NEPAL NATIONAL BUILDING CODE

NBC 110 : 1994

PLAIN AND REINFORCED CONCRETE

His Majesty's Government of Nepal
Ministry of Physical Planning and Works
Department of Urban Development and Building Construction
Babar Mahal, Kathmandu, NEPAL
2060

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This publication represents a standard of good practice and therefore takes the form of recommendations. Compliance with it does not confer immunity from relevant legal requirements, including bylaws

श्री ५ को सरकार (मन्त्रिपरिषद्) को मिति २०६०।४।१२ को निर्णयानुसार स्वीकृत

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Preface

This Nepal Standard was prepared during 1993 as part of a project to prepare a draft National Building Code for Nepal.

In 1988 the Ministry of Housing and Physical Planning (MHPP), conscious of the growing needs of Nepal's urban and shelter sectors, requested technical assistance from the United Nations Development Programme and their executing agency, United Nations Centre for Human Settlements (UNCHS).

A programme of Policy and Technical Support was set up within the Ministry (UNDP Project NEP/88/054) and a number of activities have been undertaken within this framework.

The 1988 earthquake in Nepal, and the resulting deaths and damage to both housing and schools, again drew attention to the need for changes and improvement in current building construction and design methods.

Until now, Nepal has not had any regulations or documents of its own setting out either requirements or good practice for achieving satisfactory strength in buildings.

In late 1991 the MHPP and UNCHS requested proposals for the development of such regulations and documents from international organisations in response to terms of reference prepared by a panel of experts.

this document has been prepared by the subcontractor's team working within the Department of Building, the team including members of the Department and the MHPP. As part of the proposed management and implementation strategy, it has been prepared so as to conform with the general presentation requirements of the Nepal Bureau of Standards and Metrology.

The subproject has been undertaken under the aegis of an Advisory Panel to the MHPP.

The Advisory Panel consisted of :

Mr. UB Malla, Joint Secretary, MHPP	**Chairman**
Director General, Department of Building (Mr. LR Upadhyay)	**Member**
Mr. AR Pant, Under Secretary, MHPP	**Member**
Director General, Department of Mines & Geology (Mr. PL Shrestha)	**Member**
Director General, Nepal Bureau of Standards & Metrology (Mr. PB Manandhar)	**Member**
Dean, Institute of Engineering, Tribhuvan University (Dr. SB Mathe)	**Member**
Project Chief, Earthquake Areas Rehabilitation & Reconstruction Project	**Member**
President, Nepal Engineers Association	**Member**
Law Officer, MHPP (Mr. RB Dange)	**Member**
Representative, Society of Consulting Architectural & Engineering Firms (SCAEF)	**Member**

Representative, Society of Nepalese Architects (SONA) Member
Deputy Director General, Department of Building,
(Mr. JP Pradhan) Member-Secretary

The Subcontractor was BECA WORLEY INTERNATIONAL CONSULTANTS LTD. of New Zealand in conjunction with subconsultants who included :

Golder Associates Ltd., Canada
SILT Consultants P. Ltd., Nepal
TAEC Consult (P.) Ltd., Nepal
Urban Regional Research, USA

Principal inputs to this standard came from :

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0 Foreword

This Nepal Standard comprises the Indian Code IS 456-1978 Code of Practice for Plain and Rainforced Concrete (Third Revision) amended so as to meet the conditions of Nepal. In particular, these amendments have been necessary to ensure compatibility with the DRAFT Nepal Standard NBC 105-94 : Seismic Design of Buildings in Nepal.

This document contains the amendments that are to be made to IS 456-1978 for its use in Nepal.

Most of the references is IS 456-1978 to Indian material Codes have been left unaltered until such time as appropriate Nepal Standards are developed.

Any subsequent revisions to IS 456-1978 shall be not be applicable to this Nepal Standard NBC 110-94 until specifically recognised by this Standard.

1 Scope

NEPAL AMENDMENTS TO IS 456 – 1978

Section 0 - Foreword

Delete clauses **0.1** through to **0.4** inclusively

0.5 *Replace* "code" with "Standard".
0.6 *Replace* "code" with "Standard".
0.8 *Delete and Substitute :*

0.8 To amplify the recommendations given in IS 456-1978, a commentary on the Standard has already been published by the Bureau of Indian Standards. To reduce design time in the use of certain clauses in the Standard for the design of beams, slabs and columns in general building structures, SP: 16-1979 "Design Aids for Reinforced Concrete to IS 456-1978" is available. In addition, handbooks on concrete mix design and concrete reinforcement are also available.

0.9 *Replace* "IS: 2-1960" with "NS 17-2037".

Section 1 - General

1.1 *Replace* "code" with "Standard".
1.2 *Replace* "code" with "Standard".
1.3 *add* a new clause :

1.3 In this Standard, the word "shall" indicates a requirement that must be adopted in order to comply with the Nepal Standard and the word "should" indicates recommended practice.

3.1 *Add*

3.1 *SL:* Snow load

Section 2 – Materials, Workmanship, Inspection and Testing

4.1.a *Replace* "IS: 269-1976" with "NS 49-2041".
4.2.2 *Replace* "code" with "Standard".
4.6.a *Replace* "IS: 432 (Part-I) -1966" with "NS 84-2042".
4.6.c *Replace* "IS: 1786-1979" with "NS 191-2046".

Section 3 – General Design Requiremnet

17.2.1 *Replace* "IS 1911 – 1967" with "NBC 102-94".

17.3 *Delete* and *substitute* :

17.3 Live Load, Wind Load and Snow Load – Live loads, wind loads and snow loads shall be calculated in accordance with NBC 103-94, NBC 104-94 and NBC 106-94 respectively.

17.4 *Replace* "IS: 1893-1975" with "NBC 105-94".
17.7 *Replace* "IS: 875-1964" with "IS 875: (Part V-1987".

17.9 *Add*

17.9 Both design methods require additionally-factored dead loads to be considered in combination with the earthquake load.

18.1 *Replace* "code" with "Standard".

25.1.2 *Delete* and substitute :

25.1.2 The recommendations for detailing for earthquake-resistant construction given in IS: 4326-1976 shall be taken into consideration.

25.2.1.1 *Replace* **"IS: 1786-1979" with "NS 191-2046".**

Section 5 – Structural Design (Limit State Method)

35.2 *Replace* "IS: 1911-1967" with "NBC 102-94".

Replace "IS: 875-1964" with "NBC 103-94 and NBC 104-94".

Replace "IS: 1893-1975" with "NBC 105-94".

35.4.1 *Replace* **Table 12** with the following :

Table 12
Values of Partial Safety Factor yr for Loads
(Clauses 18.3 and 35.4.1)

Load Combination	Limit Stage of Collapse				Limit States of Serviceability			
(1)	DL (2)	LL (3)	WL (4)	SL (5)	DL (6)	LL (7)	WL (8)	SL (9)
DL+LL	1.5	1.5	-	-	1.0	1.0	-	-
DL+WL	1.0*	-	1.25	-	1.0	-	1.0	-
DL+LL+WL	1.0	1.3	1.25	-	1.0	0.8	0.8	-
DL+SL+WL	1.0	-	1.25	1.25	1.0	-	0.8	1.0

NOTES :

1. When considering earthquake effects, substitute EL for WL.

2 For the serviceability limit state, the values γ_f given in this table are applicable for short term effects. While assessing the long term effects due to creep, the dead load and only that part of the live load likely to be permanent may be considered.

* This value is to be considered when stability against overturning or stress reversal is critical

Section 6 – Structural Design (Working Stress Method)

44.1.2 *Replace* "IS : 1786-1979" with "NS 191-2046".

43.4 *Add* new clause :

43.4 Design Load Combinations for Working Stress Method.

For the design of a structure and its components, the following load combinations shall be considered :

1. **DL + LL**
2. **DL + LL + WL**
3. **0.7 x DL + WL**
4. **DL + SL + WL**

Note : When considering earthquake load, substitute EL for WL.

The value 0.7 is to be considered when stability against overturning or stress reversal is critical.

44.2 Table 16

Replace "IS : 432 (Part-I)-1966" with "NS 84-2042".
Replace "IS : 1786-1967" with "NS 191-2046".