

**Employer/Consultant's Requirement
for
Faresmaathodaa Airport**

**Runway Length – 1200m
Designed Aircraft ATR
72-600**

1. Main Responsibilities of the Contractor

- 1.1.1 Contractor is responsible to organise design consultant and submit design calculations with engineering detail drawing for Runway, Taxiways and Apron pavement structure for approval. In addition, full time consultant's site representatives shall assigned at site office to inspect the conformity of the works ready for construction to design standard and to produce sign off certificates to the works have been completed in compliance with the design and standard.
- 1.2.2 Carry out all necessary site surveys and tests required to prepare the detail design and drawings.
- 1.3.3 Review and development of the airport concept that has been provided by MNPI to bring necessary adjustments to the design based on the actual site survey carried out is the responsibility of Contractor.
- 1.4.4 Preparation of detailed architectural, structural and M&E design of the buildings.
- 1.5.5 All Architectural, Structural and M&E drawings provided by the Contractor shall be reviewed & approved by EMPLOYER/CONSULTANT prior to commencement of any construction work.
- 1.6.6 Construction of the buildings including civil, structural, M&E, IT, fire Detection & Fighting system and finishing works as per the detailed design approved by EMPLOYER/CONSULTANT.
- 1.7.7 The Contractor shall obtain all necessary environmental regulatory permits such as required to execute the works.
- 1.8.8 The Contractor shall provide as-built architectural, structural and M&E drawings in editable CAD format prior to handover.

1.2 Design:

- 1.2.1 All designs shall be compliant to the British (BS), AASTHO, ASTM or equivalent Standard.
- 1.2.2 The building design shall be compliant to the National Building Code of the Maldives.
- 1.2.3 Structural and architectural design of the building shall be prepared by professional architects and engineers with extensive design experience.
- 1.2.4 All building service designs shall be designed by a professional building services Engineer or by professional electrical and mechanical engineers who holds at least a major degree in the relevant field with relevant experience.
- 1.2.5 The contractor shall submit preliminary design, design brief and specifications for EMPLOYER/ CONSULTANT'S approval prior to proceeding with detailed design.
- 1.2.6 EMPLOYER/CONSULTANT has the right to reject in full or in part the submitted design and ask for re- submission if EMPLOYER/CONSULTANT sees the design as unfit for the purpose, without additional cost or time.

1.3 Design Deliverables:

The design deliverables shall include:

1.3.1 Design brief, preliminary design and technical specifications.

- a) Pavement Structural Design Analysis:
 - ❖ Pavement Analysis,
 - ❖ Pavement Design,
- b) Design all necessary Aerodrome General Layout and construction detail drawings as mentioned:
 - ❖ Development Concept for the Aerodrome Layout shall include Runway, Taxiways and Apron, Service roads Approach Surfaces of both ends, Boundary and Security Fence, Airfield Making, buildings and other relevant structures in cooperated in the design,
 - ❖ Site Plan,
 - ❖ Building Location Layout,
 - ❖ Detail Layout for Runway, Taxiways and Apron, Service roads Approach Surfaces of both ends in the details of Runway End Safety Area (RESA),
 - ❖ Service Duct Layout for Electrical Distribution for Airfield Lighting System & Lighting Protection System including general electrical, water supply and Sewerage disposal system as required,
 - ❖ Detail Cross Sections for Runway and Shoulder with construction details,
 - ❖ Detail Cross Sections for Taxiways and Shoulder with construction details,
 - ❖ Detail Cross Sections for Turning Pads and Shoulder with construction details,
 - ❖ Detail Cross Sections for Apron and Shoulder with construction details,
 - ❖ Detail Cross Sections for Runway and Shoulder including both sides of runway and Runway End Safety Area (RESA) with surface finish details,
 - ❖ Detail Cross Sections for Apron and Shoulder with construction details,
- c) Design Aerodrome Marking Layout and all necessary detail drawings as mentioned:
 - ❖ Marking Layout for, Runway, Taxiways and Apron, Service roads,
 - ❖ Detail Marking Drawings for, Runway, Taxiways and Apron, Service roads
- d) Design Aerodrome Lighting Layout and all necessary detail drawings as mentioned:
 - ❖ Airfield Lighting Layout for, Runway, Taxiways and Apron.
 - ❖ Detail Lighting Drawings with Cable routes, Trench Layout and light post foundation details for Runway, Taxiways and Apron.
- e) Design all necessary Service Facilities General Layout and construction detail drawings as mentioned:

- ❖ Lightning Protection System,
 - ❖ External water supply and Sewerage disposal system,
 - ❖ External Electrical distribution system,
 - ❖ HVAC system,
 - ❖ Low Voltage Systems (Fire Alarm, Data and Telephone, CATV, FIDS, CCTV and PA System)
- f) All approved drawings in PDF format and upon request of the Employer/Consultant shall submit in CAD format,
- g) Structural design calculations and electrical load calculations,
- h) Shop drawings upon request of Employer/Consultant.
- i) The approval of a design by Employer/Consultant does not alleviate the Contractor from his responsibility of providing quality and professional work to the satisfaction of the Employer/Consultant.

1.4 Architectural Design

- 1.4.1 All dimensions of the building shall be compatible with the floor plans, interior design and façade design.
- 1.4.2 All finishing materials and fixtures shall be as specified in the interior design drawings and specifications.
- 1.4.3 The floor plans provided by Employer/Consultant indicate the design intent of MNPI. The Contractor shall make necessary adjustments to the floor plans to improve operational efficiency of the building, safety and security issues and to ensure the building is compatible to the requirement.

1.5 Civil & Structural Design

- 1.5.1 The structural design of the building shall be compatible and well-coordinated with the interior design and façade design of the building.
- 1.5.2 Detail design calculations and design report shall be furnished along with detailed structural drawings.
- 1.5.3 The structural design and foundation design shall be checked by a Structural Checker registered at the Ministry of National Planning and Infrastructure.
- 1.5.4 All the designs shall be submitted to the Employer/Consultant and approved by before proceeding procurement of materials, fabrication or construction works.

1.6 Electrical, air-conditioning mechanical ventilation and plumbing designs

- 1.6.1 All electrical and plumbing and designs shall be submitted and approved by Employer/Consultant before proceeding with installation on site.
- 1.6.2 Contractor shall submit his proposed mechanical, electrical and air-condition system concept brief, summarizing the systems and types of equipment he proposes to use.
- 1.6.3 The approval of a design by Employer/Consultant does not alleviate the Contractor from his responsibility of providing fully functional and safe systems for the project.
- 1.6.4 The electrical design shall be based on the existing local regulations stipulated by Maldives Energy Authority. Normal system is applicable or to be approved by Employer/Consultant
- 1.6.5 The Electrical designs shall be in line and well-coordinated with the interior architecture of the building.
- 1.6.6 The Electrical design submittals by the contractor shall include but not limited to the following:
 - ❖ Electrical Load calculation with signature from a MEA accredited Engineer.
 - ❖ Electrical Single line diagram for the proposed system.
 - ❖ Electrical Lighting Plans including details of lighting control strategies and mood lighting options.
 - ❖ Electrical Power plans.
 - ❖ Extra low voltage systems including fire detection system, public address system, closed circuit Television systems, flight information display systems and access control systems
- 1.6.7 All air-conditioning mechanical ventilation designs by the Contractor shall be submitted and approved by Employer/Consultant before proceeding with installation on site. The designs shall be in line and well-coordinated with the interior architecture of the building.
- 1.6.8 The approval of a design by Employer/Consultant does not alleviate the Contractor from his responsibility of providing fully functional and safe systems for the project. The design shall be based on the existing local regulations stipulated by Maldives Energy Authority. Normal system is applicable or to be approved by Employer/Consultant.
- 1.6.9 The design must include provision of mechanical ventilation interlocked with the air-conditioning systems such that the building interior is held at positive pressure relative to outside.
- 1.6.10 The system set point shall be adjustable between 30oC to 16oC.
- 1.6.11 The design submittals by the contractor shall include but not limited to the following:
- 1.6.12 Air-conditioning systems layout and sections.
- 1.6.13 Air-conditioning system installation details.

1.6.14 Ventilation systems and details.

1.6.15 Proposed system catalogues.

1.6.16 The systems layout shall indicate power consumption, design air flow rates (including return, supply and fresh air) and cooling capacity of each equipment used.

1.7 Plumbing and drainage system

1.7.1 The designs shall be in line and well-coordinated with the interior architecture and structure of the building.

1.7.2 The design shall be in conformation with latest British standards. Contractor shall visit site to check available points of connections to existing mains. The design submittals by the contractor shall include but not limited to the following:

- ❖ Potable (fresh) water supply systems Layout.
- ❖ Drainage systems layout.
- ❖ Stack details for water supply systems and drainage systems.

1.8 Design Compliance

1.8.1 The Designer must ensure that the materials and aggregates which are incorporated into any pavement materials have been checked and approved before incorporation into the works.

1.8.2 When any new sections of the design are submitted they must be accompanied with a completely detailed Method statement which includes all plant and labour numbers that will be used in the works. No works will be allowed to start on site unless both the technical design and the Method statement are approved.

1.8.3 On completion of the works the Designer must sign a certificate which clearly states that all works have been completed in compliance with their design.

1.9 As-Built Drawings

1.9.1 The Contractor shall maintain all record of the deviations in construction of Permanent Works from Construction drawing for the preparation of As-built Drawings.

1.9.2 These records shall be maintained in one master copy (paper copy) of the construction drawings and subsequently updated on the CAD drawings. Upon completion of the Works or at such time as agreed to or required by EMPLOYER/CONSULTANT, the Contractor shall prepare drawings which, subject to the notice of EMPLOYER/CONSULTANT, shall become As-Built Drawing.

1.9.3 All such drawings shall be endorsed by the Contractor as true records of the construction of the Works that are to remain on the Project Site. The Contractor shall also show location of the utilities exposed and retained.

1.10 Applicable Standard (BS)

Some or all of the following British Standards and Codes of Practice are referred to in this Specification and are deemed to form part thereof, but approved equivalent foreign standards may be complied with instead. The list is included here for convenience, but may not be exhaustive. The Contractor should refer to the text of the project specific Specification.

Copies of the publications listed below can be obtained from:-

British Standards Institution
Information, Services and Marketing
Linford Wood
Milton Keynes
MK14 6LE
England ,Telephone: 01908 320033

For brevity, some titles are not reproduced in full.

BS4	Structural steel sections
BS12	Portland cement
BS63	Road aggregates
BS65	Vitrified clay pipes, fittings, joints and ducts
BS76	Tars for road purposes
EN124	Gully tops and manhole tops for vehicular and pedestrian areas. Design requirements, type testing, marking, quality control
EN146	Portland blast furnace cements
DD21 3	Method for determination of the indirect tensile stiffness modulus of bituminous mixtures
EN295	Vitrified clay pipes and fittings and pipe joints for drains and sewers
BS381C	Colours for identifying, coding and special purposes
BS397	Industrial safety helmets
BS410	Test sieves
BS434	Bitumen road emulsions (anionic and cationic)
BS443	Testing zinc coatings on steel wire and for quality requirements
BS476	Fire tests on building materials and structures
BS594	Rolled asphalt for roads and other paved areas
BS718	Density hydrometers
BS729	Hot dip galvanised coatings on iron and steel articles
BS743	Materials for damp proof courses
BS812	Testing aggregates
BS873	Road traffic signs and internally illuminated bollards
BS882	Aggregates from natural sources for concrete
BS890	Building limes
BS903	Physical testing of rubber
BS1047	Air-cooled blast furnace slag, aggregate for use in construction
BS1142	Fibre building boards
BS1199	Building sands from natural sources

BS1200	Landscaping Sand for Mortars & Plastering
BS1247	Manhole steps
BS1305	Batch type concrete mixers
BS1377	Methods of test for soil for civil engineer/consultant purposes
BS1447	Specification for mastic asphalt (limestone fine aggregate) for roads, footways and paving in building
BS1449	Steel plate, sheet and strip
BS1452	Flake graphite cast iron
BS1610	Materials testing machines and force verification equipment
BS1707	Hot binder distributors for road surfacing dressing
BS1722	Fences
BS1881	Methods of testing concrete
BS1924	Stabilised materials for civil engineer/consultant purposes
BS2000	Methods of test for petroleum and its pipelines
BS2499	Hot applied joint sealant systems for concrete pavements
BS2648	Performance requirement for electrically heated laboratory drying ovens
BS2752	Specification for chloroprene rubber compounds
BS2782	Method of testing plastics
BS3012	Low intermediate density polythene sheet for general purposes (obsolescent)
BS3136	Cold emulsion spraying machines for roads
BS3148	Water for making concrete (including notes on the suitability of the water)
BS3262	Hot-applied thermoplastic road marking materials
BS3505	Unplasticized polyvinyl chloride (PVC-U) pressure pipes for cold potable water
BS3506	Specification for unplasticized PVC pipe for industrial uses
BS3690	Bitumen's for building and civil engineer/consultant
BS3797	Lightweight aggregates for masonry units and structural concrete
BS3892	Pulverised fuel ash
BS3921	Clay bricks
BS3963	Method for testing the mixing performance of concrete mixers (obsolescent)
BS4027	Sulphate resisting Portland cement
BS4102	Steel wire and wire products for fences
BS4190	ISO metric black hexagon bolts, screws and nuts (obsolescent)
BS4254	Specification for two part polysulphide based sealant (obsolescent)
BS4320	Metal washers for general engineer/consultant purposes (Metric series)
BS4363	Distribution units for electricity supplies for construction and building sites
BS4395	High strength friction grip bolts and associated nuts and washers for structural engineer/consultant.
BS4449	Carbon steel bars for the reinforcement of concrete
BS4483	Steel fabric for the reinforcement of concrete
BS4504	Circular flanges for pipes, valves and fittings (PN designated)
BS4550	Methods of testing concrete

1.11 Mobilization and Demobilization

1.11.1 Scope of Works

- a) This item includes mobilization and demobilization of all constructional plant, and equipment, including testing equipment deemed necessary to complete the Works.
- b) The Contractor shall mobilize and deliver all constructional plant and equipment required to undertake the works and all the materials for any temporary facilities required.
- c) Mobilization shall include the importation and transportation to the job-site of all equipment, constructional plant and all necessary items for the execution and completion of the works. Mobilization shall also be deemed to include any site clearance work that is necessary.
- d) It is the responsibility of the Contractor to ensure that all plant and equipment brought for the project are in working condition. In the event of a break-down of constructional plant/equipment when it is beyond the ability of the personnel or when there are insufficient tools or materials at site to affect a repair in a reasonable time, the Contractor will be instructed to provide a replacement for the same at no additional cost (including mobilization) to the Owner. In such a case, no extension will be given for completion of Works. The Contractor may also be required to remove the broken plant from the Site if it is hindering the completion of any components of the Project.
- e) Demobilization shall include the removal from site of all constructional plant and equipment and the removal of all temporary facilities erected by the Contractor for his convenience.
- f) Mobilization costs of plant and equipment referred to herein shall be paid after the Consultant / Engineer has certified and accepted that all equipment listed for the Project and material for Temporary Works have been delivered to site or part three off, as the requirement deemed necessary.
- g) Demobilization costs shall be paid after the Consultant / Engineer has certified and accepted that all equipment listed or as agreed has been removed from site and all temporary facilities dismantled and removed from the Site.

1.12 Temporary Facilities

1.12.1 Scope of Works

This item consists of the following:

- (a) Furnishing, erection and maintenance of all site facilities such as Contractor's camp and yard, temporary utilities and services, safety provisions, temporary roads and temporary navigations aids required for the execution of the Works as specified below;
- (b) Erection of all construction plant and equipment after being delivered to site; and,
- (c) Disassembly and removal of all site facilities, constructional plant and equipment from the site for de-mobilization.

1.12.2 Provisions and Requirements

- (d) The Contractor shall be responsible for temporary facilities, utilities, services and safeguards as required under the Contract.
- (e) Temporary and permanent utility facilities used for the construction work shall be adequate for the intended use and not be overloaded or otherwise used or arranged in any manner which will endanger persons, premises or the works themselves.
 - 1. Upon completion of the Works, unless otherwise directed or required, all site facilities, installations, utility services, constructional plant and equipment shall be disconnected, disassembled and removed from the Site.
 - 2. The camp area shall be kept in a clean and tidy condition throughout the construction period. The Consultant / Engineer shall have the authority to order periodical clearings at the Contractor's cost, provided that the site for disposing of Garbage / Debris allocated by the owner and is within the stipulated distance from the work site.
 - 3. All accommodation, latrine and shower facilities and canteen, shall conform in every respect with regulations imposed by local health authorities.
 - 4. The Contractor shall provide and maintain the necessary equipment as specified in contract and accessories, for construction use for the entire construction period.

5. The Contractor shall be responsible to arrange water, electricity etc. as required to execute the work throughout the project.
6. The Contractor shall provide and maintain a temporary electricity service and distribution lines of adequate capacity for power, lighting and other construction needs.
7. All utility systems shall conform to local codes and regulations.
8. All costs associated with the provision of utilities shall be borne by the Contractor.
9. The Contractor shall maintain appropriate safety measures on site and around the work areas.
10. The Contractor shall adhere to all local codes and regulations with respect to work-safety.
11. The Contractor shall maintain appropriate notices and safety measures to warn public of dangers on site.
12. The Contractor shall provide and maintain any temporary roads and access ways Project Site when required.

1.13 Site Expenses

1.13.1 Scope of Works

This item shall cover all expenses for the staff related to the management of the site and office.

1.13.2 Provisions and Requirements

- a) The site costs shall include but not be limited to the following:
- b) Site office costs, including basic staff salary, overtime payments, bonuses, travel, medical fees, overseas and other allowances. Costs should also allow for stationery and office equipment.
- c) Communication Facilities, to include the costs telephone, as well as walkie-talkie communication between the job site proper and the site office. Communication costs for the Contractor's site office shall also be included here.
- d) Site safety costs to include all matters related to workplace health and safety issue.

- e) Site security costs.
- f) First aid, to include all reasonable first aid supplies and equipment.
- g) Insurance, costs of insuring the works and temporary facilities as required.
- h) Waste management, to include all costs incurred in keeping the site clean.

1.14 Environmental Requirements

1.14.1 Introduction

Environmental Impact Assessment shall be prepared to the requirements of The Ministry of Environment. It is Contractor's requirement to prepare all documentation to the requirement of The Ministry of Environment including any monitoring that maybe required and to obtain all necessary permits. The contractor shall follow all Environmental laws and regulations of Maldives in design and during implementation of the project.

The proposed construction works are, under conditions given below, expected to have only minor impact on the surrounding coastal zone. However, this is to be expected only if relevant mitigation measures are incorporated during the construction phase as well as during the long term operational period. In this section the objectives, obligations and criteria of such mitigation measures will be outlined.

1.14.2 Feedback Monitoring

During the period of dredging and reclamation, working activities may have adverse effects on the coral reef community and the terrestrial coastal zone. One of the main activities will be the dredging of basin for the reclamation.

The most widespread and visible consequence of dredging and excavation is the generation of suspended sediments and turbidity, both of which affect the corals adversely.

Other main activities with possible adverse effects are the disposal of the dredge spoils, site clearance on land and transport on land and at sea.

The Contractor shall during the construction period carry out an environmental control programme following a feedback design in order to ensure that adverse effects are detected before they become irreversible; The basic concept of a feedback monitoring program is that selected environmental key criteria, for instance live coral coverage or sedimentation rates, are observed regularly during the construction phase. If response, based on impact criteria indicating thresholds severe but yet not irreversible levels of impact, are crossed, steps of avoidance shall be enforced.

A metrology description for the environmental migration measures proposed for the environmental control programme shall be prepared by the Contractor for the Employer/Consultant's approval prior to the implementation of the environmental control

programme and prior to any construction works on site. The environmental key criteria and possible response thresholds are specified in the following sections.

1.14.3 Operational Key Criteria for Acceptable Environmental Impact

During construction the response on the following operational key criteria for acceptable environmental impact shall be measured at the perimeter of the construction zone. The perimeter of the construction zone shall be clearly identified at site and shall be approved by the Consultant / Engineer before taking of the measurements.

The Response Threshold (RT) for the operational key criteria shall be:

- (a) Live coral coverage; No significant decrease shall occur at selected sites, representative of the coral reef community in the area, compared to likewise representative reference sites.
- (b) Concentration of suspended solids in surface waters over reef slope: less than 10 mg/l above ambient concentration during daylight hours and less than 20 mg/l at night.
- (c) Sedimentation rate on coral reef slope (5-10 m depth zone): less than 10 mg/cm² day.

1.14.4 Environmental Obligations

The Contractor has the obligations mentioned below. He shall address the issues in the methodology description for his environmental mitigation measures designed to meet the criteria mentioned in section 4.3 and the subjects listed in section 4.5:

- (a) To describe methodology of, and carry out, an appropriate feedback monitoring programme, and see that the response thresholds given above are not surpassed. For this programme detailed and currently updated dredging schedules should be given currently calculate the amount of spill.
- (b) To describe, how possible adverse impacts related to subjects listed in section 4.5 are planned to be mitigated.
- (c) Establish emergency measures and procedures for accidental spills of hazardous substances during the construction period.
- (d) Make an assessment of the possible impact of any temporary physical structure on the hydraulic situation and any possible erosion following this, and take mitigation constructions into the planning of the dredging and reclamation.
- (e) Report to the Owner.

1.14.5 Subject of Environmental Concerns

The following list included subjects considered of environmental relevance for the construction or part thereof. The list shall be considered as guideline for the contractor in his

selection of mitigating measures of relevance for his selected construction methods and they shall be subject to adjustment when experience obtained during the environmental feedback monitoring program should call for this.

- (a) Dredged material. Dredged material to be used for consumption purposes must not be deposited on the reef flats or on landsides areas outside the limit of working areas. The excavation scheme should be set up in such a way that slurry plumes are minimised as much as possible on and in the vicinity of the reefs.
- (b) Surface run off. During the construction period surface Water caused by heavy rainfall may carry larger amounts of sediment to the reefs. Such surface run off shall be minimized.
- (c) Fresh water supplies for any construction purpose or labour force are to be brought in by the Contractor.
- (d) Solid waste and sewage: as a main principle, all waste is to be removed from the island before any nuisance of dust, smell or visibility is generated.
- (e) Waste: waste oil from machinery, bilge pumping or other use as well as any waste of hazardous substances connected to the construction activities is to be collected and transported as directed by the Consultant / Engineer.
- (f) Dumping: No dumping of any kind from support vessels are allowed on the reef or in the upstream waters of the island (and should otherwise follow any national regulations on dumping).
- (g) Dust nuisance: Activities creating dust nuisance are to be conducts under wind conditions that can the dot out to sea.
- (h) Anchoring of carrier and supporting ships and vessels: anchor is not allowed to be dropped on the reef crest or reef slope outside the working areas li

2. Minimum Standards & Technical Requirements

2.1 General

This section specifies the minimum technical requirements of facilities and infrastructure to be designed and constructed within the proposed period by the Contractor.

Development concepts provided with this document is a basic idea of an airport infrastructure that meets the Employer/Consultant's requirement of this development.

The Contractor can also put forward his own airport development concept plans as required and shall meet the following requirements:

2.2 Project Scope

The major project scope includes construction of a new regional airport namely, the Faresmaathoda Airport in Gaafu Dhaalu Atoll consisting of construction of 1200 meter runway, taxiways, Apron with Shoulder and Service roads with all operational facilities. The project also included the passenger terminal, Control Tower, with necessary support buildings and associated support services. The airport will be provided with all the necessary safety operational features. The infra-structural preparation such as backfilling and levelling, provision of water, electricity and the telecommunication service along with consultancy services are all included in the scope of works.

Airport shall also be developed to the minimum standard and requirement for ATR 72-600 and complete Certification process in accordance with Maldives Civil Aviation Regulation MCARs 4 , 139 and National Aviation Security Programme conducted by Maldives Aviation Security Command (AVSECOM) including domestic operation to cater for existing turboprop aircraft used by local airlines.

2.3 Applicable Standards

All planning, design and construction works undertaken by the Developer/Contractor and his representatives shall, as a minimum, be in accordance with the laws, rules and regulations of the following Maldivian authorities:

- ❖ Ministry of Transport and Civil Aviation (MoTCA)
- ❖ Maldives Civil Aviation Authority (MCAA)
- ❖ Regional Airports / MoTCA
- ❖ Ministry of National Planning and Infrastructure (MNPI)
- ❖ Environmental Protection Agency (EPA)
- ❖ Other relevant bodies

In addition to the above, the following standards and recommended practices shall be adopted as the minimum requirements of all design and planning.

2.3.1 Maldives Civil Aviation Authority's (MCAA), Regulations:- MCAR, CARs, ASC, Civil Aviation Advisory Publications (CAAPs) & any other relevant regulations.

Where applicable, CARs and MCARs take precedence over all other standards. When MCAA regulations do not exist, FAA and other relevant standards shall be applied in that order of priority.

Applicable Regulation include, but are not limited to;

- ❖ Applicable MCARs include, but are not limited to :
- ❖ MCAR 139 - Aerodrome Rules
- ❖ MCAR 4 - Aeronautical Charts
- ❖ Applicable Air Safety Circulars, but are not limited to:
- ❖ ASC 139-5 Aerodrome Standards Manual
- ❖ ASC 139 -1 Aerodrome Rescue and Fire Fighting
- ❖ ASC 139 - 3 The Maldives Runway Safety Program
- ❖ ASC 139- 4 Formation of Local Runway Safety Team
- ❖ ASC 00-2 Safety Management System
- ❖ ICAO Standards and Recommended Practices (SARPS)- Airside

The Developer shall ensure that at all times the planning, design and maintenance of the airside infrastructure and facilities of the Airport comply with the ICAO Standard and Recommended Practices (SARPs), including, but not restricted to the following:

ICAO Publications for reference:

Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (Doc 9830)

Aerodrome Design Manual (Doc 9157)

Part 1 — *Runways*

Part 2 — *Taxiways, Aprons and Holding Bays*

Part 3 — *Pavements*

Part 4 — *Visual Aids*

Part 5 — *Electrical Systems*

Part 6 — *Frangibility*

Aeronautical Information Services Manual (Doc 8126)

Aeroplane Performance Manual (Doc 10064)

Aircraft Type Designators (Doc 8643)

Airport Planning Manual (Doc 9184)

Part 1 — *Master Planning*

Part 2 — *Land Use and Environmental Control*

Part 3 — *Guidelines for Consultant/Construction Services*

Airport Services Manual (Doc 9137)

Part 1 — *Rescue and Fire Fighting*

Part 2 — *Pavement Surface Conditions*

Part 3 — *Wildlife Control and Reduction*

Part 5 — *Removal of Disabled Aircraft*

Part 6 — *Control of Obstacles*

Part 7 — *Airport Emergency Planning*

Part 8 — *Airport Operational Services*

Part 9 — *Airport Maintenance Practices*

Air Traffic Services Planning Manual (Doc 9426)

Airworthiness Manual (Doc 9760)

Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829)

Heliport Manual (Doc 9261)

Human Factors Training Manual (Doc 9683)

Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640)

Manual of All-Weather Operations (Doc 9365)

Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476)

Manual on Certification of Aerodromes (Doc 9774)

Manual on Laser Emitters and Flight Safety (Doc 9815)

Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643)

Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332)

Procedures for Air Navigation Services — Aerodromes (PANS-Aerodromes) (Doc 9981)

Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM) (Doc 10066)

Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS) (Doc 8168)

Volume I — Flight Procedures

Volume II — Construction of Visual and Instrument Flight Procedures

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM) (Doc 4444)

Safety Management Manual (SMM) (Doc 9859)

Stolport Manual (Doc 9150)

World Geodetic System — 1984 (WGS-84) Manual (Doc 9674)

Assessment, Measurement and Reporting of Runway Surface Conditions (Cir 329)

New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Operational Measures and Aeronautical Study (Cir 301)

New Larger Aeroplanes — Infringement of the Obstacle Free Zone: Collision Risk Model and Aeronautical Study (Cir 345)

2.4 Investigations and Surveys

The Contractor shall satisfy himself of the existing site conditions and shall, as a minimum, undertake site investigation and topographic surveys of the site to gain accurate and complete records of the existing situation.

The investigation shall provide sufficient data to inform the design of structures, pavements, reclamation works, embankments and revetments, underground services and airfield pavements. It shall also be sufficiently detailed to identify any existing ground/groundwater pollutants which will require remediation and/or control measures.

The Contractor shall undertake a comprehensive and detailed topographic survey of the concession area, to fully understand the existing conditions for the use of airport planning, designing and construction.

Copies of all investigations and reports shall be provided, free of charge, Employer/Consultant in hard copy and electronic format.

2.4 Environment and Sustainability

The Contractor shall ensure that all planning, design, development works and airport operations are undertaken with full regard to and in compliance with GOM laws and regulations on environment, planning and sustainability. The Contractor shall demonstrate his understanding and awareness of the issues associated with the investment and, as required by the Maldives Environment Protection and Preservation Act, shall prepare all necessary environmental impacts assessments, compliance documentation and environmental management plans for the sustainable and efficient management of Airport. The Contractor shall comply with all relevant environmental and sustainability legislation including, but not limited to:

- ❖ The Environment Protection and Preservation Act (Law 4/93)
- ❖ The National Environmental Action Plan (NEAP 2009-2013)
- ❖ The Maldives National Strategy for Sustainable Development (NSDS)

3. Minimum Technical Requirements

3.1 Planning, designing and construction

3.1.2 Types of Aircraft expected to operate to the Airport.

- ❖ Dash 8 Q 200, with passenger capacity 37 seats.
- ❖ Dash 8 Q 300, with passenger capacity 50 seats.
- ❖ ATR 42, 500 with passenger capacity 48 seats
- ❖ ATR 72, 500 with passenger capacity 68 seats
- ❖ ATR 72, 600 with passenger capacity 70 seats

3.1.3 Critical Aircraft

- ❖ The Critical Aircraft selected for runway pavement design is ATR 72 - 600 with a seating capacity of 70 passengers.

3.1.4 Aerodrome Reference Code

- ❖ Aerodrome Reference Code shall be as Code Number 2, Code Letter C (C)

3.1.5 Airfield Pavements

- ❖ Physical planning Runway, Taxiways and Apron shall be in accordance with the standards and recommendations of MCAR Part 14, ICAO Annex 14 and ICAO Aerodrome Design Manual Part 2 with respect to physical clearances and safeguarding.
- ❖ Runway, Taxiways and Apron construction and shall be designed to have a 20 year design life or as specified in the minimum requirement.
- ❖ Slopes on Runway, Taxiways and Apron shall comply with the requirements of MCAR Part 14, ICAO Annex 14 and ICAO Aerodrome Design Manual Part 2 and, where stands are used for aircraft refueling, with NFPA 415. In any case, apron slopes shall not be less than 0.5% in any direction to facilitate positive drainage.
- ❖ Pavement markings, signage and AGL shall be in accordance with the requirements of MCAR Part 14, ICAO Annex 14, ICAO Aerodrome Design Manuals. The Developer shall, as a minimum submit the proposed Airport development concept plans at 1:5000 showing the proposed general arrangement of Airport infrastructure layout.

3.1.6 Airside roads

- a) Airside roads shall be provided to facilitate safe and efficient operation and movement of airside vehicles. The road system shall provide;

- ❖ Access to and on aprons
- ❖ Connections between aprons passenger terminal buildings including, ground support equipment areas

❖ Connections and approaches to rescue and firefighting stations

- b) The layout and operating strategy of the network shall be established in the master plan and developed during the design process to demonstrate the adequacy of the proposed system. It shall be designed to provide as direct a route as possible between facilities and shall have sufficient capacity to avoid traffic congestion at junctions at peak periods of operation.
- c) Road geometry and structure shall be designed to suit the characteristics of the vehicles operating and in compliance with relevant requirements of GOM highway design standards where appropriate. Clearances to roads from operational airside areas shall be in accordance with the minimum requirements of MCARs.
- d) Pavements shall be a flexible construction and shall be designed to GOM Highway Design Standards where these exist, otherwise to recognized international standards. Flexible pavements shall be designed to have a 15 year design life.
- e) Airside and Land side roads shall be suitably marked and signed be in accordance with the recommendations of MCAA, ICAO, Transport Authority of Maldives to ensure that priority of turn and direction is clearly shown.

3.1.7 The basic parameters for facility planning.

The annual demand for Baa Dharavandhoo Airport is calculated based on traffic records for the last 4 Years and are tabulated in the table below:

Type of Aircraft	Year	Arrivals	Departures
Dash 8 - 300	2016	1807	1807
Dash 8 - 200		1485	1485
ATR72 - 500		3910	3910
Dash 8 - 300	2017	2213	2213
Dash 8 - 200		563	563
ATR72 - 500		1006	1006
ATR42 - 500		409	409
C 208		7	7
Dash 8 - 300	2018	2514	2514
Dash 8 - 200		352	352
ATR72 - 500		766	766
ATR42 - 500		900	900
Dash 8 - 300	2019	2758	2758
Dash 8 - 200		320	320
ATR72 - 500		1396	1396
ATR42 - 500		737	737

3.2 Basic Aerodrome physical requirement

The Scope of the Airport is based on the requirements outlined below:

Runway Length:	1200 meter
Runway Width:	30 m
Strip Length:	60 m from each end of runway
Strip Width:	75 m from each side of runway centreline (at land) Support facilities shall be beyond 70 m from centre line and transitional surface.
Taxiway Length:	60
Taxiway Width:	15 m
Apron Length:	150 m or as agreed
Apron Width:	45 m
Runway End Safety Area (RESA) Length:	90 m
Runway End Safety Area (RESA) Width:	60 m
Transverse gradient:	1.5% for Runway & Taxiway. 0.75% for Apron
Transitional surface:	1:5 slope
Approach slope:	3.33%
Divergence angle:	15%
Take off climb slope:	4%
Pavement Classification (PCN)	15
Designation No:	15/33
Aerodrome Reference Code	2C

3.3 Design Concept

Airport concepts shall be developed to establish the primary services and facilities required including the provisions for improvement and modification for the future as regulated in ICAO and Maldives Civil Aviation Authority.

3.4 Pavement Structure

Design Concept of pavement structure is assumed based on the visual observation to estimate the project cost. Final Aerodrome pavement design calculations, Soil investigation data, detail drawings shall be submitted for approval after the completion of site investigations and engineering study is the responsibility of the Contractor. It is also the responsibility of Contractor to check the pavement details proposed for sub grade, sub base, base and wearing course for the conformity of the layer thickness stated under item – 3.4 and 3.5.

a) Embankment

- ❖ This Item shall consist of the construction of embankment layers in accordance with the Specification and in conformity with the lines, grades and dimensions shown on the approved plans or as finalised by the Design Consultant.

- ❖ Material for embankment layers shall consist crushed stone, crushed slag, or crushed or natural gravel and filler of natural or crushed sand, dredged or other finely divided mineral matter.
- ❖ The composite material shall be free from vegetable matter and lumps or balls of clay, and shall be of such nature that it can be compacted readily to form a firm, stable sub base.
- ❖ It is also the responsibility of the Contractor and verify the conformity of the material at site and sourcing the material for any additional requirement to complete the job. No additional payment shall be claimed for such quantity requirement.

b) Sub base Course

- ❖ This item shall consist of furnishing, placing and compacting local material sub base course on a prepared subgrade in accordance with the Specification and the lines, grades and cross-sections shown on the approved plans, or as directed by the Design Consultant.
- ❖ The material used in preparation shall be dredged or from the existing stock at site and shall be approved by the Employer/Consultant material in placed.
- ❖ Material for sub base shall consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed or natural gravel and filler of natural or crushed sand, dredged or other finely divided mineral matter.
- ❖ The composite material shall be free from vegetable matter and lumps or balls of clay, and shall be of such nature that it can be compacted readily to form a firm, stable sub base.
- ❖ It is also the responsibility of the Contractor and verify the conformity of the material at site and sourcing the material for any additional requirement to complete the job. No additional payment shall be claimed for such quantity requirement.

c) Crushed Aggregate Base Course

- ❖ This Item shall consist of furnishing, placing and compacting crushed gravel, crushed stone or crushed rock on a prepared subgrade/sub base in one or more layers in accordance with this Specification and lines, grades, thickness and typical cross-sections shown on the approved plans, or as directed by the Design Consultant.
- ❖ Material shall consist of hard, durable particles or fragments of stone or gravel crushed to the size and of the single requirements of this Item. It shall be clean and free from vegetable matters, lumps or balls of clay and other deleterious substances. The material shall be of such nature that it can be compacted readily to form a firm, stable base.
- ❖

- ❖ The base material shall conform to the grading requirements under BS 812, AASTHO-147, ASTM or Equivalent Standard acceptable to the Employer/Consultant.

d) Asphalt Wearing Course

- ❖ This Item shall consist of Mixing, transporting, furnishing, placing and compacting the asphalt concrete material on a prepared base in one or more layers in accordance with the Specification and lines, grades, thickness and typical cross-sections shown on the approved plans, or as directed by the Design Consultant.
- ❖ The whole of the bituminous surfacing works shall be carried out by an experienced specialist work force / firm / sub-contractor organized by Contractor. The Contractor shall have satisfied the Employer/Consultant at the time of tendering that the type of plant(s) proposed for use has the necessary capacity and that the delivery facilities are adequate for the smooth progress of the Works. Details of work experience records, including plant specification shall submit to the Employer/Consultant for approval. Trial sections shall be conducted upon acceptance of approval procedures.

e) Quality Control Tests

- ❖ Design Consultant shall finalize and provide to the contractor minimum quality control tests requirements in the construction specification in accordance with BS, AASTHO, ASTM or Equivalent Standard acceptable to the Employer/Consultant.

3.5 Boundary & Security Fence

Boundary and Security Fence shall be completed as per the boundary and security layout approved by Employer/Consultant and Directorate of Aviation Security Administration (DASA). The regulatory requirement shall meet to the National Civil Aviation Security Programme).

3.6 Cut-fill, grade & compaction

Shoulder for runway, apron and, a graded area to the Strip minimum 40m from center line on each side of the runway shall be provided as per Maldives Civil Aviation Regulations (MCAR) including general levelling of the area beyond 40 meter edge.

3.7 PVC Duct System

- ❖ Approved ducts shall be laid under sub base on Runway, Taxiways and Roads for Runway light and Road lights cabling, Sewerage, Water supply etc. for future as per the requirement of Ministry of National Planning Infrastructure.
- ❖ Ducts for Runway lights shall be laid in 2 locations, 450 meter from 15 end & 33 end.
- ❖ Ducts for roads shall be designated established in connection to the external electrical, sewerage disposal and water supply including all external cabling layout.

3.8 Passenger Jetty

The Contractor can use the concept of jetty layout attached in the document for jetties and shall develop the architectural and detail drawings or Contractor can also propose his own concept within the design brief given below and submit for the approval of Employer/Consultant. The concept attached with this document is only for the use of estimate the cost.

3.9 Airfield Lighting System & Navigational Aids

a) Airfield Lighting System

Airfield Lighting System shall comply with the ICAO International standards and recommended practices for Aerodromes given in Annex 14, Volume 1 for Aerodrome Design and Operations. Reference should also be made to Aerodrome Design Manual Part 4 – visual aids and Part 5 – Electrical Systems. The components specifically stated should comply with FAA requirements.

The detailed design and preparation of shop drawings is the sole responsibility of the Contractor.

This specification and description is intended only to set out the minimum requirements and it is expressly understood and agreed by the Contractor that anything which is usually furnished as a part of such installation which is necessary for its proper completion, execution and function shall be furnished as a part of this specification without additional costs and extension of time whether or not shown in details on the drawings or described in particular hereinafter.

The technical documentation shall include all layouts, calculations, shop drawings, material/equipment submittals, as built drawings etc. as necessary for complete installation in light of the tender documents and FAA/ICAO recommendations.

The monitoring and control system shall be complete and fully functional. The system shall be designed to achieve faultless operations, converting operating system into visual displays, easy adaption to suit subsequent modifications and controlling the airfield lighting with status display and command input facilities and apron lighting from Control Tower.

The Constant Current Regulators CCR's are intended to be installed in the CCR Room provided at the Fire Station Building while the control and monitoring desk is to be installed in the Control Tower.

Aerodrome Identification Sign

A sign board to show the name of the Aerodrome, visible at night. Font, Colour and size etc. shall be approved.

- ❖ Typical Lamp power rating: 2 x 40W fluorescent tube lights
- ❖ Power supply: 220V

Information Signs

Taxiway designation sign board must visible from both sides and shall be illuminated and fixed at the entrance of each Taxiway. These lights could be controlled automatically by connecting a light dependent switch to the circuit and hence might minimize the need for remote control cabling.

- ❖ Typical Lamp power rating: 2 x 20W fluorescent tube lights
- ❖ Power supply: 220V

Illuminated Wind Direction Indicator

Wind direction Indicator shall be illuminated so as to be visible for the approaching pilot at night. An obstruction light shall also be fixed on top of the mast, if it is considered as an obstacle. This illumination could be controlled automatically by connecting a light dependent switch to the circuit and hence might minimize the need for remote control cabling.

- ❖ Lamp Power rating: 100W
- ❖ Obstruction lamp rating: 60W
- ❖ Input Power supply: 220V

Obstruction Light

After an obstacle survey on the aerodrome, all objects considered as Obstacles shall be properly marked and fixed with obstruction lights for use at night. These lights could be controlled automatically by connecting a light dependent switch to the circuit and hence might minimize the need for remote control cabling.

- ❖ Typical Low Intensity Obstruction lamp power rating: 60W
- ❖ Input Power supply: 220V

Signaling Lamp

Used as an alternative device for communication between the aircraft and the Air Traffic Controller. This is located at the Tower cab.

- ❖ Lamp Power rating: 100W / 24V
- ❖ Input Power supply: 220V

Runway edge lights

- ❖ Lamp Power rating: 45W
- ❖ To be placed along the full length of the runway, in two parallel rows equidistant from the runway center line.
- ❖ To be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 meters.
- ❖ To be uniformly spaced in rows at intervals of not more than 60 meters.
- ❖ Lights on opposite sides of the runway axis shall be on lines at right angles to that axis shall be fixed lights showing variables white.

Runway End Lights

- ❖ Located at both runway ends of the runway
- ❖ Lamp Power rating: 150W

Taxiway edge lights (including both turning pads)

- ❖ Should be spaced at intervals of not more than 60 meters.
- ❖ Lights on curves should be spaced at intervals less than 60 meters, so that a clear indication of the curve is provided.
- ❖ Retro-reflective blue markers (reflector) is also an economical option can be used instead of Lights.

APAPI

- ❖ The APAPI System shall consist of 2 lights unit for each threshold. Each box shall contain two light beams in order to provide the pilot with the necessary information to execute the approach procedure with the maximum precision and safety.
- ❖ The APAPI unit shall be as compact as possible to limit the resistance to the engine jet blast. The unit shall be fully protected against corrosion. The unit shall be completely dust proof and closed, drain holes shall be provided to remove condensation water.
- ❖ The units shall be fixed to concrete slab through breakable coupling/legs and mounting flanges/base.

Series Loop Circuits

Runway Edge Lights and Runway End Lights can be connected together. This circuit is connected in a series loop and supplied through a Constant Current Regulator (CCR). An isolating transformer has to be connected at each lamp to ensure circuit continuity in the case of a lamp failure.

These Lights require to be connected in two series circuits. Alternate series of lamps connected to one circuit and the remaining lamps to the second circuit. 03 CCR are required in total.

System rating

- ❖ Runway Edge Lamp Power rating: $2 \times 19 \times 45W$
- ❖ Runway End Lights: $2 \times 6 \times 150W$
- ❖ Secondary current: 6.6A

Apron Flood Lighting

Apron flood lighting has to be fixed on masts so as to minimize shadows and glare to the pilot. 04 Apron flood Lights shall be fixed on two masts of height 12m, 02 lights on each mast aligned

for best illumination. High Pressure sodium lamps are preferred. Each light unit consists of two lamps. Mast should be painted with red and white.

An obstruction light shall also be fixed on top of the mast, if it is considered as an obstacle.

- ❖ Lamp Power rating: 4 x 2 x 400W
- ❖ Obstruction lamp rating: 60W
- ❖ Input Power supply: 220V connected to mains supply through a lamp Switching-gear box

Remote Switching and Monitoring

Switching and monitoring console shall be fixed at the Tower cab. At a controlled Aerodrome, the Air Traffic Controller shall be able to control the Aerodrome lighting and shall be able to monitor their serviceability.

Control and monitoring devices shall be fixed at the console for the following circuits

- ❖ Aerodrome Beacon (2 headed)
- ❖ APAPI (Abbreviated Precision Approach Path Indicator)
- ❖ Series loop Circuits – both circuits shall be switched together
- ❖ Apron Flood lighting – all floods could be switched together
- ❖ Sign Boards - all signs could be switched together
- ❖ Windsock (obstruction lights)

Alternate Control Panel

This is required as an alternative to switch the lighting in case the Tower console fails, this is situated at the CCR Vault and could be used as a maintenance technicians' requirement. All the circuits shall be controllable from here when control transfer switch is on at the Tower console.

Emergency Lighting Units

These are self-powered portable units to be sited at each Runway Light fixing in case of a power failure. Emergency lighting units shall be provided if an Aerodrome is not supplied with a Standby power system. The maximum power failure time for non-instrument Runway is 2 minutes. If the power persists to be longer, then Emergency Lighting Units shall be employed.

Cabling and Cable Trench

The Contractor shall provide the following minimum guarantee for each cable that the cable has been supplied and shall perform in accordance with the manufacture's specification and that any defect in material or workmanship that may occur during proper and normal use during a period of 1 year from the date of installation or a maximum of 2 years from date of shipment will be corrected or replaced by the Contractor.

Minimum size of the cable trench shall 300 mm wide and 600 mm deep. Cable route must be straight and the cable route layout shall be approved before trench excavation is done. After completion of the laying the cable the trench should be filled with suitable and acceptable sand including light compaction to the satisfaction of the Employer / Consultant.

Testing – General

Upon completion of the installation, the contractor shall perform field tests on all equipments, cables, materials and systems. All tests shall be conducted in the presence of the Employer/Consultant's Engineer for the purpose of demonstrating equipment or system compliance with the Specifications. The Contractor shall submit for Engineers approval complete details of tests to be performed describing the procedures, test observations and expected results.

All tests shall be made with proper regard for the protection of the personnel and equipment and the contractor shall be responsible for adequate protection of all personnel and equipments during such tests. The costs of any damages or rectifications works due to any accident during the testing shall be the sole responsibility of the contractor. Copies of all test data and results certified by the Engineer shall be given to the Employer/Consultant for record purpose.

The witnessing of any tests does not relieve the contractor of his guarantees for materials, equipment's and workmanship or as any other obligations of the contract.

Earth Resistance Tests

Earth resistance tests shall be made by the contractor on the airfield earthing system, separating and reconnecting earth connection.

The complete lightning protection system shall be tested for continuity and earth resistance. The combined earth resistance at any point in the lightning protection system shall not exceed 10 ohms.

Other related Works

All the bases of the lights including APAPI, Wind cone and Apron flood lights shall be design for Mass, RC Concrete and shall be laid as per the approved design drawing and in accordance with Manufacture/Suppliers instruction.

b) Alternative option

Contractor can also submit Solar Powered Runway Lighting System as an alternative option. Quantity shall be adjusted as per the requirement accordingly by the Contractor.

Item	Items Required
1	Genset powered Aerodrome Identification Signage (for airside & land side)
2	Genset powered Aerodrome Beacon (2 headed)
3	Solar Powered APAPI (Abbreviated Precision Approach Path Indicator)
4	Solar Powered Runway edge elevated lights
5	Solar Powered Runway edge inset lights (Wherever applicable)
6	Solar Powered Wingbar lights (threshold) (Wherever applicable)
7	Solar Powered Runway end lights
8	Taxiway Edge Lights (Retro-Reflective Reflectors) c/w adaptor
9	Turning Edge Lights (Retro-Reflective Reflectors) c/w adaptor
10	Apron Edge Lights (Retro-Reflective Reflectors) c/w adaptor
11	Genset powered Apron Flood Lights with Mast (with obstruction light)
12	Solar Powered Taxiway Board – A & B
13	Solar Powered Illuminated Wind Direction Indicator (with obstruction light)
14	Solar Powered Obstruction Light
15	Solar Powered Remote Switching and Monitoring System
16	CCR (Constant Current Regulator) - not required

Minimum requirement for the Powered Runway Lighting System**❖ General**

Solar-powered lights can be equipped with LED lights of lifespan not less than 100,000 hrs. All elevated solar-powered lights shall be mounted using base plate and frangible mounting. Base plate and fixing bolts shall be made of marine-grade stainless steel. Regular stainless steel shall not be accepted. Solar-powered airfield lights (fully assembled) shall be tested against jet blast and wind load of minimum speed of 240 kph. Compliance shall be confirmed by test report issued by third party laboratory or institute. Casing of the light material shall be Lexan Polycarbonate (lights that are made using steel or aluminium shall not be accepted). Dome material shall be Glass (polycarbonate shall not be accepted because of probability of quick degradation because of UV resistance and sand erosion)

Maximum height of the light, not including antenna shall be 300 mm. The light should be equipped with waterproof pressure stabilizing valve. Body of the light shall have Ingress Protection rating of IP67. Verification report should be presented upon request. Ingress protection rating shall be certified by third party accredited laboratory. The optical LED head shall be replaceable. The manufacturer shall offer complete optics replacement kits including required tools to perform the replacement.

All the lights shall be wirelessly controlled. The wireless communication system shall be comprised of two key elements; a wireless transceiver in a control & monitoring unit and a

wireless transceiver within each light. Wireless communication should be build based on mesh-protocol (point-to-multipoint radio protocol shall not be accepted)
Failure of any element of the Lighting system (including Lighting unit or control & monitoring unit) shall NOT disrupt wireless communication between the rest of the system. Failure of control unit (normally installed in tower / visual control room) shall not disrupt wireless communication between the rest of the system. In case of failure of control unit – user shall be able to activate entire lighting system at once by pressing emergency on/off button located on any chosen unit.

The light's antenna shall be detachable / replaceable. The light should be equipped with external antenna to maximize radio range. There shall be no limit to the number of lights the controller can communicate with provided they are within the required radio range.
The wireless system shall communicate using non-licensed 868 MHz radio frequency with power output of no more than 20 mW. Frequency band should require no special separate approval or be designated for other types of communication (like GSM carriers: 900 / 1800 Mhz). The system shall be capable of normal operation in the presence of RF noise typical for an airfield environment

Solar-powered system shall not required installation of Constant Current Regulator. Each light shall be powered with individual battery bank. Each solar light shall be equipped with two batteries, each battery shall have minimum power capacity of 108 Watt/h. Minimum capacity of two batteries shall be not less than 216 Watt/h. Failure of one of two batteries shall not stop light form operating – hence the light should be able to operate (on / off) only on one battery. The batteries shall be valve-regulated lead-acid (VRLA). The batteries shall be replaceable. Manufacturers offering lights energized by self-designed battery-packs shall offer standard and available worldwide battery. Light unit shall be equipped with built-in battery status indicator. The battery operating temperature range published by the manufacturer shall be at least from -20 to +50 °C. The light autonomy should meet or exceed below specification:

Runway edge light: 180 hrs, Runway threshold (end) light: 280 hrs

The lighting unit shall use solar panel installed separately from light unit body. Entire solar panel shall face one geographical direction for optimal energy collection. Solar panel shall be mounted at 33 degrees tilt. Entire solar panel shall have minimum nominal power output of 20 watts. Solar panel mounting shall allow for exchanging entire solar panel in case of breakage. Solar panel shall be of standard type available for procurement in local stores. The light shall be capable of drawing power from its internal lead-acid battery. The battery shall be capable to be charged by four alternative methods: via solar panel, via electrical cable (24VDC), via back-up charging station.

❖ Wind cone

Wind cone shall be powered using solar engine (combination of solar panel and battery bank). Illumination of wind cone shall consist of minimum internal illumination of the cone and also obstruction light on top of the wind cone mast. Illumination shall be activated wirelessly using radio control. (activation method using only so called twilight sensor shall not be accepted)

❖ A-PAPI

A-PAPI shall be powered using solar engine (combination of solar panel and battery bank).
A-PAPI shall be activated wirelessly using radio control (activation method using only so called twilight sensor shall not be accepted)

❖ Runway edge light

Comply with ICAO, Annex 14, Vol 1, 7th Edition. Runway Edge Light: clause 5.3.9.9 and Appendix 1, Figure A1-1b. Compliance of the lights with above mentioned regulations shall be confirmed by verification report issued by third party accredited laboratory (Intertek, Bureau Veritas). Runway edge light shall have bi-Directional WHITE / WHITE (CLEAR) or White / Yellow combined with Omni-directional WHITE optics. Light output of white light in the main beam shall at least 1100cd.

For bi-directional optics:

Beam Coverage of each direction Horizontal: 0-12 degrees, Beam Coverage of each direction Vertical: ± 10 degrees

Omni-directional optics shall provide min 50 cd of light output in all angles of azimuth and up to 15 deg above horizontal to enable circling guidance

❖ Runway end light

Comply with ICAO, Annex 14, Vol 1, 7th Edition. Threshold Light: clause 5.3.10.9 and Appendix 1, Figure A1-1b, End Light: clause 5.3.11.4 and Appendix 1, Figure A1-1b.

Compliance of the lights with above mentioned regulations shall be confirmed by verification report issued by third party accredited laboratory (Intertek, Bureau Veritas)

Runway end-threshold light shall have Bi-Directional GREEN / RED optics.

Beam Coverage of each direction Horizontal: 0-12 degrees, Beam Coverage of each direction Vertical: ± 10 degrees

Light output for GREEN (side) in the main beam at least 450cd

Light output for RED (side) in the main beam at least 320 cd

❖ Information signs

Internally illuminated guidance signs shall be powered using solar engine (combination of solar panel and battery bank). Guidance sign illumination shall be activated wirelessly using radio control (activation method using only so called twilight sensor shall not be accepted)

Solar-powered airfield lighting shall be equipped with computer-based Airfield Lighting Control & Monitoring system (ALCMS) that allows for individual monitoring of lighting units. ALCMS shall inform ATC personnel about such parameters of every light as: battery level, solar charging speed, remote control status over the light. ALCMS shall enable control of the lighting system and grouping them. Intensity control shall allow for minimum 3-step intensity.

3.10 Navigational & Met Equipment.

Contractor shall submit all necessary documentations, such as product specifications, brochures, catalogues etc. for the approval to the Employer/Consultant before purchase and installation. Preference shall be given to offer latest brands. These items shall be supplied and installed with all accessories required for the operation.

❖ VHF Main

- ❖ VHF Standby
- ❖ VHF Emergency Frequency 121.5
- ❖ PABX System
- ❖ UPS
- ❖ Motorola Handset
- ❖ Motorola Repeater Station
- ❖ Digital Clock with Temperature gauge
- ❖ Binocular (day / night)
- ❖ Barometer
- ❖ Anemometer and wind direction indicator - Visala Wind system
- ❖ Provision of Crash Alarm System
- ❖ Signaling Lamp

3.11 Operation & Maintenance Services

Contractor shall submit all necessary documentations, such as product specifications, brochures, catalogues etc. for the approval to the Employer/Consultant before purchase and installation.

- ❖ Security Equipment. The regulatory requirement and product specifications shall meet to the regulatory requirement of National Civil Aviation Security Programme
- ❖ Fire and rescue services equipment shall meet Category 5. System shall include all firefighting equipment such as mobile fire extinguishers (trolley or wheel type), portable fire extinguishers, breathing apparatus, Portable fire and rescue pumps & fire hose, Gas blowers, Medical first aid kit, with all accessories and shall approved the product specifications and related arrangement layout from Ministry of Defense.
- ❖ Fuel services facilities. System design shall be approved by Ministry of Defense.
- ❖ Ground handling & Maintenance equipment

3.12 Aerodrome Certification Documentation

Contractor shall submit all necessary documentations to Maldives Civil Aviation Authority for final approval upon the request of Employer/Consultant.

- ❖ Safety Management System (including SMS for ATS and Aerodrome
- ❖ Aerodrome Manual as ASC – OPS 25
- ❖ Standard Operating Procedures / Hand books/ Manuals for the following areas of work:
 - ❖ Rescue and Fire Fighting
 - ❖ Pavement Surface Condition Inspection and Maintenance

- ❖ Bird Control Reduction
- ❖ Removal of disabled aircraft
- ❖ Control of Obstacles
- ❖ Airport Emergency Planning Manual
- ❖ Airport Emergency Planning Manual
- ❖ Airport Operational Services (Unit Operation Instructions)
- ❖ Airport Management Services
- ❖ Air Traffic Services

3.13 Staff Training

The contractor shall provide training to the staff assigned by the Employer/Consultant during project implementation stage for the following: -

a) Technical Staff Training

- ❖ 1 staff for repair and maintenance of runway,
- ❖ 1 staff for building maintenance related installations
- ❖ 1 staff for electrical & air-conditioning installations
- ❖ 1 staff for water supply & sewerage installations

3.14 Basic Requirements for Airport Support Facilities

The design lifespan shall meet the following requirements:

- ❖ Construction elements – 25 years
- ❖ Facade and roof – 15 years
- ❖ Building finish – 15 years
- ❖ Design features – 15 years
- ❖ Furnishing – 7 to 10 years
- ❖ Information and telecommunication systems - 7 years
- ❖ Aviation technologies – 7 to 15 years.

a) **Passenger terminal** – Approximately 1200 sqm

Principal terminal functions shall include at minimum:

- ❖ Check -in hall shall be completed with Check-In Counter systems (minimum 2 counters with chair and 2 weighing scale), seats, tables, cabinets, air conditioning, telephone, information technology system and public addressing system, etc. as required. Baggage check-in conveyor belt system at check-in area shall be fitted with all necessary requirements to complete the job.
- ❖ Departure lounge shall be completed with minimum 2 counters with chair, 100

seats, tables, cabinets air conditioning, telephone, information technology system, public addressing system and TV etc. as required.

- ❖ Toilet facilities with all necessary fittings.
- ❖ Refreshment corner shall complete with service counter and other relevant facilities as required.
- ❖ Arrival hall shall be completed with public address system, seats, baggage clearing bench etc. as required and toilet facilities with all necessary fittings. Baggage conveyor belt system shall be fitted with all necessary requirements to complete the job.
- ❖ First Aid services shall be completed with toilet facilities and furniture, wheel chair, stretcher, patient bed, IV stand etc. as required.
- ❖ Airline and Airport offices shall be completed with furniture and fittings, air conditioning, telephone, information technology system, etc. as required.
- ❖ Prayer rooms segregated for women and men.
- ❖ Baggage loading / unloading area.
- ❖ Left luggage room.
- ❖ Operations Offices.
- ❖ Security Office.
- ❖ Cafe / restaurant shall be shall be completed with furniture and fittings, telephone, information technology system, TV etc. as required.
- ❖ Toilet facilities for public use.
- ❖ Public flight information display system with screens and flat panel boards.
- ❖ Internal and external sign boards (including security signboards).
- ❖ The area 1200 sqm stated under 3.3.1 (a) is based on ATR 72-600. Depending on the Design aircraft the arrival hall capacity shall be considered for the adjustment of the space of the Check -in area, Arrival and Departure hall.

b) Control Tower – Approximately 25 sqm ATC

Principal functions shall include at minimum:

- ❖ Control tower building design shall include Air traffic control room, CCR room & toilet facility for the staffs separately close to building.
- ❖ The building shall be completed with electrical, sanitary fittings and furniture, air conditioning to the ATC room telephone, information technology system, and

navigational aids and MET equipment etc. as required.

c) Fire Station with Fire Staff Accommodation Approximately 380 sqm

Principal functions shall include at minimum:

- ❖ Fire station building design shall include watch room, office breathing apparatus room & resting areas and toilet facilities as required. The building shall be completed with electrical, sanitary fittings and furniture, telephone, information technology system etc. as required.
- ❖ Specific office space with necessary furniture and equipment for the need of Emergency Operation Centre (EOC)
- ❖ 4 rooms with attached toilet facilities and sitting area as required. The building shall be completed with electrical, sanitary fittings and furniture and all services as required.

d) Staff Accommodation – Approximately 300 sqm

Principal functions shall include at minimum:

- ❖ Building design concept shall develop within the area given above.
- ❖ 2 staff rooms for general staff and 4 rooms with attached toilet facilities and for general staff toilet arrangements shall be made with minimum 4 water closet with Basin and shower.
- ❖ Management staff sitting area as required shall be provided. The building shall be completed with electrical, sanitary fittings and furniture and all services as required.

e) Restaurant Facilities – Approximately 224 sqm

Principal functions shall include at minimum:

- ❖ Building design shall include seating area, kitchen area, store, toilet facilities as required.
- ❖ Cabling for telephones and information technology system (extension) as required.
- ❖ All other requirements such as furniture, fittings, telephones and computers etc. shall be provided by service providers.

f) Power House with RO Plant Facilities – Approximately 200 sqm

Principal functions shall include at minimum:

- ❖ Building design shall include generator room, control room, store and space for RO plant & water storage system as required.

- ❖ Generator, Panel Board, Distribution box Foundations and Cable trenches with trench cover as required shall include the scope.
- ❖ The building shall be completed with furniture and fittings, telephone, information technology system, adequate power system to support the airport, etc. as required.

g) Security Check Post – Approximately 5.76 sqm

Principal functions shall include at minimum:

- ❖ Building design shall complete with furniture and fittings etc. as required.
- ❖ Portable check post is also acceptable based on the cost, durability and suitable to the environment.

h) Supply & Installation of Power Generation & Electrical Distribution System

Principal terminal functions include at minimum:

- ❖ General Power for all buildings street lights including Runway & Apron lighting system & Standby system for Runway & Apron lighting system and including internal and External cables as required and all necessary items to complete the system.
- ❖ Price shall be worked out for Generator Set, 100 KW/ 125 KVA, Engine, Model: 6CTA8.3 G-2 & Standby system 50 kW/62.5 KVA, Open Generators Set with Cummins Engine, Model: 6CTA8.3 -G2 (Any other generator system equivalent to the specification is also acceptable.) including, Panel Boards, Distribution Boxes, feeder circuits, internal and External power distribution cables for building and as required all necessary items to complete the system.
- ❖ Remote control panels, including synchronizing panel should be built to comply with ISO standard.

i) External Sewerage & Water Supply Distribution System

Principal terminal functions include at minimum:

- ❖ Water supply and Sewerage system shall be developed to the options proposed in the EIA Report.
- ❖ Source of water for desalination shall be bored from the ground or water harvested from the roofs or from sea. Preference will be given to economical, durable and low maintenance option.
- ❖ External water supply distribution pipe work, valves, feeder tanks, booster pumps

1 Duty + 1 Standby RO plant, brine outfall line, storage tanks with all associated works to complete the system.

- ❖ External sewage disposal pipe work, vent pipes, pump stations with control panel, maintenance shafts, sea outfall line with ballast blocks all associated works to complete the system. Preference will be given to economical, durable and low maintenance option.

j) Lightning Protection System

- ❖ Lightning Protection system shall be design and installed upon approval of drawings and specifications as required from Ministry of National Planning& Infrastructure.

k) Fire Pond with Pump Shed

- ❖ Fire Pond size = 9.4m x 8.4m (outer dimension of the protection wall), 8.2m x 7.2m (inner dimension of the protection wall), Depth to the bottom of protection wall = 3m.
- ❖ Pump Shed shall be RCC Structure with masonry infill size = 1.8m x 1.8m with RCC roof slab height = 1.35m from NGL.

l) Runway End Safety Area (RESA)

- ❖ RESA at 15 and 33 including graded areas of both sides.
- ❖ RESA shall be levelled and graded to the specification and the drawing approved by Employer/Consultant.
- ❖ Safety zone on both sides shall be compacted with suitable soil organised from the land or dredged soil to the specification or to the satisfaction of Employer/Consultant.

m) Landscaping and Street Lighting

- ❖ Street light posts shall be galvanized PV LED lights and spacing shall not be more than 30 meters. Street Lighting System shall include the civil works and must be approved by the Employer/Consultant.
- ❖ Landscaping works including road edge kerbs, paver blocks on foot paths, grass seeding and planting trees as directed by the Employer/Consultant.

4. General Minimum Construction Specification

4.1 Assumed Elevation

1.80 m (Runway midpoint) from M.S.L. (Elevation shall be finalized after the site investigation)

4.2 Runway, Apron and Taxiways

4.4.1 Sub grade / Embankment layers

- ❖ Compacted sub grade
- ❖ CBR value shall be not less than 20%
- ❖ Embankment layers thickness should not be exceeding 200 mm

4.4.2 Sub base

- ❖ 300mm thick compacted sub base material
- ❖ CBR value shall be not less than 40%
- ❖ Layers thickness should not be exceeding 150 mm

4.4.3 Base Course

- ❖ 100mm thick crushed coral or aggregate compacted (ABC)
- ❖ CBR value shall be not less than 80%

4.4.4 Wearing Course

- ❖ 75mm thick Hot mix Asphalt Surface

4.5 Service Roads

4.5.1 Sub grade

- ❖ Compacted sub grade
- ❖ CBR value shall be not less than 20%

4.5.2 Sub base / Base

- ❖ 250mm thick compacted sub base material
- ❖ CBR value shall be not less than 40%

4.5.3 Wearing Course

- ❖ 50 mm thick compacted sub base material

4.5 Shoulder

4.5.4 Runway, Taxiways, Apron & Roads

- ❖ Compacted dredged material as shown in cross section.
- ❖ CBR value shall be not less than 40%

4.6 Boundary & Security Fence

a) Type Material used in proposed design:

Note: Any other material like Aluminum, etc is also acceptable if the cost is economical and material is durable.

- ❖ RC concrete footing,
- ❖ G.I pipes (50 mm dia.) for vertical posts & Arm with required paint finish.
- ❖ G.I pipes (30mm dia) horizontally with required paint finish.
- ❖ Chain link – galvanized & PVC coated green color.
- ❖ Stretch Wire- galvanized & PVC coated green.
- ❖ Barbed Wire- 2.5mm, Barbed length :20mm Double strand, 4 points barbs at every 75mm - galvanized & PVC coated green.
- ❖ Tie Wire 1.5mm flexible galvanized & PVC coated green.

Fence at beach

- ❖ RC concrete footing / PVC pipes (100 mm dia.) for vertical posts filled with concrete.
- ❖ PVC pipes (50 mm dia.) Arm
- ❖ PVC pipes (50 mm dia.) horizontally
- ❖ Chain link – galvanized & PVC coated green color.
- ❖ Stretch Wire- galvanized & PVC coated green.
- ❖ Barbed Wire- 2.5mm, Barbed length :20mm Double strand, 4 points barbs at every 75mm - galvanized & PVC coated green.
- ❖ Tie Wire 1.5mm flexible galvanized & PVC coated green.

Security Gate

Note: Any other material like Aluminum, etc is also acceptable if the cost is economical and material is durable.

- ❖ RC concrete footing & column
- ❖ G.I pipe 38mm vertical pipes and horizontal pipes shall be used outer edge
- ❖ G.I pipe 25 or 20mm vertical pipes and horizontal pipes shall be used.
- ❖ Shall finish with approved paint.

4.7 Cut-fill, grade & compaction

Shoulder 3 meter wide as per design slope shall be filled, shaped compacted to the desired density. 22 meter from edge of the shoulder shall be graded and compacted as per

the cross section of the strip. General grading shall be done to the edge of strip as per the approved drawing.

4.8 PVC Duct System

- ❖ 100 dia. X 09mm PVC ducts laid under sub base for Runway light cabling for future.
- ❖ PVC ducts laid under sub base for Road light cabling, Sewerage, Water supply etc. as required for future.

4.9 Passenger Jetty

Passenger Jetty shall be reinforced concrete footing and piers protected with HDPVC pipe columns and RCC Tie beams connected and Timber finish on top and side protections as required. Proposed Jetty length = Approx. 35 meters. Contractor is responsible to confirm the final jetty length based on site conditions.

4.10 Airfield Lighting System & Navigational Aids

a) Airfield Lighting System

Supply and install the following items

Item no	Items Required	Qty
1	Aerodrome Identification Signage (for airside & land side)	02
2	Aerodrome Beacon (2 headed)	01
3	APAPI (Abbreviated Precision Approach Path Indicator)	02
4	Runway edge lights	38
5	Runway end lights	12
6	Taxiway Edge Lights (Retro-Reflective Reflectors) c/w adaptor	22
7	Turning Edge Lights (Retro-Reflective Reflectors) c/w adaptor	12
8	Apron Edge Lights (Retro-Reflective Reflectors) c/w adaptor	14
9	Apron Flood Lights with Mast (with obstruction light)	02
10	Taxiway Board – A & B	02
11	Illuminated Wind Direction Indicator (with powered obstruction)	01
12	Obstruction Light	01
13	Remote Switching and Monitoring System	01
14	CCR (Constant Current Regulator)	01

Quantity to meet MCAA & ICAO requirement shall be checked and verified by the Contractor. No additional cost can claim to the Employer/Consultant.

b) Navigation Aids and MET Equipment

Supply and install the following items

- ❖ VHF Main 01 No
- ❖ VHF Standby 01 No

❖ VHF Emergency Frequency 121.5	01 No
❖ PABX System (KX-TES824) suitable for Airport	01 Nos
❖ UPS - Eaton 9PX (6KVA) / equivalent	03 Nos
❖ Motorola Handset XiR P8600 / equivalent	06 Nos
❖ Repeater Station XiR P8200 / equivalent	01 No
❖ Digital Clock with Temperature gauge	01 No
❖ Binocular (day / night) BionX HD / equivalent	01 No
❖ Barometer	01 No
❖ Anemometer and wind direction indicator -	
❖ Visala Wind system / equivalent	01 No
❖ Provision of Crash Alarm System	item
❖ Signaling Lamp	01 No

4.11 Operation & Maintenance

a) Security equipment

Supply and install the following items

❖ Walk Through Detectors	02 nos
❖ Hand Held Metal Detectors	03 nos.
❖ X-ray machine (checked baggage)	01 no.
❖ X-ray machine (hold baggage)	01 no.
❖ CCTV System (shall cover the all security requirements of National Civil Aviation Security Programme & minimum 2 Screen 37")	item

b) Fire Services:

Supply and install the following items

❖ Fire category – 5	
○ Water Tank Capacity	6,000 L
○ Foam liquid tank capacity	600 L
○ Monitor discharge rate	3,200 L/min at
○ Dry powder system capacity	high 185-235 kg
○ Firefighting equipment with all accessories and fire extinguishers specified.	

c) Fuel services

Refueling system shall include platform with storage tank, filters, pumps with storage capacity of 6,500 Litre including dispensing hose laid to apron.

Ground handling & Maintenance equipment

Supply and install the following items

❖ Powered Baggage Cart	02 Nos
❖ Baggage Trolley	85 Nos
❖ Ground Power Unit (GPU)	01 Nos
❖ Terminal Arrival Baggage Belt Conveyor passenger accessible area)	01 Nos (min 10 m
❖ Check-in Belt Conveyor speed: 25m/min (+-2m/min) tolerance	01 Nos (min 10 m
❖ Wheel Chairs	01 Nos
❖ Stretcher	01 Nos
❖ Patient bed	01 Nos
❖ IV stand	01 Nos
❖ Vehicle for runway inspection & maintenance	01 Nos
❖ Rotarlasher with Tractor	01 Nos
❖ Auto Rancher	01 Nos
❖ Signaling Lamp	01 No

4.12 General finishes required

4.12.1 Passenger Terminal Building

- ❖ General Floor minimum area expected: 1200 sqm excluding baggage loading & unloading area.
- ❖ Structural finishes of the buildings
- ❖ Reinforced Concrete structure or Structural Steel frame shall be adopted.
Any alternative building system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation.
- ❖ External & Internal finishes of the building.
External Walls generally shall be with cement plaster on hollow / solid block masonry wall. Walls shall be finish with primer & Nippon paint or equivalent quality paint.

Internal Walls are generally shall be with cement plaster on hollow / solid block / stud partition (gypsum board, glass) masonry wall with paint finish, stud partition (gypsum board with paint finish, Aluminium framed glass partition).

Any wall system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation. The system proposed shall be economical & durable in comparison to the specifications mention in this document.

All External doors / windows / including panels shall be powder coated Aluminium and Hinges, latches, locks shall be approved by the Employer/Consultant before purchase / installation.

All Internal doors / windows shall be powder coated Aluminium, Window Panels shall be powder coated Aluminium. Door Panels for the Offices: Hollow timber & Toilets: shall be PVC. All timber Panels shall be finish with paint or varnish finish. Hinges, latches, locks shall be approved by the Employer/Consultant before purchase / installation.

❖ Roof structure and Roofing works:

Mild steel angles / G.I pipes / G.I Hollow section /Timber

Timber used for construction will be in accordance with the requirements of BS 1186 'Quantity of Timber and Workmanship in Joinery', Part 1, 'Quality of Timber'.

Lysaght roofing sheets (not less than 0.48mm) shall be used for roof cover with Ridge capping, Gutter, Flashings etc. PVC mesh 25x25 with 100 mm one sided aluminium foiled heat insulation or as agreed. Fascia: Timber finish with preservative & enamel paint.

All External ceiling shall be with cement board with timber frame and complete with Nippon paint or equivalent quality paint.

Any alternative roofing & ceiling system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation. The system proposed shall be economical & durable in comparison to the specifications mention in this document.

❖ Internal Ceiling System

Check – In Area, Arrival & Departure shall be finish with Decorative PVC System. X-ray machine room, offices, left luggage room, first aid, security room and all toilets shall be with tongue & grove PVC ceiling system.

❖ Floor finishes of the building.

Internal and external floor finishes: Glazed Ceramic Tile shall comply with British Standard specification No. 1281, Unglazed Ceramic Tile shall comply with British Standard specification No. 1286.

Preferred option:

For Check – In Area, Arrival, Departure = Porcelain 600 x 600 (nonskid)

X-ray machine room, offices, left luggage room, first aid, security room = Porcelain 600 x 600

Toilets and wet areas floor = 300 x 300 (nonskid)
Toilets wall = 300 x 600 height 1200 from floor level.

Steps and Outdoor areas = Outdoor Porcelain tiles

Other areas:

Cement screed floor finish with PVC mesh.

Loading and Unloading area: Concrete floor finish with reinforcement mesh.

❖ Building Services

Building services shall include: Electrical and water supply, Sewerage and drainage system, Air conditioning as required in Departure Lounge, Fire extinguisher as required, Communication, Data and IT network, Public address system.

4.12.2 Staff Accommodation Building, Power House with RO plant Room.

❖ Structural finishes of the buildings

- ❖ Reinforced Concrete structure or Structural Steel frame shall be adopted. **Any alternative building system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation.**

❖ External & Internal finishes of the building.

External Walls generally shall be with cement plaster on hollow / solid block masonry wall. Walls shall be finish with primer & Nippon paint or equivalent quality paint.

Internal Walls are generally shall be with cement plaster on hollow / solid block / stud partition (gypsum board, glass) masonry wall with paint finish, stud partition (gypsum board with paint finish, Aluminium framed glass partition).

Any wall system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation. The system proposed shall be economical & durable in comparison to the specifications mention in this document.

All External doors / windows / including panels shall be powder coated Aluminium and Hinges, latches, locks shall be approved by the Employer/Consultant before purchase / installation.

All Internal doors / windows shall be powder coated Aluminium, Window Panels shall be powder coated Aluminium. Door Panels for the Offices: Hollow timber & Toilets: shall be PVC. All timber Panels shall be finish with paint or varnish finish. Hinges, latches, locks shall be approved by the Employer/Consultant before purchase / installation.

❖ Roof structure and Roofing works:

Mild steel angles / G.I pipes / G.I Hollow section /Timber

Timber used for construction will be in accordance with the requirements of BS 1186 'Quantity of Timber and Workmanship in Joinery', Part 1, 'Quality of Timber'.

Lysaght roofing sheets (not less than 0.48mm) shall be used for roof cover with Ridge capping, Gutter, Flashings etc. PVC mesh 25x25 with 100 mm one sided aluminium foiled heat insulation or as agreed. Fascia: Timber finish with preservative & enamel paint.

All External ceiling shall be with cement board with timber frame and complete with Nippon paint or equivalent quality paint.

Any alternative roofing & ceiling system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation. The system proposed shall be economical & durable in comparison to the specifications mention in this document.

❖ Internal Ceiling System

For Sitting areas, Rooms and Toilets shall be finish with tongue & grove PVC ceiling system.

❖ Floor finishes of the building.

General floor finishes.

Sitting areas, Rooms and Toilets: Cement screed floor finish with PVC mesh.

Internal and external floor finishes:

Internal and external floor finishes: Glazed Ceramic Tile shall comply with British Standard specification No. 1281, Unglazed Ceramic Tile shall comply with British Standard specification No. 1286.

Preferred option:

For Sitting areas, Rooms = Porcelain 600 x 600 (nonskid)

Toilets and wet areas floor = 300 x 300 (nonskid)

Toilets wall = 300 x 600 (nonskid) height 2100 at shower area, other areas 1200 from floor level.

Steps and Outdoor areas = Outdoor nonskid ceramic tiles

❖ Building Services

Building services shall include: Electrical and water supply, Sewerage and drainage system, Air conditioning as required for offices and bed rooms, Fire extinguisher as required, Communication, Data and IT network.

4.13.3 Fire Garage with Fire Accommodation / Pump Shed

❖ Structural finishes of the buildings

- ❖ Reinforced Concrete structure or Structural Steel frame shall be adopted. **Any alternative building system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation.**

- ❖ Roof structure and Roofing works:

Mild steel angles / G.I pipes / G.I Hollow section / Timber

Timber used for construction will be in accordance with the requirements of BS 1186 'Quantity of Timber and Workmanship in Joinery', Part 1, 'Quality of Timber'.

Lysaght roofing sheets (not less than 0.48mm) shall be used for roof cover with Ridge capping, Gutter, Flashings etc. PVC mesh 25x25 with 100 mm one sided aluminium foiled heat insulation or as agreed. Fascia: Timber finish with preservative & enamel paint.

All External ceiling shall be with cement board with timber frame and complete with Nippon paint or equivalent quality paint.

Any alternative roofing & ceiling system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation. The system proposed shall be economical & durable in comparison to the specifications mention in this document.

- ❖ Internal Ceiling System

For Sitting areas, Rooms and Toilets shall be finish with tongue & grove PVC ceiling system.

- ❖ Floor finishes of the building.

General floor finishes.

Sitting areas, Rooms and Toilets: Cement screed floor finish with PVC mesh.

Garage area: Concrete floor finish with reinforcement mesh.

Internal and external floor finishes:

Internal and external floor finishes: Glazed Ceramic Tile shall comply with British Standard specification No. 1281, Unglazed Ceramic Tile shall comply with British Standard specification No. 1286.

Preferred option:

For Offices, Sitting areas, Rooms = Porcelain 600 x 600 (nonskid)

Toilets and wet areas floor = 300 x 300 (nonskid)

Toilets wall = 300 x 600 (nonskid) height 2100 at shower area, other areas 1200 from floor level.

Steps and Outdoor areas = Outdoor nonskid ceramic tiles

- ❖ Building Services

Building services include: Electrical and water supply, Sewerage and drainage system, Air conditioning as required for offices, ATC room and bed rooms, Fire extinguisher as required, Communication, Data and IT network.

- ❖ Fire Pond proposed method of construction of Edge protection wall of the Pond = Cement / sand mix @ 1:6 ratio bags and cement plaster @ 1:4 ratio with PVC mesh reinforcement shall be provided to the side from G.L to the low water level.
- ❖ Pump Shed shall be RCC Structure. Walls shall be masonry with paint finish on walls, and slab soffit and all external surfaces. Cement screed floor with PVC mesh and cement Slurry Finish on floor slab. Doors and windows shall be fabricated with louvre panels and electrical fitting as required.

4.12.4 Security Check Post

- ❖ Structural finishes of the buildings
- ❖ Reinforced Concrete structure or Structural Steel frame shall be adopted.

Any alternative building system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation.

- ❖ Roof structure and Roofing works:
Mild steel angles / G.I pipes / G.I Hollow section / Timber

Timber used for construction will be in accordance with the requirements of BS 1186 'Quantity of Timber and Workmanship in Joinery', Part 1, 'Quality of Timber'.

Lysaght roofing sheets (not less than 0.48mm) shall be used for roof cover with Ridge capping, Gutter, Flashings etc. PVC mesh 25x25 with 100 mm one sided aluminum foiled heat insulation or as agreed. Fascia: Timber finish with preservative & enamel paint.

All External ceiling shall be with cement board with timber frame and complete with Nippon paint or equivalent quality paint.

Any alternative roofing & ceiling system proposed by the contractor shall be approved by the Employer/Consultant before purchase / installation. The system proposed shall be economical & durable in comparison to the specifications mention in this document.

- ❖ Internal Ceiling System
Groove PVC ceiling system.
- ❖ Floor finishes of the building.
Cement screed floor with PVC mesh.
Internal and external floor finishes: Cement Slurry Finish on floor slab.
- ❖ Building Services
Building services include: Electrical system as required.

5.0 General Requirement

- a) Contractor is responsible to conduct all related surveys, material testing procedure, soil investigation reports for the approvals at designing stage.
- b) Preliminary Reclamation finished level is assumed as 1.4 m from M.S.L. to all areas covered in the scope.
- c) Material for the sub base preparation is organized by Reclamation Contractor (MTCC) within the airport boundary in stock piles. Contractor shall check the quality of soil and the availability, adequacy of the requirement and the source for any additional material that may require to complete the job.
- d) Source of Material (location of barrow areas) Barrow areas shall be finalized with inclusion of Entrance Channel and Jetty areas where natural access is not available.

5.1 The Contractor shall submit the following with the tender:

- 1. Preliminary design of Airport.
- 2. Contractor's proposed equipment's to carry out the works.
- 3. Proposed work methodology with preliminary design calculations.
- 4. Project costing:

Scope of the project with major quantities' in excel format is provided to estimate the project cost. After completion of design finalization if the quantity is within plus/minus 10% price shall remain and if the quantity increases beyond 10% price shall be adjusted as per the actual quantities.

- 5. Work schedule:

Proposed work schedule shall be submitted with Price Proposal. The work schedule shall indicate the major works to be carried out and the proposed date to start and complete the project.

- a) Detail design and EIA period shall be included within the total duration of the project.
- b) The total duration of the project shall not be more than 18 months
- c) Contractor shall allow for yearly climatic conditions in the Maldives.

5.2 Other Information

1. It is contractor's responsibility to obtain all the permits required (from regulatory authorities, service providers etc.) for dredging, reclamation and airport construction works.
2. The metric system of units shall be used throughout.
3. A preliminary survey that may require preparing the proposal is a responsibility of the Contractor.

All approvals required in relation to the project shall be the responsibility of the contractor including Environmental Impact Assessment.

5.3 Contractor's Documents

The following documents shall be submitted to the Employer/Consultant by the winning contractor:

1. Project survey report
2. Runway Pavement Design Report and calculations including the drawings as required shall be submitted for the approval after awarding the project and approval of the concept drawings.t Design Report including calculations
3. Detail design drawings, specification and method statements as specified in item covered under the Main Responsibilities of the Contractor of this document.
4. EIA (to be submitted to EPA and should be done to EPA requirement)

Drawings

[Insert here a list of Drawings. The actual Drawings, including site plans, should be attached to this section or annexed in a separate folder].

List of Drawings		
Project Number	Drawing Number	Drawing Title

Bill of Quantities or Activity Schedule

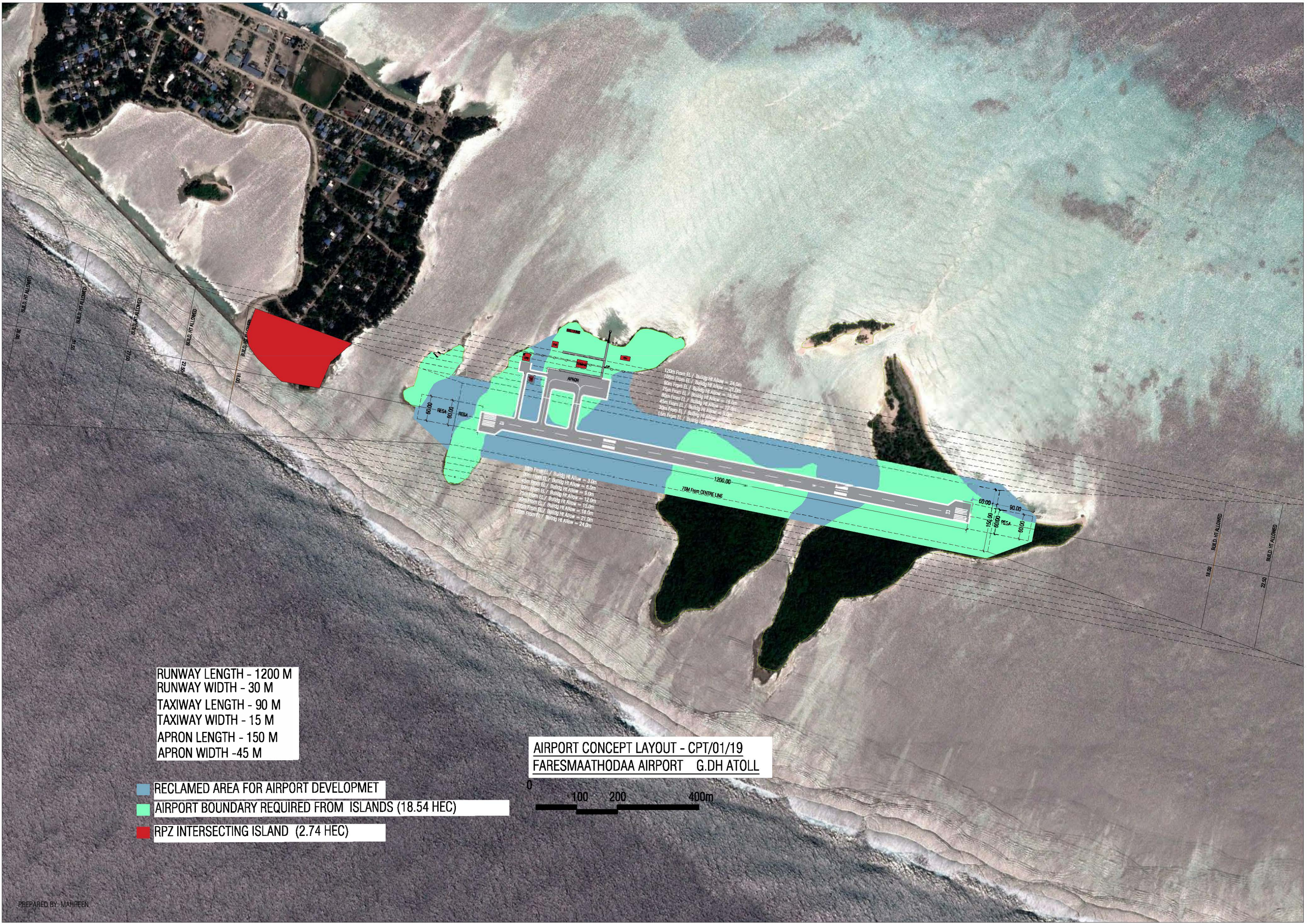
[The following units of measurement and abbreviations are recommended for use].

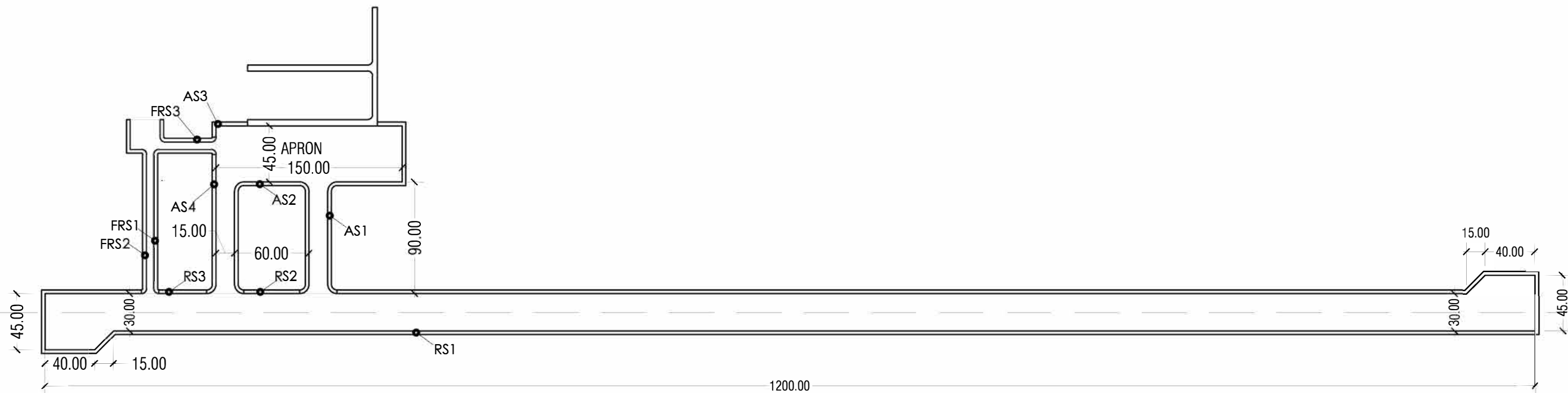
Unit	Abbreviation	Unit	Abbreviation
cubic meter	m ³ or cu m	millimetre	mm
hectare	ha	month	mon
hour	h	number	nr
kilogram	kg	square meter	m ² or sq m
lump sum	sum	square millimetre	mm ² or sq mm
meter	m	week	wk
metric ton (1,000 kg)	t		

Supplementary Information

Development Concept

**These Concepts are only to understand Employers's view.
Contractor's design shall within the limitations specified in this
document.**



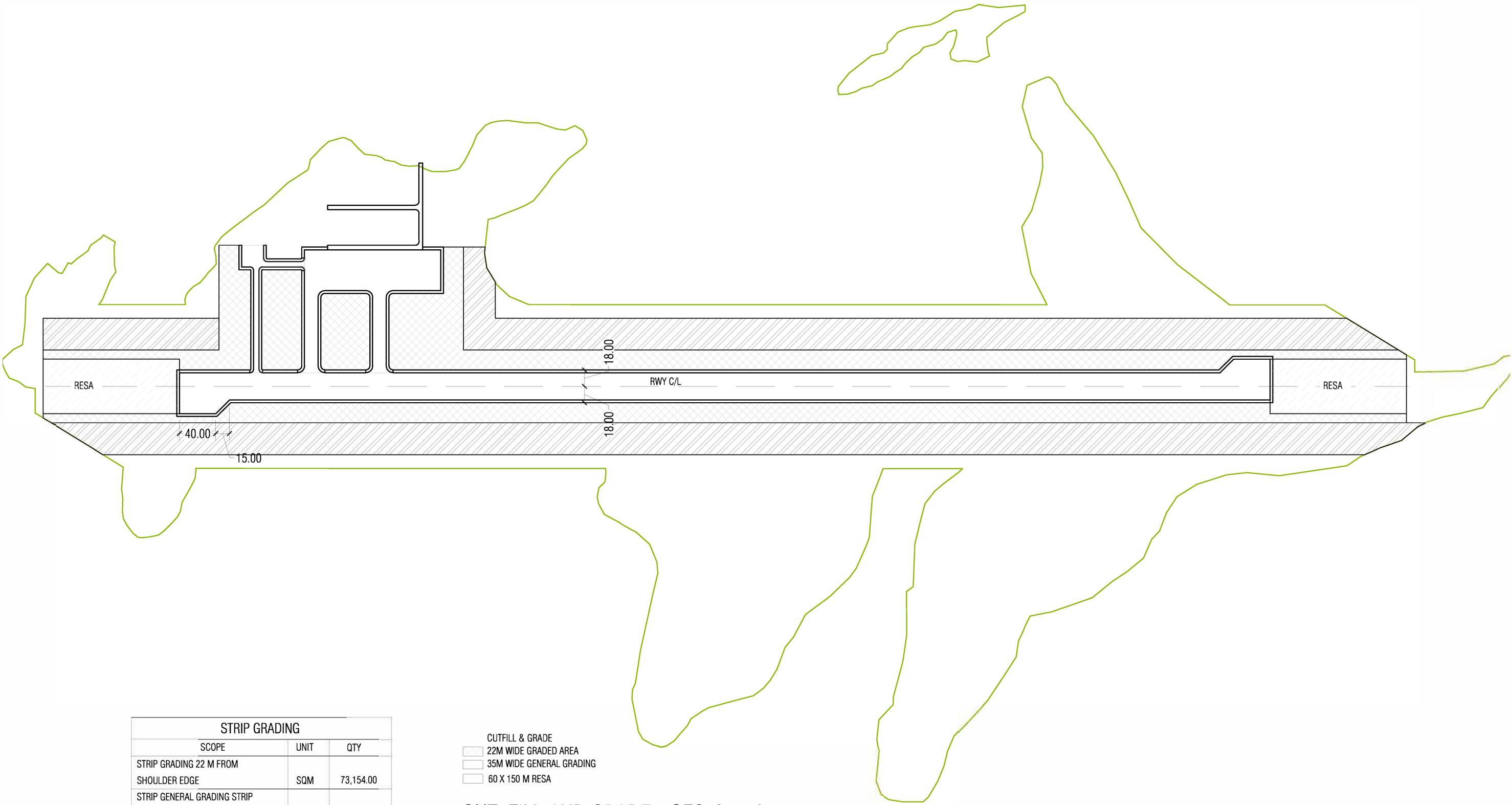


RUNWAY, TAXIWAYS, APRON AND SERVICE ROADS

RUNWAY-AREAS		
SCOPE	UNIT	QTY
RUNWAY	SQM	37,425.00
APRON / TWY	SQM	9,535.00
FIRE SERVICE ROAD	SQM	1,566.00
SERVICE ROAD	SQM	1,396.00
TOTAL AREA	SQM	49,922.00
SHOULDERS	SQM	10,243.00

GENERAL LAYOUT - GEN-01-19

FARESMAATHODA AIRPORT G.DH. ATOLL






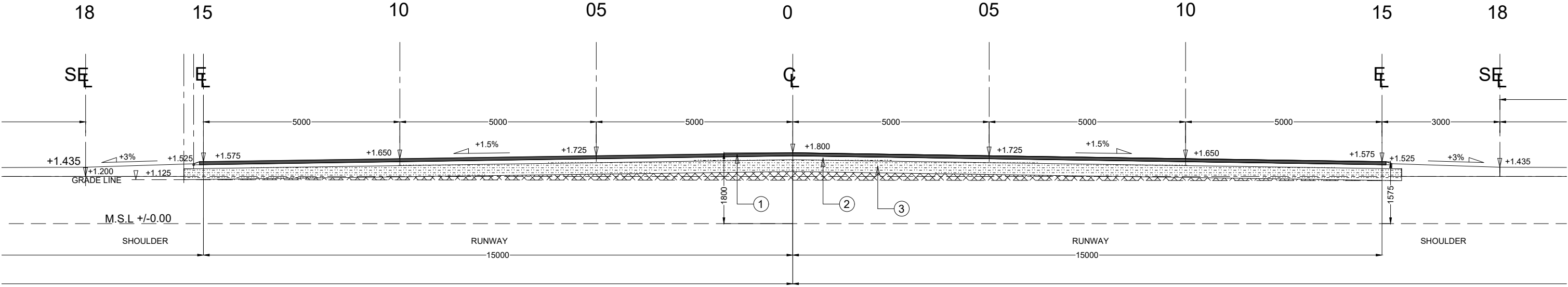
STRIP GRADING		
SCOPE	UNIT	QTY
STRIP GRADING 22 M FROM SHOULDER EDGE	SQM	73,154.00
STRIP GENERAL GRADING STRIP FROM 35 GRADED EDGE	SQM	95,089.00
RESA	SQM	18,000.00

- CUTFILL & GRADE
- 22M WIDE GRADED AREA
 - 35M WIDE GENERAL GRADING
 - 60 X 150 M RESA

CUT, FILL AND GRADE - CFG-01-19
FARESMAATHODAA G.DH. ATOLL

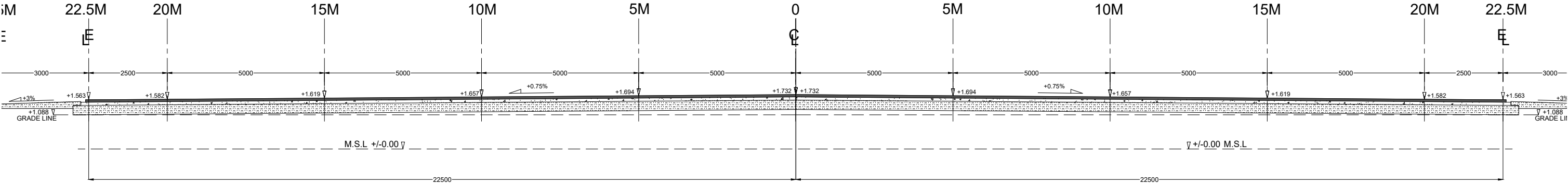
Runway Cross Sections

①		75MM THK ASPHALT WEARING COURSE
②		100MM THK COMPACTED AGGREGATE BASE COURSE
③		300MM THK COMPACTED SUB BASE MATERIAL



TYPICAL CROSS SECTION OF RUNWAY & SHOULDER

Scale 1:100

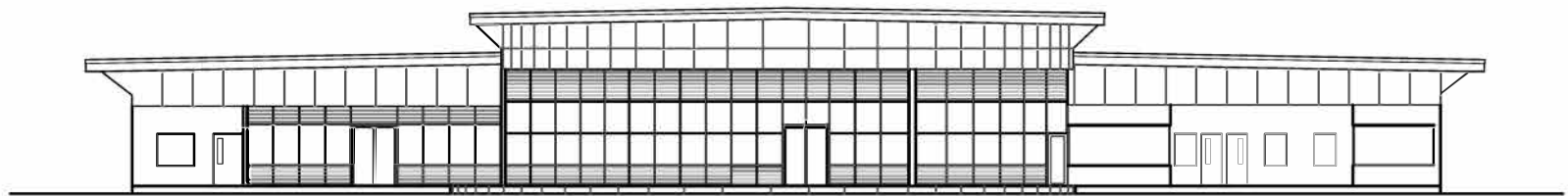


TYPICAL CROSS SECTION OF APRON

Scale 1:110

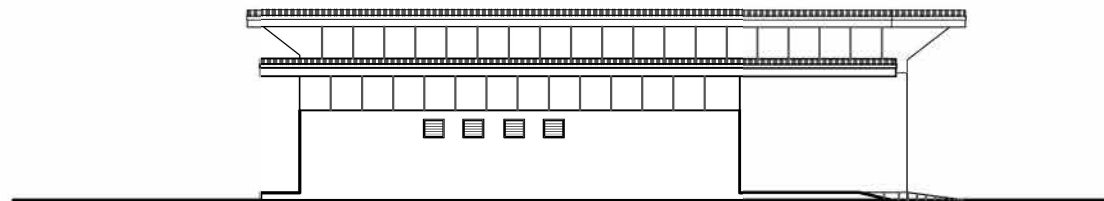
Runway Cross Sections

Supporting Building Facilities



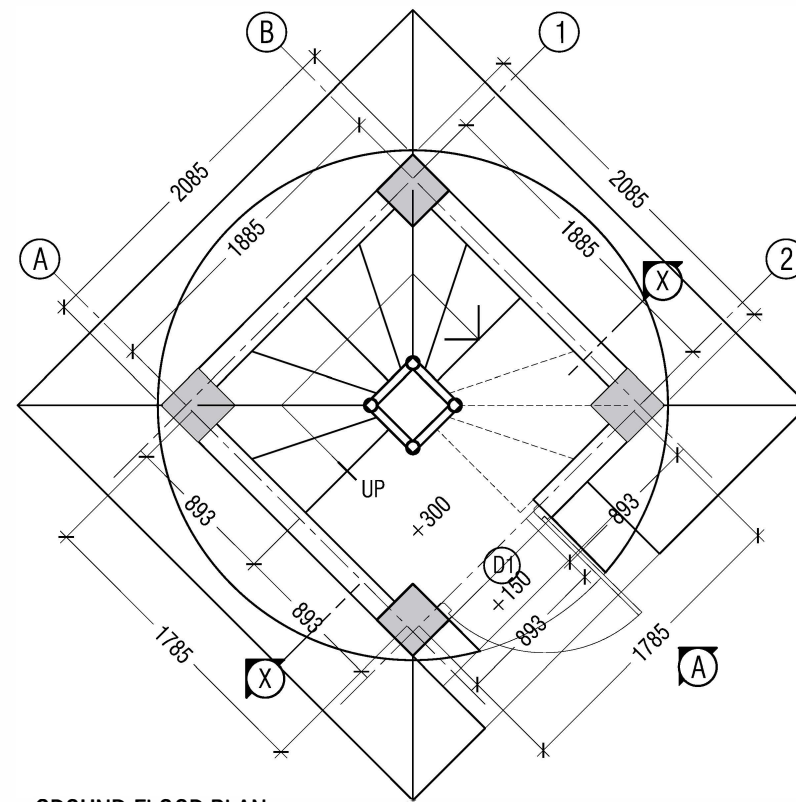
ELEVATION-A

Scale 1:200

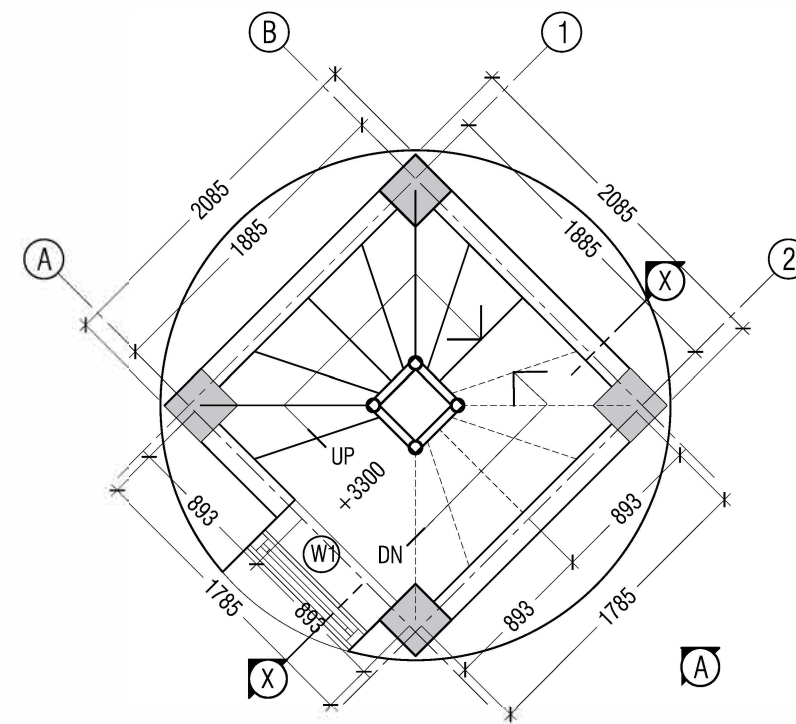


ELEVATION-B

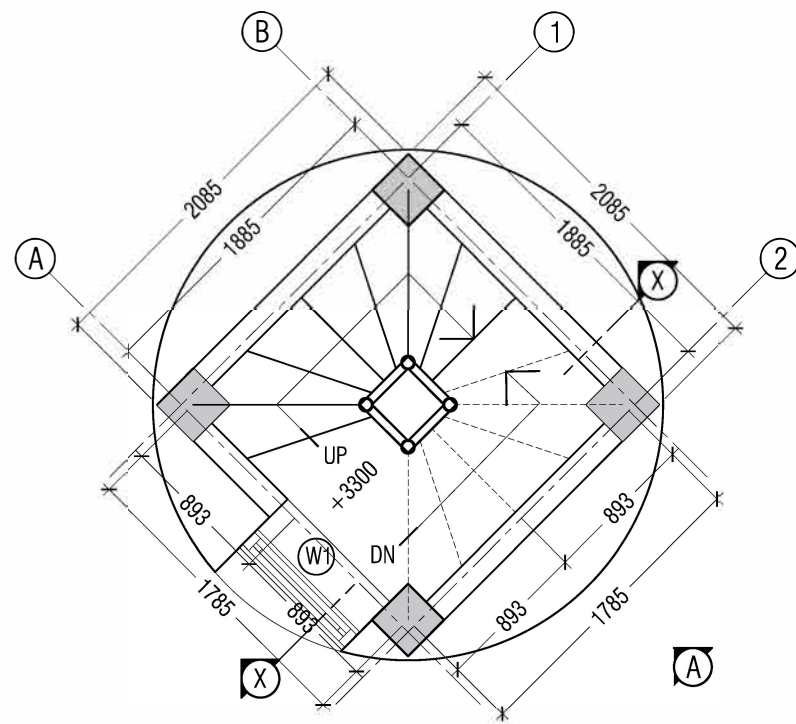
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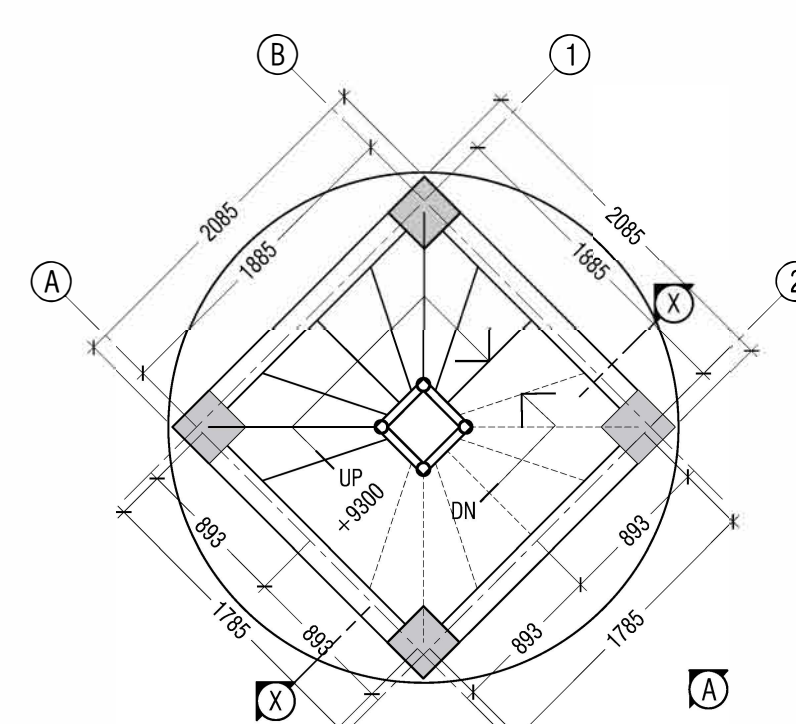
GROUND FLOOR PLAN



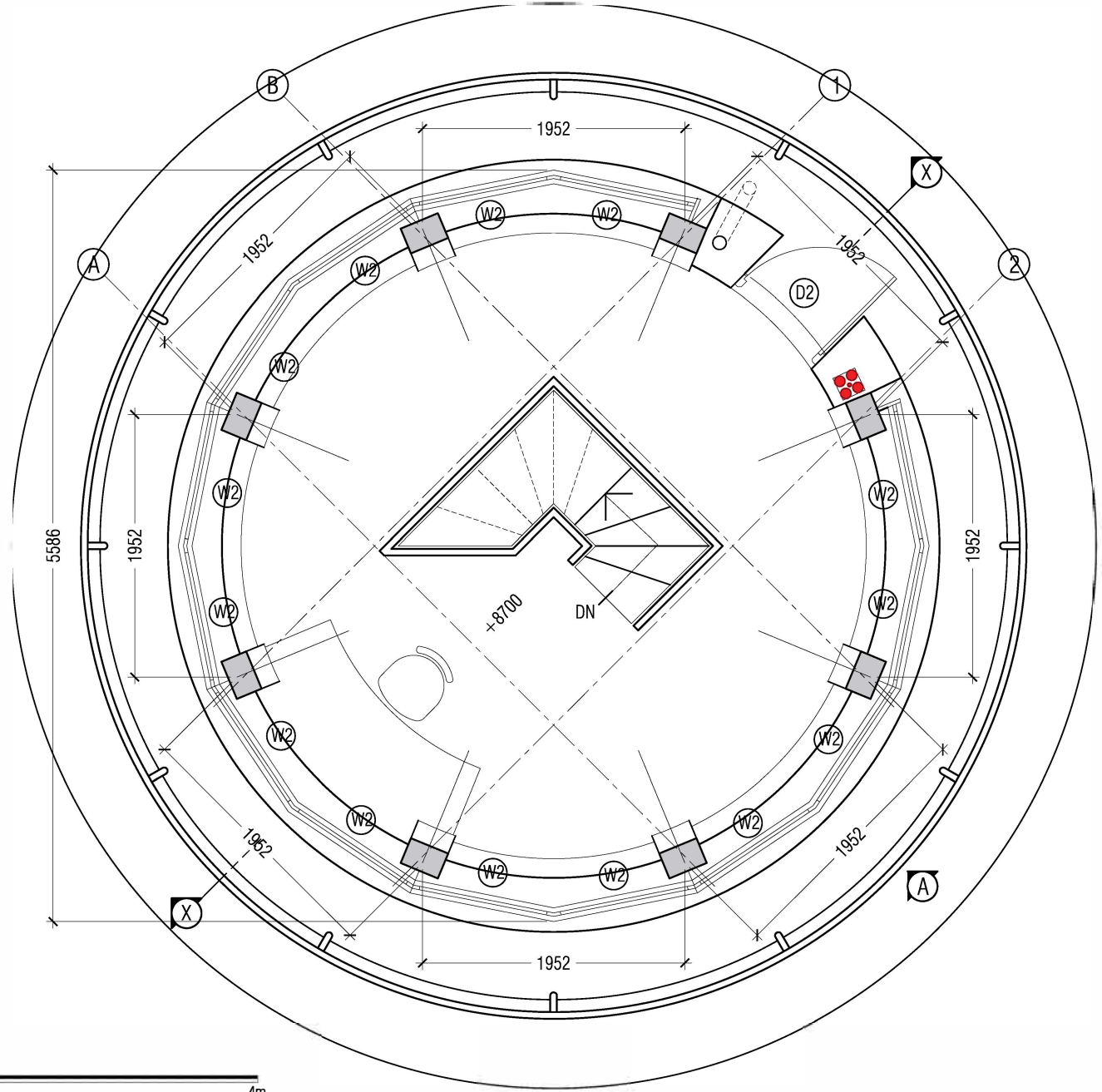
FIRST FLOOR PLAN



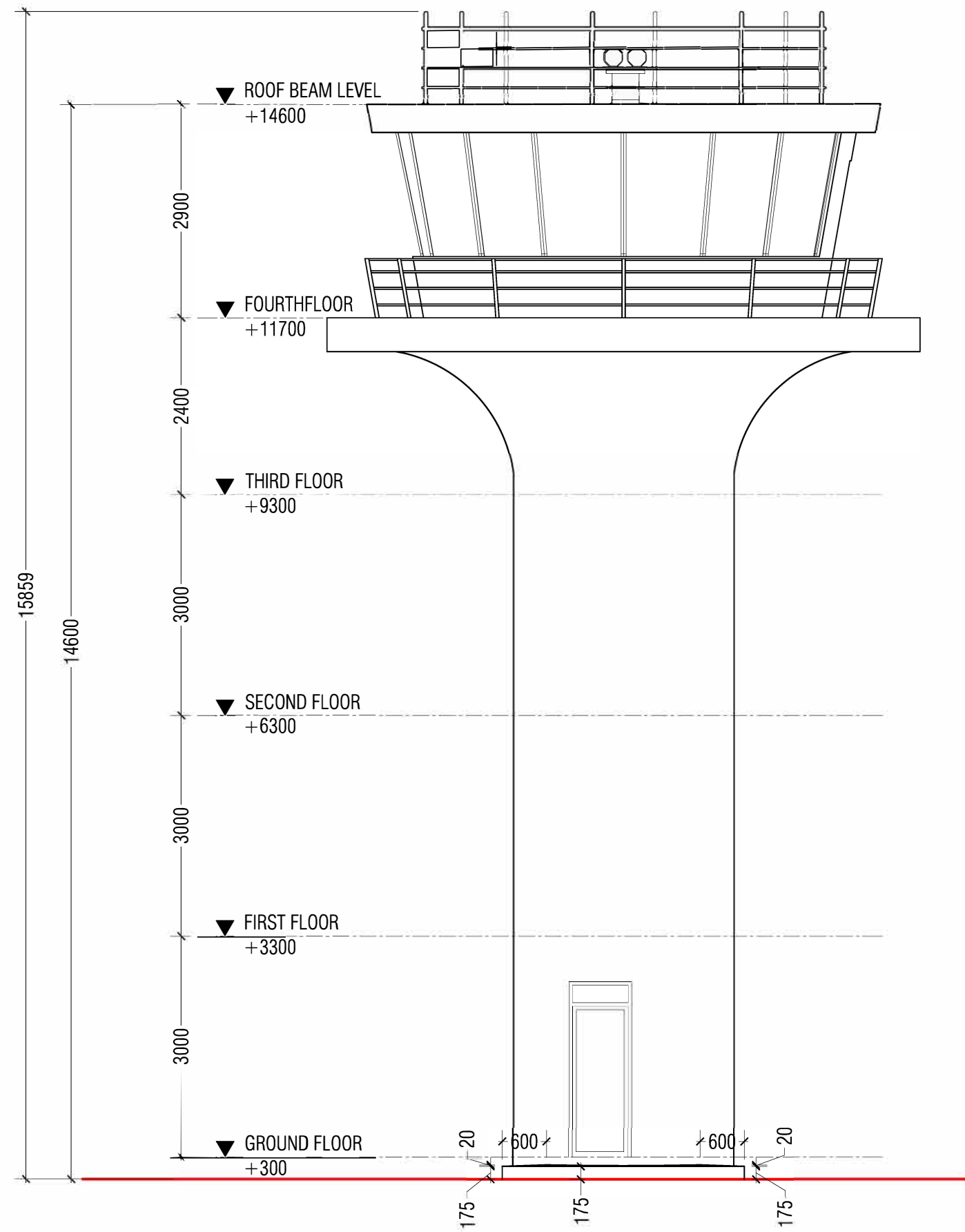
SECOND FLOOR PLAN

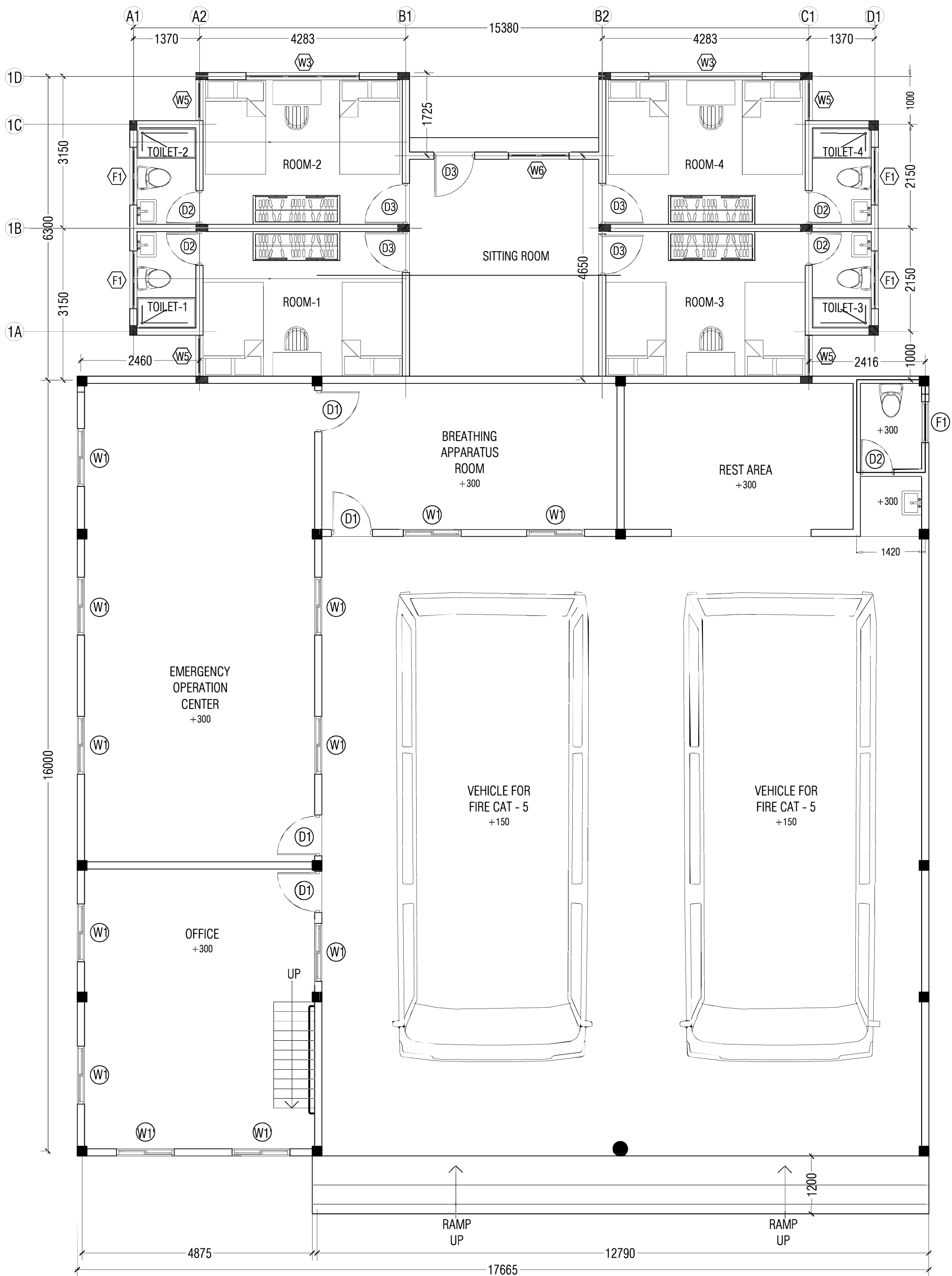


THIRD FLOOR PLAN



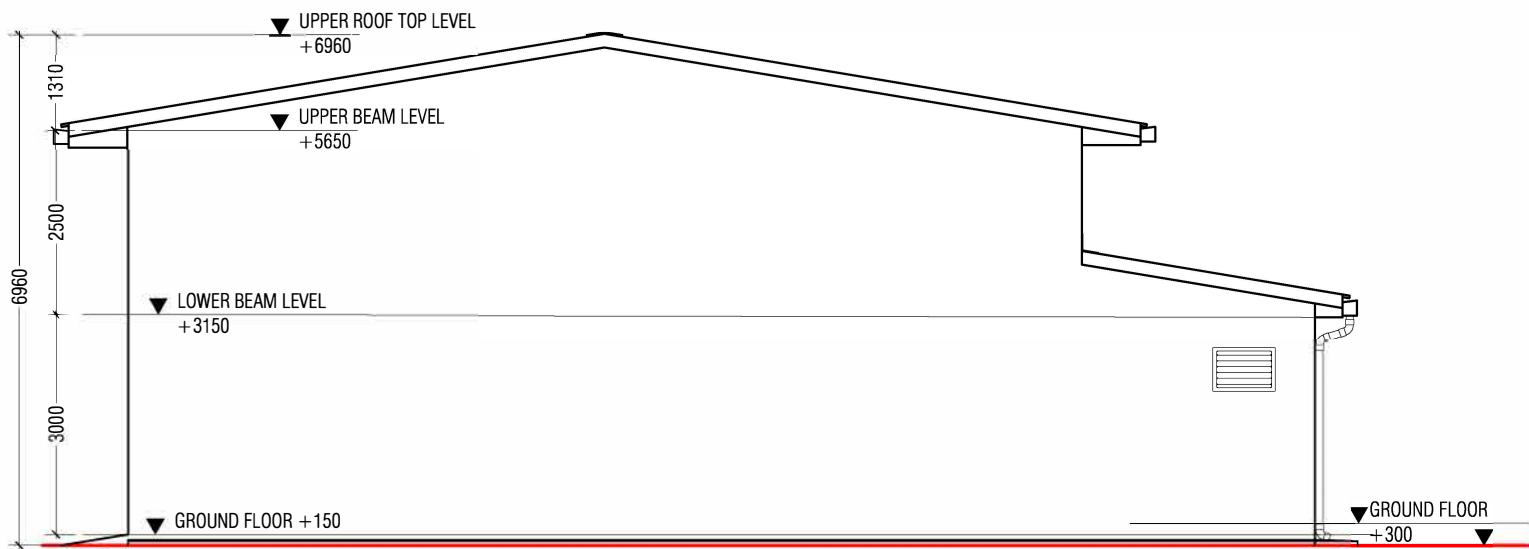
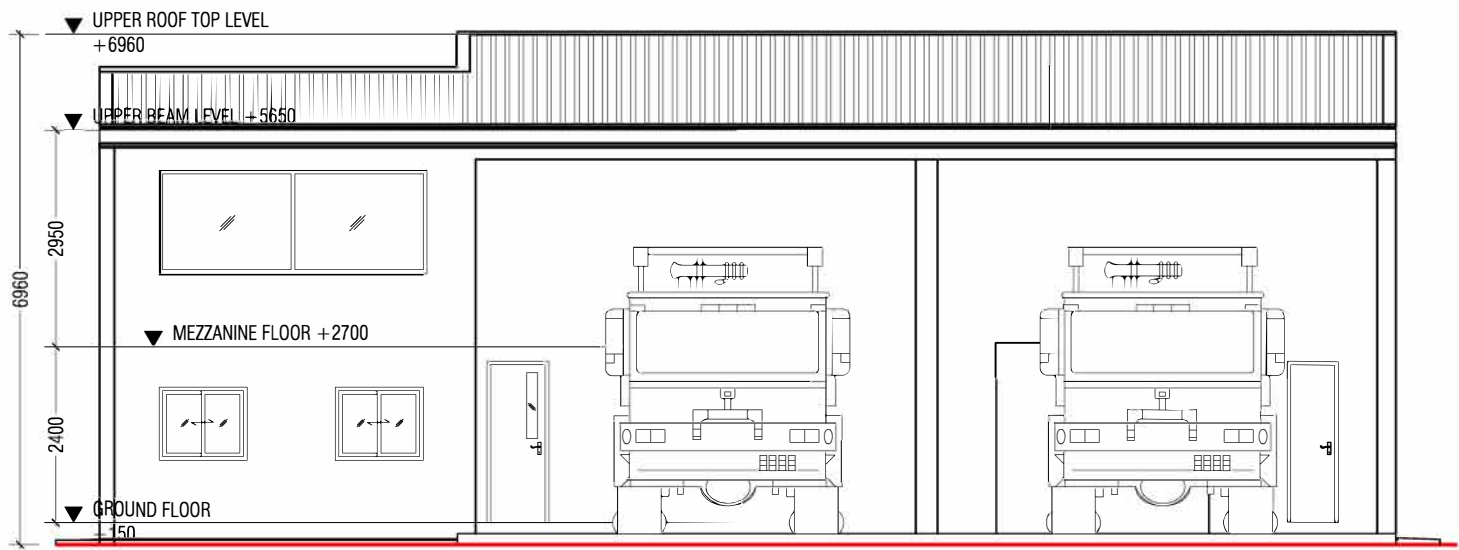
FOURTH FLOOR PLAN
SCALE 1:50

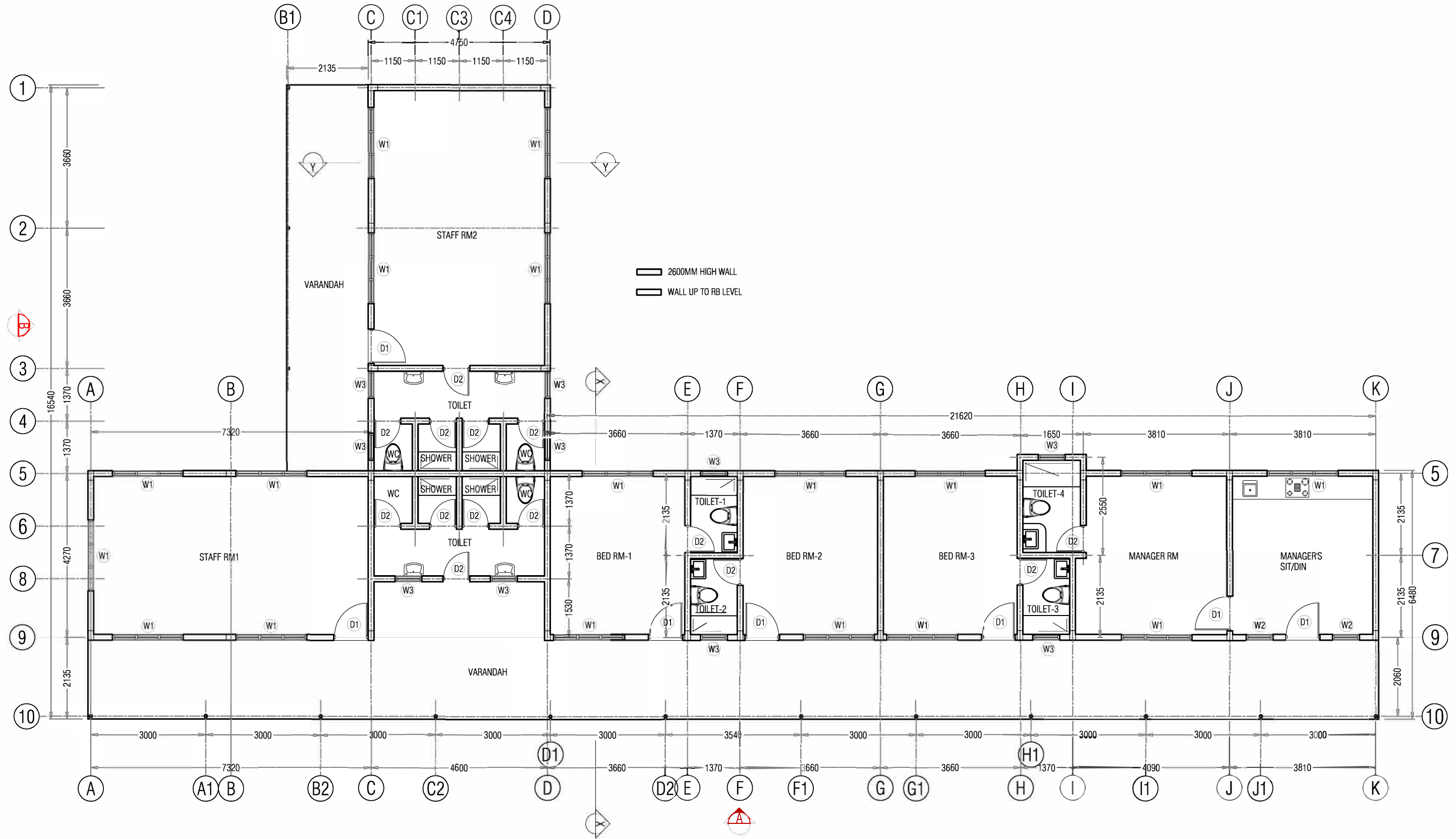




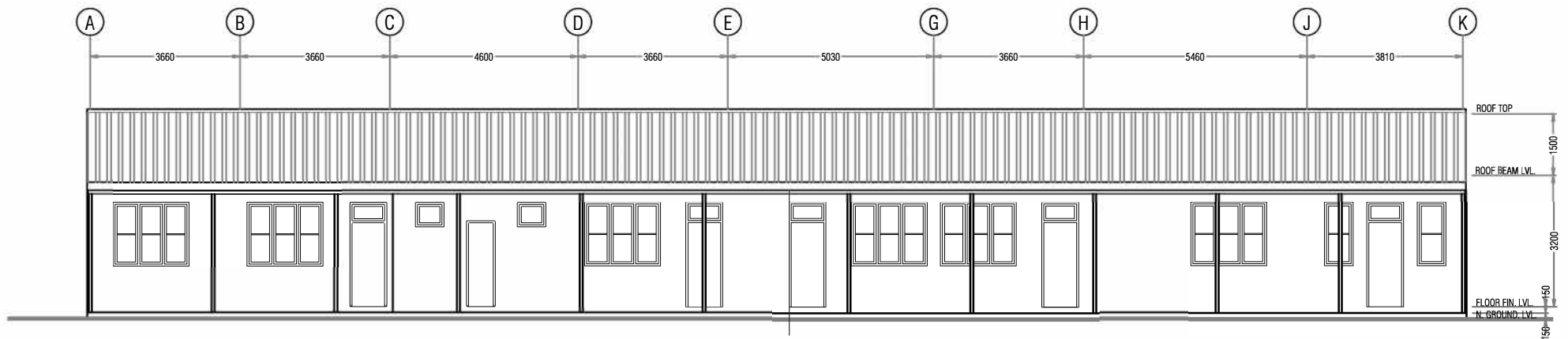
GROUND FLOOR PLAN
G.DH. FARESMAATHODAA
SCALE 1:100



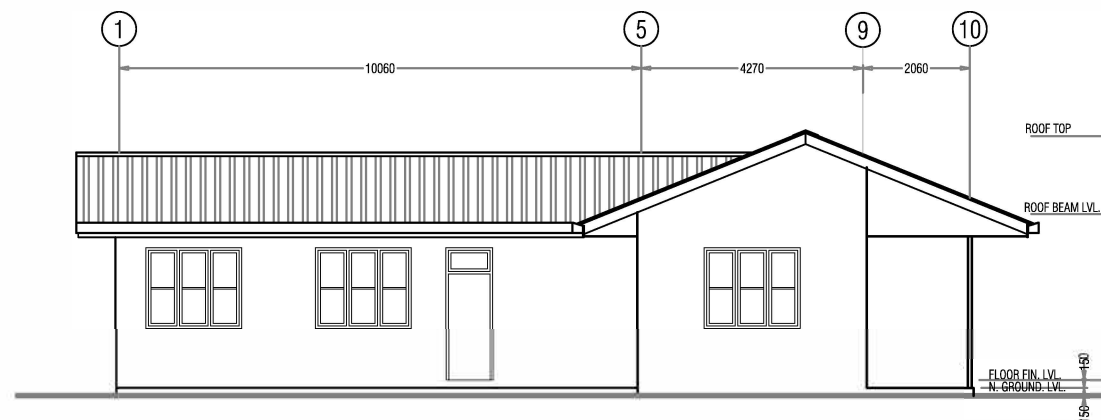




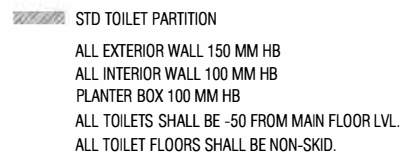
FLOOR PLAN
Scale 1:100



ELEVATION-A
SCALE: 1:100

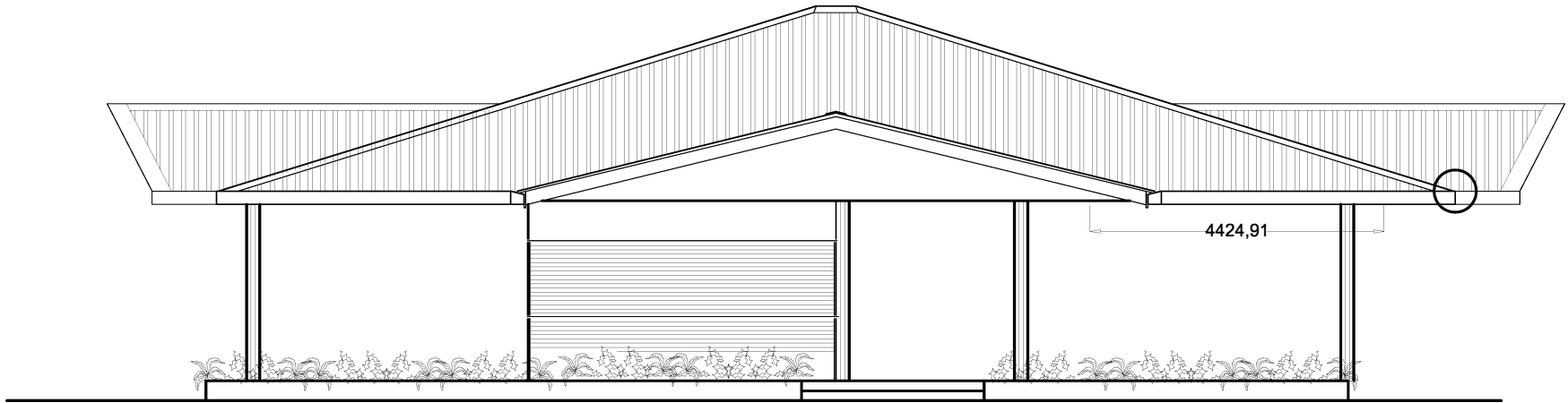


ELEVATION-B
SCALE: 1:100



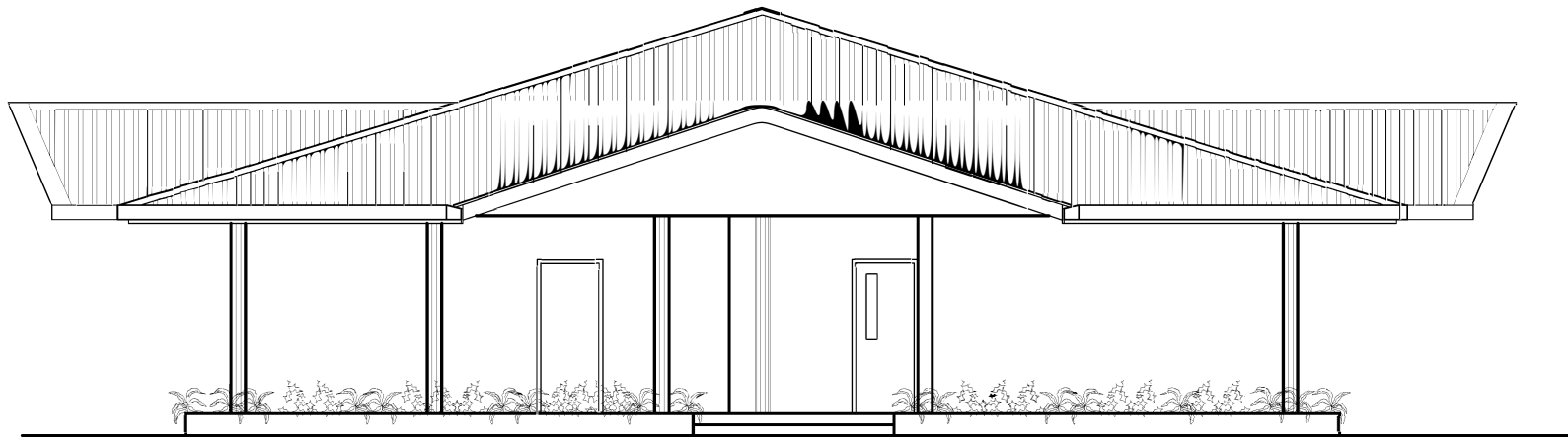
Scale 1:100

DESIGN BY: MAHREEN



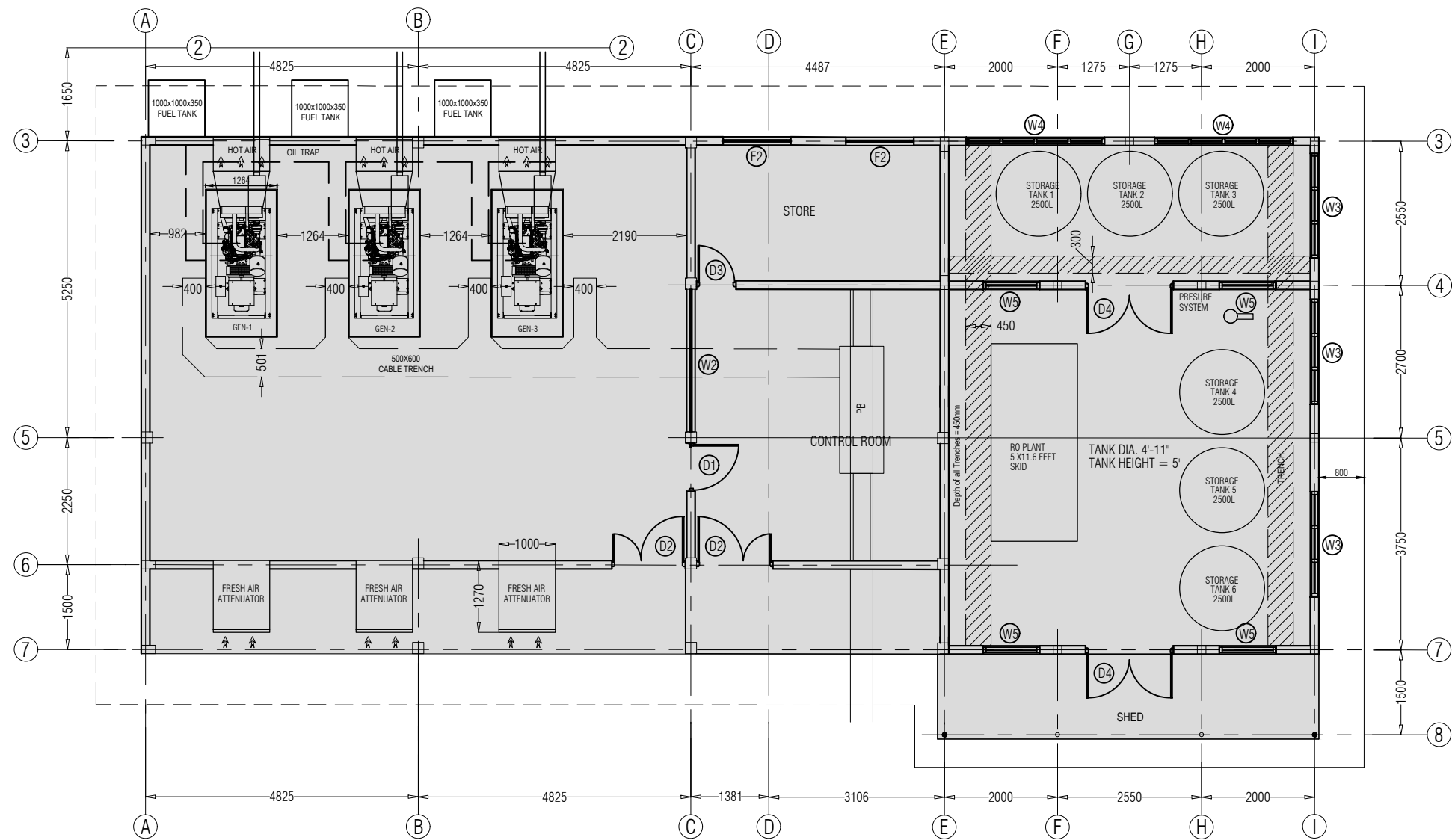
ELEVATION-A

Scale 1:100

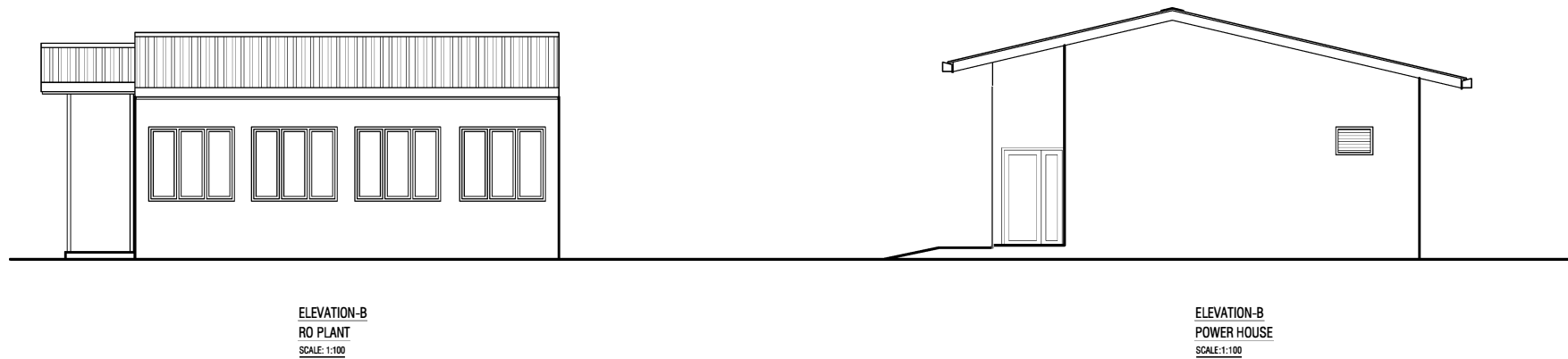
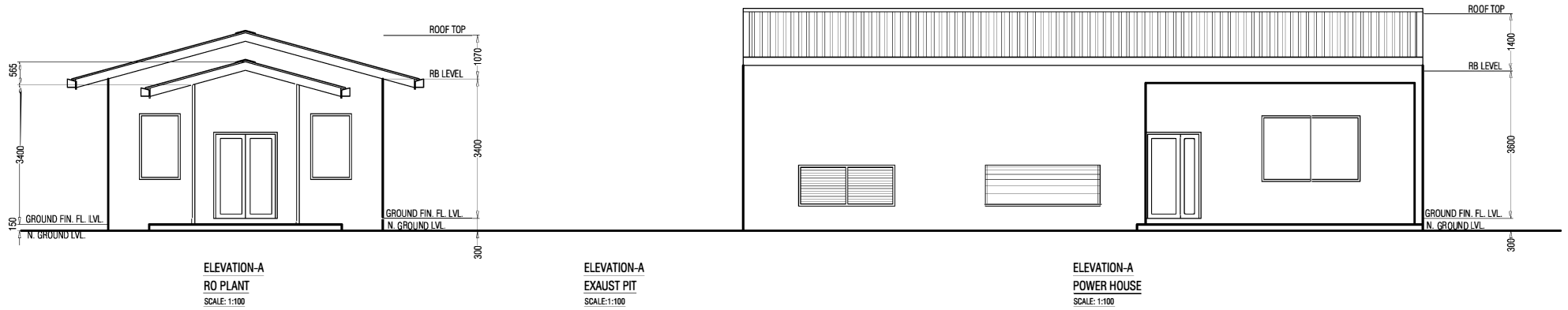


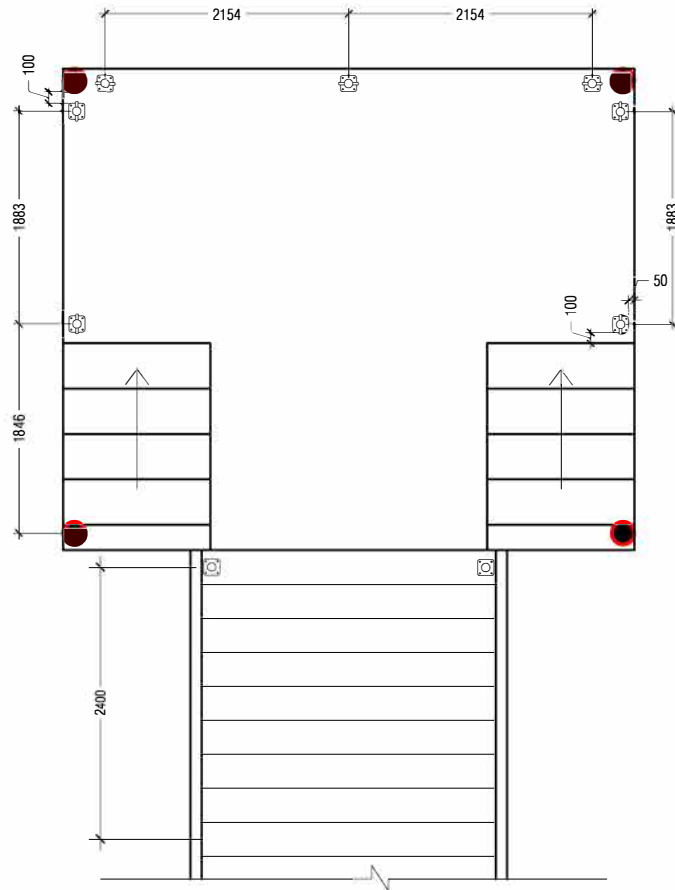
ELEVATION-B

Scale 1:100

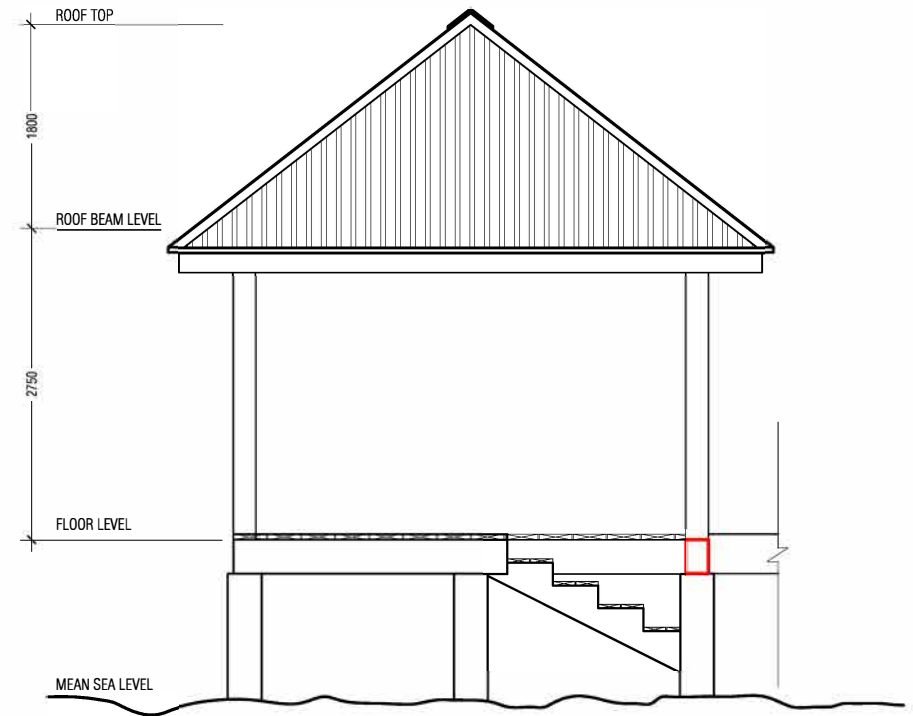


FLOOR PLAN
POWER HOUSE WITH RO PLANT (200 SQM)
Scale 1:100





DETAIL-PLAN



ELEVATION A

Price Proposal

Price Proposal

Faresmaathodaa Airport Runway Length – 1200m

<i>Bill No:</i>	<i>Description</i>	<i>Unit</i>	<i>Qty</i>	<i>Rate</i>	<i>Amount (MVR)</i>
1	Preliminaries				
1.1	This item shall include mobilization & demobilization, temporary facilities, site expenses, environmental requirements travel expenses & maintenance of vessels, plant, machineries & equipment, insurance costs & all other cost related to this item.	Sum			-
2	Design and Consultancy Services				
2.1	This item shall include EIA related surveys, documentation to prepare and submit, All types of survey, investigation required to prepare the design & design drawings and approvals etc, quality control including material testing at abroad and site laboratory established by contractor and construction supervision as required'	Sum			-
3	Airside Infrastructure				
3.1	Excavation and disposal, Sub grade, Embankment layers & Sub base Preparation including, backfill and compaction as per the approved drawing & specifications:- Runway including Turning Pads, Taxiways, Apron.	Sqm	46,960		-
3.2	Base Course Preparation including, spreading, grading and compaction as per the approved drawing & specifications:- Runway including Turning Pads, Taxiways, Apron.	Sqm	46,960		-
3.3	Wearing Course including, Plant Mixing, Transport and compaction as per the approved drawing & specifications:- Runway including Turning Pads, Taxiways, Apron.	Sqm	46,960		-
3.4	Excavation and disposal, Sub grade, Embankment layers & Sub base Preparation including, backfill and compaction as per the approved drawing & specifications:- Service Roads	Sqm	2,962		-
3.5	Base Course Preparation including, spreading, grading and compaction as per the approved drawing & specifications:- Service Roads	Sqm	2,962		-
3.6	Wearing Course including, Plant Mixing, Transport and compaction as per the approved drawing & specifications:- Service Roads	Sqm	2,962		-
3.7	Cut , fill Grade and compaction:- Shoulder 3 meter wide as per design slope, 22 meter from edge of the shoulder shall be graded and compacted as per the cross section of the strip including 35 meter wide general levelling to the edge of strip as per the approved drawing including Runway End Safety Area (RESA)	Sqm	196,486		-

<i>Bill No:</i>	<i>Description</i>	<i>Unit</i>	<i>Qty</i>	<i>Rate</i>	<i>Amount (MVR)</i>
3.8	Laying the PVC duct Pipes under sub base as per the Employer's requirement:- Runway and Roads	Sum			-
3.9	Boundary and Security Fencing with gate posts and gates:- as per design and Employer's requirement	Sum			-
3.10	Airfield Lighting System as per design:- and Employer's requirement	Sum			-
3.11	Navigational Aids & Met Equipment:- as per design and Employer's requirement	Sum			-
3.12	Runway and Road marking and signage as per design and Employer's requirement	Sum			-
4	Operation & Maintenance Sevices				-
4.1	Supply and installation of Security Equipment	Sum			-
4.2	Supply Fire and rescue services equipment:- shall meet Category 5. System shall include all firefighting related equipment and accessories as per the Employer's requirement	Sum			-
4.3	Supply & Installation of Fuel Services facilities	Sum			-
4.4	Supply and installation of Ground Handling Equipment	Sum			-
4.5	Supply & Installation of Power Generation & Electrical Distribution System	Sum			-
4.6	External Sewerage & Water Supply Distribution System	Sum			-
4.7	Lightning Protection System as per the Employer's requirement	Sum			-
5	Landside Infrastructure				-
5.1	Passenger Terminal	Sum			-
5.2	Control Tower	Sum			-
5.3	Fire Garage with Fire Staff Accommodation in cluding Fire Pond and Pump Shed	Sum			-
5.4	Staff Accommodation	Sum			-
5.5	Restaurant Facilities	Sum			-
5.6	Power House with RO Plant Facilities	Sum			-
5.7	Security Check Post	Sum			-
5.8	Passenger Jetty	Sum			-
5.9	Landscaping and Street Lighting as per the Employer's requirement	Sum			-
6	Additions/Omissions				
Total Labour & Material					-