2.3 SHEAR WALLS

Necessity of shear wall

- When shear walls are designed and constructed properly, and they will have the strength and stiffness to resist the horizontal forces.
- In building construction, a rigid vertical diaphragm capable of transferring lateral forces from exterior walls, floors, and roofs to the ground foundation in a direction parallel to their planes.
- Lateral forces caused by wind, earthquake and uneven settlement loads in addition to the weight of structure and occupants; create powerful twisting forces.
- These forces can literally tear a building apart reinforcing a frame by attaching or placing a rigid wall inside it maintains the shape of the frame and prevents rotation at the joints.
- Shear walls are especially important in high rise building subjected to lateral wind and seismic forces.
- Shear wall buildings are usually regular in plan and in elevation, in some building, lower floor are used for commercial purposes and the building are characterized with larger plan

Types of shear walls based on materials:

- RC shear wall
- Plywood shear wall
- RC hollow concrete brick masonry wall
- Steel plate shear wall

RC shear wall:

- It consists of reinforced concrete wall and reinforced concrete slabs.
- Wall thickness varies from 140mm to 150mm, depending on the number of stories, building age, and thermal requirement.

- In general these walls are continuous throughout the building height however, some walls are discontinuous as the street front or basement level to allow for commercial or parking spaces.

Plywood shear wall:

1. Plywood is the traditional material used in the construction of shear walls.

2. The creation of prefabricated shear panels have made it possible to inject strong shear assemblies into small walls the fall at either side of a opening in a shear wall

plywood shear wall consists of

- Plywood to transfer shear force
- Chords to resists tension / compression generated by the over turning moments.
- Base connections to transfer shear to foundation.

RC hollow concrete block masonry walls:

- This walls are constructed by reinforced the hollow concrete block masonry, by taking advantage of hollow spaces and shape of the hollow blocks.
- It requires continuous steel rods both in the vertical and horizontal directions at structurally critical locations of the wall panels.
- RHCBM element are designing both as load bearing walls for gravity loads and also shear walls for lateral seismic loads to safety withstand earthquakes.

Steel plate shear wall:

- Steel plate shear wall s stem consists of a steel plate wall, boundary columns and horizontal floor beams.
- Together the steel plate girder, the column act as a vertical plate girder and steel plate wall act as its web.
- The horizontal floor beams act more or less as transverse stiffeners in a plate girder.
- The steel plate shear wall systems have been used in recent year in highly seismic areas to resists lateral loads.