

**ETHIOPIAN AIRLINES GROUP – ETHIOPIAN AIRPORTS**



**DESIGN-BUILD PROJECT SCOPE**

**FOR**

***JINKA, KOMBOLCHA, SHIRE, ROBE, GODE, NEKEMTE  
AND DEMBIDOLO AIRPORTS PASSENGER  
TERMINAL AND OTHER FACILITIES***

# Table of Contents

1.0 PROJECT INTRODUCTION .....	1
1.1 SCOPE.....	1
1.2 FUNDING LIMITATIONS.....	1
1.3 LOCATION.....	1
1.4 BACKGROUND .....	3
1.5 DESCRIPTION .....	3
1.6 SCHEDULE .....	15
1.7 INFORMATION .....	16
1.8 DATA AND MATERIALS TO BE PROVIDED BY THE NPS .....	16
2.0 PROJECT REQUIREMENTS .....	16
2.1 GENERAL REQUIREMENTS .....	16
2.1.1 SCOPE OF WORK AND PROJECT SUMMARY/REQUIREMENTS .....	16
2.1.2 DEFINITION OF CONTRACT LINE ITEMS.....	17
2.1.3 PROGRESS PAYMENTS .....	69
2.1.4 PROJECT MEETINGS.....	69
2.1.5 PROJECT SCHEDULE .....	71
2.2 DESIGN REQUIREMENTS .....	73
2.2.1 DB DESIGN DEVELOPMENT AND CONSTRUCTION DOCUMENTS .....	73
2.2.2 ENVIRONMENTAL AND SUSTAINABILITY REQUIREMENTS FOR DESIGN.....	74
2.3 CONSTRUCTION REQUIREMENTS.....	74
2.3.1 ENVIRONMENTAL AND SUSTAINABILITY REQUIREMENTS FOR CONSTRUCTION:.....	74
2.3.2 SCHEDULE OF VALUES .....	75
2.3.3 CONSTRUCTION SUPPORT.....	75
2.3.4 SUBMITTALS DURING CONSTRUCTION.....	76
2.3.5 CONSTRUCTION COORDINATION.....	77
2.3.6 DIGITAL PHOTOGRAPHS:.....	77
2.3.7 QUALITY CONTROL .....	77
2.3.8 WORKING HOUR RESTRICTIONS .....	80
2.3.9 TEMPORARY SERVICES.....	80
2.3.10 ACCESS .....	81
2.3.11 PRESERVATION OF ADJACENT FEATURES .....	82
2.3.12 EXISTING UTILITIES .....	82
2.3.13 HAULING RESTRICTIONS.....	82
2.3.14 ACCIDENT PREVENTION.....	82
2.3.15 TEMPORARY CONTROLS .....	83
2.3.16 FIELD ENGINEERING.....	83

2.3.17 PROJECT CLOSE-OUT.....	84
2.3.18 SUBSTANTIAL COMPLETION AND FINAL INSPECTION .....	85
2.4 FORMS.....	86
3.0 PERFORMANCE REQUIREMENTS .....	99
3.1 DESIGN IMPERATIVES .....	99
3.2 SUSTAINABILITY.....	99
3.3 INTEGRATED DESIGN PRINCIPLES.....	99
3.4 FACILITY PERFORMANCE.....	99
3.5 ELEMENTS AND PRODUCTS .....	99
4.0 TECHNICAL SPECIFICATIONS .....	102
A SUBSTRUCTURE .....	102
B SHELL .....	102
C INTERIORS .....	102
D SERVICES.....	102
E EQUIPMENT AND FURNISHINGS.....	103
F SPECIAL CONSTRUCTION AND DEMOLITION .....	103
G BUILDING SITEWORK .....	103
SECTION 6B) GENERAL ITEM.....	104
5.0 SPECIFICATIONS FOR ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY MANAGEMENT (ESHS) OF THE WORKS.....	106
APPENDIX A. SOIL INVESTIGATION TEST RESULTS AND REPORTS.....	150
APPENDIX B. ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK.....	151
APPENDIX C. TECHNICAL REQUIREMENTS/SPECIFICATIONS.....	152
APPENDIX D. LISTS OF TERMINAL FURNITURES.....	153

## 1.0 PROJECT INTRODUCTION

### **Project Name: *NEKEMTE, DEMBIDOLO, ROBE, GODE, JINKA, SHIRE AND KOMBOLCHA AIRPORTS PASSENGER TERMINAL***

#### **Project Number:**

##### **1.1 Scope**

In accordance with the terms and conditions of the Contract, the Design-Build Contractor (DBC) shall perform the work of this Request for Proposal (RFP) for the Ethiopian Airports (EA) as described below.

All Architect-Engineer (A-E) Services required in this RFP shall be performed by licensed Architects and Engineers registered in the Ethiopian federal democratic republic or the state of the professional's residence.

##### **1.2 Funding Limitations**

The DBC Team is responsible for providing all design and construction services required for the final total lump-sum firm-fixed amount negotiated with the DBC.

##### **1.3 Location and Climate Condition**

- 1.0. **Robe**: is located in the western part of Ethiopia, Oromia Region, Bale Zone, and Robe Town, this town has a latitude and longitude of 7°7'N 40°0'E with an elevation of 2,492 metres (8,176 ft) above sea level. It is located about 430 kilometres by road from Ethiopia's capital Addis Ababa. The average temperature of the area is 22°C.
- 2.0. **Shire**: is located in Northern part of Ethiopia, Tigray region and Shire town, this town has a latitude and longitude of 14°6'N 38°17'E with an altitude of 1953 meters above sea level. Shire features a Tropical Savanna Climate with average rainfall reaches 905 mm. The daytime temperature is going to reach 23 °c and the temperature is going to dip to 9 °c at night.
- 3.0. **Kombolcha**: is located in Northern part of Ethiopia, Amhara region, South Wello zone and Kombolcha town, it has a latitude and longitude of 11°5'N 39°44'E with an elevation between 1842 and 1915 meters above sea level, the temperature typically varies from 51°F to 84°F and is rarely below 46°F or above 88°F. The average annual rainfall reaches 1248mm in kombolcha.
- 4.0 **Jinka**: is located in Southern part of Ethiopia, SNNP region, Jinka zone and town, Jinka has a latitude and longitude of 5°47'N 36°34'E and an elevation of 1490 meters above sea

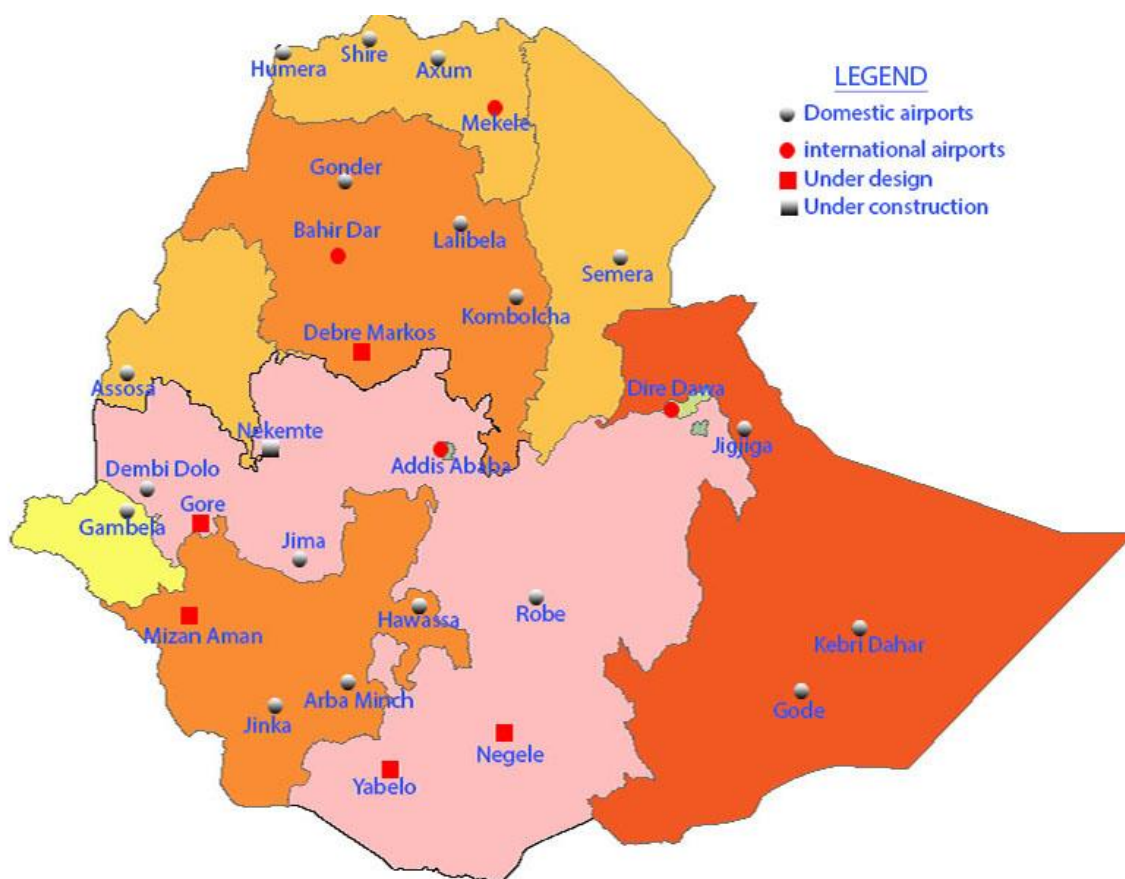
level, the daytime temperature is going to reach 32 °c and the temperature is going to dip to 21 °c at night. The average rainfall reaches 1274mm in Jinka.

5.0. **Gode:** is located in Eastern part of Ethiopia, Somali region and the city has a latitude and longitude of 5°57'N 43°27'E. Gode has a hot desert climate with uniformly very hot weather and scanty, extremely variable rainfall. The average annual temperature in Gode is 28.8 °C or 83.8 °F, and virtually every afternoon exceeds 32 °C or 89.6 °F, whilst mornings seldom fall below 20 °C or 68 °F. The maximum monthly temperature is between 33.5°C and 37.5°C.

6.0. **Nekemte:** is located in western part of Ethiopia, Oromia Region, Wollega Zone, and Nekemte Town, Nekemte has a latitude and longitude of 9°5'N 36°33'E and an elevation of 2,088 meters. The temperature here averages 17.6 °C and the average annual rainfall is 1998 mm.

7.0. **Dembidolo;** is located in the south west of Ethiopia, Oromia Region, Wollega Zone, and Dembidolo Town. This town has a latitude and longitude of 8°32'N 34°48'E with an elevation between 1701 and 1827 meters above sea level. The average temperature for the year in Dembi Dolo is 67.6°F (19.8°C).

**Note:** The bidder shall request any necessary weather/climate datas from Ethiopian Meteorology Agency. [http://www.ethiomet.gov.et/data\\_access/request\\_form](http://www.ethiomet.gov.et/data_access/request_form)



## **1.4 Background**

Ethiopian is established to develop and administer Airports and also perform any other associated activities to enhance and assure safe, reliable and efficient air transportation in the country.

Ethiopian has decided to build new similar (modern and simple structures,functionally the same which takes into consideration the climatic condition of the site) passenger terminal buildings and facilities at **Nekemte, Dembidolo, Shire, Kombolcha, Robe, Gode and Jinka Airports and construction of rigid pavement for Apron and Taxiway at Gode airport** to meet standard airport facilities. In addition, Ethiopian has decided to **widen the Dembidollo Airfield runway strip width from 37.5m to 75m on each side of the center line of the runway** and to **construct a Runway Strip and Runway End Safety Area at Kombolcha Airport** to meet standard requirements. Therefore, Ethiopian is looking for a competent **Design-Build Contractor (DBC)** for developing preliminary design, and preparation of full working drawings based on the schematic design annexed within this document and executes the construction works of the terminal building.

## **1.5 Description**

### **Design Programme**

#### **Domestic Terminal Facilities Analysis**

#### **Required Terminal Facilities Check-list**

### **General Recommendations**

We invite bidders to establish a general master plan for each airport (25 years horizon, the construction under this assignment is the first phase of the master plan) and study the possibility of modular structures. All terminals must be placed within 40m of the APRON edge. The master plan shall show that the constructions under the present assignment can be upgraded at a lesser cost to accommodate the higher traffic envisaged in the master plan (an example of long term horizon that could be considered is 2 planes at peak hour). This shall translate into the design to be proposed by the bidders that shall be evolutive in order to be upgraded to accommodate higher future traffic.

EALG is looking for an innovative design functionalities that would includes a single roof terminal including several features. Under the so called “Canopy concept”, you will be able to take account of several constraints relating to the terminal building :

#### **- Security issues**

- According to Ethiopian law, it is mandatory to have a preliminary security check at the main terminal entrance. For this reason the location of the main restaurant will be located outside the main terminal under a canopy.

- A second security screening area will take place inside the main terminal in order for passengers to board the plane so it means that the main terminal will get a “public” area and a restricted area. All these areas will be only dedicated for passengers.

**- Environment issues**

- The main advantage of the canopy concept is that the roof will be able to accommodate photovoltaic system. A 500kWc installation shall be installed to get a good level of efficiency.
- Bidders shall propose bioclimatic building: Bidders should target environment efficiency in several fields. The master plan could then envisage the upgrade of the terminal to allow installation of other systems such as air conditioning in the future (evolutive building concept). Air conditioning shall be limited to a maximum extent in order to ensure decent level of temperature comfort for passengers, except for the following areas that will be equipped with air conditioning : boarding room, offices, VIP room.
- Bidders shall include water and power meters, LED lights,... in their offer Bidders shall also provide electric GPU in order to feed at the parking the airplanes.
- For buildings, the terminal shall be neutral energy building (demonstration to be provided) and natural ventilation will be implemented to a maximum extent , target LEED (Leadership in Energy Efficient Design) standards (without reaching certification, but put in place in pragmatic manner the solutions ) explore open architecture.
- Air conditioning shall to a maximum extent be limited to VIP room, boarding room and offices, and avoided for the rest except if the airport is situated in a very hot area.

**- Surfaces calculation :**

- Surfaces calculations are mainly based on IATA “optimum” standard. The bidders shall prove that at least IATA optimum standard quality of service is reached for the terminal.

**- Architecture :**

- The design of the terminals to be constructed shall incorporate some architectural ambition, adapted to the environment and the local culture specific to each site.

**A. Major Facilities on the site**

1. Passenger Terminal( with VIP saloon)
2. Fire Fighting Station
3. Generator and transformer house( Out house)

4. Maintenance workshop
5. Pump house
6. Septic tank or any other compatible, efficient and economical waste water treatment plant and sub-surface sand filter
7. Emergency Access Road
8. Water source investigation, Water development and Construction and water supply distribution system design and construction
9. Well Graded Runway Strip and Runway End Safety Area Design and Construction at Kombolcha Airport
10. Watch Towers, Apron and Taxiway Design and Construction with Rigid Pavement for Gode Terminal only
11. Runway Strip Widening for Dembidollo Airport
12. Perimeter Fence, Security Fence and Watch Towers for Nekemte Airport

## **B. Major Functions in the Terminal and terminal area**

1. Car parking( including future expansion)
2. Curbside areas
3. Baggage make up and break down
4. Departure
5. Check in
6. Arrival
7. VIP departure and Arrival

## **C. PAX processing Hall**

### **1.0 Departure**

- 1.1 Baggage check-in hall
- 1.2 Airline counters
- 1.3 Office
  - 1.3.1 Airport offices
  - 1.3.2 Airline offices
  - 1.3.3 Airport security offices
- 1.4 Cashier's desk
- 1.5 Porters' room & amenities
- 1.6 Preflight assembly areas
- 1.7 Trolley, wheel chair parking area
- 1.8 Information boards
- 1.9 Common facilities
- 1.10 Departure lounge
- 1.11 V.I.P. lounge



## **2.0 Arrivals**

- 2.1 Pre-reclaim Waiting area
- 2.2 Baggage reclaim
- 2.3 Lost baggage store
- 2.4 Offices
  - 2.4.1 Airport offices
  - 2.4.2 Airline offices
  - 2.4.3 Airport security offices
- 2.5 Taxi/hotel reservation counters and booth
- 2.6 Desk/ direct telephone counter
- 2.7 Tourist information counters and booth
- 2.8 Porters room and amenities
- 2.9 Trolley/ wheelchair parking
- 2.10 Message board
- 2.11 Information board

## **3.0 Airside Operation**

- 3.1 Airside operation offices
- 3.2 Airline offices
- 3.3 Airport security offices
- 3.4 Baggage make-up area
- 3.5 Baggage break-down area
- 3.6 Security check area
- 3.7 X-ray
- 3.8 Baggage hold rooms
  - For airline purposes
  - For security purposes
- 3.9 Ramp operations
- 3.10 Airline employees locker rooms
- 3.11 Security employees locker rooms
- 3.12 EAE employees lockers room
- 3.13 Toilets and shower rooms

## **D. FACILITIES TO BE INCLUDED IN THE TERMINAL**

### **1.0 Equipment**

- 1.1 Baggage handling System
- 1.2 Security equipment
- 1.3 X-rays
- 1.4 Walk through

- 1.5 Building system ( MEP)
  - 1.5.1 Storm water drains and sewers
  - 1.5.2 Sanitary drains and sewers
  - 1.5.3 General lighting and power
    - 1.5.3.1 Terminal lighting
    - 1.5.3.2 Exterior Airside and landside
- 1.6 Communication system
  - Telephone and intercom system
  - Public address system
  - Flight Information Display System, FIDS
- 1.7 Signage
- 1.8 Water supply – main and standby
- 1.9 Power supply – main and standby
- 1.10 HVAC System ( Depending on the temperature of the specific terminal is located)
- 1.11 Garbage disposal system
- 1.12 Fire fighting and prevention system
  - 1.12.1 Sprinkler system
  - 1.12.2 Hydrant points
- 1.13 Digital Advertising Equipments

## **2.0 Furnishing**

- 2.1 Airline check – in counters
- 2.2 Counters( Check in, Gate and information )
- 2.3 Information
- 2.4 Hold rooms/ public areas/ arrival halls
- 2.5 Offices/terminal services

### **Note:**

- The bidder is expected to furnish the terminal building and other facilities as per the attached lists of terminal furnitures. The bidder shall submit a sample of furnitures to Employer's Representative and Employer for review and approval.
- The DBC can propose furnitures with in state of the art during furnishing of the terminal building and facilities other than furnitures listed in this terms of reference.
- The bidder shall include if any items/furnitures are missed in the attached list of terminal furnitures and additional furnitures for complete operation of the airport.

### **Area Requirements for Terminal Building**

✎ **N.B:-** *The Design Program data and the area given is indicative and not limited to the ones mentioned below rather the designer is required to present more details which may be missed by the client to make sure all necessary standard requirements fulfilled.*

**I) FOR LARGE SIZE TERMINALS (NEKEMTE, ROBE, GODE, JINKA, SHIRE AND KOMBOLCHA)**

**A. TRAFFIC FUNCTION**  
**INSIDE TERMINAL**

***A.1. PASSENGER SECURITY SCREENING TO GET TO TERMINAL***

- Originating Peak Hour Passengers (pax) .....118
- Peak 30-minute Factor (in % of PHP).....50%
- Process Time per passenger at Security (in seconds).....35
- Maximum Queuing Time (in minutes) MQT : 10
- Depth of One Security Lane (in meters) SECd : 18
- Width of One Security Lane (in meters) SECw : 7
- Number of security screening lanes..... 1
- Space per Person (in m<sup>2</sup>) .....1,5
- Circulation corridor behind the queue (in meters) W : 2
- 2 Booths (in m<sup>2</sup>) .....6
- Required area for the complete service area (in m<sup>2</sup>) .....173

***A.2. CHECK-IN***

- For Economy, Business and First Class Passengers
- Originating Peak Hour Passengers (pax) PHP : 118
- Peak 30-minute Factor (in % of PHP) PK : 50%
- Ratio of Passengers Using Traditional Check-in Facilities (in %) .....80%
- Process Time per Passenger at Service Desks (in seconds) .....120
- Maximum Queuing Time (in minutes) MQT1 : 5
- Calculate the required area for the complete service area
- Depth of the Check-in Process Area (in meters) CDd : 6,5
- Provision for counter depth, a conveyor belt and the process area for passengers and a courtesy distance between desks and queue
- Width of One Service Desk (in meters) CDw : 2,1
- Circulation corridor behind the queue (in meters) W : 22
- Number of traditional Check-in Desks .....3
- Oversize Luggage Desk .....1
- Cashier desk (in m<sup>2</sup>) .....15
- Space per Person (in m<sup>2</sup>) .....1,52
- Required area for the complete service area (in m<sup>2</sup>) .....110

***A.3. PASSENGER SECURITY SCREENING TO GET TO BOARDING LOUNGE***

- Process Time per passenger at Security (in seconds) .....25
- Maximum Queuing Time (in minutes) MQT : 10
- Depth of One Security Lane (in meters) SECd : 18

- Width of One Security Lane (in meters) SECw : 5
- Number of security screening lanes .....1
- Space per Person (in m<sup>2</sup>) .....1
- Circulation corridor behind the queue (in meters) W : 2
- 2 booths for personal checking (in m<sup>2</sup>) .....6
- Required area for the security screening process (in m<sup>2</sup>)..... 123

**A.4. DEPARTURE LOUNGE - BOARDING GATES**

- Originating Peak Hour Passengers (pax) .....118
- Aircraft Load Factor (in %)LF : 100%
- Seat Ratio (in %) .....60%
- Space per Seated Person (in m<sup>2</sup>) .....1,5
- Space per Standing Person (in m<sup>2</sup>) .....1
- Additional Space Ratio to account for boarding operation (in %) .....15%
- Required area for the gate lounge (in m<sup>2</sup>) .....177

**A.5. VIP LOUNGE**

- Ratio of Passengers in VIP Lounge (in %) .....10%
- Space per Person (in m<sup>2</sup>) .....2,5
- Toilets and pantry (in m<sup>2</sup>) .....30
- Required area for the VIP lounge (in m<sup>2</sup>) ..... 75

**A.6. BAGGAGE CLAIM AREA**

- Terminating Peak Hour Passengers (pax) .....118
- Ratio of passengers collecting bags (in %) .....80%
- Recirculation rate (in %) .....15%
- Claim frontage per passenger (in meters) .....0.85
- Unclaimed Baggage counter and office (in m<sup>2</sup>) .....15
- Storage for unclaimed office (in m<sup>2</sup>) .....15
- Carousel width (in meters) Cw : 6
- Side buffer to allow passenger movement around the reclaim belt (total meters for both side)SB : 5
- End buffer to allow passenger movement around the reclaim belt (total meters for both side)EB : 10
- Required area for the baggage claim area (in m<sup>2</sup>) .....212

**A.7. LIGHT BAR**

- Light Bar for 30 people (including kitchen) .....60
- Required area (in m<sup>2</sup>) .....60

## OUTSIDE TERMINAL (UNDER CANOPY)

### **A.8. PUBLIC DEPARTURE + ARRIVALS HALL**

• Peak Hour Passengers (pax).....	236
• Dwell Time for Passengers (in minutes) .....	20
• Dwell Time for Visitors (in minutes) .....	30
• Ratio of visitors per Passenger (pax) .....	3
• Space per Seated Person (in m <sup>2</sup> ).....	1,5
• Space per Standing Person (in m <sup>2</sup> ).....	1
• Seat Ratio .....	20%
Required area for the public departure + arrivals hall (in m <sup>2</sup> ).....	600

### **A.9. BAGGAGE MAKE-UP**

• Convoyor width behind check-in desks (in meters) (including maintenance area)CB1w : 2	
•Roller table length behind convoyor (in meters) CB2l : 15	
•Roller table width behind convoyor (in meters) (including protection rail) CB2w : 2	
•Number of pieces of luggage per passenger .....	2
• Number of pieces of luggage per cart.....	30
• Number of cart.....	7
• Space for 1 cart (in m <sup>2</sup> ).....	15
Required area for baggage make-up (in m <sup>2</sup> ).....	152

### **A.10. BAGGAGE BREAK-DOWN AREA**

•Convoyor length before baggage claim area (in meters) CB3l : 20	
•Convoyor width before baggage claim area (in meters) (including protection rail) CB3w : 2	
• Number of pieces of luggage per passenger .....	2
• Number of pieces of luggage per cart.....	30
• Number of cart.....	7
• Space for 1 cart (in m <sup>2</sup> ).....	15
Required area for break-down area (in m <sup>2</sup> ).....	145

**TOTAL TRAFFIC FUNCTION INSIDE THE TERMINAL (in m<sup>2</sup>).....930**

**TOTAL TRAFFIC FUNCTION OUTSIDE THE TERMINAL (in m<sup>2</sup>).....897**

**GRAND TOTAL.....1,827**

**B.ADMINSTRATIVE & COMMERCIAL FUNCTIONS**  
**INSIDE TERMINAL**

**B.1. MANAGEMENT OFFICES**

a. General Manager .....	18
b. Secretary .....	12
c. Meeting room.....	40
d. Terminal Technical office .....	60
e. Airline office .....	40
Required area (in m <sup>2</sup> ) .....	170

**B.2. AIRLINE OFFICES**

• Check-in operation 2 x 12m <sup>2</sup> + staff room 12m <sup>2</sup> .....	36
• Clinic 12m <sup>2</sup> + storage 12m <sup>2</sup> .....	24
• Apron operations 12m <sup>2</sup> .....	12
• Lost and found luggage .....	15
Required area (in m <sup>2</sup> ) .....	87

**B.3. SECURITY**

• office / staff .....	18
• Search .....	12
Required area (in m <sup>2</sup> ) .....	30

**B.4. CONCESSION**

•Banks/Currency exchange .....	10
• rental for concessionaries / Flowers selling counter .....	20
• Handicrafts products .....	50
Required area (in m <sup>2</sup> ) .....	80

**TOTAL ADMINITRATIVE AREAS (in m<sup>2</sup>).....367**

**OUTSIDE TERMINAL**

**B.5. IN THE PUBLIC AREA**

• Restaurant for 150 people (including kitchen) .....	300
Required area (in m <sup>2</sup> ) .....	300

**TOTAL COMMERCIAL AREAS (in m<sup>2</sup>).....300**

**GRAND TOTALS**

**GRAND TOTAL AREA INSIDE TERMINAL.....930+367= 1297**

**Ratio of circulation,toilets,etc i inside terminal.....20% of (1297)= 260**

**GRAND TOTAL AREA OUTSIDE TERMINAL.....897+300= 1197**

**GRAND TOTAL AREA (in m<sup>2</sup>).....1297+260+1197= 2,754**

## **ID)FOR SMALL SIZE TERMINAL (DEMBIDOLO)**

### **INSIDE TERMINAL**

#### **A.1. PASSENGER SECURITY SCREENING TO GET TO TERMINAL**

- Originating Peak Hour Passengers (pax) .....60
- Peak 30-minute Factor (in % of PHP).....50%
- Process Time per passenger at Security (in seconds).....35
- Maximum Queuing Time (in minutes) MQT : 10
- Depth of One Security Lane (in meters) SECd : 9
- Width of One Security Lane (in meters) SECw : 7
- Number of security screening lanes..... 1
- Space per Person (in m<sup>2</sup>) .....1,5
- Circulation corridor behind the queue (in meters) W : 2
- 2 Booths (in m<sup>2</sup>) .....6

Required area for the complete service area (in m<sup>2</sup>) .....97

#### **A.2. CHECK-IN**

- Ratio of Passengers Using Traditional Check-in Facilities (in %).....80%
- Process Time per Passenger at Service Desks (in seconds) .....120
- Number of traditional Check-in Desks .....2
- Oversize Luggage Desk .....1
- Cashier desk (in m<sup>2</sup>) .....15
- Space per Person (in m<sup>2</sup>) .....1,5

Required area for the complete service area (in m<sup>2</sup>) .....78

#### **A.3. PASSENGER SECURITY SCREENING TO GET TO BOARDING LOUNGE**

- Process Time per passenger at Security (in seconds) .....25
- Maximum Queuing Time (in minutes) MQT : 10
- Depth of One Security Lane (in meters) SECd : 18
- Width of One Security Lane (in meters) SECw : 5
- Number of security screening lanes .....1
- Space per Person (in m<sup>2</sup>) .....1
- Circulation corridor behind the queue (in meters) W : 2
- 2 booths for personal checking (in m<sup>2</sup>) .....6

Required area for the security screening process (in m<sup>2</sup>)..... 117

#### **A.4. DEPARTURE LOUNGE - BOARDING GATES**

- Originating Peak Hour Passengers (pax) .....60
- Aircraft Load Factor (in %)LF : 100%
- Seat Ratio (in %).....60%
- Space per Seated Person (in m<sup>2</sup>) .....1,5

•Space per Standing Person (in m <sup>2</sup> ) .....	1
•Additional Space Ratio to account for boarding operation (in %) .....	15%
Required area for the gate lounge (in m <sup>2</sup> ) .....	90

**A.5. VIP LOUNGE**

• Ratio of Passengers in VIP Lounge (in %) .....	10%
• Space per Person (in m <sup>2</sup> ) .....	2,5
• Toilets and pantry (in m <sup>2</sup> ) .....	30
Required area for the VIP lounge (in m <sup>2</sup> ) .....	75

**A.6. BAGGAGE CLAIM AREA**

• Terminating Peak Hour Passengers (pax) .....	60
• Ratio of passengers collecting bags (in %) .....	80%
• Recirculation rate (in %) .....	15%
• Claim frontage per passenger (in meters) .....	0.85
• Unclaimed Baggage counter and office (in m <sup>2</sup> ) .....	15
• Storage for unclaimed office (in m <sup>2</sup> ) .....	15
•Storage for unclaimed office (in m <sup>2</sup> ) Sub : 15	
•Carousel width (in meters) Cw : 6	
•Side buffer to allow passenger movement around the reclaim belt (total meters for both side) SB : 5	
•End buffer to allow passenger movement around the reclaim belt (total meters for both side) EB : 10	
Required area for the baggage claim area (in m <sup>2</sup> ) .....	179

**A.7. LIGHT BAR**

•Light Bar for 30 people (including kitchen) .....	40
Required area (in m <sup>2</sup> ) .....	40

**OUTSIDE TERMINAL (UNDER CANOPY)**

**A.8. PUBLIC DEPARTURE + ARRIVALS HALL**

• Peak Hour Passengers (pax) .....	120
• Dwell Time for Passengers (in minutes) .....	20
• Dwell Time for Visitors (in minutes) .....	30
• Ratio of visitors per Passenger (pax) .....	3
• Space per Seated Person (in m <sup>2</sup> ) .....	1,5
• Space per Standing Person (in m <sup>2</sup> ) .....	1
• Seat Ratio .....	20%
Required area for the public departure + arrivals hall (in m <sup>2</sup> ) .....	360



**A.9. BAGGAGE MAKE-UP**

- Convoyor width behind check-in desks (in meters) (including maintenance area)CB1w : 2
- Roller table length behind convoyor (in meters) CB2l : 15
- Roller table width behind convoyor (in meters) (including protection rail) CB2w : 2
- Number of pieces of luggage per passenger .....2
- Number of pieces of luggage per cart.....30
- Number of cart.....7
- Space for 1 cart (in m<sup>2</sup>).....15
- Required area for baggage make-up (in m<sup>2</sup>) .....140

**A.10. BAGGAGE BREAK-DOWN AREA**

- Convoyor length before baggage claim area (in meters) CB3l : 20
- Convoyor width before baggage claim area (in meters) (including protection rail) CB3w : 2
- Number of pieces of luggage per passenger .....2
- Number of pieces of luggage per cart.....30
- Number of cart.....7
- Space for 1 cart (in m<sup>2</sup>).....15
- Required area for break-down area (in m<sup>2</sup>) .....140
- TOTAL TRAFFIC FUNCTION INSIDE THE TERMINAL (in m<sup>2</sup>).....676**
- TOTAL TRAFFIC FUNCTION OUTSIDE THE TERMINAL (in m<sup>2</sup>).....640**
- GRAND TOTAL.....1,316**

**B. ADMINSTRATIVE & COMMERCIAL FUNCTIONS**

**INSIDE TERMINAL**

**B.1. MANAGEMENT OFFICES**

- General Manager .....18
- Secretary .....12
- Meeting room.....40
- Terminal Technical office .....60
- Airline office .....40
- Required area (in m<sup>2</sup>) .....170

**B.2. AIRLINE OFFICES**

- Check-in operation 2 x 12m<sup>2</sup> + staff room 12m<sup>2</sup>.....36
- Clinic 12m<sup>2</sup> + storage 12m<sup>2</sup>.....24
- Apron operations 12m<sup>2</sup>.....12
- Lost and found luggage .....15
- Required area (in m<sup>2</sup>) .....87

**B.3. SECURITY**

- office / staff .....18
- Search.....12
- Required area (in m<sup>2</sup>) .....30

**B.4. CONCESSION**

- Banks/Currency exchange .....10
- rental for concessionaries / Flowers selling counter .....20
- Handicrafts products .....50
- Required area (in m<sup>2</sup>) .....80

**TOTAL ADMINITRATIVE AREAS (in m<sup>2</sup>).....367**

**OUTSIDE TERMINAL**

**B.4. IN THE PUBLIC AREA**

- Restaurant for 150 people (including kitchen) .....200
- Required area (in m<sup>2</sup>) .....200

**TOTAL COMMERCIAL AREAS (in m<sup>2</sup>).....200**

**GRAND TOTALS**

**GRAND TOTAL AREA INSIDE TERMINAL.....676+367= 1043**

**Ratio of circulation,toilets,etc inside terminal.....20% of (1043)= 210**

**GRAND TOTAL AREA OUTSIDE TERMINAL.....640+200= 840**

**GRAND TOTAL AREA (in m<sup>2</sup>) .....1043+210+840= 2,093**

**1.6 Schedule**

Design Development Documents are not Notice To Proceed work but tied to award of the project.Execution of work will commence within 15 days after award. Consider the 15 calendar day allowance when figuring calendar day requirements for Design Development Documents since that is calendar days from award of the contract.

The Design work in this RFP shall be completed in accordance with the master schedule to be submitted by the DB Contractor for:

- DB Design Development Documents
- 100% Draft DB Construction Documents
- Complete Stamped and Signed DB Construction Documents

**Construction:**

The design build work should be completed no later than **540** calendar days after award of the contract.

**As-built Drawings:**

As- built Drawings completed no later than **21** calendar days after Project Completion.

All DB Design Development, DB Construction Documents and As- built Drawings shall be submitted to the *Engineer*.

**1.7 Information**

*ET group* Points of Contact:

Attention: **Eshetu Ermiaas** Floor/Room number:

**Procurement & Supply Chain Management Department**

Street Address: **Ethiopian Airlines Head Office, Africa avenue, Bole International Airport**

City: **Addis Ababa**

Post Code: **1755**

Country: **Ethiopia**

Telephone: **011-517-4552/8024/4028**

Facsimile number: **011-517-8787**

**E-mail address: [EshetuE@ethiopianairlines.com](mailto:EshetuE@ethiopianairlines.com)**

**1.8. Data and Materials to be provided by the EA**

The following data and materials will be provided to the DBC and are included in Section 5 of this RFP:

- Schematic Design
- Design Checklists

**2. PROJECT REQUIREMENT**

**2.1 GENERAL REQUIREMENTS**

**2.1.1 SCOPE OF WORK AND PROJECT SUMMARY/REQUIREMENTS**

The project will consist of the design and construction of

- Main terminal building,
- Support facilities including
  - Fire fighting station,
  - Pump house,
  - Generator house,
  - Guard house
  - Transformer house
  - Maintenance workshop and

- Emergency Access Road
- Site works including
  - Curbsides
  - Parking areas
  - Access roads which connect with the existing access road from the airport to local network
  - Pedestrian walk ways
  - Vegetation and landscaping
- Design and Construction of Well Graded Runway Strip and Runway End Safety Area at Kombolcha Airport
- Widening of Runway Strip at Dembidollo Airport
- Perimeter Fence, Security Fence and Watch Towers at Nekemte Airport
- Water source investigation, development, supply design and construction
- Police Watch Towers, Apron and Taxiway Design and Construction with Rigid Pavement at Gode Airport.

The project will include, but not be limited to, the following:

- Review the design program provided in the RFP package.
- Review the Schematic Design provided in the RFP package.
- Review site data.
- Provide survey.
- Upon award, determine and provide design schedule of work
- Perform geotechnical analysis
- Design site, site utilities, building and foundation system
- Submit DB Design Development and DB Construction Documents for review and approval, as required
- Provide schedule of construction work.
- Secure work area and provide for continued access to the facility
- Construct project
- Create and provide operations and maintenance manual
- Provide as-built drawings
- Perform Hydrological Analysis

### **2.1.2 Definition of Contract Line Items**

The intent of this section is to explain, in general, what is included in each contract line item, limits or cut-off points where one item ends and another begins. If no item exists for a portion of the work, include the costs in a related line item.

## **ITEM NO. 1 – DESIGN:**

This item consists of the requirements to be included in each discipline of the design firm which is responsible for the design preparation.

✍️ **N.B:-** *The Contractor has to come with a design consultant to do the design work. The design consultant shall :*

- Have extensive international experience in carrying design for airport terminal. It shall be able to prove more than 5 references for the same kind of projects (in terms of magnitude and type).
- Have extensive international experience in carrying design work for airport terminal with high environmental and energy efficiency targets. It shall be able to prove more than 3 references for the same kind of projects (in terms of magnitude and type and with high environmental and energy efficiency targets).

✍️ *The contractor can consider local consultant (sub-consultant) to help in facilitating local building design requirement.*

✍️ *The bidder shall attach in the bid a signed memorandum of understanding with the consultant.*

### **A) Architectural Design Requirements**

The services to be performed by the Design-Build firm are;

#### **I) Developing preliminary design**

- Surveying of the site
- Develop design concepts based on climatic condition of the site
- Develop alternative conceptual designs with respect to form and function
- Develop preliminary design to harmonize with the climatic condition of the area.
- Study and review design program
- Design report with estimated cost
- Preparation of site plan in Scale 1:500 or whatsoever is appropriate.
- Preparation of preliminary drawings including main plans, sections, elevations and other drawings as required in Scale 1:100.
- 3D images
- Soft copies of all documents
- All drawings shall be with proper graphic presentation

#### **II) The Preparation of Final Drawings and Documents**

- The preparation of Architectural drawings, including plans, sections and elevations in to a scale of 1:50 as well as detailed drawings to a larger scale as may be found necessary to enable the construction of the Works to proceed without further reference.

- Working drawings as required in the checklist that shall be fully informative in terms of graphic presentation, leveling and dimensions. This includes all necessary detail drawings and schedules in addition to layout drawings.
- The preparation of structural drawings in to a scale 1:50 based on appropriate engineering analysis of loads, stresses, deflections and strength of materials, including detailed statistical scheme and calculation and detailed drawings to a larger scale as may be found necessary.
- The preparation of drawings for sanitary installations, fire hydrant, and mechanical installation as required to a scale of 1:50 and detailed drawings to a larger scale as may be found necessary.
- The preparation of drawings for electrical installations for lighting and service, public address, fire alarm system etc. as required in scale of 1:50 and detailed drawings to a larger scale as may be found necessary.
- The preparation of electro mechanical system complete drawings, specification and bills of quantities and technical specification wherever necessary.
- The preparation of a set of construction contract documents includes specification, a bill of quantities
- Final design report: - A final design report where applicable dealing with:
  - Natural light and ventilation requirements and determinations of opening size and location
  - Acoustic and noise control
  - Electro mechanical system
  - Fire protection and means of escape
  - Materials and construction of building components and their resistance to the effects of heat, sound and fire and others.
- 3D image showing the final design and could be used for construction site billboard.
- Soft copies of all documents
- 3D model with appropriate scale showing all site elements and building blocks.

### **III) Plans and Working Drawings**

- Contractor is responsible for the design and will be required to provide project Construction Documents to EA/Employer's Representative for review and approval.
- The Contractor shall construct the Project in accordance with the Released construction Documents.
- Keep one full set of the Released construction documents on the project site during construction duration.
- Reviews, inspections, tests, and approvals conducted by EA/Employer's Representative and others acceptance/approval will not absolve the Contractor's obligation under the contract of the materials or Work reviewed, tested, or inspected.

EA/Employer's Representative may reject or accept any Work or materials, request changes, and/or identify additional Work that must be done to bring the project into compliance with contract requirements at any time prior to the Final acceptance of the contract, whether or not EA/Employer's Representative or any such Persons conducted previous reviews inspections, tests, or approvals. The Contractor shall not be relieved of obligations to perform the Work in accordance with the contract Documents or any of its obligations, by reviews, tests, inspections, or approvals performed by any Persons, or by any failure of any Person to take such action.

- Shop and working drawings shall be reviewed and approved by the Employer's Representative who prepared the Project Design Documents. Work shall not be performed or materials ordered until working drawings for such work, or changes thereto, are approved. Such approval shall not relieve the Contractor of responsibility for the successful completion of the Work.
- The Contractor shall be responsible for agreement of dimensions and details as well as for conformity of his working drawings with the contract. The Contractor shall indicate all deviations from the contract and shall also itemize and explain all deviations in the letter of transmittal.
- Upon receipt of an approved copy of the shop working drawings, the Contractor shall furnish to EA/Employer's Representative:
  - Two approved sets of prints
  - An electronic file that is viewable and printable with EA/Employer's Representative hardware and software.

## **B) Basic Structural Design Requirements**

- Topographical soil water will be provided by EALG using studies carried for the runway. All risks linked to soil, topography and water shall be borne by the bidder and fully integrated in the bid price.
- The bidders shall also make sure that the design takes into account climate change and more generally all environmental risks. The design of the infrastructures to be constructed shall be climate resilient.
- The bidders shall carry an assessment of the vulnerability to climate change of the constructions and proposals for adaptation shall be made in the design.
- Geotechnical investigation (soil test) at the site shall be conducted and test result and report shall be submitted.
- Topographic surveying shall be conducted and present/submit the result that corresponds with standard drawing and data requirements.
- Structures shall be designed and built to safely resist all actions/loads (DL, LL, Wind, Seismic and others) that they are likely to face during their service life, while remaining fit for use.

- Structural Analysis and design: –
  - Appropriate standard codes shall be applied to be able to conduct full assessment and analysis.
  - 3D modeling of structural framing system for the terminal and other building shall be prepared, analyzed and designed by appropriate latest structural design software's.
  - Foundation design shall be done as per geotechnical investigation report or soil test result (Allowable bearing capacity).
  - Design materials shall be compatible with architecture and environment.
  - All structural components of the terminal and other buildings shall be designed.
  - Material strength of steel structures, bolt grade and plates shall be verified and approved.
  - Roofing and Truss systems shall be analyzed and designed in detail as per the architectural design.
  
- Structural layout plans of various structural elements, Working and detail drawings including connection details (through sections and plans) shall be prepared.
  - Specifications must be correct, complete & consistent with the design and drawings.
  - The design, drawing and BOQ shall be consistent each other.
  - Design report on basic structural design considerations and special design concepts, if any, applicable to the project shall be prepared and submitted.

**Deliverables:** -

- Geotechnical Investigation (Soil Test) Report including soil test result and recommended solutions
- Topographic Surveying Report
- 3D Modeling of Structural Framing System
- Design Report (Statical Calculation Report) on basic structural design considerations and special design concepts, if any, applicable to the project
- Structural layout plans (foundation, column, beam and etc.) of various structural elements in appropriate scale showing major sizes and dimensions
- Structural details (through sections and plans) for various structural elements to further elaborate the structural layouts. These details have to show reinforcement configurations to a scale of 1:20, wood and steel structural systems to a scale of 1:20 or 1:10
- Bar Bending Schedules
- Proposed foundation types
- Proposed roofing and truss systems



**NB: -**

- ✍ The required detail structural design and drawings is not limited to the ones mentioned here above rather the designer is required to present more details which may be missed by the client to make sure all necessary detail drawings are not left out during the future construction process.*
- ✍ All final structural design deliverables (final working drawings/design documents) has to be based on the preliminary design and comments suggested by the Employer or Employer's Representative and approved options at preliminary design stage. The final design documents have to be prepared and submitted to the Employer and Employer's Representative in two (2) copies for each document both in hard copy and soft copy.*

**C)Sanitary Design Requirements**

**I.General**

In the designs and construction of sanitary works of the area where aviation activities are undertaking designer be sure that his /her design criteria are taken into account the compliance of the airport operation requirements in his deliverables. Considering this point the service to be render for the sanitary design, the designer shall include but not limited to:-

**II.Extent and scope of tasks**

**1. Water Supply System**

- i. Conduct demand analysis and indicate the source of water (this shall include drilling of sufficient number of wells complete with pumping system system) for **Nekemet, Shire, Kombolcha, Gode and Robe and Dembidolo**. Consider one well is already drilled for **Jinka Airport** with a safe yield of 8.5lit/sec for 12 hrs pumping airports and its adequacy for
  - Domestic Use
  - Fire Fighting
  - Gardening...if any
- ii. Domestic and Fire Fighting water storage ,Distribution system , Pump and Pump House Designs, includes
  - Storage including structural Design and distribution system layout and riser diagram
  - Type and size of pipes
  - Pipe and size of fittings and their details
  - Type and size of indoors and outdoors fire hydrants and fire fighting system
  - Type, size ,arrangement and capacity of Pumps and their mode of operation

iii. Passenger Terminal Building Internal water supply system Design

## **2. Waste water and Dry waste collection and Disposal system**

i. Identify and discuss the waste water storage or discharging point and its adequacy with all its detail (sanitary and Structural) requirement

- ii. Design and details (sanitary and Structural) of the type and size of
- a. Waste water conveyance both internal and site sanitary system
  - b. Manhole, mud collector and Oil separator
  - c. Waste conveyance line, their adequacy and profile
  - d. Dry waste collection, storage and disposal system requirements

## **3. Storm Water Collection and Disposal system**

- i. Clearly discuss and design
- a. Roof drainage layout collection points
  - b. Surface /site drainage system
- i. Design and details of the type and size of
- a. Storm water drainage conveyance utilities and their Profiles
  - b. Rain water manholes and silt collector and their adequacy of flow

## **4. Water Source Study and Investigation , Airport Water Supply System Study and design**

In the Water Source Investigation and Water supply system development activity to Five Airports (**Nekemte, Dembidollo, Jinka, Shire, Kombolcha, Gode and Robe**). In this case the two airports Jinka and Dembidollo, they are at different stages and hence in this section will have activities shown below in the bullets (this shall include drilling of sufficient number of wells complete with pumping system for Nekemte, Shire, Kombolcha, Gode and Robe Airports only, in the case of Dembidollo ground water investigation study is already performed. The Design Build Contractor is expected to review the investigation study report and amend accordingly. etc.);

### **1. Nekemte, Shire, Kombolcha, Gode and Robe Airports**

- 1. Water Source Investigation and Development Design,
- 2. Airport Water supply system Design

### **2. Dembidollo Airport**

- 1. Review the water source investigation study report, amend accordingly, if any
- 2. Airport water supply system design

The Bidder will be expected to perform the following tasks as per the requirements in each respective airport specified above.

### **1. Water source Investigations and development Design**

The major tasks that the Bidders are expected to execute , but not limited to;

- a. Conduct Reconicense survey on the water source potential in the areas
- b. Produce inception report
- c. Collect and analyze all relevant primary and secondary data that exists on the water source of the of the area. These include:
  - Conduct technical inventories on the existing and and none exploited potential water resource of the area by type, quantity,quality and potential...etc
  - Review Exisiting water supply system and demand
  - Socio Economic condition of the Airport Vs Surrounding community
  - Identify on the types of water sources potential in the area
  - Analysis of the collected data, and identification of water source for further exploration
  - Conduct feasibility study on the number and type of water sources.
  - Develop the feasibility study report on the selected water source type (the feasibility study shall include not only the potential that is to meet the demand but also the technical and enviromental challenges in the course of development , cost of development, challenges in the operation after development, and system running cost, Impacts water souce development on the environment in general and the surrounding community in particular...etc)
  - Analyse the selected water source potential of its capacity on meeting the airport demand and other users,if any.
- d. Identify water source site for development with several options if possible.
- e. Based on the existing and projected demand as well as the estimated water amount to be attain design the size water source development infrastructure.
- f. Produce and submit water source Investigation study, source design report with specification and bill of quantities.

## **2. Airport Water Supply System Design**

The Airport water supply system is the system that conveys quality and adequate water from the developed source to the Airport compound or reservoir. The design task of the Airport water supply system includes but not limited to ;

- a. Conduct Airport water Demand analysis based on the Passenger Terminal Building design program
- b. Conduct Site Survey and select the pipe route
- c. Design the Airport water supply system considering the Domestic and fire fighting demand, including but not limited to
  - Design of Electro mechanical part of the system (like pumps, stand by power generator and related accessories)
  - Design of water conveyance line system (intermediate pumps station, reservoirs...etc if any)
  - Design Internal water supply system of the Passenger Terminal Building
- d. Specification and Bill of Quantity
- e. Prepare and submit water supply system design report ,texts and drawings

## **3. Water source development and Water Supply System Construction**

The bidders are expected to accomplish ;

- a. Sufficient Water source development and Construction for Nekemet, Shire, Robe, Gode, Dembidoloand, Kombolcha Airports only (Jinka Airport has already developed water source).
- b. Water supply system Construction for all airports except Jinka Airport

The Construction work are expected based on the approved design and specification. The Bidders are also expected to submit

- c. Water source development detail completion report both in text and drawings
- d. As built drawing of the water supply system construction

## **Specifications and Bill of Quantity**

- The specification shall be clear and those standards considered in the specifications the contents shall properly and clearly discuss in describing the items.
- The specification shall describe the extent and required tests to be conducted to the fixture for the satisfaction of the quality
- The specification for items shall be enable in selecting heavy duty items and capable of resisting for possible action of vandalism.
- The BoQ shall be based on the method of measurement specified in the contract or other

### **4. Airport Dry and Wate water Disposal system Construction**

In the Airport dry waste and waste water system Construction the bidder is expected to execute the system without affecting the Airpprt and surrounding Enviroment and the it shall include include but not limited to ;

- a. Conveyance and storage system of waste water
- b. Manholes,Oil and grease separator, and related
- c.Waste water Storage with efficient, compact, simple for operation and environment friendly waste water treatment plant
- d. Provisions of Dry waste collection,storage and disposal sytem

### **5. Airport Storm water Disposal system Construction**

- a.Construction of Roof drainage systemb.
- b.Construction of site storm water drainage conveyance system for smooth disposal of the run off generated around the project under subject

*NB: Consider alternative well development as a reserve source,a minimum of Two wells.*

## **Deliverables**

### **1.Design Report**

The Design Report shall include but not Limited to;

- a. Detail Technical discussions, recommendation and suggestion of all the tasks covered in the service. *(2007 version or earlier version of Micro soft Word Doc.)*
- b. Discussion of methodologies/Design criteria and Design analysis of the water, sewerage, storm water drainage and ventilation and Air conditioning systems *(2007 version or earlier version of Micro soft Word Doc.)*
- c. Explicit Discussion of detail specification and BOQ *(2007 or earlier version of Micro soft Excel.)*

## 2. Drawings

### a. Note.

- All manholes, risers, appliances shall be labeled for easy identifications
- Manholes for different functions with different shape for easy identification and suggested;
  - Waste water manholes.....Circular (Circular cover)
  - Storm water manholes.....Rectangular (Rectangular Cover)
  - Valve Chamber.....Rectangular(Circular Cover)

### b. Water supply system

- Water source line profile -----1:50
- Water supply Storage (sanitary and structural Details) --- 1:50
- Pump House and Pumps Detail-----1:50
- Domestic Water supply lay out-----1:50
- Fire Fighting water line layout-----1:50
- Domestic water supply and Fire Fighting Trust block and Junction Detail----1:20
- Domestic and water supply riser Diagram visible scale
- Pumps (for both Fire Fighting and Domestic water supply) Connection details to pipes, controlling systems and different Valves.....1:20

### c. Waste water and dry wastes

- Sewer line layout-----1:50
- Sewer line profile-----1:50
- Manholes (sanitary and structural details) -----1:50
- Sewer line riser diagram **visible scale**
- Sewer disposal, if any unit(sanitary and structural details) -----1:50
- Detail Architectural, sanitary and structural details of Dry waste collection, storage and disposal system

### d. Storm water collection and Disposal

- Roof drainage layout-----1:50
- Storm water Site drainage lay out -----1:50
- Storm site water drainage section and profile----1:50

*NB: All the Deliverables shall be both in hard and Electronic copies in the formats specified above*

## **D. EMPLOYER'S ELECTRICAL REQUIREMENT**

### **Electrical Scope and Object of the Works**

### **Design, Supply, Installation/Erection, Testing and Commissioning of Electrical systems**

#### **General**

In the following requirements only major electrical items are mentioned. It is intended that the project to be provided under the contract shall be complete with all the electrical systems parts,

even if not specifically mentioned, necessary to make the airport construction project to operate as a whole as required and intended.

The scope of electrical works include all the airport standard electrical systems available in the airport (Passenger terminal building, firefighting building, power house, transformer house, guard house, pump house, firefighting building, site electrical works, ...). As per the final architectural drawings.

### **Electrical Scope of works**

**Electrical Systems (Major): The scope of works includes the following major electrical systems but not limited to:**

- Lighting system, Emergency lighting system, exit light,
- Power outlet systems
- Electric Power supply and distribution systems
- Public address system (PA)
- Fire alarm and Detection/protection system (FA)
- Telephone/Data systems
- Closed circuit television systems (CCTV)
- Satellite Master Antenna Television systems (SMATV)
- Lightning Protection systems (LP)
- Earthing systems/Grounding systems (ES)
- Site Electrical
- Elevator (Lift)
- Electrical Raceway, cabling, conduiting, manholes, trunk, duct, cable tray/ladder...
- EEPCO power Supply and standby generator, ATS, Transformer, Automatic Power factor correction ...etc
- Flight Information display systems(FIDS)
- All risers diagrams
- Any other electrical related systems as per architectural final drawings.

### **Standards, Regulation and Codes**

The whole of the electrical design, supply and installations shall be carried out in accordance with Current latest EBCs, the requirements of the Local Electricity and International standards.

EBC/ES	Ethiopian building codes/Ethiopian standard
ICAO	International civil aviation organization
FAA	Federal Air Transport Authority
IATA	International Air Transport Association- IATA
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronic Employer's Representatives
DIN	Deutsche Industrie Normen
ISO	International Organisation for Standardisation
EN	European Norms

AIEE	American Institute of Electrical and Electronic Employer's representatives
ANSI	American National Standards Institute
NFPA	National Fire Protection Association
EEPCO	Ethiopian Electric power corporation Procedures, Polices, Norms And Regulations- EEPCO
ETC	Ethiopian Telecommunication Corporation Norms and regulations-ETC

## **POWER DISTRIBUTION SYSTEM**

### **System Type & Power Supply Characteristics**

Nominal characteristics of power supply and distribution will be as follows:

**Medium Voltage (MV):** 15/33/66kv, 3phase. (The medium voltage is defined as per nearby EEPCO MV lines). Should be coordinated with the respective EEPCO department.

**Low Voltage (LV):** 400v/240v, 3 phase solidly neutral, earthing arrangement (TNS)

**Frequency:** 50Hz

### **Distribution Characteristics**

The electrical design of the building power supply distributed from the LV switchboard Central Main Distribution Board- CMDB which in turn is fed from a distribution transformer and stand-by diesel generator set via an Automatic Transfer Switch.

Power risers to every floor are furnished in ducts for CMDB. Final installation location of the panel (CMDB) shall be decided optimal.

LV distribution is to be 3-phase + Neutral + Earth.

All Distribution Boards to be 3-phase 400/240V for lighting / main motors and for power final or branch circuits/ motors unless specifically stated otherwise. The system shall provide 100% redundancy and reliability.

### **Lighting system**

- The scope of lighting systems includes all the areas including Passenger terminals, land side and Air side. as per final architectural drawings .
- The lighting systems scope of work also includes design, supply and install at Power house, Transformer house, Generator house, Guard house, Pump house, firefighting building lighting systems. (Shall be as per all final architectural layouts).
- The number of lighting point shall be as per standard lighting design calculation, architectural layouts and employer's approvals.
- The supply shall include panels, cables, conduits, indoor and outdoor lighting fixtures, lamps, fittings for fixture clamping.
- External lights to have a manual override facility.
- All materials and equipment shall be first quality and adequate for operation in the ambient conditions described in the Technical Specifications.
- The materials and equipment shall be designed, rated, manufactured and tested in accordance with the applicable IEC Standards.
- Lighting system and electrical appurtenances in the diesel generator room shall be flame proof, according to IEC 60079-1 or according to EN 50018.



- Use green energy technology for power source as alternative in the design process where applicable.

### **Lighting Fixtures, Lamps and Accessories**

- Design, materials and finishing of the fixtures and their accessories shall grant a long-life for all components and reduce as far as possible maintenance and cleaning.
- Maintenance shall be safe and easy. Suitable interlocks shall be provided to prevent access to energized equipment wherever it may be hazardous for personnel or equipment.
- All electrical connections shall be segregated to prevent short circuit faults inside the fixture. Fixtures shall ensure even distribution of light intensity without glaring.
- The design of the fixtures shall be agreeable and suitable for architectural effect. The fixtures shall be subject to the approval. Rated average life of the mercury lamps shall be not less than 20,000 hours.
- The color of the lamps shall be comfortable with a good distribution in the visible spectrum of the emitted light.
- Each lamp shall be provided with individual ballast and capacitor for correction of the power factor over 0.9.
- The lighting feeders shall be provided with thermo-magnetic mini circuit breakers.
- The Contractor shall carry out proper illumination design to be submitted for approval.
- Lighting Switches shall modern and energy saving where applicable.
- The design of lighting fixtures shall be energy saving lamps and the use of incandescent lamp is strictly not recommended. Use high energy efficient latest LED technology.

### **Power outlet**

- The scope includes all the areas as per final architectural drawings : Passenger terminal building( Public concourse, arrival hall, VIP porch, VIP salon, kitchen, Toilet, baggage claim, baggage make up and breakdowns, electric room, hold room, janitor, back office, ET pool offices, office admin, airport manager, terminal tech office, security, EAE pool office,..etc.), outside parking light, (land side and Air side) etc.
- The power outlet systems scope also includes design, supply and install at Power house, Transformer house, Generator house, Guard house, Pump house, firefighting building power outlet systems. (Shall be as per all final architectural layouts).
- The number of power outlet point shall be as per standard power outlet design calculation, architectural layouts and employer's approvals.
- The design, supply and installations of the power outlets also include to provide power for all electrical appliances, fire pumps, domestic water pump, x-ray machines, conveyor, electric heaters, stoves, cooker, shaver point, fridge freezers, etc...

- The number and type of points shall generally be in accordance with the international and national/EBC Minimum standards and a separate ring main is required for kitchens.
- Miniature circuit breakers shall be provided with earth leakage circuit breaker. The Consumer unit should be mounted at a suitable height, within a store, where Practicable. Where a store location is not available, the alternative location and Suitable height are to be agreed with the Employer prior to installation.
- Cable runs to socket switch positions are to be horizontal and vertical and must not run diagonally.

### **Emergency Lighting**

Proper emergency light shall be designed, supplied and installed as per latest EBC and International standards.

### **Satellite Master Antenna Television systems (SMATV)**

SMATV stands for Satellite Master Antenna Television and refers to a system that uses multiple satellite and broadcast signals to create a single integrated cable signal for distribution to a cabling network.

### **Television Installation**

- A. Television point shall be provided in each public area in cabling run in conduit suitable to receive both Analogue and Digital Broadcasts with an extended length of cabling left curled in a convenient location in the roof space of each dwelling. The point shall be set above floor Level. The Contractor is to investigate the sufficiency of the television reception in the area and is to advise the Employer of any possible problems in connection therewith prior to the completion of the installation of any television aerials. The Contractor shall allow for installing ductwork suitable for the future provision of cable TV.

### **Telephone/Datas**

- A. Standard Telephone/Data point above floor level shall be provided to each rooms as per architectural drawings. The service shall run in concealed conduit in accordance with Ethiopian Telecom's Standard Requirements and international standards.

The scope also include the incoming site Tele/Datas systems based on the existing nearby site condition and Tele/Data terminal boxes. The site design shall also be coordinated with the respective Tele/Datas Authorities (ETC).

Data/telecom system provisions is made in the form of UTP, 4 pair, CAT 6 (more...) cabling from telephone/data boxes complete with wiring accessories. The provision will make data/telecom connection at any place fast and simple in the airport area. Both telephone and data outlets are wired through CAT 6 (more...) cabling. RJ-45 outlets will be used for telephone outlets. The number of telephone/data lines runs inside a conduit/trunk/tray... shall provide minimum 30% free space available.

The telephone and data cables installed from riser shaft are laid on cable trays before reaching their nod terminated inside PVC conduits of minimum size of 16mm diameter.

Data systems, includes Data rack complete with all accessories. Including cabinet, server, switches, patch panel, PDUs, labelling, etc but not limited to the complete operation of the systems.

The bidders also provide strong and standard , high speed, WIFI systems on the airport terminal.

To make the system faster and speedy optical fiber cable shall be installed and implemented on the system.

The bidders shall be implemented and install cisco switch systems for complete data network systems.

**NB- ET Standardized Network and wireless active devices are all Cisco. Bidders have to consider this in their offer.**

### **Lightning Protection systems**

Proper lightning protection systems shall be designed, supplied and installed as per latest EBC and International standards. The calculation shall be coordinated with the actual site location whether condition of lightning level.

### **Earthing systems/Grounding systems**

Proper earthing systems shall be designed, supplied and installed as per latest EBC and International standards. After installation the Earthing resistance shall be less than 4 ohm (as per EBCs standard).

### **Fire alarm system (FA)**

#### **Fire Protection Systems**

The scope of Works shall include design, supply and install a central addressable Fire Alarm Control System for the following buildings: Passenger terminal building, Power house, Transformer house, Generator house, Guard house, Pump house, firefighting building, etc.... (Shall be as per all final architectural layouts).

This system shall monitor the entire buildings. The system, as installed, shall include, but not be limited to the following: The units shall include, but not be limited to, detectors/sensors, sounders, Manuel call point, transmitters, transducers, termination units' local alarm, trouble unit condition, and other application displays, audible alarm unit, power supplies, cabinets and all applicable accessories and auxiliary systems.

All panels shall be provided with battery and battery charger. Battery shall be capable of 24 hours back up supply in case of power supply failure. The control panel shall indicate all faults, alarm conditions, operations, zones of operation and incorporate an appropriate number of contacts and interposing relays necessary to initiate a local alarm on the switchgear and a supervisory alarm which shall be connected to the Central Control equipment.

The fire alarm systems shall be design review as per latest international standards (ICAO, NFPA, EN/BS...) and local standard (EBCs).

The system shall have an option to expandability for future work. Based on the specific area of the airport Smoke, flame, gas and heat detectors are used in the design to monitor the incidence of fire.

For protection a short circuit isolator is mounted on the loop to localize short circuit faults.

All fire alarm circuits are wired through fire resistant cabling in fire resistant conduits recessed inside slabs or solid walls. If for any reason part of a fire alarm circuit has to run surface mounted, then it shall be passed inside steel conduit of appropriate diameter. Under no circumstance shall fire alarm lines be run exposed, or inside surface mounted PVC conduits.

Technical personnel shall be trained in the functionality of the fire alarm system and fire alarm drills.

### **Public address systems (PA)**

The public address system shall be centralized to distribute sound to airport passenger as well emergency notice to all public and staffs. The system shall be integrated with Fire alarm control panel for emergency evacuation in case of fire and hazardous situation.

### **PUBLIC ADDRESS SYSTEM SPECIFICATION**

The PA systems shall require for safe, reliable, trouble free and efficient operation with adequate maintenance facilities as per modern Airport practices and standards.

The system shall have zonal selector, a minimum of 3 zone selector keys (for arrival, departure, public concourse, outside...) and all zone selector key with individual selection of at least up to 3 loudspeaker Zones.

The system shall allow call station (microphone), the system should have Pre-Call Attention tones. The system shall be required to operate with 200 – 240 V AC.

All Loudspeakers shall have a matching transformer of different tapping for 100V and 70V output of Power Amplifier.

The system should include the following but not limited: Remote call station (microphone), Amplifier changeover, Amplifiers, Speakers, speakers, Outdoor (Waterproof) speakers, Standby Power Supply.

The microphone should be desk mount type. Should have microphone on/off button with indicator light. Should have zone selection and full zone selection button with indicator light

**Maintenance Tools: Standard Sound System maintenance tools shall be provided.**

### **Closed Circuit Television System (CCTV)**

A Closed Circuit Television System (CCTV) shall be design and provided for monitoring of the Passenger terminal building, Indoor and outdoor building areas, (Shall be as per approved architectural drawings. The CCTS system will be of the latest technology, based on Ethernet interfaced cameras, with Pan/Tilt/Zoom facilities, color type, day&night optical filters, Motion detection capabilities, completed with all housing, heating and supporting structures. The system will be managed by a dedicated PC station, with all the software and hardware tools that will be necessary for a complete control and recording of the streaming files. The PC

station will be placed in the Central Control Room. All Ethernet links will be realized. All the necessary software tools, licenses, personalization activities are included in this item. A maintenance package (software) for 5 years is also included for the whole system.

### **EEPCO power Supply**

As per architectural site drawings the optimal incoming power line, transformer location, shall be defined. Coordination should be taken with actual nearby EEPCO MV lines and Ethiopian utility line regulations.

### **Distribution boards/ Panel boards**

All boards shall be designed, supply and install as per latest standards.

All boards shall utilize full-length copper bussing with full-size neutrals. Circuit breakers may be group mounted molded case circuit breakers. Fused switch assemblies are not allowed. Circuit breakers in switchboards shall be electronic trip type breakers. Provide 30% minimum spare fully bussed space in all boards. All boards shall be fully rated for 130% of the available short circuit fault current. All devices must be fully rated. Series-rating of breakers is not allowed. Provide sufficient sections to allow enough conduit entry space to accommodate all feeders including feeders for future sections. All distribution boards shall be schinder, ABB or Siemens original.

### **Testing**

All the tests shall be carried out as per latest EBC and international standards. Test the whole of the electrical installations, leave in good working order and Provide satisfactory test certificates. The earth bonding test in each shall be carried out immediately prior to hand over. The tests shall be carried out to the satisfaction of the local Electricity Authority and the Employer's Agent, and shall be at the Contractor's expense.

### **Material specification and Bill of quantity**

All electrical materials and equipment shall be world first class, high quality, long life, ...

Before procurement and installation all electrical materials and equipment shall be approved by employers/prior approval of the client. The contractor/suppliers shall provide the necessary test certificate: product certificate, third party test certificate, cataloges, manuels, warranty certificatie, ISO certificate etc.

**N.B: For all low current systems Optical Fiber Cable shall be used to connect other buldings.**

## **E. EMPLOYER'S MECHANICAL HVAC REQUIREMENT**

### **Mechanical Scope and Object of the Works**

### **Design, Supply, Installation/Erection, Testing and Commissioning of Mechanical HVAC Systems**

#### **General**

In the following requirements only major Mechanical items are mentioned. It is intended that the project to be provided under the contract shall be complete with all the mechanical systems parts, even if not specifically mentioned, necessary to make the airport construction project to operate as a whole as required and intended.

The scope of mechanical works include all the airport standard Heating, Ventilation and Air Conditioning systems(HVAC) mechanical systems available in the airport (Passenger terminal building, firefighting building, power house, transformer house, guard house, pump house, site mechanical works, ...). As per the final architectural drawings.

The aim of this HVAC system design is to provide a powerful and energy efficient ventilation and air conditioning system so that the airport will fulfil the comfort level requirement passengers and staffs.

Accordingly the mechanical systems includes the following systems but not limited to:

- Ventilation systems of public areas and toilets, kitchens and etc.
- Air conditioning only for airport offices, VIP salon, boarding lounge, meeting rooms, offices...) as per final architectural layouts.

### **Standards, Regulation and Codes**

The HVAC (Heating Ventilating and Air Conditioning systems) system shall be designed to the following latest Design Criteria

- In accordance with EBCS (New Edition), ES-3962.
- ASHRAE standard 62.1, American society of Refrigeration and Air Condition Engineers.
- ASHRAE handbook fundamentals.
- SMACNA standard is followed on HVAC duct design.
- Related HVAC acceptable standards.

### **Mechanical Scope of works**

**Mechanical Systems (Major): The scope of works includes the following major mechanical systems but not limited to:**

- Ventilation, toilet extraction systems, smoke extraction, etc.
- Ventilation, Kitchen extraction systems,
- Air conditioning only for airport offices , VIP salon, boarding lounge, meeting rooms, offices...) as per final architectural layouts.
- Any other mechanical related systems as per architectural final drawings.

### **Ventilation System**

The ventilation systems within the building are designed to provide quality air to a variety of spaces. These include providing dedicated fresh air intake fans to the heating and cooling systems of the airport to ensure that good indoor air quality is maintained by reducing the build-up of indoor air pollutants. A dedicated air supply system has been designed.

Dedicated centralized and modern exhaust systems have been designed for each of the following:

- Kitchen,
- Toilets,

**Intended Operation of the System:** Thermal comfort, Air quality, Acoustic comfort.

**Proposed HVAC equipment manufacturer/suppliers:** The proposed supply equipment's shall be international well branded, like Dynair, carrier...

### **Installation, Testing and commissioning**

All Installation, Testing and Commissioning shall be done as per latest international standard and regulations and manufacturers recommendations/catalogs.

### **Material specification and Bill of quantity**

All mechanical materials and equipment (HVAC) shall be world first class, high quality, long life,.

Before procurement and installation all electrical materials and equipment shall be approved by employers/prior approval of the client.

The contractor/suppliers shall provide the necessary test certificate: product certificate, third party test certificate, cataloges, manuels, warranty certificatie, ISO certificate etc.

### **Certificate**

All necessary, factory test and third party certificate shall be provided for all electro-mechanical HVAC equipments.

### **Terminal facilities (Electro- Mechanical facilities) requirement**

#### **General**

The contractor shall provide all the necessary electro-mechanical facilities include BHS, for the necessary operation of standard terminals.

In the following requirements only major electro-mechanical facility items are mentioned. It is intended that the project to be provided under the contract shall be complete with supply, installation, Integrations, Testing/Commissioning and Training of all the electro-mechanical facility items, even if not specifically mentioned, necessary to make the airport construction project to operate as a whole as required and intended.

#### **Scope of Terminal facilities (Electro- mechanical facilities) works:**

The scope of terminal facility works shall include all the airport standard facilities available in the airport as per the final architectural drawings.

The scope includes all terminal facilities for all airport passenger terminal building projects.

**Terminal Electro- Mechanical facilities (Major):** The scope of works includes the following major electromechanical terminal facilities **but not limited to:**

- BHS
- Elevators
- X-ray Machines
- Walkthrough Metal Detector
- Handheld Metal detector
- Any other related electromechanical facilities or machines for the complete operation of the terminals, shall be as per final architectural drawings.

## **Standards, Regulation and Codes**

The whole of the electro mechanical facility equipment design, supply, installations, integration, testing and commissioning shall be carried out in accordance with Current latest International airport related standards(ICAO,FAA,IATA,IEC,BS,DIN,ISO...etc.) and the requirements of the Local authority regulations and codes.

### **Quality**

All the proposed detailed technical specification of Terminal (Electro- mechanical facilities) equipment's will be the highest quality and safety as per international airport standards. And all facilities equipment's shall be from well branded international manufacturer/suppliers,

The required machines shall comply with international recommendations and standards such as ISO and applicable health and safety regulations or equivalent and with conditions envisaged in this specification. Instruments manufactured to standards other than international ones, will not be considered.

### **Approval**

The contractors/suppliers/manufactures shall submit the detailed technical specification of Terminal facilities (Electro- mechanical facilities) equipment's for employer/client approval.

All contractor's proposed or selected terminal facilities equipment detail specifications, quality, brand, type, series, model ...shall have prior approval by employers/client.

### **Certificate**

All necessary and third party certificate shall be provided for all facilities electro-mechanical equipment.

For all Terminal facilities (Electro- mechanical facilities) equipment's, the supplier shall submit all the necessary certifications confirming compliance with current regulations &standards. Also the certifications are required to be given for component level, production and assembly, and overall system performance level.

### **Power Requirements**

Nominal characteristics of power supply and distribution will be as follows:

**Low Voltage (LV):** 400v/240v, 3 phase solidly neutral, earthing arrangement (TNS)

**Frequency:** 50Hz

The machines shall operate with power of 400V/240AC, 50Hz, 3Ph/1Ph.

Uninterruptible Power Supply system(s) shall be provided along with each inline Screening machine for the controlled shut-down of computer systems in case of Power failures.

Voltage & frequency of mains feed and plugs shall be in conformity with CE standards. Additional adapters etc. to conform to CE standards shall not be considered.

### **Installation**

Installation of the system shall begin as per the approved schedule of work after the employer/client approval of the factory provisional test and in accordance with specific conditions of the installation site. Technical performances of the system shall not be degraded due to location of installation.



### **Test Instruments and Tool Sets**

One complete set of standard test instrument and tool sets shall be provided for each machine and submitted to the client/employer. The testing system supplied shall include a full set of technical testing tools required for the testing.

### **Acceptance & Test Protocol**

The Supplier shall submit a full and approved testing system to be implemented with respect to all items and equipment required by the specification.

The contractors/manufacture/suppliers shall be submitted complete full testing, and compliance with specifications at the levels of both individual components and the entire system for approval

The testing system supplied shall include a full set of technical testing tools required for the testing.

### **Factory Acceptance:**

The contractor/manufacture shall conduct inspection & provisional acceptance at the manufacturer's site together with authorized personnel of the manufacturer. The contractor/manufacture shall bear all the cost of the factory acceptance test.

The contractor/manufacture shall provide all the tools and equipment required for conducting inspections in order to ascertain compliance with technical specifications.

### **Site Acceptance**

Site acceptance shall be done upon the airport standard completion of installation and commissioning of the system at the site. The system shall be checked to verify that the system is ready for operational use at the quality and performance level as specified.

The tests shall be conducted to ascertain compliance with technical & operational requirements.

### **Documentation**

Upon delivery of the system, the contractor/manufacture/supplier shall provide hard copies of the documentation in English and also the softcopies in CD. The documentation shall include: Detail description of the system, technical and functional specifications, and principles of operation. Operation and maintenance instructions (troubleshooting guides, detailed fault tracing & maintenance instructions, flow charts, accompanied by explanations by means of drawings, commands, color photographs of all components of the equipment in their final location, etc).

Detailed technical descriptions, preventive maintenance instructions, location and repair of breakdowns for each sub-system, including list of recommended spare parts.

### **Training**

The Supplier shall provide the necessary training for employer/client operators and supervisors.

### **Environmental Conditions**

All the machine shall be able to operate at full capacity of proposed terminals location whether conditions (temperature, humidity...).

## **Reliability**

The manufacturer/supplier will be required to prove that the machine has been manufactured in conformance with ISO or equivalent quality control standard.

## **Safety**

The machine shall meet all international applicable laws and regulations with respect to safety devices. All safety certificate that shows machine complies with enforced regulation shall be submitted and shall be compliant with international standards (ANSI, CE ...standards).

**NB: - Bidder is expected to conduct Environmental and Social Impact Assessment and an Environmental and Social Management plan, that shall fulfil the requirements contained in the Environmental and Social study framework, for all seven airports per international standard. Bidder is expected to implement the requirements contained in these studies.**

## **A. Baggage Handling Systems (BHS)**

Scope of work: The scope of the work includes all departure and arrival conveyor systems/baggage handling systems for the complete operation of airport operation.

Design, supply and installation of new departure and arrival baggage handling systems as per the technical and operational requirements set forth in the new airport as per international standards.

### **Technical and Functional requirements**

Extent of the works at the airport shall be supply and installation of fully automated baggage handling essential includes check-in desks, weigh and dispatch weigh scales, collector and transport conveyors, baggage claim horizontal carousels, screening machine... as specified in the Architectural terminal drawings.

#### **1. DEPARTURE SYSTEM**

The system shall be designed in such a way to handle standard baggage types as indicated in IATA baggage Identification chart with the following weight and dimensional requirements.

Baggage Size	Length	Width	Height	Weight
Maximum	900mm	750mm	750mm	50kg
Minimum	150mm	75mm	75mm	0.5kg

#### **a. Check-in counters**

Provision of the following system components shall be availed at the Check-in counters.

- 6 check-in desks with chairs. (As per architectural drawings)

Their design shall be suited and fitting with the space available. The desks shall be made from standard wooden material with its surface finished with a high quality stainless steel and such quality material appropriate for airport use. The chair shall be ergonomically suitable for continuous use with adjustable height, dark fabric cover. The bidder design should have to consider the availability of space by site visiting assessment/integrating with terminal architectural drawings and decide the dimensions of the check in desk with chair but the minimum length of the check in desk should be 1.1m and width 0.8m

- Weigh and Despatch conveyors

Each desk shall be provided with separate bag weighing and dispatch belt conveyors with stainless steel cladding, endless belt with PVC cover and diamond patterned top.

The conveyors shall be mounted on tracks and castors for easy removal during cleaning and maintenance.

- Control Console

Desk activation key switch, illuminated buttons/foot switch to inch baggage forward and dispatch onto collector conveyor as well as emergency stop buttons shall be provided.

- Weigh scales

Weigh scale with appropriate digital display panels both for the check-in agent and the passenger.

- Pertinent bag conditioning and toppling bars, photo cells and required control and electrical parts for automatic operation shall all be installed.

#### **b. Collector conveyor**

A new take away conveyor to collect each of the dispatched bags from the check in counters shall be installed.

- It shall avoid any sharp/90 degree junctions when bags are fed onto it and also at junction with the next downstream conveyor after the collector.
- It shall be inverter controlled and equipped with appropriate sensors and required features for automatic control, smooth start up, overload detection, position tracking, etc
- Appropriate bag conditioning and toppling devices shall be installed
- Inverter controlled drive motor installed in such a way to allow ample maintenance space with adequate ground clearance
- Minimum Conveyor height: 400mm and adjustable

#### **c. Transport conveyors and Fire door**

Conveyors appropriate for conveying, singulation and conditioning of bags into the screening machine up until bags are fed onto the makeup carousel shall be installed. Length, inclination and arrangement of the new conveyor segments required herein shall be determined as per dimension of the baggage scanning machine and total distance from check-in to airside sorting. Besides a new ISO certified automatic fire door/shutter made of galvanized steel with

minimum 4 hour fire resistance capability and PVC draft curtains shall be installed and interlocked with the conveyor control system.

#### **d. Make up carousel**

Single, flat, endless loop make up carousel shall be provided. The carousel shall be friction drive type and be fully integrated and controlled from the PLC.

- Presentation length 21m
- Galvanized steel finish. ,
- Overlapping rubber slat,
- 1000mm frame width
- Inverter Controlled Drive
- minimum 4 emergency stop buttons dimpled into front shroud and/or mounted on posts over each of the carousels
- The height of makeup carousel shall be 450mm minimum

### **2.ARRIVAL SYSTEM**

Ultra-silent - endless loop, flat baggage reclaim carousel shall be installed at the arrival hall. It shall have a PLC based control interface having all the necessary buttons, switches and lamps required for the standalone operation.

- Drive type: friction drive
- Presentation length: 35m
- Stainless steel finish in passenger area and galvanized steel finish on the air side
- Overlapping rubber slat,
- Frame width 1000mm
- Inverter controlled drive, Speed: 27meter/minute
- minimum 4 emergency stop buttons dimpled into front shroud and/or mounted on posts over each of the carousels
- The height of reclaim carousel shall be 450mm minimum

Besides along with the carousel two automatic fire doors and PVC draft shall be installed. The fire door shutters shall be ISO compliant and made of galvanized steel with minimum 4 hour fire resistance capability.

### **3.CONTROL SYSTEM REQUIREMENTS**

At all airports, new PLC based control system shall be installed. The primary central point of control for the BHS systems shall be from this MCP while provision of local drive panel to allow manual control of the individual conveyor segments shall be provided with such a selection capability to switch between automatic control from the PLC and manual control of the conveyors as needed.

The MCP shall be mounted in a floor standing enclosure and shall employ an off-the-shelf industrial PLC and Profibus communications network configuration for signaling and

connection between the field devices with the controller. The field devices that need to be installed to manage the functionality of the system shall include the use of photocells, proximity switches, limit switches, overhead sensors, emergency stop push buttons, beacons, audible warning devices and the likes. Illuminated push buttons for system start up, stopping and fault reset, emergency stop, reset key switch as well as indicator lamps to show system status, faults, emergency and such events shall be provided as a minimum function control provisions on the MCP along with HMI LCD screen.

Besides, a volt-free connection for interfacing with the building fire alarm system shall be provided on the MCP whereas upon activation, a controlled shutdown of the conveyor system shall be initiated.

### **Functional and operational requirements**

The system shall employ the required hardware and software components to assure the required functional and operational requirements are attained. The control software with this respect shall be designed, developed and tested in accordance with detailed software design procedures and standardized software functions for such applications.

- Energy save mode

when the conveyors run for more than a certain configured amount of time without bags, the system shall be able to automatically detect this and initiate energy save mode (i.e. the respective conveyors to go into a halt) whereas upon blockage of a preceding PEC, it shall be able to automatically restart.

The baggage control system (BCS) shall have appropriate interface to be integrated with the security scanning machine. The minimal requirement is that the BCS shall sense operational status of the x-ray machine's conveyor and initiate die-back of the preceding conveyors when the x-ray's conveyor is in stoppage.

- Integration with baggage screening machine.
- Die back control, bag jam detection, tracking and multiple dispatch

The control system design shall bear a proven technique to allow appropriate baggage tracking, die back control; bag jam fault detection (PEC blockage for longer than a pre-set amount of time) and collision free multiple dispatching capabilities as part of the essential operational requirements. The later shall be assured through dedicating virtual slots on the collector conveyors for every despatching counter in a first come first serve approach thereby avoid any collisions during simultaneous dispatching operation.

## **4. GENERAL CONDITIONS**

### **4.1 Design Loadings**

For the purpose of sizing drives, shaft size, bearings etc., the following load conditions shall be considered:

#### **Belt Conveyors:**

- Conveyor loading 35 kg/m
- Structural Loading 150 kg/m

Makeup and Reclaim Carousels:

- Structural Loading 150 kg/m

#### **Access ways:**

Standard walkover access ways required for safe and efficient maintenance and operation of each system shall be provided and installed.

### **4.2 Technical Training**

#### **Factory Training**

Factory training shall be conducted at the manufacturer's site by certified trainer for six technical personnel for a period of ten training days before installation at the supplier's cost. This includes economy class airfare, full accommodation, local transport from airport to the accommodation place, between accommodation place and the factory and a daily allowance of 100 Euros.

#### **Onsite Training**

Upon completion of the works, a 3-day advanced onsite technical training along with operation supervision shall be given to at least 5 personnel involving in maintenance and operation of the BHS system at each of the airports. It shall be tailor-made to meet training demand in areas of installation, maintenance and troubleshooting of the various mechanical, control and electrical parts.

### **4.3 Acceptance and Test Protocol**

All the necessary training materials and learning aids shall be provided by the supplier.

#### **Factory Acceptance**

Upon completion of manufacturing, the supplier shall advise the procuring entity with a written notice that the work is ready for provisional factory acceptance. EA shall then designate a provisional factory-acceptance team of 3 members to conduct inspection & provisional acceptance at the manufacturer's site for four days.

The supplier shall bear all the cost of the factory acceptance test team including the airfare, hotel accommodation, allowance of 100 Euros per day and provision of local transport between airport, hotel and factory.

Reports shall be issued for each system equipment's stating compliance with the standards and requirements detailed in the technical specification, prior to the shipment. The shipment of the equipment's shall be subjected to the Purchaser approval of the factory tests.

#### **Site Acceptance**

Upon the completion of installation of the system at the site, the supplier shall notify in written that the system has been successfully installed, calibrated and checked to verify that it is ready for a prior test and operational.

The provisional site acceptance shall be conducted in two stages. The acceptance team shall first determine whether work including the supply and installation have been completed in compliance with the specifications and the contract. Then performance tests shall be conducted to ascertain compliance with technical & operational requirements.

#### **4.4 Documentation**

Upon completion of the project, the systems technical, operational and maintenance manuals shall be provided in 2 coloured hard copies and on CD to each of the airport.

The documentation shall encompass detail technical and functional descriptions, schematic drawing, fault tracing and troubleshooting guides, preventive maintenance instructions as well as as-built drawings.

#### **4.5 Warranty**

The supplier shall insure that the systems provided under this project shall be of the best workmanship and perform in accordance with the technical specification detailed in this tender. They shall all be free from any defect in material or workmanship. All system parts and components installed within scope of this project shall have a minimum of 24-month warranty provision including labour and parts.

#### **4.6 Schedule of works**

The supplier shall enclose a schedule that shows every stage of the work. This work schedule shall take effect following acceptance by the procuring entity and the supplier will be liable for the timely completion as per the schedule.

#### **4.7 Approval with Related Standards**

The system design and its pertinent parts and components shall comply with applicable international recommendations and standards such as ISO 9000. All compliance certifications given for component level, production and assembly and overall system performance shall be submitted. Conformity.

Mains feed and plugs shall be in with CE standards. Additional adapters to conform to CE standards shall not be accepted.

#### **4.8 Environmental condition**

The baggage handling system shall operate on the following climatic Condition

- Temperature : +0<sup>0</sup>C-50<sup>0</sup> C
- Humidity : 1%-95%

#### **4.9 Power supply**

- Voltage: 380VAC, 3PH
- Frequency: 50 Hz

#### **4.10 Hours of Operation**

The system design shall be made on the assumption of continuous hours of operation

#### **Spare parts and Tools**

For all Electromechanical and facility equipment's, Bidders shall list and supply all the necessary tools for 5 years short term spare parts for each equipment for operation and maintenance purpose.

PLC programming tools and all its accessories (Laptop, software ... etc) shall be supplied for employer for maintenance purpose.

#### **Specifications**

The baggage handling systems (BHS) shall be siemens BHS or approved equivalent. All equipment's brand, specifications, type shall be submitted and approved by employer.

#### **B. Baggage Screening X-ray Machines.**

The scope shall include supply, installation, commissioning & training of baggage screening x-ray machines.

#### **Carry-on & checked-in luggage screening CXS**

##### **1. General Conditions**

- 1.1. This document defines the general and technical requirements for the purchase of X-ray machines for security screening applications.
- 1.2. The purpose of this specification is to ensure that the suppliers and the equipment conform to the requirements stated herein.
- 1.3. This specification forms the basis upon which the machines shall be purchased and accepted.

##### **2. Scope**

- 2.1. Scope shall include supply, installation, commissioning & training of baggage screening x-ray machines.
- 2.2. The X-ray machines are intended mainly for the inspection of a large variety of passengers' carry-on personal items, hand & checked-in luggage, express shipments and parcels.
- 2.3. The machines shall be used to detect a wide variety of contraband, customs forbidden items, potential threats to transportation safety including but not limited to explosives, weapons and all kinds of sabotage materials.



### **3.Proposal Submitted By Suppliers**

- 3.1. Correspondences and documentation shall be submitted in English. The Purchaser shall not be responsible for any mistakes in translation.
- 3.2. Submitted technical offers shall be detailed as required herein this document.

Model, names, country of origin and complete documentation of the proposed equipments shall be indicated. Country of origin of all proposed machines shall be from Europe or USA.

- 3.3. Together with the technical proposal, the supplier shall also submit:
  - 3.1.1. A completed compliance table that shows the proposed system conforms to all the requirements and technical specifications. Any deviation from these specifications shall be clearly detailed and reference shall be made to the specific paragraph or paragraphs that are relevant to the deviation.
  - 3.1.2. Statements and reference documents for compliance with the standards and practices required in this specification.

### **4.Schedule of the Work**

- 4.1. The supplier shall enclose a schedule that shows every stage of the work how they will deliver and install the machine. This work schedule shall take effect following acceptance by the procuring entity and the supplier will be liable for the timely completion as per the schedule.
- 4.2. The purchaser reserves the right to inspect the compliance with the declared schedule during the planning, production, and supply periods. The supplier shall provide all the necessary assistance and access required for effective inspection and control of the planning, production and supply in the timetable.

### **5.Approval with Related Standards**

- 5.1. The required machines shall comply with international recommendations and standards such as ISO 9000 and applicable health and safety regulations as US FDA or equivalent and with Conditions envisaged in this specification. Instruments manufactured to standards other than international ones, will not be considered.
- 5.2. The carry-on luggage screening machines in shall have a configuration Qualified the TSA ACSTL 2018 and be compliant with ECAC LEDS standard Type C3 requirements, machines shall able to screen multiple containers and does not need to be opened to take samples (the original seal remains intact); containers of LAGs do not need to be taken out of the luggage.
- 5.3. The carry-on & checked-in luggage screening machines in shall be TSA ACSTL 2018 Qualified.
- 5.4. Voltage & frequency of mains feed and plugs shall be in conformity with CE standards. Additional adapters etc. to conform to CE standards shall not be considered.

## **6. Installation**

- 6.1. Installation of the system shall be conducted by the supplier at each site as per the approved schedule of work after the purchaser's approval of the factory provisional test and in accordance with specific conditions of the installation site.
- 6.2. Technical performances of the system shall not be degraded due to location of installation. If certain measures are required to be taken at places of installation, they shall be clearly specified by the supplier in their response to this tender.

## **7. Test Instruments and Tool Sets**

### **Test cases:**

Standard adjustment cases & test pieces for testing penetration, resolution, high density & overall detection capability of these machines shall be submitted to the purchaser ; **one complete set for each machine.**

## **8. Acceptance & Test Protocol**

### **8.1. General**

- 8.1.1. The Supplier shall submit a full and approved testing system to be implemented with respect to all items and equipment required by the specification/contract, signed by the supplier's internal quality controller.
- 8.1.2. The Purchaser may alter the testing system to be submitted for his approval by the Supplier as well as add additional tests to those proposed, with the aim of ensuring full Testing and compliance with specifications at the levels of both individual components and the entire system.
- 8.1.3. The testing system supplied shall include a full set of technical testing tools required for the testing.

### **8.2. Factory Acceptance:**

- 8.2.1. Upon completion of manufacturing, the supplier shall advise the procuring entity with a written notice that the work is ready for provisional factory acceptance. The procuring entity shall then designate a provisional factory-acceptance team of four members to conduct inspection & provisional acceptance at the manufacturer's site for five days together with authorized personnel of the manufacturer.
- 8.2.2. The supplier shall bear all the cost of the factory acceptance test team including the airfare, hotel accommodation, meal, health & travel insurance, daily subsistence of hundred euros and provision of local transport between airport, hotel and factory.
- 8.2.3. Reports shall be issued for each piece of equipment stating compliance with the standards and requirements detailed in the technical specification, prior to the shipment of the machines. The shipment of the equipment shall be subjected to the Purchaser approval of the factory tests.

- 8.2.4. If any work is found to be defective, deficient or does not comply with the specification and the contract, the supplier shall be granted such period of time as may be determined by the Purchaser to remedy such failure and provisional acceptance tests shall start at the end of such period. If the firm fails to remedy such defects and deficiencies within the said period granted, delay penalties related with materials shipment as laid down in the contract shall be applied.
- 8.2.5. The supplier shall provide all the tools and equipment required for conducting inspections in order to ascertain compliance with technical specifications.
- 8.2.6. All defects and deficiencies which do not impede the factory acceptance shall be entered in a protocol and shall be remedied within such period as may be determined by the Acceptance team.
- 8.2.7. Final factory acceptance shall not be effected unless the said defects and deficiencies are remedied.

### **8.3. Site Acceptance**

- 8.3.1. The supplier shall notify the Purchaser upon the completion of installation and commissioning of the system at the site. The notice shall include a declaration that the System was successfully installed, calibrated and checked to verify that the system is ready for operational use at the quality and performance level as specified herein this document.
- 8.3.2. The above notice and declaration shall be in writing and signed by an authorized representative of the supplier.
- 8.3.3. Onsite acceptance shall be conducted by a team designated by the Purchaser at a time table set by the Purchaser. An early notice of not less than 10 days will be given to the supplier.
- 8.3.4. If any defect or failure is identified that impedes on site acceptance of the works under this tender, it shall be entered in a Protocol. Grant of additional period to the supplier to remedy any failure so identified shall be subject to approval of the Acceptance Committee.
- 8.3.5. The acceptance test shall be conducted in the presence of an authorized representative of the supplier.
- 8.3.6. On-site acceptance procedures shall be conducted in two stages. The acceptance team shall first determine whether work including installation has been completed in compliance with the specifications and the contract. Then tests shall be conducted to ascertain compliance with technical & operational requirements.

### **9. Warranty Period**

- 9.1. The supplier shall prove that the machines will be brand new and of the best workmanship and guarantees for a period of, at least, 24 months from the date of final acceptance.

- 9.2. At the time of handing-over, the supplier shall make sure that, the systems with all their parts are functioning and their performance is in accordance with the specifications detailed in this tender.
- 9.3. In each case of malfunction, incompatibility and/or non-compliance with the provisions detailed above, the supplier shall take immediate action upon receiving notice from the Purchaser to remedy the malfunction and bring the system to a working and operational capability.
- 9.4. Without prejudice to the aforesaid, the supplier shall supply service and maintenance during the warranty period, without any additional payment to the purchase price. The service and Maintenance will include labor, parts, and any other costs related to such a service and maintenance commitment.
- 9.5. Despite the aforesaid provisions, the supplier will not be held responsible for damage to any parts of the systems and/or defects caused by use, maintenance or operation of the system not according to the written instructions provided to the Purchaser by the supplier.
- 9.6. In addition to the aforesaid, the supplier will not be responsible for parts & software which were modified, altered, repaired or replaced by anyone other than the supplier's representative.
- 9.7. The two-year warranty shall include an unlimited working hours warranty for the X-ray generator & its assembly installed in the systems.

## **10. Documentation**

- 10.1. Upon delivery of the system, the supplier shall provide 4 hard copies of the documentation in English and also the softcopies in CD. Such documentation shall include:
  - 10.1.1. Detail description of the system, technical and functional specifications, principles of operation.
  - 10.1.2. Operation and maintenance instructions (troubleshooting guides, detailed fault tracing & maintenance instructions, flow charts, accompanied by explanations by means of drawings, commands, color photographs of all components of the equipment in their final location, etc)
  - 10.1.3. Detailed technical descriptions, preventive maintenance instructions, location and repair of breakdowns for each sub-system, including list of recommended spare parts.
- 10.2. The literature shall be written in full coordination with the customer and shall contain all the information required by the purchaser. Upon completing the preparation of the literature the supplier shall deliver to the customer, before delivering the system, a draft for his approval.
- 10.3. Acceptance of the system from the Supplier depends, among other things, on implementation of this section.

## **11. Training**

### 11.1. Operator and Supervisor Training

11.1.1. The Supplier shall provide training courses for Purchaser's operators and supervisors

11.1.2. The training courses shall be of two types:

- Operators training
- Supervisor training

11.1.3. For each level, the training course shall provide the trainees with all the theoretical and practical knowledge required for the successful and efficient use of the machines.

11.1.4. The operator training shall be provided for at least 20 operators. Operator training shall be implemented upon delivery of the system to the customer and shall be conducted at the installation site.

11.1.5. The supervisors shall first take the operators course and then the supervisor's course. The supervisor training shall be provided for groups of 10-15 supervisors at a site designated by the Purchaser.

### 11.2. Technical Training

11.2.1. The Supplier shall provide thorough technical training for Purchaser's Technicians at its own expense

11.2.2. The training form shall be of two types:

- On-site Training
- Factory training at the manufacturer's site

11.2.3. Onsite training shall be provided for ten trainees with theoretical and practical knowledge that may be necessary for such level of training

11.2.4. Factory training shall be conducted at the manufacturer's site by certified trainer for six technical personnel for a period of ten training days before installation at the supplier's cost. This includes economy class airfare, full accommodation, meal, health & travel insurance, local transport and daily subsistence cost of hundred euros.

11.2.5. All the necessary training materials and learning aids shall be provided by the supplier.

## **12. TECHNICAL SPECIFICATIONS**

### 12.1. General

12.1.1. The X-ray machines are intended for the inspection of a large variety of passengers' luggage, carry-on personal items, hand & check-in luggage, express shipments, small and large parcels, to identify potential threats to transportation safety and security including but not limited to weapons, explosives materials, customs forbidden items and such dangerous goods.

- 12.1.2. The system shall be required to operate under particularly difficult environmental conditions as dusty & confined environment at an especially high level of reliability.
- 12.1.3. The machines shall be required to apply a user-friendly interface that will enable fast and effective operation of the machine even by a common operator.
- 12.1.4. The supplier shall be required to maintain an available stock of spare parts for a minimum of 10 years and shall provide a written confirmation.
- 12.1.5. The baggage screening machines shall be supplied with **heavy-duty feeder & exit steel rollers** each being, at least, **two meters** long.

## 12.2. The Radioscopic Subsystem

### 12.2.1. General

The system shall be based on a diagonal dual-energy radioscopic layout. The radioscopic units shall comprise X-ray generator, detector, data acquisition system, and a computerized image processing and display system.

### 12.2.2. X-ray generator

- 12.2.2.1. The High Voltage rating shall be a minimum of 140kV for carryon luggage screening machine and 160KV for Checked-in luggage screening machine.
- 12.2.2.2. The X-ray generator shall maintain accurate operating potential (kV) and current (mA) via feedback regulation with over-voltage and over-current protective shutdown.
- 12.2.2.3. The generator shall be provided with a rugged sealed housing with integral metal bellows, expansion chamber to preclude moisture contamination of oil.
- 12.2.2.4. Shall use passive or active cooling system based on convection cooling
- 12.2.2.5. Sealed oil bath cooling and insulation shall ensure 100% duty cycle with no need for switching off the X-ray generator for cooling down to working temperature.
- 12.2.2.6. The X-ray generator shall be equipped with an over-temperature safety shutdown.
- 12.2.2.7. The X-ray generators temperature will be controlled so as to enable continues use of the machine at a very high capacity, even under Particularly difficult environmental conditions and with minimal wear and tear of the X-ray generator.
- 12.2.2.8. The X-ray generators assembly must include protection against an uncontrolled increase of temperature above the permitted working temperature. The said protection will be independent of any computer program.
- 12.2.2.9. The supplier is required to provide tested life cycle of the x-ray generators operated in a duty cycle of 100 % for 24 hrs a day,7

days a week,. Preference will be given to that having the longest durability.

### **12.2.3. Detector Array**

12.2.3.1.The detector array shall consist of L-shaped arrangement of high resolution dual energy photo diode detectors installed on multiplex detector boards. The detectors shall comprise scintillation crystals of high quantum efficiency for maximal penetration and contrast sensitivity. The detector array shall be sealed for moisture and dust resistance. The detectors shall be installed on amplifying low noise electronics for the production of clear, low noise imaging.

12.2.3.2.The detector array shall be successive and with a standard spacing between the photo diodes and between the detectors modules, as to avoid distortions or deficiencies in the X-ray image of the screened object.

12.2.3.3.The analog to digital (ATD) conversion shall be as close as possible to the multiplexer detector boards. Preference will be given to an —on board|| ATD conversion.

### **12.2.4. Geometry of the Radioscopic System**

12.2.4.1.The X-ray generators will be situated in relation to the detector array so that any item which passes through the inspection tunnel will be completely scanned and fully imaged without corner cut-off.

12.2.4.2.The radioscopic system shall be of an L shape design so as to minimize the footprint size of the machines. The x-ray generator shall be located so that the radiation will be beamed diagonally towards the detector array.

### **12.3. Computer System**

12.3.1. The machine shall utilize a high speed computer system having greatest performance to efficiently carry out computations in real time. It shall have a user friendly interface with the following minimal requirements:

- Processor: Intel Pentium dual core, or better /or the equivalent in other brands
- Memory:1GB RAM or better
- Platform: Windows 2000, or later/or its equivalent
- USB 2.0 and Ethernet ports

### **12.4. Image Display Unit**

12.4.1. The X-ray image shall be displayed on a 19|| or larger LCD color Monitors.

12.4.2. The screen shall be pure flat LCD screen, with low radiation, flicker-free and should be coated with an anti-reflective substance.

12.4.3. The resolution shall not be less than 1280 by 1024

- 12.4.4. The screen shall be equipped with the necessary control features: OSD, brightness/contrast, H/V size, H/V position, zoom, trapezoidal, parallelogram, degaussing, tilt, etc
- 12.4.5. The display system will have a memory of not less than 1024X1024 with a depth of 12 bits. The number of gray levels in the display memory will not be less than 256.
- 12.4.6. The system shall enable distinction between different types of materials e.g. organic, inorganic and the mixture of the above by measuring the Zeff properties of the materials within the screened object using dual energy technology. The different categories of materials shall be displayed on the screen using three different colors,
- orange for the organic
  - Blue for the metals and
  - Green for medium range and mixtures of materials.
- 12.4.7. Areas within the X-ray image that can't be efficiently measured for its Zeff properties due to high X-ray attenuation shall be displayed in dark grey or black.
- 12.4.8. The default image presented on the screen shall be the colored material classification image. A single pushbutton in the control panel shall enable to remove the color information so as to switch to the monochrome X-ray image.
- 12.4.9. It shall be possible to connect additional parallel screens (slaves) and/or connection to a video recorder of a common standard by connecting it to a standard video port.

## **12.5. Image Evaluation Functions**

### **12.5.1. Image Magnification (Zoom)**

12.5.1.1. The system shall enable digital magnification of the X-ray image zoom X 2, X 4 or X8. The enlarged image may exceed the size of the screen but it shall be possible to pan and scroll the enlarged image on the screen in order to enable the evaluation of all parts of the image.

12.5.1.2. The image shall be moved on the screen by means of arrow keys, joystick, touchpad, or mouse.

### **12.5.2. Monochrome Image (Black & White)**

12.5.2.1. The system shall enable to switch between the material classifications colored image to the basic x-ray transition monochrome image.

12.5.2.2. The monochrome image shall enable to observe 22-24 grey levels.

12.5.2.3. Switching between B & W and color shall be enabled by a single pushbutton in the control panel keyboard. The pushbutton shall be operated in a 'toggle' mode. If left in monochrome mode, upon the entrance of new object the image display shall automatically return to the colored mode.



### 12.5.3. Inverse Video (Negative)

12.5.3.1. The system shall enable the reverse monochrome (negative) X-ray image to be displayed.

12.5.3.2. By pressing a single pushbutton in the control panel keyboard the image shall be displayed in reverse i.e. black becomes white and vice-versa. The pushbutton shall be operated in a `__toggle` mode. If left in negative mode, upon the entrance of a new object to the inspection area the image display shall automatically return to the regular mode.

### 12.5.4. Edge Enhancement

12.5.4.1. By emphasizing edges and transitions, an improved image definition can be achieved for easier identification of individual objects and items. In certain cases, for instance if the image consists of many details and structures, an edge enhancement may rather clutter the image and confuse the operator. For this reason, that feature shall be activated by pressing a single pushbutton in the control panel keyboard.

12.5.4.2. The Edge Enhancement pushbutton shall be operated in a `__toggle` mode. If left in Edge Enhancement mode, upon the entrance of a new object to the inspection area the image display shall automatically return to the regular mode.

### 12.5.5. Contrast Enhancement

12.5.5.1. The system shall enable the image contrast sensitivity to be optimized to three pre-set selectable modes:

- Low Penetration
- Regular Penetration
- High Penetration

12.5.5.2. This feature shall extract the contrast sensitivity to specific sections of the gray-scale.

12.5.5.3. The activation of the different contrast modes shall be achieved by successive pushes on a single pushbutton or by different pushbuttons. The selected contrast level will be indicated by means of indication lamps near the pushbutton or by a message on the Status Bar of the screen.

### 12.5.6. High Density Alert

12.5.6.1. The system shall enable a warning to be given of an area in the screened object where the X-ray absorption level does not enable effective inspection of its contents (hereinafter: `—High Density Alert`). The High Density Alert will be displayed to the operator by means of marking the area where high density has been discovered by flashing it on the image displayed on the screen.

- 12.5.6.2. It shall be possible to display the high density alert designations in any of the basic advanced imaging modes
- 12.5.6.3. It shall be possible to switch the High Density Alert display on and off in any of the imaging modes by one push-button.
- 12.5.6.4. It shall be possible to adjust the absorption level and the number of pixels which will activate the High Density Alert to any level and size. Access to this adjustment will be protected by a password.
- 12.5.6.5. The high density alert shall be designated to the operator by means of:
  - 12.5.6.5.1. Adjustable strength sound warning
  - 12.5.6.5.2. Marking the area where high density has been discovered by flashing it on the image displayed on the screen.
  - 12.5.6.5.3. Automatic stopping of the conveyor belt after the object has been completely scanned and displaying its full image on the screen.

#### **12.5.7. Dynamic Gray Scale Manipulation**

- 12.5.7.1. The system will enable the Image Analyst to optimize the image contrast sensitivity for a specific section of the image
- 12.5.7.2. A region of interest of the image will be designated for the activation of this feature by marking a frame on the image using a pointing device i.e. mouse, trackball. for this section of the image the Image analyst will adjust the contrast sensitivity by continually sliding a —window\ along the image gray- scale.
- 12.5.7.3. The image analyst will be able to set in real-time the —width\ of the —window\ i.e. the range of the brightness levels and simultaneously to shift the —window\ along the different sections of the gray-scale. This real-time setting will be dynamic and continuance.

#### **12.5.8. Pseudo-Colors**

- 12.5.8.1. Representation of image by wide range of available combinations of colors and shades further to the limited visible gray levels to may improve the visual contrast sensitivity.
- 12.5.8.2. Several pre-set color charts, for the full gray-scale, will be available to be selected.
- 12.5.8.3. Dynamic Gray- Scale manipulation will be available for the pseudo color features as described above.

### **12.6. Control Unit**

- 12.6.1. The control unit will include the screen upon which the X-ray image is displayed and the control and command panel of the machine.

- 12.6.2. The control unit will be an independent unit connected to the machine by means of a cable which will enable it to be positioned in any place around the machine at a distance of not less than 3 meters.
- 12.6.3. The command panel will be clear and simple to operate. All the control commands and indicator lights will be marked in English.
- 12.6.4. The control and command panel shall comprise:
  - 12.6.4.1. A key switch for turning the machine on and off.
  - 12.6.4.2. An indicator light showing the supply of current to the machine when it is turned on.
  - 12.6.4.3. An indicator light showing the operation of the radiation in the machine (X- ray ON).
  - 12.6.4.4. Commands for operation of the conveyor belt in a forward and backward direction and for stopping it.
  - 12.6.4.5. A command for the enlargement of the X-ray picture (zoom) and indicator lights showing that the enlargement mode is displayed on the screen.
  - 12.6.4.6. An emergency cut-off switch for all the system's dangerous components, mainly the radiation generator and the conveyor belt.
  - 12.6.4.7. Controls for the operation of optional modes such as contrast adjustment, edge enhancement, negative, etc.

#### **12.7. Automatic Image Archive**

- 12.7.1. The system shall avail a dedicated space for the automatic image archiving up to 100,000 images with their linked data
- 12.7.2. This feature shall enable the option of recording and storing the images and data of all objects inspected during a defined period for recheck and investigation purposes.
- 12.7.3. Provision must be made to enable downloading of auto archived Images onto external storage media in a standard image format and be viewable on standard PC

#### **12.8. Threat Image Projection (TIP)**

- 12.8.1. All machines must be provided with a fully operational TIP feature.
- 12.8.2. The system shall comprise extensive library of threat images. The range of TIP threat images must include military explosives, sheet explosives, commercial explosives, shielded devices customs forbidden items and improvised explosive devices.
- 12.8.3. It shall be possible to turn on or off the TIP feature
- 12.8.4. The supplier shall submit a full and detailed functional and technical description of the proposed TIP system including the software system, management & administration scheme.

## 12.9. Required Performance

### 12.9.1. Resolution:

The machine shall permit 38 AWG thick copper wire to be discerned in any place within the space of the inspection tunnel

### 12.9.2. Penetration:

- carry-on luggage screening : minimum 35mm of steel
- Checked-in baggage and parcel screening : minimum 30mm of steel

### 12.9.3. Material Differentiation

12.9.3.1. Organic/Inorganic differentiation—the X-ray system shall enable to differentiate, on the screen display, organic and inorganic matter by presentation in different colors.

12.9.3.2. Useful Organic Imaging ---the x-ray system shall penetrate through steel and differentiate on the screen display by different colors between organic materials of different effective atomic number.

12.9.3.3. Thin Organic Imaging—the X-ray system shall be capable to determine thin organic substance imaging. The test object shall incorporate plastic of various thicknesses to provide sufficient range to characterize the system's ability to image thin organic material.

12.9.3.4. Useful Organic Differentiation—to determine the useful organic differentiation, the test object shall incorporate various samples of plastics placed on top of steel which varies in thickness.

### 12.9.4. Uniformity of the X-Ray Image

12.9.4.1. The system will ensure uniformity of performance in any place in the inspection tunnel and will prevent distortions as a result of the geometrical form of the radiosopic layout.

## 12.10.Operational Requirements

12.10.1.The machine shall enable complete scanning of an object up to the length of 100cm in full screen.

12.10.2.The machine shall enable an unobstructed scanning of any object up to the above mentioned size independent of its form, size and component materials.

12.10.3. The conveyor belt will be composed of one continuous unit and there will not be any projections or protrusions in the inspection tunnel which may cause the scanned object to stop moving and/or become jammed and/or damaged.

12.10.4.Conveyor capacity with evenly distributed load shall be minimum160kg

12.10.5.The carry-on luggage screening machines in shall have appropriate hardware and software interface for integration with automatic tray return system.

12.10.6.The checked-in luggage screening machines shall have appropriate hardware and software interface for integration with the existing baggage handling system.

12.10.7.It shall be possible to drive the conventional x-ray machines conveyor belts to back and forward directions and shall have a reverse scanning capability

12.10.8. Duty cycle of the machines shall be 100%, 24 hrs a day, 7 days a week, and 52 weeks a year.

#### **12.11. Environmental Conditions**

12.11.1. The machine shall operate at full capacity at a temperature of between -5°C and +40°C and a relative humidity of up to 95%. It shall not be harmed by unlimited exposure to these climatic conditions.

12.11.2. The machines shall operate with line of 220VAC ±10%, 50Hz, all fitted with high capacity UPS and AC stabilizer.

12.11.3. The machine will operate at full capacity and at the duty cycle specified above under conditions of a shed open to dust & sand.

#### **12.12. Reliability**

12.12.1. The supplier will be required to prove that the machine has been manufactured in conformance with ISO-9000 or equivalent quality control standard.

12.12.2. The supplier will be required to make declaration as to the average time span between breakdowns of the machines and its components. Preference will be given to machines with greater time span between breakdowns.

#### **12.13. Safety**

12.13.1. Valid radiation safety certificate that shows machine complies with enforced regulation shall be submitted

12.13.2. No Access shall be possible to dangerous components (heat, current, radiation etc.) without keys which shall be held by trained & authorized personnel.

12.13.3. The system shall have at least three emergency cut-off switches, one on the control panel and two more adjacent to each one of the X-ray inspection tunnel

#### **Note:**

- ✎ Model, names, country of origin and complete documentation of the proposed equipment shall be indicated. Country of origin of all proposed facility machines/equipment shall be from Europe or USA.
- ✎ The bidders/suppliers shall be provided the necessary quantity of the facility machines/equipment's for complete operation of the airport as per architectural drawings and international standards.

### **C. TECHNICAL REQUIREMENTS FOR WALKTHROUGH METAL DETECTOR**

The scope shall include supply, installation, commissioning & training of walk through metal detector.

#### **Required Features:**

- Shall allow to identify where, how much and what type of metal is being brought
- detects fire arms and knives even when they are hidden within body cavities,
- Shall accurately indicate the position of the threat, its intensity and its prevalent composition

#### **Security Features:**

- Users shall choose/set/ security levels directly from the known international standards or implement their own standard.

#### **Alarm modes & signaling:**

- Multi-zone visual indication with high resolution vertical & lateral LED display
- Signaling of flow/traffic management that allows/protects entry shall be provided.
- Detection signal level shall be proportional to the mass in transit and visible
- Audible alarm with at least 10 selectable tone types and intensity levels
- It shall count the In and out of traffic through the metal detector.
- Shall split metallic and non-metallic alarm signaling
- Shall have a programmable random alarm signaling

**Interior Dimension:** Passage width 800mm, height 2000m

**Power supply:** 220Vac±10%, 50Hz

**Operating conditions:** Temperature -5 to +50, Humidity 0-95%

**Sensitivity:** Selectable from 1 to 100%

#### **Control Unit:**

- Self-contained digital electronics with robust construction
- High visibility LCD display and keypad
- Access to front panel shall be protected by hardware key and multi-level password

**Programming:**

- Shall have at least 20 built-in international standard security level programs
- Programmable via remote Infrared remote control unit, RS-232, Bluetooth and Ethernet Interfaces

**Traffic control:** Resettable bidirectional counter

**Accessories:**

- Standard test piece shall be provided with each machine
- British type AC plug
- Remote control unit and programming cables
- Battery back-up for 2hrs

**Certification and Conformity:**

- shall comply with safety regulation to pregnant women and people with pacemaker or other life support systems and to magnetic storage media
- shall conform to current international security standards for enhanced metal detectors
- shall comply with EC regulation & international standards relating to electrical safety & electromagnetic compatibility( EMC)
- Certificates of compliance with these requirements shall be provided

**Documentation**

- Four copies of operation, maintenance and technical manuals, and all relevant documentations shall be provided

**Warranty:** 24 months from date of installation

**Spare parts:** a written confirmation for availability of spare parts for 10 years shall be provided

**F. Gode Airport Apron and Taxiway Design and Construction Requirements**

In addition to the terminal facilities, construction of Apron and Taxiway is also included in this contract. Use the following data for design and construction.

**Apron**

Length=150 m

Width=75 m

Surface type: Rigid pavement

Design Aircraft: B737-800 for pavement design

## Taxiway

Length=200m

Width=23m

Surface type: Rigid pavement

Design Aircraft: B737-800 (for pavement design)

### **1. Scope of Work**

- Carry out the assessment considering all **ICAO Standard/FAA requirements for design aircraft.**
- Carrying out geotechnical investigation services.
- Assessments and soil investigation reports, carry out a complete geometrical and structural (pavement) and hydraulic/drainage designs.

### **2. Design work Items (Engineering Design)**

- Topographic Survey
- Geotechnical investigation and recommendation
- Hydraulics Recommendation
- Soils and Material Investigation
- Geometric and Pavement design of Taxiway & Apron
- Any required Structure design
- Marking
- Design Document
- Record drawings of As Built plans

### **3. STANDARDS AND DESIGN REFERENCES**

The design and construction work shall be performed in accordance with the following standards, specification or Reference Documents. If a specific standard, specification or reference document is not listed herein, the Employer's Representative shall identify the pertinent standard, specification or Reference Document to the Contractor. The Contractor must meet the minimum standards & criteria (ICAO Standard). Minimum design standards of criteria can only be utilized upon approval of the Employer's Representative.

**Note:** The Design Builder shall use and apply latest editions of standards and design reference documents on this project.

- ICAO Standard /FAA requirements
- Geometric Design Manual (ICAO)
- Geotechnical Design Manual (ERA 2013)
- Flexible Pavement Design Manual (ICAO), FAA & ERA 2013
- Site Investigation Manual (ERA2013)



- Drainage Design Manual (ERA 2013)
- ERA Standard Drawing (ERA 2013)
- ERA Standard Technical Specification (2013)
- Environmental Management System Manual (ICAO)

Where the aforesaid codes, standards and specifications are silent on any aspect, the following standards in order of preference shall be adopted, unless otherwise directed by EA/Employer's Representative:

- (a) ERA manual 2002
- (b) American Association of State Highway and Transport Officials (AASHTO).
- (c) American Society of Testing Materials (ASTM).
- (d) British Standards (BS)
- (e) Any other standard proposed by the Contractor and approved by EA

### **Bill Of Quantities and Specification**

The bill of quantities and specification of materials will be prepared by the DBC based on the final working drawings. But described below are list of indicative materials.

- Foundation and floor slab- reinforced concrete
- Structural members ( column and beams)- steel structure
- Exterior envelopes- curtain walls, Aluminium cladding and finished HCB
- Interior partitions- light and demountable materials for toilets and HCB for other partitions
- Roofing- steel truss and EGA sheet or other quality envelope.
- All Sanitary materials and fixtures and supporting elements should have to be selected considering energy efficiency and to meet the requirements of internationally recognized standards such as EN ISO and ASTM or equivalent institution.
- The plumbing materials (pipes, appliance, pumps, etc) and fire fighting equipments to be designed shall satisfy approved specifications for quality, durability, compatibility, stability and shall comply with the specific nature of the project.

### **Standards and Design References**

The design and construction work shall be performed in accordance with the following standards, specification or Reference Documents. If a specific standard, specification or reference document is not listed herein, the Employer's Representative shall identify the pertinent standard, specification or Reference Document to the Contractor. Minimum design standards of criteria can only be utilized upon approval of the Employer's Representative.

- ICAO Standard /FAA requirements
- EBCS (latest Ethiopian building code standard)
- BATCODA
- British Standards (BS)

Where the aforesaid codes, standards and specifications are silent on any aspect, the following standards in order of preference shall be adopted, unless otherwise directed by **ET Group** /Employer's Representative:

- (f) American Association of State Highway and Transport Officials (AASHTO).
- (g) American Society of Testing Materials (ASTM).
- (h) Any other standard proposed by the Contractor and approved by **ET Group**

### **Project Designs**

The Design-Builder shall develop the Project design so as to meet all the requirements of the Contract Documents. The Employer has proposed the preliminary concept design prepared as **Scope /conceptual design** and the same is recommended only to a limited level. If the Design-Builder adopts the Conceptual Design as the basis from which it will design the Project, the Design-Builder is responsible for:

- Ensuring that the resulting design meets the requirements of the Contract Documents.
- Assuming responsibility for any Project requirements arising from using the Conceptual Designs as the basis of the Project design and construction.
- The scope presented should be considered as the minimum employer's requirement.

### **G. Dembidollo Airport Runway Strip Widening**

In addition to the terminal facilities, construction of widening runway strip is also included in this contract. Use the following data in conjugation with the standards recommendation for design and construction.

#### **Runway Strip**

- Length = 2180m
- Width = From 37.5m to 75m both side
- Design Aircraft: Q-400 for pavement design

#### **1.Scope of Work**

The widening of the runway will comprise, but not limited, carry out all required the assessment considering all ICAO Standard/FAA requirements for design aircraft.

#### **2.Items of work**

The work shall consist of complete assessment of the decided runway locations, furnishing all design plans, documentation, equipment, materials, labor and incidentals necessary to successfully complete the project in compliance with the contract provisions. The Contractor for this project shall perform, as minimum, the primary item of work listed below. This list is not all-

inclusive and the Contractor shall be responsible for identifying all items of work and executing them according to the design and specifications to meet the employer's requirement.

i. Reporting Requirement

- Detailed Engineering Design Report
- Site Assessment Report
- Topographic Survey Report
- Soils, Materials and/or Pavement Report
- Hydrological / Hydraulics and Structural Report
- Drawings
- Engineering Cost Estimate

ii. Design work Items (Detailed Engineering Design)

- Analysis of decided locations
- Topographic Survey of the proposed site
- Soils, material and geotechnical investigation and recommendation
- Hydraulics Recommendation
- Geometric and Pavement design of Runway and Taxiway strip
- Any required Structure design
- Quality management program of implementation
- Design Document
- Record drawings of As-Built plans

## **H. Nekemte Airport Perimeter and Security Fence Design and Construction Requirements**

### **Perimeter Fence Requirements:**

To ensure aircraft safety, it is critical to exclude large mammals' species such as Hyenas, Hippos and Wild pigs from airport environments, as well as to consider thoroughly and carefully all available management methods. Airports are often located on or adjacent to undeveloped land that provides habitat for various species large enough to pose a direct hazard to aircraft. Thus, the design and construction of perimeter fence should consider the above factor.

The major tasks that the Bidders are expected to execute all Perimeter (from design to construction), but not limited to;

- Erection of the reinforced concrete post
- Meshing with barbed wire
- Metal gate (main gate and minor gates) with all its accessories

In addition, bidders are required to visit the site to be well acquainted with the site and existing facilities.

### **Standards**

The Contractor shall design and install Perimeter in accordance with the following specifications & guide lines for the airport:

- ICAO Standard
- ES EN 1992:2015 Design of concrete structure
- ERA's 2013 Standard Specifications for construction
- ERA's 2002 Standard Drawing
- Any other standard proposed by the Contractor and approved by EA

### **Security Fence Requirements**

The major tasks that the Bidders are expected to execute security fence works (from design to construction), but not limited to;

- Suitable foundation work for specific sites
- Angle iron post
- Galvanized mesh wire 2m height,
- Reinforcement bar diameter for post anchorage
- Anti rust painting as required
- Metal gate (main gate and minor gates)

The distance of security fence from runway, taxiway and apron is according to ICAO and other international standards. In addition bidders are required to visit the site to be well acquainted with the site and existing facilities.

## **I. Nekemte and Gode Airports Watch Towers Design and Construction Requirements**

### **Location and Height**

- Towers shall be located inside the inner clear zone of the security fencing system.
- The height to the cabin floor should be between 3 and 5 m; it varies based on visibility and land terrain.
- The door of the tower should face another tower to allow for visual monitoring.
- Towers should be spaced at a **maximum of 1 km** apart and have an uninterrupted view of a minimum of 73.1 m in any direction along the perimeter fence.
- Towers must be able to observe the entire inner and outer clear zones and fence line.

### **Structure and wall**

- Conduct a thorough site analysis and review of operational requirements prior to initiating design of watch towers.
- While there is no specific size or floor spacing criteria for tower cabins, the Contractor should use site specific condition to decide the area.
- All walls should be a minimum of 20cm thick.

## Windows

- Windows must be no less than 915 mm high in size and placed a minimum of 915 mm above the floor surface.
- Having windows continuous around the cabin may be considered as it increases visibility.
- Windows must meet the same ballistic threat level as the cabin construction itself.

## Lighting

- The tower cabin should be equipped with dimmer controlled lights to aid with night vision and additional security to the occupants.
- Provide a night light with red lens and remote emergency lighting.
- The roof of the cabin should have a movable searchlight controllable from the interior of the cabin.

## Utilities

- Provide water and waste system service for general use and for the unisex restroom in the ground floor.
- If it is technically impossible or economically infeasible to provide these utilities due to site constraints, the installation may waive (cause trouble) the requirement to provide the water and waste utilities.

## J. Emergency Access Road

- The DBC shall execute emergency access road construction at all seven airports starting from design to construction). Emergency access roads should be provided within the aerodrome boundary and to approach areas at least from the threshold to the airport boundary so as to facilitate achieving minimum response times.
- Emergency access roads shall be capable of supporting the **heaviest vehicles** which will use them, and be usable in **all weather conditions**.
- The access road should be **unpaved road** (Gravel Road).
- An essential consideration in the design of gravel roads is to ensure all-weather access. This requirement places particular emphasis on the need for sufficient bearing capacity of the pavement structure and provision of drainage and sufficient earthworks in flood or problem soil areas (e.g. black cotton).
- Geotechnical and material (field survey and materials properties) investigations shall be conducted in order to determine subgrade capacity and materials quality for design and construction of a gravel road.
- Depending on the CBR<sub>design</sub> of the subgrade, improved subgrade layers shall be constructed as required, on which the gravel wearing course is placed.
- The crossfall of carriageway and shoulders for gravel roads shall be provided as per ERA's *Geometric Design Manual – 2013*. This is to ensure that potholes do not develop by rapidly removing surface water and to ensure that excessive crossfall does not cause erosion of the surface. Provision of drainage is extremely important for the performance of gravel roads.

- The geometric design and pavement design of the gravel access road shall be as per ERA (Ethiopian Road Authority), Geometric and Pavement Design Manual – 2013.
- The design documents shall be approved by the Employer or Employer’s Representative before commencement of the construction works.

**K. Design and Construction of Well Graded Runway Strip and Runway End Safety Area at Kombolcha Airport**

The runway strip and runway end safety area enhances the safety of airplanes which undershoot, overrun, or veer off the runway, and it provides greater accessibility for firefighting and rescue equipment during such incidents.

There are gorges and river in both sides of the runway. Thus, the DBC should consider this for design and construction of both runway strip and runway end safety areas.

**Runway Strip**

Runway Strip is defined as the area surrounding the runway that is prepared or suitable for reducing damage to aircraft in the event of unintentional excursion of aircrafts from the runway surface.

The aerodrome reference code for Kombolcha Airfield is 3C and 2000m \* 30m runway dimension and 60\*60 Stopway. A strip shall extend before the threshold and beyond the end of the runway or stopway for a distance 60m for code number 3.

A strip including a non-instrument runway should extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of 75m for code number 3.

The DBC is expected to design and construct a well graded runway strip 2260m \* 150m. All the designs and construction of runway strip shall be based on ICAO Annex 14, Aerodrome Design Manuals.

**Runway End Safety Area**

Runway End Safety Area is defined as the area beyond the end of the runway that is prepared or suitable for reducing damage to aircraft in the event of Undershoot and Overshoot.

The runway end safety area shall extend from the end of a runway strip to a distance of 90 m and the width of a runway end safety area shall be twice that of the associated runway (Runway width is 30 m and 45 m including a 7.5 m shoulder width).

The DBC is expected to design and construct a well graded runway end safety area (RESA),

- 90m \* 90m

All the designs and construction of runway strip shall be based on ICAO Annex 14, Aerodrome Design Manuals.

## **ITEM NO. 2 – CONSTRUCTION:**

### **I) Survey Records**

The Contractor shall be responsible for all survey works necessary to complete the work. All survey control data, calculations, surveying and measuring required for setting out shall be the Contractor's responsibility.

Detailed survey records shall be maintained, including a description of the work performed on each shift, the methods utilized and control points used.

Survey records shall be delivered in hardcopy format and also in electronic file format. The electronic format shall be in ASCII, .dwg, or DXF format. They shall be delivered at the time of substantial completion unless requested by **ET Group** or Employer's Representative at an earlier time.

### **II) Actual works**

The actual work of the project should be executed according to the construction documents prepared by the DBC following the **ET Group** requirements described in this document.

Variations of work from the final 100% approved construction documents will not be entertained.

The Design-Builder warrants that:

1. All design work performed pursuant to the Contract Documents, including that done by the Subcontractors and manufacturers, shall conform to all professional Employer's Representative principles generally accepted as standards of the industry;
2. The Project shall be free of defects, including design errors, omissions, inconsistencies and other defects;
3. Materials and equipment furnished under the Contract Documents shall be of good quality and when installed shall be new;
4. The Work shall meet all of the requirements of the Contract Documents;
5. The specifications and/or drawings selected or prepared for use during construction shall be appropriate for their intended use; and
6. The Project shall be fit for use for the intended function.

### **2.1.3 Progress Payments**

**Design Phase** - Progress payments during the design phase of the work will be based on submission, review, and acceptance of design deliverables.

**Construction Phase** - Progress payments during construction will be based on the percentage of work completed on items listed on the approved schedule of values. Actual construction completed and in place will form the basis for payment. Verification of the % complete shall be initiated by the Contractor under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance, the % complete shall be validated by the Engineer who acts as the Employer's representative. The Contractor shall make the computations for payment based on the governments verification of work completed and in place for any periods for which progress payments are requested.

The Contractor shall furnish the originals of all field notes and all other records relating to the basis for payment, to the Contracting Officer, who shall use them as necessary to determine the final amount of progress payments. The Contractor shall retain copies of all such material furnished to the Contracting Officer.

#### **2.1.4 Project Meetings**

This meeting is more productive if held on site. It is generally easier to get airport participants to the meeting and visiting the site after the meeting should be encouraged.

Before scheduling this meeting, Performance and Payment bonds for the construction portion of the project must be submitted and approved. The DB Contractor has 15 calendar days after award to commence with the work, so bonds must be submitted within that time frame to avoid delay to the schedule established in section 1.6.

#### **Design Meetings**

After the award of the contract and acceptance of the Performance and Payment bonds, the CO will arrange a design meeting with the DBC. The meeting agenda shall include the following as a minimum:

- Review and emphasize the *ET Group needs* and design objectives.
- Environmental and sustainability requirements
- Design schedule (provide minimum of two color hard copies). **Note:** No portion of the work can begin construction until 100% Complete DB Construction Documents are approved for that portion and any other portion of the work that may be affected by it.
- Modifications during design
- Submittals during design
- Areas available for use by the DBC
- Access requirements of the site
- Natural and Cultural Resource Protection
- Payments to the DBC

#### **Preconstruction Meeting**

The following Project Requirement deliverables shall be submitted a minimum of one week prior to the Preconstruction Meeting.

- Letter designating your Project Superintendent



- Project Schedule with construction portion fully developed.
- If any, a list of subcontractors for this project (must be same as in your proposal)
- Worksite Environmental and Social Management Plan, including a Waste Management Plan
- Quality Control Plan

After 100% Complete DB Construction Documents are approved (or completed portions of DBCDs necessary for fast tracking the project), and prior to the start of construction, the CO will arrange an on-site Preconstruction meeting with the DBC. The meeting agenda will include the following as a minimum:

- Correspondence procedures
- Roles and responsibilities
- Lines of Authority
- Progress Payments
- Submittal process
- Construction schedule (provide a minimum of two color hard copies and electronic copy in software it was created in) **Note:** No portion of the work can begin construction until 100% Complete DB Construction Documents are approved for that portion and any other portion of the work that may be affected by it.
- Labor standards
- Modifications
- ESHS reporting
- Accident reporting
- Security Rules and Regulations
- Environmental and sustainability requirements for the Project, required tracking for sustainability.
- Saturdays, Sundays, holidays and night work (if important)

### **Progress Meetings**

The DBC shall participate in weekly/monthly meetings with the Contracting Officer, and other project team members to update them on the following meeting agenda items:

- Approval of minutes of previous meetings
- Submittal status
- Review of off-site fabrication and delivery
- Requests for Information (RFI's) and issues
- Modifications
- Work in progress and projected
- Schedule update
- Status of Project Record Drawings and

- Other business relating to work

### 2.1.5 Project Schedule

**General:** The Contractor shall provide two (2) color copies and one electronic copy of the project schedule after award and before the design meeting. The schedule shall include a detailed design phase with design deliverable submission dates, review periods as well as a summary construction schedule with important milestones included for both phases.

Fully develop the construction portion of the schedule and submit to the Contracting Officer before the Preconstruction meeting or any construction begins. The project schedule shall be updated on a quarterly basis throughout the entire contract period and until project substantial completion.

**Purpose:** The purpose of the project schedule is to ensure adequate planning, coordination, scheduling, and reporting during execution of design and construction activities of the DBC. The project schedule will assist the DBC and the Contracting Officer in monitoring the progress of the work, evaluating proposed changes, and processing the DBC's monthly progress payment requests

**Software:** The software shall be the latest version of Microsoft Project, Primavera Project Planner, SureTrak, or approved equal.

**Schedule Development:** The project schedule shall cover the entire contract period. The late finish date of the project schedule shall be the same date as the established completion date of the contract.

The DBC shall use the Critical Path Method (CPM) with limited use of lead or lag durations between schedule activities. The DBC's project schedule shall consist of procurement activities (including mobilization, submittal, and the fabrication and delivery of key and long-lead procurement items) and construction activities.

The DBC's project schedule shall consist of, but not be limited to, the following for each activity:

- Identify each and every activity number with numerical designations (maximum 5-digit). Numbering of activities shall be in increments of 10.
- Concise description of the work represented by the activity (maximum 48 characters). Avoid the use of non-standard abbreviations. The work related to each activity shall be limited to one work trade.
- Activity duration in whole working days with a maximum duration of 15 work days each, unless otherwise approved by the Contracting Officer, except for non-construction activities including mobilization, shop drawing and sample submittals, fabrication of materials, delivery of materials and equipment, and concrete curing.

In developing the project schedule, the DBC shall be responsible for ensuring that subcontractor work at all tiers, as well as its own work, is included in the project schedule.

The project schedule, as developed, shall show the sequence and interdependence of activities required for complete performance of the work. The DBC shall be responsible for ensuring all

work sequences are logical and the project schedule shows a coordinated work plan. Proposed durations assigned to each activity shall be the DBC's best estimate of time required to complete the activity considering the scope and resources planned for the activity. Resource loading of each activity shall list all personnel by labor category and equipment type and capacity proposed to complete the activity in the duration shown. Include permit requirements and constraints. Seasonal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures, wind and/or precipitation to ensure completion of all work within the contract time.

**Time Impact Analysis for Contract Modifications, Changes, Delays, and Contractor Requests Requirements:** When contract modifications or changes are initiated, delays are experienced, or the DBC desires to revise the project schedule, the DBC shall submit to the Contracting Officer a written time impact analysis illustrating the influence of each modification, change, delay, or DBC request on the contract time.

**Time Extensions:** Activity delays shall not automatically mean that an extension of the contract time is warranted or due the DBC. It is possible that a modification, change, or delay will not affect existing critical activities or cause non-critical activities to become critical. A modification, change, or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the project schedule, thereby not causing any effect on the contract time. Time extensions will be granted in accordance with the terms of the contract.

**Float:** Float is not for the exclusive use or benefit of either the *ET Group* or the *DBC*. Extension of the contract time will be granted only to the extent the equitable time adjustments to the activity or activities affected by the modification, change, or delay exceeds the total (positive or zero) float available on a particular activity.

## **2.2 Design Requirements**

### **2.2.1 DB Design Development and Construction Documents**

This element of work shall consist of the preparation of the DB Design Development Documents and DB Construction Documents. All documents shall be prepared using the International System of Weights and Measurements.

#### **Deliverables**

The following deliverables are required (refer to Section 1.6 for schedule):

#### **DB Design Development**

##### DB Design Development Documents:

- Documents for *Engineer* Review:

- Submit 2 paper copies of the following Draft DB Design Development Documents for review:

- DB-Design Development Drawings
- Product File
- Submit one electronic copy of the Draft DB Design Development Drawings.

**DB Construction Documents**

100% Draft DB Construction Documents

- Documents for *Engineer* Review:
  - Submit 2 paper copies of the following 100% Draft DB Construction Documents for review:
    - DB-Construction Drawings
    - Product File
    - Design Calculations
    - Written responses to the DB Design Development Documents Review Comments
  - Submit one electronic copy of the 100% Draft DB Construction Drawings, and resolution to all *Engineer DB* Design Development Document Review Comments.

Complete Stamped and Signed DB Construction Documents

Address and incorporate 100% Draft DB Construction Documents comments into the Complete Stamped and Signed DB Construction Documents and submit, for approval, per the following table, the record set of Complete Stamped and Signed DB Construction Documents for construction, *ET Group Archiving*, and general use.

COMPLETE STAMPED AND SIGNED DB CONSTRUCTION DOCUMENTS	ELECTRONIC FORMATS *	HARDCOPY FORMATS
DB-Construction Drawings	AutoCAD	Full-Size Paper (ANSI D)
Design Reports	PDF	A4 paper
Design Calculations	PDF	A4 paper
Written responses to the 100% Draft DB Construction Documents review comments	PDF & MS-Excel	A4 paper

## **2.2.2 Environmental and Sustainability Requirements for Design**

Environmental and sustainability requirements for the project are defined in the Environmental and Social Management Framework (ESMF) and in the Specifications for Environmental, Social, Health and Safety Management (ESHS) of the Works.

Based on these requirements, the contractor will finalize Environmental and Social Impact Assessments (ESIA) for each worksite that are consistent with the final design.

In addition, bidders shall take account of the general recommendations regarding environmental issues and to implement all the request indicated in this chapter.

## **2.3 Construction Requirements**

### **2.3.1 Environmental and Sustainability Requirements for Construction**

Bidder is expected to implement the requirements contained in the Environmental and Social study framework, Environmental and Social Impact Assessment and Environmental and Social Management plan.

Prior to the scheduled Preconstruction meeting, the Contractor shall submit a draft Worksite Environmental and Social Management plan (Worksite ESMP) to the Contracting Officer for approval. The Worksite ESMP shall be structured according to the plan specified in Appendix 1 to the ESHS Specifications, including a Health and Safety Plan, a Waste Management Plan and a Traffic Management Plan.

The Health and Safety Plan shall include (but not be limited to) identification of potential health and safety risks, prevention and protection measures, human and material resources involved, works requiring work permits, and emergency plans to be implemented in the case of an accident.

The Waste Management Plan shall include (but not be limited to) a list of the facilities and disposal area(s) to be used, a list of proposed materials to be reused or recycled, a list of materials that cannot be recycled or reused, storage and collection methods of waste and recyclables, handling procedures, and means of keeping recyclables free of contamination, and a description of the means of transportation of the recyclable materials and an estimate of how often bins will need to be emptied.

The Traffic Management Plan shall include (but not be limited to) the characteristics of vehicles and machinery in use, expected traffic, itineraries, speed limits and restrictions.

The Contractor shall appoint an Environment, Social, Health and Safety Manager in charge of implementing the ESHS specifications. The Contractor submits a monthly ESHS activity report

summarizing all ESHS initiatives implemented in relation to the works, including all elements stipulated in clause 6 of the ESHS specifications.

### **2.3.2 Schedule of Values**

The total costs for the component parts of work shall equal the contract line item amount for that lump-sum item. Include mobilization, general condition costs, overhead and profit in the total value of unit price items and in the component parts of work for each lump-sum item, as described below. Do not include mobilization, general condition costs, overhead or profit as a separate item.

The total cost of all items shall equal the contract sum. The Schedule of Values will form the basis for progress payments.

### **2.3.3 Construction Support**

#### **Staging Areas**

Construction sites will be limited to the smallest feasible area. Ground disturbance and site management will be carefully controlled to prevent undue damage to vegetation, soils, and archeological resources and to minimize air, water, soil, and noise pollution.

Staging is limited in or near the construction area for a construction office or trailer. Construction equipment and material storage shall be located in previously disturbed areas near the construction site. All staging areas shall be returned to pre-construction conditions once construction is complete. Standards for this, and methods for determining when the standards are met, shall be developed in consultation with the CO.

#### **Structures:**

Trailers, Storage, Field Offices, Staging Area and Sheds: Location to be approved by the Contracting Officer.

**DBC's Field Office:** Field office shall be structurally sound construction, and weather tight. The location will be determined by *Engineer prior* to issuing a Start Work Notice.

**Storage Sheds:** If used, provide weather tight sheds or other covered facilities for storage of materials subject to weather damage.

If used, all temporary water, sewer, sanitary facilities and electric utilities, shall be completely removed upon project completion. Remove temporary utility connections.

The location of the Staging Area for construction equipment will require CO approval.

The DBC shall protect tree trunks and root systems of trees in or adjacent to work areas.

#### **Parking of Construction Vehicles**

Parking of vehicles shall be limited to existing roads, in legally designated areas, and within approved staging area(s).

### **2.3.4 Submittals during Construction**

Material Submittal and Approval Procedures:

The following submittals will require *Engineer approval* prior to procurement or performance of the work:

- All submittals pertaining to Interior finishes
- All submittals pertaining to Exterior finishes
- Fire detection systems
- Sanitary fixtures
- Electrical and mechanical fixtures and plumbings

Submit all submittals required in the Project and Performance Requirements. Submit sufficient information based upon the performance specifications for the *Engineer to* make an informed decision on compliance or lack of compliance for the items above. A copy of the form is included at the end of the Project Requirements.

Submit construction submittals a minimum of 30 days prior to the need for approval.

#### **Contracting Officer's Review:**

- Any work done or orders for materials or services placed before approval shall be at the Contractor's own risk.
- After reviewing submittals, the Contracting Officer will return one copy of form and one copy of applicable (marked up) submittal sheets to the Contractor. All submitted items will be retained. The DBC is responsible for producing additional copies for his/her own use.
- Samples: Samples shall be large enough to illustrate clearly the functional characteristics and full range of color, texture, or pattern.
- Manufacturers' Catalog Sheets: Submit only pertinent pages; mark each copy of standard printed data to identify specific products proposed for use. The Contracting Officer reserves the right to require additional submittals. After review, the Contracting Officer shall notify the DBC of approval, approved with notations, or disapproved – resubmit

The returned submittal will be marked in one of three ways as defined below:

**APPROVED:** Acceptable with no corrections.

**APPROVED WITH NOTATIONS:** Minor corrections or clarifications are required. All comments are clear and no further review is required. The Contractor shall address all review comments when proceeding with the work.

**DISAPPROVED - RESUBMIT:** Rejected as not in accordance with the contract or as requiring major corrections or clarifications. The Contracting Officer will identify the reasons for disapproval. The Contractor shall revise and resubmit with changes clearly identified.

### **2.3.5 Construction Coordination**

**Notification:** The Contracting Officer (CO) will provide all necessary written notification and/or direction to the contractor.

### **2.3.6 Digital Images:**

Take appropriate digital images documenting construction progress and problems, such as capturing items that will not be seen later, etc. Send digital images to recipients on a weekly basis, as directed by Contracting Officer, of each work activity via e-mail in an approved format.

### **2.3.7 Quality Control**

#### **General**

The quality of all work shall be the responsibility of the Contractor. Testing shall be the responsibility of an independent testing laboratory. Inspect and test all work as needed to ensure that the quality of materials, workmanship, construction, finish, and functional performance is in compliance with applicable specifications and drawings.

Inspect at various stages of construction as needed to insure the finished product meets the guidelines.

Quality Control Daily Reports shall be completed by the Quality Control Supervisor.

Test reports shall be completed by person performing the test.

The Contracting Officer may designate locations of tests.

#### **Quality Control Staff**

The Contractor's Quality Control Supervisor may also perform the duties of Project Superintendent.

The Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.

The Contractor's job supervisory staff may be used to assist the Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.

Testing Laboratory and Equipment:

- Employ certified independent laboratories to perform sampling and testing. The testing laboratory organization shall be certified for the type of testing work to be done.



- All measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards. Upon request, measuring and testing devices shall be made available for use by the Government for verification tests.

### **Submittals**

**Quality Control Plan:** Prior to the Preconstruction meeting, submit for approval a written Contractor Quality Control (CQC) plan.

If the plan requires any revisions or corrections, the Contractor shall resubmit the plan within 10 days.

The ET Group reserves the right to require changes in the plan during the contract period as necessary to obtain the quality specified.

No change in the approved plan may be made without written concurrence by the Contracting Officer.

The plan shall include:

- A list of personnel responsible for quality control and assigned duties. Include each person's qualifications.
- A copy of a letter of direction to the Contractor's Quality Control Supervisor outlining assigned duties.
- Names, qualifications, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms.
- Methods of performing, documenting, and enforcing quality control of all work.
- Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.

**Daily Reports:** Submit showing all inspections and tests on the first workday following the date covered by the report. Utilize the forms attached at the end of this section.

**Test Reports:** Submit Test Information Sheets with Quality Control Daily Reports.

Submit failing test results and proposed remedial actions within four hours of noted deficiency.

Submit three copies of complete test results not later than one calendar days after the test was performed.

If the CQC plan and Quality Control Daily Reports are not submitted as specified, the Contracting Officer may retain all payments until such time a plan is accepted and implemented, or may retain payments for work completed on days there are no Quality Control daily reports.

**Off-site Inspection Reports:** Submit prior to shipment.

## **Execution**

**Off-Site-Control:** Items that are fabricated or assembled off-site shall be inspected for quality control at the place of fabrication.

**On-site Control:** Notify the Contracting Officer at least 48 hours in advance of the preparatory phase meeting.

Notify the Contracting Officer at least 24 hours in advance of the initial and follow-up phases.

### **Quality Control Phases**

**Preparatory Phase:** Perform before beginning each feature of work.

Review control submittal requirements with personnel directly responsible for the quality control work. As a minimum, the Contractor's Quality Control Supervisor and the foreman responsible for the feature of work shall be in attendance.

Review all applicable specifications sections and drawings related to the feature of work.

Ensure that copies of all referenced standards related to sampling, testing, and execution for the feature of work are available on site.

Ensure that provisions have been made for field control testing.

Examine the work area to ensure that all preliminary work has been completed.

Verify all field dimensions and advise the Contracting Officer of discrepancies with contract documents.

Ensure that necessary equipment and materials are at the project site and that they comply with approved shop drawings and submittals.

Document all preparatory phase activities and discussions on the Contractor's Quality Control Daily Report.

**Initial Phase:** As soon as work begins, inspect and test a representative portion of a particular feature of work for quality of workmanship.

Review control testing procedures to ensure compliance with contract requirements.

Document all initial phase activities and discussions on the Contractor's Quality Control Daily Report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

**Follow-Up Phase:** Inspect and test as work progresses to ensure compliance with contract requirements until completion of work.

**Additional Preparatory and Initial Phases:** Additional preparatory and initial phases may be required on the same feature of work for the following reasons:

Quality of on-going work is unacceptable.

Changes occur in the applicable quality control staff, on-site production supervision, or work crew.

Work on a particular feature of work is resumed after a substantial period of inactivity.

### **Documentation**

Maintain Quality Control Daily Reports and Daily Test Report Information Sheets.

Quality Control Daily Reports may not be substituted for other written reports required under clauses of the contract, such as Disputes, Differing Site Conditions, or Changes.

### **Enforcement**

The Contractor shall stop work on any item or feature pending satisfactory correction of any deficiency noted by the quality control staff or the Contracting Officer.

### **2.3.8 Working Hour Restrictions**

All work and deliveries shall be limited to the weekday hours of 8:00 am to 5:00 pm unless otherwise approved by the Contracting Officer. No work shall occur on holidays or weekends without prior approval.

### **2.3.9 Temporary Services**

Temporary materials may be new or used, but must be adequate in capacity for the required usage, meet all requirements of the ESHS Specifications, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

**Fire Protection Equipment:** Observe and enforce standards of fire prevention. No open fires shall be allowed.

**Vehicles and Equipment:** Provide one fire extinguisher on each vehicle or piece of equipment. The responsibilities shall include locating and maintaining fire protective equipment and establishing and maintaining safe torch cutting and welding procedures.

**Hazard Control:** Take all necessary precautions to prevent fire during construction. Do not store flammable or combustible liquids in existing structures. Provide adequate ventilation during use of volatile or noxious substances.

**Spark Arresters:** Written determinations of areas and periods of potential fire hazard will be issued by Contracting Officer. Locate internal combustion equipment so that exhausts discharge well away from combustible materials. Locate service areas a minimum of 15 meters from buildings. Shut down equipment before refueling.

**Smoking:** Smoking within buildings or temporary storage sheds is prohibited.

**Welding:** Cutting by torch or welding shall be performed only when adequate fire protection is provided.

**Electricity and Lighting:** Make arrangements with utility company for metered connection to existing utility and pay all costs. Coordinate work with Contracting Officer. When temporary connections are removed, restore existing utility services to their original condition.

**Telephone:** The DBC shall make arrangements with the local telephone company and pay all costs if the DBC wants to have job-site telephone service.

**Water:** DBC shall provide potable water and pay all costs.

**Heating and Cooling:** Furnish temporary heating and cooling. Use of permanent heating and cooling system shall not be allowed without written authorization from Contracting Officer. When the permanent heating and cooling system is approved for use as temporary heating and cooling, pay all costs until final acceptance. Install new filters before final acceptance. Equipment warranties shall start on date of Final Acceptance.

**Sanitary Facilities:** Provide and maintain temporary toilet facilities. Enclosures shall be weatherproof, sight proof and of sturdy construction. Completely remove sanitary facilities on completion of work.

### **2.3.10 Access**

Coordinate construction efforts with the Contracting Officer such that there is minimal impact to the work of the *ET Group Service* personnel and the visiting public.

During construction of the scheduled facilities, the Design Build Contractor shall have continuous access to the site.

### **2.3.11 Preservation of Adjacent Features**

Confine all operations to work limits of the project. Prevent damage to natural surroundings. Restore damaged areas outside the work limits, repairing or replacing damaged trees and plants, at no additional expense to the *ET Group*.

Provide temporary barriers to protect existing trees, plants and root zones that are to remain in place. Do not remove, injure or destroy trees or other plants without prior approval. Consult with the Contracting Officer. Remove agreed upon roots and branches that interfere with construction. Carefully supervise excavation, grading, backfilling, and other construction operations near trees and plants, to prevent damage.

### 2.3.12 Existing Utilities

Disruptions of services shall be kept to a minimum. The contractor shall coordinate with the local utility companies. All disruptions shall be arranged at least 48 hours in advance with *ET Group* and must be approved by Contracting Officer.

### 2.3.13 Hauling Restrictions

Comply with all legal and local load restrictions in the hauling of materials.

### 2.3.14 Accident Prevention

Prior to the Preconstruction Meeting, the Contractor shall submit an accident prevention program as part of the Workside ESMP. The program must be accepted by the *ET Group before* any on site work can begin. Include the following:

Name of responsible supervisor to carry out the program; monthly safety meetings; first aid procedures; outline of each phase of work, hazards associated with each phase and methods proposed to ensure property protection, and safety of the public, *ET Group* staff and DBC employees; training; planning for possible emergency situations; housekeeping and fire protection.

**Accident Reporting:** Reportable accidents, defined as death, occupational disease, traumatic injury to contractor's personnel, *ET Group employees* or the public, property damage of any accident in excess of 3000 birr and fires, must be reported within seven days. Complete an Accident/Property Damage Report (attached Form CM-22) and forward to the Contracting Officer.

**Quality Assurance:** Ensure that all employees are physically qualified to perform their assigned duties in a safe manner. Do not allow employees to work if their abilities are impaired. Operators of all equipment shall be able to understand signs, signals and operating instructions, and be capable of operating such equipment.

#### **Accident Prevention Products: Provide the following:**

- First aid facilities, including at least one first aid officer present at all times per team of 10 to 50 workers present;
- A health care centre set up at the Contractor's costs for Project Areas with more than 35 workers present at any one time and where it is not possible to reach a medical clinic within a period of 45 minutes, by land and in normal conditions, according to the requirements stipulated in the ESHS specification;
- Personnel protective equipment according to the requirements stipulated in the ESHS specification;

- Emergency instructions, including telephone numbers and reporting instruction for ambulance, physician, hospital, fire department and *ET Group security*. Place in conspicuous locations at the worksite.
- Adequate egress at all times.
- Hard hats for all employees and for up to 6 visitors.

**Training:** Provide training for first aid and hazardous material handling and storage, as well as other ESHS issues, as stipulated in the ESHS specifications and documented each month in the ESHS activity report.

### 2.3.15 Temporary Controls

**Housekeeping:** Keep project neat, orderly, and in a safe condition at all times.

**Weather Protection:** When inclement weather is expected, provide temporary protection, for areas where roofing, siding, windows, doors or other enclosing elements have been removed or have not been installed. Inspect protective coverings frequently to ensure that they are functioning properly.

### 2.3.16 Field Engineering

The DBC shall set initial construction stakes establishing lines, slopes, grades, reference points, base lines and bench marks as required. The DBC shall execute the work in accordance with these stakes, and perform all additional staking necessary to execute the work.

All existing survey control utilized for this project shall be preserved. Controls that are destroyed by the DBC shall be replaced by the DBC at their expense.

### 2.3.17 Project Close-out

**Project Record Drawings:** Maintain one complete full-size set of contract drawings and one full-size set of vendor-supplied drawings. Clearly mark changes, deletions, and additions to show actual constructed conditions. Keep record drawings current. Certification of accuracy and completeness will be required for monthly payment requisitions. On completion of the total project, submit complete record drawings.

**As-Built Drawings:** Provide as-built drawings by updating the Approved DB Construction Drawing AutoCAD files with information provided on the record drawings, contract modifications; and other applicable shop drawings, sketches, and data. AutoCAD files should be in compliance with NPS/DSC CAD Standards.

Provide as-constructed drawings in the following formats:

- full-size (A1) paper copies

- CD-ROMS, each with drawing files in both PDF and AutoCAD formats

**Posted Operating Instructions:** Furnish operating instruction attached to or posted adjacent to equipment. Include wiring diagrams, control diagrams, control sequence, start-up adjustment, operation, lubrication, shutdown, safety precautions, procedures in case of equipment failure and other items of instruction recommended by manufacturer.

**Cleaning:** Before scheduling the final inspection, remove all tools, equipment, surplus materials, and rubbish. Restore or refinish surfaces that are damaged due to work of this contract to original condition. Remove grease, dirt, stains, foreign materials, and labels from finished surfaces. Thoroughly clean building interiors. Pick up and remove all construction debris from the site. At time of final inspection, project shall be thoroughly clean and ready for use.

Before submitting a request for final inspection, submit the following:

- Project Record Drawings and As-Constructed Drawings: As specified above.
- Guarantees and Bonds: As specified in Performance Requirements and Specifications.
- Spare Parts and Materials: As specified in Performance Requirements and Specifications
- Operation and Maintenance Data: As specified below and in Performance Requirements and Specifications.
- Keys and Keying Schedule: Submit all keys including duplicates. Wire all keys for each lock securely together. Tag and plainly mark with lock number, equipment identification, or panel or switch number, and indicate location, such as building and room name or number.
- Operating Tools: As specified in the individual sections.
- Special Tools: One set of special tools required to operate, adjust, dismantle, or repair equipment. Special tools are those not normally found in possession of mechanics or maintenance personnel.
- Mechanical and Electrical Systems: Verify the following in writing:
  - All systems are complete.
  - All systems have been properly started and are operational.
  - All controls are complete and operational, and sequences have been checked and are functioning properly.
  - Testing and Balancing Report: As required in the technical specifications.

**Operation and Maintenance Data:** Provide one of 3-ring binders with operation and maintenance data, to the Contracting Officer for review, prior to the final inspection. Data shall include manufacturer's standard literature, equipment data sheets, vendor-furnished as-built drawings; custom written data not included in manufacturer's standard literature; schedules, warranties, parts lists, test results, and subcontractor list.

After **ET Group review** is completed, incorporate comments, and submit 3 final sets of operation and maintenance data to the Contracting Officer.

### **2.3.18 Substantial Completion and Final Inspection**

Submit written certification that project, or designated portion of project, is substantially complete, and request in writing a final inspection. Upon receipt of written request that project is substantially complete, the Contracting Officer will proceed with inspection within 10 days of receipt of request or will advise the Contractor of items that prevent the project from being designated as substantially complete.

When work is determined to be substantially complete, the Contracting Officer will prepare a list of deficiencies ("Punch List") to be corrected before final acceptance. The Contracting Officer will issue a Letter of Substantial Completion. If work is not determined to be substantially complete, the Contracting Officer will notify the DBC in writing. After completing work, the DBC shall resubmit certification and request a new final inspection.

If, following final inspection, the work is determined to be substantially complete, Contracting Officer will prepare a list of deficiencies to be corrected before final acceptance and issue a Letter of Substantial Completion. The contractor shall complete the work described on the list of deficiencies within 30 calendar days, as weather permits. If the Contractor fails to complete the work within this time frame, the Contracting Officer may either replace or correct the work with an appropriate reduction in the contract price or charge for re-inspection costs in accordance with the Inspection of Construction clause of the contract.

**Acceptance of the work:** After all deficiencies have been corrected, the Contracting Officer will issue a Letter of Acceptance.



## 2.4 FORMS

<b>TRANSMITTAL – ETHIOPIAN AIRPORTS</b>						Transmittal No.:		
						Sheet: 1 of:		
Park:		Project:	Contract No.:			PMIS No.:		Date:
Contractor:			Subcontractor/Supplier:			<b>EA ACTION</b>		
Item No.	Specification Section No.	Paragraph No.	Description of Item (Size, Type, Name, Manufacturer, Use, Etc.)	No. of Copies Submitted	No. of Copies Returned	Approved	Approved with Notations	Disapproved - Resubmit
Contractor Signature				Recommended by				
Title, Date				Title			Date	
I hereby certify that this submittal has been reviewed for								

accuracy, completeness, and compliance with contract requirements (FAR 52.236-21)		
Review Comments	Action By	Date
Contracting Officer's Representative		
Approval of this submittal is subject to the provisions of the contract drawings and specifications. This action is for general concurrence only and the Government is not responsible for errors or omission.		
SUBMITTAL LOG DATES: From contractor [____], To reviewer [____], From reviewer [____], To Contractor [____]		
Distribution: ( ) Contractor ( ) DSC File ( ) COR ( ) A/E ( ) DSC Interim ( ) COR Interim ( ) Contractor Interim		
CM-16Rev. 4/00		

TRANSMITTAL CONTINUATION - ETHIOPIAN AIRPORTS						Transmittal No.:			
Park:		Project:		Contract No.:		Sheet: 1 of:		PMIS No.:	Date:
Contractor:			Subcontractor/Supplier:			NPS ACTION			
Item No.	Specification Section No.	Paragraph No.	Description of Item (Size, Type, Name, Manufacturer, Use, Etc.)	No. of Copies Submitted	No. of Copies Returned	Approved	Approved with Notations	Disapproved - Resubmit	

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Review Comments

CM-16 Rev. 06/06



Damages:	
Corrective Action Taken:	
Contractor Reporting:	Date:
Project Inspector	Date:
Reporting:	
<b>ATTACH COPIES OF ANY ADDITIONAL INFORMATION (&amp; photos)</b>	
COMMENTS	

May 12, 2004 / Form No. CM-22

## CONTRACTOR'S QUALITY CONTROL DAILY REPORT

REPORT NO. \_\_\_\_\_ SHEET 1 OF \_\_\_\_\_

PROJECT		CONTRACT NO.		DATE	
EA		CONTRACTOR'S REPRESENTATIVE ON THE JOB			
WEATHER (Rain, Snow, Cloudy, Windy, etc.)	RAINFALL L Inches	TEMPERATURE MAX.   MIN.		GROUND CONDITIONS (Dry, Damp, Wet, Frozen, etc.)	

### 1. PRIME CONTRACTOR

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

### WORK PERFORMED BY PRIME CONTRACTOR:


MATERIALS DELIVERED	OFFICIAL VISITORS TO SITE

### 2A. SUBCONTRACTOR, \_\_\_\_\_: (If more than one subcontractor use copies of following page.)

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments



<b>WORK PERFORMED BY SUBCONTRACTOR:</b>						
3. SPECIFIC INSPECTIONS: (Inspections performed, results, and corrective actions)						
4. TESTING: <input type="checkbox"/> Check if any testing was performed today. (Complete and attach Test Report Information Sheets.)						
Type _____ and _____ Location _____ of _____ Testing: _____						
5. VERBAL INSTRUCTION RECEIVED FROM GOVERNMENT ON CONSTRUCTION DEFICIENCIES OR RE-TESTING REQUIRED:						
6. REMARKS:						
7. CERTIFICATION:						
I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by the prime contractor and each subcontractor and determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.						
_____ Contractor's Quality Control Representative						

SUBCONTRACTOR WORK CONTINUED:

CONTRACT NO.

REPORT NO.

SHEET \_\_\_\_ OF \_\_\_\_

2 SUBCONTRACTOR,

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY SUBCONTRACTOR:

2 SUBCONTRACTOR,

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY SUBCONTRACTOR:

2 SUBCONTRACTOR,

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		

				YES	NO	Comments

**WORK PERFORMED BY SUBCONTRACTOR:**


**2 SUBCONTRACTOR,**

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	COMMENTS

**WORK PERFORMED BY SUBCONTRACTOR:**


**DAILY TEST REPORT INFORMATION SHEET**

CONTRACT NO. \_\_\_\_\_ REPORT NO. \_\_\_\_\_

SHEET \_\_\_\_\_ OF \_\_\_\_\_

1. Individual Making Inspection or Test:	
2. Testing Laboratory; Name:	Phone #:
Address: _____ _____	
3. Description of Work and Test Method: _____ _____ _____	
4. Location of Samples and Tests or Inspections: _____ _____	
5. Specification Section:	
6. Inspection or Test Data: _____ _____ _____	
7. Test Results and Interpretations of Test Results: _____ _____ _____ _____	
8. Comments or Professional Opinion About Compliance of Inspected Work or Tested Work with contract Document Requirements: _____ _____	

—
9. Recommendations: _____
—
—
10. Corrective Actions Taken: _____
—
—

**CERTIFICATION:**

I certify that the above testing report is complete and correct and that all testing performed this day for this contract is in strict compliance with the plans and specifications except as noted above.

\_\_\_\_\_  
Signature of Inspector

## **3.0 PERFORMANCE REQUIREMENTS**

### **3.1 Design Imperatives**

Utilize the following at all stages of the design and construction processes:

- Appropriate Design Solutions for Terminal Use and Maintenance Capabilities
- Integration of Facilities into the airport Environment .
- Compliance Consistency Reviews
- Constructability Strategies
- Quality Control
- Risk Analysis
- Scope and Budget Consistency Reviews
- Sustainable Design Practices
- Value-Based Decision-Making Methodology

### **3.2 Sustainability**

This project shall meet all of the federal sustainability requirements.

### **3.3 Integrated Design Principles**

Integrated Design Principles shall be employed. Use a collaborative, integrated design process that:

- Initiates and maintains an integrated project team in all stages of a project;
- Meets performance goals as for siting, energy, water, materials, and indoor environmental quality along with other comprehensive design goals; and, ensures incorporation of these goals throughout the design and lifecycle of the building; and,
- Considers all stages of the building's lifecycle, including deconstruction.

### **3.4 Facility Performance**

All work performed shall comply with applicable laws, regulations, and *ET Group policies* and guidelines.

### **3.5 Elements and Products**

In addition to requirements specified in other chapters, provide products and elements that comply with the following:

- 1.Where "no substitutions" is indicated, use only the product (or one of the products) specified.
- 2.Elements Made Up of More Than One Product:

- a. Where an element is specified by performance criteria, the project shall use construction either proven-in-use or proven-by-mock-up, unless otherwise indicated.
  - i. Proven-In-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as specified and functioning as specified.
  - ii. Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in full-scale mock-up using the same materials and design as specified and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).
  - iii. The DBC may choose whether to use elements proven-in-use or proven-by-mock-up, unless either option is indicated as specifically required.
  - iv. Where test methods accompany performance requirements, those test methods shall be used to test the mock-up.
- b. Where a type of product is specified, without performance criteria specifically applicable to the element, the project shall use the type of product specified.
- c. Where more than one type of product is specified, without performance criteria specifically applicable to the element, the DBC shall use one of the types of products specified.
- d. Where a type of product is specified, with applicable performance criteria, the DBC shall use either the type of product specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
- e. Where more than one type of product is specified, with applicable performance criteria, the DBC shall use either one of the types of products specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
- f. Where neither type of product nor performance criteria are specified, the DBC shall use products that will perform well within the specified life span of the building.

### 3. Products:

- a. Where a product is specified only by a manufacturer name and model number/brand name, the DBC shall use only that model/brand product.

- b. Where the properties of a product are specified by description and/or with performance criteria, the DBC shall use products that comply with the description and/or performance criteria.
- c. Where manufacturers are listed for a particular product, the DBC shall use a product made by one of those manufacturers that also complies with other requirements.
- d. Where actual brand name products are not identified by either the Contracting Officer or the DBC, the DBC shall identify the products to be used.
- e. In the Proposal:
  - i. The DBC shall identify one or more product types for each system, assembly, or element.
  - ii. For each product type, the DBC shall identify brief descriptive or performance specifications.
  - iii. For major manufactured products that are commonly purchased by brand name, and any other products so indicated, we will identify at least one manufacturer that will be used.
- f. During DB Design Development or DB Construction Documents Submissions:
  - i. Where more than one product type is identified for a particular system, assembly, or element, the DBC shall identify exactly which type will be used.
  - ii. For each product type, the DBC shall identify descriptive or performance specifications; early submittals shall be brief specifications, but complete specifications shall be provided prior to completion of construction documents.
  - iii. For each product type, the DBC shall identify at least one manufacturer that will be used.
  - iv. For major manufactured products that are commonly purchased by brand name, and any other products so indicated, the DBC shall provide manufacturer's product literature on at least one actual brand name product that meets the specifications, including performance data and sample warranty.
- g. During Construction:
  - i. The DBC shall identify actual brand name products used for every product, except commodity products specified by performance or description.



- ii. Where a product is specified by performance requirements with test methods, and if so specified, the DBC shall provide test reports showing compliance.
  - iii. The DBC shall provide manufacturer's product literature for each brand name product.
  - iv. The DBC shall provide the manufacturer's certification that the product used on the project complies with the contract documents.
- h. Before End of Closeout:
- i. The DBC shall provide copies of all manufacturer warranties that extend for more than one year after completion.

## **4.0 TECHNICAL REQUIREMENTS**

*The end product should be a complete, well coordinated set that references requirements covered in Parts 1, 2, and 3 of the RFP. The requirements are organized as follows:*

### **A Structure and Excavation**

- A10 – Form Work
- A20 – Reinforcement Bar
- A30 – Concrete
- A40 – Structural Steel
- A50 – Excavation

### **B Exterior Enclosure**

- B10- Concrete Masonry
- B20 – Glazed Curtain Wall
- B30 – Doors
- B40- Roofing
- B50- Water Proofing

### **C Interiors and Finishes**

- C10 – Exterior Painting
- C20 – Interior Painting
- C30 – Tiling
- C40 – Ceiling

## **D Services**

D10 – Conveying

D20 – Plumbing

D30 – HVAC

D40 – Fire Protection

D50 – Electrical

D60 – Environmental (photovoltaic, leds, meters,...)

## **E Airport Special Sysetems**

E10 – Security Check Equipments

E20 – Signage

## **F Building Site work**

F10 – Landscaping

F20 – Parking Areas

**Note:** The technical requirements are attached with the Schedule of Requirement in the appendix.

**Section 6B) GENERAL ITEM**

The Contractor shall provide all facilities described here under to the Engineer and his staff and the Employer for each project. All costs of the facilities shall be distributed on rated of all work items.

Employer’s Representative Site Facilities

The facilities listed here under should be provided for each site

1.Office

The Office shall have separate room for the resident Engineer and a meeting room with the following area, and shall consist of the following separate sub-divisions within the building (minimum internal area indicated) unless otherwise directed by the Employer’s Representative.

Description	Area
Resident Engineer’s Office	12 m2
Meeting room	20m2
toilet	3 m2
TOTAL	35m2

2.Furniture and Equipment

2.1 Office equipment

- Desk top RAM 8GB Memory 750 GB ,core i3..... 1
- HP Lase jet printer (A4)..... 1

2.2 office furniture/new

- Swivel chair..... 1
- Table..... 1
- Meeting table( large)..... 1
- Meeting chairs ..... 6
- Shelves..... 1
- File cabinet..... 1

### 3. Transport

- one 4WD Toyota or equivalent, including its running cost and a driver

### 4.0 Utilities/fixed and running cost

- One telephone line
- Electric power
- Water consumption

### **Overtime Payment**

The normal working hours of the consulting Engineer is from 8 A.M to 5 P.M Monday through Saturday. The contractor shall pay the overtime expenses as per the local standard rates.

If the contractor has failed to do so as said above or unable to comply his obligation concerning the general items, the employer or the engineer is in a position to accommodate the general items and the contractor is liable for his failure of in complying the general items. Therefore, the expense incurred by the Engineer or employer to full fill the general items should be repaid from any payments due to the contractor as provided here under.

## 5.0 SPECIFICATIONS FOR ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY MANAGEMENT (ESHS) OF THE WORKS

### 1. Essential ESHS issues of worksite management

The ESHS topics identified during the Environmental and Social Management Framework study of the project, which present a major risk for the worksites management are:

a)ESHS resources and facilities and ESHS monitoring organization	<i>[select:]</i> YES / NO
b)Project Areas management (base camps, quarries, borrow pits, storage areas)	<i>[select:]</i> YES / NO
c)Health & Safety on worksites	<i>[select:]</i> YES / NO
d)Local recruitment and ESHS trainings of local staff (capacity building), ESHS trainings of subcontractors and local partners (transfer of knowledge)	<i>[select:]</i> YES / NO
e)Relations with stakeholders, information and consultation of local communities and authorities	<i>[select:]</i> YES / NO
f)Traffic management	<i>[select:]</i> YES / NO
g)Hazardous products	<i>[select:]</i> YES / NO
h)Wastewater (effluents)	<i>[select:]</i> YES / NO
i)Protection of water resources (in dry regions)	<i>[select:]</i> YES / NO
j)Atmospheric emissions, noise and vibrations	<i>[select:]</i> YES / NO
k)Waste management	<i>[select:]</i> YES / NO

1) Site rehabilitation and revegetation	[select:] YES / NO
---	-----------------------

**2.ESHS requirements not applicable under this Contract**

**The ESHS norms, standards and discharge limit values recommended by the specialised international organisations affiliated to the United Nations shall apply to the Contract:**

Yes  / No

*[In the case of a project rated B<sup>1</sup> by AFD, check "No". Only the country's regulations are applicable. The table below should then be completed as per the example provided below, stating that Clauses 9.2 and 9.3 are not applicable.*

*[In the case of a project rated A or B<sup>+</sup> by AFD, check "Yes".]*

*[The Employer shall specify in the following table the Clauses of the ESHS Specifications that shall not apply to this Contract as not being relevant in the context of the Works:]*

The following Clauses of the ESHS Specifications shall not apply to this Contract and shall not be priced by the Bidder under the specific ESHS Cost Schedule:

<b>Number of the non-applicable Clause</b>	<b>Description</b>
<i>Clause [insert Clause number]</i>	<i>[insert description]</i>
<i>[Etc.]</i>	<i>[Etc.]</i>

*[An example is provided below, for information (to be deleted in the final version of the Bidding Documents):]*

**Example of a works situation and deletion of certain clauses from the ESHS Specifications**

**Context:** Construction and development of 2 buildings with 4 floors on the same worksite, in an urban area. The worksite already exists and the ESIA has not shown any issues in regard to biodiversity. The worksite is in the city, served by public transport, and it is not necessary to establish a camp to house staff. In addition, a hospital centre is nearby to evacuate and treat staff in the event of an accident.

The project is rated B by AFD for the environmental and social risks for the Works. In this case, only the country's regulations apply.

<sup>[1]</sup> The A, B<sup>+</sup> or B ranking of the project is carried out by the AES (Environmental and Social Support) Division of AFD, after analyzing the project's risks and environmental and social impact.]

In this case, for example, the following Clauses of the ESHS Specifications will not apply in the context of this contract and will therefore not be counted by the Bidder in the ESHS price table:

Number of the non-applicable Clause	Description
<u>9.2 and 9.3 - Norms, standards and discharge limit values recommended by the specialised international organisations affiliated to the United Nations, as described in ESHS Specifications</u>	Sub-Clause 9.1 remains applicable: The Contractor shall be required to comply with applicable norms, standards, and discharge limit values according to the regulations of the country where the work is performed.
<u>16 – Vegetation clearing</u> <u>17 – Biodiversity</u>	
<u>30 – Health care centre and medical personnel</u> <u>32 – Emergency medical evacuations</u> <u>33 – Access health care</u>	The Contractor will be required to obtain an agreement with a nearby hospital to evacuate and treat staff in case of an accident.
<u>36.2 – Accommodation conditions</u> <u>36.3.2 – Canteen</u> <u>36.4 – Food</u> <u>40 – Transport &amp; accommodation</u> <u>41 - Meals</u>	Sub-Clauses 36.1 – Drinking water and 36.3.1 and 36.3.3 – Hygiene in shared areas remain applicable
<u>39.9 à 39.12 – Local recruitment office</u>	Sub-Clauses 39.1 to 39.8 and 39.13 remain applicable.

Throughout the present ESHS Specifications (hereinafter called "**the ESHS Specifications**"), a reference to Conditions of Contract, abbreviated by CC, means a reference to both the General Conditions of Contract and the Particular Conditions of Contract. Readers should apply due care, when being referred to a specific Clause or Sub-Clause, to:

- Read first the Clause or Sub-Clause text from the General Conditions of Contract;
- Then check whether this text has been amended by the Particular Conditions of Contract, and if so, to which extent.

As per CC Sub-Clause 1.5 – Priority of Documents, when interpreting the Contract, the terms of the Particular Conditions of Contract prevail over those found in the General Conditions of Contract.

Any term in these ESHS Specifications which is identical to a term in the Conditions of Contract shall have the same meaning as the one defined in the Conditions of Contract.

Any term in capital letters in these ESHS Specifications is defined in CC Sub-Clause 1.1 – Definitions.

## Table of Contents

A. ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY MANAGEMENT SYSTEM ..111	
1 RESPONSIBILITIES AND LIABILITIES .....	111
2 ESHS PLANNING DOCUMENT .....	112
3 MANAGEMENT OF NON-CONFORMITIES .....	113
4 RESOURCES ALLOCATED TO ENVIRONMENTAL MANAGEMENT .....	114
5 INSPECTIONS .....	115
6 REPORTING .....	115
7 RULES OF PROCEDURE .....	117
8 ESHS TRAINING .....	118
9 STANDARDS .....	118
B. PROTECTION OF THE ENVIRONMENT .....	119
10 PROTECTION OF ADJACENT AREAS .....	119
11 SELECTION OF BORROW AREAS, BACKFILL MATERIAL STOCKPILE SITES AND ACCESS ROAD .....	120
12 EFFLUENTS .....	120
13 ATMOSPHERIC EMISSIONS AND DUST .....	121
14 NOISE & VIBRATION .....	121
15 WASTE .....	122
16 VEGETATION CLEARING .....	125
17 BIODIVERSITY .....	126
18 EROSION AND SEDIMENT TRANSPORT .....	127
19 SITE REHABILITATION .....	129
20 DOCUMENTATION ON THE PROJECT AREA CONDITION .....	129
C. HEALTH & SAFETY .....	130
21 HEALTH AND SAFETY PLAN .....	130
22 DAILY AND WEEKLY MEETINGS .....	131



23 EQUIPMENT AND OPERATING STANDARDS .....	131
24 WORK PERMIT .....	131
25 PERSONAL PROTECTIVE EQUIPMENT .....	131
26 DANGEROUS SUBSTANCES .....	132
27 PLANNING FOR EMERGENCY SITUATION .....	133
28 MEDICAL CHECK-UPS .....	134
29 FIRST AID .....	134
30 HEALTH CARE CENTRE & MEDICAL PERSONNEL.....	134
31 FIRST AID KITS .....	136
32 EMERGENCY MEDICAL EVACUATIONS.....	136
33 ACCESS TO HEALTH CARE .....	136
34 HEALTH MONITORING.....	136
35 SANITARY REPATRIATION .....	137
36 HYGIENE, ACCOMMODATION AND FOOD.....	137
37 SUBSTANCE ABUSE.....	139
D. LOCAL LABOUR AND RELATIONS WITH LOCAL COMMUNITIES .....	139
38 LABOUR CONDITIONS .....	139
39 LOCAL RECRUITMENT.....	139
40 TRANSPORT & ACCOMMODATION .....	141
41 MEALS .....	141
42 DAMAGE TO PEOPLE AND PROPERTY.....	141
43 LAND ACQUISITION AND LAND TAKE .....	142
44 TRAFFIC.....	142
APPENDIX 1 – CONTENTS OF WORKSITE - ESMP .....	144
APPENDIX 2 – PROPERTIES RENDERING A PRODUCT DANGEROUS .....	148

## **A.Environmental, Social, Health and Safety Management System**

### **1.Responsibilities and Liabilities**

- 1.1.In conjunction with his obligations defined under the Contract, the Contractor will plan, execute and document construction works pursuant to the Environment, Social, Health and Safety (ESHS) Specifications.
- 1.2.The Contractor is liable for all damages to natural resources caused by the execution of the Works or the methods used for execution, unless it is established that the execution or methods were necessary, according to the provisions of the Contract or an Engineer's instruction.
- 1.3.Under the Contract and as introduced by the ESHS Specifications , the term "Project Area" means:
  - a)The land where work will be carried out; or
  - b)The land necessary for the implantation of construction facilities (work camp, workshops, offices, storage areas, concrete production plants) and including special access roads; or
  - c)Quarries for aggregates, rock material and riprap; or
  - d)Borrow areas for sand and other selected material; or
  - e)Stockpiling areas for backfill material or other demolition rubble; or
  - f)Any other location, specifically designated in the Contract as a Project Area.

The term "Project Area" encompasses any individual Project Area or all Project Areas.

For the sake of clarity, Project Area is a different concept than Site under CC Sub-Clause 1.1.6.7.

Project Area defines an area within which the Contractor is to comply with environmental, social, health and safety obligations defined in the ESHS Specifications.

Site is the places where the Permanent Works are to be executed and to which Plant and Materials are to be delivered, and where right of access to, and possession of, is to be given by the Employer to the Contractor. The Employer is under no similar obligation for any area located outside the Site, even if within the Project Area, where access is at Contractor's risk.

In term of physical footprint, the CC Sub-Clause 1.1.6.7 Site is included in the Project Area. The Project Area is then of greater geographical extent than the Site.

- 1.4.The ESHS Specifications refer to the entire area of influence for the Works:
  - a)Protection of the natural environment (water, air, soil,

vegetation, biological diversity) in areas within any Project Area and its surroundings, i.e. including but not limited to access roads, quarries, borrow areas, stockpiling of backfill material, camps or storage areas;

b) Health and safety conditions to be maintained for the Contractor's personnel and any other person present on the Project Areas, or along access routes;

c) Working practices and the protection of people and populations living near the Project Area, but exposed to the general disturbance caused by works.

#### 1.5. Subcontractors:

The ESHS Specifications apply to the Contractor and unless explicitly agreed with the Engineer, all Subcontractors used for the execution of the Works. Pursuant to Sub-Clause 4.4 of the CC, the Contractor is fully liable for all actions, non-compliance and negligence by Subcontractors, their representatives, employees and workers, to the same degree as it would be held liable for its own actions, non-compliance or negligence or that of its own representatives, employees or workers.

#### 1.6. Applicable regulations:

The Contractor must identify all regulations in relation to the protection of the environment (water, air, soils, noise, vegetation, fauna, flora, waste, groundwater) and, pursuant to Clauses 4 and 6 of the CC, the protection of people (labour law, indigenous populations, standards on occupational exposure, other). The Contractor must list all texts, standards and other regulatory limitations in its Worksite Environmental and Social Management Plan (Worksite - ESMP as specified in Sub-Clause 2.1 of the ESHS Specifications) and specify the means taken for compliance.

## **2. ESHS Planning Document**

### 2.1. Environmental and Social Impact Assessments

2.1.1. The Contractor prepares and ensures prior validation by the Engineer of Environmental and Social Impact Assessments (ESIA) for all seven airports on basis of the final design reports.

2.1.2. The ESIA have to be conducted by an independent body.

2.1.3. All ESIA have to be compliant with the requirements contained in the Environmental and Social Management Framework (ESMF) of the project and be based on World Bank Environmental and Social Standards.

### 2.2. Worksite Environmental and Social Management Plan (Worksite - ESMP)

2.2.1. The Contractor prepares and ensures prior validation by the Engineer, implementation and regular update of a Worksite Area

Environmental and Social Management Plan (Worksite - ESMP).

- 2.2.2. The Worksite - ESMP represents the unique reference document in which the Contractor defines in detail all organisational and technical provisions implemented to satisfy the obligations of the ESHS Specifications.
- 2.2.3. The Contractor defines in the Worksite - ESMP the number, the locations and the type of Project Area as defined in Sub-Clause 1.3 of the ESHS Specifications. For each of the identified Project Area, unless otherwise agreed by the Engineer, the Contractor establishes an Environmental Protection Plan (EPP). The EPP(s) are annexed to the Worksite - ESMP.
- 2.2.4. The Worksite - ESMP covers the entire period from the Contract Agreement signature date to the date of issue of the Performance Certificate by the Engineer.
- 2.2.5. Unless agreed otherwise by the Engineer, the Worksite - ESMP is written in the language of communication defined under Sub-Clause 1.4 of the CC.
- 2.2.6. The first draft version of the Worksite - ESMP is to be provided by the Contractor to the Engineer within 28 days from the date of execution of the Contract Agreement.
- 2.2.7. No physical work or activity shall commence on any Project Area until such time the Worksite - ESMP, and the annexed EPP corresponding to the Project Area, are approved by the Engineer.
- 2.2.8. During the execution of the Works, whenever instructed by the Engineer, the Worksite - ESMP will be updated by the Contractor and reissued to the Engineer. The revised version shall highlight the new elements incorporated in the document.
- 2.2.9. The Worksite - ESMP (and the EPP) is structured according to the plan specified in Appendix 1 to the ESHS Specifications.

### **3. Management of non-conformities**

- 3.1. In application of Clause 5, non-conformities detected during inspections carried out by the Contractor or Engineer are subject to a process adapted to the severity of the situation. The non-conformities will be defined as deviations from the requirements of the applicable regulations, the ESHS Specifications, the ESMP, and the Worksite - ESMP. Non-conformities are divided into 4 categories as follows:
  - 3.1.1. Notification of observation of minor non-conformities. The non-conformity results in a notification to the Contractor's Representative, followed-up by a signed notification of observation prepared by the Engineer. The multiplication of notifications of observation at the Project Area, or absence of corrective actions by the Contractor, can result in the severity of the non-conformity being raised to that of level 1.
  - 3.1.2. Level 1 non-conformity: Non-conformities that present a moderate and non-immediate risk for health, environment, social or safety. The non-conformity is identified in writing to the Contractor and shall be resolved within five (5) days. The Contractor addresses to the Engineer the proof explaining how the non-conformity has been

corrected. Further to an inspection and a favourable evaluation of effectiveness of the corrective action, the Engineer validates in writing the close-out for the non-conformity. In all cases where a non-conformity of level 1 is not resolved within one (1) month, the severity of the non-conformity is raised to level 2.

3.1.3. Level 2 non-conformities: applies to all non-conformities that represent a moderate and immediate risk or with significant consequences to health and/or the environment, social or safety. The same procedure as for level 1 non-conformities is applied. Corrective action shall be taken by the Contractor within three (3) days. All level 2 non-conformities which are not resolved within one (1) month, are raised to level 3.

3.1.4. Level 3 non-conformities: applies to all non-conformities that have resulted in damage to health or the environment, or which represent a high risk for health, safety, environmental or social hazards. The highest levels of the Contractor's and Engineer's hierarchies present in the Employer's country are informed immediately and the Contractor has twenty-four (24) hours to bring the situation under control. Pursuant to Clause 14.7 of the CC, a level 3 non-conformity results in the suspension of interim payments until the non-conformity has been resolved. If the situation requires, and in pursuance to Clause 8.8 of the PC, the Engineer can order the suspension of work until the resolution of the non-conformity.

#### **4.Resources allocated to environmental management**

##### 4.1.ESHS supervisors and Manager:

4.1.1.Pursuant to Sub-Clause 4.18 of the CC and in addition to the provisions of Sub-Clause 6.7 of the CC, the Contractor appoints one (or two depending on the case) Environment, Social, Health and Safety Manager(s) in charge of implementing the ESHS Specifications. Several experts may be assigned to fulfill this position. The manager(s) will be the Key ESHS Personnel identified in the bidding process, if any.

4.1.2.The ESHS Manager is permanently based at the Project Area for the full duration of the Works as of Contractor's mobilisation until Taking-Over Certificate is issued.

4.1.3.This manager holds the power within the Contractor's organisation to be able to suspend the Works if considered necessary in the event of level 2 or 3 non-conformities, and allocate all resources, personnel and equipment required to take any corrective action considered necessary.

4.1.4.The ESHS Manager speaks fluently the language of communication of the Contract, and the official language of the Employer's country, if the language of communication of the Contract is not the official language. The ESHS Manager will hold a relevant University degree or a significant experience of at least five (5) years in designing and monitoring the implementation of an environmental and social management plan for construction works.

4.1.5.ESHS supervisors are appointed in sufficient numbers and represent the ESHS Manager within work teams. Their role is to ensure that the Works are carried out pursuant to the ESHS Specifications and notify

the ESHS Manager of any detected non-conformities.

4.2. Person in charge of relations with external stakeholders:

4.2.1. The Contractor appoints a person responsible for relations with external stakeholders: local communities, administrative authorities, religious and other representatives. If necessary, a team will be created.

4.2.2. Administrations and local authorities will be informed of the existence of this person as of the start of works and will be provided with contact details so as to be able to contact this person if a problem arises during the execution of works, or concerning the behaviour of the Contractor's Personnel, inside or outside the Project Area.

4.3. The team, including the ESHS supervisors and manager, and the person in charge of relations with external stakeholders, will be allocated the necessary resources to operate independently (travel, office equipment and communication).

## **5. Inspections**

5.1. In addition to the ESHS Manager's own inspections, an ESHS inspection will be carried out on the facilities and Project Area on a weekly basis jointly with the Engineer.

5.2. A written report will be drafted for each weekly inspection, in a format approved by the Engineer, addressing non-conformities detected on the Project Area as specified in the ESHS Specifications.

5.3. Each non-conformity will be documented by a digital photograph with captions to provide a visual illustration, explicitly indicating the location, date of inspection and the non-conformity in question.

## **6. Reporting**

6.1. As part of the Progress Report specified in Sub-Clause 4.21 of the CC, the Contractor submits an ESHS activity report summarising all ESHS initiatives implemented in relation to the execution of the Works during the reporting period to the Engineer on a monthly basis. The activity report is a separate document from the update of the Worksite - ESMP, which is updated at the intervals indicated in Sub-Clause 2.2.8 of the ESHS Specifications.

6.2. The ESHS activity report is written exclusively in the language of communication defined under Sub-Clause 1.4 of the CC.

6.3. Pursuant to Sub-Clause 4.21 of the CC, the ESHS activity report is submitted at the latest 7 working days after the last day of the month in question. The report contains the following information.

6.3.1. List of ESHS personnel present at the Site at the end of the month.

6.3.2. Construction works activities conducted during the month.

6.3.3. Inspections carried out (location and intervals).

6.3.4. Non-conformities detected during the month with descriptions of the root cause analysis and corrective actions taken.

6.3.5. Description of actions conducted and measures taken during the month to remedy non-conformities and to manage environmental, social, health and safety risks and impacts.

6.3.6. Description of stakeholder engagement activities undertaken with

neighbouring populations, local authorities, governmental agencies.

6.3.7. Monitoring results for the following indicators:

- a) Effluent quality (Sub-Clause 12.5 of the ESHS Specifications), if applicable;
- b) Drinking-water quality, if applicable;
- c) Hazardous and non-hazardous waste generation;
- d) Air and noise emissions, if applicable;
- e) Project Area state (Sub-Clause 20 of the ESHS Specifications);
- f) Recruitment, number of positions and hours worked by local Contractor's Personnel (Sub-Clause 39.3 of the ESHS Specifications);
- g) Health & safety statistics: in pursuance to Clauses 4 and 6 of the CC, number of fatal accidents, lost-time accidents, number of accidents without lost-time, serious illness, frequency of accidents, and serious misconduct by Contractor's Personnel (record sheet attached as an appendix to the activity report, pursuant to Sub-Clause 7.7 of the ESHS Specifications); including root cause analysis and corrective actions taken.

6.3.8. Where appropriate, description of the formal or informal complaints (negative media attention, strikes or labour disputes, protests, complaints from communities, NGO or workers or formal notice from authorities, etc.) related to environmental, social, health and safety risks and impacts of the Works; including root cause analysis and corrective actions taken.

6.3.9. Report on training activities (topic, number and duration of sessions, number of participants).

6.3.10. Provisional environmental, social, health and safety actions for the coming months.

6.4. Notification of ESHS events:

6.4.1. The Engineer is informed within one hour of any accident, (i) involving serious bodily injury to a member of personnel, a visitor or any other third party, caused by the execution of the Works or the behaviour of the personnel of the Contractor, or (ii) any significant damage to private property, or (iii) any significant damage to the environment.

6.4.2. The Engineer is informed as soon as possible of any near-accident relating to the execution of the Works which, in slightly different conditions, could have led to bodily injury to people, or damage to private property or the environment.

## 7. Rules of Procedure

- 7.1. Rules of procedure are established by the Contractor for the Project Areas, addressing the following: safety rules, zero tolerance for substance abuse (refer to Clause 37), environmental sensitivity of areas around the Project Areas, the dangers of STDs with HIV/AIDS, gender issues (in particular sexual harassment) and respect for the beliefs and customs of the populations and community relations in general (drawing special attention to the risks of prostitution and human trafficking).
- 7.2. The rules are clearly displayed at the different Project Areas.
- 7.3. The rules confirm the Contractor's commitment to implementing the ESHS provisions provided for in the Contract.
- 7.4. New Contractor's Personnel and existing Contractor's Personnel are made aware and acknowledge their understanding of the rules of procedure and the associated provisions. Rules of procedure document are initialed by all Contractor's Personnel prior to the start of any physical work at any Project Area.
- 7.5. Pursuant to Clauses 6.9 and 6.11 of the CC, the rules of procedure include a list of acts considered as serious misconduct and which must result in dismissal from any Project Area by the Contractor, or by the Engineer if the Contractor is not acting in due course, should a Contractor's Personnel repeatedly commit an offence of serious misconduct despite awareness of the rules of procedure, and this is without prejudice to any legal action by any public authority for non-compliance with applicable regulations:
  - a) Drunkenness during working hours;
  - b) Drug use;
  - c) Punishable statements or attitudes, and sexual and mental harassment in particular;
  - d) Violent behaviour;
  - e) Intentional damage to the assets and interests of others, or the environment;
  - f) Repeated negligence or imprudence leading to damage or prejudice to the environment, the population or properties, particularly breaching provisions intended to prevent the spreading of STD with HIV/AIDS;
  - g) Possession and/or consumption of meat or any other part of an endangered animal or plant as defined in the Washington convention (CITES) and national regulations.
- 7.6. Serious misconduct, such as organization of sex trade (pimping), committing pedophilia, rape, physical aggression, drug trafficking, deliberate and severe pollution, trading and/or trafficking in all or part of protected species, shall lead to immediate dismissal as of the first report of misconduct is detected, in application of the rules of procedure and labour laws.
- 7.7. The Contractor establishes a record for each case of serious misconduct, and a copy will be provided to the Contractor's Personnel in question, indicating all action taken to terminate the misconduct by the Contractor's Personnel in



question and to bring the attention of other Contractor's Personnel to the type of incident detected. This record will be provided to the Engineer as an attachment to the ESHS activity report (see Sub-Clause 6.3 of the ESHS Specifications).

## **8.ESHS Training**

8.1.The Contractor prepares a training and capacity building program for its Contractor's Personnel, as described in the Worksite - ESMP and documented each month in the ESHS activity report.

8.2.The Contractor also details in the training program the actions and ESHS training for Subcontractors and other members of the joint venture when applicable.

8.3.Training sessions are two-fold: introductory sessions for starting work at the Project Area, and technical training as required in relation to the execution of the Works.

8.3.1.Starting work sessions are organised for each Contractor's Personnel and shall cover as a minimum:

a)Rules of procedure;

b)Safety rules on Project Areas;

c)Protection of areas adjacent to Project Area;

d)Risks relating to sexually transmitted diseases (Sub-Clause 6.7 of the CC), prostitution, human trafficking, and sexual harassment;

e)Basic health: combating malaria (if prevalent) and waterborne diseases, improving hygiene;

f)Emergency response procedures or evacuation.

8.3.2.Technical training:

a)Training in the skills needed for tasks requiring a work permit (Clause 24 of the ESHS Specifications);

b)Training in first aid and transporting the injured in order to achieve the targets defined in Sub-Clause 29.1 of the ESHS Specifications on the number of first aid officers per Project Area and per team;

c)Ability to drive on rough ground.

8.4.The Contractor prepares an awareness program, where applicable, for local communities adapted to the main risks relating to the Works. This program will be included in the training program described in Sub-Clause 8.1 of the ESHS Specifications.

## **9.Standards**

9.1.The Contractor complies with all norms, standards and discharge limit values defined in the national regulations of the Employer's country regulations and pursuant to Sub-Clause 1.6 of the ESHS Specifications.

9.2.The Contractor comply with norms, standards and discharge limit values recommended by the specialised international organisations affiliated to the

United Nations, as described in Sub-Clause 9.3 below of the ESHS Specifications. In the event of discrepancies in between international standards and national regulations, the Contractor shall comply with the most stringent requirements.

9.3. The specialised international organisations affiliated to the United Nations referred to in Sub-Clause 9.2 of the ESHS Specifications include:

–World Bank, including the IFC and its Environmental, Health and Safety guidelines available from <http://www.ifc.org/ehsguidelines>.

For matters not addressed in the IFC above document, the most stringent of the norms, standards and discharge limit values of the following institutions shall apply:

- World Health Organization (WHO);
- International Labour Organization (ILO) (in particular in pursuance to Sub-Clauses 6.20, 6.21, 6.23 and 6.24 of the CC);
- International Maritime Organization (IMO).

### **Protection of the Environment**

#### **10. Protection of adjacent areas**

10.1. Pursuant to Sub-Clause 4.18 of the CC, and unless instructed otherwise by the Engineer, the Contractor uses construction methods and means of protection in order to avoid or minimize adverse effects that are incurred on vegetation, soils, groundwater and surface water, biodiversity, natural drainage and the water quality in areas within any Project Area and its surroundings for the entire duration of the Works.

10.2. Wetland areas include marshes, fens, mires or natural or artificial bodies of water, whether permanent or temporary, where water is stagnant or flowing, fresh, saline or briny, including seawater with a low-tide depth of six metres or less. Filling of all or part of a wetland area is not permitted, unless the Works are necessary according to the provisions of the Contract or the instructions of the Engineer.

10.3. With the exception of access roads, or unless instructed otherwise by the Engineer, the entire perimeter of land sites with a surface area of less than 2 hectares is physically demarcated with a fence or tape. For Project Area with a surface area of more than 2 hectares, the perimeter will be physically demarcated by a perimeter track, road, signs or any other means leaving no possible ambiguity as to the location of the Project Area perimeter.

10.4. Unless instructed otherwise by the Engineer, the Contractor defines the perimeter of the Project Area at a distance of at least:

- a) 50 m from any permanent water course and outside of floodable areas;
- b) 300 m from sensitive urban services and buildings (health

centre, school centres, water supply for populations);

c)200 m from any housing; and

d)300 m from housing in the specific case of work requiring the use of explosives.

10.5.If the footprint of the Works do not respect the distances mentioned in the situations a) to d) of Sub-Clause 10.4 above of the ESHS Specifications, and unless agreed upon otherwise by the Engineer, the Contractor will contract a bailiff to make a sworn statement regarding the existence and conditions of residential buildings situated around the Site with a distance specified in paragraph b) to d) of Sub-Clause 10.4 of the ESHS Specifications. The bailiff's sworn statement is prepared and provided to the Engineer with the EPP.

**11.Selection of borrow areas, backfill material stockpile sites and access road**

11.1.The Contractor will submit to the Engineer for prior approval, within the framework of the EPP (provided in Clause 2.2.3), (i) the location of proposed borrow areas or areas to be excavated, (ii) proposed backfill material stockpile locations or zones designated for the rubble from demolition works.

11.2.The access routes to the Project Areas will be shown on a map and approved by the Engineer prior to the start of the corresponding Works.

**12.Effluents**

12.1.Effluents consist of liquid discharges, including infiltration, from Project Area, transporting a pollutant (dissolved, colloidal or particles).

12.2.A pollutant is a given chemical compound that is at a concentration that is greater than the limit values recognised for that compound according to Clause 9 of the ESHS Specifications.

12.3.If no recognised threshold exists pursuant to Sub-Clause 12.2 of the ESHS Specifications, the Contractor provides proof that the charges are harmless.

12.4.No effluent is discharged by the Contractor into water courses, soils, lakes or the marine environment without prior treatment and without monitoring of the treatment's performance to guarantee the absence of pollution.

12.5.The Contractor carries out or contracts the monitoring of the effluent quality pursuant to Sub-Clause 12.4 of the ESHS Specifications. In the first case, the Contractor provides the ESHS Manager with the means and skills to carry out in-situ monitoring and laboratory analysis of the performance indicators. In the second case, the Contractor establishes a contract with a specialised contractor, accredited with the Employer's country authorities for this activity.

12.6.The physical and chemical parameters of the effluent that are monitored are those that are listed in the applicable regulations according to the provisions of Clause 9 of the ESHS Specifications. The parameters have prior approval from the Engineer.

12.7.The Contractor will list, locate, and characterise (flow, expected quality, discharge frequency) all sources of effluents and outlets in the natural environment in the Environment Protection Plan(s).

12.8.The Contractor will submit to the Engineer an effluent monitoring report on a monthly basis, including documentation for the following for each

effluent discharge point: (i) average flow rates of discharged effluents, (ii) discharge frequencies and durations over the month, and (iii) the physical and chemical quality of the effluent discharged, for the conformity parameters listed in Sub-Clause 12.1 above of the ESHS Specifications.

12.9. The special case of rainwater run-off:

12.9.1. Run off consists of the rainwater flow on the surface or the soil and other technical surfaces at Project Areas.

12.9.2. In the context of the Contract, run-off is considered as an effluent and will be treated in accordance with Sub-Clause 12.4 above, unless demonstrated otherwise, as documented and substantiated by the Contractor, and approved by the Engineer.

12.9.3. Particular attention will be given to all platforms with installed generators, hydrocarbon storage tanks, refuelling stations and concrete plants (cover, containment, settling, pH neutralization).

### **13. Atmospheric emissions and dust**

13.1. Emissions refer to any discharge into the air of solid substances, aerosols, gases, radiation, or energy, whether point sources (e.g. incineration stack) or diffuse (e.g. fugitive dust emissions from road use by trucks).

13.2. The Contractor will use equipment and adopt construction and transport methods with atmospheric emissions which are not in excess of the threshold emission values recommended in the applicable regulations according to the provisions of Clause 9 of the ESHS Specifications.

13.3. The fleet of vehicles or equipment emitting combustion gases will be maintained at the intervals and according to the methods specified by the manufacturer.

13.4. The Contractor will document the maintenance records for its fleet of vehicles, machinery and equipment. The records will be in the language of communication defined under CC Sub-Clause 1.4, or any other language approved by the Engineer, and will be at the disposal of the Engineer.

13.5. On unpaved roads used by the vehicles and machinery of the Contractor:

13.5.1. The Contractor takes action to abate fugitive dust emissions generated by vehicles or mobile equipment in residential areas and on roads within the Project Area perimeter.

13.5.2. The Contractor will implement the necessary measures, as described in the Worksite - ESMP, to avoid or limit dust generation: dust removal, regular watering, reduction of Contractor's vehicles speed as specified in Sub-Clause 44.9 of the ESHS Specifications.

13.6. When storage, handling and transportation of bulk materials is made in the open air and exposed to the wind, the Contractor implements the necessary dust abatement measures, including one or several of the following techniques: vegetation of the surface, covering of the surface, humidification of the surface, covering the trucks, etc.

### **14. Noise & vibration**

14.1. The Contractor uses equipment and adopts construction and transport methods so not to generate noise levels in excess of values recommended in the applicable regulations according to the provisions of Clause 9 of the

ESHS Specifications.

14.2. Except as otherwise provided in the Contract or unless waived by the Engineer, high noise generating works (e.g. pile driving, blasting, rock clearing, drilling, percussion drilling) which may impact occupied receptor areas are carried out during normal working days, but prohibited at night. A receptor area is defined as an area used for nocturnal socioeconomic activities (e.g. accommodation camps, residential areas, hotels, health centres).

14.3. The use of heavy vehicles at night is specified in Sub-Clause 44.9 of the ESHS Specifications.

## **15. Waste**

15.1. The Contractor is responsible for identifying, collecting, transporting and treating all waste produced on the Project Areas by its personnel, Subcontractors and visitors.

15.2. Waste management should be based on the following hierarchy: prevention of waste generations, reuse, recycling and disposal. The Contractor selects suppliers having a voluntary and documented policy to reduce the volume and weight of packaging, and to select recyclable or biodegradable packaging.

15.3. The Contractor establishes and maintains a waste register which is at the disposal of the Engineer. This register will record all waste management operations: production, collection, transport, treatment. The following aspects are documented in this register:

a) Type of waste, using the nomenclature specified in Sub-Clause 15.7 of the ESHS Specifications;

b) Waste quantities;

c) Name and address of the third party waste management facilities receiving waste or parties taking possession of the substances no longer considered as waste;

d) Name and address of waste transport contractors;

e) Planned waste treatment.

15.4. The Contractor files and maintains at the disposition of the Engineer the waste manifests for the collection, transport, treatment and/or elimination of waste.

15.5. The waste register is established and available as of the Contractors mobilisation to any Project Area. This register will be archived for at least 1 year after the Taking-Over Certificate for the Works is issued.

15.6. The Contractor implements specific waste management practices adapted to the level of danger for human health or the natural environment. Three waste categories are identified for Project Areas and in tracking documents:

a) Hazardous waste: any waste with one or several dangerous properties as listed in Appendix 2 to the ESHS Specifications;

b) Non-hazardous waste: any waste with no properties rendering it hazardous. Non-hazardous waste contaminated by hazardous material will be considered as hazardous waste, unless instructed otherwise by the Engineer;

c) Inert waste: any waste unaffected by any significant physical, chemical or biological modifications, which does not decompose, burn or produce any physical or chemical reaction, is not biodegradable and does not damage any substance with which it comes into contact in a manner likely to cause damage to the environment or human health.

15.7. The Contractor assesses, documents and effectively implements any local recycling or re-use options for its waste.

15.8. Waste is categorised and stored separately prior to removal from the Project Areas, depending on the level of danger, phase (liquid, solid or gas), the waste management solution to be applied and its potential in terms of recycling or reuse.

15.9. Waste is collected from each Project Area at the same rate that it is produced and is placed in temporary locations meeting the following criteria:

a) Located at a distance of over 100 m from any natural sensitive area and over 500 m from any socioeconomic sensitive area (school, market, healthcare centre, water well or catchment area), with the exception of waste storage area in camps;

b) Protected from moving machinery and vehicles, but easy to access for regular collection;

c) Located on a flat impervious surface to prevent infiltrations;

d) Under cover for non-inert waste;

e) Stored in containers of the appropriate size, tightness and level of resistance depending on the danger and phase (solid, liquid, gas) of the waste;

f) Liquid wastes storage is equipped with secondary retention with a volume at least equal to the greater of the following two values (i) 100% of the capacity of the largest reservoir and (ii) 50% of the overall capacity of the associated reservoirs;

g) Hazardous waste stored pursuant to Sub-Clause 26.8 of the ESHS Specifications.

15.10. Waste is removed from Project Areas and transported to recycling,

treatment and waste management facilities on a regular basis. The frequency of removal, approved by the Engineer, guarantees:

- a) No overflow from containers;
- b) No unpleasant odour or emissions which are dangerous for human health;
- c) No proliferation of insects, rodents, dogs or other animals which are harmful or dangerous for human health;
- d) Regular cleaning of containers and surfaces on which they are located.

15.11. Unless otherwise specified in the Contract or instructed by the Engineer, waste incineration is prohibited on Project Areas. Two exceptions are medical waste and green waste, which unless instructed to the contrary by the Engineer, are managed pursuant to Clauses 15.15.1 and 16.1.3 of the ESHS Specifications.

The use of third party waste management services is subject to a documented prior audit of the treatment, storage and recycling facilities by the Contractor, to guarantee the conformity with the provisions of the ESHS Specifications on waste.

15.12. Pursuant to Sub-Clause 1.5 of the ESHS Specifications, the provisions applicable to the Contractor regarding waste management also apply to any third party waste management Subcontractor. The Engineer reserves its right to inspect third party waste management facilities and prohibit the Contractor from using the facilities if considered unacceptable.

15.13. The management of non-hazardous waste complies with the following conditions:

15.13.1. Inert waste is removed or treated on-site and can be disposed in a permanent or temporary landfill with unused backfill material. The location, capacity and environmental protection measures, particularly for water courses, implemented by the Contractor or any Subcontractor, will comply with the provisions of the ESHS Specifications, and will be described in the EPP and validated by the Engineer.

15.13.2. Non-hazardous waste that cannot be recycled is disposed of to landfill, complying with the following criteria:

- a) Walls and base sealed by a geo-membrane or a layer of compacted clay with a permeability  $10^{-7}$  cm/s;
- b) Drained for the recovery of leachates, which are routed to a lagoon aerobic/anaerobic treatment prior to discharge into the natural environment or collected in a temporary storage prior to regular collection and transfer to a treatment unit (septic tank or wastewater

treatment plant);

c) Regularly compacted and covered by earth to limit odours and the proliferation of insects;

d) When the landfill has reached full capacity, vents are installed to evacuate gases, and the landfill covered by a geo-membrane with a minimum thickness of 1 mm, or a layer of compacted clay, and a top layer of 1.5 m of topsoil, which is revegetated.

Any other proposal must first be validated by the Engineer.

15.14. The Contractor's hazardous waste is managed by a specialised waste Subcontractor, accredited in the Employer's country for this activity.

15.15. In the absence of an existing waste management solution for hazardous waste satisfying the provisions of Sub-Clause 15.14 of the ESHS Specifications, the Contractor takes the following action:

15.15.1. Medical waste is incinerated in a specific facility constructed and accredited for this purpose. The Contractor will submit the technical specifications of the facility to the Engineer before importing or procuring the equipment.

15.15.2. Hydrocarbons, lubricants, paints, solvents and batteries are transported in drums to the capital city, or any other city where suitable waste management facilities are available. Sludge from settling tanks/ponds, septic tanks or oily water skimmers will also be managed in the same way.

15.15.3. Contaminated soils from construction/demolition and drilling muds will be treated, stabilised and disposed of to landfill. Prior approval is required from the Engineer regarding the method and site location. The Contractor obtains authorisation from the competent local authorities prior to any disposal to landfill.

15.15.4. Prior approval from the Engineer is required before implementing waste management solutions on any other hazardous waste.

15.15.5. Prior to the issue of the Taking-Over Certificate for the Works, the Contractor provides documentation on hazardous waste landfilled at other sites than accredited third party waste management facilities. The documentation includes a plan showing the location of landfill sites. The document is provided to the competent local authorities whose jurisdiction covers the landfill sites.

## **16. Vegetation clearing**

16.1. The Contractor describes in the Worskite - ESMP the planned methods and schedule for vegetation clearing. Specific agreement from the Engineer is obtained prior to any clearing works.

16.1.1. Vegetation clearing using chemicals is not permitted.

16.1.2. Vegetation clearing using bulldozer is not permitted in zones less than 30 m from areas designated as sensitive by the Engineer, where only manual clearing is authorised.

16.1.3. Unless otherwise specified in the Contract or if otherwise instructed



by the Engineer, burning vegetation is not permitted. Green waste can be burnt with prior approval from the Engineer regarding the location, method and schedule.

- 16.2. Areas cleared prior to undertaking earthworks are shown on a plan with a minimum scale of 1/10,000. Plans are submitted to the Engineer for validation prior to starting clearing works.
- 16.3. The Contractor undertakes physical demarcation of zones to be cleared using a method approved by the Engineer.
- 16.4. Trees not to be cut down are identified in relation with the Engineer. Such trees are marked with paint and protected against clearing machinery using a method approved by the Engineer.
- 16.5. Clearing is undertaken without damage to adjacent non-cleared areas. Topsoil is stored within the cleared areas at the edge of the cleared zone. Clearing is undertaken working from the edge of the zone inwards.
- 16.6. Wood with economic value:
  - 16.6.1. During clearing, the Contractor stockpiles separately: (i) tree trunks with a diameter at chest height greater than the size defined by the Engineer, and (ii) trunks with a smaller diameter, branches, leaves, stumps and roots.
  - 16.6.2. Unless instructed otherwise by the Engineer when validating the plans of Sub-Clause 16.2 of the ESHS Specifications or unless specified otherwise in the Employer's country regulations, the trunks of trees exceeding the diameter defined by the Engineer are made available to the local communities, according to the methods defined with the Engineer.

## **17. Biodiversity**

- 17.1. The Contractor shall ensure that all personnel are informed and aware of the importance to protect fauna and flora. Information and awareness training is documented.
- 17.2. The Contractor shall ensure that all personnel are informed and aware of wildlife encounters procedures. Information and awareness training is documented.
- 17.3. The Contractor shall define in the Worksite – ESMP the method with regards to fauna and flora management prior to clearing activities. This method must notably address the work schedule, which sometimes can be adjusted to limit impacts on fauna and flora.
- 17.4. Where possible, areas shall be cleared from one side to another, or from the inside out, to prevent animals becoming trapped.
- 17.5. The Contractor personnel shall not approach, injure, hunt, capture, possess, feed, transport, rear or trade wild animals and/or collect eggs while working on the Project Areas.
- 17.6. The Contractor personnel shall not collect flora species while working on the Project Areas.
- 17.7. The Contractor shall report any sighting or finding of wounded or dead wildlife to the Engineer immediately.

- 17.8. The Contractor shall protect excavations to prevent injury to animals.
- 17.9. The Contractor shall release any trapped uninjured animals immediately.
- 17.10. The Contractor shall not disturb natural habitats outside the Project Areas.
- 17.11. The Contractor shall only use designated roads or paths and abide by speed limits.
- 17.12. The Contractor shall not start forest fires.
- 17.13. The Contractor shall not introduce Invasive Alien Species (IAS).
  - 17.13.1. All construction machinery imported from overseas shall be inspected to detect IAS and washed before dispatching to the Project Areas.
  - 17.13.2. If the presence of topsoil contaminated with IAS is detected, that topsoil shall only be stored or re-spread in the area from where it was removed.
  - 17.13.3. When earthworks are carried out in IAS contaminated areas, vehicles shall be washed before moving them to other areas.
  - 17.13.4. Where necessary, the Contractor shall develop IAS control procedures (e.g. physical removal, slashing, mulching, herbicides, etc.). Methods used to control or prevent such species shall not cause adverse impacts on the environment or communities.
  - 17.13.5. To limit the risk of introducing marine invasive species, the Contractor shall control the ballast water and anti-fouling systems of vessels arriving from other bioregions in accordance with International Maritime Organization (IMO) conventions and guidelines.

**18. Erosion and sediment transport**

- 18.1. The Contractor plans earthworks and optimises the management of space to ensure that all cleared surfaces and areas exposed to soil erosion are minimised on all Project Areas.
- 18.2. Topsoil:
  - 18.2.1. Unless indicated otherwise by the Engineer, the top 25 centimetres of the soil will be considered as topsoil.
  - 18.2.2. Earthworks for the temporary occupation of the Project Area are preceded by the clearing of topsoil and the storage of this soil separately from the underlying sterile soil.
  - 18.2.3. Topsoil is stored according to the provisions approved by the Engineer to enable reuse during Project Area rehabilitation.
  - 18.2.4. The refurbishment must be done in accordance with the provisions of Clause 19.
- 18.3. Draining and treatment of rainwater run-off:
  - 18.3.1. The gradient of Project Areas allows the collection and drainage of rainwater from the entire surface area to one or several discharge points. No pools of water are created.

18.3.2. Suspended solids in rainwater are removed using sediment traps / settling ponds. Rainwater from vehicle parking areas, machinery areas, workshops is subject to treatment with oily water separators.

18.3.3. Rainwater treatment units are sized, cleaned, maintained and accessible to ensure compliance with the effluent quality criteria defined in Sub-Clause 12.9 of the ESHS Specifications and to allow monitoring of performance.

18.4. Sediment control:

18.4.1. The Contractor installs sediment control barriers to slow the flow of water and control sediment transport at Project Areas with (i) a gradient of more than 20%, and (ii) where land is disturbed by the Works or where stockpiled mineral material are susceptible to erosion.

18.4.2. Sediment control barriers are installed on the slope or at the base of the slope to protect the natural drainage system from sediment accumulation at levels higher than the natural situation. These barriers comply with the following principles:

a) Made with geotextiles or straw bales or any other means pre-approved by the Engineer;

b) Deployed before the start of works and removal of topsoil. Barriers can be used for the physical demarcation of working areas;

c) Installed, cleaned, maintained and replaced according to manufacturer recommendations;

d) Drainage surface area does not exceed 1,000 m<sup>2</sup> per 30 m of barrier. The length of the slope behind the barrier is less than 30 m, and is not used for flows in excess of 30 l/s.

18.4.3. For the dredging of marine sediments, unless specified otherwise in the Contract, or instructed otherwise by the Engineer, and particularly if the working area is exposed to currents, the Contractor will install a geotextile silt curtain, or any other technique approved by the Engineer to control turbidity clouds.

18.5. Backfilling and stockpiling of backfill materials:

18.5.1. In the EPP of these temporary and permanent stockpiles, the Contractor defines the proposed arrangements (height, slope, drainage, revegetation, etc.) to guarantee stability and erosion resistance.

18.5.2. For permanent backfill material stockpiles, the stockpile is shaped and compacted to ensure long-term stability.

18.5.3. Temporary stockpiles likely to result in strong erosion (duration of storage, rainy season, presence of downstream issues, etc.) are protected against runoff erosion by (i) revegetation using fast

growing grass species, either by direct seeding or by hydro-seeding, or (ii) using other natural anti-erosion cover with prior approval from the Engineer.

## **19.Site rehabilitation**

19.1.Unless instructed otherwise by the Engineer, the Contractor will rehabilitate all Project Areas disturbed by the Works, prior to the provisional acceptance of the Works.

19.2.All buildings and free standing and underground structures (e.g. piping, underground tanks, sumps and basins) are removed pursuant to the provisions of Sub-Clause 4.23 of the CC. All waste and rubble is removed in accordance to the provisions of Clause 15 of the ESHS Specifications. After removal of buildings structures and rubble, the Contractor returns Project Areas to their original condition, according to the following provisions.

19.2.1.Land is adjusted to ensure that run-off water drains without eroding soil or stagnating in pools. Unless instructed otherwise by the Engineer, the gradients of restored sites (excluding backfill as defined in Sub-Clause 18.5 of the ESHS Specifications) must be as for the adjacent undisturbed land.

19.2.2.Rehabilitated Project Areas do not represent hazards for people. Areas near steep drops at quarries are indicated with permanent concrete signs. Holes are refilled. Sharp or unstable items are rendered inoffensive.

19.2.3.Unless specified otherwise in the Contract, or instructed otherwise by the Engineer, the Contractor undertakes revegetation of all Project Areas disturbed by the Works and bears the cost of such work.

19.2.4.Topsoil set aside during initial earthworks pursuant to Sub-Clause 18.2 of the ESHS Specifications, is evenly spread over cleared areas. The surface of compacted soils on Project Areas is loosened by scouring (using rakes or other acceptable methods).

19.2.5.The Contractor describes in the Worskite - ESMP the planned revegetation works to ensure sustainable Project Area rehabilitation: methods, plant species to be used and their origins, activity schedule based on a progressive taking over of Project Areas.

19.2.6.Prior approval by the Engineer is required regarding the origin of seeds and plants proposed by the Contractor. The species used for revegetation must be suitable for the local environmental conditions, and selected according to the rehabilitation program: stabilisation of backfill, landscaping, drainage, prevention of erosion, etc.

19.2.7.Revegetation is undertaken throughout the duration of construction Works, and is not limited to the rehabilitation of Project Areas at completion of the Works.

## **20.Documentation on the**

20.1.The Constructor documents changes in condition of all Project Areas from the start of Works until the Performance Certificate is issued.

## **Project Area condition**

Documentation comprises dated and geo-referenced colour photographs taken from a constant angle and viewpoint.

20.2. The Project Area condition is documented as a minimum for the following stages:

- a) Before any Project Area disturbance at the start of works;
- b) On completion of Works, but prior to starting rehabilitation;
- c) On completion of rehabilitation and revegetation, if necessary, but prior to the Taking-Over Certificate issuing;
- d) After the end of the Defects Notification Period and prior to the Performance Certificate issuing.

20.3. The Contractor specifies in the Worksite – ESMP: (i) the list of viewpoints to be used, (ii) areas to be photographed, and (iii) methods used for taking and archiving photographs.

20.4. Adjacent areas (100 m from the perimeter of the Project Area) are included in photographic documentation.

20.5. Unless instructed otherwise by the Engineer, structures to be buried are photographed weekly until covered. As a minimum the structures are photographed twice for Works with duration of less than 7 days, and at least once a week for Works with a longer duration.

20.6. Photographs subject to the present Clause 20 are archived in digital format and provided to the Engineer on a monthly basis under the CC Sub-Clause 4.21 monthly progress report.

20.7. The nomenclature of electronic files for photographs explicitly indicates the Project Area, date and structure documented.

## **Health & Safety**

### **21. Health and Safety Plan**

21.1. In application of Clauses 4 and 6 of the CC, the Contractor describes in the Health and Safety Plan section of the Worksite - ESMP its organisation for managing health and safety (section 7 of Worksite – ESMP as described in Appendix 1 to the ESHS Specifications), pursuant to its Health and Safety Management System (HSMS).

21.2. Pursuant to Clause 6 of the CC, the plan identifies and specifies:

- a) All health and safety risks relating to the execution of the Works, by also identifying gender-specific risks;
- b) Prevention and protection measures to control risks related to the execution of the Works, by differentiating, where necessary, measures concerning the protection of women and men;
- c) Human and material resources involved;
- d) Works requiring work permits; and

e)Emergency plans to be implemented in the case of an accident.

21.3. In addition, this Health and Safety Plan describes how workers are trained in health and safety aspects.

21.4. The Contractor implements prevention, protection and monitoring measures, as described in the Health and Safety Plan.

## **22. Daily and weekly meetings**

22.1. The Contractor organises as a minimum one health and safety meeting per Project Area per week (or at another frequency approved by the Engineer) with all the personnel assigned to the Project Area. This applies only to Project Areas where work is ongoing. At the meeting accidents and incidents that occurred in the previous week are discussed and feedback provided. Means of improvements are identified, documented and assessed to establish corrective actions. The Engineer is invited to participate at all health and safety meetings. Meeting reports are provided to the Engineer.

22.2. The Contractor organises daily (or at another frequency approved by the Engineer) health and safety meetings per team at all Project Areas, prior to the start of the daily work. The meeting establishes the health and safety risks associated with the day's tasks and activities, and means of prevention and protection to be implemented. Minutes of the meetings shall be recorded.

## **23. Equipment and operating standards**

23.1. The facilities and equipment used by the Contractor are installed, maintained, revised, inspected and tested pursuant to the manufacturer's recommendations. The recommendations are available in the language of communication defined under CC Sub-Clause 1.4 (or any other language approved by the Engineer).

23.2. The Contractor lists and describes in the Health and Safety Plan the national and international standards, guidelines and industry codes of practice, applied during the execution of works.

## **24. Work permit**

24.1. Unless otherwise provided in the Contract, or unless otherwise instructed by the Engineer, work requiring work permits are defined in the Health and Safety Plan. Work permits will be documented and saved.

24.2. The Contractor puts in place a work permit procedure to manage risks through the implementation of prevention and protection measures prior to the starting of work. This procedure is subject to validation by the Engineer.

## **25. Personal protective equipment**

25.1. The Contractor ensures that all personnel, visitors or third parties entering a Project Area are equipped with Personal Protection Equipment (PPE) pursuant to the practices and standards specified in Clause 9.

25.2. The Contractor describes in the Health and Safety Plan the PPE to be used per Project Area and per activity.

25.3. Personnel and visitors to Project Areas are equipped with a safety helmet, safety shoes and a reflective jacket as a minimum.

25.4. Adequate quantities of PPE are available on the Project Areas. Storage conditions must be compatible with usage pursuant to the provisions of Sub-Clause 23.1 of the ESHS Specifications.

25.5. Contractor personnel are trained in how to use and care for PPE and the

Engineer must be able to obtain the training reports.

## **26.Dangerous substances**

- 26.1. A substance is considered dangerous if one or several of its properties render it dangerous, as defined in Appendix 2 to the ESHS Specifications. The Contractor identifies and manages dangerous substances planned for use on the Project Area in the manner described in the present Clause 26.
- 26.2. Details of risks and related prevention and protection measures are included in the Health and Safety Plan.
- 26.3. The assessment of the impact of the toxicity of dangerous substances on the reproductive functions of women and men must be taken into account.
- 26.4. The transport to the Project Area and use of dangerous substances requires prior authorisation from the Engineer.
- 26.5. The Contractor obtains all necessary authorisations and/or licenses for the storage and use of dangerous substances from local authorities. A copy of the authorisations is provided to the Engineer.
- 26.6. For each dangerous substance used, the Contractor will implement the recommendations described (i) in the Material Safety Data Sheets (MSDS), and (ii) by the Globally Harmonized System of Classification and Labelling of Chemicals established by the United Nations for hazardous chemicals.
- 26.7. Copies of MSDSs are kept on the Project Area, and made available to personnel. The Contractor's staff is aware of the health and safety risks related to hazardous materials. The Contractor provides the Engineer with copies of all MSDSs and training reports.
- 26.8. Storage of dangerous substances
  - 26.8.1. Storage areas are designed and equipped by the Contractor based on the chemical and physical properties of the substances, on the types of containers stored, the number of people requiring access, the ventilation requirements, the quantities of the substance used and potential chemical reaction with other substances (see Sub-Clause 26.8.5 of the ESHS Specifications).
  - 26.8.2. Pursuant to Sub-Clause 15.6 of the ESHS Specifications, the Contractor anticipates and plans for the storage and management of hazardous waste.
  - 26.8.3. Storage areas for dangerous substances are subject to strict rules, which are regularly checked by the ESHS Manager appointed pursuant to Sub-Clause 4.1.4 of the ESHS Specifications. The rules include the following as a minimum:
    - a) Access to the storage area is limited to trained and authorised individuals;
    - b) An inventory is maintained up-to-date;
    - c) MSDSs must be available for all stored dangerous substances, and the substances must be clearly labelled;
    - d) A strict and methodical storage system is

implemented (storage plan posted, large or heavy packaging may not be stored at heights, equipment and tools may not be stored in the dangerous substance storage room);

e) Compliance with product expiry dates and implementation of a disposal procedure for substances which are not needed or which have expired;

f) Entrances, exits and access to emergency equipment are kept clear at all times.

26.8.4. Storage areas are clearly identified with warning signs at the entrance. The Contractor displays the storage plan (location of the different products, maximum inventory), a summary of labelling system and information on chemical incompatibilities.

26.8.5. Chemicals which could react together (leading to explosions, fire, projections or the emission of dangerous gases) are physically separated.

26.8.6. Products that react violently with water are stored so as to prevent contact with water, even in the event of flooding.

26.8.7. Inflammable products are stored separately in a dedicated area with adequate ventilation at all times.

26.8.8. Buildings used to store large quantities of dangerous substances are isolated from other buildings to avoid the spreading of fire. Such buildings are constructed using solid and non-combustible building materials, and are equipped with evacuation systems and the appropriate firefighting equipment. Access to the buildings is clear, allowing for rapid evacuation in the event of an accident. The electrical systems are reduced to the essential minimum, and access points are equipped with adequate lighting (300 lux).

26.8.9. All storage areas are equipped with secondary retentions. Each storage area acts as a general secondary retention. Suitable absorbents (neutralising and non-combustible) are available in the storage area to clean up any spills and leaks.

26.8.10. The Contractor maintains the storage area at a suitable temperature for storing dangerous substances at an appropriate level to avoid any deterioration of the containers.

## **27. Planning for emergency situation**

27.1. The emergency plan required in application of Sub-Clause 21.2 of the ESHS Specifications covers the following emergency situations as a minimum:

a) Fire or explosion;

b) Structural failure;

c) Loss of the containment of dangerous substances;

d) Safety incident or malicious act;



e)Natural disasters.

- 27.2.The Contractor details the emergency plan in the Health and Safety Plan.
- 27.3.The Contractor ensures that all personnel are informed and aware of how to react in an emergency situation, and responsibilities are defined. Information and awareness training are documented, and available on all Project Areas.
- 27.4.The Contractor organises and documents emergency simulation exercises within 3 months of the physical start of the Works, and subsequently once every 12 months up to the issue of the Taking-Over Certificate. The Engineer is invited to participate in each of these exercises.
- 27.5.Fire extinguishers are made available in each building at clearly identified locations.

**28.Medical check-ups**

- 28.1.The Contractor organises medical check-ups for all Contractor’s Personnel prior to the initial mobilisation to the Project Area to check aptitude for the work. Medical check-ups are adapted to the anticipated occupied positions and carried out pursuant to the recommendations of the International Labour Organization. Subsequent to the check-up, a written medical certificate is issued declaring the aptitude of the worker for the allocated tasks.
- 28.2.Hearing tests are conducted for the Contractor’s personnel exposed to specific risks (such as noise levels above 80 dB(A), exposure to hazardous materials, etc.) in order to establish an initial state of health. Annual tests are carried out to monitor any changes and detect any deterioration.
- 28.3.The Engineer can request additional medical examinations for the Contractor’s Personnel if considered necessary, and all associated costs shall be borne by the Contractor.
- 28.4.A medical examination is carried out on any Contractor’s Personnel returning to work after leave caused by a work related accident. A written medical certificate is issued confirming the Contractor’s Personnel’s aptitude to return to work at the designated workstation.
- 28.5.The Contractor can produce a copy of its Contractor’s Personnel’s work aptitude certificates at the request of the Engineer or any competent authority.
- 28.6.Specific arrangements for tasks’ assignments or workstations shall be made for pregnant Personnel.

**29.First aid**

- 29.1.The Contractor ensures that at least one first aid officer is present at all times during working hours per Project Area and per team of 10 to 50 workers present, and one extra first aid officer for each additional 100 workers.
- 29.2.The Project Area must be equipped with a communication system available immediately and primarily for the purposes of communication with the first aid services. Information on how to communicate with the first aid services is clearly indicated near the communications equipment.

**30.Health care centre & medical personnel**

- 30.1.For Project Areas with more than 35 workers present at any one time and where it is not possible to reach a hospital, medical clinic or the Contractor’s health centre within a period of 45 minutes, by land and in

normal conditions:

30.1.1. The Contractor sets up a health care centre at its own cost. This centre is:

- a) Operational and easy to access all times;
- b) Kept clean and in good condition;
- c) Equipped with appropriate heating or air-conditioning;
- d) Equipped with sanitary facilities and drinking water;
- e) Equipped with instruments, equipment, medicines and material required to examine and treat injured or sick workers in emergency conditions;
- f) Equipped with the supplies and furnishing required to allow medical personnel to provide first aid and fulfil their other functions.

30.1.2. A doctor is present on-site at all times, working full-time during normal day hours. The doctor is on-call when more than 20 workers are working simultaneously outside of normal day hours.

30.1.3. The doctor has the following profile:

- a) At least 5 years' experience on large-scale construction works at sites located at a distance from a hospital;
- b) Trained in infectious diseases, waterborne and epidemiological diseases prevalent in the Employer's country;
- c) Able to lead training sessions on occupational health and first aid;
- d) Trained in management and logistics for a remote health care centre;
- e) Able to speak the same working language used by most members of personnel fluently (communication in emergency situations);
- f) In good physical condition, able to access remote working areas.

30.1.4. The Contractor allocates a road or air vehicle for first aid purposes to the first aid station pursuant to standard NF EN 1789/2007.

30.1.5. The Contractor ensures the presence of at least one nurse to assist the doctor per team with 200 - 800 workers allocated, and one extra nurse for each additional 600 workers allocated to this team. Over and above 500 workers per team, the Contractor ensures the presence of an extra doctor for each additional 500 workers allocated to this

team.

**31.First aid kits**

31.1.Each Project Area must be equipped with an adequate number of first aid kits to ensure that all workers can access these kits in approximately 5 minutes. Kits must be available at all times.

31.2.Each vehicle is equipped with a first aid kit.

31.3.First aid equipment complies with attached specifications.

**32.Emergency medical evacuations**

32.1.The Contractor establishes, and provides the Engineer within one month of the physical start of works a copy of an agreement with a specialised company for the handling of personnel in the event of a serious accident requiring an emergency medical evacuation, which cannot be organised using the first aid vehicle specified in Sub-Clause 30.1.4 of the ESHS Specifications without endangering the life of the patient.

32.2.The agreement includes a convention with a referring hospital where the member of personnel evacuated in emergency conditions will be treated.

32.3.The agreement covers the use of air transportation in order to evacuate the injured patient(s) to the referring hospital.

**33.Access to health care**

33.1.The Contractor guarantees access to health care as defined in Clause 30 for all personnel in necessary cases of accident or illness occurring during the execution of the Works, i.e.:

a)Medical check-ups: initial (recruitment), annual and upon returning to work after sick leave;

b)Screening, vaccinations and preventive healthcare;

c)General healthcare during the execution of the Works;

d)Medical assistance in the event of an accident and assistance for emergency evacuations.

33.2.Subcontractor's personnel, other contractors, the Employer or the Engineer, present at the Project Area, must never be refused medical assistance, under the pretext that they are not directly employed by the Contractor. The Contractor may however define a unit rate cost per medical act for personnel, other than its own Contractor's Personnel, display this rate in the healthcare centre and forward the information to the Engineer.

33.3.In the event of accident or serious illness, medical personnel must be trained, available and equipped with the necessary material, medicines and consumables to provide first aid for the patient, stabilise their condition, until the patient is:

a)Either treated or discharged; or

b)Hospitalized at the camp or in a larger hospital; or

c)Evacuated to a medical centre which is well equipped for intensive care, if necessary.

**34.Health monitoring**

34.1.The Contractor cannot recruit workers in poor health.

34.2.The initial pre-recruitment examination must confirm that applicants carry

no infectious diseases and are physically able to carry out the tasks required for the position.

34.3. The detection of pregnancy during the initial pre-recruitment examination of female applicants shall not constitute grounds for declining recruitment, unless medical risk is proven.

34.4. The Contractor organises annual medical check-ups for its Contractor's Personnel and keeps up to date a medical record for each Contractor's Personnel. The presence of Contractor's Personnel for medical check-ups, treatment and hospitalisation is incorporated into the Contractor's planning.

34.5. The Contractor provides the Contractor's Personnel with prophylaxis and vaccinations against local diseases and vectors. In particular, the Contractor will promote the use of impregnated mosquito nets by its Contractor's Personnel in camps or off-site lodging, and distributes these nets appropriately.

34.6. The Health and Safety Plan includes a Contractor's Personnel health risk assessment based on exposure to specific risks (such as noise levels above 80dB(A), exposure to hazardous materials, etc.) and describes the medical monitoring implemented.

### **35. Sanitary repatriation**

35.1. The Contractor is responsible for the sanitary repatriation of Contractor's Personnel in the event of a serious injury or illness. The Contractor will take out the necessary insurance to cover the cost of the sanitary repatriation of its Contractor's Personnel.

### **36. Hygiene, accommodation and food**

36.1. Drinking water:

36.1.1. Pursuant to Sub-Clause 6.14 of the CC, the Contractor provides personnel with drinking water at all Project Areas. The quantity and quality of this water complies with the standards of the World Health Organization at supply points.

36.1.2. Unless the supply of drinking water is provided by a certified supplier, the quality of the drinking water provided to workers is tested at least at the start of the Works and then on a monthly basis. The protocol for taking and analysing samples is based on the recommendations of the World Health Organization. The results shall be documented and made available on the Project Areas.

36.2. Accommodation conditions:

36.2.1. The accommodation provided for non-resident Personnel in a camp or an alternative structure outside of the Project Areas, such as a hotel or rented house, will comply with the conditions of Sub-Clause 36.2 of the ESHS Specifications in pursuance of Sub-Clause 6.6 of the CC.

36.2.2. Unless specified otherwise in the Contract, or instructed otherwise by the Engineer, Personnel are housed in rooms. Rooms do not host more than 4 individuals, with no bunk beds, and with 0.5 m<sup>3</sup> of storage space available per person.

36.2.3. Rooms shall not be mixed: separate rooms must be made available for both men and women.

36.2.4. Rooms are lit and equipped with power sockets, beds and windows

fitted with mosquito nets. Flooring is of a hard and impervious material.

36.2.5. The temperature in rooms and common areas shall be kept at an appropriate level during occupied hours.

36.2.6. Night-time noise levels to which personnel are exposed comply with the limits recommended by the World Health Organization.

36.2.7. The Contractor provides one drinking water tap per 10 Contractor's Personnel, one shower per 10 Contractor's Personnel as a minimum, one individual toilet for 15 Contractor's Personnel as a minimum, and one urinal per 25 Contractor's Personnel at accommodation camps. Separate showers, toilets and locker-rooms must be made available for women.

36.2.8. The Contractor constructs and maintains a shared leisure area in each camp and a sports field for use by Personnel.

### 36.3. Hygiene in shared areas:

36.3.1. Sanitary areas (showers, sinks, urinals, toilets) are cleaned and disinfected by the Contractor's cleaning service at least once every 24 hours. Cleaning operations are documented.

36.3.2. The canteen, kitchen and kitchen utensils are cleaned after each meal service.

36.3.3. The number and location of toilets on Project Areas shall be adapted to the number of employees and the configuration of the Project Areas (distance, isolated area, etc.). Separate toilets will be made available for women.

### 36.4. Food:

36.4.1. In application of Sub-Clause 6.13 of the CC and Sub-Clause 41.1 of the ESHS Specifications, the Contractor provides meals at a reasonable cost to its Contractor's Personnel in a canteen area and according to a procurement system which complies with the provisions of Sub-Clause 36.4 of the ESHS Specifications.

36.4.2. The Contractor defines and implements actions in order to guarantee (i) the quality and quantities of food stuffs, (ii) compliance with health rules when preparing meals, (iii) fitting out and servicing premises and equipment, both in the kitchen and food storage areas.

36.4.3. The Contractor inspects the cleanliness of food transport vehicles, temperature control and the cold chain, as well as best before dates, and takes the necessary corrective actions. The temperatures of chillers are regularly checked.

36.4.4. The Contractor checks that health requirements are met for food storage conditions in the kitchen or other locations, food cooking times and temperatures, and the conditions in which prepared products are left prior to consumption, to ensure no health risks. No food remains are to be reused.

36.4.5. The Contractor recruits trained canteen personnel and ensures that

supervisors monitor compliance with sanitary instructions. The Contractor ensures that canteen personnel have means of ensuring compliance with health rules (changing rooms, linen, hand washers, the condition of flooring and paint, and the existence of a cleaning plan).

36.5. The ESHS Manager carries out an audit on all Project Areas every 3 months, and documents the results, and includes the conditions of hygiene in which meals are prepared and food conserved. The results of this audit are provided to the Engineer.

36.6. The ESHS Manager regularly informs Contractor's Personnel on appropriate behaviour in terms of workplace hygiene. This information is documented and saved.

### **37. Substance abuse**

37.1. Pursuant to Sub-Clause 6.16 of the CC, the use, possession, distribution or sale of illegal drugs, controlled substances (as per local regulations) and alcohol is totally prohibited on the Project Areas. The Contractor implements a zero tolerance policy for the consumption of these substances.

37.2. Any person suspected by the Engineer to be under the influence of alcohol or controlled substances on any Project Area is immediately suspended from his position by the Contractor, pending the results of medical tests.

## **Local Labour and Relations with Local Communities**

### **38. Labour conditions**

38.1. The Contractor should ensure decent labour conditions for workers and notably compliance with applicable law and regulations in the country of implementation of the contract, and with the fundamental conventions of the International Labour Organisation (ILO). This includes workers' rights related to wages, working hours, rest and leave, overtime, minimum age, regular payment, compensation and benefits. The Contractor should respect and facilitate workers' rights to organise and provide a grievance mechanism for all direct and indirect workers. The Contractor should implement non-discrimination and equal opportunity practices, and ensure prohibition of child or forced labour.

### **39. Local recruitment**

39.1. Local recruitment is defined as the number of positions actually allocated to people residing in the region of the Works, which must be defined by the Contractor in its offer according to relevant criteria by giving priority to populations living in the area of influence or in the immediate proximity of the Project Area.

39.2. Pursuant to Sub-Clause 6.1 of the CC, the Contractor implements a voluntary local recruitment policy for its personnel for the duration of the Works and shall enforce this policy to its Subcontractors.

39.3. The Contractor demonstrates the effective implementation of this voluntary policy to the Engineer in its monthly activity report as defined in Sub-Clause 6.3 of the ESHS Specifications.

39.4. Pursuant to Clause 8 of the ESHS Specifications, the Contractor shall develop a training program. This training program must be open to women and men and be adapted to their level of education and needs of each group to occupy the positions proposed during the Works.

39.5. Local labour needs are estimated prior to the start of Works and described

in the Worskite - ESMP with the following information:

- a) Identification of positions that could be filled by local staff and the level of qualification required;
- b) Definition of the planned procedure for the effective recruitment of these members of staff;
- c) Establishment of mechanisms to ensure non-discrimination of women in accessing recruitment procedures. This mechanism must cover the definition of the positions, the methods of communication on the positions to be filled, etc.;
- d) Deployment schedule for these positions;
- e) Initial training to be provided by the Contractor for each job description.

39.6. In order to prevent outsiders from entering the Project Area, local recruitment at the Project Area, including at the entrance, is prohibited.

39.7. Local recruitment office:

39.7.1. Prior to the start of works, the Contractor establishes a local recruitment office in the district where the main Project Area is located, at a location pre-approved by the Engineer.

39.7.2. A representative of the Contractor is present in this office at least two mornings each week, from the start of the Works to a date pre-approved by the Engineer.

39.7.3. The representative provides information on job vacancies with the Contractor for the execution of the Works (required qualifications, duration, and location) and on the information to be provided in applications.

39.7.4. Lists of local candidates are drafted by the representative allocated to the office and forwarded to the Contractor's human resources manager on a weekly basis.

39.8. The Contractor's Human Resources manager selects candidates listed by the local recruitment office based on requirements for the Works and the Contractor's recruitment procedures. A written contract between the Contractor and the local Contractor's Personnel is drafted, signed and archived by the Contractor.

39.9. If the Project Areas are located near to several different communities, the Human Resources manager ensures a fair distribution of local recruitment between the different communities, by giving priority to the people affected by the project.

39.10. The Human Resources manager will ensure that recruitment campaigns in local communities have been spread to women and that the latter have not been discriminated in recruitments.

39.11. Pursuant to Sub-Clause 6.22 of the CC, the Contractor maintains one record per local Contractor's Personnel indicating the hours worked per

person allocated to the Works, the type of tasks carried out, the wages paid and any training taken. Records are available at the main Project Area at all times, so the Engineer and the authorised representatives of the government can assess the content.

#### **40. Transport & accommodation**

40.1. Unless specified otherwise in the Contract, or instructed otherwise by the Engineer, the Contractor provides or enables access to daily transport for Contractor's Personnel living more than 15 minutes' walk from the Project Area and more than one hour by land transport.

40.2. The transport is organised under conditions which comply with local regulations and which ensure the safety of the people transported.

40.3. The Contractor organises collective transport: pick-up times and locations are defined and services organised appropriately.

40.4. If the Project Area is moved during the working season and if the Contractor retains the local personnel trained at the start of the Works, the accommodation of the Contractor's Personnel is managed by the Contractor:

a) Within a mobile camp with the other non-local Contractor's Personnel; or

b) In villages located near to the mobile Project Area, in this case, each local Contractor's Personnel will receive a housing allowance in addition to his wages.

#### **41. Meals**

41.1. Food supplies for the meals of the Contractor personnel will exclude any meat obtained from hunting or poaching, with the exception of fish.

41.2. The Contractor provides at least two meals per day to local Contractor's Personnel pursuant to the hygiene conditions specified in Clause 36 of the ESHS Specifications, at reasonable price.

#### **42. Damage to people and property**

42.1. The Contractor shall not disturb or interfere with the inhabitants of local communities close to or in the Project Area, and shall respect their houses, cultures, animals, properties, customs and practices.

42.2. Pursuant to Sub-Clauses 4.14 and 17.1 of the CC, the Contractor is responsible for damages to people and property caused by the execution of the Works or the procedures used for execution.

42.3. Access to the Project Areas is prohibited to unauthorized persons. The Contractor is responsible for the security and access control of the Project Areas.

42.4. The Engineer is informed of any damage caused to people, or the property of individuals, other than the Contractor's personnel, within 6 hours of the event, regardless of the value of the prejudice.

42.5. Housing existing before the start of the Works, located within a minimum radius of 800 m around the perimeter of the quarries and within a minimum radius of 500 m around the other Project Areas that will be subject to blasting, will be examined by a bailiff unless agreed upon otherwise with the Engineer.

42.6. The bailiff's sworn statement is prepared and provided to the Engineer with



the EPP.

42.7. Should any problems be detected due to the intensity of blasting, the Engineer is entitled to request that the Contractor carry out seismic measurements of the intensity of the vibrations induced by the blasting, at variable distances from the blasting points, under the supervision of the Engineer, and at the cost of the Contractor.

**43. Land acquisition and land take**

43.1. Pursuant to Sub-Clause 7.8 of the CC, the Contractor will cover (i) occupancy indemnities for the extraction or use of construction materials and (ii) the cost of acquiring or temporarily occupying the necessary land to stockpile excess backfill material.

43.2. The Contractor provides compensation for any prejudice suffered by the owners and users of this land, if these users are not the same parties as the owners.

43.3. The Contractor demonstrates to the Engineer (i) who are the owner and the users, if different parties have been identified, and (ii) a written agreement governing the temporary occupancy or acquisition of this land has been negotiated and duly paid up to the two parties, if different.

**44. Traffic**

44.1. The Contractor defines a Traffic Management Plan in Worksite - ESMP (section 11 as defined in Appendix 1 to the ESHS Specifications).

44.2. The Traffic Management Plan:

a) includes the characteristics of its fleet of vehicles and site machinery; and

b) defines the itineraries used on a map for each route between the different Project Areas that must be validated by the Engineer.

44.3. The Contractor requests that the Employer obtain the authorisations of the competent administrative authorities if public roads are used. Any Engineer's instruction to update the Traffic Management Plan shall be implemented.

44.4. Within one month of the physical start of Works, the Contractor informs the administrative authorities of areas crossed by the Contractor's vehicles, of the itinerary and characteristics (frequency of passing, size and weight of trucks, materials carried) of the Contractor's fleet of vehicles.

44.5. If public roads are used, and unless approved otherwise by the Engineer, the Contractor mandates a bailiff to make a sworn report regarding the state of the road prior to use by the Contractor's vehicles. The report is annexed to the Traffic Management Plan.

44.6. The Contractor describes in the Traffic Management Plan the expected traffic created by its fleet of vehicles (frequency of trips between Project Areas, working hours, convoys).

44.7. The Contractor also describes the number and positioning of flagmen.

44.8. Unless specified otherwise in the Contract or instructed otherwise by the Engineer, heavy vehicles (i.e. with a GVWR of more than 3.5 tons) may not be used at night between 22:00 and 06:00.

44.9. Speed limits:

- 44.9.1. The Contractor takes action to limit and check the speed of all vehicles and machinery used to execute the Works.
- 44.9.2. The maximum speed of all machinery and vehicles of the Contractor comply with the lowest of the following: the speed limit defined according to the Employer's country regulations or the following limits.
- a) 10 km/h within the Project Area;
  - b) 30 km/h in villages or hamlets, in towns, from 100 m before the first house;
  - c) 80 km/h on unpaved roads outside of towns, villages, hamlets and camps.
- 44.9.3. Pursuant to Sub-Clause 4.15 of the CC, and in coordination with the competent Employer's country authorities, the Contractor provides and installs signs for the fleet of vehicles along public roads, when public signs are inadequate.
- 44.9.4. The Contractor provides each of its drivers with a map at the appropriate scale of the roads authorised for the execution of the Works, clearly indicating the maximum speeds authorised, and ensures their understanding.
- 44.10. It is strictly prohibited to transport people, equipment or products other than those required for the Works and the management of Project Areas, on board any of the Contractor's vehicles. This provision also applies to the transport of live animals and meat obtained from hunting, fishing or poaching.
- 44.11. The trailers and skips used to carry materials which could be projected (sand, crushed material, aggregates, selected materials) are covered with a tarpaulin for the entire itinerary between two Project Areas.
- 44.12. The Contractor carries out regular inspections along the roads used by its fleet of vehicles to ensure compliance with the provisions of Clauses 44.8 to 44.11 of the ESHS Specifications. The Contractor records these inspections and the results and transmits a summary of checks carried out for the previous month to the Engineer on a monthly basis.

## APPENDIX 1 – Contents of Worksite - ESMP

1. **Environmental policy**
  - Declaration of ESHS policy signed by the managing director of the Contractor and clearly defining the commitment of the Contractor in terms of (i) ESHS management for its construction sites and (ii) compliance with the ESHS Specifications of the Contract.
2. **Worksite -ESMP**
  - Target and content of the Worksite Environmental and Social Management Plan
  - Preparation and updating schedule
  - Quality assurance and validation
3. **ESHS resources**
  - Human resources:
    - ESHS Manager
    - ESHS Supervisors
    - Person in charge of relations with stakeholders
    - Medical personnel
  - Logistics & communications:
    - ESHS vehicles
    - IT stations
    - In situ noise, air and water measuring equipment
    - Analysis laboratory used
  - Reporting:
    - Weekly inspections
    - Monthly
    - Accident / Incident
4. **ESHS regulations**
  - Definition of standards for the applicable national ESHS regulations and the ESHS recommendations of institutions affiliated to the United Nations (WHO, ILO, IMO, IFC), applicable to the execution of works:
    - Discharge standards
    - Minimum wage
    - Day and/or night traffic restrictions
    - Other
  - Definition of ESHS standards for the industry applied
5. **ESHS operational inspection resources**
  - Site tracking procedure:
    - Frequency
    - Personnel
    - Assessment criteria
  - Non-conformity handling and detection procedure:
    - Distribution information
    - Notification depending on the level of importance allocated to non-conformities
    - Tracking of the closing of the non-conformities
  - Management of data on tracking and non-conformities:
    - Archiving
    - Use as a performance indicator
6. **Project Areas**
  - Description of Project Areas (as per definition in Sub-Clause 1.3 of the ESHS Specifications):
    - Number

- Location on a topographical map
  - Activities
  - Opening & closing schedule
  - Access
  - Reference to the Appendix: an Environment Protection Plan (EPP) for each Project Area
7. **Health and Safety Plan**
- Identification and characterisation of health and safety risks, including the exposure of personnel to chemicals, biological hazards and radiation
  - Description of working methods to minimise hazards and control risks
  - List of the types of work for which a work permit is required.
  - Personal protection equipment.
  - Presentation of the medical facilities at Project Areas:
    - Healthcare centre, medical equipment and allocation of medical staff
    - Medical acts that can be carried out on-site
    - Ambulance, communications
    - Referring hospital
  - Evacuation procedure for medical emergencies.
  - Description of the internal organisation and action to be taken in the event of an accident or incident.
8. **Training plan**
- Basic training for non-qualified staff
  - Health & safety training
9. **Labour Conditions**
- Description of Human Resource Policy for construction works of direct and indirect workers
10. **Local recruitment**
- Local labour requirements:
    - Job descriptions and the levels of qualifications required
    - Recruitment procedure and deployment schedule
    - Initial training to be provided by the Contractor for each job description
  - Location and management of the local recruitment office(s)
11. **Traffic Management Plan**
- Description of the fleet of vehicles/machinery used for the execution of the Works
  - Deployment (Project Area & schedule) and maintenance sites for each vehicle and machine
  - Mapping of itineraries, travel times, and areas where speeds are limited
  - Dust suppression:
    - Mapping or road sections where dust reduction initiatives apply
    - Water points identified or to be created for refuelling tanker trucks
    - Capacity of the tanker trucks used and calculation of the number of trucks required
    - Width of the track to determine if one watering run or equivalent is adequate (narrow track) or if two runs are required (wide track)
    - Number of watering or equivalent operations proposed per day depending on the climate
12. **Dangerous products**
- Inventory of dangerous products per Project Area and per period
  - Transport and storage conditions and chemical incompatibility
13. **Effluents**
- Characterisation of effluents discharged to the receiving environment
  - Facilities for the treatment or pre-treatment of effluents
  - Measures for reducing the sediment content of rainwater runoff

- Measures for monitoring the efficiency and performance of facilities for reducing sediment content of rainwater runoff
  - Resources and methods for monitoring effluent and rainwater runoff quality
14. **Noise and vibrations** ➤ Estimation of the frequencies, duration, days of the week and noise levels per Project Area
15. **Waste** ➤ Inventory of waste per Project Area and per period  
 ➤ Collection, intermediate storage, handling and treatment methods for ordinary or inert waste  
 ➤ Storage and handling methods for dangerous waste
16. **Clearing and revegetation** ➤ Methods & schedule for clearing vegetation and earthwork activities  
 ➤ Methods, species and schedule for the revegetation of Project Areas disturbed by the Works
17. **Biodiversity** ➤ Schedule for adequate fauna and flora management  
 ➤ Measures for minimizing impact on fauna and flora species based on the Contracting Authority procedures  
 ➤ Measures for monitoring the efficiency and performance of the plan in place  
 ➤ Measures for limiting IAS  
 ➤ Measures for monitoring the efficiency and performance of the plan in place
18. **Prevention of erosion** ➤ Location of zones suffering from erosion  
 ➤ Methods and schedule for the implementation of anti-erosive actions, including topsoil storage
19. **Documentation on the Project Area condition** ➤ List and cover of viewpoints  
 ➤ Imaging method  
 ➤ Archiving photographs
20. **Rehabilitation** ➤ Method and schedule for Project Area rehabilitation
21. **Appendices** ➤ Environment Protection Plans (number and location specified in Section 6 “Project Areas” above):
- Marking out of the Project Area perimeter on a map
  - Definition of zones for vegetation clearing, zones for the storage of usable timber, zones for burning of green waste
  - Definition of on-site activities: construction, storage areas, accommodation areas, offices, workshops, concrete making units
  - Layout of activity areas on the Project Area: construction works, production/operation areas, rehabilitation and closure
  - Zones for the storage of topsoil, spoil from earthworks, materials
  - Access routes and checkpoints
  - Project Area occupancy schedule
  - Organisation of Project Area preparation
  - Liquid discharge outlet points
  - Proposed sampling points for monitoring water quality
  - Atmospheric emission outlet points
  - Location of the storage site for dangerous products
  - Location and mapping of waste treatment facilities when handled by an external service provider
  - Any other information relating to the environmental management of the Project

## Area

- Emergency plan:
  - Description of facilities
  - Characterisation of hazards
  - Emergency situations
  - Organisation structure - roles and responsibilities
  - Emergency procedures
  - Human and material resources
  - Triggering of the plan
  - Reporting
- Bailiff's sworn reports as specified in Sub-Clauses 10.5, 42.4 and 44.5 of the ESHS Specifications.

## APPENDIX 2 – Properties rendering a product dangerous<sup>2</sup>

1. **Explosive** substances and preparations which could explode in the presence of a flame or which are more sensitive to impacts and friction than dinitrobenzene.
2. **Combustive** substances and preparations which, when in contact with other substances, particularly inflammable substances, undergo strongly exothermic reactions.
3. **Easily inflammable** substances and preparations (i) in liquid phase (including extremely inflammable liquids), with a flash point below 21°C, or which can heat up to the extent of spontaneous combustion in ambient air; or (ii) in solid phase, which can burst into flames easily in the brief presence of a source of inflammation and which will continue to burn after the removal of the source of inflammation or (iii) in gaseous phase, which are inflammable in air at normal pressure; or (iv) - which, when in contact with moist air or water, produce dangerous quantities of gases which are easily inflammable.
4. **Inflammable** liquid substances and preparations, with a flash point equal to or above 21°C and less than or equal to 55°C.
5. **Irritant** non-corrosive substances and preparations which, when in immediate, extended or repeated contact with the skin and mucosa, can cause inflammation.
6. **Harmful** substances and preparations which, in case of inhaling, swallowing or cutaneous penetration, can lead to risks of limited severity.
7. **Toxic** substances and preparations (including highly toxic substances and preparations), which, in case of inhaling, swallowing or cutaneous penetration, can lead to serious, acute or chronic risks, and even death.
8. **Carcinogenic** substances and preparations which, in case of inhaling, swallowing or cutaneous penetration, can lead to or increase the frequency of cancer.
9. **Corrosive** substances and preparations which, in case of contact with living tissues, can destroy the latter.
10. **Infectious** substances containing viable micro-organisms or their toxins, for which it is known or we have good reasons to believe that they cause disease in humans or other living organisms.
11. **Harmful to reproduction function** substances and preparations which, in case of inhaling, swallowing or cutaneous penetration, can induce or increase the frequency of undesirable non-hereditary effects in offspring or have a negative effect on reproductive functions and abilities.
12. **Mutagenic** substances and preparations which, in case of inhaling, swallowing or cutaneous penetration, can lead to hereditary genetic disorders or increase the frequency of these disorders.
13. **React with water** substances and preparations which, in case of contact with water, air or an acid, release a

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<sup>2</sup> Source: French Environment Law (*Code de l'environnement*) / Articles R541-8

- toxic or highly toxic gas.
14. **Sensitising** substances and preparations which, in case of inhaling or cutaneous penetration, can lead to a hypersensitisation, so that renewed exposure to the substance or preparation will cause characteristic harmful effects. This property can only be considered if test methods are available.
  15. **Ecotoxic** substances and preparations with inherent or potential immediate or deferred risks for one or several environmental components.
  16. **Dangerous for the environment** substances and preparations which are likely, after elimination, to lead to another substance, by any means, e.g. a lixiviation product, with one of the above characteristics.



## **Appendixes**

**The below appendixes are attached separately**

1. Appendix A: Soil Investigation Test Results and Reports
2. Appendix B: Environmental and Social Management Framework (ESMF)
3. Appendix C: Technical Requirement/Specification
4. Appendix D: Lists of Terminal Furnitures