SUPPLY AND INSTALL A 65M RADIO TOWER
US EMBASSY ABUJA, NIGERIA

STATEMENT OF WORK

1.0 INTRODUCTION

The American Embassy in Abuja, Nigeria requires the service of a qualified contractor to supply and install a radio tower 65 m high including the reinforced concrete foundation and equipment building. The site is located at the USG residential compound (aka "Santa Fe Compound) at 5 Osara Close, Maitama, Abuja.

2.0 SCOPE OF WORK

The contractor shall conduct an initial inspection of the site to obtain an overview of the project, document the existing site conditions, and to develop a schedule for the work.

The design items of the works shall allow for the following:

Tower Foundation System Requirements:

- Design and construction of a reinforced concrete foundation system to support the radio tower, per requirements herein, and all loading induced by the radio tower (dead/attachments, live, wind).
- During the design of the tower foundation system, a set of construction drawings and calculations should be developed for review by the USG. All calculations and drawings are to be developed utilizing either International Building Code (IBC) 2021 or Eurocode Suite (latest addition).
- As a minimum, foundation calculations shall provide the following.
  - Design Criteria Used
  - Loads Applied from Tower
  - Tower Connections Loads
  - Shear and Bending Moment Diagrams
  - Pile Loadings (if applicable)
  - Deflection Calculations (if mat foundation)
- As a minimum, foundation drawings shall provide the following.
  - General Notes
  - Foundation Plan
  - Sections & Detail Sheet
  - Tower Connection Details
  - Reinforcing Steel Cutsheet(s)

- Appropriate specifications should be provided to compliment the drawing and calculation package. Specifications should include all needed sections as determined by the design of the tower foundation.

Radio Tower Requirements:

- Supply and install a radio tower 65 m high. The tower shall be capable of withstanding wind forces identified in the following, have anti-climb features to prevent unauthorized personnel from being able to climb the tower, minimum of level IV lightening protection per NF C-17-102 2011 standards and earthing system.
- If guidewire supported tower is not an acceptable support system, the tower should be designed as self-supporting, without supplementary cable supports.
- Wind Load Criteria – 54 m/s (195 km/h)
- Live Load Capacity – Min. (2)-300 lb point loads at any location, to occur concurrently (in addition to attachment loads). This is to provide tower support access for install or repair needs.
- As a minimum, tower calculations shall provide the following.
  - Design Criteria Used
  - Loads Applied on the Tower
  - Tower-to-Foundation Connections Design
  - Global Tower Response Items
  - Tower Deflection Information (from dead, live & wind loads). *Note – compounding effects of foundation deformations should be considered.
  - Frequency & resonance calculations of tower, induced by wind loading. Provide frequency and mode shape information.
  - Tower Element Design (all elements)
  - Tension & Compression Values
  - Shear & Bending Moment Diagrams
  - Element Utilization Values
  - Element Deflection Values
  - Pile Loadings (if applicable)
  - Deflection Calculations (if mat foundation)
- Appropriate specifications should be provided to compliment the drawing and calculation package. Specifications should include all needed sections as determined by the design of the tower system.
- A tower access system (preferably an enclosed system) shall be provided for access to all tower locations capable of supporting attachment elements.
- The tower design shall allow for the installation of three antennas, associated cabling, and all necessary appurtenances. US Government will furnish antennas and Heliax cabling only.
- Earthing system shall provide less than 2 ohms resistance to earth.
- Supply and install all necessary conduit to connect the tower to the onsite radio shed which is approximately 40m away from the tower location.

This section (2.0) only provides general guidelines for the design/construct package of the permanent work. The Contractor shall develop the design and cost proposal to allow for all

conventional detailing (and good engineering practice) of the work such as site restoration, drainage, painting, ceilings, nailing etc.

3.0 CONTRACTOR RESPONSIBILITY:

- The Contractor is responsible for all design work to provide the service efficiently and safely. The designs for all areas of work shall require the approval of the USG/Contracting Officer. No work shall commence unless the CO has approved the designs, plans for (but not limited to) the radio tower supply, foundation design, tower design and any special requirement for the work.
- The contractor will perform all construction per the approved design, in accordance with specified international and local construction codes. The most stringent code requirements control (international and local) for all cases (drawings, calculations, and construction).
- The contractor shall conduct the work in a safe and secure manner to prevent damage to person and property. Maximum care should be taken while excavating to avoid damages to existing underground services.
- The Contractor shall be responsible for all repairs and/or replacement from damages due to the negligence of the contractor's operations.
- All disturbed areas should be restored to its original state & shape after the job is completed. Work area shall be cleaned of all debris at the end of the project.
- The contractor shall provide materials & safety equipment and all required tools and equipment to complete the project.
- Material testing shall be conducted in accordance with all ASTM (American Society for Testing and Materials) requirements, to confirm quality and proper application of materials. Testing should be included in the cost proposal and work plans but coordinated and implemented by an actively registered third-party facility/entity. USG to provide final approval of testing specifications and facility once selected.

4.0 US EMBASSY RESPONSIBILITY:

- Provide access to property during normal working hours (0800-1600).
- Provide onsite staging area for contractor's equipment and materials.
- Provide electrical and water supply as necessary for the performance of the work.
- Provide toilet facilities for workers on the project. The Contractor remains responsible for all repairs to the toilet facility on site once such damages are caused by the work force on site.
- The Embassy is not responsible for any loss or damage to contractor's equipment or materials. The Contractor shall ensure that all equipment and materials are properly stored and secured on site.

5.0 GENERAL CONDITIONS:

- The Contractor shall include in the proposal all connection details; methodology; design drawings, and pricing. Minor omissions or changes do not constitute a change in pricing and the Contractor shall demonstrate good engineering practice in the price build-up.

- The Contractor shall include in the proposal a construction plan of sufficient detail to demonstrate that the contractor has considered all the challenges of the project and is prepared to undertake the works in a competent and professional manner in accordance with all standards and codes, including:
  - Project specific safety program
  - Project Specific Quality Control and Quality Assurance (QA/QC) plan
  - Project environmental protection plan
  - Detailed earthling system
  - Detailed construction and installation plan
  - Material testing and oversight plan

- **The Contractor shall ensure that all materials or products for the project are in compliance with ASTM (American Society for Testing and Materials) International standards and all materials must be clearly labeled to identify the country of make; *the supplier marking alone is not acceptable as the country of make.***

- **The data sheet showing the type of radio tower; installation methodology and country of manufacture is a MANDATORY SUBMISSION for the bid.**

6.0 ATTACHMENTS:

Attachment A: USG Supplied Antenna

DB224-B

1-port omni exposed dipole antenna, 155–165 MHz, 360° HPBW, fixed electrical tilt

Broad response
Two-piece mast for ease of shipping

- General Specifications
  - **Antenna Type** Omni
  - **Band** Single band
  - **Color** Silver
  - **Grounding Type** RF connector inner conductor and body grounded to reflector and mounting bracket
  - **Performance Note** Outdoor usage
  - **Radiator Material** Aluminum
  - **RF Connector Interface** N Male
  - **RF Connector Location** Bottom
  - **RF Connector Quantity, low band** 1
  - **RF Connector Quantity, total** 1
- Dimensions
  - **Length** 6477 mm | 255 in
  - **Net Weight, without mounting kit** 15.9 kg | 35.053 lb
- Electrical Specifications
  - **Impedance** 50 ohm
  - **Operating Frequency Band** 155 – 165 MHz

- **Polarization** Vertical

- Electrical Specifications
  - **Frequency Band, MHz 155–165**
  - **Gain, dBi** 8.1
  - **Beamwidth, Horizontal, degrees** 360
  - **Beamwidth, Vertical, degrees** 16
  - **Beam Tilt, degrees** 0
  - **VSWR | Return loss, dB** 1.5 | 14.0
  - **Input Power per Port,**
  - **maximum, watts** 500
- Mechanical Specifications
  - **Wind Loading at Velocity, maximum** 126.0 lbf @ 100 mph | 560.5 N @ 100 mph
  - **Wind Speed, maximum** 130 km/h | 80.778 mph
- Regulatory Compliance/Certifications
  - **Agency Classification**
  - **CE Compliant with the relevant CE product directives**
  - **ISO 9001:2015 Designed, manufactured and/or distributed under this quality management system**
- Included Products
  - DB365-OS – Pipe Mounting Kit that consists of two clamps for mounting antennas to round members 1.25 -
  - 3.5 in (35 - 89 mm) OD round members.