Nepal Housing Reconstruction Programme

MODEL HOLLOW CONCRETE BLOCK BUILDING DESIGN

Submitted By

September, 2016
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: ELEVATIONS

SCALE: 1:50
DATE: AUG 15, 2016
DESIGNED BY: BUILD CHANGE
GENERAL NOTES
I. GENERAL
A. THE DESIGN OF THIS HOUSE IS BASED ON THE REQUIREMENTS OF NEPAL NATIONAL BUILDING CODE AND INDIAN STANDARD CODES.
B. THE BUILDER IS RESPONSIBLE FOR COORDINATING THE WORK OF ALL WORKERS AND FOR CHECKING DIMENSIONS. NOTIFY THE ENGINEER OF ANY DISCREPANCIES AND RESOLVE BEFORE PROCEEDING WITH THE WORK.
C. THE BUILDER SHALL PROVIDE MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES INCLUDE, BUT MAY NOT BE LIMITED TO, BRACING AND SHORING FOR LOADS DURING CONSTRUCTION.
D. THE BUILDER AND HOMEOWNER SHALL REPORT TO THE ENGINEER ANY CONDITIONS ON SITE THAT CONFLICT WITH THE DRAWINGS.
E. THE BUILDER SHALL ASSURE THAT SITE SAFETY IS RESPECTED TO PREVENT INJURY OF PERSONS ON SITE OR ANY DAMAGE.

II. FOUNDATIONS
A. SITE PREPARATION AND FOUNDATION WORK SHALL CONFORM TO THE FOLLOWING:
1. CLEAR THE SITE OF ORGANIC MATERIAL PRIOR TO LEVELING THE SOIL.
2. NO ROCK OR SIMILAR IRREDUCIBLE MATERIAL WITH A MAXIMUM DIMENSION GREATER THAN 20CM SHALL BE PLACED IN FILLS.
3. ALL FILLS SHALL BE COMPACTED IN LIFTS NOT EXCEEDING 20CM IN THICKNESS TO A MINIMUM OF 95 PERCENT OF MAXIMUM DRY DENSITY.
4. LAYOUT THE FOUNDATION GEOMETRY AND LOCATION USING NYLON STRING AND STAKES.
B. FOUNDATION TRENCHES SHALL BE CONSTRUCTED WITH THE FOLLOWING REQUIREMENTS:
C. MARK THE FOUNDATION TRENCH LOCATIONS WITH CHALK OR STRING LINE ACCORDING TO THE DIMENSIONS SHOWN ON PLAN. LINES SHALL BE AT RIGHT ANGLES.
D. THE BOTTOM OF THE TRENCH MUST BE LEVEL, CLEAN AND FREE OF LOOSE SOIL.
E. IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER REMOVED.

III. FORMWORK
A. FORMWORK SHALL BE OF GOOD QUALITY, STRAIGHT AND UNWARPED.
B. FORMWORK BELOW SLABS SHALL CONSIST OF ¾” PLYWOOD MINIMUM. THE PANELS SHALL BE SUPPORTED BELOW BY 2X4 WOOD BEAMS SPACED AT 1 METER MAXIMUM. SUPPORT EACH WOOD BEAM WITH METAL POSTS, 2X4 WOOD POSTS OR 6CM MINIMUM DIAMETER WOOD LOGS AT 1 METER MAXIMUM SPACING. PROVIDE SHIMS AT THE POST BASES AS REQUIRED FOR STABILITY.
C. FORMS SHALL BE SUBSTANTIAL AND SUFFICIENTLY TIGHT TO PREVENT LEAKAGE OF CEMENT PASTE.
D. FORMS SHALL BE PROPERLY BRACED OR TIED TOGETHER TO MAINTAIN POSITION AND SHAPE.
E. IMMEDIATELY BEFORE NEW CONCRETE IS PLACED, ALL CONSTRUCTION JOINTS SHALL BE WETTED AND STANDING WATER REMOVED.

IV. REINFORCING STEEL
A. REINFORCEMENT SHALL BE DEFORMED REINFORCEMENT.
B. REINFORCING TO HAVE A MINIMUM STRENGTH OF 415 MPa.
C. BARS INDICATED IN THE DRAWINGS SHALL CONFORM TO THE FOLLOWING MINIMUM DIMENSIONS:

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>DIA (MM)</th>
<th>CHAIN LENGTH</th>
<th>LAP LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø6MM</td>
<td>8.0MM</td>
<td>300MM</td>
<td></td>
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<tr>
<td>Ø10MM</td>
<td>10.0MM</td>
<td>400MM</td>
<td></td>
</tr>
<tr>
<td>Ø12MM</td>
<td>12.0MM</td>
<td>500MM</td>
<td></td>
</tr>
<tr>
<td>Ø16MM</td>
<td>16.0MM</td>
<td>650MM</td>
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</tbody>
</table>
D. STEEL SHALL BE RUST FREE. CONCRETE FROM PREVIOUS POURS SHALL BE REMOVED WITH A WIRE BRUSH PRIOR TO POURING CONCRETE.
E. TERMINATE REINFORCING STEEL IN STANDARD HOOKS, UNLESS OTHERWISE SHOWN.
F. PROVIDE REINFORCING SHOWN OR NOTED CONTINUOUS IN LENGTHS AS LONG AS PRACTICABLE.
G. PROVIDE MEASURES NECESSARY TO STABILIZE REINFORCING ASSEMBLIES PRIOR TO PLACING CONCRETE.

V. CAST-IN-PLACE CONCRETE, MORTAR AND CEMENT PLASTER
A. THE DESIGN IS BASED ON CONCRETE COMPRESSIVE STRENGTH, FC, AT 28 DAYS TO BE 20 MPa (M20), MINIMUM FOR ALL STRUCTURAL MEMBERS. THE PLAIN CEMENT CONCRETE (PCC) ABOVE THE SOLING AT THE GROUND FLOOR WILL HAVE FC, AT 28 DAYS TO BE 15 MPa (M15), MINIMUM.
B. CEMENT: PORTLAND CEMENT, TYPE 1, DRY AND UNOPENED BAGS.
C. SAND: BLACK SAND, CLEAN AND WASHED. FINE FOR CEMENT PLASTER AND MORTAR, COARSE FOR CONCRETE.
D. AGGREGATE: CRUSHED, ANGULAR GRAVEL LESS THAN 2CM IN SIZE FOR CONCRETE.
E. WATER: CLEAN, NOT SALTY OR MUDDY.
GENERAL NOTES

F. CONCRETE SPACERS SHALL BE PLACED AT 0.8M ON CENTER MAXIMUM AND SECURED WITH BINDING WIRE TO THE REINFORCING BARS PRIOR TO PLACING CONCRETE IN ACCORDANCE WITH THE FOLLOWING, UNLESS OTHERWISE NOTED IN THE DRAWINGS:

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>SPACER LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>BELOW AND AT SIDES OF FOUNDATION REINFORCEMENT</td>
<td>75 MM</td>
</tr>
<tr>
<td>SIDES OF COLUMNS</td>
<td>25 MM</td>
</tr>
<tr>
<td>BETWEEN TIE REINFORCING AND MASONRY WALLS</td>
<td>25 MM</td>
</tr>
<tr>
<td>SIDES OF BEAM AND BELOW SLAB REINFORCEMENT</td>
<td>20 MM</td>
</tr>
</tbody>
</table>

DESIGNED BY:

DRAWING TITLE:

MODEL HOLLOW CONCRETE BLOCK

DATE: SEPT, 2016

Nepal Housing Reconstruction Programme

GENERAL NOTES

G. MIX DESIGN PROPORTIONS SHALL BE AS FOLLOWS:

<table>
<thead>
<tr>
<th>USE</th>
<th>CEMENT</th>
<th>SAND</th>
<th>AGGREGATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>M15 CONCRETE</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>M20 CONCRETE</td>
<td>1</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>MORTAR</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>GROUT</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>PLASTER</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

H. PROPORTION, MIX, TRANSPORT AND PLACE CAST-IN-PLACE CONCRETE AS NOTED BELOW:
1. MIX ON A CLEAN CONCRETE OR ASPHALT SURFACE, NOT ON SOIL.
2. MIX DRY UNTIL MATERIALS REACH A CONSISTENT COLOR, THEN ADD WATER.
3. ADD WATER ONLY AS NEEDED TO REACH DESIRED CONSISTENCY, NOT EXCEEDING THE AMOUNT NOTED IN THE MIX DESIGN PROPORTIONS BELOW.
4. CONSISTENCY SHALL RESULT IN SLUMP OF 5CM TO 10CM, OR A HAND TEST THAT RESULTS IN NO WATER SPOILING OUT WHEN CONCRETE IS HELD TIGHTLY IN THE HAND, BUT THE CONCRETE DOES NOT HOLD ITS FORM WHEN RELEASED.

I. AT LOCATIONS WHERE BLOCKS OR NEW CONCRETE WILL BE PLACED ABOVE CONCRETE, SCRAPE THE SURFACE AT ALL INTERFACES AFTER CASTING TO CREATE A ROUGHENED SURFACE.

J. AT LOCATIONS WHERE CONCRETE IS CAST OR CEMENT PLASTER APPLIED AGAINST MASONRY, WET SURFACES PRIOR TO PLACEMENT AND CLEAN OF LAITANCE, FOREIGN MATTER, AND LOOSE PARTICLES WITH A WIRE BRUSH OR BY CHIPPING.

K. WET FORMWORK AND STEEL PRIOR TO PLACING CONCRETE.

L. PLACE CONCRETE WITHIN 60 MINUTES AFTER MIXING. WITH THE EXCEPTION OF COLUMNS WHICH CAN HAVE COLD JOINTS AT THE SILL AND LINTEL BEAM LEVEL, PLACE AN ENTIRE ELEMENT (I.E. BEAM) WITHIN ONE DAY.

M. USE A VIBRATOR OR HAMMER AND ROD TO CONSOLIDATE CONCRETE AROUND REINFORCING.

N. AFTER REMOVING FORMS, CURE THE CONCRETE BY WETTING FIVE TIMES PER DAY FOR THREE DAYS MINIMUM.

O. CHIP OUT CONCRETE FOR THE ENTIRE ELEMENT AND REPUR ALL CONCRETE ELEMENTS THAT CONTAIN ANY OF THE FOLLOWING: EXPOSED STEEL REINFORCING, CRACKS LARGER THAN 3MM, NUMEROUS CRACKS IN A LOCALIZED AREA, OR DIAGONAL OR VERTICAL CRACKS IN A BEAM.

VI. CONCRETE MASONRY

A. THE PURCHASE OF GOOD QUALITY BLOCKS IS THE HOMEOWNERS RESPONSIBILITY. PRIOR TO THE PURCHASE OF CONCRETE HOLLOW BLOCKS, THE HOMEOWNER SHALL CONFIRM VIA TESTING, THE QUALITY OF THE BLOCKS MADE BY THE PROPOSED PRODUCER WHO WILL SUPPLY BLOCKS FOR THE HOUSE CONSTRUCTION. IN CASE PROPER TESTING FACILITIES ARE UNAVAILABLE, HOMEOWNER WILL CONDUCT A DROP TEST TO CONFIRM QUALITY OF BLOCKS.

B. THE DESIGNS ARE BASED ON BLOCKS WITH A MINIMUM GROSS COMPRESSION STRENGTH OF 5 MPa AND OVERALL DIMENSIONS OF 15MMx20MMx40MM AND WITH TWO CELLS.

C. IT IS RECOMMENDED TO PROVIDE CEMENT PLASTER FINISH TO ALL MASONRY WALLS. PLASTER TO BE AT LEAST 15MM THICK AND APPLIED AT EACH SIDE OF THE WALL, UNLESS OTHERWISE NOTED.

D. THE VERTICAL AND HORIZONTAL JOINT THICKNESS SHALL BE BETWEEN 10MM MINIMUM AND 20MM MAXIMUM.

E. USE A MINIMUM OF 1/2 BLOCK LENGTH BONDING.

F. MORTAR AND GROUT: FIRST MIX SAND AND CEMENT AND THEN ADD WATER. USE WITHIN 30 MINUTES OF MIXING OR DISCARD.

G. WET BLOCKS WITH CLEAN WATER PRIOR TO PLACING.

H. DO NOT USE DAMAGED BLOCKS. IF USING PARTIAL BLOCKS, USE AT LEAST 1/2 OF BLOCK.

J. PLACE BLOCKS SO THAT THE UPPER FACE IS LEVEL BEFORE PLACING MORTAR OR GROUT.

K. WHERE BARS ARE PLACED WITHIN THE BLOCKS:
   1. CENTER THE VERTICAL REINFORCING IN THE WALL, UNLESS OTHERWISE NOTED.
   2. VERTICALLY ALIGN THE BLOCK CELLS.
   3. FILL ALL CELLS WITH GROUT.
   4. CLEAN THE CELLS OF MORTAR AND DEBRIS PRIOR TO PLACING THE GROUT.
   5. BARS IN THE FOUNDATION SHOULD CORRESPOND WITH THE SIZE AND LOCATIONS OF THE WALL REINFORCING WITHIN THE BLOCKS.

L. CURE THE WALL BY LIGHTLY WETTING 3 TIMES PER DAY FOR 3 DAYS.

M. THE CONFIGURATION AND DISTANCE BETWEEN WALLS SHOULD BE MODIFIED TO INCORPORATE THE MODULAR DESIGN BASED ON THE SIZE OF THE CONCRETE HOLLOW BLOCKS.

N. THE CONCRETING OF THE TIE COLUMNS AT EACH FLOOR HEIGHT TO BE DONE IN THREE PHASES AFTER THE MASONRY WALL IS COMPLETE TO THAT LEVEL:
   1. FROM FLOOR TO SILL LEVEL.
   2. FROM SILL LEVEL TO LINTEL LEVEL.
   3. FROM LINTEL LEVEL TO THE NEXT FLOOR LEVEL.

THE BEAM AT THAT LEVEL TO BE CONCRETE MONOLITHIC TO THE CONCRETING OF THE TIE COLUMNS.

VII. CARPENTRY

A. STRUCTURAL WOOD FRAMING: KOTTE SALLA WOOD OR APPROVED EQUAL.

B. PRESERVATIVE OR MOISTURE BARRIERS SHALL BE USED ON ALL WOODEN MEMBERS PLACED AGAINST CONCRETE SURFACES. ALL WOOD STRUCTURAL MEMBERS THAT ARE DIRECTLY EXPOSED OR OPEN TO WEATHER, LIKE RAIN, WIND, AND SUN, SHOULD BE PROTECTED BY EITHER PAINTING OR VARNISHING THE EXPOSED SURFACES.

C. KNOTS IN WOOD MEMBER ARE NOT RECOMMENDED FOR USE.

D. THE PLACEMENT OF THE NAILS SHALL COMPLY WITH THE RELEVANT STANDARDS.

E. WOOD WITH THE FOLLOWING SHALL NOT BE USED IN CONSTRUCTION

   a. WITH BARKS AND WANE.
   b. WITH SHAKES, CHECKS AND SPLITS.
   c. WITH SAPSTAIN AND DECAY.
   d. WOOD WHICH HAVE UNDERGONE WRAPPING AND SWELLING.

   1. NAILS: COMMON WIRE (SHOULD CONFORM TO RELEVANT NEPAL/INDIAN STANDARDS):
      a. LENGTH AT WOOD-TO-WOOD CONNECTION: 3.5" ROOFING NAILS WITH 1cm Dia. HEADS:
      a. LENGTH AT METAL DECK-TO-WOOD CONNECTION: 2.5"  METAL STRAPS: 26 GAGE OR THICKER GALVANIZED IN TWO LAYERS, EMBED STRAPS IN RING BEAM OR COLUMN, PASSING THE STRAP AROUND THE REINFORCING STIRRUP OR BAR.

VIII. METAL ROOFING

A. THE METAL DECKING SHOULD BE AT LEAST 26 GAGE (0.48mm) OR THICKER AND GALVANIZED.
GOOD QUALITY BLOCKS

BREAKS EVEN DURING HANDLING AND STORING

VISUAL INSPECTION OF MASONRY BLOCKS
CONCRETE HOLLOW BLOCKS

RULE: IF BLOCK LOOKS SOFT AND IS FALLING APART, CONDUCT DROP TEST.

DROP BLOCK FROM CHEST HEIGHT ON HARD SURFACE TO TEST BLOCK QUALITY. IF MORE THAN 1 OUT OF 5 BLOCKS BREAKS, THE BATCH OF BLOCKS IS PROBABLY NOT STRONG ENOUGH.
### Minimum requirements for Hollow Concrete Block Building Design

<table>
<thead>
<tr>
<th></th>
<th>Site Selection</th>
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<tbody>
<tr>
<td>1</td>
<td>Site Selection</td>
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<td></td>
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<td>A building shall not be constructed if the site is:</td>
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<tr>
<td></td>
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<td>Geological fault or Ruptured Area</td>
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<td></td>
<td></td>
<td>Area susceptible to landslide</td>
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<tr>
<td></td>
<td></td>
<td>Steep slope &gt; 20%</td>
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<td></td>
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<td>Filled Area</td>
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<td></td>
<td></td>
<td>River bank ad water logged area</td>
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<td></td>
<td></td>
<td>Maximum number of stories</td>
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<tr>
<td>2</td>
<td>Shape of house</td>
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<td></td>
<td>Span of wall</td>
<td>Largest span of the room should not be more than 3.5 metres</td>
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<td></td>
<td>Height of wall</td>
<td>Maximum height of wall should not be more than 2.5 metres</td>
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<td></td>
<td>Proportion</td>
<td>The house shall be planned in square, rectangular. External length to width ratio of the building should not exceed 3</td>
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<td>3</td>
<td>Foundation</td>
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<tr>
<td></td>
<td>General</td>
<td>The foundation trench shall be of uniform width. The foundation bed shall be on the same level throughout the foundation in the flat area</td>
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<tr>
<td></td>
<td>Depth</td>
<td>The depth of footing should not be less than 900mm depending on the soil sub strata</td>
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<td></td>
<td>Width</td>
<td>The width of footing should not be less than 900 mm in medium soil condition.</td>
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<td>4</td>
<td>Plinth</td>
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<tr>
<td></td>
<td>General</td>
<td>Provide a reinforced concrete band at plinth level, as shown in detail drawings. The plinth height should not be less than 300mm from existing ground level.</td>
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<tr>
<td></td>
<td>Depth of beam</td>
<td>Depth of plinth beam shall be greater than or equal to 150mm</td>
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<tr>
<td></td>
<td>Width of beam</td>
<td>Width of plinth beam shall be greater than or equal to 200mm</td>
</tr>
<tr>
<td></td>
<td>Reinforcement</td>
<td>Main reinforcement should be 4-10mm dia. Bars. Use 7mm diameter rings at 150mm center to center. Hook length should be 50mm. Bars shall have a clear cover of 25mm concrete</td>
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<tr>
<td></td>
<td>Walls</td>
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<td>5</td>
<td>General</td>
<td>Masonry should be laid staggered in order to avoid continuous</td>
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<td></td>
<td></td>
<td>vertical joints. The wall should have toothing at the wall-</td>
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<td></td>
<td></td>
<td>tiecolumn interface to facilitate good connection</td>
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<td></td>
<td>Hollow Block</td>
<td>The hollow blocks used shall be of good quality and shall</td>
</tr>
<tr>
<td></td>
<td>units</td>
<td>adhere to the Nepal Standards of block production</td>
</tr>
<tr>
<td></td>
<td>Mortar joints</td>
<td>Mortar joints should be between 20mm to 10mm in thickness. The</td>
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<tr>
<td></td>
<td>and ratio</td>
<td>mortar shall be 1:5 (cement:sand) or richer</td>
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<tr>
<td></td>
<td>Span of wall</td>
<td>The length of wall shall be less than or equal to 3.5 metres.</td>
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<td></td>
<td></td>
<td>The length of wall between vertical reinforcing members (tie</td>
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<td></td>
<td></td>
<td>column or vertical grouted reinforcement) shall be less than</td>
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<tr>
<td></td>
<td></td>
<td>or equal to 1.5 metres.</td>
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<tr>
<td></td>
<td>Width</td>
<td>The thickness of wall shall be greater than or equal to 150mm</td>
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<table>
<thead>
<tr>
<th>6</th>
<th>Openings</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Location</td>
<td>Openings are to be located away from inside corners by a clear</td>
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<tr>
<td></td>
<td></td>
<td>distance of at least 600mm</td>
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<td></td>
<td>Total length</td>
<td>Total length of openings in a wall is not to exceed half of</td>
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<tr>
<td></td>
<td></td>
<td>the length of the wall</td>
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<tr>
<td></td>
<td>Distance</td>
<td>The horizontal distance between two openings shall not be less</td>
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<tr>
<td></td>
<td></td>
<td>than 600mm</td>
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<tr>
<td></td>
<td>Lintel level</td>
<td>The lintel level should be kept same for all doors and windows</td>
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</tbody>
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<table>
<thead>
<tr>
<th>7</th>
<th>Vertical Tie columns and reinforcements</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Location</td>
<td>Tie columns should be placed at each corner and intersection of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the walls as well as on either side of the door.</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>The size of the tie-column shall be equal to the width of the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>wall</td>
</tr>
<tr>
<td></td>
<td>Spacing</td>
<td>The spacing of tie-column shall be less than or equal to 3.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>metres.</td>
</tr>
<tr>
<td></td>
<td>Reinforcement</td>
<td>The minimum reinforcement to be used is 4-12mm dia. Longitudinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bars and 7mm dia. Stirrups at 150mm c/c</td>
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<thead>
<tr>
<th>8</th>
<th>Vertical reinforcement grouted in blocks</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Location</td>
<td>Vertical reinforcement in the blocks is placed on either side</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of the window</td>
</tr>
<tr>
<td></td>
<td>Reinforcement</td>
<td>Minimum 12mm dia. Bar centred in the Hollow block cell and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>grouted with cement mortar</td>
</tr>
<tr>
<td>9</td>
<td>Horizontal band</td>
<td></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>General</td>
<td>Horizontal bands should be provided throughout the entire wall</td>
<td></td>
</tr>
<tr>
<td>Sill band</td>
<td>A continuous sill band shall be provided throughout the entire wall at the bottom level of the openings. The minimum depth of the band shall be 75mm</td>
<td></td>
</tr>
<tr>
<td>Lintel band</td>
<td>A continuous lintel band shall be provided throughout the entire wall at the top level of the openings. The minimum depth of the band shall be 75mm</td>
<td></td>
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<tr>
<td>Floor/Roof band</td>
<td>A continuous floor/roof band shall be provided throughout the entire wall at the top of the walls at floor/roof level. The minimum depth of the band shall be 200mm. The minimum width of the band shall be 200mm</td>
<td></td>
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<tr>
<td>Reinforcement</td>
<td>Main reinforcement should be 4-10mm dia. Bars. Use 7mm diameter rings at 150mm. Hook length should be 50mm. Bars shall have a clear cover of 25mm concrete</td>
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<table>
<thead>
<tr>
<th>10</th>
<th>Roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light roof</td>
<td>Use light roof comprising wooden or steel truss covered with CGI sheets</td>
</tr>
<tr>
<td>Connection</td>
<td>All members of the timber truss or joints should be properly connected as shown in detail drawings</td>
</tr>
<tr>
<td>Cross-tie</td>
<td>Trusses should be properly cross tied with wooden braces as shown in detail drawings</td>
</tr>
<tr>
<td>Timber</td>
<td>Well seasoned Khote salla wood without knots should be used for roofing, timber treatment such as use of coal tar or any other preservative can prevent timber from being decayed and attacked by insects</td>
</tr>
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<table>
<thead>
<tr>
<th>11</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortar</td>
<td>Cement sand mortar should not be leaner than 1:5 (cement:sand) for masonry and 1:6 for plaster</td>
</tr>
<tr>
<td>Concrete</td>
<td>Concrete mix for seismic bands should not be leaner than 1:1.5:3 (cement:sand:aggregates)</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>High strength deformed bars - Fe415</td>
</tr>
<tr>
<td></td>
<td>Roof</td>
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</tr>
<tr>
<td>12</td>
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ARCHITECTURAL DRAWINGS
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: PLANS

SCALE: 1:50

DATE: SEPT, 2016

NOTE: THE LENGTHS PROVIDED HERE ARE APPROXIMATE. ACTUAL LENGTHS TO BE FINALIZED BASED ON BLOCK SIZE.
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: PLANS

SCALE: 1:50
DATE: SEPT., 2016
DEIGNED BY: BUILD CHANGE

NOTE: THE LENGTHS PROVIDED HERE ARE APPROXIMATE. ACTUAL LENGTHS TO BE FINALIZED BASED ON BLOCK SIZE.
Nepal Housing Reconstruction Programme

MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: PLANS

SCALE: 1:50

DATE: SEPT., 2016

DESIGNED BY: BUILD CHANGE

NOTE: THE LENGTHS PROVIDED HERE ARE APPROXIMATE. ACTUAL LENGTHS TO BE FINALIZED BASED ON BLOCK SIZE.

MODEL HOLLOW CONCRETE BLOCK DOUBLE-STORY

ROOF PLAN

CUTTING A

3000 APPROX

3000 APPROX

3000 APPROX

300 APPROX

CORRUGATED GALVANIZED IRON SHEET ROOFING

BEAM BELOW

RIDGE LINE

BALCONY BELOW

300 APPROX ROOF PROJECTION ON ALL SIDES

NOTE: THE LENGTHS PROVIDED HERE ARE APPROXIMATE. ACTUAL LENGTHS TO BE FINALIZED BASED ON BLOCK SIZE.
MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: ELEVATIONS

Nepal Housing Reconstruction Programme

SCALE: 1:50
DATE: SEPT., 2016

DESIGNED BY: BUILD CHANGE

A-04

MODEL HOLLOW CONCRETE BLOCK

FRONT ELEVATION

DOUBLE STOREY

12.5 MM PLASTER INTERIOR / EXTERIOR (RECOMMENDED)

WOODEN DOUBLE DOORS

DOUBLE PANELED WOODEN WINDOW

CORRUGATED GALVANIZED IRON SHEET ROOFING

WOODEN GABLE WALL

50 MM X 100 MM RAFTER

WOOD JOIST - WOODEN BEAM CAPITAL

12.5 MM PLASTER INTERIOR / EXTERIOR (RECOMMENDED)

RIGHT ELEVATION

50 MM X 100 MM RAFTER

WOODEN GABLE WALL

12.5 MM PLASTER INTERIOR / EXTERIOR (RECOMMENDED)
MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: ELEVATION AND SECTION

SCALE: 1:50
DATE: SEPT., 2016
DESIGNED BY: BUILD CHANGE

Nepal Housing Reconstruction Programme

NOTE: FOR DETAIL D 2.1 REFER TO PAGE NO P-02

A-06
MODEL HOLLOW CONCRETE BLOCK

LEFT ELEVATION

- Wooden Gable Wall
- Wooden Joist
- Wooden Beam Capital
- 12.5 mm Plaster Interior / Exterior (Recommended)

BACK ELEVATION

- Wooden Gable Wall
- Wooden Joist
- Wooden Beam Capital
- 12.5 mm Plaster Interior / Exterior (Recommended)

Nepal Housing Reconstruction Programme

Type of House: MODEL HOLLOW CONCRETE BLOCK

Drawing Title: ELEVATIONS

Scale: 1:50

Designed by: BUILD CHANGE

Date: Sept., 2016

A-05
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: ELEVATIONS

SCALE: 1:50

DATE: SEPT, 2016

DESIGNED BY: BUILD CHANGE

MODEL HOLLOW CONCRETE BLOCK

DOUBLE-STORY

FRONT WALL ELEVATION

EXTERIOR WALL

15 x 15 CM CONCRETE COLUMN

15 CM CONCRETE BLOCK WITH STAGGERED BOND AND 1.25 CM MORTAR JOINTS

15 CM CONCRETE BLOCK WITH STAGGERED BOND AND 1.25 CM MORTAR JOINTS

PŁINTH BEAM

LINTEL BAND

SILL BAND

FLOOR BEAM

LINTEL BAND

STONE MASONRY FOOTING

3000 APPROX

3000 APPROX

3000 APPROX
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<th>G.F</th>
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**Door and Window Schedule**

**Model: Hollow Concrete Block Double-Story**

**Scale:** 1:10

**Date:** Sept, 2016

**Designed By:** Build Change
MODEL HOLLOW CONCRETE BLOCK

STAIRCASE PLAN
SCALE: 1:10

STAIRCASE SECTION (DETAIL AT S.2)
SCALE: 1:20

600 WIDE LANDING

25 MM THICK WOODEN TREAD

35 MM THICK WOODEN PLANK

STAIRCASE DETAILS

SCALE: 1:10

2000

Nepal Housing Reconstruction Programme
TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: STAIRCASE DETAILS

DESIGNED BY: BUILD CHANGE

DATE: SEPT., 2016
AS GIVEN
CHIP OUT OR CUT FACE OF BLOCK TO INSTALL CONDUIT. DO NOT OVER SIZE OPENING.

FILL VOID WITH MORTAR AND SETBOX OUTLET OR SWITCH BOX.

PLACEMENT OF OUTLET OR SWITCH BOX

12.5 MM CONCRETE MORTAR JOINT

MASONARY WALL

50 MM MAX

EXISTING MASONARY WALL

25 MM VERTICAL CONDUIT

CHIP OUT ON OUT FACE OF BLOCK TO INSTALL CONDUIT. DO NOT OVER SIZE OPENING.

FILL VOID WITH MORTAR AND SETBOX

PLACEMENT OF VERTICAL CONDUIT

12.5 MM CONCRETE MORTAR JOINT
STRUCTURAL DRAWINGS
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: COLUMN AND FOUNDATION LAYOUT

SCALE:
DATE: SEPT, 2016
DESIGNED BY: BUILD CHANGE

MODEL HOLLOW CONCRETE BLOCK
DOUBLE-STORY

FOUNDATION AND PLINTH BEAM LAYOUT

VERTICAL REINFORCEMENT ON EITHER SIDE OF THE WINDOW, REFER DETAIL D.12

LEGEND

- REINFORCED CONCRETE COLUMN
- VERTICAL REINFORCEMENT ON EITHER SIDE OF THE WINDOW
- WOOD POST

S-01
FIRST FLOOR BEAM LAYOUT

100x150 MM WOODEN BEAM

50x50 JOIST AT 300MM C/C

200x200 BEAM

SLAB EXTEND FOR SUPPORT OF JOIST

3000 APPROX

COLUM
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: BEAM LAYOUT

MODEL HOLLOW CONCRETE BLOCK

DOUBLE-STOREY

DATE: SEPT, 2016

DESIGNED BY: BUILD CHANGE

S-03

A

B

C

D

1

2

3000 APPROX

3000 APPROX

3000 APPROX

COLUMN

3000 APPROX

3000 APPROX

3000 APPROX

SEAM

3000 APPROX

1400

ROOF PORTION

ROOF BEAM LAYOUT

Nepal Housing Reconstruction Programme

MODEL HOLLOW CONCRETE BLOCK

BEAM LAYOUT

DATE: SEPT, 2016

DESIGNED BY: BUILD CHANGE

S-03
MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: DOUBLE-STORY

DRAWING TITLE: MODEL HOLLOW CONCRETE BLOCK

FOUNDER SECTION

SCALE: 1:20

DESIGNED BY: BUILD CHANGE

DATE: SEPT. 2016

Nepal Housing Reconstruction Programme

SECTION OF EXTERNAL FOUNDATION DETAIL AT D.1

SECTION OF INTERIOR FOUNDATION DETAIL AT D.2

150MM HOLLOW CONCRETE BLOCK

STONE MASONRY FOUNDATION

RAMMED EARTH

CONCRETE SPACER 75 MM

MORTAR OR CONCRETE COVER TO PROTECT BAR

STONE SOILING WITH SAND

COMPACTED FILL

SLOPE TRENCH TO MAINTAIN STABILITY

STIRRUPS AT 100 MM C/C

12Ø COLUMN BARS

STIRRUPS AT 150 MM C/C

CONCRETE SPACER 25 MM

900

150

150

150

500

200X150 PLINTH BEAM

CONCRETE SPACER 75 MM

CONCRETE SPACER 25 MM

300 ANGLED

COMPACTED FILL

MORTAR OR CONCRETE COVER TO PROTECT BAR

CONCRETE SPACER 75 MM

STONE MASONRY FOUNDATION

RAMMED EARTH

CONCRETE SPACER 25 MM

12Ø COLUMN BARS

STIRRUPS AT 100 MM C/C

25

500

P.C.C. (1:2:4)

CONCRETE SPACER 75 MM

CONCRETE SPACER 25 MM

150MM HOLLOW CONCRETE BLOCK

STONE MASONRY FOUNDATION

RAMMED EARTH

CONCRETE SPACER 75 MM

MORTAR OR CONCRETE COVER TO PROTECT BAR

STONE SOILING WITH SAND

COMPACTED FILL

SLOPE TRENCH TO MAINTAIN STABILITY

STIRRUPS AT 100 MM C/C

12Ø COLUMN BARS

STIRRUPS AT 150 MM C/C

CONCRETE SPACER 25 MM

900

150

150

150

500

200X150 PLINTH BEAM

CONCRETE SPACER 75 MM

CONCRETE SPACER 25 MM

300 ANGLED

COMPACTED FILL

MORTAR OR CONCRETE COVER TO PROTECT BAR

CONCRETE SPACER 75 MM

STONE MASONRY FOUNDATION

RAMMED EARTH

CONCRETE SPACER 25 MM

12Ø COLUMN BARS

STIRRUPS AT 100 MM C/C

25

500

P.C.C. (1:2:4)

CONCRETE SPACER 75 MM

CONCRETE SPACER 25 MM

150MM HOLLOW CONCRETE BLOCK

STONE MASONRY FOUNDATION

RAMMED EARTH

CONCRETE SPACER 75 MM

MORTAR OR CONCRETE COVER TO PROTECT BAR

STONE SOILING WITH SAND

COMPACTED FILL

SLOPE TRENCH TO MAINTAIN STABILITY

STIRRUPS AT 100 MM C/C

12Ø COLUMN BARS

STIRRUPS AT 150 MM C/C

CONCRETE SPACER 25 MM

900

150

150

150
MODEL HOLLOW CONCRETE BLOCK

Nepal Housing Reconstruction Programme

TYPE OF HOUSE:

MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE:

FOUNDATION AND COLUMN POST SECTION

FOUNDATION SECTION OF EXTERIOR WALL

DETAIL AT D.3

FOUNDATION SECTION OF COLUMN POST

DETAIL AT D.4

BUILD CHANGE

DATE: SEPT, 2016

SCALE: S-05
SECTION OF INTERNAL PORCH FOUNDATION
DETAIL AT D.4

100x100 MM WOODEN POST

2 LAYERS 26 GAUGE FLATTENED CGI STRAP SHEET

2 .75 MM LONG NAILS CONNECTING STRAP AND WOODEN POST (4 TOTAL)

12Ø VERTICAL BARS

CONCRETE SPACER 25 MM

MODEL HOLLOW CONCRETE BLOCK
DOUBLE-STORY

Nepal Housing Reconstruction Programme

MODEL HOLLOW CONCRETE BLOCK
FOUNDATION AND COLUMN POST SECTION

S-06

DESIGNED BY: BUILD CHANGE

SCALE: 1:10
DATE: SEPT, 2016
MODEL HOLLOW CONCRETE BLOCK

PLAN SECTION OF PLINTH AT CORNER AND SECTION

SECTION OF PLINTH BEAM REINFORCEMENT
DETAIL AT D.6

SECTION OF COLUMN AT WALL INTERSECTION

Nepal Housing Reconstruction Programme
DRAWING TITLE: MODEL HOLLOW CONCRETE BLOCK
TYPE OF HOUSE: PLAN SECTION OF PLINTH AT CORNER AND SECTION

CONCRETE SPACER 25 MM
2-10Ø RIBBED BARS
6Ø CLOSED TIE
2-10Ø RIBBED BARS

150 MM CONCRETE BLOCK MASONRY WALL

STONE MASONRY FOUNDATION

CONCRETE SPACER 25 MM
2-12Ø RIBBED BARS
6Ø CLOSED TIE
2-12Ø RIBBED BARS

STIRRUPS AT 150 MM C/C
STIRRUPS AT 150 MM C/C

TIE COLUMN REINFORCEMENT
775 MM/STIRRUPS AT 100 MM C/C

AS PER LAP DETAIL D.13

10Ø RIBBED BARS (2 TOP/2 BOTTOM)
6Ø STIRRUPS

10Ø RIBBED BARS (2 TOP/2 BOTTOM)
6Ø STIRRUPS
SECTION OF PLINTH BEAM REINFORCEMENT

DETAIL AT D.7

PLAN OF PLINTH BEAM
REINFORCEMENT AT CORNER

SECTION OF COLUMN AT CORNER

CONCRETE SPACER 25MM

2-12Ø RIBBED BARS

6Ø CLOSED TIE

150 MM CONCRETE BLOCK MASONRY WALL

2-10Ø RIBBED BARS

6Ø CLOSED TIE

STONE MASONRY FOUNDATION

CONCRETE SPACER 25MM
SECTION OF SILL/LINTEL REINFORCEMENT
DETAIL AT D.8

SECTION OF COLUMN AT CORNER

PLAN OF SILL/LINTEL
REINFORCEMENT AT CORNER

150 MM CONCRETE BLOCK MASONRY WALL

2-10Ø RIBBED BARS

6Ø CLOSED TIE

CONCRETE SPACER 20 MM

775 MM STIRRUPS AT 100 MM C/C

AS PER LAP DETAIL D.13

10Ø RIBBED BARS

CONCRETE SPACER 25 MM

6Ø STIRRUPS

CONCRETE SPACER 25 MM

150 MM CONCRETE BLOCK MASONRY WALL

2-10Ø RIBBED BARS

6Ø CLOSED TIE

CONCRETE SPACER 20 MM

775 MM STIRRUPS AT 100 MM C/C

AS PER LAP DETAIL D.13

10Ø RIBBED BARS

CONCRETE SPACER 25 MM

6Ø STIRRUPS

CONCRETE SPACER 25 MM
Nepal Housing Reconstruction Programme

MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: PLAN SECTION OF SILL/LINTEL AT WALL INTERSECTION AND SECTION

SCALE: 
DATE: SEPT, 2016
DESIGNED BY: BUILD CHANGE

SECTION OF SILL/LINTEL REINFORCEMENT

DETAIL AT D.9

SECTION OF COLUMN AT WALL INTERSECTION

CONCRETE SPACER 25MM

2-12Ø RIBBED BARS

6Ø CLOSED TIE

CONCRETE SPACER 20 MM

150 MM CONCRETE BLOCK MASONRY WALL

2-10Ø RIBBED BARS

6Ø CLOSED TIE

PLAN OF SILL/LINTEL

REINFORCEMENT AT WALL INTERSECTION

775MM (STIRRUPS AT 100 MM C/C)

STIRRUPS AT 150 MM C/C

775MM (STIRRUPS AT 100 MM C/C)

AS PER LAP DETAIL D.13

6Ø STIRRUPS

10Ø RIBBED BARS

STIRRUPS AT 150 MM C/C

10Ø RIBBED BARS

6Ø STIRRUPS

CONCRETE SPACER 20MM

150 MM CONCRETE BLOCK MASONRY WALL

6Ø STIRRUPS

775MM (STIRRUPS AT 100 MM C/C)
SECTION OF RING BEAM REINFORCEMENT
DETAIL AT D.10

SECTION OF COLUMN AT WALL INTERSECTION

CONCRETE SPACER 25 MM

OFFSET BEAM REINFORCEMENT TO PASS COLUMN REINFORCING (CENTERED)

2-10Ø RIBBED BARS

8Ø BARS OF SLAB

6Ø CLOSED TIE

2-10Ø RIBBED BARS

PLAN OF RING BEAM

REINFORCEMENT AT WALL INTERSECTION

CONCRETE SPACER 25 MM

775 MM/STIRRUPS AT 100 MM C/C

6Ø STIRRUPS

10Ø RIBBED BARS

(2 TOP/2 BOTTOM)

STIRRUPS AT 150 MM C/C

AS PER LAP
DETAIL D.13

10Ø RIBBED BARS

(2 TOP/2 BOTTOM)

CONCRETE SPACER 25 MM

PLAN SECTION OF RING BEAM AT CORNER AND SECTION

775 MM/STIRRUPS AT 100 MM C/C

6Ø STIRRUPS

STIRRUPS AT 150 MM C/C

10Ø RIBBED BARS

(2 TOP/2 BOTTOM)

CONCRETE SPACER 25 MM
MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

PLATE SECTION OF RING BEAM AT CORNER AND SECTION

SECTION OF RING BEAM REINFORCEMENT
DETAIL AT D.11

SECTION OF COLUMN AT WALL INTERSECTION

Nepal Housing Reconstruction Programme

S-13

BUILD CHANGE

SEPT, 2016
MODEL HOLLOW CONCRETE BLOCK

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: CONCRETE FILL DETAIL AND LAPPING DETAIL

SCALE: DOUBLE-STYLE

DESIGNED BY: BUILD CHANGE

DATE: SEPT, 2016

150 MM HOLLOW CONCRETE BLOCK WALL

CONCRETE FILLING

CONCRETE FILLING

WINDOW

DETAIL OF VERTICAL BARS ON EITHER SIDE OF THE WINDOW

DETAIL D.12

12Ø VERTICAL BAR ON EITHER SIDE OF THE WINDOW (SEE S.15 FOR CONNECTION TO FOUNDATION)

LAPPED BARS CONNECTED BY BINDING WIRE

MAIN BARS

600 MM (LAP LENGTH)

DETAIL OF LAPPING OF MAIN BARS

DETAIL D.13

Nepal Housing Reconstruction Programme
**Model Hollow Concrete Block**

**Type of House:**

**Drawing Title:**

**Scale:**

**Designed By:**

**Date:**

**Details:**

- **End of Stirrups Are Located Alternately at Top Corner Bar of the Section**
- **Detail C-135 HOOL Detail for Stirrups and Ties**
- **Hollow Block**
- **GROUT FILL**
- **12Ø Bar Centered in Cell**
- **GROUT**
- **CEMENT MORTAR**

---

**Model Hollow Concrete Block**

**Beam Detail**

**Cement Mortar Grout**

**70**

**140**

**10**

**S-15**

Nepal Housing Reconstruction Programme
ELEVATION OF WALL WITH WINDOW OPENING

- Vertical: 12Ø bars in block cells filled with grout
- Beams
- Plinth beam
- Stone masonry foundation
- Hook vertical bars into the plinth beam
- 12Ø mm bars block cells
- Fills cells with grout
- +2475 LVL (Floor LVL)
- +1850 LVL (Lintel Band)
- +725 LVL (Sill Band)
- +00 LVL (Plinth Level)
ELEVATION OF WALL WITH DOOR OPENING

- Ring Beam
- Plinth Beam
- Stone Masonry Foundation
- Sill Band
- Column on Either Side of the Door
- Sill Bars Hook into the Column
- Toothing
- Lintel Band
- +2875 LVL (Floor LVL)
- +1838 LVL (Lintel Band)
- +735 LVL (Sill Band)
- +33 LVL (Plinth Level)

Designed by: Build Change

Date: Sept, 2016

Nepal Housing Reconstruction Programme

Type of House: Model Hollow Concrete Block

Drawing Title: Elevation of Wall with Door Opening
MODEL HOLLOW CONCRETE BLOCK

SLAB SECTION AT X-X

SLAB SECTION AT Y-Y

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: FLOOR BEAM SECTION

DESIGNED BY: BUILD CHANGE

DATE: SEPT, 2016

SCALE: S-19
TIMBER DETAILS
Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: PORCH DETAILS

SCALE: 1:50

DATE: SEPT., 2016

DESIGNED BY: BUILD CHANGE

MODEL HOLLOW CONCRETE BLOCK

DOUBLE-STOREY

GROUNDFLOORLEVEL

WOODEN CAPITAL

50X50 MM JOIST

50X50 MM JOIST @ 300 C/C

20 MM PLYWOOD BOARD

100X150 MM WOODEN MAIN BEAM

50 MM PCC

50 MM PCC

PLINTH FOUNDATION

PLINTH BEAM

PLINTH BEAM

100X100 MM WOOD POST

100X100 MM WOOD POST

GL

GL

2200

3000 APPROX

3000 APPROX

3000 APPROX

ALL DIMENSIONS IN MM
2-75 MM LONG NAILS B/W THE STRAP AND THE JOIST ON EITHER SIDE (4 TOTAL)

20MM PLYWOOD BOARD

50X50 JOIST @300 C/C

2 LAYERS OF 26 GAUGE FLATTENED CGI STRAP EMBEDDED IN CONCRETE (400 MM LONG)

PROJECTED SLAB

200X200 MM CONCRETE BEAM

HOLLOW BLOCK WALL

2-75 MM LONG NAILS B/W THE STRAP AND THE JOIST ON EITHER SIDE (4 TOTAL)

20MM PLYWOOD BOARD

50X50 JOIST @300 C/C

2 LAYERS OF 26 GAUGE FLATTENED CGI STRAP EMBEDDED IN CONCRETE (400 MM LONG)

PROJECTED SLAB

200X200 MM CONCRETE BEAM

HOLLOW BLOCK WALL

HOLLOW BLOCK WALL

HOLLOW BLOCK WALL

3D VIEW OF CONNECTION

DETAIL AT D.21
CONNECTION DETAIL OF BEAM WITH PORCH JOIST AT GROUND FLOOR

ALL DIMENSIONS IN MM
FIG: COLUMN TO JOIST CONNECTION USING

150

100X100 MM COLUMN POST

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-75MM LONG NAILS INCLINED(45°)
DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100 X 50 MM
MAIN BEAM

2-100MM LONG NAILS
B/W JOIST AND COLUMN
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
EACH SIDE (4 TOTAL)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

100X100 MM COLUMN

50x50 MM JOIST ON EACH
SIDE OF POST

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)

100X100 MM COLUMN

100

100X100 MM COLUMN

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50x50 MM JOIST ON EACH
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2-100MM LONG NAILS
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INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL)

100X100MM COLUMN

100X100 MM COLUMN

2-100MM LONG NAILS
B/W JOIST AND MAIN BEAM
EACH SIDE (4 TOTAL)

2-100MM LONG NAILS
INCLINED(45°) DOWNWARDS
B/W POST AND MAIN BEAM
(4 TOTAL ON OPPOSITE SIDE OF
COLUMN)
MODEL HOLLOW CONCRETE BLOCK

 DOUBLE-STORY

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: PORCH DETAILS

SCALE: 1:50
DATE: SEPT., 2016

DESIGNED BY: BUILD CHANGE

100 MM LONG NAILS INCLINED UPWARDS (B/W CAPITAL AND BEAM)

100 MM LONG NAILS INCLINED UPWARDS (B/W CAPITAL AND POST)

26 GAUGE-2 LAYER FLATTENED CGI STRAP ON BOTH SIDES OF POST (990 MM LONG)

100X150 MM MAIN BEAM OR PORCH BEAM

2-100 MM LONG NAILS STRAIGHT ON EITHER SIDE (B/W STRAP AND CAPITAL) (4 TOTAL)

4-100 MM LONG NAILS STRAIGHT ON EITHER SIDE (B/W STRAP AND POST) (8 TOTAL)

26 GAUGE-2 LAYER FLATTENED CGI STRAP ON BOTH SIDES OF POST (990 MM LONG)

100X150 MM MAIN BEAM OR PORCH BEAM

100 MM LONG NAILS INCLINED UPWARDS (B/W CAPITAL AND BEAM)

100 MM LONG NAILS INCLINED UPWARDS (B/W CAPITAL AND POST)

2-100 MM LONG NAILS STRAIGHT ON EITHER SIDE (B/W STRAP AND CAPITAL) (4 TOTAL)

4-100 MM LONG NAILS STRAIGHT ON EITHER SIDE (B/W STRAP AND POST) (8 TOTAL)

100X100 MM COLUMN

DETAIL AT D.21

CONNECTION DETAIL OF CAPITAL WITH MAIN BEAM

ALL DIMENSIONS IN MM

P-04
TIMBER TRUSS
DRAWINGS
MODEL HOLLOW CONCRETE BLOCK

50 X 100 MM MAIN RAFTER

32.5 MM THICK GUSSET PLATE

2 LAYERS OF FLATTENED 26 GAUGE CGI STRAP WRAPPED AROUND THE MEMBERS

50 X 100 MM PORCH RAFTER

100X50MM MAIN ROOF RAFTER (BEYOND)

2 LAYERS OF FLATTENED 26 GAUGE CGI STRAP (700MM LONG)

50X100 MM PORCH RAFTER

150 MM HOLLOW BLOCK MASONRY WALL

SECTION AT B1-B1

CONNECTION OF PORCH RAFTER AND FLOOR BEAM

DETAIL OF WEDGE WOODEN PIECE

ALL DIMENSIONS IN MM

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: DETAIL OF CONNECTIONS

DESIGNED BY: BUILD CHANGE
ROOF TRUSS ELEVATION WITH GUSSET PLATE

CGI SHEET
50 x 50 PURLIN, TYPICAL

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: DETAIL OF ROOF TRUSS

Nepal Housing Reconstruction Programme

DESIGNED BY: BUILD CHANGE
37.5MM THICK GUSSET PLATE ON EITHER SIDE (2 Nos.)

50 X 50 MM PURLIN

300 X 50 MM MAIN ROOF RAFTER

6-75 MM LONG NAILS CONNECTING GUSSET PLATE AND RAFTER ON EACH SIDE OF RAFTER (12 TOTAL PER RAFTER)

6-75 MM LONG NAILS CONNECTING GUSSET PLATE AND RAFTER ON EACH SIDE OF RAFTER (12 TOTAL PER RAFTER)

2-75 MM LONG NAILS ON EITHER SIDE OF THE KING POST (4 TOTAL)

2-75 MM LONG NAILS ON OPPOSITE SIDE OF KING POST (4 TOTAL)

26 GAUGE CGI SHEET

25 GUAGE CGI SHEET

ALIGNMENT OF GRAIN

DETAIL OF GUSSET PLATE AT CONNECTION 1 (2 Nos.)

DETAIL AT CONNECTION 1

DETAIL AT CONNECTION 1

MEMBER 1 (RAFTER)

MEMBER 2 (RAFTER TOWARDS PORCH)

MEMBER 3 (KING POST)

MEMBER 2 (RAFTER TOWARDS PORCH)

MEMBER 3 (KING POST)

MEMBER 3 (50 X 50 MM KING POST)

MEMBER 1 (RAFTER)

MEMBER 1 (50 X 100 MM RAFTER)

MEMBER 2 (50 X 100 MM RAFTER)

MEMBER 3 (50 X 50 MM KING POST)

2.75 MM LONG NAILS ON OPPOSITE SIDE OF KING POST (4 TOTAL)

6-75 MM LONG NAILS CONNECTING GUSSET PLATE AND RAFTER ON EACH SIDE OF RAFTER (12 TOTAL PER RAFTER)

240 184 184 120 120

Alignment of Grain

120 120

100X50MM MAIN ROOF RAFTER

100X50MM MAIN ROOF RAFTER

3D VIEW OF CONNECTION 1

ALL DIMENSIONS IN MM

DATE: SEPT, 2016

Nepal Housing Reconstruction Programme

type of house: MODEL HOLLOW CONCRETE BLOCK

drawing title: detail of connections

scale:

designed by: BUILD CHANGE

T-06
DETAIL OF CONNECTIONS

- MEMBER 3 (50 x 50 mm KING POST)
- MEMBER 5 (50 x 50 mm DIAGONAL WEB)
- MEMBER 7 (100 x 50 BOTTOM TIE)

DETAIL AT CONNECTION 2

- 2-75 mm long nails on either side of each diagonal web (4 total per diagonal web)
- 6-75 mm long nails on either side of each bottom tie (12 total per tie)
- 2-75 mm long nails on either side of king post (4 total)
- 37.5 mm thick gusset plate on either side (2 nos.)
- 3D view of connection 2

ALL DIMENSIONS IN MM

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK
DRAWING TITLE: DETAIL OF CONNECTIONS

DESIGNED BY: BUILD CHANGE
DATE: SEPT, 2016
T-07
2-75 MM LONG NAILS CONNECTING GUSSET PLATE AND MEMBER 4 (4 Nos. TOTAL)

2-75 MM LONG NAILS CONNECTING GUSSET PLATE AND MEMBER 2 (4 Nos.)

37.5 MM THICK GUSSET PLATE (2 Nos.)

2-75 MM LONG NAILS ON OPPOSITE SIDE (4 TOTAL)

MEMBER 2 (50 X 100MM RAFTER)

MEMBER 4 (50 X 50 MM DIAGONAL WEB)

MEMBER 4 (50 X 50 MM DIAGONAL WEB)

50 X 100MM R A F T E R

50 X 50 MM

PURLIN

26 GAUGE CGI SHEET

37.5 MM THICK GUSSET PLATE (2 Nos.)

3D VIEW OF CONNECTION 3

DETAIL AT CONNECTION 3

DETAIL OF GUSSET PLATE (2 Nos.)

ALL DIMENSIONS IN MM

T-08

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: DETAIL OF CONNECTIONS

SCALE:

DATE: SEPT, 2016

DESIGNED BY: BUILD CHANGE
MEMBER 2 (50 X 100 MM RAFTER)

MEMBER 7 (50 X 100 BOTTOM TIE)

200X200 MM CONCRETE BEAM

200X200 MM RING BEAM

150 MM HOLLOW BLOCK MASONRY WALL

2-75 MM LONG NAILS ON EACH SIDE TO MAIN RAFTER (12 Nos.)

2-75 MM LONG NAILS ON EACH SIDE TO BOTTOM TIE (12 Nos.)

6-75 MM LONG NAILS CONNECTING RAFTER AND GUSSET PLATE (12 Nos.)

6-75 MM LONG NAILS CONNECTING BOTTOM TIE AND GUSSET PLATE (12 Nos.)

37.5 MM THICK GUSSET PLATE (2 Nos.)

CUT PORTION OF MEMBER 7

MEMBER 2 (RAFTER TOWARDS PORCH)

MEMBER 7 (BOTTOM TIE)

25

25

25

25

100

ALIGNMENT OF GRAIN

304

196

196

500

37.5 MM THICK GUSSET PLATE (2 Nos.)

50X100MM MAIN ROOF RAFTER

200X200 MM RING BEAM

3D VIEW OF CONNECTION 4

DETAIL OF JOINTS AT CONNECTION 4

DETAIL AT CONNECTION 4

DETAIL OF GUSSET PLATE

50X100MM BOTTOM TIE

6-75 MM LONG NAILS CONNECTING RAFTER AND GUSSET PLATE (12 Nos.)

ALL DIMENSIONS IN MM

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: DETAIL OF CONNECTIONS

SCALE: DATE: SEPT. 2016

DESIGNED BY: BUILD CHANGE
2 LAYERS OF 26 GAUGE FLATTENED CGI STRAP (800 MM LONG)

2 LAYERS OF CGI STRAP

75 MM LONG NAIL B/W THE STRAPS AND RAFTER

32.5 MM THICK GUSSET PLATE

150 MM HOLLOW BLOCK MASONRY WALL

2 LAYER OF 26 GAUGE FLATTENED CGI STRAP

37.5 MM GUSSET PLATE

TOTAL LENGTH OF 10MM STRAP IN TWO LAYERS = 1055 MM

200 X 200 MM RING BEAM

3D VIEW OF CGI STRAP CONNECTION

ALL DIMENSIONS IN MM

75 MM LONG NAIL B/W THE STRAPS AND RAFTER

DETAIL OF CGI STRAP

WRAP OVER TRUSS AND DOWN OPPOSITE FACE EACH SIDE

50 X 100 MM RAFTER

32.5 50 32.5

2-75MM LONG NAILS B/W STRAP AND GUSSET ON EACH SIDE (4 TOTAL)

2-75MM LONG NAILS B/W STRAP AND RAFTER ON EACH SIDE (4 TOTAL)

1-75MM LONG NAILS B/W STRAP AND RAFTER ON EACH SIDE (2 TOTAL)

2 LAYER OF 26 GAUGE FLATTENED CGI STRAP

200 X 200 MM RING BEAM

37.5 MM GUSSET PLATE

75MM LONG NAIL B/W THE STRAPS AND RAFTER

50 X 100 MM RAFTER

32.5 50 32.5
Connection of Purlin and Rafter over Discontinuous Ends

2-100 MM LONG NAILS CONNECTING THE BLOCK AND THE PURLIN

2-100 MM LONG NAILS CONNECTING THE BLOCK AND THE PURLIN

100 MM LONG NAILS CONNECTING THE BLOCK AND THE RAFTER

100 MM LONG NAILS CONNECTING THE BLOCK AND THE PURLIN

50 X 50MM TIMBER BLOCK

50 X 50MM TIMBER BLOCK

50X50 MM PURLIN

50X50 MM PURLIN

50X100 MM RAFTER

50X100 MM RAFTER

75MM LONG NAILS

50X50 MM TIMBER BLOCK

50X50 MM TIMBER BLOCK

50 X 50MM PURLIN

50 X 50MM PURLIN

ALL DIMENSIONS IN MM
- 100 MM LONG NAIL CONNECTING THE BLOCK AND PORCH RAFTER (4 TOTAL)

50X100 MM PORCH RAFTER

100 X 150 MM PORCH BEAM

50X50 MM TIMBER BLOCK

2- 100 MM LONG NAIL CONNECTING THE BLOCK AND PORCH RAFTER (4 TOTAL)

50X100 MM PORCH RAFTER

25X150 MM FASCIA CONNECTED BY 2 NAILS OF 75MM TO THE PORCH RAFTER

50X50 MM TIMBER BLOCK

2- 100 MM LONG NAIL CONNECTING THE BLOCK AND PORCH BEAM (4 TOTAL)

50X100 MM PORCH RAFTER

50 X 100MM PORCH RAFTER

2- 100 MM LONG NAILS CONNECTING THE BLOCK AND PORCH RAFTER (4 TOTAL)

50 X 50MM TIMBER BLOCK

2- 100 MM LONG NAILS CONNECTING THE BLOCK AND PORCH RAFTER (4 TOTAL)

100 X 150MM PORCH BEAM

DETAIL AT CONNECTION 6

CONNECTION OF PORCH RAFTER AND PORCH BEAM

ALL DIMENSIONS IN MM

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: DETAIL OF CONNECTIONS

SCALE: DATE: SEPT, 2016

DESIGNED BY: BUILD CHANGE
50X50 MM TIMBER BLOCK

2-100 MM LONG NAILS CONNECTING BLOCKS AND THE PURLIN

50X100 MM RAFTER

50X50 MM PURLIN

2-100 MM LONG NAILS CONNECTING BLOCK AND THE RAFTER

50X100 MM RAFTER

100 MM LONG NAILS CONNECTING THE BLOCK AND THE RAFTER

100 MM LONG NAILS CONNECTING THE BLOCK AND THE PURLIN

50 X 50MM PURLIN

50X50 MM TIMBER BLOCK

50 X 50MM PURLIN

100 MM LONG NAILS

50X100 MM RAFTER

50X50 MM TIMBER BLOCK

ALL DIMENSIONS IN MM

MODEL HOLLOW CONCRETE BLOCK

DOUBLE-STORY

CONNECTION OF PURLIN AND RAFTER OVER DISCONTINUOUS ENDS

CONNECTION OF PURLIN AND RAFTER OVER DISCONTINUOUS ENDS

Nepal Housing Reconstruction Programme

TYPE OF HOUSE: MODEL HOLLOW CONCRETE BLOCK

DRAWING TITLE: DETAIL OF CROSS BRACING

SCALE: DESIGNATED BY: BUILD CHANGE

DATE: SEPT, 2016

T-17
QUANTITY ESTIMATION
### SUMMARY OF QUANTITY ESTIMATE

**Masonry**

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**Nepal Housing Reconstruction Programme**

**TYPE OF HOUSE:** MODEL HOLLOW CONCRETE BLOCK

**DRAWING TITLE:** BUILDING AND ESTIMATION

**SCALE:** 1:50 **DATE:** SEPT, 2016

**DESIGNED BY:** BUILD CHANGE