL DOORS MUST BE INSTALLED SQUARE, TRUE AND PLUMB.

ALL DOOR FRAMES FOR POWER FLOATED DOORS TO BE PROVIDED WITH ADDITIONAL LUGS AT BOTTOM OF FRAME, TO BE SHOT FIXED TO CONCRETE SLAB.

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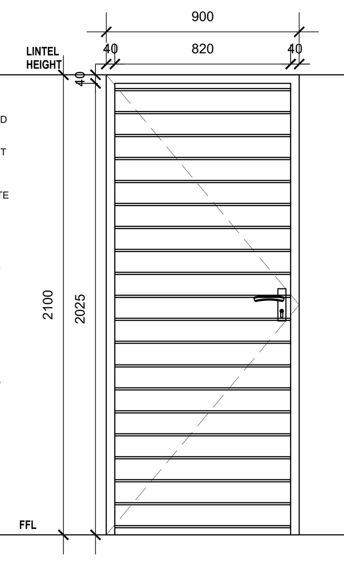
LOCATION	MAIN ENTRANCE		
QUANTITY	30	TYPE	DOOR:900MM WIDE,2100MM HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	2100 mm x 900mm SOLID HARDWOOD DOOR WITH SLATTED PANELS BOTH SIDES AND COUNSELED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST. COLOUR TO ARCHITECT.		

TP-02

ISSUE FOR INFORMATION



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REFER ALL DISCREPANCIES TO ARCHITECT PRIOR TO ANY WORK BEING PUT IN HAND

BRICK OPENING TO BE CONFIRMED ON SITE BEFORE ANY WORK AND OR SHOP DRAWINGS ARE PUT IN HANDS.

ARCHITECT APPROVES DRAWINGS ON AESTHETIC BASIS ONLY AND DESIGN RESPONSIBILITY REMAINS WITH SUBCONTRACTOR.

ANY CEMENT SPLASHES TO BE WASHED OFF IMMEDIATELY WITH CLEAR WATER AND DRIED THOROUGHLY.

ALL DOORS MUST BE INSTALLED SQUARE, TRUE AND PLUMB.

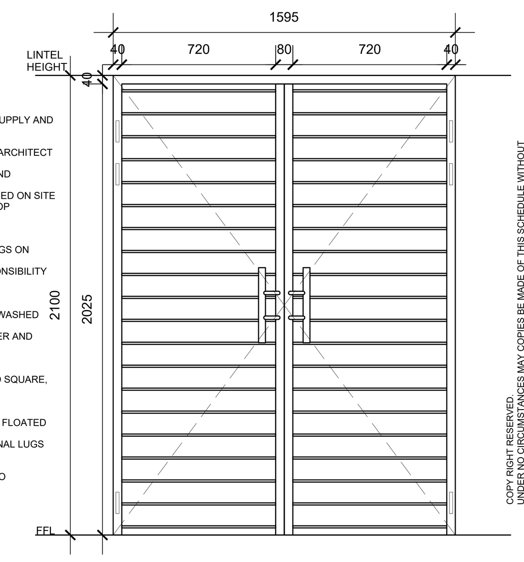
ALL DOOR FRAMES FOR POWER FLOATED DOORS TO BE PROVIDED WITH ADDITIONAL LUGS AT BOTTOM OF FRAME, TO BE SHOT FIXED TO CONCRETE SLAB.

COPY RIGHT RESERVED. UNDER NO CIRCUMSTANCES MAY COPIES BE MADE OF THIS SCHEDULE WITHOUT THE PRIOR WRITTEN CONSENT OF THE MANAGEMENT OF 690 SIGNATURE GROUP ARCHITECTS.

LOCATION	INTERNAL DOORS		
QUANTITY	18	TYPE	DOOR:900MM WIDE,2100MM HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	2100 mm x 900mm SEMI SOLID HARDWOOD DOOR WITH SLATTED PANELS BOTH SIDES AND COUNSELED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST. COLOUR TO ARCHITECT.		

TP-03

ISSUE FOR INFORMATION



DOOR NOTES

ALL DOOR SIZES ARE DESIGN, SUPPLY AND FIXED.

REFER ALL DISCREPANCIES TO ARCHITECT PRIOR TO ANY WORK BEING PUT IN HAND

BRICK OPENING TO BE CONFIRMED ON SITE BEFORE ANY WORK AND OR SHOP DRAWINGS ARE PUT IN HANDS.

ARCHITECT APPROVES DRAWINGS ON AESTHETIC BASIS ONLY AND DESIGN RESPONSIBILITY REMAINS WITH SUBCONTRACTOR.

ANY CEMENT SPLASHES TO BE WASHED OFF IMMEDIATELY WITH CLEAR WATER AND DRIED THOROUGHLY.

ALL DOORS MUST BE INSTALLED SQUARE, TRUE AND PLUMB.

ALL DOOR FRAMES FOR POWER FLOATED DOORS TO BE PROVIDED WITH ADDITIONAL LUGS AT BOTTOM OF FRAME, TO BE SHOT FIXED TO CONCRETE SLAB.

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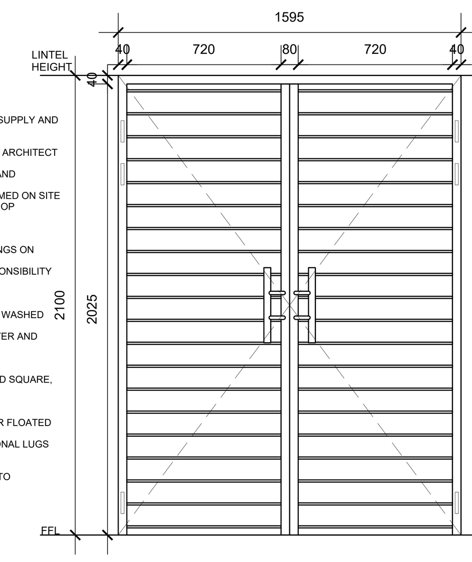
LOCATION	MAIN ENTRANCE		
QUANTITY	09	TYPE	DOOR: 1595mm WIDE x 2100mm HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	1595mm x 2100mm SOLID HARDWOOD DOOR SIDES AND CONCEALED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST DETAILS. COLOUR OF THE DOOR AND FRAME TO ARCHITECT'S SPECIALIST.		

TP-04

ISSUE FOR INFORMATION



DOOR NOTES

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REFER ALL DISCREPANCIES TO ARCHITECT PRIOR TO ANY WORK BEING PUT IN HAND

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ARCHITECT APPROVES DRAWINGS ON AESTHETIC BASIS ONLY AND DESIGN RESPONSIBILITY REMAINS WITH SUBCONTRACTOR.

ANY CEMENT SPLASHES TO BE WASHED OFF IMMEDIATELY WITH CLEAR WATER AND DRIED THOROUGHLY.

ALL DOORS MUST BE INSTALLED SQUARE, TRUE AND PLUMB.

ALL DOOR FRAMES FOR POWER FLOATED DOORS TO BE PROVIDED WITH ADDITIONAL LUGS AT BOTTOM OF FRAME, TO BE SHOT FIXED TO CONCRETE SLAB.

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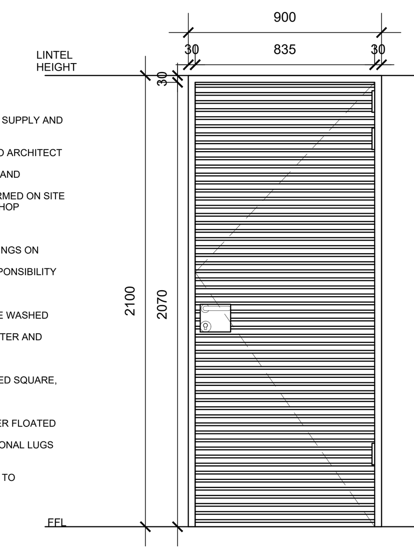
LOCATION	INTERNAL DOORS		
QUANTITY	05	TYPE	DOOR: 1595mm WIDE x 2100mm HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	1595mm x 2100mm SEMI SOLID HARDWOOD DOOR SIDES AND CONCEALED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST DETAILS. COLOUR OF THE DOOR AND FRAME TO ARCHITECT'S SPECIALIST.		

TP-05

ISSUE FOR INFORMATION



DOOR NOTES

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ALL DOORS MUST BE INSTALLED SQUARE, TRUE AND PLUMB.

ALL DOOR FRAMES FOR POWER FLOATED DOORS TO BE PROVIDED WITH ADDITIONAL LUGS AT BOTTOM OF FRAME, TO BE SHOT FIXED TO CONCRETE SLAB.

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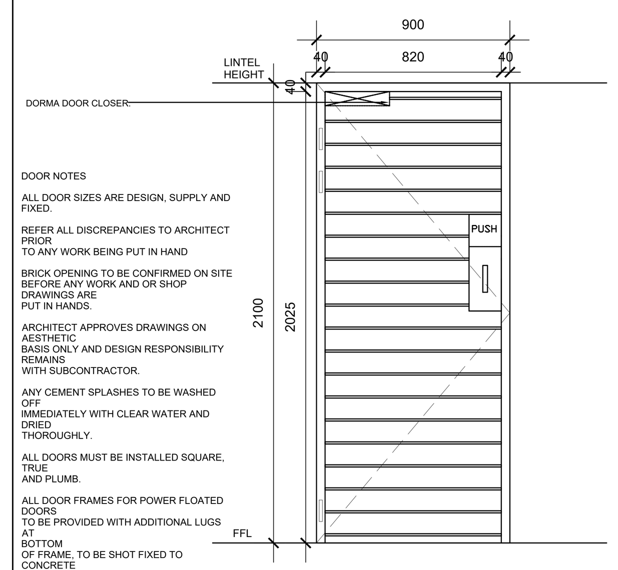
LOCATION	PUBLIC PLATFORM ABLUTIONS		
QUANTITY	12	TYPE	DOOR: 900mm WIDE x 2100mm HIGH STEEL FRAME.
FINISH	75mm, 1.2mm GALVANIZED SLAT MATERIAL OR OTHER RECOMMENDED SLAT BY MANUFACTURE.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	900mm x 2100mm GALVANISED AND EPOXY COATED M/S STEEL DOOR SIDES AND CONCEALED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST DETAILS.		

TP-06

ISSUE FOR INFORMATION



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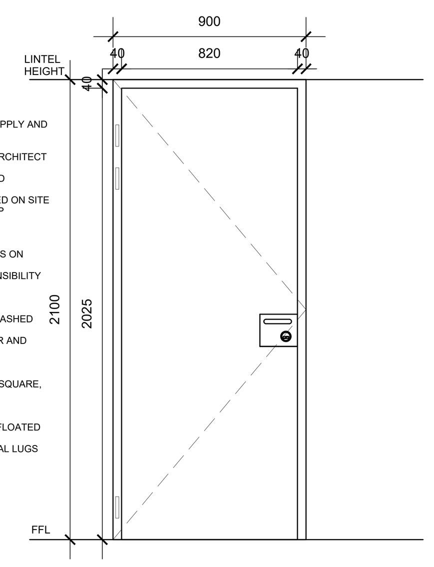
LOCATION	MALE AND FEMALE ABLUTIONS		
QUANTITY	06	TYPE	DOOR: 900mm WIDE x 2100mm HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. 1 No. DORMA DOOR CLOSER LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	900mm x 2100mm SEMI SOLID TIMBER DOOR SIDES AND CONCEALED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST DETAILS. COLOUR OF THE DOOR AND FRAME TO ARCHITECT'S SPECIALIST.		

TP-07

ISSUE FOR INFORMATION



DOOR NOTES

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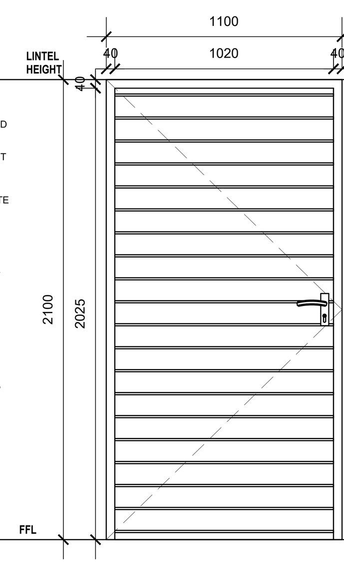
LOCATION	MALE AND FEMALE CUBICLES		
QUANTITY	51	TYPE	DOOR: 900mm WIDE x 2100mm HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK KNOB AND INDICATOR LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	900mm x 2100mm SEMI SOLID TIMBER DOOR SIDES AND CONCEALED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST DETAILS. COLOUR OF THE DOOR AND FRAME TO ARCHITECT'S SPECIALIST.		

TP-08

ISSUE FOR INFORMATION



DOOR NOTES

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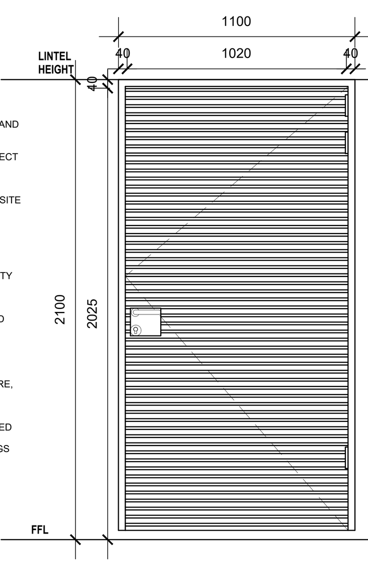
LOCATION	DISABLED ABLUTIONS		
QUANTITY	02	TYPE	DOOR:1100MM WIDE,2100MM HIGH ALUMINIUM FRAME.
FINISH	WOOD TO BE SEALED WITH LINSEED OIL OR OTHER RECOMMENDED SEALANTS BY MANUFACTURE AND TO BE PAINTED TO ARCHITECT SPEC. APPROVED BY CLIENT.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	2100 mm x 1100mm SEMI SOLID HARDWOOD DOOR WITH SLATTED PANELS BOTH SIDES AND COUNSELED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST. COLOUR TO ARCHITECT.		

TP-09

ISSUE FOR INFORMATION



DOOR NOTES

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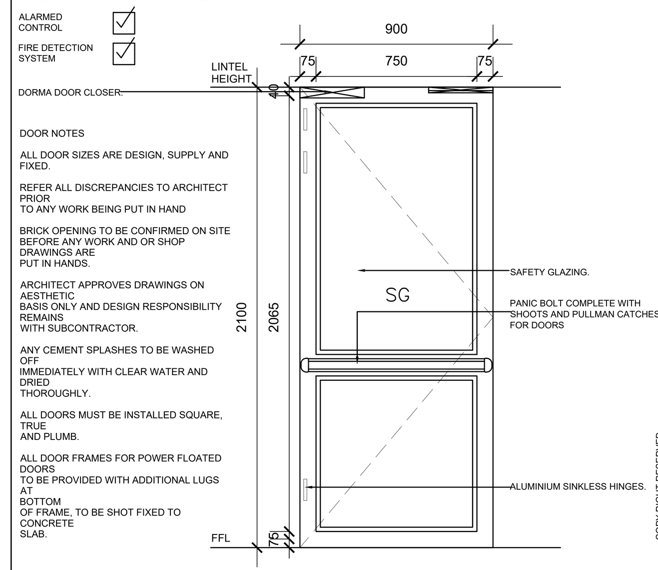
LOCATION	PUBLIC PLATFORM DISABLED ABLUTIONS		
QUANTITY	02	TYPE	DOOR:1100MM WIDE,2100MM HIGH ALUMINIUM FRAME.
FINISH	75mm, 1.2mm GALVANIZED SLAT MATERIAL OR OTHER RECOMMENDED SLAT BY MANUFACTURE.		
GLAZING	N/A		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	900mm x 2100mm GALVANISED AND EPOXY COATED M/S STEEL DOOR SIDES AND CONCEALED EDGES TO SUIT OPENING, DOOR TO BE FITTED WITH 3 x HINGES PER LEAF ALL TO SPECIALIST DETAILS.		

TP-10

ISSUE FOR INFORMATION

BY ELECTRICAL CONSULTANT CONNECTED TO: -

- ALARMED CONTROL ☑
- FIRE DETECTION SYSTEM ☑



DOOR NOTES

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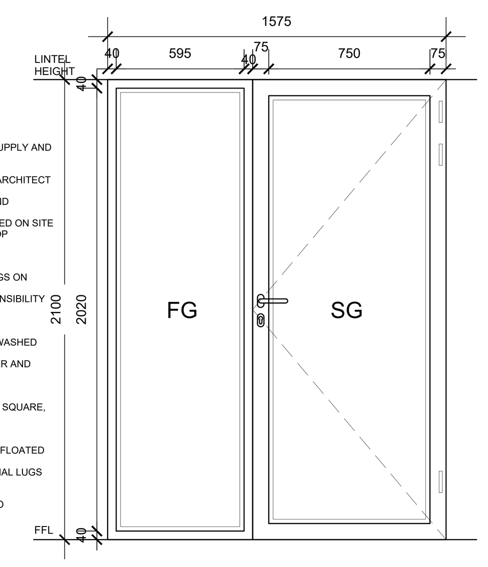
NOTE : NO UNDERCUT IN FIRE DOOR

LOCATION	STAIRCASE EXIST		
QUANTITY	02	TYPE	DOOR: 900mm WIDE,2100mm HIGH NATURAL ANODIZED ALUMINIUM FRAME.
FINISH	NATURAL ANODIZED ALUMINIUM DOOR AND FRAME FINISH		
GLAZING	6MM SAFETY GLASS IN PANELS. ALL TO COMPLY TO AAAMSA STANDARDS.		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. 2 No. DORMA DOOR CLOSER. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	900mm x 2100mm CLASS "B" 2 HOUR FIRE RATED ALL PURPOSE MADE NATURAL ANODIZED ALUMINIUM DOOR FRAME TO SUITE OPENING FITTED WITH 3 X HINGES PER LEAF. ALL TO SPECIALIST. COLOUR TO ARCHITECT. DOOR TO BE LINKED TO FIRE DETECTION SYSTEM.		

TP-11

ISSUE FOR INFORMATION



DOOR NOTES

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ALL DOORS MUST BE INSTALLED SQUARE, TRUE AND PLUMB.

ALL DOOR FRAMES FOR POWER FLOATED DOORS TO BE PROVIDED WITH ADDITIONAL LUGS AT BOTTOM OF FRAME, TO BE SHOT FIXED TO CONCRETE SLAB.

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NOTE : NO UNDERCUT IN FIRE DOOR

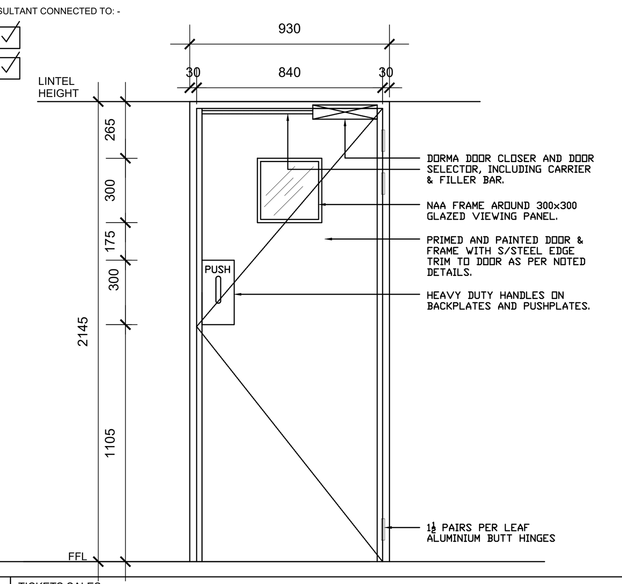
LOCATION	BOARD ROOM		
QUANTITY	01	TYPE	DOOR: 1575mm WIDE,2100mm HIGH NATURAL ANODIZED ALUMINIUM FRAME.
FINISH	NATURAL ANODIZED ALUMINIUM DOOR AND FRAME FINISH		
GLAZING	6MM SAFETY GLASS IN PANELS. ALL TO COMPLY TO AAAMSA STANDARDS.		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. LOCK SET, OPENING LEAF DOOR HANDLE, AND HINGES AS PER MANUFACTURER'S SPECIFICATIONS.		
DOOR & FRAME DESCRIPTION	1575mm x 1200mm PURPOSE MADE NATURAL ANODIZED ALUMINIUM DOOR FRAME TO SUITE OPENING FITTED WITH 3 X HINGES PER LEAF. ALL TO SPECIALIST. COLOUR TO ARCHITECT.		

TP-12

ISSUE FOR INFORMATION

BY ELECTRICAL CONSULTANT CONNECTED TO: -

- ACCESS CONTROL ☑
- FIRE DETECTION SYSTEM ☑



LOCATION	TICKETS SALES		
QUANTITY	01	TYPE	DOOR: 930 x 2100mm SOLID DOUBLE DOOR
FINISH	PRIMED & PAINTED WITH 2 COATS PLASCON VELVAGLO APPLIED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION. COLOR: T.B.C		
GLAZING	300x300mm GLASS VIEWING PANELS WITH ALUMINIUM FRAMES AND RUBBER GASKETS.		
IRON MONGERY	IRONMONGERY SCHEDULE BY SPECIALIST. 2 No. 6 PIN TUMBLER KEY SYSTEM, MORTICE DEAD LOCK WITH AN ADDITIONAL HEAVY DUTY MAGNETIC LOCK AND STRIKE INCLUDING KEY SWITCH AND SURFACE MOUNTED CASING. 1 No. 'DORMA' HEAVY DUTY DOOR CLOSER WITH SLIDE CHANNEL. 2 No. HEAVY DUTY ALUMINIUM PULL HANDLE (CENTRE MOUNTED) ON 300x150X3mm N.A.A. BACKPLATE. 3 No. HEAVY DUTY ALUMINIUM CONTINUOUS HINGES AS PER SPECIALIST.		
DOOR & FRAME DESCRIPTION	LEVEL G3 BULLET RESISTANT ANT-BANDIT DOOR, COMPLETE WITH 100 x 50 x 3mm GAUGE MILD STEEL RECTAGULAR FRAME AND 25 x 25 x 3mm MS ANGLE REBATED, OVERALL SIZE 930 x 2100mm HIGH IN POWDER COATED AND GALVINISED CLADDING WITH PEEP HOLE, SUPPLIED WITH A 6 PIN TUMBLER KEY SYSTEM, MORTICE DEAD LOCK WITH AN ADDITIONAL HEAVY DUTY MAGNETIC LOCK AND STRIKE INCLUDING KEY SWITCH AND SURFACE MOUNTED CASING, 6 AMP POWER SUPPLY, PUSH BOTTONS AND INTERLOCK SYSTEM, HEAVY DUTY ALUMINIUM CONTINUOUS HINGE, ALUMINIUM SLAM BAR WITH HEAVY DUTY DOOR CLOSER AND D-STYLE. DOOR TO COMPLY TO SABS 1658-1996.		

DOOR NOTE:

- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED STEEL AND TIMBER DOOR FRAMES TO BE REMOVED AND REPLACED WITH NEW FRAMES, WHERE NECESSARY, TO MATCH EXISTING. STRICTLY REFER TO ARCHITECTS BEFORE ANY DOOR FRAME REMOVAL.
- ALL EXISTING INTERNAL AND EXTERNAL DAMAGED DOORS TO BE REMOVED AND REPLACED WITH NEW DOORS TO MATCH EXISTING.
- ALL NEW INTERNAL AND EXTERNAL STEEL DOOR FRAMES TO BE SANDED DOWN, TREATED AND PAINTED WITH PLASCON PROFESSIONAL GLOSS ENAMEL (PBS 1000) OR DULUX TRADE GLOSS ENAMEL PAINT, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL NEW ALUMINIUM DOOR FRAMES TO BE NATURAL ANODISED ALUMINIUM, IN ACCORDANCE TO PRASA BLUE PRINT.
- ALL EXISTING INTERNAL AND EXTERNAL TIMBER DOOR FRAMES TO BE SANDED DOWN & VARNISHED OR REPAINTED WITH TWO COATS OF QUALITY VARNISH AS PER HERITAGE REQUIREMENTS.
- PAINT ALL INTERNAL DOOR LEAFS TO BE PAINTED WITH PLASCON OR DULUX TRADE PEARLGLO EMULSION PAINT.
- PAINT ALL EXTERNAL DOOR LEAFS TO BE PAINTED WITH PLASCON PROFESSIONAL OR DULUX TRADE GLOSS ENAMEL PAINT.
- EXISTING SECURITY BANDIT GATES TO BE CLEANED AND REPAIRED. PROPOSE NEW GALVANIZED STEEL SECURITY GATES WHERE NECESSARY ACCORDING TO THE CLIENT.

GENERAL NOTES

- ALL DIMENSIONS ARE INDICATED IN MILLIMETRES AND MUST BE CONTROLLED ON SITE. THIS DRAWING MUST NOT BE SCALED. ONLY FIGURED DIMENSIONS MAY BE USED.
- ALL DISCREPANCIES ARE TO BE VERIFIED WITH THE CONSULTANT PRIOR TO THE COMMENCEMENT OF WORK .
- THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH STRUCTURAL, CIVIL, ARCHITECTURAL, AND MECHANICAL DRAWINGS.
- ALL ELECTRICAL INSTALLATIONS ARE TO COMPLY WITH SANS 10142-1. AND LOCAL MUNICIPAL BY-LAWS.
- COPYRIGHT IS RESERVED ON ALL DRAWINGS AND DESIGNS.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE

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CLIENT LOGO

prasa PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE
	PRASA	08.07.2022

MAIN CONSULTANT

TITLE	NAME	DATE
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CHECKED		
ENG. COORD		
ARCHITECT	M. MADIBA	26.08.2022
ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	DATE
SIGNATURE	
REG. NUMBER	

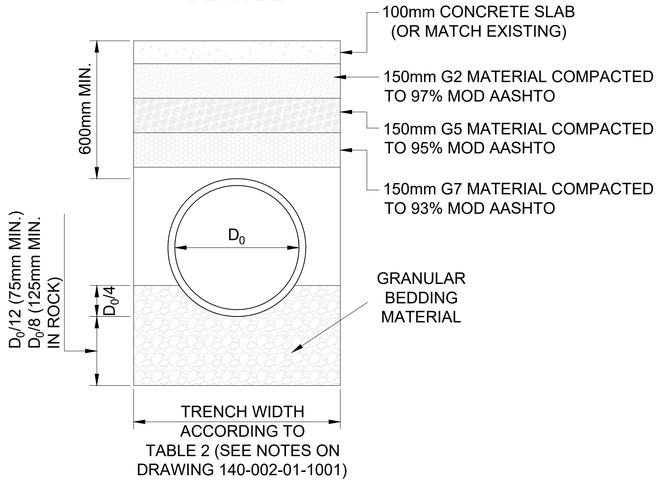
EST. 2015 LODEMANN

PRASA MANTAINANCE/ ALTERATIONS &ADDITIONS PLAN

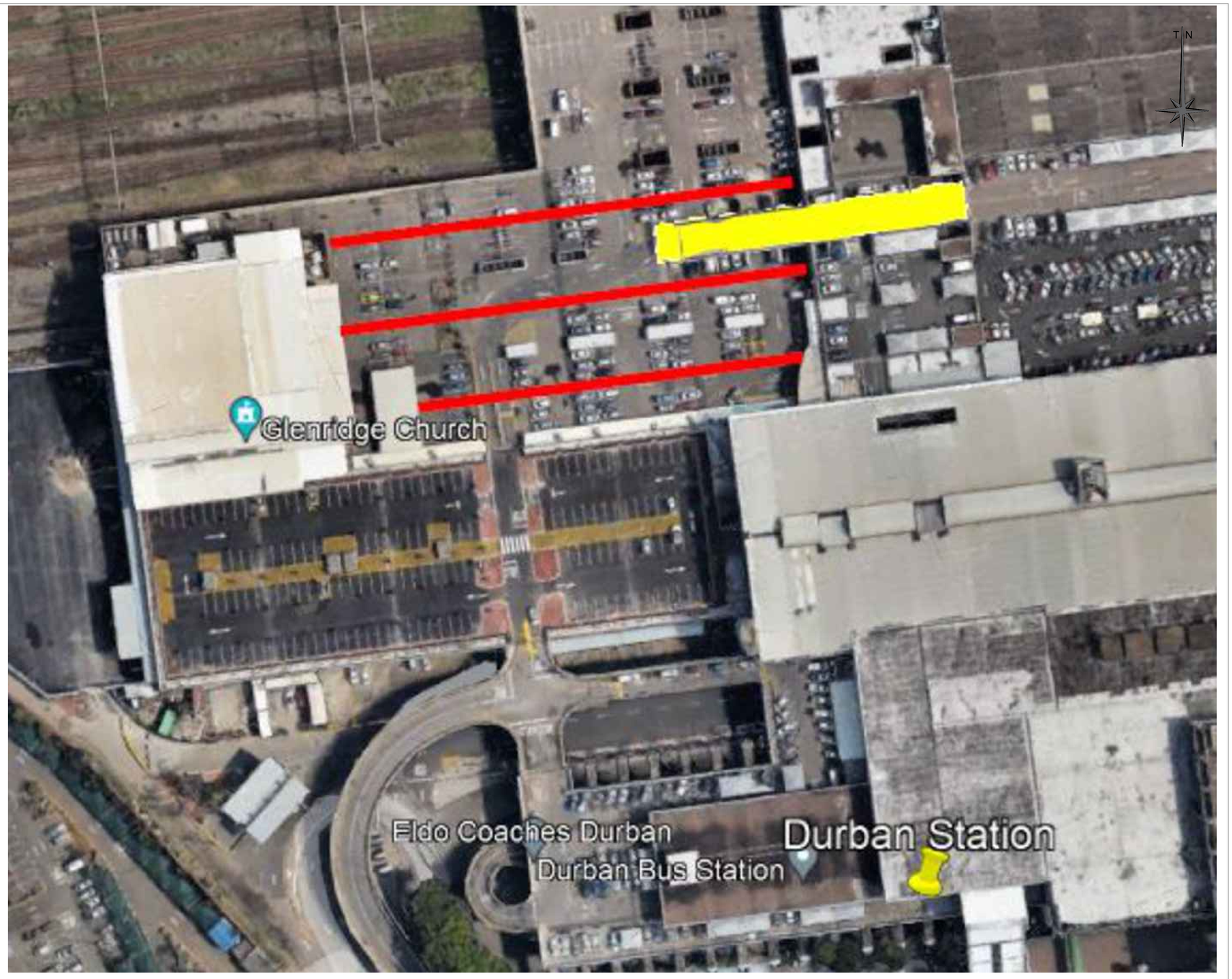
DURBAN STATION
DOOR SCHEDULE

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1:50	08-07-22	1040-002-01-0017		1	A1	ISSUED FOR INFORMATION

DETAIL 2



STORMWATER PIPES AT OLD GAME WAREHOUSE



LEGEND:

SUSPENSED BOX CHANNEL DRAINS REPLACEMENT

40mm ASPHALT RESURFACING AREA

1040-002-01-1003	STORMWATER: TYPICAL CHANNEL AND GRID INLET DETAILS
1040-002-01-1001	BEDDING OF STORMWATER PIPES
DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1	ISSUED FOR TENDER	ZD	SH	SH	16-09-2022

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EST. 2015

LODEMANN

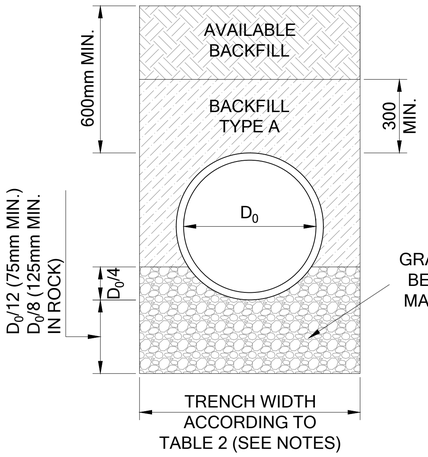
UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION

RESURFACING,CHANNEL LAYOUT AND DETAILS

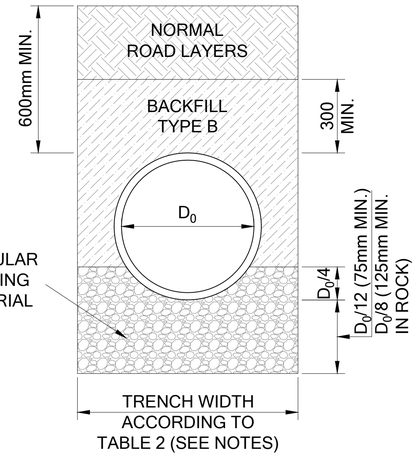
SCALE	DATE	Drawing number	CLIENT Drawing number	Rev.	Sheet size	Status
N.T.S.	01-08-22	1040-002-01-1000		1	A1	ISSUED FOR TENDER

DETAIL 1



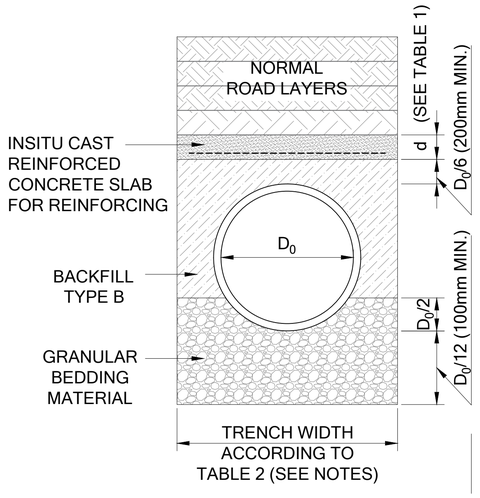
STORMWATER PIPES UNDER SIDEWALK

DETAIL 2



STORMWATER PIPES UNDERNEATH ROADS, ACCESS ROADS & PARKING AREAS

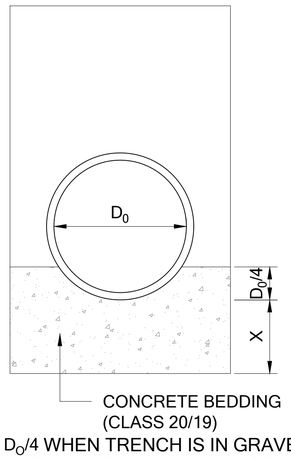
DETAIL 3



SITUATIONS WHERE A CONCRETE SLAB IS REQUIRED

STORMWATER PIPES UNDERNEATH MAIN ROUTES UNDER THE FOLLOWING CIRCUMSTANCES
1. COVER < 800mm FOR $D_O \leq 750$mm
2. COVER < 900mm FOR $D_O \leq 750$mm

DETAIL 4



$X = D_O/4$ WHEN TRENCH IS IN GRAVEL SOIL
$X = D_O/8$ WHEN TRENCH IS IN ROCK

SITUATIONS WHERE A CONCRETE BEDDING IS REQUIRED

LEGEND

D = PIPE CLASS
D_0 = INTERNAL PIPE DIAMETER

NOTES

1. ALL PIPES BELOW SIDEWALKS & OPEN AREAS TO BE CLASS 50 'D' EXCEPT WHERE COVER < 2.0m ON 1200mm ø AND GREATER THE CLASS OF THE PIPES ARE TO BE INCREASED TO 75 'D'.
2. FOR STORMWATER PIPES BELOW STREETS & MAIN ROUTES, SEE TABLE 2.
3. THE CONTRACTOR SHALL AT ALL TIMES ADHERE TO THE SAFETY PRECAUTIONS AS SET OUT IN SANS 12OO D - 1988.
4. IF TRENCHES ARE 200mm WIDER THAN THE SPECIFIED WITH IN TABLE 2, IT MAY BE NECESSARY TO CHANGE THE PIPE CLASS.
5. BEDDING:
   a. NORMAL BEDDING ACCORDING TO DETAIL 1.
   b. BEDDING ACCORDING TO DETAIL 2.
   c. CONCRETE SLAB OVER PIPE ACCORDING TO DETAIL 3.
   d. CONCRETE BEDDING ACCORDING TO DETAIL 4.
6. BEDDING MATERIAL:
   THE MATERIAL USED CONSISTS OF SELECTED GRAVEL WITH PI ≤ 6, MUST BE FREE OF STONES LARGER THAN 20mm, ORGANIC MATERIALS AND CLAY LUMPS. THE BEDDING MATERIALS AT THE SIDES OF THE PIPE MUST BE COMPACTED TO 90% MOD. AASHTO DENSITY AFTER THE PIPE HAS BEEN LAID.
7. BACKFILL TYPE A:
   THE MATERIAL USED MUST BE UNIFORM AND MUST BE COMPACTED TO 90% MOD ASSHTO DENSITY IN LAYERS NOT MORE THAN 100mm AND MUST BE FREE OF:
   a. ROOTS OF TREES, BUILDING RUBBLE AND ORGANIC MATERIAL.
   b. CLAY LUMPS LARGER THAN 75mm.
   c. STONES LARGER THAN 20mm.
8. BACKFILL TYPE B:
   MINIMUM G9 MATERIAL ACCORDING TO THR14 CLASSIFICATION COMPACTED TO A MINIMUM OF 90% MOD. AASHTO DENSITY IN LAYERS NOT MORE THAN 150mm.
9. MINIMUM PIPE SIZE TO BE 450mm DIAMETER.
10. CONNECTIONS FROM ERVEN TO MUNICIPAL SYSTEM SYSTEM TO BE 450mm.

TABLE 1

CONCRETE SLAB: CLASS 25/19 CONCRETE	DEPTH (d)	REINFORCING	MIN. COVER
D_0 < 900mm	150mm	REF. No 245 WELDED MESH	40mm
900mm < 0 < 1800mm	200mm	REF. No 311 WELDED MESH	40mm

TABLE 2

PIPE CLASSES FOR PIPES UNDER SECONDARY STREETS, LIGHT ACCESS ROADS, PARKING AREAS, PRVATE ENTRANCES AND SIDEWALKS FOR 40kN WHEEL LOAD WITH DUE ALLOWANCE FOR IMPACT LOADS.

ϕ	TRENCH WIDTH	COVER (m)											
mm	mm	0.6	0.9	1.0	1.2	1.5	1.8	2.0	2.5	3.0	4.0	5.0	6.0
450	950	75D	75D	75D	75D	50D	50D	50D	75D	75D	75D	75D	75D
525	1020	75D	75D	50D	50D	50D	50D	50D	75D	75D	75D	75D	75D
600	1620	75D	50D	50D	50D	50D	50D	75D	75D	75D	100D	100D	100D
675	1710	75D	75D	75D	75D	75D	75D	75D	75D	75D	100D	100D	100D
750	1790	75D	50D	50D	50D	50D	75D	75D	75D	75D	100D	100D	75D
825	1870	75D	50D	50D	50D	50D	50D	75D	75D	75D	100D	100D	100D
900	1950	75D	50D	50D	50D	50D	75D	75D	75D	75D	100D	100D	100D
1050	2120	75D	75D	75D	75D	75D	75D	75D	75D	75D	75D	100D	100D
1200	2280	75D	50D	50D	50D	50D	50D	50D	75D	75D	75D	100D	100D
1350	2450	50D	50D	50D	50D	50D	50D	50D	75D	75D	75D	100D	100D
1500	2610	50D	50D	50D	50D	50D	50D	50D	75D	75D	75D	100D	100D
1650	2760	50D	50D	50D	50D	50D	50D	50D	75D	75D	100D	100D	100D
1800	3260	50D	50D	50D	50D	50D	50D	50D	50D	75D	75D	100D	100D

PIPE CLASSES FOR PIPES UNDER ROUTES FOR H8 - WHEEL LOADS OF EIGHT 80kN WHEEL LOAD WITH DUE ALLOWANCE FOR IMPACT LOADS.

ϕ	TRENCH WIDTH	COVER (m)											
mm	mm	0.6	0.9	1.0	1.2	1.5	1.8	2.0	2.5	3.0	4.0	5.0	6.0
450	950	75D	100D	100D	100D	100D	100D	100D	100D	100D	75D	75D	75D
525	1020	75D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
600	1620	75D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
675	1710	75D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
750	1790	75D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
825	1870	75D	50D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
900	1950	75D	50D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
1050	2120	75D	50D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
1200	2280	75D	50D	100D	100D	100D	100D	100D	100D	100D	100D	100D	100D
1350	2450	50D	50D	100D	100D	100D	75D	75D	100D	100D	100D	100D	100D
1500	2610	50D	50D	100D	100D	100D	75D	75D	100D	100D	100D	100D	100D
1650	2760	50D	50D	100D	100D	100D	100D	100D	75D	100D	75D	75D	75D
1800	3260	50D	50D	100D	50D	75D	75D	75D	75D	100D	100D	100D	100D

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DRAWING NO.	REFERENCE
1040-002-01-1002	STORMWATER: TYPICAL CHANNEL AND GRID INLET DETAILS
1040-002-01-1000	DURBAN STATION: RESURFACING,CHANNEL LAYOUT AND DETAILS

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1	ISSUED FOR TENDER	ZD	SH	MM	16-09-2022

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ELEC. ENG.		
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.	S. HERSTEIN	
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PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
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REG. NUMBER	D/2404/2017	

EST. 2015
LODEMANN

UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION

BEDDING OF STORMWATER PIPES

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
N.T.S.	01-08-22	1040-002-01-1001		1	A1	ISSUED FOR TENDER

STORMWATER PIPES UP TO 900mmØ

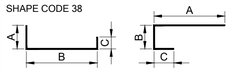
PIPE Ø	L	W
0-525	1.8	1.4
600-675	1.8	1.6
750-900	1.8	1.8

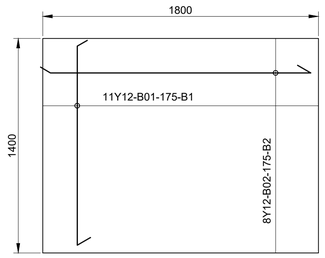
BENGING SCHEDULE FOR PIPE ϕ≤525 MANHOLE

	MEMBER NAME	BAR MARK	TYPE SIZE	SHAPE CODE	TOTAL QTY	TOTAL LENGTH	BENDING A	BENDING B	BENDING C	BENDING r	MASS (Kg/m)	MASS PER BAR (Kg)	TOTAL MASS (Kg)
1	BASE	B01	Y12	38	11	1475	100	1300	75	-	0,888	1,310	14,408
2		B02	Y12	38	8	1875	100	1700	75	-	0,888	1,665	13,320
3	SLAB	S01	Y12	38	11	1515	100	1340	75	-	0,888	1,345	14,799
4		S02	Y12	38	9	1915	100	1740	75	-	0,888	1,701	15,305
5		S03	Y10	20	8	500	500	-	-	-	0,617	0,309	2,468
6		S04	Y12	38	10	550	100	350	100	-	0,888	0,488	4,884
7		S05	Y12	38	6	650	100	450	100	-	0,888	0,577	3,463

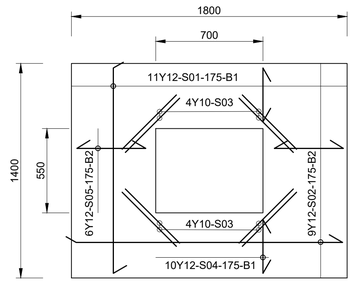
NOTES:
1. THE SHAPE CODES & DIMENSIONS GIVEN ARE IN ACCORDANCE WITH SANS: 82 BENDING DIMENSIONS FOR CONCRETE REINFORCEMENT.
2. R: *ROUND MILD STEEL BARS TO SANS 920.*
3. Y: *ROUND DEFORMED HIGH TENSILE BARS TO SANS 920, min. YIELD PIONT 450MPa.*

SHAPE CODE 38

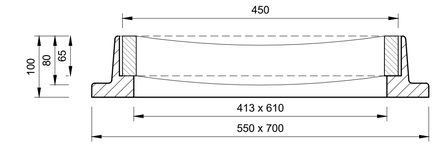




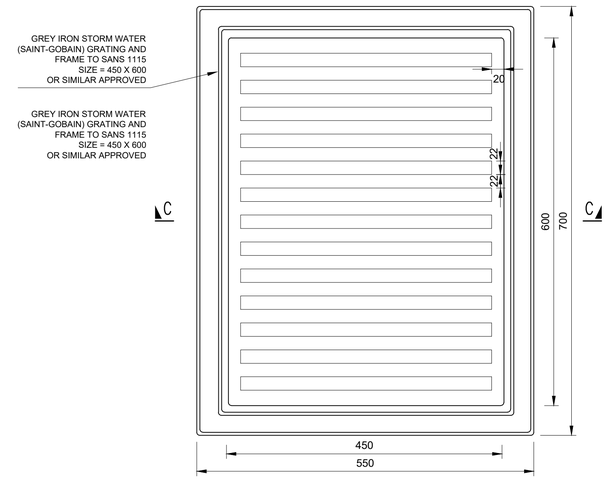
BASE REBAR DETAIL
SCALE: 1:20



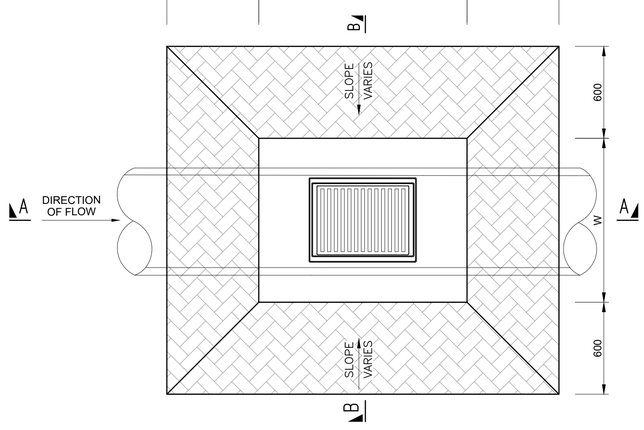
COVER SLAB REBAR DETAIL
SCALE: 1:20



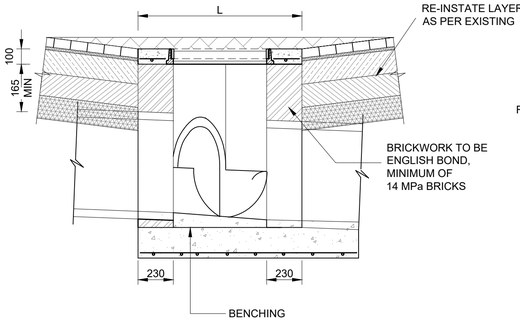
SECTION C-C
SCALE: 1:5



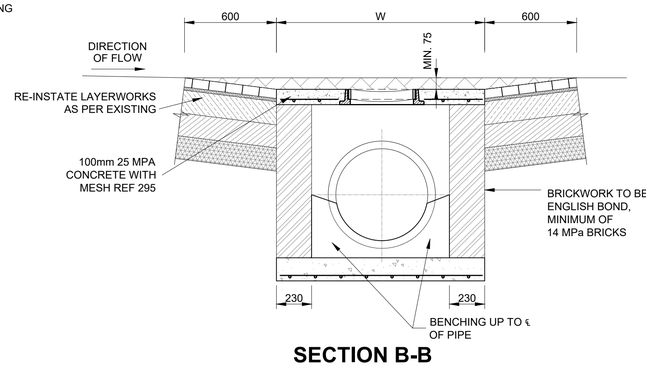
GRID COVER DETAIL
SCALE: 1:5



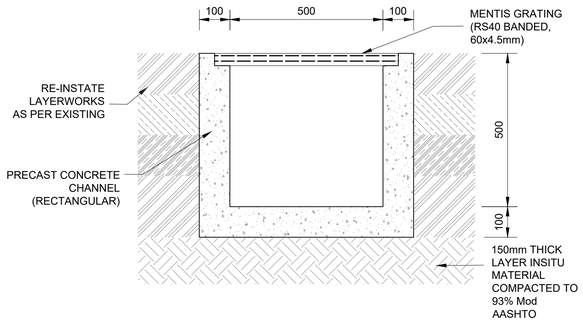
DETAILS OF GRID INLET
SCALE: 1:20



SECTION A-A
SCALE: 1:20



SECTION B-B
SCALE: 1:20



CONCRETE CHANNEL (PRECAST)
SCALE: 1:10

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DRAWING NO.	REFERENCE
1040-002-01-1001	BEDDING OF STORMWATER PIPES
1040-002-01-1000	DURBAN STATION: RESURFACING,CHANNEL LAYOUT AND DETAILS

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1	ISSUED FOR TENDER	ZD	SH	MM	16-09-2022

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STRUCT. ENG.		
CIVIL. ENG.	S. HERSTEIN	
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

EST. 2015
LODEMANN

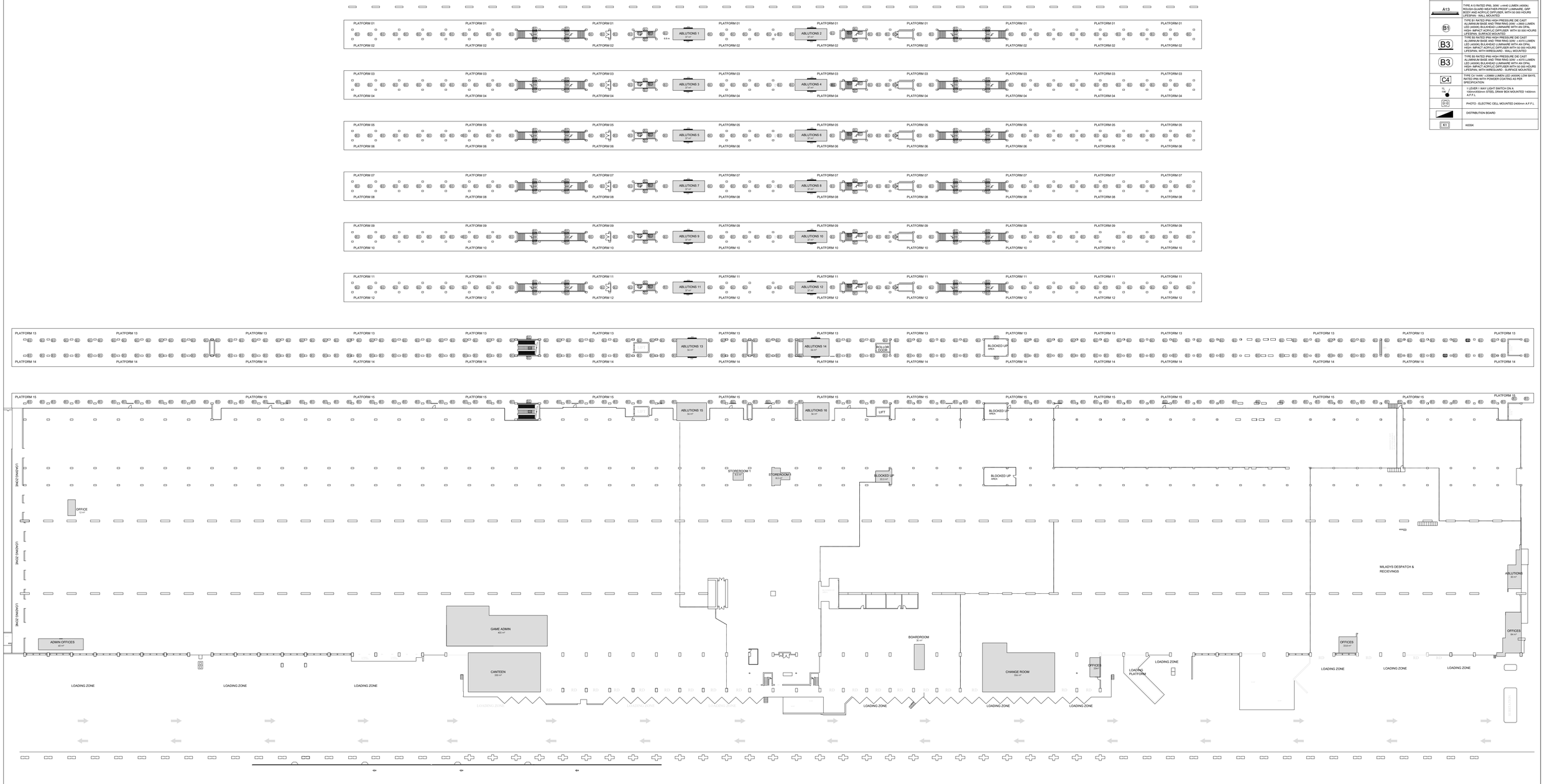
UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME
DURBAN STATION

STORMWATER: TYPICAL CHANNEL AND GRID INLET DETAILS

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
AS SHOWN	01-08-22	1040-002-01-1002		1	A1	ISSUED FOR TENDER

LEGEND:

B3	TYPE B5 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 32W/ ± 4370 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH 4kV OPAL HIGH - IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN. WITH WIREGUARD - POLE MOUNTED
A13	TYPE A13 RATED IP65, 30W/ ± 4440 LUMEN (4000k) LED BULKHEAD LUMINAIRE WITH 4kV OPAL HIGH IMPACT BODY AND ACRYLIC DIFFUSER. WITH 50 000 HOURS LIFESPAN - WALL MOUNTED
B1	TYPE B1 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 20W/ ± 2600 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH 4kV OPAL HIGH - IMPACT ACRYLIC DIFFUSER. WITH 50 000 HOURS LIFESPAN. SURFACE MOUNTED
B3	TYPE B5 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 32W/ ± 4370 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH 4kV OPAL HIGH - IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN. WITH WIREGUARD - WALL MOUNTED
B3	TYPE B5 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 32W/ ± 4370 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH 4kV OPAL HIGH - IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN. WITH WIREGUARD - SURFACE MOUNTED
C4	TYPE C4 14/40/ ± 2/3MM LUMEN LED (4000K) LOW BAY/S, RATED IP65 WITH POWDER COATING AS PER SPECIFICATION
	1 LEVER 1 WAY LIGHT SWITCH ON A 100mmX50mm STEEL DRAW BOX MOUNTED 1400mm A.F.F.L
	PHOTO - ELECTRIC CELL MOUNTED 2400mm A.F.F.L
	DISTRIBUTION BOARD
K1	KIOSK



GENERAL NOTES:

1. ELECTRICAL INSTALLATION TO COMPLY WITH SANS 10142-1 AS AMENDED.
2. CONTRACTORS TO USE EXISTING CIRCUITING. CONTRACTORS TO RETAIN EXISTING CABLES AND CONDUCTORS WHERE APPLICABLE. NEW CABLE AND CONDUCTOR SHALL BE INSTALLED UPON ENGINEERS APPROVAL.
3. CONTRACTORS TO REPLACE LIGHT FITTINGS AS PER SPECIFICATION.
4. CONTRACTOR TO PROVIDE UNIVERSAL ELECTRICAL LOCK ON ALL KIOSK AND DB'S.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1.	ISSUED FOR TENDER	LM	TM	MM	23-08-2022

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TITLE	NAME	DATE
DRAWN	L. MKHIZE	
CHECKED		
ENG. COORD		
ARCHITECT		
ELEC. ENG.	T. MBATHA	
MECH. ENG.		
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

EST. 2015
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UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

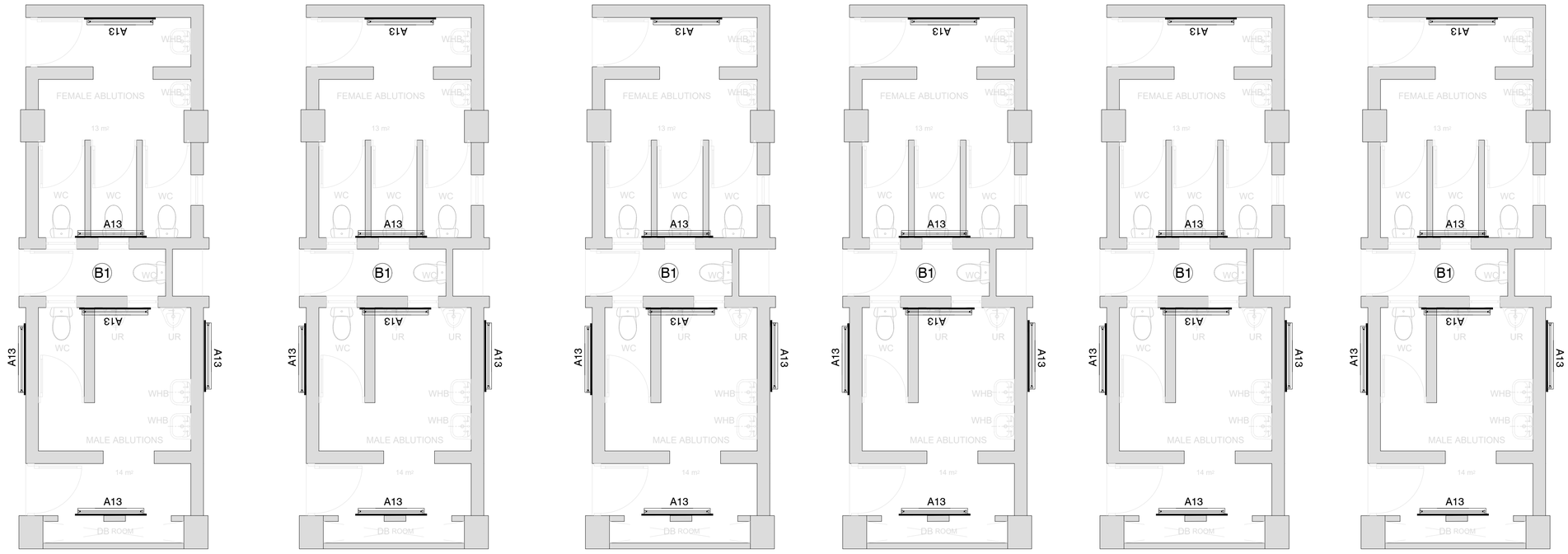
DURBAN STATION
GROUND STOREY PLANS: PLATFORMS LIGHTING LAYOUT

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
N.T.S	22-08-22	1040-002-01-3000		1	A1	ISSUED FOR TENDER

LEGEND:	
A13	TYPE A13 RATED IP65, 30W/ ±4440 LUMEN (4000k) ROUGH-GUARD WEATHER-PROOF LUMINAIRE, GRP BODY AND ACRYLIC DIFFUSER, WITH 50 000 HOURS LIFESPAN - SURFACE MOUNTED
B1	TYPE B1 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 20W/ ±2600 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH AN OPAL HIGH- IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN. SURFACE MOUNTED
B1	TYPE B1 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 20W/ ±2600 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH AN OPAL HIGH- IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN. WALL MOUNTED WITH STEEL CAGE.
B3	TYPE B3 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 32W/ ±4370 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH AN OPAL HIGH- IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN, WITH WIREGUARD - SURFACE MOUNTED
C4	TYPE C4 144W/ ±20869 LUMEN LED (4000K) LOW BAYS, RATED IP65 WITH POWDER COATING AS PER SPECIFICATION
1L 1W	1 LEVER 1 WAY LIGHT SWITCH ON A 100mmX50mm STEEL DRAW BOX MOUNTED 1400mm A.F.F.L
	PHOTO - ELECTRIC CELL MOUNTED 2400mm A.F.F.L
	DISTRIBUTION BOARD

NOTES:

1. CONTRACTOR TO REPLACE EXISTING LAMPS WITH NEW LED TUBE LAMPS IN ALL ABLUTIONS.



ABLUTIONS 1
SCALE 1:50

ABLUTIONS 2
SCALE 1:50

ABLUTIONS 3
SCALE 1:50

ABLUTIONS 4
SCALE 1:50

ABLUTIONS 5
SCALE 1:50

ABLUTIONS 6
SCALE 1:50

GENERAL NOTES:

1. ELECTRICAL INSTALLATION TO COMPLY WITH SANS 10142-1 AS AMENDED.
2. CONTRACTORS TO USE EXISTING CIRCUITING. CONTRACTORS TO RETAIN EXISTING CABLES AND CONDUCTORS WHERE APPLICABLE. NEW CABLE AND CONDUCTOR SHALL BE INSTALLED UPON ENGINEERS APPROVAL.
3. CONTRACTORS TO REPLACE LIGHT FITTINGS AS PER SPECIFICATION.
4. CONTRACTOR TO PROVIDE UNIVERSAL ELECTRICAL LOCK ON ALL KIOSK AND DB'S.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1.	ISSUED FOR TENDER	LM	TM	MM	23-08-2022

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NAME	M. MADIBA	DATE
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REG. NUMBER	D/2404/2017	

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UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
ABLUTIONS 1 TO 6 LIGHTING LAYOUT

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
N.T.S	22-08-22	1040-002-01-3001		1	A1	ISSUED FOR TENDER

LEGEND:	
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B1	TYPE B1 RATED IP65 HIGH PRESSURE DIE CAST ALUMINIUM BASE AND TRIM RING 20W/ ±2600 LUMEN LED (4000K) BULKHEAD LUMINAIRE WITH AN OPAL HIGH- IMPACT ACRYLIC DIFFUSER WITH 50 000 HOURS LIFESPAN. SURFACE MOUNTED
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C4	TYPE C4 144W/ ±20869 LUMEN LED (4000K) LOW BAYS, RATED IP65 WITH POWDER COATING AS PER SPECIFICATION
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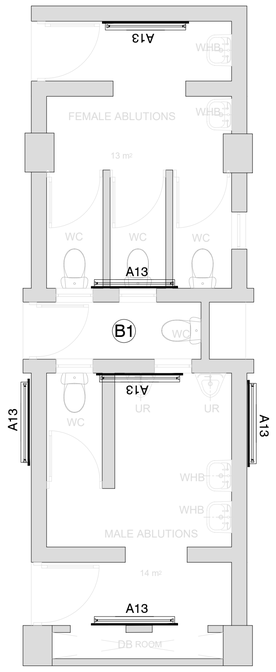
	PHOTO - ELECTRIC CELL MOUNTED 2400mm A.F.F.L
	DISTRIBUTION BOARD

NOTES:

1. CONTRACTOR TO REPLACE EXISTING LAMPS WITH NEW LED TUBE LAMPS IN ALL ABLUTIONS.



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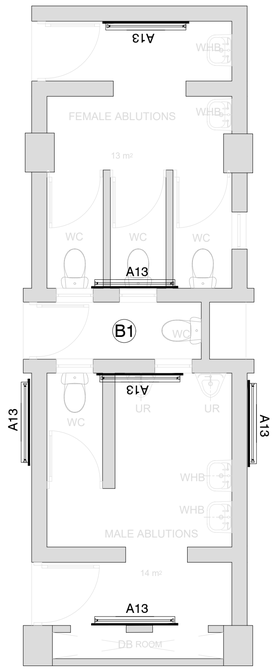
SCALE 1:50



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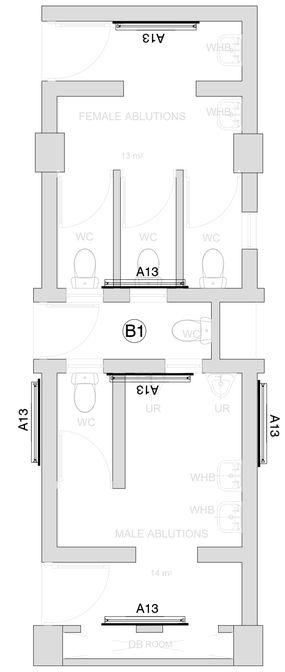
SCALE 1:50



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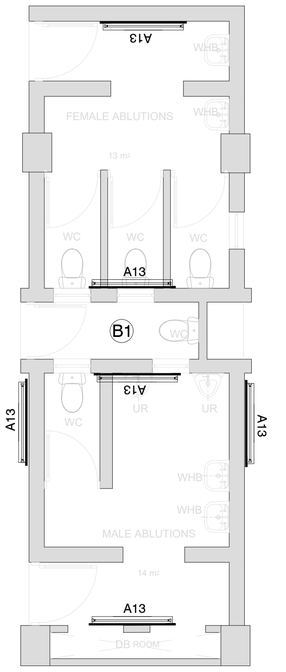
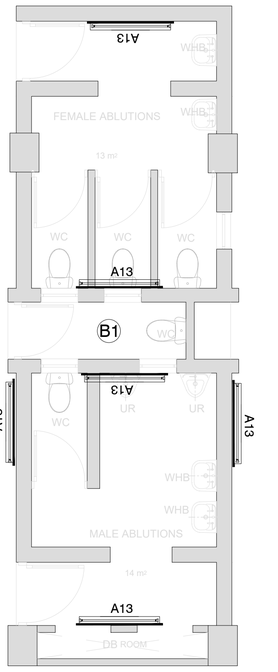
SCALE 1:50



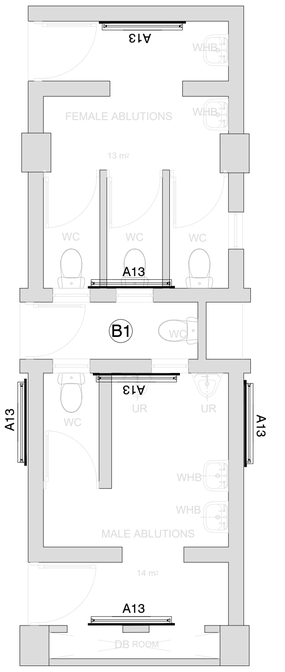
ABLUTIONS 10

SCALE 1:50



ABLUTIONS 11

SCALE 1:50



ABLUTIONS 12

SCALE 1:50

GENERAL NOTES:

1. ELECTRICAL INSTALLATION TO COMPLY WITH SANS 10142-1 AS AMENDED.
2. CONTRACTORS TO USE EXISTING CIRCUITING. CONTRACTORS TO RETAIN EXISTING CABLES AND CONDUCTORS WHERE APPLICABLE. NEW CABLE AND CONDUCTOR SHALL BE INSTALLED UPON ENGINEERS APPROVAL.
3. CONTRACTORS TO REPLACE LIGHT FITTINGS AS PER SPECIFICATION.
4. CONTRACTOR TO PROVIDE UNIVERSAL ELECTRICAL LOCK ON ALL KIOSK AND DB'S.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1.	ISSUED FOR TENDER	LM	TM	MM	23-08-2022

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MAIN CONSULTANT

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ARCHITECT		
ELEC. ENG.	T. MBATHA	
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CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

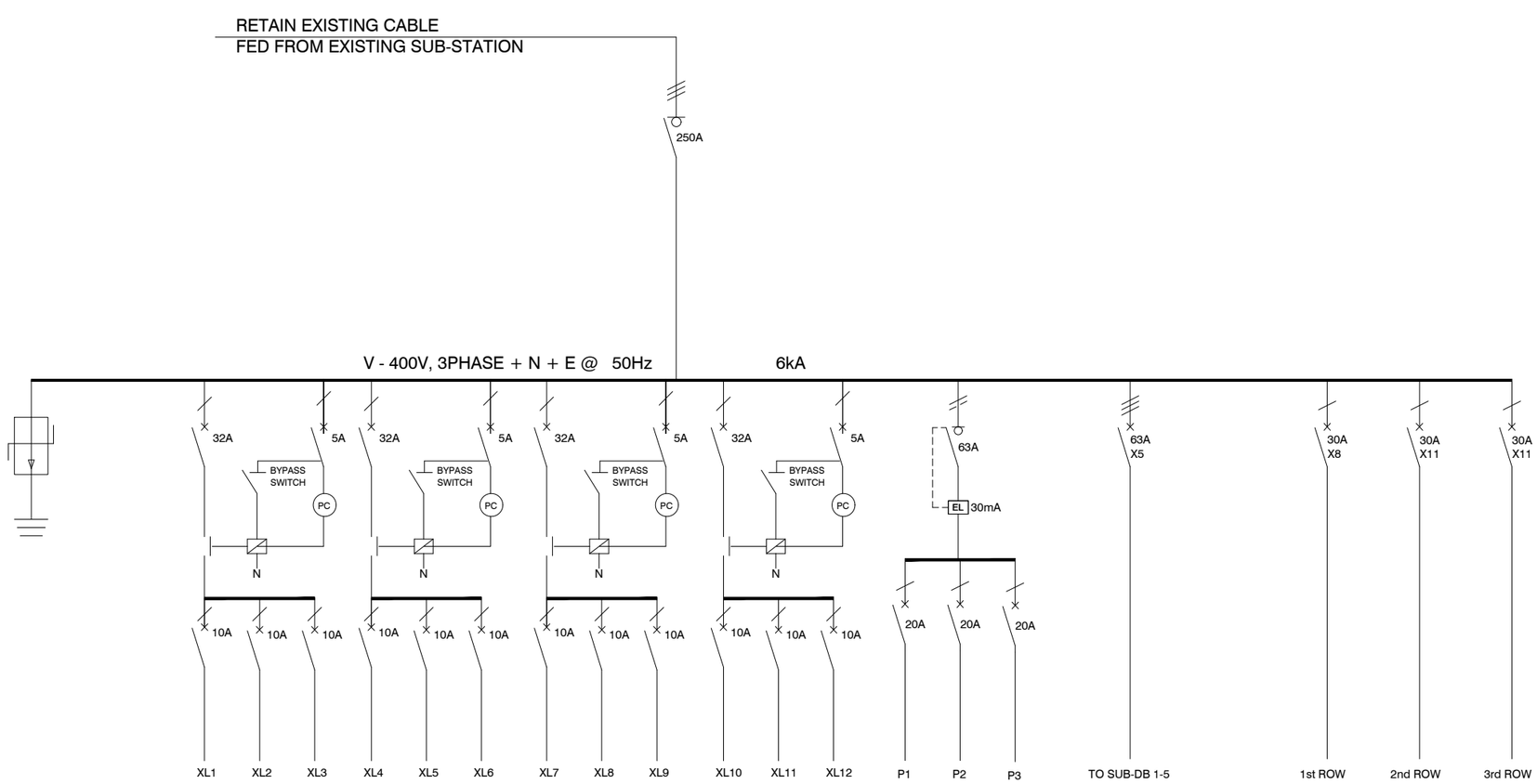
NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

EST. 2015
LODEMANN

UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
ABLUTIONS 7 TO 12 LIGHTING LAYOUT

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1:50	22-08-22	1040-002-01-3002		1	A1	ISSUED FOR TENDER



EXTERNAL LIGHTS (XL)
230V
50Hz
2x 2,5mm² CONDUCTOR + 2,5mm EARTH

EXTERNAL LIGHTS (XL)
230V
50Hz
2x 2,5mm² CONDUCTOR + 2,5mm EARTH

EXTERNAL LIGHTS (XL)
230V
50Hz
2x 2,5mm² CONDUCTOR + 2,5mm EARTH

EXTERNAL LIGHTS (XL)
230V
50Hz
2x 2,5mm² CONDUCTOR + 2,5mm EARTH

SWITCHED SOCKETS OUTLET (P- PLUGS CIRCUITS)
230V
50Hz
2x 4,0mm² CONDUCTOR + 2,5mm EARTH

TO SUB-DB 1-5
400V
50Hz
EXISTING CABLE

LEGEND

	3 POLE CIRCUIT BREAKER
	1 POLE CIRCUIT BREAKER
	3 POLE ISOLATOR
	1 POLE ISOLATOR
	EARTHING
	1/ 3 PHASE CONTACTOR
PC	PHOTO ELECTRIC CELL
kWh	kwh- POWER MASTER METER AS PER SPECIFICATION
	SURGE ARRESTER
EL	2 POLE (L+N) EARTH LEAKAGE UNIT

NOTES:

1. CONTRACTORS SHALL RE-INSTALL ALL CIRCUITS TO MATCH EXISTING.

.

ADDITIONAL NOTES
1. THIS DB SHALL COMPLY WITH SANS 1973/61439 AND SHALL BE DESIGNED AND MANUFACTURED BY A SPECIALIST SWITCHBOARD MANUFACTURER.
2. ALL EQUIPMENT SHALL COMPLY TO THE RELEVANT SANS STANDARDS.
3. CASCADING CIRCUIT BREAKERS MUST BE USED.
4. THE ICU OF CIRCUIT BREAKER IS THE SAME AS FOR FEEDING BUSBAR.
5. PROVIDE 20% SPARE SPACE.
6. MATERIAL SHALL BE 2,0mm WHITE 3CR12 PAINTED ORANGE STEEL WITH POWDER COATED EPOXY.
7. NEUTRAL AND EARTH BAR MUST BE EQUAL TO PHASE BAR.
8. NO MIX OF BRANDS.

BOARD INFORMATION	
NAME OF DB	: DB-1
LOCATION	:PLATFORM 9
MOUNTING	: SURFACE MOUNTED
IP CLASS	: 55
CABLE ENTRY	: TOP FEEDERS AND BOTTOM FEEDERS
DOOR REQUIRED	: YES, MAIN BREAKER TO PRO-TRUDE
COLOUR DB PLATE	: ELECTRIC ORANGE

GENERAL NOTES:

1. ELECTRICAL INSTALLATION TO COMPLY WITH SANS 10142-1 AS AMENDED.
2. CONTRACTORS TO USE EXISTING CIRCUITING. CONTRACTORS TO RETAIN EXISTING CABLES AND CONDUCTORS WHERE APPLICABLE. NEW CABLE AND CONDUCTOR SHALL BE INSTALLED UPON ENGINEERS APPROVAL.
3. CONTRACTOR TO PROVIDE UNIVERSAL ELECTRICAL LOCK ON ALL KIOSK AND DB'S.
4. CONTRACTOR TO PROVE EXISTING CABLE AND/ OR EXISTING CIRCUITS

DRAWING NO.	REFERENCE
1040-002-01-3004	DB-1 SUB (UP TO DB-5 SUB) SINGLE LINE DIAGRAM

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1.	ISSUED FOR TENDER	LM	TM	MM	23-08-2022

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MAIN CONSULTANT

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DRAWN	L. MKHIZE	
CHECKED		
ENG. COORD		
ARCHITECT		
ELEC. ENG.	T. MBATHA	
MECH. ENG.		
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INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

EST. 2015
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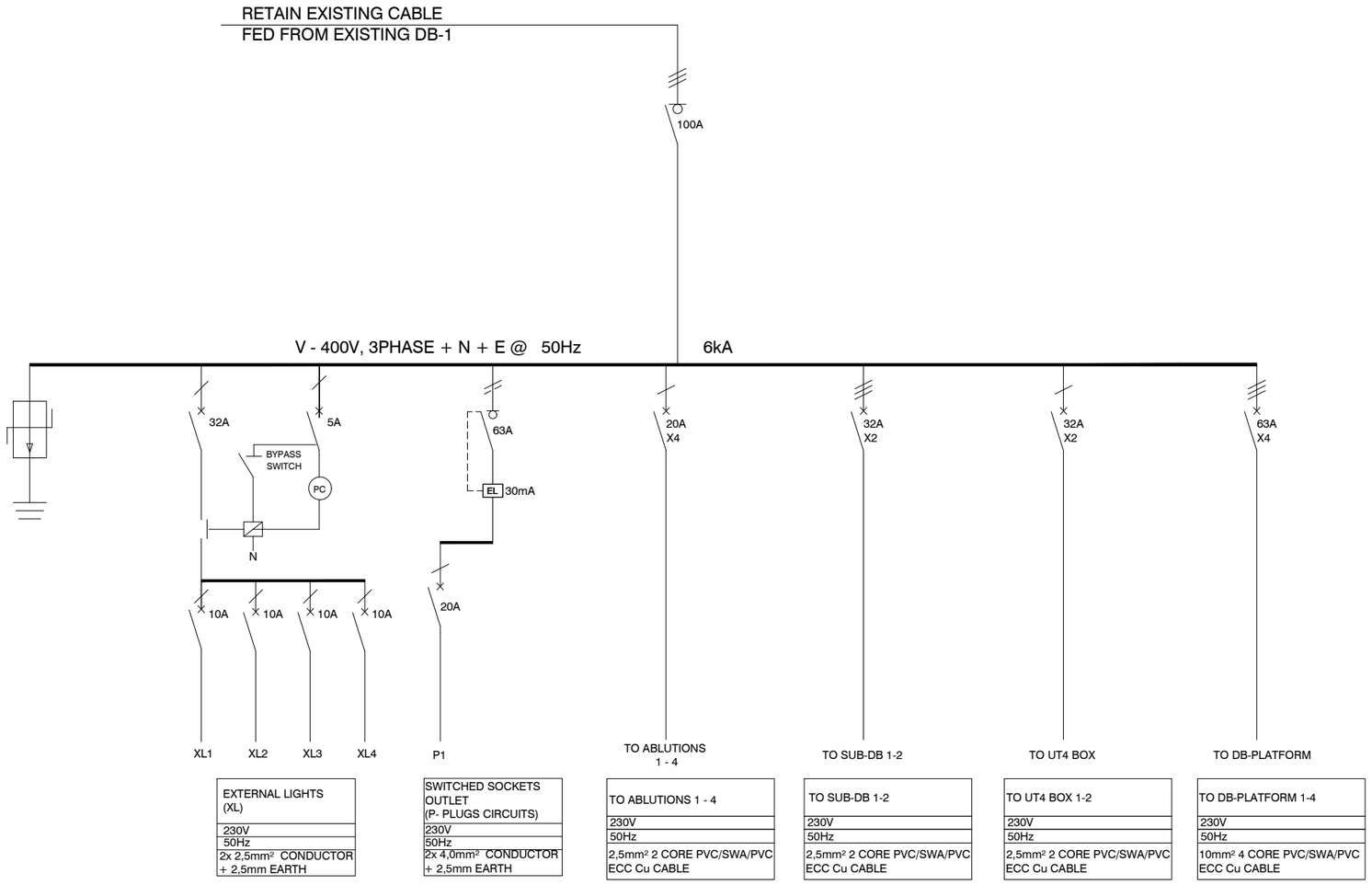
UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
DB-1 SINGLE LINE DIAGRAM

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
N.T.S	22-08-22	1040-002-01-3003		1	A3	ISSUED FOR TENDER



EXTERNAL LIGHTS (XL)
230V
50Hz
2x 2,5mm² CONDUCTOR + 2,5mm EARTH

SWITCHED SOCKETS OUTLET (P- PLUGS CIRCUITS)
230V
50Hz
2x 4,0mm² CONDUCTOR + 2,5mm EARTH

TO ABLUTIONS 1 - 4
230V
50Hz
2,5mm² 2 CORE PVC/SWA/PVC ECC Cu CABLE

TO SUB-DB 1-2
230V
50Hz
2,5mm² 2 CORE PVC/SWA/PVC ECC Cu CABLE

TO UT4 BOX 1-2
230V
50Hz
2,5mm² 2 CORE PVC/SWA/PVC ECC Cu CABLE

TO DB-PLATFORM 1-4
230V
50Hz
10mm² 4 CORE PVC/SWA/PVC ECC Cu CABLE

LEGEND

	3 POLE CIRCUIT BREAKER
	1 POLE CIRCUIT BREAKER
	3 POLE ISOLATOR
	1 POLE ISOLATOR
	EARTHING
	1/ 3 PHASE CONTACTOR
PC	PHOTO ELECTRIC CELL
kWh	kwh- POWER MASTER METER AS PER SPECIFICATION
	SURGE ARRESTER
EL	2 POLE (L+N) EARTH LEAKAGE UNIT

NOTES:

1. CONTRACTORS SHALL RE-INSTALL ALL CIRCUITS TO MATCH EXISTING.

.

ADDITIONAL NOTES
1. THIS DB SHALL COMPLY WITH SANS 1973/61439 AND SHALL BE DESIGNED AND MANUFACTURED BY A SPECIALIST SWITCHBOARD MANUFACTURER.
2. ALL EQUIPMENT SHALL COMPLY TO THE RELEVANT SANS STANDARDS.
3. CASCADING CIRCUIT BREAKERS MUST BE USED.
4. PROVIDE 20% SPARE SPACE.
5. MATERIAL SHALL BE FIBRE GLASS COLOUR BEIGE
6. NEUTRAL AND EARTH BAR MUST BE EQUAL TO PHASE BAR.
7. NO MIX OF BRANDS.
8. KIOSK MUST HAVE A DOUBLE SWITCH SOCKET OUTLET
9. MAIN BREAKER MUST BE LOCKABLE WITH 3 LOCK HOLES

BOARD INFORMATION	
NAME OF DB	: DB-SUB 1 (UP TO DB-SUB 5)
LOCATION	: PLATFORM
MOUNTING	: FLOOR STANDING
IP CLASS	: 65
CABLE ENTRY	: BOTTOM FEEDERS
DOOR REQUIRED	: YES

GENERAL NOTES:

1. ELECTRICAL INSTALLATION TO COMPLY WITH SANS 10142-1 AS AMENDED.
2. CONTRACTORS TO USE EXISTING CIRCUITING. CONTRACTORS TO RETAIN EXISTING CABLES AND CONDUCTORS WHERE APPLICABLE. NEW CABLE AND CONDUCTOR SHALL BE INSTALLED UPON ENGINEERS APPROVAL.
3. CONTRACTOR TO PROVIDE UNIVERSAL ELECTRICAL LOCK ON ALL KIOSK AND DB'S.
4. CONTRACTOR TO PROVE EXISTING CABLE AND/ OR EXISTING CIRCUITS

DRAWING NO.	REFERENCE
1040-002-01-3003	DB-1 SINGLE LINE DIAGRAM

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
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PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
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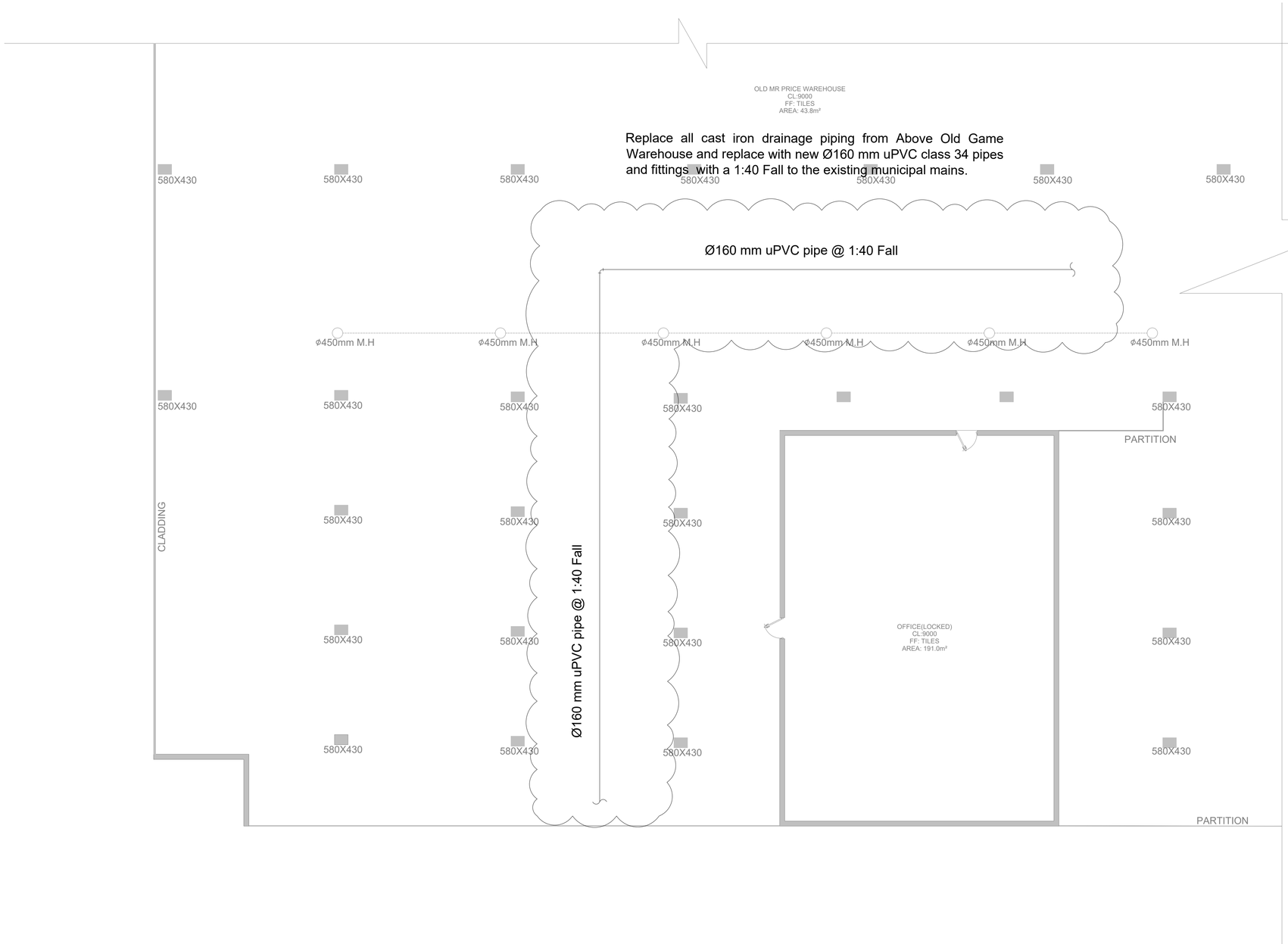
REG. NUMBER	D/2404/2017	

EST. 2015
LODEMANN

UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
DB-SUB 1 (TO DB-SUB 5)
SINGLE LINE DIAGRAM

SCALE :	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
N.T.S	22-08-22	1040-002-01-3004		1	A3	ISSUED FOR TENDER



LEGEND	
	COLD WATER SYSTEM LINE
	WASTE WATER SYSTEM LINE
	VERTICAL DROPPER PIPE
	VERTICAL RISER
	45-90 DEG TEE JOINT
	PIPE REDUCER
	45-90 DEG ELBOW
r.e	RODDING EYE
i.e	INSPECTION EYE

WET SERVICES NOTES

THE ITEMS LISTED BELOW AND IN THE NOTES FORM PART OF THE SPECIFICATION FOR THE WASTE WATER DRAINAGE INSTALLATION.

UNLESS STATED OTHERWISE ON A THE DRAWING OR THE TECHNICAL SPECIFICATION REPORT THE FOLLOWING SHALL APPLY:

GREY WASTE NOTES

1. ALL GREY WATER PIPING AND FITTINGS SHALL BE 50mm Ø CLASS 34 PVC PIPING CONSTRUCTED TO SANS 791.
2. ALL GREY WATER PIPING ARE TO MAINTAIN A FALL OF 1:80.

BLACK WATER NOTES

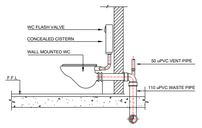
1. ALL BLACK WATER PIPING AND FITTINGS SHALL BE 50mm - 110 Ø CLASS 34 PVC PIPING CONSTRUCTED TO SANS 791.
2. ALL BLACK WATER PIPING ARE TO MAINTAIN A FALL OF 1:40.

WATER RETICULATION NOTES

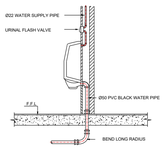
1. WATER CONNECTIONS TO FITTINGS:-15mme TO WHB, WC AND SHOWERS.
2. COLD & HOT WATER PIPING TO BE PEX (PLASTIC PIPING). SUPPLEMENTARY WET/AUXILIARY VENTING TO BE INSTALLED WHERE REQUIRED BY CODES REFERRED TO IN GENERAL NOTES ITEM 1.

DRAINAGE SYSTEM PRESSURE TESTING

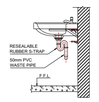
1. ALL WASTE WATER PIPING SHALL BE HYDRAULICALLY TESTED IN THE PRESENCE OF THE ENGINEER AND THE RESULTS RECORDED.
2. PIPING SHALL BE TESTED IN SECTIONS AS THE WORK PROGRESSES, BEFORE BEING COVERED IN TRENCHES OR FLOORS. THE COMPLETED PIPELINE SHALL ALSO BE TESTED JUST PRIOR TO TAKEOVER OF THAT LINE BY THE CLIENT.
3. FAILURE TO COMPLY WITH THE ABOVE WILL RESULT IN THE CONTRACTOR BEING REQUIRED TO EXPOSE ALL THE PIPING IN ORDER FOR THE PRESSURE TESTS TO BE CARRIED OUT HE WILL ALSO BE RESPONSIBLE FOR ALL COSTS INCURRED BY OTHERS IN UNCOVERING AND MAKING GOOD THE WORKS DUE TO THE CONTRACTORS FAILURE TO COMPLY WITH THIS REQUIREMENT.



TYPICAL WC INSTALLATION DETAIL



TYPICAL WALL HUNG URINAL INSTALLATION DETAIL



TYPICAL HAND WASH BASIN INSTALLATION DETAIL

GENERAL NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS.
2. ALL DIMENSIONS AND HEIGHTS ARE TO BE CHECK ON SITE BEFORE WORK PUT ON HAND.
3. REPORT DISCREPANCIES TO ARCHITECT OR ENGINEER.
4. THIS DRAWING MUST NOT BE USED TO SCALE OFF. USE ONLY WRITTEN DIMENSIONS. CONTACT THE ENGINEER OR ARCHITECT WHERE CLARITY IS SOUGHT.
5. FOR SETTING OUT DATA, SETTING OUT POINTS AND DATUM LEVELS REFER TO SURVEY INFORMATION AND ARCHITECT'S DRAWINGS.
6. STRUCTURAL WORKS IS TO BE CARRIED OUT IN ACCORDANCE WITH THE PROJECT SPECIFICATION AND THE RELEVANT S.A.N.S SPECIFICATIONS.
7. CONSULT RELEVANT ARCHITECT'S, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS AND DETAILS AS RELEVANT FOR DRAINAGE, STORMWATER OUTLET, RWDPS AND HOLES AND SLEEVES FOR THESE SERVICES. NO HOLES ARE TO BE CORED WITHOUT ENGINEERS WRITTEN APPROVAL.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1	ISSUED FOR TENDER	SIM	RC	MM	22-08-2022

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MAIN CONSULTANT

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CHECKED		
ENG. COORD		
ARCHITECT		
ELEC. ENG.		
MECH. ENG.	R CHABILAL	22-08-22
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

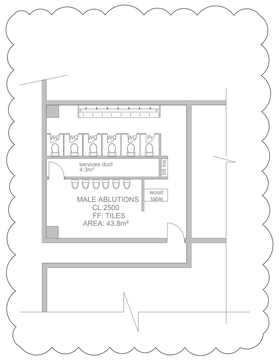
EST. 2015
LODEMANN

UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
ABOVE OLD GAME WAREHOUSE - WET SERVICES

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1 : 200	22-08-22	1040-002-01-4000		1	A1	ISSUED FOR TENDER

Replace all defective piping and fittings with new SABS approved like for like or equivalent uPVC fittings and piping.

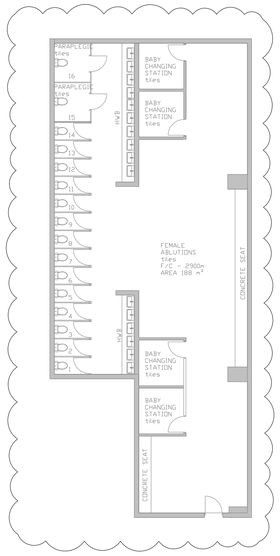


GROUND FLOOR: MALE ABLUTION BLOCK

SCALE: 1:100

TOTAL AREA:43.8 m²

Replace all defective piping and fittings with new SABS approved like for like or equivalent uPVC fittings and piping.

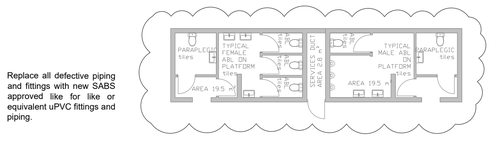


GROUND FLOOR: PUBLIC TOILETS

SCALE: 1:100

TOTAL AREA:1 789.00m²

Replace all defective piping and fittings with new SABS approved like for like or equivalent uPVC fittings and piping.

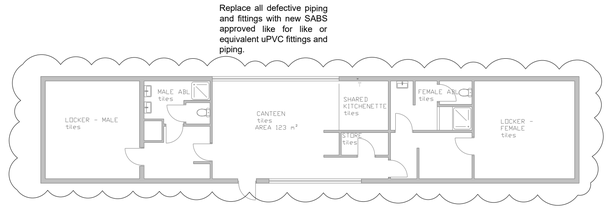


GROUND FLOOR: ABLUTIONS

SCALE: 1:100

TOTAL AREA:41.8 m²

Replace all defective piping and fittings with new SABS approved like for like or equivalent uPVC fittings and piping.



GROUND FLOOR: SECURITY STAFF ROOM

SCALE: 1:100

TOTAL AREA:123.1m²

LEGEND

	COLD WATER SYSTEM LINE
	WASTE WATER SYSTEM LINE
	VERTICAL DROPPER PIPE
	VERTICAL RISER
	45-90 DEG TEE JOINT
	PIPE REDUCER
	45-90 DEG ELBOW
r.e	RODDING EYE
i.e	INSPECTION EYE

WET SERVICES NOTES

THE ITEMS LISTED BELOW AND IN THE NOTES FORM PART OF THE SPECIFICATION FOR THE WASTE WATER DRAINAGE INSTALLATION.

UNLESS STATED OTHERWISE ON A THE DRAWING OR THE TECHNICAL SPECIFICATION REPORT THE FOLLOWING SHALL APPLY:

GREY WASTE NOTES

1. ALL GREY WATER PIPING AND FITTINGS SHALL BE 50mm Ø CLASS 34 PVC PIPING CONSTRUCTED TO SANS 791.
2. ALL GREY WATER PIPING ARE TO MAINTAIN A FALL OF 1:80.

BLACK WATER NOTES

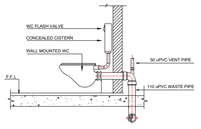
1. ALL BLACK WATER PIPING AND FITTINGS SHALL BE 50mm - 110 Ø CLASS 34 PVC PIPING CONSTRUCTED TO SANS 791.
2. ALL BLACK WATER PIPING ARE TO MAINTAIN A FALL OF 1:40.

WATER RETICULATION NOTES

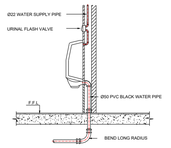
1. WATER CONNECTIONS TO FITTINGS:-15mme TO WHB, WC AND SHOWERS.
2. COLD & HOT WATER PIPING TO BE PEX (PLASTIC PIPING). SUPPLEMENTARY WET/AUXILIARY VENTING TO BE INSTALLED WHERE REQUIRED BY CODES REFERRED TO IN GENERAL NOTES ITEM 1.

DRAINAGE SYSTEM PRESSURE TESTING

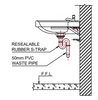
1. ALL WASTE WATER PIPING SHALL BE HYDRAULICALLY TESTED IN THE PRESENCE OF THE ENGINEER AND THE RESULTS RECORDED.
2. PIPING SHALL BE TESTED IN SECTIONS AS THE WORK PROGRESSES, BEFORE BEING COVERED IN TRENCHES OR FLOORS. THE COMPLETED PIPELINE SHALL ALSO BE TESTED JUST PRIOR TO TAKEOVER OF THAT LINE BY THE CLIENT.
3. FAILURE TO COMPLY WITH THE ABOVE WILL RESULT IN THE CONTRACTOR BEING REQUIRED TO EXPOSE ALL THE PIPING IN ORDER FOR THE PRESSURE TESTS TO BE CARRIED OUT HE WILL ALSO BE RESPONSIBLE FOR ALL COSTS INCURRED BY OTHERS IN UNCOVERING AND MAKING GOOD THE WORKS DUE TO THE CONTRACTORS FAILURE TO COMPLY WITH THIS REQUIREMENT.



TYPICAL WC INSTALLATION DETAIL



TYPICAL WALL HUNG URINAL INSTALLATION DETAIL



TYPICAL HAND WASH BASIN INSTALLATION DETAIL

GENERAL NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS.
2. ALL DIMENSIONS AND HEIGHTS ARE TO BE CHECK ON SITE BEFORE WORK PUT ON HAND.
3. REPORT DISCREPANCIES TO ARCHITECT OR ENGINEER.
4. THIS DRAWING MUST NOT BE USED TO SCALE OFF. USE ONLY WRITTEN DIMENSIONS. CONTACT THE ENGINEER OR ARCHITECT WHERE CLARITY IS SOUGHT.
5. FOR SETTING OUT DATA, SETTING OUT POINTS AND DATUM LEVELS REFER TO SURVEY INFORMATION AND ARCHITECT'S DRAWINGS.
6. STRUCTURAL WORKS IS TO BE CARRIED OUT IN ACCORDANCE WITH THE PROJECT SPECIFICATION AND THE RELEVANT S.A.N.S SPECIFICATIONS.
7. CONSULT RELEVANT ARCHITECT'S, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS AND DETAILS AS RELEVANT FOR DRAINAGE, STORMWATER OUTLET, RWDPS AND HOLES AND SLEEVES FOR THESE SERVICES. NO HOLES ARE TO BE CORED WITHOUT ENGINEERS WRITTEN APPROVAL.

DRAWING NO.	REFERENCE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHKD	APPD	DATE
1	ISSUED FOR TENDER	SIM	RC	MM	22-08-2022

REVISIONS / ISSUE AUTHORIZATION

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CLIENT LOGO

prasa
PASSENGER RAIL AGENCY OF SOUTH AFRICA

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	SI MATHUNJWA	22-08-22
CHECKED		
ENG. COORD		
ARCHITECT		
ELEC. ENG.		
MECH. ENG.	R CHABILAL	22-08-22
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

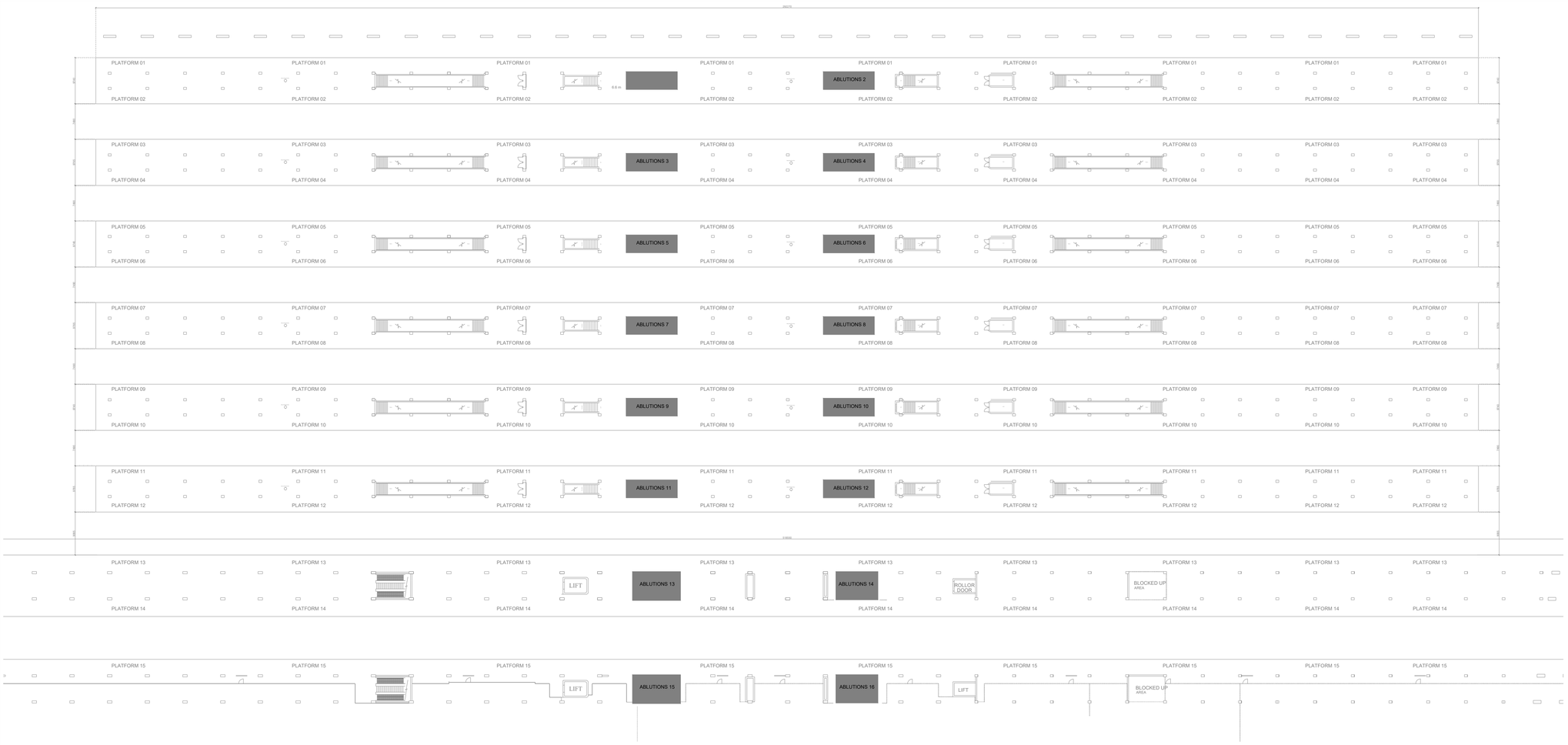
NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

EST. 2015
LODEMANN

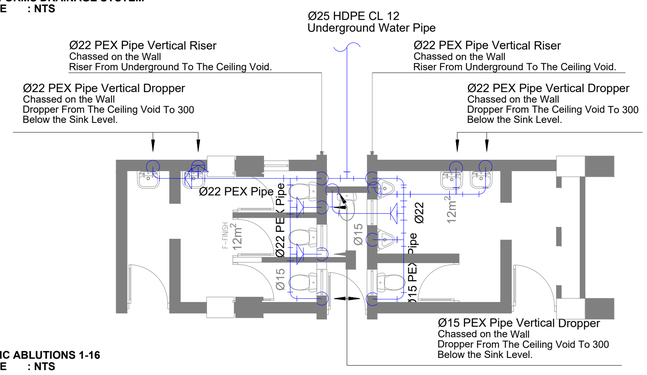
UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
ABLUTIONS - WET SERVICES

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1 : 200	22-08-22	1040-002-01-4001		1	A1	ISSUED FOR TENDER

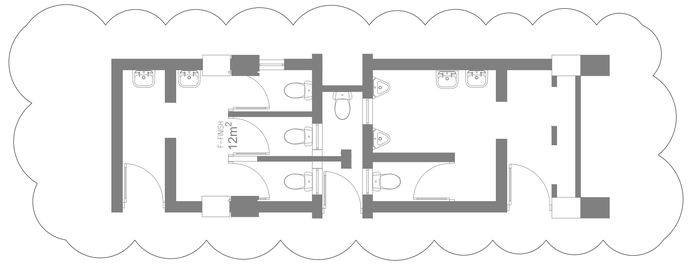


PLATFORMS DRAINAGE SYSTEM
SCALE : NTS



PUBLIC ABLUTIONS 1-16
SCALE : NTS

Replace all defective drainage piping and fittings with new SABS approved uPVC equivalent fittings and piping.



PUBLIC ABLUTIONS 1-16
SCALE : NTS

LEGEND

	COLD WATER SYSTEM LINE
	WASTE WATER SYSTEM LINE
	VERTICAL DROPPER PIPE
	VERTICAL RISER
	45-90 DEG TEE JOINT
	PIPE REDUCER
	45-90 DEG ELBOW
r.e	RODDING EYE
i.e	INSPECTION EYE

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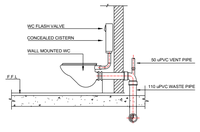
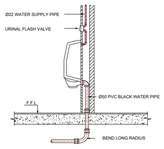
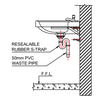


TYPICAL WC INSTALLATION DETAIL



TYPICAL WALL HUNG URINAL INSTALLATION DETAIL



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1	ISSUED FOR TENDER	SIM	RC	MM	22-08-2022

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CLIENT LOGO

CLIENT

TITLE	NAME	DATE

MAIN CONSULTANT

TITLE	NAME	DATE
DRAWN	SI MATHUNJWA	22-08-22
CHECKED		
ENG. COORD		
ARCHITECT		
ELEC. ENG.		
MECH. ENG.	R CHABILAL	22-08-22
STRUCT. ENG.		
CIVIL. ENG.		
INSTRU. ENG.		
PROC. ENG.		

APPROVED BY

NAME	M. MADIBA	DATE
SIGNATURE		
REG. NUMBER	D/2404/2017	

EST. 2015
LODEMANN

UMLAZI SUB CORRIDOR 1 - STATION IMPROVEMENT PROGRAMME

DURBAN STATION
LOWER GROUND FLOOR - WET SERVICES

SCALE	DATE	Drawing Number	CLIENT Drawing Number	Rev.	Sheet size	Status.
1 : 200	22-08-22	1040-002-01-4002		1	A1	ISSUED FOR TENDER

Item No		Quantity	Rate	Amount

SECTION NO. 1

BILL NO. 1

PRELIMINARIES

BUILDING AGREEMENT AND PRELIMINARIES

The **JBCC** Principal Building Agreement (May 2018 Edition 6.2) prepared by the Joint Building Contracts Committee shall be the applicable building agreement, amended as hereinafter described

The **JBCC** Principal Building Agreement **contract data** form an integral part of this **agreement**

The Preliminaries revision 1 (February 2016) published by the Association of South African Quantity Surveyors for use with the **JBCC** Principal Building Agreement Edition 6.2 shall be deemed to be incorporated in these **bills of quantities**, amended as hereinafter described

The **contractor** is deemed to have referred to the abovementioned documents for the full intent and meaning of each clause

The clauses in the abovementioned documents are hereinafter referred to by clause number and heading only

Where any item is not relevant to this **agreement** such item is marked N/A signifying "not applicable"

PREAMBLES FOR TRADES

The Model Preambles for Trades 2008 published by the Association of South African Quantity Surveyors is designed to support and extend the abbreviated descriptions utilised in these bills of quantities by inter alia referring to SANS construction standards.

Note that the text of the Standard System of Measuring Building Work (seventh edition) and that of the Standard Method of Measuring Building Work for Africa 2015 (first edition) is the same

Carried Forward R

Brought Forward		R	
The Model Preambles for Trades 2008 as published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in these **bills of quantities** and no claims arising from brevity of description of items fully described in the said Model Preambles will be entertained			
Supplementary preambles and/or specifications are incorporated in these **bills of quantities** to satisfy the requirements of this project. Such supplementary preambles and/or specifications shall take precedence over the provisions of the Model Preambles			
The **contractor's** prices for all items throughout these **bills of quantities** shall take account of and include for all of the obligations, requirements and specifications given in the Model Preambles and in any supplementary preambles and/or specifications			
Carried Forward		R	

Brought Forward R

NOTES TO TENDERERS

Minimum Threshold for Local Content

Section No.2 - Builder's Work

BILL	Item	Description	Threshold
Steel doors (transformer doors) and frames			
		PRESSED STEEL TRANSFORMER ROOM DOORS AND FRAMES	
		Pressed Transformer doors	
7	1	Door size 813 x 2032mm high with rebated frame suitable for 230mm wall	100%
7	2	Door size 1595x 2032mm high with rebated frame suitable for 230mm wall	100%
		STEEL ROLLER SHUTTERS ETC	
7	4	Electrically operated slatted roller shutter for 2110 x 2100mm high opening	100%
		PRESSED STEEL DOOR FRAMES	
7	3	Single door size frame 813 x 2032 mm high	100%
Metal sheeting			
_	_	**ROOF SHEETING**	_
3	1	Roof sheeting pitch no exceeding 18 degrees	100%
Gutters, downpipes and lauders			
		RAINWATER GOODS	
9	1	PVC gutters with 20mm overlapping joints sealed with and including bitumen impregnated foam plastic joint sealing strip and riveted at 20mm centres	100%

Carried Forward R

Section No. 1
Bill No. 1
Preliminaries

Brought Forward R

9	2	80mm x 1,2mm PVC down pipe fixed to brick wall including brackets	100%
9	3	Extra over eaves gutter for offset	100%
9	4	Extra over eaves gutter for outlet	100%
9	5	Extra over eaves gutter for stopped end	100%
9	6	Extra over for shoe	100%

Section No.2 - Builder's Work (Wet Services)

BILL	Item	Description	Threshold
		SANITARY PLUMBING	
9	13-15	Class 34 uPVC Pipe	100%
9	16-26	Class 34 uPVC FITTINGS	100%
9	27-29	Pipe Hangers - Anchor, Threaded Rod & Hilti Hanger	100%
		WATER SUPPLY - COLD WATER RETICULATION	
		Replace defective pipe sections and fittings	
9	30-32	PEX Piping	100%
9	33-41	Extra over PEX pipes for fittings	100%
9	42-45	Plastic Pipe Compression Fittings And Valves	100%
9	46-48	Pipe Hangers - Anchor, Threaded Rod & Hanger	100%
9	49	Heavy brown paper loosely wrapped around pipe as sheath for expansion	100%

Section No.3 - Electrical Installation

BILL	Item	Description	Threshold
		CABLES AND CONDUCTORS	
1	5	2,5mm conductors (mixed colours - live, neutral and earth).	90%

Carried Forward R

Section No. 1
Bill No. 1
Preliminaries

Brought Forward R

1	6 -7	2.5 mm² 2c 600/1000V PVC/SWA/PVC ECC Cu Cable. 2.5 mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	90%
1	23	240 mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	90%

TRUNKING, POWER SKIRTING & CONDUITS

1	9	P9000 trunking hot dipped galvanised inclusive of all items required to install in accordance with manufacturers specification.	100%
1	10 - 12	25mm PVC Conduit including all necessary accessories. 25mm steel Conduit including all necessary accessories. 32mm steel Conduit including all necessary accessories.	100%

Tenderers are to inspect the drawings issued with these Bills of Quantities and to satisfy themselves with the nature and the requirements of the Contract works. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.

Tenderers are to read the descriptions, which are intended as a means of identifying various facets of the work, in conjunction with the drawings. Tenderers shall allow for all costs in connection with the various items taking full cognisance of both the drawings and the Bills of Quantities.

Tenderers shall notify the Quantity Surveyor in writing of any discrepancies encountered upon which clarification will be given by the Quantity Surveyor in writing to the Tenderer. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard

Carried Forward R

Brought Forward		R	

Tenderers are to note that setting out of the works will be the complete responsibility of the Tenderer and they should therefore acquaint themselves with the site boundaries, site co-ordinates, datum levels etc. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.

Tenderers are to note that all items with ZERO quantities are Rate Only items and should be priced as such.

Tenderers are to note that there might be specified suppliers to be used for certain trades as per the annexure to this tender document. Tenderers should familiarise themselves with the suppliers on the list and ensure to allow for accordingly. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.

Tenderers are to fully acquaint themselves with the construction period and shall allow for any night shift if required. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.

STRUCTURE OF THIS PRELIMINARIES BILL

Section A : A recital of the headings of the individual clauses of the aforementioned **JBCC Principal Building Agreement**

Section B : A recital of the headings of the individual clauses of the aforementioned Preliminaries document

Section C : Any special clauses to meet the particular circumstances of the project

PRICING OF PRELIMINARIES

Should the **contractor** select Option A in the **contract data** for the adjustment of **preliminaries**, the amounts entered against the relevant items in these **preliminaries** are to be divided into one or more of the three categories provided namely fixed (F), value related (V) and time related (T)

Carried Forward		R	

	Brought Forward		R	
	SECTION A: PRINCIPAL BUILDING AGREEMENT			
	Interpretation (A1-A7)			
1	Clause 1.0 - Definitions and interpretation F:..... V:..... T:.....	Item		
2	Clause 2.0 - Law, regulations and notices F:..... V:..... T:.....	Item		
3	Clause 3.0 - Offer and acceptance F:..... V:..... T:.....	Item		
4	Clause 4.0 - Assignment and cession F:..... V:..... T:.....	Item		
5	Clause 5.0 - **Contract documents** F:..... V:..... T:.....	Item		
6	Clause 6.0 - **Employer's agents** 1. **PRINCIPAL AGENT** LODEMANN HOLDINGS Suite 301 Wheeler House 112-116 Mathews Meyiwa Rd (Stamford Hill) Morningside Durban F:..... V:..... T:.....	Item		
	Carried Forward		R	

	Brought Forward		R	
7	Clause 7.0 - Design responsibility			
	F:..... V:..... T:.....	Item		
	Insurance and security (A8-A11)			
8	Clause 8.0 - **Works** risk			
	F:..... V:..... T:.....	Item		
9	Clause 9.0 - Indemnities			
	F:..... V:..... T:.....	Item		
10	Clause 10.0 - Insurances			
	F:..... V:..... T:.....	Item		
11	Clause 11.0 - **Security**			
	F:..... V:..... T:.....	Item		
	Execution (A12 - A17)			
12	Clause 12.0 - Duties of the **parties**			
	F:..... V:..... T:.....	Item		
13	Clause 13.0 - Setting out			
	F:..... V:..... T:.....	Item		
14	Clause 14.0 - Nominated **subcontractors**			
	F:..... V:..... T:.....	Item		
15	Clause 15.0 - Selected **subcontractors**			
	Carried Forward		R	

Section No. 1
Bill No. 1
Preliminaries

	Brought Forward		R	
	F:..... V:..... T:.....	Item		
16	Clause 16.0 - **Direct contractors** **Attendance on direct contractors** In respect of **direct contractors** the **contractor** shall: F:..... V:..... T:.....	Item		
17	Clause 17.0 - **Contract instructions** **Site instructions** Instructions issued on **site** are to be recorded in a site instruction book which is to be supplied and maintained on **site** by the **contractor** F:..... V:..... T:.....	Item		
	<u>Completion (A18 - A24)</u>			
18	Clause 18.0 - Interim completion F:..... V:..... T:.....	Item		
19	Clause 19.0 - **Practical completion** F:..... V:..... T:.....	Item		
20	Clause 20.0 - Sectional completion F:..... V:..... T:.....	Item		
21	Clause 21.0 - **Defects** liability period and **final completion** F:..... V:..... T:.....	Item		
	Carried Forward		R	

	Brought Forward		R	
22	Clause 22.0 - **Latent defects** liability period F:..... V:..... T:.....	Item		
23	Clause 23.0 - Revision of date for **practical completion** **Substitution of materials and goods** The removal or substitution of any **materials and goods** which do not conform to the specification or the **contract drawings** shall not constitute grounds for the extension of the **construction period** nor for the adjustment of the **contract value** [17.1.8, 23.1 & 2] F:..... V:..... T:.....	Item		
24	Clause 24.0 - **Penalty** for late or non-completion F:..... V:..... T:.....	Item		
	<u>Payment (A25 - A27)</u>			
25	Clause 25.0 - Payment F:..... V:..... T:.....	Item		
26	Clause 26.0 - Adjustment of the **contract value** and **final account** F:..... V:..... T:.....	Item		
27	Clause 27.0 - Recovery of expense and/or loss F:..... V:..... T:.....	Item		
	<u>Suspension and termination (A28 - A29)</u>			
28	Clause 28.0 - Suspension by the **contractor**			
	Carried Forward		R	

	Brought Forward		R	
	F:..... V:..... T:.....	Item		
29	Clause 29.0 - Termination			
	F:..... V:..... T:.....	Item		
	Dispute resolution (A30)			
30	Clause 30.0 - Dispute resolution			
	F:..... V:..... T:.....	Item		
	The required information of the **parties** and the amount of the **contract sum** shall be inserted in the **agreement** for signature of the **agreement** by the **parties**			
	F:..... V:..... T:.....	Item		
	F:..... V:..... T:.....	Item		
	SECTION B: PRELIMINARIES			
	Interpretation (B1)			
31	Clause 1.1 - Definitions			
	F:..... V:..... T:.....	Item		
32	Clause 1.2 - Interpretation			
	F:..... V:..... T:.....	Item		
	Documents (B2)			
33	Clause 2.1 - Checking of documents			
	F:..... V:..... T:.....	Item		
34	Clause 2.2 - Provisional **bills of quantities**			
	Carried Forward		R	

	Brought Forward		R	
	F:..... V:..... T:.....	Item		
35	Clause 2.3 - Availability of **construction information** **Budgetary allowances and provisional sums** The **budgetary allowances** and/or **provisional sums** allocated for subsequent trades included in this **agreement** will be separately procured, based on multiple procurement of **subcontractors** during the **construction period** F:..... V:..... T:.....	Item		
36	Clause 2.4 - Ordering of **materials and goods** F:..... V:..... T:.....	Item		
	Previous work and adjoining properties (B3)			
37	Clause 3.1 - Previous work - dimensional accuracy F:..... V:..... T:.....	Item		
38	Clause 3.2 - Previous work - **defects** F:..... V:..... T:.....	Item		
39	Clause 3.3 - Inspection of adjoining properties F:..... V:..... T:.....	Item		
	The site (B4)			
40	Clause 4.1 - Defined **works** area F:..... V:..... T:.....	Item		
	Carried Forward		R	

	Brought Forward		R	
41	Clause 4.2 - Handover of **site** in stages F:..... V:..... T:.....	Item		
42	Clause 4.3 - Enclosure of the **works** F:..... V:..... T:.....	Item		
43	Clause 4.4 - Geotechnical investigation F:..... V:..... T:.....	Item		
44	Clause 4.5 - Encroachments F:..... V:..... T:.....	Item		
45	Clause 4.6 - Existing premises occupied F:..... V:..... T:.....	Item		
46	Clause 4.7 - Services - known F:..... V:..... T:.....	Item		
47	Clause 4.8 - Protection of trees and/or relevant natural features F:..... V:..... T:.....	Item		
	<u>Management of contract (B5)</u>			
48	Clause 5.1 - Management of the **works** F:..... V:..... T:.....	Item		
49	Clause 5.2 - Progress meetings F:..... V:..... T:.....	Item		
	Carried Forward		R	

Section No. 1
Bill No. 1
Preliminaries

	Brought Forward		R	
50	Clause 5.3 - Technical meetings			
	F:..... V:..... T:.....	Item		
	Samples, shop drawings and manufacturer's instructions (B6)			
51	Clause 6.1 - Samples of materials			
	F:..... V:..... T:.....	Item		
52	Clause 6.2 - Workmanship samples			
	F:..... V:..... T:.....	Item		
53	Clause 6.3 - Shop drawings			
	F:..... V:..... T:.....	Item		
54	Clause 6.4 - Compliance with manufacturer's instructions			
	F:..... V:..... T:.....	Item		
	Deposits and fees (B7)			
55	Clause 7.1 - Deposits and fees			
	F:..... V:..... T:.....	Item		
	Temporary services (B8)			
56	Clause 8.1 - Water			
	F:..... V:..... T:.....	Item		
57	Clause 8.2 - Electricity			
	F:..... V:..... T:.....	Item		
	Carried Forward		R	

Section No. 1
Bill No. 1
Preliminaries

	Brought Forward		R	
58	Clause 8.3 - Ablution and welfare facilities F:..... V:..... T:.....	Item		
59	Clause 8.4 - Communication facilities F:..... V:..... T:.....	Item		
	Prime cost amounts (B9)			
60	Clause 9.1 - Responsibility for **prime cost amounts** F:..... V:..... T:.....	Item		
	Attendance on subcontractors (B10)			
61	Clause 10.1 - General attendance F:..... V:..... T:.....	Item		
62	Clause 10.2 - Special attendance F:..... V:..... T:.....	Item		
	General (B11)			
63	Clause 11.1 - Protection of the **works** F:..... V:..... T:.....	Item		
64	Clause 11.2 - Protection/isolation of existing/sectionally occupied **works** F:..... V:..... T:.....	Item		
	Carried Forward		R	

	Brought Forward		R	
65	Clause 11.3 - Security of the **works** F:..... V:..... T:.....	Item		
66	Clause 11.4 - Notice before covering work F:..... V:..... T:.....	Item		
67	Clause 11.5 - Disturbance F:..... V:..... T:.....	Item		
	Clause 11.6 - Environmental disturbance F:..... V:..... T:.....	Item		
68	Clause 11.7 - **Works** cleaning and clearing F:..... V:..... T:.....	Item		
69	Clause 11.8 - Vermin F:..... V:..... T:.....	Item		
70	Clause 11.9 - Overhand work F:..... V:..... T:.....	Item		
71	Clause 11.10 - Tenant installations by **direct contractors** F:..... V:..... T:.....	Item		
72	Clause 11.11 - Advertising F:..... V:..... T:.....	Item		
	Carried Forward		R	

	Brought Forward		R	
	Preliminaries schedule (B12)			
73	**Information for completion of the preliminaries schedule** Information necessary for elections and completion of those clauses contained in the **preliminaries** schedule which are necessary for tender purposes is given hereunder. Where no information is given it shall mean that no specific requirements are expected or that the clause is not relevant to this specific contract 12.1 - Provisional **bills of quantities** [2.2] The quantities are provisional - **Yes** 12.2 - Availability of **construction information** [2.3] **Construction documentation** is complete - **No** 12.3 - Previous work - dimensional accuracy [3.1] 12.4 - Previous work - **defects** [3.2] 12.5 - Inspection of adjoining properties [3.3] 12.6 - Defined **works** area [4.1] 12.7 - Handover of **site** in stages [4.2] 12.8 - Enclosure of the **works** [4.3] 12.9 - Geotechnical investigation [4.4] 12.10 - Existing premises occupied [4.6] 12.11 - Services - known [4.7] 12.12 - Protection of trees and/or relevant natural features [4.8]			
	Carried Forward		R	

Brought Forward		R	
12.13 - Water [8.1]			
Option A (by **contractor) - Yes**			
Option B (by **employer** - free of charge) - **No**			
Option C (by **employer** - metered) - **No**			
12.14 - Electricity [8.2]			
Option A (by **contractor) - Yes**			
Option B (by **employer** - free of charge) - **No**			
Option C (by **employer** - metered) - **No**			
12.15 - Ablution and welfare facilities [8.3]			
Option A (by **contractor) - Yes**			
Option B (by **employer** - free of charge) - **No**			
12.16 - Communication facilities [8.4]			
12.17 - Protection of the **works** [11.1]			
12.18 - Protection/isolation of existing/sectionally occupied **works** [11.2]			
Protection/isolation is required - **Yes**			
12.19 - Disturbance [11.5]			
12.20 - Environmental disturbance [11.6]			
Controlling all forms of pollution			
The **contractor** shall be responsible for and take all precautions in controlling by whatever means necessary all forms of pollution emanating from the **site** during the **construction period** due *inter alia* to noise, artificial light, wind-blown sand, dust, deposits of mud, etc			
The **contractor** is to ensure that all roads which border the **site** and is used by the **contractor** during the execution of the **works** are kept clean and free of any dirt or debris caused by the execution of the **works**			
Carried Forward		R	

	Brought Forward		R	
	F:..... V:..... T:.....	Item		
	SECTION C: SPECIFIC PRELIMINARIES			
	Section C **Section C** contains specific preliminary items which apply to this contract except where N/A (Not Applicable) appears against an item The warranty will not be enforced if the work is damaged by **defects** in the execution of the **works**, in which case the responsibility for replacement shall rest entirely with the **contractor** F:..... V:..... T:.....	Item		
74	Overtime Should overtime be required to be worked for any reason whatsoever, the cost of such overtime is to be borne by the **contractor** unless the **principal agent** has specifically authorised, prior to execution thereof, that costs for such overtime are to be borne by the **employer** F:..... V:..... T:.....	Item		
75	Co-operation of the **contractor** for cost management It is specifically agreed that the **contractor** accepts the obligation of assisting the **principal agent** in implementing proper cost management. The **contractor** will be advised by the **principal agent** of all cost management procedures which will be implemented to ensure that the **contract value** does not exceed the budget F:..... V:..... T:.....	Item		
	Carried Forward		R	

	Brought Forward			R
76	Overloading The **contractor** shall take all necessary steps to ensure that no damage occurs due to overloading of any portion of the **works** or temporary works eg scaffolding, etc. The **contractor** shall submit details of his proposed loading, storage, plant erection, etc to the **principal agent** for approval prior to proceeding with such loading, storing or erecting and shall comply with and pay for the **principal agent's** requirements in connection with the provision of temporary support work, etc. Any damage caused to the **works** by overloading shall be made good by the **contractor** at his sole expense F:..... V:..... T:.....	Item		
77	Propping of floors below The **contractor** is advised that propping of floors below may be required if he wishes to use any areas of completed suspended reinforced concrete slabs for vehicle access, storage of **materials and goods** and location of plant, scaffolding, etc. The location of these areas and any necessary propping shall be approved by the **principal agent** and the cost thereof shall be borne by the **contractor** F:..... V:..... T:.....	Item		
78	Testing of flat roof waterproofing for watertightness Flat roof waterproof areas shall be prepared with small sand dykes around them of a size and enclosing an area approved by the **principal agent**, flooded with water and kept "ponded" for at least forty (40) hours as a test to ensure the watertightness of the waterproofing and before any further construction work is carried out above the waterproofing F:..... V:..... T:.....	Item		
	Carried Forward			R

	Brought Forward			R
	The **contractor** is to submit to the **principal agent** on an annual basis a schedule of spend, split into vendors engaged as **subcontractors** and suppliers indicating their BBBEE rating including proof of the said rating F:..... V:..... T:.....		Item	
79	Advertising rights The **employer** may elect to contract with advertising agencies for the erection of advertising hoardings, banners, wraps or the like for the duration of the contract. The **contractor** shall not prevent such an arrangement and will assist in the facilitation of same. Position and type of advertising structure to be agreed with the **principal agent** so as not to hinder the **contractor** in meeting the obligations under this **agreement** F:..... V:..... T:.....		Item	
80	Confidentiality The **contractor** undertakes to maintain in confidence any and all information regarding this project and shall obtain appropriate similar undertakings from all **subcontractors** and suppliers. Such information shall not be used in any way except in connection with the execution of the **works** No information regarding this project shall be published or disclosed without the prior written consent of the **employer** F:..... V:..... T:.....		Item	
	Carried Forward			R

	Brought Forward		R	
81	Media releases All rights of publication of articles in the media, together with any advertising relating thereto or in any way connected with this project, shall vest with the **employer** The **contractor** together with his **subcontractors** shall not, without the prior written consent of the **employer**, cause any statement or advertisement connected with this project to be printed, screened or aired by the media F:..... V:..... T:.....	Item		
	SUMMARY OF CATEGORIES Category : Fixed R..... Category : Value R..... Category : Time R.....			
	Carried to Final Summary		R	

Section No. 1
Bill No. 1
Preliminaries

Item No		Quantity	Rate	Amount

SECTION NO. 2

BILL NO. 1

DEMOLITIONS AND ALTERATIONS

PREAMBLES

The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill

SUPPLEMENTARY PREAMBLES

Supplementary preamble items described in Bill No. 1, shall equally apply to this Bill.

Existing structures

In taking down and removing existing work, the utmost care shall be taken to prevent any structural or other damage to the remaining portions on the building and the Contractor shall provide all shoring, needling, strutting, etc. to ensure the stability of all structures during the alteration work, Any damage to the structure and/or building as well as the rectification of same will be for the contractor's account

Services

Special care shall be exercised during the progress of the work to ensure that electrical installation, water supply pipes, telephone and other services which may be encountered are not interfered with and notice shall be given to the Representative/Agent if any disconnection or alterations become necessary.

Dust and noise

The Contractor is to take all necessary precautions to the satisfaction of the Representative/Agent to prevent any nuisance from the dust and /or noise whilst carrying out the work.

Carried Forward R

Brought Forward		R	
Disposal of debris The Contractor shall be responsible for the removal from site of all materials, debris and rubbish resulting from the work which removal is deemed to be included in the rates unless otherwise stated. Rates for taking out and removing doors and frames shall include for removing door stops, cabin hooks, etc and making good floor and wall finishes to match existing Making good of finishes shall include making good of the brick and concrete surfaces onto which the new finishes are applied, where necessary **Temporary support to openings through existing walls** Making openings, altering openings in existing walls and removing lintels above existing openings shall be done with the utmost care to prevent any structural damage. All necessary supports, propping, shoring, needling, strutting, turning pieces, etc. to walls openings is deemed to be included in the contractor's rates. **Electrical and Mechanical** Where items include for taking down electrical and mechanical fittings the disconnection and making safe electrically is deemed to be included. **GENERAL NOTES TO TENDERERS** Tenderers are to inspect the drawings issued with these Bills of Quantities and to satisfy themselves with the nature and the requirements of the Contract works. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard. Tenderers are to read the descriptions, which are intended as a means of identifying various facets of the work, in conjunction with the drawings. Tenderers shall allow for all costs in connection with the various items taking full cognisance of both the drawings and the Bills of Quantities.			
Carried Forward		R	

				R	
	Brought Forward				
	Tenderers shall notify the Quantity Surveyor in writing of any discrepancies encountered upon which clarification will be given by the Quantity Surveyor in writing to the Tenderer. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard				
	Tenderers are to note that setting out of the works will be the complete responsibility of the Tenderer and they should therefore acquaint themselves with the site boundaries, site co-ordinates, datum levels etc. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.				
	Tenderers are to note that all items with ZERO quantities are Rate Only items and should be priced as such.				
	Tenderers are to note that there might be specified suppliers to be used for certain trades as per the annexure to this tender document. Tenderers should familiarise themselves with the suppliers on the list and ensure to allow for accordingly. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.				
	Tenderers are to fully acquaint themselves with the construction period and shall allow for any night shift if required. Failure to do so will be the complete responsibility of the Tenderer and no claims whatsoever will be entertained in this regard.				
	REMOVAL OF EXISTING WORK				
	Demolishing and removing asbestos				
1	Removing asbestos gutters and disposing off site on a licensed dump site		Item		155,000.00
	Taking down and removing roofs, floors, panelling, ceilings, partitions, etc				
2	Roof sheeting from structural steel support structure including damaged fascia and barge boards	m2	1,764		
3	Acoustic tile suspended ceilings including suspension grid, hangers, etc	m2	1,078		
	Carried Forward			R	

				R	
	Brought Forward				
	Taking out and removing doors, windows, etc including thresholds, sills, etc and building up openings in brick walls including making good face brickwork on one side and cement plaster on other side (making good paintwork elsewhere)				
4	Timber doors, size 813 x 2032mm	No	58		
5	Timber doors, size 1595 x 2032mm	No	14		
	Taking out/off and removing metalwork				
6	Roller shutter doors, size 2110 x 2100mm	No	17		
	Hacking up/off and removing floor tile and wall finishes, including removing mortar bed or backing from concrete or brickwork and preparing surfaces for new screed, plaster, tile finishes, etc				
7	Ceramic tile and preparing screed to receive new floor coverings	m2	845		
	Taking out and removing piping, sanitary fittings, etc including disconnecting piping from fittings and making good floor and wall finishes (making good tiling and paintwork elsewhere)				
8	Vitreous china wash hand basin	No	36		
9	Vitreous china WC pan with cistern	No	75		
10	Vitreous china wall hung urinal with flush valve	No	12		
	Taking out/off and removing 4mm bituminous waterproofing				
11	**4mm bituminous waterproofing**	m2	3,200		
	Carried Forward			R	

				R	
	Brought Forward				
	PREPARATORY WORK TO EXISTING SURFACES				
12	Remove all loose paint, surface contaminants, friable materials. Remove any mould release agent using clean water, leaving surface clean, dry and dust free. Concrete soffits to be painted, rippel paint texture. 15mm smooth plaster to underside of soffit & painted. Prime surface with one coat professional plaster primer with an overcoating time of 18 hours and finish with two coats of matt paint with an overcoating time of 4 hours. All in strict specifications as per data sheets which may be provided on request, in accordance with preferred manufacturers	m2	120		
	MAKING GOOD OF FINISHES ETC				
	Making good plaster				
13	Wall plaster in patches	m2	1,504		
	Repairing bulastrades				
14	Steel balustrades		Item		35,000.00
	Repairing cracks on concrete floors				
15	Repair concrete crack with suitable trafficable silicone sealant such as Sika Sikaflex 3 or similar approved can be used to seal the crack from water ingress preventing further damage to the concrete and rebar. Scrabbled concrete to be repaired using Pro-Struct 528 VO-MCI repair mortar		Item		441,000.00
	BUDGETARY ALLOWANCES				
16	Provide a budgetary amount of R85,000.00(Eighty Five Thousand) for the pressure washing of concrete floors.		Item		85,000.00
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 1
Alterations and Renovations

Item No			Quantity	Rate	Amount
	SECTION No. 2				
	BILL NO. 2				
	WATERPROOFING				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	WATERPROOFING TO ROOFS, BASEMENTS, ETC				
	4mm bituminous waterproofing				
1	On flat roofs	m2	3,200		
	PROTECTIVE ROOFING PAINT				
	Two coats bituminous aluminium paint				
2	On waterproofing to roofs	m2	3,200		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 2
Waterproofing

Item No			Quantity	Rate	Amount
	SECTION NO. 2				
	BILL NO. 3				
	ROOF COVERINGS				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	Supplementary preamble items described in Bill No. 1, shall equally apply to this bill.				
	ROOF SHEETING				
	Concealed Fix interlocking, 0,58mm thick heavy industrial Z275 spelter galvanised steel sheeting with Chromadek, ColorPlus, Colourbond or Globalcoat finish to one side and Grey other side and accessories, fixed to steel purlins using SL 700 approved clips and fasteners. Cover width 700mm. High wind - 120km/h plus - loading to be considered with installation and fixing must be in accordance with manufacturer's recommendations and specifications.				
1	Roof sheeting pitch no exceeding 18 degrees	m2	3,528		
	ROOF AND WALL INSULATION				
	Heavy industrial grade aluminium foil based insulation				
2	Insulation laid taut over purlins (at approximately 1600mm centres) and fixed concurrent with roof covering including galvanised steel straining wires	m2	3,528		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 3
Roof Coverings

Item No		Quantity	Rate	Amount

SECTION NO. 2

BILL NO. 4

CARPENTRY AND JOINERY

PREAMBLES

The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill

SUPPLEMENTARY PREAMBLES

Supplementary preamble items described in Bill No. 1, shall equally apply to this bill.

GENERAL NOTES TO TENDERERS

General notes, described in Bill No.1, shall equally apply to this Bill.

SUPPLEMENTARY PREAMBLES

Joinery

Descriptions of frames shall be deemed to include frames, transoms, mullions, rails, etc.

Descriptions of hardwood joinery shall be deemed to be fixed with hardened steel nails or shot pins to brickwork or concrete.

Fixing

Items described as nailed shall be deemed to be fixed with hardened steel nails or shot pins to brickwork or concrete

Decorative laminate finish

Laminate finish shall be glued under pressure. Edge strips shall be butt jointed at junctions with adjacent similar finish

Carried Forward R

Brought Forward		R	
Timber			
All softwood to be South African Pine			
Descriptions			
Items described as "bolted" shall be deemed to exclude the bolts and include the holes unless otherwise described.			
Where the fixing of members is not stated it shall mean the nailing of one timber member to another.			
The term "planted on" shall mean the nailing of one timber member to another			
The term "screwed on" shall mean the countersunk screwing of one timber member to another.			
The term "screwed on and pelleted" shall mean the screwing of one timber member to another with the heads of screw sunk and pelleted.			
The term "plugged" shall mean the countersunk screwing of a timber member to and including plastic plugs in brickwork or concrete.			
The term "plugged and pelleted" shall mean the screwing of a timber member to and including plastic plugs in brickwork or concrete with heads of screw sunk and pelleted.			
Shelving, etc. described as screwed to steel must be fixed from underside and prices are to include for countersunk drilling through the steel for screw fixing.			
Descriptions of floors, ceilings, joinery, etc. shall be deemed to include for all square cutting			
Descriptions of items given in linea metre shall be deemed to include for mitres, stopped ends, fitted intersections, etc.			
Descriptions of rounded angles, rebates, grooves, chamfers, moulded edges, etc. shall be deemed to include for angles, ends, etc.			
Carried Forward		R	

				R	
	Brought Forward				
	ROOFS, ETC				
	FASCIAS AND BARGE BOARDS				
1	15 x 225mm Fascia board countersunk screwed to roof timbers (elsewhere) with two brass screws at maximum 754mm centres and jointed with and including standard aluminium halfround cover strips at all	m	530		
2	15 x 80 x 225mm Barge board countersunk screwed to roof timbers (elsewhere) with two brass screws and nailed with steel nails into mortar joints at maximum 750mm centres and jointed with and including standard aluminium halfround cover stips at all joints	m	162		
	DOORS ETC				
	44mm thick solid door with 6 hardwood veneer panels welded to the steel frame				
3	Single door size 813mm x 2032mm high	No	38		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 4
Carpentry and Joinery

Item No			Quantity	Rate	Amount
	SECTION NO.2				
	BILL NO. 5				
	CEILINGS, PARTITIONS AND ACCESS FLOORING				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	Note:				
	Electrical light fittings, diffusers, panels, etc generally are "lay in" units of the same dimensions as the suspension grid described and allowance must be made accordingly for their support inclusive of any flexibility insetting out that may be required (ceiling panels have not been deducted and pricing is to take cognisance thereof)				
	CEILINGS ETC				
	SUSPENDED CEILINGS				
	12.5mm vinyl faced gypsum ceiling panels, face-covered with white embossed vinyl, size 1200 x 600mm, laid on fire rated cliq system s3 exposed demountable suspension system including galvanised main tees, cross Tees, etc., all suspended with galvanised hangers at centres not exceeding 1200mm, with ceiling perimeter finished with shadowline w-trim plugged at 200mm centres, and all installed to manufacturer's Instructions.				
1	Suspended Ceilings	m2	1,078		
	Carried Forward			R	

				R
	Brought Forward			
	CEILING INSULATION			
2	50mm cellulose fibre insulation applied strictly in accordance with the manufacturer's instructions.	m2	1,078	
	Carried Forward to Summary of Section No. 2			R

Section No. 2
Bill No. 5
Ceilings, Partitioning and access flooring

Item No			Quantity	Rate	Amount
	SECTION NO.2				
	BILL NO. 6				
	IRONMONGERY				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	Supplementary preamble items described in Bill No. 1, shall equally apply to this bill.				
	IRONMONGERY FIXED TO DOORS, etc.				
	LOCKS				
1	75mm Three lever upright mortice rebated lockset with satin chrome furniture	No	72		
	HANDLES, etc.				
2	100mm Chromium plated bow handle bolted through door with the bolt ends hammered to prevent the nuts being removed	Sets	86		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 6
Ironmongery

Item No			Quantity	Rate	Amount
	SECTION NO.2				
	BILL NO. 7				
	METALWORK				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	Supplementary preamble items described in Bill No. 1, shall equally apply to this bill.				
	PRESSED STEEL TRANSFORMER ROOM DOORS AND FRAMES				
	Pressed Transformer doors				
1	Door size 813 x 2032mm high with rebated frame suitable for 230mm wall	No	20		
2	Door size 1595x 2032mm high with rebated frame suitable for 230mm wall	No	14		
	PRESSED STEEL DOOR FRAMES				
	Standard single rebate steel frame suitable for one brick wall, with 1 pr. 100mm brass butt hinges. Clean down, prepare and apply 1 coat red oxide. Primer 1 undercoat, 2 coats enamel to developer's approval (elsewhere)				
3	Single door size frame 813 x 2032 mm high	No	38		
	Carried Forward			R	

	Brought Forward			R	
	STEEL ROLLER SHUTTERS ETC				
	Roll-up perforated galvanised, sabs 1461, & epoxy coated m/s perforated roller shutter for openings up to 3m x 4m high. Electrically operated with 220 volt hl600 motor with manual override, with 75 x 1.0mm thick galv. Endlocked slats complete with nylon end-locks, 120mm extra-wide tamper proof m/s guides, powder coated ancillary components including door curtain, 4.5mm thick end plates, guide rails, closed shaft, extruded aluminium t-bar with astragal rubber weather seal, & single span (no join) galv. Cover box. Operated with high security key switch. Fixed to brick, concrete or structural steel jambs and structural steel beam over. Contractor to provide cavity of 160mm x 120mm for recessing guides.				
4	Electrically operated slatted roller shutter for 2110 x 2100mm high opening	No	17		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 7
Metalwork

Item No			Quantity	Rate	Amount
	SECTION NO. 2				
	BILL NO.8				
	TILING				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	Descriptions				
	Unless described as "fixed with adhesive to plaster (plaster elsewhere)" descriptions of tiling on brick or concrete walls, columns, etc shall be deemed to include 1:4 cement plaster backing and descriptions of tiling on concrete floors etc shall be deemed to include 1:3 plaster bedding.				
	FLOOR TILING				
	Full bodied porcelain tiles, size 600 x 600mm x 10mm (P.C allowance of R 150.00/m2 excludes V.A.T. but includes delivery to site), min R9 preferably R10 slip rated fixed to internal floor screed with tile adhesive mixed with bonding liquid in lieu of water with diagonal joints continuous in both directions and grouted with 3mm tile grout, excess grout on the surface to be cleaned with water as work proceeds.				
1	On floors	m2	85		
2	100mm high skirting	m	106		
	Carried Forward			R	

	Brought Forward			R	
	WALL TILING				
	Gloss White glazed ceramic wall tiles, size 200 x 200mm, fixed to wood floated Class II mortar plaster backing with approved tile adhesive mixed with bonding liquid in lieu of water, with 3mm joints continuous in both directions grouted with tile grout with minimum 5mm expansion joints at perimeter				
3	On plastered walls	m2	25		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 8
Tiling

Item No		Quantity	Rate	Amount
	SECTION NO. 2			
	BILL NO. 9			
	PLUMBING AND DRAINAGE (PROVISIONAL)			
	PREAMBLES			
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill			
	Note:			
	All glazed ceramic sanitaryware to comply with SABS 497			
	All stainless steelware for medical institutions to comply with SABS 497			
	Stainless steel sinks to comply with SABS 907			
	Stainless steel washtroughs to comply with SABS 906			
	Cisterns to comply with SABS 821 and fitments to SABS 1509			
	All taps to comply to SABS 226			
	RAINWATER GOODS			
	225 x 225mm 1,2mm PVC gutters including rivet-fixed mitres and end caps internally sealed using Silicon Mastic, hung by hangers with downpipes (elsewhere specified). Install strictly to manufacturer's specifications. Profile, type and finish all to Architect's approval			
1	PVC gutters with 20mm overlapping joints sealed with and including bitumen impregnated foam plastic joint sealing strip and riveted at 20mm centres m	700		
	Carried Forward		R	

				R	
	Brought Forward				
2	80mm x 1,2mm PVC down pipe fixed to brick wall including brackets	m	188		
3	Extra over eaves gutter for offset	No	75		
4	Extra over eaves gutter for outlet	No	75		
5	Extra over eaves gutter for stopped end	No	100		
6	Extra over for shoe	No	75		
	SANITARY FITTINGS				
	Refer to sanitary schedule drawing for full description of abbreviations				
	Approved				
7	Vitreous china close coupled washdown suite colour: white, comprising 90Deg. outlet open rim pan and matching 6 litre top dual flush cistern including lid and fitments, with thermoset seat.	No	75		
8	Ceramic fire clay drop-in vanity basin, colour: white,size 595 x 455mm including chain stay hole fitted into opening in vanity top (elsewhere specified) and sealed with silicone sealant where basin rim meets vanity top.	No	36		
9	Vaal or similar approved Sanitaryware white vitreous china wall mounted urinal with top inlet (code 705426) or back inlet (code 7054Z1). Overall size 600x385x380mm. Supplied with 38mm c.p. domical grating, a spreader(with a 20mm tread) and two hanger brackets	No	12		
	WASTE UNIONS, TRAPS ETC.				
	The following sanitary fittings to SABS specifications, etc.				
	Approved				
10	32mm chrome plated bottle trap	No	12		
	Rubber				
11	40 x 40mm Deep seal "P" or "S" trap	No	36		
	Carried Forward			R	

				R	
	Brought Forward				
	TESTING				
12	Testing water pipe system		Item		
	SANITARY PLUMBING				
	Sewer and drainage pipes and fittings shall be through Solid wall Class 34 uPVC socketed soil piping in according to SABS 791, jointed and sealed with butyl rubber rings Soil, waste and vent pipes and fittings shall be according to SABS 967 and solvent jointed Cold water supply pressure pipes and fittings shall be according to SABS 966 and jointed by means of the "Lyng" type jointing system Pipes shall be fixed and jointed according to SABS 0112				
	Class 34 uPVC Pipe				
13	50mm pipes	m	70		
14	110mm pipes	m	30		
15	160mm pipes	m	250		
	Class 34 uPVC FITTINGS				
16	50mm 90 degree Bend	No	10		
17	50mm 45 degree Bend	No	48		
18	50mm Equal Access junction	No	91		
19	110mm 45 degree Bend	No	40		
20	110mm pan connector	No	101		
21	110mm 90 degree Bend	No	16		
22	110mm 90 degree access Bend	No	16		
23	110mm diameter - 50mm diameter junction	No	78		
24	110mm Equal Access junction	No	16		
	Carried Forward			R	

				R	
	Brought Forward				
25	160mm diameter- 110mm diameter junction	No	15		
26	160mm diameter 90 Access Deg Bend	No	40		
	Pipe Hangers - Anchor, Treaded Rod & Hilti Hanger				
27	50mm Diameter pipe.	No	20		
28	110mm Diameter pipe.	No	10		
29	Remove and dispose cast Iron Piping as per client instructions			SUM	
	WATER SUPPLY				
	COLD WATER RETICULATION				
	Replace defective pipe sections and fittings				
	PEX Piping				
30	15mm Diameter pipe.	m	554		
31	22mm Diameter pipe.	m	190		
32	28mm Diameter pipe.	m	10		
	Extra over PEX pipes for fittings:				
33	15mm elbow.	No	35		
34	22mm elbow.	No	50		
35	28mm elbow.	No	3		
36	15mm Equal Tee.	No	3		
37	22mm Equal Tee.	No	146		
38	28mm Equal Tee.	No	3		
39	22-15 mm Reducer	No	156		
	Carried Forward			R	

				R	
	Brought Forward				
40	28-15 mm Reducer	No	10		
41	28-22mm Reducer	No	10		
	Plastic Pipe Compression Fittings And Valves				
42	15mm elbow.	No	20		
43	22mm Isolation Valve.	No	40		
44	22mm Strainer Valve.	No	30		
45	28mm Isolation Valve.	No	5		
	Pipe Hangers - Anchor, Treaded Rod & Hilti Hanger				
46	15mm Diameter pipe.	No	20		
47	22mm Diameter pipe.	No	100		
48	28mm Diameter pipe.	No	3		
	Heavy brown paper loosely wrapped around pipe as sheath for expansion.				
49	15 - 22mm Diameter pipe.	m	624		
50	Provision For Pipework Chasing and Making Good After	m	604		
	BUDGETARY ALLOWANCES				
51	Provide the Amount of R30,000.00(Thirty Thousand) for the servicing of all sanitary ware to full functionality.		Item		30,000.00
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 9
Plumbing and Drainage (Provisional)

Item No			Quantity	Rate	Amount
	SECTION NO.2				
	BILL NO. 10				
	PAINTWORK				
	PREAMBLES				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	SUPPLEMENTARY PREAMBLES				
	Supplementary preamble items described in Bill No. 1, shall equally apply to this bill.				
	PAINTWORK ETC TO EXISTING WORK				
	ON FLOATED PLASTER				
	Prepare and apply one coat professional plaster primer and two coats acrylic PVA paint.Colour code (Papyrus 22) Plascon DC 8 or similar				
1	Plastered walls	m2	2,148		
	METAL SURFACES				
	Prepare and apply one coat professional plaster primer, univeral undercoat and two coats super enamel Colour code (Slate Stone B7- E1-4) or similar				
2	On doors frames	m2	65		
	ON WOOD				
	Prepare and paint three coats clear varnish:				
3	On doors	m2	125		
	Carried Forward			R	

				R	
	Brought Forward				
	SMOOTH CONCRETE				
	One coat alkali resistant primer and two coats superior quality acrylic emulsion paint for interior and exterior use				
4	Soffits of slab	m2	120		
	PAINTWORK ETC TO NEW WORK				
	ON FLOATED PLASTER				
	Prepare and apply one coat primer and two coats internal paint with mat finish				
5	On internal ceilings and cornices	m2	1,078		
	METAL SURFACES				
	Prepare and apply one coat professional plaster primer, univeral undercoat and two coats super enamel Colour code (Slate Stone B7- E1-4) or similar				
6	On steel door	m2	66		
7	On windows frames with burglar bars	m2	68		
	ON WOOD				
	Prepare and paint three coats clear varnish:				
8	On doors	m2	125		
	Carried Forward to Summary of Section No. 2			R	

Section No. 2
Bill No. 10
Paintwork

Item No		Quantity	Rate	Amount
	SECTION NO. 2			
	BILL NO. 11			
	PROVISIONAL SUMS			
	Note			
	The items described hereunder cover work which is not fully defined at tender date and which is intended to be executed by the contractor and/or his subcontractors. The amounts shown shall be used as directed by the principal agent and shall be deducted in all or in part if not required.			
	STATION SIGNAGE			
1	Allow an amount of R350,000.00 (Three Hundred and Fifty Thousand) for the installation of missing station signage	Item		350,000.00
2	Profit		%	
3	Attendance		%	
	COMMUNITY LIAISON OFFICER			
4	Allow an amount of R90,000.00 (Ninety Thousand) for a Community Liaison Officer.	Item		90,000.00
5	Profit		%	
	PROTECTION SERVICES			
6	Allow an amount of R400,000.00 (Four Hundred Thousand) for occupation at Durban Station	Item		400,000.00
7	Profit		%	
8	Attendance		%	
	Carried Forward to Summary of Section No. 2		R	

Section No. 2
Bill No. 11
Provisional Sums

Item No		Quantity	Rate	Amount
	SECTION NO.2			
	BILL NO.12			
	BUDGETARY ALLOWANCES			
	Note			
	The items described hereunder cover work which is not fully defined at tender date and which is intended to be executed by the contractor and/or his subcontractors. The amounts shown shall be used as directed by the principal agent and shall be deducted in all or in part if not required.			
	BINS & BENCHES			
1	Allow an amount of R427,500.00 (Four Hundred and Twenty Seven Thousand Five Hundred) for bins and benches	Item		427,500.00
2	Profit		%	
	Carried Forward to Summary of Section No. 2		R	

Section No. 2
Bill No. 12
Budgetary Allowances

SECTION SUMMARY - BUILDER'S WORK

Bill No		Page No	Amount
1	Alterations and Renovations	27	
2	Waterproofing	28	
3	Roof Coverings	29	
4	Carpentry and Joinery	32	
5	Ceilings, Partitioning and access flooring	34	
6	Ironmongery	35	
7	Metalwork	37	
8	Tiling	39	
9	Plumbing and Drainage (Provisional)	44	
10	Paintwork	46	
11	Provisional Sums	47	
12	Budgetary Allowances	48	

Carried to Final Summary R

Section No. 2

Item No			Quantity	Rate	Amount
	SECTION NO. 3				
	BILL NO. 1				
	ELECTRICAL INSTALLATION				
	LOW VOLTAGE				
	DISCONNECTION/ REMOVAL OF REDUNDANT ELECTRICAL EQUIPMENT				
	The following equipment shall be isolated, disconnected, removed and handed over to the Employer:s				
1	Decommissioning and stripping of existing electrical installations including cables, conductors, luminiares, control devices, DB's, etc in the existing building.			SUM	
	LV SWITCHGEAR				
	DBs and LV Switchgear				
	Manufacture, deliver to site, install, commission, test kiosks, distribution boards as per specification and single line diagram, to be housed in electrical. All electrical panels shall be stainless steel material, rates to include powder coated, busbars and drilling, busbar connections internal wiring etc. Refer to single line diagram for electrical panel colour				
2	DB-1	No	1		
3	Sub-DB	No	5		
4	Surface mounted UT4 IP65 Box complete with 32A, 1-pole isolator, 3x 10A circuit breakers with complete with busbars	No	26		
	Carried Forward			R	

				R	
	Brought Forward				
	CABLES AND CONDUCTORS				
	Supply, deliver to site cables and conductors as specified. Install, rack, strap and testing of cables as per specification including clamps, ties and cable numbering system				
5	2.5mm conductors (mixed colours - live, neutral and earth)	m	7,500		
6	2.5 mm² 2c 600/1000V PVC/SWA/PVC ECC Cu Cable	m	3,800		
7	2.5 mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	m	2,600		
	CABLES AND CONDUCTORS				
	Termination of cables shall include supply installation and testing of the glands with corrossion guard , making-off the cable, lugs, and fitting the gland to the board gland plate, switchgear or equipment and final connection of cable tails into board or terminals. Include for Reducing Glands and shrouds where applicable. NB: IP65 Glands are to be used where applicable.				
8	2,5mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	No	70		
9	Supply, deliver to site, store & install P9000 trunking hot dipped galvanised inclusive of all items required to install in accordance with manufacturers specification. Rate must be inclusive of all items such as brackets, raw bolts, splices, bonding straps etc. required to install in accordance with manufacturers specification.	m	2,520		
10	25mm PVC Conduit including all necessary accessories. Rate to include chasing wall for conduit in the wall, close wall and make good.	m	2,600		
11	25mm steel Conduit including all necessary accessories. Rate to include chasing wall for conduit in the wall, close wall and make good.	m	700		
12	32mm steel Conduit including all necessary accessories. Rate to include chasing wall for conduit in the wall and made close made good / surface mounted with required accessories.	m			**Rate Only**
	Carried Forward			R	

	Brought Forward			R	
	LUMINARIES AND CONTROL DEVICES				
	Supply, deliver, accept and store the following luminaries, complete with lamps and control gear as per specification. See and refer to the specification document for details of each luminary.				
13	Type A13 - IP65 Rated, 30W / +/-4440 lm LED - 4000k Rough-guard Surface-mounted weather-proof luminaire, GRP body and acrylic diffuser, with 50000 hours lifespan.	No	160		
14	Type B3 - IP65 Rated high-pressure die cast aluminium base and trim ring 32W/ +/- 4370lm LED - 4000k bulkhead luminaire with an opal high-impact acrylic diffuser, with 50000 hours lifespan.	No	312		
15	Type B4 - same as B3 above, but with battery backup to operate for 1-hour	No	133		
16	Type C4 - 144W / +/-20869lm LED (4000k) Lowbay, rated IP65 with powder coating as per specification	No	225		
17	Type C5 - same as type C4 above, but with battery backup to last 1-hour as per specification	No	95		
18	Retrofit existing vapour-proof luminiare with LED tube 28W / on a 4ft vapour-proof luminaire. Also removal of electronic balast for a complete operation of the luminiare.	No	68		
19	Photo electric cell as per specification	No	13		
20	Supply and installation of 32 Amp 4-Pole surface mounted isolator, complete with all necessary accessories	No	26		
	TEST AND COMMISSIONING				
	Test and commission the complete electrical installation including completion of quality check sheets, Compliance Certificates & test results and submitting them to the Employer's Representative.				
21	Test and commission the complete electrical installation including Certificates of Compliance & test results to the Engineer.			SUM	
	Carried Forward			R	

	Brought Forward			R	
	BACK-UP GENERATOR				
22	Backup diesel Generator - 200kVA, 400VAC three phase, 50Hz, with auto-change over panel. Generator to be installed and supplied with full tank diesel, must be able to Starts & Stops Automatically, Maintenance-free Battery, Silent Weatherproof Mild-steel Canopy, Long-range Fuel Tank, Easy Cable Entry, Emergency Stop Button, Weatherproof Exhaust System.			SUM	
23	240 mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	m	260		
24	240 mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	No	2		
	Carried to Final Summary			R	

Section No. 3
Bill No. 1
Electrical Installation

Item No			Quantity	Rate	Amount
	SECTION NO.4				
	BILL NO. 1				
	EARTHWORKS (PROVISIONAL)				
	PREAMBLES:				
	The tenderer is referred to the relevant clauses in the Model Preambles for Trades (2008 Edition) as issued by the Association of South African Quantity Surveyors before pricing this bill				
	EARTHWORKS (PIPE TRENCHES)				
	Excavation in earth not exceeding 2m deep				
	Excavate in all materials, backfill and compact to 90% mod AASHTO density, and dispose of surplus and unsuitable materials for trenches				
1	0m up to 1.5m	m3	60		
2	Excavate and dispose of unsuitable material from trench bottom	m3	5		
	Extra over trench and hole excavations in earth for excavation in				
3	Intermediate excavation	m3	5		
	Excavation Ancillaries				
	Backfilling				
4	Using the excavated material	m3	5		
5	Using imported selected material G7 from Commercial Sources	m3	12		
6	Using imported selected material G5 from Commercial Sources	m3	12		
	Carried Forward			R	

				R
	Brought Forward			
	Overhaul			
7	Limited overhaul up to 1,0 km (provisional)	m3	24	
8	Long overhaul above 1,0 km (provisional)	m3	600	
	Particular Items			
	Backfilling			
9	Up to 400 L/min	Hrs	2.00	
10	Up to 600 L/min	Hrs	1.00	
	WORK TO EXISTING SERVICES			
	Dealing with services that are at risk because of construction of earthworks (other than trenching)			
11	Electric cable	No	2	
	Carried Forward to Summary of Section No. 4			R

Section No. 4
Bill No. 1
Earthworks (Provisional)

Item No			Quantity	Rate	Amount
	SECTION NO.4				
	BILL NO. 2				
	STORMWATER DRAINAGE				
	CONCRETE PIPES				
	Supply and lay concrete pipe culverts				
	On Class B Bedding				
1	300mm dia. Type 100D	m	80		
2	450mm dia. Type 100D	m	10		
	MANHOLES				
	Manholes, catchpits, precast inlet and outlet structures complete (elsewhere measured)				
	1050mm dia. Rings				
3	Up to 1,0m deep	No	1		
4	1,0m to 2,0m deep	No	1		
	1250mm dia. Rings				
5	Up to 1,0m deep	No	1		
6	1,0m to 2,0m deep	No	1		
	Manholes: brickwork chambers and catchpits including soffit slab for various pipe sizes				
7	Up to 600mm diameter	No	5		
8	Up to 750mm diameter	No	1		
	Brickwork				
9	230mm thick	m2	20		
10	Benching	m2	5		
	Carried Forward			R	

				R	
	Brought Forward				
	Accessories				
	Manhole covers including frames				
11	Type 2A, SABS 558/1973	No	4		
12	Type 2B, SABS 558/1973	No	1		
13	Type 4, SABS 558/1973	No	1		
	Inlet grids including frames				
14	Type 6, SABS 1115	No			
15	TPA type 40	No			
	Step irons				
16	Galvanised step irons to BS1247	No	10		
	Concrete cover slabs				
17	600mm x 600mm x 50mm	No	5		
	Drain covers				
18	150mm x 150mm cast iron	No	15		
	CLEANING OF EXISTING PIPEWORK				
	Cleaning of existing underground pipework by an approved method to leave pipework free from debri, mud and water				
19	Pipes not exceeding 300mm internal diameter	m	80		
20	Pipes exceeding 300mm but not exceeding 600mm internal diameter	m	10		
	Carried Forward to Summary of Section No. 4			R	

Section No. 4
Bill No. 2
Stormwater Drainage

Item No			Quantity	Rate	Amount
	SECTION NO. 4				
	BILL NO. 3				
	ROADS AND PARKING				
	DEMOLISH AND SPOIL MATERIAL OFF SITE				
	Demolish and spoil material for structures, buildings, etc at a spoil site established by the Contractor				
1	Up to 30mm asphalt (wearing course)	m2	700		
	ASPHALT BASE AND SURFACING				
	PRIME				
	Prime coat using				
2	MC-30 cut-back bitumen	ltr	500		
	TACK COAT				
3	Tack coat using cationic premix grade bitumen emulsion	ltr	420		
	ASPHALT SURFACING				
	Supply and lay continuously graded asphalt with 5% bitumen content				
4	40mm Thick	m2	700		
	Saw cutting asphalt or cemented pavement layers				
5	Sawing asphalt	m	200		
6	Sawing cemented pavement layers	m	100		
	Carried Forward			R	

				R
	Brought Forward			
	ROAD MARKINGS: PARKING AND PLATFORM AREAS			
	RETRO-REFLECTIVE ROAD MARKINGS			
	White lines (broken or unbroken)			
7	100mm Lines: Parking Areas	m	100	
	Yellow lines (broken or unbroken)			
8	100mm Lines	m	150	
	Carried Forward to Summary of Section No. 4			R

Section No. 4
Bill No. 3
Roads and Paving

SECTION SUMMARY - EXTERNAL WORKS

Bill No		Page No		Amount
1	Earthworks (Provisional)	55		
2	Stormwater Drainage	57		
3	Roads and Paving	59		

Carried to Final Summary R

Section No. 4

FINAL SUMMARY

Section No		Page No		Amount
1	PRELIMINARIES	22		
2	BUILDER'S WORK	49		
3	ELECTRICAL INSTALLATION	53		
4	EXTERNAL WORKS	60		
	SUB-TOTAL		R	
	ADD 10% CONTINGENCIES TO BE USED AT THE CLIENT AND PRINCIPAL AGENTS DESCRETION		R	
	SUB-TOTAL		R	
	ADD VAT		R	
	Carried to Form of Tender		R	