Method Statement for Formwork, Reinforcement and Concrete Works

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SCOPE

This procedure is developed for the construction execution of form, reinforcement and concrete works for SMMC (Saint Martin Medical Center) main building at Saint Martin, Dutch Caribbean. The latest revision of the project specifications shall be used as references and is part of this Method Statement in the execution of work.

FABRICATION AND INSTALLATION OF FORMS:

Type of Formwork:

The timber formwork is to be used when limited reuse of formwork is required. As for requirement of maximum reuse of formwork, the steel formwork is to be used.

Formwork Design:

Both types of formwork shall be designed to meet the following requirements:

- The structure dimensions indicated in the construction drawings.
- Stability of the formwork (both vertically and laterally) in the initial position during or after concreting.
- The surface finish shall be as per the required type.
- The formwork shall allow proper concrete placement and vibration.
- The formwork shall be well tight to prevent mortar loss.
- The formwork shall withstand the pressure of the fresh concrete and, dead and live loads as well as reshoring loads in multi stories structures.
- The form shall support solidly and in accurate positions, all the embedded items placed as per construction drawings.

Ties:

Ties will be placed at such intervals that will not allow any movement or deformation of the formwork beyond the specified tolerance limits. Forms for small section elements, i.e, columns, shall be tied externally.
Through-ties shall be used for big area forms.

Coating:

Prior to concreting, the form shall be cleaned and any foreign material shall be removed. If necessary, openings shall be provided in the formwork for the removal of the foreign materials. Before placing the formwork, it will be coated with the approved release agent. The properties and coating procedure shall conform to project specifications.

Removal of Forms and Shoring:

Formwork for columns, sides of beams, walls (except for tank foundations) and other formworks not supporting the concrete weight shall be removed.

Shoring and Propping:

All shoring and propping requirements shall be submitted to client for approval.

Chamfers:

All exterior exposed corners shall be chamfered as / when indicated in the construction drawings. *An outline of the configuration of the system of form work proposed to be used is given here under.*

- It is proposed to use timber formwork for all the works. The main panel of the form will be made with 18mm laminated ply board. Lesser thickness may be used in the case of minor items. In any case, the forms will be made to withstand the pressure of concrete and also such that it is water tight.
- In panels mostly vertical will be stiffened using aluminium and/or timber beams fixed along the length and width of the planks.
- Steel soldiers may be used to hold the panels together, where the height of the form is more than 1.5M.
- External corners of the structures above ground level will be formed with 25mm chamfer.
- For vertical elements like walls etc. openings will be provided to facilitate pouring in and compacting, if required.
- Cover blocks made of same concrete mix of parent material will be used for supporting of reinforcement rebar with correct cover.
- Stripping of forms will be done very carefully so that no damage is caused to the concrete.
- Forms for columns, walls, sides of beams and other vertical forms not supporting the weight of concrete will be stripped after 48 hours after placing of concrete.
- Forms for beam soffits, slabs, and other parts requiring support will be removed as per specified standards.
- The quality assurance for formwork will be followed as per approved inspection and test plan.

REINFORCEMENT:

The reinforcing steel should be conforming to project specification and as per drawings.

Handling and stacking:

- Number and spacing of supports will be such that there is no sagging of the stacked bars.
- Stacked rebar will be covered with tarpaulins or such other means and protected from mud, oil or any other thing that causes damage.
- Standards as set out in the project specifications will be adhered to in handling and storage of reinforcing materials.
- Rebar will be fabricated according to the bar bending schedule supplied by the Contractor.
- Each bundle of bars will be tagged to be identified by the design drawing number, the structure, mark number, bar quantity and size.

Cutting and Bending of Bars:

The reinforcement will be cut and bent in accordance with the approved bar bending schedules. The bending of reinforcements will be done on the bending machine, producing a gradual and even motion. Bars will be bent cold and at specified radii.

Receipt and Storage of Bars:

- The rebar received from the supplier will be inspected. All defective materials will be repaired or replaced by the supplier.
- The storage of rebar will be arranged above ground on padded supports, using timber pieces or sand bags. The rebar will be covered with dark light proof material to prevent rusting.

Placing of Reinforcement:

- Minimum concrete cover for reinforcement shall be as per the Reinforced Concrete Works General Notes.
- All reinforcement shall be supported and fastened before concrete is placed and shall be secured against displacement within permitted tolerances.
- Reinforcement supported by formwork shall rest on bar supports made of plastic or other acceptable materials.
- All splices will be provided as indicated in the approved for construction drawings.
- Bending or straightening of bars partially embedded in concrete will not be permitted without prior approval of the Owner.
- RFI will be issued in accordance to site inspection procedure.
- The reinforcement at obstructions or where it clashes with another reinforcement will not be cut, bent, omitted or modified without prior approval from the Owner.
- The welding of reinforcement will not be permitted.

Fixing of Reinforcement:

- The reinforcement will be accurately fixed in the required position. The bars intended to be on contact at passing points will be securely tied together at all such points with tying wire.
- After fixing, the reinforcement will be inspected for type, size, and accuracy of placing. The areas where the coating will be found to be damaged it will be repaired as per approved method statement.
- The reinforcement projecting out from work being concreted or already concreted will not be bent out of its correct position. It will be protected from deformations or other damages.
- The cover to reinforcement will be maintained by using either plastic spacers or concrete blocks.
- Cantilever and top bars over supports will be held in correct position during concreting with the help of rebar chairs placed between top and bottom bars and approved spacers below the bottom bars.

Quality Control:

The reinforcement will be inspected before concreting. It will be ensured that the surface of reinforcement will be free from mud, oil, retarders, grease or any other substance which would affect adversely the steel or concrete chemically or reduce the bond. Also it will be ensured that it is placed in full accordance to the issued for construction drawings.

EMBEDDED ITEMS:

- All the embedded items will be fabricated or procured prior to concreting and fixed in place using suitable templates.
- Suitable templates will be designed for the positioning and fixing of the embedded items. Templates as supplied by the Contractor will be used in case of foundations for large Skirt Mounted Vessels.
- The adequacy and positioning will be checked by the supervisor before submitting a Request For Inspection to the PMT's (Project Management Team) QC. The QC will check them in turn before forwarding this request to the QC of the Contractor. This procedure ensures the right kind of embedded items are in right place and in right quantities.
- Anchor bolts will be placed plumb well within the tolerances mentioned in project specifications.

CONCRETING:

Transportation of Concrete:

Out of the available transit mixer trucks, at least one will be kept as stand by. Before the departure of the loaded transit mixer, the delivery ticket will be handed over to the driver.

Delivery of Concrete:

- Before discharging the concrete at the point of delivery, the driver will provide the Material Engineer or Quality Control Engineer the delivery ticket identifying the material for each batch of concrete.
- The concrete will be conveyed to the place of placing in the following manner:
    - Metallic or Metal-lined chutes
    - Concrete Pump: The concrete pump will be of adequate pumping capacity. Wherever required, the concrete will be pumped through steel pipes.
    - Concrete Bucket: Metallic concrete buckets with bottom opening will also be used. It will be carried to place of pouring by a crane.

Deposition of Concrete:

- The concrete will be deposited continuously or in layers of such thickness so that cold joints are not formed. The concrete, which has partially hardened, will not be deposited. Suitable construction joints will be provided to avoid formation of cold joints.
- After placing, the concrete will be consolidated by using mechanical or electrical vibrators, which will be operated by competent workmen. Use of vibrators to transport concrete within the formwork will not be allowed.

Protection of Fresh Concrete:

Unless adequate protection is provided, concrete will not be placed during rain.

Curing of Concrete:

Immediately after placement, concrete will be protected from premature drying and excessively hot temperatures and will be maintained with minimum moisture loss at relatively constant temperature for a period necessary for the hydration of the cement and hardening of the concrete.
The curing of concrete will be carried out by one of the following procedures:

1. Pouring or continuous sprinkling of water.
2. Application of hessian kept continuously wet and covered with white polyethylene sheet.
3. Application of sand kept continuously wet.
4. Application of waterproof sheet material subject to approval by Client.
5. Application of curing compound subject to approval by Client.

The system to be used will depend on the nature of the structure. The above methods (1), (2) and (5) will be the mostly used.
Moisture loss from surfaces placed against wooden forms or steel forms, exposed to heating by sun, will be minimised by draping forms with wet hessian covered with white polyethylene until they can be safely removed. After forms are removed, the concrete will be cured up to the end of prescribed period.

Quality Control:

- The workability of the concrete will be continuously monitored at delivery place before casting.
- Samples for conducting tests for determining the compressive strength on concrete will be taken according to the specifications.
- Concreting will be carried out using the approved design mixes and that specified for the structure. The concrete from approved sources only will be used for all concreting works.
- All rebar and forms will be cleaned of debris and foreign materials before pouring.
- It will be ensured that the temperature of concrete at the time of placing does not exceed more than 30° C.
- The concrete pouring will be done within the initial setting time of the cement. For the purpose of this, the time of batching as marked on the delivery sheet will be considered.
- During hot weather, reinforcement temperature will be reduced by shading, water pray before pouring as well as additional crew wi II be engaged to expedite the finishing etc. However preference for night pouring of concrete will be given.
- The concrete will then be poured into the mould I form after ensuring that it is free of all foreign materials or debris; the inserts are in place; the re-bars are as per the drawings and all other QC requirements are complied with.
- The concrete surfaces will be rendered appropriate finish to eliminate all voids and pits unless specified otherwise in the drawings.
- The concrete will be laid in layers not exceeding 300mm in thickness; each layer compacted separately before the next is laid.
- At least two vibrators of needle type will be made available at the site, where one of them acts as a stand-by.
- In case of mass pouring, the concreting will be done uninterrupted so that cold joints can be avoided. However, in case of slabs/ paving appropriate pre-approved construction joints will be provided. For the mass concrete pouring, specific method statement will be submitted.
- Concrete surface will be finished as per specifications within the initial setting time of concrete. Immediately after finishing surface shall be covered with white polyethylene sheeting which shall be in contact with concrete surfaces to avoid evaporation of moisture content from fresh concrete.
- Control joints, if any, will be cut within 12 hours after placing of concrete.

TESTING OF CONCRETE:

A third party laboratory as approved by the Contractor will be appointed to carry out tests on concrete as may be applicable as per project specification.

- Temperature, slump, unit weight and air content of fresh concrete shall be measured at the point of pour, prior to placement in forms. Concrete not conforming to the requirements of the specification shall be rejected. Test sample cylinders will be collected in accordance with project specifications.
- Temperature of fresh concrete will be recorded in accordance with specification requirement. Test Cylinders will be dated and numbered consecutively. Each cylinder of each set will also be given an identifying tag (A, B, C, D).

SAFETY PLAN:

Safety of men and materials is a high priority for Client. All safety measures will be observed during the entire works. Detailed safety measures for every works will be elaborated in the concerned RAMS being submitted to HSE department, however basic account of the safety strategy is given under:

- All the activities will be envisaged a week in advance and job safety requirements will be worked out by analyzing the likely hazards and resorting to preventive.
- Proper house keeping at the end of the day is a part of the mandatory tasks assigned to workers to avoid accidents due to littered tools and materials.
- Flagmen will be engaged to control the movement of trailers, cranes, pumps and other mobile equipments.
- Weekly tool box talk will be conducted and brief safety measures required for the ensuing days will be discussed.
- First aid facility will be available entire the period in the work site.