

STATEMENT OF WORK FOR CONSTRUCTION SERVICES

MSGR Electrical Upgrades
U.S. Embassy
Windhoek, Namibia

1.0 INTRODUCTION

1.1 The Work, as defined herein, includes, but not limited, to the following description, which appears here as a general guideline and is not intended to represent each and every item necessary to perform the Work and shall consist of all Construction, and related work in accordance with Contract Documents inclusive of Project Drawings, Specifications, and any Addenda.

1.2 PROJECT STATEMENT:

The contractor shall inspect the work site to evaluate the existing electrical service, panels, switchboards, exterior and interior circuit distribution inclusive of switches, receptacles (sockets), fixtures, and equipment. Contractor shall perform an electrical load analysis to determine current balance and distribution of loads; adequacy of existing panel boards; breakers; and conductors. Contractor shall install new equipment, additional receptacles (sockets), switches, fixtures, conduit and conductors, and rework existing conduit with circuits to achieve a balanced load distribution which does not overload circuits and switchboards.

The U.S. Embassy Windhoek has a requirement to obtain Construction Services for the following work:

1.2.1 GENERAL:

- A. Existing electrical system rework to include installation of main service laterals with corresponding disconnects, sub-panel switchboards, branch circuits, grounding, equipment, and fixtures. Provide a written evaluation of the adequacy of the existing electrical systems along with recommendations to include calculations to support revised balanced electrical loads and equipment size selections.
- B. Provide one-line diagram indicating size of conductors, conduits, disconnects, switchboards and distribution of circuits with rated breakers.
- C. All electrical materials and equipment shall be new and approved for the intended use and location by a recognized testing laboratory. Used construction materials shall not be installed without special permission obtained in advance.
- D. Conduits, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Conduits and cable assemblies shall be continuous from outlet to outlet and from fitting to fitting.
- E. Where cables run through holes in studs, joists or similar wood members, holes shall be bored at the approximate center.
- F. There shall be no splices within the conduits. An approved box shall be installed at each socket outlet (receptacle), switch, or junction of conduit, electrical non-metallic tubing, armored cable, or

non-metallic sheathed cable. At least 150mm of wire, measured from the face of the box shall be left at each outlet and switch point for making up joints for the connection of fixtures or devices. Splices shall be made electrically and mechanically secure and be covered with an approved insulated solderless connector.

1.2.2 SITE WORK:

- A. Provide and install exterior grade duplex-plug type receptacles (sockets) in exterior grade weatherproof box and cover at designated locations. Intercept and extend existing receptacle (socket) electrical circuits where practical. Installation of all new conduits and conductors may be exposed along with receptacle (socket) weatherproof box and cover.
- B. Provide and install exterior grade weatherproof box enclosure for pool equipment at new location. Install exterior grade weatherproof box and cover at designated locations. Intercept and extend existing receptacle (socket) electrical circuits where practical. Replace, resize and relocate existing SP-3 switchboard panel, breakers, timers to accommodate all exterior circuits.
- C. Replace and relocate existing SP-1 switchboard panel, breakers, timers and GFCI(RCBO/RCD) outlet, 15/A/5A-230V. Intercept and extend existing electrical circuits where practical and route to new location.
- D. Install pole mounted exterior security lighting system.
- E. Install exterior grade security light fixtures. Intercept and extend existing electrical circuits where practical.
- F. Contractor shall coordinate and make final electrical connections for relocated pool pump equipment, solar water heaters and exterior light fixtures provided installed under a separate contract.
- G. Contractor shall coordinate the installation of a diesel generator with automatic transfer switch on a reinforced concrete slab as located on the plans to be installed under a separate contract.
- H. Remove existing electric signage inclusive of mast and ancillary supports at roof level along with electrical conduit and conductors; terminate at existing switchboard.

1.2.3 BUILDING:

- A. Intercept existing receptacle (socket) electrical circuits; extend existing circuits to include additional wall mounted duplex receptacles (sockets). Installation of all new conduits and conductors shall not be exposed; receptacles shall be recessed with cover plates to match existing.
- B. Replace all wall mounted interior single-plug type receptacles (sockets) with duplex-plug type receptacles at their existing locations.
- C. Abandoned receptacles (sockets) shall be removed with flush-mounted blank cover plate installed. Intercept existing conduits and conductors and re-route to feed additional duplex –plug type receptacles (sockets) at each room.

- D. Contractor shall coordinate and make final electrical connections for new split package air conditioning units along with wall mounted condenser units provided and installed under a separate contract. Contractor coordinate and install as necessary supplemental electrical circuits inclusive of conductors, conduit with appropriately sized disconnects for each respective unit.
- E. Install an emergency fire alarm and emergency lighting system.

Emergency fire alarm and emergency lighting system specifications:

- 1. Emergency Fire Alarm System:
Fire Alarm Control Panel: 2 zone two-wire fire alarm panel with 2.1Ah VRLA battery back-up EN54 2
Devices: Smoke Detector; Manual Call Point
- 2. Emergency Lighting:
Conforms to BS EN60598-1:2008 & A1:2006 BS EN 60598-2-22:1998;
Power Rating: 230V AC 50Hz; and an
IP Rating: IP20
Luminaire : Non-Maintained Emergency Luminaire

1.2.4 INSTALLATION AND TESTING

All electrical equipment shall be new and comply with this specification and the latest issues of the relevant standard specifications and codes of practice.

The Contractor shall be held fully responsible for the electrical works and for the correct and satisfactory testing and commissioning of the complete electrical installation. The contractor shall give reasonable notice in writing to enable the Contracting Officer's Representative (COR) or designated inspector to inspect and witness tests of materials, equipment and installed electrical system. The Contractor shall, at his own cost, render all assistance and supply all labor appliances and any other materials, as the COR may require to inspect any portion of the works at any stage during construction. During such operations the Contractor shall if required, suspend any or all the Works without having any claim for loss of damage as a result thereof. Commissioning shall not commence until all work on that part of the system has been completed.

First, the electrical equipment and circuitry shall be checked and tested in each distribution board and shall be rendered "healthy" and fully operational before any other part of the installation is commissioned. The settings of all protective, instrument and timing devices are to be correct, based on the manufacturer's characteristic curves. The operation of all equipment and motors shall be tested in the "manual" sequence first, prior to attempting "automatic" sequence control. Commissioning shall follow the electrical testing procedures, prior to start-up of the plant.

The Contractor shall verify that all items of installation and equipment are correctly wired and connected before start-up. On completion of all inspections, tests and commissioning of the Works the Contractor shall issue to the COR with a certificate of compliance by an accredited person.

1.2.5 MATERIAL AND EQUIPMENT

- A. All material and equipment shall be new and conform in respect of quality, manufacture, tests and performance, with the requirements of the South African Bureau of Standards or where no such standards exist, with the relevant current Specification of the British Standards Institution.
- B. All material and equipment shall be of high quality and suitable for the conditions on site. These conditions shall include weather conditions as well as conditions under which materials are

installed, stored and used. Should the materials not be suitable for use under temporary site conditions then the Contractor shall at his own cost provide suitable protection until these unfavourable site conditions cease to exist.

- C. The Contractor shall, where requested to do so, submit samples of equipment and material to the COR for approval prior to installation. Samples may be retained in the COR's possession until the contract is completed after which they will be returned.

1.2.6 INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES

This section covers the installation of conduits and conduit accessories in buildings and other structures under normal environmental conditions and for system voltages up to 600 V.

- A. The following types of conduit installations are included:
 - 1. Non-metallic conduit.
 - 2. Flexible conduit.
- B. Conduits may be installed as follows:
 - 1. In open roof spaces.
 - 2. Surface mounted against walls, concrete slabs, etc.
 - 3. In wall chases.
- C. Bending and setting of conduit must be done with special bending apparatus manufactured for the purpose and which are obtainable from the manufacturers of the conduit systems. Damage to conduit resulting from the use of incorrect bending apparatus or methods applied shall be rejected by the COR and be completely removed and rectified and any wiring already drawn into such damaged conduits must be completely renewed at the contractor's expense.
- D. For light and socket (receptacle) outlet circuits, the conduit used shall have an external diameter of 20mm. In all other instances the sizes of conduit shall be in accordance with the "Wiring Code" for the specified number and size of conductors, unless otherwise directed in part 2 of this specification or indicated on the drawings.

1.2.7 OTHER SERVICES

Conduits may not be installed closer than 150 mm to pipes containing gas, steam, hot water or other materials, which may damage the conduits or conductors. Conduits may not touch pipes of other service installations in order to prevent electrolytic corrosion. Where this is unavoidable, cathodic protection shall be provided.

1.2.8 NON-METALLIC CONDUIT

Installation Conditions: Where specified for a particular service, non-metallic conduit may be installed under the following conditions:

- A. All non-metallic conduit shall comply fully with SANS 950 and shall be installed in accordance with Appendix C of the same specification as well as SANS 10142.
- B. Insulated heat-resistant boxes shall be used for outlets of totally enclosed luminaries and other fittings where excessive temperatures are likely to occur.
- C. Luminaries and other fittings shall not be supported by non-metallic conduit or conduit boxes.

These fittings shall be secured to the surrounding structure in a way that is acceptable to the COR.

- D. The conduit shall be supported and fixed with saddles with a maximum spacing of 1 m, even in roof spaces. (Refer to SANS 10142.) The Contractor shall supply and install all additional supporting timbers required.
- E. It shall be possible to rewire the completed installation in the future without undue difficulty.
- F. Non-metallic conduit and fittings shall not be used under the following conditions:
 - 1. Outside a building (unless protected, or sheltered under eaves).
 - 2. For mechanical load bearing.
 - 3. Where they may be subjected to temperatures below -10°C or above 70°C for prolonged periods.
 - 4. As primary electrical insulation.
 - 5. In areas where they may be subject to mechanical damage.
 - 6. For applications other than those for which they are designed.
 - 7. In concrete slab unless specified to the contrary.

1.2.9 PAINTING OF CONDUITS

Exposed conduit may be painted with normal oil or PVA paints, but care must be taken to ensure that the paint used does not contain any component that will soften or have any other detrimental effect on the materials from which the conduit and fittings are manufactured.

1.2.10 CONNECTING OF CONDUIT TO METAL EQUIPMENT/COMPONENTS

When any part of a non-metallic conduit system has to be connected to metal equipment or components (e.g. switchboard, surface socket (receptacle)-outlet or switch box, existing metallic conduit system, etc.) fittings and joints manufactured specifically for this purpose must be used. Non-metallic conduit must not be threaded to fit metallic connectors.

1.2.11 BENDS

In conduit of nominal size not exceeding 25 mm. In all other cases bends must be achieved by the use of accessories that are introduced into the conduit run. Bends shall comply with SANS 10142.

1.2.12 BENDING

Conduit of nominal size up to and including 25mm may be cold bent by hand provided that the radius of the bend is greater than six times the nominal size of the conduit, and that the external angle of the bend does not exceed 90°.

- A. The procedure (which involves the use of a bending spring) should be as follows:
 - 1. Determine the angle through which the conduit is to be bent.

2. Warm the cold conduit over the length to be bent by rubbing with hands.
3. Select a bending spring which matches the conduit size and insert in to the conduit at the point where the bend is required.
4. Bend the conduit slowly with one motion (either with the hands alone approximately 1 m apart, or across the knee) to double the required angle, release the conduit and, when its position is stable, withdraw the bending spring (turning it in an anti-clockwise direction to reduce its diameter) and gently correct the angle.
5. Install and secure the conduit immediately following bending.

1.2.13 ADHESIVE JOINTS

All adhesive joints must be made in a clean dry area. The surfaces of all components to be bonded must be dry and clean.

The insertion depth should be marked on the conduit end and the adhesive applied (by means of a soft clean brush) as quickly as possible to the surfaces to be bonded by brushing lengthwise along the conduit, ensuring that a thin coating of uniform thickness is formed. The joint must be made immediately after the application of the adhesive by pushing the prepared parts squarely together with a twisting motion to the full insertion depth. Care must be taken to avoid squeezing adhesive into the cableway and all excess adhesive must be wiped off.

NOTE: Solvent adhesives contain highly volatile liquids and their containers should not be left open.

1.2.14 CUTTING

A fine-tooth hacksaw should be used to cut conduit to the required length. Each cut end should be square and free from swarf, burrs and loose material. When determining the length of conduit to be cut, allowance must be made for the length of couplings or accessories attached to the conduit. Incorrect determination will cause bulging of the conduit or insufficient joint length.

1.2.15 FLEXIBLE CONDUIT

- A. In installations where the equipment has to be moved frequently to enable adjustment during normal operation, for the connection of motors or any other vibrating equipment, for the connection of thermostats and sensors on equipment, for stove connections and where otherwise required by the Department, flexible conduit shall be used for the final connection to the equipment.
- B. The installation shall comply with SANS 10142.
- C. Flexible conduit shall preferably be connected to the remainder of the installation by means of a draw-box. The flexible conduit may be connected directly to the end of a conduit if an existing draw-box is available within 2 m of the junction and if the flexible conduit can easily be rewired.
- D. Flexible conduit shall consist of metal-reinforced plastic conduit or PVC-covered metal conduit with an internal diameter of at least 15mm, unless approved to the contrary. In false ceiling voids, flexible conduit of galvanised steel construction may be used. Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured of either brass or mild steel plated with either zinc or cadmium.

1.2.16 INSTALLATION REQUIREMENTS

- A. Positions of Outlets

All accessories such as boxes for socket (receptacle)-outlets, switches, lights, etc. shall be accurately positioned. It is the responsibility of the Contractor to ensure that all outlets are installed level and square, at the correct height from the floor, ceiling or roof level and in the correct position relative to building lines and equipment positions as specified. It shall be the responsibility of the Contractor to determine the existing, ceiling and roof levels. Draw-boxes shall not be installed in positions where they will be inaccessible after completion of the installation. Draw-boxes shall be installed in inconspicuous positions to the approval of the COR and shall be indicated on the "as built" drawings.

B. Cover plates

All draw-boxes and outlets shall be fitted with cover plates, either as part of the switch or socket (receptacle) assembly or with blank cover plates if unused. Blank cover plates shall match other cover plates in the same area. Flush mounted cover plates in both ceilings and walls shall overlap the draw-box and edges of the recess. If the fixing lugs are substantially deeper than the finished wall surfaces, suitable coiled steel wire or tubes shall be used as spacers.

C. Draw-wires

Galvanised steel draw-wires shall be installed in all unwired conduits e.g. conduits for future extensions, telephone installations and other services.

D. Bends

1. A maximum of two 90 bends or the equivalent displacement will be allowed between outlets and/or boxes.
2. Draw-boxes shall be installed at maximum intervals of 15 m in straight runs. All bends shall be made without heating the conduit or without reducing the diameter of the conduit. The inside radius of a bend shall not be less than five times the outside diameter of the conduit. (Refer to SANS 10142,

E. Wall Socket (Receptacle)-outlets

Where more than one socket (receptacle)-outlet is connected to the same circuit, the conduit shall be looped from one outlet box to the following on the same circuit. Where a metal channel is used, the conduit may be installed from the channel directly to the outlet box on condition that the conductors can be looped from one outlet to the next without making any joints in the wires.

F. Luminaires

Where the conduit end is used to support luminaires, a ball-and socket (receptacle) type lid shall be fitted to the pendant box in all cases where the conduit is longer than 500 mm. In all other cases a dome lid may be used. Where luminaires are specified which are fixed directly to the pendant box, the pendant box shall be fixed independently of the conduit installation.

G. Flush Mounted Outlet Boxes

The edges of flush mounted outlet boxes shall not be deeper than 10 mm from the final surface. Spacer springs shall be used under screws where necessary.

H. Excess Holes

All excess holes in draw-boxes or other conduit accessories shall be securely blanked off by means of brass plugs to render the installation vermin proof.

I. Debris

Care shall be taken to prevent debris or moisture from entering conduits during and after installation. Conduit ends shall be sealed by means of a solid plug which shall be screwed to the conduit end. Conduits shall be cleaned and swabbed to remove oil, moisture or other debris that may be present before conductors are installed. Swabs shall not be attached to the conductors.

J. Defects

Each length of conduit shall be inspected for defects and all burrs shall be removed. All conduits that are split, dented or otherwise damaged or any conduits with sharp internal edges shall be removed from site. The Contractor shall ensure that conduits are not blocked.

K. Withdrawal of Conductors

To ensure that all electrical conductors are easily withdrawable from conduits and to ensure that there are no joints in the conductors, the COR shall have the right to have the conductors of any circuit removed at his discretion. If the conductors are found to be in a satisfactory condition after having been withdrawn, the US Government shall bear the cost of withdrawing and re-installing such conductors. If the conductors are found to have been damaged during installation or removal or if joints are found, they shall be replaced and the cost shall be borne by the Contractor.

1.2.17 SURFACE INSTALLATIONS AND INSTALLATIONS IN ROOF SPACES

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified, conduit installed on the surface must be plumbed or levelled and only straight lengths shall be used.

A. APPEARANCE

1. All conduits shall be installed horizontally or vertically as determined by the route and the Contractor shall take all measures to ensure a neat installation.
2. Where conduits are to be installed directly alongside door frames, beams, etc. that are not true, conduits shall be installed parallel to the frames, beams, etc.
3. All labels shall be removed from surface mounted conduit.

B. SADDLES

Conduits shall be firmly secured by means of saddles and screws and in accordance with SANS 10142. Where saddles are used to secure vertical lengths of conduit connected to surface mounted switch boxes or socket (receptacle) outlet boxes, the saddles shall be spaced so that the intervals between the box and the first saddle, between any two successive saddles and between the last saddle and the ceiling or roof are equidistant. Conduits shall be secured within 150 mm before and after each 90° bend and within 100mm of each outlet box.

C. JOINTS

Joints will only be allowed in surface conduit lengths exceeding 3.5m. Threads shall not be visible at joints of completed installations, except where running joints are used. Running joints will be allowed only when absolutely necessary. All running joints shall be provided with locknuts and shall be painted with red lead immediately after installation.

D. ACCESSORIES

Inspection bends or tee pieces shall not be used. Non-inspection type bends may be used in the case of 32mm or 50 mm diameter conduits. All draw-boxes supporting luminaries or other equipment shall be fixed independently of the conduit installation.

E. OFFSETS

Where an offset is required at conduit terminations or crossovers, the conduit shall be saddled at the offset.

F. CROSS OVER

Conduit routes shall be carefully planned to avoid crossovers. Where a crossover is inevitable, one conduit only shall be offset to cross the other. Crossovers shall be as short as possible and shall be uniform. Alternatively, crossovers shall be installed in purpose-made boxes. This method shall be employed on face brick walls and in other circumstances where required by the COR.

G. PARALLEL CONDUIT

Parallel conduit runs shall be equidistant and saddles shall be installed in line. Alternatively, a special clamp may be used to secure all conduits in unison. In the case of conduits of different diameters, the latter method shall only be used if a purpose-made clamp designed to accommodate the various conduit sizes, is provided.

H. PAINTING OF CONDUIT

All surface mounted conduits and accessories shall be painted with two coats of a high quality enamel paint or as otherwise specified. The color shall comply with the color code specified for the installation or where no code has been specified, shall match the color of the surrounding finishes.

I. CONDUIT IN ROOF SPACES

1. In open roof spaces (no ceiling) conduits shall run along the wall plates and the rafters. The installation of conduits suspended between the rafters is not acceptable.
2. Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5 m by means of saddles screwed to the roof timbers for metallic conduit and 1m for non-metallic conduit.
3. Nails or crampets will not be allowed.
4. Under flat roofs in false ceilings or where there is less than 900 mm clearance, or in instances where the ceilings are insulated with glass-wool or other insulating material impeding access, the conduit shall be installed in a manner which allows for wiring from

below the ceilings.

5. Conduit runs from switchboards shall terminate in fabricated sheet steel draw-boxes installed directly above or in close proximity to the boards.
6. Spare conduits covering the total number of spare ways on switchboards, shall be provided between the boards and the roof draw box.
7. Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450mm throughout the installation. The contractor shall supply and install all additional supporting timbers in the roof space as required.

J. FIXING TO WALLS

Only approved plugging materials such as aluminum inserts, fibre plugs or plastic plugs, etc., and round-head screws shall be used when fixing saddles, switches, plugs etc. to walls. Wood plugs are not acceptable nor should plugs be installed in joints in brick walls.

1.2.18 CHASES AND BUILDER'S WORK

- A. The contractor shall be responsible for the all work related to the installation of conduits, outlet boxes, switchboard trays, bonding trays and other wall outlet boxes and will undertake the necessary chasing and cutting of walls and the provision of openings in ceilings and floors for luminaries and other electrical outlets for the rewiring and renewal of existing installations.
- B. Where no Builder or Main Contractor is available, the Contractor must provide all chases and is required to cover conduits installed in chases by a layer of 4:1 mixture of coarse sand and cement, finished 6 mm below the face of the plaster and roughened. Chases shall be deep enough to ensure that the top of conduits are at least 12 mm below the finished surface of the plaster.
- C. Where the Contractor is responsible for the cutting of chases or the building in of conduits and other equipment, he will be held responsible for all damage as a result of this work and will be required to make good to the satisfaction of the COR.
- D. This ruling is particularly applicable but not exclusively to the rewiring and renewal of existing installations. Chases shall be made by means of a cutting machine.
- E. Under no circumstances shall face brick walls or finished surfaces be chased or cut without the written permission of the COR. Where it is necessary to cut or drill holes in the concrete structure, the prior permission of the COR shall be obtained.

1.2.19 FIXING MATERIALS

A. RESPONSIBILITY

It is the responsibility of the Contractor to position and securely fix conduits, ducts, cables and cable channels, switchboards, fittings and all other equipment or accessories as required for the Installation. The Contractor shall provide and fix all supports, clamps, brackets, hangers and other fixing materials.

B. FINISHING

All unpainted supporting steelwork installed by the Contractor shall be wire brushed and given one coat of rust-resisting primer, followed by one coat of high quality enamel paint before any other equipment is fixed.

C. STRUCTURAL STEEL

Supports, brackets, hangers, etc. may only be welded to structural steel members where prior permission of the Department has been obtained. "CADDY" or similar fasteners may be used to fix equipment to structural steel members.

D. SCREWS AND BOLTS

Where holes exist in equipment to be fixed, bolts and fixing screws as specified shall be used. Where sizes are not specified, the largest bolt or screw that will fit into the hole shall be used.

E. WALL PLUGS

Where the fixing holes in brick or concrete walls are smaller than 10mm dia. and where the mass of the equipment is less than 10kg, wall plugs may be used to fix conduits, cables and other equipment. Fibre or plastic plugs shall be used. Wooden Plugs are not acceptable. Aluminium plugs may be used in face bricks. Plugs installed in joints between bricks are not acceptable. A masonry drill of the correct size shall be used to drill holes for plugs. Round-headed screws of the correct diameter to match the specific plug shall be used throughout.

F. ANCHOR BOLTS

Where the fixing holes are 10mm and larger or where the mass of the equipment is 10kg, equipment shall be fixed by means of expanding anchor bolts or by means of bolts cast into the concrete or built into walls.

G. GALVANIZED EQUIPMENT

Brass screws bolts and nuts shall be used to fix galvanized equipment.

H. SHOT FIRED FIXING

1. Materials such as metal cable ducts or channels may be fixed against walls and concrete slabs by means of the shot-fired fixings.
2. The Contractor shall ascertain whether this method of fixing will carry the weight of the material including conductors, cables and other items of equipment to be installed later. Should it be found that the method of fixing is inadequate and supports tend to loosen, the Contractor will be required to fix the material by an alternative method to the approval of the COR.
3. Where the shot-fired method is used, warning signs shall be placed at all entrances leading to the area where this work is in progress. The Contractor shall take all reasonable precautions to prevent accidents.
4. Nails and explosive charges recommended by the manufacturer shall be used throughout.

I. CLAMPS AND BRACKETS

Clamps and brackets used to fix or support equipment such as cable trays, ducts, etc. shall be of a purpose made type suitable for the specific application.

1.2.20 WIRING

This section covers wiring in approved wire-ways for electrical installations in buildings or other structures under normal environmental conditions for 50 Hz systems not exceeding 600 V.

A. TYPE OF CONDUCTORS

PVC-insulated or equivalent, stranded copper conductors and bare stranded or green PVC-insulated copper earth conductors. Only where cables are specified or in instances where the exceptions stipulated in SANS 10142 are applicable, may the Contractor deviate from this requirement.

B. WIRE-WAYS

1. All unarmoured conductors shall be installed in conduits, cable channels (trunking) or power skirting and shall under no circumstances be exposed. Cable channels and power skirting shall be of metal construction unless specifically approved to the contrary.
2. Contractor shall note that common wire-ways will only be permitted for relatively light current-carrying conductors such as lighting and socket (receptacle)-outlet circuits. Refer also to par. 4 below. Heavy current-carrying conductors such as feeders to distribution boards and large power points, must be installed in separate conduits or wire-ways.
3. Wiring shall only be carried out after the wire-way installation has been completed, but before painting has commenced. Debris and moisture shall be removed from the wireways prior to the installation of the conductors.

1.2.21 CIRCUITS

Conductors that are connected to different switchboards, shall not be installed in the same wireway. The wiring of one circuit only will be allowed in a 20 mm dia. conduit with the exception of the wiring from switchboards to fabricated sheet metal boxes close to switchboards in which case more than one circuit will be allowed. For larger conduit sizes the requirements of SANS 10142, shall be met.

1.2.22 LOOPING AND JOINTS

A loop-in wiring system where conductors are looped from outlet to outlet, shall be employed. Joints in conductors shall be avoided as far as possible but where it becomes unavoidable, joints will be accepted in cable channels only and not in conduits. Joints shall be soldered or shall alternatively consist of approved ferruling, properly covered with heat-shrink sleeves. The use of PVC insulation tape is not acceptable.

1.2.23 GROUPING OF CONDUCTORS

In cases where the conductors of more than one circuit are installed in the same wireway, the conductors of each separate circuit (including earth conductor) shall be taped at intervals of 1m with PVC insulation tape. The conductors of different circuits shall however remain separate in order that any given circuit can be withdrawn. Conductors entering switchboards or control boards shall be grouped and bound by means of plastic or metal bands (not tape).

1.2.24 CABLE TRAYS

Conductors may only be installed directly on cable trays if specifically approved by the COR. In these cases cable trays shall be at least 2m above walkways or working areas. Conductors of the same circuit shall be grouped in the same manner as described in the previous paragraph. All the conductors on the cable tray shall then be tied down securely to the cable tray at intervals of 2m or less by means of plastic or metal bands (not tape).

1.2.25 DRAWING IN OF CONDUCTORS

When conductors are drawn through conduit, care shall be taken that they are not kinked or twisted. Care shall also be taken that the conductors do not come into contact with materials or surfaces that may damage or otherwise adversely affect the durability of the conductor.

1.2.26 THREE-PHASE OUTLETS

- A. With the exception of three-phase outlets, circuits connected to different phases shall not normally be present at lighting, switch or socket (receptacle) (receptacle) outlet boxes. Where this is unavoidable, barriers shall be provided between terminals or connections of the various phases and the box shall be suitably labelled internally to indicate the presence of three phase voltages.
- B. A neutral conductor shall be installed to all three phase outlets intended for equipment connection, whether socket (receptacle) or isolators, irrespective of whether the particular equipment normally requires a neutral or not.

1.2.27 VERTICAL CONDUIT INSTALLATION

Conductors installed in vertical wire-ways shall be secured at intervals not exceeding 5m to support the weight of the conductors. Clamps shall be provided in suitable drawboxes for this purpose.

1.2.28 CONNECTIONS

The insulation of conductors shall only be removed over the portion of the conductors that enter the terminals of switches, socket (receptacle) outlets or other equipment. When more than one conductor enters a terminal, the strands shall be securely twisted together. Under no circumstances shall strands be cut off.

1.2.29 EARTHING CONDUCTORS

- A. When earth continuity conductors are looped between terminals of equipment, the looped conductor ends shall be twisted together and then soldered or ferruled to ensure that earth continuity is maintained when the conductors are removed from a terminal.
- B. The installation shall be earthed to comply with SANS 10142.
- C. The installation shall be bonded to comply with SANS 10142.

1.2.30 COLORS

The colors of conductor insulation shall comply with SANS 10142. The colors of conductors for sub-circuits shall as far as possible correspond with the color of the supply phase. The colors of conductors for wiring to two-way and intermediate switches shall preferably differ from the color

of phase conductors.

1.2.31 SINGLE POLE SWITCHES

Single pole switches shall be connected to the phase conductor and not to the neutral conductor.

1.2.32 SIZE OF CONDUCTORS

Where conductor sizes are not specified, the following minimum conductor sizes shall be used:

- A. Lighting circuits: 1,5mm² and 2.5mm² copper earth conductor
- B. Socket (receptacle) outlet circuits: 2,5mm² and 2,5mm² copper earth conductor.
- C. Bell circuits: 1,5mm²
- D. Stove circuits: 10mm² and 6mm² copper earth conductor

1.2.33 INSTALLATION OF LIGHT SWITCHES AND SOCKET (RECEPTACLE)-OUTLETS

A. STANDARDS

Light switches and socket (receptacle) outlets shall comply with the quality specification for "LIGHT SWITCHES", and UNSWITCHED AND SWITCHED SOCKET (RECEPTACLE) OUTLETS". Surface or flush mounted boxes and cover plates, complying with the Department's quality specification for "CONDUIT AND CONDUIT ACCESSORIES" shall be provided.

B. POSITION OF OUTLETS

Switches and socket (receptacle)-outlets shall be accurately positioned in accordance with the drawings. It is the Contractor's responsibility to ensure that all outlets are installed level and square, at the correct height from the floor and at the correct position relative to building lines and equipment positions as specified. It is the Contractor's responsibility to determine the correct final floor level and ceiling level.

C. COVER PLATES

All switches and socket (receptacle)-outlets shall be fitted with standard metal cover plates. The color of cover plates shall be as specified or shall otherwise match the surrounding finishes as closely as possible. Unless specified to the contrary, ivory cover plates shall be installed on painted walls. Cover plates in the same area shall have the same color. Flush mounted cover plates shall overlap the draw-box and edges of the recess. Cover plates shall under no circumstances be cut unless authorized by the COR.

D. ESCUTCHEON PLATES

Where flush mounted switches or socket (receptacle)-outlets are installed in special wall finishes e.g. wood or board panels, acoustic tiles or other cladding, etc. and where the wall finishes must be cut to accommodate the switch, it may be necessary to fix an escutcheon plate to the wall to cover the cut-outs. The escutcheon plate shall fit closely around the outlet boxes and shall be fixed independently of the boxes and cover plates. Beveled cover plates shall be fixed to the outlet boxes and shall fit firmly against the escutcheon plate.

E. APPEARANCE

The sides of adjacent switches, plugs, push-buttons etc. shall be parallel or perpendicular to each other and uniformly spaced. A common escutcheon plate shall be placed around flush mounted outlets and accessories where the standard cover plates do not cover the cut-outs in the finishes.

F. DEEP BOXES

Where switch or socket (receptacle)-outlet boxes have been set deep, spiral type steel wire spacers shall be used to fix the yoke of the switch or socket (receptacle).

1.2.34 INSTALLATION OF SOCKET (RECEPTACLE) OUTLETS

A. MOUNTING HEIGHT

Unless specified to the contrary, socket (receptacle)-outlets shall be installed at the following heights above finished floor level, measured to the center of the outlet:

1.	Flush mounted in general:	300mm
2.	Showrooms, shops, servants quarters:	1.4m
3.	Domestic kitchens, tea kitchens:	1.05m
4.	Commercial kitchens:	1.4m
5.	Factories, workshops, garages:	1.4m

B. WALLS

In cases where socket (receptacle)-outlets must be mounted at a nominal height of 300mm and where the lower portion of the wall consists of face bricks and the upper portion is plastered, the outlets shall be installed in the plastered portion of the wall. If however the plastered portion of the wall commences 500mm or more above floor level the outlets shall be installed in the face bricks. Where a wall has different surface finishes the outlets shall be installed within the same finish and not in the dividing lines between the different wall finishes. All outlets shall be installed at least 150mm away from door frames.

1.2.35 INSTALLATION OF LIGHT SWITCHES

A. MOUNTING

Light switches shall be installed 1.4m above finished floor level unless specified to the contrary. Mounting heights given shall be measured from the finished floor level to the center of the switch. All single switches shall be installed with the long side of the toggle vertical.

B. DOORS

Unless specified to the contrary, switches adjacent to doors shall be installed on the side containing the lock. If the position of the lock is not shown on the drawings, the position shall be verified before the switch-box is installed. Switch boxes in brick or concrete walls shall be installed 150mm from the door frame. Light switches installed in partitions or door frames shall be of the type designed for that purpose.

C. WALLS

Where the lower portion of a wall is face brick and the upper portion plastered, light switches shall be installed wholly in the plaster provided that the lower edge of the plaster is not higher than 1.6m above the finished floor level. In general where different wall finishes are used in the same area. Switches shall be installed within the same finish and not on the dividing lines between finishes.

D. PARTITIONS

Light switches installed in partitions shall preferably be of the type designed to be accommodated in the partition construction. Switches installed in the metal supports do not require switch boxes. Switches may not be flush mounted in partition walls without switch boxes.

E. WATERTIGHT SWITCHES

Switches that are exposed to the weather or are installed in damp areas shall be of the watertight type.

F. MULTIPLE SWITCHES

Where several switches are required in one position, multi-lever switches in a common switch box shall be provided wherever possible. All circuits wired into this box shall be on the same phase in order that voltages in excess of 250 V are not present in the box. Where it is not possible or practical to do this, barriers shall be installed and a label shall be prominently displayed within the box stating that voltages in excess of 250 V are present.

1.2.36 INSTALLATION OF LUMINAIRES

A. POSITIONS

The mounting positions of luminaires shall be verified on site. All luminaires shall be placed symmetrically with respect to ceiling panels, battens, beams, columns or other architectural features of the space unless otherwise indicated. The layout as shown in the Documents shall generally be adhered to but any discrepancies or clashes with structural or other features must be referred to the COR, before commencing erection of the installation.

B. COVER PLATES

Cover plates shall be fitted over all draw-boxes and outlets intended for luminaires that are not covered by the luminaires canopy, lamp-holder, ceiling rose or similar accessories.

C. FIXING TO DRAW BOXES

Where an outlet box or draw-box provides the necessary support for a luminaires, all luminaires with the exception of fluorescent luminaires mounted against ceilings, shall be fixed directly to the box. Fluorescent luminaires and luminaires with a mass in excess of 10kg shall however be suspended independently of the outlet box.

D. HANGERS AND SUPPORTS

Where provision has not been made for the fixing of luminaires, the Contractor shall supply the necessary supports, hangers, conduit extensions, angle brackets or any other fixing method approved by the COR.

E. SUSPENDED LUMINAIRES

The necessary hangers shall be provided where luminaries which are of the non-suspension type have to be fixed below false ceilings or roof slabs. The use of 20mm conduits fixed to the roof slab or ceiling is preferred. Provision shall be made for adjustments to enable the levelling of luminaries. Suspended conduits shall be fixed to the ceiling by means of screwed dome lids, bolts and nuts. Ball-and-spigot type dome lids shall be used where conduit lengths exceed 600mm. Wiring shall be installed in the conduit hangers.

F. SUSPENDED WIRING CHANNELS

Luminaries (especially fluorescent luminaries) may also be suspended from ceilings by means of suspended metal channels. The metal channel may be supported by conduits or threaded rods. Should metal rods be utilized, these shall be screwed to anchor bolts fixed in the roof slab. Wiring shall either be installed in conduits fixed to the metal channel or in the metal channels and covered with a suitable cover plate. Purpose-made clamps shall be used to fix the luminaries to the cable channel.

G. CEILING BATTENS

Where wooden blocks are used to suspend luminaries, ceiling battens shall not be cut. The wooden blocks shall be cut to fit around battens and shall be screwed to the ceiling. Battens may however be cut where fluorescent or incandescent luminaries with metal canopies have to be installed against a false ceiling.

H. GLASS-BOWL LUMINAIRES

Unless specified to the contrary, suspended glass-bowl luminaries shall be installed with the underside at least 2.1 m above finished floor level.

I. FLUORESCENT LUMINAIRES FIXED TO CONCRETE SLABS

Fluorescent luminaries to be installed directly against concrete slabs or walls shall be securely fixed to the outlet box and at two additional points. Shot-fired fixings are not acceptable. Where approved, fluorescent luminaries may be installed against metal wiring channels in which the wiring is housed. The channel fixing may in this case be shot-fired. Purpose-made fluorescent fixing adaptors shall be used to fix luminaries to cable channels.

1.2.37 FLUORESCENT LUMINAIRES FIXED TO CEILINGS

- A. In all cases where luminaries are fixed to false ceilings, the Contractor shall ensure that the ceiling is capable of carrying the weight of the luminaries before commencing installation. Should any doubt exist in this regard, the matter shall be referred to the COR.
- B. In cases where the weight of the luminaire is not carried by the ceiling but by a support or other suspension method, provision shall be made to prevent relative movement between the ceiling and luminaire, ceiling rose or connection point.
- C. Surface mounted fluorescent luminaries shall fit firmly against the ceiling branding without leaving gaps between luminaire and ceiling. The luminaire shall be fixed directly to the ceiling by means of brass plated round-head wood screws and washers.
- D. In the case of tiled ceilings with exposed or concealed T-section supports, surface mounted

luminaries shall be fixed only to the tiles by means of butterfly screws or bolts with nuts and washers. The tiles shall be suitably reinforced.

- E. Luminaries may alternatively be fixed to metal cross-pieces resting in the ceiling tees.
- F. Drilling of holes in ceiling tees to support luminaries will not be allowed.
- G. Luminaries shall be fixed in neat relation to the ceiling lay-out.

1.2.38 CONTINUOUS ROWS OF LUMINAIRES

In cases where fluorescent luminaries are installed in tandem, only one connection outlet need be supplied per circuit. All luminaries shall be coupled to one another by means of nipples or brass bushes and locknuts to ensure that wiring is not exposed and that earth continuity is maintained. Luminaries on the same circuit may be wired through the channel formed by the luminaire bodies. In this case silicon-rubber insulated conductors shall be used and internal connections shall be made at porcelain terminal blocks. "SCREW IT" or similar connectors may only be used if prior permission is obtained from the Department. The wiring for any other circuits or outlets, even though these may be in the same row, may not be installed through the luminaire bodies. The Contractor shall ensure that continuous rows are straight and parallel to the relevant building lines.

1.2.39 SPECIAL CEILINGS

In cases where special ceilings e.g. aluminum strips, decorative glass, metal leaves, etc. are to be installed, the Contractor and the Manufacturer of the ceiling shall agree upon the method of fixing of luminaries in the ceiling.

1.2.40 BULKHEAD LUMINAIRES

Surface mounted bulkhead luminaries shall not be screwed directly to conduit ends. The conduit shall terminate in a round draw-box at the top or rear of the luminaire. The PVC-insulated conductors shall terminate in a porcelain terminal strip in the draw-box. Silicon-rubber-insulated conductors shall be installed from the terminal strip to the luminaire lamp-holder. "SCREW-IT" or similar connectors may only be used if prior permission is obtained from the COR.

1.2.41 TYPE OF CONDUCTOR

PVC-insulated conductors, unless protected by an approved heat-resistant sheathing, shall not be used where the temperature of the insulation is likely to exceed 70°C. In unventilated luminaries or luminaries capable of housing incandescent lamps over 60W, the interconnecting wiring from the lamp-holder to the circuit wiring shall consist of silicon-rubber insulated conductors. Silicon-rubber insulated conductors shall be used exclusively in the case of high bay fittings. Refer also to the provisions of SANS 10142.

1.2.42 WIRING OF LAMP HOLDERS

The central terminal of Edison Screw (E.S.-type) LAMP-HOLDERS shall be connected to the phase conductor and the screwed housing to the neutral conductor.

1.2.43 CONNECTIONS TO EQUIPMENT

This section covers the final electrical connections to switchboards and various equipment in

general electrical installations under normal environmental conditions for system voltages up to 600 V.

1.2.44 CONNECTIONS TO SWITCHBOARDS

A. CONDUIT ENTRIES

1. Where sufficient space for conduit entries as well as adequate space for future conduit entries is available, conduits may be terminated directly on the switchboard.
2. Alternatively, conduits connected to switchboards shall terminate in a common fabricated sheet steel draw-box installed in the vicinity of the switchboard. In open roof spaces this draw-box shall be placed in a roof space of not less than 900mm clearance.
3. Lighting and socket (receptacle)-outlet circuits may be separately grouped in common conduits or metal ducts (trunking) from the distribution board to the draw-box. The drawbox shall be of sheet steel with a minimum thickness of 1,6mm and shall be fitted with a removable cover plate.

B. FLUSH MOUNTED SWITCHBOARDS

Where flush mounted switchboards are required, the recessed switchboard tray shall be built into the brick or concrete wall. All conduits from the floor or roof shall be fully recessed and shall be bonded directly to the tray by means of locknuts on both sides and the ends of the conduits fitted with a brass bush.

C. SURFACE MOUNTED SWITCHBOARDS

Where surface mounted switchboards are specified but where the conduits can be fully recessed, the conduit shall be connected to a recessed connection box installed behind the switchboard. An opening with the same dimensions as the connection box shall be cut in the back of the switchboard and fitted with a suitable grommet.

D. SPARE CONDUITS

Where conduits from a switchboard run into a false ceiling space above the board, a minimum of two 25mm and two 20mm spare conduits shall be installed into the ceiling space immediately above the board.

E. CABLE CONNECTIONS

1. Where underground cables are to be connected to switchboards, it shall be the responsibility of the Contractor to ensure that metal, earthenware, asbestos-cement or other approved sleeves are built in correctly to enable installation and connection of the cable to the switchboard.
2. PVC or pitch fibre sleeves are not acceptable.
3. Sleeves shall be installed with a fall from inside to outside of the building to facilitate drainage. The sleeves shall be sealed with a non-hardening compound after installation of the cables to render the installation vermin proof and waterproof.
4. A metal cable channel with removable metal cover plate shall be installed by the Contractor and shall extend from the switchboard to the floor or into the ceiling void as required. The channel shall coincide with the position of sleeves. The channel shall be flush mounted except in the case of surface mounted switchboards and then only with

the permission of the COR.

5. The cable channel shall be large enough to permit the installation of cable glands and future cables, particularly where spare sleeves have been provided.
6. The color of the channel cover shall match that of the associated switchboard.

F. CABLE TRENCHES

Where cables in floor trenches have to be connected to wall mounted switchboards, approved sleeves or conduits shall be installed from the side of the trench to the bottom of the switchboard. These sleeves shall be positioned and fixed before the concrete is cast.

1.2.45 CONNECTIONS TO MOTOR DRIVEN EQUIPMENT.

- A. An isolator or starter containing an isolator shall be installed within 2m of motor driven equipment. The requirements of SANS 10142 shall be met. If this isolator cannot be installed on a wall, switchboard or other suitable place, an approved free-standing pedestal shall be provided. The pedestal shall be 1m high and outside normal walkways, access routes, etc.
- B. The connection to the equipment shall be carried out as follows:
 1. Metal reinforced plastic or PVC-covered flexible metal conduits with individual conductors or a multi-core PVC insulated cable and separate bare earth conductor installed inside the conduit may be used. The flexible conduit shall not exceed 600mm. Screwed conduit shall be used from the end of the flexible conduit to the isolator and/or starter. Refer to the department's standard specification for "FLEXIBLE CONDUIT", Section B1, par. 5.
 2. Multi core armoured PVC- or rubber-insulated cable and earth conductor.
 3. Cables and flexible conduits shall be provided with sufficient slack to allow positional adjustment of the equipment.
- C. Supply cables to equipment may not be installed across floors which are for general use.

1.2.46 CONNECTIONS TO WATER HEATERS

- A. Each water heater shall be connected to a separate circuit with a separate earth conductor.
- B. The conduit from the switchboard to the water heater shall terminate in a draw-box within 1 m of the water heater terminals. The connection from the draw-box shall be conductors in conduit or PVC-insulated cable. Only in instances where heaters are mounted out of normal reach may flexible conduit and round boxes with dome lids be used for the final connection.
- C. Three-phase supplies to fixed storage water heaters shall be in accordance with manufacturer's requirements.
- D. The mounting of the water heater and the provision of the water connections will be undertaken by others. The Contractor shall ensure that the elements and thermostats can easily be replaced.
- E. Before testing a water heater, the Contractor shall confirm with the Plumbing Contractor that the unit is filled with water.

- F. Unless otherwise specified in the Detail Technical Specification, the wiring of hot water heater circuits not exceeding 4 kW shall consist of 4mm² conductors and 2,5mm² earth conductor.
- G. Unless it is specified that isolators for water heaters shall be provided in the switchboard, a local isolator shall be provided for each water heater. In the case of water heaters not exceeding 4 kW, a 30 A double-pole metal-clad isolator shall be surface mounted over the flush conduit outlet box.

1.2.47 CONNECTIONS TO AIR CONDITIONING UNITS

A. ISOLATORS

A flush mounted suitably rated double-pole isolator shall be provided within 1m of the unit. Where the equipment is mounted out of reach, the isolator shall be installed at 1,5m above floor level. Only where units are mounted in easily accessible positions and where an isolating switch is incorporated in the unit, may this isolator be omitted. Where flush isolators are used, flush conduit shall be installed to link with the equipment outlet point. Flexible cords of sufficient rating may be used for the final connection to the equipment.

B. WIRING

The minimum conductor size to be used shall be 4 mm². Each fan, heater or air-conditioning unit shall be on a separate circuit.

C. FLUSH MOUNTED CONVECTION HEATERS

The heater frame or tray shall be built or cast into the wall at a height such that the underside of the heater is at 250mm above floor level. Conduits shall terminate on the frame near the terminals.

D. SURFACE MOUNTED EQUIPMENT

1. Connections to surface mounted equipment shall consist of a draw-box located in the vicinity of the terminals of the unit. In workshops and industrial areas the connections shall be made by means of flexible conduit connected to dome lids on the draw-box. Conductors shall be connected directly to the unit.
2. In non-industrial applications, PVC-insulated 3-core flexible cables may be used for the connection.
3. Where flexible cables are used, a bush shall be provided at the rear of the unit for cable entry and a bush and clamp (or gripper gland) at the draw-box. The clamp shall tightly grip the outer insulation of the cable to prevent tension on the connections between cable and conductors in the draw-box.
4. Where air-conditioning units are situated above power skirting, the isolator shall be installed in the power skirting and the flexible cable or cord to the unit shall be installed in the power skirting through a gripper or compression gland. The cable shall be made as short as practical and shall be neatly saddled to the surface of the wall.
5. Each connection shall be protected by means of a single-pole circuit-breaker on the associated switchboard.
6. Brass bushes shall be provided to protect the wiring at the rear cable entries to the

control unit and fan connection box.

1.2.48 CONNECTIONS TO COOKING APPLIANCES

- A. Unless specified to the contrary, the circuit connection to each cooking appliance shall consist of:
 - 1. 2 x 10mm² PVC-insulated conductors and 6mm² bare copper earth conductor for single phase connections, or
 - 2. 4 x 4mm² PVC-insulated conductors and 2,5mm² bare copper earth conductor for three phase connections.
- B. A 60A double pole or 30A triple pole micro-gap isolator flush mounted in a wall outlet box, shall be installed 1,5m above floor level to the left or right of the appliance in accordance with SANS 10142. A white baked enamel cover plate shall be provided, situated wholly on the tiled or plastered surface as applicable.
- C. The conduit shall terminate 450mm above floor level behind the appliance position. The conduit end shall be approximately 75mm long and shall face downwards. Connections from the conduit end to the appliance shall be installed in accordance with SANS 10142. Sufficient slack shall be provided in the flexible connection to move the appliance 600mm away from its normal position for cleaning or maintenance.
- D. Alternatively a 45A, 3-pin socket (receptacle)-outlet may be mounted on a round draw-box 450mm above floor level. The connection to the appliance shall consist of a plug and 10mm², rubber-insulated and sheathed cable in accordance with SANS 1520. The cable shall be long enough to enable the appliance to be moved 600mm from its normal position for cleaning or maintenance.
- E. Crimped or soldered lugs shall be provided on all conductors intended for connection to cooking appliances.
- F. Each appliance shall be connected to a separate circuit. A separate earth wire shall be provided for each appliance.

1.2.49 EARTHING OF A GENERAL ELECTRICAL INSTALLATION

All earth conductors shall be stranded copper with or without green PVC insulation. The conductors shall comply with the quality specification for "PVC-INSULATED CABLES". All earth conductor sizes shall be determined in accordance with SANS 10142, par. 4.6 where the earth does not form an integral part of the cable.

A. SWITCHBOARDS

A separate earth connection shall be supplied between the earth busbar of the main switchboard and the earth busbar of every sub-switchboard. These connections shall consist of bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively armored cables with earth continuity conductors included in the armoring may be utilized.

B. SUB-CIRCUITS

The earth conductors of all sub-circuits shall be connected to the earth busbar in the supply switchboard in accordance with SANS 10142.

C. RING MAINS

Common earth conductors may be used where various circuits are installed in the same wiring channel in accordance with SANS 10142. In such instances the sizes of earth conductors shall be specifically approved by the Department. Earth conductors for individual circuits branching from the ring main shall be connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

D. CONNECTIONS

Under no circumstances shall connection points, bolts, screws, etc. used for earthing be utilized for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided. Unless earth conductors are connected to proper terminals, the ends shall be tinned and lugged. Lugs may be crimped, using mechanical or pneumatic tools designed for this purpose, on condition that evidence is submitted that the method used complies with the performance requirements of BS 4579, Part 1: "COMPRESSION JOINTS IN COPPER."

E. NON METALLIC CONDUIT

Where non-metallic conduit is specified or allowed, stranded copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including switch boxes, socket (receptacle)-outlet boxes, draw-boxes, switchboards, luminaries, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

F. FLEXIBLE CONDUIT

An earth conductor shall be installed in all non-metallic flexible conduit. This earth conductor shall not be installed external to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

G. WATER PIPES

Metal cold water mains shall be bonded to the earth busbar in the Main Switchboard by solid 15 x 2mm copper strapping. All other hot and cold water pipes shall be connected by 12 x 0,8mm perforated or solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipe work by brass nuts and bolts and against walls be brass screws at 150mm centers. In all cases where metal water pipes, down pipes, flues, etc. are positioned within 1.6 m of switchboards, an earth connection consisting of copper strapping shall be installed between the pipe work and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each switchboard.

H. ROOFS

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor of each switchboard. The roof and gutters shall be connected at 15m intervals to this conductor by means of 12 x 0.8mm copper strapping (not conductors) and galvanized bolts and nuts. Self-tapping screws are not acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

1.3 SITE LOCATION:

Marine Security Guard Residence (MSGR)
16 Daan Bekker Street
Windhoek, Namibia

- 1.4 Work shall be completed as expeditiously as possible. The structure will not be occupied during the execution of this contract. Contractor shall coordinate with Contracting Officer for work phasing and job sequencing with work commencing and completing each section of the work in a sequential manner. Electrical work shall be coordinated with other contracts where noted. Contractor to submit a phasing plan with construction schedule for review and approval prior to commencement of work at the site.

2.0 GENERAL REQUIREMENTS

- 2.1 The Contractor shall provide quantity surveyors, construction personnel, equipment, materials, tools and supervision as needed to complete the services that meet the technical requirements in this Statement of Work [SOW]. It is expected that the Contractor shall partner closely with Embassy personnel.
- 2.2 The work shall be executed in a diligent manner in accordance with a negotiated firm fixed price and performance period. The period of performance for all Phases of the project shall be completed in **90 calendar days** from Notice to Proceed.
- 2.3 The Contractor shall have limited access to or be admitted into any structure outside the areas designated for the project except with permission by the Embassy. The Contractor shall address the impact of the consequent disruption and provide for a continuing level of operation for continuous occupation of the MSGR during construction.
- 2.4 The Contractor shall be required to prepare and submit reports, bill of materials, product literature, drawings, specifications, quality control schedules, safety plan and construction costs. These documents shall provide the necessary interfaces, coordination, and communication between the Embassy and Contractor for the delivery of a completed project.

3.0 GOVERNMENT MATERIAL (GM)

Pursuant to Contract Clause FAR 52-245-2, Government-Furnished Property (Short Form), the Government will furnish the following materials and equipment for the installation by the Contractor. The Government Material (GM) is stored at **U.S. Embassy**. The contractor shall move, uncrate, assemble, and install the GM. GM shall be uncrated and inspected by the contractor in the presence of the Contracting Officer's Representative (COR) to determine any damaged or missing parts. The contractor shall be responsible for damage or loss occurring after this inspection. The contractor shall notify the COR fourteen (14) days in advance of the date the GM is needed. Any GM not incorporated in the work shall be returned to the Government and placed in storage at **U.S. Embassy** as directed by the COR.

- 3.1 Contractor shall provide adequate quantities of materials in addition to the inventory of materials currently stored at the site to provide a complete the project as specified. Detailed List of Items provided at the site includes:

- **Emergency Generator**

4.0 CONTRACT ADMINISTRATION

- 4.1 The Contractor shall not conduct any work that is beyond this Statement of Work and accompanying specifications unless directed in writing by the Contracting Officer [CO]. Any work done by the Contractor beyond this SOW and accompanying specifications without direction from the CO will be at the Contractor's own risk and at no cost to the Embassy.
- 4.2 The Contracting Officer shall provide a Notice to Proceed [NTP] to the Contractor. No work shall be initiated until the NTP is issued by the CO.
- 4.3 The Contracting Officer may designate more than one individual to serve as the Contracting Officer's Representative [COR]. The Contractor will be furnished evidence of COR appointments, including explicit authority delegated to each COR and their responsibilities.
- 4.4 The Embassy does not make representations or warranties of whatsoever kind or nature, either expressed or implied, as to the quality, level of completion, accuracy, extent of compliance with the standards, codes and requirements described or referred to in this SOW, or the extent of coordination between or among the documents provided to the Contractor.
- 4.5 The Embassy's review, approval, or acceptance of, nor payment for the services required under this contract shall be construed to operate as a waiver of any rights under this contract or any cause of action against the Contractor arising out of the performance of this contract.
- 4.6 The Embassy has the right to inspect and test all services called for by the contract, to the extent practicable at all times and places during the term of the contract. The Office of Overseas Buildings may perform quality assurance inspections [QAI] and tests during construction to confirm the work is installed according to the SOW.
- 4.7 The Contracting Officer has the authority to issue a temporary stop order during the execution of any particular phase of this SOW. This authority may be executed when the Embassy requires time for official functions, or is in possession of specific credible information indicating that the lives of Embassy personnel are immediately threatened and that the execution of the project will increase the Embassy's vulnerability. The Contractor shall promptly notify the CO that work has been stopped.
- 4.8 If any of the Contractor's services do not conform to the contract requirements, the COR may require the Contractor to perform the services again in conformity with the contract requirements. The Embassy may by contract or otherwise, perform the services and charge the Contractor any cost incurred by the Embassy that is directly related to the performance of such service or terminate the contract for default.
- 4.9 The Embassy has the right to terminate this contract of convenience at any time in whole, or from time to time, if the Contracting Officer determines it is in the interest of the Embassy.

5.0 RESPONSIBILITY OF THE CONTRACTOR

- 5.1 The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all construction and other services furnished under this contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiencies in its construction and other services.

- 5.2 The Contractor shall identify a Project Site Manager who shall be responsible for the overall management of the project and shall represent the Contractor on the site during construction. The Project Site Manager shall be approved by the COR.
- 5.3 The Project Site Manager shall attend all project meetings, prepare Status Reports on the project and submit them to the COR. Status Reports shall contain meeting minutes, accomplishments, arising concerns and proposed solutions, any proposed changed orders, and any other pertinent information required to report the progress of performance.
- 5.4 All documentation produced for this project will become the ownership of the Embassy at the completion of this project.
- 5.5 The Contractor shall verify that all materials, equipment, and systems provide operational dependability. The Contractor assures the completed construction shall be easily maintained or replaced with readily available materials and services.
- 5.6 Any cost associated with services subcontracted by the Contractor shall be borne by and be the complete responsibility of the Contractor under the fixed price of this contract.
- 5.7 The Contractor is responsible for safety and shall comply with all local labor laws, regulations, customs and practices pertaining to labor, safety and similar matters. The Contractor shall promptly report all accidents resulting in lost time, disabling, or fatal injuries to the COR.
- 5.8 The Contractor shall be and remain liable to the Embassy in accordance with applicable law for all damages to the Embassy caused by the Contractor's negligent performance of any of the services furnished under this contract. The rights and remedies for the Embassy provided for under this contract are in addition to any other rights and remedies provided by law.

6.0 PRE-CONSTRUCTION REQUIREMENTS

- 6.1 The Contractor shall examine all the documents and visit the site to fully inform themselves of all the conditions and limitations applied to the work and submit a firm fixed price cost proposal for all the work. No subsequent cost allowance will be made to the Contractor for neglect of the existing conditions.
- 6.2 Submit Initial Project Execution Schedule and Base Line Project execution.
- 6.3 Submit a copy of a Contractor's Installation Guarantee covering the work, labor and equipment for a period of ONE [1] year at no cost to the Contracting Officer signed by the Contractor.
- 6.4 Submit a Bill of Materials [BOM], product literature, samples and standard specification submittals of all materials to be used in the project provided by the contractor. The BOM's shall list the equipment and materials in sufficient detail that a purchase order for the materials and equipment can be executed without further elaboration or specifications. These documents will be used by the COR to approve all equipment and materials.

6.5 Construction Cost Estimate - The Contractor shall prepare an electronic cost estimate, using Microsoft Excel, for each Task to be submitted for review to reflect an estimate of total construction costs for the project. The estimate shall provide sufficient detail using descriptive building component line items with corresponding unit's for quantities, materials and labor. Total costs shall include contractor overhead, profit and taxes.

7.0 CONSTRUCTION REQUIREMENTS

7.1 No construction shall begin until approvals of the Pre-Construction Submittals are accepted by the COR.

7.2 The Contractor shall be responsible for all required materials not provided by the Embassy, equipment and personnel to manage, administer, and supervise the project. All workmanship shall be of good quality and performed in a skillful manner as determined by the COR.

7.3 All materials and equipment incorporated into the project shall be new unless noted otherwise. The Contractor shall transport and safeguard all materials and equipment required for construction.

7.4 Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations. Damaged or defective items shall be replaced. The contractor will be responsible for security of all materials and equipment.

7.5 Receipt Of Materials - Shipment of equipment, materials, and supplies shall be addressed to the Contractor - not the Embassy. The Contractor must be on hand to accept shipments; the Embassy will not accept shipments.

7.6 The Contractor will be provided with a storage and staging area as determined by the COR. The Contractor shall be responsible for restoring the area to its original condition at the completion of the work. The Contractor shall be responsible for repair of any damage incurred to buildings or pavement as a result of storage activities. The Contractor is responsible for obtaining any additional off compound storage areas as required.

7.7 The Contractor shall at all times keep the work area free from accumulation of waste materials. Upon completing construction, the Contractor shall remove all temporary facilities and leave the project site in a clean and orderly condition acceptable to the COR.

7.8 The Contractor shall perform the work at the site during the Embassy's normal workday hours, unless agreed upon with the COR.

7.9 The Contractor shall be responsible for connection of temporary utilities to existing utilities including water and power lines. All temporary connections to local water and power lines shall be coordinated with the COR. The Contractor shall pay all costs incurred in connecting, converting, and transferring the utilities to the work. The Contractor shall be responsible for making connections including providing back flow preventer devices on connections to domestic water lines, providing transformers, and for disconnections.

7.10 At the end of each work day, or notification of a temporary stop order, the Contractor shall lower and fixed all temporary work platforms and/or harnesses. Contractor shall notify the COR of the temporary barricade locations. Beginning the next workday, the contractor shall remove the temporary barricades before continuing the project.

- 7.11 Storm Protection - Should warnings of wind of gale force or stronger be issued, the Contractor shall take every practicable precaution to minimize danger to person, the work and adjacent property. Precautions shall include, but not be limited to, closing all openings, removing all loose materials, tools and equipment from exposed locations, and other temporary work.
- 7.12 Cleanup - The Contractor shall keep the work area, including storage areas, free from accumulations of waste materials on a daily basis and comply with all federal, state and local regulations pertaining to the storage, transport and disposal of wastes. The Contractor shall not use Embassy waste disposal facilities including garbage cans, trash piles or dumpsters.
- 7.13 Landscape Restoration - The surfaces of all unpaved areas disturbed by construction activities shall be sodded with an approved grass native to the sodded area as approved by the COR. These shall include areas which existing pavement is removed, areas where excavation takes place, and areas where existing sod is killed or compacted by construction activities. Landscape shrubs killed or damaged by construction activities shall be replaced with same species and size.

8.0 CRITERIA

- 8.1 The Contractor work shall in accordance with U.S. codes and standards. The COR will review and comment on the Contractor's submissions using the following codes and standards:
American Society for Testing & Materials,

- International Building Code [IBC]
- National Electric Code [NEC]
- South African Building Code

9.0 DELIVERABLE SCHEDULE

- 9.1 The Contractor shall commence work under this contract promptly, execute the work diligently, and achieve final completion and acceptance including final cleanup of the premises within the period specified.

9.2	Milestones:	
	Contractor Pre-Proposal Site Visit	July 21, 2014
	Award of Contract & Notice to Proceed	August 11, 2014
	Pre-Construction Submittals	Within 10 days of NTP
	Embassy Submittal Review	14 days
	Construction Begins	Within 14 days of NTP
	Substantial Completion	NTP + 90 calendar days
	Beneficial Occupancy	Substantial Completion + 5 calendar days

- 9.3 Project Completion: Furnish two (2) hard copies of maintenance and operating information, Contractor's one year workmanship guarantee and product literature of all items installed.

10.0 PROJECT SECURITY

- 10.1 The work to be performed under this contract requires that the Contractor, its employees and sub-contractors submit corporate, financial and personnel information for review by the Embassy. Information submitted by the Contractor will not be disclosed beyond the Embassy.

10.2 The Contractor shall submit this information including construction vehicle requirements within 10 days of the Notice to Proceed.

10.3 Contractor Personnel Security

After award of the contract, the Contractor shall have ten (10) days to submit to the Contracting Officer's representative, a list of workers, supervisors and consultants assigned to this project (Biographic Data on Personnel) for the Embassy to conduct all necessary security checks, which may include National Criminal Indices Checks (NCICs). For each individual the list shall include:

- Full Name
- Place and Date of Birth
- Current Address
- Identification number
- Passport Number
- Passport Date of Issuance and Expiration

Failure to provide any of the above information may be considered grounds for rejection and/or re-submittal of the application. Once the Embassy has completed the security screening and approved the applicants, the Embassy will provide a badge to the individual for access to the site. The Embassy may revoke this badge at any time due to the falsification of data, or misconduct on site.

11.0 PAYMENTS

11.1 The Contractor shall provide a fixed priced lump sum proposal to the Contracting Officer. The Contractor may submit requests for progress payments at monthly intervals to cover the value of labor and materials completed to date. In making progress payments, there shall be retained 10% of the amount due until final completion.

11.2 The Contractor shall submit one copy of all payment invoices, with the appropriate backup documents to the COR. The COR will determine if the invoice is complete and proper as submitted. The COR also will determine if billed services have been satisfactorily performed and if expenses billed are correct. If it is determined that the amount billed is incorrect, the COR will within seven days, request the Contractor to submit a revised invoice.

11.3 The Contractor shall specifically identify his last invoice "Final Invoice." The Final invoice shall include the remaining payment claimed to be due under the basic contract and all modifications issued, if any. The final invoice shall also have the Contractor's Release of Claims Certificate attached.

12.0 PROJECT CLOSE OUT

12.1 FINAL INSPECTION AND ACCEPTANCE

12.1.1 When the work is complete and ready for final inspection, submit a written request for final inspection (at least with 7 days anticipation) to the Contracting Officer.

12.1.2 During the course of the inspection, the representative of the COR will compile a list of items (if any) requiring further attention. A copy of this list will be provided to the Contractor who will have a period of 7 days in which to rectify the offending items of the installation.

12.1.3 The Contractor shall then provide written notice that he is ready for an inspection of the remedial work to the offending items.

12.1.4 This procedure will continue until the entire installation has been correctly completed to the satisfaction of the COR.

12.2 WARRANTIES

All warranties and/or guarantees, either implied or expressed, for individual equipment shall be endorsed to Government.

12.3 FIELD TESTS

Notify, in writing, the COR at least 10 working days in advance of the dates and times scheduled for all field tests.

In addition to the above the Contractor shall have the complete installation tested and approved by the local authorities where applicable.

Subsequent to the above testing and approval, the Contractor shall in the presence of the COR test all circuits with respect to:

1. Phase balance.
2. Insulation level.
3. Polarity.

Upon completion of the installation and within 3 months of the handover date, the Contractor shall provide and make available a recording voltmeter to record the voltage at three locations in the complex over a period of 48 hours each. These locations will be determined by the COR.

12.4 "AS-BUILT" DRAWINGS

At the completion of the work, the Contractor shall provide the COR with as built drawings showing the exact location measured from fixed points of all cables, equipment, disconnects, panel boards, receptacles and light fixtures.

In addition a complete one-line diagram showing all supply cables, disconnects and switchboards; coordinated distribution and identification circuits inclusive of conduits with conductors.

The installation will not be regarded as complete until all of the above requirements listed in 1, 2 and 3 above have been met.

12.4 INSTRUCTION TO GOVERNMENT PERSONNEL *(IF APPLICABLE)*

The contractor shall furnish the services of competent instructors who will give full instructions to the designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or systems specified. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. Instruction for government personnel shall be coordinated for specified equipment and systems. At a minimum training shall be provided for equipment/systems. Commissioning shall

be provided before training. A minimal of four (4) training hours with material handouts shall be provided based on manufacturer's data for operation.

13.0 APPENDICES

13.1 Electrical Product Examples – 9 Sheets

13.2 Construction Drawings – 7 Sheets

END OF STATEMENT OF WORK

WINDHOEK MSGR
RENOVATION PROJECT

ELECTRICAL
PRODUCT EXAMPLES

APPENDIX 13.1

REVISION 1 - 7/18/2014

KINGSHIELD

EXTERIOR WALL MOUNTED

PART NO: LEDFLPIR & LEDFL

LED FLOODLIGHTS

L-1

KingShield are pleased to introduce the new LED Floodlights to its range of LED lighting. These floodlights, with their modern design, come with and without a PIR sensor to give you more choice of fitting.

PASSIVE INFARED SENSORS

Complete with **PIR** Sensor

IP65 Rated

High quality aluminium body

Lower energy alternative to xenon

Colour Temperature - 6,000k

Long life span of 50,000 hours

70 lm/W



LED FLOODLIGHTS

With PIR



LEDFLPIR10/20

Detection angle 120°
Detection distance 8m

LEDFLPIR10
- 10 Watt with PIR

L-1A

LEDFLPIR20
- 20 Watt with PIR

LEDFLPIR30
- 30 Watt with PIR

L-1



LEDFLPIR30

Without PIR



LEDFL10/20

LEDFL10
- 10 Watt
LEDFL20
- 20 Watt
LEDFL30
- 30 Watt



LEDFL30

*High Lighting Efficiency at
Lower Power Costs*

Search



EXTERIOR LIGHT WALL MOUNTED

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PowerBreaker

RCDs

KingShield

SafetySure RCDs

PowerX Weatherproof

Wiring Accessories

Bells & Chimes

Indoor Lighting

Outdoor Lighting

Emergency Lighting

Timers, Sensors & Security

Heating & Ventilation

Relays

ToolShield

Super Rod

Tools

Norslo

Cable Termination

Cable Management

Fixings, Accessories & Consumables

New Products

100W Polycarbonate Anti-Vandal Bulkhead Clear



Product ID: POLY

- Anti-Vandal Polycarbonate Diffuser
- Non-corrosive aluminium body
- B22 bayonet cap lampholder
- Requires 40W tungsten filament lamps
- Lamps not supplied
- Suitable for use with low energy lamps
- IP65
- Dimensions: H130 x W240 x D100mm

▶ [Click HERE](#) for Instruction manual

[Outdoor Lighting >](#)

IP65 Bulkheads



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KingShield

SafetySure RCDs

PowerX Weatherproof

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Heating & Ventilation

Relays

ToolShield

Super Rod

Tools

Norslo

Cable Termination

Cable Management

Fixings, Accessories & Consumables

New Products

IP65 CFL Square Bulkheads



Product ID: 2DS28

Dimensions: Base Ø 250mm, Height 87mm

2DS28BO Black bezel, Opal diffuser
17 lm/W

2DS28WO White bezel, Opal diffuser
17 lm/W

2DS28BP Black bezel, Prismatic diffuser
41 lm/W

2DS28WP White bezel, Prismatic diffuser

41 lm/W

[Emergency Gear Trays](#)

CFLTRAYS Emergency Gear Tray

► [Click HERE](#) for Instruction manual

[Emergency Lighting >](#)

Emergency CFL Bulkheads

This range of CFL bulkheads are suitable for indoor or outdoor use, constructed from polycarbonate and have a high frequency electronic ballast. Available with either a white or black base and either an opal or prismatic diffuser. All fittings are supplied with white bezel unless stated otherwise.

- High Frequency Ballast
- Class 1 construction
- Polycarbonate diffuser and base
- GR8q, 4 pin lamp supplied
- F marked
- 230V AC 50Hz
- Battery life is greater than 3 hours in emergency mode when used with emergency gear tray
- Conforms to EN60598-2-1



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IP65 HF ANTI-CORROSSIVE FLUORESCENT LUMINAIRES

The KingShield ACP light fittings include **High Frequency Ballast**, suitable for commercial and industrial applications. Complete with polycarbonate base and diffuser with stainless steel clips and fixing clips. Emergency pack available on request.

Fittings include HF Ballast

Polycarbonate base and diffuser

Stainless steel diffuser clips and fixing clips

Suitable for commercial and industrial applications

Takes T8 fluorescent tubes (not supplied)

Emergency option available

110V option available



IP Rating IP65
Conforms to EN 60598-1

PART NO.	EMERGENCY VERSION	DESCRIPTION	LENGTH
ACPHF118	-	18W Single Lamp 6 clips	675mm / 2ft
ACPHF136	ACPHF136EM	36W Twin Lamp 8 clips	1271mm / 4ft
ACPHF158	ACPHF158EM	58W Single Lamp 10 clips	1580mm / 5ft
ACPHF170	ACPHF170EM	70W Single Lamp 12 clips	1830mm / 6ft
ACPHF218	-	18W Twin Lamp 6 clips	675mm / 2ft
ACPHF236	ACPHF236EM	36W Twin Lamp 8 clips	1271mm / 4ft
ACPHF258	ACPHF258EM	58W Twin Lamp 10 clips	1580mm / 5ft
ACPHF270	ACPHF270EM	70W Twin Lamp 12 clips	1830mm / 6ft
110V			
ACPHFLV158	-	58W Single Lamp - Yellow 10 clips 110V	1580mm / 5ft
ACPHFLV258	-	58W Twin Lamp - Yellow 10 clips 110V	1580mm / 5ft

HF ANTI-CORROSSIVE FLUORESCENT LUMINAIRES

LED TWIN SPOT

The KingShield Non-Maintained IP20 LED Twin Spot for interior installations provides up to three hours of emergency lighting thanks to the 1 x 3.6V, 4.5Ah battery (supplied). The smart polycarbonate body in a bright white finish unit provides the ideal choice for warehouses, factories and long corridors.

IP20 Rated

Non-Maintained

Health Indicator

LED low power consumption

Emergency operation duration 3 hours

Polycarbonate body - white finish

Carry handle - easy to transport

Multiple of uses - good in a power cut and for around the home

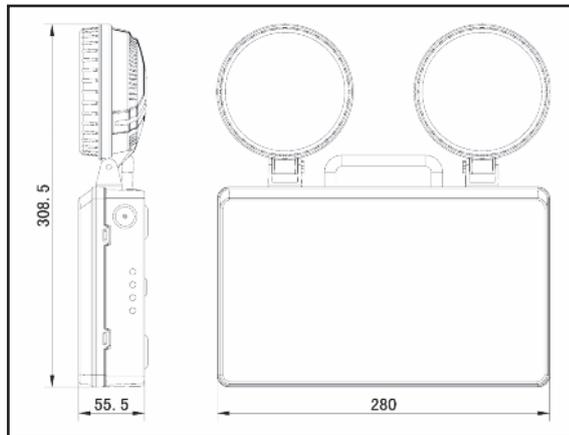
Conforms to **BS EN60598-1:2008 & A1:2006**
BS EN 60598-2-22:1998



ELTSLED20NM - LED Twin Spot

Power Rating:	230V AC 50Hz
IP Rating:	IP20
LED Power Consumption:	3.2W Total, 130 lm/W
Ambient Temp:	-10°C - 40°C
Battery Type:	1 x 3.6V 4.5Ah Ni Cd Battery (supplied)

LED TWIN SPOT



ELTSLED20NM

EXIT SIGNS

A range of shallow profile, emergency luminaires for interior applications. Suitable for Non-Maintained and Maintained usage.

Emergency operation duration 3 hours

Facility for remote switching

Dual fused & switched mains terminal

Power Rating	230V AC 50Hz
IP Rating	IP20
Conforms to	BS EN 60598-1:2004 & A1:2006, BS EN 60598-2-22:1999



EXIT SIGNS



ELEXLED

- Comes complete with 3 legends
- Lightweight polycarbonate case
- High brightness
- Easy installation
- Long life span
- Low energy
- Attractive design

Technical Data

1.3W Exit Light
3 X AA cell battery pack
Polycarbonate body & white finish
Ambient Temp 0-40°C

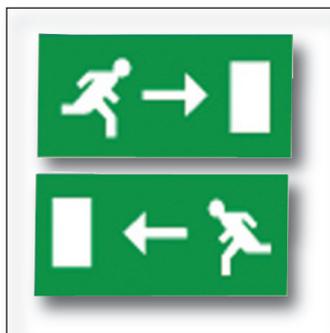


ELEXS

- Supplied with down legend
- Durable steel case
- Long life span
- Attractive design
- Easy installation

Technical Data

8W Exit Light
Supplied with 1 x 8W G5 T5 Tube &
2 x D cell battery pack
Steel body & white finish
Ambient Temp 0-25°C



ELLEX

- Reversible legends for Exit Light

WALL MOUNTED AT BATHROOMS



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PowerBreaker

RCDs

KingShield

SafetySure RCDs

PowerX Weatherproof

Wiring Accessories

Bells & Chimes

Indoor Lighting

Outdoor Lighting

Emergency Lighting

Timers, Sensors & Security

Heating & Ventilation

Relays

ToolShield

Super Rod

Tools

Norslo

Cable Termination

Cable Management

Fixings, Accessories & Consumables

New Products

[Wiring Accessories >](#)

Bathroom Shaver Sockets - Double Gang

Traditional double gang dual voltage Shaver Sockets suitable for bathroom use.

- Manufactured in high gloss thermoplastic
- 230V AC, 115/230V AC Dual voltage
- Accepts British and Continental plugs
- 20VA double wound transformer
- One shot thermal protection
- Auto switching shutters - to prevent two plugs being inserted at the same time
- Conforms to EN61558-1 & EN61558-2-5
- Dimensions H146 x W85 x D49mm



SHAS
Curved Front Face
White



P17
Flat Front Face
White



P17C
Flat Front Face
Polished Chrome



P17SC
Flat Front Face
Satin Chrome

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KITCHEN

CAT. No. 73225X45	SOUTH AFRICA, INDIA, UNITED KINGDOM BS546 COMBINATION 6/16 AMPERE-230 VOLT 50/60 Hz (UK2-15R / UK3-5R) GFCI (RCBO / RCD) OUTLET, 10 Ma. TRIP, 2 POLE-3 WIRE GROUNDING. FLUSH MOUNT TO AMERICAN 2 GANG WALL BOXES. WHITE.
-----------------------------	--

CERTIFICATIONS	CE <input checked="" type="checkbox"/> ROHS <input checked="" type="checkbox"/>
STANDARDS	BS546 <input checked="" type="checkbox"/> BS546A <input checked="" type="checkbox"/> IS 1293 <input checked="" type="checkbox"/> SABS 164 <input checked="" type="checkbox"/>

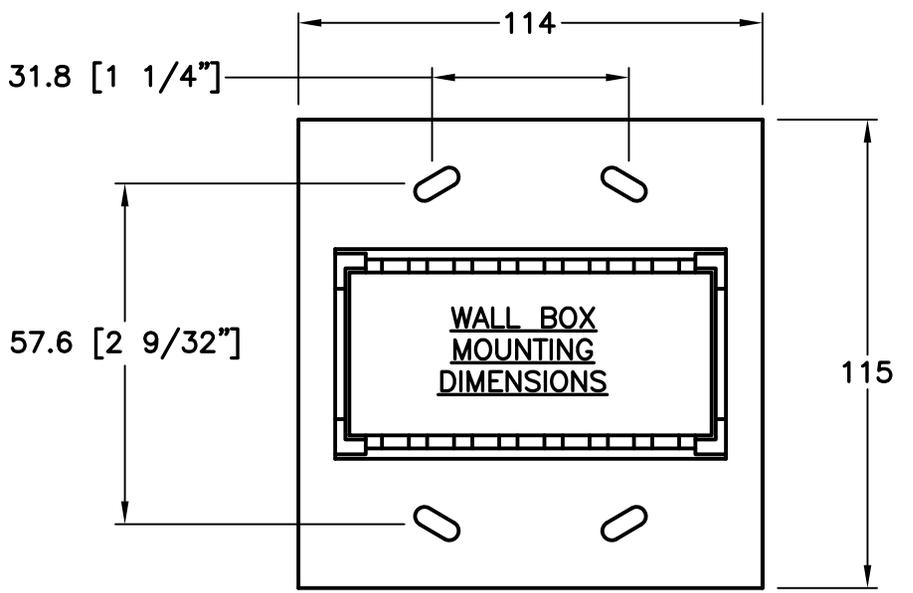
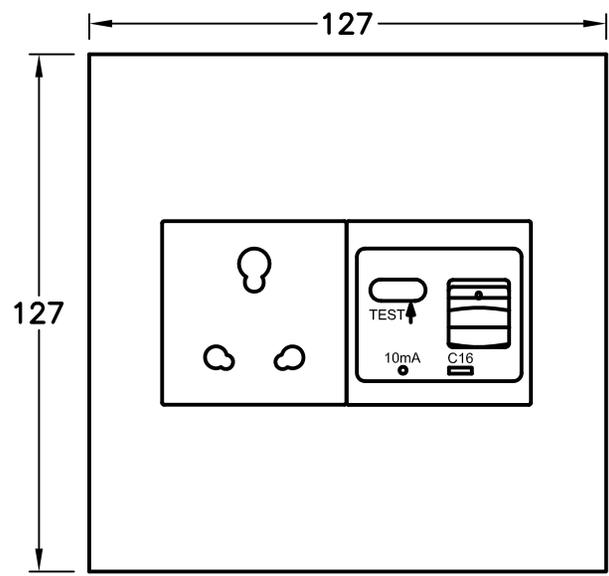
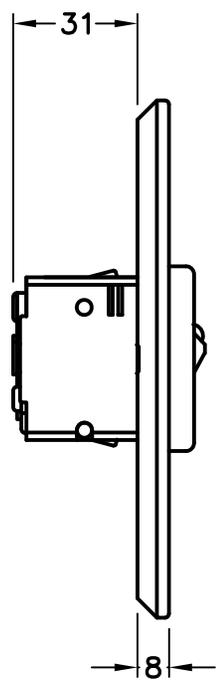
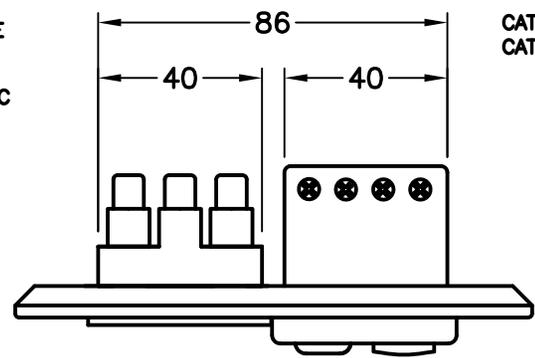
ALL DIMENSIONS ARE IN MILLIMETERS

- RCD (GFCI) TECHNICAL DATA:**
1. NO RESET AFTER POWER FAILURE (LATCHED RCD)
 2. PROTECTS DOWNSTREAM OUTLETS
 3. RECOMMENDED TERMINAL TORQUE 0.08 Nm (NEWTON-METER)
 4. OPERATING TEMP. -5°C TO +40°C

NOTE: UNIT CONSISTS OF FOUR (4) COMPONENTS, ONE (1) EACH #73105X45 OUTLET, 74458X45 GFCI MODULE, 79210X45-N FRAME, 79220X45-N WALL PLATE.

RELATED PRODUCTS:

CAT No. 73225 CAT No. 73225-30	6/16 AMPERE, 10MA TRIP, GLAND ENTRY, HORIZONTAL SURFACE MOUNT 6/16 AMPERE, 30MA TRIP, GLAND ENTRY, HORIZONTAL SURFACE MOUNT
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EXTERIOR RECEPTACLE (SOCKET)

CAT. No. <h2 style="text-align: center;">73225</h2>	SOUTH AFRICA, INDIA, UNITED KINGDOM BS546 COMBINATION 6/16 AMPERE-230 VOLT 50/60 Hz (UK2-15R / UK3-5R) GFCI (RCBO / RCD) OUTLET, 10 Ma. TRIP, 2 POLE-3 WIRE GROUNDING. IP55 RATED WEATHERPROOF BOX AND COVER (GLAND TYPE CABLE ENTRY), HORIZONTAL SURFACE MOUNT. GRAY.
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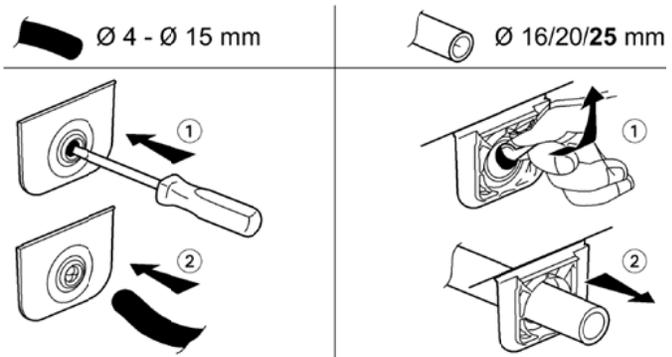
CERTIFICATIONS	CE <input checked="" type="checkbox"/> ROHS <input checked="" type="checkbox"/>
STANDARDS	BS546 <input checked="" type="checkbox"/> BS546A <input checked="" type="checkbox"/> IS 1293 <input checked="" type="checkbox"/> SABS 164 <input checked="" type="checkbox"/>

- TECHNICAL DATA:**
1. NO RESET AFTER POWER FAILURE. (LATCHED RCD)
 2. PROTECTS DOWNSTREAM OUTLETS
 3. OPERATING TEMP. -5°C TO +40°C
 4. RECOMMENDED TERMINAL TORQUE 0.08 Nm (NEWTON-METER)

RELATED PRODUCTS:
 CAT No. 73225X45 6/16 AMPERE, 10MA TRIP, FLUSH MOUNT
 CAT No. 73225-30 6/16 AMPERE, 30MA TRIP, GLAND ENTRY, HORIZONTAL SURFACE MOUNT

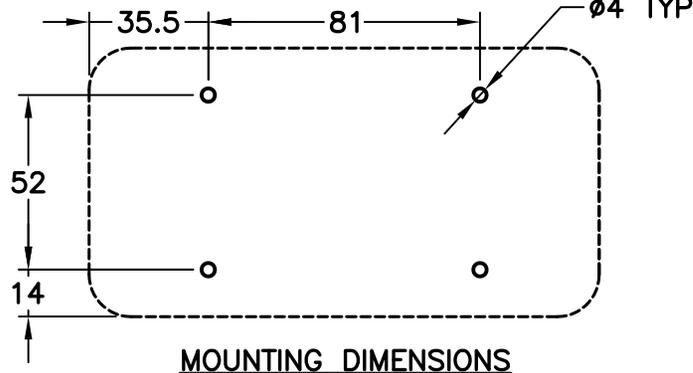
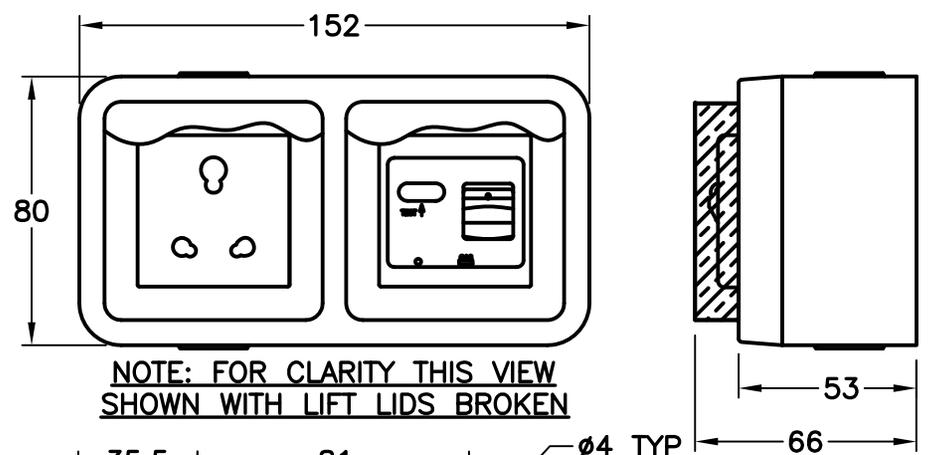
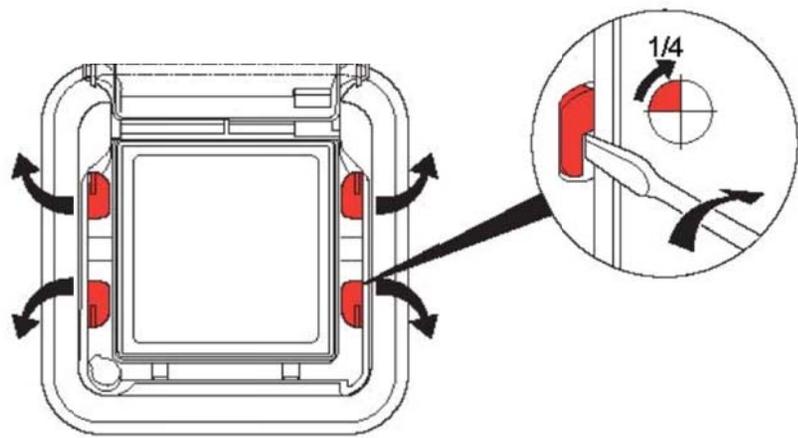
SPECIFICATIONS (WALL BOX):

1. MEMBRANE CABLE/CONDUIT ENTRY GLANDS
 ACCEPT $\phi 4-15$ mm CABLES
 ACCEPT $\phi 16/20/25$ mm CONDUITS



SPECIFICATIONS (COVER ASSEMBLY):

1. ATTACHING COVER ON THE BOX IS ENSURED BY ROTATING FOUR 1/4 TURN FIXINGS.



MOUNTING DIMENSIONS

ALL DIMENSIONS ARE IN MILLIMETERS



Conventional Fire Alarm Systems

Conventional fire alarm systems utilising C-Tec's conventional panel with Apollo Series 65 devices

Conventional Fire Alarm Panels

- FP-038 2 zone conventional fire alarm panel
- FP-039 4 zone conventional fire alarm panel
- FP-040 8 zone conventional fire alarm panel

Batteries

- FPA-070 2.1Ah VRLA battery (2 required for 2 and 4 zone panels)
- FPA-071 2.8Ah VRLA battery (2 required for 8 zone panel)

Devices

- FPA-229 57°C Series 65 rate of rise heat detector
- FPA-230 75°C Series 65 rate of rise heat detector
- FPA-231 90°C Series 65 rate of rise heat detector
- FPA-233 90°C Series 65 fixed heat detector
- FPA-235 Series 65 diode detector base
- FPA-236 Series 65 optical smoke detector
- FPA-323 Series 65 sounder base with diode
- FPA-008 103dBA red multi-tone electronic sounder
- FPA-339 87.5dBA red tri-tone electronic sounder
- FPA-012 24V Xenon strobe red lens
- FPA-032 Combined 103dBA sounder/24V Xenon strobe red base/red lens
- FPA-006 Red surface mounted call point
- FPA-036 Call point replacement glasses (pack of 5)
- FPA-011 95dBA red 6" bell
- FPA-027 95dBA red 8" bell



Two-Wire Conventional Fire Alarm Systems

Two-wire fire alarm systems utilising C-Tec's two-wire panel with Apollo AlarmSense devices

Conventional Fire Alarm Panels

- FP-041 2 zone two-wire fire alarm panel
- FP-042 4 zone two-wire fire alarm panel
- FP-043 8 zone two-wire fire alarm panel

Batteries

- FPA-070 2.1Ah VRLA battery (2 required for 2 and 4 zone panels)
- FPA-071 2.8Ah VRLA battery (2 required for 8 zone panel)

Devices

- FPA-239 AlarmSense heat detector
- FPA-243 AlarmSense detector base
- FPA-245 AlarmSense optical smoke detector
- FPA-240 AlarmSense heat detector/sounder base combination
- FPA-246 AlarmSense smoke detector/sounder base combination
- FPA-352 AlarmSense smoke detector/sounder beacon base combination
- FPA-354 AlarmSense heat detector/sounder beacon base combination
- FPA-250 AlarmSense sounder base
- FPA-254 AlarmSense surface mounted manual call point

**MANUAL
PULL
STATION**

WINDHOEK MSGR
RENOVATION PROJECT
ELECTRICAL

CONSTRUCTION DRAWINGS

APPENDIX 13.2

REVISION 07/18/2014

GENERAL ELECTRICAL NOTES:

1. ALL ELECTRICAL WORK SHALL COMPLY WITH THE LATEST SOUTH AFRICAN CODE (SANS) THE LIFE SAFETY CODE, AND SHALL BE IN ACCORDANCE WITH ALL APPLICABLE STATE AND LOCAL CODES, AND BUILDING STANDARDS, UNLESS DRAWING AND/OR SPECIFICATIONS INDICATE WORK OVER AND ABOVE CODE REQUIREMENTS. FURNISH ALL MATERIALS AND LABOR NECESSARY FOR THE COMPLETION OF WORK UNLESS NOTED OTHERWISE.
2. ALL ELECTRICAL EQUIPMENT SHALL BE LABELED BY AN APPROVED ACCREDITED AGENCY AND TESTING ORGANIZATION.
3. PRIOR TO BID, THE CONTRACTOR SHALL EXAMINE ALL PROJECT DOCUMENTS TO DEVELOP A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE. FAILURE TO REVIEW ALL CONTRACT DRAWINGS AND EXISTING CONDITIONS WILL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PERFORM ALL WORK REQUIRED. THE CONTRACTOR SHALL, UPON REVIEW OF THE DRAWINGS AND EXISTING CONDITIONS, ADVISE THE COR OF ANY DISCREPANCIES WHICH WILL AFFECT THE WORK REQUIRED.
4. THE CONTRACTOR SHALL FURNISH, INSTALL, WIRE CONNECT, AND ENERGIZE ALL EQUIPMENT, DEVICES, APPURTENANCES, AND THE COMPLETE SYSTEM INDICATED IN THE CONTRACT DOCUMENTS.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL ITEMS NECESSARY FOR THE COMPLETE INSTALLATION OF THE EQUIPMENT AS REQUIRED BY CODE WITHOUT ADDITIONAL COST TO THE GOVERNMENT, REGARDLESS WHETHER THE ITEMS ARE SHOWN ON THE PLAN OR COVERED BY THE SPECIFICATIONS.
6. THE CONTRACTOR SHALL INSTALL ALL MECHANICAL AND ELECTRICAL EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
7. ALL EQUIPMENT, DEVICES, AND RELATED APPURTENANCES SHALL BE THE LATEST PRODUCT OF THE SPECIFIED MANUFACTURERS UNLESS OTHERWISE INDICATED.
8. GOVERNMENT FURNISHED EQUIPMENT (GFE): THE CONTRACTOR SHALL ROUGH-IN THIS EQUIPMENT AND SHALL MAKE CONNECTIONS TO THIS EQUIPMENT TO MAKE IT OPERATE AS INTENDED, INCLUDING PROVIDING MISCELLANEOUS ITEMS SUCH AS LUGS, RECEPTACLES, WIRE, CABLE, CONDUIT, FLEXIBLE CONDUIT, AND OUTLET BOXES OR FITTINGS.
9. THE CONTRACTOR SHALL GUARANTEE ALL WORKMANSHIP, MATERIALS, EQUIPMENT, AND RELATED ITEMS FOR A PERIOD AFTER ACCEPTANCE OF THE PROJECT BY THE GOVERNMENT AND REPLACE ANY DEFECTIVE MATERIALS, EQUIPMENT, AND RELATED ITEMS WITHIN THE GUARANTEE PERIOD. THE PERIOD SHALL BE TWELVE MONTHS FROM THE COMPLETION OF THE PROJECT UNLESS OTHERWISE SPECIFIED IN THE SPECIFICATIONS OR CONTRACT DOCUMENTS.
10. DELETED
11. DELETED
12. ALL WIRES IN EXISTING CONDUITS SHALL BE ABANDONED, AND THE CONDUITS AND JUNCTION BOXES SHALL BE PERMANENTLY SEALED.
13. FOR ALL EQUIPMENT CONNECTIONS, THE CONTRACTOR SHALL PERFORM THE FOLLOWING AS REQUIRED BY THE EQUIPMENT OR AS INDICATED; EXTEND AND CONNECT TO EQUIPMENT; MOUNT AND CONNECT TO STARTERS; INSTALL PUSH BUTTON STATION AND THERMAL OVERLOAD SWITCHES; FURNISH SUITABLE RECEPTACLES, PLUG, COVER PLATE, CORD, ARMORED CABLE, WIRE, DIRECT CONNECTIONS, DISCONNECT SWITCHES, ETC.
14. EXACT LOCATION AND MOUNTING HEIGHTS OF JUNCTION BOXES, OUTLETS, STUB-UPS, ETC. SHALL BE DETERMINED FROM CONSTRUCTION DRAWINGS, EQUIPMENT, DETAILS, SPECIFICATIONS WHERE APPLICABLE, AND MANUFACTURER'S ROUGH-IN DRAWINGS.
15. ALL LIGHTING FIXTURE LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECTURAL SECTIONS AND DETAILS, MECHANICAL AND PLUMBING WORK AND SYSTEMS. NOTIFY THE COR IMMEDIATELY OF ANY DISCREPANCY.
16. LOCATIONS OF EQUIPMENT ARE SHOWN DIAGRAMMATICALLY ON THE DRAWINGS. THE CONTRACTOR SHALL OBTAIN EXACT LOCATIONS AND ESTABLISH EXACT DIMENSIONS ON THE JOB SITE AFTER STUDYING THE CONDITIONS.
17. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC ONLY. THE CONTRACTOR SHALL COORDINATE FOR EXACT LOCATIONS, MOUNTING METHODS, AND DIMENSIONS OF LIGHT FIXTURES, LIFE SAFETY DEVICES, CEILING DEVICES, RECEPTACLES, AND OTHER ITEMS VISIBLE IN PUBLIC AREAS.
18. IN THE EVENT THAT ANY GOVERNMENT FURNISHED EQUIPMENT, DEVICES, OR MATERIAL BECOMES DAMAGED AFTER RECEIPT - THE CONTRACTOR SHALL REPLACE THE EQUIPMENT AT NO ADDITIONAL COST TO THE GOVERNMENT.
19. ELECTRICAL EQUIPMENT REQUIRING ACCESS SUCH AS JUNCTION BOXES, CONNECTIONS TO EQUIPMENT, ETC. SHALL NOT BE INSTALLED ABOVE INACCESSIBLE CEILINGS OR BEHIND WALLS.
20. DELETED.
21. THE MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL MOTOR STARTERS FOR MECHANICAL EQUIPMENT AND THE EQUIPMENT SHALL BE WIRED BY THE ELECTRICAL CONTRACTOR.
22. THE ELECTRICAL CONTRACTOR SHALL COORDINATE AND VERIFY VOLTAGE/PHASE INDICATED ON ELECTRICAL DRAWINGS WITH MECHANICAL/PLUMBING EQUIPMENT TO BE PROVIDED PRIOR TO INSTALLING ELECTRICAL SERVICE. SHOULD A DISCREPANCY BE NOTED BETWEEN EQUIPMENT TO BE SUPPLIED AND WHAT IS INDICATED ON THE DRAWINGS, THE CONTRACTOR SHALL OBTAIN WRITTEN DIRECTION FROM COR BEFORE PROCEEDING WITH WORK.
23. ALL SWITCHES AND RECEPTACLES SHOWN ON THE DRAWINGS IN THE SAME LOCATION SHALL BE INSTALLED IN MULTIPLE GANG BOXES MOUNTED IN A COMMON COVER PLATE UNLESS OTHERWISE NOTED. POWER SYSTEMS SHALL NOT BE INSTALLED IN THE SAME BOX WITH TELEPHONE/DATA. THE CONTRACTOR SHALL PROVIDE DIVIDER AS REQUIRED BY CODES.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTLY PHASING THE CIRCUITS IN THE PANELBOARDS.
25. ALL GROUNDING SHALL BE DONE AS PER SANS REQUIREMENTS.
26. ALL BRANCH CIRCUIT WIRING ON THE DRAWINGS THAT IS UNMARKED INDICATES TWO CURRENT CARRYING CONDUCTORS AND A GROUNDING CONDUCTOR.
27. THE ACTUAL NUMBER OF WIRES FOR EACH CIRCUIT ARE NOT INDICATED ON THE DRAWINGS UNLESS NECESSARY FOR CLARIFICATION. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL WIRES NECESSARY FOR THE PROPER FUNCTION OF THE SYSTEM WHETHER INDICATED ON THE DRAWINGS OR NOT.
28. RECEPTACLES MOUNTED WITHIN 1.8M OF SINKS SHALL BE PROTECTED BY GROUND FAULT INTERRUPTER (GFI) TYPE CIRCUIT BREAKERS.
29. SUBMIT SHOP DRAWING FOR THE FOLLOWING: LIGHTING FIXTURES, SWITCHES, RECEPTACLES, COVER PLATES, OCCUPANCY SENSORS, PANELBOARDS, CONDUCTOR, RACEWAYS, AND ALL EQUIPMENT DEFINED IN THE SPECIFICATIONS.
30. ALL ELECTRICAL EQUIPMENT INCLUDING DISCONNECT SWITCHES LOCATED OUTSIDE OF THE BUILDING SHALL BE WEATHERPROOF.
31. ALL PANELBOARDS AND DISCONNECT SWITCHES SHALL HAVE COPPER BUS AND APPURTENANCES.
32. ALL PANELBOARD LUGS SHALL ACCOMMODATE THE INDICATED CONDUCTOR SIZES.
33. DELETED
34. ALL WIRING SHALL BE COPPER CONDUCTORS UNLESS NOTED OTHERWISE. ALL WIRING 6mm AND LESS SHALL BE SOLID CONDUCTOR.
35. THE CONTRACTOR SHALL VERIFY THAT ALL DOORS SWINGS ARE CORRECT BEFORE INSTALLING LIGHT SWITCH OUTLETS.
36. BRANCH CIRCUITS FOR RECEPTACLES & MOTORS SHALL BE INSULATED COPPER CONDUCTORS IN NON-METALLIC CONDUIT. MINIMUM CONDUIT SIZE IS 20mm. FLEXIBLE CONDUIT CONNECTIONS TO MOTORS WITH A MAXIMUM ACCEPTABLE LENGTH OF 1.8M.
37. LIGHTING BRANCH CIRCUIT WIRING AT CONNECTION TO FIXTURE SHALL BE MC CABLE, COPPER CONDUCTORS WITH A MAXIMUM ACCEPTABLE LENGTH OF 1.8M.
38. ALL EMPTY CONDUIT RUNS IN EXCESS OF 3M SHALL BE PROVIDED WITH A PULL WIRE OR FISH TAPE/CORD.
39. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER SIZING OF ALL MOTOR OVERLOAD DEVICES (HEATERS) IN STARTERS BASED ON ACTUAL NAMEPLATE RATINGS ON THE MOTORS BEING INSTALLED.
40. THE CONTRACTOR SHALL NOTE BSA LABEL/NAMEPLATE ON MECHANICAL EQUIPMENT, OR IF THE LOCAL INSPECTOR REQUIRES THE OVERLOAD PROTECTIVE DEVICES TO BE FUSED, THE ELECTRICAL CONTRACTOR SHALL PROVIDE A FUSED DISCONNECT SWITCH WITH PROPER SIZE FUSES AT THE SWITCH LOCATION AS INDICATED ON THE DRAWINGS.
41. ALL DUPLEX RECEPTACLES ON DEDICATED CIRCUITS SHALL BE NEMA 6-20R.
42. NON-METALLIC CONDUIT WITH CONDUCTORS SHALL BE USED IN LIEU OF CABLE IN ALL VISIBLE PUBLIC AREAS AND BACK OF HOUSE LOCATIONS. "MC" CABLE SHALL NOT BE TERMINATED AT PANELBOARDS. CABLE SHALL TERMINATE OUTSIDE OF ELECTRICAL CLOSETS AND ROOMS WITH GUTTERS. CONDUIT SHALL BE USED TO CONNECT GUTTER PANELS.
43. DELETED
44. ALL BALLASTS SHALL BE ELECTRONIC AND RATED FOR THE LAMP IT OPERATES.
45. THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE MECHANICAL CONTRACTOR ON ANY REQUIRED CONTROL CIRCUITS INCLUDING "LINE" AND "LOW" VOLTAGE POWER REQUIREMENTS. THE ELECTRICAL CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING ANY NECESSARY "LINE" OR "LOW" VOLTAGE WIRING AND CONDUIT TO NEW ELECTRIC THERMOSTATS, DAMPERS OR OTHER ACTUATORS AND CONTROL EQUIPMENT. CONTROL SYSTEMS FOR NEW MECHANICAL SYSTEMS SHALL BE COMPLETE AND OPERATIONAL.
46. A SEPARATE GREEN ISOLATED EQUIPMENT GROUND WIRE SHALL BE PULLED IN ALL TENANT BRANCH AND FEEDER CIRCUITS, INCLUDING BUT NOT LIMITED TO CONNECTION FOR LIGHTS, RECEPTACLES, AIR HANDLING UNITS, PUMPS AND OTHER MOTORS/EQUIPMENT.
47. ALL CUTTING AND PATCHING SHALL BE PERFORMED IN A WORKMANLIKE MANNER ACCEPTABLE TO THE COR
48. ALL ELECTRICAL SYSTEMS, DEVICES, AND RELATED ITEMS SHALL BE TESTED AT THE COMPLETION OF THE PROJECT. THE CONTRACTOR SHALL REPLACE ANY AND ALL DEFECTIVE DEVICES, ITEMS, OR SYSTEMS AT COMPLETION OF THE PROJECT.
49. ALL ELECTRICAL WORK, INCLUDING SERVICE AND EQUIPMENT, SHALL BE CONDUCTED ON DE-ENERGIZED SYSTEMS AND COMPONENTS. WHERE CONTINUOUS SERVICES REQUIRED TO EQUIPMENT, AN ALTERNATIVE MEANS OF SERVICE SHALL BE PROVIDED AND INSTALLED UNTIL THE REQUIRED NEW AND/OR ALTERED WORK HAS BEEN COMPLETED.
50. EXPOSED INTERIOR: ALL EXPOSED INTERIOR WIRING SHALL BE IN NON-METALLIC CONDUIT WITH STEEL COMPRESSION CONNECTORS. COUPLINGS AND FITTINGS FOR NON-METALLIC CONDUIT SHALL BE OF STEEL (CAST POT METAL IS NOT ACCEPTABLE) AND SHALL BE OF THE COMPRESSION TYPE.
51. DELETED

SYMBOLS LIST:

	WALL MOUNTED INCANDESCENT FIXTURE WITH EMERGENCY BATTERY PACK. SEE LIGHTING FIXTURE SCHEDULE.
	NEW SWITCH, WATER-PROOF
	SINGLE POLE TOGGLE SWITCH. SUBSCRIPTS AT SWITCH SYMBOL INDICATE THE THE FOLLOWING: 3-THREE WAY. MH +1220MM A.F.F. U.O.N.
	SECURITY LIGHT POLE
	MOTION SENSOR SECURITY LIGHTS/FLOOD LIGHTS. 10W (TYPE L-1A)
	CEILING MOUNTED, WALL MOUNTED JUNCTION BOX
	DUPLEX RECEPTACLE: 2P-3W-20A-230V. SUBSCRIPTS ADJACENT TO SYMBOL INDICATE THE FOLLOWING (TYPICAL FOR ALL RECEPTACLE)
	DUPLEX RECEPTACLE: 2P-3W-20A-250V. FOR OVEN AND DYER HOOK-UPS.
	EXISTING RECEPTACLE TO REMAIN
	GFCI GROUND FAULT CIRCUIT INTERRUPTER(RCBO/RCD), WATER-PROOF RECEPTACLE
	NEW TRANSFER SWITCH
	DISCONNECT SWITCH 65A, 3P, 230V U.O.N.
	ELECTRICAL PANELBOARD, MAIN DISTRIBUTION PANEL SURFACE MOUNTED.
	ELECTRICAL PANELBOARD, SUPERSCRIPIT INDICATES: SUB PANEL-1 OR 2
	COMBINATION IONIZATION-PHOTO ELECTRIC (DUEL SENSOR) SMOKE DETECTOR
	UNDERGROUND ELECTRICAL CONDUIT
	NEW EXHAUST FAN THROUGH WALL, 215mm OPENING REQUIRED.
	NEW WALL MOUNTED AIR CONDITIONING UNIT. CONNECT TO RESPECTIVE CONDENSING UNIT FOR POWER/CONTROLS.
	NEW SPLIT PACK CONDENSER UNIT
	NEW SURFACE MOUNTED LIGHT
	NEW RECESSED DOWN LIGHT
	NEW DATA/TEL. OUTLET JUNCTION BOX, WALL MOUNTED 18" AFF UON
	EXISTING DATA OUTLET
	EXISTING TELEVISION OUTLET
	NEW TELEVISION OUTLET
	NEW SURFACE MOUNTED CEILING LIGHT
	NEW EMERGENCY CFL BULKHEAD (TYPE L-3)
	NEW FLOURESCENT LUMINARIES (TYPE L-4)
	NEW SURFACE MOUNTED CEILING EMERGENCY LIGHT
	NEW EXTERIOR WALL MOUNTED LIGHT (TYPE L-2)
	NEW FIRE ALARM CONTROL PANEL
	NEW CEILING FAN, LIGHT FIXTURE COMBINATION
	NEW LED TWIN SPOT LIGHT, BATTERY-POWERED EMERGENCY LIGHT (TYPE L-5)
	MANUAL FIRE ALARM PULL STATION
	AUDIBLE SOUNDER(MIN. 75dBA) WITH STROBE.



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Washington, D.C.

MSGR RENOVATION PROJECT
for
U.S. EMBASSY WINDHOEK NAMIBIA

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	FIRE ALARM PULL STATIONS & SMOKE DET.	07/18/2014
Rev Number	Description	Date

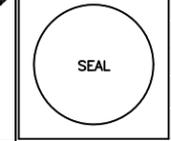
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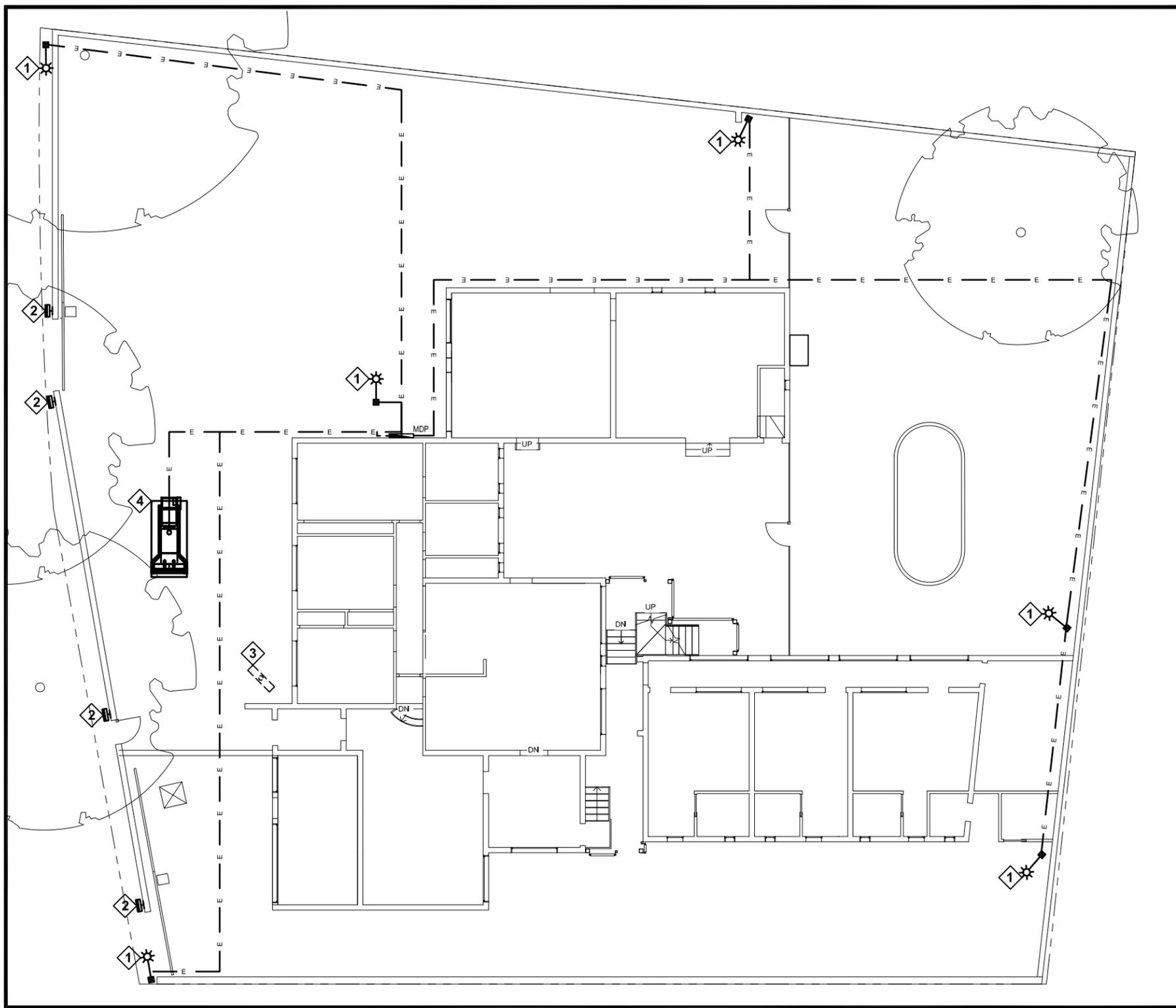
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ELECTRICAL NOTES

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	1:2540	

Date	06/20/14	Sheet Number
Drawn By	EAE	E0.00
Checked By		
Project Number		
Classification	UNCLASSIFIED	





NEW ELECTRICAL SITE PLAN
SCALE: NOT TO SCALE

GENERAL NOTES:

1. DRAWINGS ARE PROVIDED AS REFERENCE FOR THE STRUCTURE'S LAYOUT.
2. CONTRACTOR SHALL VERIFY SIZE, QUANTITY, AND LOCATION OF ALL OPENINGS.
5. CONTRACTOR SHALL PROTECT SURROUNDING AREAS ALL TIMES FROM PAINT OVERSPRAY AND/OR SPILLAGE.
6. CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS TO PROTECT AND MOVE DESIGNATED EXTERIOR FURNISHINGS.
7. CONTRACTOR SHALTDOWN AND STORAGE AREAS SHALL NOT INTERFERE WITH OTHER CONTRACTORS PERFORMANCE OF THEIR WORK.
8. CONTRACTOR SHALL REMOVE ALL RUBBISH & DEBRIS FROM THE PROJECT SITE DAILY; DO NOT ALLOW THE ACCUMULATIONS INSIDE OR OUTSIDE THE BUILDING.
9. PROJECT OPERATIONS SHALL NOT BLOCK CORRIDORS OR MEANS OF EGRESS FOR THE OCCUPANTS OF THE BUILDING.
10. PREVENTION OF THE SPREAD OF DUST & DEBRIS TO OCCUPIED PORTIONS OF THE STRUCTURE & AVOID THE CREATION OF A NUISANCE OR HAZARD IN THE SURROUNDING AREAS.
11. PROTECT EXISTING WORK THAT SHALL REMAIN IN PLACE.
12. WHERE REMOVALS LEAVE A HOLE AND DAMAGED SURFACES EXPOSED IN THE FINISH WORK; PATCH AND REPAIR THESE AREAS TO MATCH EXISTING SURROUNDING SURFACES.

KEYED NOTES:

1. NEW SECURITY LIGHTING SYSTEM INCLUSIVE OF TWO (2) 30-WATT LED FLOOD LIGHTS WITH PASSIVE INFRARED SENSORS (TYPE L-1), POLE MOUNTED WITH BURIED ELECTRICAL CONDUITS WITH CONDUCTORS. CONTRACTOR SHALL COORDINATE TRENCHING ACTIVITIES TO NOT DISTURB EXISTING UTILITIES. LIFT AND RESET EXISTING PRE-CAST CONCRETE PAVERS AS REQUIRED FOR INSTALLATION.
2. REMOVE EXISTING WALL MOUNTED LIGHT FIXTURES AND INSTALL 100W EXTERIOR WALL MOUNTED ANTI-VANDAL LIGHT FIXTURE.(TYPE L-2)
3. REMOVE EXISTING ELECTRIC SIGNAGE INCLUSIVE OF MAST AND ANCILLARY SUPPORTS AT ROOF LEVEL ALONG WITH ELECTRICAL CONDUIT AND CONDUCTORS; TERMINATE AT EXISTING SWITCHBOARD.
4. NEW GENERATOR WITH ATS INSTALLED UNDER SEPARATE CONTRACT.

LEGEND:

	UNDERGROUND ELECTRICAL CONDUIT
	SECURITY LIGHT POLE
	MAIN DISTRIBUTION PANEL



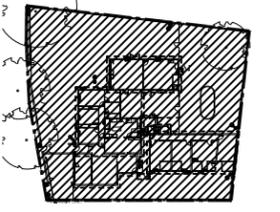
United States Department of State
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MSGR RENOVATION PROJECT
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KEY PLAN

SCALE: NOT TO SCALE

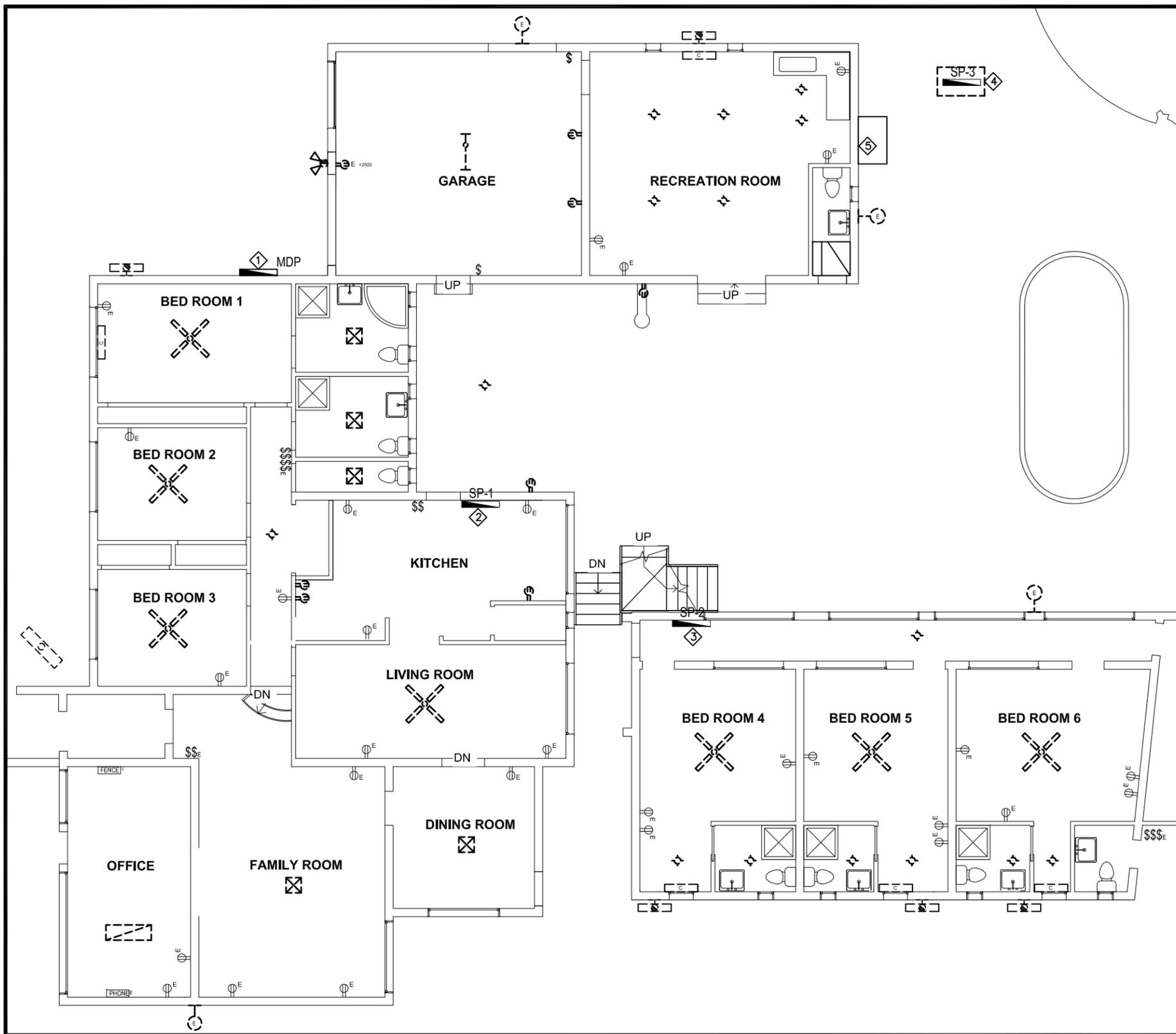


Rev Number	Description	Date
Revisions		

Release For Construction:

Drawing Title		
ELECTRICAL NEW SITE PLAN		
GBO Project Number XXXXXX	Drawing Scale NTS	Phase
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AS SHOWN		

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	Project Number		
	Classification	UNCLASSIFIED	



GROUND LEVEL ELECTRICAL DEMOLITION PLAN
SCALE: NOT TO SCALE

GENERAL NOTES:

1. DRAWINGS ARE PROVIDED AS REFERENCE FOR THE STRUCTURE'S LAYOUT.
2. CONTRACTOR SHALL VERIFY SIZE, QUANTITY, AND LOCATION OF ALL OPENINGS.
5. CONTRACTOR SHALL PROTECT SURROUNDING AREAS ALL TIMES FROM PAINT OVERSPRAY AND/OR SPILLAGE.
6. CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS TO PROTECT AND MOVE DESIGNATED EXTERIOR FURNISHINGS.
7. CONTRACTOR LAYDOWN AND STORAGE AREAS SHALL NOT INTERFERE WITH OTHER CONTRACTORS PERFORMANCE OF THEIR WORK.
8. CONTRACTOR SHALL REMOVE ALL RUBBISH & DEBRIS FROM THE PROJECT SITE DAILY; DO NOT ALLOW THE ACCUMULATIONS INSIDE OR OUTSIDE THE BUILDING.
9. PROJECT OPERATIONS SHALL NOT BLOCK CORRIDORS OR MEANS OF EGRESS FOR THE OCCUPANTS OF THE BUILDING.
10. PREVENTION OF THE SPREAD OF DUST & DEBRIS TO OCCUPIED PORTIONS OF THE STRUCTURE & AVOID THE CREATION OF A NUISANCE OR HAZARD IN THE SURROUNDING AREAS.
11. PROTECT EXISTING WORK THAT SHALL REMAIN IN PLACE.
12. WHERE REMOVALS LEAVE A HOLE AND DAMAGED SURFACES EXPOSED IN THE FINISH WORK; PATCH AND REPAIR THESE AREAS TO MATCH EXISTING SURROUNDING SURFACES.

ELECTRICAL NOTES:

1. INTERCEPT EXISTING RECEPTACLE (SOCKET) ELECTRICAL CIRCUITS; EXTEND EXISTING CIRCUITS TO INCLUDE ADDITIONAL WALL MOUNTED DUPLEX RECEPTACLES (SOCKETS). INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS SHALL NOT BE EXPOSED; RECEPTACLES SHALL BE RECESSED WITH COVER PLATES TO MATCH EXISTING.
2. REPLACE ALL WALL MOUNTED INTERIOR SINGLE-PLUG TYPE RECEPTACLES (SOCKETS) WITH DUPLEX-PLUG TYPE RECEPTACLES AT THEIR EXISTING LOCATIONS.
3. ABANDONED RECEPTACLES (SOCKETS) SHALL BE REMOVED WITH FLUSH-MOUNTED BLANK COVER PLATE INSTALLED. INTERCEPT EXISTING CONDUITS AND CONDUCTORS AND RE-ROUTE TO FEED ADDITIONAL DUPLEX -PLUG TYPE RECEPTACLES (SOCKETS) AT EACH ROOM.

KEYED NOTES:

- 1 MAIN PANEL / METER AND SERVICE ENTRANCE
- 2 REPLACEMENT SP-1 SWITCHBOARD INSTALLED AT NEW LOCATION.
- 3 EXISTING SP-2 SWITCHBOARD PANEL
- 4 REPLACEMENT SP-3 SWITCHBOARD INSTALLED AT NEW LOCATION.
- 5 PROVIDE AND INSTALL EXTERIOR GRADE IP55 RATED WEATHERPROOF BOX ENCLOSURE FOR POOL EQUIPMENT AT NEW LOCATION. REPLACE AND RELOCATE EXISTING SP-3 SWITCHBOARD PANEL, BREAKERS, TIMERS AND GFCI (RCBO/RCD) OUTLET, 16A/6A-230V, IN A WEATHERPROOF BOX AND COVER. INTERCEPT AND EXTEND EXISTING ELECTRICAL CIRCUITS WHERE PRACTICAL AND ROUTE TO NEW LOCATION. LIFT AND RESET EXISTING PRE-CAST CONCRETE PAVERS FOR INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS.

LEGEND:

	LIGHTS TO BE DEMOLISHED
	CEILING FAN TO BE REMOVED
	WALL MTD. EVAPORATOR UNIT. TO BE REMOVED
	WALL MTD. CONDENSING UNIT. TO BE REMOVED
	RECEPTACLE TO REMAIN
	RECEPTACLE TO BE DEMOLISHED
	LIGHT SWITCH TO BE DEMOLISHED
	SWITCHES TO REMAIN



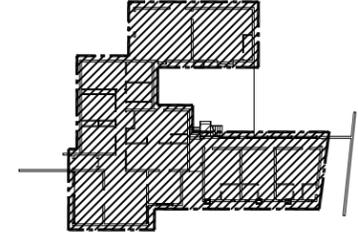
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for
U.S. EMBASSY WINDHOEK NAMIBIA

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KEY PLAN

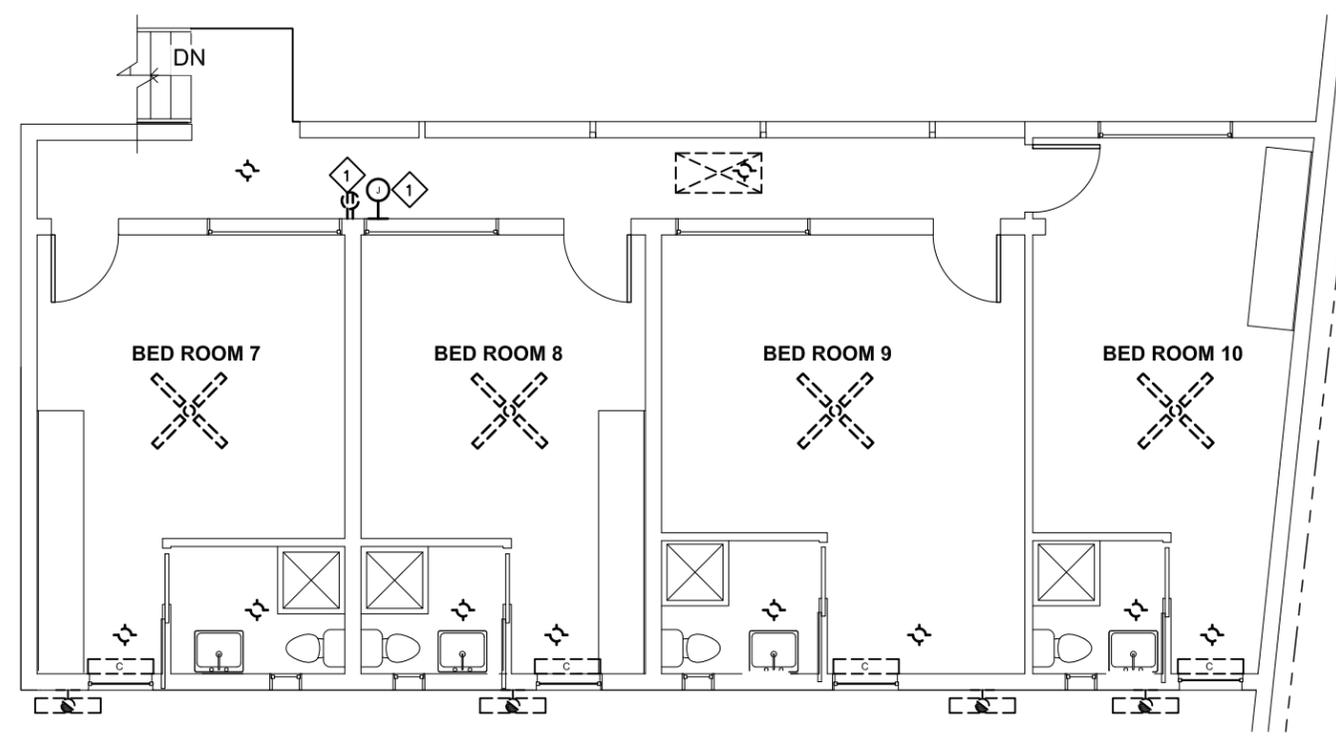
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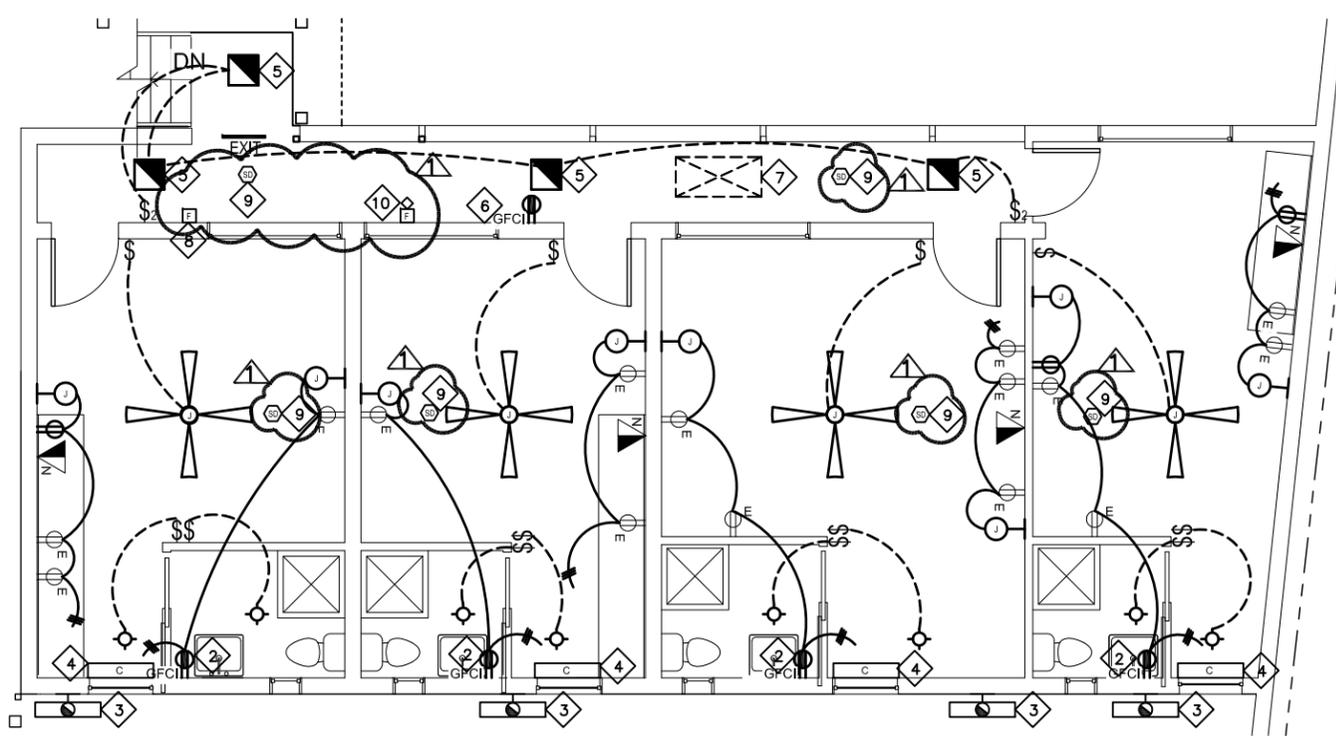
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ELECTRICAL		
GROUND LEVEL DEMOLITION PLAN		
GR0 Project Number	Drawing Scale	Phase
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	Project Number		
Classification UNCLASSIFIED			



FIRST LEVEL ELECTRICAL DEMOLITION PLAN

SCALE: 1:50



FIRST LEVEL NEW ELECTRICAL PLAN

SCALE: 1:50

GENERAL NOTES:

1. DRAWINGS ARE PROVIDED AS REFERENCE FOR THE STRUCTURE'S LAYOUT.
2. CONTRACTOR SHALL VERIFY SIZE, QUANTITY, AND LOCATION OF ALL OPENINGS.
5. CONTRACTOR SHALL PROTECT SURROUNDING AREAS ALL TIMES FROM PAINT OVERSPRAY AND/OR SPILLAGE.
6. CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS TO PROTECT AND MOVE DESIGNATED EXTERIOR FURNISHINGS.
7. CONTRACTOR LAYDOWN AND STORAGE AREAS SHALL NOT INTERFERE WITH OTHER CONTRACTORS PERFORMANCE OF THEIR WORK.
8. CONTRACTOR SHALL REMOVE ALL RUBBISH & DEBRIS FROM THE PROJECT SITE DAILY; DO NOT ALLOW THE ACCUMULATIONS INSIDE OR OUTSIDE THE BUILDING.
9. PROJECT OPERATIONS SHALL NOT BLOCK CORRIDORS OR MEANS OF EGRESS FOR THE OCCUPANTS OF THE BUILDING.
10. PREVENTION OF THE SPREAD OF DUST & DEBRIS TO OCCUPIED PORTIONS OF THE STRUCTURE & AVOID THE CREATION OF A NUISANCE OR HAZARD IN THE SURROUNDING AREAS.
11. PROTECT EXISTING WORK THAT SHALL REMAIN IN PLACE.
12. WHERE REMOVALS LEAVE A HOLE AND DAMAGED SURFACES EXPOSED IN THE FINISH WORK; PATCH AND REPAIR THESE AREAS TO MATCH EXISTING SURROUNDING SURFACES.

ELECTRICAL NOTES:

1. INTERCEPT EXISTING RECEPTACLE (SOCKET) ELECTRICAL CIRCUITS; EXTEND EXISTING CIRCUITS TO INCLUDE ADDITIONAL WALL MOUNTED DUPLEX RECEPTACLES (SOCKETS). INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS SHALL NOT BE EXPOSED; RECEPTACLES SHALL BE RECESSED WITH COVER PLATES TO MATCH EXISTING.
2. REPLACE ALL WALL MOUNTED INTERIOR SINGLE-PLUG TYPE RECEPTACLES (SOCKETS) WITH DUPLEX-PLUG TYPE RECEPTACLES AT THEIR EXISTING LOCATIONS.

KEYED NOTES:

1. ABANDONED RECEPTACLES (SOCKETS) SHALL BE REMOVED WITH FLUSH-MOUNTED BLANK COVER PLATE INSTALLED. INTERCEPT EXISTING CONDUITS AND CONDUCTORS AND RE-ROUTE TO FEED ADDITIONAL DUPLEX -PLUG TYPE RECEPTACLES (SOCKETS) AT EACH ROOM.
2. PROVIDE AND INSTALL 230V 115/230V AC DUAL VOLTAGE BATHROOM SHAVER SOCKET. INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS SHALL NOT BE VISIBLE AT THE INTERIOR SPACE.
3. PROVIDE ELECTRICAL CONNECTION FOR REPLACEMENT SPLIT PACK AIR CONDITIONING UNIT (UNIT TO BE PROVIDED UNDER A SEPARATE CONTRACT).
4. PROVIDE ELECTRICAL CONNECTION FOR REPLACEMENT SPLIT PACK CONDENSER UNIT (UNIT TO BE PROVIDED UNDER A SEPARATE CONTRACT).
5. PROVIDE AND INSTALL IP65 CFL EMERGENCY LIGHT FIXTURE 230 AC 50HZ IP20 RATED WITH BATTERY BACKUP WITH CLASS 1 CONSTRUCTION. (TYPE L-3)
6. GFCI (RCBO/RCD) OUTLET, 16A/6A-230V, 50/60 HZ, 30 MA. TRIP, BS546A TYPE M, TYPE D (UK2-15R)/UK3-5R) POWER SOCKET, SHUTTERED CONTACTS, IP55 RATED WEATHERPROOF BOX AND COVER, HORIZONTAL SURFACE MOUNT.
7. AREA RESERVED FOR ROOF ACCESS LADDER AND HATCH. TO BE INSTALLED UNDER SEPARATE CONTRACT.
8. THE HEIGHT OF THE MANUAL FIRE ALARM PULL STATION BOXES SHALL BE MIN. 1067MM AND MAX. OF 1372MM MEASURED VERTICALLY FROM THE FLOOR LEVEL TO THE ACTIVATING HANDLE OR LEVER OF THE BOX.
9. COMBINATION IONIZATION-PHOTOELECTRIC(DUAL SENSOR) SMOKE DETECTOR
10. AUDIBLE SOUNDER MIN. 75 dBA / WSTROBE



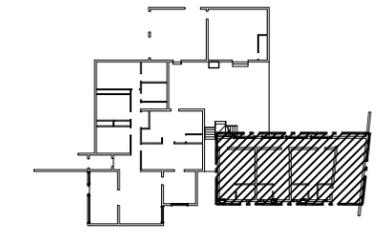
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for
U.S. EMBASSY WINDHOEK NAMIBIA

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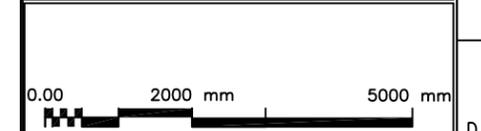


KEY PLAN

SCALE: NOT TO SCALE

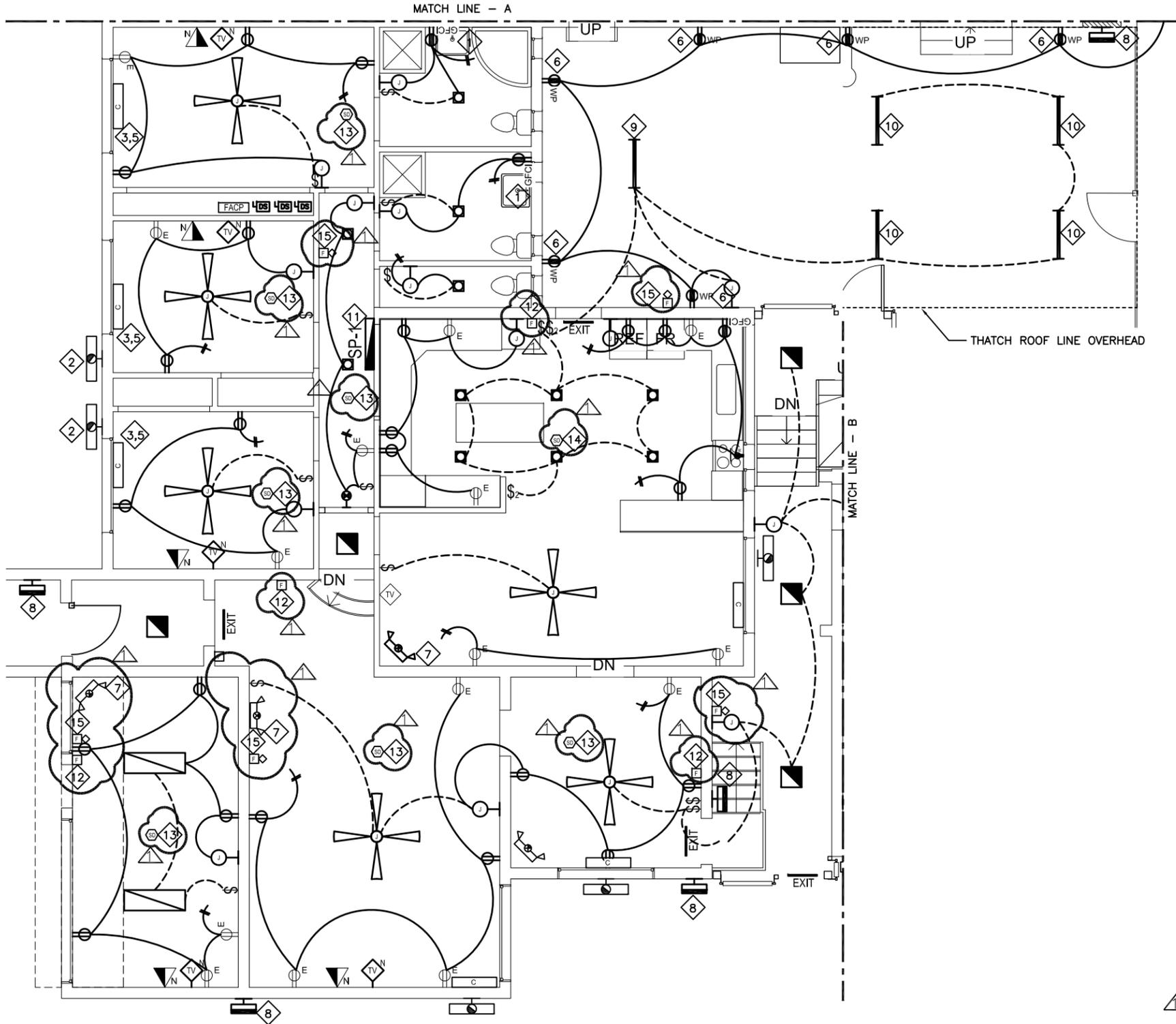


Rev Number	Description	Date
1	FIRE ALARM PULL STATIONS & SMOKE DET.	07/18/2014



Release For Construction:	
Drawing Title	
ELECTRICAL	
FIRST LEVEL DEMO & NEW PLAN	
GR0 Project Number XXXXXX	Drawing Scale NTS
CADD File Name	Phase CONCEPT
CADD Plot Scale AS SHOWN	Sheet Number E1.02

Date 06/20/14	Sheet Number E1.02
Drawn By EAE	Project Number
Checked By	
Classification UNCLASSIFIED	



**GROUND LEVEL
NEW ELECTRICAL PLAN**
SCALE: 1:50

GENERAL NOTES:

1. DRAWINGS ARE PROVIDED AS REFERENCE FOR THE STRUCTURE'S LAYOUT.
2. CONTRACTOR SHALL VERIFY SIZE, QUANTITY, AND LOCATION OF ALL OPENINGS.
3. CONTRACTOR SHALL PROTECT SURROUNDING AREAS ALL TIMES FROM PAINT OVERSPRAY AND/OR SPILLAGE.
4. CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS TO PROTECT AND MOVE DESIGNATED EXTERIOR FURNISHINGS.
5. CONTRACTOR LAYDOWN AND STORAGE AREAS SHALL NOT INTERFERE WITH OTHER CONTRACTORS PERFORMANCE OF THEIR WORK.
6. CONTRACTOR SHALL REMOVE ALL RUBBISH & DEBRIS FROM THE PROJECT SITE DAILY; DO NOT ALLOW THE ACCUMULATIONS INSIDE OR OUTSIDE THE BUILDING.
7. PROJECT OPERATIONS SHALL NOT BLOCK CORRIDORS OR MEANS OF EGRESS FOR THE OCCUPANTS OF THE BUILDING.
8. PREVENTION OF THE SPREAD OF DUST & DEBRIS TO OCCUPIED PORTIONS OF THE STRUCTURE & AVOID THE CREATION OF A NUISANCE OR HAZARD IN THE SURROUNDING AREAS.
9. PROTECT EXISTING WORK THAT SHALL REMAIN IN PLACE.
10. WHERE REMOVALS LEAVE A HOLE AND DAMAGED SURFACES EXPOSED IN THE FINISH WORK; PATCH AND REPAIR THESE AREAS TO MATCH EXISTING SURROUNDING SURFACES.

ELECTRICAL NOTES:

1. INTERCEPT EXISTING RECEPTACLE (SOCKET) ELECTRICAL CIRCUITS; EXTEND EXISTING CIRCUITS TO INCLUDE ADDITIONAL WALL MOUNTED DUPLEX RECEPTACLES (SOCKETS). INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS SHALL NOT BE EXPOSED; RECEPTACLES SHALL BE RECESSED WITH COVER PLATES TO MATCH EXISTING.
2. REPLACE ALL WALL MOUNTED INTERIOR SINGLE-PLUG TYPE RECEPTACLES (SOCKETS) WITH DUPLEX-PLUG TYPE RECEPTACLES AT THEIR EXISTING LOCATIONS.
3. ABANDONED RECEPTACLES (SOCKETS) SHALL BE REMOVED WITH FLUSH-MOUNTED BLANK COVER PLATE INSTALLED. INTERCEPT EXISTING CONDUITS AND CONDUCTORS AND RE-ROUTE TO FEED ADDITIONAL DUPLEX -PLUG TYPE RECEPTACLES (SOCKETS) AT EACH ROOM.

KEYED NOTES:

1. PROVIDE AND INSTALL 230V 115/230V AC DUAL VOLTAGE BATHROOM SHAVER SOCKET. INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS SHALL NOT BE VISIBLE AT THE INTERIOR SPACE.
2. PROVIDE ELECTRICAL CONNECTION FOR REPLACEMENT SPLIT PACK AIR CONDITIONING UNIT (UNIT TO BE PROVIDED UNDER A SEPARATE CONTRACT).
3. PROVIDE ELECTRICAL CONNECTION FOR REPLACEMENT SPLIT PACK CONDENSER UNIT (UNIT TO BE PROVIDED UNDER A SEPARATE CONTRACT).
4. PROVIDE ELECTRICAL CONNECTION FOR REPLACEMENT SPLIT PACK CONDENSER UNIT (UNIT TO BE PROVIDED UNDER A SEPARATE CONTRACT).
5. PROVIDE AND INSTALL ELECTRICAL CONDUIT, CONDUCTORS AND PROVIDE FINAL CONNECTIONS FOR NEW SPLIT PACK AIR CONDITIONING SYSTEMS WITH DISCONNECTS (AIR CONDITIONERS AND CONDENSER UNITS TO BE PROVIDED UNDER A SEPARATE CONTRACT).
6. GFCI (RCBO/RCD) OUTLET, 16A/6A-230V, 50/60 HZ, 30 MA. TRIP, BS546A TYPE M, TYPE D (UK2-15R)/UK3-5R) POWER SOCKET, SHUTTERED CONTACTS, IP55 RATED WEATHERPROOF BOX AND COVER, HORIZONTAL SURFACE MOUNT.
7. PROVIDE AND INSTALL 230 AC 50HZ IP20 RATED WITH BATTERY BACKUP LED TWIN SPOT LIGHT EMERGENCY LIGHT FIXTURE. (TYPE L-5)
8. REMOVE EXISTING WALL MOUNTED LIGHT FIXTURES AND INSTALL 100W EXTERIOR WALL MOUNTED ANTI-VANDAL LIGHT FIXTURE. (TYPE L-2)
9. IP65 HF ANTI-CORROSIVE LIGHT FIXTURE NON-MAINTAINED 220 - 240V 50HZ 36W TWIN LAMP T8 FLUORESCENT LAMP BATTERY BACKUP. (TYPE L-4-EMERGENCY VERSION)
10. IP65 HF ANTI-CORROSIVE LIGHT FIXTURE NON-MAINTAINED 220 - 240V 50HZ 36W TWIN LAMP T8 FLUORESCENT LAMP. (TYPE L-4)
11. REPLACE AND RELOCATE EXISTING SP-1 SWITCHBOARD PANEL, BREAKERS, TIMERS AND GFCI(RCBO/RCD) OUTLET, 15/A/5A-230V. INTERCEPT AND EXTEND EXISTING ELECTRICAL CIRCUITS WHERE PRACTICAL AND ROUTE TO NEW LOCATION.
12. THE HEIGHT OF THE MANUAL FIRE ALARM PULL STATION BOXES SHALL BE MIN. 1067MM AND MAX. OF 1372MM MEASURED VERTICALLY FROM THE FLOOR LEVEL TO THE ACTIVATING HANDLE OR LEVER OF THE BOX.
13. COMBINATION IONIZATION-PHOTOELECTRIC(DUAL SENSOR) SMOKE DETECTOR
14. SMOKE DETECTORS INSTALLED IN THE KITCHEN SHALL BE AT LEAST 3 METERS FROM A COOKING APPLIANCE
15. AUDIBLE SOUNDER MIN. 75 DBA / WITH STROBE

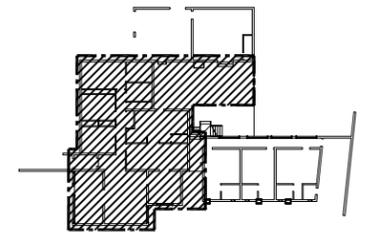


United States Department of State
OFFICE OF OVERSEAS BUILDINGS OPERATIONS
Washington, D.C.

**MSGR RENOVATION
PROJECT**
for
**U.S. EMBASSY
WINDHOEK
NAMIBIA**

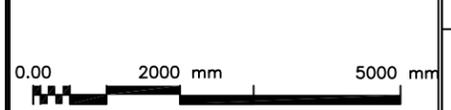
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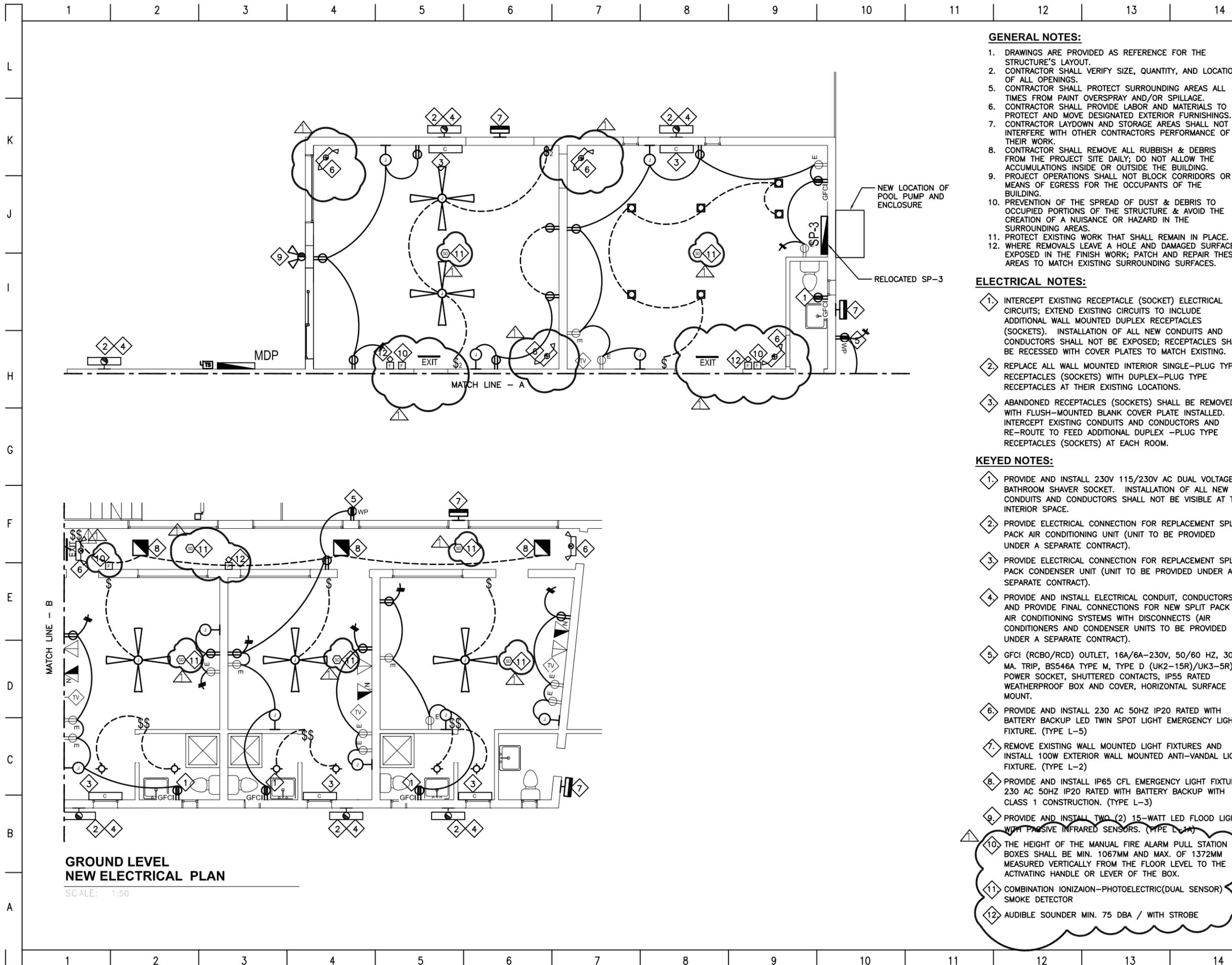
Release For Construction:

**ELECTRICAL
NEW ELECTRICAL PLAN**

GBO Project Number: XXXXXX
Drawing Scale: 1:50
Phase: CONCEPT
CADD File Name: AS SHOWN

Date: 06/20/14
Sheet Number: E1.03
Drawn By: EAE
Checked By:
Project Number:
Classification: UNCLASSIFIED





GENERAL NOTES:

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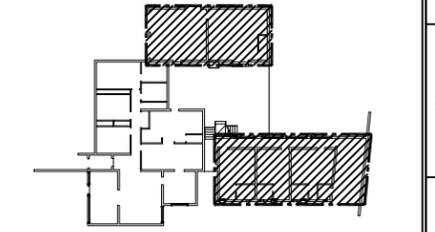
1. PROVIDE AND INSTALL 230V 115/230V AC DUAL VOLTAGE BATHROOM SHAVER SOCKET. INSTALLATION OF ALL NEW CONDUITS AND CONDUCTORS SHALL NOT BE VISIBLE AT THE INTERIOR SPACE.
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5. GFCI (RCBO/RCD) OUTLET, 16A/6A-230V, 50/60 HZ, 30 MA. TRIP, BS546A TYPE M, TYPE D (UK2-15R)/UK3-5R) POWER SOCKET, SHUTTERED CONTACTS, IP55 RATED WEATHERPROOF BOX AND COVER, HORIZONTAL SURFACE MOUNT.
6. PROVIDE AND INSTALL 230 AC 50HZ IP20 RATED WITH BATTERY BACKUP LED TWIN SPOT LIGHT EMERGENCY LIGHT FIXTURE. (TYPE L-5)
7. REMOVE EXISTING WALL MOUNTED LIGHT FIXTURES AND INSTALL 100W EXTERIOR WALL MOUNTED ANTI-VANDAL LIGHT FIXTURE. (TYPE L-2)
8. PROVIDE AND INSTALL IP65 CFL EMERGENCY LIGHT FIXTURE 230 AC 50HZ IP20 RATED WITH BATTERY BACKUP WITH CLASS 1 CONSTRUCTION. (TYPE L-3)
9. PROVIDE AND INSTALL TWO (2) 15-WATT LED FLOOD LIGHTS WITH PASSIVE INFRARED SENSORS. (TYPE L-1A)
10. THE HEIGHT OF THE MANUAL FIRE ALARM PULL STATION BOXES SHALL BE MIN. 1067MM AND MAX. OF 1372MM MEASURED VERTICALLY FROM THE FLOOR LEVEL TO THE ACTIVATING HANDLE OR LEVER OF THE BOX.
11. COMBINATION IONIZATION-PHOTOELECTRIC(DUAL SENSOR) SMOKE DETECTOR
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MSGR RENOVATION PROJECT
for
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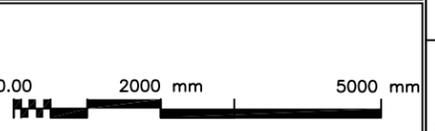
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Release For Construction:

ELECTRICAL		
NEW ELECTRICAL PLAN		
GR0 Project Number XXXXXX	Drawing Scale 1:50	Phase CONCEPT
CADD File Name	CADD Plot Scale AS SHOWN	DATE

SEAL	Date 06/20/14	Sheet Number
	Drawn By EAE	E1.04
	Checked By	
	Project Number	Classification UNCLASSIFIED



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MSGR RENOVATION PROJECT

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Revisions		

Release For Construction:

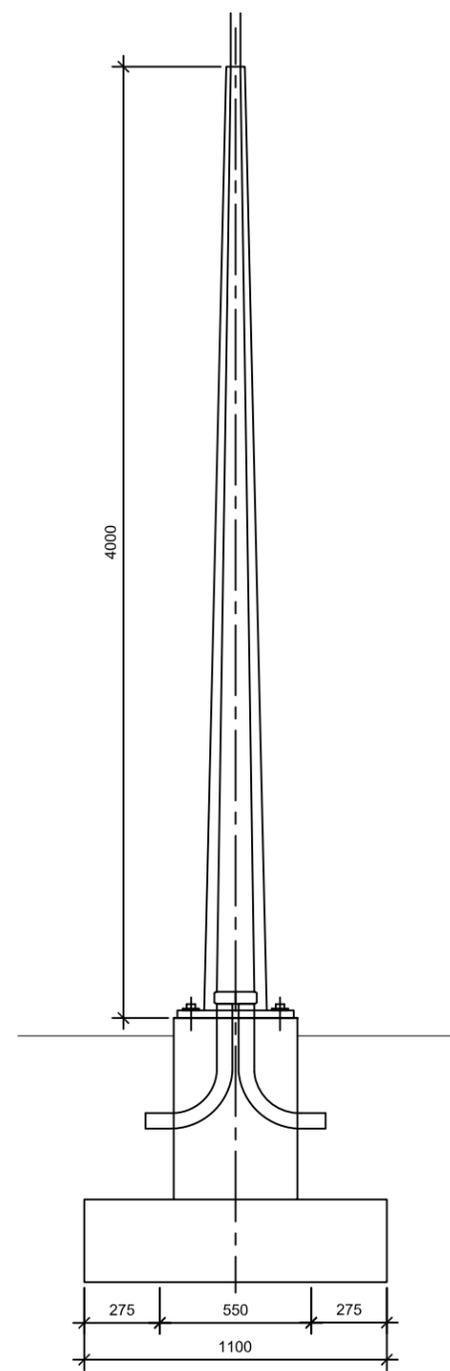
Drawing Title: **DETAILS ELECTRICAL**

GRB Project Number	Drawing Scale	Phase
XXXXXX	NTS	
CADD File Name	CADD Plot Scale	<input checked="" type="checkbox"/> CONCEPT <input type="checkbox"/> 30% <input type="checkbox"/> 60% <input type="checkbox"/> 90% <input type="checkbox"/> FINAL
	AS SHOWN	

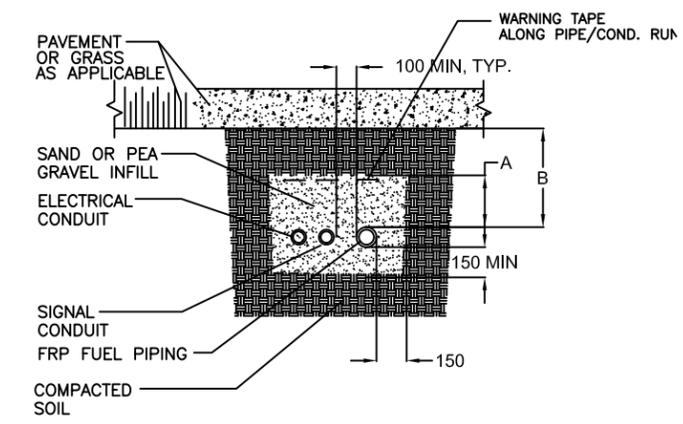
SEAL	Date	06/20/14	Sheet Number
	Drawn By	EAE	E5.01
	Checked By		
	Project Number		
Classification: UNCLASSIFIED			

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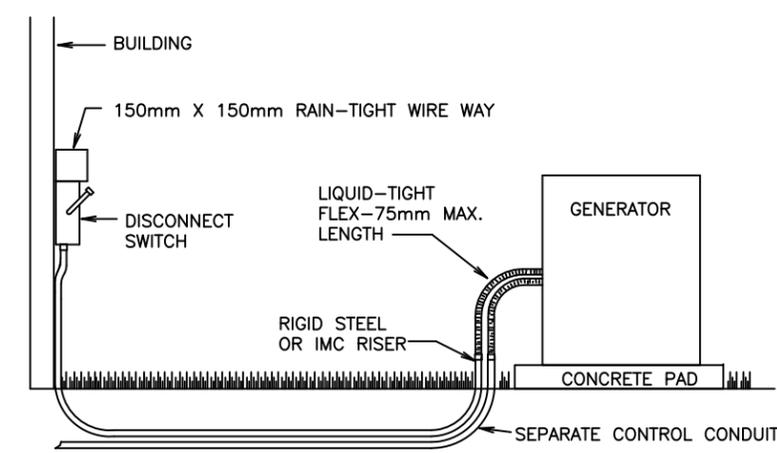
1 TYPICAL CCTV / LIGHT POLE SECTION
SCALE: NTS



PIPE SIZE MM	SURFACE CONDITION	A MM MIN.	B MM MIN.
50	UNPAVED	300	430
	PAVED, MIN. 100MM ASPHALT	200	300
	PAVED, MIN. 100MM CONCRETE	120	230
80	UNPAVED	350	500
	PAVED, MIN. 100MM ASPHALT	230	330
	PAVED, MIN. 100MM CONCRETE	180	280
100	UNPAVED	350	500
	PAVED, MIN. 100MM ASPHALT	250	350
	PAVED, MIN. 100MM CONCRETE	180	280

NOTE: 1. PIPING TO BE COMPLETELY SURROUNDED W/SAND OR 3 TO 10MM DIA PEA GRAVEL.
2. SLOPE FUEL PIPING 1% DN TO UG TANK

1 PIPE TRENCHING DETAIL
SCALE: NTS



1 GENERATOR CONDUIT DETAIL
SCALE: NTS