



## **Housing Earthquake Safety Initiative (HESI)**

# **National symposium on Building Codes and Building Code Implementation Systems**

**Organized jointly by  
DUDBC, UNCRD, UNDP Nepal and NSET**

**24 May 2008, Lalitpur**

**Proceedings & Outcome of the Training  
Workshop on Building Code Implementation for  
24 Municipal Engineers of Nepal**

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# TRNG/WS Objectives

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- **Be familiarized with various requirements of building codes, building regulations, building/planning by-laws for ensuring safe building construction and proper city development;**
- **Be familiarized with building control system (building permit process) to ensure the safe construction of buildings being in practice in few cities of Nepal and other countries and to help review such practices by field visits; and**
- **Guide/facilitate in developing general broad framework for implementation of building control system (ensuring building code compliance) suitable for large, medium, small municipalities of Nepal based on the current and potential institutional system and capacity; and suggest action plan.**



# Participants

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- **Engineers, Junior Engg of 24 MUNI**
  - **KMC, LSMC, Bhaktapur, Kirtipur, Madhyapur Thimi, Banepa, Panauti, Biratnagar, Itahari, Ilam, Tansen, Nepalgunj, Birendranagar, Dhangadhi, Triyuga, Kamalamai, Birgunj, Hetauda, Pokhara, Vyas, Butwal, Bharatpur, Dharan, Janakpur**
- **A professor from Japan**
- **Representative of ADRC**
- **Professionals from UNCRD, DUDBC, NSET**



# Structure

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**Module 1: Opening Ceremony/ Introductory Module**

**Module 2: Understanding the Building Codes, Building by-laws, Building Regulations and their provisions**

**Module 3A: Experiences from Building Code Implementation in Nepal and Japan (Achievements and lessons) - Experience of Nepal**

- Structural aspects (Group 1)
- Planning (Group 2)
- Municipal laws / bylaws (Group 3)
- Field Inspection system (Group 4)
- Quality Control (Group 5)
- Capacity building, awareness, publication

**Module 3B: Experiences from Building Code Implementation in Nepal and Japan (Achievements and lessons) - Experience of Other Countries**

**Module 4: Lessons from Experiences of Building Code Implementation**

**Module 5: On-site Observation of Building Code Implementation Process, Field Practices**

**Module 6: Evaluation of Existing Practices**

**Module 7: What Next for Effective Building Code Implementation?**

**Module 8: Conclusion**



# Emerging Consensus

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- **Uniform understanding of NBC needs to be improved**
- **Huge problem of Non-engineered Buildings**
  - **Positive changes can be achieved and there are examples**
- **Good example need to be studied and evaluated**
- **MRT – very important and applicable, but needs review**
- **Capacity enhancement is a need and also a challenge**
- **The 58 municipalities are different levels, so strategies for BCI should be different!**



# Problems summarized (contd ...)

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- **No clear understanding re responsibility to design/check Level B buildings**
  - **Municipal engineers**
  - **Local consultants**
  - **National Consultants**
  - **Division Offices of BUDBC?**
- **Level D efforts negligible but that can change the scenario in villages and rural wards of municipalities**
- **BC does not seem to be a political priority of municipalities**
  - **Efforts by municipal engineering unit responding to the legal provisions (circular by ministries) and professional call**



# Action Plan A -1

Action	Key Actors	Time	Associated institutes
<b>Design Aspect</b> <b>Short-Term</b> <ul style="list-style-type: none"> <li>Orientation to the designers</li> <li>Training to the technical staffs</li> <li>Preparation of Design Check-list</li> </ul> <b>Long-Term</b> <ul style="list-style-type: none"> <li>Computer-based structural designing training to designers</li> <li>Training on retrofitting design of existing buldg.</li> </ul>	<ul style="list-style-type: none"> <li>Municipality</li> <li>Municipality</li> <li>Municipality</li> <li>Municipality/DUDBC</li> </ul>	<ul style="list-style-type: none"> <li>6 months</li> <li>6 months</li> <li>3 months</li> <li>1 year</li> </ul>	<ul style="list-style-type: none"> <li>NSET/DUDBC</li> <li>DUDBC</li> <li>Consultant (experts)</li> </ul>
<b>Laws /Bylaws</b> <b>Short-Term</b> <ul style="list-style-type: none"> <li>Municipal approval of implementing NBC</li> </ul> <b>Long-Term</b> <ul style="list-style-type: none"> <li>Revision of NBC</li> <li>Additional code of seismic retrofitting</li> <li>Widening of the scope of MRT</li> <li>Preparation of Specification code</li> <li>Working permit system to the mason, designers and contractors</li> </ul>	<ul style="list-style-type: none"> <li>Municipality</li> <li>DUDBC</li> <li>DUDBC</li> <li>DUDBC</li> <li>DUDBC</li> <li>DUDBC</li> <li>Municipality</li> </ul>	<ul style="list-style-type: none"> <li>3 months</li> <li>3 years</li> <li>3 years</li> <li>1 year</li> <li>3 years</li> <li>3 years</li> <li>5 years</li> </ul>	<ul style="list-style-type: none"> <li>NOC, NEA, Structural engineers association, SONA, Engineering institutes, NSET</li> <li>Do</li> <li>Engineering institutes</li> </ul>
<b>Field-Inspection System</b> <b>Shortterm</b> <ul style="list-style-type: none"> <li>Establishment of Monitoring cell</li> <li>Preparation of check-list for field inspection</li> <li>Field supervision made compulsory to the public and Class A buildings</li> </ul>	<ul style="list-style-type: none"> <li>Municipality</li> <li>Municipality</li> <li>Municipality</li> </ul>	<ul style="list-style-type: none"> <li>6 months</li> <li>6 months</li> <li>1 month</li> </ul>	<ul style="list-style-type: none"> <li>Professional organizations, Engineering institutions and consulting firms</li> <li>Municipality</li> <li>Consulting firms</li> </ul>



# Action Plan A -2

□	Action□	Key-Actors□	Time□	Associated institutes□
	¶ Long term¶ •→ Field-supervision-made-compulsory-to-all-type-of-buildings¶ •→ Inspection-work-fully-done-by-the-private-sectors□	¶ ¶ ¶ ¶ •→ Municipality¶ •→ Municipality□	¶ •→ 3-years¶ ¶ •→ 5-years□	¶ •→ Consulting-firms¶ ¶ •→ Consulting-firms□
Quality-Control¶ □	Short term¶ •→ Commitment-of-Local-suppliers-and-Local-Chamber-of-commerce-for-supply-of-quality-materials-by-sensitizing-them¶ ¶ Long term¶ •→ Working-permit-system-to-the-masons¶ •→ Rewarding-system-to-the-house-owners-and-the-masons-who-provide-quality-construction¶ •→ Checking-of-major-construction-materials-according-to-Nepal-standard¶ •→ Incorporate-the-code-in-the-housing-loan-system□	¶ •→ Municipality¶ ¶ ¶ ¶ ¶ •→ Municipality¶ •→ Municipality¶ ¶ •→ Municipality¶ ¶ •→ Nepal Rastra Bank□	¶ •→ 3-months¶ ¶ ¶ ¶ ¶ ¶ ¶ •→ 5-years¶ •→ Every year¶ ¶ ¶ •→ 5-years¶ ¶ •→ 5-years□	¶ •→ Local-suppliers-and-Local-chamber-of-commerce¶ ¶ ¶ ¶ ¶ ¶ •→ Mason-and-local-contractors-association¶ •→ Civil-society¶ ¶ ¶ •→ Private-consultants¶ ¶ •→ Financial-Institutions□
Awareness,¶ Capacity-Building¶ □	Short term¶ •→ Celebration-of-Earthquake-safety-day¶ •→ Publication-and-distribution-of-broachers-and-pamphlets-to-the-house-owners.¶ •→ Broadcasting-from-local-media.¶ ¶ Long term¶	¶ •→ Municipality¶ ¶ •→ Municipality¶ ¶ ¶ •→ Municipality¶ ¶ ¶ ¶	¶ •→ Continuous¶ ¶ •→ 6-months¶ ¶ ¶ •→ 6-months¶ ¶ ¶ ¶	¶ •→ Political-parties,-Civil-societies,-Line-agencies,-Education-institutes¶ •→ DUDBC,-NSET,-EU-and-donor-agencies¶ •→ Do¶ ¶ •→ NSET-and-Funding-





# Action Plan A - 3

□	Action□	Key-Actors□	Time□	Associated-institute□
	<ul style="list-style-type: none"> <li>•→ TOT to social mobilisers¶</li> <li>•→ Orientation program to the communities by mobilizing social mobilizers¶</li> <li>•→ Trainings to new masons, contractors and technicians (50 masons, 10 junior engineers, 5 engineers per 100 buildings per year)¶</li> <li>• Refreshers training to the trained masons, contractors and technicians¶</li> <li>•→ Demonstration model in the municipality¶</li> <li>•→ Construction of Large scale model buildings¶</li> <li>•→ Incorporate the earthquake preparedness curriculum in school¶</li> <li>•→ Incorporate the code in engineering curriculum¶</li> <li>•→ □</li> </ul>	<ul style="list-style-type: none"> <li>•→ Municipality¶</li> <li>•→ Municipality¶</li> <li>¶</li> <li>¶</li> <li>•→ Municipality¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>• Municipality¶</li> <li>¶</li> <li>¶</li> <li>•→ Municipality¶</li> <li>¶</li> <li>•→ Municipality¶</li> <li>¶</li> <li>•→ CDC¶</li> <li>¶</li> <li>¶</li> <li>•→ Universities□</li> </ul>	<ul style="list-style-type: none"> <li>•→ 2 years¶</li> <li>•→ 3 years¶</li> <li>¶</li> <li>¶</li> <li>•→ Continuous¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>• Continuous¶</li> <li>¶</li> <li>¶</li> <li>•→ 2 years¶</li> <li>¶</li> <li>•→ 5 years¶</li> <li>¶</li> <li>•→ 5 years¶</li> <li>¶</li> <li>¶</li> <li>•→ 5 years□</li> </ul>	<ul style="list-style-type: none"> <li>agencies¶</li> <li>•→ CBOs¶</li> <li>¶</li> <li>•→ DUDBC/NSET/MLD¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>¶</li> <li>•→ DUDBC/NSET/MLD¶</li> <li>¶</li> <li>• DUDBC¶</li> <li>¶</li> <li>•→ Donor agencies□</li> </ul>
Others□	<ul style="list-style-type: none"> <li>•→ Preparation of implementation process guidelines□</li> </ul>	<ul style="list-style-type: none"> <li>•→ MLD/DUDBC□</li> </ul>	<ul style="list-style-type: none"> <li>•→ 1 year□</li> </ul>	<ul style="list-style-type: none"> <li>•→ Concerned government organisations□</li> </ul>

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# BCI: Action Plan Muni A

PA 1	PA2	PA3	PA4	PA5	Remarks
Orientation & Training to Municipal / Consul. Designers, BC(M) , CAD(DUDBC)	CHKLST for Field INSP (M)	Review MRT to widen scope (DUDBC)	BC compliance mandatory in housing loan system (	TRNG (50M+10JE +5E per 100 buildings per year)	<ul style="list-style-type: none"> <li>•Retrofitting Code</li> <li>•Working Permit for Designer &amp; Masons</li> <li>•M-Cell</li> <li>•Incentive to HO &amp; M</li> <li>•TOT for Social Mob.</li> <li>•Teach BC in BE Classes</li> <li>•implementation process guidelines</li> </ul>



# BCI: Action Plan Muni B

Action	Pr	Key Actor	Time	Associate Agency
Training to Municipal technical staff for NBC codes	1	Municipality	6 months	DUDBC, NSET
International exposure visit to municipal technical staff	2	UNCRD	1 year	Municipality, NSET,MLD, DUDBC
Public meeting on earthquake disaster management and NBC	3	Municipality	1 years	NSET, DUDBC, Journalists, civil society
Training to Mason, bar benders, plumbers, electricians, carpenter, shuttering fixer (20 Nos per 100 buildings per year)	4	Municipality/ DUDBC	1 years	NSET, NGOs, CTEVT
Awareness program from local FM, TV, postering, brochure	5	Municipality	1 year	NSET, DUDBC, Journalists,



# BCI: Action Plan Muni B

Action	Pr	Key Actor	Time	Associate Agency
Awareness program to school teachers, students, health workers, TLOs, Police and others	6	Municipality	1 year	NSET, DUDBC, Journalists,
Preparation of checklist for field inspection	7	Municipality	2 years	NSET, DUDBC
Updating of municipal building by-laws	8	Municipality	1 year	NSET, UDLE, TDC, DUDBC
Decision for Implementation of NBC	9	Municipality	2 years	NSET, TDC, DUDBC
Training to consultants about NBC and focusing on grid pattern designing		Municipality	6 months	DUDBC, NSET
Checklist preparation for MRT		Municipality	6 months	DUDBC, NSET
Drawing with structural detailing and guidelines for MRT (Nepali and local languages as well)		DUDBC	1 year	Municipality, NSET, UNCRD, MLD, Engineering council
Hiring of structural engineer		Municipality	5 years	DUDBC, MLD
Training to Municipal technical staff and consultants for structural design softwares		Municipality	2 years	DUDBC, NSET
Updating of municipal building laws		Mld	1 year	NSET, UDLE
Updating of National Building Code		DUDBC	2 years	NSET, NEC
Inspection of work at foundation, DPC, beam and slab		Municipality	2 years	Consultants, local CBOs, monitoring committee
Involvement of consultants for layout and construction supervision		Municipality	2 years	Consultants, local CBOs, monitoring committee
Formation of monitoring committee		Municipality	3 years	DUDBC, representative of consultants, contractor, civil society
Introduce Inspection card system		Municipality	3 years	DUDBC, representative of consultants, contractor, civil society
Inspection by interns and engineering students		Municipality	2 years	Students, engineering colleges



# BCI: Action Plan Muni B

Action	Pr	Key Actor	Time	Associate Agency NSET, NGOs,
Orientation about quality of construction material to traders, supplier, house owners and contractors		Municipality	1 years	DUDBC, Consumers forum and local journalists
Training to municipal technical staffs, local contractors and industry people about using quality marked construction materials only.		Municipality	6 months	NSET, NGOs and DUDBC
Municipal Earthquake Risk Assessment ( eg RADUIS tools)		Municipality	1 years	NSET, DUDBC, CCI, NGO, civil society
Fixing boarding boards against EQ disaster		NSET	1 year	Municipality, DUDBC, MLD, DoMG, UNCRD
Establishment of e/w safety unit		Municipality	1 year	
Hiring of additional staff including structural engineer		Municipality	2 year	NSET, DUDBC
Preparation of implementation process guideline for NBC		Municipality	3 year	NSET, DUDBC
Establishment of e/w safety unit		DUDBC, MLD	1 year	NSET, MuaN, UNCRD and others
Hiring of additional staff including structural engineer		Municipality	2 year	NSET, DUDBC
Preparation of implementation process guideline for NBC		Municipality	3 year	NSET, DUDBC
Establishment of e/w safety unit		DUDBC, MLD	1 year	NSET, MuaN, UNCRD and others
Hiring of additional staff including structural engineer		Municipality	2 year	NSET, DUDBC



# BCI: Action Plan Muni C

Action	Pr	Key Actor	Time	Associate Agency
<b>Prepare/upgrade municipal laws/by laws, approval from board, council and bringing it to action</b>	1	Municipality	1 yr	Municipality
<b>Conduct training workshop for municipal technical staffs, consultants, local contractors, masons about MRT/NBC, field inspection and quality control</b>	2	UNCRD	1 year	Municipality, NSET,MLD, DUDBC
<b>Dessimination of MRT, building code through school,media,publications</b>	3	Municipality	1 years	NSET, DUDBC, Journalists, civil society
<b>Publication of guidelines, MRT in simple Nepali language</b>	4	Municipality/ DUDBC	1 years	NSET, NGOs, CTEVT
<b>Establishment of separate section for building permit with sufficient numbers of technical staffs.</b>	5	Municipality	Within 2 years	MOLD



# BCI: Action Plan Muni C

Action	Pr	Key Actor	Time	Associate Agency
<b>Prepare/upgrade municipal laws/by laws, approval from board, council and bringing it to action</b>	1	Municipality	1 yr	Municipality
<b>Conduct training workshop for municipal technical staffs, consultants, local contractors, masons about MRT/NBC, field inspection and quality control</b>	2	UNCRD	1 year	Municipality, NSET,MLD, DUDBC
<b>Dessimination of MRT, building code through school,media,publications</b>	3	Municipality	1 years	NSET, DUDBC, Journalists, civil society
<b>Publication of guidelines, MRT in simple Nepali language</b>	4	Municipality/ DUDBC	1 years	NSET, NGOs, CTEVT
<b>Establishment of separate section for building permit with sufficient numbers of technical staffs.</b>	5	Municipality	Within 2 years	MOLD



# BCI: Action Plan Muni C

Action	Key Actor	Time	Assoc. Agency
Initially introduction of MRT system for drawing approval and construction monitoring	Municipality	Within 1 year	DUDBC
Making easy availability of MRT to local contractors, consultants and enforcing them for application	Municipality	Within 1 year	DUDBC, MO LD, NSET
Structural design for 'B' type building	DUDBC	Within 4 years	Municipality
Publication of advisory guidelines for 'D' type building	Municipality	Within 1 year	DUDBC
Approval for implementing building code by municipal board, council	Municipality	Within 4 years	
Separate budget allocation for building permit process which shouldn't be transferred to any other budget heading	Municipality, MOLD	Within 1 year	
Additional trained staff for field inspection	Municipality	Within 1 year	
Involvement of trained masons, consultants, designers for field inspection	Municipality	Within 1 year	DUDBC, NSET
Provision of checklist during field inspection	Municipality	Within 1 year	
Involving trained masons, technicians from municipality and owner himself	Municipality		
Department of Quality Control should provide updated checklist of building materials			NBSM
Awarding publicly to owners			





# Some Obvious Conclusions

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- **MRT can help much for enhancing seismic safety of buildings in urban Nepal**
- **Checklist for Class B buildings for capable municipalities, for others some support to check design should be provided**
- **Capacity Building appears to be priority one action**
- **Building permit process to incorporate BC – existing system could be modified to achieve it**



# Some Obvious Conclusions (contd ..)

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- **Political and social acceptability of the urgency to implement BC and the roles of municipal, DUDBC, Engineering Council, Professional associations, academia in its implementation needs to be understood and enhanced**
- **Municipal engineering professionals have pivotal role in developing systems for effective implementation of BC**
  - **Create Demand**
  - **Establish system for addressing the needs**



# BCI: Action Plan Muni B

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Muni Class	PA 1	PA2	PA3	PA4	PA5	Remarks
B						



# BCI: Action Plan Muni B

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Muni Class	PA 1	PA2	PA3	PA4	PA5	Remarks
B						

**Thank You !!!**