

Appendix 9

POSTER OF MINIMUM REQUIREMENTS FOR SAFER HOUSING

1. QUALITY OF MATERIALS

2. STRUCTURAL SECTION OF MAIN MEMBERS

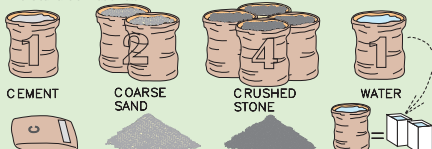
3. CONNECTION OF STRUCTURAL MEMBERS

1. QUALITY OF MATERIALS:

1.1 CONCRETE

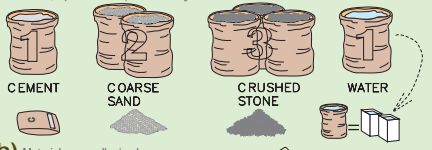
a) REINFORCED TIE BEAM

Mixture design for reinforced tie beam is one (1) portion of Portland cement, two (2) portions of clean coarse sand, four (4) portions of crushed stone (the size is less than 1/2") and one (1) portion of clean and drinkable water.



COLUMNS, RING BEAMS, LIGHT SLAB

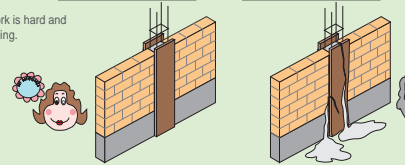
Mixture design for confined columns, ring beams and light slab is one (1) portion of Portland cement, two (2) portions of clean coarse sand, three (3) portions of clean crushed stone (the size is less than 1/2") and one (1) portion of clean and drinkable water. In case of salty soil for foundation, vinyl sheet is used to prevent salt damage of concrete.



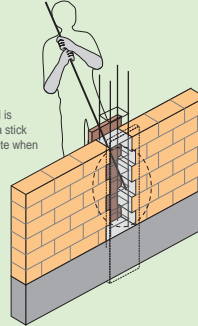
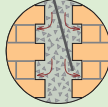
b) Materials are well mixed where the aggregate is not visible and poured to form work immediately.



c) Form work is hard and no bleeding.

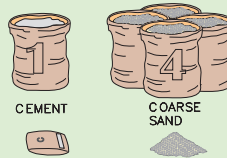


d) Any gaps and void is avoided by using a stick to compact concrete when it is pouring.



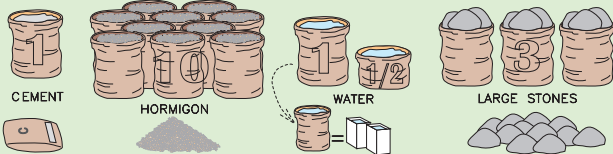
1.2 MORTAR

Mixture design is one (1) portion of Portland cement and four (4) portions of clean coarse sand.



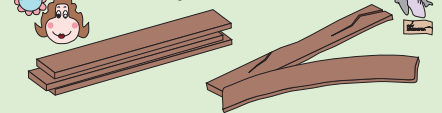
1.3 FOUNDATION

Mixture design for foundation is one (1) portion of Portland cement, ten (10) portions of hormigon, one and half (1.5) portions of clean and drinkable water and three (3) portions of large stones (the size is maximum 10"). Hormigon is composed of gravel and coarse sand directly obtained from quarry place.



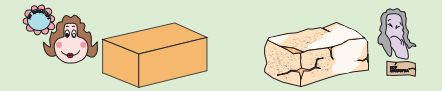
1.4 WOOD

Wood is hard, dry, dense fiber, well cured, no crack and straight.



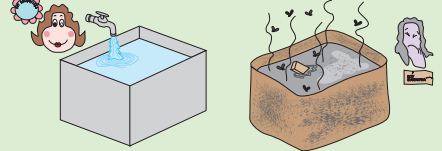
1.5 BRICK

Brick is burned and orange color without white pale shadow. Brick is also dust free, without cracks or bending.



1.6 WATER

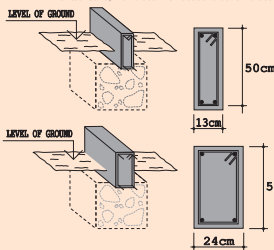
Water is clean and drinkable.



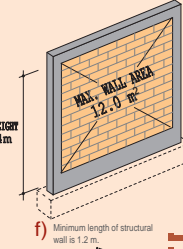
2. STRUCTURAL SECTION OF MAIN MEMBERS:

2.2 SECTIONS OF REINFORCED CONCRETE MEMBER

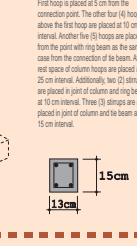
a) The beam width is 13 cm or 24 cm according to the width of the wall. The minimum height is 50 cm. The beam is reinforced with four (4) steel bars of 3/8" diameter, with stirrups of 1/4" diameter at 20 cm intervals. If the soil is mainly composed of silty and/or sandy, the tie beam is needed to be reinforced.



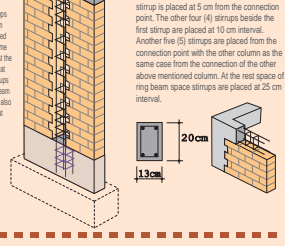
b) Maximum wall area framed with tie beam, column and ring beam is 12.0 m². The maximum height of the wall is 2.4 m.



c) Column has a minimum section of 13 cm wide and 15 cm high, and four (4) steel bars of 3/8 diameter are placed with hoops of 1/4 diameter. Five (5) hoops are placed from the connection point with tie beam.

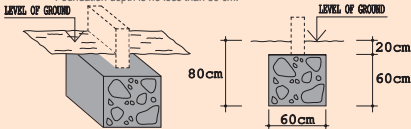


d) Minimum dimension of ring beam is 13 cm wide and 20 cm high, and four (4) steel bars of 3/8 diameter are placed with stirrups of 1/4 diameter. Five (5) stirrups are placed from the connection point with column.



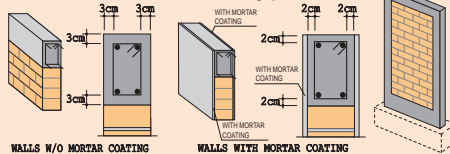
2.1 FOUNDATION

Foundation width and height is 60 cm or more. In case of the foundation without loads from small beams of roofing, the width of foundation can be 50 cm. Foundation depth is no less than 80 cm.



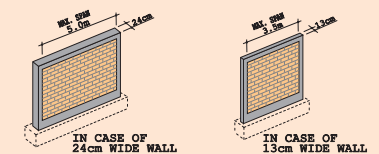
e) COVERING

Minimum covering depth of concrete is 2 cm for walls with finish and 3 cm for walls without finish. In case of foundation, covering depth is 7.5 cm.



2.3 MAXIMUM SPAN

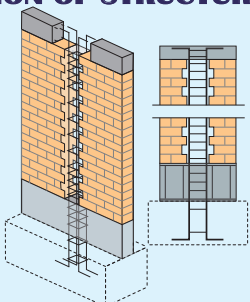
Maximum span of columns is 5.0 m in case of 24 cm wide wall. It is 3.5 m in case of 13 cm wide wall.



3. CONNECTION OF STRUCTURAL MEMBERS:

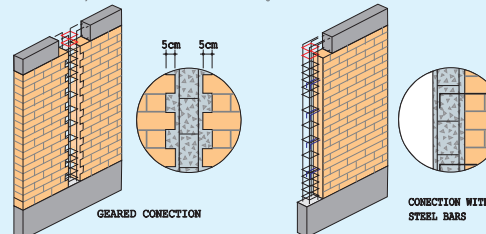
3.1 Anchor of column to the beam and ring beam.

Four (4) steel bars of column anchored to the foundation. The steel bars bend 90° at 7.5 cm from the bottom of foundation. The bent steel bars are prolonged 25 cm. In case of reinforced tie beam, the steel bars of column and tie beam must be carefully tied by steel wires to ensure an adequate connection between these structural elements. In case of good soil, concrete without reinforcement is used. In the same way, four (4) steel bars of column anchored to reinforced ring beam. The steel bars bend 90° at 2 cm from the top of ring beam. The bent steel bars are prolonged 50 cm measured from the column surface.



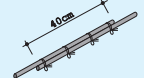
3.2 Connection of wall and column.

There are two connection methods. One is that joint between wall and columns is geared and the length of the salient part of brick does not exceed 5 cm. The other is that two (2) steel bars of 1/4" diameter anchor at every four (4) layers of wall bricks at least 40 cm inside masonry and 12.5 cm inside column with vertical turning of 90° at 10 cm.



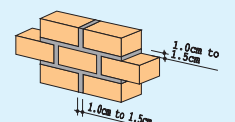
3.3 Overlapping of reinforcements:

Steel bars of reinforced concrete overlap at least at 40 cm.



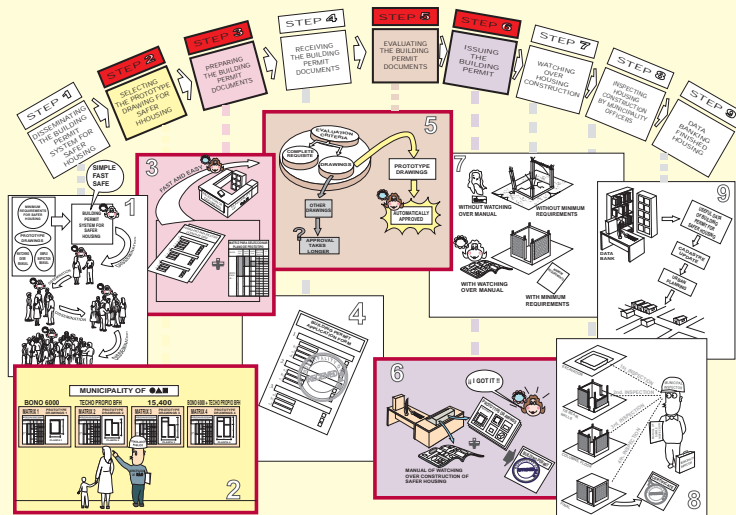
3.4 Wall joint mortar thickness:

Thickness of joint mortar for wall is from 1.0 to 1.5 cm.



Appendix 10

POSTER OF PROTOTYPE DRAWINGS FOR SAFER HOUSING



BONO 6000 S/. 6,000

PROYECTO 1	PROYECTO 2	PROYECTO 3	PROYECTO 4
AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²
...

TECHO PROPIO BFH S/. 13,400

PROYECTO 1	PROYECTO 2	PROYECTO 3	PROYECTO 4
AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²
...

MINIMUM REQUIREMENTS

- 1. QUALITY OF MATERIALS:**
COLUMNS, RING BEAMS, LIGHT SLAB
- 2. STRUCTURAL SECTION OF MAIN MEMBERS:**
- 3. CONNECTION OF STRUCTURAL MEMBERS:**

BONO 6000 + TECHO PROPIO BFH S/. 15,400

PROYECTO 1	PROYECTO 2	PROYECTO 3	PROYECTO 4
AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²
...

BONO 6000 + TECHO PROPIO BFH S/. 19,400

PROYECTO 1	PROYECTO 2	PROYECTO 3	PROYECTO 4
AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²	AREA: 30.00 m ²
...