

SEISMIC STRENGTHENING MEASURES

1. THE SEISMIC ZONE MAP IS REVISED WITH ONLY FOUR ZONES, INSTEAD OF FIVE ZONES. ERSTWHILE ZONE-I HAS BEEN MERGED TO ZONE-II. HENCE, ZONE -I DOES NOT APPEAR IN THE NEW ZONING, ONLY ZONES -II, III, IV AND V DO. GARRISON ENGINEER SHOULD PERSONALLY ASCERTAIN THE ZONE OF THE LOCATION OF STRUCTURE.
2. IMPORTANCE FACTOR (I) IS A FACTOR USED TO OBTAIN THE DESIGN SEISMIC FORCE DEPENDING ON THE FUNCTIONAL USE OF THE STRUCTURE, CHARACTERISED BY HAZARDOUS CONSEQUENCES OF ITS FAILURE, ITS POST- EARTHQUAKE FUNCTIONAL NEED, HISTORIC VALUE, OR ECONOMIC IMPORTANCE. GARRISON ENGINEER SHOULD PERSONALLY ASCERTAIN THE IMPORTANCE FACTOR OF EACH BUILDING.

TABLE -1: IMPORTANCE FACTOR - I

SL.NO.	STRUCTURE	IMPORTANCE FACTOR
(1)	(2)	(3)
1)	IMPORTANT SERVICE AND COMMUNITY BUILDINGS, SUCH AS HOSPITALS, SCHOOLS, MONUMENTAL STRUCTURES, EMERGENCY BUILDINGS LIKE TELEPHONE EXCHANGE, TELEVISIONS STATIONS, RADIO STATIONS, RAILWAY STATIONS, FIRE STATION BUILDINGS, LARGE COMMUNITY HALLS LIKE CINEMAS, ASSEMBLY HALLS AND SUBWAY STATIONS, POWER STATIONS.	1.5
2)	ALL OTHER BUILDINGS	1.0

3. FOR THE PURPOSE OF SPECIFYING THE EARTHQUAKE RESISTANT FEATURES IN MASONRY BUILDINGS, THE BUILDINGS HAVE BEEN CATEGORISED IN FIVE CATEGORIES, A TO E BASED ON THE SEISMIC ZONE AND THE IMPORTANCE OF BUILDING-I, WHERE

I = IMPORTANCE FACTOR APPLICABLE TO THE BUILDING.

THE BUILDING CATEGORIES ARE GIVEN IN TABLE - 2

TABLE - 2 BUILDING CATEGORIES FOR EARTHQUAKE RESISTANT FEATURES

IMPORTANCE FACTOR	SEISMIC ZONE				
	II	III	IV	V	
(1)	(2)	(3)	(4)	(5)	
1.0	B	C	D	E	
1.5	C	D	E	E	

NOTE:- CATEGORY A IS NOW DEFUNCT. AS ZONE-I DOES NOT EXIST ANYMORE

4. ALL MASONRY BUILDINGS SHALL BE STRENGTHENED BY THE METHODS, AS SPECIFIED FOR VARIOUS CATEGORIES OF BUILDINGS, AS LISTED IN TABLES-3 AND DETAILED IN SUBSEQUENT CLAUSES.

TABLE -3 STRENGTHENING ARRANGEMENTS RECOMMENDED FOR MASONRY BUILDINGS (RECTANGULAR MASONRY UNITS)

BUILDING CATEGORY	NO. OF STOREYS	STRENGTHENING TO BE PROVIDED IN ALL STOREYS	WHERE
(1)	(2)	(3)	
B	i) 1 TO 3	a, b, c, f, g	a - MASONRY MORTAR.
	ii) 4	a, b, c, d, f, g	b - LINTEL BAND.
C	i) 1 AND 2	a, b, c, f, g	c - ROOF BAND AND GABLE BAND.
			d - VERTICAL STEEL AT CORNERS AND JUNCTIONS OF WALLS.
D	i) 1 AND 2	a to g	e - VERTICAL STEEL AT JAMBS OF OPENINGS.
			f - BRACING IN PLAN AT TIE LEVEL OF ROOFS.
E	i) 1	a to h	g - PLINTH BAND .
			h - DOWEL BARS

REFERENCES:-

1. IS 1893 (PART 1) :2002 CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES PART 1 GENERAL PROVISIONS AND BUILDINGS (FIFTH REVISIONS)
2. IS 4326 : 1993 EARTHQUAKE RESISTANT DESIGN AND CONSTRUCTION OF BUILDINGS - CODE OF PRACTICE (SECOND REVISION - INCORPORATING AMENDMENT NO-3 JANUARY 2005).
3. E-IN-C TECHNICAL INSTRUCTION NO-5 OF 2002 GENERAL CONCEPTS AND GUIDELINES ON EARTHQUAKE RESISTANT DESIGN AND CONSTRUCTION IN MASONRY AND R.C.C. STRUCTURE IN MES.
4. IS 13920 :1993 DUCTILE DETAILING OF REINFORCED CONCRETE STRUCTURE SUBJECTED TO SEISMIC FORCES CODE OF PRACTICE (THIRD REPRINT NOV. 1996)

GENERAL NOTES

1. CONTRACTOR AND EXECUTIVE AUTHORITY TO CHECK AND VERIFY ALL DIMENSIONS BEFORE EXECUTION OF WORK.
2. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SHOWN.
3. FIGURED DIMENSIONS SHALL BE FOLLOWED. REINFORCEMENT BARS SHALL NOT BE COUNTED FROM DRAWINGS WHERE SPACING IS INDICATED.
4. QUALITY CONTROL RECORDS AS PER THE QUALITY CONTROL MANUAL SHALL BE PREPARED IN TRIPPLICATE FOR ALL BUILDINGS IN ZONE IV AND V RECORD SHALL BE PUT UP TO THE CONCERNED ACCEPTING OFFICER AND ONE COPY OF THE SAME SHALL BE RETAINED BY GE, CWE, AND CE's OFFICE ALONG WITH A CA DOCUMENTN, SET OF DRAWINGS AND DESIGN FOLDER.

1	24-04-06	CORRECTED UPTO DATE	<i>[Signature]</i>	<i>[Signature]</i>
SNO.	DATE	DESCRIPTION	T.O. INITIAL	DIRCD

REVISIONS	
DATE	31-03-06
DRN	RENUKA
TCD	
CKD	
SCALE	AS SHOWN
SHT. SIZE	A3
 (DEVI SINGH) TECH.OFFICER AAD (ARCH)	
SEISMIC STRENGTHENING MEASURES IN MASONRY BUILDINGS	
DRG. NO.	SHEET NO.
	1/8
 (YOGESH K SINGHAL) SE DIRECTOR (DESIGN) FOR CHIEF ENGINEER	
DRG NO CEJZ / STD-216/06	