

GRADE OF CONCRETE AND STEEL FOR BUILDINGS HAVING MORE THAN 3 STOREYS MINIMUM CONCRETE GRADE M-25 AND MAXIMUM STEEL GRADE F_y 415 TO BE USED.

2. DETAILING OF BEAMS

a. MEMBER SIZE PROPORTIONS

1. WEB WIDTH $b \geq 200 \text{ mm}$
- II. OVERALL DEPTH $D < 0.25 L$ (L-CLEAR SPAN)
- III. RATIO $b/D > 0.3$ PREFERABLY

b. LONGITUDINAL REINFORCEMENT

1. MINIMUM LIMIT OF TENSION STEEL AREA RATIO

$$\rho = \frac{A_{st}}{bd} \quad \left\{ \begin{array}{l} \rho_{\text{MIN}} = 0.24 \sqrt{f_{ck}} \\ \rho_{\text{MAX}} = 0.025 \end{array} \right.$$

- II. MAXIMUM LIMIT OF STEEL AREA RATIO

$$\rho_{\text{MAX}} = 0.025$$

- III. AT JOINT FACE MINIMUM COMPRESSION STEEL $A_{sc} \geq 0.5 A_{st}$

- IV. MINIMUM 2 BARS SATISFYING MINIMUM REINFORCEMENT CRITERIA TO RUN THROUGHOUT LENGTH OF BEAM ON TOP AS WELL AS BOTTOM FACE.

- V. ALL LONGITUDINAL BARS TO HAVE FULL ANCHORAGE $(L_d + 10 \times \text{DIA OF BAR})$ - ALLOWANCE FOR 90° BEND IN END COLUMNS. LONG BARS SHOULD BE SPLICED IN THE MIDDLE PART OF THE BEAM BETWEEN QUARTER SPAN POINTS AND BETWEEN A DISTANCE OF NOT LESS THAN 2d FROM THE JOINT FACE.

c. TRANSVERSE REINFORCEMENT

SPACING OF STIRRUPS IN THE END 2d LENGTH OF BEAM'S IS GIVEN BY

$$s \leq d/4 \quad \text{'d' - EFFECTIVE DEPTH OF BEAM}$$
$$s \leq 8 \times \text{SMALLEST LONGITUDINAL DIMENSION}$$
$$s \geq 100 \text{ mm}$$

3. COLUMN DETAILING

a. MEMBER SIZE PROPORTIONS

- I. $b \geq 200 \text{ mm}$ AND $b \geq 300 \text{ mm}$ IF BEAM SPANS EXCEED 5m OR UNSUPPORTED COLUMN HEIGHT EXCEEDS 4m WHERE 'D' IS LARGER DIMENSION
- III. $b/D \geq 0.4$

b. LONGITUDINAL REINFORCEMENT

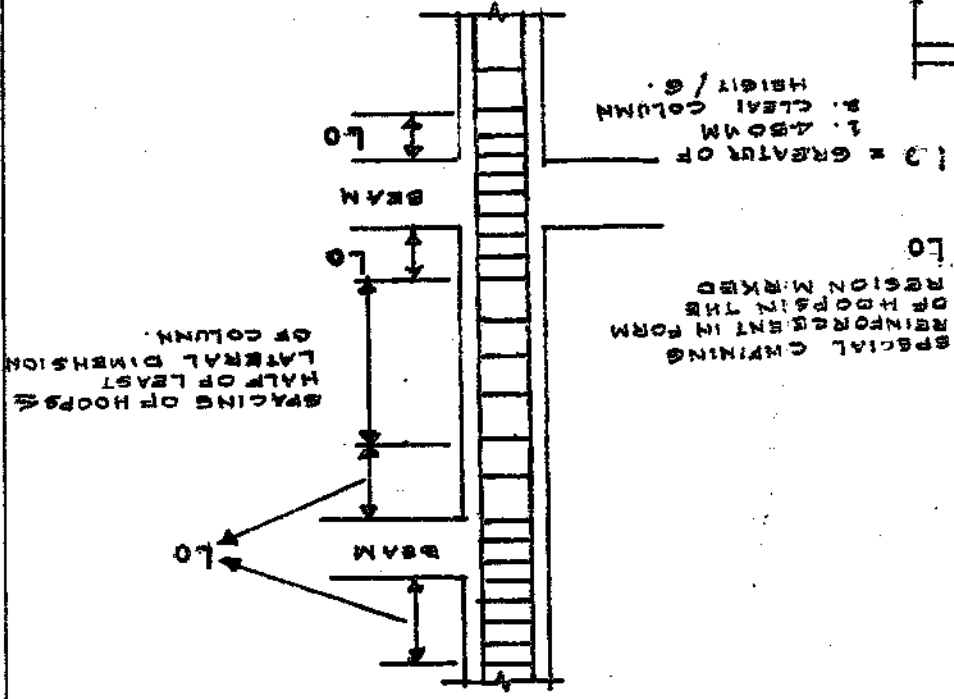
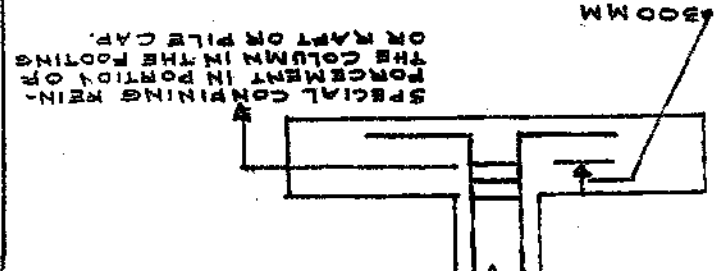
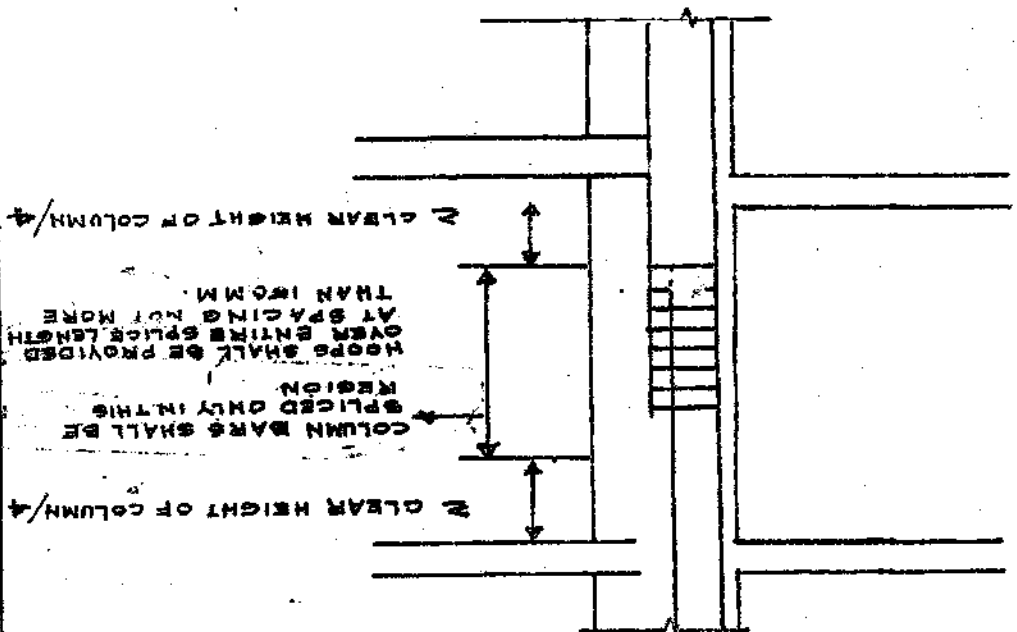
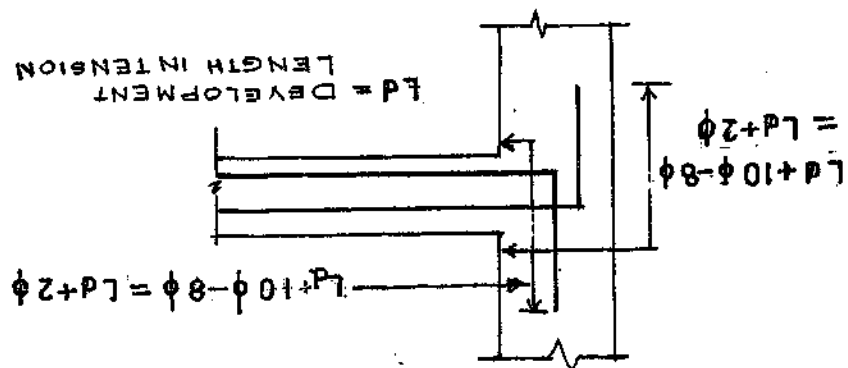
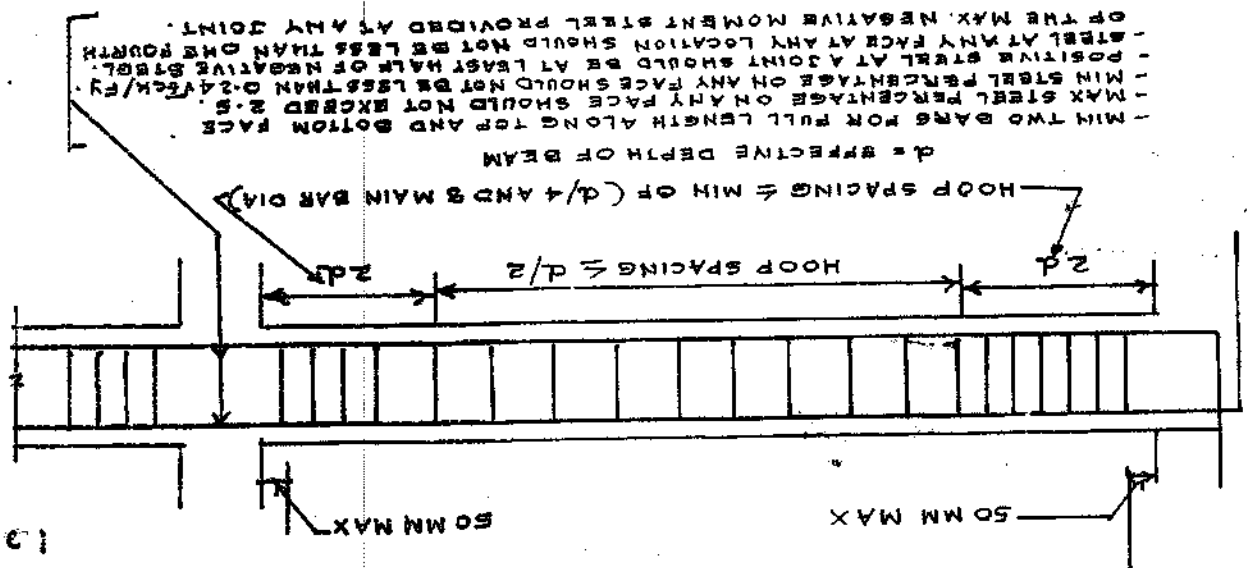
- I. NOT MORE THAN 50% OF LONGITUDINAL STEEL BARS TO BE SPLICED IN ANY ONE SECTION
- II. SPLICE LENGTH = L_d
- III. SPLICES TO BE ENCLOSED WITHIN CLOSED HOOPS @ $150 \text{ mm } \%$

c. TRANSVERSE REINFORCEMENT

- I. $c \leq b/4$ 'b' IS SMALLER DIMENSION
- II. $100 \text{ mm} \geq s \geq 75 \text{ mm}$
- III. SPACING OF HOOPS $\geq b/2$
- IV. SPECIAL CONFINING HOOP REINFORCEMENT AT END OF COLUMN TO BE PROVIDED FOR A LENGTH LARGEST OF (a) 450 mm OR (b) $1/6^{\text{th}}$ CLEAR HEIGHT OF COLUMN OR (c) LONGER LATERAL DIMENSION 'D' OF COLUMN
- V. TRANSVERSE TIES FOR SPECIAL CONFINING REINFORCEMENT IN THE FORM OF CLOSED HOOPS TO BE PROVIDED WHERE HOOKS AT THE END OF STIRRUPS SHOULD BE BENT THROUGH 135° WITH A LENGTH OF $10 \times \text{STIRRUP BAR DIA}$ AND PARALLEL LEGS OF RECTANGULAR HOOP SHOULD BE SPACED NOT MORE THAN $300 \text{ mm } c/c$ IN PLAN.

DATE 31-12-2002		DRN CK PREM	DES V V RAMAN	SCALE AS SHOWN	SO-2 (DESIGN) Lt Col Member	SO-1 (DESIGN) for CHIEF ENGINEER Lt Col
CHIEF ENGINEER	UDHAMPUR ZONE	DRG. NO. CE/TD-1186/2002				
ADDITIONAL NOTES ON DUCTILE DETAILING (IS:13920-1993)						
REVISIONS						
SL. NO.	DATE	DESCRIPTION	INT.			

SEISMIC DETAILING OF POSITIVE AND NEGATIVE MOMENT REINFORCEMENT.



SN#	DATE	DESCRIPTION	INITIAL
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REVISION

ADDITIONAL NOTES ON DUCTILE

DATE: 31-12-02
 Dtn: RAVINDRAN
 Desg: V V RAMAN
 DRG NO: CE/10186/02

CHIEF ENGINEER SHI NO. 2/3 UDHAMPUR ZONE

For Chief Engineer
 Lt Col S O-I (Design)
 Lt Col S O-II (Design)

CHIEF ENGINEER NO. 3/3 UDHAMPUR ZONE		D.F.No. - Scale -	
Date 31-12-2002 Dm Ravindran Desg VV Raman		DRG NO:CE/TD-1186/02	
(AS PER IS:13920-1993) DETAILING		SO-II (DESIGN) LT COL S-O-I (DESIGN) FOR CHIEF ENGINEER	
ADDITIONAL NOTES ON DUCTILE DETAILING			
REVISION			
SN	DATE	DESCRIPTION	INITIAL

