RECOMMENDED BUILDING STANDARDS FOR JOYABAJ

I. Background

The purpose of the following building standards for the pueblo of Joyabaj is to provide a guide for the people when they build a formal house, to ensure that they build homes which will be safe for their families and which will not endanger the homes or lives of their neighbors.

These standards are what are known as "performance standards". This means that any type of house may be built, any size of house may be built, and any material can be used to build the house, so long as the final structure which is built is earthquake resistant, and so long as it does not endanger the lives or property of neighbors or passersby.

II. Definitions

A. Earthquake resistant: A house is deemed to be earthquake resistant if it incorporates at least 75% of the earthquake resistant building principles and has a lightweight roof. Earthquake resistant does not mean that the house is earthquake-proof; it means that the house will suffer only limited damage in an earthquake and the occupants will have time to safely evacuate the house during an earthquake.

B. Lightweight roof: A lightweight roof is defined as a roofing material which weighs less than 1 kilo per square foot. Examples: lamina, paja, duralita, oja de palma.

C. L-Shaped house: An L-shaped house is one which is built in the shape of the letter "L", and in which the walls are continuous, not separated by crush sections.

D. Lightweight walls: Lightweight walls are defined as walls which are either built of a lightweight material (such as wood, block, brick, or adobe de canto) or which do not exceed a height of 2.20 meters measured from the ground, or a combination of both.

E. Steep slope: A steep slope is a slope which exceeds 60^{o}, measured in declining numbers of degrees from the vertical (90^{o}).

F. General standards: General standards apply to all structures defined in Section III of this document.

G. Dividing wall: A dividing wall is a solid wall which separates one lot from another, or which is used to subdivide a piece of property.

III. Applicability

These building standards apply to all structures in which people live. They do not apply to commercial structures, industrial buildings, churches, or buildings owned by the city of Joyabaj, the Department of Quiché, or the Government of Guatemala.

IV. General Standards

A. Siting:

1. No house will be located closer than 1 vara to another structure or to a dividing wall.

2. No house shall be located closer than 10 meters to a steep slope.

3. No house shall be built on a landfill or on the edge of a slope known to be leveled by bulldozing.

B. Form of the Structure:

1. No house shall be built in the form of an "L" unless a crush section made of lightweight material separates the two parts of the house by a minimum distance of 1 vara. The roof may be continuous as long as it is lightweight and also has a crush section.

2. No house shall have an exterior wall which is more than 2.5 times longer than the shortest exterior wall.

3. The parallel walls of all structures must be of equal length.

C. Safety Standards:

1. All houses must have doors which open outward.

2. No house shall have a cornice.

D. Roof:

1. All houses must have a lightweight roof.

2. All trusses must rest on the upper ring beam of the wall and not be built into the wall itself.

V. Earthquake Resistant Principles

All structures must use at least eight (8) of the following principles:

A. Exterior walls should be lightweight.

B. Exterior walls should be balanced by having doors and windows opposite each other in the parallel walls.

C. Parallel exterior walls should be built of the same material.

D. All doors and windows should be a minimum of 1 vara from the end of a wall.

E. All doors and windows should be a minimum of 1 vara from each other.

F. All doors in interior walls should be in the middle of the wall.

G. All doors and windows should be in the long walls of the house.

H. The highest wall of houses with shed (sloping) roofs should be no higher than ½ meter above the opposite wall.

I. All overhanging porches (corridores) should be fastened or built in an approved manner.

J. All doors inside the house should open in the direction of the nearest door leading to the outside of the house.

K. All houses should use lightweight gables (mojenetes).

L. Mortar should not be more than 1" thick.

VI. Earthquake Resistant Principles Applying to Specific Types of Houses

A. Bajareque structures: All houses built of bajareque must use six (6) of the following principles:

1. Bajareque houses should use cross-braces of wood or wire.
2. Bajareque houses should use a continuous ring beam at the top of all the walls, interior as well as exterior.
3. Bajareque houses should use a diagonal brace at each corner of the ring beam.
4. All posts should be treated with a recommended wood treatment.
5. All posts should be a minimum of 1 vara in the ground.
6. All windows and doors should have vertical posts on each side of the openings.
7. A stucco should be applied to both sides of the walls.

B. Adobe houses: All houses built of adobe de soga must use a minimum of eight (8) of the following principles:

1. Adobe houses must have strong foundations.
2. Adobe houses should use cross-braces of wood or wire.
3. Adobe houses should use a continuous ring beam at the top of all the walls, interior as well as exterior.
4. Adobe houses should use a diagonal brace at each corner of the ring beam.
5. Adobe walls should have strong corner posts in each wall, buried at least 1 vara.
6. All posts should be treated with a recommended wood treatment.
7. All windows and doors should have vertical posts on each side of the openings.
8. Each third layer of adobe should have a strand of barbed wire laid between it and attached to the posts to serve as additional reinforcement.
9. Exterior walls should use buttresses.
10. Interior walls should be attached to posts in the exterior wall as well as use diagonal braces attached to the ring beam.

C. Adobe de canto houses: All houses built of adobe de canto must use a minimum of six (6) of the following principles:

1. Adobe de canto houses must have strong foundations.
2. Adobe de canto houses should use cross-braces of wood or wire.
3. Adobe de canto houses should have wooden ring beams every two layers. These must be attached to the vertical posts.
4. Adobe de canto walls should have strong corner posts in each wall, buried at least 1 vara.
5. Adobe de canto houses should use a diagonal brace at each corner of the ring beam.

6. All posts should be treated with a recommended wood treatment.

7. All windows and doors should have vertical posts on each side of the openings.

8. A strand of wire should be placed on both sides of each layer of adobe de canto and tied securely to the posts.

9. A stucco should be applied to both sides of the walls.

D. Houses of block: All houses built of block must use a <u>minimum</u> of seven (7) of the following principles:

1. Block houses should be built on strong foundations with a water barrier (solera de humidad).

2. Block houses should have ring beams in the center of the wall.

3. Block houses should have ring beams at the top of the wall.

4. Block houses should have strong corner posts of reinforced concrete.

5. Block houses should have vertical columns made of reinforced concrete.

6. All windows and doors should have vertical columns on each side of the openings.

7. Corners should be reinforced in an approved manner.

8. Block mojenetes must be reinforced with vertical columns and surrounded by poured concrete on all sides.

9. The roof should rest on a truss, not on the mojenete.

E. Brick houses: All houses made of brick must use a minimum of seven (7) of the following principles:

1. Brick houses should be built on strong foundations with a water barrier (solera de humidad).

2. Brick houses should have ring beams at the top of the wall.

3. Brick houses should have ring beams in the center of the wall.

4. Brick houses should have strong corner posts of reinforced concrete.

5. Brick houses should have vertical columns made of reinforced concrete.

6. Brick houses should have cross-braces of wood or wire.

7. All windows and doors should have vertical columns on each side of the openings.

8. Corners should be reinforced in an approved manner.

9. Brick mojenetes must be reinforced with vertical columns and surrounded by poured concrete on all sides.

10. The roof should rest on a truss, not on the mojenete.

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