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MINISTRY OF HEALTH - ETHIOPIA



Adwa & Abala Hospital Rehabilitation Projects

ABALA HOSPITAL CONSTRUCTION OF ONE STOP CENTER

TECHNICAL SPECIFICATIONS



MoW : Mosaïque Ingénierie France & MTT

Ref: 25126-CCTP-20260515-V01 OSC Abala

01	15 May 2026	First submission	NK	MB	JN
Nr	Date	Description	Prepared By	Revised by	Approved by

INDEX

I General & Structural Works Technical Specifications

1. GENERAL PROVISIONS	5
1.1. GENERAL.....	5
1.2. SCOPE OF WORK.....	5
1.3. CONTRACTOR OBLIGATIONS.....	5
1.4. GENERAL STANDARDS AND REGULATIONS.....	6
1.5. WORKS COORDINATION	6
1.6. VERIFICATION AND CONTROL OF THE BILL OF QUANTITIES	7
1.7. DIMENSIONAL CHECKS AND SETTING-OUT VERIFICATION.....	7
1.8. ON-SITE STORAGE	7
1.9. SITE SAFETY.....	7
1.10. TESTING AND COMMISSIONING	7
1.11. WASTE MANAGEMENT	7
1.12. SITE CLEANING.....	8
1.13. SITE WELFARE COMPOUND (LIFE BASE).....	8
1.14. SITE NOTICE BOARD.....	8
1.15. SITE HOARDING AND SECURITY FENCING	8
1.16. SHOP DRAWINGS	8
1.17. DOCUMENTS TO BE PROVIDED PRIOR TO EXECUTION	8
1.18. MODIFICATIONS DURING CONSTRUCTION.....	9
1.19. SETTING OUT AND BENCHMARKS.....	9
1.20. MATERIAL SAMPLES	9
1.21. AS-BUILT DOCUMENTATION.....	9
1.22. WARRANTIES.....	9
1.23. SUBSTRATE ACCEPTANCE.....	10
1.24. RAINWATER MANAGEMENT DURING CONSTRUCTION.....	10
1.25. SITE ACCESS	10
1.26. PROTECTION FROM WEATHER CONDITIONS	10
1.27. SUBSTRATE INVESTIGATION	10
1.28. DESIGN ASSUMPTIONS.....	10
1.29. REINFORCEMENT STEEL.....	11
1.30. TOLERANCES AND FINISHES	11
2. SPECIAL REQUIREMENTS.....	12
2.1. INFRASTRUCTURE, ROADS, AND UTILITIES WORKS	12
2.2. SUPERSTRUCTURE WORKS	16
2.3. TIMBER ROOF STRUCTURE AND ROOFING	18

II Architectural Works Technical Specifications

3. BLOCK WORK.....	25
3.1. 200 MM HOLLOW CONCRETE BLOCK (HCB) WALLS	25
3.2. 150 MM HOLLOW CONCRETE BLOCK (HCB) WALLS — INCLUDING ROOF PARAPET.....	25
4. CARPENTRY AND JOINERY WORKS.....	25
4.1. CHIPBOARD SUSPENDED CEILINGS	25
5. METAL WORKS.....	26
5.1. ALUMINIUM DOORS AND WINDOWS — GENERAL.....	26
5.2. CIRCULAR HOLLOW SECTION BALCONY GUARD RAIL	26
5.3. WALL-MOUNTED HAND RAIL — ENTRANCE RAMP.....	26
5.4. FACADE PROTECTION — HOLLOW CIRCULAR TUBE FRAME WITH PLEXIGLASS INFILL PANELS	27
6. FINISHING WORKS.....	27
6.1. TWO-COAT CEMENT-SAND PLASTER TO INTERNAL WALLS	28
6.2. TWO-COAT CEMENT-SAND PLASTER TO EXTERNAL WALLS.....	28

6.3.	GYPSUM PLASTER TO INTERNAL CEILINGS, SOFFITS, AND STAIR LANDINGS	28
6.4.	PORCELAIN FLOOR TILES 600 X 600 X 9 MM.....	28
6.5.	PORCELAIN TILE SKIRTING 100 X 9 MM.....	29
6.6.	NON-SLIP CERAMIC FLOOR TILES 300 X 600 X 9 MM — WET AREAS	29
6.7.	GLAZED CERAMIC WALL TILES 300 X 200 X 6 MM — WET AREAS	29
6.8.	MARBLE WINDOW SILL.....	29
6.9.	MARBLE DOOR THRESHOLD (SILL).....	29
6.10.	ANGLE IRON CORNER PROTECTION	30
6.11.	THREE-COAT EXTERNAL RENDER	30
6.12.	RC PAVEMENT AROUND BUILDING — C-20, 1.20 M WIDE	30
6.13.	REINFORCED CONCRETE KERB (CURB STONE) — 100 X 400 MM.....	30
6.14.	PRECAST CONCRETE HALF-ROUND CHANNEL — Ø300 MM ON RED ASH BEDDING	31
6.15.	ENTRANCE SIGNAGE AND LOGO.....	31
6.16.	LOAM SOIL FOR GRASS PLANTING	31
6.17.	ORNAMENTAL PLANTS AND ENDEMIC TREES	32
6.18.	KITCHEN WORKTOP UNIT — MARBLE TOP, MASONRY BASE, AND TIMBER DOORS.....	32
6.19.	FIXED KITCHEN ISLAND UNIT.....	32
6.20.	4-BURNER BUILT-IN CERAMIC HOB.....	33
7.	PAINTING WORKS.....	33
7.1.	INTERNAL WALLS — THREE COATS WASHABLE PLASTIC EMULSION PAINT	33
7.2.	CHIPBOARD CEILINGS — THREE COATS EMULSION PAINT.....	33
7.3.	TWO COATS SYNTHETIC (OIL) PAINT TO METAL ROOFING	33
7.4.	QUARTZ PAINT TO EXTERNAL WALLS.....	34

III Electrical Works Technical Specifications

8.	GENERAL REQUIREMENTS.....	35
8.1.	Scope of Work	35
8.2.	Various Obligations	35
8.3.	Codes and Standards.....	36
8.4.	As-Built Drawings.....	36
8.5.	Maintenance during the Warranty Period	36
8.6.	Testing and Acceptance	37
8.7.	Origin and Reference of Equipment	37
8.8.	Modifications.....	37
8.9.	Construction Site	37
8.10.	Rejection.....	38
8.11.	Drawings to be Provided.....	38
9.	EARTHING SYSTEM.....	38
9.1.	General	38
9.2.	Grounding Point.....	38
9.3.	Equipment Earthing of the Electrical Works	39
9.4.	Protective Conductors:.....	39
9.5.	Earthing Pit :	39
10.	DISTRIBUTION BOARDS.....	39
10.1.	General	39
10.2.	Specifications.....	40
10.3.	Circuit Breakers :	41
11.	WIRES AND CABLES.....	41
11.1.	Wires & Cables - Lighting & Power.....	41
11.2.	Installation of Wires & Cables.....	42
11.3.	Cable Supports.....	42
11.4.	Conduits.....	42
12.	WIRING DEVICES	43
12.1.	General	43
12.2.	Switches and Device Plates	43
12.3.	Socket Outlets.....	43
13.	LIGHTING FIXTURES.....	44

13.1.	General	44
13.2.	Characteristics	44
13.3.	Emergency Lighting:	44
13.4.	Nomenclature : Non-exhaustive list :	45
14.	IT NETWORK	45
15.	CCTV	45
15.1.	NVR - IP Recorder	46
15.2.	Internal IP Hard Drive	46
15.3.	Indoor Dome IP Surveillance Camera	46
15.4.	. Outdoor IP Tube Surveillance Camera	46
15.5.	Video Surveillance Wiring Kit	46
16.	FIRE DETECTION	47
16.1.	Addressable Fire Detection Central Unit - 32 Points	47
16.2.	Fire Detector	48
16.3.	Portable Fire Extinguishers	49

IV MEP Works Technical Specifications

17.	DESIGN ASSUMPTIONS	50
17.1.	CLIMATE DATA OF THE SITE (ABALA – AFAR)	50
17.2.	DOMESTIC REFERENCE CONDITIONS	51
17.3.	OCCUPANCY ASSUMPTIONS	51
17.4.	INTERNAL INTAKE AND METABOLISM	51
17.5.	BREAKDOWN ASSUMPTIONS	51
18.	MEP TECHNICAL REQUIREMENTS	51
18.1.	HVAC – AIR CONDITIONING	51
18.2.	VENTILATION	52
18.3.	SANITARY PLUMBING	53
19.	PERFORMANCE REQUIREMENTS	56
20.	TESTING AND COMMISSIONING	56
21.	DOCUMENTS TO BE PROVIDED (AS BUILT)	56
22.	WARRANTIES	56

I General & Structural Works Technical Specifications

1. GENERAL PROVISIONS

1.1. GENERAL

These Special Technical Specifications govern the construction works for the One Stop Center (OSC) building for Abala Hospital, Ethiopia.

1.2. SCOPE OF WORK

The services to be provided include, but are not limited to:

- Site survey and inspection of existing conditions.
- Protection and preservation of adjacent structures.
- Execution of all works to a high standard of quality.
- Housekeeping throughout the works and removal of all waste and debris to approved disposal sites upon completion.
- Substrate recognition and acceptance.
- Supply of new, fit-for-purpose materials and products.
- Supply and operation of all construction plant, equipment, and tooling.
- Installation of products in strict accordance with the specifications and contract documents.
- Formal acceptance or rejection of unsuitable substrates prior to commencement of any work thereon; any rejection must be notified in writing before works proceed.
- Preparation of shop drawings, fabrication plans, and reservation schedules for review and approval by the Architect and Project Manager; all penetrations and openings must be included.

1.3. CONTRACTOR OBLIGATIONS

The provisions of the CCTP and BOQ are not exhaustive. The Contractor must allow in his tender for all supplies, materials, and works necessary for the complete and proper execution of the works, even where not explicitly described herein.

Works within the Contractor's scope are also understood to include all works necessary for the integration of other trades within the building; the Contractor acknowledges having made provision for these without omission or reservation in his overall price.

The Contractor is responsible for independently verifying all operations described in the CCTP, BOQ, and drawings.

It is explicitly stated that it is sufficient for a work item to be described or specified in any one of the contract documents (CCTP, BOQ, or drawings) for the Contractor to be required to carry it out, without restriction or reservation. The Contractor may not, under any circumstances, invoke unforeseeable conditions or interpretation of drawings or specifications to avoid, limit, or seek a supplement for executing the works or the constraints they entail.

Quantities shown are for information purposes only; tenderers are required to verify them.

As part of the performance of his contract, the Contractor must:

- Prior to submitting his tender, verify under his own responsibility all operations and works described in the specifications, and complete them if necessary using all available means (consultation with the Project Manager, study of drawings, site visit, etc.), so as to allow in his prices for all works necessary for the complete and proper execution. Where any service, work, ancillary task, or accessory required for the execution of the work is not priced as a separate item, it is to be included in the price of the relevant main work items.
- Verify all quantities. All quantities are net in-place quantities, without allowance for waste, off-cuts, recovery, bulkage, etc. The Contractor is responsible for the quantities and completeness of his offer. Any discrepancies in quantities must be notified to the Project Manager in writing at the time of tender submission.

- No additional payment will be granted after tender submission on the grounds of the Contractor's lack of knowledge of the project.
- Prepare construction drawings and detail drawings, together with all necessary calculation notes.
- Prepare Site Installation Plans.
- Meet all energy costs for the needs of the site.
- Set out all structures and layouts in accordance with the Architect's drawings.
- Supply, transport, and install all materials, products, and works necessary for the construction of the works within this lot.
- Provide all approved scaffolding, plant, and lifting equipment necessary to carry out the works.
- Execute all openings, chases, infills, sealings, and fixings required for the proper execution
- Provide all fixings for his works, using any means compliant with applicable standards.
- Provide all labour and materials for any remedial works, finishing, verification, and adjustment of his works upon completion and during the defects correction period following handover.
- Load and transport all debris and waste to approved recycling and disposal facilities, with waste sorting in accordance with the site waste management plan. The Contractor must maintain his plant, installations, and work areas clean at all times during and upon completion of his works.
- In the event of non-compliance with cleaning requirements, any cleaning of the site may be ordered by the Project Manager at the expense of the Contractor(s) responsible.
- Provide the Technical Inspector with all supporting documents and technical opinions for all processes and products used, together with all execution documents (drawings, diagrams, implementation details, calculation notes, specifications, instructions for non-traditional materials or processes, classification and test reports, etc.). All documents must be submitted at least 10 working days before execution.
- Prepare and maintain As-Built Documentation (DOE), to be submitted in 4 copies to the Project Manager upon completion of the project.
- Deliver to the Contracting Authority all written operating and maintenance instructions for all installations and equipment.

1.4. GENERAL STANDARDS AND REGULATIONS

All works must be carried out in full compliance with the building regulations applicable to the services provided. All works must conform to the applicable codes, official texts, and standards in force on the date of tender submission, including in particular:

- Contract
- The technical specifications, drawings and BOQ
- Construction Code
- Applicable legislative texts
- Labour Code
- All applicable decrees and regulations
- Ethiopian EBCS standards
- PRM (Reduced Mobility) Regulations
- Fire Regulations

All regulations listed above (non-exhaustive) shall be those in force on the first day of the month in which prices are established. These general documents are not provided with the tender file, as Contractors are deemed to be familiar with them or able to obtain them from the relevant publishing organisations.

This list is not exhaustive. The Contractor must carry out all works in strict accordance with the Rules of Good Practice and all applicable Technical Standards and Regulations.

1.5. WORKS COORDINATION

The Contractor must place orders with suppliers in good time for all products not held in stock, to ensure that the supply of materials does not compromise the start or progress of the works within the programme. The Project Manager reserves the right to request copies of orders and to inspect the Contractor's workshops or the site to verify the availability of materials and the progress of fabrication work.

Under no circumstances may the Contractor cite supply delays as a reason for delayed installation of products or materials.

1.6. VERIFICATION AND CONTROL OF THE BILL OF QUANTITIES

The tender file defines in precise terms the subject matter of the contract and the characteristics of the works to be executed. Prices submitted by the Contractor must be for works delivered in a fully completed state.

- All works and supplies necessary to deliver the subject matter of the contract to the Contracting Authority in a complete and perfect state of completion cannot be considered as 'additional works' and do not give rise to additional payments.
- The pricing breakdown annexed to the Contractor's tender carries no contractual value; in the event of discrepancies, only the sum stated in the contract deed is binding on the Project Owner.
- Since quantities are not contractual in nature, the Contractor must verify all values shown in the tender file before submitting his offer.
- Once contracts have been signed and accepted, no claim based on omission or error in quantities will be entertained.

The offer must also include (broken down within unit prices):

- Regulatory measures for the protection of workers (safety nets, guardrails, etc.)
- Internal scaffolding for the execution of works (including erection, rental, and dismantling)
- Miscellaneous off-cuts and waste not included in the quantities shown in the priced schedule

1.7. DIMENSIONAL CHECKS AND SETTING-OUT VERIFICATION

The Contractor must verify on site, prior to any installation, that the dimensions and indications given on the drawings can be followed. In case of doubt, he must refer the matter immediately to the Project Manager. The Contractor may not, on his own initiative, modify any aspect of the project, but must highlight all changes he considers necessary and request additional information on any point that appears unclear or incomplete. He must complete in every detail the drawings provided by the Project Manager.

Contractors' representatives must attend all site meetings. Their representative must be a competent and responsible technician, authorised to receive instructions and make decisions on behalf of the company.

1.8. ON-SITE STORAGE

The Contracting Authority will allocate a storage area on site for materials supplied, under the full responsibility of the Contractor.

1.9. SITE SAFETY

The Contractor must scrupulously comply with all applicable safety standards, in accordance with current legislation.

1.10. TESTING AND COMMISSIONING

Each trade must carry out the technical tests and verifications of all kinds for which it is responsible. In addition to its own tests, the Contractor must perform functional verification tests of its installations in accordance with the applicable technical documents. Test reports must be submitted in 3 copies to the Project Manager in accordance with the standards defined by the Technical Inspection and Prevention Committee.

1.11. WASTE MANAGEMENT

The Contractor is responsible for the disposal of its waste, where collective skips are not provided on site. All waste must be removed to approved disposal facilities (the Project Manager may require evidence of disposal) at the exclusive expense of the Contractor. No storage of waste on site will be tolerated.

1.12. SITE CLEANING

The Contractor is responsible for the permanent cleaning of its works and for the removal of all construction debris. All external areas within the scope of this lot must be fully cleaned prior to acceptance of the works. All necessary remedial and finishing works must be carried out so that the entire scope is handed over in perfect working order and condition. Surrounding areas must also be cleaned and reinstated.

1.13. SITE WELFARE COMPOUND (LIFE BASE)

Rental and installation of a site office compound, including: platform and access layout; prefabricated module; tables and chairs; lighting; air conditioning; refrigerator; including all connections and sub-metering; site distribution board; regular cleaning. Includes a changing room equipped with metal lockers and sanitary facilities. Depending on the phasing of the works, the welfare compound may be relocated during the construction programme without giving rise to any additional cost.

All requirements for connection of the welfare compound to site services, including connections, supply and drainage (electrical supply, foul water, surface water, potable water supply, telecommunications and high-speed Internet)

1.14. SITE NOTICE BOARD

Supply and installation of a site notice board, including regulatory and visual graphics in colour:

- Names, cities, and telephone numbers of all project stakeholders
- Project perspectives and visualisations
- Logos of the Cities of Abala

1.15. SITE HOARDING AND SECURITY FENCING

The Contractor must supply and install a temporary site boundary fence to secure the entire perimeter of the works within the site boundary.

The fence must consist of rigid galvanised mesh panels, minimum 2.00 m in height, mounted on concrete pedestals or ground-anchored in accordance with site constraints, securely attached with appropriate fixings to ensure durability. The tarpaulin must be fully opaque to prevent visibility of the site from the outside.

A double-leaf metal access gate, minimum 3.50 m clear opening width, must be installed to allow access for plant and personnel. The gate must be fitted with a secure locking system with a padlock, supplied and installed by the Contractor. The installation must ensure adequate stability, resistance to wind and rain, and compliance with applicable safety standards. The Contractor must maintain the fence, tarpaulins, and gate in good condition throughout the works, and carry out complete dismantling at the end of the project.

1.16. SHOP DRAWINGS

The Contractor holds the execution design (EXE) mission. All studies and construction drawings are the responsibility of the Contractor. The following documents are due to the Project Management:

- Detail drawings (Notebooks of Details)
- Site layout plans
- Construction shop drawings
- Quality Control and Inspection Plan (QCIP)
- Structural calculation notes
- Including the G3 geotechnical mission for foundations
- Including the structural design and technical studies

The Contractor must submit the completed shop drawings, approved by the Technical Inspector, Geotechnical Engineer, and Project Manager, at least one month before the commencement of any works.

1.17. DOCUMENTS TO BE PROVIDED PRIOR TO EXECUTION

The following documents must be submitted prior to commencement of works:

- Site installation plan

- Special Health and Safety Plan (PPSPS)
- Construction shop drawings and fabrication plans, together with all structural calculation notes
- Product data sheets and technical approvals for all materials and products used
- Material samples
- Detailed programme
- Intervention methodology statements

1.18. MODIFICATIONS DURING CONSTRUCTION

Minor dimensional differences, changes due to adjustments, or changes arising from construction requirements do not in any case constitute grounds for a claim for additional payment. Similarly, if prior to construction, modifications to the location, routing, or layout of components are deemed technically necessary or arise from construction requirements, these shall not give rise to additional payment. All works must strictly comply with the approved construction execution documents.

1.19. SETTING OUT AND BENCHMARKS

The Structural Work Contractor must ensure that fixed planimetric and level benchmarks are established by a qualified land surveyor and maintained in good condition for the duration of the works. Based on these fixed reference points, the Contractor must set out all buildings using batter boards, masonry stakes, and bollards placed outside the building footprint.

Any dimensional or level errors identified during setting out must be reported immediately to the Project Manager so that necessary corrections can be made.

The Contractor must liaise with all relevant authorities and utility bodies to verify that alignments, dimensions of utility connections, roads, drains, and all services are compatible with the works being constructed.

A setting-out report must be prepared at the Contractor's expense, defining: the principal axes and alignments; the finished floor level references; the road and site boundary levels. This report must be submitted to the Project Manager, who will verify its concordance with the design, before forwarding to the Project Owner.

1.20. MATERIAL SAMPLES

Tenderers must submit, as early as possible, samples and technical specifications for all materials and equipment proposed, for review by the Project Manager. This must be done in a timely manner so that decisions on acceptance or rejection do not affect the programme. Where a change of material by the Contractor causes programme delays, those delays will be attributed to the Contractor.

1.21. AS-BUILT DOCUMENTATION

Upon completion of the project, the As-Built files must be submitted in 3 copies and must include:

- 1 set of paper drawings of all installations, diagrams, and detail drawings
- 1 set of digital drawings in AutoCAD (.DWG) or Revit compatible format
- Material technical instructions and data sheets
- Warranty certificates
- Equipment maintenance instructions
- 2 USB keys containing all DOE data and drawings

1.22. WARRANTIES

The Contractor formally guarantees the conformity of his works with the applicable national building regulations. This warranty, of one year's duration, requires the replacement as soon as possible of any part of the works found to be defective, and the restoration of any element that deteriorates under normal conditions of use during this period. All supplies and repairs made under this warranty are themselves warranted for a further period of one year, under the same conditions as the initial works. The date of acceptance, with or without reservations, constitutes the starting point for the two-year, five-year, and/or ten-year warranties.

1.23. SUBSTRATE ACCEPTANCE

The Contractor must formally accept the substrate on which he is required to execute his works. The commencement of works constitutes unconditional acceptance of the substrate.

1.24. RAINWATER MANAGEMENT DURING CONSTRUCTION

The Contractor of this trade is responsible for the supply and installation of all devices (rainwater outlets, temporary downpipes, etc.) necessary for the drainage of rainwater from the buildings until final connection. In the event of leaks during the construction period, the Contractor must repair and fully restore all damaged elements, regardless of the trade concerned.

1.25. SITE ACCESS

In the event of muddy or waterlogged conditions, the Contractor must guarantee access for all plant, construction vehicles, and personnel (pedestrians). The supply and installation of gravel (appropriate aggregate) with a suitable geotextile of adequate quality must be provided by the Contractor at no additional charge.

1.26. PROTECTION FROM WEATHER CONDITIONS

No waterproofing work may be carried out on wet substrates. In the event of adverse weather, all completed works must be effectively protected. Temporary tarpaulins must be installed over all areas not yet definitively treated, in anticipation of rainwater pooling. The Contractor must take all measures to limit water accumulation (installation of temporary surface water downpipes, etc.).

1.27. SUBSTRATE INVESTIGATION

The Contractor of this lot must investigate all substrates relevant to the works. Prior investigation of substrates will identify any defects and enable the appropriate remedial systems to be selected. This investigation will determine the type of preliminary works required.

1.28. DESIGN ASSUMPTIONS

NOTE: Loads are indicative and may be adjusted in accordance with Project Management requirements.

SEISMIC DESIGN (EBCS 8)	
Seismic Zone	Zone 2
WIND AND SNOW	
Basic Wind Velocity	Vb0 = 22 m/s
Snow	Not applicable
VARIABLE (LIVE) LOADS	
Roof (maintenance access)	Q = 0.80 kN/m ²
Access ramps	Q = 4.00 kN/m ²
Hospital areas	Q = 5.00 kN/m ²
PERMANENT (DEAD) LOADS	
Reinforced concrete self-weight	25.0 kN/m ³
Wall weight	G = 5.45 kN/m
Wall cladding weight	G = 1.80 kN/m
Built-up roofing system + suspended ceiling	G = 0.50 kN/m ²
Fire resistance — concrete structures	R60 (1 hour) — vertical and horizontal elements

1.29. REINFORCEMENT STEEL

Shaping, assembly, and installation of all reinforcement in accordance with the structural breakdown. Horizontal and vertical tie beams, stirrups, and lintels must be incorporated within masonry elements. Concrete cover spacers/blocks to be provided for all reinforcement.

Placement and securing of reinforcement:

At the time of concreting, all reinforcement must be free of loose rust, non-adherent mill scale, soil, or grease. Reinforcement must be installed in accordance with the details shown on the drawings, taking into account applicable standard requirements. All reinforcement must be tied together and held in position against the formwork to prevent any significant displacement or deformation during concrete placement. The type and positioning of spacers must be compatible with the long-term behaviour of the structure, particularly with regard to corrosion protection and, where applicable, fire resistance.

Steel characteristics:

- Grade: HA (High-Adherence Ribbed Bar) — Fe E 400
- Yield strength: $f_{yk} = 400 \text{ MPa}$

NOTE: Method of measurement: by kilogram, based on the structural study, for in-situ concrete construction. Off-cuts, assembly bars, dimensional tolerances, ties, and spacers are implicitly included in the Contractor's price. Where reinforcement quantities are not individually specified, they are implicitly included in the price of the corresponding works. Quantities are provided for information only; the Contractor agrees not to claim any additional payment for quantities in excess.

1.30. TOLERANCES AND FINISHES

1.30.1. NATURE AND VERIFICATION OF MATERIALS

The materials used must comply with the following requirements:

- Requirements of the applicable Unified Technical Documents
- Specific requirements of these specifications

All materials must conform to the samples accepted by the Project Manager and Project Owner.

The use of materials or products of higher quality than required will not give rise to any additional payment unless specifically ordered in writing by the Architect. The use of inferior materials will result in their automatic rejection and replacement at the expense of the Contractor, who will also bear the cost of any consequential reinstatement work.

The Contractor may propose equivalent products to those specified, provided they have the same aesthetic and technical characteristics. The use of any equivalent product must be approved in advance by the Project Manager.

The Contractor must submit to all tests, inspections, analyses, or expert assessments requested by the Contracting Authority or Project Manager. All associated costs are to be borne by the Contractor.

The Contractor must carry out self-inspection by submitting concrete structure inspection sheets weekly.

For each concrete delivery, the Contractor must provide the batch plant delivery note.

The Contractor must provide technical data sheets for all steels used and must be able to demonstrate compliance to the Technical Inspector following these tests.

1.30.2. SURFACE DEFECT REPAIR (PATCHING)

Skim coat patching on raw concrete: All patching on raw concrete intended to receive a finish, and all general concrete structure finishes, must be carried out using cement mortar or an approved equivalent, ensuring good bonding with the parent concrete and minimising shrinkage. Product dosages and application must comply with the manufacturer's instructions.

Patching on fair-faced or painted concrete: Where concrete surfaces intended to remain visible are not of sufficiently neat appearance or are incompatible with the standard of finish required by the Project Manager, the Contractor holding

this lot must carry out the works again at his own expense. No skim coating or painting is permitted without prior written agreement of the Project Manager. Where the required finish standard is not met, demolition and re-execution are the Contractor's responsibility.

1.30.3. RESERVATIONS IN FOUNDATIONS

The Contractor must provide for all holes to be reserved in the foundations for the passage of all pipes and services, together with the ducts and infilling over the full thickness of the foundations once the pipes have been laid and accepted.

1.30.4. NOTES ON REINFORCED CONCRETE AND MASONRY WORKS

Except for specific steel items, the Contractor must include in his price for all concrete and masonry works the value of all required formwork, all handling, and all means necessary for implementation and execution.

1.30.5. NOTES ON REINFORCED CONCRETE STRUCTURES AND MISCELLANEOUS WORKS

- Except for specific items, all works referring to articles with reinforcement will be measured and valued accordingly.
- The Contractor of this lot is responsible for all openings, reservations, gutter collection points, and chases for other trades, as well as infilling where the area to be filled exceeds 100 cm². He must coordinate with the Electrical Contractor to ensure timely installation of polyethylene conduit tubes in wall panels and floor slabs.
- The Contractor must report to the Project Manager any abnormal concentration of conduits that could weaken walls or floors and potentially cause future cracking.
- For external walls of main circulation areas, beams, and lintels, no concrete construction joints other than those shown on the execution drawings are permitted. Construction joints must be located at the upper face of floor slabs.
- The list of reinforced concrete works is not exhaustive. The Contractor must also allow for all stitching bars required.

2. SPECIAL REQUIREMENTS

2.1. INFRASTRUCTURE, ROADS, AND UTILITIES WORKS

2.1.1. TOPSOIL STRIP

Prior to the commencement of earthworks, the Contractor must strip the topsoil across all areas affected by the works (building footprint, roads, utility routes, storage areas, etc.). The strip must be carried out to an average depth of 200 mm (to be adjusted in accordance with the soil investigation or Project Manager's instruction), down to clean, organic-free subsoil. The stripped topsoil must be:

- Either stockpiled at the perimeter of the site for potential reuse at the end of the works (landscape backfill, seeding, etc.); or
- Evacuated to an approved treatment or disposal facility in compliance with applicable regulations

All excavated material must be cleared of all parasitic elements (roots, waste, etc.) and must not contaminate adjacent areas. Stripped areas must be protected against erosion and waterlogging. The Contractor is responsible for the removal, temporary storage, protection, and potential reuse of the topsoil in compliance with the environmental requirements of the project.

2.1.2. EXCAVATIONS FOR UNDERGROUND STRUCTURES

Trench and shaft excavations using mechanical plant for shallow foundations, including all handling for loading onto transport equipment. Trimming of excavation bottoms and sides for full-face concrete pours. An additional working space must be allowed for foundation formwork. All excavation bottoms must be inspected and accepted by a

Geotechnical Engineer at the Contractor's expense. Foundations must respect the bearing depth specified in the geotechnical report. All necessary precautions must be taken to avoid damaging existing underground services (surface water, electrical, heating, foul water, etc.).

Inclusions:

- Setting out on the ground
- Dewatering of natural or artificial groundwater
- Repair of collapsed trench walls
- Partial shoring to prevent accidental over-break
- Trimming of walls at excavation faces to allow full-mass concrete pours
- Grading of excavation bottoms
- Loading and disposal of surplus soil, including all taxes and disposal charges
- Reinstatement with existing fill material after completion of foundations; surplus soil to be evacuated at the Contractor's expense
- Removal of all hard points found at excavation bottoms that could constitute stress concentrations
- All dewatering, including management of rising water tables, surface rainfall, and all groundwater types, in accordance with the recommendations of the geotechnical report

NOTE: Method of measurement: m³

2.1.3. CONDUIT DUCTS

Supply and installation of polyolefin corrugated conduit sleeves (TPC), fitted with draw wires, including all installation and connection accessories. Application of bedding sand around the ducts. Including loading and disposal of surplus soil, all taxes and disposal charges, all necessary backfill of excavated material, warning marker tapes, and all necessary constraints in accordance with the requirements of the Electrical Contractor and Project Manager.

NOTE: Method of measurement: linear metre (m)

2.1.4. SEPTIC TANK INSTALLATION

All works associated with the installation of the septic tank will be carried out by the Contractor, including the diversion of existing utility networks (foul water, surface water, etc.) where necessary to permit installation. The Contractor must carry out the preliminary study required to determine the appropriate tank capacity, based on the estimated number of users of the building (working staff and future patients), to correctly size the installation in accordance with sanitary requirements.

Utility diversion works include:

- Identification of existing networks (foul water, surface water, and others)
- Diversion of pipes affected by the location of the tank (if necessary)
- Protection of existing networks during execution of the works

Installation works include:

- All earthworks necessary for the installation of the tank
- Preparation of the excavation base (stabilised bedding layer)
- Installation of the tank and connection to all relevant building drainage systems
- Backfilling and compaction around the tank
- Installation of control and access devices (inspection chambers, access covers, vents)
- Connection to drainage networks and installation of appropriate ventilation
- Supply and installation of a contamination-barrier geotextile in excavation bases and test pits; to underside of insulation layer, including peripheral laps and in accordance with manufacturer's requirements, for complete and proper execution

2.1.5. TECHNICAL TRENCHES FOR UNDERGROUND SERVICES

Trenches for underground services must be excavated under this lot (Structural Work) in accordance with the requirements of the construction execution study and the network layout drawings. The dimensions, depths, and construction methods of the trenches will be defined by the EXE study, based on the characteristics of the different

services to be installed (surface water, foul water, electricity, telecommunications, gas, etc.) and the specific site conditions.

Trench works include:

- Trench excavation: the depth and width of trenches will be determined in accordance with the EXE study and adjusted to suit the characteristics of the services to be laid. The Contractor is responsible for excavating to the specified dimensions and for managing any unforeseen conditions arising during execution.
- Trench support and shoring: depending on the results of the EXE study and ground conditions (unstable ground, significant depth), shoring, timbering, or support systems may be required. The cost of such measures, including erection, maintenance, and dismantling, is borne by this lot.
- Backfilling and compaction: after installation of all services, trenches must be backfilled with compliant materials and compacted to the required density.

Management of excavated material:

- Non-reusable material must be removed to approved disposal sites at the expense of this lot
- Reusable material may be stockpiled on site for use in other areas of the site, subject to compliance with environmental requirements
- Trench works must be completed within the agreed programme to allow rapid and safe installation of services, while complying with all applicable safety standards. The Contractor is responsible for all works including preparatory works, safety measures, and spoil management.

2.1.6. INSTALLATION OF FOUL WATER (FW), SURFACE WATER (SW), AND POTABLE WATER SUPPLY (PWS) PIPEWORK

The installation of foul water (FW), surface water (SW), and potable water supply (PWS) pipework is to be carried out under this lot, in accordance with the construction execution drawings (EXE study) and the technical specifications for the services to be installed. All laying works include the supply and installation of all pipes and their connection to the respective networks.

Foul Water (FW) Pipes: FW pipes must be installed with materials complying with applicable standards (PVC, concrete, etc.) and laid at a sufficient gradient to ensure gravity flow. Connections to the drainage network (collectors, tanks, etc.) must comply with the technical requirements of the drainage network.

Surface Water (SW) Pipes: SW pipes must be installed in the trenches prepared under this lot with materials specified by the relevant authorities (PVC, concrete, etc.). Installation must ensure optimum drainage with a compliant gradient to prevent any risk of waterlogging.

Potable Water Supply (PWS) Pipes: PWS pipes must be installed to sanitary standards using materials certified for potable water distribution (HDPE, lined steel, etc.). Installation must comply with health and safety requirements and ensure water quality. Frost protection devices must be installed in sensitive areas.

Installation conditions: all EU, EP, and AEP pipework must be installed in the trenches prepared under this lot, in accordance with the dimensions specified in the EXE study. Pressure and leak tests must be carried out for each type of pipe to verify compliance with network requirements. All connections between pipes and existing or future networks must be made in accordance with the specifications of the relevant network operators.

2.1.7. DRAINAGE SYSTEM WITH PERFORATED DRAINS, SIPHONS, AND GUTTER CHANNELS

Installation of a complete drainage system for the collection and discharge of rainwater and groundwater, including perforated drains, siphons, and gutter channels to ensure efficient and safe water flow.

Materials supplied:

- Perforated drains: PVC or equivalent, for subsurface water infiltration
- Gutter channels: for surface rainwater collection, in concrete or PVC
- Siphons: to prevent backflow and drain excess water
- Geotextile: to protect drains and prevent clogging

Installation:

- Trench excavation to specified dimensions
- Installation of perforated drains on a gravel or sand bedding layer
- Installation of gutter channels at perimeter and siphons at strategic network points

Connections and checks:

- Connection of the drainage system to the main drainage network
- Flow tests and functional verification of all components

Maintenance:

- Installation of inspection chambers for system maintenance access

2.1.8. SUB-BASE AND BASE COURSE LAYERS

All works relating to sub-grade formation, excavation, and fill required for sub-base must be carried out in accordance with the requirements of the EXE study and the technical specifications. The objective is to provide a stable, uniform, and high-quality formation.

Cut and excavation: excavation of all unsuitable or surplus material from the sub-grade (topsoil, unstable layers, or any material likely to affect bearing capacity). Extracted materials to be sorted and disposed of in compliance with applicable regulations. The depth of cut will be defined in accordance with the soil investigation results.

Sub-grade formation layers: once excavation is complete, a formation layer of selected granular materials (gravel, sand, etc.) must be installed in accordance with the EXE study requirements to create a stable uniform base. The layer must be constructed in multiple passes, with each layer being compacted to achieve the required density.

Main requirements for the sub-base layer:

- Uniform compaction to guarantee bearing capacity
- Correct gradient and drainage to prevent surface water ponding

2.1.9. ISOLATED FOOTINGS (REINFORCED CONCRETE)

Construction of isolated reinforced concrete footings including: supply and installation of concrete appropriate for reinforced concrete in infrastructure, with full vibration for a homogeneous pour; aggregate size, workability, and compaction method selected to achieve the specified design strengths.

- Class C2 or better formwork finish
- Connection of footings to one another in accordance with seismic design requirements, including all starter bars
- All starter bars, reinforcement, and fixing provisions for the anchorage of RC columns
- All formwork, all handling, energy resources, plant, and constraints for construction below groundwater level
- Supply and installation of lean concrete blinding on all surfaces in contact with the ground, minimum 50 mm thickness. The blinding surface must be clean before concrete is poured, with no soil contamination. The blinding concrete must extend at least 50 mm beyond the footing on all sides
- Supply and installation of expansion joints where required
- Swellable waterproofing strips (RX type) at all horizontal and vertical construction joints in concrete

NOTE: Pre-sizing shown in the pricing schedule is for information purposes only. Final dimensioning per the structural design study, at the Contractor's expense. Method of measurement: m³.

2.1.10. ISOLATED FOOTING REINFORCEMENT STEEL

Supply and installation of high-adherence (HA) ribbed reinforcement steel, all diameters, including ties, off-cuts, all bending and shaping, assembly, etc. Protection of all steel on extended standby against corrosion.

NOTE: Pre-sizing shown in the pricing schedule is for information purposes only. Final dimensioning per structural design study. Method of measurement: kg.

2.1.11. RC GROUND BEAMS (GRADE BEAMS)

Supply and installation of reinforced concrete ground beams between isolated footings by all appropriate means, incorporating a mass water-repellent admixture, poured between formwork, including all keying and execution constraints.

Ground beams for horizontal and vertical superstructure connections, constructed in reinforced concrete, either prefabricated semi-industrialised or cast in situ, rectangular cross-section. Construction in accordance with applicable standards:

- Class C3 formwork for all faces in contact with the ground

- Class C4 formwork for all exposed faces, in a uniform light grey colour with uniform surface texture, free of joints or voids, for a smooth, glazed fair-faced concrete finish
- A2 type starter bars and dowels
- P1 waterproofing protection for all elements in contact with the ground
- Swellable waterproofing strips (RX type) at all horizontal and vertical construction joints
- All reservations for the passage of MEP services
- All starter bars, reinforcement, and fixing provisions for all structural anchorages
- Supply and installation of lean concrete blinding on all ground-contact surfaces, minimum 50 mm thickness
- Supply and installation of expansion joints where required

Reference dimensions (WFD phase):

- Width: 300 mm
- Depth: 400 mm

*NOTE: Pre-sizing shown in the pricing schedule is for information purposes only. Final dimensioning per structural design study.
Method of measurement: m³.*

2.1.12. RC GROUND BEAM REINFORCEMENT STEEL

Supply and installation of high-adherence (HA) ribbed reinforcement steel, all diameters, including ties, off-cuts, all bending and shaping, assembly, etc. Protection of all steel on extended standby against corrosion.

*NOTE: Pre-sizing shown in the pricing schedule is for information purposes only. Final dimensioning per structural design study.
Method of measurement: kg.*

2.1.13. RC COLUMN BASES

Supply and construction of reinforced concrete column bases, designed to ensure the optimal connection between vertical columns and their foundations.

Scope of services:

- Installation of appropriate formwork, ensuring dimensional stability and a fair-faced formwork finish
- Concrete pour with full vibration, curing, and protection in accordance with the project's technical specifications
- All constraints necessary to guarantee alignment, level, and structural continuity between the column and its footing support

Column bases must be constructed in accordance with the construction execution drawings prepared by the structural design office, and must comply with all tolerances and Project Management requirements.

2.1.14. COLUMN BASE REINFORCEMENT STEEL

Supply, cutting, bending, and installation of high-adherence (HA) ribbed reinforcement steel for reinforced concrete column bases.

Scope of services:

- Primary and secondary reinforcement in accordance with the execution drawings from the structural design office
- Ties, stirrups, off-cuts, bending, anchorage, and all assembly requirements
- Accurate positioning of all reinforcement using concrete-compatible spacers and supports, ensuring correct cover and alignment
- Protection of all steel on extended standby against corrosion (tarpaulin cover or other approved method)

2.2. SUPERSTRUCTURE WORKS

2.2.1. CREATION OF OPENINGS WITH INSTALLATION OF LINTELS

All works necessary for the installation of lintels in accordance with the execution drawings and the structural engineer's calculation notes, including:

- Installation of appropriate temporary propping and shoring
- Fabrication and installation of lintels (reinforced concrete or structural steel as specified in the contract documents), including: formwork installation; reinforcement positioning and tying; maintenance of specified concrete covers; concrete pour, vibration, and curing
- Bedding, wedging, and alignment of the lintel to ensure correct load transfer
- Reconstruction of supporting masonry, infill, masonry repairs, and finishes
- Removal of all excavated material and reinstatement of surrounding areas

The Contractor must comply with all execution drawings, applicable standards, structural engineer's requirements, and all safety rules relating to works within the existing structure.

2.2.2. RC COLUMNS

Supply and construction of vertically reinforced concrete columns, circular or square cross-section, designed to carry the structural loads of the building. Execution must ensure a high quality of finish with neat, clean formwork, particularly for exposed or fair-faced elements.

Materials and supplies:

- Reinforced concrete, minimum class C25/30, or as specified by the structural design office
- High-adherence (HA) ribbed reinforcement steel, sized in accordance with the design office's reinforcement drawings
- Specific formwork (traditional or purpose-made) ensuring a neat finish, particularly for exposed columns

Construction:

- Installation in accordance with the execution drawings
- Circular or square formwork, with particular attention to final appearance (smooth surface, free of significant voids or defects)
- Reinforcement in accordance with technical specifications
- Concrete pour and vibration to achieve full compaction
- Careful striking of formwork, with checking of edges, surfaces, and plumb

Quality control:

- Dimensional tolerances and verticality checks
- Fair-faced concrete finishing without excessive remedial work or patching
- Concrete testing where required (strength, workability, etc.)

2.2.3. RC COLUMN REINFORCEMENT STEEL

Supply and installation of high-adherence (HA) ribbed reinforcement steel, all diameters, including ties, off-cuts, all bending and shaping, assembly, etc. Protection of all steel on extended standby against corrosion.

NOTE: Pre-sizing shown in the BOQ is for information purposes only. Final dimensioning per structural design study. Method of measurement: kg.

2.2.4. RC BEAMS

Supply and installation of reinforced concrete beams by all appropriate means in the superstructure, including all keying and execution constraints. Construction in accordance with specifications:

- Concrete class B2 (C25/30 minimum)
- Class C3 formwork finish
- Including supply and installation of expansion joints where required

Reference dimensions (WFD phase):

- Width: 200 mm
- Depth: 300 mm

NOTE: Pre-sizing shown in the BOQ is for information purposes only. Final dimensioning per structural design study. Method of measurement: m³.

2.2.5. RC BEAM REINFORCEMENT STEEL

Supply and installation of high-adherence (HA) ribbed reinforcement steel, all diameters, including ties, off-cuts, all bending and shaping, assembly, etc. Protection of all steel on extended standby against corrosion.

NOTE: Pre-sizing shown in the BOQ is for information purposes only. Final dimensioning per structural design study. Method of measurement: kg.

2.2.6. RC PARAPET

Supply and construction of a reinforced concrete parapet around the full perimeter of the roof in accordance with the structural engineering drawings.

Scope of services:

- Formwork to the specified height and dimensions with a neat finish (clean formwork)
- Complete reinforcement using HA ribbed steel, all diameters, including ties, stirrups, anchorages, etc., in accordance with the reinforcement drawings
- Concrete pour, vibration, curing, careful formwork striking, and edge treatment
- Compliance with all specified covers, dimensional tolerances, and flatness requirements

The parapet must be designed to receive the waterproofing finishes, upstands, or coping details as specified by the Project Manager. All openings or penetrations required for the installation of accessories must be incorporated within this lot.

2.2.7. PROTECTION OF STRUCTURES AND SITE CLEANING UPON COMPLETION

Throughout the duration of his works, the Contractor must ensure effective protection of all completed works, as well as all elements on standby or in reservation. He must preserve the integrity of all structures, prevent any damage or soiling, and maintain all work areas in a safe and orderly condition.

Upon completion of his works, the Contractor must carry out a complete clean-up of all his work areas, including:

- Removal of all debris, waste, surplus materials, and formwork elements
- Sweeping and cleaning of all surfaces
- Cleaning of all reserved openings and technical areas

These operations are exclusively the responsibility of this lot and are a prerequisite for acceptance of the works and the commencement of subsequent trades.

2.2.8. MISCELLANEOUS MASONRY

This lot covers all miscellaneous masonry works within the project scope. This includes the construction of minor structures in reinforced or plain concrete, shear walls, blockwork, together with all bedding and infill works. The scope also includes construction of thresholds, window sills, low walls (parapet walls), and all other ancillary works necessary for the proper execution of the project.

All materials used (concrete, masonry blocks, mortars) must comply with applicable standards, particularly with regard to mechanical strength and durability. Careful workmanship must be ensured, guaranteeing the stability, flatness, and aesthetic integration of all structures within the overall works. Finishes such as renders and pointing must be executed with precision in accordance with the Project Owner's instructions.

2.3. TIMBER ROOF STRUCTURE AND ROOFING

2.3.1. MATERIAL QUALITY — TIMBER GENERAL REQUIREMENTS

All structural timber must comply with the following minimum requirements:

- Species: tropical hardwood or equivalent structural species, approved by the Project Manager, with a minimum strength class of C24 per EN 338, or equivalent grade per EBCS 5.
- Moisture content at time of installation: maximum 18% for solid timber; maximum 12% for engineered wood products.

- All structural timber must be kiln-dried (KD) or have demonstrably achieved the required equilibrium moisture content prior to delivery on site.
- Treatment: all structural timber must be pre-treated against insect attack, rot, and fungal attack with an approved preservative system. Treatment class: UC3 (exterior, above ground) minimum, or UC4 (ground contact) where applicable, in accordance with EN 335. The Contractor must submit treatment certificates and Safety Data Sheets prior to installation.
- Visual grading: all timber must be visually graded prior to use. Pieces with excessive knots, shakes, splits, wane, or distortion beyond permitted limits per the applicable grading standard must be rejected.

2.3.2. CONNECTIONS AND FIXINGS — GENERAL

All metal connectors, joist hangers, truss plates, bolts, screws, and other fixings must:

- Be manufactured from hot-dip galvanised steel (minimum Z275 coating per EN 10346) or stainless steel grade A2 or A4, appropriate to the exposure conditions.
- Comply with EN 14545 (connectors), EN 14592 (fasteners), and EN 14545 (punched metal plate fasteners) as applicable.
- Be installed strictly in accordance with the manufacturer's technical specifications and the structural execution drawings.

The use of plain steel or electrolytically galvanised fixings in exposed or damp conditions is not permitted.

2.3.3. TIMBER TRUSSES AND ACCESSORIES

This item covers the complete supply, prefabrication (where applicable), delivery, handling, erection, and installation of all structural timber trusses forming the primary roof structure, together with all associated accessories, connectors, and temporary bracing required during and after erection.

Timber:

- Structural solid timber or glued laminated timber (glulam) in accordance with EN 14080, strength class GL24h minimum (or equivalent per EBCS 5), as specified in the structural execution drawings.
- Moisture content at installation: $\leq 15\%$ for glulam; $\leq 18\%$ for solid timber.
- Pre-treatment: UC3 class minimum, in accordance with EN 335 and EN 351.

Truss connectors and plates:

- Punched metal plate (gang-nail) fasteners: in accordance with EN 14545 and EN 1075; hot-dip galvanised, minimum Z275 per EN 10346; manufactured by an approved supplier with CE marking.
- Bolts, screws, and dowels: in accordance with EN 14592; hot-dip galvanised or stainless steel grade A2.
- Ridge and eaves connectors, hanger brackets, and angle brackets: as specified in the structural drawings and manufacturer's data; hot-dip galvanised minimum.

Accessories included in the unit rate:

- All temporary and permanent bracing members (longitudinal, transverse, and diagonal) as required by the structural design
- All metal connectors, joist hangers, and anchorage devices to the supporting structure
- All bolts, washers, nuts, screws, and associated fixings
- All temporary propping and bracing required during erection until the structure is stable
- All anti-corrosion end-grain sealant treatment applied to all cut surfaces after trimming on site

Handling and storage:

- Trusses must be handled vertically or in pairs with spreader bars to prevent lateral buckling; lifting at points designated in the erection drawings.
- On-site storage must be on level bearers, clear of the ground, and protected from rain and direct sunlight.

Erection:

- All trusses must be erected plumb and true, at the spacings shown on the execution drawings, and securely anchored to the supporting structure before any loads are applied.

- Temporary bracing must be maintained in place until the permanent bracing system is fully installed and all connections are tightened.
- Truss-to-wall plate connections must be made using approved hurricane tie or equivalent hold-down connectors, in accordance with the structural drawings.
- All site-cut surfaces must be immediately treated with end-grain preservative sealant.
- The completed truss assembly must be checked for alignment, level, and plumb before acceptance. Maximum deviation from design position: ± 10 mm over any 3 m span.

Tolerances:

- Truss spacing: ± 10 mm from design dimension
- Level of top chord: ± 5 mm over any 4 m length
- Verticality: $\pm H/300$ or 10 mm maximum (H = truss height)

2.3.4. PURLINS AND ACCESSORIES

This item covers the complete supply, delivery, handling, and installation of all secondary roof framing members (purlins) spanning between the primary trusses, together with all associated accessories, connectors, and fixings. Purlins are the direct support for the sandwich panel roofing system.

Timber purlins:

- Structural solid timber or engineered timber (LVL, glulam) as specified in the execution drawings; minimum strength class C24 per EN 338 or equivalent per EBCS 5.
- Moisture content at installation: $\leq 18\%$.
- Pre-treatment: UC3 class minimum, certificate required.

Alternatively, cold-formed steel Z- or C-section purlins may be specified by the structural engineer; in that case all steel sections must:

- Comply with EN 10149-2 (hot-rolled) or EN 10346 (cold-formed galvanised) with minimum Z275 zinc coating
- Be sized and detailed in the structural execution drawings
- Be supplied with a corrosion protection system appropriate to the exposure class

Fixings and accessories included in the unit rate:

- All purlin-to-truss connectors (joist hangers, cleats, or bolted connections as per structural drawings)
- All bolts, screws, coach screws, washers, and associated fixings
- All bridging or blocking between purlins to prevent rotation, as required by the structural design
- All anti-corrosion end-grain sealant applied to all cut surfaces

2.3.5. CONCRETE FOR RC GUTTER

This item covers the supply, mixing (ready-mixed or site-batched), placement, vibration, curing, and protection of all concrete for the reinforced concrete roof gutter formed at the eaves of the roof structure. The gutter acts as both rainwater collector and structural tie beam at eaves level. All formwork required for the casting of the gutter is included in the unit rate of this item.

Concrete Specification

- Concrete class: C25/30 minimum (characteristic compressive strength = 25 MPa at 28 days), in accordance with EBCS 2 / EN 206.
- Exposure class: XC3/XC4 (moderate to cyclically wet environment at roof level); water-cement ratio ≤ 0.50 .
- Cement type: Portland CEM I or CEM II/A, sulphate-resistant where applicable.
- Maximum aggregate size: 20 mm.
- Slump / consistency class: S3 (100–150 mm slump) to facilitate placement in narrow formwork.
- A mass integral water-repellent admixture must be incorporated in all concrete placed in the gutter profile.
- Minimum cover to reinforcement: 35 mm (exposed outdoor environment).

Placement and Curing

- Concrete must be placed continuously to avoid cold joints. If interruption is unavoidable, a construction joint must be formed at a position approved by the Project Manager.
- Concrete must be fully compacted using internal vibrators (poker vibrators) without over-vibration.

- Immediately after striking, all exposed concrete surfaces must be cured for a minimum of 7 days using wet hessian, curing membrane, or equivalent approved method.

2.3.6. 50 MM SANDWICH PANEL ROOFING

This item covers the complete supply, delivery, handling, and installation of 50 mm thick insulated sandwich roof panels, including all longitudinal and transverse side laps, all necessary fixing screws and washers, and all mastic sealing at laps and fixings. The panel system must constitute a fully weathertight roofing envelope upon completion.

2.3.6.1. PANEL SPECIFICATION

Panel construction:

- Both outer and inner faces: pre-painted galvanised steel profiled sheet, minimum base metal thickness 0.50 mm, hot-dip galvanised to Z275 per EN 10346.
- Exterior face coating: PVDF or HDP polyester, minimum 25 µm dry film thickness, colour as specified by the Project Manager; UV resistant; salt spray resistance ≥ 500 hours per ISO 9227.
- Interior face coating: polyester or epoxy primer coat, minimum 15 µm dry film thickness.

Insulation core:

- Rigid closed-cell polyisocyanurate (PIR) foam core, minimum density 32 kg/m³; or mineral wool (MW) core, minimum density 100 kg/m³, as specified by the Project Manager.
- PIR foam: thermal conductivity $\lambda \leq 0.023$ W/(m·K); blowing agent: CO₂ or equivalent non-HFC agent.
- Mineral wool (if used): non-combustible (Euroclass A2 reaction to fire); thermal conductivity $\lambda \leq 0.036$ W/(m·K).

2.3.6.2. PANEL PERFORMANCE:

- Total thermal transmittance (U-value): ≤ 0.45 W/(m²·K) for PIR core; ≤ 0.65 W/(m²·K) for mineral wool core.
- Acoustic performance: as required by the Project Manager, to be confirmed in the technical data sheet.
- Span capability: the panel must be certified for the purlin spacing adopted, with allowable UDL ≥ 1.5 kN/m² (including maintenance loads) at the specified span. Manufacturer's certified span table must be submitted.
- Panel length: single-span or multi-span as shown on the execution drawings; maximum length as governed by transport and handling constraints.
- Longitudinal joint: hidden-fix standing seam or exposed-fix overlapping rib, as specified in the execution drawings.

2.3.6.3. ACCESSORIES — INCLUDED IN UNIT RATE

- Self-drilling, self-tapping roofing screws with EPDM bonded sealing washers, stainless steel grade A2 or hot-dip galvanised, in accordance with EN 14566; length and diameter as required by the panel system.
- All inter-panel longitudinal seam sealant tape and/or mastic as specified by the panel manufacturer.
- All end-lap sealant strips at transverse laps (if panels are lapped longitudinally).
- Fixing plates and anti-capillary tape at all eaves and ridge interfaces.

All temporary protection film must be removed from all surfaces immediately after installation; no film residues are acceptable.

2.3.6.4. INSTALLATION REQUIREMENTS

Storage on site:

- Panels must be stored flat on level bearers, protected from moisture, and stacked according to the manufacturer's recommendations (maximum stack height).
- Factory-applied protective film must be kept intact until installation.

Preparation:

- All purlins must be checked for alignment, level, and straightness before panels are laid.
- Maximum purlin level differential across any bay: ± 3 mm.

Laying:

- Panels must be laid starting from the eaves, progressing to the ridge, in the direction opposite to the prevailing wind.
- All panels must be fixed at every purlin in accordance with the manufacturer's fixing pattern and the structural wind-uplift calculation.
- All longitudinal side laps must be sealed with the manufacturer-specified mastic or tape before the adjacent panel is placed.
- All fixing screws must be driven to the correct torque (not over-driven); the sealing washer must be visibly compressed but not extruded.
- Panels must not be walked on directly; crawl boards must be used at all times during installation.

Tolerances:

- Alignment of panel edges: ± 5 mm from the design line over any 6 m length.
- Overall roof squareness: diagonal difference ≤ 10 mm per 10 m of roof width.

Upon completion, the roofing contractor must carry out a water-tightness check in the presence of the Project Manager before any subsequent trades commence work on or above the roof.

2.3.6.5. QUALITY CONTROL

- Product data sheet, Declaration of Performance, certified span tables, and fire classification test report to be submitted prior to delivery.
- Sample panel (minimum 1 m²) to be submitted to the Project Manager for approval of colour, profile, and surface finish prior to bulk delivery.
- Fixing count records must be kept for each roof bay and submitted to the Project Manager.

2.3.6.6. RIDGE ASSEMBLY

This item covers the complete supply, delivery, and installation of the ridge capping and ventilation system at the apex of the roof structure. The ridge assembly must provide a permanently weathertight and, where required, ventilated termination to the sandwich panel roofing on both slopes.

The ridge capping system must include at minimum:

- Profiled ridge cap flashing: manufactured from pre-painted galvanised steel sheet, minimum 0.60 mm base metal thickness, hot-dip galvanised Z275 per EN 10346; coating finish and colour to match the roofing panels; profile formed to suit the panel rib geometry and provide a minimum 150 mm lap onto each panel slope.
- EPDM or cross-linked polyethylene (XLPE) pre-formed ridge filler pieces: to close off open panel ribs at the ridge level and prevent insect and water ingress; supplied and installed in accordance with the panel manufacturer's requirements.
- All fixing screws with EPDM sealing washers, of the same specification as for the panels (see Item 2.1.6.3).
- Continuous mastic sealant bead on both laps of the ridge cap onto the panel surface.
- All internal closure angles and butyl sealing tape at ridge-to-wall abutments, where applicable.

Ventilation:

- A proprietary ventilated ridge cap system must be supplied, providing a minimum 5,000 mm² free ventilation area per linear metre, while maintaining full weathertightness.
- Ridge ventilation systems must incorporate a vermin-proof stainless steel or UV-stabilised polypropylene mesh.

Installation

- The ridge cap must be continuous along the full length of the ridge.
- All joints in the ridge cap must be lapped a minimum of 150 mm in the direction of the prevailing wind, with mastic sealant applied between laps.
- The ridge cap must be fixed at every panel rib on both sides.

- All cut edges of the ridge cap must be protected with edge trim or sealant to prevent corrosion.
- Upon completion, the ridge assembly must be visually inspected for straightness, correct lap, and full sealing; any defects must be rectified before acceptance.

NOTE: The lump sum price must include all labour, materials, accessories, sealants, and fixings for the complete ridge system as described, regardless of the total ridge length. The Contractor must verify the ridge length from the drawings prior to tender.

2.3.7. 50 MM SANDWICH PANEL WALL CLADDING AND FREE TOP EDGE CLOSURE SYSTEM

This item covers the complete supply, delivery, handling, and installation of 50 mm thick insulated sandwich panels used as vertical wall cladding on all areas of the timber structure that remain exposed after the roof covering is installed — in particular gable ends, fascia faces, and unenclosed vertical or near-vertical surfaces of the timber frame.

The panels specified are installed vertically and are subject to different wind loading, jointing, and sub-frame requirements as detailed below.

A critical additional requirement applies : the roof panels terminate at the high eave as a free top edge with no supporting wall. The Contractor is responsible for the complete sealing and weatherproofing of this free edge using the three-component system described below. This is a mandatory weathertightness requirement and forms part of the scope of this item.

2.3.7.1. SUB-FRAME SYSTEM

Vertical cladding requires a secondary sub-frame to transfer wind loads to the primary timber structure and to allow alignment adjustment. The following are included in the unit rate:

- Horizontal or vertical cold-formed galvanised steel rails or timber battens, section sized by the Contractor's structural calculation, fixed to the timber frame at centres compatible with the panel span and the wind load design.
- All fixing brackets between the sub-frame and the primary timber structure: stainless steel A2 or hot-dip galvanised Z275; type and spacing per structural calculation.
- Thermal break pads between sub-frame and primary structure where required.
- All adjustment and levelling provisions: face flatness ± 5 mm over any 3 m length; plumb $\pm H/500$ or 10 mm maximum.

2.3.7.2. FREE TOP EDGE CLOSURE SYSTEM

This clause applies specifically to the high eave of the mono-pitch roof where the sandwich roof panel terminates in free air with no supporting wall. This is the most critical weatherproofing detail of this lot. The Contractor must treat this edge with the following three-component system, all of which are included in the unit rate of this item.

Component 1 — Profiled Foam or EPDM (Panel End Seal)

A pre-formed closoir (foam filler piece or EPDM moulded profile) must be installed in the open panel rib profile at the high and low eave cut end of every roof panel. This is the primary barrier against water and pest ingress into the insulation core.

- Material: closed-cell polyethylene (PE) foam or EPDM rubber, pre-shaped to exactly match the rib profile of the specified panel. The closoir must be supplied or approved by the panel manufacturer to ensure a perfect fit.
- Installation: the closoir must be bonded into the panel rib with a compatible adhesive or double-sided butyl tape, applied dry and under compression to ensure full contact around all rib radii with no voids.
- Coverage: one closoir per panel rib, over the full width of the panel, without any gap at panel side joints.
- After installation, the closoir face must be flush with or slightly proud of the panel face to allow the top trim to compress it when fixed.

Component 2 — Top Edge Trim (Coping Trim)

A purpose-formed metal coping trim must be installed over the full length of the free top edge of the roof, covering the panel end, the closoir, and providing a weathertight cap with a positive drip edge.

- Material: pre-painted galvanised steel sheet, minimum 0.60 mm base metal thickness, hot-dip galvanised Z275 per EN 10346; PVDF or HDP coating to match the roofing panels; colour as specified by the Project Manager.

- Profile: formed as a Z-section or reverse-U section, with: a horizontal top aile bearing on the upper face of the panel, minimum 80 mm wide, with a 10 mm upstand anti-capillary check at the outer edge; a vertical front aile retaining over the panel face, minimum 60 mm deep, terminating in a 5 mm drip bead; a rear aile (where applicable) engaging behind the panel top edge or onto the sub-frame, minimum 30 mm.
- Continuity: the trim must be continuous over the full ridge length. Joints between trim lengths must be lapped minimum 100 mm in the direction of the prevailing wind, with a continuous bead of neutral-cure silicone or butyl mastic between laps.
- Fixings: self-drilling screws with EPDM bonded sealing washers, stainless steel A2 minimum, fixed through the horizontal aile into the panel top face and into the sub-frame or truss top chord at maximum 400 mm centres. Fixing pattern must satisfy the wind uplift calculation for the edge zone.
- Sealant: a continuous bead of neutral-cure silicone sealant or butyl mastic tape must be applied between the horizontal aile of the trim and the upper face of the panel before the trim is fixed, to form a fully compressed wet seal under the trim.

Component 3 — Interface Flashing between Roof Panel and Vertical Cladding

At the junction between the inclined roof panel and the vertical cladding panel, an apron flashing must be installed to prevent water from tracking behind the cladding at the corner.

- Material: pre-painted galvanised steel, minimum 0.60 mm, coating to match.
- Geometry: formed as a continuous L-flashing; horizontal leg minimum 120 mm bearing on the roof panel upper face, lapped under the top edge trim; vertical leg minimum 100 mm overlapping the top of the vertical cladding panel.
- Sealant: butyl mastic tape on the underside of the horizontal leg before fixing; neutral-cure silicone at the vertical leg overlap onto the cladding.
- Fixings: stainless steel A2 self-drilling screws with EPDM washers at maximum 300 mm centres on the horizontal leg.

2.3.7.3. VERTICAL JOINTING SYSTEM

Vertical joints between adjacent cladding panels must provide long-term weathertightness under driving rain and wind pressure. One of the following systems must be used, as confirmed by the manufacturer and approved by the Project Manager:

- Standing seam or concealed-fix interlocking joint: panels clip together along the vertical edge with no exposed fasteners on the face; joint profile must incorporate a drainage rebate and a sealing gasket.
- Open-drained rainscreen joint (maximum 8 mm) backed by a continuous wind-barrier membrane (vapour-permeable, $S_d \leq 0.1$ m, UV-resistant at the joint face).

2.3.7.4. PERIMETER FLASHINGS AND TRIMS

All of the following are included in the unit rate:

- Eaves starter profile at base of cladding: pre-painted galvanised steel, minimum 0.60 mm; incorporating an insect-barrier mesh.
- Corner trims at all vertical external corners: minimum 100 mm face width each side; fixed at 400 mm maximum centres.
- Internal corner angles where cladding meets adjacent surfaces.
- All soakers and stepped flashings at any junction between vertical cladding and inclined roof panels.
- The three-component free top edge closure system described in clause 2.1.8.5 (closoir, top edge trim, interface flashing) — included in full.
- All mastic sealant, butyl tape, and accessories required for a complete weathertight installation.

II Architectural Works Technical Specifications

3. BLOCK WORK

3.1. 200 MM HOLLOW CONCRETE BLOCK (HCB) WALLS

Supply and fix 200 mm thick hollow concrete block (HCB) Class B walls, both sides left for plastering, bedded in cement mortar mix 1:3. Walls to be built off the structural frame or foundations as shown on the architectural drawings.

Inclusions:

- Setting out of all walls in accordance with the architectural drawings.
- All HCB units to comply with applicable EBCS standards; minimum compressive strength 5 MPa; units to be sound, true to shape, and free from cracks, chipping, or other defects.
- Cement mortar bedding and perpend joints, mix 1:3 (cement:sand), joint thickness 10 mm maximum; joints to be fully filled and struck flush.
- All horizontal and vertical movement joints as shown on drawings, filled with compressible filler and sealed with flexible mastic.
- All concrete block lintels or structural steel lintels over openings, including temporary propping during construction.
- All reinforced concrete ring beams, tie beams, and column casings as shown on drawings.
- All chases, holes, and recesses for services, pipes, conduits, and fixings, including making good upon completion.
- All cutting and bonding at corners, junctions, and reveals.
- Raking out of joints to a depth of 15 mm on both faces to form a key for plastering.

NOTE: Method of measurement: m². Deduct openings > 0.5 m². All lintels, tie beams, and ring beams included in unit rate.

3.2. 150 MM HOLLOW CONCRETE BLOCK (HCB) WALLS — INCLUDING ROOF PARAPET

Supply and fix 150 mm thick hollow concrete block (HCB) Class B walls, both sides left for plastering, bedded in cement mortar mix 1:3. Applicable to internal partition walls and roof parapet walls as shown on drawings.

All requirements as per clause 3.1.1 above, with the following additional requirements for roof parapets:

- Parapet walls to be constructed to the heights and profiles shown on the architectural drawings.
- Top of parapet to be finished to receive coping or waterproofing upstand as specified; all construction to comply with the waterproofing contractor's requirements.
- Reinforced concrete coping or pre-cast coping units as shown on drawings, including all bedding and pointing.

NOTE: Method of measurement: m². Deduct openings > 0.5 m².

4. CARPENTRY AND JOINERY WORKS

4.1. CHIPBOARD SUSPENDED CEILINGS

Supply and fix 8 mm thick chipboard (particle board) ceiling panels, including for walkways, finish and colour to the approval of the Engineer. Price includes all of the following:

- 40 x 50 mm Zigba wood (or approved equivalent hardwood) batten framing, including all primary and secondary battens, hangers, and noggings, suspended from the structural soffit or roof structure at centres compatible with the panel dimensions.
- All chipboard panels cut to size and fixed to the framing with countersunk screws at maximum 300 mm centres; all joints to be tight and true.
- All edges, reveals, and perimeter trims finished with matching timber beading or aluminium angle trim as directed by the Engineer.
- All cut-outs for light fittings, diffusers, access hatches, and services as shown on the reflected ceiling plan; edges of all cut-outs to be trimmed and reinforced.

- All access panels required for maintenance of above-ceiling services.
- All temporary works, scaffolding, and platforms required for installation.

NOTE: Method of measurement: m² of ceiling area measured flat on plan. Deduct openings > 0.5 m². All framing, trims, and fixings included in unit rate.

5. METAL WORKS

5.1. ALUMINIUM DOORS AND WINDOWS — GENERAL

Supply and fix doors and windows fabricated from aluminium tubular profile frames, silver metallic anodised finish, ALLCO-5 or approved equivalent, 2 mm minimum wall thickness, thermally broken where required. All units to be factory-fabricated and site-installed. Price includes all of the following:

- Aluminium frame sections, sills, heads, and transoms, all mitre-cut and mechanically jointed, with internal drainage channels and weep holes.
- Double-glazed units (or single-glazed where specified), minimum 4 mm glass; glass to comply with applicable safety standards; all glazing beads, gaskets, and sealants.
- All ironmongery: door furniture, locking cylinders, handles, closers, hinges (stainless steel grade A2), and weather seals as specified.
- All fixing anchors, cramps, and lugs cast into or fixed to the surrounding structure; all mastic pointing between frame and wall on all faces.
- All protective film to be kept on frames until completion of all wet trades; film to be fully removed and frames cleaned before handover.

NOTE: Method of measurement: per unit (No.) as itemised above. All glazing, ironmongery, sealants, and fixings included in unit rate.

5.2. CIRCULAR HOLLOW SECTION BALCONY GUARD RAIL

Supply and fix Ø50 mm, 2 mm thick circular hollow section (CHS) steel guard rail to balconies, screwed to 40 x 3 mm flat steel base plate anchored to the structural slab. All works to comply with applicable safety standards and minimum height requirements. Inclusions:

- CHS vertical posts at maximum 1,200 mm centres, with flat plate base fixed to slab by minimum 2 No. M12 chemical anchors; post height to provide minimum 1,100 mm clear guard rail height above finished floor level.
- CHS horizontal rails at top, mid, and bottom as shown on drawings; all joints to be continuously welded and ground flush.
- All fabrication, hot-dip galvanising after fabrication (minimum 85 µm coating per EN ISO 1461), touch-up of all site welds with zinc-rich primer.
- Two coats of approved exterior paint finish, colour to Engineer's approval.

NOTE: Method of measurement: linear metre (ml) measured along the top rail. All posts, fixings, and finishing included in unit rate.

5.3. WALL-MOUNTED HAND RAIL — ENTRANCE RAMP

Supply and fix Ø50 mm, 2 mm thick CHS wall-mounted hand rail to the entrance ramp, all welded and continuously supported. Inclusions:

- CHS rail, all bends formed by hot bending or welded elbows; continuous along the full ramp length plus minimum 300 mm horizontal returns at top and bottom.
- Wall brackets at maximum 1,200 mm centres, fixed to the wall with minimum M10 stainless steel A2 bolts into chemical anchors; brackets to be stainless steel or hot-dip galvanised mild steel.
- All fabrication, hot-dip galvanising, and paint finish as per clause 3.3.2.
- Rail height: 900 mm above finished ramp surface at all points.

NOTE: Method of measurement: linear metre (ml) along the centre line of the rail.

5.4. FACADE PROTECTION — HOLLOW CIRCULAR TUBE FRAME WITH PLEXIGLASS INFILL PANELS

Supply and installation of facade protection system consisting of a hollow circular tube steel frame with plexiglass (acrylic sheet) infill panels, fixed to the facade. The total height of the assembly (wall + protection system) must be a minimum of 2,500 mm above finished floor or ground level at every point. All vertical or horizontal CHS tubes as shown on the facade drawings.

Steel frame:

- Hollow circular tube (CHS) frame members, Ø50 mm, wall thickness 2 mm, forming vertical posts and horizontal rails to the layout shown on the drawings.
- Vertical posts fixed to the facade with flat plate base anchors (40 x 3 mm), secured with minimum 2 No. M10 stainless steel A2 chemical anchors per post; all penetrations sealed with weather-resistant mastic.
- Horizontal rails and intermediate framing members, continuously welded and ground flush, sized to support the plexiglass infill panels without deflection.
- Hot-dip galvanised finish after fabrication (minimum 85 µm coating per EN ISO 1461); all site welds touched up with zinc-rich primer; two coats of approved exterior paint finish, colour to Engineer's approval.

Plexiglass infill panels:

- Extruded acrylic sheet (PMMA plexiglass), minimum thickness 6 mm; impact-modified grade suitable for exterior exposure.
- Colour and decorative pattern (tinted, or frosted) to be selected and approved by the Engineer prior to order; the Contractor must submit minimum three colour and pattern samples for Engineer's selection.
- Panels to be cut to size and retained within the steel frame using purpose-made aluminium or stainless steel A2 clamping beads or glazing channels, with EPDM gaskets on all four edges to allow for thermal expansion; no direct contact between the plexiglass and the steel frame permitted.
- Minimum panel-to-frame clearance for thermal movement: 3 mm per 500 mm of panel dimension.
- UV-stabilised: the plexiglass must have a minimum UV resistance rating ensuring colour stability over 10 years of outdoor exposure; manufacturer's UV resistance certificate to be submitted.
- All panels to be protected with factory-applied masking film until completion of all adjacent works; film to be removed and panels cleaned immediately before handover.

General inclusions:

- All setting-out, drilling, and fixing to the facade.
- All aluminium or stainless steel glazing beads, EPDM gaskets, and associated fixings.
- All protective packaging removal and final cleaning of plexiglass surfaces.
- Verification that the total assembled height (existing wall below + protection system) achieves the minimum 2,500 mm requirement at all points; any shortfall to be reported to the Engineer before fabrication commences.

NOTE: Method of measurement: Linear meter. All frame, fixings, plexiglass panels, gaskets, beads, and finishing included in unit rate.

6. FINISHING WORKS

Unless otherwise stated below, all finishing works must comply with the following general requirements:

- All substrates to be checked and accepted before any finish is applied; all surfaces to be clean, dry, sound, and free from dust, grease, laitance, or loose material.
- All materials to be new, from an approved manufacturer, and accompanied by technical data sheets submitted to the Engineer prior to use.
- All finished surfaces to be protected until handover; any damage or soiling to be made good at the Contractor's expense.

6.1. TWO-COAT CEMENT-SAND PLASTER TO INTERNAL WALLS

Apply two coats of plastering in cement-sand mortar (1:3) to internal wall surfaces, including all concrete structure joints. Inclusions:

- Pre-cleaning of substrate: removal of all dust, laitance, and loose material; hacking of smooth concrete surfaces; application of bonding agent where required.
- Groove work (scoring) to all substrate joints as per the design.
- First (scratch) coat: minimum 10 mm thick, applied and keyed for the finish coat.
- Finish coat: minimum 8 mm thick, steel-floated to a smooth, flat finish; total minimum thickness 18 mm.
- All angle beads, stop beads, and movement joint beads as shown on drawings, set plumb and level.
- Post-cleaning of all surfaces and removal of all splashes and spillages.
- Maximum permitted deviation from flat: 3 mm under a 2 m straightedge.

NOTE: Method of measurement: m² net plastered area. Deduct openings > 0.5 m². All beads and accessories included in unit rate.

6.2. TWO-COAT CEMENT-SAND PLASTER TO EXTERNAL WALLS

Apply two coats of plastering in cement-sand mortar (1:3) to external wall surfaces. All requirements as per clause 6.1, with the following additional requirements:

- Waterproof admixture to be incorporated in both coats at the manufacturer's recommended dosage.
- Finish to be scratch-textured or smooth as directed by the Engineer; all surfaces to receive quartz paint finish.
- All external angles to be protected with hot-dip galvanised or stainless steel angle beads.

NOTE: Method of measurement: m² net plastered area. Deduct openings > 0.5 m².

6.3. GYPSUM PLASTER TO INTERNAL CEILINGS, SOFFITS, AND STAIR LANDINGS

Supply and apply gypsum plastering over the partially smoothed and dried cement-sand plastered surface of ceilings, soffits, and stair landings. Inclusions:

- Surface preparation: all cement-sand plaster to be cured, dry, and free from dust before gypsum is applied.
- Gypsum finish coat, minimum 3 mm thick, applied with a steel trowel to a smooth, flat, white finish; no tool marks or ridges acceptable.
- All internal angles formed with a clean, straight arris.
- Maximum permitted deviation from flat: 2 mm under a 2 m straightedge.

NOTE: Method of measurement: m². Deduct openings > 0.5 m².

6.4. PORCELAIN FLOOR TILES 600 X 600 X 9 MM

Supply and lay 600 x 600 x 9 mm approved quality porcelain floor tiles, stacked to floors in accordance with the supervisor's instruction. Inclusions:

- Tile quality: first choice, fully vitrified porcelain, minimum breaking strength 1,300 N, slip resistance $\geq$ R9, colour and finish to Engineer's approval.
- All tiles to be laid on a full bed of cement-based tile adhesive (minimum Class C2 per EN 12004) on a minimum 40 mm thick sand-cement screed (mix 1:4), compacted and tamped level.
- All joints: minimum 3 mm width, filled with approved cementitious grout, colour to match tiles.
- All cutting at perimeters, columns, and penetrations using a wet-cut tile saw; no hand-cutting permitted on exposed edges.
- All expansion joints at maximum 5 m centres and at all perimeter junctions with walls, filled with flexible sealant, colour to match grout.
- Maximum height difference between adjacent tiles: 1 mm. Maximum deviation from flat: 3 mm under a 2 m straightedge.

NOTE: Method of measurement: m². Deduct openings > 1.0 m². Screed, adhesive, grout, and sealant included in unit rate.

6.5. PORCELAIN TILE SKIRTING 100 X 9 MM

Supply and lay approved type porcelain tile skirting, 100 mm high x 9 mm thick, matching the floor tiles, bedded on and including cement mortar backing. Inclusions:

- All skirting tiles to match the adjacent floor tile in colour and finish.
- Fixed with cement-based adhesive on cement mortar backing; all joints grouted to match floor tiles.
- Top edge of skirting to be clean and straight; all internal and external angles to be mitred.

NOTE: Method of measurement: linear metre (ml). All adhesive, grout, and cutting included in unit rate.

6.6. NON-SLIP CERAMIC FLOOR TILES 300 X 600 X 9 MM — WET AREAS

Supply and lay approved type 300 x 600 x 9 mm thick non-slip ceramic tile flooring, bedded on and including 41 mm thick sand-cement screed, in wet areas (WCs, showers, utility rooms). Inclusions:

- Tiles: anti-slip rating minimum R11 (wet areas); first choice quality; colour and finish to Engineer's approval.
- All joints minimum 3 mm, filled with waterproof grout.
- All falls to be incorporated in the screed to ensure positive drainage to floor drains; minimum fall 1:80.
- Waterproof membrane to be applied to the screed before tiling in all shower areas and WC wet zones as directed.
- All other requirements as per clause 3.4.4.

NOTE: Method of measurement: m². Screed, waterproof membrane, adhesive, and grout included in unit rate.

6.7. GLAZED CERAMIC WALL TILES 300 X 200 X 6 MM — WET AREAS

Supply and lay approved type 300 x 200 x 6 mm thick glazed ceramic wall tiles, bedded on and including cement mortar backing, in wet areas to the heights shown on drawings. Inclusions:

- First choice quality glazed ceramic tiles; colour and finish to Engineer's approval.
- Applied with cement-based adhesive on a cement mortar dubbing-out coat; all joints minimum 2 mm, filled with waterproof grout.
- All tiles set plumb and level; all rows to be coursed from a datum line established before laying commences.
- All cut tiles at perimeters and penetrations to be a minimum of half tile width; no sliver cuts permitted on exposed edges.
- Top edge of tiled area to be finished with a matching capping tile or aluminium edge trim as directed.

NOTE: Method of measurement: m². Deduct openings > 0.5 m². All adhesive, grout, trims included in unit rate.

6.8. MARBLE WINDOW SILL

Supply and fix approved type marble window sill, cut to appropriate size, weathered and throated on the front edge, mounted on and including 30 mm thick cement mortar bedding. Inclusions:

- Marble: locally sourced, polished finish, colour to Engineer's approval; minimum thickness 30 mm; all edges machine-polished; front edge with 5 mm drip groove.
- Bedded on a full bed of 1:3 cement mortar; all joints to wall reveals sealed with neutral-cure silicone sealant, colour to match marble.
- All sills to be set to the correct level and fall (minimum 5 mm fall outward) before the mortar sets; any sill found out of level or without positive outward fall to be relaid at the Contractor's expense.

NOTE: Method of measurement: linear metre (ml). All bedding, sealant, and cutting included in unit rate.

6.9. MARBLE DOOR THRESHOLD (SILL)

Supply and fix approved type marble door threshold, cut to appropriate size, weathered and mounted on and including 30 mm thick cement mortar bedding. Inclusions:

- Marble specification as per clause 3.4.8; thickness minimum 30 mm; all edges machine-polished; top surface honed or polished as directed.
- All thresholds to be bedded level and flush with the adjacent floor finish on both sides; any height difference to be formed as a gentle chamfer.
- All joints sealed with neutral-cure silicone sealant.

NOTE: Method of measurement: linear metre (ml). All bedding and sealant included in unit rate.

6.10. ANGLE IRON CORNER PROTECTION

Supply and fix 30 x 30 x 3 mm mild steel angle iron corner protection to all vulnerable internal corners, up to a height of 150 cm from finished floor level, flushed to wall plaster. Inclusions:

- Angle iron: hot-rolled mild steel 30 x 30 x 3 mm equal angle, cut to length and fixed with masonry anchors at maximum 500 mm centres.
- Set flush with the plaster surface; all fixing heads to be countersunk and filled.
- Hot-dip galvanised finish or two coats of anti-rust paint followed by enamel finish coat, colour to Engineer's approval.

NOTE: Method of measurement: linear metre (ml).

6.11. THREE-COAT EXTERNAL RENDER

Apply three coats of plaster in cement mortar to external walls, masonry, concrete beams, column surfaces, and concrete parapet walls. Price includes pre-cleaning, groove work as per the design for exterior walls, edge plastering, post-cleaning, and all necessary preparatory works. Inclusions:

- Preparatory work: all substrate joints and cracks to be raked out, filled, and reinforced with fibre mesh before plastering.
- First coat (spatterdash or scratch coat): applied to the prepared substrate; min. 6 mm thick; keyed for the second coat.
- Second coat (floating coat): min. 10 mm thick, ruled and floated level.
- Third coat (finish coat): min. 4 mm thick, steel-floated or sand-faced as directed; total minimum thickness 20 mm.
- Waterproof admixture incorporated in all coats at manufacturer's recommended dosage.
- All angle beads, stop beads, and movement joint beads as shown on drawings.

NOTE: Method of measurement: m². Deduct openings > 0.5 m². All beads and accessories included in unit rate.

6.12. RC PAVEMENT AROUND BUILDING — C-20, 1.20 M WIDE

Supply and construction of 10 cm thick C-20 reinforced concrete pavement, 1.20 m wide, around the full perimeter of the building, including 4Ø8 deformed bar mesh, expansion joints at regular intervals, and 5 cm lean concrete blinding layer. Inclusions:

- Excavation and compaction of sub-grade to the required formation level; disposal of surplus material.
- 50 mm lean concrete blinding, mix C-5 (150 kg cement/m³), on prepared sub-grade.
- 100 mm thick RC pavement slab, concrete mix C-20 (minimum 280 kg OPC/m³, 28-day characteristic cube strength $\geq$ 20 MPa).
- Reinforcement mesh: 4 No. Ø8 mm deformed (ribbed) bars each way, placed in the mid-depth of the slab, with 25 mm minimum cover to all faces.
- Expansion joints at maximum 3 m intervals and at all building perimeter junctions: 10 mm wide, formed with compressible filler board, sealed with flexible polyurethane sealant.
- Surface finish: wood-float finish with a light broom finish for slip resistance; edges to be formed with a 10 mm radius edging tool.
- Curing: minimum 7 days wet curing after casting.

NOTE: Method of measurement: m². All blinding, reinforcement, formwork, expansion joints, and sealant included in unit rate.

6.13. REINFORCED CONCRETE KERB (CURB STONE) — 100 X 400 MM

Construction of 100 x 400 mm in-situ reinforced concrete kerb around the full perimeter of the building, with concrete C-15 (280 kg cement/m³), joints in cement mortar 1:3. Price includes formwork, reinforcement, expansion joints, 50 mm lean concrete blinding in C-5, and all necessary excavation works. Inclusions:

- Excavation of kerb trench to required depth and width; trimming of trench bottom; disposal of all surplus excavated material off site.
- 50 mm thick lean concrete blinding, mix C-5 (150 kg cement/m³), on prepared trench bottom.
- Formwork to both faces; erected, struck, and removed after minimum 3 days.
- In-situ reinforced concrete kerb body, mix C-15 (minimum 280 kg OPC/m³); poured continuously per bay.
- Reinforcement: 4 No. deformed (ribbed) longitudinal main bars Ø8 mm; Ø6 mm stirrups at 250 mm centres.
- Cement mortar joints between bays, mix 1:3, maximum joint width 10 mm.
- Expansion joints at maximum 5 m centres, formed with compressible filler board, sealed with flexible sealant.

NOTE: Method of measurement: linear metre (ml). All excavation, blinding, formwork, reinforcement, joints, and sealant included in unit rate.

6.14. PRECAST CONCRETE HALF-ROUND CHANNEL — Ø300 MM ON RED ASH BEDDING

Supply and installation of precast concrete half-round drainage channel, 300 mm nominal diameter, bedded on 100 mm compacted red ash (red cinder). Inclusions:

- Precast concrete half-round channel units, minimum compressive strength 30 MPa; straight units and all bends, junctions, and end-caps as required by the drainage layout.
- Excavation of channel trench to the required depth and gradient; trimming of trench bottom.
- 100 mm thick red ash (burnt cinder) bedding layer, evenly spread and lightly compacted to provide a uniform, stable bearing; gradient to be maintained throughout.
- Accurate setting and alignment of channel units to the lines and levels shown on the drainage drawings; maximum joint offset between adjacent units: 5 mm.
- Semi-dry cement mortar joints between units, mix 1:3.
- Connection to inspection chambers and kerb drainage outlets as shown on drawings.
- Disposal of all surplus excavated material off site.

NOTE: Method of measurement: linear metre (ml). All bedding, jointing, and cutting included in unit rate. Inspection chambers measured separately.

6.15. ENTRANCE SIGNAGE AND LOGO

Fabricate and fix name plate and logo at the main entrance as per the Supervisor's instruction. Material shall be metal with approved finish. Inclusions:

- All design, fabrication, supply, and installation of the sign panel; material, dimensions, and layout to be submitted to the Engineer for approval before fabrication commences.
- Lettering and logo to be fabricated from brushed stainless steel, aluminium, or powder-coated mild steel as directed; all letters and logo elements to be individually cut and fixed with concealed standoff fixings.
- All fixings, backing plates, and sealants; sign to be plumb, level, and securely anchored to the wall or frame.
- All protective packaging to be removed and sign to be cleaned before handover.

NOTE: Method of measurement: lump sum (l/s). Price to include all design, fabrication, transport, and installation.

6.16. LOAM SOIL FOR GRASS PLANTING

Supply and lay loam soil for grass planting. Preparation of land by loam soil as per the Engineer's instruction. After land preparation, supply and lay grass turf or seed as directed. Inclusions:

- Loosening and raking of existing sub-grade to a minimum depth of 150 mm.
- Supply and spread of imported loam topsoil, minimum 150 mm compacted depth, free from stones > 25 mm, roots, and contamination; loam to be of approved quality, pH 6.0 to 7.0.
- Fine raking and levelling of topsoil surface to the finished landscape levels shown on drawings.
- Supply and sowing of approved grass seed mixture (or supply and laying of turf as directed), including all watering, fertilising, and maintenance until first cut or until an established, uniform coverage is achieved.

NOTE: Method of measurement: m². All topsoil, seed/turf, and initial maintenance until establishment included in unit rate.

6.17. ORNAMENTAL PLANTS AND ENDEMIC TREES

Supply and plant ornamental plants and endemic trees in Ethiopia, such as *Acacia saligna*, *Acacia abyssinica*, *Grevillea robusta*, or approved equivalent species, in accordance with the Engineer's planting plan. Inclusions:

- All plants to be supplied from a reputable nursery; minimum pot size and height as specified in the planting plan; all plants to be healthy, well-rooted, and free from disease or pests.
- Excavation of planting pits to minimum 600 x 600 x 600 mm for trees; 400 x 400 x 400 mm for shrubs.
- Backfill with a mix of imported loam and organic compost (ratio 3:1); staking and tying of all trees with minimum 2 No. hardwood stakes and tree ties.
- All watering, fertilising, mulching, and maintenance until the end of the defects liability period.

NOTE: Method of measurement: per unit (No.) for trees; per m² for ground cover plants. All planting materials, pits, backfill, stakes, and initial maintenance included in unit rate.

6.18. KITCHEN WORKTOP UNIT — MARBLE TOP, MASONRY BASE, AND TIMBER DOORS

Supply and construction of kitchen worktop unit with marble top, masonry base, and timber doors, complete unit to the dimensions shown on the drawings and to the approval of the Project Manager. Inclusions:

Masonry base:

- Construction of 100 mm solid concrete blockwork base, built off the finished floor slab, to a finished worktop height of 850 mm above finished floor level.
- Cement mortar bedding and jointing, mix 1:4; cement and sand render finish to all exposed blockwork faces, mix 1:3, steel-floated, ready to receive paint finish.

Worktop:

- Supply and installation of 30 mm thick polished marble slab worktop, locally sourced; colour and veining to be approved by the Project Manager prior to order.
- All edges machine-polished with eased and polished edge profile; all sink cutouts and hob cutouts as shown on drawings.
- Bedded on a continuous mortar or adhesive bed; all joints between slabs sealed with colour-matched epoxy joint filler; silicone sealant at all abutments to walls.

Upstand / splashback:

- 100 mm high polished marble upstand, same material and finish as worktop, silicone-jointed to wall and worktop.
- Doors and drawer fronts:
- Supply and installation of doors in solid hardwood or MDF with hardwood lipping; finish: two coats primer and two coats hard-wearing paint, colour to Project Manager's selection.
- All ironmongery included: concealed soft-close hinges, catches, and brushed stainless steel A2 pull handles; all doors set, hung, and adjusted for smooth operation.

NOTE: Method of measurement: m² of worktop plan area. All masonry base, marble top, upstand, doors, ironmongery, and accessories included in unit rate.

6.19. FIXED KITCHEN ISLAND UNIT

Supply and construction of fixed kitchen island unit as per clause 3.4.18 above (same materials, base, and finish), to the dimensions shown on the drawings, ready to receive a 4-burner built-in electric hob. Inclusions:

- All items as per clause 3.4.18, adapted to the island geometry (four finished sides).
- Cutout in worktop for hob installation, sized and positioned in accordance with the hob manufacturer's requirements.
- All necessary electrical conduit and back-boxes built into the masonry base for the hob power supply connection.

NOTE: Method of measurement: m² of worktop plan area

6.20. 4-BURNER BUILT-IN CERAMIC HOB

Supply and installation of 4-burner built-in ceramic hob, flush-mounted into the kitchen island worktop. Inclusions:

- Electric ceramic hob, 600 x 600 mm nominal (or as shown on drawings); 4 independent cooking zones with individual touch or rotary controls; smooth tempered glass surface.
- Minimum total power 6 kW; residual heat indicators; child lock function.
- All cutout to marble worktop (coordinated with marble contractor), electrical connection to dedicated circuit, and all accessories for a complete and operational installation.
- Brand and model to be submitted to the Project Manager for approval prior to order.

NOTE: Method of measurement: per unit (No.). All cutout, connection, and accessories included in unit rate.

7. PAINTING WORKS

General requirements for all painting works:

- All surfaces to be clean, dry, and free from dust, grease, rust, or loose material before any paint is applied.
- All paints to be from an approved manufacturer; brand and colour to be submitted for Engineer's approval before work commences.
- Each coat to be applied at the manufacturer's recommended spreading rate; minimum drying time between coats as per manufacturer's instructions.
- All paint to be applied by brush, roller, or spray as appropriate; all edges and reveals to be cut in neatly.
- All furniture, fittings, and completed finishes to be adequately protected before painting commences.

7.1. INTERNAL WALLS — THREE COATS WASHABLE PLASTIC EMULSION PAINT

Prepare and apply by brush three coats of plastic emulsion paint to internal plastered walls, beams, and columns, using an approved type washable paint. Inclusions:

- One coat of approved alkali-resistant primer or sealer on new plaster; allow to fully cure before applying finish coats.
- Two coats of washable plastic emulsion paint, colour to Engineer's approval; each coat applied in a different direction; surface to be lightly sanded between coats.
- All edges, reveals, and internal angles to be cut in cleanly; all roller lines or brush marks to be absent from the finished surface.

NOTE: Method of measurement: m². All preparation, primer, and finish coats included in unit rate.

7.2. CHIPBOARD CEILINGS — THREE COATS EMULSION PAINT

Prepare and apply three coats of plastic emulsion paint to chipboard suspended ceilings. All requirements as per clause 3.5.1, with the following additional requirements:

- All joints between chipboard panels to be filled with flexible filler and sanded flush before priming.
- Primer coat to be an approved MDF/chipboard primer; two finish coats of white or tinted emulsion as directed.

NOTE: Method of measurement: m².

7.3. TWO COATS SYNTHETIC (OIL) PAINT TO METAL ROOFING

Apply two coats of synthetic (oil-based) paint to all exposed metal roofing elements, gutters, and metal flashings. Inclusions:

- One coat of zinc phosphate or red oxide anti-corrosion primer on all bare or abraded metal surfaces.
- Two coats of synthetic enamel or alkyd paint, colour to Engineer's approval; minimum dry film thickness 40 µm per coat.
- All touch-up of damaged or missed areas to be carried out after erection of the roof structure.

NOTE: Method of measurement: m². All preparation, primer, and finish coats included in unit rate.

7.4. QUARTZ PAINT TO EXTERNAL WALLS

Apply quartz textured paint to external plastered walls, beams, and columns. Price includes primary coats. Inclusions:

- One coat of approved exterior alkali-resistant primer; allow to fully cure.
- One intermediate coat of exterior paint if required by the manufacturer.
- One coat of quartz-aggregate textured exterior paint, applied by roller or spray to achieve a uniform texture; colour to Engineer's approval.
- All edges and reveals to be masked and cut in cleanly.

NOTE: Method of measurement: m². All preparation, primer, and finish coats included in unit rate.

III Electrical Works Technical Specifications

8. GENERAL REQUIREMENTS

The Contractor shall supply all necessary labor and material, and shall install, complete ready for use, the above mentioned systems including the installation and wiring of miscellaneous equipment and devices, as indicated on the drawings and as herein specified.

8.1. *Scope of Work*

The company responsible for this lot must undertake the tasks and fulfill the following obligations (non-exhaustive list):

- Sampling of all proposed or requested materials
- Transportation, unloading, storage, and delivery on-site of all supplies and accessories necessary for the perfect execution of the works in accordance with current legislation and standards
- Supply, installation, and connection of distribution boards and panels
- Supply, installation, and connection of control and protection equipment
- Supply, installation, and connection of electrical conduits for 'Lighting' and 'Power supply'
- Supply and installation of conduits to protect power conduits
- Supply and installation of small equipment (power outlets, switches, push buttons, junction boxes.)
- Supply and installation of lighting fixtures
- Supply and installation of the grounding system
- Supply, installation, and connection of control equipment
- Supply and installation of the emergency lighting system
- Protection of existing structures, restoration of structures damaged during the works, and cleaning at the end of the works
- Coordination with companies installing equipment whose operation and installation are linked to the works of this lot
- Testing and adjustment of installations and devices

In general, all works, supplies, and various services necessary for the perfect execution of the works, in accordance with standards and the terms of the contract, and the protection and preservation of supplies during the duration of the works until the reception of the installations.

8.2. *Various Obligations*

a) Documents Consulted

If actual ratings of equipment supplied under other sections are different than the values indicated on the Drawings, the Contractor shall implement all necessary modifications at no extra cost, to the approval of the Engineer and relevant Local Authorities

b) Electrical Protection

Electrical equipment shall be protected against mechanical damage and from the weather especially from water dripping or splashing upon it, at all times during shipment, storage, and construction.

c) Material Storage

The contractor is obligated to locate suitable spaces to house the electrical equipment before its installation.

8.3. Codes and Standards

The Contractor shall carry out all electrical works in accordance with the latest issue of the regulations for the Electrical Installations, and where not in contradiction with the latest requirements of Local Electrical Authorities and Civil administration.

If any redesign or modification of the Works is necessitated by the adoption of another approved code or due to Local Electrical Authorities or safety instruction requirements, the extra cost incurred (if any) both for redesign and material shall be borne by the Contractor.

All equipment and materials supplied for this contract shall be manufactured in strict compliance with the latest relevant recommendations of the BS standards if available. Otherwise they shall comply with the latest relevant Euro norm specifications unless otherwise specified or approved.

- IEC (International Electrotechnical Commission)
- BS EN ISO 13485: Medical devices - Quality management systems - Requirements for regulatory purposes.
- BS 7671: Requirements for Electrical Installations (IET Wiring Regulations).
- BS EN 16001: Energy management systems. Requirements with guidance for use.
- BS EN 12469: Biotechnology - Performance criteria for microbiological safety cabinets.

Specification for Conductors in Insulated Cables &	- BS 6360 : 1991.
Specification for Galvanised Steel Armouring of Cables	- BS 1442 : 1986.
Specification for Aluminium Strip	- BS 2897 : 1985.
Specification for Gases evolved in combustion of	- BS 6425
Specification for PVC insulated non armoured cables	- BS 6004: 1995
Specification for armoured Cables	- BS 6346:1989.
Specification for Mineral Insulated Cables.	- BS 6207: 1995.
Specification for Insulated Flexible Cords	- BS 6500:1994.
Specification for Cables required maintaining circuit Integrity under fire conditions	- BS 6387:1994.

8.4. As-Built Drawings

The plans and diagrams provided with the file are conceptual documents that allow the proposal to be established. The contractor must potentially identify any abnormal provisions or omissions found in the documents of the tender file. Otherwise, the company will be solely responsible for all expenses necessary to bring the installation into compliance.

"As-Built" drawings shall be submitted and duly reviewed and approved by the engineer

8.5. Maintenance during the Warranty Period

Under this lot, the company must perform the complete maintenance of its installation (parts and labor) throughout the warranty period. It is specified that the warranty year will only begin from the day of the complete acceptance of the installations in perfect working order.

The Contractor shall provide appropriate warranties, where applicable, indemnifying the client against the failure of supplied goods/equipment within the prescribed period.

The warranty details shall be displayed on all goods/equipment. These details shall include:

- Warranty start and end date.
- Suppliers contact phone number.
- Local service center

8.6. *Testing and Acceptance*

A- Factory Tests

Under this lot, the company must conduct the testing and verification of the contractual characteristics of any equipment subject to testing at the factory platform, including electrical cabinets and the generator set.

B- Site Tests

It is clearly specified that factory tests do not exempt site tests, which will be particularly operational tests of the installation in working order:

- Isolation measurements for different circuits
- Measurements of voltage drops at full load
- Verification of phase balancing
- Measurement of earth resistances
- Continuity of earth circuits
- Calibration of measuring devices
- Inspection of protective devices for different circuits
- Circuit breaker tripping test

The list of these tests is provided for indicative purposes only and is not exhaustive. The Project Manager reserves the right to request any additional tests deemed necessary.

It is emphasized that factory tests do not constitute acceptance. For the tests of their installation, the contractor of this lot must coordinate with other trades."

8.7. *Origin and Reference of Equipment*

In conjunction with its proposal, the company must specify the brands and references of the various equipment it intends to install, supported by technical data sheets. This clause applies to all components of the installations without exception.

8.8. *Modifications*

If during the work, the Contractor wishes to make changes or modifications, then these modifications shall be submitted to the Engineer for approval. If these changes result in extra expenses in design and / or material these expenses shall be borne by the Contractor.

8.9. *Construction Site*

Upon the contract award, the contractor will designate a site manager who will be the sole point of contact for the representatives of the Client and the Project Manager. This individual must possess all the necessary skills to address any questions regarding the installations throughout the entire study and execution period of the works.

If the company intends to subcontract a portion of the work, it must provide a list of subcontractors competent to meet the requirements of the tender documentation.

8.10. *Rejection*

In the event that tests or observations made during the procurement, manufacturing, and installation of equipment indicate that the supplied equipment or executed works do not meet the specifications of the order, rejection of the entire supply or the implicated part may be pronounced by the client. The company must then replace the entire set or the affected part at its own expense, within the shortest possible time, without claiming any price increase or compensation of any kind.

8.11. *Drawings to be Provided*

A- Documents to be provided during the submission

Bids must be accompanied by a mandatory list of references for the proposed equipment.

B- Execution Drawings

The Contractor shall submit shop drawings and samples, No equipment or system for which shop drawings and/or samples are required, shall be ordered or installed unless all such drawings and/or samples are duly reviewed and approved by the Engineer. The Contractor shall, upon the request of the Engineer provide plain paper copies of the standards' extracts to which references are made in the specifications.

The Contractor shall check Architectural, Structural, Air- Conditioning, Plumbing and any other available Drawings to avert any possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts, the Contractor shall secure the Engineer's approval on necessary adjustments before any installation work is started.

All accessories and appurtenances that the Engineer deems functionally necessary for a complete installation shall be supplied and installed by the contractor whether or not explicitly indicated or described, at no extra charge.

9. EARTHING SYSTEM

9.1. *General*

Under this lot, the company must implement the entire regulatory grounding system for user masses, including grounding points, ground connections, the network of protective conductors, as well as equipotential bonding for grounding.

The Earthing system shall be in full compliance with the requirements of the IEE Wiring Regulations, Local Authorities Practices and the Specifications.

Any modification required by Local authorities shall be done at no extra cost

The impedance of equipment (earth loop) at any point in the electrical wiring system shall be sufficiently low to limit the voltage to earth and to facilitate the operation of the circuit protective devices in the circuits, as required by the IEE Wiring Regulations, BS 7430 and in compliance with requirements of Local Power Authorities.

9.2. *Grounding Point*

The System Earthing shall consist of earthing pits buried underground at a depth of 1 meter minimum. The specified system shall be in accordance with the project layout and location as indicated on the drawings

The main earthing bus of the main switchboard(s), shall be connected to the system earthing.

9.3. Equipment Earthing of the Electrical Works

Equipment earthing of the Electrical Works shall consist of bonding all non-current carrying metal parts of the Electrical installation to the System earth.

Non-current carrying metal parts of the electrical installation shall include such items as cabinets, exposed metal parts of apparatus as well as enclosures, doors, grilles, etc., protecting or shielding electrical equipment from direct access to unauthorized personnel.

The series earthing of one piece of equipment to another will not be permitted. All equipment earthing connections shall be tapped from the applicable earth source.

The cable armouring shall not be accepted as equipment earthing conductor.

All socket outlets, power apparatus, lighting fixtures and switches shall be earthed.

9.4. Protective Conductors:

All circuits running in conduits or in flexible conduits shall have earthing insulated conductors of minimum sizes as follows:

Current carrying conductor (S) (mm²)	Earthing Wire (protective SP) (mm²)
S less than or equal to 16	S
S greater than or equal to 16 but less than or equal to 35	16
S greater than 35	0.5 S

9.5. Earthing Pit :

The earthing rod shall be constructed from three copper clad steel rods installed in a masonry pit, including a cover plate, frame, and counter-frame made of angle iron

10. DISTRIBUTION BOARDS

10.1. General

Under this lot, the contractor shall supply and install the Main Distribution Boards, as shown on the Drawings and as herein specified. The equipment shall include bus bars, circuit breakers and/or fusible switches, and all necessary parts to install a complete distribution board, as shown on the Drawings and as herein specified.

It is specified that before the assembly and wiring of the Distribution Boards, the contractor must submit the execution drawing for approval by the Project Manager.

The Contractor shall submit shop drawings for the distribution boards including schematic diagrams with all protective devices, control, instruments and instrument transformers details, dimensions of the assembly, etc. A copy of these shop drawings shall also be submitted to the Local Power Authorities (if required) for approval. Any modification required by the Engineer or the Local Power Authorities to allow the equipment to comply with the codes, standards and specifications called of hereinbefore shall be carried out without additional charges.

10.2. Specifications

The equipment shall be suitably constructed for safe, proper and reliable operation without undue wear, corrosion, heating or other operating trouble.

The design, form of construction and arrangement details of the equipment shall be as indicated on the drawings and to the approval of the Engineer.

The arrangement of the equipment within the assemblies shall be individually-mounting type in a modular arrangement and shall be such as to afford maximum accessibility to all parts, incoming and outgoing wires and cables.

The main distribution board assembly shall be tested at factory in accordance with the requirements of BSEN 60439-1 and the associated standards.

Work tests shall include inspection of all components, wiring and a complete electrical functioning test.

Presentation

They will be of a prefabricated type, made of 20/10th steel sheet or fiberglass-reinforced polyester, equipped with a door with invisible hinge and key-locking mechanism. They will include a minimum reserve of 20%.

The door must have a basket for organizing documents related to the cabinet's equipment. IP 41 for indoor cabinets, IP 66 for outdoor Cabinets.

Signal lamps and any control elements will be located on the front. Adequate space will be provided around each device for wiring and maintenance. All live parts will be protected and made inaccessible by removable insulation to prevent accidental contact. In addition, the cabinets will be manufactured in accordance with the following specifications:

- Apparatus fixed on DIN rail or arranged on a metal frame.
- Wiring using U 500 SV wire in PVC conduit.
- Front-accessible apparatus protected against direct contact.
- Remote control and signaling must be brought to terminals.
- Cable entry and exit at the top or bottom with cable glands.
- Dimensions will be compatible with the locations indicated on the plans.

a- Incoming Components

Each cabinet will have a circuit breaker or a load-break switch, differential or not, as indicated in the plans, possibly associated with a set of HPC fuses. Presumed short-circuit currents will be checked by the contractor based on the final characteristics of the installation. These incoming components will be of the fixed type.

Each phase and neutral bus bar shall be tin plated and shall consist of hard drawn, high conductivity copper of uniform rectangular cross section throughout to BS 1433.

Earthing bus shall be sized in accordance with the BS 7430 for prospective short circuit. Grounding (earthing) bus shall extend through the entire length of the assembly.

b- Secondary circuit breakers

Will be of the fixed type, subsidiary circuit breakers will be of the size specified in the plans, with breaking capacity greater than or equal to the short-circuit current at the cabinet level, calculated based on the final characteristics of the installation.

c- Label

All enclosures containing functional units shall be clearly labeled. Every functional unit shall be labeled separately from all others. External labels shall have letters not less than 5 mm in height and internal labels not less than 3 mm. The letters shall be black in color on white background.

f- Surge Protectors

In compliance with regulations, each Distribution Boards will be equipped with a surge protector.

10.3. *Circuit Breakers :*

Circuit breakers shall be molded case type, totally front accessible and front connectable. The breakers shall be mounted in the distribution board to permit installation, maintenance and testing without reaching over any live side bussing.

All line and load side connections shall be individual to each breaker. No common mounting of electrical bus connectors will be acceptable. Line side breaker connections shall be bolt-on type. Breaker connections requiring leaf and coil springs which could loosen or fly apart during a fault are not acceptable.

Molded Case Circuit Breakers shall be electronic type with adjustable, setting for overload and short circuit. Each breaker shall be supplied with an externally operable mechanical means to trip the circuit breaker.

11. WIRES AND CABLES

The Contractor shall supply, install and connect all wires and cables necessary for complete electrical system, as indicated on the drawings, as required and as specified herein.

11.1. *Wires & Cables - Lighting & Power*

Conductors shall be of high conductivity annealed copper with concentric stranding for stranded conductors, to BS 6360, or approved equal.

Minimum conductor size used shall not be less than 2.5 mm² for power circuits and 1.5 mm² for lighting circuits.

All wires for lighting and power systems pulled inside conduits shall be single core, insulated with PVC compound, of grade not less than 450/750 volts, to BS 6004.

Conductors shall be solid-stranded. Flexible cords for connection of fixtures to circuit-wiring shall have finely stranded copper Conductor with PVC insulation.

Cords used for power connections shall be of high conductivity tinned copper wires, (2.5 mm² unless otherwise indicated) insulated with ethylene propylene rubber, three cores twisted together, filled and sheathed with chlorosulphonated polyethylene (EPR CSP), 300/500 V rated, and shall withstand an operating temperature of 85 C, to BS 6500.

Cords used for pendant lighting points and between lighting outlet above false ceiling to lighting fixture shall be circular three core (1.5 mm²) silicon rubber insulated, glass fiber braided 300/300

V rated to BS 6500.

11.2. Installation of Wires & Cables

All wires shall be installed in accordance with the applicable provisions of the approved codes and as indicated on the Drawings.

The number of wires and sizes of conduits indicated on the Drawings is a guide only and are not necessarily the correct number and sizes necessary for the actual equipment installed. The Contractor shall install as many wires and conduits as required and necessary for a complete electrical system, and shall provide adequately for the equipment actually to be installed

Conductors shall be continuous and no splices shall be made except within outlet or junction boxes

At every outlet and pull box, wires and cables passing through shall be left slack by an amount equivalent to 15 cm of cable length to allow inspection and connection to be made therein

All conductors to be contained within a single conduit shall be drawn in at the same time. A wire pulling compound shall be applied to conductors being drawn through conduit.

Wires and cables for feeders, sub-feeders, control, and branch circuit wiring shall be color coded as follows (Unless otherwise indicated):

Color	Phase
Red	A or 1
Yellow	B or 2
Blue	C or 3
Black	Neutral
Green/yellow	Equipment grounding

Feeders and sub-feeders shall be either single conductor wires pulled inside conduits or multi- conductor cables run exposed on walls or in trenches as shown on the Drawings.

11.3. Cable Supports

Cable ladders shall be manufactured from Mild steel, with hot-dip galvanized finish. The steel thickness shall be according to the size of the ladder and application. It shall conform to BS 1449

All parts like flat elbows, offset reducers, straight reducers, cross pieces, tee pieces, drop outs, etc. as well as accessories shall be furnished as to function, and to the manufacturers standards.

11.4. Conduits

Conduit runs are shown diagrammatically to outline the general routing of the system. The installation shall be made to avoid interfering with pipes, ducts, structural members, or other equipment. Should structural or other interferences prevent the installation of the conduits, or setting of boxes, cabinets, or other electrical equipment, as indicated on the Drawings, deviations must be approved by the Engineer, and after approval, shall be made without additional charges. The number of conduits shall not be less than that indicated on the Drawings.

Conduits and conduit fittings shall be so designed and constructed that they ensure reliable mechanical protection to the cables contained therein, and shall withstand the stresses likely to occur during transport, storage and installation. They shall be marked with the marker's name or trade mark. Marking shall be indelible and easily legible.

Conduits shall be adequate for proper and easy wire pulls, and in no case shall the wires occupy a cross-sectional area of more than 30% of the inner conduit cross-section.

All accessories and fittings such as bends, straps, double straps, junction boxes, bushes, etc. shall be provided as required.

Non-metallic conduits shall be heavy gauge, high impact rigid PVC Type A (Metric) or Type AH (Imperial) unless otherwise indicated, having a maximum continuous service temperature of 70 degree C or more. Boxes shall be standard PVC or phenolic material except for recess lighting outlets which shall be High Degree type

Conduits and fittings shall comply with BS 4607: Part 2:1991.

Conduits embedded in ceiling slab, in walls and under floor shall be non-metallic type. Conduits exposed above false ceiling shall be non metallic type.

All conduit work and plastering shall be complete before wires are pulled in unless otherwise permitted by the Engineer. Conduit shall be plugged with cork and boxes covered appropriately to avoid filling with plaster.

Conduits shall be installed without causing any damage to the structural members

12. WIRING DEVICES

12.1. General

The Contractor shall supply and install all of the wiring devices as indicated on the Drawings and as herein specified.

Wiring devices shall be flush mounted type, unless otherwise noted and shall be installed at heights directed by the Engineer.

Samples of devices and plates shall be submitted for choice and approval of the Engineer.

12.2. Switches and Device Plates

a- Devices plates

Plates shall be rectangular or square in shape to the approval of the Engineer. Plates shall be designed to match associated devices.

b- Switches

Switches shall be rocker operated mounted with the operating handle in the upward position when in the "ON" position unless otherwise directed by the Engineer.

Switches shall interrupt the hot wire.

Switches shall be quick-make, quick-break, with silver alloy contacts, trunnions and spring assembly lubricated for the life of the switch, with neoprene bumpers.

Switches shall be 250 volt AC only rated with number of poles and 10 Amp ratings as indicated on the Drawings, to BS 3676

12.3. Socket Outlets

Socket outlets shall be mounted with correct polarity, such that circuit breaker shall cut the hot wire.

16-amp socket outlets shall be flat pin type, to BS 1363, single or twin as indicated

13. LIGHTING FIXTURES

13.1. General

The Contractor shall, unless otherwise indicated on the Drawings or Bills of Quantities, supply, install and connect the lighting fixtures including but not limited to lamps, ballasts, accessories, fixing hardware necessary for installations, as shown on the Drawings, as required, and as herein specified.

Fixtures shall comply with all applicable requirements as herein outlined unless otherwise specified or shown on the Drawings.

Technically equivalent and architecturally acceptable lighting fixtures may be accepted with proper price justification and to the decision of Engineer.

Fixtures shall bear manufacturer's name and the factory inspection label.

Fixtures shall be completely wired and constructed to comply with IEC Publication 598-1 598-2 and BS EN 60598-1: 1993 unless otherwise specified.

All luminaries supplied by the contractor shall be photo-metrically tested to BS 5225

Any plastics used in the luminaries shall be light and U.V. stable and shall be suitable for their application.

All sheet steel components shall be suitably pre-treated and electro-statically spray -painted using acrylic polyester or epoxy powder paint.

Fixtures that are used under canopy or directly exposed to weather shall be considered as being outdoor type.

13.2. Characteristics

Recessed fixture shall be constructed so as to fit into ceiling without distorting either the fixture or the ceiling. Plaster rings shall be provided for plaster ceilings. The Contractor shall coordinate the dimensions with the false ceiling tile or panel dimensions.

Outdoor fixtures (under canopy or directly exposed to the weather) shall be constructed of an appropriate weather resistant material including gaskets to prevent entrance of water into wiring.

Fixtures with hinged diffuser doors shall be provided with spring clips or other retaining devices to prevent the diffuser from moving.

Bathroom fixtures shall be marked as being suitable for damp locations and shall be of minimum IP44 degree of protection, class-1. Lamp-holders of such fixtures shall be provided with a protective shield to prevent contact with the lamp cap.

Fixtures with exposed metal parts shall be provided with a means for connecting an equipment earthing conductor for such fixtures.

Non-reflecting surfaces such as fixture frames and trims shall be finished with baked enamel paint, unless otherwise specified. The colour of the paint shall be as indicated on the Drawings or as directed later by the Engineer on Site.

Wiring within fixture and for connection to the branch circuit wiring up to the outlet box of lighting point shall not be less than 1.5 mm². Insulation shall be silicone rubber, finish shall be glass braid

13.3. Emergency Lighting:

Emergency lighting will be provided through:

- Autonomous emergency lighting unit, 60 lm, 1h, installed above exit doors, in corridors, and at each change of direction to ensure a rapid and efficient evacuation in the event of a power outage.

13.4. Nomenclature : Non-exhaustive list :

Before any supply, the contractor must submit technical data sheets and samples devices for choice and approval of the Engineer.

Designation	Location
40 W LED panel : (600mm x 600mm) recessed modular LED panel with color temperature 4000k, body in aluminium and PMMA optical material	Internal space
40 W LIGHT LED (1200mm): compact high performance, with fully recyclable aluminium body, polycarbonate diffusers and stainless toggles, 40W.	Internal circulations
10 W LED Ceiling light IP 65 : a ceiling LED downlight incorporating a thermally optimized, deep drawn aluminium body with IP65 as standard. Color temperature 4000k-10w LED	WC
40 W Light LED (600mm) : 40W compact LED luminaire with polycarbonate body and opal diffuser, Color temperature 4000k	Technical room

14. IT NETWORK

A pre-wiring for IT and telephone systems will be implemented in accordance with the plan and descriptive specifications, featuring the following characteristics:

Wiring:

Cables will be routed through non-flame propagating gray PVC conduits. All precautions will be taken to prevent interference. The proposed cables and connectors must adhere to specific international standards for structured cabling, Category 6. The cable should:

- Be twisted pair, FTP Category 6A
- Support a minimum speed of 100 Mbps
- Be flame-retardant
- Be anti-inductive, multipair, with a shield, belonging to the SYT series

Connectors:

- RJ45 Category 6 for IT cabling
- RJ45 Category 6 for telephone cabling

15. CCTV

The contractor shall provide, install, and connect a video surveillance system consisting of:

- NVR - 8-channel IP Recorder
- Internal IP Hard Drive

- Indoor dome IP surveillance camera
- Outdoor IP surveillance camera
- Complete video surveillance wiring

15.1. *NVR - IP Recorder*

The recorder is a hybrid digital IP video recorder with the following features:

-
- Supports up to 16CH or 8 CH 5M
- 80 Mbps network camera recording
- Max. 4 HDDs, e-SATA supported storage
- Removable hard drive (easy installation)

15.2. *Internal IP Hard Drive*

An internal 3.5" digital hard drive with a capacity of 5 TB.

15.3. *Indoor Dome IP Surveillance Camera*

Indoor cameras will have the following features:

- Resolution: 5 MP
- Lens: 3-8.5 mm
- Visible IR distance: 30m
- LDC support (lens distortion correction)
- Clear view, WiseStream support,
- Day and night (ICR), MD, RS-485, SSNRIII, dual power
- Motion detection, tampering detection, defocus detection
- Day and night detection

15.4. *Outdoor IP Tube Surveillance Camera*

Outdoor cameras will have the following features:

-
- Resolution: 5 MP
- Lens: 3-8.5 mm
- Visible IR distance: 30 m
- LDC support (lens distortion correction)
- Clear view, WiseStream support,
- Day and night (ICR), MD, RS-485, SSNRIII, dual power
- Motion detection, tampering detection, defocus detection
- Day and night detection.

15.5. *Video Surveillance Wiring Kit*

The contractor must ensure the entire wiring of the video surveillance system with an IP cable that ensures data transmission from different equipment. The cable will be flame-retardant.

16. FIRE DETECTION

To ensure the protection of property and individuals, the building will be equipped with a fire alarm system. A Type 1 alarm system will be installed throughout the entire building. The system will consist of an addressable fire detection central unit (CDI).

All components of the Fire Detection and Firefighting System (SSI) must be stable, reliable, efficient, and easy to maintain. Additionally, all equipment must be certified in accordance with current regulations and national, international, or country of origin standards.

The fire detection and firefighting system will include:

- ☐ Fire detection central unit
- ☐ Fire detectors
- ☐ Break glass buttons
- ☐ Alarm diffusers
- ☐ Portable multipurpose powder fire extinguisher
- ☐ Portable CO2 fire extinguisher

16.1. *Addressable Fire Detection Central Unit - 32 Points*

It will be installed at the reception area, accessible and presented in the form of a cabinet containing mainly the following equipment :

On the front:

- Power supply fault indicator
- "Circuit Trouble" indicator
- 1 "Fire" indicator (on manual alarm) per zone
- 1 audible "Fire" alarm signal, triggering with each alarm, even if they are successive.
- Various push buttons
- The entire zone corresponding to the required capacity, with clear display of the concerned zone.

Inside:

- All modular and detachable cards or drawers.
- All auxiliary relays for internal operation and those intended for control commands.

The fire detection central unit is of the microprocessor-addressed type enabling the management of all detection and control points distributed on a two-wire installation. It must comply with NFS 61.950.

Each detection, control, or alarm point is assigned an individual address, and addresses can be grouped by software into zones with a common label.

The correspondence between detections (inputs), messages, and control actions is programmable by software.

The central unit engages in full-duplex communication, successively with all addressable points (manual or automatic detectors, actuators, etc.), requesting their status and possibly transmitting orders to be executed.

Messages are displayed in alphanumeric or optical LED format. A keyboard allows the programming and

testing of the central unit and the installation.

The programming should allow, among other things, enabling and disabling a detector or a zone, requesting the status of a detector, setting its alarm threshold, testing it, and managing interlocks and evacuation alarms. The central unit is normally in surveillance mode, monitoring the line's status and responding to any abnormal situation related to the nature and gravity of the problem (line fault, lack of response from a detector, alarm on a detector, etc.).

When it enters the alarm state, the central unit displays the address and location of the alarmed detector, performs necessary interventions according to the programming, and continues monitoring the rest of the installation.

A printer connected to the central unit records all events detected by the central unit, indicating the nature, location, date, and time of the event.

All signalling, control, relay, etc., components must be labelled with engraved Dymo labels.

16.2. Fire Detector

It will be ensured by detectors tailored to the premises and the risks associated with them. Detectors will be installed in most rooms, high-risk areas, and corridors. Their individual characteristics will correspond to the environment to be protected, ensuring reliable and very rapid indirect protection.

Optical Smoke Detectors

Optical smoke detectors are based on the principle of light dispersion caused by smoke particles in a labyrinthine chamber. The increasing modification of the light intensity threshold affects the electronic device, which, depending on its sensitivity setting, transmits an alarm signal to the central unit. The signal will be maintained until it is acknowledged. The detectors will have built-in action indicators.

Manual Alarm Trigger (Glass Break)

Throughout the building, manual alarm triggers of the "glass break" type, either surface-mounted or recessed, will be provided, allowing for local manual intervention by the security service or the public in the event of a disaster or detected anomaly. These boxes, installed at a height of 1.30 meters, will be placed approximately every 20 meters for general horizontal and vertical circulation areas, spaces open to the public, etc., and positioned as close as possible to staircases. In the case of partitioned areas with fire doors, there will be at least one manual alarm option per zone. For spaces open to the public, the layout of these manual alarm points will consider the arrangements and equipment of the premises to ensure perfect accessibility. Standardized Manual Alarm Triggers, following conventional color codes, will be adapted to the corresponding zone covered by the detectors. They may be independent of the traditional zoning in cases where certain parts and areas of the building are not equipped with automatic detection.

Sound Diffuser

Sound diffusers will consist of warning enclosures with electronic sirens conforming to standards, producing sound levels equivalent to:

- 106 dB at 1 meter
- 94 dB at 3 meters

Their numbers and placements will be such that, under all circumstances, the alarm can be perfectly heard in

the considered area without causing disturbance to other unaffected areas (to avoid general panic).

Their placements will be strategic, under the ceiling or false ceiling, for optimal sound distribution. In the event of these alarms being activated either manually via "glass break" interventions or from the central unit, the autonomy will be a minimum of 30 minutes with continuous auxiliary power.

Cabling, relays, various equipment, will be planned according to the different security operational imperatives.

Detection-Alarm-Warning Wiring

The entire wiring will be carried out in accordance with standards.

Wiring will be executed using 2-pair 9/10th cables, in concealed conduits for secondary circuits and installations in technical rooms, on cable trays, or false ceilings. Fire-resistant CR1 type cables will be used for wiring sound alarms.

Each zone wiring will be directly connected to the detection central unit, without the use of intermediate distribution splitters. Additionally, the control cables will be of CR1 type.

The contractor will define the dimensions of their wiring in general routes on cable trays and will account for a 20% reserve possibility.

Information regarding the conduits to be installed, whether concealed or surface-mounted, will comply with standardization. No conduit will be less than 13 in size.

All recessed boxes, junction boxes, etc., will be the responsibility of this lot, including all installation accessories, fixtures, connections, etc.

16.3. *Portable Fire Extinguishers*

Medium-capacity fire extinguishers suitable for the specific risks are provided at the locations indicated on the plans. There are two types of extinguishers:

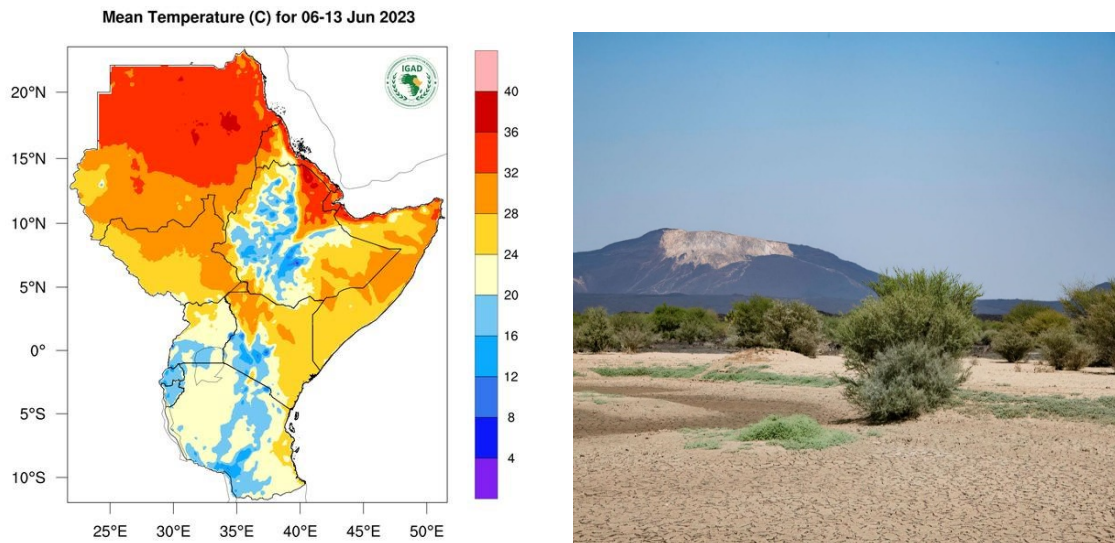
Multipurpose powder fire extinguisher with a useful load of 6 kg, placed at locations specified on the plans, with a minimum of one extinguisher for every 200 m² of space.

Carbon dioxide (CO₂) fire extinguisher with a useful load of 5 kg, positioned near special risk equipment.

IV MEP Works Technical Specifications

17. DESIGN ASSUMPTIONS

17.1. CLIMATE DATA OF THE SITE (ABALA – AFAR)



- **Climate zone** : arid desert
- **Summer base outdoor temperature (calculation):**
 - Tmax day: **45°C**
 - Tmin night: **30°C**
- **Relative humidity** : 20-40%
- **Solar radiation** : very strong
- **Wind** : Dust-laden
- **Altitude** : about **500 m**
- **Air pressure** : ~95 kPa

These conditions require:

- Tropicalized **equipment**
- Dust protection
- Severe sizing

17.2. DOMESTIC REFERENCE CONDITIONS

Space	Temperature	Relative humidity
Consultation room	24 to 26°C	≤ 60%
Waiting room	26 to 28°C	≤ 65%
Sanitary rooms	non-air-conditioned	-

17.3. OCCUPANCY ASSUMPTIONS

Space	Occupation
Consultation room	2 to 3 people
Waiting room	1 pers. / 1.5 m ²
Sanitary facilities	Non continuous usage

17.4. INTERNAL INTAKE AND METABOLISM

- Activity: **Low**
- Metabolism:
 - **70 W sensitive / person**
 - **60 W latent / person**
- LED lighting:
 - 8 to 10 W/m²
- Medical devices:
 - 100 to 300 W per room

17.5. BREAKDOWN ASSUMPTIONS

- Natural ventilation by door undercut
- Estimated renewal:
 - **1 to 2 volumes/hour**
- Air Transfer Direction:
 - from clean to sanitary areas

18. MEP TECHNICAL REQUIREMENTS

18.1. HVAC – AIR CONDITIONING

18.1.1. GENERAL PRINCIPLE

Air conditioning will be provided by systems such as:

- **Tropicalised mono-split inverter**

Each main room will be equipped with an independent unit.

18.1.2. MINIMUM TECHNICAL CHARACTERISTICS

- Guaranteed operation up to **50°C outdoors**
- Technology **Inverter**
- Refrigerant: R32 or R410A
- High energy class
- Enhanced filtration (dusty air)
- Anti-corrosion treatment of heat exchangers
- Built-in electrical protection
- Automatic restart after shutdown

18.1.3. INSTALLATION

- Wall-mounted indoor unit
- Protected outdoor unit (awning + anti-sand grid)
- Insulated refrigeration connections

Insulated copper connection pipes of class M1, oil trap, additional freon load in 410 A, welding, connection, nitrogen rinsing, vacuum, supports, pressurization, electricity test at 40 bar until commissioning and all accessories. Electrical connections between indoor and outdoor units.

The refrigeration connection running through the apartment or on the terrace will be installed on cable trays with covers.

- Gravity condensate discharge

18.1.4. SPECIFIC CONSTRAINTS

- Simple maintenance (no specialized tools)
- Mandatory accessibility
- Local spare parts availability

18.2. VENTILATION

18.2.1. PRINCIPLE

Natural ventilation provided by:

- **Door Undercut**

18.2.2. TECHNICAL REQUIREMENTS

- Undercut height: 1.5 to 2 cm
- Transfer grids if required
- Air exhaust via high openings (sanitary)

18.2.3. OBJECTIVES

- Ensure minimal air renewal
- Avoiding odor stagnation
- Limiting cross-contamination

18.3. SANITARY PLUMBING

18.3.1. DESIGN ASSUMPTIONS

A/ COLD WATER - DOMESTIC HOT WATER

All the distribution inside the building must be sized according to the following conditions:

Pressure :

- Maximum in use 3.0 bar
- Minimum to use 1.5 bar

Coefficient of simultaneity: REEF Curve III

- Maximum flow velocity outdoors. 1.50 m/s
- Recessed general networks 1.20 m/s
- Exposed plinth networks 1.00 m/s

18.3.2. DUCTS, OPENINGS AND SEALS

The ducts and horizontal passages of the walls and foundations will be carried out by the Structural Work Contractor, on the basis of the reservations requested by the holder of this lot under his control.

The Plumbing Contractor will provide the ducts and check the installation.

The contractor is mainly required to monitor the evacuation dimensions for connection to manholes or ground evacuation (E.P).

Openings and seals must not impair the strength of the load-bearing elements.

The nature of the seals must not impair the strength of the load-bearing elements.

The nature of the sealings or plugs must be appropriate to the works that are subject to them.

In particular, in all damp places, sealing and filling must be done with cement mortar. It is forbidden to make the openings or sealing of structures with waterproofing without prior authorization from the Project Manager.

In this case, the Contractor will be responsible for the necessary waterproofing repairs carried out in accordance with best practices.

18.3.3. COLD WATER PIPING

- MAIN COLD-WATER DISTRIBUTION

From the existing meter, located on the fence of the establishment, each room will have its own independent drinking water supply

the cold water distribution networks will be provided for each room according to the indications on the Master Plans.

The networks will be made of PPR and multilayer tubes inside the buildings.

Multilayer piping CSTB CERTIFICATION REQUIRED : In rolls pre-sheathed by a CINTROPLAST or similar insulating sheath for particular recessed supplies, including grooves, protection of the pipes by cement mortar throughout the period of the site.

STABILISED POTABLE-GRADE PPR PIPING received a technical opinion CSTB, SDR 9 from DN20 to DN75, SDR 7.4 beyond, including all accessories, possible flanges, reductions, curves, support contained supported by angles or corbels, fitting between tube and supports and all constraints,

The outdoor drinking water network will be made of high-density polyethylene PN 10, for underground cold water networks outside or inside the building. Including all special connection pieces, trenching, upper and lower protection by a layer of fine sand from 10 to 15 cm and backfilling in accordance with the project specifications, including penetration by PVC sheaths for sanitation, and all conditions included.

The copper connection to the polyethylene must be made by means of a support clamp.

- SPECIAL HOT / COLD WATER SUPPLIES

From the shut-off valves located at the entrance to each room, the cold and hot water supplies will pass through exposed and plinth in some rooms, recessed in other rooms and under tiles protected by ducts in other rooms.

The fixing will be done by removable counterpart clamps placed on a rosette with plastic ring interposition. The fixing clamps must be a maximum of 60 cm apart

- **DOMESTIC HOT WATER PRODUCTION**

The production of domestic hot water will be provided by electric storage water heater, accelerated insulated by foam of at least 35 mm, electrical protection class IPX5 including support, safety group composed of safety valve, isolation valve, siphon funnel for safety group and electrical box for programmed start-up and shutdown.

Capacity: 50 Liters

18.3.4. SEWAGE DISPOSAL

- **CHUTES AND COLLECTORS.**

The general drainage system will be of the total separative type, up to the external manholes

They will be made of PVC tubes of standard diameter and will pass outside or inside homes

The fixing will be done by PVC clamps with removable counterparts.

Any branch connection on the vertical stack must include a rodding access tee.

90° elbows at the base of stacks are prohibited.

The stacks must include all special fittings necessary for connecting the branch drains, and expansion joints at one per floor level.

- **SPECIAL EVACUATIONS**

Special drains will be carried out in PVC pipes of standard diameters.

The special drains will be of the visible type under the appliances and of the recessed type if necessary to reach the manholes

- **UNDERGROUND DRAINAGE SYSTEMS**

The underground pipes will be made of PVC sanitation.

No bends will be allowed on underground networks.

All the networks buried under screed will be the responsibility of the structural works lot.

18.3.5. SANITARY APPLIANCES AND FITTINGS

General

All sanitary appliances will be completely installed, including all accessory supplies.

They must be new and delivered to the site free of any alteration.

All the necessary protections will be implemented during the work to ensure their good state of conservation.

The taps will be standardised of the chrome type and integral to the appliances.

The control mechanism must be of the "Out of water" type. The connection of taps to copper tubes must be made by fittings, to facilitate any intervention in the event of a tap change.

In general, no water tap should be welded to the tube.

Before placing an order, the contractor must submit to the client a complete sample of the appliances and valves that he intends to install.

All devices will be white color and single choice, unless otherwise noted.

The contractor may propose all the devices recognized as being of equivalent quality by adding to the quote all the written documents necessary for documentation and reference.

The contractor is required to make his intention known and to obtain approval for the product he proposes before supplying his site.

It will bear without recourse all consequences due to non-compliance with these requirements, in particular

with regard to delays in supply.

Choice of sanitary ware

The appliances will be of first choice according to the ranking of choices in the unified technical document DTU n°60 and its additives published by the Scientific and Technical Centre for Building (C.S.T.B.).

Every piece must bear the indication of the choice in which it is classified. This indication must be indelible. Any part not bearing the indication of the choice will be considered decommissioned and will not be accepted. Sanitary ware such as toilets, toilets, washbasins, urinals are provided with the M.T.C. brand or similar.

Before placing his orders for the articles that concern him, the successful contractor must present to the Project Manager, for final approval, a complete sample of the materials, taps and appliances that he intends to use.

The Contractor will only use equipment that complies with this sampling. Any modification must be approved by the Project Manager.

WASHBASIN

White washbasin, to be placed on a shelf including stainless steel cover rosette. Timed tap with automatic closing, Delay ~7 sec, flow rate preset to 3 l/min at 3 bar, adjustable from 1.5 to 6 l/min, tamper-proof anti-scale jet breaker, solid brass body chrome-plated M1/2", fastening by lock nut, 10-year warranty, fixed spout with aerator, pull, brass drain with retractable flap, supply by 350 mm stainless steel hose and siphon with removable base.

WASHBASIN FOR PWD

Ergonomic washbasin for disabled people with concave porcelain border to be placed on a pneumatic mechanism and equipped with cold water tap with clinical lever. Flexible drain trap 1" 1/4, including protective trim dim: 30x50 cm . 70cm long tilting bar with AISI-304 DN32 stainless steel plate and friction. Capacity 150kg in accordance with UNI-CNR 10021/85 - 10011/85. Glossy finish

Tilting mirror with reflective surface for accident prevention, nylon-rilsan coating with white finish.

FLOOR MOUNTED TOILET

Supply and installation of floor-mounted vitreous china WC complete with dual-flush cistern, soft-close seat and cover, and all necessary fixing accessories.

WC to be of first-quality ceramic, white colour, stain-resistant and easy to clean.

Dual-flush mechanism with water-saving system, flush capacity 3/6 litres or equivalent.

Horizontal or vertical outlet as per approved plumbing layout.

Seat and cover in heavy-duty thermoset plastic with stainless steel hinges.

Connection to water supply through concealed or exposed angle valve and flexible hose.

Connection to drainage network including all seals, fittings, wax ring, sleeves, traps and accessories required for proper operation.

Installation to comply with manufacturer recommendations and approved shop drawings.

Price shall include testing, commissioning, sealing with sanitary silicone, and making good all disturbed finishes.

TURKISH TOILET WITH PUSH BUTTON

Turkish white toilet bowl dimensions: 610x465x195 mm, PVC toilet outlet with neoprene lip seal, fixing accessories and all accessories.

Brushed stainless steel control plate and recessed direct flush timed valve with waterproof flush box for flushing system at 3/4" by direct connection to the pipe, shut-off and flow adjustment valve, integrated and front-accessible trigger module and cartridge. Dual key 3L/6L adjustable to 2L/4L. Rectangular design.

SINK

Kitchen Double sink and drainer equipped with a swan-neck mixer, and PVC bottle siphon. Made of stainless steel, minimum thickness 0.8 mm, complete with single-lever mixer tap, basket strainers, traps, fixing accessories, cold only water connection and wastewater drainage connections, fully operational.

WALK-IN SHOWER

Walk-in shower equipped with a complete chrome-plated shower mixer with ceramic disc, including hose and shower head, D22mm wall bar, height 60cm, low height stainless steel vent channel with stainless steel grid 50x690 mm.

SHOWER FOR PWD

Folding shower seat in AISI-304 DN32 stainless steel, with ppl slats, 80x80 shower tray special disabled in extra-flat ABS equipped with a drain with siphon, Shower enclosure 80x80cm, H185 cm in polyglass, Handle with universal shower device 40x120 cm in AISI-304 DN32 stainless steel. Capacity 150 kg in accordance with UNI-CNR standard 10021/85 -10011/85 GLOSSY FINISH. chrome-plated thermostatic mixer with long lever.

19. PERFORMANCE REQUIREMENTS

- Materials should be resistant to:
 - Extreme heat
 - dust
 - Humidity
- Simple and robust installation
- Clear network identification

20. TESTING AND COMMISSIONING

Before handover:

- Air conditioning function test
- Sanitary flow verification
- DHW (Temperature) Test
- Checking network waterproofing

21. DOCUMENTS TO BE PROVIDED (AS BUILT)

- Shop drawings
- Calculation notes
- Technical data sheets
- Care instructions
- Network diagrams

22. WARRANTIES

- Minimum warranty: **12 months**
- Maintenance commitment