

Preamble:

This implementation proposal is based on the underlining assumption that the project will be based in Nigeria and are as applicable to Greenfield site with normal soil conditions.

The proposal also outlines the step-by-step implementation processes of a typical site management program. However, we recognize the fact that some of the activities detailed herein may differ from region to region.

It has been also assumed that Mabseed is not responsible for such activities like Site Acquisition prior to commencement of project.

MABSEED TOWER SITE MANAGEMENT PROGRAM

Program Management

The focal point of the Mabseed management team is the Program Manager. He is the master scheduler and coordinator and the client's primary contact. Key support personnel are assigned for the duration of the program to assure continuity, quality and satisfaction.

The program management team will establish and maintain communication with the client's project personnel, receiving and disseminating all information relative to design, construction and implementation of the total program. Reporting of job progress is provided through the project schedule, bar graphs and written status reports as deemed necessary to provide visibility of projected and actual progress. Where subcontractors are used, they are pre-qualified and monitored by the Mabseed site inspectors to assure adherence to strict quality requirements.

1. TECHNICAL SITE SURVEY

Prior to Mabseed accessing any site there will be a site survey report indicating the nature of the ground conditions, the site layout and any unusual site conditions that may influence the site development. Wherever possible two survey pegs will be present prior to commencing with building operations. In all instances all necessary site development approvals (ownership/lease, regional and town planning, civil aviation etc) shall be the responsibility of the client and shall have been acquired prior to the site handover for development. A site survey report endorsed by client's representative, landowner and Mabseed is developed.

In addition to the above the sites should also be examined to determine whether they are to be designs for topographical or weather effects. The sites shall be examined to determine whether they are on the edge of sharp cliff faces or escarpments. Issue such, as soil stabilization and piling are determined at this stage.

INSTRUCTION TO PROCEED

After notification by the client that a specific site survey report has been approved and that authorization to proceed to site has been granted, schedules necessary to illustrate and perform construction and installation work shall be prepared. In all instances the design work for all structure and load bearing foundations will be completed by a registered professional

engineer in this case it is assumed that OUR CLIENT will be responsible for all designs. However, it is the practice of Mabseed to advise client when modification is needed or abnormalities are observed in the drawings.

Drawings

A tower drawing package will be specifically developed and packaged for each site if Mabseed is made to undertake the exercise. Primary drawings will reflect the site name and contain drawings numbers of all secondary drawings.

The key erection drawings will include, but not be limited, to the following:

1. Site Layout drawing
2. Tower site name and province/state
3. A list of all secondary drawings
4. A plan view of the tower showing climbing ladder and feed line ladder

Secondary drawings will include:

1. Foundation drawings with all necessary details shown.
2. Tower lighting kit installation. (where necessary)
3. Grounding
4. Packing list showing part numbers, sizes and weights of associated materials
5. Antenna mounting detail.
6. Installation of any miscellaneous appurtenances.
7. Electrical drawing and manuals

It the practice of Mabseed Tower that all site drawing are available on site at all times for ease of reference.

Site Civil Works

This involves all the activities pertaining to site construction quality control. Mabseed will schedule, monitor, and co-ordinate the on-site construction activities based on the construction drawings and normally acceptable engineering practices.

Site Preparation and clean up

Before commencement of any work, it is important to check for all underground utilities using the available plot plan and drawing as a reference. Should trial holes be necessary to locate underground utilities, this shall be done in a careful manner. All necessary precautions shall be taken to avoid damage, and injury to personnel.

Staking and layout

This involves the survey of site to confirm proper orientation, positioning, grade requirements, and drainage. The survey shall be performed using the survey pegs provided prior to commencement of works.

Access Roads

Access roads shall be capable of supporting tower steel delivery, concrete and construction vehicles. Care shall be taken during the construction of access roads so as not to create any abnormal alteration in the drainage that would cause excessive erosion.

Existing roads may be deemed adequate as observed and approved by the client and Mabseed.

Clear and grub

Mabseed will clear, grub, and shape the proposed area according to the design requirements maintaining a maximum distance of up to 1 meter outside the design or as specified by client.

Trees shall be cut off to existing ground level where stumping is not required. In the event that stumping is required all roots will be grubbed and removed. Where necessary or where it is deemed appropriate small trees be removed from site. Large trees shall be

pushed outside the construction and grading area, or removed to pre-designated locations.

Grading

Grading shall be according to the plot plan for dimensions and specific site requirements. Where embankments are close to the compound area, they shall be sloped to a 45-degree angle, with diversions, so that no water shall run onto the newly constructed area. The area shall be graded or shaped to avoid any standing water due to rain. During any grading activity, the site shall be left sloped to prevent standing water at the close of each day.

Fencing

Perimeter size shall be determined by the client's plot plan. The supply and installation of any fencing is dependant on the site specification and will be installed according to the manufactures specifications.

Tower Foundation Design & Installation

Tower Foundation Design:

Anchor and tower base foundation designs shall be based upon the soil characteristics and parameters listed in the site geo-technical report (soil test report). Foundation designs shall not be based upon defined parameters for "normal soil" when sub – standard soil exist at the site. However it will be assumed that all soil are normal soils, unless the client provides the necessary soil or geo-technical information.

We assume "normal" soil as being stable cohesive soils with a bearing capacity of 100-150kpa

Soil Specification:

For tower foundation designs, the specifications in the soil shall be strictly followed.

Foundation design final report

The final printed report shall be signed by a registered professional engineer. The report shall include the foundation drawings and any results of specific tests required to stabilize soil conditions necessitating a special foundation design.

Foundation Installation

Mabseed shall supply materials and labour required to develop a tower foundation. Mabseed shall verify that the foundation location stakes are correctly located as to orientation and distance in accordance with the construction drawings and site design.

The construction drawings and site design agreed by the client shall have the following information.

1. Vicinity – site map with north arrow
2. Property corners and boundary lines
3. Center of tower
4. Tower height, antenna sizes, elevation and azimuths
5. Building location in relation to the tower
6. Notes as to known special requirements of the property owners (if land is leased)
7. Other requirements as required by local ordinance.

Construction tolerance

Exposed surfaces of tower foundations shall be constructed a level within acceptable tolerances in accordance with the design elevation.

Mixing water shall be fresh potable water and shall be free of deleterious materials.

Pouring of Concrete

All concrete shall be done on site with continuous mixing concrete trucks.

Proper procedures for control of volume batching on site must be in place.

De-watering measures shall be taken in cases of very wet soil or rock in order to preclude concrete separation. Concrete shall not be poured into standing water deeper than 13mm.

Concrete which has not been placed within 1 to 11/12 hours after batching shall be rejected according to specifications for Ready Mixed Concrete where applicable.

All concrete shall be mechanically vibrated using a hand held vibrator.

To avoid segregation concrete shall not be moved laterally by means of shovels or placed in position using chutes and must not be moved laterally by means of vibration.

Proper curing of concrete should take place for at least the initial 96 hours after the completion of the pour but preferably 7 days depending on the ambient humidity. Acceptable method of curing include:

Regular spraying of water to keep the top surface moist leaving forms 1 place. Placing sand, earth, straw saw dust and keeping moist cover surface with plastic sheeting or curing paper.

Forming

All form work shall be of wood or metal. All form work shall be erected to within specified lines and grades. Sufficient bracing and/or form ties shall be installed to maintain this tolerance upon placement of concrete. Mabseed prefers the use of steel shutters as form work or plywood in order to provide a better concrete finish.

All form work shall be coated with form oil prior to concrete placement (no diesel fuel shall be used). All form work shall remain in-place for a minimum of 48 hours after concrete placement, except for the top 50mm of form work which shall be stripped after 21 hours to facilitate finishing.

Reinforcing Steel (Rebar)

All reinforcing steel shall be new, deformed billet steel conforming to design specifications.

All reinforcing steel bending procedure shall be governed by applicable provisions for Reinforced concrete, or equivalent specifications.

All reinforcing steel shall be tried in place with double tie wire "tack weld" shall not be used.

All reinforcing steel, including over lops shall be a minimum cover of 50mm top and bottom, and 50mm along the sides unless specified otherwise in the construction drawings.

Hot Weather Concreting

In the extreme northern region of Nigeria where the ambient temperature at the site exceeds, or is anticipated to exceed 32 deg. C during the first 72 hours of the day curing period, precautions shall be taken to protect the newly placed concrete from flash-set.

Concrete Finish

All concrete shall be give a broom finish at initial set, unless specified as having a smooth, troweled finish, the use of grout to attain line and/or grade shall be avoided.

Form work shall be stripped after the appropriate time and all chamfered edges shall be finished off.

All concrete work, including rebar tying, form work, concrete placement, protection and finishing, shall be subject to design specification and inspection.

Excavation and Backfill

All excavations left open overnight shall be protected. Necessary precautions shall be taken to avoid damage and injury to livestock or personnel.

All materials removed during excavation not to be used for backfill shall be graded on the site or removed as indicated on site drawings.

Backfill shall be placed as soon as the concrete has obtained adequate strength to support the backfill and not be damaged by the backfilling operation.

All backfill soil shall be suitable to meet requirements shown on the foundation design drawings, shall be clean of any trash, trees, and other organic materials. Mechanical tamping in layers not to exceed 150mm must be used to achieve good compaction. The soil to be compacted should be at optimum moisture content i.e. not too dry or saturated.

Generator base, Oil tank Base and Shelter base construction shall also follow laid down acceptable standards.

Tower or Antenna Support Structure Erection

Mabseed shall provide tower erection services and will ensure each structure be handled and installed in accordance with the key assembly drawings delivered with each unit, and in accordance with the site layout drawings.

Bolts shall be installed so that the nuts are on the outside or on top of the structure members. There shall be at least 2mm threads visible beyond all nuts.

Dissimilar metals in contact with each other shall not be used.

Towers shall meet the vertical alignment tolerance specified. In order to facilitate this the tower base legs should be properly leveled and bolted up prior to the assembly of any section above.

Ensure mast plumpness and twist is monitored and corrected as the mast is erected and not left till the end of correct. The tower should be assembled with the verticality/straightness as well as twist about the vertical axis continuously being checked and bolted up tight as the mast increases in height. The bolts should not be "torqued up" only after the tower is erected.

The leg splice joints consist of backing plate, leg angle, bosom angle, washer, and nut.

The bolts should be tightened using the "turn-of-the-nut" method or by use of load indicator washers. The turn of the nut method is summarized by:

**“nip” nut to a snug-fit with the relevant sized purger spanner
Hold bolt head and turn the nut a further
1/3 turn for bolt length of 4d
½ turn for bolt length of 4d to 8d or 200mm
2/3 turn for bolt length of 8d or 200mm**

The bolts should all be installed with one flat washer under the nut.

Once the tower has been erected and checked for plumb and straightness a non-shrink grout shall be corked in under the base plates and floated to a vertical surface in line with the edge of the base plates.

The complete base plate including the under side, the nuts and HD bolts as well as the grouted section shall be painted with water based bitumen paint.

Tower Lighting

Mabseed shall demonstrate the tower lighting system ensuring it is complete and operational where applicable.

Tower Grounding

To be installed as required by client requirements. Copper rods are at least 4ft in length and copper tape are 25mm minimum thick. If the earth resistance test conducted after initial grounding is done shows a high reading, improvement of grounding using an earth pit is done.

Torque Wrenching

All installed bolts and nuts are torqued to ensure no loose bolts.

Shelter Foundation Installation

As in tower foundation, installation of shelter foundation is done in accordance with the approved foundation design drawings.

Concrete Specification

Concrete specification as set forth in the “Tower Foundation Installation” of this statement of work shall be applicable to the shelter foundation installation.

Shelter Installation & Grounding

Shelter Installation

Each shelter shall be handled and installed in accordance with the set up instructions delivered with each unit, and in accordance with the site layout drawings.

Each feed line cable will then be cut to the appropriate length to reach radio equipment and the bottom cable end connector will then be installed on the feed line.

All feed lines will be supported at a maximum of 1 meter intervals, grounding kits will be installed at a minimum of 3 locations on the towers. All connectors will be weatherproofed. After installation and testing, all feed lines will be labeled using a marker band to allow positive identifications by radio installation/maintenance personnel.

Grounding

The top and bottom of the cable attached to the tower shall be electrically bonded to the tower with Mabseed grounding kits for lighting protection. Also, the cable run shall be bonded at midpoint if its length on the tower is greater than 60m.

Termination

All cut cables ends that are not immediately terminated shall be covered to protect them from the weather and the entry of foreign matter.

Weatherproofing

All connectors that are exposed to wind and tower vibrations (such as jumpers connecting a main feeder to an antenna) shall be protected with connector weather proofing kit.

Cable Markers

All cables shall be labeled using marker bands to allow positive identification during installation and for future use by Radio Installation Personnel.

Site Completion and Acceptance

Testing

Return Loss Tests

Sweep VSWR testing will be performed across the specified operating band for cellular antenna/transmission system. Test data containing the following information shall be provided.

1. Cable type
2. Length
3. Facing, azimuth
4. Antenna type
5. Site name
6. Maximum reading of sweep

A copy of each system VSWR and Return Loss Test will be included in the final site data package.

Acceptance Criteria

The site will have been prepared in accordance with the site layout plan including clearing, grading, grounding, access roads, electrical/telephone, fencing and graveling.

Foundation installed in accordance with design drawings.

Tower erected and plumbed in accordance with specifications.

Antenna and transmission line cable installed in accordance with Mabseed recommended practices.

VSWR and cable loss tested and recorded.

When all site work is completed a Site Completion Notice will be filled out and signed by the representative of the client and Mabseed. All test data will be compiled copied and put into folders and submitted to Buyer for their site records.

All cellular feeders shall be tested for insertion loss. Insertion loss shall met or exceed the Mabseed published specifications.

Logistics and Security

Warehousing

Mabseed shall receive the incoming materials provided under this contract at the company's warehouse staging area, and coordinate its delivery to the sites.

Security

Mabseed shall provide appropriate and applicable security through the construction and installations phase of the job except as otherwise stated by client.

As Built Documentation:

Mabseed on successful completion of project will provide As Built Documentation of all installations. In addition all manuals in respect of all supplied equipment and accessories are handed over to client.

Signed

Mabseed Nig. Ltd