

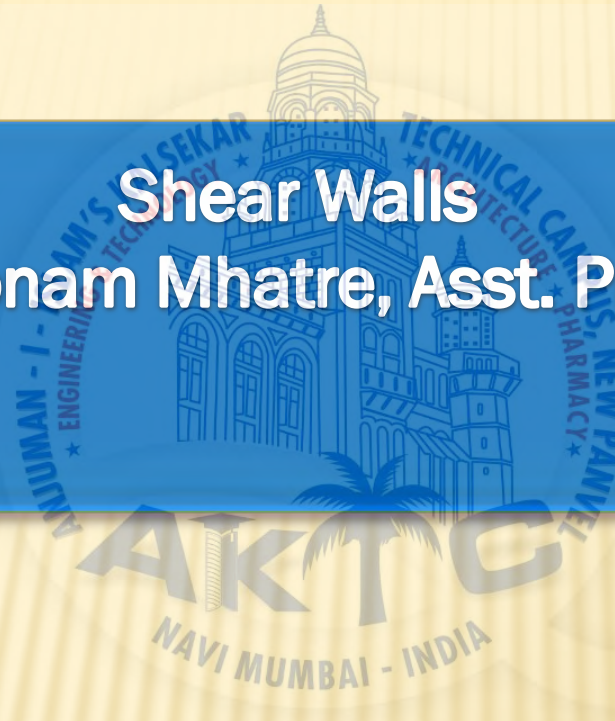


ANJUMAN-I-ISLAM'S KALSEKAR TECHNICAL CAMPUS NEW PANVEL

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SCHOOL OF ENGINEERING & TECHNOLOGY
SCHOOL OF PHARMACY
SCHOOL OF ARCHITECTURE

Shear Walls
Mrs. Poonam Mhatre, Asst. Professor



SHEAR WALLS

What is a Shear Wall ?

Reinforced concrete buildings often have vertical plate-like RC walls called Shear Walls in addition to slabs, beams and columns. These walls generally start at foundation level and are continuous throughout the building height. Their thickness can be as low as 150mm, or as high as 400mm in high rise buildings. Shear walls are usually provided along both length and width of buildings. Shear walls are like vertically-oriented wide beams that carry earthquake loads downwards to the foundation.

EARTHQUAKE

- ❖ An Earthquake (also known as a quake, tremor or temblor) is the result of a sudden release of energy in the Earth's crust that creates seismic waves.



TECHNIQUES TO RESIST EARTHQUAKES

- **SHEAR WALLS**
- Bracing
- Dampers
- Rollers
- Isolation
- Light weight materials
- Bands
- Others.



Brace
structure



When the limit is exceeded, it suddenly falls. The danger cannot be avoided.

Heim



When the limit is exceeded, it gradually deforms to absorb the earthquake energy. The danger can be avoided.

- Earthquakes affect RCC structures too...
- Slabs forces the beam to bend with it when horizontal forces act.

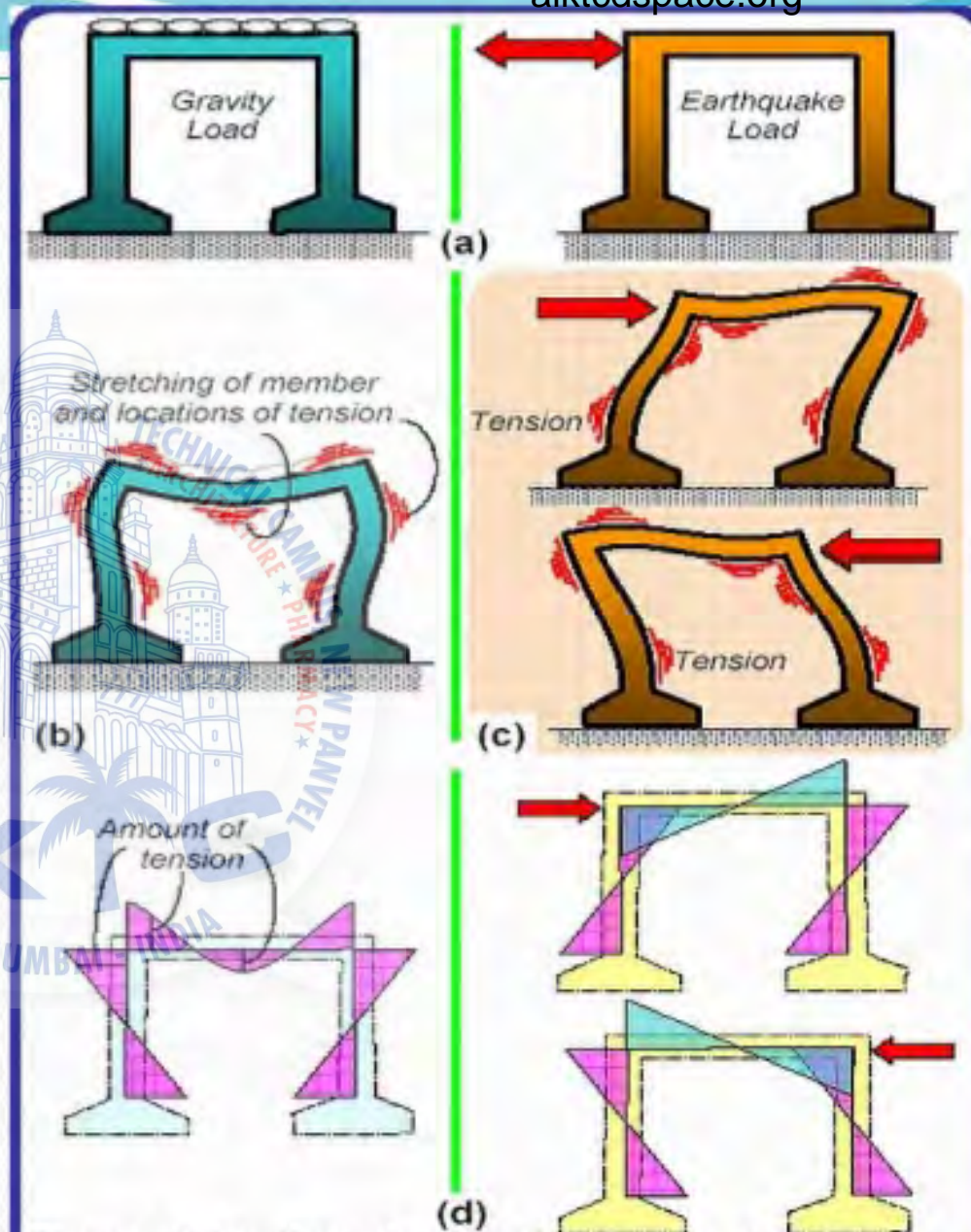
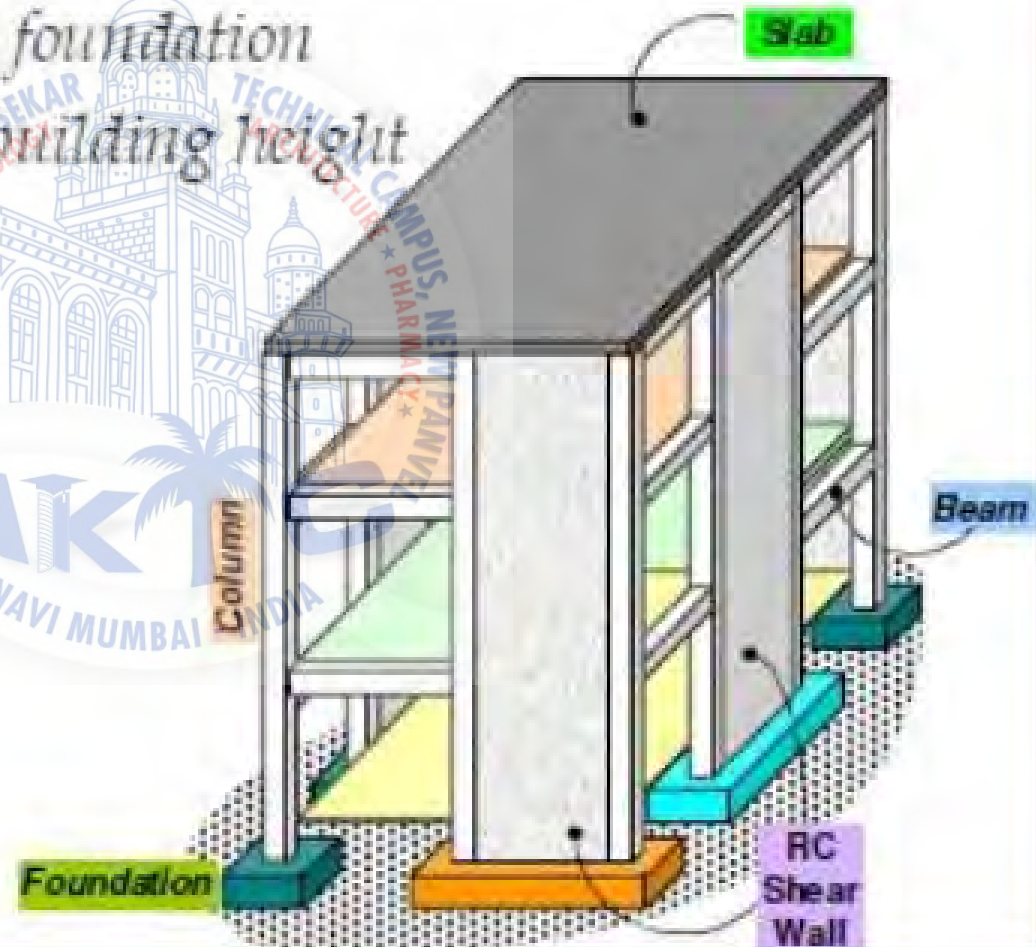
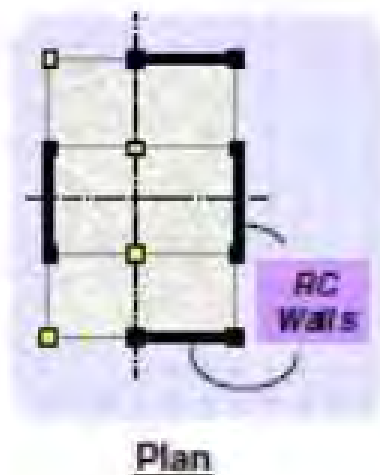


Figure 4: Earthquake shaking reverses tension and compression in members – reinforcement is required on both faces of members.

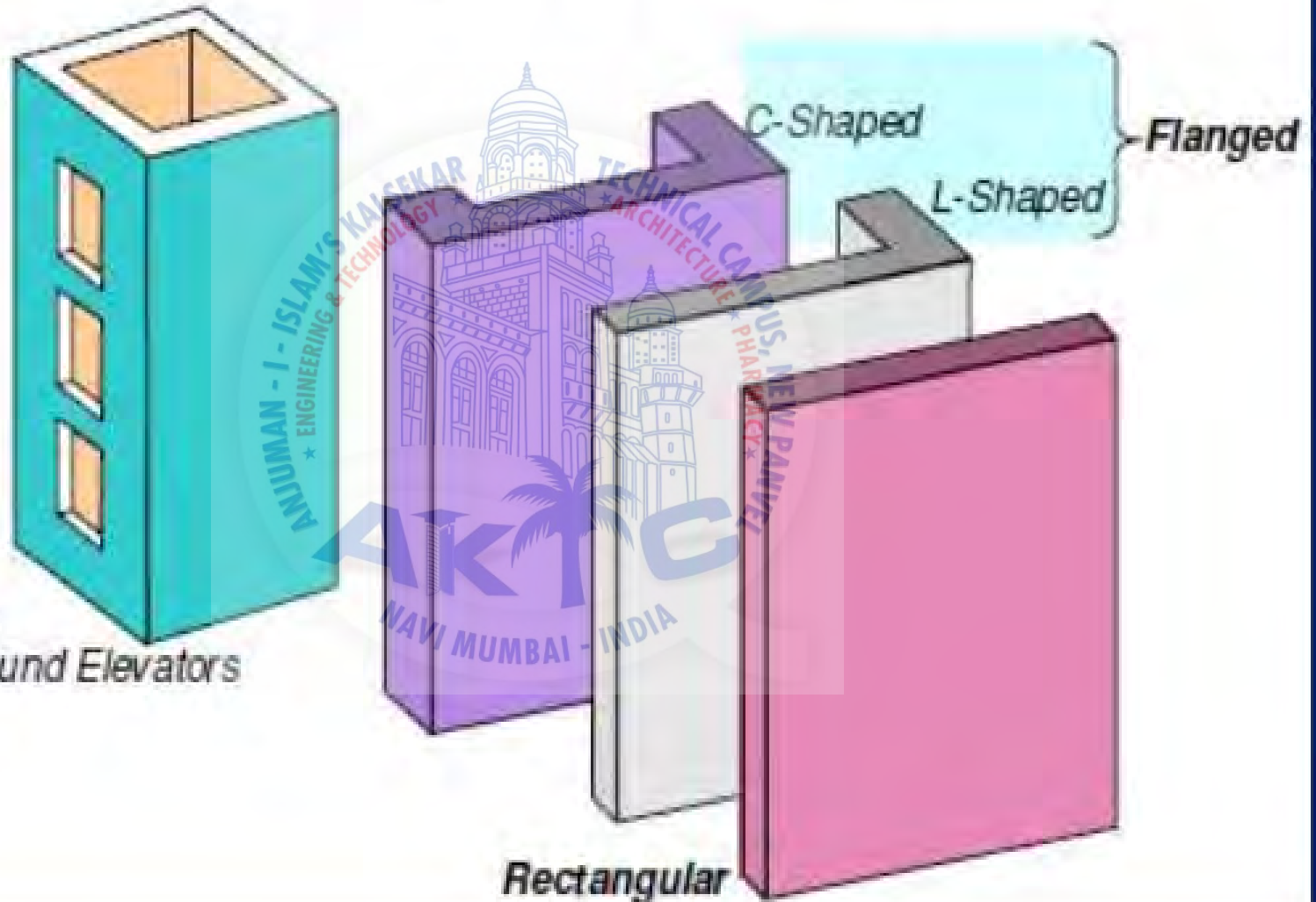
SHEAR WALL

- **What is a Shear Wall?**
 - Vertical plate-like RC Walls
 - Generally starts at foundation
 - Goes through full building height



SEISMIC DESIGN OF RC WALLS...

- Possible Geometry of Walls



*Hollow::
Walls around Elevators*

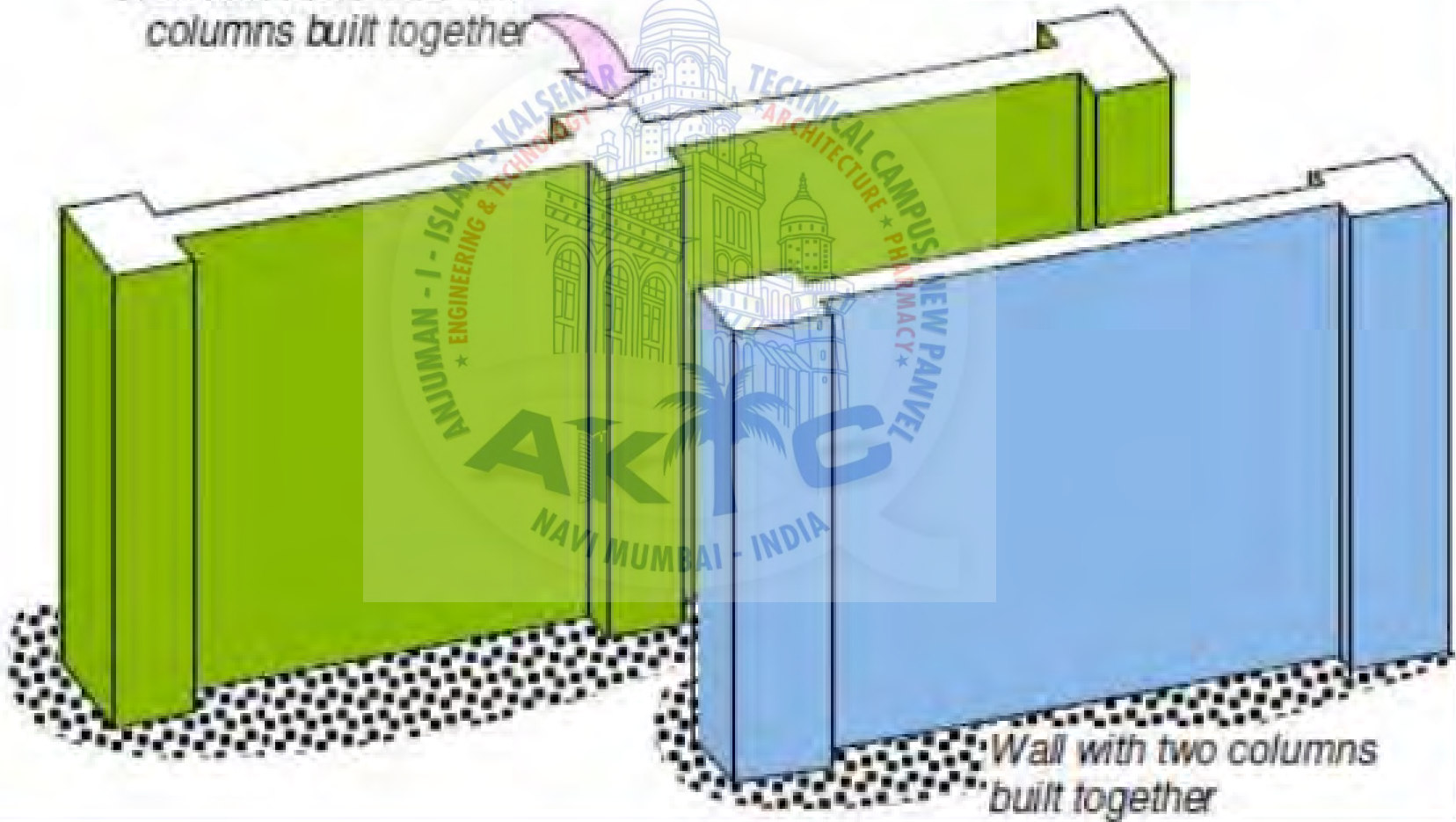
Rectangular

SEISMIC DESIGN OF RC WALLS...

- Possible Geometry of Walls...

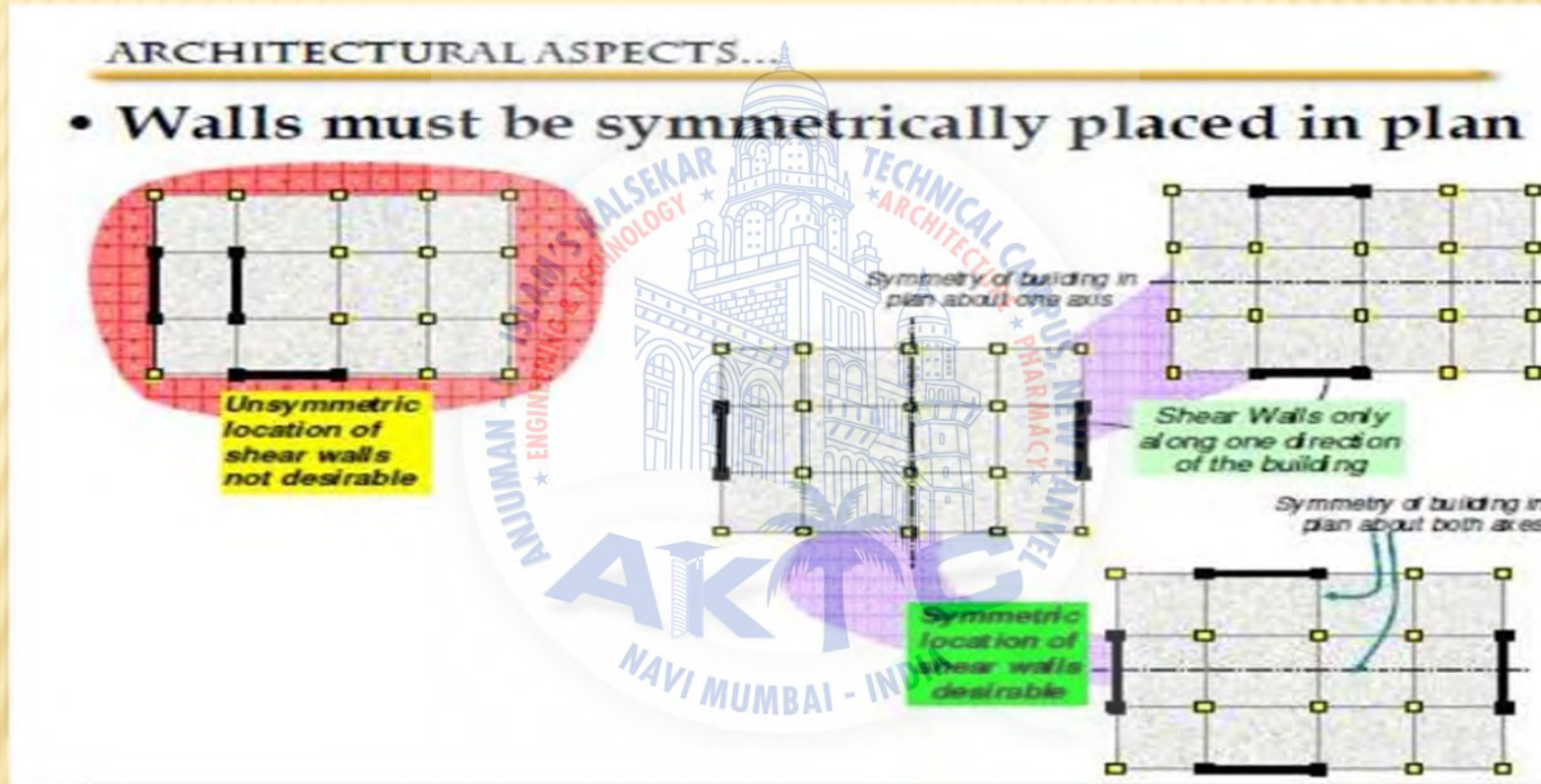
Barbell-Shaped

Wall with more than two columns built together



Wall with two columns built together

IMPORTANT POINTS TO BE CONSIDERED WHILE LOCATING SHEAR WALLS

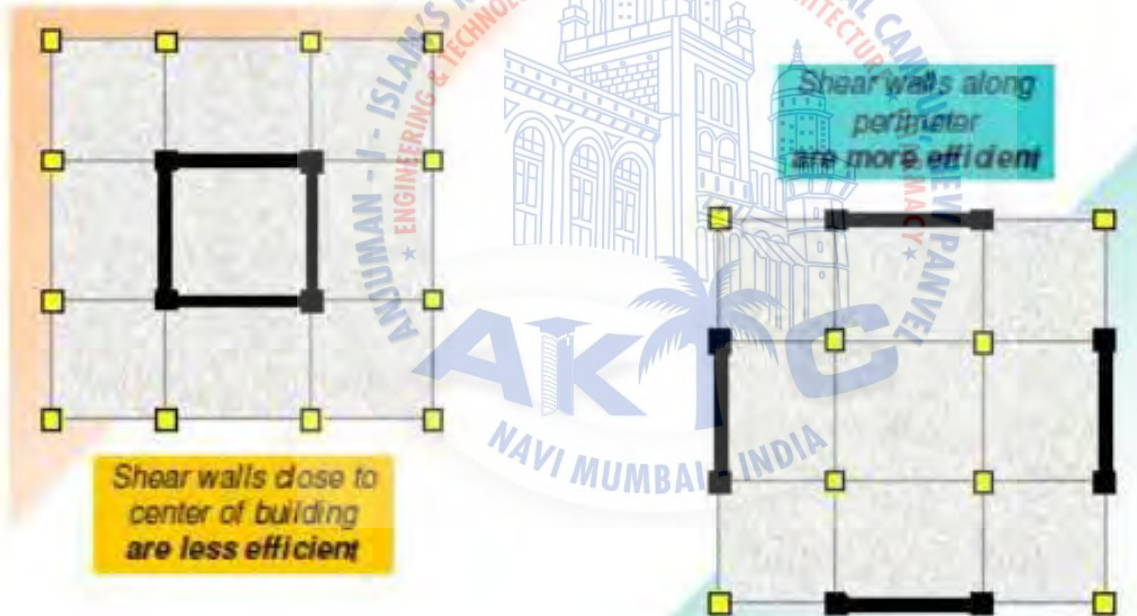


➤ SHEAR WALLS SHOULD BE ALWAYS PLACED SYMMETRICALLY IN PLAN

➤ THE SYMMETRY OF THE BUILDING SHOULD BE ALONG ONE AXIS OR BOTH THE AXIS

IMPORTANT POINTS TO BE CONSIDERED WHILE LOCATING SHEAR WALLS

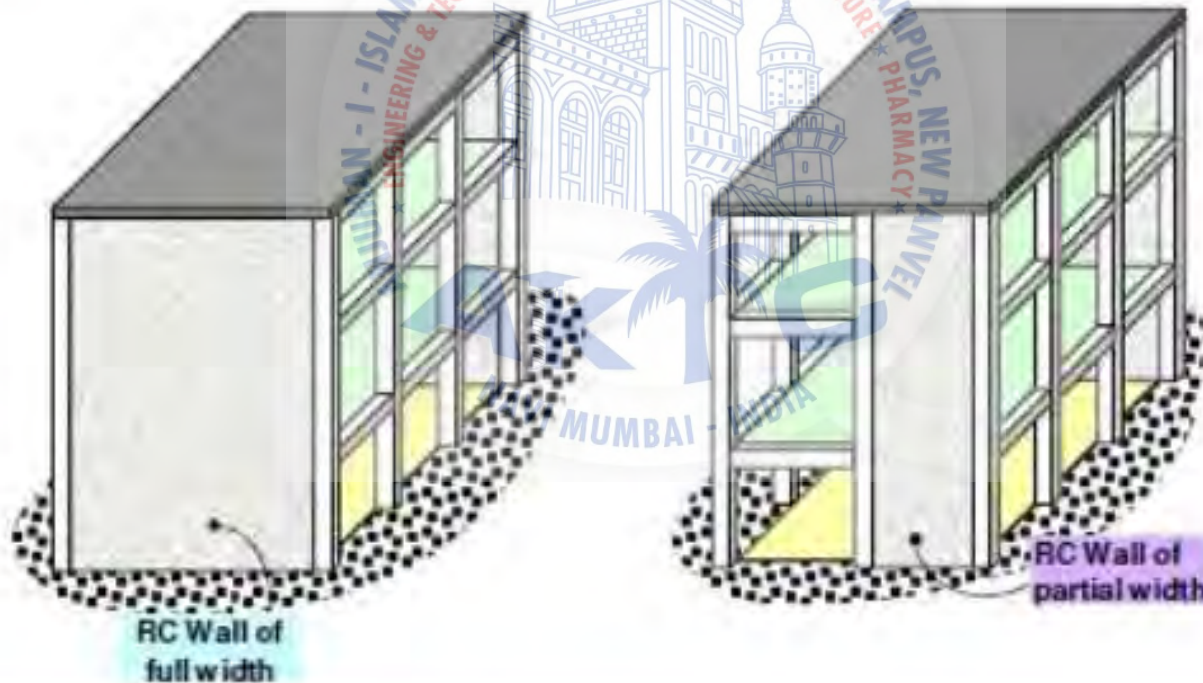
- Walls should be along perimeter of building
 - Improves resistance to twist



SHEAR WALLS ARE GENERALLY CONSTRUCTED ALONG THE PERIPHERY OF THE BUILDING TO IMPROVE RESISTANCE TO TWIST.

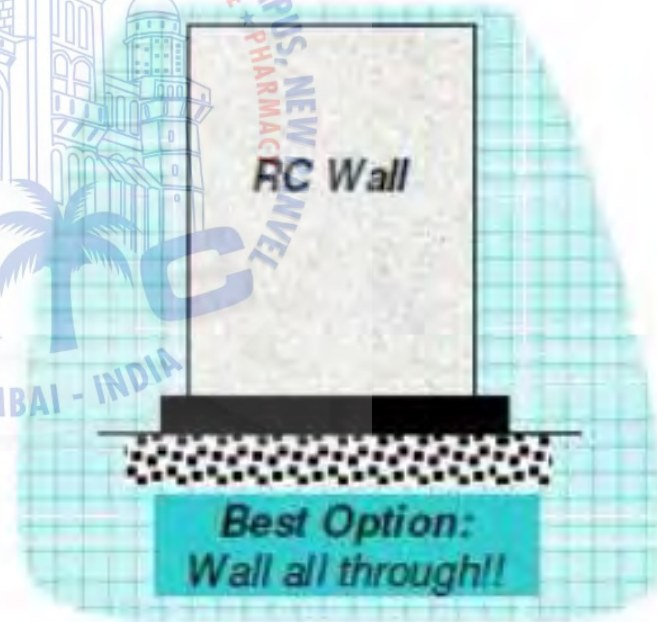
IMPORTANT POINTS TO BE CONSIDERED WHILE LOCATING SHEAR WALLS

- Shear wall can extend over the full width of building, or even over partial width



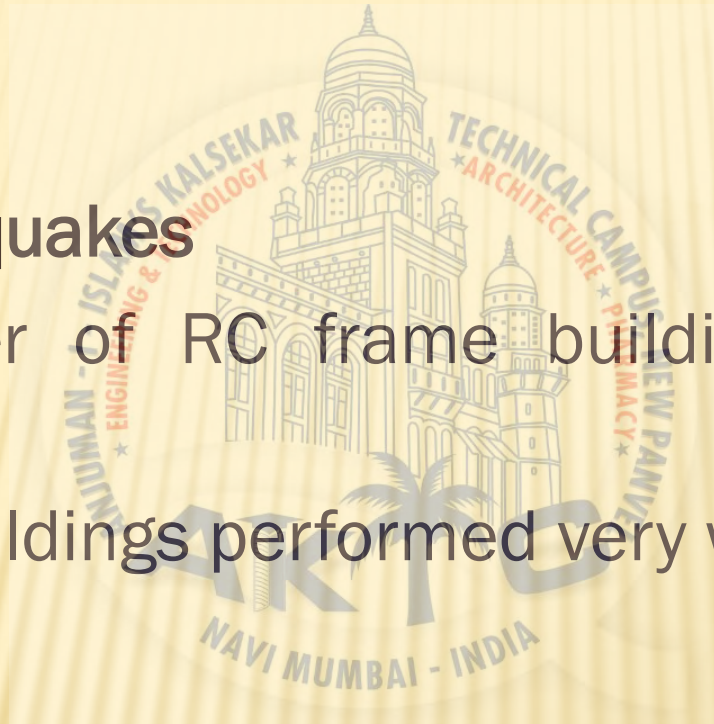
IMPORTANT POINTS TO BE CONSIDERED WHILE LOCATING SHEAR WALLS

- Walls should be throughout the height
 - *Cannot be interrupted in lower levels*



ADVANTAGES OF SHEAR WALLS

- ✘ Very good earthquake performance, if properly designed.
- ✘ In past earthquakes
 - Large number of RC frame buildings damaged or collapsed.
 - Shear wall buildings performed very well.
- ✘ Easy to construct
 - Straight forward reinforcement detailing
 - Easily implemented at site



ADVANTAGES OF SHEAR WALLS

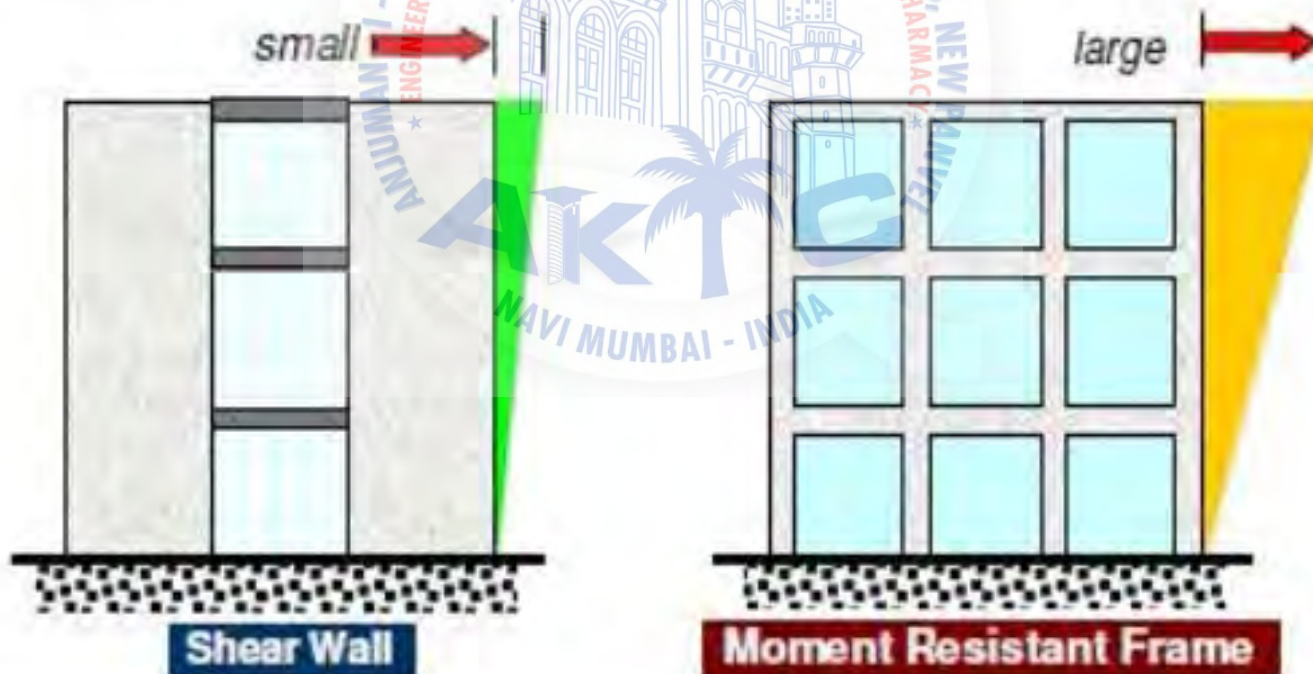
✘ Effective in

- Reducing the cost of construction
- Minimizing earthquake damage to
 - Structural elements
 - Non-structural elements like glass windows, building contents etc.

ADVANTAGES OF SHEAR WALLS

- **Advantages of Shear Walls...**

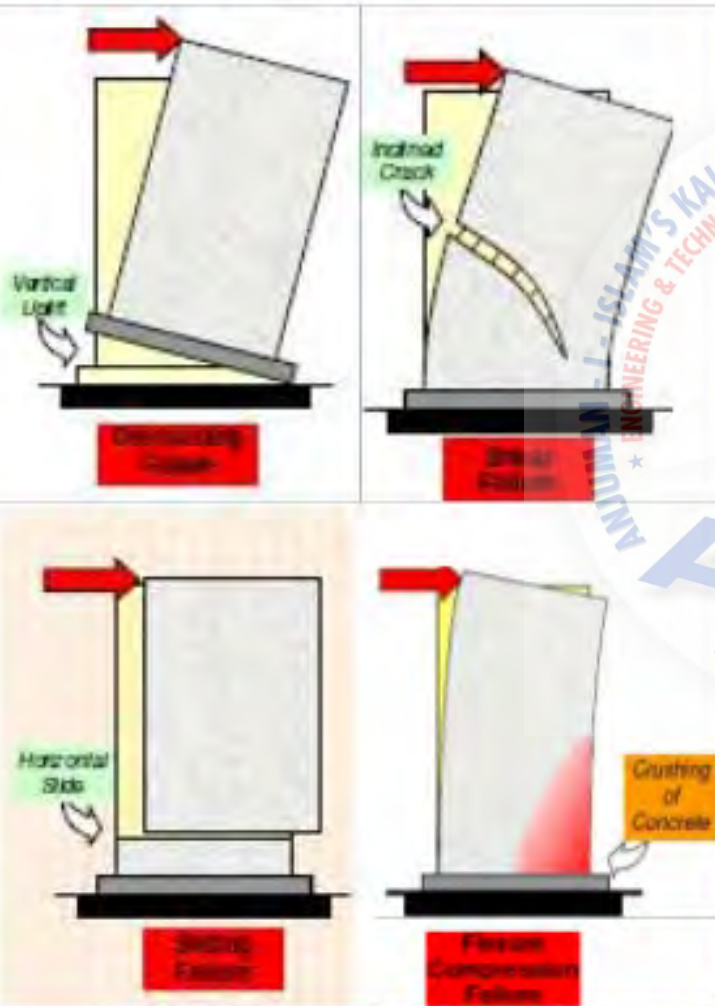
- Lesser lateral displacement than frames
- Lesser Damage to structural and non-structural elements



ADVANTAGES OF SHEAR WALLS

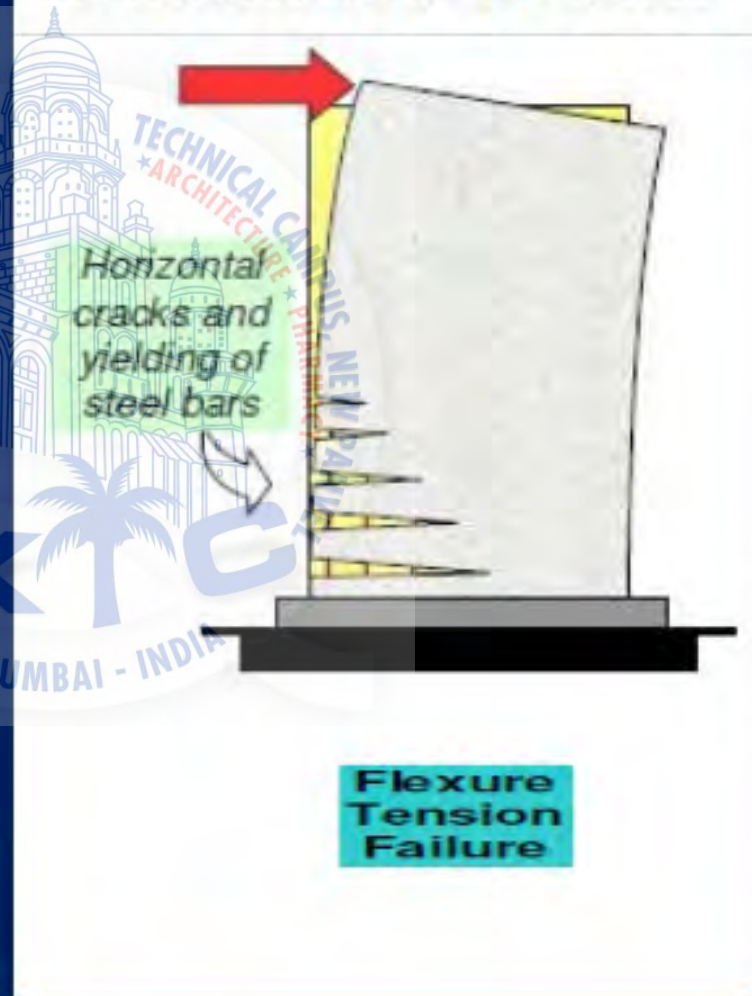
SEISMIC BEHAVIOUR

• Undesirable Modes of Failure

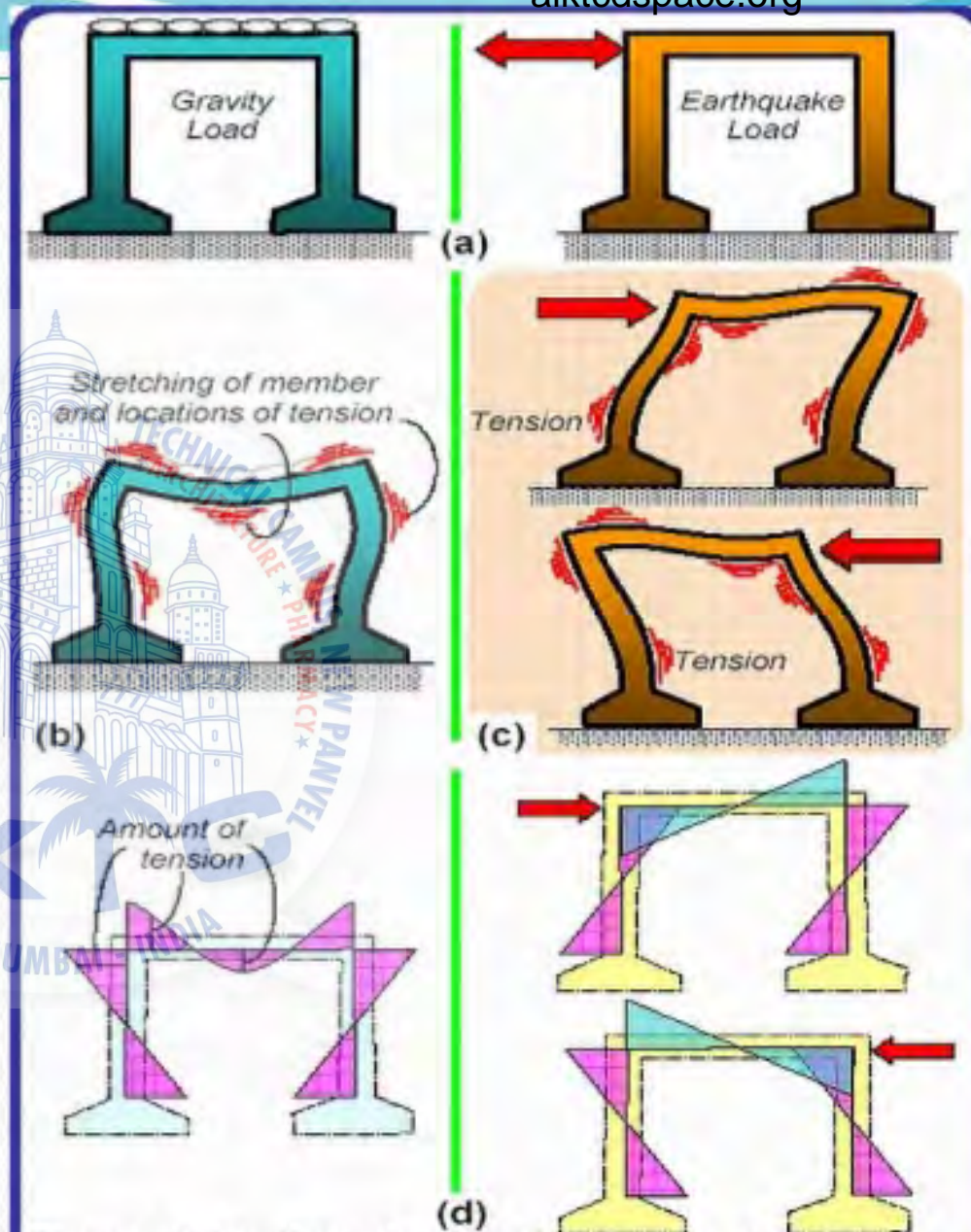


SEISMIC BEHAVIOUR...

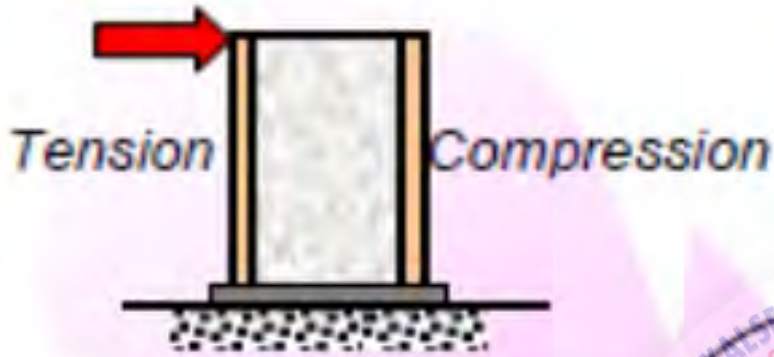
• Desirable Mode of Failure



- Earthquakes affect RCC structures too...
- Slabs forces the beam to bend with it when horizontal forces act.

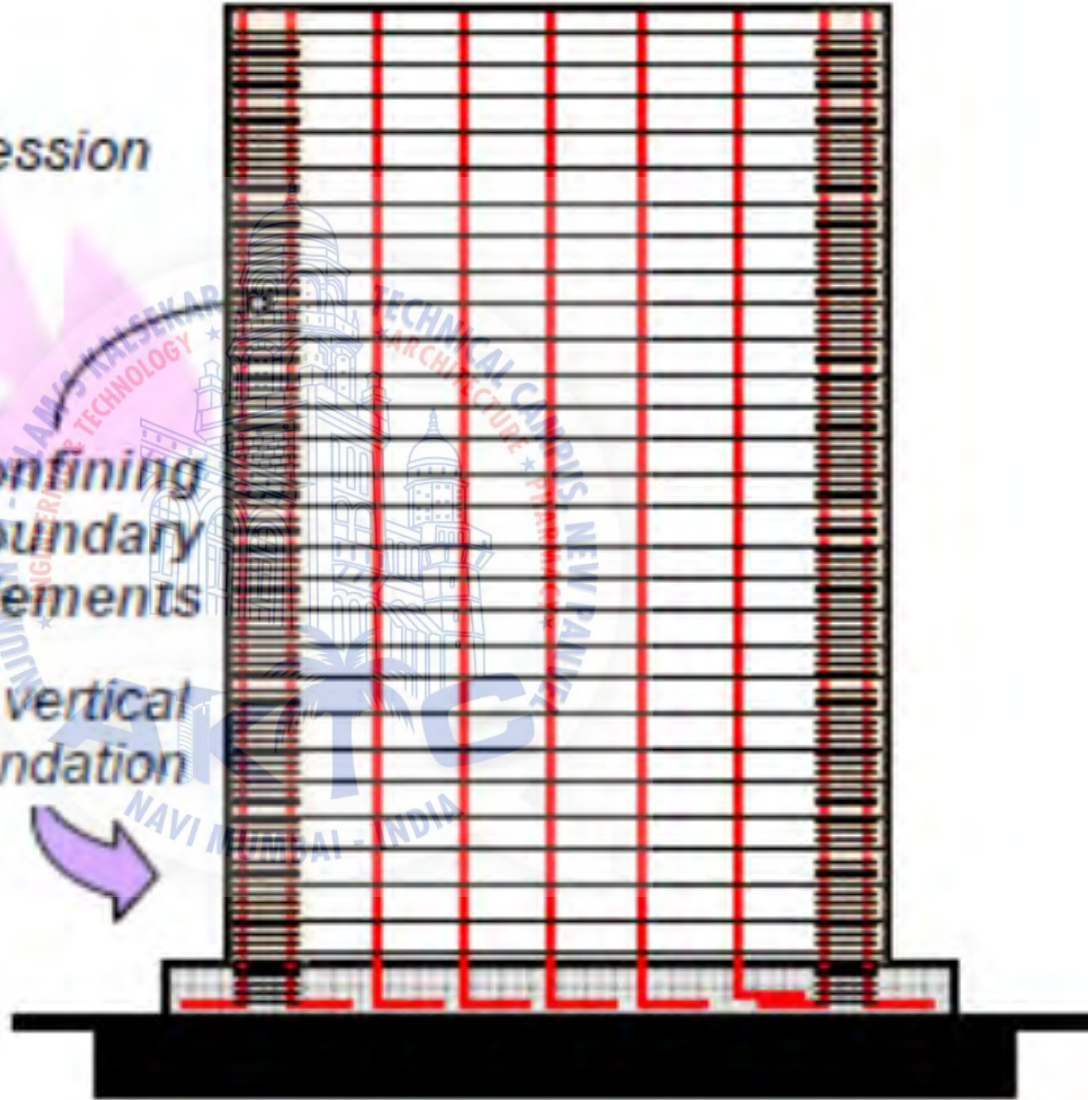


ADVANTAGES OF SHEAR WALLS



Closely spaced confining reinforcement in boundary elements

Proper anchoring of vertical reinforcement into foundation

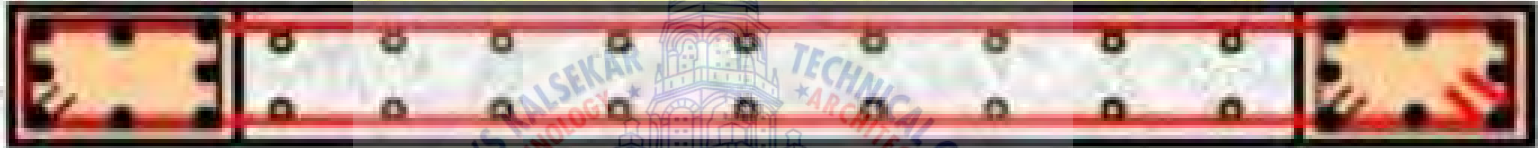


(a)

ADVANTAGES OF SHEAR WALLS

Boundary Element

Boundary Elements without increased thickness



Boundary Elements with increased thickness

Boundary Element



*Confining reinforcement in boundary elements:
135° hooks, closely spaced ties*

Anchoring of wall reinforcement in boundary element