Building Code Implementation and Enforcement Strategy for Urban Resilience Unit (URU) – Inception Report

URP/RAJUK/S-9; Credit No.: 55990

PREPARED FOR RAJDHANI UNNAYAN KARTRIPAKKHA (RAJUK)

JANUARY 2019

Prepared by

ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

EXECUTIVE SUMMARY

International Code Council (ICC) and Smart Development Engineers (SDE) were appointed in October 2018 by the Rajdhani Unnayan Kartripakkha (Capital Development Authority) or RAJUK of the Government of Bangladesh to undertake a consultancy service for Building Code Implementation and Enforcement Strategy. This Inception Report documents feedback centered on project concept, objectives, approach and methodology shared and discussed with the stakeholders and sets out how the joint venture of ICC and SDE, in consultation with and with approval from RAJUK, intends to proceed with the substantive project.

The key tasks making up the proposed approach and methodology for the project, presented to solicit views of the stakeholders for improvement and validation, are:

- Assessment of where things stand today within RAJUK's jurisdiction with respect to the current regulatory system to enforce the Bangladesh National Building Code (BNBC).
- Identification of strengths, weaknesses, opportunities and challenges for strategic and successful BNBC implementation, and to devise an implementation plan, based on the initial assessment.
- Development and execution of an extensive public awareness and educational campaign to reinforce the critical importance of building code implementation and enforcement, with particular emphasis on awareness of seismic risk and its mitigation.
- Distillation of specific lessons learned and formulation of recommendations for improving the code enforcement program for RAJUK.

The principal themes that came out of stakeholder consultations were:

- Proper checking of structural drawings for all buildings needs attention. Inspection and trained professional inspectors are important.
- Accreditation of structural engineers needs to be improved under an effective institutional arrangement.
- Compliance with code should be incentive driven to ensure structural safety and stability and sustainability of structures.
- Building code should be reflected in the education system as and where it fits appropriately.
- Supervision and monitoring of code implementation is important.
- Testing of construction materials by properly accredited laboratories is important.
- RAJUK has undertaken six urban resilience programs, which are inter-wined; this needs to be taken into consideration.
- Coordination with other programs related to BNBC such as Japan International Cooperation Agency's (JICA's) initiatives for urban resilience is very important.

An Inception Workshop held on November 1, 2018 and a Project Implementation Concept Workshop held on December 8-9, 2018 provided a clear understanding about the complexity of this project of

multi-disciplinary nature, where the embedded issues of institutional and legal mandates, knowledge, communication and awareness, rules of business of RAJUK and the ultimate goal toward sustainability of the efforts need to be reflected in the program.

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CHAPTER 1. INTRODUCTION AND BACKGROUND

International Code Council (ICC) and Smart Development Engineers (SDE) were appointed in October 2018 by the Rajdhani Unnayan Kartripakkha (Capital Development Authority) or RAJUK of the Government of Bangladesh to undertake a consultancy service for Building Code Implementation and Enforcement Strategy. This Inception Report documents feedback centered on project concept, objectives, approach and methodology shared and discussed with the stakeholders and sets out how the joint venture of ICC and SDE, in consultation with and with approval from RAJUK, intends to proceed with the substantive project.

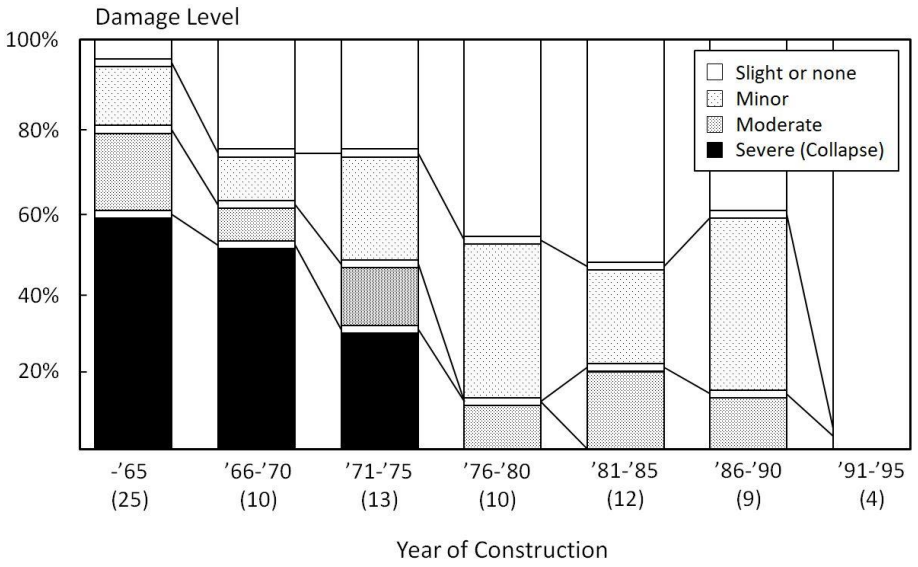
1.1 ADVANTAGES OF BUILDING CODE UPDATE AND ENFORCEMENT

It may be instructive to begin this Inception Report with a few success stories of regular update of building codes and their proper enforcement.

The Disaster Prevention Research Institute (DPRI) of Kyoto University issued some revealing statistics following the January 17, 1995 earthquake[1, 2] that hit the Japanese port City of Kobe and surrounding areas (the Great Hanshin earthquake). The figure below is drawn on the basis of those statistics. The figure clearly shows that the strongest correlation of damage was with the age of the structure.

The correlation can be attributed largely, if not entirely, to important revisions over the past 50 years to the Japanese national building code and related national standards. The Japanese national code, the *Building Standard Law of Japan* (BSLJ), specifies design loads, allowable stresses, and other requirements. The details of structural design are specified in standards issued by the Architectural Institute of Japan (AIJ). These AIJ standards, prepared separately for each structural material, are supplements to the BSLJ.

The 1968 Tokachi-oki earthquake caused significant damage to buildings, and a revision to the BSLJ reduced the spacing of steel ties in reinforced concrete columns to 100 mm. In 1971, a major revision of the AIJ standard for reinforced concrete incorporated ultimate strength design for shear of beams and



columns, including more stringent shear reinforcement requirements. These changes are comparable to important code changes in the United States following the 1971 San Fernando earthquake in California. Post-1971 reinforced concrete structures performed much better in the 1995 Kobe earthquake than their pre-1971 counterparts, primarily because of the improved shear design of columns, as can be seen clearly from the above figure.

The 1978 Miyagiken-oki earthquake caused significant damage to buildings and led to a 1981 revision of the BSLJ, which introduced a two-phase earthquake-resistant design. The first-phase design (essentially the allowable stress design from the previous BSLJ) is intended to protect a building against loss of function in ground motions expected to occur several times during its lifetime, with peak ground accelerations in the range of 0.08g to 0.10g. The second-phase design is intended to ensure safety under a ground motion expected to occur once in the lifetime of a building, with peak ground accelerations in the range of 0.3g to 0.4g. Post-1981 structures designed by the two-phase procedure performed well in the 1995 Kobe earthquake, as can be seen clearly from the following figure.

On March 11, 2011, a magnitude 9.0 earthquake occurred near the east coast of Honshu, the main island of Japan. This earthquake, known as the 2011 Tohoku earthquake, caused strong ground shaking throughout much of eastern Honshu and triggered tsunami waves that caused widespread damage at many locations along the northeast coast of Japan. Strong ground shaking occurred in Sendai, the major city located 130 km away from the epicenter. Some ground shaking–induced damage was observed even in the Tokyo metropolitan region, more than 350 km southwest of the epicenter; however, widespread structural damage was not observed across eastern Honshu. The lack of widespread significant structural damage from ground motions could once again be attributed to the same important revisions to the Japanese national building code and related national standards.[3]

Total devastation of a community caused by tsunami unleashed by the Tohoku earthquake of March 2011.

Post-earthquake view of downtown Sendai, located only 130 km from the epicenter of the March 2011 Tohoku earthquake, where one had to look for damage, which occurred predominantly in the older buildings.

The earthquake that shook Chile on February 27, 2010, was one of the most devastating in the history of the country, which has a 4270-km coastline along the Pacific Ring of Fire. The moment magnitude issued by the U.S. Geological Survey was 8.8. The earthquake was followed by hundreds of aftershocks, the strongest measuring from 6.0 to 6.9 on the moment magnitude scale. The majority of structures

performed acceptably or better, considering the severity of the earthquake. The number of deaths and the amount of property loss, while quite significant, were not disproportionate to the severity of the earthquake. Much of this was attributable to Chile's history of adoption and implementation of adequate building codes.[4]

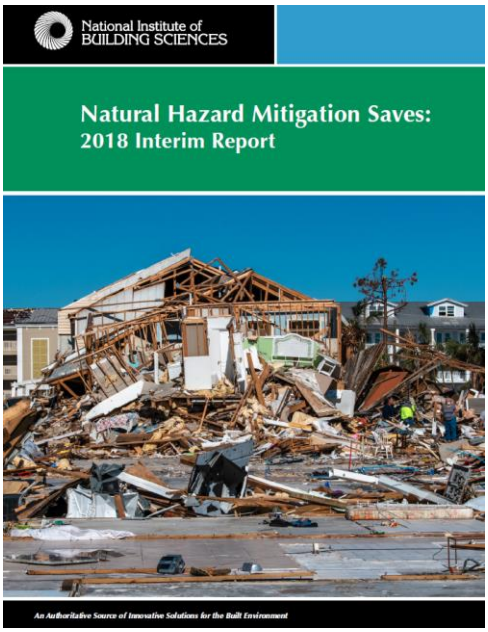
Damage to Chilean buildings and other structures caused by the February 2010 earthquake was commensurate with the severity of the earthquake

As can be seen from the previous section, we can do little to reduce some of the critical and unpredictable natural and man-made disasters, but we can do a lot about the risk to the structures that we design and build. It is important to remember the frequently quoted observation that earthquakes do not kill, but collapsed buildings and facilities do. Although earthquakes cannot be prevented, current science and engineering provide tools that can be used to reduce the damage caused by them. Building codes were created and developed as a response to major disasters including earthquakes, which have caused devastation in highly populated regions. These are often revised based on lessons learned in earthquakes and knowledge gained from research findings, and as such they are constantly evolving. There are many seismic codes used worldwide. Most codes at their root share common fundamental approaches to designing buildings for earthquake effects, but differ in their technical requirements and contain provisions addressing local geologic conditions, common construction types, technical and enforcement capacity, socio-economic conditions and historic issues.

It should be obvious that the best building code will not do anyone any good unless it is properly enforced. The aim of code enforcement should be compliance for our own safety, security and sustainability; emphasis should not be placed on punishment for non-compliance. Reasons for lack of compliance include not only defiance and carelessness, but also lack of knowledge. Investments in disaster resilience do not result in immediate paybacks and financial returns to the investor. Therefore,

building owners are often reluctant to upgrade existing structures and instead elect to invest money in projects that offer the prospect of a more immediate financial return.

The National Institute of Building Sciences (NIBS) of the United States just released the Natural Hazard Mitigation Saves: 2018 Interim Report.[5] This report follows a multi-year study on natural hazard mitigation and comes more than a decade after NIBS' original report on mitigation. The project team studied flood risk, hurricane wind hazards and earthquake risk. They found that the national mitigation benefit-cost ratio associated with code adoption is $6 to $1 for floods, $10 to $1 for hurricanes, and $12 to $1 for earthquakes, with benefits coming through avoided casualties, post-traumatic stress, property damage, business interruptions and insurance premiums. The results show that all building stakeholders benefit from regularly updated codes – from developers, titleholders and lenders, to tenants and communities. These findings demonstrate the importance of regular updates to the building codes and strong code enforcement in order to mitigate damage from natural disasters such as earthquakes, hurricanes and flooding.



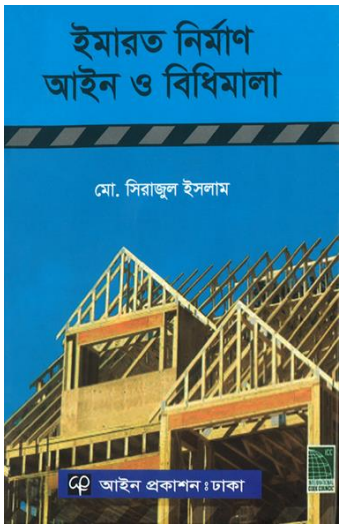
1.2 BUILDING REGULATIONS IN BANGLADESH

A paper by Salma A. Shafi[6] is an excellent source of information on this topic and is drawn upon in this section. The following are important:

Building Construction Act, 1952. After creation of Pakistan in 1947, the cities were growing rapidly. The 1932 Bengal Municipal Act was the only regulation for building control. To address the situation, the government promulgated the East Bengal Building Construction ordinance, 1951 which was later re-enacted as the Building Construction Act, 1952. The Act provides regulations regarding setbacks, building heights etc. in urban areas. The act also provided for prevention of haphazard construction of buildings and excavation of tanks which are likely to interfere with the planning of certain areas in Bangladesh and enables government through Section 16 to make any substantial rules for carrying out the purposes of this Act.

The Town Improvement Act, 1953. It was the first statute that recognized the need for a planning approach and created an autonomous agency which was Dhaka Improvement Trust (DIT) in 1956 and became RAJUK through an amendment in 1987.

Building Construction Rules (RAJUK's Bidhimala), 1984, 1996, 2008. These rules[7] seek to control development plot-by-plot and case-by-case. They control development by imposing conditions on setbacks, site coverage, construction of garages, access to plot, installation of elevators, land use of a particular plot and height of building. Restricting the height of a building helps to control the density of an area and manage the growth of the city in some way. One of the most significant recent improvements is the introduction of Floor Area Ratio (FAR). To manage the growth of the city it provides rules of building coverage area, allowable floor space and relation among building height - road width and plot size.



Bangladesh National Building Code (BNBC). In order to ensure optimum return of substantial portion of national resource invested in building construction, in both public and private sectors and to achieve satisfactory performance of any building, construction needs to be controlled and regulated. These instruments needed updating, rationalization and unification. It was therefore felt that a comprehensive building code would serve the purpose of a uniform national standard.

The work to develop the Code began in 1992 and was completed by the end of 1993. In 2006, the Building Construction Act was amended to include a new section 18 A, empowering the government to promulgate the building code as a legally binding document.[8]

The UN's highest official for disaster risk reduction, Margareta Wahlstrom, called in 2012 for an update of the building code, to protect the seismically active country from widespread devastation. An update was already underway at the time of her call. The Ministry of Housing and Public Works formed a steering committee with the responsibility of Updating BNBC 1993 in 2008. The Housing and Building Research Institute (HBRI) was tasked with providing secretarial service to the steering committee and managing implementation of the project. An agreement was signed between HBRI and the Bureau of Research, Testing and Consultation (BRTC) of the Bangladesh University of Engineering and Technology (BUET) in December 2009 giving the task of updating the Code to BUET. A Draft completed by 2010. The

Steering Committee approved of the draft in 2015. It is still awaiting final government approval. A draft dated 2012 is in wide circulation.[8]

For the purpose of this report, the term "building code" refers specifically to the 1993 (2006) BNBC and RAJUK's Bidhimala, 2008.

1.3 BUILDING DISASTERS

The Rana Plaza disaster of 2013 drew serious attention to building codes and their enforcement. An eight-story commercial building collapsed on April 24. The search for the dead ended on May 13, 2013 with a death toll of 1,134. Approximately 2,500 injured people were rescued from the building alive. It is considered the deadliest structural failure accident in modern human history, and therefore also the deadliest garment factory accident in history.[9]

The building contained clothing factories, a bank, apartments, and several shops. The shops and the bank on the lower floors were immediately closed after cracks were discovered in the building. The building's owners ignored warnings to avoid using the building after cracks had appeared the day before. Garment workers were ordered to return the following day, and the building collapsed during the morning rush-hour when an electric power generator on one of the upper levels was turned on.

The direct reasons for the building failure were:[9]

1. Building built on a filled-in pond which compromised structural integrity,
2. Conversion from commercial use to industrial use,
3. Addition of three floors above the original permit,[
4. The use of substandard construction material (which led to an overload of the building structure aggravated by vibrations due to the generators).

While the Rana Plaza disaster was the worst, it was by no means the only disaster involving buildings. The following table records a number of significant events.

Date	Identification/ Location	Deaths, Injuries	Description[6]
April 24, 2013	Rana Plaza	1134 dead, Approximately 2500 injured	See text
June 3, 2010	Nimtoli	120 dead	Flames gutted eight buildings and over 20 shops at Nawab Katra of Nimtoli.
June 1, 2010	Begunbari	23 dead	A five-story building toppled onto three tin-shed houses in Begunbari area at night.
February 25, 2006	Phoenix Garments	21 dead, several injured	A 5-story building complex collapsed. The building that housed the factory of Phoenix Fabrics a year earlier was being converted into a 500-bed hospital. There were also showrooms of Phoenix Fabrics and Phoenix Electronics on the ground and first floors and a number of

			tin-shed rooms on the rooftop. Experts blamed faulty and unplanned construction for the collapse.
April 11, 2005	Spectrum/Shahryar Sweater Factory	64 killed, 80 injured	Nine-story factory building collapsed early in the morning.
June 10, 2004	Shankhari Bazar	11 killed	Predawn collapse of a six-story building built on 200-year-old three-storey foundations at Shankhari Bazar in Old Dhaka. The building was among 32 structures, built without designs, in Shankhari Bazar that RAJUK marked as highly vulnerable.

1.4 SEISMIC VULNERABILITY

It should be noted that all the listed disasters happened in the absence of any significant seismic or wind event. As noted in the Terms of Reference for this project (TOR, see Annex 1), in recent years, Bangladesh has reformed its approach to cyclone and flood risk management and preparedness. The threat of earthquakes, however, has received much less attention.

According to the TOR, "The objective of the overall engagement is to develop a comprehensive approach to managing earthquake risk through a structured process of knowledge development, education, and planning that involves a wide range of stakeholders to increase engagement and ownership."

1.5 BUILDING CODE ENFORCEMENT

As per Section 2.1, Chapter 2, Part 2 of the 1993 BNBC [and the 2012 BNBC draft],[6] the Government is under obligation to establish a new or designate an existing agency responsible for the enforcement of the Code throughout Bangladesh. However, the Government is yet to set up this Building Regulatory Authority. The absence of a regulatory authority to care for all safety aspects of buildings as per BNBC is a major concern. See Annex 2 for Chapter 2 of the 2012 BNBC draft.

Section 2.6, Part 2 of the 1993 BNBC [Section 2.13.1, Part 2 of the 2012 BNBC draft] only provides that violation of the Code will be an offense and the authority shall take legal action. However, it prescribes no procedure for institution of legal proceedings. This needs to be addressed.

Section 2.11, Part 2 of the 2012 BNBC draft requires: "Any planning, design, supervision of construction, repair, maintenance, modification and alteration of buildings, or any other work regulated by the Code shall be certified by an engineer, architect or planner for its compliance with the provisions of the Code."

The remainder of this section reproduces items, with only minor modifications, from Asia Sentinel dated May 9, 2013.[10] The issue devoted much space to the Rana Plaza disaster of April 24, 2013.

> Experts say the building [Rana Plaza] was but one example of a broken system for authorizing, carrying out and monitoring construction. Tens of thousands more buildings – and millions of

people inside them – could face the same fate, said Anisur Rahman, an urban planner with ADPC's (Asian Disaster Prevention Center) office in Bangladesh.

"It's a management mess," acknowledged K.Z. Hossain Taufique, an urban planner and director of town planning for the government's Capital Development Authority [RAJUK], explaining how since the 1980s, as more businesses and people located in cities, responsibility for town planning has been divided between the Housing Ministry and the Ministry of Local Government, creating a patchwork of authorization – and leaving deadly gaps.

The National Building Code from 1993 and building construction guidelines [RAJUK's Bidhimala] (2008) are rarely – at best weakly – enforced, say government experts.

… Mohammed Abu Sadeque, director of the governmental Housing and Building Research Institute, which is spearheading the building code's revision, said with the recent industrial disaster, the problem was not the code, which is "good enough" and "fairly safe and sound", but rather its lack of enforcement.

Corruption and lack of integrity at all levels – from dishonest architects and engineers to profiteering owners and government officials – means cutting corners, said Bashirul Haq, an architect in Dhaka who recently served on a government committee revising the building code.

"Dhaka has limited space. Developers are in this market for money and want to squeeze as much as they can into any space. Yes, we have a law, but who is implementing it?" he asked.

According to the TOR for this project, "Building Code implementation and enforcement in Dhaka has been described as "largely problematic". The capacity and numbers of personnel from RAJUK to meet the demands of continued building construction and carry out building permitting according to the requirements of the Bangladesh National Building Code (BNBC) are lacking. The shortage of building inspectors, the weaknesses in competency, and the lack of understanding of Building Code implementation and enforcement to protect human lives and property, has resulted in a negligent code enforcement process."

CHAPTER 2. SCOPE OF THE INCEPTION REPORT

The scope of this Inception Report focuses on a balanced regulatory system and a sustainable process. This involves successful implementation of building code regulations and an effective code enforcement process. The process must be open and transparent, to address deficiencies in current systems and procedures, as identified by various interested parties. What is needed is the development of an Infrastructure for plan review and building inspection, which may require institutionalization of strong technical committees. Such development would require political commitment, education and training, certification of professionals and paraprofessionals, building product evaluation and accreditation of laboratories and similar institutions.

The tasks to be carried out by the consultants are the following (for details, see Annex 1: Terms of Reference):

Task 1: Situational Analysis

Task 2: Development of Concept Note

Task 3: Development of Proposed Program for Enforcement of Building Codes and Construction Control Regulations

Along with the above, the consultant will be responsible for providing:

- Training Need and Staffing Need Surveys
- Educational Campaign
- Monitoring and Evaluation

Improvement Building Code Enforcement within RAJUK Jurisdiction (Project S-9) is one of six Urban Resilience programs that RAJUK has undertaken more or less simultaneously. The other five programs are:

- Conduct a Vulnerability Assessment of Critical and Essential Facilities and Lifelines (Project S-4)
- Support the Development of a Risk-Sensitive Land Use Planning Practice in Dhaka (Project S-5)
- Create and Operationalize an Urban Resilience Unit (URU) in RAJUK (Project S-6)
- Establish an Electronic Construction Permitting System (Project S-7)
- Design and Supervise Construction of URU Building (Project S-11)

Coordination with the other programs, in particular Projects S-6 and S-7, is vital to the success of this project.

The Japan International Cooperation Agency is carrying out its own urban resilience program in Bangladesh. Coordination with their project is also going to be important.

CHAPTER 3. OBJECTIVES, FINALIZATION OF METHODOLOGY AND WORK PLAN

According to Section 1, Context, of the TOR, as noted earlier, "The objective of the overall engagement is to develop a comprehensive approach to managing earthquake risk through a structured process of knowledge development, education, and planning that involves a wide range of stakeholders to increase engagement and ownership.

According to Section 3, Scope of Work, of the same TOR, "The objective of this engagement is to build the capacities and administrative structure for RAJUK to implement and enforce the Bangladesh National Building Code (BNBC), the provisions of the Structure Plans and Detailed Area Plans (DAPs) and to building field inspection and controls."

The Structure Plan and the Detailed Area Plan are parts of the Dhaka Metropolitan Development Plan (DMDP), which is a three-tier plan package. The Dhaka Structure Plan (1995-2015) and the Urban Area Plan (1995-2015) were completed under the DMDP package, approved and published in the Bangladesh Gazette. The Detailed Area Plan (DAP) is the third and last tier of DMDP. It provides more detailed planning proposals for specific sub-areas compliant with the Structure Plan and the Urban Area Plan. DAP aimed to implement the Structure Plan and the Urban Area Plan policies and recommendations.

The majority of efforts on this project will be devoted to proper implementation and enforcement of BNBC. The presumption is that the seismic design provisions in Part 6 of even the 1993 BNBC will ensure life safety in the design earthquake anticipated by BNBC. The consultants firmly believe this to be the case. Although updates are very much needed and will result in improvements, life safety in the design earthquake is ensured by the 1993 provisions. BNBC containing these provisions, if properly implemented and enforced, will minimize loss of life in earthquakes.

The education and outreach effort under this project will be devoted largely to raising awareness of seismic risk, to training professionals in properly implementing the seismic design provisions of BNBC, and to make code enforcement personnel including inspectors more aware of building features that are important from a seismic point of view.

3.1 TECHNICAL APPROACH, METHODOLOGY AND TASKS

The technical approach, methodology and tasks are summarized in the following table.

Summary of Technical Approach, Methodology and Deliverables

Deliverables	Activities
1. Inception Report	Mobilization of project team and finalization of methodology and work plan with input from meetings with key stakeholders and RAJUK. Preparation and submittal of Inception Report to RAJUK for approval.
2. Situational Analysis	This task is aimed at an assessment of where things stand today within RAJUK's jurisdiction with respect to the current regulatory system to enforce the National Building Code of Bangladesh. Activities include: 1. Review of documentation provided by RAJUK concerning code

Deliverables	Activities
	enforcement violations and resolution. 2. Field observations: visits to building sites picked with and without RAJUK's guidance to find out first-hand about building code enforcement. 3. Extensive interviews with building officials, building inspectors, design professionals, contractors, construction managers and developers. 4. Discussion of findings and conclusions from 1., 2., and 3 with RAJUK and with a Project Working Group (PWG) consisting of stakeholders at a stakeholders' workshop. 5. Preparation of a final situational report considering input from stakeholders. 6. Conducting a training needs survey, targeting local government code enforcement personnel, contractors and construction workers, government decision-makers/policy makers, and the design community. 7. Conducting a staffing needs survey including consideration of staffing level as well as specialization, qualification and compensation level of staff. The required investment needs will be quantified, and proposed timelines set.
3. Concept Note	The aim of this task is to identify strengths, weaknesses, opportunities and challenges for strategic and successful BNBC implementation, and to devise an implementation plan, based on the initial assessment. Activities include: 1. Organizing a workshop with the PWG to review and assess current legal and administrative procedures for addressing violations and enforcement of building code and zoning regulations. The results will be summarized and supplemented by the research described below. 2. Conducting targeted desk research to document other models of building code implementation and enforcement in both developed and developing countries. A selection will be made of the available models that are most applicable to conditions in Bangladesh. 3. Investigating incentives for building code compliance. The establishment of a ratings system for code-compliant buildings is a possibility. 4. Developing specific approaches to resolving two issues related to Building Code implementation and enforcement, often cited as

Deliverables	Activities
	major impediments: a) Weakness in the legislative framework; and b) A lack of competent resources. 5. Developing a Draft Concept Note from Activities 1 through 4 above, defining relevant parameters for building code implementation and enforcement by RAJUK. A validation workshop with the PWG will lead to a final Concept Note, a project deliverable.
4. **Proposed Program for Enforcement of Building Codes and Construction Control Regulation**	This task will extend the Concept Note into a proposed model for RAJUK's enforcement of building codes and construction control regulations. Activities include: 1. Development of a plan, setting forth legal, administrative, technical, and logistical parameters for transparent and rigorous building code implementation and enforcement. 2. Validation of the proposed enforcement model with relevant stakeholders (i.e., PWG), RAJUK leadership, and the Ministry of Housing and Public Works to ensure viability and efficient implementation. The proposed enforcement program will be finalized based on input from the validation process. 3. Following validation of the plan, preparation of the necessary documentation to submit the proposed enforcement program for approval by the government under the leadership of RAJUK. 4. Formulation of a training and capacity building plan, based on the Training Needs Survey. Development of the curriculum for training and identification of the delivery methodology, the target audience, objectives, and cost estimates. A schedule for the roll out of the capacity building program will be delivered for approval by RAJUK.
5. Education Campaign	The purpose of this task is to develop and execute an extensive public awareness and educational campaign to reinforce the critical importance of building code implementation and enforcement to protect life.
6. Monitoring and Evaluation	The purpose of this task is to assess progress achieved by the proposed enforcement program. A set of objective indicators for monitoring and evaluating progress will be developed in consultation with RAJUK. Accomplishments as well as drawbacks will be documented. Specific lessons learned and recommendations for improving the program will be provided to RAJUK. A Monitoring and Evaluation report will be issued.

CHAPTER 4. INCEPTION WORKSHOP

An Inception/Kick-Off Workshop was held at the Spectra Convention Centre in Dhaka on November 1, 2018. A large number of over one hundred invited stakeholders including a significant number of RAJUK personnel attended. The Workshop program and the attendees' list are included in Annex 3.

In the last part of the program, the participants were divided into three separate groups. The grouping was based on the participants' area of work. Each group was presented with three key questions. The questions guided the discussions and the answers were then shared among all participants. The questions and the answers are included in Annex 3.

The Workshop led to the following findings:

- Proper code is needed for successful engineering design and enforcement is needed for implementation.
- The proper implementation of building code will transform a society in a number of ways:
    1. Directly saving lives, avoiding construction accidents,
    2. Cutting down on loss of lives in natural disasters,
    3. Reducing property loss and thereby sustaining infrastructure development.
- RAJUK has a building construction approval process and a construction monitoring process. Inspectors do check setback distances and other similar regulations (see Annex 4).
- Two most important aspects of building design and construction are:
    1. Building design needs to be done according to the building code:
        I. This can only be ensured through proper structural plan check. Rajuk does not have adequate capacity for structural plan checking. Rajuk may want to consder outsourcing this function to certified third party plan checkers
        II. Particular attention needs to be given to compliance of earthquake-resisting design aspects with the applicable provisions of BNBC
    2. Construction needs to be done according to the Building Code: This can be ensured only through proper inspection. Three types of inspection are provided for in the *International Building Code*[11]:
        I. Jurisdictional inspection: inspectors employed by the local jurisdiction go out to the jobsite to check for compliance with the building code.
        II. Special inspection: required in high seismic and/or high wind areas for certain specified items; special inspection can be periodic or continuous.
        III. Structural observations: visual observation by a registered design professional to make sure that what is being built is what was designed at the design office.
- Many inspector/ plan examiner certification programs are available from ICC (see Annex 2). Such certification is part of the qualification, skill and experiance that an inspector should have.

CHAPTER 5. STAKEHOLDER CONSULTATIONS

Meetings held with various stakeholders are summarized below. Detailed notes on some of the consultations are provided in Annex 5.

	Date	Organization Visited	ICC/SDE Team	Interviewees
1.	October 27, 2018	Sthapona Consultants	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Md. Shajal Khan	Engr. Md. Mehedi Hasan, CEO & Chief Consultant
2.	October 28, 2018	BUET, Department of Civil Engineering	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Latif Helaly (Project Director) Engr. Abdul Siddik Hossain	Dr. Ahsanul Kabir, Professor & Department Head Dr. Mehedi Ahmed Ansary, Professor Dr. Raquib Ahsan, Professor
3.	October 28, 2018	BUET, Department of Architecture	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Latif Helaly (Project Director) Engr. Abdul Siddik Hossain	Dr. Nasreen Hossain, Professor & Department Head Dr. Raquib Ahsan, Professor
4.	October 28, 2018	BUET, Japan Institute of Disaster Prevention and Urban Safety (JIDPUS)	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Latif Helaly (Project Director) Engr. Abdul Siddik Hossain	Dr. Raquib Ahsan, Director Tasnim Tarannum Isaba, Lecturer Shamontee Aziz, Lecturer Ishfaq Aziz, Lecturer
5.	October 28, 2018	Fire Service and Civil Defense	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Latif Helaly (Project Director) Engr. Abdul Siddik Hossain	Brigadier General Ali Ahmed Khan, Director General Major S. M. Muzahid Monir
6.	October 30, 2018	Asia-Pacific University	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Latif Helaly (Project Director) Engr. Abdul Siddik Hossain Mr. Md. Mahboob Hassan, Procurement Specialist, RAJUK/URU/WB	Prof. Jamilur Reza Chowdhury, Vice Chancellor

	Date	Organization Visited	ICC/SDE Team	Interviewees
7.	October 31, 2018	Ahsanullah University of Science & Technology	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Siddik Hossain Mr. Md. Mahboob Hassan, Procurement Specialist, RAJUK/URU/WB	Prof. A. M. M. Safiullah, Vice Chancellor Dr. Md. Abdur Rouf, Professor
8.	November 4, 2018	Military Institute of Science & Technology	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader)	Prof. Dr. Md. Zoynul Abedin Col. Md. Masudur Rahman, Professor and Department Head
9.	November 5, 2018	Rangs Properties Ltd.	Dr. S.K. Ghosh (Team Leader) Dr. Aminul Islam (Practice Leader) Engr. Iffat Huq Engr. Abdul Siddik Hossain	Angelo Afnan Hamid, Manager, Cordination – Project Management Md. Habib Ul Alam, Manager – Project Management S M Ahsan Mico, Head of Design
10.	November 5, 2018	Housing and Building Research Institute (HBRI)	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Abdul Siddik Hossain	Md. Shamim Akhtar, Director General Md. Abdul Wahed, Principal Research Engineer
11.	November 4, 2018	The World Bank	Dr. S.K. Ghosh (Team Leader) Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Mr. Md. Mahboob Hassan, Procurement Specialist, RAJUK/URU/WB	Swarna Kazi S. M. Mehedi Hasan
12.	November 5, 2018	Japan International Cooperation Agency (JICA)	Dr. S.K. Ghosh (Team Leader) Dr. Aminul Islam (Practice Leader) Engr. Abdul Siddik Hossain	Takumi Tsuchiya Md. Anisuzzaman Chowdhury
13.	December 4, 2018	Bangladesh Association of Construction Industry (BACI)	Dr. Ahmadul Hassan (Executive Director, SDE) Dr. Aminul Islam (Practice Leader) Engr. Iffat Huque Engr. Md. Shajal Khan Engr. Abdul Siddik Hossain	Engr. Muniruddin Ahmed, President, BACI Md. Shahidul Islam, secretary, BACI S.M. Rafiqul Islam, Chairman, GBB Power Ltd Engr. Abu M Masud, Icon Engineering Engr. Mahmudul Hassan, Member, BACI Engr. Shafiqul H Talukdar, Starlite Services Ltd. Engr. Aftab Uddin Ahmed, Former President, BACI

	Date	Organization Visited	ICC/SDE Team	Interviewees
14.	December 6, 2018	Institution of Engineers, Bangladesh	Dr. Aminul Islam (Practice Leader) Engr. Iffat Huque Engr. Md. Shajal Khan Engr. Abdul Siddik Hossain	Engr. Mollah Mohammad Abul Hossain, Vice-President (Service sand Welfare), Engr. Md. Nuruzzaman, Vice-President (Human Resources Development), Engr. Khandker Manjur Morshed, Honorary General Secretary, Engr. Md. Hamidul Hoqoe, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB) and a large number of IEB committee members
15.	December 6, 2018	Bangladesh Association of Consulting Engineers (BACE)	Dr. Aminul Islam (Practice Leader) Engr. Iffat Huque Engr. Md.Shajal Khan Engr. Abdul Siddik Hossain	Dr. M. Shamim Z. Bosunia, President, BACE Shahidul Hassan Khan, General Secretary, BACE Engr. Abu Hasan M Eunus, Chairman, Dexterous Consultants Ltd.

CHAPTER 6. PROJECT IMPLEMENTATION CONCEPT WORKSHOP

A Project Implementation Concept Workshop was held at the Radisson Blu hotel in Dhaka on December 8 and 9, 2018 (see Annex 6). Presentations were made and detailed discussions were held on RAJUK Projects S-4, S-5, S-6, S-7, S-9, and S-11. The presentation on Project S-9, Building Code Implementation and Enforcement Strategy for Urban Resilience Unit, was made by Dr. S. K. Ghosh, Team Leader, on December 8th (the presentation is included in Annex 6). Following the presentation, there was a discussion session presided over by Dr. Raquib Ahsan of BUET. A summary of the discussion follows.

Question- Answer:

1. From Institute of Architects Bangladesh (IAB): Not only the integrity of the structure, but livability have to be ensured as well. Professionals from BUET need to be involved.
2. Bangladesh Meteorological Department (BMD): Who will monitor and update the data (seismic maps and codes) in future?
   Dr. Raquib Ahsan: Project S-09 is related to implementation and enforcement of BNBC, not updating.
3. Fire Service Civil Defense (FSCD): They provide permission for building high-rise buildings. They need to train their team so that they can do their best.
4. Bangladesh Navy: Some legal bindings (punishment for people who do not follow the code) and awareness generation is needed for the general public.
5. Nurul Islam: Proper manpower is an issue. The RAJUK zonal head should be a technical person.
6. RTI: What is meant by enforcement? What is the coverage area?
   Ans: Entire BNBC is to be enforced. Only DMDP (Dhaka Metropolitan Development Plan) area is covered.
7. Dr. Monjur, SDE: A system for reward and punishment should be introduced for implementing the BNBC code.

CHAPTER 7. KEY FINDINGS

The findings from the Inception Workshop, the stakeholder consultations and the Project Implementation Concept Workshop are summarized in this section.

7.1 CODE SUPPORT AND CODE EDUCATION

- There is no code commentary with the current BNBC.
- Including a commentary would be very helpful in implementing the code.
- Design examples using code should be developed
- In primary education, some basic idea of code should be included.
- At undergraduate level, all engineering departments could discuss about the new version of code.
- In 3rd to 5th year undergraduate courses, relevant parts of the building code should be taught.
- Short courses for graduate engineers need to be available.

7.2 GARMENT INDUSTRY

The garment industry [Alliance for Worker Safety Bangladesh and ACCORD, Bangladesh], after the Rana Plaza disaster, have found ways to enforce the building code for their structures. The rest of the building industry should look upon this success story as a learning opportunity and may even choose imitate steps that appear to be practicable. A paper by Ansary and Barua[12] is useful to read on this topic and is included in Annex 2.

7.3 STRUCTURAL PLAN CHECKS

- Design needs to be in accordance with the building code.
- This can be ensured only through proper plan check, including check of design calculations.
- Structural drawings currently need to be submitted only for buildings more than ten stories tall. No structural calculations need to be submitted.
- The structural drawings undergo some review that is far from thorough. RAJUK does not have adequate capacity for structural plan check.
- Proper plan check capability needs to be put in place – not only for taller buildings, but for all buildings. Or RAJUK could outsource structural plan checking to pre-selected structural firms.

7.4 INSPECTION

- Construction needs to be in accordance with the building code. The only way to ensure compliance is through proper inspection. There are three types of inspection in U.S. building codes:
- Jurisdictional inspection
- Special inspection: Continuous special inspection and Periodic special inspection
- Structural observations

Jurisdictional inspection is the only kind done in Bangladesh. It needs a lot of improvement. The scope of such inspection needs to be expanded. There are fairly urgent manpower needs. Also, inspector training is badly needed.

To be considered for the future are special inspection and structural observation. The *International Building Code* definitions of Special Inspector, Special Inspection, and Structural Observation are given below.

SPECIAL INSPECTOR. A qualified person employed or retained by an approved agency and approved by the building official as having the competence necessary to inspect a particular type of construction requiring special inspection.

SPECIAL INSPECTION. Inspection of construction requiring the expertise of an approved special inspector in order to ensure compliance with this code and the approved construction documents.

Continuous special inspection. Special inspection by the special inspector who is present continuously when and where the work to be inspected is being performed.

Periodic special inspection. Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed.

STRUCTURAL OBSERVATION. The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents.

7.5 ACCREDITATION

- Institute of Architects Bangladesh (IAB) administers de facto accreditation of architects, which apparently is fairly effective.
- Institution of Engineers, Bangladesh (IEB) could be more effective in this regard.

7.6 CERTIFICATE OF OCCUPANCY

- The owner is currently not concerned about the occupancy certificate although it is required by RAJUK's *Bidhimala*. Some measures should be taken to make it compulsory for owner to have occupancy certificate before occupying.
- There is also no attempt to renew the certificate in 5 years, although it is required by RAJUK's current *Bidhimala*.
- It is important to find a way to make old building owners have something equivalent to an occupancy certificate which is renewable on a regular basis.

7.7 RAJUK'S LIMITATIONS

- Shortage of manpower: whereas 30 inspectors are supposed to be there, only 10 inspectors are available.
- Transportation: for frequent field visits, the number of vehicles available is very limited. There are no vehicles for inspectors.
- Insufficient number of computers, printers: whereas 30 -40 computer are needed, there are only 3-4 computers
- No efficient server for online processing of applications.
- Unavailability of updated software.
- Unavailability of modern tools and equipment for data collection.

- There is no in-house or outside training facility for the professionals.

7.8 SOME INITIATIVES RECOMMENDED BY RAJUK

- RAJUK frequently goes to field to enforce various laws; however, they need police to accompany them to ensure security. They often do not get the necessary support. Provisions are required for adequate police support.
- There should be some penalty by law for deviations from approved design.
- There should be some coordination among the bank loan authority and RAJUK, so that if client is taking loan, he is bound to abide by RAJUK's *Bidhimala* for building construction
- There should be a law to make sure that client has an occupancy certificate before utility lines are connected.
- The various RAJUK zones do not have the required personnel. More logistic support for decentralization is required.
- There should be a mechanism to ensure safety and security of RAJUK professionals during field inspections.
- An incentive system should be put in place to reward RAJUK employees for better performance.
- A campaign is needed for awareness generation among building owners regarding building code and RAJUK's *Bidhimala*.

7.9 COORDINATION WITH OTHER FUNDED PROGRAMS

RAJUK's other urban resilience programs are:

- S-4: Vulnerability Assessment of Critical and Essential Infrastructure
- S-5: Develop Risk-Sensitive Land Use Planning
- S-6: Create and Operationalize Urban Resiliency Unit (URU)
- S-7: Electronic Construction Permitting System
- S
- S-11: Design and Supervision of URU Building
- S-8: Professional Accreditation Program (Not contracted yet)
- Coordination with the other funded programs, particularly S-6 and S-7 is going to be vitally necessary. This, in fact, has started.
- Coordination with JICA is also going to be important. This also got started in early November.

CHAPTER 8. WORK PLAN INCLUDING PROPOSED REVISIONS

The original Work Plan submitted with the ICC/SDE technical proposal is presented as Work Plan 1.

Prior to the Inception Workshop of November 1, 2018, in view of input received from the World Bank, the project duration was shortened from 36 months to 31 months. The revised Work Plan presented at the Inception Workshop is presented as Work Plan 2.

Both the World Bank and RAJUK have now expressed a desire that 40% of the project be completed by the end of June 2019. To try to accomplish this, the consultants are requesting a couple of adjustments in the Work Plan and a couple of adjustments in the payment schedule.

The one significant change in the Work Plan is that the consultants would like to advance the Education and Outreach Campaign to the period from March 1st to June 15th. It has become abundantly clear, based on observations and consultations so far, that awareness of seismic matters and knowledge about code compliance are sorely lacking. Something this vital should not be postponed to the end of the project.

The consultants have also done some fine tuning of the periods during which various tasks under Situation Analysis will be conducted, without affecting the total duration of this activity.

The proposed work plan is shown here as Work Plan 3. The consultants request approval of Work Plan 3.

In the payment schedule, the consultants have proposed two adjustments. First, the second payment for Situation Analysis Report should be increased to 20%, while lowering the 8th and final payment to 10%. Second, the date of the 6th payment for Education and Outreach Campaign Report should be advanced to June 15, 2019. The revised Payment Schedule is presented following the Work Plans. The consultants request approval of the revised Payment Schedule as well.

Work Plan 1

FORM TECH -5 (FOR FTP AND STP)

WORK SCHEDULE AND PLANNING FOR DELIVERABLES

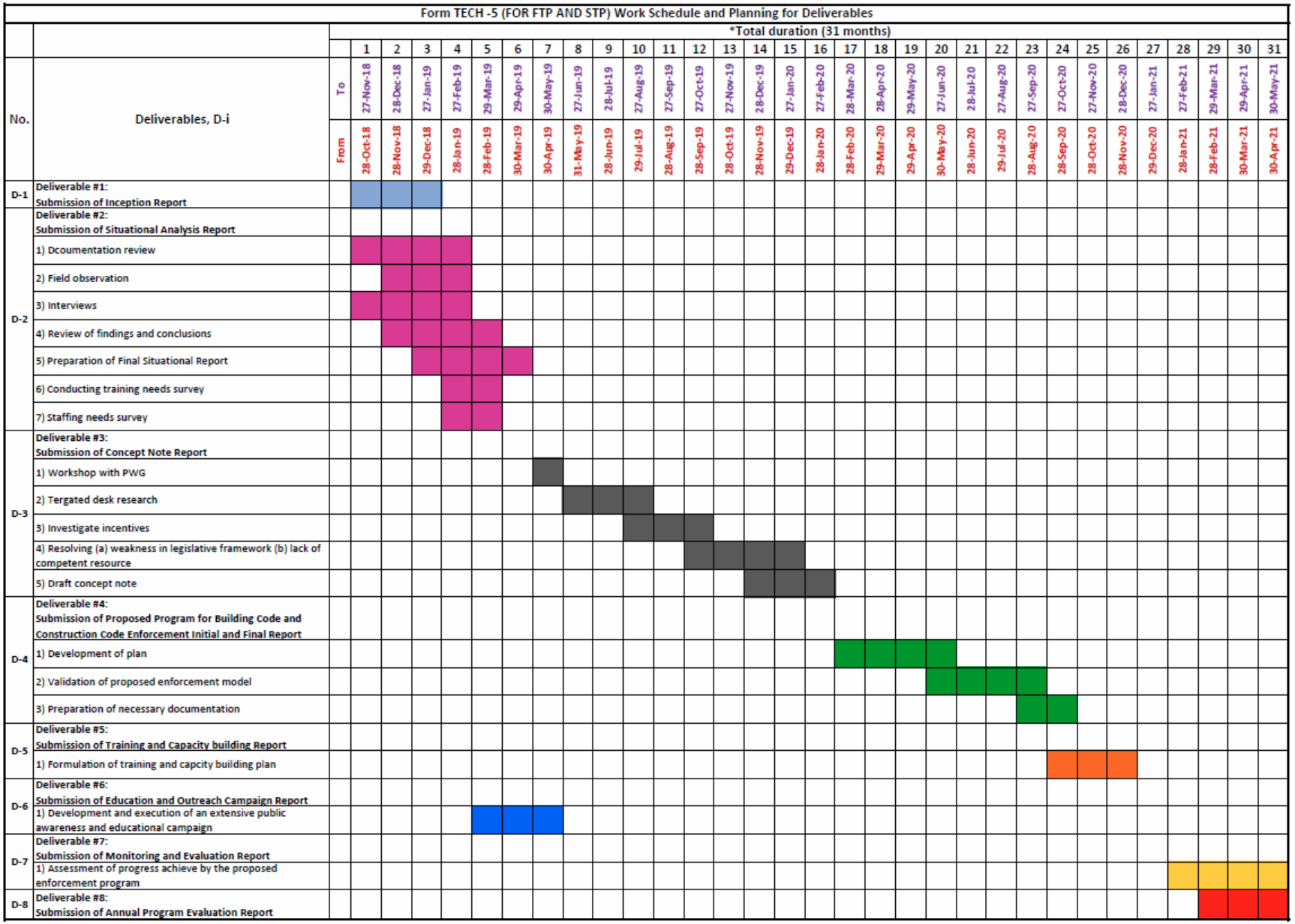
No.	Deliverables, D-i		Duration (total 36 months)																																		
		To	27-Nov-18	28-Dec-18	27-Jan-19	27-Feb-19	29-Mar-19	29-Apr-19	30-May-19	27-Jun-19	28-Jul-19	27-Aug-19	27-Sep-19	27-Oct-19	27-Nov-19	28-Dec-19	27-Jan-20	27-Feb-20	28-Mar-20	28-Apr-20	29-May-20	27-Jun-20	28-Jul-20	27-Aug-20	27-Sep-20	27-Oct-20	27-Nov-20	28-Dec-20	27-Jan-21	27-Feb-21	29-Mar-21	29-Apr-21	30-May-21	27-Jun-21	28-Jul-21	27-Aug-21	27-Sep-21	27-Oct-21
		From	28-Oct-18	28-Nov-18	29-Dec-18	28-Jan-19	28-Feb-19	30-Mar-19	30-Apr-19	31-May-19	28-Jun-19	29-Jul-19	28-Aug-19	28-Sep-19	28-Oct-19	28-Nov-19	29-Dec-19	28-Jan-20	28-Feb-20	29-Mar-20	29-Apr-20	30-May-20	28-Jun-20	29-Jul-20	28-Aug-20	28-Sep-20	28-Oct-20	28-Nov-20	29-Dec-20	28-Jan-21	28-Feb-21	30-Mar-21	30-Apr-21	31-May-21	28-Jun-21	29-Jul-21	28-Aug-21	28-Sep-21	
D-1	**Deliverable #1: Inception Report**																																				
D-2	**Deliverable #2: Situational Analysis**																																				
	1) Dcoumentation review																																				
	2) Field observation																																				
	3) Interviews																																				
	4) Review of findings and conclusions																																				
	5) Preparation of Final Situational Report																																				
	6) Conducting training needs survey																																				
	7) .Staffing needs survey																																				
D-3	**Deliverable #3: Concept Note**																																				
	1) Workshop with PWG																																				
	2) Tergated desk research																																				
	3) Investigate incentives																																				
	4) Resolving (a) weakness in legislative framework (b) lack of competent resource																																				
	5) Draft concept note																																				
D-4	**Deliverable #4: Proposed Program for Enforcement of Building Codes and Construction**																																				
	1) Development of plan																																				
	2) Validation of proposed enforcement model																																				
	3) Preparation of necessary documentation																																				
D-5	**Deliverable #5: Education Campaign**																																				
	1) Formulation of training and capcity building plan																																				
	2) Development and execution of an extensive public awareness and educational campaign																																				
D-6	**Deliverable #6: Monitoring and Evaluation**																																				
	Assessment of progress achieve by the proposed enforcement program																																				

Work Plan 2

Form TECH -5 (FOR FTP AND STP) Work Schedule and Planning for Deliverables																																
		*Total duration (31 months)																														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.	Deliverables, D-i	To	27-Nov-18	28-Dec-18	27-Jan-19	27-Feb-19	29-Mar-19	29-Apr-19	30-May-19	27-Jun-19	28-Jul-19	27-Aug-19	27-Sep-19	27-Oct-19	27-Nov-19	28-Dec-19	27-Jan-20	27-Feb-20	28-Mar-20	28-Apr-20	29-May-20	27-Jun-20	28-Jul-20	27-Aug-20	27-Sep-20	27-Oct-20	27-Nov-20	28-Dec-20	27-Jan-21	27-Feb-21	29-Mar-21	29-Apr-21	30-May-21
		From	28-Oct-18	28-Nov-18	29-Dec-18	28-Jan-19	28-Feb-19	30-Mar-19	30-Apr-19	31-May-19	28-Jun-19	29-Jul-19	28-Aug-19	28-Sep-19	28-Oct-19	28-Nov-19	29-Dec-19	28-Jan-20	28-Feb-20	29-Mar-20	29-Apr-20	30-May-20	28-Jun-20	29-Jul-20	28-Aug-20	28-Sep-20	28-Oct-20	28-Nov-20	29-Dec-20	28-Jan-21	28-Feb-21	30-Mar-21	30-Apr-21	
D-1	**Deliverable #1: Submission of Inception Report**																															
D-2	**Deliverable #2: Submission of Situational Analysis Report**																															
	1) Dcoumentation review																															
	2) Field observation																															
	3) Interviews																															
	4) Review of findings and conclusions																															
	5) Preparation of Final Situational Report																															
	6) Conducting training needs survey																															
	7) Staffing needs survey																															
D-3	**Deliverable #3: Submission of Concept Note Report**																															
	1) Workshop with PWG																															
	2) Tergated desk research																															
	3) Investigate incentives																															
	4) Resolving (a) weakness in legislative framework (b) lack of competent resource																															
	5) Draft concept note																															
D-4	**Deliverable #4: Submission of Proposed Program for Building Code and Construction Code Enforcement Initial and Final Report**																															
	1) Development of plan																															
	2) Validation of proposed enforcement model																															
	3) Preparation of necessary documentation																															
D-5	**Deliverable #5: Submission of Training and Capacity building Report**																															
	1) Formulation of training and capcity building plan																															
D-6	**Deliverable #6: Submission of Education and Outreach Campaign Report**																															
	1) Development and execution of an extensive public awareness and educational campaign																															
D-7	**Deliverable #7: Submission of Monitoring and Evaluation Report**																															
	1) Assessment of progress achieve by the proposed enforcement program																															
D-8	**Deliverable #8: Submission of Annual Program Evaluation Report**																															

Updating Date: November 5, 2018

Work Plan 3



Updating Date: January 15, 2019

Revised Payment Schedule :

Advance	10% of contract amount	It will be set off/adjusted by the Client in equal portions against 2nd , 3rd, 4th and 5th payments.	Within xx days of signing of contract on July 16, 2018
1st Payment	5% of contract amount	Upon submission of ***"Inception Report."***	October 15, 2018
2nd Payment	10% of contract amount **Propose 20%**	Upon submission of ***"Situation Analysis Report"***	March 15, 2019
3rd payment	10% of contract amount	Upon submission of ***"Concept Note Report"***	March 15, 2020
4th Payment	10% of contract amount	Upon submission of ***"Proposed Program for Building Code and Construction Code Enforcement Report" initial and final***	November 15, 2020
5th Payment	15% of contract amount	Upon submission of ***"Training and Capacity building Report"***	January 15, 2021
6th Payment	10% of contract amount	Upon submission of ***"Education and Outreach Campaign Report."***	~~April 15, 2021~~ **June 15, 2019**
7th Payment	20% of contract amount	Upon submission of ***"Monitoring and Evaluation Report."***	July 15, 2021
8th & Final Payment	20% of contract amount **Propose 10%**	Upon submission of ***"Annual Program Evaluation Report – last year and fulfillment of all other contractual obligations by consultant."***	

Respective payments shall be made subject to fulfillment of all deliverables within the stipulated time and approval of concerned reports by the client.

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ABBREVIATIONS

AIJ	Architectural Institute of Japan
BNBC	Bangladesh National Building Code
BRTC	Bureau of Research, Testing and Consultation
BSLJ	Building Standard Law of Japan
BUET	Bangladesh University of Engineering and Technology
DAP	Detailed Area Plan
DMDP	Dhaka Metropolitian Development Plan
DPRI	Disaster Prevention Research Institute
HBRI	Housing and Building Research Institute
ICC	International Code Council
JICA	Japan International Corporation Agency
JIDPUS	Japan Institure of Disaster Prevention and Urban Safety
PWG	Project Working Group
RAJUK	Rajdhani Unnayan Kartripakkha (Capital Development Authority)
SDE	Smart Development Engineers
SMO	Safety Monitoring Organization
TOR	Terms of Reference
UN	United Nations
URP	Urban Resilience Project
URU	Urban Resistance Unit

ANNEX 1: TERMS OF REFERENCE

[Reproduced from Section 7 of Request for Proposals (RFP) no. URP/RAJUK/S-09, Selection of Consultants for "Consultancy Services for Building Code Implementation and Enforcement Strategy," issued by Rajdhani Unnayan Kartripakkha (RAJUK) in February 2018.]

1. CONTEXT

In recent years, Bangladesh has reformed its approach to cyclone and flood risk management and preparedness. Triggered by major loss of life and assets, notably during the cyclones of 1970 and 1991 that killed over 300,000 and 140,000 people respectively, the Government of Bangladesh (GoB), civil society, and international development partners have demonstrated that investment in the systems and structures of flood risk management and cyclone preparedness saves lives, reduces economic loss, and protects development gains. As such, Bangladesh is cited often in the rationale for investment in disaster risk management (DRM) activities globally.

The threat of an earthquake, however, is less visible but significant given that Bangladesh lies on the seismically active Indian plate. Inertia has slowed earthquake awareness because these events occur less regularly and are currently relatively absent from the living memory of the country's inhabitants and leaders. Studies by the Geological Survey of Bangladesh divide the country into three seismic zones, which show that earthquake risk is medium to high throughout the country and increases towards the north and east of the country. Although there is some uncertainty, research suggests that an earthquake of up to magnitude 7.5 is possible, and the nearest fault line runs just 60km from the nation's capital.

Given a lack of recent earthquake events, an understanding of earthquake risk and corresponding strategies to mitigate the impact of such events is lacking. A National Plan on Disaster Management (2010-2015) includes an Earthquake Management Plan and a National Earthquake Contingency Plan, which have been developed under the Ministry of Food and Disaster Management. These plans identify response and risk reduction activities with corresponding lead and support agencies. However, the plans lack the comprehensive vision of a national earthquake strategy, and a convincing demonstration of benefits, implementation, and controls. Furthermore, the institutional structure for multi-stakeholder engagement to deal with a problem as complex as urban earthquake risk is also lacking and the existing plans do not engage agencies and organizations in a sustainable way.

To respond to this critical gap in the management of disaster risk in Bangladesh, this project represents the second phase of a multi-phase national DRM program to build institutional capacity to mitigate the impact of earthquakes in the rapidly urbanizing cities of Bangladesh. The objective of the overall engagement is to develop a comprehensive approach to managing earthquake risk through a structured process of knowledge development, education, and planning that involves a wide range of stakeholders to increase engagement and ownership.

2. BACKGROUND

Building Code implementation and enforcement in Dhaka has been described as "largely problematic". The capacity and numbers of personnel from RAJUK to meet the demands of continued building construction and carry out building permitting according to the requirements of the Bangladesh National Building Code (BNBC) are lacking. The shortage of building inspectors, the weaknesses in competency, and the lack of understanding of Building Code implementation and enforcement to protect human lives and property, has resulted in a negligent code enforcement process.

The current process for code enforcement is limited to checking setbacks and ignores the structural provisions. The noted development and code violations include the following:

- Not maintaining the distance of building from adjacent road
- Not maintaining height of building as per the plan
- Not maintaining setback rules of building
- Changing the land use of the building
- Systemic ignorance of structural provisions, including earthquake provisions of the building code
- Violations of fire code provisions
- Low or inexistent field construction quality control and inspections

3. SCOPE OF WORK [1]

This engagement will build the capacities and administrative structure for RAJUK to implement and enforce the Bangladesh National Building Code (BNBC), the provisions of the Structure Plans and Detailed Area Plans (DAPs) and to building field inspection and controls. This funding is confined to RAJUK jurisdictional responsibilities and mandate.

Task 1: Situational Analysis. The consultant will prepare an initial assessment on various code enforcement violations and resolution involving these cases in RAJUK jurisdiction to cover structural and building code, housing code, city/municipal code, occupancy and zoning violations, nuisance violations, other related violations and their sub-types. The consultant shall also investigate the various status of enforcement cases (e.g., complaints, notice of violations, resolution plan, notices and orders, legal action and case resolutions by planning and building divisions, and other authorities.) The work shall also include related violations, conflicts resulting from project implementation and enforcement by other agencies, public or private within RAJUK area of jurisdiction.

- At least a full section of the report should be related to the structural and architectural violations, and in particular the seismic requirements violations.
- A portion of the report should be developed from reviewing government documentation.
- Another portion should be from field observations as well as from interviews with building officials, engineers, architects design professionals, contractors, construction managers and developers.
- The findings and conclusions should be reviewed and discussed with RAJUK PIU-PIC.
- A stakeholders' workshop should be prepared to discuss and validate the findings with the stakeholders. The stakeholders should represent broad segments of professionals and academe involved in construction regulation and enforcement, design, construction, planning and development and organized in a Project Working Group (PWG).

The total duration of the task is foreseen to be 4 months. A final Situational Report should be completing taking into consideration the input from the stakeholders as a deliverable of the project.

[1] Sub- component C.4a-C4.e Building code enforcement within RAJUK. Annex 2:Detailed Project Description, , Project Component Design for the Bangladesh URP Investment Program

Task 2: Concept Note. Based on the findings of the initial assessment, the consultant shall also review policies to identify strengths, weaknesses (and gaps), opportunities and challenges for strategic and successful BNBC implementation. The current legal and administrative procedures for addressing violations and enforcement of building code and zoning will also be assessed. This review can also take place in the form of a workshop with the PWG. The results should be summarized and supplemented by the Consultant's research.

In addition, the Consultant shall do a targeted desk research to document other models of Building Code implementation and enforcement in both developed and developing countries, and to assess their potential adaptation to Bangladesh. Among the various models, a selection should be made representing those that are most suitable to the conditions in Bangladesh.

An additional analysis should be focused at investigating incentives for enforcement from both the public and private sector. The global experience (from both developed and developing countries) will be relevant. These incentives could be directed to building owners, developers, contractors and designers. They could be structural (e.g., require certain insurance coverages) or non-structural (e.g., recognition). They could be establish to promote sound practices and to utilize market driven potentials, such as establishing rewards or ratings for code-compliant buildings.

The Consultant should particularly address two aspects of Building Code implementation and enforcement that have often been cited as major impediments: a) The weakness in the legislative framework; and b) the lack of competent resources. Specific approaches on how to resolve these issues should be provided.

The output of this process should be a Draft Concept Note defining the relevant parameters for Building Code implementation and enforcement by RAJUK within the relevant international context. Most relevant experiences from other countries should be summarized in an Appendix with annotations of their relevance to the proposed Bangladesh model.

The duration of the consultancy is foreseen to be 2 months. The Consulting Firm should submit the draft for review by the PIU and undertake a validation workshop with the PWG prior to developing a final Concept Note and submit it as a deliverable of the project.

Task 3: Proposed Program for Enforcement of Building Codes and Construction Control Regulation. This task consists of extending the elements developed in the Concept Note into a proposed model for enforcement of building codes and construction control regulation for RAJUK. It includes the development of the parameters (legal, administrative, technical, and logistical) for a transparent, rigorous, building code implementation and enforcement.

The key impediments to enforcement should be indicated and the approach to overcoming these impediments described. The rationale for such approach should be explained. An assessment of the challenges and success parameters should also be provided. These should be supported by examples from international experience on what worked and did not work, and how these experiences can be structured to have a positive outcome in Bangladesh, and particularly for RAJUK. Implications on

resources (both human and financial) should be estimated and indicated. Potential institutional and/or organizational changes to create an enabling environment for Building Code implementation and enforcement should be explained and rationalized. Similarly incentive programs should be suggested. In terms of human resource capacity, specific training and capacity programs for building officials and engineers should be provided and their costs and delivery mechanisms specified.

Timelines for implementation should be provided and discussed together with monitoring and evaluation criteria. The latter should be discussed in details together with the related corrective measures.

At the same time, the consultant shall outline and develop practical steps, strategies and feasibility with RAJUK to improve the enforcement process and to ensure timely resolution of cases. Resolution plans which create an overall and step-wise timeline for resolving the various enforcement cases shall be developed. This is intended to guide and assist property owners on the building permitting process, to develop a plan to avoid costly fines and ensure acceptable resolution of existing or potential enforcement case. Existing resolution plans developed by RAJUK in the past will also have the opportunity to be reinforced. These shall be developed with RAJUK in consultation with the relevant ministries and agencies tasked in the BNBC implementation, building permitting and zoning approval.

The consultant shall propose a detailed and comprehensive report and guideline on the enforcement model and relevant interventions and submit to RAJUK/PIU for their review. The duration of this task is foreseen to be 8 months.

Validation Process. The consultant will validate the proposed enforcement model and related interventions with the relevant stakeholders (i.e., PWG), RAJUK leadership and the MoHPW to ensure viability, susceptibility and efficient implementation. Based on the input and comments from the validation process, the consultant will finalize the proposed enforcement program indicating the following:

a) Legislative Framework indicating any reforms or changes that need to be introduced to enable better enforcement.
b) Administrative process both internal (i.e., the internal work processes of RAJUK) and external (the process of building permit application and controls), and any changes and reforms that may need to be introduced to enable enforcement.
c) Potential immediate interventions that can be adopted to improve the system
d) Incentive mechanisms to improve the current environment and create a risk-adverse environment
e) The requirements in resources (human, financial and material) and their potential costs.
f) A capacity building program to improve the competency of building officials and engineers in the understanding of the code provisions and their enforcement
g) The opportunities for partnership with the private sector, the academe and opportunity for better synergy between concerned government institutions
h) A monitoring and evaluation system with specific indicators to measure progress in Building Code implementation and enforcement and industry standards
i) The parameters of an educational and informational campaign to improve understanding of the building code and raise awareness on the relevance and importance of compliance with building code regulation
j) A timeline for implementation of the proposed program with milestones and review opportunities.

The consultant should prepare the necessary documentation to submit the proposed enforcement program for approval the government under the leadership of RAJUK. The Consultant should review other initiatives under Component C of Bangladesh Urban Resilience Project, and particularly Component C2 related to the electronic permitting process and Component C1 related to the creation of the Urban Resilience Unit. The objective is to harmonize the outputs of this component with the various recommendations and initiatives recommended by these other initiatives. The duration of this task is foreseen to be 4 months

Training and Capacity Building. An integral part of the enforcement program is to design, structure and conduct a training and capacity building program for building officials, construction engineers, architects, planners and other construction professionals on building code requirements and implementation procedures.

- The Consultant should define the curriculum for training, the delivery methodology, the target audience, objectives, and indicative costs.
- A schedule for the roll out of the capacity building program should be delivered and approved by the PIU.
- The Consultant should engage the qualified subject matter experts to develop the course content and to supervise the delivery of the courses.
- Similarly, the consultant should engage qualified training facilitators to conduct the pilot training courses.
- A training and Capacity Building Plan should be formulated and submitted as a deliverable to the project.

The duration of this task is foreseen to be 3 months

Educational Campaign. In parallel to the Building Code implementation and enforcement program, the consultant will develop and execute an extensive public awareness and educational campaign to reinforce the critical importance of the implementation of the building code and the development controls to protect life. The objective is to bring public awareness for the need of a competitive design and construction industry in Bangladesh. The activities include:

- Prepare guide, brochures, information and promotional material
- Enlist speakers and advocate
- Prepare and submit a schedule of meetings and seminars
- Enlist partners among professional bodies, media and academe
- Prepare cost and logistical requirements
- Conduct a minimum of three outreach events with partners.

A report providing the objective, approach, and roll-out, and evaluation of the Educational Campaign should be provided as a deliverable of the project. ***The duration of this task is foreseen to be 3 months***

Monitoring and Evaluation. To assess progress achieved by the proposed enforcement program, in consultation with RAJUK, the consultant will develop a set of objective indicators for monitoring and evaluating progress in the implementation of the program and document the accomplishments as well as the drawback of the program. Specific lessons learned and recommendations on how to improve the program should be provided to RAJUK. The Consultant will issue an M&E report as a deliverable and an evaluation report in year three (3) of the contract. ***The duration of this task is foreseen to be 12 months***

4. OUTPUTS AND DELIVERIES

The deliverables to the engagement summarized are the following but not limited to:

- Inception report
- Situational Analysis Report
- Concept Note Report
- Proposed Program for Building Code and Construction Control Enforcement Mechanism Report – Initial Release
- Proposed Program for Building Code and Construction Control Enforcement Mechanism Report – Final Release
- Training and Capacity Building Report and Conduction
- Educational and Outreach Campaign Report
- Monitoring and Evaluation Report
- Annual program evaluation (2nd to 3rd year)

5. IMPLEMENTATION ARRANGEMENTS

The Consulting Firm will work closely with RAJUK's PIU-PIC and all concerned government ministries and agencies to coordinate activities, collect data, and conduct workshops and consultation. These agencies as well as concerned stakeholders (i.e., developers, contractors, architects, engineers, and others) should be organized in a Project Working Group (PWG), which should meet at least once a quarter. The PWG should be used as the mechanism for stakeholders' involvement, data collection, validation, consensus building and advocacy. Meetings with the PWG should be carefully organized and documented.

After the inception stage the Consulting Firm shall prepare a detailed schedule and task-flow diagram, which depicts the interrelationship of various tasks in the assignment which lead to the completion works and mechanism of coordination with the client and other related entities. This would be kept and update throughout the Project duration.

A focal point will be identified at inception that would be the lead representative of Consulting Firm responsible for coordination and all interfaces with the Consulting Firm. The Team Leader of Consulting Firm will be the principal contact and will be expected to be readily available during project implementation. The Consulting Firm shall be responsible for all aspects of performance of services as set forth in the preceding sections of these TORs.

6. SELECTION PROCEDURE AND FORM OF CONTRACT

The firm will be selected following the World Bank's Guidelines: Selection and Use of Consultants by the World Bank for Operational Purposes and form of contract would be Complex Lump Sum Contract.

Minimum qualifications of the firm to be selected

This assignment is suitable for a variety of firms having global experience in engineering, engineering management, structural design, construction management and business management focusing on construction. The firm must demonstrate in-depth knowledge in structural engineering and land use planning practices in developed and developing countries. It must have had consulting involvement with governments in developing countries, preferably in South Asia. Experience in Bangladesh is a

strong plus. Local presence in Dhaka is required either through a native office or thru a local partner involved in the same practice. The firm should demonstrate stable and well-established internal documentation processes and business relationships.

7. DURATION OF THE ASSIGNMENT

Duration of the contract would be 3 years from contract signing date. The final 1 year will only involve the ongoing capacity development and program monitoring activities.

8. STAFFING REQUIREMENTS

Indicative information on key staff positions and inputs is provided in the table below. The Consultant may propose variations from these positions and inputs. However, when doing so, they should clearly indicate how their proposed staff profiles and inputs can guarantee effective delivery of the activities and outputs required by these Terms of Reference. The Consultant should also suggest relevant and appropriate junior staff, support staff and administrative assistance required to complete the assignment effectively. The Consultant may vary individual key staff inputs but the total key staff inputs shall not be less than 132 staff months.

The consulting Firms are encouraged to use the expertise available in Bangladesh to the extent possible. However, international experience is necessary to carry out the assignment. The Consulting Firms are free to propose a staffing plan and skill mix necessary to meet the objectives and scope of the services. If all the required skills are not available within the consulting firms, they are encouraged to make joint ventures with other firms. An indicative list of posts and their specifications where the firms will propose their required man-months/position numbers but not limited to carrying out the assignment is provided in Annexure-1 and Annexure-2 respectively.

9. REPORTING AND MANAGEMENT OF THE ASSIGNMENT

The assignment has been commissioned by the Government of Bangladesh. The consultant will report to RAJUK and the Ministry of Housing.

The project will be monitored and evaluated based on a result-oriented approach. It is highly suggested that the consultants firm set up milestones for the course of the project implementation.

ANNEX 2: BUILDING CODE ENFORCEMENT INSTRUMENTS

Items included in this Annex are:

1. Chapter 2 of the 2012 Draft of the Bangladesh National Building Code
2. RAJUK's Notice for the Builders
3. RAJUK's Construction Approval Application Checklist
4. ICC Certifications Available
5. JICA Document: Difficulties in Structural Safety of Buildings
6. Ansary and Barua Paper on Workplace Safety in the RMG Industry

Chapter 2

ORGANIZATION AND ENFORCEMENT

2.1 CODE ENFORCEMENT AGENCY

2.1.1 The Government shall establish a new or designate an existing department/agency responsible for enforcement of this Code throughout Bangladesh. Code enforcing agency shall have the authority of the government and shall herein be referred to as the Building Regulatory Authority (BRA). This Authority shall work as apex body to implement the provisions of the Bangladesh National Building Code (BNBC) and will be administered under the Ministry of Housing and Public Works, Government of Bangladesh.

2.1.2 Central Headquarters of BRA will be located in Dhaka or any other place as decided by the government. Headed by one Chairman it will have Members not exceeding five. There will be necessary officers and staff for smooth functioning of the office.

2.2 ENFORCEMENT AT THE FIELD LEVEL

2.2.1 The Building Regulatory Authority will designate a section/wing/part/branch/division of any public office engaged in the development sector with specific geographical jurisdiction as sub-ordinate office of BRA. These offices will be named as Office of the Building Official (OBA). OBAs will be established at various local/regional development area or local government levels.

2.2.2 These Offices of Building Official will have necessary number of officers, technical assistants, inspectors, and other employees as shall required for proper implementation and administration of the provisions of the Code. All the officers and staff of these field offices shall be under administrative control of BRA. They will be in the pay-roll of the office they will be serving and will be treated as on deputation to BRA.

2.3 BUILDING OFFICIAL

2.3.1 The administrative and operational chief of the code enforcing office shall be designated as the Building Official who shall act on behalf of the Authority. The Building Official will exercise the power and perform responsibilities and duties of Authorised Officer as laid down in the Building Construction Act. The Building Official may designate an employee or employees who shall carry out the specified duty and exercise the specified power of the Building Official.

2.3.2 The Authority may direct that power of Building Official may be exercised through a Building Construction Committee (B.C.Committee). 75% or more members in such committees shall comprise of professionals like architects, civil engineers and town planners. Building Official shall work as ex-officio member-secretary of the B.C. Committee.

2.4 ADMINISTRATIVE JURISDICTION OF BUILDING OFFICIALS

2.4.1 The areas delineated below in the table shall be under the jurisdiction of the Building Officials located in the offices /authorities mentioned in the right hand column:

Sl.	Area	Authority
1	Areas falling under the master plan control of Rajdhani Unnayan Kartipokhkha (Raj.U.K)	Raj.U.K
2	Areas falling under the master plan control of Chittagong Development Authority (C.D.A.)	C.D.A.
3	Areas falling under the master plan control of Rajshahi Development Authority (R.D.A)	R.D.A
4	Areas falling under the master plan control of Khulna Development Authority (K.D.A)	K.D.A
5	Areas falling under the master plan control of any Development Authority to be established in future	relevant development authority
6	Areas falling under the geographical jurisdiction of any City Corporation where no Development Authority exists	relevant city corporation
7	Areas falling under the geographical jurisdiction of any Municipality where no Development Authority exists	Relevant municipality
8	Areas not falling under any of the above	PWD division office in each administrative district
9	Special areas, if any	To be declared by the government as and when necessary

2.4.2 There may be as many Building Officials as required depending upon the area of jurisdiction. But every Building Official will be in charge of an independent and well demarcated area.

2.5 MERGING THE JURISDICTIONS UNDER SMALL LOCAL BODIES

Small local bodies like pourashavas and thanas located outside the larger city municipalities and having insufficient funds for individually carrying out the task of a code enforcing agency may jointly appoint or designate, with the approval of the authority, a Building Official who shall have a jurisdiction over the combined area of jurisdiction of the concerned local bodies.

2.6 QUALIFICATION OF THE BUILDING OFFICIAL

The person to be designated as the Building Official shall be at least an architect, civil engineer, or town planner in addition to fulfilling any other requirement of the Authority. The employees of the Building Official shall be adequately qualified to carry out the responsibilities assigned to them by the Building Official.

2.7 RESTRICTIONS ON THE BUILDING OFFICIAL

The Building Official or any of his employees shall not in any way, directly or indirectly, be engaged in planning, design, construction, repair, maintenance, modification or alteration of a building, certification of any work or materials, supply of materials, labour, equipment or appliances or any other work regulated by the provisions of this Code. The Building Official or any of his employees shall not be interested in business, either directly or indirectly, as planner, engineer, architect, builder or supplier or in any other private business transaction or activity within the jurisdiction of the Authority which conflicts with his official duties or with the interest of the code enforcing agency.

2.8 DAMAGE SUIT

In the process of discharging the official duties as required and permitted by the Code, the Building Official or any of his employees shall not be personally liable for any damage that may be caused to any person or property. Any suit filed against the Building Official or any of his employee because of an act performed by him in the official discharge of his duties and under the provisions of the Code shall be defended by the legal

representative of the Authority until the final decision of the proceedings. In no case shall the Building Official or any of his employees be liable for costs in any legal action, suit, or defence proceeding that may be filed in pursuance of the provisions of the Code.

2.9 POWERS AND DUTIES OF THE BUILDING OFFICIAL

2.9.1 General

The Building Official shall be authorized to enforce all the provisions of this Code and for such purposes the Building Official shall have the power of a law enforcing officer.

The Building Official shall be authorized to interpret this Code and to adopt and enforce rules and supplemental regulations in order to clarify the application of its provisions in conformity with the intent and purpose of this Code.

2.9.2 Deputies

The Building Official may appoint such number of technical officers and inspectors and other employees as shall be authorized from time to time in accordance with the prescribed procedures and with the approval of the Authority.

The Building Official may designate such officers or inspectors as may be necessary to carry out the functions of the code enforcement agency.

2.9.3 Recognition of Professional Services

The Building Official may recognize the professional services provided by architects, engineers, planners and supervisors. Such recognition may be withdrawn by the Building Official under the provisions set forth in Sec 2.6.3.

2.9.4 Application and Permits

Applications shall be made in writing to the Building Official for any erection, construction, addition, alteration, modification, repair, improvement, removal, conversion or demolition of any building or structure regulated by this Code. The Building Official shall receive such applications, examine the premises, enforce compliance with this Code and issue permits for the intended work.

2.9.5 Building Notices and Orders

All necessary notices and orders to correct illegal or unsafe conditions, to require the specified safeguards during construction, to require adequate access and exit facilities in existing buildings and to ensure compliance with all the requirements of safety, health and general welfare of the public as included in this Code shall be issued by the Building Official.

2.9.6 Right of Entry

The Building Official may enter a building or premises at reasonable times to inspect or to perform the duties imposed by this Code if:

i) it is necessary to make an inspection to enforce the provisions of this Code; or

ii) the Building Official has reasonable cause to believe that a condition contrary to or in violation of this Code exists making the building or the premises unsafe, hazardous or dangerous.

If the building or premises is occupied, the Building Official shall present credentials to the occupant and request entry. If the building or premises is unoccupied, the Building Official shall first make a reasonable effort to locate the owner or any other person having charge or control of the building or premises and request entry. If entry into the building or premises is refused or the owner of the unoccupied building or premises cannot be located, the Building Official shall secure entry as provided by the law.

2.9.7 Inspection

The Building Official shall inspect all construction or work for which a permit is required or he shall accept reports of inspection by an engineer, architect or planner and may approve or disapprove the work inspected. The work or construction to be inspected shall remain accessible and exposed for inspection purposes until the approval is obtained.

All reports of inspection shall be in writing and certified by the Building Official or the engineer or the architect making the inspection.

Approval of work or construction as a result of such inspection shall not be interpreted to be an approval of a violation of the provisions of this Code or of other ordinances of the jurisdiction.

The Building Official may require survey of the site and adjoining areas to verify that the structure is located in accordance with the approved plans.

2.9.8 Orders to Stop Work

The Building Official may issue an order for immediate discontinuation of a work and cancellation of a previous permit for such work at any stage if:

i) any work is being done contrary to the provision of this Code or other pertinent laws or ordinances implemented through the enforcement of this Code; or

ii) it is determined by the Building Official that the construction is not proceeding according to the approved plan.

In such cases the Building Official shall notify the owner in writing of such an order and all further construction shall be stayed until correction has been effected and approved.

2.9.9 Occupancy Violation

The Building Official may order the current uses of a building discontinued and the building or portion thereof vacated by serving a notice on any person if the Building Official determines that the building or structure or equipment therein regulated by this Code is being used contrary to the provisions of this Code. Such person shall discontinue the use within the time prescribed by the Building Official after receipt of such notice to make the structure, or portion thereof, comply with the requirements of this Code.

2.9.10 Maintenance of Records

The Building Official shall maintain records of all applications and drawings received, permits and orders issued, inspections made and reports prepared and submitted by other recognized agencies. Copies of all relevant papers and documents for enforcement of the Code shall be preserved by the Building Official. All such records shall be kept open to public inspection at all suitable times.

2.9.11 Expert Opinion

The Building Official may engage, subject to the approval of the Authority, an expert or a panel of experts for opinion on unusual technical issues that may arise in administering the provisions of the Code.

2.10 APPEALATE AUTHORITY

There shall be an Appealate Authority to hear and decide appeals of orders, decisions or determinations made by the Building Official related to the application and interpretation of this Code. It shall be constituted as per the provision laid out in the Building Construction Act. The Appealate Authority shall provide reasonable interpretation of the provisions of this Code and determine the suitability of alternative materials or methods of design or construction. Such Board shall consist of members appointed by the Authority who are noted for their education and experience in the relevant field of building construction and whose term of office shall be at the pleasure of the Authority. This body shall, with the approval of the government, adopt rules of procedure for conducting its business, and shall communicate all decisions and findings in writing to the appellant with a copy to the Building Official.

This authority shall have no discretion for interpretation of the administrative provisions contained in Part 2 of this Code nor shall the be empowered to waive any requirement of this Code.

2.11 REQUIREMENT OF CERTIFICATION OF WORK

Any planning, design, supervision of construction, repair, maintenance, modification and alteration of buildings, or any other work regulated by the Code shall be certified by an engineer, architect or planner for its compliance with the provisions of the Code.

2.12 LIMITS OF PROFESSIONAL CONDUCT

An architect, engineer or planner assisted if necessary by personnel working under his direct control, shall be allowed to plan, design and supervise construction, repair, maintenance, alteration and modification of buildings or structures regulated by this Code provided he certifies compliance of the work with the provisions of the Code. Such a person may provide any such certificate as long as his or her services are recognized by the Building Official as specified in Sec 2.9.3 and such recognition is not withdrawn under the provisions of Sec 2.13.2withdrawn under the provisions of Sec 2.13.2

2.13 VIOLATION AND PENALTIES

2.13.1 General

Any person, firm, corporation or government department or agency who as owner of the property erects, constructs, enlarges, alters, repairs, moves, improves, removes, converts, demolishes, equips, uses, occupies or maintains any building or structure or cause or permit the same to be done in violation of this Code shall be guilty of an offence and the Authority shall take legal action against such offenders. The term owner shall, for the purpose of these provisions include any developer who by appointment, contract or lease is or has been responsible for the actions listed above.

2.13.2 Professional Violation

The engineer, architect or planner responsible for design, supervision or certification of any construction or other work of a building or structure shall ensure compliance of such work with the provisions of this Code, any violation of which or any other professional misconduct insofar as implementation of the provisions of this Code is concerned including making false statements or issuing false certificates or any incidence of proven professional incapability shall make him liable to penalties as prescribed by the Authority including withdrawal of recognition.

2.13.3 Obligation of Offender

A person shall not be relieved from the duty of carrying out the requirements or obligations imposed on him or her by virtue of the provisions of this Code even if such person is convicted for an offence under the provisions of this section.

2.13.4 Conviction No Bar to Further Prosecution

If a person is convicted under the provisions of this Code for failing to comply with any of its requirements or obligations such conviction shall not act as a bar for further prosecution for any subsequent failure on the part of such person to comply.

2.14 POWER TO MAKE RULES

The Authority may make rules for carrying out the provisions and intentions of this Code. Such rules shall not contradict nor nullify any of the provisions of this Code. The Authority may fix and refix from time to time application fees for issuance of permits for all works under the provisions of this Code.

রাজধানী উন্নয়ন কর্তৃপক্ষ
রাজউক ভবন, ঢাকা।

ইমারত নির্মাণকারীদের জন্য জ্ঞতব্য

তারিখঃ

স্মারক নং-২৫.৩৯.০০০০. .৩৩.

রাজউক এলাকার ভবন নির্মান ইচ্ছুক ব্যক্তি/ডেভেলপারদের রাজউক থেকে ভূমি ব্যবহার ছাড়পত্র ও অনুমোদিত নক্শা গ্রহন ছাড়াও নিম্ন বর্ণিত কার্য সম্পাদন করতে হবেঃ

১. কাজ চলাকালীন ছাড়পত্র ও নক্শা অনুমোদনের পর কাজ শুরু করার অন্তত ১৫ (পনের) দিন পূর্বে ঢাকা মহানগর ইমারত(নির্মান, উন্নয়ন, সংরক্ষণ ও অপসারণ) বিধিমালা-২০০৮ এর ৩০৭ নাম্বার ফরম এর মাধ্যমে সংশ্লিষ্ট অথরাইজড অফিসারকে নির্মাণ কাজ শুর করার এবং সংশ্লিষ্ট কারিগরী ব্যক্তিবর্গের (প্রকৌশলী/স্থাপতি ইত্যাদি) প্রত্যয়ন বা সম্মতিপত্র জমা দিতে হবে।

২. কারিগরী জনবল (প্রকৌশলী/স্থাপতি, প্লাম্বিং ইঞ্জিনিয়ার, মেকানিক্যাল ইঞ্জিনিয়ার) ইত্যাদি পরিবর্তন করতে হলে পরিবর্তনের ১৫ (পনের) দিনের মধ্যে ইমরত (নির্মাণ, উন্নয়ন, সংরক্ষণ ও অপসারণ) বিধিমালা ২০০৮ এর ৩০৮ নং ফরম এর মাধ্যমে কর্তৃপক্ষের কাছে আবেদন করতে হবে । নবনিযুক্ত কারিগরী ব্যক্তি দায়িত্ব গ্রহণ না করা পর্যন্ত এবং তার সম্মতিপত্র কর্তৃপক্ষেকে না জানানো পর্যন্ত নির্মান কাজ স্থগিত থাকবে।

৩. নির্মান কাজ শুরু করার পর প্লিন্থ স্তর পর্যন্ত নির্মাণ কাজ শেষ হলে ইমারত (নির্মাণ, উন্নয়ন, সংরক্ষণ ও অপসারণ) বিধিমালা ২০০৮ এর ৩০৯ নং ফরম এর মাধ্যমে সংশ্লিষ্ট কর্তৃপক্ষকে অবহিত করতে হবে।

৪. প্লিন্থ স্তর পর্যন্ত কাজ সমাপ্ত হলে ৩০৯ নং ফরমে কর্তৃপক্ষকে অবহিত করনের সাথে সাথে ইমারত (নির্মাণ, উন্নয়ন, সংরক্ষণ ও অপসারণ) বিধিমালা ২০০৮ এর ৩১০ নং ফরম এর মাধ্যমে মালিক/ডেভেলপার কর্তৃক নিয়োজিত কারিগরী ব্যক্তিবর্গের নির্মাণ কাজ সম্পর্কিত প্রতিবেদন সংশ্লিষ্ট অথরাইজড অফিসারের কাছে জমা দিতে হবে।

৫. ৩০৭,৩০৮,৩০৯ ও ৩১০ নং ফরম এর মাধ্যমে প্রতিবেদন প্রাপ্তির পর কর্তৃপক্ষের পক্ষে সংশ্লিষ্ট অথরাইজড অফিসার বাস্তব অবস্থার প্রেক্ষিতে ৩১১ নং ফরম এর মাধ্যমে সম্মতিপত্র বা ৩১২ নং ফরম এর মাধ্যমে অসম্মিতিপত্র প্রদান করবেন। ৩১১ নং ফরম এর ভিত্তিতে সম্মতিপত্র পাওয়ার পর মালিক/ডেভেলপার পরবর্তী কার্যক্রম শুরু করতে পারবে।

৬. ৩১৩ নং ফরম এর মাধ্যমে প্রত্যায়নপত্র প্রদানকারী ব্যক্তি তার আংশিক তত্ত্বাবধানের প্রতিবেদন পেশ করতে পারবে।

৭. কাজ শেষ হওয়ার পর মালিক/ডেভেলপারকে ইমারত (নির্মাণ, উন্নয়ন, সংরক্ষণ ও অপসারণ) বিধিমালা ২০০৮ এর ৪০১ নং ফরম এর মাধ্যমে কর্তৃপক্ষের (সংশ্লিষ্ট অথরাইজড অফিসারের) কাছে কাজ সমাপ্তির বিষয়টি অবহিত করতে হবে। ৪০২ নং ফরমের মাধ্যমে মালিক/ডেভেলপার নিয়োজিত কারিগরী ব্যক্তিবর্গ প্রত্যয়নপত্র প্রদান করবেন।

৮. ৪০১ ও ৪০২ নং ফরম এর মাধ্যমে আবেদনপত্র প্রাপ্তির পর, নির্মাণ কার্য ইমরত নির্মাণ বিধিমালা অনুযায়ী হয়ে থাকলে রাজউকের পক্ষে অথরাইজড অফিসার ৪০৪ নং ফরমে Occupancy Certificate অকুপেন্সি সার্টিফিকেট (ব্যবহার সনদপত্র) প্রদান করবেন।

৯. ব্যবহার সনদপত্র লাভ করার পূর্বে উক্ত ইমারত বা কাঠামো আংশিক বা সম্পুর্ণ কোন অবস্থাতেই ব্যবহার করা যাবে না।

১০. Occupancy Certificate (ব্যবহার সনদপত্র) ছাড়া Utility Service (গ্যাস, পানি, বিদ্যুৎ ইত্যাদি) সংযোগ সংশ্লিষ্ট সংস্থা প্রদান করবে না।

১১. রাজউক এর পরিকল্পিত আবাসিক এলাকায় নির্মিত কোন ভবন/ফ্ল্যাট Occupancy Certificate ছাড়া হস্তান্তরের অনুমোদন দেয়া হবে না।

গ্রহণকারী (মালিক/আম-মোক্তার গ্রহিতা)
নামঃ
ঠিকানাঃ

মোবাইল নাম্বারঃ

অথরাইজড অফিসার
জোন ৩/৯
রাজধানী উন্নয়ন কর্তৃপক্ষ
জোনাল অফিস, মহাখালী, ঢাকা।

রাজধানী উন্নয়ন কর্তৃপক্ষ

উন্নয়ন নিয়ন্ত্রণ শাখা

নির্মাণ অনুমোদন আবেদনের চেক লিষ্ট

অংশ-১ (ফরম-৩০১ এর সাথে সংযুক্ত করতে হবে)

পূর্ণাঙ্গ ও ত্রুটিমুক্ত আবেদন প্রাপ্তির ৪৫ কার্য দিবসের মধ্যে নিষ্পত্তি করা হবে।

ক্রমিক নং	প্রয়োজনীয় তথ্যাবলী ও দলিল পত্রাদির বিবরণ	সংযুক্ত/উল্লেখ আছে	মন্তব্য
১.	সম্পূর্ণ ও স্বাক্ষরিত আবেদনপত্র ও ব্যাংক রশিদ		
২.	প্রস্তাবিত জমির মালিকানা সংক্রান্ত দলিলপত্রাদি		
(ক)	দলিলের কপি (সত্যায়িত)		
(খ)	ডি.সি.আর (সত্যায়িত কপি)		
(গ)	নামজারী পত্র, পর্চা পত্র (সত্যায়িত কপি)		
(ঘ)	নামজারী ও জমাভাগের প্রস্তাবপত্র (সত্যায়িত কপি)		
(ঙ)	আম-মোক্তারনামার সার্টিফাইড কপি		
(চ)	হালনাগাদ খাজনার রশিদ (সত্যায়িত কপি)		
৩.	ভূমি ব্যবহার ছাড়পত্র বা সরকারী সংস্থার অনাপত্তিপত্র		
৪.	বিশেষ প্রকল্প ছাড়পত্র অনুমোদন (প্রযোজ্য ক্ষেত্রে)		
৫.	কে.পি.আই.ডি.সি. এর অনাপত্তি পত্র (প্রযোজ্য ক্ষেত্রে)		
৬.	বহুতল ভবন নির্মাণের ক্ষেত্রে বিভিন্ন অধিদপ্তর/সংস্থার প্রয়োজনীয় ছাড়পত্র (পরিবেশ, ফায়ার সার্ভিস, ওয়াসা, বিদ্যুৎ, তিতাস, ডি.সি. ট্রাফিক, ঢাকা যানবাহন সমন্বয় বোর্ড, বেসামরিক বিমান চলাচল কর্তৃপক্ষ)		
৭.	জাতীয় গৃহায়ন কর্তৃপক্ষের অনাপত্তিপত্র (প্রযোজ্য ক্ষেত্রে)		
৮.	গৃহায়ন ও গণপূর্ত মন্ত্রণালয়ের অনুমতি পত্র (প্রযোজ্য ক্ষেত্রে)		
৯.	গৃহায়ন ও গণপূর্ত মন্ত্রণালয় বা রাজউক কর্তৃক অনুমোদিত বিভাজন/একত্রীকরণ নক্শাসহ অনুমোদন পত্র (প্রযোজ্য ক্ষেত্রে)		
১০.	নক্শা অনুমোদনের নির্ধারিত ফি জমাদানের ব্যাংক রশিদ		
১১.	Floor Area Ratio (FAR) এর হিসাব		
১২.	গভীর ভিত্তি, পাইলিং, বেসমেন্ট বা ভূ-গর্ভস্থ তলা নির্মাণের ক্ষেত্রে আবেদনকারী স্বাক্ষরিত সংযুক্তি ৩০১-এ প্রদত্ত ক্ষতিপূরণ মুচলেকা (প্রযোজ্য ক্ষেত্রে)		
১৩.	মৃত্তিকা পরীক্ষা (Soil Test) রিপোর্ট (বিশেষ প্রকল্প ছাড়পত্রের নির্দেশনা মোতাবেক প্রযোজ্য ক্ষেত্রে)		
১৪.	বিধি ১৩ অনুযায়ী ৮ প্রস্থ স্থাপত্য নক্শা (মালিকের নাম, অমুদ্রিত স্বাক্ষর এবং কারিগরী ব্যক্তি/ব্যক্তিবর্গের অমুদ্রিত স্বাক্ষর, নাম, ঠিকানা, টেলিফোন নম্বর, পেশাজীবী প্রতিষ্ঠানের সদস্যপদ ও রেজিস্ট্রেশন নম্বর নক্শায় উল্লেখপূর্বক)		
১৫.	বিধি ১৩ (৭,৮) অনুযায়ী সাইট প্ল্যান ও লে-আউট নক্শা		
১৬.	বিধি ১৩ (৯, ১০, ১১, ১২) অনুযায়ীঃ		
	(ক) ফ্লোর প্ল্যান		
	(খ) পার্কিং প্ল্যান		
	(গ) লম্বালম্বি ও আড়াআড়ি ২টি সেকশন		
	(ঘ) উন্নতি (Elevation)		
১৭.	প্রযোজ্য ক্ষেত্রে বিধি ৪৩ অনুযায়ী নিয়োজিত স্থপতির অভিজ্ঞতার প্রমাণস্বরূপ সংশ্লিষ্ট পেশাজীবী প্রতিষ্ঠানের কারিগরী ব্যক্তি হিসাবে তালিকাভূক্ত সার্টিফিকেটের অনুলিপি		
১৮.	প্রস্তাবিত ভবনের কাজ শুরু করার পূর্বে বিদ্যমান ভবন/স্থপনা অপসারণ করা হবে মর্মে টাঃ ৩০০/- মাত্র মূল্যের নন-জুডিশিয়াল স্ট্যাম্পে অঙ্গীকারনামা (প্রযোজ্য ক্ষেত্রে)		
১৯.	আবেদন ফরম-৩০১ এর অনুচ্ছেদ ৪(জ) রাস্তার নামের সাথে হোল্ডিং নম্বর উল্লেখ করতে হবে		

২০। অদ্য.....তারিখে সকল তথ্য ও কাগজপত্র পাওয়া গেছে।

ICC Certifications Available

Certifications:

- □ Disaster Response Inspector
- □ Residential Building Inspector
- □ Commercial Building Inspector
- □ Residential Electrical Inspector
- □ Commercial Electrical Inspector
- □ Commercial Energy Inspector
- □ Commercial Fire Alarm Inspector
- □ Residential Mechanical Inspector
- □ Commercial Mechanical Inspector
- □ Residential Plumbing Inspector
- □ Commercial Plumbing Inspector
- □ Property Maintenance and Housing Inspector
- □ Zoning Inspector
- □ Coastal & Floodplain Construction Inspector
- □ Commercial Fire Sprinkler Inspector
- □ Fire Inspector I
- □ Fire Inspector II
- □ Fuel Gas Inspector
- □ Permit Technician
- □ Certified Portable Fire Extinguisher Technician
- □ Pre-Engineered Industrial Fire Ext. System Technician
- □ Pre-Engineered Kitchen Fire Ext. System Technician
- □ Electrical Plans Examiner
- □ Building Plans Examiner
- □ Plumbing Plans Examiner
- □ Mechanical Plans Examiner
- □ Residential Plans Examiner
- □ Fire Plans Examiner
- □ Green Building – Residential Examiner
- □ Commercial Energy Plans Examiner
- □ Commercial Fire Alarm Plans Examiner I
- □ Commercial Fire Alarm Plans Examiner II
- □ Commercial Fire Sprinkler Plans Examiner
- □ Pre-stressed Concrete Special Inspector
- □ Reinforced Concrete Special Inspector
- □ Structural Masonry Special Inspector
- □ Soils Special Inspector
- □ Spray-applied Fireproofing Special Inspector
- □ Structural Steel & Bolting Special Inspector
- □ Structural Steel & Welding Special Inspector
- □ Residential Fire Sprinkler Inspector/Plans Examiner
- □ Commercial Energy Inspector/Plans Examiner w/ASHRAE
- □ IgCC Commercial Inspector/Plans Examiner w/ASHRAE

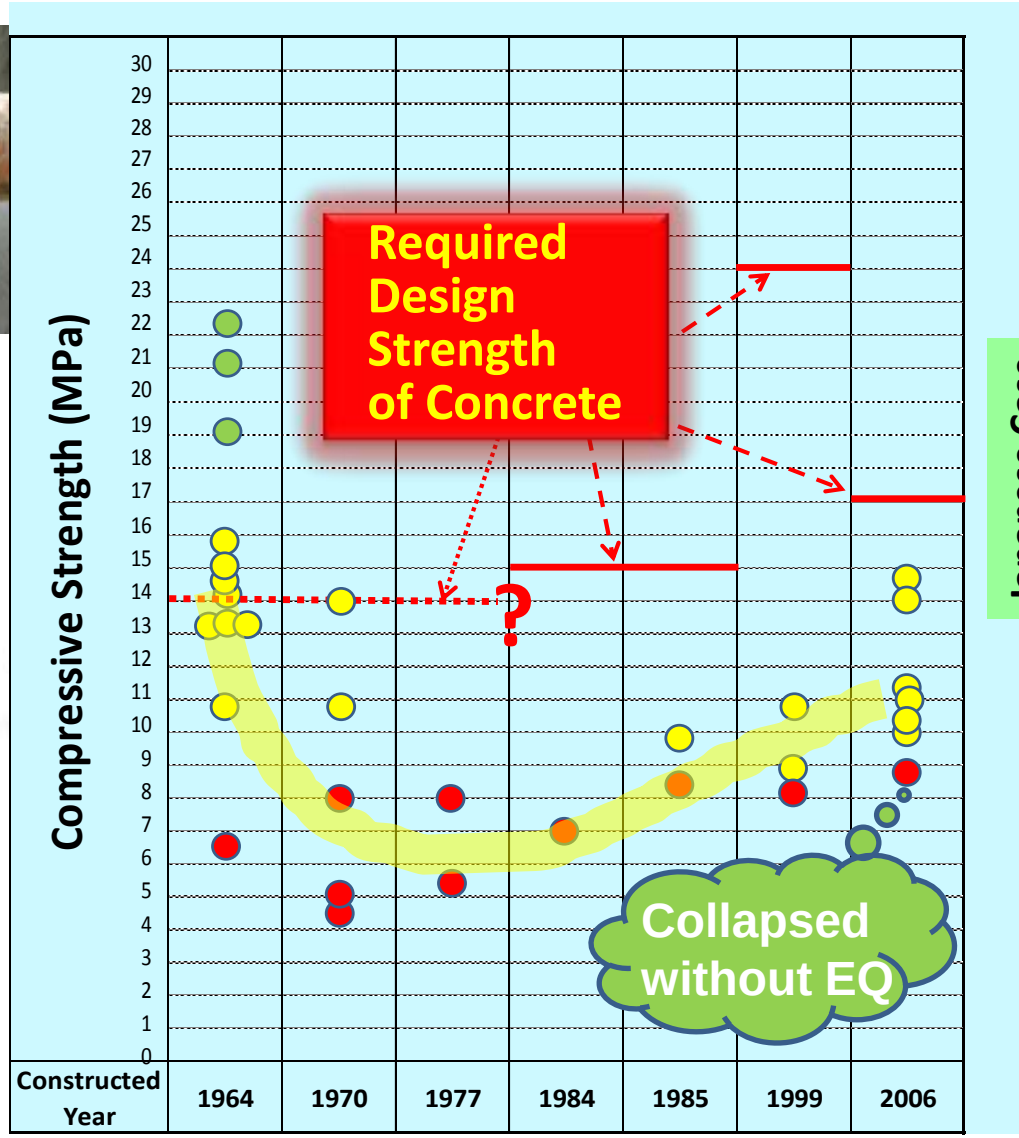
Combination Designations:

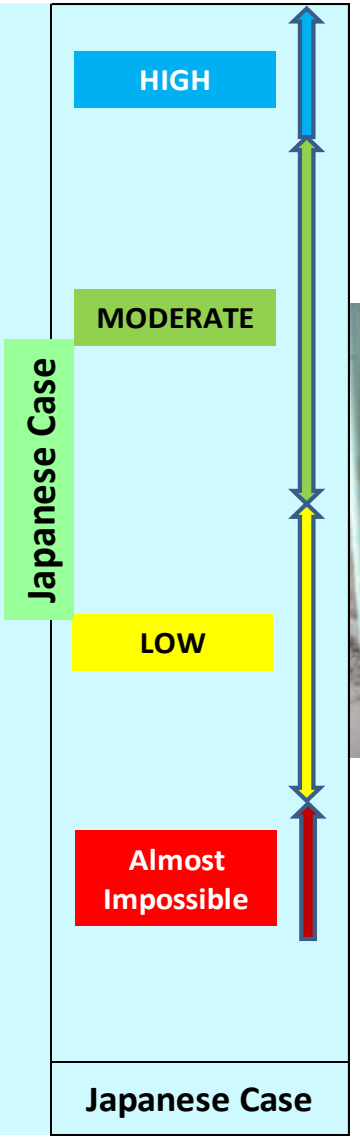
- □ Building Inspector
- □ Plumbing Inspector
- □ Combination Inspector
- □ Certified Electrical Code Official
- □ Certified Plumbing Code Official
- □ Permit Specialist
- □ Certified Building Official
- □ Electrical Inspector
- □ Residential Combination Inspector
- □ Combination Plans Examiner
- □ Certified Fire Code Official
- □ Certified Housing Code Official
- □ Master Code Professional
- □ Certified Fire Marshal
- □ Mechanical Inspector
- □ Commercial Combination Inspector
- □ Certified Building Code Official
- □ Certified Mechanical Code Official
- □ Energy Code Specialist
- □ Master of Special Inspection

Difficulties in structural safety of the buildings

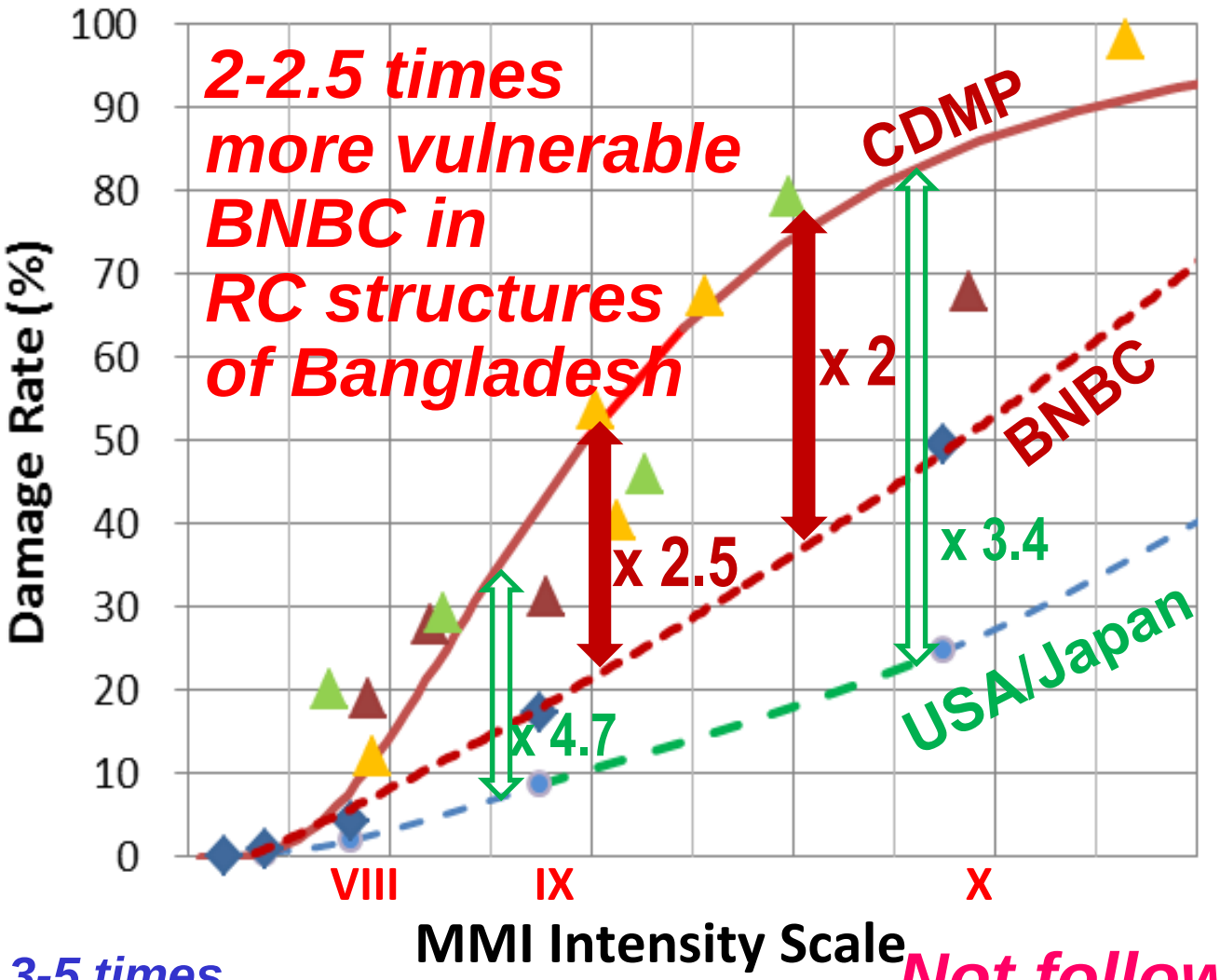
Concrete Strength is almost "Half of Required"

CNCRP
Project for Capacity Development on Natural Disaster Resistant Techniques of Construction and Retrofitting for Public Buildings





How Weak the Bangladesh Buildings



Reasons are;

Concrete strength (Materials, furnishing process)

Re-Bar , hoop, tie (plain, friction, materials)

Connection (between column and beam, floor to column)

Design, Construction work

Ductility: Reduction factor

3-5 times more vulnerable than Japan/US in RC structures of Bangladesh

Not following BNBC (awareness, application process)

Deviation from the approved plan

Table: Summary of buildings inspected during July 2018 (by RAJUK)

Zone	Number of Buildings Inspected	Number of deviated Buildings	Number of Buildings constructed according to approved plan of RAJUK	% of deviation
Zone-1	15	15	--	100
Zone-2	133	113	20	84.96
Zone-3	198	179	19	90.40
Zone-4	775	359	416	46.32
Zone-5	120	89	31	74.17
Zone-6	700	560	140	80.00
Zone-7	133	130	03	97.74
Zone-8	500	500	--	100
Total	2574	1945	629	75.56

Average 75.56 % of the buildings were deviated from the approved plan

Difficulties in BNBC Enforcement

IMMEDIATE REMEDY

After the Rana Plaza

After the Rana Plaza Incident in April 2013, **financial & technical needs** for mitigating further incidents are identified. JICA & other stakeholders created a program for structural assessment and finance for RMG factories.

1. Application by RMG Factories
2. Selection by BGMEA & BKMEA
3. Screening by CNCRP & Stakeholders Meeting
4. Initial Assessment by PWD
5. Credit Assessment by Commercial Bank
6. Detailed Assess & Seismic Design by PWD
7. Civil Work by PWD and Loan Provision

Eligible Applicants	- **SMEs factories** of Bangladesh Garment Manufacturers & Exporters Associations (BGMEA) & Bangladesh Knitwear Manufactures & Exporters Association (BKMEA) member - RCC-building owned factories
Structural Safety Assessment	(1) Initial Assessment (2) Detailed Assessment (3) Seismic Retrofit/Reconstruction Design
Financing Program	(1) Fund: a. **Fund Amount 1 billion BDT**, b. Sub loan Limit; 100 million BDT (2) End-user Interest: Max 5.0% spread on Bangladesh Bank financing rate (3) Eligible Portion: a. Repairing / Retrofitting / Rebuilding / Relocation of the factory; b. Purchase of safety equipment (4) Repayment: Up to 15 years with 2 years grace
Stakeholders	1. BGMEA, 2. BKMEA, 3. Public Works Department, 4. Bangladesh Bank, 5. JICA

"Project for Capacity Development on Natural Disaster-Resistant Techniques of Construction and Retrofitting for Public Buildings (**CNCRP**)" and
"Financial Sector Project for the Development of SME Enterprises (**FSPDSME**)"

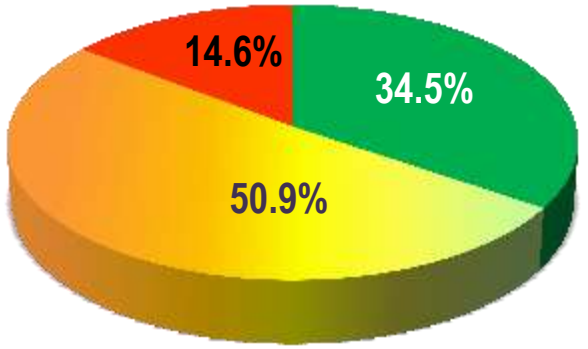
RESULTS

From the Assessment

Application by RMG Factories	300 Applicants	- BGMEA/BKMEA announced the program among their member factories. 300 factories submitted applications.
Selection by BGMEA & BKMEA	214 Screened	- 214 factories fulfilled the first criteria; (a) ownership of factory, (b) willingness to conduct assessment, (c) less than 2,000 workers, (d) reinforced structure, (e) located in Dhaka Greater Region
Screening by CNCRP & Stakeholders Meeting	**159 Failed**, 55 Passed	- 159 out of 214 failed to provide critical information prior to the assessment such as; **(a) construction permit, (b) engineering information (architectural & structural drawings)**
Initial Assessment by PWD	55 Assessed	- 55 factories were assessed by simplified methodologies. **65.5%** somehow **did not comply the standards of building regulations (Bangladesh National Building Code 1993: BNBC)**.

[At Initial Assessment Level]

- **159**/214 (**74%**) Target Factories do **NOT** have either "**construction permit**" or "**(structural) drawing**"
- **36**/55 (**65.5%**) Factories do **NOT** comply the standards set by **BNBC**



ISSUES on ENFORCEMENT

Building Construction Act & BNBC

Building Permit Process

Owner —*Order*→ Private Consultant —*Building Permit Application*→ **Municipality / RAJUK** —*Approval Drawing*→ Owner

***No Seismic Design**
***No Structural Design**

***Only Desktop Review**
***No Design Review on Structure and Architecture Design"**

Building Construction Process

Owner —*Order*→ Private Contractor —*Delivery*→ Owner —*Report*→ **Municipality / RAJUK** —*Certificate*→ Owner

Monitoring ↑ *Municipality/RAJUK*

***No As-built Structural Drawing incl. Seismic Design**

***No Monitoring**
***No Intermediate Inspection**

Report ↓ ↑ *Guidance*

***No Site Confirmation**
***No Completion Inspection**
***No Accreditation by Authorized Engineers' Group**

Building Regulatory Authority

***Annual Review**
***Provision of rule/regulation**
***Revising Manual**

Need to set-up National/Local Level Enforcement Institution to make the enabling environment for building safety

Building the analytical and institutional foundation

Issues	Agenda	Situations	Suggestions
Construction Approval	Law & Regulation Establishment Enforcement Institutional Arrangement	- Authorities do not have enough capacity (manpower, proper system). - Procedure is not appropriate (no responsibility of RAJUK on structural issues and construction, no inspection on building construction process) - Necessary information of structural safety of the building is not required for approval. - RAJUK and Fire Service Dept. issue certificates without coordination.	- Revision of acts (Building Construction Act 1996, Dhaka Metropolitan Building Construction Act 2008) - Establishment of a technical review committee (Building Regulatory Authority) by regulation or act.
Technical Capacity	Human Resource Development	- Limited study on structural safety especially no consideration to earthquake and retrofitting in engineering universities. - There is no proper license system for architects or civil engineers. - Improper construction management (construction itself and supervision)	- Additional training for existing architects (and civil engineers) - Certification system for trained architects by a technical review committee - Revision of curriculum in engineering universities
Financial Accessibility	Disaster Response Capacity	- Limited financial products for a mid-longer term loan especially for SMEs - Lending terms and interest rates are not favorable to fixed assets borrowing.	- Government special arrangement for a financial mechanism (ex. Low interest fund and guarantee for loan)

JICA's Cooperation in Urban DRR

JICA Cooperation for Urban Disaster Risk Reduction

			Public Sector	Private Sector
Research and Development:			The Project for Technical development to upgrade structural integrity of buildings in densely populated urban areas and its strategic implementation towards resilient cities (TSUIB_HBRI 2016-2021)	
Capacity Building (Human Resources, Technology, Organization)	Seismic Evaluation, Design and Construction	Development of Manuals related to Seismic Techniques	Capacity Dev. on Disaster Resistant Techniques of Construction and Retrofitting for Public Buildings (CNCRP_PWD 2011-2015) / Project on Promoting Building Safety For DRR (BSPP_PWD 2016-2020)	
		Promoting seismic related techniques and knowledge through trainings		Technical Cooperation to RAJUK (New)
	Building Regulation	Promotion of BNBC Capacity Building for Building Inspection		
Promoting Seismic Building Safety			Urban Building Safety Project (Loan, PWD/FID 2016-2022)	
Community-based DRR			Project on Capacity Building for Community- based DRR in Urban Areas of Bangladesh (DNCC 2016-2019)	

JICA's Integrated support for Building Safety

1.	**System**	- Law Enforcement Mechanism, Updating Building Standards, Construction Management, Licensing
2.	**Human Resource**	- Manual, Training (OJT,Class, Overseas)
3.	**Organization**	- Toward Bangladesh Building Regulatory Body through "***Technical Review Panel***"
4.	**Realization**	- Public Buildings, Private Buildings

Science & Technology

SATREPS 2016-2020

Develop Next Generation's Retrofit Technology

Technical Review Panel

- To review progress and lessons of UBSP and BSPP
- To oversee the process of design, intermediate and completion inspection
- To Suggest to Government how to enforce BNBC based on the experiences of UBSP and BSPP

Phase 1 2011-2015

CD of Public Engineers through Training, Formulation of Manual for Safety Buildings

1. Building inventory
2. Seismic Assessment
3. Design and Construction Manual
4. Pilot Project

Phase 2. 2015-2021

Updating System and CD of Public and Private Engineers through training and Apply of Model System for Safety Buildings

1) Developing Engineer Training System
2) Construction Manage. System

** Model System will be applied for targetprivate buildings of Yen Loan Project*

Component 1 2015-2023

Strengthen Public Buildings

- Retrofit and Construction-

Component 2 2015-2023

Financial Support on Strengthen Private Builings

- Retrofit and Construction-

***Based on Design and Constrcution Management developed by the Technical Cooperation

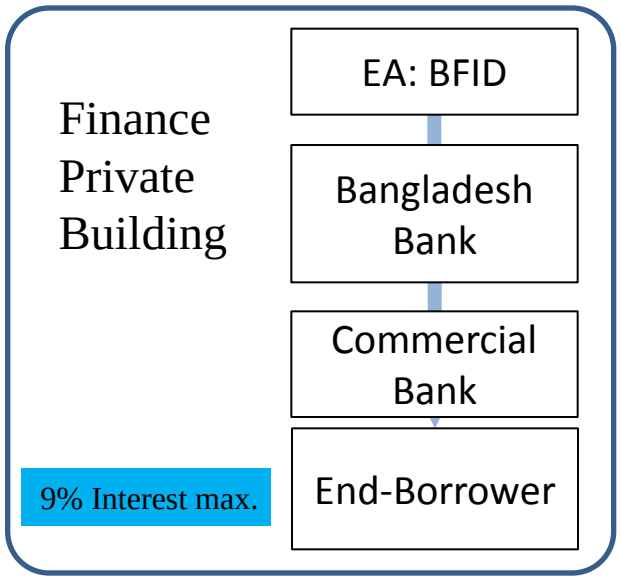
Technical Cooperation

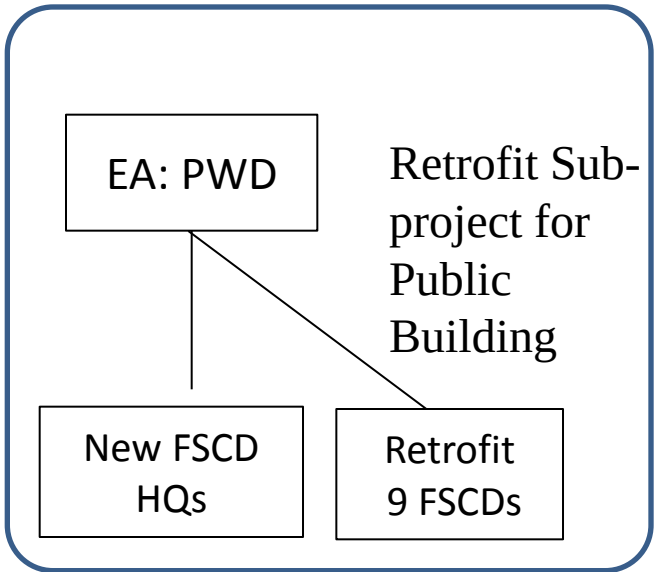
Yen Loan

JICA's Initiatives for Urban Resilience contd…

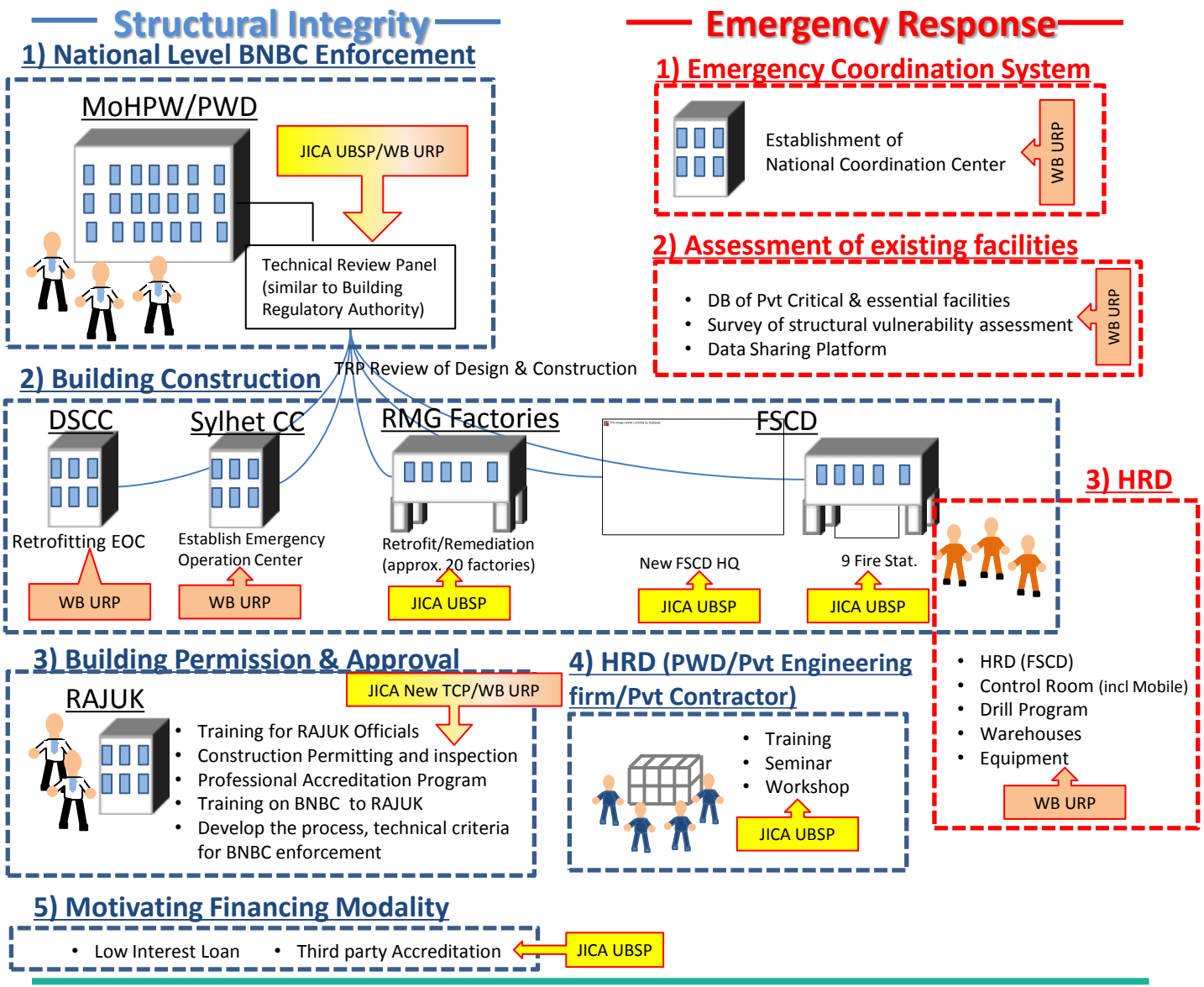
Urban Building Safety Project (UBSP)

Objective: To strengthen the building safety in Urban Areas		**Component:** 1. Financing Scheme for Private Buildings Safety 2. Project Loan for Public Buildings Safety 3. Consulting Services 4. Institution Development Consultant 5. Training for Public/ private Engineers
Area: Dhaka , N. Ganj, Gazipur & and Chittagong District	**Amount:** 120 mil US$	
LA Signed	13th December 2015	Duration: 2016 to 2021





World Bank & JICA Integrated Approach



JICA's Initiatives for Urban Resilience contd…

<table>
<tr><th colspan="3">Promoting Building Safety for Disaster Risk Reduction (BSPP)</th></tr>
<tr><td colspan="2"><u>Objective</u>:

Enhance the existing capacity of public/ private engineers, system development and extend the support of CNCRP</td><td rowspan="2"><u>Outputs</u>:
1. Prepare Human resource Development system for building safety
2. Capacity Enhancement on seismic assessment, seismic design, Retrofitting design and construction supervision</td></tr>
<tr><td><u>Area</u>:

Metropolitan Cities</td><td><u>Amount</u>:

5 Million US$ (L/S)</td></tr>
<tr><td>RD signed</td><td>8th December 2015</td><td>Duration: 4 years</td></tr>
</table>

Manuals developed with PWD

1.Manual for Seismic Retrofitting Evaluation of Existing Reinforced Concrete Buildings
2. Manual for Seismic Retrofit Design of Existing Reinforced Concrete Buildings
3. Manual for Retrofit Construction and Supervision of Reinforced Concrete Buildings
4. Guidelines for Quality Control of Design and Construction of Reinforced Concrete Buildings
5. Manual For Seismic Design of Reinforced Concrete Buildings
6. Manual for Vulnerability Assessment and Damage Prediction of Reinforced Concrete Buildings

JICA's Initiatives for Urban Resilience contd…

Technical Development to Upgrade Structural Integrity of Buildings in Densely Populated Urban Areas and its Strategic Implementation towards Resilient Cities in Bangladesh (SATREPS)

Objective: to reduce earthquake disaster risk and promote urban safety		**Outputs:** 1. Understanding of building characteristics governing its performance 2. Performance evaluation methodology of buildings against collapse 3. Retrofit schemes for buildings with low performance 4. Effective urban planning strategies for sustainable and resilient cities
Area: Dhaka	**Amount:** 4 Million US$ (L/S)	
RD signed	22nd February 2016	Duration: 4 years

Jointly Implemented by:

Bangladesh Side:

MoHPW, HBRI, PWD, BUET, UAP, AUST

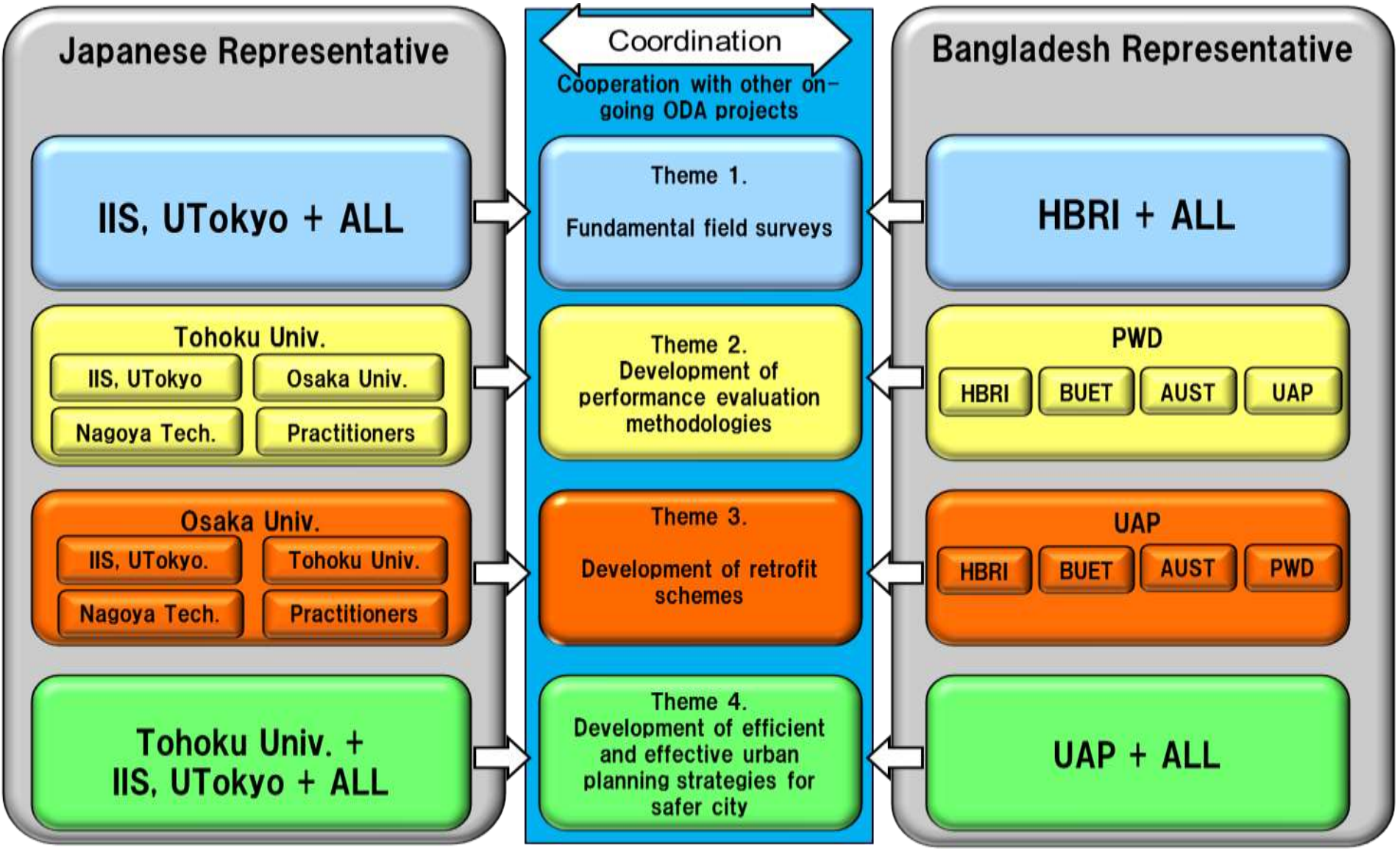
Japan Side:

Tohoku University, Osaka University Building Research Institute

Nagoya Institute of Technology, Horie Architectural Engineering

Research Institute , Constec Engineering Corporation, OYO Int. corp.

JICA's Initiatives for Urban Resilience contd…



JICA's Initiatives for Urban Resilience contd…

Capacity Building for Community Based DRR in Urban Areas of Bangladesh

<table>
<tr><td colspan="2"><u>Objective</u>:

To build up a system in which the communities in DNCC can implement DRR activities in a appropriate manner</td><td rowspan="2"><u>Outputs</u>:
1. Human resources development for the promotion of community based DRR
2. Assist DNCC to prepare model community on DRR
3. Disseminate the experience and learning to other stakeholders
4. Create a platform for continuous dissemination / sharing and collaboration</td></tr>
<tr><td><u>Area</u>:

36 ward of NDCC
& Related stakeholders</td><td><u>Amount</u>:

(L/S)</td></tr>
<tr><td>MM signed</td><td>21st April 2016</td><td>Duration: 2.6 years</td></tr>
</table>

<u>Jointly Implemented by:</u>

<u>Bangladesh Side:</u>

Dhaka North City Corporation, BRAC

<u>Japan Side:</u>

SEEDS Asia (Japanese NGO)

JICA's New Technical Cooperation Project with RAJUK

T/C Purpose and Activities (Tentative)

1. Project Purpose

Enhancement of RAJUK's process of Construction Building Permission and Construction Inspection to improve resilience of private buildings.

2. Project Output

I. **Improve Building Construction Approval Process (For the Design phase)**

II. **Improve Construction Inspection and Monitoring Process (For the Construction phase)**

III. **Increase awareness of the measures to improve building resilience among stakeholders (engineers, contractors, relevant associations and so on)**

Discussion with World Bank

World Bank URP Components Excerpt

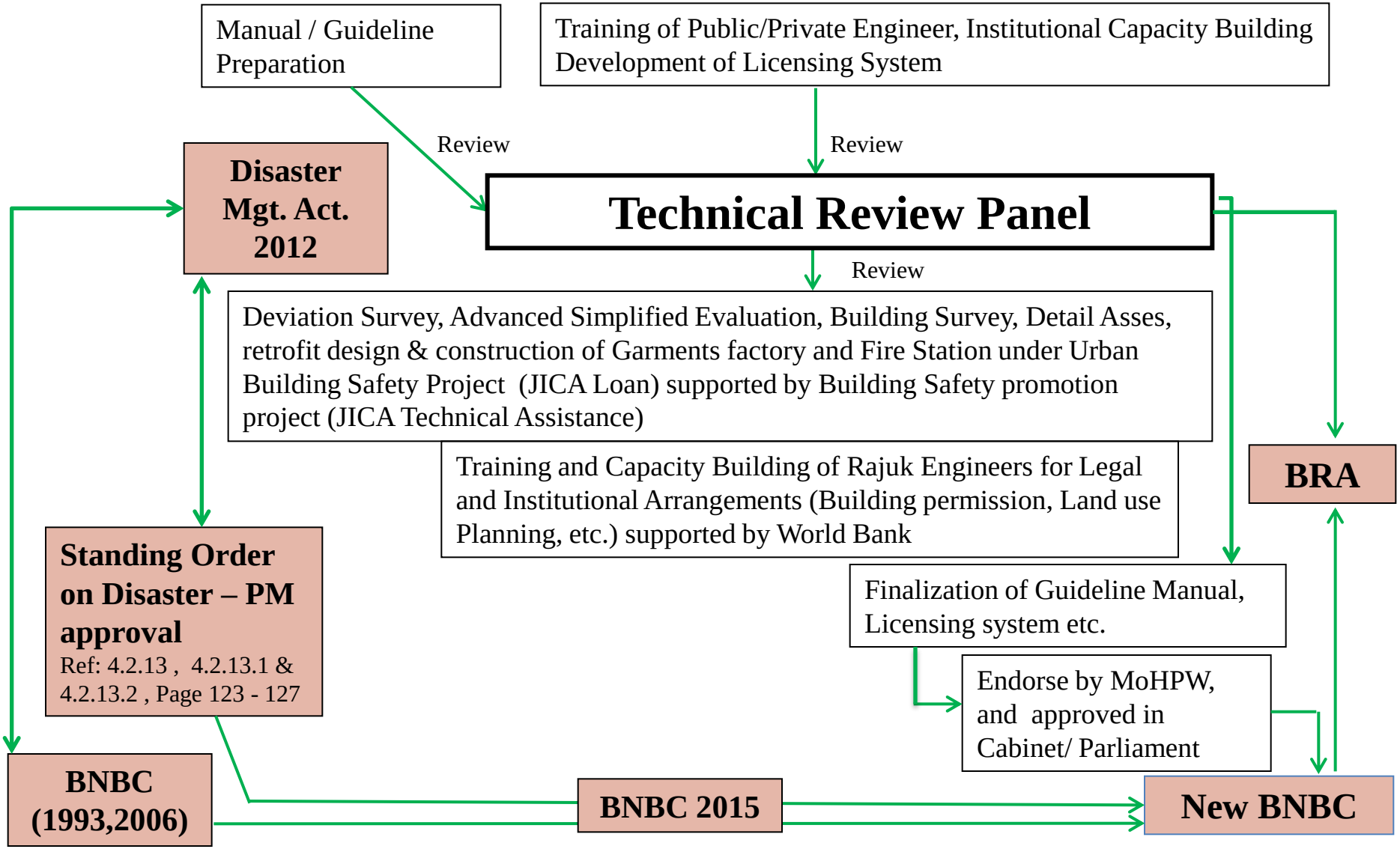
Source : JICA based on WB TORs

Component	Contents	Duration	Overrapping
B1	Vulnerability assessment and prioritized investment plan for critical assets	3 years	
B2	Development of risk sensitive land use planning practice	3 years	
C1	-Develop legal, administrative and organizational structure of Urban Resilience Unit (URU) -Conducting technical training and capacity building for URU staffs.	30 months	
C2	-Development of **Electronic Permitting System** for effective and transparent process -Development of strategic plan for the system to be viable and sustainable through workshops -Operational trainings	2 years	middle
C3	Installation of Professional Engineer or Architect Accrediation Program	30 months	
C4	-Analysis of obstacles for **BNBC implementation and enforcement** (including private buildings) -Proposing a timebased program to reform institutional and/or organizational changes through workshop -Conducting training and capacity building program for building officials, construction engineers, architects, planner and other construction professionals -Educational campaign for raising public awareness	4 years	high
B+C	Detailed Design and construction supervision of URU's training and laboratory building	27 months	

- C4 component will provide **Situational Analysis and Concept Note**.
  JICA will be an observer of the working committee for a better collaboration
- Building permission process will be digitalized with WB's support but may require an update from the engineering and technical point of view (i.e. Structural Assessment)

JICA’s view for future

JICA's approach to formulate BRA (Building Regulatory Authority)



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Review Article

Workplace safety compliance of RMG industry in Bangladesh: Structural assessment of RMG factory buildings

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[b] International Labour Organization (ILO) sponsored Building Safety Assessment on behalf of National Tripartite Committee (NTC), Government of Bangladesh (GoB), Bangladesh
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Workplace safety
Plans of actions
Structural assessment initiatives

ABSTRACT

Ready-made garment (RMG) in Bangladesh faces challenges to ensure workplace safety for the millions of garment workers in compliance with the national and international labour standards and labour rights. The recent deadly Rana Plaza collapse resulted in three important plans of actions to address the challenges in the sector. This paper presents an assessment of the potential and challenges of RMG industry in Bangladesh. It presents a detail review of the initiatives taken after Rana Plaza accident along with progress made in terms of overcoming the challenges. It also presents a detail review of the actions the structural assessments of buildings housing RMG factories in Bangladesh including its progress, implementation mechanism, and outcomes. The study reveals that RMG is one of the most important export oriented business sector in Bangladesh, which has progressed a lot since the Rana Plaza collapse in terms of achieving workplace safety compliance under three plans of actions, among which achievement in initiatives regarding structural assessment of RMG factory buildings is significant. Still nearly 1000 factories remain to be assessed. Moreover, assessment of buildings is not an end in itself, based on the recommendations of the assessment, the weak factory buildings need to be made resilient by addressing the structural issues.

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Contents

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1. Introduction

Accidents in an industry endanger the safety of workers, adversely affect livelihood of their workers and their families, and those living in the vicinity of the industry. Thousands of people are killed and injured in industrial accidents every year [1]. According to the ILO, occupational accidents and work-related diseases cause over 2.3 million fatalities annually, of which over 350,000 are caused by occupational accidents. These result in immeasurable human sufferings and major economic losses for entrepreneurs and economies as a whole; around 4 percent of the world's gross domestic product (GDP), or about US$2.8 trillion, is lost annually in direct and indirect costs [2]. Among different types of hazards in textile industry, physical hazards such as fire, building collapse, etc., are strongly related to structural and workplace safety compliance. Different industrial hazards resulted in several initiatives worldwide to protect human life and reduce material damage from industrial accidents, both nationally and internationally.

Occupational hazards are common in China, which has been witnessing dramatic economic development over the past 20 years [3]. For the prevention of occupational hazards, especially occupational diseases, several legislative measures have been adopted in China. Other initiatives included extensive research on occupational health and safety, capacity building, and implementation of basic occupational health services in collaboration with international organizations, etc. [3]. The occupational hazards in Japan are characterized by health issues and industrial accidents, resulting in enactment of several laws and acts [4,5].

Manmade industrial disasters happen frequently in Europe, resulting in adoption of minimum requirements for safety and health protection at the workplace to prevent accidents and occupational diseases in Member States of the European Union (EU) [6–8]. Among the industrial accidents influencing adoption of preventive measures, Seveso chemical accident in Italy (1976) and Baia Mare industrial accident in Romania (2000) are significant [9–12]. The poor working condition in industries of United Kingdom (UK) resulted in initiation of factory inspection and imposition of Factory Act in 1833, which was amended several times afterwards to address industrial accident issues. Several initiatives were undertaken in response to industrial accidents in the UK. These included industrial explosion in Silvertown, East London killing 73 workers (1917); explosion and fire at Flixborough, Lincolnshire killing 28 workers and injuring 36 workers (1974); collapse of a four-storey factory building in Glasgow caused by a liquefied petroleum gas (LPG) explosion killing nine and injuring thirty three workers (2004); and massive explosion and fire at the Buncefield Oil Storage Depot, Hemel Hempstead (2005) [12, 13]. In the USA, unhealthy working conditions and frequent serious accidents resulting economic and social losses prompted the government to undertake different actions, e.g., in 1877 the first Factory Act along with factory inspection initiative were enacted in Massachusetts in response to the tragic fire at the Granite Mills in Fall River (1875) [14].

In 1919, following the end of the First World War, the International Labour Organization (ILO) was established in order to address all conceivable aspects of labour rights internationally. Occupational health and safety (OHS) is one of the main priorities of the ILO, the concept of which was developed by the ILO and the World Health Organization (WHO) in 1950 as a building block for labour legislation [15,16].

The Ready Made Garment (RMG) industry in Bangladesh, with poor safety records, has been facing challenges regarding compliance with the international standard to ensure workplace safety and better working conditions for the millions of garment workers [17,18]. One of the most deadly fire accidents in RMG sector Bangladesh is Tazreen Fashion fire on November 24, 2012, which resulted in death of 112 workers [19]. Since Tazreen Fashion Factory fire to April 17, 2015, about 84 fire incidents have occurred in the sector leading to at least 31 deaths and 903 injuries [20]. In 2005, the building of Spectrum factory collapsed causing death of 64 garment workers and injury of 80 [18]. In 2006, 22 workers died due to collapse of the Phoenix Garments building. Just months after the fatal fire at Tazreen Fashions, Rana Plaza collapsed on 24 April 2013 resulting in 1134 deaths and more than 2500 injuries. It was the most fatal industrial accident in RMG sector in Bangladesh, and one of the deadliest industrial disasters in the world, which was the result of the reluctant attitude of the stakeholders towards the compliance issues.

Without workplace safety compliance, it is almost impossible to ensure business sustainability and thus to survive in global competitive market [21]. Despite the challenges in RMG sector in Bangladesh, McKinsey, a global management consulting firm, described Bangladesh as the next hot spot in apparel sourcing [22]. The firm forecasted that the export-value growth will be 7–9 percent annually resulting in doubling of apparel export by 2015 and tripling by 2020, if the sector in Bangladesh can ensure total compliance with the international standards. Even after the Rana Plaza collapse, a study jointly conducted by the United States Fashion Industry Association (USFIA) and the University of Rhode Island (URI) revealed that the US-based fashion companies are expected to boost their sourcing from Bangladesh by 2016 [23].

Considering the potential of RMG industry in Bangladesh, several and diverse national and international commitments and initiatives resulted as part of the reform and restructuring of the RMG sector aiming at improvement of workplace safety to safeguard the lives of over four million RMG workers and to retain the confidence of global buyers following the Rana Plaza accident [24,25]. The targets and objectives of these initiatives are same and they share some common courses of action [25]. Among the common actions considered in three initiatives, structural assessment of RMG factory buildings is significant to ensure a safe working environment for all in the sector preventing further accidents.

This work focuses on the progress of disaster risk reduction in RMG sector through addressing workplace safety issues with special focus on resilience of factory buildings. This paper discusses the history, potential and challenges of RMG industry in Bangladesh and reviews the initiatives taken after Rana plaza accident to overcome the challenges along with their progress in terms of achievement within two years. It also reviews in detail the structural assessments of RMG factories including its progress, implementation mechanism, and outcomes within two years after Rana Plaza collapse Based on the reviews, recommendations have been made for effective structural assessment to make the weak factory buildings resilient by addressing the structural issues. This study was carried out on the basis of extensive field visits to garment factories and review of data and information from secondary resources.

2. Ready Made Garment (RMG) industry in Bangladesh: History, potential and challenges

Ready Made Garment (RMG) industry sector of Bangladesh commenced its journey in late 1970s due to global demand [26,27]. The growth in the RMG sector has been a welcome change for Bangladesh's export market, which has diversified the economy of the country. It has indeed emerged as a niche market for Bangladesh's export sector.

The history of RMG industry in Bangladesh dates back to 1950 when cost of production increased in Western World due to increase in labour wage in RMG sector [28]. As a result, retailers

started searching for places where the cost of production was cheaper, e.g., Hong Kong, Taiwan and South Korea [27,28]. In 1974, Multi Fiber Agreement (MFA) was made by General Agreement on Tariffs and Trade (GATT) to control the level of imported RMG products from developing countries into developed countries, imposing six percent increase in export rate every year from a developing country to a developed country and quotas on countries that exported at a higher rate [28]. Bangladesh was able to escape the MFA quotas as it was not perceived to be a particular threat to the industries of those countries [29]. The MFA agreement led the producers to search for countries that were outside the umbrella of quotas and had cheap labour like Bangladesh. Thus, exemption of Bangladesh from MFA and cheap labour influenced the emergence of RMG sector in the country, when South Korean company Daewoo signed a 5-year collaboration agreement with Desh, a Bangladeshi garment in 1974. Later the development and improvement of communication system and networking, flexible government policy toward the sector, and other factors facilitated the expansion and success of Bangladesh's entire garments export sector [26,28,30]. By late 1980s, the sector became the main export sector and a major source of foreign currency in Bangladesh [26,28]. Thus, the MFA quota was a blessing to the RMG industry of Bangladesh. In 2005, phase out of the quota was completed under the Uruguay round of GATT (1994) [27,30,31]. At the end of the quota period, it was predicted by many that the phase out would greatly affect the export of the country. However, the post MFA era is another story of success proving all predictions wrong [27,30,31].

In the recent years, RMG exports from Bangladesh have been growing at an impressive rate. In fiscal year (FY) 1984–1985, the value of RMG export from Bangladesh was 116.20 million USD, which was 3.89 percent of total export [32]. It is now the biggest export earner in Bangladesh with an export earnings of around 25 Billion USD, accounting for 81.01 percent of the total export earnings of the country in FY2014–15. Due to such growth in RMG export earning, Bangladesh became the second largest apparel exporting country in the world in 2010 just within a course of three decades despite other challenges in the sector [33–35]. Fig. 1 shows comparative statement on share of different sectors in total export earning of Bangladesh, which represents the increasing superiority of export earnings of RMG sectors in last eight fiscal years. This figure highlights the importance of RMG sector in Bangladesh.

Apart from its contribution in export earning, the RMG industry emerged as an important player in the economy in terms of employment generation, poverty alleviation and empowering of women [35]. In 1978, there were only 9 export-oriented garment manufacturing units employing 0.12 million workers, which shot up to around 3500, employing more than 4.2 million workers in 2014 [32,34]. At present, European Union (EU including UK) and

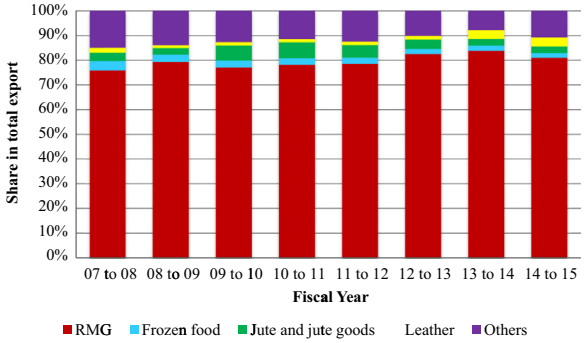


Fig. 1. Share of different sectors in total export earning of Bangladesh (data from [36]).

North America (the US and Canada) are the main buyers of RMG products of Bangladesh, where 60 percent of export contracts of western brands are with European buyers, and about 30 percent with North American buyers [27,37]. Bangladesh is a participant in General System of Preferences (GSP) programmes of both the EU's as well as that of the US.

It is apparent from Fig. 1 that that the growth rate of RMG sector in Bangladesh has been around nine percent over the FY2013–14, which is slightly lower than the earlier 5 years during which average growth was around 12 percent [38]. Moreover, a significant decrease in share of export earnings in the sector is observed from FY2013–14 (83.79 percent) to FY2014–15 (81.02 percent). This reduction has resulted due to several factors including image smearing due to industrial accidents, political turmoil, energy crises, physical distribution, and discriminatory treatment by some major global buyers. Industrial accidents are common in RMG factories of Bangladesh due to lack of compliance with national and international standards. Many factories did not meet the minimum standards prescribed in building and construction legislation causing different accidents like fire and building collapse, causing enormous suffering to workers and their families [17]. One of the most deadly fire accidents in RMG sector is Tazreen Fashion fire on November 24, 2012. Just months after this fatal fire Rana Plaza, located at Dhaka–Aricha highway near Savar bus stand (Fig. 2), collapsed on 24 April 2013 at around 8:30 am, resulting in 1134 deaths and more than 2500 injuries.

Rana Plaza housed five garment factories employing around 5000 people, 300+ shops, and a bank. It was a 9-storied industrial building with a single basement. Fig. 2 shows the schematic diagram of the building, facts regarding collapse of the building, and photos before and after it collapsed. Local Municipality (Savar) gave permission to the owner of Rana Plaza to construct a five storey commercial building with one basement in 2005. Later the owner was allowed to extend it up to nine storey, without considering the structural design, though the foundation of the building was for 5 storey [39]. Moreover, the building was converted from commercial to industrial use, and power generators were placed at the higher floors. As a result of such violation in building construction, cracks developed on some pillars and onfew floors of the building following a jolt on 23 April 2013, a day prior to the fateful day. After inspection, industrial police requested the building authorities to close the building and to suspend operations of the factories on that day. However, the building owner and top-management of the garment factories ignored the warning and forced the workers to work in the next morning on 24 April, 2013. As a consequence, the collapse resulted in the high death toll of 1134 and more than 2500 people were badly injured at the end of the rescue operation on 14 May 2013 [40,41]. This tragic accident received global attention, and brought forward diverse issues concerning millions of workers, employers, brands and consumers – the entire supply chain in the RMG sector of Bangladesh [42].

After Rana Plaza accident, the US President suspended Bangladesh from participating in the GSP programme on June 27, 2013, and the suspension order was to be implemented within 60 days after the announcement [43]. Many in the international community had wondered if the EU would soon follow suit, or if it would pursue a different approach toward spurring policy changes in the country [44]. Convinced by ILO, the EU confirmed that it would be keeping Bangladesh in its Everything But Arms (EBA) scheme of GSP, which grants least developed countries, such as Bangladesh, duty-free, quota-free access to the EU market for all goods exports, with the exception of arms and ammunition [44,45]. Thus, the initial reaction of the trading partners and global business and investors after Rana Plaza collapse weakened confidence in Bangladesh [46].

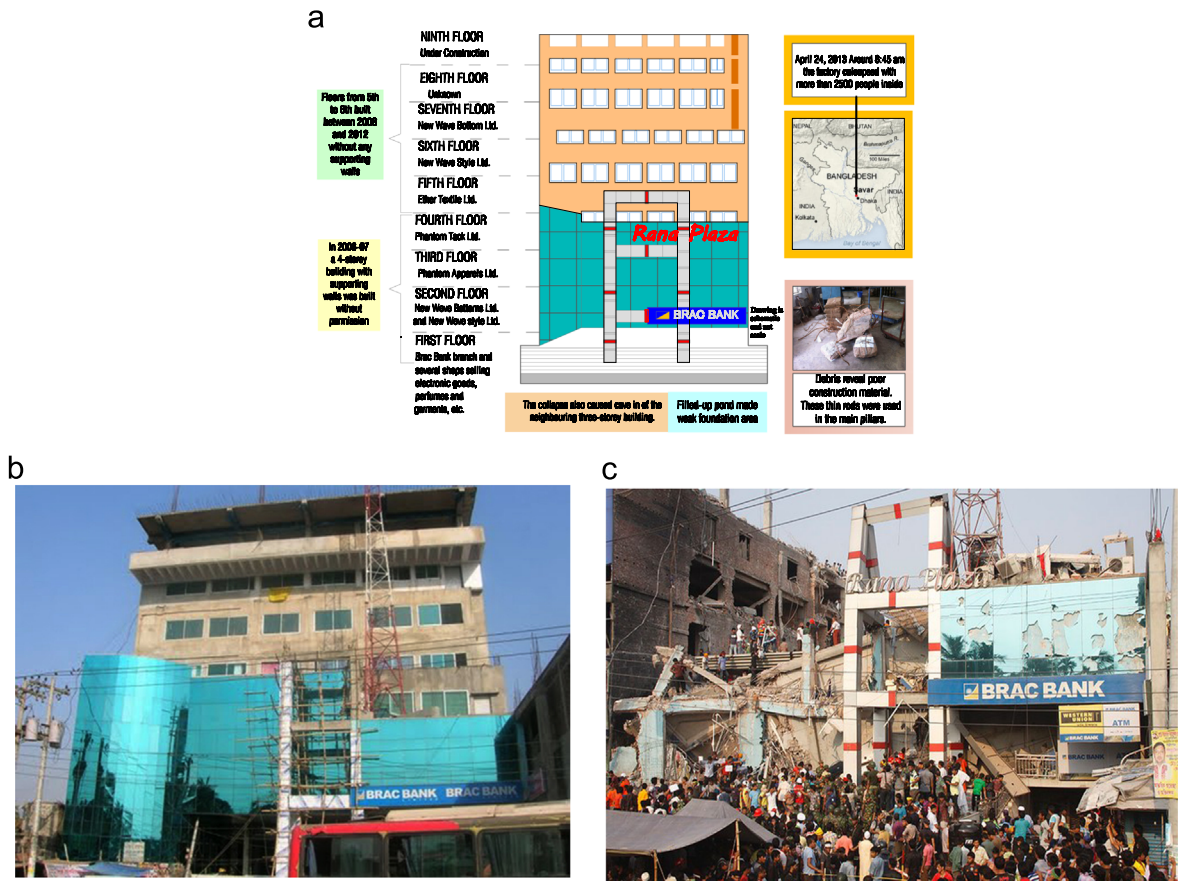


Fig. 2. Rana Plaza collapse on April 24, 2013: (a) Rana Plaza profile and facts regarding its collapse (Prepared by authors, *Source*: The Globe and Mail, & The Daily Star). (b) Rana Plaza before collapse (*Source*: The Daily Star). (c) Rana Plaza after collapse (*Source*: bdnews24.com).

3. Initiatives after Rana Plaza collapse: Workplace safety compliance Issues

To safeguard the lives of over four million RMG workers and to retain the confidence of global buyers following the Rana Plaza accident, several and diverse national and international commitments and initiatives resulted as part of the reform and restructuring of the Bangladesh RMG sector aiming at improving workplace safety in garment factories [24,25]. The initiatives include but not limited to, National Tripartite Plan of Action (NTPA), the European Union Sustainability Compact, and the United States Trade Representative (USTR) Plan of Action.

After Rana Plaza accident, the Government of Bangladesh (GoB) put in place a number of incentives to ease the difficulties faced by RMG entrepreneurs, e.g., bringing down the advance income tax from 0.8 percent of f.o.b. value to 0.3 percent, arrangement of low-cost credit for struggling RMG units, etc. [47]. But these incentives were not enough to satisfy the requirement of global buyers. Thus, tripartite partners, i.e. GoB, RMG workers, and RMG employers, signed a Joint Statement built upon NTPA on May, 2013 [48]. The NTPA on Fire Safety was first outlined on March 2013 after Tazreen Fashion fire accident [49]. Afterwards, without altering the content, the NTPA on Fire Safety was merged with the Joint Statement to form the NTPA on Fire Safety and Structural Integrity in the RMG Sector of Bangladesh in July 2013 [48]. The NTPA on Fire Safety and Structural Integrity includes 25 commitments divided into the three categories, i.e. legislation and policy, administration, and practical activities, among which 16 have been fully or substantially completed and nine of the commitments have been partly completed within two years of the Rana Plaza accident [25]. The National Tripartite Committee (NTC) was established in 2013 under NTPA commitment to ensure and monitor implementation of the NTPA [41,48]. The committee chaired by Labour Secretary includes Government agencies, employers, i.e. Bangladesh Employer's Federation (BEF), Bangladesh Garment Manufactures & Exporters Association (BGMEA) and Bangladesh Knitwear Manufacturers & Exporters Association (BKMEA), and trade unions.

Based on NTPA, the EU, GoB and ILO issued an agreement of time-bound actions, "The Sustainability Compact: Compact for Continuous Improvements in Labour Rights and Factory Safety in the Ready-Made Garment and Knitwear Industry in Bangladesh" in July 2013 to promote improved labour standards and responsible business conduct in the RMG and knitwear industry in Bangladesh [25,48,50]. A total of twenty nine activities are listed in the EU Sustainability Compact, among which 15 actions have been fully or substantially completed, 13 actions have been partly completed, and one action regarding encouraging retailers and brands to adopt and follow a unified factory audit code of conduct in Bangladesh has not been initiated yet [25]. The United States Trade Representative (USTR) requested GoB to implement a sixteen-point action plan within one year in order to reinstate Bangladesh's GSP status in the US market [25,43]. The USTR Action Plan endorsed the EU Sustainability Compact particularly for trade union related activities. Substantial progress has been made in regards to 12 of the actions and greater progress is required in regards to four actions [25]. Table 1 shows the status of actions under three initiatives. From this review it is realized that Bangladesh has progressed a lot in terms of the achievement or completion of actions initiated under plans of actions.

In addition to these initiatives, two different factory inspection programmes have been established to make work place safer in Bangladesh: the Bangladesh Accord on Fire and Building Safety in

Table 1
Status of actions under three initiatives.

Initiative	Fully or substantially completed	Partly completed
NTPA	1. Submit the Bangladesh Labour Law Reform Package to the Parliament. 2. Adopt a National Occupational Health and Safety Policy. 3. Establish a Task Force on Building and Fire Safety under the Cabinet Committee for the RMG sector. 4. Establish a single resource for information on fire safety licensing and certification. 5. Recruitment of 200 labour inspectors 6. Upgrade the Department of the Inspection for Factories and Establishments (DIFE) to a Directorate. 7. Strengthen the capacity of the DIFE. 8. Establish a publicly accessible database on safety issues in RMG factories. 9. Develop and introduce a unified fire safety checklist to be used by all relevant government agencies. 10. Conduct a factory level fire safety needs assessment. 11. Deliver a fire safety “crash course” for mid-level factory managers and supervisors. 12. Establish a fire safety hotline for workers. 13. Strengthen the capacity of the Bangladesh Fire Service and Civil Defence (FSCD). 14. Develop guidelines for the establishment of labour management committees on occupational safety and health and/or fire safety. 15. Develop and disseminate fire safety self-assessment and remediation tools. 16. Redeploy RMG workers that were rendered unemployed by the incident, as well as rehabilitated disabled workers.	1. Review relevant laws, rules and regulations regarding fire, building and chemical safety. 2. Review and adjust factory licensing and certification procedures. 3. Develop a transparent and accountable industry sub-contracting system. 4. Develop and implement a factory fire safety improvement programme. 5. Develop and deliver fire safety training to factory inspectors. 6. Develop and deliver fire safety training to union leaders. 7. Assess the structural integrity of all active RMG factories. 8. Develop and deliver mass worker education tools. 9. Develop a tripartite protocol for compensation of the families of deceased and injured RMG workers.
EU Sustainability compact	1. Amend the Bangladesh Labour Law. 2. The ILO is to provide technical assistance to Bangladesh towards implementation and follow-up concerning freedom of association and the right to collective bargaining. 3. Ensure freedom of association, collective bargaining and the application of the Bangladesh Labour Law. 4. Register independent trade unions and ensure protection of unions and their members from anti-union discrimination and reprisals. 5. Conduct a diagnostic study of the Labour Inspection System, followed by the development and implementation of an action plan with appropriate measures. 6. Conduct regular visits to assess industrial establishments. 7. Upgrade the Department of the Chief Inspector of Factories and Establish a Directorate. Recruit 200 additional inspectors by the end of 2013. 8. Implement the National Action Plan on Fire Safety and Structural Integrity in the RMG industry in Bangladesh, with the support of the ILO, in accordance with established milestones and timelines as stipulated in the Programme of Action. 9. Assess the structural and fire safety of all active export-oriented RMG and knitwear factories and initiate remedial actions. 10. Create a publicly accessible database. 11. Achieve eligibility for the ‘Better Work Bangladesh' (BWB) programme. 12. Explore the possibility of reallocating funds under the current EU-funded ‘Technical and Vocational Education and Training' (TVET) project implemented by the ILO. Implement the existing EU-funded ‘Better Work and Standard' (BEST) cooperation programme. 13. Extend the social compliance component in the ongoing EU BEST programme with Bangladesh. 14. Underline the importance of engaging with stakeholders to ensure effective implementation of and consistency among various initiatives. 15. Implement the ILO's skills and training programme for injured workers. Rehabilitate and reemploy affected workers.	1. Implement, enforce and monitor the Labour Law. 2. Issue and implement all rules required by law. 3. Develop and adopt additional domestic legislative proposals to address freedom of association and protection of the Right to Organize and Collective Bargaining. 4. Establish Joint Committees for the improvement of occupational safety and health. 5. Deliver education and training programmes on fundamental principles, rights at work and occupational safety and health. 6. Extend technical assistance to address labour standards. 7. The ILO is to assist Bangladesh in reviewing the adequacy of reforms in meeting ILO requirements. 8. Align actions with the ILO Programme Outline 2013–2016, ‘Improving Working Conditions in the RMG Sector in Bangladesh', and ‘Better Work', to be supported technically or financially by the EU under the next programming cycle (2014–2020). 9. Explore further funding possibilities within the upcoming programming period (2014–2020), including through the ‘Thematic Programme Global Public Goods and Challenges' programme. 10. Rehabilitate those who are permanently disabled as a result of the Rana Plaza Tragedy. 11. Ensure a focus on skills development in future EU assistance to Bangladesh 12. Encourage other companies to expeditiously join the Accord within their respective capacities. 13. Take note of the steps taken by European social partners in the RMG sector to update their 1997 and 2008 Codes of Conduct on Fundamental Rights, within the framework of the European Sectoral Social Dialogue Committee for Textiles and Clothing.
USTR Bangladesh Action Plan	1. Develop a plan to increase the number of labour, fire and building inspectors, improve their training, establish clear procedures for independent and credible inspections and expand resources and their disposal, so as to conduct effective inspections. 2. Increase fines and other sanctions for failure to comply with labour, fire or building standards to levels sufficient to deter future violations. 3. Develop and implement a plan to assess the structural building and fire safety of all active RMG/knitwear factories in consultation with the ILO. Initiate remedial actions, or close or relocate inadequate factories, as appropriate. 4. Create a publicly accessible database of all RMG/knitwear factories as a platform for reporting labour, fire and building inspections.	1. Enact and implement labour law reforms to address key concerns related to freedom of association and collective bargaining. 2. Develop and implement mechanisms to prevent harassment, intimidation and violence against labour activists and unions.

Table 1 (*continued*)

Initiative	Fully or substantially completed	Partly completed
	5. Establish an effective compliant mechanism 6. Continue to register unions to ensure protection of unions and their members from anti-union discrimination and reprisal. 7. Publicly report information on the status and final outcomes of individual union registration applications. 8. Register non-government labour organizations. 9. Publicly report any complaints received of anti-union discrimination or other unfair labour practice. 10. Bring the EPZ law in conformity with international standards. 11. Issue regulations to ensure the protection of EPZ workers' freedom of association until the EPZ law has been repealed or overhauled. 12. Issue regulations to ensure transparency in the enforcement of the existing EPZ law until the EPZ law is repealed or overhauled.	

Source: Prepared on the basis of Moazzem and Islam [25].

Bangladesh, and the Alliance for Bangladesh, where ILO fulfills the role of neutral chair. The Accord on Fire and Building Safety in Bangladesh (the Accord) was signed by over 190 apparel companies from over 20 countries in Europe, North America, Asia and Australia; two global trade unions, IndustriALL and UNI Global; and eight Bangladeshi trade unions on May 15, 2013. It is a 5-year independent and legally binding agreement designed to build a safe and healthy Bangladeshi RMG Industry [51,52]. The Alliance for Bangladesh Worker Safety (the Alliance) officially launched its local operation in Dhaka on December 9, 2013, which is also a 5-year independent and legally binding agreement founded by a group of North American apparel companies and retailers and brands (26 North American retailers and brands) to develop and launch the Bangladesh Worker Safety Initiative [53].

The initiatives and their achievements indicate that Bangladesh RMG sector is not only trying hard to maintain required global standards but in fact in some cases it was far exceeding the standards set by the competing countries [38]. Thus, despite the challenges, the RMG sector still holds a competitive position in global RMG market showing impressive export performance in FY 2013–14 and FY 2014–15 (Fig. 1).

4. Structural assessments of buildings housing RMG factories in Bangladesh

4.1. Progress of the structural assessment initiative

After Rana Plaza accident, work-place safety was considered one of the most important challenges to sustain RMG industry in Bangladesh. Thus actions regarding structural and fire safety assessment of all active export-oriented RMG factories were addressed in all the action plans. The supporting actions included up-gradation and strengthening of the Chief Inspector of Factories and Establishment office to a “department”, recruitment of additional labour, fire and building inspectors, arrangement of training programmes to increase capacity of the inspectors, development of plan in consultation with the ILO to conduct effective inspections, initiation of remedial actions or close or relocate factories as appropriate, and creation of a publicly accessible database of all RMG/knitwear factories as a platform for reporting labour, fire and building inspections. All of these actions are either fully or partially completed (Table 1).

The GoB has already upgraded Chief Inspector of Factories and Establishment office to Department of the Inspection for Factories and Establishments (DIFE), sanctioning 679 new staff positions including 392 new inspectors and also started organizing training programme for the newly recruited inspectors for capacity building. Bangladesh University of Engineering and Technology (BUET) and two private engineering firms TUV SUD Bangladesh (Pvt.) Ltd. and Veritas Engineering & Consultant on behalf of the NTC, the Accord, and the Alliance are responsible for conducting the assessments of the structural integrity and fire safety of RMG factory buildings. To undertake the structural assessment of factory buildings with common approach, Guidelines for Assessment of Structural Integrity and Fire and Safety including harmonized standards were developed by the technical experts (structural engineers, fire safety experts, etc.) from the BUET on behalf of the NTC, the Accord, and the Alliance. A review panel along with a review mechanism was also established to handle urgent safety issues in garment factories. Finally, in November 2013, assessments of the structural integrity and fire safety of RMG factory buildings officially commenced, led by engineers from BUET [46,48,54,55]. The BGMEA and BKMEA agreed to share necessary documents related to factory design and layout with the Committee to facilitate a smooth assessment process [54].

Among a total of 1400 Accord member factories, 1250 have been inspected till March, 2015. Moreover, among newly listed factories, initial inspections of 250 factories have already completed. As of March 2015, the Accord has received and handed over 950 Corrective Action Plans (CAPs) to the respective factories. So far 683 CAPs have been published on the website [56]. The Alliance has already inspected all of its 647 factories [57]. The NTPA has set a target to inspect around 1500 factories that are neither part of the Accord or the Alliance with the support of the ILO. The Bangladesh University of Engineering and Technology (BUET) team has inspected 471 factories, and two private sector companies TUV SUD Bangladesh (Pvt.) Ltd and Veritas Engineering & Consultant have been assigned to inspect the rest of the factories in the initiative [24,34,46]. Despite such progress in the assessment, the initiative is currently facing a number of difficulties in conducting the inspections. The difficulties include listing with incorrect address, factories in the list missing as a result of previous closures, and incomplete listing of factories [25].

4.2. Implementation mechanism of the structural assessment

To undertake the structural assessment of factory buildings with common approach and standard, ILO brought together technical experts (structural engineers, fire safety experts, etc.) the BUET on behalf of the NTC, the Accord, and the Alliance. NTC endorsed ‘Guidelines for Assessment of Structural Integrity and Fire and Safety' including harmonized standards and inspection checklist developed by technical experts from BUET, the Accord and the Alliance [58]. The common steps for structural assessment of buildings housing RMG factories by team of expert are described below:

4.2.1. Visual inspection

Visual inspections of factory building are done for identification of existence of any distress in the structure of a building.

4.2.2. Review of current use and loading pattern

The design drawings and soil investigation reports of the factory buildings (if available) are reviewed to assess the current use and loading pattern.

4.2.3. Assessment of immediate threat of collapse from current building use

Assessment of immediate threat of collapse from current building use is done to take decision about further initiatives required to make the factory buildings resilient. For the assessment of immediate threat of collapse from current building use, the surveyors firstly highlight key columns and carry out simple calculations of working stresses to find out Factor of Safety (FOS), which is Column Ultimate Strength, divided by the Column Working Stress. Here, the Column Working Stresses are calculated comparing data set values and trigger points developed. Column Ultimate Strengths of the key columns of RMG factory buildings are calculated using Eq. (1) according to Bangladesh National Building Code (BNBC) (1993) [59].

$$P_n = 0.8\varphi [0.85 f_c (A_g - A_{st}) + f_y A_{st}] \quad (1)$$

where P_n is the ultimate strength of a column, Φ is the strength reduction factor ($=0.7$), f'_c is the compressive (cylinder) concrete strength, A_g is the gross area of concrete section, A_{st} is the area of reinforcement and f_y is the steel strength.

To decide on Column Ultimate Strengths, firstly the key columns are checked for brick or stone aggregate concrete. In case of unknown column material, brick aggregate is assumed. Due to the absence of any compressive strength data for existing RMG factory buildings, equivalent compressive (cylinder) concrete strengths (f'_c) are used for preliminary analysis. For the key columns with stone aggregate concrete and brick aggregate concrete, equivalent compressive (cylinder) concrete strength (f'_c) are assumed to be 16.3 MPa (2365 psi) and 14.1 MPa (2045 psi), respectively. These two equivalent concrete strengths were estimated on the basis of the cylinder test results conducted at BUET Concrete Laboratory between 2003 and 2009 using Eq. (2). Fig. 3 shows cylinder test results collected from BUET database between 2003 and 2009 for both stone aggregate concrete and brick aggregate concrete along with number of cylinders used as samples for the tests, and mean and standard deviation of concrete strengths found from the tests.

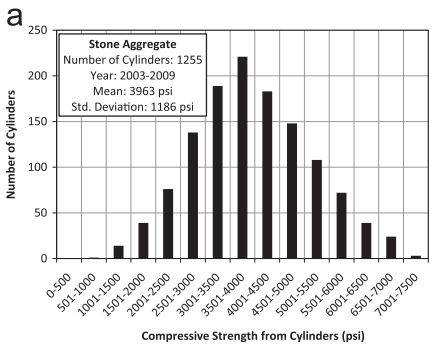
$$f_c = \text{mean of concrete strengths} - 1.34 \times \text{standard deviation of concrete strengths} \quad (2)$$

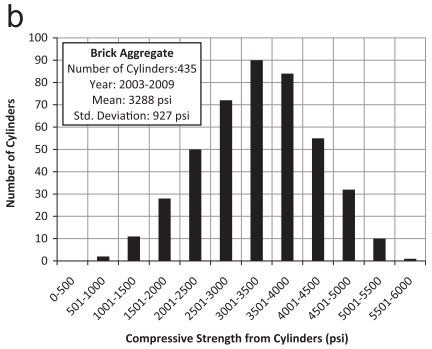
After deciding on concrete strengths of the key columns, the order of reinforcement is checked with a ferro-scanner to calculate the area of reinforcement (A_{st}). In case of unknown number of reinforcement bar, it is assumed as 1 percent of gross area of concrete section. For the buildings constructed before 2005 and after 2005 the steel strengths (f_y) are assumed 40 ksi (276 MPa) and 60 ksi (414 MPa), respectively. After deciding on all these information, Column Ultimate Strength is calculated.

Finally, FOS is calculated from Column Ultimate Strength and Column Working Stress. Based on FOS, four colour codes have been proposed to be used indicating the level of vulnerability of the factory buildings and the required actions within certain time frame to overcome the vulnerable condition. Table 2 shows the colour codes based on FOS of columns along with required actions within time frame. Thus, preliminary assessment of immediate threat of collapse from current building use is carried out.

4.2.4. Recommendation and preliminary assessment report preparation

After each inspection, preliminary assessment reports are prepared including the findings along with required recommendations for the building owner and user according to the assessment results. After assessment, if any factory building is notified as hazardous, the respective assessment teams let the review panel of





Cylinder test results for stone aggregate	
Range of compressive strength (in psi)	**Frequency of cylinders (in number)**
0-500	0
501-1000	1
1001-1500	14
1501-2000	39
2001-2500	76
2501-3000	138
3001-3500	189
3501-4000	221
4001-4500	183
4501-5000	148
5001-5500	108
5501-6000	72
6001-6500	39
6501-7000	24
7001-7500	3
Total	1255
Mean	3962.642 psi
Std Dev.	1185.508 psi

Cylinder test results for brick aggregate	
Range of compressive strength (in psi)	**Frequency of cylinders (in number)**
0-500	0
501-1000	2
1001-1500	11
1501-2000	28
2001-2500	50
2501-3000	72
3001-3500	90
3501-4000	84
4001-4500	55
4501-5000	32
5001-5500	10
5501-6000	1
Total	435
Mean	3287.853 psi
Std Dev.	926.9226 psi

Fig. 3. Cylinder test results collected from BUET database between 2003 and 2009: (a) cylinder test results for stone aggregate and (b) cylinder test results for brick aggregate.

Table 2
Colour codes based on FOS of columns along with required actions within time frame structural assessment of buildings housing RMG factories.

Factor of Safety (FOS) of column	Colour codes	Description	Required action	Actions with time frame
Below 1.25	Red	Critical visible defects resulting in immediate danger to structure and workers.	Require careful review. Take actions to increase FOS by reducing load less than the minimum load on any floor, i.e. 1 kN/m² or 20psf. If FOS is still below 1.25, then evacuate the facility immediately considering expert opinion.	Require Detailed Engineering Assessment (DEA) along with core test immediately.
Between 1.50 and 1.25	Amber	Significant visible defects with no immediate danger to structure or workers.	No reason to suspend operations in the facility. Production may continue subject to agreement to address issues raised and actions prioritized locally in report.	Require DEA along with core test within 6 weeks.
Between 1.86 and 1.5	Yellow	Limited visible defects with no immediate danger to structure or workers.	Production may continue subject to agreement to address issues raised and actions prioritized in report.	Require actions and core test within 6 months.
Better than 1.86	Green	No critical visible defects or structures and no visible immediate risks to workers.	Generally all clear subject to agreement to address prioritized comments. Production can continue.	No immediate actions required.

Bangladesh Government know about those factory buildings to carry on further assessment by inspection team and take final decision regarding the closure of the factory.

For factory buildings falling under red and amber category, Detailed Engineering Assessment (DEA) is carried out. Other issues triggering DEA are: concerns with structural issues, i.e. extensions, lateral system, flat plate punching capacity and slender columns, and state of documentation and approvals. DEA of the buildings involve soil investigation, other non-destructive tests and 3D building modelling.

Core tests are essential actions for factory buildings falling under red, amber and yellow category to verify the assumed equivalent compressive (cylinder) concrete strength (f'_c) (at preliminary assessment stage). This helps to gradually improve the state of building and reach to green category. For the purpose of core test at least four, three inch diameter core samples are required to be collected and tested and ACI 562 [60] is used to estimate equivalent concrete strength from the core data.

4.3. Findings from RMG factory buildings' structural assessments

Starting from June 2013 until February 2015, 4552 core samples of 825 factory buildings were collected and tested at BUET Concrete Laboratory, among which 2673 samples were of brick aggregate and 1823 of stone aggregate. Fig. 4 shows year wise distribution of the buildings along with their storey numbers from which core samples were tested at BUET. Out of these 825 factory buildings, 12 were built before 1980, 198 were built between 1980 and 2000, and the rest after 2010. Approximately, 52 percent of those factory buildings were constructed after 2005. Fig. 5 shows representative or typcial factory buildings by their construction year.

Fig. 6 shows the structural assessment results conducted by different teams and Table 3 shows Review Panel decisions for different cases. A total 65 factories were referred to Review Panel, out of which 29 factories located in 12 buildings were closed, 17 factories located in 10 buildings were partially closed, and 19 factories located in 12 buildings were allowed to operate (Table 3). Till March 2015, summary reports of 474 RMG factories assessed by the Accord were available in DIFE website, among which majority (274) fall under amber category, and 11 fall under red category (Fig. 6). The Accord brought 38 immediate risk cases to the Review Panel. The Review Panel decided to fully close eight factories, partially close 24, and allowed six to operate with reduced loads (Table 3). Again, till March 2015, summary reports of 122 RMG factories assessed by the Alliance were available in DIFE website, among which majority (93) fall under amber category, and nine fall under red category (Fig. 6). The Alliance brought 25

Fig. 4. Year wise distribution of factories from which cores are collected.

Fig. 5. Representative of factory buildings by their construction year: (a) construction year: 1984, (b) construction year: 1992, (c) construction year: 2002 and (d) construction year: 2012.

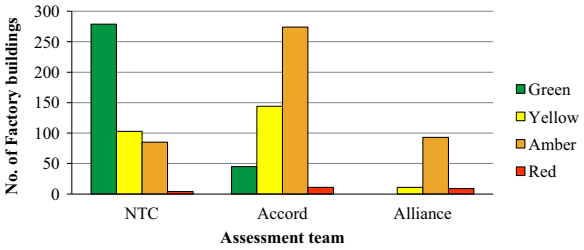


Fig. 6. Structural assessment results by different team (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

immediate risk cases to the Review Panel; the Panel decided to fully close four factories, partially close eight, and allowed 13 to operate with reduced loads (Table 3). Till December 2014, assessments of 618 factories have been conducted under the National Initiative by BUET covering 471 factory buildings. Among those, majority of the buildings (279) fall under green category, and four fall under red category (Fig. 6). Among the immediate risk cases two were brought to the Review Panel which decided to fully close one factory and partially close one (Table 3).

As per recommendation after preliminary assessments, a total of 4552 cores were collected from 825 factory buildings to undertake core test for verifying the assumed compressive strength and take further initiatives accordingly for reducing risk of the factory buildings. Fig. 7 shows distribution of these core test results for all aggregates, stone aggregates and brick aggregates along with number of sample cores for the tests, and mean and standard deviation of strengths found from the tests. For all the aggregate samples, the mean and standard deviation of strength are 3009 psi (20.8 MPa) and 1290 psi (8.9 MPa), respectively. For brick aggregate sample cores, the mean and standard deviation of strength are 2805 psi (19.3 MPa) and 1231 psi (8.5 MPa), respectively. For stone aggregate sample cores, the mean and standard deviation of strength are 3312 psi (22.8 MPa) and 1320 psi (9.1 MPa), respectively.

4.4. Recommendation regarding structural assessment

According to the assessments by different parties, the common problems faced by the factories regarding safety hazards are: lack of fire doors and fire exits, inadequate fire alarm systems, inadequate fire separations and protected exits, lack of lateral stability in structure, lack of accurate structural drawing, inadequate space for electrical installations (i.e. substations), etc. To make the weak factory building resilient by removing the problems, the Corrective Action Plan, Detailed Engineering Assessment and

Table 3
Review Panel decisions to different cases of building assessment.

Decision	NTC		Accord		Alliance		Total		No. of workers affected
	No. of factories	No. of buildings	No. of factories	No. of buildings	No. of factories	No. of buildings	No. of factories	No. of buildings	
Referred to Review Panel	2	2	38	18	25	14	65	34	20724
Partially closed	1	1	8	5	8	4	17	10	1530
Closed	1	1	24	9	4	2	29	12	15093
Decision pending	0	0	0	0	0	0	0	0	0
Inspection pending	0	0	0	0	0	0	0	0	0
Allowed operation	0	0	6	4	13	8	19	12	4101

Source: Adopted from [61].

Retrofitting have to be undertaken immediately in accordance with the initial assessment report under the NTC.

4.4.1. Corrective Action Plan (CAP)

Corrective Action Plan (CAP) is the plan for action to be prepared by each factory to address and correct the problems found out in the initial structural assessment of the factory building. It is very important to eliminate or reduce the problems within significant extent to ensure structural safety. Fig. 6 shows comparative status of structures assessed by Accord, Alliance and NTC, and Fig. 8 shows the Assessment Workflow of Alliance. The Accord and The Alliance have already started this process. By now 598 CAP have been approved by the Accord [62]. All factories under the Alliance are now in the process of addressing safety concerns and updating safety equipment and close to 300 factories have approved CAPs [57]. The Alliance has also published a protocol regarding this issue [63].

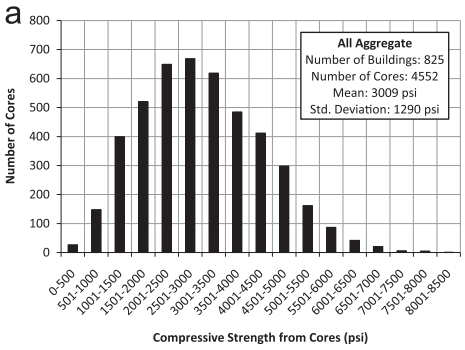
In contrary, no CAP has been prepared under National Initiative by now. Recently a task force has been formed at the beginning of January 2015 headed by Inspector General (Additional Secretary) of DIFE along with two professors from BUET, one director from RAJUK, and one director from Fire Service and Civil Defense (FSCD). The Terms of Reference (ToR) includes regular inspection of the factory buildings to inspect whether the factories follow the recommendations accordingly, Detailed Engineering Assessment (DEA), and preparation of CAP. The time limit has been set to 30 March, 2015 for short-listing of the firms or companies to undertake the activities.

NTC has also approved a CAP process for the NTC assessed factory buildings composed of five main steps. Firstly, the inspection reports will be shared with factory owners. The factory owners will review the reports to propose an outline of CAP accordingly along with name of firm to carry out DEA of the factory building (within the short-listed DEA firms by the DIFE Task Force) within a maximum of two weeks. Secondly, the outline of the CAP will be approved within two weeks through joint meeting between Factory Technical Team and the Initial Assessment Team. Thirdly, the approved firm will conduct DEA and prepare report containing detail remediation scheme within 6–12 weeks and submit it for review and comments by the DIFE Task Force. Fourthly, the DIFE Task Force will review the DEA along with remediation scheme and send comments to the factory owner within two weeks after receiving the DEA report. After revision of DEA and remediation scheme by the approved firm, it will be submitted to DIFE Task Force for final approval within maximum two weeks.

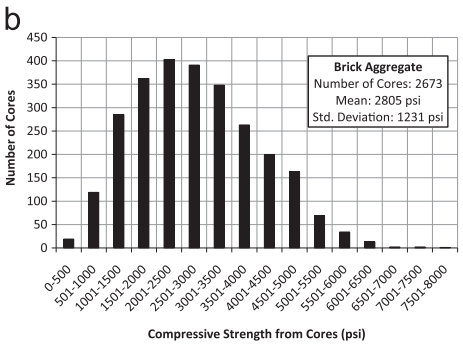
4.4.2. Detail engineering assessment (DEA)

Detail engineering assessment is required to have in-depth understanding of the condition of the structure. It also identifies inadequate structural members (if any) with respect to capacity as per code. In addition, the condition of the structure can be assessed for different loading conditions. As per Alliance, Accord, and NTC guidelines [64], DEA is required if the visual or initial assessment finds structural distress in main load-carrying members, apparently inadequate main structural members for both vertical and lateral load, or extension beyond design drawing or permission. Accord (2014) and Alliance (2014) have published their own protocol regarding DEA [63,65]. The typical steps for the assessment are shown below. The steps may vary according to the level of assessment and information available.

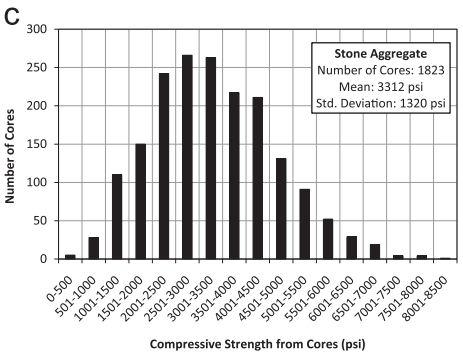
1. Prepare As-built Architectural and Structural drawings, if not available already. The as-built drawing shall show the structural, non-structural elements with dimensions at all levels, foundations and framing on plan, section and elevation, and cross-sectional drawings showing reinforcements in foundations, columns, beams, slabs, etc. If as-built drawings are available – verify if it truly represents the structure. As-built drawing shall be prepared/checked as per NTC Guideline [64].
2. Scanning of reinforcement bars in main structural elements of lower tiers to confirm as-built condition.
3. Confirm bar size by drilling 50 mm × 50 mm holes at reinforcement bar location.
4. Arrange confirmatory soil test (2–3 borings).
5. Spot check of foundation by excavation, if necessary.
6. Identify causes of any physical distress, dampness or any other abnormalities and suggest remedial measures.
7. Work on specific items of concern identified in the initial structural assessment report.
8. Identify any overloading, additions, extensions, presence of water tanks, towers. Study their effect on the structure and suggest remedial measures.
9. Arrange for core test by taking 4 Nos. 3 in. cores (preferably from columns) to assess in situ strength ensuring sample reliability; testing of cores in approved laboratories only, and proper interpretation of core test results considering various factors as per ASTM C42-90.
10. Use ACI 562 [60] to find equivalent concrete strength to be used in design checking.
11. UPV tests may also be conducted with proper calibration.
12. Prepare structural model as per As-built drawing using appropriate software by following the standard practice and building code.
13. Obtain reliable data on steel grade or arrange testing of steel rebar (if possible) or assume 40 grades conservatively for using in all analysis/design adequacies.
14. Use loading and load factors as per standard [64].
15. Check strength and serviceability requirements as per Bangladesh National Building Code [59].



Core test results for all aggregates	
Range of compressive strength from cores (psi)	**Frequency (No. of cores)**
0-500	27
501-1000	148
1001-1500	400
1501-2000	521
2001-2500	649
2501-3000	669
3001-3500	619
3501-4000	485
4001-4500	412
4501-5000	298
5001-5500	162
5501-6000	87
6001-6500	42
6501-7000	21
7001-7500	6
7501-8000	5
8001-8500	1



Core test results for brick aggregate	
Range of compressive strength from cores (psi)	**Frequency (No. of cores)**
0-500	19
501-1000	119
1001-1500	285
1501-2000	362
2001-2500	403
2501-3000	391
3001-3500	348
3501-4000	263
4001-4500	199
4501-5000	163
5001-5500	69
5501-6000	34
6001-6500	13
6501-7000	2
7001-7500	2
7501-8000	1



Core test results for stone aggregates	
Range of compressive strength from cores (psi)	**Frequency (No. of cores)**
0-500	5
501-1000	28
1001-1500	110
1501-2000	150
2001-2500	242
2501-3000	266
3001-3500	263
3501-4000	217
4001-4500	211
4501-5000	131
5001-5500	91
5501-6000	52
6001-6500	29
6501-7000	19
7001-7500	4
7501-8000	4
8001-8500	1

Fig. 7. Core tests performed at BUET Laboratory between 2013 and 2015: (a) test results for all core samples, (b) test results for brick aggregate cores and (c) test results for stone aggregate cores.

16. Make recommendation(s) based on results of DEA, including restriction of loading, restriction on vertical extension.
17. In case of deficiency in structural integrity of the structure(s), appropriate retrofitting scheme is to be designed.
18. Prepare Load Plan and arrange posting of load plan and approve it.
19. Submit report for review by the Engineering Team.

4.4.3. *Retrofitting*

Retrofitting is the modification of existing structures to make them more resistant and safe. In case of factory buildings, retrofitting will have to be carried out as per the DEA. The DEA of factory buildings will incorporate a full structural evaluation of the building, as well as investigation of ways to improve the factory buildings based on several defining criteria [65]. In case of

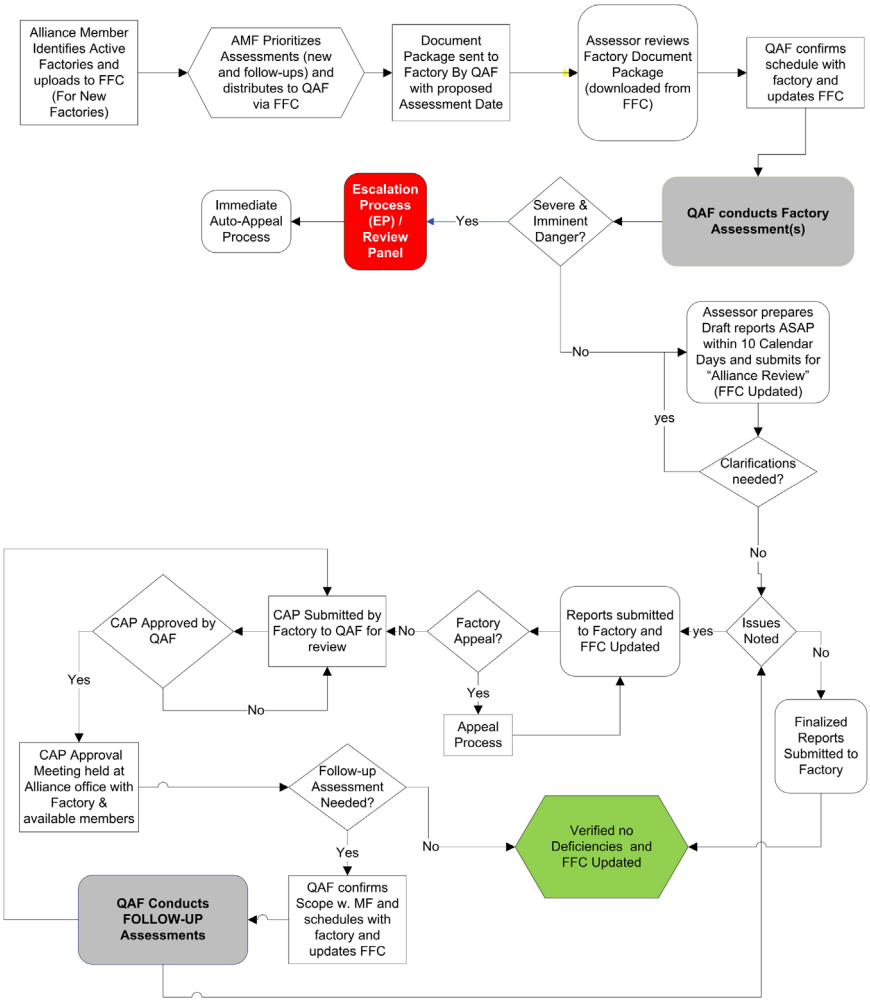


Fig. 8. Assessment Workflow of the Alliance [63].

retrofitting, the requirements of BNBC [59] are to be adhered to as much as possible, although it is recognized that in some cases a fair judgment must be made as to how much a building can be improved based on its existing condition, as well as how economical it will be to satisfy every design criteria as stipulated by code requirements. The overall strategy will be generally as follows based on a hierarchical principle of increasing compromises:

a. Follow strictly the code design requirements to assess the actual deficiency of the building under analysis.
b. Determine all possible requirements, and which compliant factors can be relaxed in order to achieve a minimum level of compliance of another factor which does not comply (for example, the relaxation of floor loading in order to achieve a reasonable level of punching shear resistance when taking into account lateral loads which cause unbalanced forces within the structural system).
c. Propose a comprehensive remedial plan based on the extent of works and the practicality of carrying them out cost-effectively. Prepare alternative retrofitting schemes to remedy the structural deficiency. Discuss with the owner about construction issues and cost. Decide the most optimum retrofitting option.
d. Submit Retrofitting Scheme for review by the Assessment Team.
e. Supervise retrofitting work during construction for quality control and certify the structural integrity/safety after construction as per the provision of the Remediation and Oversight Protocol.

In some cases, situation may arise at which the results of the analysis may have the possibility of rendering certain buildings completely unfit for the intended use, and the extent of remedial works may be too much and too complicated to implement. In such cases, it should be decided whether or not partial or complete demolition and reconstruction should be considered as a single viable option.

5. Conclusions

There is no denying that Bangladesh has progressed a lot since two years after Rana Plaza collapse in terms of achieving workplace safety compliance in RMG industry under three plans of actions—National Tripartite Action Plan (NTPA), the European Union Sustainability Compact, and the United States Trade Representative (USTR) Plan of Action. Among 25 commitments under the National Tripartite Plan of Action on Fire Safety and Structural Integrity (NTPA), 16 have been fully or substantially completed and nine have been partly completed. Among a total of 29 listed activities in the EU Sustainability Compact, 15 actions have been fully or substantially completed, 13 actions have been partly completed, and one action has not been initiated yet. The United States Trade Representative (USTR) proposed a 16-point action plan, where

substantial progress has been made in regards to 12 of the actions and greater progress is required in regards to four.

In all three plans of actions, structural assessments of buildings housing RMG factories have been given importance, with regard to which substantial progress has been made. This include upgradation of Chief Inspector of Factories and Establishment office to DIFE, sanction of 679 new staff positions including 392 new, organization of training programme for capacity building of the newly recruited inspectors, development of Guidelines for Assessment of Structural Integrity and Fire and Safety including harmonized standards, establishment of a review panel along with a review mechanism to handle urgent safety issues in garment factories, initiation of assessments of the structural integrity and fire safety of RMG factory buildings, and creation of publicly accessible database of all RMG factories as a platform for reporting labour, fire and building inspections. Till December 2014, assessments of 618 factories have been conducted under the National Initiative by BUET covering 471 factory buildings. By March 2015, assessment of approximately 1500 factories have been done, among 1600 listed factories, by the Accord which houses approximately 1.9 million workers, and 507 factory assessment summary reports are available in DIFE website which are housed in 474 buildings. To date, each of the 647 factory producing for Alliance Members have been inspected, which houses approximately 1.1 million workers. Among these 122 factory-assessment summary reports are available in DIFE website which are housed in 113 buildings.

Still there are nearly 1000 factories yet to be assessment under national initiative. The reason for such delay is that NTC is facing a number of difficulties in conducting the inspection. The main difficulty remains in the list of factories provided by BGMEA and BKMEA, based on which the assessments have to be carried out. The list contains factories with wrong address causing delay in locating the factories and some enlisted factories that do not even exist. Moreover, there remain some factories which are not member of any organizations such as BGMEA and BKMEA. So, the list of factories needs to be updated and verified internalizing the remaining factories to ensure quick completion of the assessment.

On the other hand, structural assessment alone is not enough to ensure a safe working environment for all in the sector. The weak factory buildings are required to be strengthened to ensure resilience through different initiatives, i.e., preparation on Corrective Action Plan based on the assessment findings, Detailed Engineering Assessment as proposed in the initial assessment report, and retrofitting as requirement. The Accord and the Alliance have shown much progress in preparation of CAP, but no CAP has been prepared under National Initiative so far. So, immediate actions are required by NTC to address the issues.

After Rana Plaza tragedy, there was a strong apprehension that RMG sector would confront a challenging time, but the sector has performed better than other competing countries in post Rana Plaza Tragedy period. In the long run, the challenge is to maintain momentum already created for achieving sustainability in RMG sector in Bangladesh. The future competitiveness in the sector would depend on adjustment with rising operational cost towards maintaining compliance. If the industry wants to achieve the export target of USD $50 Billion by 2021, all the factory buildings identified to be structurally unsound would have to be structurally strengthened within the next 5 years.

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ANNEX 3: INCEPTION WORKSHOP

The purpose of the workshop was to share the objectives, plan of the project, and methodology with key stakeholders for their feedback, which would help improve and guide the next course of action.

INCEPTION WORKSHOP ON

"BUILDING CODE IMPLEMENTATION AND ENFORCEMENT STRATEGY"

FOR URBAN RESILIENCE UNIT

PACKAGE NO: URP/RAJUK/S-9 ; CREDIT NO. : 55990

Venue: Spectra Convention Centre
Address: House # 19, Road # 07, Gulshan-01 Dhaka-1212
Date: 01 November, 2018 (Thursday)

09:00 am – 09:25am	**Registration & Reception**
	Inaugural
09:30 am – 09:40 am	**Welcome Speech** | Abdul Latif Helaly, Project Director, URP, RAJUK
09:40 am – 10:00 am	**Project Overview** | Abdul Latif Helaly, Project Director, URP, RAJUK
	Project Inception
10:00 am – 10:15 am	**Introduction of ICC Inc., Team Composition and Overall Objective** | Mark A. Johnson, Executive Vice President, ICC
10:15 am – 10:55 am	**Methodology & Workplan** | Dr. S. K. Ghosh, President, S. K. Ghosh Associates Inc. and Team Leader
10:55 am – 11:15 am	**Questions and Answers**
11:15 am – 12:30 pm	**Break out for Group Exercise, Plenary Presentation & Comments** Moderated by | Dr. Ahmadul Hassan, Executive Director, SDE
12:30 pm – 12:40 pm	**Wrap-up of the Session** | Dr. Aminul Islam(Practice Leader, Knowledge Management & Outreach)
12:40 pm - 12:50 pm	**Message on the Way Forward** from RAJUK
12:50 pm – 01:00 pm	**Closing Remarks** | Alberto Herrera, Coordinator & Training Expert, ICC
	**** LUNCH (01:00 PM to 01:40 PM) ****

Presentations

Mr. Abdul Latif Helaly, Project Director, Urban Resilience Project of RAJUK delivered the welcome speech and presented an overview of the project.

Mr. Mark A. Johnson, Executive Vice President of the International Codes Council (ICC) presented an introduction to the partners of the project**.**

Dr. S. K. Ghosh, President of S.K. Ghosh Associates LLC. and the Team Leader of the project presented the project methodology, workplan and team composition.

Questions and Answer Session

The question answer session that followed was moderated by **Prof. Mehdi Ahmed Ansary**. Some highlights of this session were as follows:

Prof. Ansary commented on the proposed methodology of documentation review for the situation analysis part:

- Information about building collapse and other related events needs to be compiled from RAJUK reports as well as review of newspaper articles
- Someone from RAJUK needs to be involved in accumulating all relevant RAJUK reports
- The stakeholder should include Bangladesh Association of ConstructionIndustry (BACI), Bangladesh Association of Consulting Engineers (BACE), and Housing and Building Research Institute (HBRI).

Some comments from Mr. Md. Mahboob Hassan of RAJUK were as follows:

- The incentive mechanism for code compliance that is being considered is much appreciated.
- An outreach program should be included for greater awareness of the code
- The gaps in resources, qualities of resource persons and professionals need to be identified.
- Emphasis should be given on implementation strategies.
- RAJUK needs transparency, honesty.

JICA representative's comments are as follows:

- JICA has been working for almost three years in different sectors of building code implementation
- JICA also had a stakeholder consultation workshop last month
- They are working on improvement of the process of construction permitting system.
- They are also working on capacity development of RAJUK.
- JICA would be interested in working with ICC and SDE on these issues.

Dr Raquib Ahsan of BUET-JIDPUS highlighted the following:

- The banking sector should be considered as an important stakeholder as they seem to be more concerned about loan disbursement rather than detailed design of the structure they are disbursing the loans for.
- The methodology of the project should be flexible enough to incorporate all the findings at the last stage.
- An ICC Chapter should be established in Bangladesh at the end of the project.

Dr. Monjur Hossain of SDE

- Proposed to consider setting up a tribunal to ensure compliance with the code and to strictly maintain the code

Representative from Rangs Properties Ltd. Commented:

- There is no code commentary with the current BNBC.
- Including a commentary would be very helpful in implementing the code.

Dr Raquib Ahsan replied:

- Drafting the code itself has been very time consuming, so to incorporate the commentary will be very difficult. However, it is the right time to start working on the commentary of BNBC.

Representative from Bangladesh Fire Service and Civil Defense

- There should be coherence/harmonization between building code and the fire and electrical safety code.

Dr. Raquib Ahsan responded as follows:

- Alliance for Worker Safety Bangladesh and ACCORD Bangladesh also emphasize fire safety. They try to ensure strict adherence to BNBC in this regard. ACCORD Bangladesh have some additional measures to ensure fire safety which are quite strict. However, he also added that if the BNBC is followed then that itself would provide enough safety for fire related hazards. In BNBC, the fire related parts are Part 4 and Part 3.

Group Discussions

The question and answer session was followed by a break-out session which was moderated by **Dr. Ahmadul Hassan**, Executive Director, Smart Development Engineering, SDE.

In this session the participants were divided into three separate groups for discussions. The grouping was based on participants area of work. Each group was presented with three key questions. The questions guided the discussions and the answers were then shared among all participants. Following are the answers to the questions.

Group 1: Regulatory Authorities

Q1: What are the challenges in enforcing the building code?

A1:

- Lack of knowledge or wrong perception about BNBC
- Demotivation of the owner- perceived lack of personal benefit
- Demotivation of the owner- no incentive in the form of reduced insurance premium
- Lack of responsibility on the part of the designer
- Lack of responsibility or knowledge concerning implementation
- Organizational problems/uneven distribution of load
- Lack of manpower
- Inadequate operating rules for code enforcementNo involvement by the professionals
- Political influence

Q2: What are the strategies to overcome the challenges?

A2:

- Awareness campaign

- Incentives to owners and code enforcement personnel
- Development of clear operating rules- authority/responsibility/accountability
- Less human intervention in the approval process
- Capacity building
- Providing prototype building design to professionals
- Accreditation of professionals

Q3: What are your opinions of the methodology presented and the deliverables proposed?

A3:

- Outreach activities are important
- Harmonization and integration with other components of URP is important
- Piloting [Dr. Amin or Iffat: Could you please elaborate on this a little? Just the word is not understandable.]

Group 2: Knowledge Group

Q1: How can the code be made more understandable and easier to use?

A1:

- To make the code more understandable, the language could be translated into Bengali. At first a shorter version of the National Building Code for Bangladesh should be made, then it could be translated into Bengali. However, the technical terms will need to remain in English, with lots of pictures and illustrations.
- In a shorter version of the code, more charts and mathematical terms could be used.
- Stakeholder training with certification needs to be undertaken**.**

Q2: How do you integrate the building code into your curriculum/capacity development program?

A2:

- In primary education, some basic idea of code should be included.
- In the final undergraduate year, all engineering departments could discuss about the new version of BNBC that is available but not approved.
- Short courses for graduate engineers need to be made available.
- In 3rd to 5th year undergraduate engineering classes, relevant parts of the building code should be taught.
- Design examples using the code should be developed

Q3: What are your opinions of the methodology presented and the deliverables proposed?

A3:

- At first, gap analysis and fact finding should be done by RAJUK themselves. These findings will be internal, then external organizations can help them.
- Validation by stakeholders is desirable.

Group 3: Beneficiary, User Group

Q1: How do you think compliance with code may benefit you?

A1:

- By improving safety, stability, sustainability, and satisfaction in terms of cost and time.
- Compliance with the code will ensure structural safety, stability, and sustainability,which will result in user satisfaction.

Q2: What is your idea of an "Earthquake resilient Building"?

A2:

- A building that complies with the building code.
- A building that is constructed following proper structural drawings and detailing
- Code enforcement at the construction site produces a resilient building
- It requires training sessions for the workers to ensure resiliency.
- A building for which there is monitoring and supervision of construction

Q3: What are your opinions of the methodology presented and the deliverables proposed?

A3:

- Need to make sure that general user and worker understand code provisions and need to arrange workshop to make them aware.
- Should encouraging users to follow the code by giving incentive. Incentives might be in the form of money (tax reduction or loan) oraccreditation and promotion of the user.
- Code should increase supervision during implementation through BIM (Building Information Modelling).

List of Participants

Name of Participant	Organization
1. Abdul Latif Helaly	PD (URP), RAJUK
2. Dr. Satyendra K. Ghosh	President, S. K. Ghosh Associates LLC
3. Mark Johnson	ICC
4. Alberto Herrera	ICC
5. Dr. Ahmadul Hassan	Executive Director, SDE
6. Dr. Aminul Islam	Knowledge Management and Outreach Expert, SDE
7. Dr. Mehedi Ahmed Ansary	Civil Engineering Dept, BUET
8. Dr Raquib Ahsan	Director, BUET-Japan Institute of Disaster Prevention and Urban Safety (JIDPUS)
9. Fatema Tuz Zohura (Representative of Prof. Dr. AMM Shafiullah)	Ahsanullah University of Science & Technology
10. Dr. Monjur Hossain	Sr. Structural Engineer, SDE
11. Ishfaq Aziz	BUET-JIDPUS
12. Md. Aminul Islam	BUET- JIDPUS
13. Iffat Huque	Consultant , SDE
14. Md. Motiur Rahman	Rangs Properties Ltd.
15. Md. Habib Ul Alam	Rangs Properties Ltd.
16. S.K Sakif SAAD	Rangs Properties Ltd.
17. Moklesur Rahman	CNRS
18. Md. Majharul Islam	Structural Engineer, GreenBuilt Engg. & Consultants Ltd.
19. Jahan Ara	Deputy director, URP:PCMU
20. Dr. Md. Humayan	Dhaka University
21. Md. Ali Ishtiak	Robust Development Limited
22. Lintu Gazi	PWD
23. Takumi Tsuchiya	JICA
24. Md. Mustafizur Rahman	EIMS
25. Hamidul Ahsan	EIMS

Name of Participant	Organization
26. Hasibuz Zaman	EIMS
27. Ahmed Hasib	EIMS
28. Md. Mahboob Hassan	URP, RAJUK
29. Nidalia Jahan	URP, RAJUK
30. Shadia Masud	URP,RAJUK
31. Maruf Hasan	URP, RAJUK
32. Abul Khair	URP, RAJUK
33. Tapan Kumar	URP, RAJUK
34. Pretom Sikder	URP, RAJUK
35. B S Rushpendue B.	URP, RAJUK
36. Anwarul Kader	URP, RAJUK
37. Bilash Kumar Ghosh	URP, RAJUK
38. Md. N Hossain Imon	URP, RAJUK
39. Abdur Rahman Khan	Chairman, URP:RAJUK
40. B M N Absar	URP, RAJUK
41. Abu Hanif	URP, RAJUK
42. Shovon Saha	RAJUK
43. Md. Shahad Hossain (Mabud)	URP, RAJUK
44. Md. Maminul Islam	URP, RAJUK
45. S. M. Shafiquzzaman	Assistant Engr.,URP, RAJUK
46. Md. Mushfiqur Rahman	URP, RAJUK
47. Saleh Ahmed Helaly	URP, RAJUK, Tactical Officer
48. Md. Abdus Samad Azad	URP, RAJUK
49. Md. Rajib Hassan	URP, RAJUK
50. Md. Taimur Tanvir	URP, RAJUK
51. Gazi Golam Sarwar	URP, RAJUK
52. Rakibuzzaman Sumon	URP, RAJUK
53. Md. Hassan	URP, RAJUK
54. Md. Saifur Rahman Joardar	URP, RAJUk

Name of Participant	Organization
55. Md. Apel Mahmud	URP, RAJUK
56. Hafizur Rahman	RAJUK
57. Dewan Mohammad Al Mahi	RAJUK
58. Shovon Shaha	RAJUK
59. Md. Khagrul Hasan	URP: PCMU
60. Abdul Matin	URP: PCMU

PDF files of presentations by Mark Johnson and S. K. Ghosh at the Inception Workshop appear next in this Annex.

Building Code Implementation and Enforcement Strategy for Urban Resilience Unit (URU)
Rajdhani Unnayan Kartripakkha (RAJUK)

INCEPTION WORKSHOP

Presented by

International Code Council Inc.
And
Smart Development Engineering (SDE) Limited

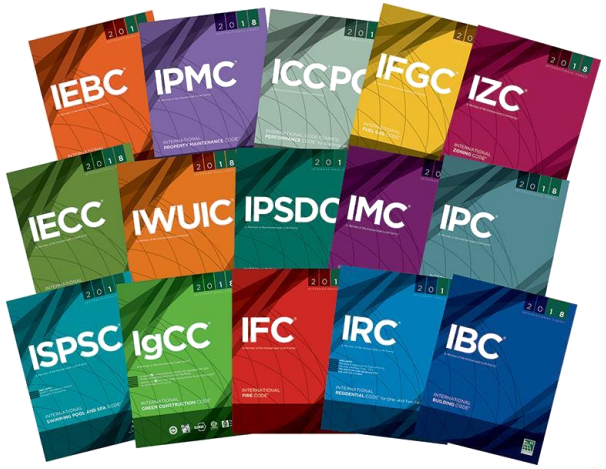
November 1, 2018

International Code Council (ICC)

- Nonprofit U.S. corporation
- 64,000+ member organization with 383 Chapters Globally
- Committed to making buildings safe, protect people and preserve properties
- Develops building codes and standards used to design, construct and maintain residential/commercial buildings
- Provides suite of services to assist in effective implementation of codes and standards
- Staff of more than 260 engineers, architects and administrators

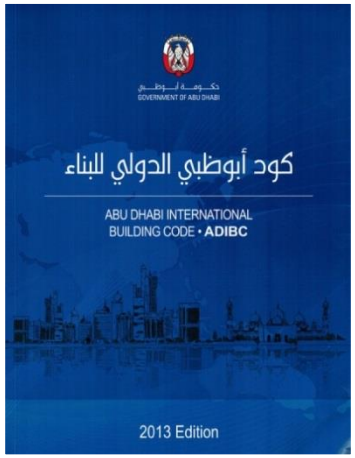
ICC Services for Building Capacity

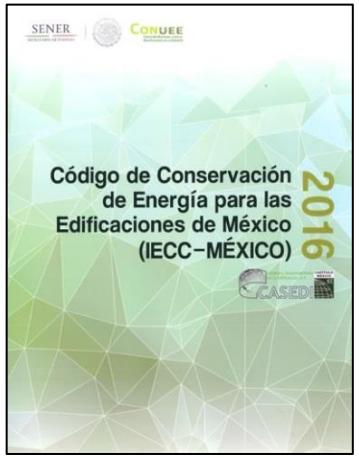
- Codes/Standards Development and Implementation
- Consulting Services
- Permitting Software/Content Management Services
- Training
- Product Evaluation
- Personnel Certification
- Accreditation

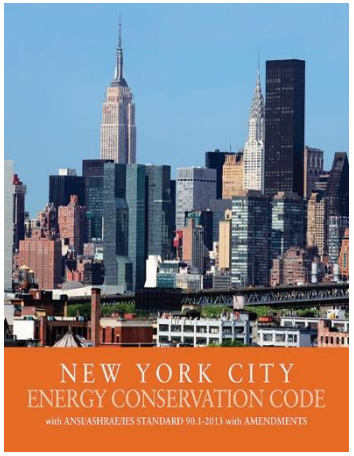


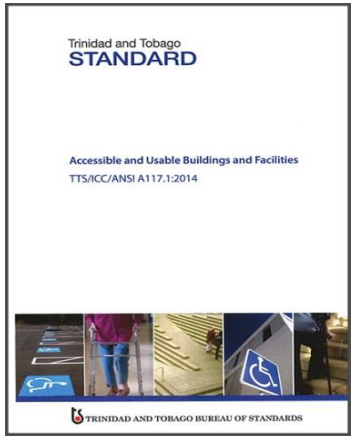
ICC Experience with Clients in Regulatory Building Capacity

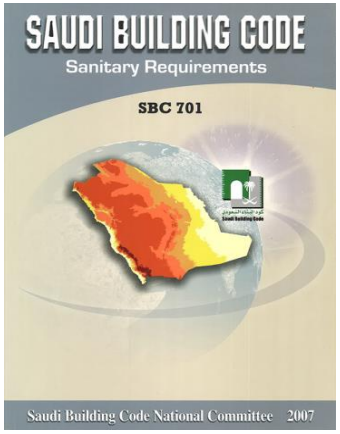
- Abu Dhabi
- Jamaica
- Mexico
- Cambodia
- CROSQ
- Puerto Rico
- New York City
- Others











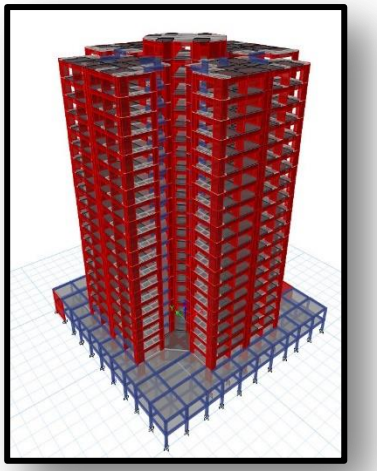
ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

Smart Development Engineering (SDE) Limited

Smart Innovation for Tomorrow

- Multidisciplinary Planning and Engineering Company
- Good Reputation for Planning, Architectural and Building Design Service, Structural Vulnerability Assessment, Urban Planning, IT Services and Project Management
- A staff of 135 employees which includes 80 Civil Engineers



Smart Development Engineering (SDE) Limited

Smart Development Engineering (SDE) Limited

Smart Innovation for Tomorrow

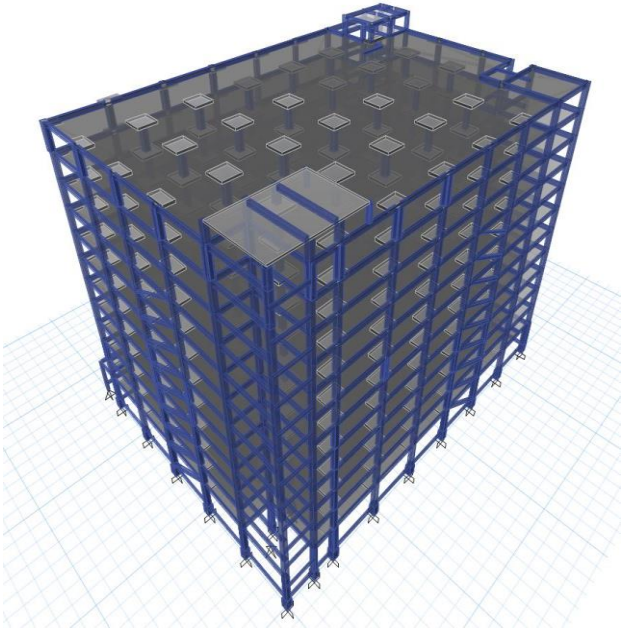
Major Area of Activities

- Urban Planning and Rural Development
- Architectural and Building Design Services
- Seismic Vulnerability Assessment and Structural Retrofitting Design
- Soil Investigation, Liquefaction and Site Amplification Assessment
- IT Service, Project Management
- Supplying Earthquake Research Engineering Equipment

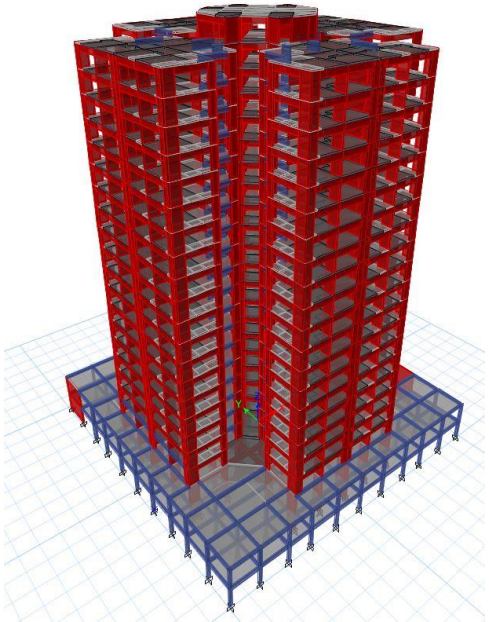
Smart Development Engineering (SDE) Limited

Smart Innovation for Tomorrow

Some Current Projects



Structural Retrofitting of
12-storey RMG Building



High rise Building
Modeling and Analysis
For Residential Building

SDE has applied the Building Code and Guidelines below

1. BNBC 2006
2. BNBC 2017
3. ACI 318-11
4. ASCE 7-10

For DEA, Retrofitting Design

5. ASCE 41-13
6. FEMA P-155

For Seismic Assessment

7. AASHTO
8. NCEER

For Soil Liquefaction

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Knowledge Partners of SDE Limited

Bangladesh University of Engineering and Technology (BUET)

> Department of Civil Engineering

> Department of Urban and Regional Planning

> Department of Architecture

> BUET – JIDPUS

University of Dhaka (DU)

Military Institute of Science and Technology (MIST)

Ahsanullah University of Science and Technology (AUST)

Jahangirnagar University (JU)

University of Asia Pacific (UAP)

Islamic University of Technology (IUT)

ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

Components for Success: A Balanced Regulatory System

Building Code Regulations

Process

- Open and Transparent process
- Continuous
- Input from all interested parties
- Strong Technical Committees

Effective Code Enforcement

Infrastructure

- Plan review
- Building inspection
- Support of Political Leaders
- Education and training
- Certification of Individuals
- Building product evaluation
- Accreditation

Building Code Implementation and Enforcement Strategy for Urban Resilience Unit (URU)

Rajdhani Unnayan Kartripakkha (RAJUK)

INCEPTION WORKSHOP

Presented by

International Code Council Inc.

And

Smart Development Engineering (SDE) Limited

November 1, 2018

Objectives

Objectives

This project will address and propose solutions in the following specific areas:

- Adequate capacity and number of RAJUK personnel to meet the demands of continued building construction.
- An adequate building permitting process according to the requirements of the Bangladesh National Building Code (BNBC).
- Appropriate training and capacity of building inspectors, to increase their competency, and understanding of Building Code implementation and enforcement

Objectives

- Emphasis on the proper understanding and application of structural provisions to address recurrent problems such as:
  - distance of building from adjacent road
  - height of building as per the plan
  - setback rules of building
  - proper land use of the building
  - correct application of structural provisions, including earthquake provisions of the building code
  - violations of fire code provisions
  - improvement of field construction quality control and inspections

Personnel

Key Experts

Team Leader: Dr. S. K. Ghosh, President, S. K. Ghosh Associates LLC (SKGA), an ICC Subsidiary

Project Manager: Dr. Md. Zoynul Abedin, Professor, Military Institute of Science & Technology, Bangladesh

Practice Leader: Civil & Structural Engineer in Earthquake Engineering: Dr. Pro Dasgupta, Director of Engineering, SKGA

Project Leader: Legal and Institutional Arrangements: Dr. David S. Nelson, ICC

Practice Leader: Knowledge Management and Outreach: M. Aminul Islam, Adjunct Professor, North-South University, Dhaka, Bangladesh

Non-Key Experts

Bodhi Rudra, Structural Engineer, SKGA

Sandra Hyde, Structural Engineer, ICC

Alberto Herrera, Code Consultant/Specialist, ICC

Rock Meng, Fire Protection Engineer

Md. Nuruzzaman , Barrister at Law and BSc. Civil Engineer, Legal Expert, SDE

Moloy Chaki, Training and disaster management Coordinator, SDE

Dr. Sharmin Reza Chowdhury, Sr. Structural Engineer, SDE

Md. Luthful Haider, Sr. Architect, SDE

Abdul Siddik Hossein, Civil Engineer, SDE

Other (potential) Consultants

Amod Mani Dixit, Seismic Expert, Nepal

Neville Pereira, Building Official, County of Monterey, California

Osama Younan, Building Official, City of Los Angeles, California

Other Research Associates

Ms. Tanjiba Rahman Tishi, Urban planner and GIS

Syed Shakib Al Muiez, Civil Engineering (Building audit and inspection)

Ms. Fathiya Zaman, MBA, Communication officer

Methodology

Methodology

1. Inception Report
2. Situational Analysis
3. Concept Note
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations
5. Education Campaign
6. Monitoring and Evaluation

Methodology
1. Inception Report

Mobilization of project team and finalization of methodology and work plan

with input from

meetings with key stakeholders and RAJUK.

Preparation and submittal of Inception Report to RAJUK for approval.

2 Months

October 28, 2018 – November 27, 2018

Methodology
2. Situational Analysis

This task is aimed at an assessment of

where things stand today within RAJUK's jurisdiction

with respect to the current regulatory system

to enforce the National Building Code of Bangladesh.

10 Months

October 28, 2018 – August 27, 2019

ICC SKGA S. K. GHOSH ASSOCIATES

SDE Smart Development Engineering (SDE) Limited

Methodology
2. Situational Analysis

2.1 Documentation Review Oct 28, 2018 – Jan 27, 2019

Review of documentation provided by RAJUK concerning code enforcement violations and resolution.

2.2 Field Observations Nov 28, 2018 – Jan 27, 2019

Visits to building sites picked with and without RAJUK's guidance to find out first-hand about building code enforcement.

2.3 Interviews Sept 16 – Nov 15, 2018

Extensive interviews with building officials, building inspectors, design professionals, contractors, construction managers and developers.

Methodology
2. Situational Analysis

2.4 Review Nov 16, 2018 – Jan 15, 2019

Discussion of findings and conclusions from 2.1, 2.2, and 2.3 with RAJUK and with a Project Working Group (PWG) consisting of stakeholders at a stakeholders' workshop.

2.5 Final Situational Report April 30 – June 27, 2019

Preparation of a final situational report considering input from stakeholders.

Methodology
2. Situational Analysis

2.6 Training Needs Survey May 30 - June 28, 2019

Conducting a training needs survey, targeting local government code enforcement personnel, contractors and construction workers, government decision-makers/policy makers, and the design community.

2.7 Staffing Needs Survey June 28 – Aug 27, 2019

Conducting a staffing needs survey including consideration of staffing level as well as specialization, qualification and compensation level of staff. The required investment needs will be quantified, and proposed timelines set.

Methodology
3. Concept Note

The aim of this task is to identify strengths, weaknesses, opportunities and challenges

for strategic and successful BNBC implementation,

and to devise an implementation plan,

based on the initial assessment.

11 Months

July 29, 2019 – June 27, 2020

Methodology
3. Concept Note

3.1 Workshop with PWG July 29 – Aug 27, 2019

Organizing a workshop with the PWG to review and assess current legal and administrative procedures for addressing violations and enforcement of building code and zoning regulations. Results will be summarized and supplemented by research described below.

3.2 Targeted Desk Research Aug 28 – Nov 27, 2019

Conducting targeted desk research to document other models of building code implementation and enforcement in both developed and developing countries. A selection will be made of the available models that are most applicable to conditions in Bangladesh.

Methodology
3. Concept Note

3.3 Investigating Incentives Sept 28 – Dec 28, 2019

Investigating incentives for building code compliance. Establishment of a ratings system for code-compliant buildings is a possibility.

3.4 Resolving **a) weaknesses in legislative framework , and**
b) lack of competent resources

Dec 29, 2019 – April 28, 2020

Developing specific approaches to resolving two issues related to Building Code implementation and enforcement, often cited as major impediments:

a) Weakness in the legislative framework; and

b) A lack of competent resources.

Methodology
3. Concept Note

3.5 Issuance of Concept Note March 20, 2020 – June 27, 2020

Developing a Draft Concept Note from Activities 3.1 through 3.4 above, defining relevant parameters for building code implementation and enforcement by RAJUK. A validation workshop with the PWG will lead to a final Concept Note, a project deliverable.

Methodology
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations

This task will extend the Concept Note

into a proposed model

for RAJUK's enforcement of building codes and construction control regulations.

11 Months

June 27, 2020 – April 29, 2021

Methodology
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations

4.1 Development of Plan June 27 – Oct 27, 2020

Developing a Draft Concept Note from Activities 1 through 4 above, defining relevant parameters for building code implementation and enforcement by RAJUK. A validation workshop with the PWG will lead to a final Concept Note, a project deliverable.

4.2 Validation Model Sep 28, 2020 – Jan 27, 2021

Validation of the proposed enforcement model with relevant stakeholders (i.e., PWG), RAJUK leadership, and the Ministry of Housing and Public Works to ensure viability and efficient implementation. The proposed enforcement program will be finalized based on input from the validation process.

Methodology
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations

4.3 Preparing Documentation Dec 29, 2020 – Feb 27, 2021

Following validation of the plan, preparation of the necessary documentation to submit the proposed enforcement program for approval by the government under the leadership of RAJUK.

4.4 Training and Capacity Building Plan Jan 28, 2021 – April 29, 2021

Formulation of a training and capacity building plan, based on the Training Needs Survey. Development of the curriculum for training and identification of the delivery methodology, the target audience, objectives, and cost estimates. A schedule for the roll out of the capacity building program will be delivered for approval by RAJUK.

Methodology
5. Education Campaign

The purpose of this task is to develop and execute

an extensive public awareness and educational campaign

to reinforce the critical importance of building code implementation and enforcement

to protecting life.

4 Months

April 23, 2021 – July 29, 2021

Methodology
6. Monitoring and Evaluation

The purpose of this task is to assess progress achieved by the proposed enforcement program.

A set of objective indicators for monitoring and evaluating progress will be developed in consultation with RAJUK.

Accomplishments as well as drawbacks will be documented.

Specific lessons learned and recommendations for improving the program will be provided to RAJUK.

A Monitoring and Evaluation report will be issued.

6 Months

April 30, 2021 – October 27, 2021

ICC SKGA S. K. GHOSH ASSOCIATES

SDE Smart Development Engineering (SDE) Limited

Work Schedule

No.	Deliverables, D-i	To	27-Nov-18	28-Dec-18	27-Jan-19	27-Feb-19	29-Mar-19	29-Apr-19	30-May-19	27-Jun-19	28-Jul-19	27-Aug-19
		From	28-Oct-18	28-Nov-18	29-Dec-18	28-Jan-19	28-Feb-19	30-Mar-19	30-Apr-19	31-May-19	28-Jun-19	29-Jul-19
D-1	Deliverable #1: Inception Report											
D-2	Deliverable #2: Situational Analysis											
	1) Dcoumentation review											
	2) Field observation											
	3) Interviews											
	4) Review of findings and conclusions											
	5) Preparation of Final Situational Report											
	6) Conducting training needs survey											
	7) .Staffing needs survey											

Work Schedule

No.	Deliverables, D-i	To	27-Aug-19	27-Sep-19	27-Oct-19	27-Nov-19	28-Dec-19	27-Jan-20	27-Feb-20	28-Mar-20	28-Apr-20	29-May-20	27-Jun-20
		From	29-Jul-19	28-Aug-19	28-Sep-19	28-Oct-19	28-Nov-19	29-Dec-19	28-Jan-20	28-Feb-20	29-Mar-20	29-Apr-20	30-May-20
D-3	**Deliverable #3: Concept Note**												
	1) Workshop with PWG												
	2) Tergated desk research												
	3) Investigate incentives												
	4) Resolving (a) weakness in legislative framework (b) lack of competent resource												
	5) Draft concept note												

Work Schedule

No.	Deliverables, D-i	To	28-Jul-20	27-Aug-20	27-Sep-20	27-Oct-20	27-Nov-20	28-Dec-20	27-Jan-21	27-Feb-21
		From	28-Jun-20	29-Jul-20	28-Aug-20	28-Sep-20	28-Oct-20	28-Nov-20	29-Dec-20	28-Jan-21
D-4	Deliverable #4: Proposed Program for Enforcement of Building Codes and Construction									
	1) Development of plan									
	2) Validation of proposed enforcement model									
	3) Preparation of necessary documentation									

Work Schedule

No.	Deliverables, D-i	To	27-Feb-21	29-Mar-21	29-Apr-21	30-May-21	27-Jun-21	28-Jul-21	27-Aug-21	27-Sep-21	27-Oct-21
		From	28-Jan-21	28-Feb-21	30-Mar-21	30-Apr-21	31-May-21	28-Jun-21	29-Jul-21	28-Aug-21	28-Sep-21
D-5	**Deliverable #5: Education Campaign**										
	1) Formulation of training and capcity building plan										
	2) Development and execution of an extensive public awareness and educational campaign										
D-6	**Deliverable #6: Monitoring and Evaluation**										
	Assessment of progress achieve by the proposed enforcement program										

Stakeholder Visits

1. Sthapona Consultants, October 29, 2018

Engr. Md. Mehedi Hasan, CEO & Chief Consultant

- A designer does not find answers to many questions in the code (BNBC)
- Common problems
  - Improper design
  - Construction does not follow design
  - Materials are not what was specified

Stakeholder Visits

1. Sthapona Consultants, October 29, 2018

- No building code before 2000
- Owners not willing to pay for earthquake resistance
- Permit utility connections only after inspectors certify that construction has been according to design?
- Periodic inspection even after occupancy?
- Illogical provisions in 1993 BNBC (specifics cited)
- No mechanism to qualify professionals

Stakeholder Visits

2. BUET, Department of Civil Engineering

Dr. Ahsanul Kabir, Professor & Department Head

Dr. Mehedi Ahmed Ansary, Professor

Dr. Raquib Ahsan, Professor

Stakeholder Visits

3. BUET, Department of Architecture

Dr. Nasreen Hossain, Professor & Department Head

Stakeholder Visits

4. BUET, Japan Institute of Disaster Prevention and Urban Safety (JIDPUS)

Dr. Raquib Ahsan, Director, and three lecturers

Stakeholder Visits

5. Asia-Pacific University

Prof. Jamilur Reza Chowdhury, Vice Chancellor

Stakeholder Visits

6. Ahsanullah University of Science & Technology

Prof. A. M. M. Safiullah, Vice Chancellor

Dr. Md. Abdur Rouf, Professor

Stakeholder Visits

7. Rangs Properties Ltd.

Stakeholder Visits

8. Housing and Building Research Institute (HBRI)

Director General

Questions?

Thank you

ANNEX 4: RAJUK PROCESS AND RESOURCES

A meeting was held between SDE and RAJUK Zones 3 and 4 in Dhaka on November 15, 2018. Included in this Annex are:

1. A list of meeting participants
2. Notes on the meeting
3. Document showing RAJUK Zone 3 manpower situation
4. Document showing RAJUK Zone 4 manpower situation

Meeting between SDE and RAJUK Zones 3 and 4
Held in Dhaka on November 15, 2018

Participants:

1. Khandaker Aliour Rahman
   Director, Zone-3
   Email: aliourrahman@yahoo.com
   Cell: +8801777775505

2. Mobarak Hossain
   Authorized Officer, Zone-3
   Cell: +8801819240540

3. Sonia Shahnaz
   Assistant Authorized Officer
   Mail: ohona_me@yahoo.com
   Cell: +8801816314964

4. Dr Ahmadul Hassan
   Executive Director, SDE

5. Dr M. Aminul Islam
   Knowledge and Outreach Expert, SDE

6. Iffat Huque
   Consultant, SDE

7. Syed Ahsanul Haque Rubel
   SDE

Notes on Meeting between SDE and RAJUK Zones 3 and 4
Held in Dhaka on November 15, 2018

At the start of the discussion, Ms. Sonia Shahnaz, Assistant Authorized officer, presented an organogram of RAJUK which shows the decentralization of the organization. Then, in the presentation, the steps of development control were elaborated on step by step. Then some limitations were highlighted in the construction approval process.

The highlighted limitations are:

- Shortage of manpower: whereas 30 inspectors are needed, there are only 10 inspectors
- Transportation: for frequent field visits, limited number of vehicles
- Insufficient number of computers, printers: whereas 30 -40 computer are needed, there are only 3-4 inspectors
- No efficient server for online process
- Unavailability of updated software
- Unavailability of modern tools and equipment
- No in-house or outside training facility for the professionals

Limitations in the process:

- During inspection, only the visual deviations are considered. Structural design of the building is not evaluated. According to RAJUK professionals, structural safety should be the concern of land owners or developers.
- The owner is not concerned about the occupancy certificate. Some measures should be taken to make sure the owner obtains occupancy certificate.

Some initiatives to improve the whole process:

- 100 police are needed for the enforcement of the law.
- There should be some penalty under law for deviations from design.
- There should have some coordination between the bank loan authority and RAJUK, so that the client becomes bound to maintain the rules for building construction
- Rules for having utility lines connected should be modified, so that clients are bound to have the occupancy certificate.
- More logistic support for decentralization.
- Ensuring safety and security of RAJUK professionals during field inspection
- An iIncentive system should be introduced as the reward for better performance
- A campaign is needed for awareness generation.

Zone - 3.

Manpower

1. Director - 01.
2. Authorized Officer - 01
3. Asst. Authorized officer - 03.
4. Chief Building Inspector - 06.
5. Building Inspector - ~~15~~ 16.
6. File Keeping Officer - 01
7. Upper Dealing Assistant - 02.
8. LD = 12
9. Work Charge = 04.
10. MTS - 02

Zone - 3

Manpower

1. Officer = 28
2. UDA = 02
3. LD = 12
4. Work Charge = 04.
5. MLSS = 02

পরিচালক জোন-৪ রাজউক,(৪/১, ৪/২ এবং ৪/৩)

সাব-জোন-৪/১ এবং ৪/২ এর কর্মকর্তা/কর্মচারীদের নামের তালিকা নিম্নরূপ:

ক্রমিক নং	নাম	পদবী	মন্তব্য
১.	জনাব খন্দকার অলিউর রহমান	পরিচালক জোন-৪	
২.	জনাব মো: আদিলউজ্জামান	অথরাইজড অফিসার (৪/১ এবং ৪/২)	
৩.	জনাব মো: আলী আজম মিঞা	সহকারী অথরাইজড অফিসার-৪/১	
৪.	জনাব মোহাম্মদ কায়সার পারভেজ	সহকারী অথরাইজড অফিসার-৪/১	
৫.	জনাব সাইফুল ইসলাম	সহকারী অথরাইজড অফিসার-৪/২	
৬.	জনাব সোনিয়া শাহনাজ	সহকারী অথরাইজড অফিসার-৪/২	
৭.	জনাব মো: আবু হানিফ সরকার	প্রধান ইমারত পরিদর্শক-৪/১	
৮.	জনাব কাওছার আহমেদ	প্রধান ইমারত পরিদর্শক-৪/১ এবং ৪/৩	
৯.	জনাব মো: মাহমুদ হাসান	নথি রক্ষন কর্মকর্তা-৪	
১০.	জনাব উজ্জ্বল ভূইয়া	তত্ত্বাবধায়ক-৪	
১১.	জনাব সৈয়দ শাহ জাহান কবির	ইমারত পরিদর্শক-৪/১	
১২.	জনাব মো: শফিকুল ইসলাম	ইমারত পরিদর্শক-৪/১	
১৩.	জনাব বিশ্বজিৎ সিংহ	ইমারত পরিদর্শক-৪/১	
১৪.	জনাব জাহিদুল ইসলাম	ইমারত পরিদর্শক-৪/১	
১৫.	জনাব মো: আল-মামুন	ইমারত পরিদর্শক-৪/১	
১৬.	জনাব মো: সরফুদ্দিন	ইমারত পরিদর্শক-৪/১	
১৭.	জনাব সাইফুল ইসলাম	ইমারত পরিদর্শক-৪/১	
১৮.	জনাব তৌফিক উজ্জামান	ইমারত পরিদর্শক-৪	
১৯.	জনাব মো: আজিজুল হক	ইমারত পরিদর্শক-৪	
২০.	জনাব বিটু কুমার মন্ডল	ইমারত পরিদর্শক-৪	
২১.	জনাব মো: আমিন কবির	ইমারত পরিদর্শক-৪	
২২.	জনাব মো: সাইফুল ইসলাম	ইমারত পরিদর্শক-৪	
২৩.	জনাব মো: আলমগীর হোসেন	ইমারত পরিদর্শক-৪	
২৪.	জনাব ফরিদা আক্তার	উচ্চমান সহকারী-৪/১	
২৫.	জনাব সাইফুল আলম	উচ্চমান সহকারী-৪/১	
২৬.	জনাব মো: আমান উল্লাহ	উচ্চমান সহকারী-৪/৩, ৪	
২৭.	জনাব মো: আতিকুর রহমান	অফিস সহকারী কাম কম্পিউটার অপারেটর-৪/১	
২৮.	জনাব কে এম রোকনুজ্জামান	অফিস সহকারী কাম কম্পিউটার অপারেটর-৪/১	
২৯.	জনাব রূপক তালুকদার	বেঞ্চ সহকারী-৪/১	
৩০.	জনাব মো: জাহাঙ্গীর আলম	অফিস সহায়ক-৪/১	
৩১.	জনাব আব্দুল বাতেন	অফিস সহায়ক-৪	
৩২.	জনাব হাবিবুর রহমান	ডাটা-এন্ট্রি অপারেটর-৪/১	
৩৩.	জনাব আওলাদ হোসেন	সুপারভাইজার-৪/২	
৩৪.	জনাব মো: শাহজাহান ভূইয়া	জরীপ সাথী-৪/২	

ANNEX 5: STAKEHOLDER CONSULTATIONS

06 December 2018
Meeting with Bangladesh Association of Consulting Engineers (BACE)

Meeting Participants

ICC/SDE Team	Bangladesh Association of Consulting Engineers
– Dr. Aminul Islam (Practice Leader) – Engr. Iffat Huq – Engr. Shajal Khan – Engr. Abdul Siddik Hossain	– Dr. M. Shamim Z. Bosunia, President, BACE – Shahidul Hassan Khan, General Secretary, BACE – Engr. Abu Hasan M Eunus, Chairman, Dexterous Consultants Ltd.

BACE President Professor MSZ Bosunia thinks a wide gap currently exists between engineering design and methods and actual construction conducted by manual laborers. This gap needs to be reduced in order to mitigate the risks posed by seismic activities, and with that goal, he made policy recommendations to involve designers in the construction stage – first, to review the on-site practices and educate the construction personnel on properly implementing the design specifications, and second, to review and simplify the design with construction feasibility in mind. For the latter, an examination would be necessary to identify key items in terms of prevention of earthquake damage.

It was observed by the BACI that RAJUK does not have any system in place to check structural design. Since a number of professionals with strong academic background are engaged in the practice of structural design, RAJUK may enlist such certified professionals for this purpose. Designers may get training organized by the joint efforts of IEB, IAB, BACE, BACI, BASI, etc.

RAJUK should talk to Professional Engineers organizations and Associations such as IEB, IAB, BACI, BACE, BASI on the issue of QC, material testing, geotechnical conditions, and inspection to enforce and implement BNBC through Third Party Check.

06 December 2018
Meeting with Institution of Engineers, Bangladesh

Meeting Participants

ICC/SDE Team	Institution of Engineers, Bangladesh
– Dr. Aminul Islam (Practice Leader) – Engr. Iffat Huq – Engr. Shajal Khan – Engr. Abdul Siddik Hossain	– Engr. Mollah Mohammad Abul Hossain, Vice-President (Service sand Welfare), – Engr. Md. Nuruzzaman, Vice-President (Human Resources Development), – Engr. Khandker Manjur Morshed, Honorary General Secretary, – Engr. Md. Hamidul Hoqoe, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB) – A large number of IEB committee members

- No structural inspection is performed by RAJUK

- Occupancy certificate in most cases are not obtained, and in some cases, are given without meeting the requirements.
- Building approval is obtained for a particular land use zone and use purpose, but then the design is changed and the building is used for other purposes.
- The primary problem is how to enforce Building Codes and effective implementation
- Awareness for clients, engineers and regulatory organizations is extremely important.
- Research and Development Cell of IEB can help support to address the burning issues related to urban resilience.

04 December 2018
Meeting with Bangladesh Association of Construction Industry (BACI)

Meeting Participants

ICC/SDE Team	Bangladesh Association of Construction Industry
– Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Iffat Huque – Engr. Md. Shajal Khan – Engr. Abdul Siddik Hossain	– Engr. Muniruddin Ahmed, President, BACI – Md. Shahidul Islam, secretary, BACI – S.M. Rafiqul Islam, Chairman, GBB Power Ltd – Engr. Abu M Masud, Icon Engineering – Engr. Mahmudul Hassan, Member, BACI – Engr. Shafiqul H Talukdar, Starlite Services Ltd. – Engr. Aftab Uddin Ahmed, Former President, BACI

BACI is a platform for professional engineers in large scale construction industry in Bangladesh. Key observation and recommendations are as follows:

- BACI implements most of the public sector big construction projects
- They are implementing most of the works of PWD and Roads & Highway which follow the design and specifications in line with BNBC but there is no vetting system to check the code implementation.
- In public works department there is provision of third party supervision for quality check. But it is not practiced in other sectors.
- There is no capacity in RAJUK for plan checking to ensure proper application of BNBC.
- Concrete mix designs are not well defined
- There is no regulatory body for QC check. There is no legal provision to control inefficient and inadequate construction firms entering in big construction industry by political backing, which is a potential danger. BACI recommended that each firm should have membership of BACI as a prequalification requirement.
- BACI recommended Third Party Inspection and Quality Performance Check system.

- BACI is implementing construction sector capacity building with ADB support on construction labour training, certificate course and ISO Certification as a mandatory requirement.

30 October 2018
Meeting with Key Informant Professor Jamilur Reza Chowdhury, VC, Asia Pacific University

Meeting Participants

ICC/SDE Team	Asia Pacific University
– Dr. S.K. Ghosh (Team Leader) – Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Abdul Latif Helaly (Project Director) – Engr. Abdul Siddik Hossain – Mr. Md. Mahboob Hassan, Procurement Specialist, RAJUK/URU/WB	– Prof. Jamilur Reza Chowdhury, Vice Chancellor

Discussion:

- Professor JRC provided a chronological overview of the development of BNBC, including its seismic provisions such as when the first seismic zonation was undertaken by the Geological Survey of Bangladesh in 1979.
- An analytical history of BNBC with associated issues such as wind risk analysis, storm surge study and follow-up initiative of Master Plan of building Coastal cyclone shelters were explained.
- After the tragic disaster of Rana Plaza building collapse and hundreds of deaths, High Court directed the Government to implement Building Code to follow all over the country.
- Formation of Building Regulatory Authority suggested.
- RAJUK may choose to accredit professional firms. These firms will be authorized to undertake engineering, particularly structural design, in compliance with the BNBC. RAJUK will pay the firms but it will be ultimately charged to the building owners.

Suggestions/Recommendations:

1. The BNBC should be updated regularly.
2. ASCE 7 Chapters 13 and 15 have some guidelines regarding nonstructural components and nonbuilding structures, respectively.
3. In RCC buildings with roof sheds made of prefabricated steel, the primary structure and the roof shed should be modeled separately.
4. Enforcement agencies like ACCORD and Alliance should be formed to enforce the code. In addition, without a proper design approval, there should be no utility connection.
5. Procedures must be created to address all non-compliance systematically.

6. Pitch roof live load reduction should be included in the current code similar to that in ASCE.
7. Insurance of buildings design professional and enforcement professionals should be provided by the government.

Date: 28 October 2018
Venue: Department of Civil Engineering, Bangladesh University of Engineering and Technology

Meeting Participants

ICC/SDE Team	Asia Pacific University
– Dr. S.K. Ghosh (Team Leader) – Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Abdul Latif Helaly (Project Director) – Engr. Abdul Siddik Hossain	– Dr. Ahsanul Kabir, Professor & Department Head – Dr. Mehedi Ahmed Ansary, Professor – Dr. Raquib Ahsan, Professor

Discussions:

- Background of the National Building Code was discussed. Housing and Building Research Institute (HBRI) invited Development Design Consultants Ltd (DDC) for preparing Bangladesh National Building Code (BNBC) in 1992. A draft BNBC was prepared in 1993. Finally, Dr. Jamilur Reza Choudhury approved it during Caretaker Government in 2006.
- In 2010, HBRI invited BUET and other consultants for revision of BNBC. The submission was done in 2012. After that, Steering committee approved it in 2015.
- In 2017, BNBC was submitted to the Prime Minister to be gazetted and published.
- The Diploma engineers should be addressed in BNBC
- Administration and enforcement of code have been included in Part 2 of BNBC.
- In BNBC 1993, it is mentioned that multiple authorities may exist as building officials whose responsibility will be for building approval.
- The terms Building Official and Authorized Official have the same meaning.
- In the City Corporation Area, Building Construction Act is being implemented by inspectors.
- Local Government only gives the building approval without enforcing the code.
- Bangladesh Building Regulation Authority (BBRA) should regulate building code within Bangladesh.
- For low rise building (up to 10 storied), only Architectural drawings are being submitted to RAJUK for approval.

- For high rise building (above 10 storied), Architectural and Structural drawings must be submitted to RAJUK for approval. Building Construction (BC) committee consists of six members. Also, approvals need to be obtained from 12 different organizations such as, Dhaka Wasa, city corporation, police, environment etc.
- RAJUK should form a committee specifically for giving approval for high rise buildings above or equal to 40 storied building.
- Building inspectors or contractors should follow building construction stages.

Date: 28 October 2018
Venue: Department of Architecture, Bangladesh University of Engineering and Technology

Meeting Participants

ICC/SDE Team	Asia Pacific University
– Dr. S.K. Ghosh (Team Leader) – Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Abdul Latif Helaly (Project Director) – Engr. Abdul Siddik Hossain	– Dr. Nasreen Hossain, Professor & Department Head – Dr. Raquib Ahsan, Professor

Discussion:

- Six components of Bangladesh Urban Resilience Project were briefly explained by Engr. Abdul Latif Helaly (Project Director).
- Less than 2% of all buildings have building occupancy certificate
- BNBC Part 3 and 4 include architecture and fire safety, respectively
- Building code is not being followed because of building owners select the lowest-bidding contractors
- Utility service connections can help in code enforcement
- RAJUK needs to issue approvals in stages
- Geotechnical engineering course is absent in Architectural course curriculum
- Awareness regarding fire safety in buildings should increase
- Land owners must be trained about resilience

Date: 28 October 2018
BUET– Japan Institute of Disaster Prevention & Urban Safety (JIDPAS)

Meeting Participants

ICC/SDE Team	Asia Pacific University
– Dr. S.K. Ghosh (Team Leader) – Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Abdul Latif Helaly (Project Director) – Engr. Abdul Siddik Hossain	– Dr. Raquib Ahsan, Director – Tasnim Tarannum Isaba, Lecturer – Shamontee Aziz, Lecturer – Ishfaq Aziz, Lecturer

Presentation and Discussion

- JIDPAS made a presentation on the Institute's professional excellence and advancement in the field of earthquake engineering, training capacity on earthquake resistant structural design and geotechnical investigation.
- JIDPAS has conducted training program for RAJUK Engineers, Architects and Planners.
- They have undertaken detailed engineering assessment, seismic evaluation , assessment of seismic exposure, building and socio-economic exposure and prepared micro-zonation map
- Skilled at doing Building vulnerability assessment

Comments

Building Code compliance and implementation strategy call for mass scale capacity building of the engineers, architects, planners, decision makers as well as the owners of the buildings. BUET-JIDPAS is an inspiring international standard training institute to meet this capacity building challenge.

Date: 28 October 2018
Bangladesh Fire Service & Civil Defense

Meeting Participants

ICC/SDE Team	Asia Pacific University
– Dr. S.K. Ghosh (Team Leader) – Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Abdul Latif Helaly (Project Director) – Engr. Abdul Siddik Hossain	– Brigadier General Ali Ahmed Khan, Director General – Major S. M. Muzahid Monir

Discussion:

- Main challenges are unregulated construction, lack of fire hydrant, traffic jam, narrow roads, no water sources nearby fire incident area;
- All building should design for fire protector water reservoir
- Building should have positive water pressure and escape route

- During implementation, drawings have been changed after RAJUK approval
- Steel building should have fire protector for columns and sprinkler
- In Dhaka city, there are currently 13 fire stations (17 stations have been proposed)
- Land adjustment plan should be implemented
- In Dhaka city, fire safety & civil defense has nearly 60 thousand volunteers
- Soft story for parking is a huge problem for residential buildings
- Code Enforcement message may be sent to volunteers using central database
- In Dhaka City, Fire safety team has response time of about (20-25) min
- For industry, electrical line should improved along with fire safety plan
- Fire safety monitoring firms (nos 6) – their tasks are to fire safety audit, monitoring and reporting
- During fire incidents, fire source detection tools are available.

Comments:

Fire Service and Civil Defense being first responder of any natural and man-made disasters, maintain 45,000 registered urban volunteers for emergency response. This powerful resource could be used effectively as a change agent to carry the message of benefit of adopting Building Code for safety and security of the people at large in the city

Date: 27 October 2018 |Saturday
Sthapona Consultants, a Real Estate Builder

Meeting Participants

ICC/SDE Team	Asia Pacific University
– Dr. S.K. Ghosh (Team Leader) – Dr. Ahmadul Hassan (Executive Director, SDE) – Dr. Aminul Islam (Practice Leader) – Engr. Md. Shajal Khan	– Engr. Md. Mehedi Hasan, CEO & Chief Consultant

Discussions:

- The frequency of code update is high on the international level whereas in Bangladesh it is low.
- In BNBC 1993, there is no specific guideline for secondary and primary structure. It is a common practice in Bangladesh to have a prefabricated steel shade on the rooftop of the multistory buildings, most often than not garments factory buildings. The RCC portion and the steel portion

need to have dissimilar time periods; otherwise the building might face the problem of resonance during dynamic loadings like earthquake or wind load.

- Most of the buildings investigated in recent times have inadequacies. This is due to the fact that these buildings have an improper design due to the lack of proper knowledge of ethics and codes, improper construction methods and poor construction material to save money. In fact, most of the buildings were constructed before the year 2000. Back then design engineers, either by their judgment or due to client's influence, avoided earthquake loads in their design.
- Double arch roof dome has no provision of wind load in the current code (BNBC-2006).
- RAJUK's current role in approving buildings is to check space allocations like FAR, set back etc.
- The Alliance will now be working as Safety Monitoring Organization (SMO)
- In the current code of BNBC 2006, the load combination 1.4 Dead+ 1.4025 Eq has no use whatsoever.
- The code provision of minimum reinforcement required for the pre-cast pile is 1.5%, which is very high.
- In the current code, the soil-structure interaction is not properly mentioned.

Highlights of the overall Discussion since 27 October

- The most critical gap is that in the current building approval process, buildings up to 10 stories do not require structural plan for RAJUK jurisdiction. It is required only for high rise buildings above 10 stories.
- The current process for code enforcement is limited to checking setbacks and ignores the structural provisions. The noted development and code violations include the following:
    - Not maintaining the original approved design plan
    - Not maintaining the distance of building from adjacent road
    - Not maintaining height of building as per the plan
    - Not maintaining setback rules of building
    - Changing the land use of the building
    - Systemic ignorance of structural provisions, including earthquake provisions of the building code
    - Violations of fire code provisions
    - Low or inexistent field construction quality control and inspections

ANNEX 6: PROJECT IMPLEMENTATION CONCEPT WORKSHOP

The program schedule of the workshop can be seen on the next page. It should be noted that Mr. Md. Shah Kamal and Mr. Md. Shahid Ulla Khandaker were unable to attend. Their presentations were not made. Also, Prof. Raquib Ahsan substituted for Prof. Dr. Ishtiaque Ahmed as Session 2 moderator. PDF files of Dr. Ghosh's two presentations are included in this Annex.

PROGRAMME SCHEDULE:

DAY 01

9:00 AM-10:00 AM	Registration & Mingling at Lobby Area
10:00 AM-10:10 AM	Opening Remarks by **Mr. Md. Abdur Rahman**, Chairman, RAJUK
10:10 AM-10:30 AM	Project Overview by **Engr. Abdul Latif Helaly,** Project Director, Urban Resilience Project RAJUK Part
10:30 AM-11:20 AM	Project Components brief by International Consultant of World Bank and Six Team Leaders
11:20 AM-11:30 AM	Speech by Special Guest **Ms. Swarna Kazi**, Sr. Disaster Risk Management Specialist, The World Bank
11:30 AM-11:40 AM	Speech by Special Guest **Professor Dr M. Shamim Z Bosunia**, Institution of Engineers, Bangladesh (IEB)
11:40 AM-11:50 AM	Speech by Special Guest **Mr. Md. Shah Kamal**, Secretary, Ministry of Disaster Management and Relief
11:50 AM-12:00 PM	Speech by Special Guest **Mr. Md. Shahid Ulla Khandaker**, Secretary, Ministry of Housing and Public Works
12:00 PM-12:30 PM	Speech by Chief Guest National Professor **Dr. Jamilur Reza Choudhury**, Vice Chancellor, University of Asia Pacific
12:30 PM-2:00 PM	Lunch & Prayer Break

Technical Session 1: Project Implementation Concept to Create & Operationalizing the URU in RAJUK

2:00 PM-3:30 PM	Modeartor: Prof. Dr. Sk. Sekender Ali, Dean, Faculty of Civil Engineering, Bangladesh University of Engineering & Technology (BUET)

Technical Session 2: Project Implementation Concept on Building Code Implementation and Enforcement Strategy for Urban Resilience Unit (URU)

3:30 PM-5:00 PM	Modeartor: Prof. Dr. Ishtiaque Ahmed, Department of Civil Engineer, Bangladesh University of Engineering and Technology
5:00 PM-5:30 PM	Evening Tea/ Coffee

DAY 02

Technical Session 3: Project Implementation Concept on Vulnerability Assessment and Prioritized Investment Plan for Critical Assets in Dhaka for Urban Resilience Unit (URU)

9:30 AM-11:30 AM	Moderator: Prof. Dr. A.M.M. Safiullah, Vice-Chancellor of Ahsanullah University of Science and Technology

Technical Session 4: Project Implementation Concept on Risk Sensitive Land Use Planning Practice within Dhaka City

11:30 PM-1:00 PM	Moderator: Prof. Dr. A.M.M. Safiullah, Vice-Chancellor of Ahsanullah University of Science and Technology
1:00 PM-2:00 PM	Lunch & Prayer Break

Technical Session 5: Project Implementation Concept on Assessing the Current State and Deploying a Web-based Integrated Information Management System for the Construction Permit System of RAJUK

2:00 PM-3:30 PM	Modeartor: Prof. Dr. Mohammad Kaykobad, Professor of Computer Science and Engineering in Bangladesh University of Engineering and Technology

Technical Session 6: Project Implementation Concept on Design and Supervision of Urban Resilience Unit (URU) Building including Research, Training, and Testing Laboratory Facilities under RAJUK in Dhaka, Bangladesh

3:30 PM-5:00 PM	Modeartor: Prof. Dr. Ishtiaque Ahmed, Department of Civil Engineering, Bangladesh University of Engineering and Technology
5:00 PM-5:10 PM	Closing Remarks by Major (Engr) Shamsuddin Ahmed Chowdhury, (Retd), Member (Development), RAJUK, DHAKA
5:10 PM-5:40 PM	Evening Tea/ Coffee

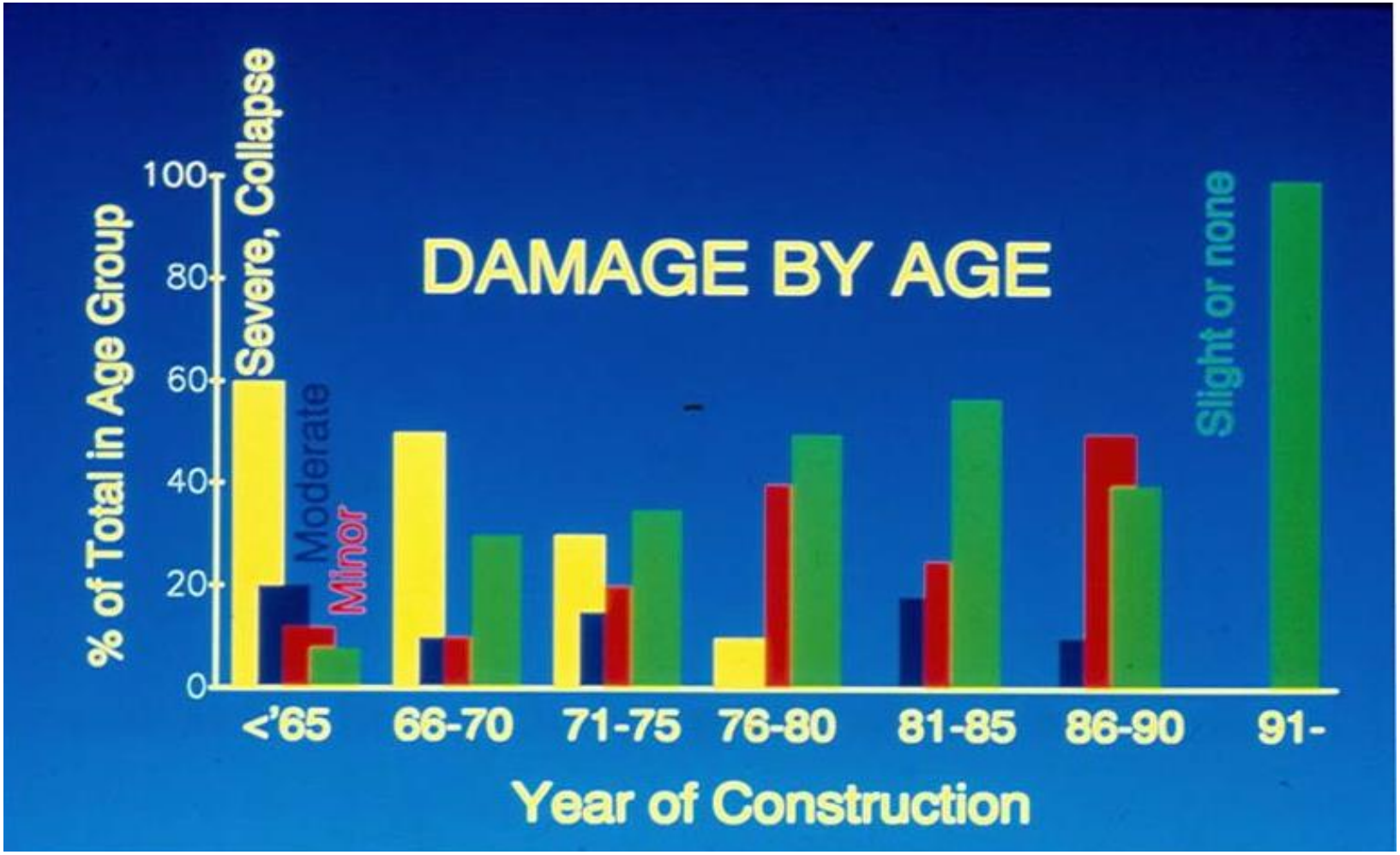
Building Code Implementation and Enforcement Strategy
for Urban Resilience Unit (URU)
Rajdhani Unnayan Kartripakkha (RAJUK)

PROJECT IMPLEMENTATION CONCEPT WORKSHOP

Presented by

International Code Council Inc.
and
Smart Development Engineering (SDE) Limited

December 9, 2018


DAMAGE BY AGE
% of Total in Age Group
100
80
60
40
20
0
Severe, Collapse
Moderate
Minor
Slight or none
<'65
66-70
71-75
76-80
81-85
86-90
91-
Year of Construction

Most Recent Significant Event

- A magnitude 7.0 earthquake struck north of Anchorage, Alaska, on November 30, 2018, at 8:29 a.m. local time.

- Associated Press (AP) Report:

A seismic expert said Alaska and California use the most stringent standards to help buildings withstand earthquakes.

Sterling Strait, a member of the Alaska Seismic Hazards Safety Commission, said the states use the International Building Code, considered the best available standard for seismic safety.

Most Recent Significant Event

- Associated Press (AP) Report (Contd.):

Gov. Bill Walker said sometimes people, including himself, grouse about stringent building codes. But he's "really glad" they were in place as he only had minor water damage at his home.

"Building codes mean something," he said.

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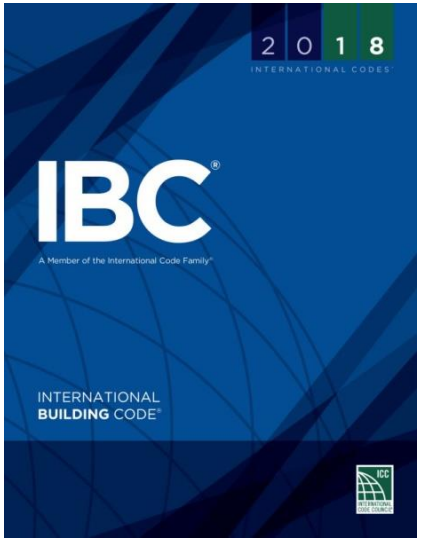

SDE

Smart Development Engineering (SDE)

ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

Objectives

This project will address and propose solutions in the following specific areas:

- Adequate capacity and number of RAJUK personnel to meet the demands of continued building construction.
- An adequate building permitting process according to the requirements of the Bangladesh National Building Code (BNBC).
- Appropriate training and capacity of building inspectors, to increase their competency, and understanding of Building Code implementation and enforcement

Methodology

1. Inception Report
2. Situational Analysis
3. Concept Note
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations
5. Education Campaign
6. Monitoring and Evaluation

Revised Work Schedule

October 28, 2018 – May 30, 2021

Garment Industry

The garment industry [Alliance for Worker Safety Bangladesh and ACCORD, Bangladesh], after the Rana Plaza disaster, have found ways to enforce the building code for their structures. The rest of the building industry needs to learn from this success story and imitate as much of it as practicable.

Structural Plan Checks

- Design needs to be in accordance with the building code.
- This can be ensured only through proper plan check, including check of design calculations.
- Proper plan check capability needs to be put in place – not only for taller buildings, but for all buildings. Or RAJUK could outsource structural plan checking to pre-selected structural firms.

Inspection

- Construction needs to be in accordance with the building code. The only way to ensure compliance is through proper inspection.
- Major improvements are needed in this area.

Observations

- S-9 is a most worthwhile project
- It can do a lot of good, if successfully completed
- Everyone has been wonderfully forthcoming
- Everyone has been highly cooperative
- ICC and SDE are totally committed
- There will be problems and setbacks, but “we shall overcome”

Questions?

Thank you

Building Code Implementation and Enforcement Strategy for Urban Resilience Unit (URU)

Rajdhani Unnayan Kartripakkha (RAJUK)

PROJECT IMPLEMENTATION CONCEPT WORKSHOP

Presented by

International Code Council Inc.

And

Smart Development Engineering (SDE) Limited

December 9, 2018

Joint Venture Partners

Joint Venture Partners

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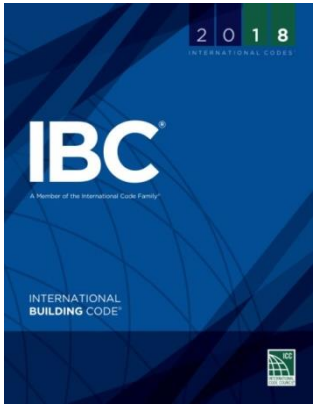

- Nonprofit U.S. corporation
- Committed to making buildings safe, protect people and preserve properties
- Develops building codes and standards used to design, construct and maintain residential/commercial buildings
- Provides suite of services to assist in effective implementation of codes and standards
- 64,000+ member organization with 380 Chapters Globally
- Staff of more than 260 engineers, architects and administrators

ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

Joint Venture Partners

- ICC Services
  - Codes/Standards Development and Implementation
  - Consulting Services
  - Permitting Software/Content Management Services
  - Training
  - Product Evaluation
  - Personnel Certification
  - Accreditation

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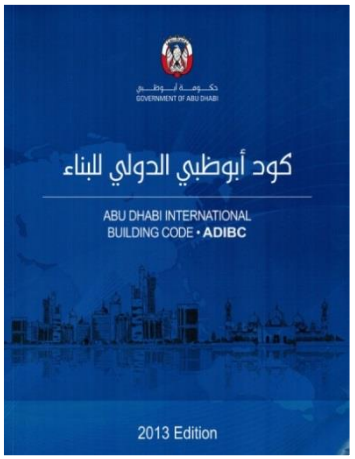
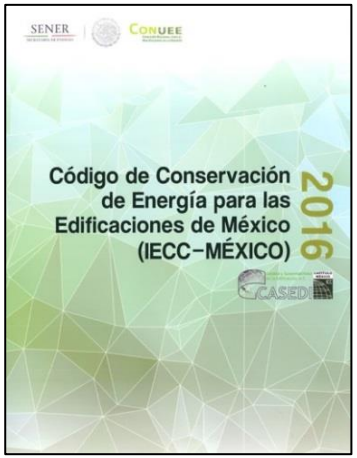
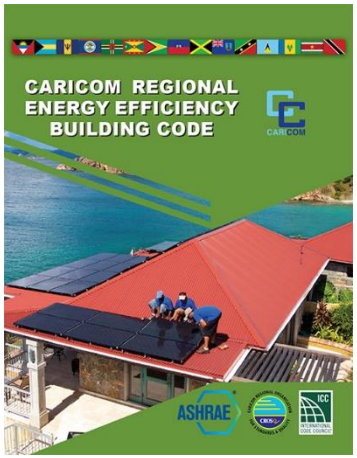
Joint Venture Partners

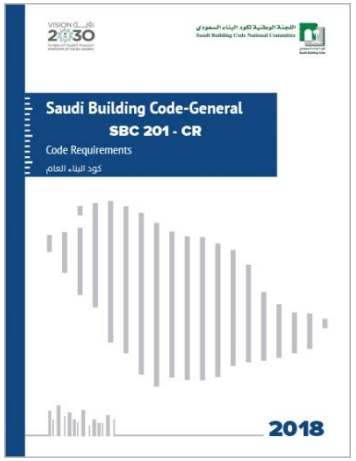
Experience in Working with Clients on Building Regulatory Capacity

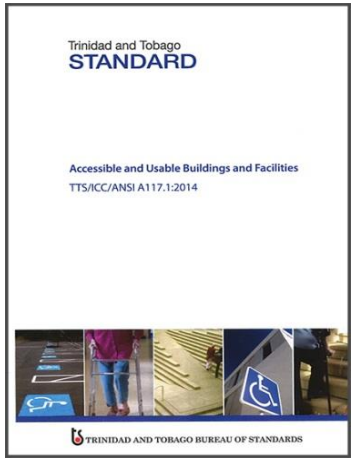
- Abu Dhabi
- Jamaica
- Mexico
- Cambodia
- CROSQ
- Puerto Rico
- Saudi Arabia
- Etc.











ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

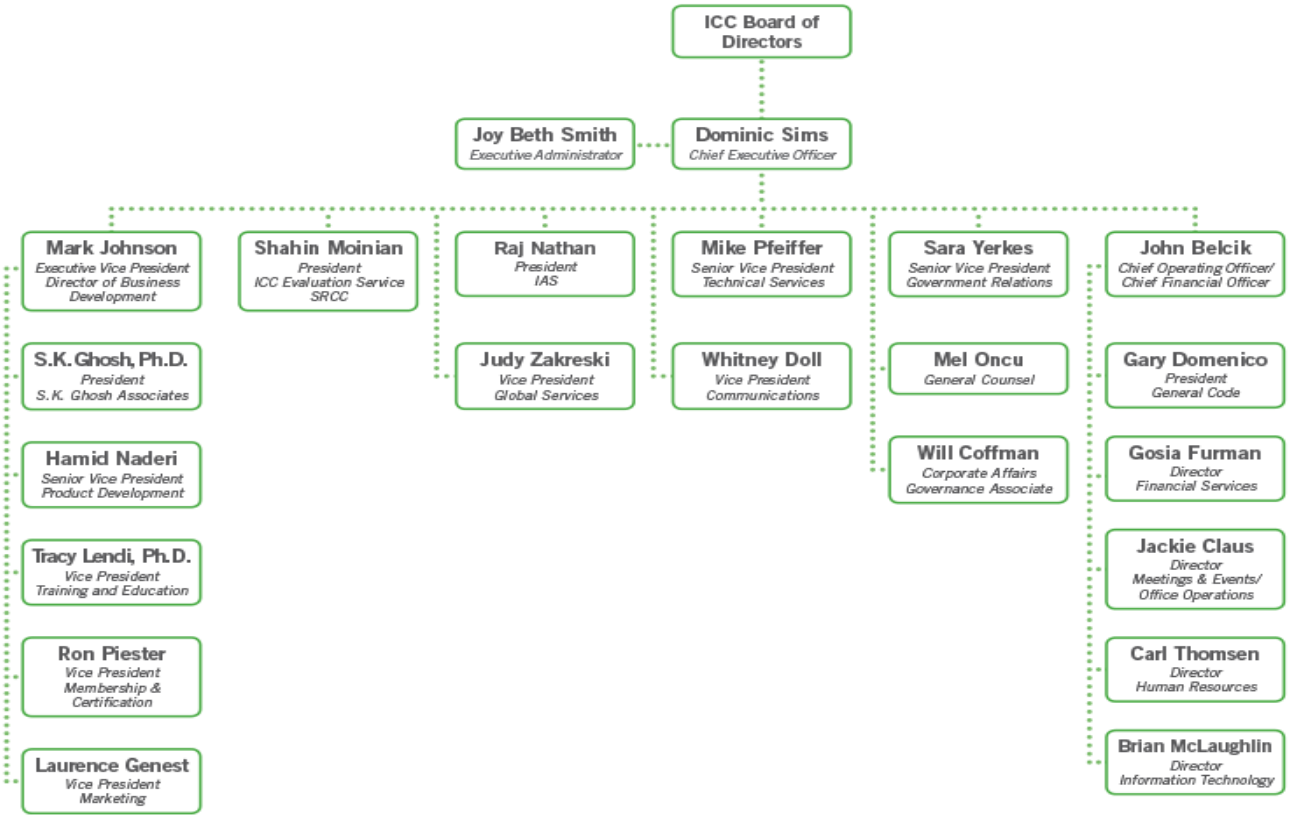
Joint Venture Partners

Smart Development Engineering (SDE)

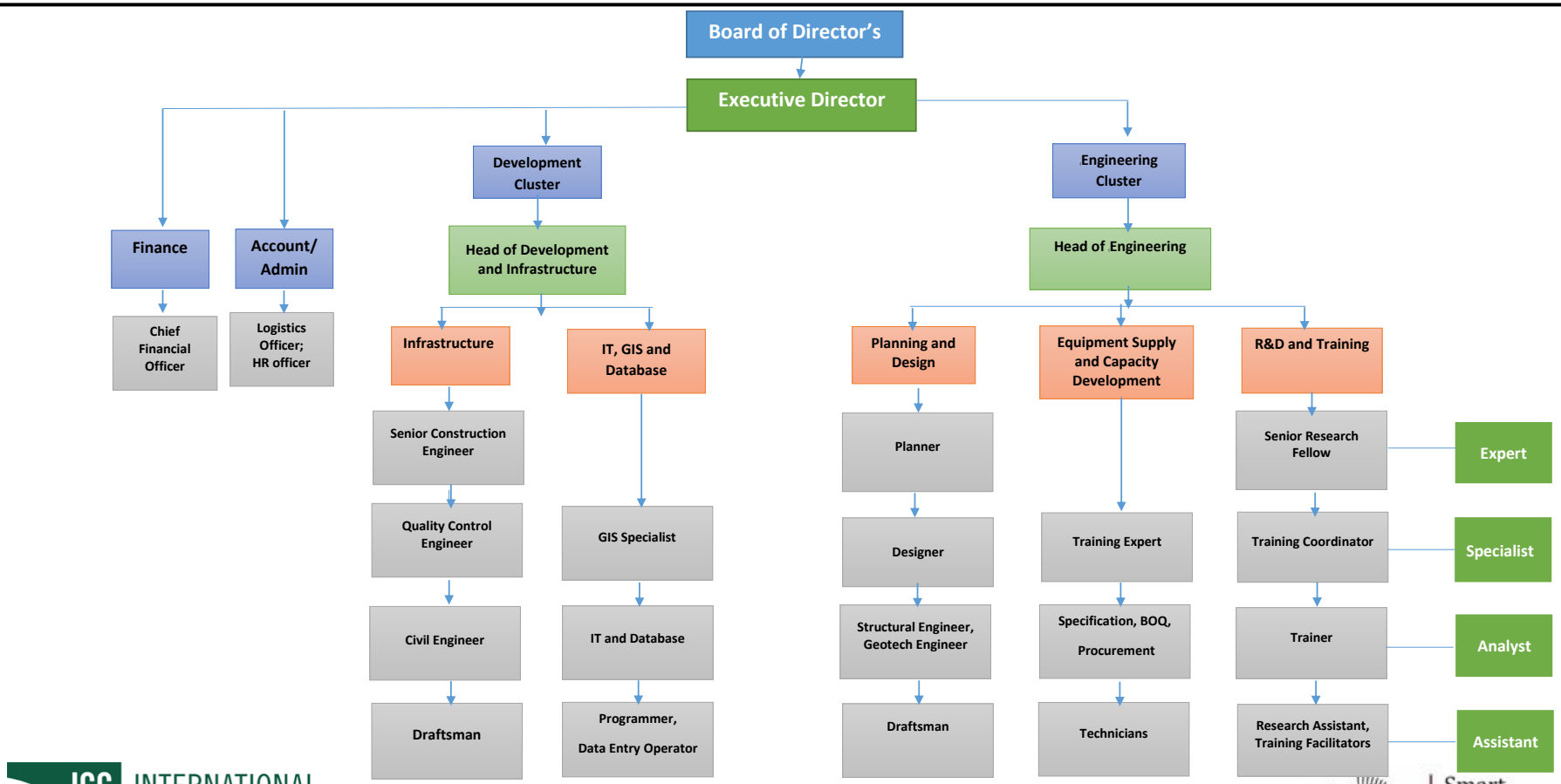
- A multidisciplinary Planning and Engineering company
- Headquartered in Dhaka, Bangladesh
- Provides professional services to the public and private sectors and to state owned enterprises.
- Committed to contributing towards sustainable development through multidisciplinary approach and has the resources and expertise to meet current and future challenges

ICC Organization

SDE Organization



SDE Organization



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ICC INTERNATIONAL CODE COUNCIL®

SDE Smart Development Engineering (SDE) Limited

Objectives

Objectives

This project will address and propose solutions in the following specific areas:

- Adequate capacity and number of RAJUK personnel to meet the demands of continued building construction.
- An adequate building permitting process according to the requirements of the Bangladesh National Building Code (BNBC).
- Appropriate training and capacity of building inspectors, to increase their competency, and understanding of Building Code implementation and enforcement

Objectives

- Emphasis on the proper understanding and application of structural provisions to address recurrent problems such as:
  - distance of building from adjacent road
  - height of building as per the plan
  - setback rules of building
  - proper land use of the building
  - correct application of structural provisions, including earthquake provisions of the building code
  - violations of fire code provisions
  - improvement of field construction quality control and inspections

Personnel

Key Experts

Team Leader: Dr. S. K. Ghosh, President, S. K. Ghosh Associates LLC (SKGA), an ICC Subsidiary

Project Manager: Dr. Md. Zoynul Abedin, Professor, Military Institute of Science & Technology, Bangladesh

Practice Leader: Civil & Structural Engineer in Earthquake Engineering: Dr. Pro Dasgupta, Director of Engineering, SKGA

Project Leader: Legal and Institutional Arrangements: Dr. David S. Nelson, ICC

Practice Leader: Knowledge Management and Outreach: M. Aminul Islam, Adjunct Professor, North-South University, Dhaka, Bangladesh

Non-Key Experts

Bodhi Rudra, Structural Engineer, SKGA

Sandra Hyde, Structural Engineer, ICC

Alberto Herrera, Code Consultant/Specialist, ICC

Rock Meng, Fire Protection Engineer

Md. Nuruzzaman , Barrister at Law and BSc. Civil Engineer, Legal Expert, SDE

Moloy Chaki, Training and disaster management Coordinator, SDE

Dr. Sharmin Reza Chowdhury, Sr. Structural Engineer, SDE

Md. Luthful Haider, Sr. Architect, SDE

Abdul Siddik Hossein, Civil Engineer, SDE

Other (potential) Consultants

Amod Mani Dixit, Seismic Expert, Nepal

Neville Pereira, Building Official, County of Monterey, California

Osama Younan, Building Official, City of Los Angeles, California

Other Research Associates

Ms. Tanjiba Rahman Tishi, Urban planner and GIS

Syed Shakib Al Muiez, Civil Engineering (Building audit and inspection)

Ms. Fathiya Zaman, MBA, Communication officer

Methodology and Work Plan

Methodology

1. Inception Report
2. Situational Analysis
3. Concept Note
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations
5. Education Campaign
6. Monitoring and Evaluation

Tasks, Deliverables, Dates
1. Inception Report

Mobilization of project team and finalization of methodology and work plan

with input from

meetings with key stakeholders and RAJUK.

Preparation and submittal of Inception Report to RAJUK for approval.

3 Months

October 28, 2018 – January 27, 2019

Tasks, Deliverables, Dates
2. Situational Analysis

This task is aimed at an assessment of

where things stand today within RAJUK's jurisdiction

with respect to the current regulatory system

to enforce the National Building Code of Bangladesh.

6 Months

October 28, 2018 – April 29, 2019

Tasks, Deliverables, Dates
2. Situational Analysis

2.1 Documentation Review Oct 28, 2018 – Jan 27, 2019

Review of documentation provided by RAJUK concerning code enforcement violations and resolution.

2.2 Field Observations Nov 28, 2018 – Jan 27, 2019

Visits to building sites picked with and without RAJUK's guidance to find out first-hand about building code enforcement.

2.3 Interviews Oct 28, 2018 – Jan 27, 2019

Extensive interviews with building officials, building inspectors, design professionals, contractors, construction managers and developers.

Tasks, Deliverables, Dates
2. Situational Analysis

2.4 Review Nov 28, 2018 – Jan 27, 2019

Discussion of findings and conclusions from 2.1, 2.2, and 2.3 with RAJUK and with a Project Working Group (PWG) consisting of stakeholders at a stakeholders' workshop.

2.5 Final Situational Report Dec 29, 2018 – Feb 27, 2019

Preparation of a final situational report considering input from stakeholders.

Tasks, Deliverables, Dates
2. Situational Analysis

2.6 Training Needs Survey Jan 28, 2019 - Mar 29, 2019

Conducting a training needs survey, targeting local government code enforcement personnel, contractors and construction workers, government decision-makers/policy makers, and the design community.

2.7 Staffing Needs Survey Feb 28, 2019 – Apr 29, 2019

Conducting a staffing needs survey including consideration of staffing level as well as specialization, qualification and compensation level of staff. The required investment needs will be quantified, and proposed timelines set.

Tasks, Deliverables, Dates
3. Concept Note

The aim of this task is to identify strengths, weaknesses, opportunities and challenges

for strategic and successful BNBC implementation,

and to devise an implementation plan,

based on the initial assessment.

10 Months

Apr 30, 2019 – Feb 27, 2020

Tasks, Deliverables, Dates
3. Concept Note

3.1 Workshop with PWG Apr 30, 2019 – May 30, 2019

Organizing a workshop with the PWG to review and assess current legal and administrative procedures for addressing violations and enforcement of building code and zoning regulations. Results will be summarized and supplemented by research described below.

3.2 Targeted Desk Research May 31, 2019 – Aug 27, 2019

Conducting targeted desk research to document other models of building code implementation and enforcement in both developed and developing countries. A selection will be made of the available models that are most applicable to conditions in Bangladesh.

Tasks, Deliverables, Dates
3. Concept Note

3.3 Investigating Incentives July 29, 2019 – Oct 27, 2019

Investigating incentives for building code compliance. Establishment of a ratings system for code-compliant buildings is a possibility.

3.4 Resolving **a) weaknesses in legislative framework , and**
b) lack of competent resources

Sep 28, 2019 – Jan 27, 2020

Developing specific approaches to resolving two issues related to Building Code implementation and enforcement, often cited as major impediments:

a) Weakness in the legislative framework; and

b) A lack of competent resources.

Tasks, Deliverables, Dates
3. Concept Note

3.5 Issuance of Concept Note Nov 28, 2019 – Feb 27, 2020

Developing a Draft Concept Note from Activities 3.1 through 3.4 above, defining relevant parameters for building code implementation and enforcement by RAJUK. A validation workshop with the PWG will lead to a final Concept Note, a project deliverable.

Tasks, Deliverables, Dates
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations

This task will extend the Concept Note

into a proposed model

for RAJUK's enforcement of building codes and construction control regulations.

9 Months

Feb 28, 2020 – Oct 27, 2020

Tasks, Deliverables, Dates
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations

4.1 Development of Plan Feb 27, 2020 – Jun 27, 2020

Development of a plan, setting forth legal, administrative, technical, and logistical parameters for transparent and rigorous building code implementation and enforcement.

4.2 Validation Model May 30, 2020 – Sep 27, 2020

Validation of the proposed enforcement model with relevant stakeholders (i.e., PWG), RAJUK leadership, and the Ministry of Housing and Public Works to ensure viability and efficient implementation. The proposed enforcement program will be finalized based on input from the validation process.

Tasks, Deliverables, Dates
4. Proposed Program for Enforcement of Building Codes and Construction Control Regulations

4.3 Preparing Documentation

Aug 28, 2020 – Oct 27, 2020

Following validation of the plan, preparation of the necessary documentation to submit the proposed enforcement program for approval by the government under the leadership of RAJUK.

Tasks, Deliverables, Dates
5. Training and Capacity Building Plan

Formulation of a training and capacity building plan, based on the Training Needs Survey. Development of the curriculum for training and identification of the delivery methodology, the target audience, objectives, and cost estimates. A schedule for the roll out of the capacity building program will be delivered for approval by RAJUK.

Sep 28, 2020 – Dec 28, 2020

Tasks, Deliverables, Dates
6. Education Campaign

The purpose of this task is to develop and execute an extensive public awareness and educational campaign to reinforce the critical importance of building code implementation and enforcement to protecting life.

4 Months

Dec 29, 2020 – Mar 29, 2021

Tasks, Deliverables, Dates
7. Monitoring and Evaluation

The purpose of this task is to assess progress achieved by the proposed enforcement program.

A set of objective indicators for monitoring and evaluating progress will be developed in consultation with RAJUK.

Accomplishments as well as drawbacks will be documented.

Specific lessons learned and recommendations for improving the program will be provided to RAJUK.

A Monitoring and Evaluation report will be issued.

4 Months

Jan 28, 2021 – May 30, 2021

Tasks, Deliverables, Dates
8. Annual Program Evaluation Report

3 Months Feb 28, 2021 – May 30, 2021

Work Schedule

No.	Deliverables, D-i	To	27-Nov-18	28-Dec-18	27-Jan-19	27-Feb-19	29-Mar-19	29-Apr-19	30-May-19	27-Jun-19	28-Jul-19	27-Aug-19
		From	28-Oct-18	28-Nov-18	29-Dec-18	28-Jan-19	28-Feb-19	30-Mar-19	30-Apr-19	31-May-19	28-Jun-19	29-Jul-19
D-1	Deliverable #1: Inception Report											
D-2	Deliverable #2: Situational Analysis											
	1) Documentation review											
	2) Field observation											
	3) Interviews											
	4) Review of findings and conclusions											
	5) Preparation of Final Situational Report											
	6) Conducting training needs survey											
	7) .Staffing needs survey											

Revised Work Schedule

No.	Deliverables, D-i		1	2	3	4	5	6
		To	27-Nov-18	28-Dec-18	27-Jan-19	27-Feb-19	29-Mar-19	29-Apr-19
		From	28-Oct-18	28-Nov-18	29-Dec-18	28-Jan-19	28-Feb-19	30-Mar-19
D-1	**Deliverable #1: Submission of Inception Report**							
D-2	**Deliverable #2: Submission of Situational Analysis Report**							
	1) Documentation review							
	2) Field observation							
	3) Interviews							
	4) Review of findings and conclusions							
	5) Preparation of Final Situational Report							
	6) Conducting training needs survey							
	7) Staffing needs survey							

Work Schedule

No.	Deliverables, D-i	To	27-Aug-19	27-Sep-19	27-Oct-19	27-Nov-19	28-Dec-19	27-Jan-20	27-Feb-20	28-Mar-20	28-Apr-20	29-May-20	27-Jun-20
		From	29-Jul-19	28-Aug-19	28-Sep-19	28-Oct-19	28-Nov-19	29-Dec-19	28-Jan-20	28-Feb-20	29-Mar-20	29-Apr-20	30-May-20
D-3	**Deliverable #3: Concept Note**												
	1) Workshop with PWG												
	2) Targeted desk research												
	3) Investigate incentives												
	4) Resolving (a) weakness in legislative framework (b) lack of competent resource												
	5) Draft concept note												

Revised Work Schedule

No.	Deliverables, D-i		7	8	9	10	11	12	13	14	15	16
		To	30-May-19	27-Jun-19	28-Jul-19	27-Aug-19	27-Sep-19	27-Oct-19	27-Nov-19	28-Dec-19	27-Jan-20	27-Feb-20
		From	30-Apr-19	31-May-19	28-Jun-19	29-Jul-19	28-Aug-19	28-Sep-19	28-Oct-19	28-Nov-19	29-Dec-19	28-Jan-20
D-3	**Deliverable #3: Submission of Concept Note Report**											
	1) Workshop with PWG		■									
	2) Targeted desk research		■	■	■	■						
	3) Investigate incentives					■	■	■				
	4) Resolving (a) weakness in legislative framework (b) lack of competent resource							■	■	■	■	
	5) Draft concept note									■	■	■

Work Schedule

No.	Deliverables, D-i	To	28-Jul-20	27-Aug-20	27-Sep-20	27-Oct-20	27-Nov-20	28-Dec-20	27-Jan-21	27-Feb-21
		From	28-Jun-20	29-Jul-20	28-Aug-20	28-Sep-20	28-Oct-20	28-Nov-20	29-Dec-20	28-Jan-21
D-4	Deliverable #4: Proposed Program for Enforcement of Building Codes and Construction									
	1) Development of plan									
	2) Validation of proposed enforcement model									
	3) Preparation of necessary documentation									

Revised Work Schedule

No.	Deliverables, D-i		17	18	19	20	21	22	23	24
		To	28-Mar-20	28-Apr-20	29-May-20	27-Jun-20	28-Jul-20	27-Aug-20	27-Sep-20	27-Oct-20
		From	28-Feb-20	29-Mar-20	29-Apr-20	30-May-20	28-Jun-20	29-Jul-20	28-Aug-20	28-Sep-20
D-4	**Deliverable #4: Submission of Proposed Program for Building Code and Construction Code Enforcement Initial and Final Report**									
	1) Development of plan									
	2) Validation of proposed enforcement model									
	3) Preparation of necessary documentation									

Work Schedule

No.	Deliverables, D-i	To	27-Feb-21	29-Mar-21	29-Apr-21	30-May-21	27-Jun-21	28-Jul-21	27-Aug-21	27-Sep-21	27-Oct-21
		From	28-Jan-21	28-Feb-21	30-Mar-21	30-Apr-21	31-May-21	28-Jun-21	29-Jul-21	28-Aug-21	28-Sep-21
D-5	**Deliverable #5: Education Campaign**										
	1) Formulation of training and capacity building plan										
	2) Development and execution of an extensive public awareness and educational campaign										
D-6	**Deliverable #6: Monitoring and Evaluation**										
	Assessment of progress achieve by the proposed enforcement program										

Revised Work Schedule

No.	Deliverables, D-i		*Total duration (31 months)							
			24	25	26	27	28	29	30	31
		To	27-Oct-20	27-Nov-20	28-Dec-20	27-Jan-21	27-Feb-21	29-Mar-21	29-Apr-21	30-May-21
		From	28-Sep-20	28-Oct-20	28-Nov-20	29-Dec-20	28-Jan-21	28-Feb-21	30-Mar-21	30-Apr-21
D-5	**Deliverable #5: Submission of Training and Capacity building Report**									
	1) Formulation of training and capacity building plan									
D-6	**Deliverable #6: Submission of Education and Outreach Campaign Report**									
	1) Development and execution of an extensive public awareness and educational campaign									
D-7	**Deliverable #7: Submission of Monitoring and Evaluation Report**									
	1) Assessment of progress achieve by the proposed enforcement program									
D-8	**Deliverable #8: Submission of Annual Program Evaluation Report**									

Stakeholder Visits

1. Sthapona Consultants

Engr. Md. Mehedi Hasan, CEO & Chief Consultant

- A designer does not find answers to many questions in the code (BNBC)
- Common problems
  - Improper design
  - Construction does not follow design
  - Materials are not what was specified

Stakeholder Visits

1. Sthapona Consultants

- No building code before 2000
- Owners not willing to pay for earthquake resistance
- Permit utility connections only after inspectors certify that construction has been according to design?
- Periodic inspection even after occupancy?
- Illogical provisions in 1993 BNBC (specifics cited)
- No mechanism to qualify professionals

Stakeholder Visits

2. BUET, Department of Civil Engineering

Dr. Ahsanul Kabir, Professor & Department Head

Dr. Mehedi Ahmed Ansary, Professor

Dr. Raquib Ahsan, Professor

- Development and contents of 1993 BNBC and its update
- Threshold of tall buildings – more than ten stories
- Approval through Building Construction Committees

Stakeholder Visits

2. BUET, Department of Civil Engineering

- Separate BC Committees for buildings up to 8 stories and for buildings more than 8 stories tall
- Inspector sent to site. Government pays for inspection
- No checking of structural drawings or calculations
- Garment factories treated differently

Stakeholder Visits

3. BUET, Department of Architecture

Dr. Nasreen Hossain, Professor & Department Head

Stakeholder Visits

4. BUET, Japan Institute of Disaster Prevention and Urban Safety (JIDPUS)

Dr. Raquib Ahsan, Director, and three lecturers

Stakeholder Visits

5. Fire Service and Civil Defense

Brigadier General Ali Ahmed Khan, Director General

Major S. M. Muzahid Monir

Stakeholder Visits

6. Asia-Pacific University

Prof. Jamilur Reza Chowdhury, Vice Chancellor

Stakeholder Visits

7. Ahsanullah University of Science & Technology

Prof. A. M. M. Safiullah, Vice Chancellor

Dr. Md. Abdur Rouf, Professor

Stakeholder Visits

8. Military Institute of Science & Technology

Prof. Dr. Md. Zoynul Abedin

Col. Md. Masudur Rahman, Professor and Department Head

Stakeholder Visits

9. Rangs Properties Ltd.

Angelo Afnan Hamid, Manager, Cordination – Project Management

Md. Habib Ul Alam, Manager – Project Management

S M Ahsan Mico, Head of Design

Stakeholder Visits

10. Housing and Building Research Institute (HBRI)

Md. Shamim Akhtar, Director General

Stakeholder Visits

11. The World Bank

Swarna Kazi

S. M. Mehedi Hasan

Stakeholder Visits

12. Japan International Cooperation Agency (JICA)

Takumi Tsuchiya

Md. Anisuzzaman Chowdhury

Inception Workshop

November 1, 2018

Spectra Convention Center

Gulshan, Dhaka

Bangladesh National Building Code

Bangladesh National Building Code (BNBC) 1993

Approved in 2006

Based on 1991 *Uniform Building Code* and ACI 318-88

Draft developed by Design Development Corporation (DDC) under contract from Housing and Building Research Institute (HBRI). DDC made agreement with BUET.

Government-established Steering Committee had major input

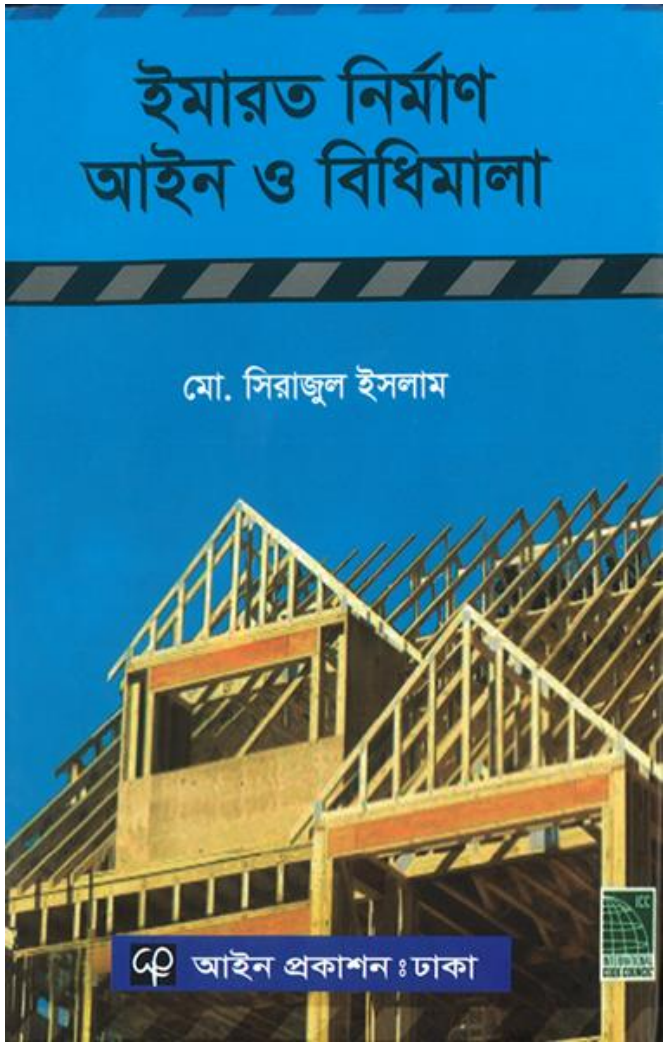
Bangladesh National Building Code

- Ministry of Housing and Public Works formed a steering committee with the responsibility of Updating BNBC 1993 in 2008
- HBRI was tasked with providing secretarial service to the steering committee and managing implementation of the project
- An agreement was signed between HBRI and BUET in December 2009 giving the task of updating the Code to BUET
- Draft completed by 2010
- Steering Committee approved in 2015
- Relevant Ministry approved in 2017

Bangladesh National Building Code

- The 1993 BNBC update is still awaiting final approvals
- The big problem area is the role of the diploma engineer

RAJUK's *Bidhimala*



Code Support and Code Education

- There is no code commentary with the current BNBC.
- Including a commentary would be very helpful in implementing the code.
- Design examples using code should be developed
- In primary education, some basic idea of code should be included.
- At undergraduate level, all engineering departments could discuss about the new version of code.
- In level 3rd to 5th year undergraduate courses, relevant parts of building code should be taught.
- Short courses for graduate engineers need to be available.

Garment Industry

The garment industry [Alliance for Worker Safety Bangladesh and ACCORD, Bangladesh], after the Rana Plaza disaster, have found ways to enforce the building code for their structures. The rest of the building industry needs to learn from this success story and imitate as much of it as practicable.

Structural Plan Checks

- Design needs to be in accordance with the building code.
- This can be ensured only through proper plan check, including check of design calculations.
- Structural drawings currently need to be submitted only for buildings more than ten stories tall. No structural calculations need to be submitted.
- The structural drawings undergo some review that is far from thorough. RAJUK does not have adequate capacity for structural plan check.
- Proper plan check capability needs to be put in place – not only for taller buildings, but for all buildings. Or RAJUK could outsource structural plan checking to pre-selected structural firms.

Inspection

- Construction needs to be in accordance with the building code. The only way to ensure compliance is through proper inspection. There are three types of inspection in U.S. building codes:
- Jurisdictional inspection
- Special inspection: Continuous special inspection

  Periodic special inspection
- Structural observations

Inspection

- **SPECIAL INSPECTION.** Inspection of construction requiring the expertise of an *approved special inspector* in order to ensure compliance with this code and the *approved construction documents*.

Continuous special inspection. Special inspection by the *special inspector* who is present continuously when and where the work to be inspected is being performed.

Periodic special inspection. Special inspection by the *special inspector* who is intermittently present where the work to be inspected has been or is being performed.

Inspection

- **SPECIAL INSPECTOR.** A qualified person employed or retained by an *approved* agency and *approved* by the *building official* as having the competence necessary to inspect a particular type of construction requiring *special inspection.*

- **STRUCTURAL OBSERVATION.** The visual observation of the structural system by a *registered design professional* for general conformance to the *approved construction documents*.

Accreditation

- Institute of Architects Bangladesh (IAB) administers de facto accreditation of architects, which apparently is fairly effective.
- Institution of Engineers, Bangladesh (IEB) could be more effective in this regard.

Certificate of Occupancy

- The owner is currently not concerned about the occupancy certificate although it is required by RAJUK's *Bidhimala*. Some measures should be taken to make it compulsory for owner to have occupancy certificate before occupying.
- There is also no attempt to renew the certificate in 5 years, although it is required by RAJUK's current *Bidhimala*.
- It is important to find a way to make old building owners have something equivalent to an occupancy certificate which is renewable on a regular basis.

RAJUK's Limitations

- Shortage of manpower: whereas 30 inspectors are supposed to be there, only 10 inspectors are available.
- Transportation: for frequent field visit, number of vehicles is very limited. There are no vehicles for inspectors.
- Insufficient number of computers, printers: whereas 30 -40 computer are needed, there are only 3-4 computers
- No efficient server for online processing of applications.
- Unavailability of updated software.
- Unavailability of modern tools and equipment for data collection.
- There is no in-house or outside training facility for the professionals.

Some Initiatives Recommended by RAJUK

- RAJUK frequently goes to field to enforce various laws; however, they need police to accompany them to ensure security. They often do not get the necessary support. Provisions are required for adequate police support.
- There should be some penalty by law for deviations from approved design.
- There should be some coordination among the bank loan authority and RAJUK, so that if client is taking loan, he is bound to abide by RAJUK's *Bidhimala* for building construction

Some Initiatives Recommended by RAJUK

- There should be a law to make sure that client has an occupancy certificate before utility lines are connected.
- Each RAJUK zone does not have the required personnel. More logistic support for decentralization is required.
- There should be a mechanism to ensure safety and security of RAJUK professionals during field inspections.

Some Initiatives Recommended by RAJUK

- Incentive system should be put in place to reward RAJUK employees for better performance.
- Campaign is needed for awareness generation among building owners regarding building code and RAJUK's *Bidhimala*.

Funded Programs

- S-4: Vulnerability Assessment of Critical and Essential Infrastructure
- S-5: Develop Risk-Sensitive Land Use Planning
- S-6: Create and Operationalize Urban Resiliency Unit (URU)
- S-7: Electronic Construction Permitting System
- S-9: Building Code Enforcement and Implementation
- S-11: Design and Supervision of URU Building

Funded Programs

- S-8: Professional Accreditation Program – Not contracted yet?

Coordination

- Coordination with other funded programs, particularly S-6 and S-7 is going to be vitally necessary.
- Coordination with JICA is also going to be important.

Questions?

Thank you