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## TERMS OF REFERENCE

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### RESPONSIBILITIES OF THE CONSULTANT FOR CONSTRUCTION SUPERVISION WORK

#### ARTICLE 1

The Consultant agrees to provide the services specified under article 2 for the..... on the project of rehousing upgrading of..... located in.....

The Consultant will report directly to the client.

#### ARTICLE 2

##### CONSTRUCTION SUPERVISION

##### SERVICES

The Consultant will provide technical assistance and Approval of the schedule of construction activities proposed by the Contractor and report to the client.

The Consultant will check and approve the quality of construction materials before the contractor supply

The Consultant will follow-up the quantity of construction materials supplied by the contractor and those remaining in the stock.

The Consultant will supervise all the construction activities, approve the work done, and make sure that all construction works are being done according to the rules of the art and also respecting the approved construction drawings and designs.

The Consultant shall promptly advise on any known or discovered error, omission, or other defect in the plans, drawings, and specifications.

The consultant will assist and provide technical advisory on changes in design or related works, as per the request of the client.

The consultant will work closely with..... which will provide technical support in RLB construction technology to the Consultant according to the MoU between the ..... and .....

The consultant will submit a monthly progress report to the client.

##### CONSULTANT JOB DESCRIPTION

- Oversee, review and make sure that all construction activities are being done in good working conditions and feedback of project client.
- Will make sure that All exchanges, recommendations, approval and communication at the site are written in the site commutation notebook, through e-mail or letter
- Will ensure best efforts to minimize construction cost by reviewing Bill of Quantities according to best practices in constructing rowlock technology.
- Prevents fines and interruptions by complying with, and enforcing, codes.
- Will follow up and remind the contractor about safety and health on the construction site
- Will follow up safety and healthy work environment by following and enforcing standards and procedures; complying with legal regulations.
- Approve the work done by the contractor.
- Enhances organization reputation by accepting ownership for accomplishing new and different requests; exploring opportunities to add value to job accomplishments.

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## ARTICLE 3

### Construction Checklist for supervision of Construction works Using Rowlock Bond technology

#### 0. Introduction

This construction checklist is a comprehensive step by step practical guide for construction Inspectors and supervisors on how to build a multi-story building using the Rowlock Bond (RLB).

The checklist is presented in section that cover key steps of construction of the RLB wall, site communication, health and labor protection. It has a comprehensive quality control checklist that the construction Inspector and supervisor should use to verify and satisfy that construction works have been done to set standards. The main construction stages for building RLB wall are briefly covered in this document.

#### I. Communication at the site

All exchanges, recommendations, approval and communication at the site are written in the site commutation notebook, through e-mail or letter.

#### II. Construction quality control checklist

The need for quality control in building construction cannot be over-emphasized. This protocol summarizes key quality control checklist to be enforced by the construction Inspector and supervisor during the entire construction process.

#### III. Safety and Health on construction site

“Accidents do not just happen, they are caused to happen”.

The main reasons for construction related accidents are carelessness, technical faults, in appropriate use of tools, abuse of alcohol, and most important no proper awareness about potential sources of accidents. Knowing the sources of potential and predictable accidents means that we can prevent them. It is the duty of an Inspector or supervisor to know the potential sources of accidents and to prevent them as far as possible. Safety on a construction site is also every individual's concern, and everyone must do everything possible to prevent accidents from happening.

##### A. For safety purpose the site should be:

#### 1. Tidy and safe

- ~ Site walkways free from an obstacles
- ~ Fill or protected holes and trenches where an unsuspecting person can fall in
- ~ Avoid to store materials poorly or stack to unsafe heights where they can collapse on workers.
- ~ Scaffolding and Ladders should be strong and stable

#### 2. Workers welfare and safe working conditions.

#### 3. Use of fair construction equipment's.

#### 4. Control all electrical equipment

#### 5. Always check the stability and safety of the formwork before pouring of concrete

#### 6. Combustible materials such as petrol and paints must be stored separately from materials such as timber in case of an accidental fire.

#### 7. Bricks and blocks should not be piled up to heights exceeding 1 meter

#### 8. Fire extinguishers should be placed in strategic places near the storage facilities.

#### 9. Workers welfare and safe working conditions

Every worker on a building site must wear protective clothing.  
The mandatory safety clothing every worker on site should wear is as illustrated below:



#### B. Cleanliness, health, hygiene and rest place

Cleanliness on a construction site will help in eliminating potential causes of accidents and contributing to the general hygiene and health of workers.

Some of the basic health and hygiene requirements on a construction site are:

- Provision of clean toilets separate for both male and female
- Provision of washing hands facilities
- Provision of a safe, sheltered place from rain and sun for resting during lunch breaks
- Provision of safe and clean drinking water

#### C. First Aid

Every site must have a first aid box with the basic first aid medicine and items and there should be at least one person on site trained in the administration of first aid.



A Basic First Aid Box

#### IV. Construction quality control checklist for Inspectors and supervisor

##### Introduction

A construction quality control checklist is an important monitoring tool that is used by an Inspector or supervisor to check crucial construction stages, ensuring that the building is built in accordance to structural and architectural design specifications.

The checklist must be used and filled on a daily basis for the supervisor or every time the Inspector visits the site, or when crucial activities such as pouring of concrete are taking place.

##### Construction control checklist

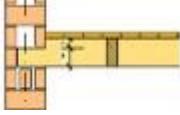
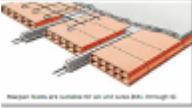
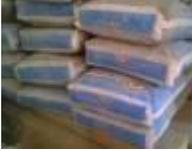
Name of Supervisor or Inspector:	Date of inspection:
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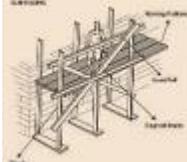
No	Construction Stage	What to check	Illustration	Observations	Recommendations
1	General checking of the Drawing at the site and Construction permit	<ul style="list-style-type: none"> <li>Regular checking of the drawings at the site if are always similar to the drawing submitted for the construction permit</li> </ul>			
2	General checking of the house	<ul style="list-style-type: none"> <li>Regular checking of the house measurement, verticality and levels</li> </ul>			
3	Concrete preparation & pouring.	<ul style="list-style-type: none"> <li>Concrete mixing especially for columns, main beams, shear walls, sub columns and foundation footings is done using a concrete mixer. It is mandatory.</li> <li>Mortar mixing is done on a clean base.</li> <li>A bucket or a batch box is used for measuring cement, sand and gravel, not wheelbarrow.</li> <li>For manual mixing, the ingredients are mixed dry until a uniform color is achieved.</li> <li>Concrete is made in small quantities that can be poured within less than 40minutes.</li> <li>The poured concrete is protected from evaporation or damage by rain water.</li> <li>The concrete is cured for a minimum of 14days.</li> </ul>			
4	Making reinforcement cage for the ground/tie beam.	<ul style="list-style-type: none"> <li>Use the bar sizes as specified.</li> <li>Where bars overlap, ensure the minimum overlap specified is maintained.</li> <li>The stirrups should be spaced at specified spacing.</li> <li>The stirrup hocks are bent inside at 45°, and a minimum of 50mm.</li> <li>Stirrups alternated forming a spiral.</li> </ul>			

5	Making concrete spacers.	<ul style="list-style-type: none"> <li>• Concrete spacers are made 7-days ahead of concrete pouring.</li> <li>• A cement/sand mix of 1:2 is used.</li> </ul>			
6	Making form work.	<p>Is the formwork:</p> <ul style="list-style-type: none"> <li>• Made from straight timber?</li> <li>• Reinforced with 2"x1" on the sides and top every 600mm or 2ft.</li> </ul>			
7	Making Masonry form work.	<ul style="list-style-type: none"> <li>• A constructed wall of 1.30m of height (12 layers of bricks) which have the form work masonry for the columns in the middle and the columns in the corners.</li> <li>• When constructing the formwork masonry, you always do horizontal reinforcement as required on drawing with manual vibration</li> <li>• After the construction of the formwork masonry, you have to wait 5 days before pouring concrete for columns so that the wall can be strong enough to support vibrated concrete.</li> <li>• Before pouring, you have to make sure that the bottom of that column is clear and clean so that the link between old concrete and the new one be done as required.</li> </ul>	    		
8	Placing concrete spacers.	<p>The concrete spacers are placed before concrete pouring and placed:</p> <ul style="list-style-type: none"> <li>• At bottom of the formwork.</li> <li>• On both sides of the reinforcement cage in case of a beam.</li> <li>• On all sides of the reinforcement cage in case of the columns.</li> <li>• Are spaced at 600mm (2ft) c/c.</li> </ul>			
9	Concrete pouring.	<p>When pouring concrete, check the following:</p> <ul style="list-style-type: none"> <li>• Formwork is watered.</li> <li>• Concrete is vibrated either manually or mechanically.</li> <li>• Every concrete have to be poured after verification and approval from supervising team.</li> <li>• For concrete pouring when the form work is done in masonry, you have to keep always the vibrator inside stirrups to avoid direct contact of the vibrator and the wall.</li> </ul>	  		
10	Placing the DPC.	<p>The DPC should be placed:</p> <ul style="list-style-type: none"> <li>• At 150mm (6") minimum above the ground level.</li> <li>• The top of the foundation wall/tie beam is well leveled.</li> </ul>			

		<ul style="list-style-type: none"> <li>• Approved DPC material is used.</li> </ul>			
11	Setting out the first two courses.	<ul style="list-style-type: none"> <li>• First dry-stacking the first 2-courses of brick work.</li> </ul>			
12	Bricks selection.	<ul style="list-style-type: none"> <li>• Only bricks without surface defects should be used.</li> <li>• Cracked bricks are not used.</li> </ul>			
13	Bricklaying with mortar.	<ul style="list-style-type: none"> <li>• The bricks are soaked in water before laying them.</li> <li>• Both vertical and bed joints are maintained at 10mm.</li> <li>• The joints are fully filled with mortar.</li> <li>• The bricks are kept clean.</li> <li>• Regular checking of the mixing ration both mortar and concrete as detailed in the technical specification</li> <li>• Regular checking of the wall corners squareness</li> <li>• Use of small thin white rope on both side of the wall for wall alignment</li> <li>• The gap between constructed blocks and block E have to be maintained and avoid mortar to fall in by using a wooden plank</li> <li>• The maximum brick wall height per day should not exceed more than 9 layers.</li> <li>• A brick wall needs to be cured for at least 7 days (Several times a day, water needs to be poured over the brick wall).</li> <li>• The maximum brick wall height per day should not exceed more than 9 layers.</li> <li>• To use adequate water in the mix to avoid the mortar to dirty the brick wall.</li> <li>• The brick wall have to be clean.</li> <li>• Where the wall will not come up (elevated) at the same time, bricks wall have to be elevated in steps.</li> </ul>			
14	Corner details.	<ul style="list-style-type: none"> <li>• Verify the accurate positioning of reinforcement bars.</li> <li>• Concrete is poured after every 12-courses of bricklaying, the following 3day when the bricks have reasonably set.</li> <li>• Position and size of reinforcement bars have to be checked</li> </ul>			
15	Wall intersection details.	<ul style="list-style-type: none"> <li>• Verify the accurate positioning of reinforcement bars.</li> <li>• Concrete pouring after every 3-courses of bricklaying, the following day when the bricks have reasonably set.</li> </ul>			
16	Hidden beam details.	<ul style="list-style-type: none"> <li>• The cavity in the last course is sealed with bricks of lower quality.</li> </ul>			

	(Test if concrete has been poured by driving a nail in various locations around the concealed beam.)	<ul style="list-style-type: none"> <li>• Bricks are laid on the next course to form a U-section that will form the concealed beam.</li> <li>• Placing reinforcing bars in the cavity as specified.</li> <li>• Pouring concrete inside the cavity.</li> <li>• Concrete pouring after every 12-courses of bricklaying, the following day when the bricks have reasonably set.</li> </ul>			
17	Hidden column details.	<p>The hidden column is achieved by:</p> <ul style="list-style-type: none"> <li>• Erecting the reinforcing bars right from the foundations.</li> <li>• Building brick work around the column</li> <li>• Pouring concrete on every 12-course.</li> <li>• L shape corner brick formwork should be constructed with much attention by respecting the joints size (horizontal and vertical) and filling them correctly.</li> <li>• Use the cement bags paper to fill the column concrete space to brock mortar to fall in.</li> <li>• Use Regular tape meter, plumb bob, hose pipe level and water level</li> <li>• Use metal stick to check mortar in the brick column formwork prior to the concreting and open the bottom brick to removal mortar in case it is found. The removed brick have to be fixed back and support it for immediate concrete pouring.</li> <li>• The corner columns have to be built in advance meaning twelve layers in two days and then built the mid part while waiting for the corner brick formwork to set.</li> <li>• The concrete of the L shape reinforcement for the no bearing wall sides should be concreted at every three layers as detailed on drawings and by letting the roughed end for column concrete connection.</li> </ul>			
18	Fixing doors & window frames.	<ul style="list-style-type: none"> <li>• Door and window frames are positioned next to a hidden column.</li> <li>• The metal brackets that connect the frames to the wall are well connected with the hidden column reinforcement.</li> </ul>			
19	Plumbing/drainage works.	<ul style="list-style-type: none"> <li>• The plumber is engaged at an early stage to fix pipe work.</li> <li>• Plumbing pipes have to be check and tested before being covered</li> </ul>			
20	Placing electrical conduits.	<ul style="list-style-type: none"> <li>• The electrician is engaged at an early stage to fix electrical conduits.</li> </ul>			

		<ul style="list-style-type: none"> <li>• Check all electrical and plumbing reservation devices (switches, sockets, lamps, toilet)</li> <li>• Reservation pipes for electrical cables have to be installation as the wall goes up</li> </ul>			
21	Fixing wooden floors.	The floor beams/joists are well anchored inside the wall without exposing them outside.			
22	Fixing concrete/Maxspan floors.	<ul style="list-style-type: none"> <li>• Reinforcement details should be respected</li> <li>• Correct spacing of the U or T-beams.</li> <li>• Maxspan blocks are tightly packed.</li> <li>• Concrete poured is evenly spread.</li> <li>• The concreting and finishing of floor have to be done at once</li> </ul>			
B	Materials quality	What to check	Illustration	Observation	Quality
1	Cement	<ul style="list-style-type: none"> <li>• The quality of all supplied materials (sand, steel bars,.....) must be approved for use after checking</li> <li>• Cement is fresh, well stored and protected from absorbing moisture.</li> </ul>			
2	Sand	Evenly graded with clay content less than 10%.			
3	Gravel	Specified size, free from clay and dust <10%.			
4	Steel	Specified size and free from rust.			
5	Bricks	<p>Regular checking of brick quality to be free from defects with good surface finish and a compression strength more or equal that 10Mpa (To be specified in the design)</p> <ul style="list-style-type: none"> <li>~ Face and color</li> <li>~ Shape and Size</li> <li>~ Well fired</li> </ul>			
6	Timber	Free from warps & twists and is well seasoned and stored.			
C	Health and Safety on site	What to check	Illustration	Observation	Quality

1	Worker's welfare	<p>Protective clothing &amp; First aid:</p> <ul style="list-style-type: none"> <li>• Are workers wearing protective clothing such as helmets?</li> <li>• Labor insurance</li> <li>• Is there an equipped First Aid?</li> <li>• Drinking water for labor</li> <li>• Toilet</li> </ul>			
2	Site tidiness	<p>Safe working conditions:</p> <ul style="list-style-type: none"> <li>• Clear walkways with no obstacles.</li> <li>• No timber with nails is found on walkways.</li> <li>• Materials are stored in an orderly and strategic manner.</li> </ul>			
3	Safe equipment	<p>Safe ladders and scaffolds:</p> <ul style="list-style-type: none"> <li>• Are the ladders and scaffolding used safe or do they pose danger to workers?</li> </ul>			
4	Materials storage	<p>Safe storage:</p> <ul style="list-style-type: none"> <li>• Are materials such as cement stored in a protected environment?</li> <li>• Are bricks and timber and steel bars stored stacked up at safe heights?</li> </ul>			