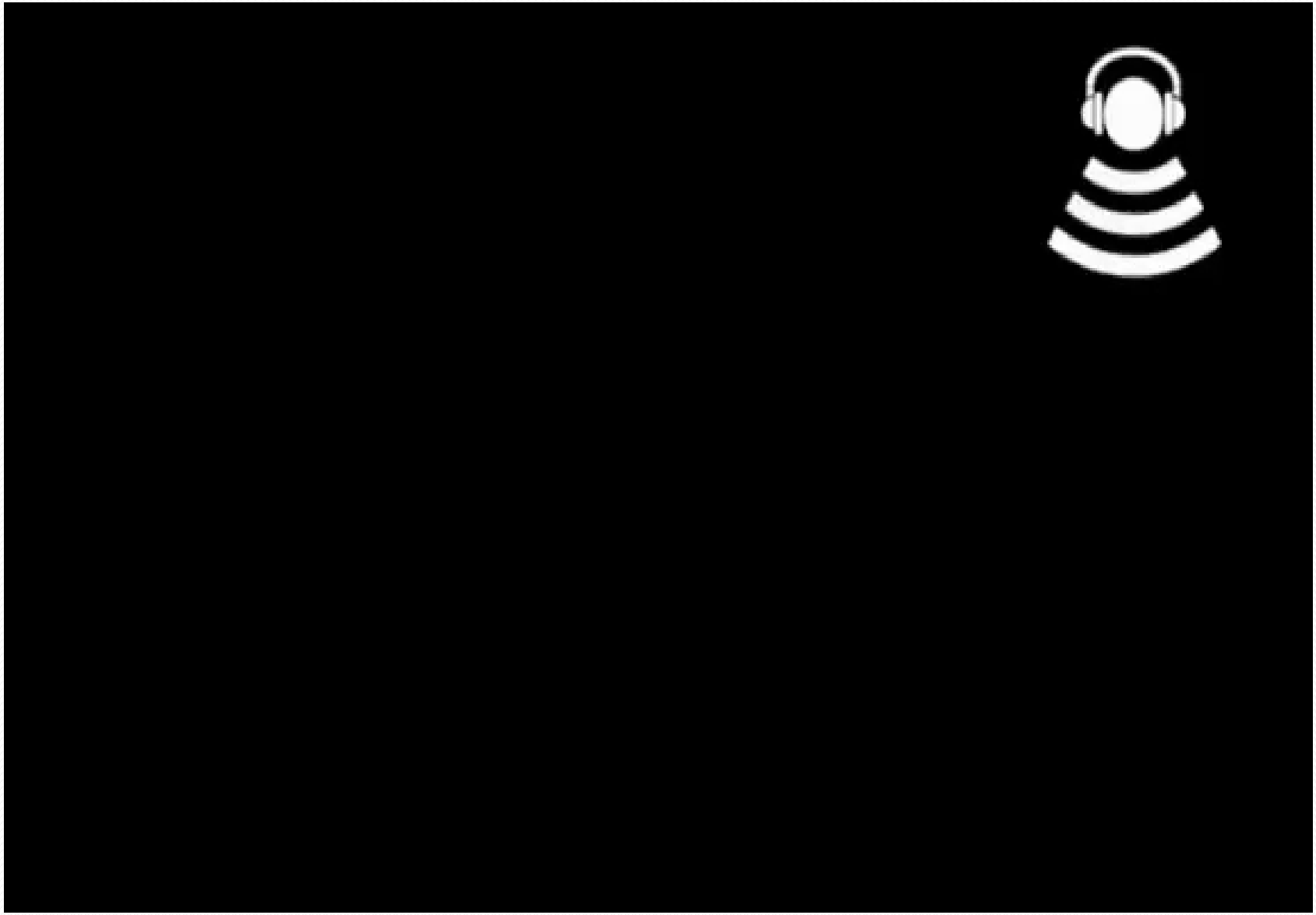
DEAR FRIENDS

WELCOME

RED - RH

RE-CONSTRUCTION OF EARTHQUAKE DAMAGED RURAL HOUSES

PLATE TECTONICS



EARTHQUAKE ANIMATED

PLINTH AREA

27’-2” X 22’-3”

= 605sft.

COST

Rs 4.89 LAKHS

PLINTH AREA RATE

Rs. 808.26/Sq.ft.

PROVISIONS

. BED ROOMS = 2 Nos.
. KITCHEN CUM
DINING = 1 No.
. TOILET = 1 No.
. VERANDHA = 1 No.

FOOTING - DETAILS

- **FOOTING DEPTH MINIMUM - 6' – 0"**
- **FOOTING SPREAD - 4' X 4'**
- **PYRAMID - OUTTER 4", INNER – 12"**
- **MIX - 1: 2: 4**
- **TOR STEEL - 12MM in Both Direction**

Number of columns - 9 Nos.

Foundation Size For columns

4'-0" x 4'- 0"

Depth of Foundation – 6'

Bars for column mesh 12mm dia.

8 nos. Both Ways.

Note:

Mix to be used for R.C.C. 1 :2 :4

1. **Minimum Extra Length for hook 10d, where "d" is the diameter of the stirrups**
2. **Max. spacing of Stirrups near joints 1/4D up to a length of 2D, where D is the over all depth of beam /least lateral dimension of the column.**

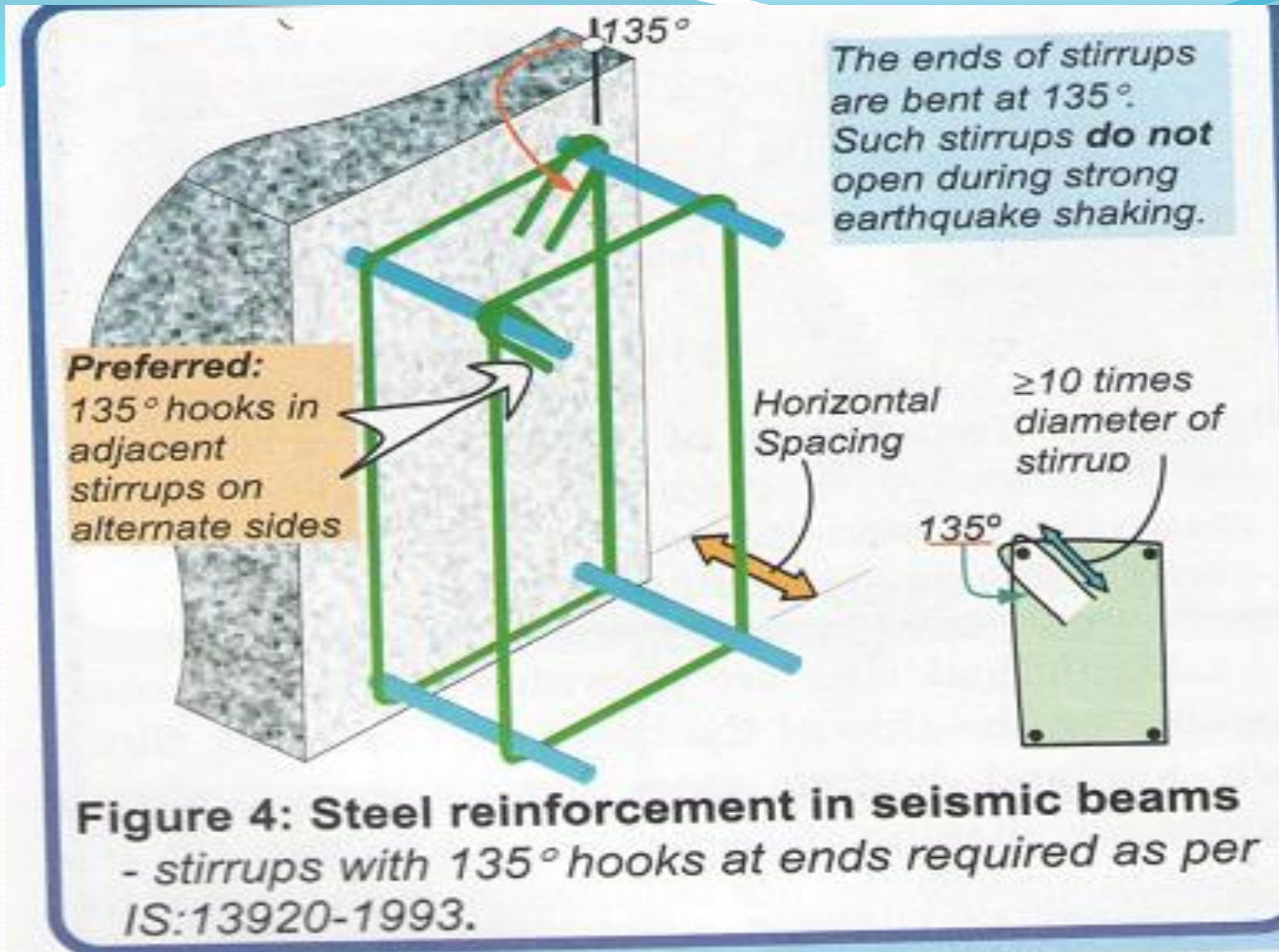


Figure 4: Steel reinforcement in seismic beams
- stirrups with 135° hooks at ends required as per IS:13920-1993.

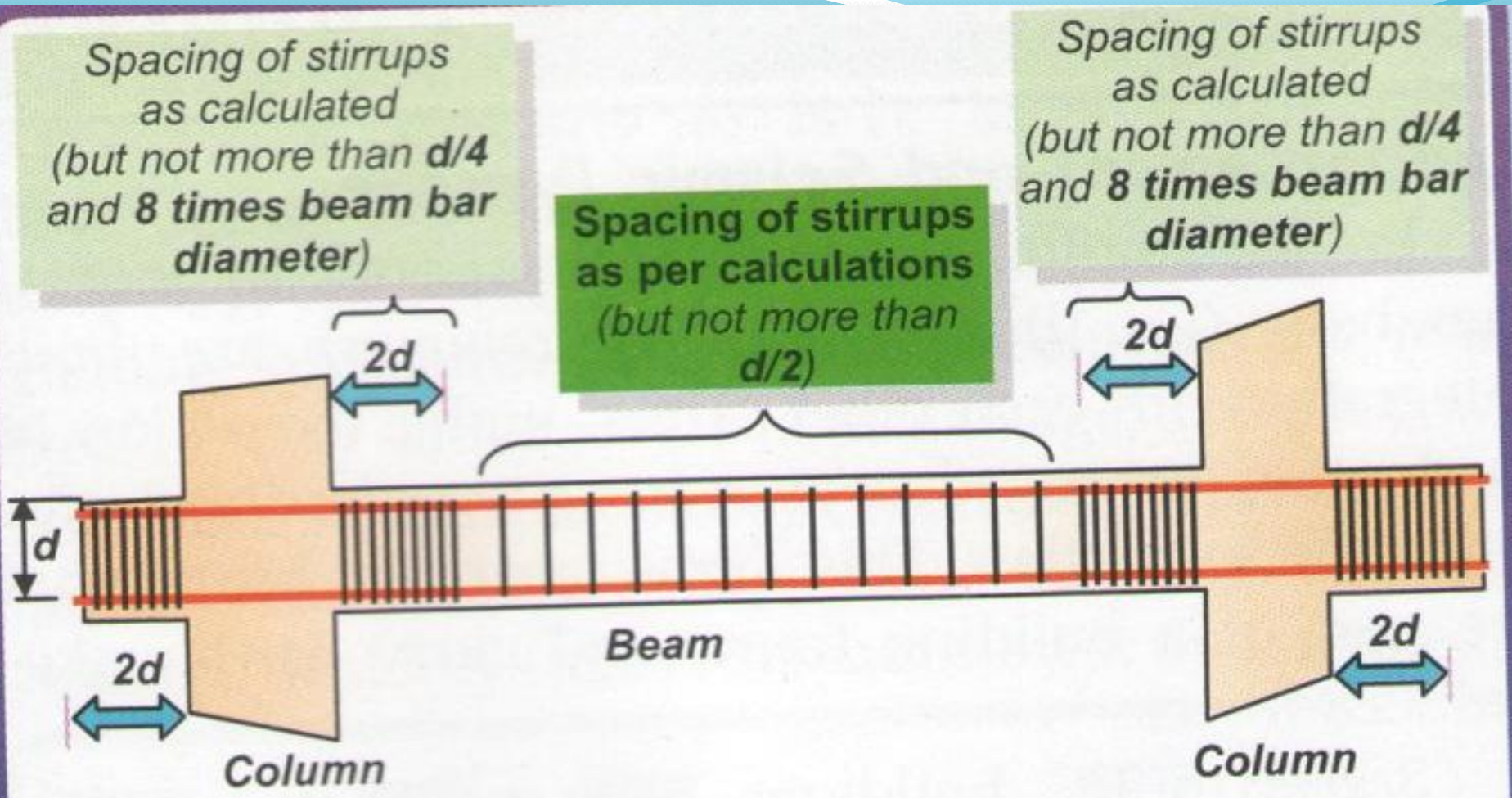


Figure 5: Location and amount of vertical stirrups in beams – *IS:13920-1993 limit on maximum spacing ensures good earthquake behaviour.*

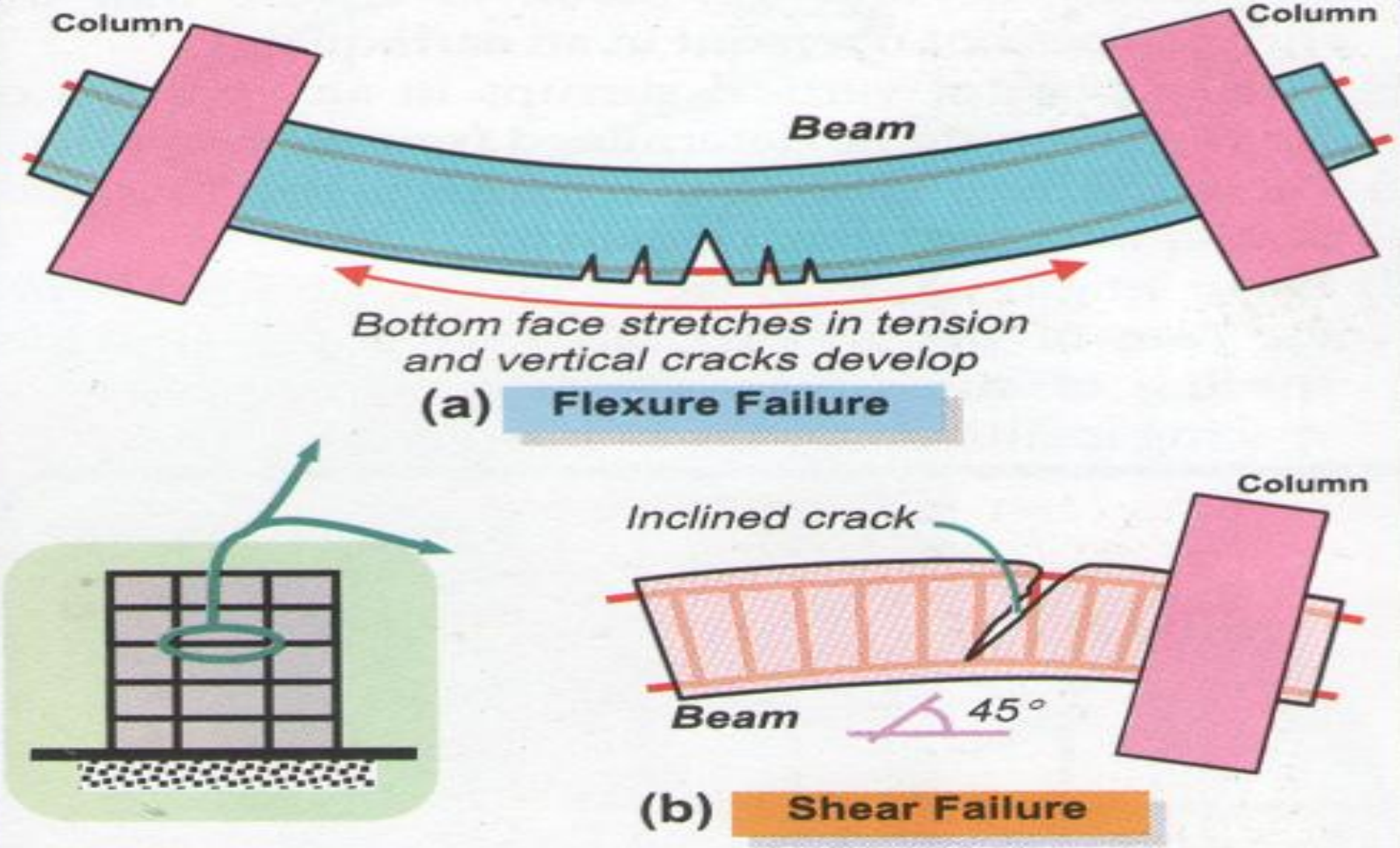


Figure 2: Two types of damage in a beam: *flexure damage is preferred. Longitudinal bars resist the tension forces due to bending while vertical stirrups resist shear forces.*

Column:-

Size 12” x 12”

TOR STEEL BARS 4 nos. of 16mm dia.

ELL length for column rod 2’ - 0”

Stirrups - 8mm dia. 9” x 9” @ 3” C/C near the joints and 6” C/C for other portion

Plinth beam 12” x 12”

Rod requirement 4 nos. 12mm dia. rods

COLUMN contd.

Stirrups / ring rod 9" X 9" @ 3"c/c near the joints and 6" for other portions

Height of Plinth 1' - 6"

Height of Column up to beam level 8'- 0"

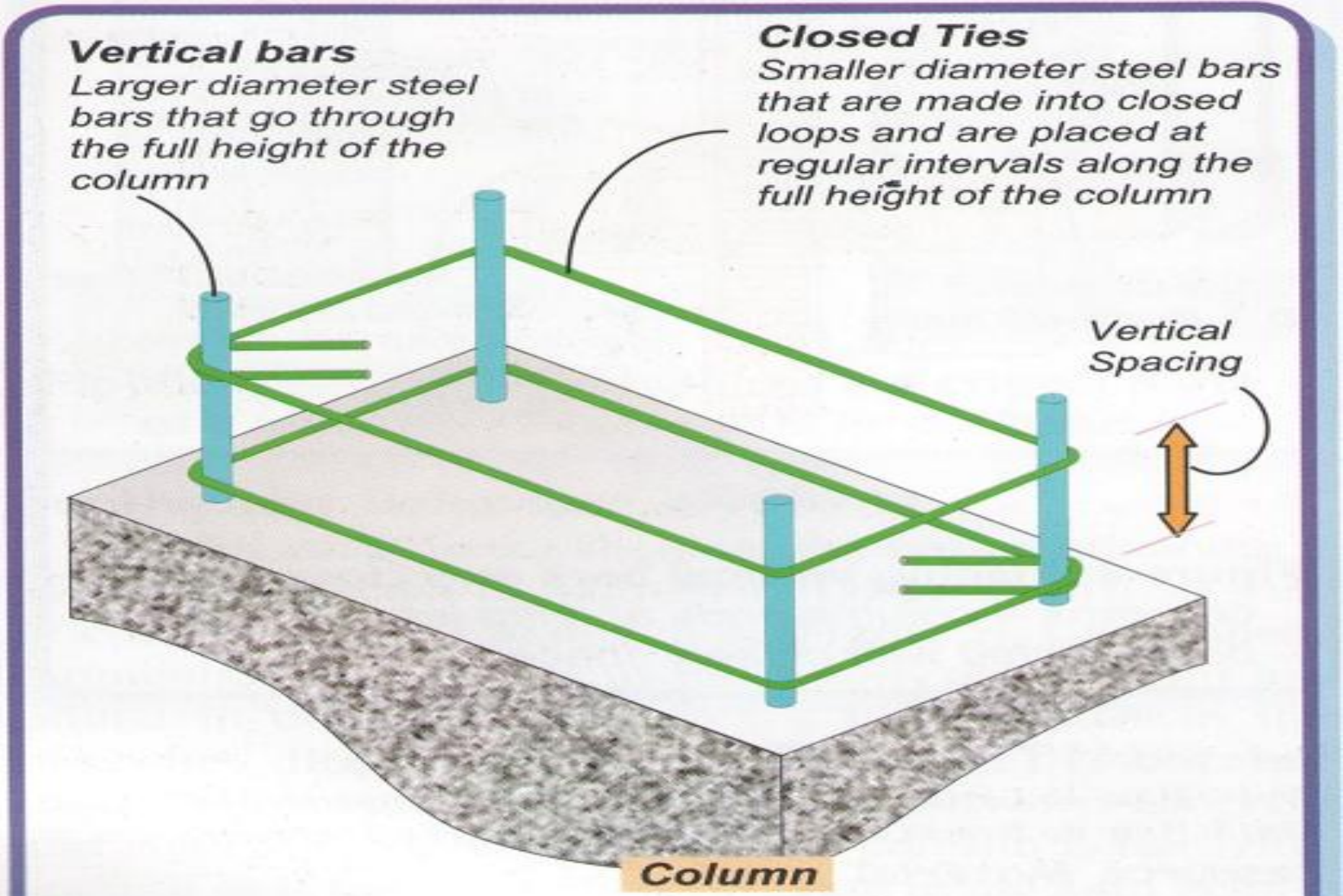


Figure 1: Steel reinforcement in columns – *closed ties at close spacing improve the performance of columns under strong earthquake shaking.*

Ties with ends bent at 135°

*The ends of ties are bent at 135°. Such ties **do not** open during strong earthquake shaking.*

(a)

Shear Failure
Large spacing of ties and lack of 135° hook ends in them causes brittle failure of during 2001 Bhuj earthquake

(b)

Figure 2: Steel reinforcement in seismic columns
– closed ties with 135° hooks are required as per Indian Ductile Detailing Code IS:13920-1993.

Roof beam

Size 12”X 16” (12” + 4”)

Cantilever beam 12” X 16” at joint and 4” at the outer end

Details of Rod – FOR BEAM

BOTTOM 3 nos. 16mm dia.

TOP 2 nos. 12mm dia.

Short Piece 2 nos. 16mm dia. of 6’ long

Stirrups 8mm dia. 4” @ C/C near the joints and 6” C/C for other Portions

Roof beam - cantilever

Size 12”X 16” (12” + 4”)

Cantilever beam 12”X 16” at joint and 4” at the outer end

FOR CANTILEVER TOP 2 NOS 16mm Dia. & 2nos 12 mm

Bottom 2nos 12mm Dia.

Stirrups 8mm dia. 3 ” @ C/C through to end

Note:

Mix to be used for R.C.C. 1 : 2 : 4

Minimum Extra Length for hook 10d, where "d" is the diameter of the stirrups

Max. spacing of Stirrups near joints 1/4D up to the length of 2D, where D is the over all depth of beam / least lateral dimension of the column

Roof Slab:-

Thickness: - 4”

Details of Rod:-

Main Bar: 10mm dia. @ 8” c/c both ways.

Alternate Bars to be bent up

Short piece :10 mm dia. of 6’ long

GCI SHEET ROOFING

- WOODEN TRUSS – SHOULD BE A COMPOSITE UNIT
- JOINTS ARE IMPORTANT – MORTISE & TENNION,
- TOUNGE & GROOVE, LAP JOINTS
- INTRODUCE FLAT PLATE ANGLE STRAPS WITH NUTS & BOLTS
- GCI SHEET PUNCHING THE CORRECT WAY
- REMOVING GLAZE ON SHEET BEFORE PAINT
- CORRECT USE OF LIMPET BITUMENISTIC WASHERS AND STANDARD L OR J HOOKS

GOOD WORK PRACTICES

- CLEAN SAND & AGGREGATE
- MAINTAIN WATER CEMENT RATIO
- MIX BE DONE ON CLEAN AND STRONG PLATFORM
- WASH AGGREGATES BEFORE MIX
- MAKE WOODEN BOX FOR CORRECT MEASURE
- BARS SHOULD NOT BE TAMPERED OR KINKED
- BARS SHOULD BE RUST FREE
- MAINTAIN AGGREGATE SIZE
- SECURE ALL SCAFFOLDING AND FORM WORK
- MAINTAIN SECURITY REQUIREMENTS
- MAINTAIN QUALITY & QUANTITY.

MATERIAL QUANTITY - DETAIL

Carriage	SIZE	kgs	mtr	nos / Bags
TS 16mm	16mm	675 kgs	427	35.6
TS 12mm	12mm	461 kgs	518	43.2
TS 10mm	10mm	1094 kgs	1765	147.0
TS 8mm	8mm	440 kgs	1128	94.0
		2600 kgs		
Cement				300
Bricks				6000
Sand				600
Aggregate				1200

Effects of completely shattered joints of concrete frame

Support-columns and upper deck failure,

Failure of retaining wall due to ground movement

Shifting from foundation.


MARMARA
MARKET

THANK YOU