

Ministry of Urban Development  
 Department of Urban Development & Building Construction  
**Building Code Division**  
 Babarmahal, Kathmandu

**NBC Compliance Check list on Structural Analysis & Design for Masonry**

S.No	Description	Quantity	Unit	Adopted Code	Remarks
<b>A General Information:</b>					
A.1	Owner's Name:				
A.2	Address:				
A.3	Types of Building:				
A.4	Structural Designed By:				
	Consultancy Firm:				
	Designers' Name:				
	Nepal Engineering Council No:				
<b>B Geometrical Configuration of Building:</b>					
B.1	No. of Blocks:				
B.2	No. of Story:				
B.3	Story Height:				
	Basements				
	Ground Floor				
	Typical				
B.4	No. of staircase:				
B.5	Total height of structure:				
B.6	Total height for Fundamental time period calculation:				
B.7	Height to width ratio of building:				
B.8	Length to width ratio of building:				
B.9	Seismic joints if any				
B.10	Floorwise Stiffness Irregularities:				
B.11	Floorwise Mass Irregularities:				
B.12	Centre of Mass				
B.13	Centre of Rigidity				
B.14	Eccentricity/Permissible eccentricity				
B.15	Floor wise:	Wall Height	Wall Thickness	Maximum Length	
	i) Ground Floor				
	ii) First Floor				
	iii) Second Floor				
<b>B.16 Opening Details:</b>					
	i) Least distance from corner				
	ii) Does the total length of opening in any wall exceed 50% of its length?				

iii)	Does the horizontal distance between any two opening less than 600mm or 1/2 of height of shorter opening?				
iv)	Does the Vertical distance between two opening less than 600mm or 1/2 of width of smaller opening?				
v)	If any of the above mentioned cases do not comply, do you have provision for strengthening around opening?				
<b>C Geological Investigation:</b>					
i)	Geological Investigation Conducted	Yes		No	
	<b>If Yes</b>				
C.1	Soil Investigation Report:				
C.2	Soil Investigation Done By?:				
C.3	Allowable Bearing Capacity:				
C.4	N- value:				
C.5	Type of Soil:				
C.6	Water Table:				
C.7	Liquefaction Potential?:				
C.8	Calculated Maximum Pressure in Foundation:				
C.9	Depth of Foundation				
C.10	Width of Foundation				
	<b>If No</b>				
C.11	Adopted Value as per NBC 205 Table 3.1				
C.12	Site Consideration as per NBC 108 ?	Yes		No	
<b>D Structural Analysis and Design Procedure:</b>					
D.1	Structural Analysis Software:(version)				
D.2	Structural System:				
D.3	Foundation System:				
D.4	Load Patterns Used:				
D.5	Load Combinations used:				
D.6	Mass source considered?:				
D.7	Concrete Grade Used :				
	For Column:				
	For Beam:				

	For Slab:				
	For Foundation:				
	Others...				
D.8	Reinforcement Grade Used:				
	Reinforcement Grade Used for shear reinforcement:				
D.9	Mechanical Properties of other construction materials used:				
	i. Brick, crushing strength:				
	ii. Steel Section:				
	iii. Brick Crushing Strength:				
	iv. Mortar ratio for load bearing masonry:				
D.10	<b>Seismic Coefficient Method (AS per NBC105 or IS 1893:2002) :-</b>				
D.10.1	Design horizontal Seismic Coefficient( $A_{h_{x/y}}$ )/( $C_d$ ):				
D.10.2	Basic Seismic Coefficient,(C) (NNBC105):				
D.10.3	Zone Factor (Z):				
D.10.4	Importance Factor(I):				
D.10.5	Response Reduction Factor(R )/ Performance factor (K):				
D.10.6	Soil Type:				
D.10.7	Fundamental Time Period( $T_{x/y}$ ):				
D.10.8	Average response acceleration coeff ( $S_{a/g}$ ):				
D.10.9	Seismic Weight:				
D.10.10	Design Seismic Base Shear( $V_{bx/y}$ ):				
D.10.11	Base Shear from Dynamic Analysis (Response spectrum analysis or time history)				
	$R_x=$				
	$R_y=$				
D.10.12	Damping:				
D.11	<b>Dynamic Analysis Method:</b>				
D.11.1	Seismic Analysis method				
D.11.2	No. of modes Considered:				
D.11.3	Type of Modal Combination:				
D.11.4	<b>Modal Mass Participation Factor:</b>				
	In X-direction				
	In Y-direction				
D.11.5	<b>Scale Factor</b>				
	i. Along X-direction:				
	ii. Along Y-Direction:				
D.11.6	<b>Total Deflection of Building:</b>				
	i. Along X-direction:				
	ii. Along Y-Direction:				
D.11.7	<b>Inter Story Deflection (Drift):</b>				
D.11.8	Separation Between blocks if any:				
D.11.9	<b>Strength of masonry in out of plane bending:</b>				
	i) <b>Check for tension and compression:</b>				

	$\sigma_c$ max				
	$\sigma_t$ max				
ii)	<b>Check for Shear:</b>				
	$f_{vmax}$				
iii)	<b>Check for sliding:</b>				
	Lateral force/Resisting force				
D.11.10	<b>Strength of masonry in in-plane bending</b>				
i)	Check for tension and compression:				
	$\sigma_c$ max				
	$\sigma_t$ max				
ii)	Check for Shear:				
	$f_{vmax}$				
iii)	Check for sliding done?:				
	Lateral force/Resisting force:				
D.11.11	<b>Foundation Design</b>				
	Size				
	Connection pad in case of wooden post				
	Foundation Connection Details Provided?				
<b>D.12</b>	<b>RC Band Design</b>				
D.12.1	Band/Beam	RC Band Minimum thickness	Min. No of Bars	Min Dia. of Bars(mm)	
i)	Plinth				
ii)	Sill				
iii)	Lintel				
iv)	Roof				
v)	Dowel Stitch				
D.12.2	Maximum Vertical Spacing of Dowel Band lies within the range 500-700mm?				
D.12.3	Through Stones of a length equal to the full wall thickness used in every 600mm lift at not more than 1.2m apart horizontally?				
D.12.4	Provision of buttresses at not exceeding 12 times the wall thickness if the maximum length of unsupported wall exceeds 12 times its thickness?				
D.12.5	Connection of vertical band/post with foundation?				
<b>E.</b>	<b>Reinforced Concrete Design</b>				
E.1	Concrete Design code Referred:				
E.2	Ductile Detailing code Referred:				
E.3	Typical design of structural elements foundation, slab, staircase, retaining wall etc:				
<b>F</b>	<b>Earthquake Resistant measures adopted for non-structural elements:</b>				
	i. Sill Band, Lintel Band .....				
	ii. ....				
	iii. ....etc				

<b>G</b>	<b>Retrofitting Design, if existing building</b>				
G.1	Non Destructive Test of structural elements				
	i. Schmidt Hammer				
	ii. Rebar Detection test				
	iii. Ultrasonic Pulse Velocity test				
	iv. Other, if any				
G.2	Retrofitting design code referred				
G.3	Retrofitting Analysis Method: Non Linear Analysis/ Performance based analysis/Conventional				
G.4	Method of retrofitting				
<b>H</b>	<b>Attachments:</b>				
H.1	Application form				
H.2	Comprehensive Structural Design Report				
H.3	Detailed Architectural Drawings				
H.4	Detailed Structural Drawings with ductile details				
H.5	CD of Structural Analysis				
H.6	NDT test report, Retrofit Design & drawing if existing building				

**Signature:**

**Owner's Name:**

**Designer's Name:**