

Manav Sadhna : Nepal project.

Going through the images of failures in rural area of Nepal, following observations are made (with reference to the unit, manav sadhan proposes to build)

1. The dwelling units are constructed in brick masonry with mud.
2. No proper bonds of masonry units provided in the walls
3. No appropriate foundation to the load bearing walls.
4. The wooden members of floors and roof are not properly connected with the surrounding walls

From seismic resistant structural design/detailing viewpoint and to make the construction technique as simple as possible , following points will be considered in the design of the proposed unit.

1. First and foremost, walls with proper arrangement of bricks in each layer (masonry bond) will be proposed so as to ensure integrated behaviour of masonry wall even in routine conditions. The cement sand mortar is proposed to ensure proper bonding of brick units.
2. The joints and corners play the important role in stability of a load bearing unit, options of strengthening of corners are proposed. This is ensured by alternative provision of
 - (a) Confinement columns (made of Reinforced Cement Concrete with nominal reinforcement) at appropriate locations
 - (b) Provision of single reinforcement bar at corners, embedded in the masonry bond itself.
 - (c) Providing U shaped reinforcement bars at corners and junctions along the height of the masonry walls.
 - (d) Combination of above three.
3. The unit is bound by Reinforced Cement Concrete bands at appropriate levels like plinth level, Sill and/or lintel level and roof level. This will ensure the monolithic behaviour of the unit under future seismic activity.
4. Reinforced cement concrete slab is proposed at first floor level. This will impart stiffness to the floor in the direction of seismic forces and will also help walls remain stable under balancing gravity loads .
5. At roof level either wooden roof truss or steel roof truss option is explored, with proper joint detailing , connections with main load bearing walls such that the roof remains fairly light, ductile and stable under seismic and/or wind loads.
6. Major openings like large doors and windows will be strengthened by nominal RCC band all around (RCC band at lintel level) so as to take care of re entrant corners for seismic forces and ensure proper distribution of such forces in surrounding region walls.
7. On finalizing the structural details, we intend to provide proper training to local engineers and artisans, which shall include proper sequence of construction and maintaining the on site quality of construction materials, with due emphasis on curing etc.
8. It is also recommended to review the soil conditions scientifically and decide about the engineering properties of soil, so as to incorporate necessary details for foundations.

These are the points put forward in general yet specific form along with the typical structural details

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