

## **SECTION 4**

### **Minimum Requirements**

## **A - MINIMUM STANDARDS**

### **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's requirement of this development.

Future developments as required shall be designed and constructed to the same minimum design and regulatory standards, updated as applicable.

### **2.2 Applicable Standards**

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

- Ministry of Tourism (MoT)
- Maldives Civil Aviation Authority (MCAA)
- Regional Airports / MoT
- Ministry of Housing and Infrastructure (MHI)
- 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.

#### **2.2.1 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;

- CAR Part 13 Aerodromes, Aviation Fuel Supply and Air Navigation
- 16 Protection of the Environment
- 18 Aerodrome Rules

- 19 Airport and Aircraft Security
- Applicable MCARs include, but are not limited to :
- MCAR 139 - Aerodrome Rules
- MCAR 14 Aerodrome Standards Manual
- MCAR 4 - Aeronautical Charts
- Applicable Air Safety Circulars, but are not limited to:
- 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
- ASC OPS 25 - Manual on Certification of Aerodromes
- ICAO Standards and Recommended Practices (SARPS)- Airside

The Contractor 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 Annex 12 – Search and Rescue
- ICAO Annex 14 – Aerodrome Design and Operations
- ICAO Annex 15 – Aeronautical Information Services
- ICAO Annex 16 – Environmental Protection
- ICAO Annex 17 – Security International Civil Aviation against acts of unlawful interference
- IATA Airport Development Reference Manual;

#### 2.2.2 ICAO Airport Planning Manuals (APM)

#### 2.2.3 ICAO Aerodrome Design Manuals (ADM)

- Part 1: Runways

- Part 2: Taxiways, Aprons and Holding Bays
- Part 3: Pavements
- Part 4: Visual Aids
- Part 5: Electrical Systems
- ICAO Airport Service Manuals (ASM)
- Part 1: Rescue and Fire Fighting
- Part 2: Pavement Surface Conditions
- Part 3: Bird Control and Reduction
- Part 4: Fog Dispersal
- 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 Services

### **2.3 Investigations and Surveys**

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

The geotechnical investigation shall be specified, undertaken and reported in accordance with appropriate international standards. 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 and bathymetric 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 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)

## MINIMUM TECHNICAL REQUIREMENTS

### 2.5 Planning, designing and construction

#### 2.5.1 Basic Aerodrome physical requirements

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

<b>Runway Length:</b>	<b>1200 m</b>
<b>Runway Width:</b>	30 m
<b>Strip Length:</b>	60 m from each end of runway
<b>Strip Width:</b>	75 m from each side of runway centerline
<b>Taxiway Length:</b>	90 m or as agreed
<b>Taxiway Width:</b>	15 m
<b>Apron Length:</b>	150 or as agreed
<b>Apron Width:</b>	50 m or as agreed
<b>Runway End Safety Area ( RESA) Length:</b>	90 m
<b>Runway End Safety Area ( RESA) Width:</b>	60 m
<b>Transverse gradient:</b>	1.5% for Runway & Taxiway. 0.5% for Apron
<b>Transitional surface:</b>	1:5 slope
<b>Approach slope:</b>	3.33%
<b>Divergence angle:</b>	15%
<b>Take off climb slope:</b>	4%
<b>Pavement Classification (PCN)</b>	15 estimated (proposed critical aircraft is ATR 72-600)
<b>Designation No:</b>	Will be finalized after the approval of airport final concept.
<b>Aerodrome Reference Code</b>	2C

#### 2.5.2 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, 50 with passenger capacity 48 seats
- ATR 72, with passenger capacity 70 seats

#### 2.5.3 The basic parameters for facility planning.

The annual demand for Sh. Funadhoo Airport is calculated based on traffic records for the last 3 Years and are tabulated in the table below:

Air Traffic Records for year 2013 to 2015 at Hanimaadhoo Airport

Type of Aircraft	Year	Arrivals	Departures
Dash 8 - 300	2015	1817	1817
Dash 8 - 200		741	741
ATR 72 - 600		442	442
ATR 72 - 500		831	831
ATR 42 - 500		103	103
Dash 8 - 300	2014	2059	2059
Dash 8 - 200		852	852
ATR 72 - 600		397	397
ATR 72 - 500		0	0
ATR 42 - 500		940	940
Dash 8 - 300	2013	1618	1618
Dash 8 - 200		1030	1030
ATR 72 - 600		109	109
ATR 72 - 500		0	0
ATR 42 - 500		758	758

### 2.5.3 Critical Aircraft

- The Critical Aircraft selected for the Airport is ATR 72 - 500 with a seating capacity of 70 passengers.

### 2.5.4 Aerodrome Reference Code

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

### 2.5.5 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 or in accordance with the forecast schedule.
- 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 Contractor shall, as a minimum submit the proposed Airport development concept plans at 1:5000 showing the proposed general arrangement of Airport infrastructure layout.

#### 2.5.6 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 fire fighting 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.



## **B – General Minimum Construction Specifications**

### **3.1     *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.

### **3.2     *Pavement Structure***

Design Concept of pavement structure is assumed based on the visual observation to estimate the project cost. Final design calculations, detail drawings shall be submitted for approval after the completion soil investigations and engineering study is the responsibility of the Contractor.

### **3.3     *Assumed Elevation***

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

### **3.4     *Runway, Apron and Taxiways***

#### **3.4.1   Sub grade**

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

#### **3.4.2   Sub base**

- 300mm thick compacted sub base material
- CBR value shall be not less than 40%

#### **3.4.3   Base Course**

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

#### **3.4.4   Wearing Course**

- 75mm thick Hot mix Asphalt Surface

### **3.5     *Service Roads***

#### **3.5.1   Sub grade**

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

#### **3.5.2   Sub base / Base**

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

### 3.5.3 Wearing Course

35mm thick Hot mix Asphalt Surface

### 3.6 Drainage System

Drainage system specially for runway and apron: A graded area is needed from runway shoulder and strip. Strip shall be graded 40m from centre line on each side.

#### 3.15 PVC Duct System

- PVC ducts laid under sub base for Runway light cabling for future.
- PVC ducts laid under sub base for Road light cabling for future.

### 3.8 Boundary & Security fence

- Boundary Fence shall be done as per the boundary layout approved by Regional Airports/MoT.
- Security Fence shall be completed as per Maldives Civil Aviation Regulations (MCAR)

## **SECTION - 5**

### **Development Concepts**

THIS CONCEPT IS DEVELOPED FOR DISCUSSION USE.  
CONCEPT WILL BE FINALIZED BASED ON EIA DECISION STATEMENT.



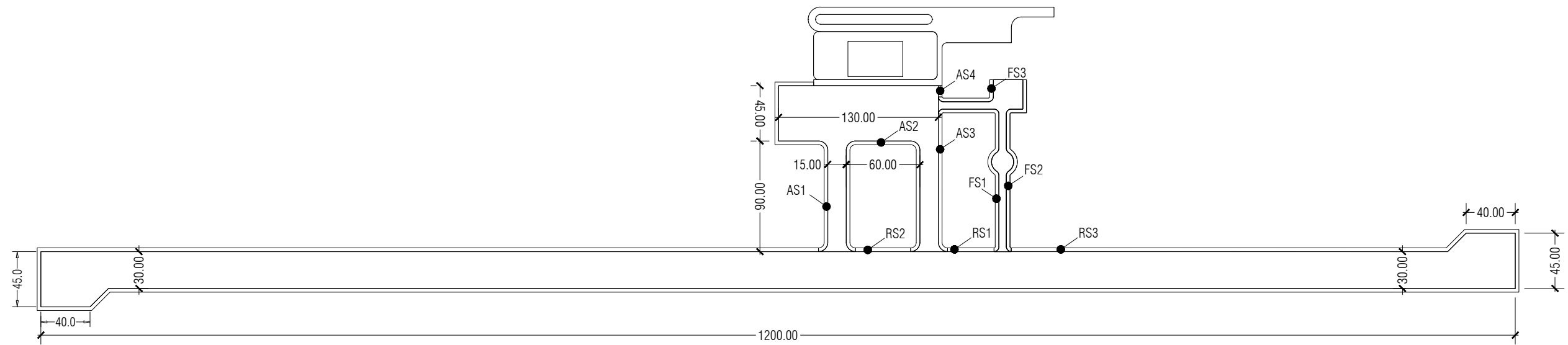
RUNWAY LENGTH - 1200 M  
RUNWAY WIDTH - 30 M  
TAXIWAY LENGTH - 90 M  
TAXIWAY WIDTH - 15 M  
APRON LENGTH - 130 M  
APRON WIDTH - 45 M  
AIRPORT BOUNDARY REQ FROM VILLAGE (4.50 HEC)  
RECLAMATION ( 26.54 HEC)

# AIRPORT DEVELOPMENT CONCEPT FUNADHOO SH. ATOLL



PROJECT:	FUNADHOO AIRPORT
TITLE:	AIRPORT CONCEPT LAYOUT
DRAWN BY:	SAMIR
DESIGN BY:	MAHREEN
DRAWING NO:	
SCALE:	SCALE -
DATE:	JAN-2018
CHECKED BY:	MAHREEN

REGIONAL AIRPORTS  
MIN. OF TOURISM  
REP. OF MALDIVES  
TEL: 323805, FAX: 320911  
Email: regional@airports.gov.mv

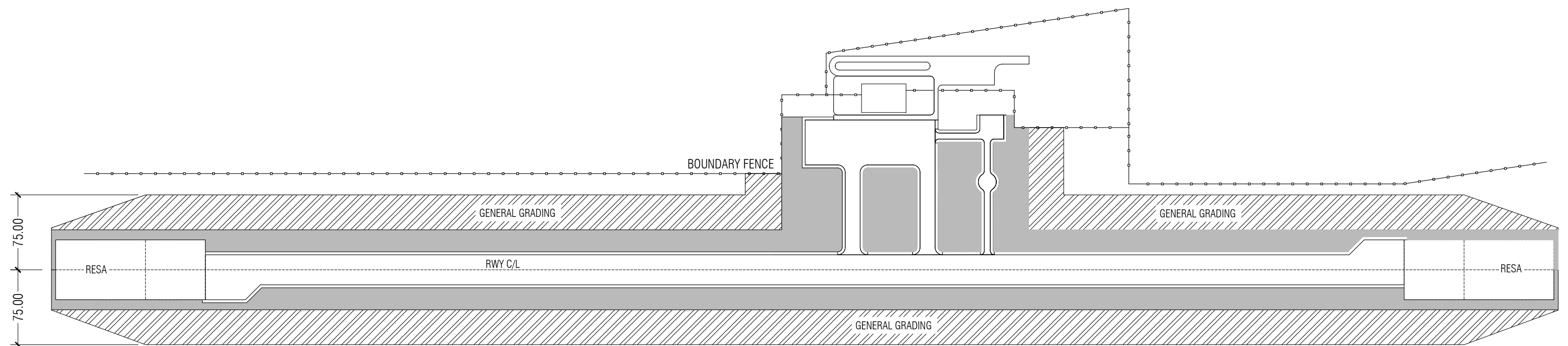


## RUNWAY, TAXIWAYS, APRON AND SERVICE ROADS

RUNWAY-AREAS		
SCOPE	UNIT	QTY
RUNWAY	SQM	37,425.00
APRON / TWY	SQM	8,635.00
FIRE SERVICE ROAD	SQM	1,714.00
SERVICE ROAD	SQM	4,007.00
TOTAL AREA	SQM	51,786.00
RUNWAY SHOULDER	SQM	7,321.00
APRON SHOULDER	SQM	1,685.00
FIRE SHOULDER	SQM	1,140.00

GENERAL LAYOUT - GEN/01/18  
 FUNADHOO AIRPORT SH. ATOLL





CUTFILL & GRADE  
22M WIDE GRADED AREA  
35M WIDE GENERAL GRADING

RUNWAY-AREAS			STRIP GRADING		
SCOPE	UNIT	QTY	SCOPE	UNIT	QTY
RUNWAY	SQM	37,425.00	STRIP GRADING 22 M FROM		
APRON / TWY	SQM	8,635.00	SHOULDER EDGE	SQM	72,084.00
FIRE SERVICE ROAD	SQM	1,714.00	STRIP GENERAL GRADING STRIP		
SERVICE ROAD	SQM	4,007.00	FROM 35 GRADED EDGE	SQM	93,687.00
RUNWAY SHOULDER	SQM	7,321.00	TOTAL AREA	SQM	165,771.00
ARPRON SHOULDER	SQM	1,685.00			
FIRE SHOULDER	SQM	1,140.00			
RESA	SQM	18,000.00			
TOTAL AREA	SQM	79,932.00			

CUT, FILL AND GRADE - CFG/01/18  
FUNADHOO SH. ATOLL



JUNGLE CLEARING  
FUNADHOO SH. ATOLL

0 50 100 200m

JUNGLE CLEARING 35,705 SQM (3.57 HEC)






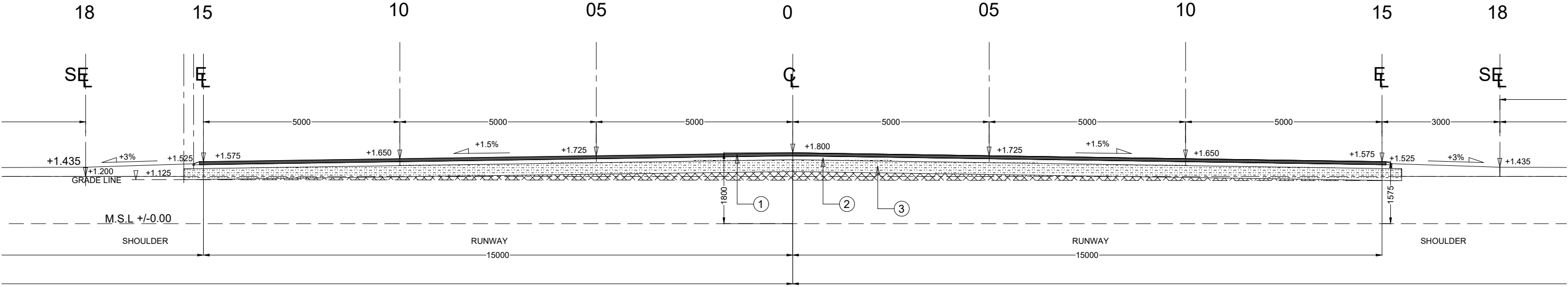
TOP SOIL REMOVAL  
FUNADHOO SH. ATOLL

TOP SOIL REMOVAL 11,135 SQM

0 50 100 200m

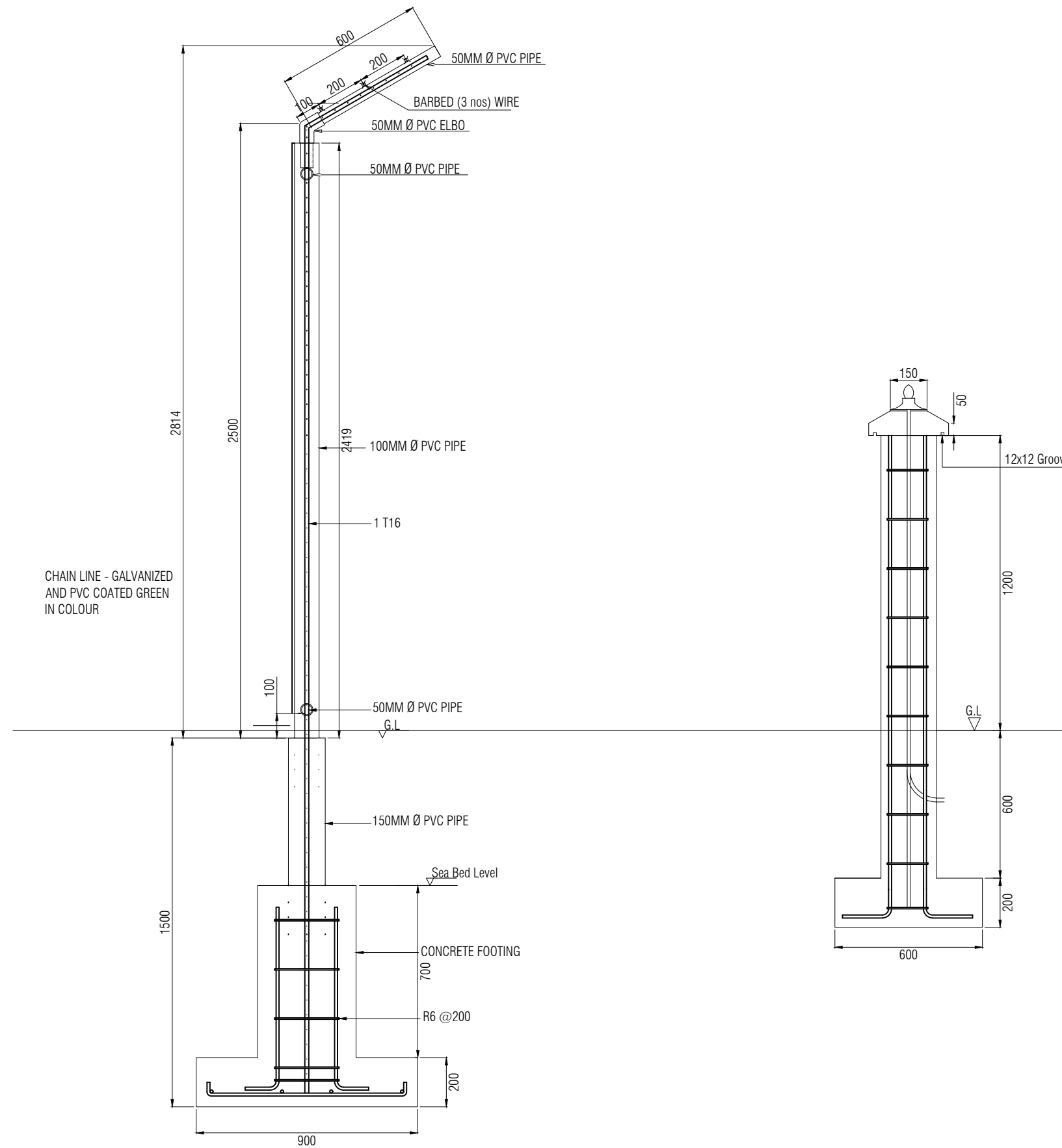


①		75MM THK ASPHALT WEARING COURSE
②		100MM THK COMPACTED AGGREGATE BASE COURSE
③		300MM THK COMPACTED SUB BASE MATERIAL



**TYPICAL CROSS SECTION OF RUNWAY & SHOULDER**

Scale 1:100



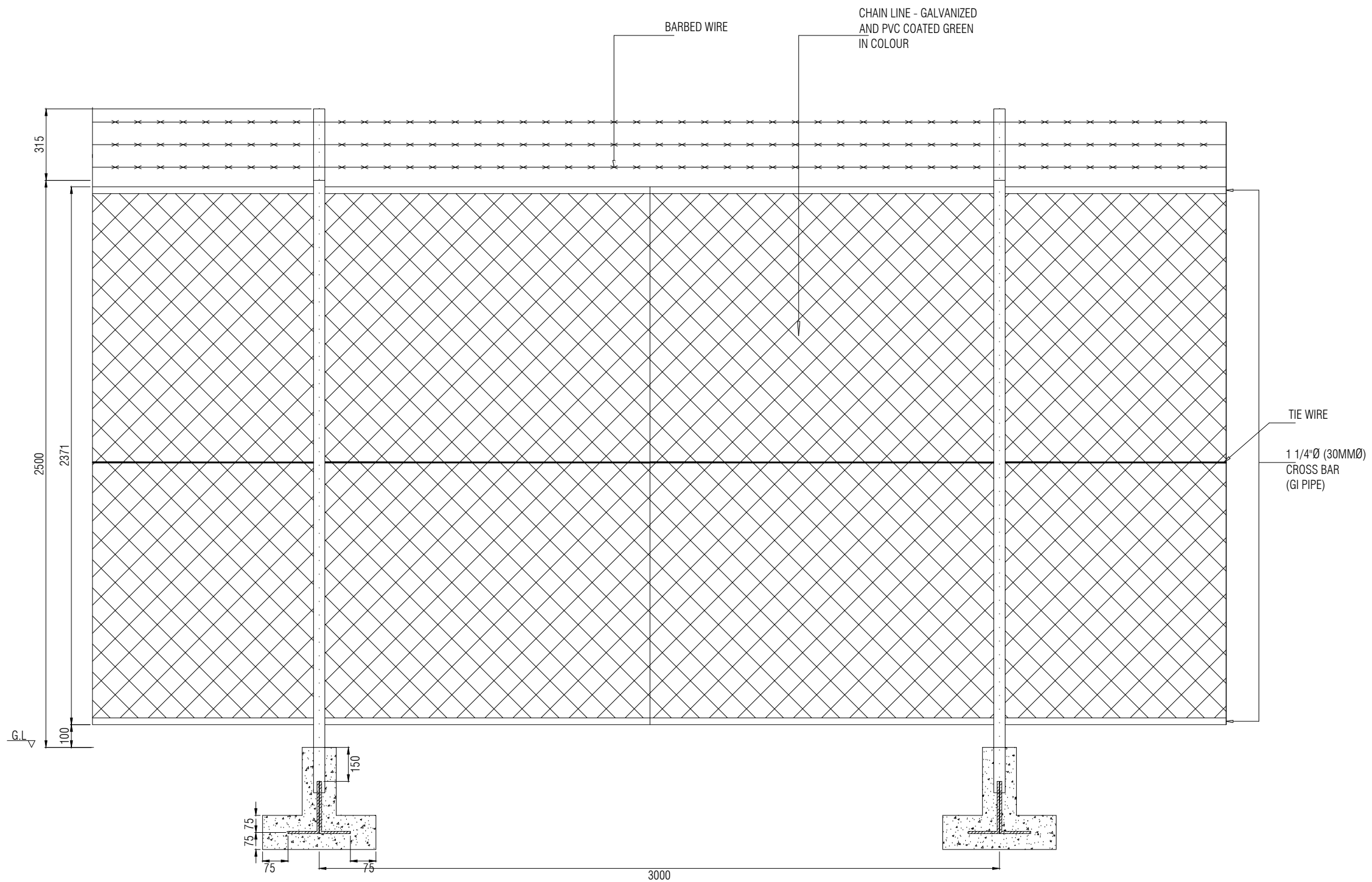
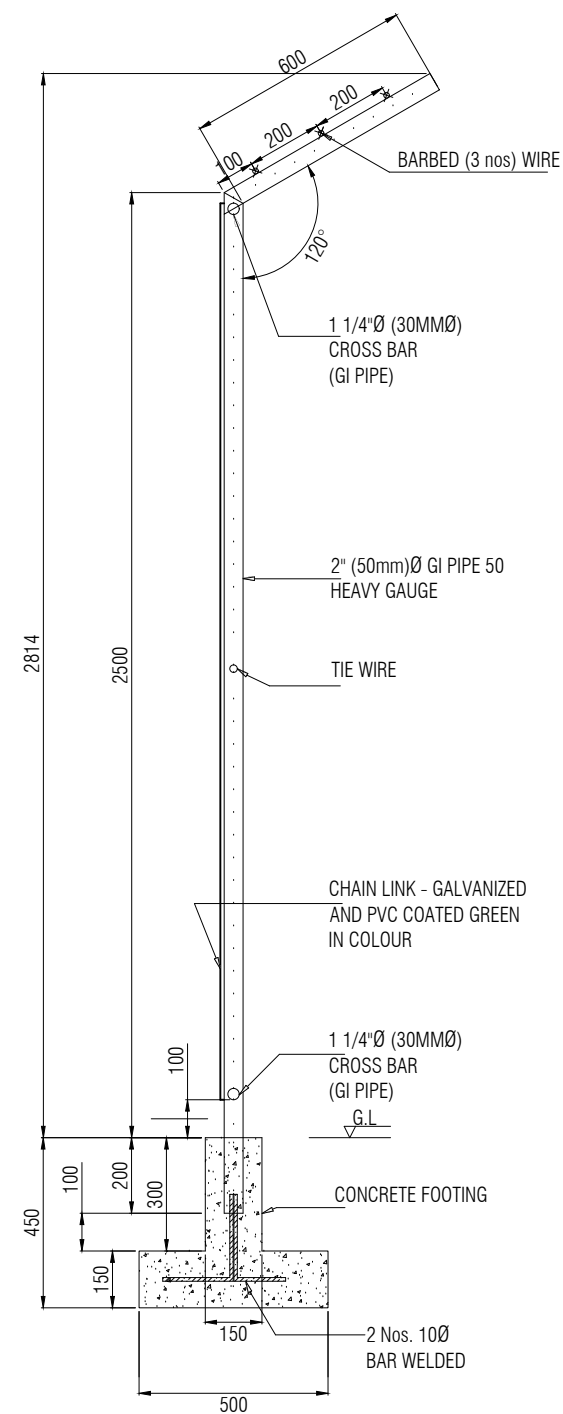
BEACH FENCE SECTIONAL VIEW

SCALE 1:20

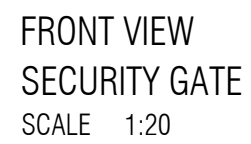
NOTE: EVERY BEACH FENCE WILL BE 25M FROM THE SHORELINE

FOOTING  
BARICADE GATE

1.DETAILS OF FENCE.



## 2.DETAILS OF GATE - 01 Nos.



## **SECTION - 6**

### **Detail Drawings**

[INSERT AFTER DETAILED STUDY]

## **SECTION - 7**

### **Technical Specification and Method Statement**

[INSERT AFTER DETAILED STUDY]

## **SECTION - 8**

### **Bill of Quantities**

## **Bill of Quantities**

The description of the work items of the Bill of Quantities are for identification only, and are not intended to comprise a full comprehensive list of all operations required for completion of the Works. In this respect, this Schedule shall be read in conjunction with the Contract, the Specifications and the Drawings

The Scheduled Lump Sums, rates quoted in this Schedule shall be deemed to cover all the Contractor's obligations, commitments and liabilities under the Contract whether or not the same are particularly mentioned.



























## **SECTION - 9**

### **Other Documents**

