



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

Situational Analysis Report

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PREPARED FOR **RAJDHANI UNNAYAN KARTRIPAKKHA (RAJUK)**

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PREPARED BY



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 Situational Analysis Report marks the culmination of studies aimed at an 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).

Chapter 1 outlines the objectives of Project URP/RAJUK/S-9 and spells out the scope of this Situational Analysis Report. It provides background on population growth in Dhaka and the proneness to major disasters that Bangladesh is unfortunately a victim of. The chapter provides a summary of building regulations in Bangladesh and discusses seismic vulnerability of the Dhaka metropolitan area. Two recent major fire events are briefly discussed and the point is made that the available 2017 draft of the BNBC needs to be put into effect urgently.


Chapter 2 reviews code enforcement violations and their resolution in RAJUK's jurisdiction. The review is based on interviews with RAJUK personnel, analysis of documents provided by RAJUK, and news articles. Complaints that RAJUK deals with are of three kinds: (1) those filed by RAJUK against builders or building owners, (2) those filed by third parties to RAJUK about violations of RAJUK rules, and (3) complaints filed by builders and building owners against RAJUK. It is pointed out that an efficient control of complaints and appeals can provide the tool for a more efficient code enforcement process.

Chapter 3 attempts to establish a methodology for checking the compliance of existing buildings in Dhaka city with BNBC-1993 (2006). For this purpose, a checklist was developed based on importance and data availability. There are seven categories of criteria i.e. architectural, structural, under-construction safety and practices, fire safety, plumbing, mechanical and electrical. 87 buildings were surveyed for preliminary compliance check. Buildings built after 2006 were considered. Several residential and a few commercial buildings were inspected. Excel files were developed to record the collected data and analyze the compliance with code. Percentages of code compliance have been analyzed and a detailed analysis has been presented for these buildings.

From the observations, it was found that there are major violations with regard to very basic architectural issues like setback, allowable building height and minimum approach road width. There is substantial violation on minor issues that are nonetheless important from a disaster management point of view. These include signs warning not to use the lift in case of fire or the signs for high voltage zone or area of no smoking, etc. In most cases, handrails on both sides of the fire safety stair were not found. In none of the industrial buildings, specific requirements for fire safety were satisfied. During construction, fire extinguishers were never found near locations of welding or near the switchboards. Parts of electric generators, motors and rotary converters were never found securely fenced. No warning sign was displayed in the lift lobby when there was no lift installed. Proper lightening protection was seldom found. In many cases the height of substation room was not enough.

Attempts were also made to identify reasons for these violations through interviewing architects, engineers, and developers. The most obvious reason for many of the violations is lapses in inspection by RAJUK. Another evident reason is lack of knowledge on the part of designers and builders and lack of awareness on the part of the owners. Complicated approval procedure was also mentioned as one of the reasons for violations.

Chapter 4 summarizes the findings from a significant number of stakeholder interviews. Some of the most disturbing findings follow:

- No occupancy certificate is taken out for 99% of buildings. This makes a mockery of the entire regulatory process. Refusal to connect utilities until a valid occupancy certificate can be produced has been suggested most often as a remedy. However, there are apparently political downsides to an implementation of this suggestion.
- No legal regulatory provision exists to keep inefficient and incapable construction firms from entering the construction industry by political backing.
- 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.
- Design Engineers / Architects responsible for changing approved design plans have been reported to their certifying institutions (IEB or IAB), but no actions have been taken.
- Authorized Officers have no authority over inspectors and other subordinates to influence their performance.
- Too many vital RAJUK positions are open. There are 10 authorized officers in place, whereas 24 positions are approved.
- Fire safety check is completely missing for low-rise residential buildings which are shorter than 7-storied.
- Four to five engineers sign 90% of the drawings issued by RAJUK (this is not independently verified). It has been suggested that a number  be put on the number of jobs for which an engineer can sign the drawings in a month.
- Buildings are built to heights beyond what is authorized by RAJUK. The Frauq Rupayan Tower, the site of a recent fire that killed 26 people, is a prominent example of that. It was built to 23 stories tall, while the approved height was 18 stories.
- There is corruption and a lack of transparency in the approval process of RAJUK. While this perception is widespread, the consultants are not competent to judge to what extent the perception reflects reality or what the extent of the corruption is. Most, however, agree that the best way to eradicate it is through Electronic Construction Permitting, electronic record keeping, and so forth.

Chapter 5 reports on a training needs survey. There is urgency in ensuring that new construction meets updated codes and standards. Training is a critical component of this effort, and as identified in this chapter, to date, a plan for consistent or uniform training has not been developed. Such a plan would help to ensure that all professionals and workers of the building construction industry are trained to the updated BNBC.

Chapter 6 reports on a staffing needs survey. As noted in this chapter, staffing levels are below the allotted positions making it difficult for the RAJUK staff to fulfill their duties under the existing system. The technical expertise of staff is somewhat limited and it is difficult to attract highly qualified personnel. Resources to staff are limited as well, making it challenging to carry out their specified duties.

The inability to hire and maintain staffing levels could be caused by a variety of reasons. This shortfall of staffing could potentially result from limited opportunities for career advancement and better paid opportunities in the private sector, among other factors. Concerns of a hostile work environment at job sites with limited support could also be a factor.

Hiring a complete cadre of educated, skilled, and trained staff will be necessary to carry out the enforcement of BNBC-2017. Significant changes will need to be instituted to attract and maintain qualified staff to enforce BNBC-2017 fully.

Chapter 7 reports on a stakeholder's workshop held in Dhaka on March 14, 2019.

Chapter 8 points out that the design of a structure must be in compliance with applicable codes. A jurisdiction makes sure of such compliance through plan review, before issuing a construction permit.

The construction of a structure must also be in compliance with applicable building codes. A jurisdiction makes sure of such compliance through proper inspections, before issuing a certificate of occupancy.

The codes and standards system of the U.S. and that of the Dhaka metropolitan area are described and compared.

Although RAJUK is mandated to enforce BNBC-1993 (2006), they essentially enforce only the architectural requirements of *Bidhimala* 2008, which are close to those of the BNBC. To ensure that structural design is in compliance with BNBC-1993 (2006), the RAJUK depends on the stamp(s) of accredited professionals on drawings. To ensure that the design of mechanical, electrical, and plumbing (MEP) systems is in compliance with BNBC-1993 (2006), RAJUK also depends on the stamp(s) of accredited professionals on drawings.

The difference between code implementation and code enforcement is pointed out. The steps required for proper implementation of BNBC-2017 are enumerated.

Enforcement of BNBC-2017 would entail structural and nonstructural (primarily fire safety) plan review, MEP plan review, structural and fire safety inspections, and MEP inspections. It is pointed out that RAJUK is now carrying out only architectural plan review and inspections only to check compliance with the architectural requirements of *Bidhimala* 2008. For compliance with other BNBC requirements, RAJUK depends on stamp(s) of accredited design professionals on drawings and on Form 402 submitted by the accredited professional(s) engaged in a project, on which the professional confirms that construction work has been completed under his/her/their supervision. A supervision report for works supervised is also required to be submitted.

The accreditation requirements of IAB and IEB are explained.

It is pointed out that the seismic vulnerability of Dhaka City is enhanced by: (1) a large number of concrete frame buildings with unreinforced masonry infill, (2) a significant number of buildings with soft stories, and (3) the use of concrete flat plate construction in many buildings.

Finally, a case is made for the establishment of an organized, transparent, systematic process by which the BNBC can be changed at regular intervals with input from concerned stakeholders.

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CHAPTER 1. INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION AND OBJECTIVES

International Code Council (ICC) and Smart Development Engineering (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 (Project URP/RAJUK/S-9).

According to Section 1, Context, of the Terms of Reference (TOR) of the Request for Proposals (RFP) for Project S-9, “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.”

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
- 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 for building
 - proper land use by 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

It was proposed and agreed at the Inception Report Validation Workshop of 14 March 2019 that the objectives of Project S-9 can be distilled down to:

- Implementation and enforcement of BNBC-2017 in its entirety
- Public awareness and education campaign with emphasis on earthquake resistance

The 2017 date on the BNBC is highly important and will be discussed slightly later in this report.

1.2 SCOPE OF SITUATIONAL ANALYSIS REPORT

This Situational Analysis Report marks the culmination of studies aimed at an 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). Activities under the studies included:

1. Review of documentation provided by RAJUK and obtained from other sources concerning code 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 Items 1, 2, and 3 with RAJUK and with a Project Working Group (PWG) consisting of stakeholders at a stakeholders' workshop.
5. Conducting a training needs survey, targeting local government code enforcement personnel, contractors and construction workers, government decision-makers/policy makers, and the design community.
6. Conducting a staffing needs survey including consideration of staffing level as well as specialization, qualification and compensation level of staff.

Chapters 2, 3, 4, 5, and 6 of this report are devoted to Items 1, 2, 3, 5, and 6 above, respectively. Chapter 7 discusses Item 4. Chapter 8 presents the consultants' assessment as to where things stand today within RAJUK's jurisdiction with respect to implementation and enforcement the Bangladesh National Building Code (BNBC).

1.3 BACKGROUND

The Rajdhani Unnayan Kartripakkha (RAJUK) (Capital Development Authority) is the governmental agency in charge of urban development of the Dhaka metropolitan area. RAJUK control extends over Dhaka North and South City Corporations, the Thanas of Narayanganj, Tongi, Siddhirganj, Bandar, Kadam, Rasul Keraniganj, Fatullah, Gazipur and parts of the districts of Sonargaon, Arahazar and Savar,

which are part of the Dhaka urban sprawl. RAJUK jurisdiction excludes military buildings and housing facilities and certain other government buildings and facilities.

One of RAJUK’s functions and main challenges is regulating building construction in an urban area that covers 1,463.60 square kilometers in Dhaka District plus the areas of 14 other Thanas for a total of 1528 square kilometers comprising Greater Dhaka. The urban area of Dhaka under RAJUK’s jurisdiction has experienced major urban sprawl and vertical growth in response to the housing and business demand triggered by a significant GDP growth during the last decade.

According to the Asian Development Bank, economic growth is expected to continue at a steady pace in the next few years as shown in Figure 1-1^{1.1}

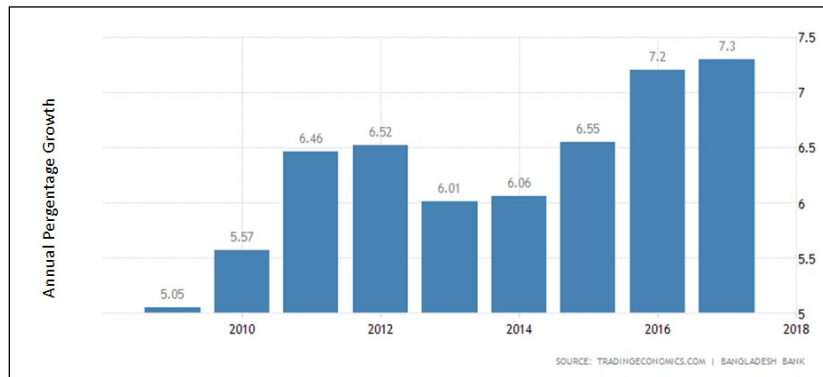


Figure 1-1. Bangladesh GDP Growth Rate

Although construction is not the leading source of GDP growth in Bangladesh, the urban area of Dhaka is experiencing a great demand for new construction.

After Bangladesh’s independence in 1971, Dhaka’s expansion has been steady at a population growth rate of nearly 10 percent per year. According to the study Toward Great Dhaka, done by the World Bank, population growth has stabilized at around 5 percent in recent years, but it is still a phenomenal expansion. The population of Greater Dhaka grew from 3.4 million in 1981 to nearly 18 million in 2015.

Greater Dhaka is Bangladesh’s cultural and political center and arguably the country’s most important urban setting. It is also one of the largest cities in the world, containing one-tenth of Bangladesh’s population and over a third of its urban population while occupying only 1 percent of its land. This population density is analyzed in the World Bank study:^{1.2}

“About 9 million of Greater Dhaka’s inhabitants live in the Dhaka City Corporations, of which 8 million in the western part. The average density of this central area of the city has reached a staggering 41,000 inhabitants per square kilometer.”

With the population growth of Greater Dhaka projected to continue at a rate of about 3-4 percent per year, anticipated housing demand continues to spur new mega developments.

With the growth in population it becomes critical to adequately address the natural calamities such as floods, tropical cyclones, tornadoes, and tidal bores that occur almost every year. The cyclones of 1970 and 1991 were particularly devastating, the latter killing some 140,000 people.

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.

Despite the above, in September 1998, Bangladesh saw the most severe flooding in modern world history. As the Brahmaputra, the Ganges and Meghna rivers spilt over and engulfed 300,000 houses, 9,700 km (6,000 mi) of road and 2,700 km (1,700 mi) of embankment. A thousand people were killed and 30 million more were made homeless. Effectively, two-thirds of the country was under water. The severity of the flooding was attributed to unusually high monsoon rains, an influx of equally unusual large amounts of melt water from the Himalayas, and the widespread cutting down of trees (that could have intercepted the rain water) for firewood or other uses.

Earthquakes pose a significant threat to Bangladesh, particularly the city of Dhaka and have been paid little or no attention so far. They are a particular focus of Project S-9.

Also, two recent fire incidents in the wake of innumerable others in recent years have brought a lot of attention to the risk from fire in a densely populated city like Dhaka. The latest incidents are discussed in more detail later in this chapter.

1.4 BUILDING REGULATIONS IN BANGLADESH

The following information is largely drawn from an excellent paper by Salma A. Shafi.^{1,3}

Building Construction Act, 1952. The 1932 Bengal Municipal Act, the only regulation for building control at the time of the creation of Pakistan in 1947, was inadequate to cope with the ensuing rapid growth of cities. To address the situation, the East Bengal Building Construction ordinance, 1951, was promulgated and 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. This was the first statute that recognized the need for a planning approach and created an autonomous agency called the Dhaka Improvement Trust (DIT) in 1956 with the specific objectives of undertaking development programs for Dhaka and Narayanganj and for some other areas in the vicinity of the two cities. The major functions of the organization were preparation of

development plans, widening roads and reducing traffic congestion, laying out plans for better traffic circulation, providing open spaces for recreation, demolishing or constructing buildings and constructing roads, bridges, and culverts. Functions also included acquisition of land for area development and providing urban facilities and services for public uses and for improvement schemes.

Dhaka Improvement Trust became RAJUK through an amendment to the Town Improvement Act of 1953 in 1987. While DIT's jurisdiction extended over 320 sq miles, RAJUK's jurisdiction was expanded to 590 sq miles. The prime function of the organization is to develop, improve, extend and manage the city of Dhaka and the surrounding areas through a process of proper development planning and development control. The five divisions of RAJUK are:

- Administration and Finance
- Planning
- Development
- Development Control
- Estate and Land

Thus RAJUK is planner, developer, and regulator of development at the same time. Entrusting the last two roles to the same organization has been the subject of some criticism.

Building Construction Rules (RAJUK's *Dhaka Mahanagar Imarat Bidhimala*), 1984, 1996, 2008. These rules^{1,4} 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 optimal return on the substantial national resources invested in building construction in both public and private sectors and to achieve satisfactory performance of buildings, construction needs to be controlled and regulated. The regulating instruments need updating, rationalization and unification. It was therefore felt that a comprehensive building code would serve the purpose of uniform building regulations across the nation.

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.^{1,5} An updated available version of this code is discussed later in this report.

1.5 SEISMIC VULNERABILITY

The threat of an earthquake in most parts of Bangladesh is significant, given that Bangladesh lies on the seismically active Indian plate. Earthquake awareness, however, is lacking because no devastating

earthquake has occurred in recent memory. 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 60 km from the nation's capital.

The first seismic zoning map of the Indian subcontinent was prepared by the Geological Survey of India in 1935. The Bangladesh Meteorological Department adopted a seismic zoning map in 1972. In 1977, the Government of Bangladesh constituted a Committee of Experts to examine the seismic problem and make appropriate recommendations. The Committee proposed a zoning map of Bangladesh in the same year. This map is included in BNBC 1993 (2006) (and in BNBC 2017, which is discussed later).

In the zoning map (Figure 1-2), Bangladesh has been divided into three seismic zones: Zone I, Zone II and Zone III. Zone I, extending over the northern and eastern regions of Bangladesh, with the presence of the Dauki Fault system of eastern Sylhet and the deep seated Sylhet Fault and proximity to the highly seismic southeastern Assam region, is a zone of high seismic risk. Northern Bangladesh, comprising greater Rangpur and Dinajpur districts, is also a region of high seismicity because of the presence of the Jamuna Fault and the proximity of other faults. Zone II, extending over the central part of Bangladesh, is a region of more moderate seismicity. Zone III, comprising the southwestern part of Bangladesh, is seismically quiet, relatively speaking.

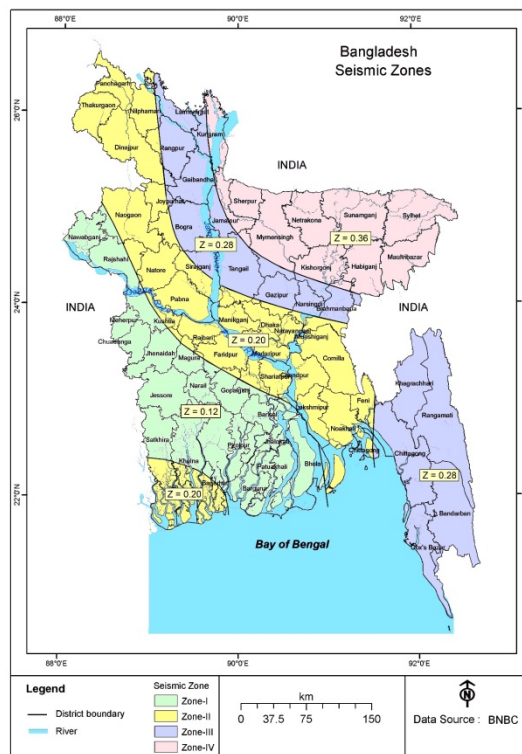


Figure 1-2: Seismic zone map of Bangladesh

The source of the following paragraph is the Bengal Newz News Portal:

UNB, Sangsad Bhaban, 28 June [2011] : Some 72,000 buildings of Dhaka city will collapse totally if there is an earthquake in the range of 7-7.5 on the Richter scale, Bangladesh parliament was informed Monday. Replying to a written question from M Shahrier Alam (Awami League-Rajshahi), Food and Disaster Management Minister Dr M Abdur Razzaque said that with the same magnitude of earthquake, another 85,000 buildings will suffer medium to more damage. He said that this was revealed in a study conducted on 326,000 buildings of Dhaka City Corporation.

The Minister said that if the earthquake hits at night, around 90,000 people will be killed or injured, whereas the number will be 70,000 if the quake hits in daytime. There will be 30,000 million tons of debris due to the demolition of the buildings, he said, adding that a 25-ton capacity truck will have to ply 1.2 million times to remove the debris.

Razzaque said that due to such massive building collapse from earthquake, the loss will amount to US \$ 6 billion, which is half of the national budget for current fiscal year.

The 1 April 2019 issue of the Dhaka Tribune published an article titled "Experts: Millions in Dhaka at risk of fire, earthquake," In it, they quoted National Professor Jamilur Reza Choudhury as saying that a large number of buildings in Dhaka flouted the building code and Building Construction Rule [RAJUK's *Bidhimala*] 1996 during construction, putting people's lives at risk.

"With so many vulnerable buildings in the capital, I fear that between 100,000 and 150,000 people may be killed if a strong earthquake hits Dhaka," he said.

Prof Choudhury also said the country still could not achieve good progress in earthquake preparedness.

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. It was documented in the Inception Report for Project S-9 (see Section 1.1 of Inception Report) that technically sound and up-to-date building codes, properly enforced, can save lives and minimize property damage in earthquakes.

1.6 RECENT DISASTERS AND VULNERABILITY OF BUILDINGS

Two recent fire incidents within five weeks of each other, following many more over the years, have been very unsettling to the population of Dhaka.

The first of these incidents occurred on 20 February 2019. A fire started as a result of a road accident between a pickup van and a private car. After the collision, a gas cylinder stored in the private car exploded. Flames then quickly spread to a nearby restaurant and five buildings. The fire left at least 80 people dead and 50 others injured.

The first place the flames hit was a chemical warehouse on the ground floor of a five-story building, named Hazi Wahed Mansion, in Old Dhaka's congested Chawkbazar area and the flames then quickly spread through four other buildings (Figures 1-3, 1-4), including a community center where a wedding party was on, Press Trust of India reported quoting a fire service official.



Figure 1-3: Chawkbazar fire of 20 February 2019 during the fire incident

A team of firefighters searched the Hazi Wahed Mansion in Chawkbazar's Churihatta after the fire incident, only to make a terrifying discovery that several hundred barrels and sacks of combustible and flammable substances were stored in the basement. The fire could have been even more devastating had the flames come into contact with the huge stockpile of chemicals in the basement.

According to Bangladesh Environment Conservation Rules 1997, no industry can operate in and around a residential area using hazardous chemicals or goods.

According to a survey by the Fire Service and Civil Defense at the end of 2017, a total of 360 factories and stores of chemicals were found in the areas under ward 24 and 35 of Dhaka South City Corporation. Both the wards fall under Old Dhaka.



Figure 1-4: Chawkbazar fire of 20 February 2019 after the fire incident



Figure 1-5: Banani (FR Tower) fire of 28 March 2019

On 28 March 2019, 26 office workers were killed and at least 70 others were injured in a fire at FR (Faruq Rupayan) Tower, a 23-story building in Banani, an upscale commercial district of the city (Figure 1-5). The fire was brought under control only after four hours by 22 firefighting units, backed by army, navy and air force personnel and equipment. Air force helicopters were used to drop water on the building. As is common in most Dhaka buildings, there were no water sprinklers installed in the multi-story building. There was also a lack of fire safety equipment inside the building.



Figure 1-6: Occupants trying to escape fire in FR Tower Building

The FR Tower, which was built before 2006, did not have a single fire-protected staircase and the main staircase was filled with choking smoke. At just 0.6 m (a spiral steel staircase outside) and 1.2 m wide (the main staircase), the building's two exits were too narrow for people inside to leave easily (Figure 1-6). They were also blocked by obstructions that made the task even harder. Office workers able to reach the top of the building were rescued by air force helicopters. According to news reports, the Bangladesh fire department had sent two letters in the last two years highlighting the dangerous lack of safety in the building.

Authorities knew the multi-story block was unsafe. The tower building, in fact, was supposed to be just 18-storeys high but was illegally extended to 23 floors.

FR Tower's faulty construction, illegal extension, lack of emergency exits, insufficient smoke detectors and absence of firefighting equipment are typical of most buildings in Dhaka.

According to the World Socialist Web Site (wsws.org), a survey by the Fire Service and Civil Defense headquarters in 2017 revealed how vulnerable the city is to fire. The survey investigated basic fire-safety measures including: Does the building have firefighting equipment? Is it heavily populated? Does it have emergency exits? Have practice evacuation drills been established? Is there any chance of an electrical fire? Is there an underground water reservoir? The overwhelming majority of 3,786 establishments surveyed were regarded as highly dangerous. Only 129 buildings were not classified as "Risky" or Extremely Risky."

According to the 1 April 2019 issue of the Dhaka Tribune, "Buet Prof Ansari recalled that their 2011 survey of 53 high-rises in Dhaka city showed that 90% of them lacked adequate fire safety measures."

1.7 AVAILABLE UPDATE OF BANGLADESH NATIONAL BUILDING CODE

The current edition of be in BNBC was gazetted in 2006 but had been completed in 1993. From completion to gazetting took 13 years. It was obviously rather dated by then. The UN's highest official for disaster risk reduction, Margareta Wahlstrom, called in 2012 for an update of the BNBC, 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 (2006) 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 was completed by 2010. The Steering Committee approved of the draft in 2015. Some further refinements resulted in a 2017 draft. This draft contains greatly improved fire safety requirements and seismic design provisions for buildings.

The 2017 draft has been approved by the Ministry of Housing and Public Works and also vetted by the Ministry of Law. However, it is still awaiting notification through public gazette. Without such notification, the document cannot be legally enforced. Gazetting is being delayed apparently because diploma engineers are not happy with the role assigned to them in BNBC 2017. This issue needs to be resolved urgently and BNBC 2017 needs to be put into effect without any further delay. Until then, an outdated code is adding to the vulnerability of the building stock.

1.8 Summary

This chapter outlines the objectives of Project URP/RAJUK/S-9 and spells out the scope of this Situational Analysis Report. It provides background on population growth in Dhaka and the proneness to major disasters that Bangladesh is unfortunately a victim of. The chapter provides a summary of building

regulations in Bangladesh and discusses seismic vulnerability of the Dhaka metropolitan area. Two recent major fire events are briefly discussed and the point is made that the available 2017 draft of the BNBC needs to be put into effect urgently.

REFERENCES

- 1.1. Bangladesh GDP Growth Rate, *Trading Economics*, <https://tradingeconomics.com/bangladesh/gdp-growth>
- 1.2. Bird, J., Li, Y., Rahman, H. J., Rama, M., and Venables, A. J., *Toward Great Dhaka: A New Urban Development Paradigm Eastward*, eLibrary, World Bank Group, 2018 (<http://dx.doi.org/10.1596/978-1-4648-1238-5>)
- 1.3. Shafi, S. A., Keynote Paper on National Building Code and Its Implementation, Round Table Discussion on Implementation of National Building Code, National Press Club, Dhaka, Bangladesh, Jan 30 2010. (<https://www.blast.org.bd/content/key-note/national-building-code-29June.pdf>)
- 1.4. *Imarat Nirman Ain o Bidhimala* (Building Construction Rules and Regulations), Rajdhani Unnayan Kartripakkha (RAJUK), Dhaka, Bangladesh, 1984, 1996, 2008.
- 1.5. *Bangladesh National Building Code*, 1993 (2006) Edition, Ministry of Works, Dhaka, Bangladesh, 2006; 2012 and 2017 Drafts, Ministry of Housing and Public Works, Dhaka, Bangladesh, 2012, 2017.

CHAPTER 2. CODE VIOLATIONS AND RESOLUTIONS

2.1 INTRODUCTION AND OBJECTIVES

This chapter of the Situational Analysis Report consists of a review of code enforcement violations and their resolution in RAJUK's jurisdiction. This includes

1. Types of complaints recorded
2. Procedure currently in place to address code violations and other complaints.
3. Problems RAJUK faces in proper code enforcement

The review was mostly based on

1. Interviews with RAJUK's Legal Department and Authorized Officers^{2.1, 2.2}
2. Analysis of documents provided by RAJUK, and several news articles.

The news articles, in particular, provided an insight into the issues affecting the control of building construction seen from the general public's perspective. This analysis was necessary because of a lack of more detailed information available from RAJUK and the weakness in RAJUK's processes to address code violations and the resulting complaints

2.2 COMPLAINTS AND RESOLUTIONS

It was found that the complaints recorded at RAJUK are generally one of three types:

1. Complaints filed by RAJUK against builders or building owners for alleged violations of code provisions (see Annex 2A). No specific information could be obtained regarding what types of violations generally causes this type of complaints, but it is understood that these are due to noncompliance with the building constructions rules stipulated in the *Bidhimala*,^{2,3} especially those related to setback distance, floor area ratio, etc.
2. Complaints filed by third parties to RAJUK about violations of RAJUK rules by owners/developers that affect the third parties.
3. Complaints filed by builders or building owners against RAJUK for a lack of timely response, a lack of due process, unreasonable requests, unjustified decisions, etc. See evidence of these complaints in Annex 2A.

2.2.1 Complaints Filed by RAJUK

These are generally due to noncompliance with the *Bidhimala* rules related to setback distance, floor area ratio, etc. In the two-year period of 2017 through 2018, this type of complaint constituted less than 1% of the total number of complaints recorded at RAJUK. Data provided by RAJUK's legal department showed that the normal practice is to let most cases of noncompliance with the *Bidhimala* turn into legal disputes, which are accumulating by the thousands as time passes. Many of these disputes could

have been resolved at the code administration level, that is, during the construction process if more resources were put into preventive measures rather than into corrective ones, which in many cases are irreversible. Setbacks, for instance, are checked after the foundation and concrete slabs are poured in, making noncompliance a problem that cannot be easily resolved without major disputes and subsequent lawsuits.

2.2.2 Complaints Filed by Third Parties

Until recently, these types of complaints were lodged verbally through in-person visits to RAJUK offices, and passed on to the Authorized Officer (AO) without a formal procedure to track their resolutions. However, a formal process of receiving and addressing these complaints was introduced in early 2019. In the new process, complaints are received in written form, and a number is assigned to it to bring more accountability, and to have better-defined responsibilities and more control in the documentation of the complaint.

A majority of the complaint letters (90% of the cases) is addressed to the Chairman of RAJUK, but it is typically the Director of Development Control who first receives a complaint. The Director then writes a cover letter and forwards the complaint to the Authorized Officer of the Zone where the construction involved is located. The Authorized Officer files the documents into what is called a “C2 file”. An Inspector then obtains the documents from the C2 file and assesses the complaint, which may require an inspection of the construction in question. If the complaint is deemed valid, RAJUK sends three notices to the party responsible for the violation in three consecutive weeks, requesting that necessary corrections be made. If the requested corrections are not made within the specified period of time, RAJUK may initiate legal action against the responsible building owner. The RAJUK complaint process is described in Figure 2-1.

2.2.3 Complaints Against RAJUK

As a public agency, RAJUK’s actions are the object of public scrutiny. Because no specific information was easily available concerning code enforcement violations and their resolutions, newspaper articles related to public complaints on code violations and accusations against RAJUK were reviewed for this report. The issues addressed in the articles are varied – from RAJUK’s inaction against construction irregularities, to RAJUK’s inability to evict the occupants of unapproved buildings, mismanagement of official documents, approving commercial buildings in residential areas, officials accepting bribes, and more.

Most articles found in the public space point to specific complaints and personal accusations that are not relevant as samples for the purposes of this study. The aim of this analysis is to find common and current issues and the solutions applied to code violations. Nevertheless, below are some articles that are worth considering.

According to the article *“No RAJUK actions against illegal construction”* published on January 6, 2019, in the Dhaka Tribune:

“The city dwellers have accused development authority RAJUK of not taking actions against the irregularities in the buildings that are undergoing construction, violating the rules.”

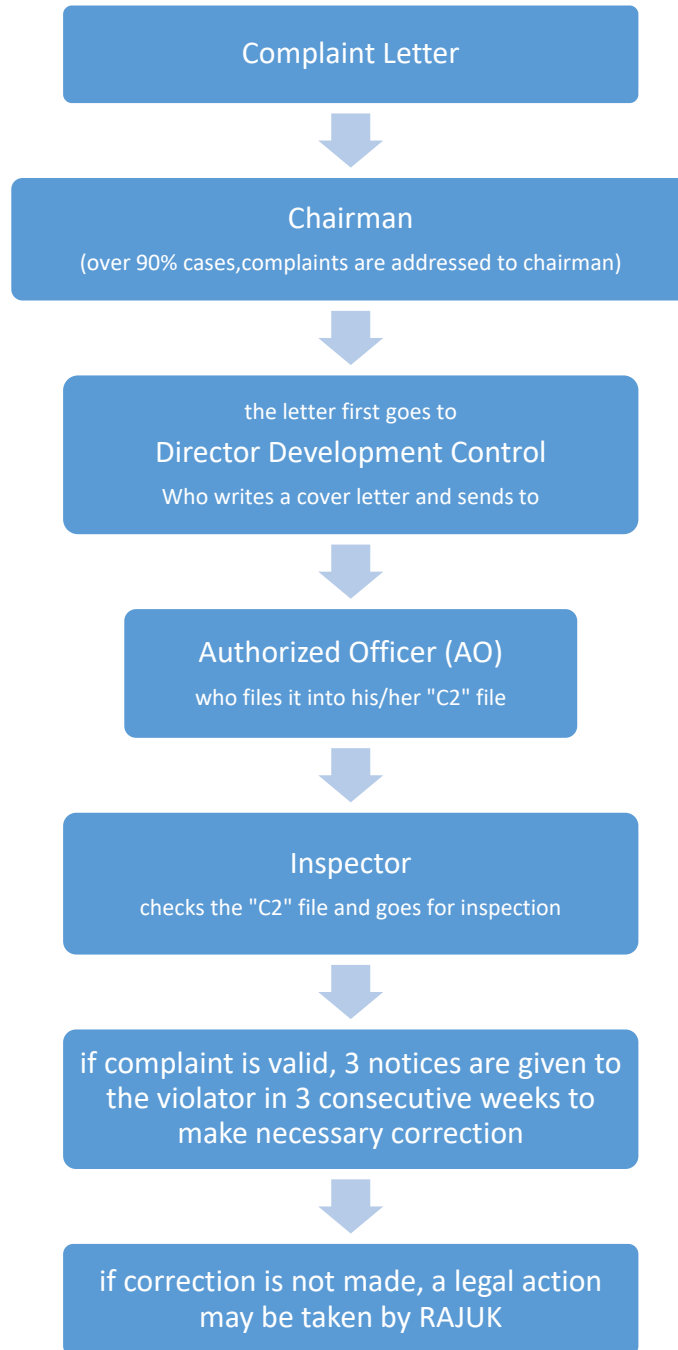


Figure 2-1: RAJUK Process to Resolve Third Party Complaints

The article indicates that the complainers accuse the development authority officials of “allowing the construction of risky buildings in exchange for hefty amounts of money.” And at the same time, the article states that RAJUK authorities admit their limitations and shortage of manpower but claim to take action upon receiving complaints. The article indicates specific areas of problems RAJUK faces, including a lack of support from the police when evictions are necessary.

According to the article, building experts expressed the opinion that if RAJUK would take a strong stance, it would not be possible to construct buildings beyond the approved plan. The same experts advocated greater punishment for code violations.

The article indicates that the *Bidhimala* requires 20-foot-wide roads adjacent to large structures, which is in most cases “blatantly ignored,” and cites specific cases of complaints regarding this requirement being ignored for more than a year. It also adds that there are hundreds of complaints about RAJUK not taking action against hundreds of buildings that are being built well beyond the approved number of floors.

According to the article, “The Ministry of Disaster Management and Relief listed 72,000 buildings in Dhaka that are risky, most of which were built without following the approved plan.”

It further notes, “According to a 2011 survey, among the 2,193 government buildings in Dhaka, 59 percent are prone to damage from earthquakes. Another survey in 2013 marked 321 buildings as risky.”

The article contends that RAJUK has no intention of evicting the occupants of unapproved buildings, which abound in the Dhaka jurisdiction. Further, according to its sources, the Tribune concludes, “There is no lacking in the law, neither is RAJUK absolutely short of manpower” and “A strong stance on their [RAJUK’s] part can make all the difference.”

Perhaps the most compelling article, “*Illegal buildings mushroom in RAJUK areas*”, was published by The Independent on March 21, 2016. The article detailed a series of unauthorized buildings, including a building in Tongi that was unauthorized under the Detailed Area Plan (DAP). Not only did it take RAJUK three months to serve the final notice to halt construction, after the order to stop construction was issued, the builder continued with the illegal construction and completed the roof on the third floor in defiance of RAJUK’s power. There was no visible action either to stop construction or to demolish the illegal structure. The article states that construction continued, putting other buildings in the area at risk and potentially leading to an accident at any time. Among the unauthorized buildings mentioned were:

- A building encroaching on a public road in such a way that people cannot move through the road. A complaint claimed that the building did not have a permit from RAJUK.
- An unauthorized five-story building at Purba Bhatara that encroaches on the footpath, ignoring opposition from the public. No engineer or consultant was engaged for the building’s construction, according to a complaint sent to RAJUK.
- Unauthorized buildings inside the DAP regions of Tongi, Narayanganj and Savar, against which the authorities failed to take timely action.

RAJUK officials acknowledged wrongdoings on the part of local officials in those particular areas. In most cases, the RAJUK officials cited a shortage of manpower and the collusion of law enforcement personnel as the reasons for their failure to stop the rapid growth of illegal structures.

The article contends that the lack of monitoring of the development process was another reason behind the boom of illegal buildings. According to RAJUK officials, a final notice to the builders of a Tongi building was issued, demanding removal of the illegal structure within seven days, but the builder continued with the construction, ignoring the notice. Copies of the notice were sent to other agencies, including the Tongi police station and power, gas and WASA (Water Supply and Sewerage Authority) offices in Dhaka. Construction of the building without an approved design is a violation of Section 3/B of the 1952 Building Construction Act and endangered another buildings in the area. The article cites attempted bribery by the developer. The owner of the neighboring building declared that the new building was being constructed without permits from the authority, in violation of the building code, and endangers the existing building with an adjacent excavation.

The information in the article indicates uncertainty about RAJUK's authority, both actual and perceived. The complaints filed with RAJUK, (as well as the Tongi police station and Gazipur City Corporation) had no effect in stopping the construction of the example provided. RAJUK officials were chased away by the builders when they went for an inspection of the site, with the builders arguing that the construction was going on where the capital's regulatory body had no authority.

The Officer in Charge of the local police station is quoted as saying, "If Rajuk wants a police force to be deployed, we are ready to provide it. But until and unless Rajuk gives us a written request, we cannot provide the force to take action against such construction."

Other examples cited in this article indicate the lack of coordination and information as to which authorities have jurisdiction over the land and buildings being constructed. A consequence of this situation is that, according to a former mayor of the Gazipur City Corporation (GCC), "There could be hundreds of illegal constructions in Tongi, which is now under Rajuk's Detailed Area Plan."

A GCC surveyor declared that, following a complaint over an illegal construction project, he forwarded a file to the GCC executive engineer, requesting him to serve a notice to the land-owner and the developer. The executive engineer could not be reached for his comment. The surveyor, however, said that he cannot serve any notice without the consent of the local ward councilor.

The article indicates that after the approval of the Detailed Area Plan (DAP) in 2011, vast areas around Dhaka stretching up to Salna of Gazipur came under RAJUK's jurisdiction and that all construction plans within that area need its approval.

The Chairman of RAJUK at the time of the publication of the article is quoted as saying, "The zonal and authorized officers are preparing the list of unauthorized buildings which are coming up every day. We will address the problem by incorporating the new and previous lists." He, too, recognized that RAJUK needed cooperation from the local administration in taking legal action against such unauthorized buildings.

The article concludes by quoting sources saying there are “hundreds of thousands of unauthorized buildings, which were constructed in Dhaka city and its outskirts.” And that, according to the Director of Development and Planning, RAJUK has no information on the exact number of such buildings. However, the director is quoted as saying that there are about 150,000 unauthorized buildings in Dhaka-Narayanganj-Demra (DND) project area alone.

An article published in the Daily Star on February 12, 2016, *“Rajuk files kept by building owner,”* indicates that RAJUK’s official records of a building approval were found in the possession of a building owner during a dispute over car parking rights in a mixed occupancy building, “a five-story structure with shops on the ground floor and car park inside the residential part of the building.” The code violation was an additional floor that was built beyond the approved plan. A plan that had been tampered with was produced by the owner, according to an executive magistrate who conducted a “mobile court drive.” The building owner produced the original RAJUK official documents and building plan, which were supposed to be part of RAJUK file records. The Authorized Officer indicated that the building owner should not have been in possession of official documents.

On January 29, 2016, in an article titled, *“Institutional corruption at RAJUK”*, the Daily Star denounces wrongdoings by RAJUK for having approved illegal housing plans and creating chaotic situations in residential areas where commercial buildings have been constructed in plots designated for noncommercial use.

“Rajuk comes under fire”, published on January 28, 2016 in the Daily Star, highlights a case of an illegal construction on a piece of land that was under dispute since 2001. In 2011, RAJUK approved a building plan in favor of the party occupying the land, even though the case was still pending in court. Another case is mentioned where RAJUK allowed an occupying party to construct a 10-story building. Even after the legal owner produced all his ownership documents before RAJUK, it did not cancel the building approval.

The same article indicates that there are “many incidents of RAJUK losing files,” and claims that the Ministry of Housing and Public Works (MoHPW) was aware and accepted these issues. The article provides examples of lawlessness in building construction in Dhaka. It also states that building owners randomly deviate from approved plans, and that the MoHPW allegedly declared “there is hardly any building that has not deviated from the original plan,” and that RAJUK could not oversee every single building during and after construction, and that this agency should have done its duty with whatever capacity it had. The article also notes:

“Plot owners in Gulshan, Banani, and Baridhara obtained building plans for residential houses but today these residential areas have no difference with the commercial,” and that “They [plot owners] have set up hotels, shops, restaurants, offices and massage parlours in residential buildings at will, and it happened due to RAJUK's negligence ...”

The article goes on to state that this would not have happened if RAJUK had taken legal action when the violations took place, and that even the MoHPW has stated that the designated parking spaces in the

basements of almost every building are being used illegally as shops, restaurants and warehouses, aggravating traffic congestion on the streets.

Another article dating from 2014 and updated in 2015, "*Rajuk fails to act in two months*", published in the Daily Star, denounces the slow reaction from RAJUK authorities regarding an illegal extension of a five-story building. Reportedly, neighbors filed a complaint with RAJUK and had not received a response to in two months. The extension added 75-square-foot spaces to all five floors, according to the article, which quoted a civil engineer as saying, "the extension would not have been so risky had it been built on columns and beams." The engineer added, "A five-inch brick wall without a foundation would not withstand the concrete load and would collapse anytime." The article quotes the Authorized Officer as saying, "There is no symptom like cracks or leaning to consider the building risky." The article mentions that complainants eventually met with the Chairman of RAJUK asking for his intervention.

Three other articles dated 2012 and older address issues such as faulty bidding processes for major infrastructure projects in Uttara ("*Rajuk goes for re-tender*", December 27, 2012, the Daily Star); lengthy processes and tight deadlines on RAJUK plot allocations ("*Plot aspirants struggle as Rajuk sets tight deadline*", December 17, 2008, the Daily Star); and then-new RAJUK mobile court capabilities ("*Rajuk empowered to try offenders under its own roof*", July 25, 2007, the Daily Star).

In addition to the legal issues RAJUK faces, other areas of concern regarding its inability to implement and enforce the existing building regulations are wrongdoings and bribery. An independent study published in 2007 by Transparency International Bangladesh, "*Corruption in Plan Permission Process in RAJUK: A Study of Violations and Proposals*",^{2,4} identifies corruption at most stages of the construction permitting and land use clearance processes.

2.2.4 Resolution of Complaints

In an interview on January 21, 2019, URP Deputy Project Director Aminur Rahman, pointed out that in a year, 5,000-6,000 newly constructed buildings are approved and that in the last two years, nearly 8,000 cases were recorded at RAJUK. Of these cases, less than 1% was filed by RAJUK against the building owner. Most cases remain unresolved.

Complaints filed by RAJUK or by third parties against builders or building owners often lead to lawsuits, which are handled by RAJUK's legal department headed by a Director of Law overseeing two law officers, four logistics officers and 150 panel lawyers. However, for critical cases involving financial matters, the Attorney General is consulted with the approval of proper authorities. RAJUK also hires a number of lawyers on a contractual basis. Among the cases resolved from 2017 to 2018, 62 verdicts were in favor of the government and six were against the government. However, as of January 28, 2019, a total of 6,949 cases are still pending.

Rahman pointed out that 400,000 buildings within RAJUK's jurisdiction are two stories and above. Among these, 60% are not approved by RAJUK. There are 1.8 million single-story, semi-pacca (semi-permanent) buildings of tin-shade construction.

The RAJUK Annual Report (2016-2017)^{2.5} addresses in general how the legal cases are handled. The Report states that RAJUK's legal department deals with litigation on issues such as land acquisition, plot allocation, building plan approval/rejection, issuance of land use clearance, land/building development, administrative backlog, and approval of private housing land development. The Annual Report indicates that from June 2016 to May 2017, the RAJUK legal department registered 619 suits filed against RAJUK, among which 576 are writ petitions taken to the High Court Division of the Supreme Court, 38 are title suits in the District Court and 11 are arbitration cases. Out of 73 judgments, 65 verdicts favorable to RAJUK were returned.

Furthermore, the Report states that in 2017 there were 6,365 writs, title suits, arbitration cases and contempt of court cases still pending in both the High Court and Appellate Divisions of the Supreme Court.

The Report points out that a Case Diary has been initiated in RAJUK per a September 2016 decision of the RAJUK board. The Report also indicates that RAJUK conducts Mobile Court regularly as well as evictions against illegal construction.

As for the complaints against RAJUK, the newspaper articles analyzed and summarized in this report give only a glimpse of the public opinion and the great challenges RAJUK and the stakeholders face to maintain an efficient system to address code violations and complaints from affected communities and individuals. The data analyzed and in-person interviews provide indicators that, while there are efforts and actions carried out by RAJUK, the main problem is a lack of a mechanism to enforce the BNBC and the *Bidhimala*. Such a mechanism must include a process to deal with incoming complaints and their resolutions, efficient record-keeping of all allegations and a log of their resolutions, among other steps that will be discussed and proposed in the recommendations part of the Concept Note of this project.

Complaints against RAJUK generally point to a lack of an efficient administrative process to enforce the building code and the construction rules. The RAJUK officials cite a shortage of manpower and the collusion of law enforcement personnel with the developers as the reasons for their inability to enforce the code and to stop the rapid growth of illegal structures. Lack of police protection has at times prevented RAJUK personnel from conducting site inspections. RAJUK officials also mentioned wrongdoings on the part of local officials in some areas.

For the purposes of this report, it is noteworthy to recognize the limits of RAJUK's jurisdiction and that not all complaints and disputes fall under their currently established responsibilities. The lack of coordination and the inability of the city corporations to regulate, assist regulating, or establish some sort of control on building construction makes code compliance even more complicated for RAJUK, given its scope and jurisdiction. RAJUK's given responsibilities as an urban planner, developer, building regulator, and builder make it challenging to exert proper control over code violations in such a large jurisdiction without the appropriate resources, programs, processes, mechanisms, and technical capacity.

2.3 CODE VIOLATIONS AND COMPLAINTS ACCORDING TO THE 2018 IBC

An efficient code implementation and enforcement system must define the violations to the building code and provide a scheme to address complaints resulting from these violations. The International Building Code (IBC), as a model code, considers these issues in specific sections of Chapter 1, Administration. 2018 IBC Section 114, Violations, defines what is unlawful and therefore constitutes the basis of all citations and correction notices sent to the building owners. Section 114.1, Unlawful acts, states:

“It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or equipment regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code.”

The IBC Code and Commentary, a document that helps code users better understand the contents of the code, notes that the building official or authority having jurisdiction (AHJ) is required to notify the responsible parties of the construction or use of a building if such building is in violation of the code. The notification must include the section of the code that is being violated and must give the opportunity to the responsible party to respond or correct the violation in question (see 2018 IBC Section 114.2).

Further, the code indicates that the building official or AHJ must pursue the correction of the violation using the appropriate legal means of the jurisdiction. This is not optional. The Code and Commentary also indicates that a reasonable time or a set period of time must be given between the notice of violation and the actions taken by the responsible party. This allows violations to be corrected voluntarily without having to escalate to a legal battle.

The penalties for violating the provisions of the code have to be in accordance to the laws of the jurisdiction and in coordination with its legal structure (see 2018 IBC Section 114.2).

2.4 QUALITY MANAGEMENT SYSTEM

An efficient control of complaints and appeals can provide the tools for a more efficient code enforcement processes.

An efficient code enforcement process must contain clear and precise procedures to receive and resolve complaints by and against RAJUK and its Inspectors, Authorizing Officers and others who apply the regulations or fail to do so. When records of these complaints are filed properly, they could accumulate into a wealth of information that can help prevent and resolve future issues, and preferably avoid escalating them to legal battles. To achieve an efficient code enforcement system, clear procedures must be in place regarding how to handle complaints and appeals. For this, a Quality Management System (QMS) based in international standards such as ISO 17020 (Inspection Agencies) could be used to establish detailed requirements to handle and administer complaints. ISO 17020 contains a section that describes some specific steps to deal with complaints and their resolution. These steps are described below.

Based on the criteria set forth in ISO 17020, a program to efficiently control complaints and appeals would include:

- A documented process to receive, evaluate and make decisions on complaints and appeals.
- A description of the handling process for complaints and appeals, available to any interested party upon request.
- A process to define the nature and area of the complaint, and define which part of the organization is responsible to deal with it.
- A declaration that the responsibility for all decisions at all levels of the handling process for complaints and appeals falls on the agency or organization receiving the complaint.
- A declaration that agency or organization investigations and decisions on appeals shall not result in any discriminatory actions.
- A handling process for complaints and appeals that includes the following elements and methods:
 - A description of the process for receiving, validating, investigating the complaint or appeal, and deciding what actions are to be taken in response to it.
 - A system for tracking and recording complaints and appeals, including actions undertaken to resolve them.
 - Documentation ensuring that any appropriate action is taken.
- A declaration that the agency or organization receiving the complaint or appeal is responsible for gathering and verifying all necessary information to validate the complaint or appeal.
- A mechanism whereby the agency or organization shall acknowledge receipt of the complaint or appeal, and shall provide the complainant or appellant with progress reports and the outcome.
- Protocols ensuring that decisions regarding complaints will be made or reviewed by individuals not involved in the original activities giving rise to the complaint, and be communicated to the complainant or appellant by such individuals.
- Issuance of a formal notice to the complainant or appellant of the end of the complaint and appeals handling process.

2.5 SUMMARY

Chapter 2 reviews code enforcement violations and their resolution in RAJUK's jurisdiction. The review is based on interviews with RAJUK personnel, analysis of documents provided by RAJUK, and news articles. Complaints that RAJUK deals with are of three kinds: (1) those filed by RAJUK against builders or building owners, (2) those filed by third parties to RAJUK about violations of RAJUK rules, and (3) complaints filed by builders and building owners against RAJUK. It is pointed out that an efficient control of complaints and appeals can provide the tool for a more efficient code enforcement process.

REFERENCES

- 2.1. Interview of Mr. Aminur Rahman, URP Deputy Project Director, by ICC/SDE personnel on January 21, 2019.
- 2.2. Interview of Mr. Md. Mahfuzul Karim, RAJUK Law Officer, by ICC/SDE personnel on January 28, 2019.
- 2.3. *Imarat Nirman Ain o Bidhimala* (Building Construction Rules and Regulations), Rajdhani Unnayan Kartripakkha (RAJUK), Dhaka, Bangladesh, 1984, 1996, 2008.
- 2.4. *Corruption in Plan Permission Process in RAJUK: A Study of Violations and Proposals*, Transparency International Bangladesh, Dhaka, Bangladesh, 2007.
- 2.5. *Annual Report 2016-2017*, Rajdhani Unnayan Kartripakkha (RAJUK), Dhaka, Bangladesh, 2017.

ANNEX 2A. COMPLAINT RESOLUTION BY RAJUK

- 1. Show cause notice for deviation from approved design**
- 2. Disposal of allegation**

Rajdhani Unnayan Kartripakkha
Zone - 6
RAJUK Building, Dhaka

Memo no: 25.39.0000.122.32.65.19-140 Estha:

Date: 4.03.2019

Show cause notice for deviation from approved design

This is to inform that, you Saleha Begum, Address-89/9, Hasnahena Lane, Shutikhalpar, Dholpur, Dhaka are undertaking construction work in the under mentioned land of which C.S/R.S Dag no---- plot no- 89/9, Mouza- Jatrabari, Sector/Section----- Block no----- Road no----- Ward no----- Police Station- Jatrabari, District- Dhaka. It is noticed during inspection that you have done/are doing construction work in the under-construction building/structure with deviation from approved design.

- a. You surrendered essential land for widening road 0.00m instead of 1.6m.
- b. According to approved design setback: in front 0.76m instead of 1.50m, in back side(west) 0.50m instead of 1.00m, 1.04m,1.06m, in right side(south) 0.76m instead of 1.50m, in left side(north) 0.76m instead of 1.50m, 1.53m, 1.64m

Moreover, you have left 0.00m instead of 2.44m in the left side (north) and 0.00m in the right side (south) for widening the road.

Thus by deviating from the approved design you have violated building construction act 1952 and building construction rules.

Under the circumstances, you are requested to show cause in writing within 07(seven) days to the under-signed as to why the necessary order will not be given to demolish/remove the part of the building/structure constructed by violating the approved design. Otherwise actions will be taken according to law.

To
Name: Saleha Begum
Address: 89/9, Hasnahena lane
Shutikhalpar, Dholpur, Dhaka

Sd/- 4.3.2019
Md. Nuruzzaman Hossain Zahir
Authorized officer-6/1
Rajdhani Unnayan Kartripakkha
RAJUK Bhaban, Dhaka.

Memo no: 25.39.0000 .32.

Date:

For kind information and action (not according to seniority):

1. Member (Development Control), Rajdhani Unnayan Kartipakkha, Dhaka.
2. Director (Development Control-2)Rajdhani Unnayan Kartipakkha, Dhaka.
3. Director (Zone-6)Rajdhani Unnayan Kartipakkha, Dhaka.
4. Officer in charge..... police station.

(It is requested to take necessary measure to keep stop all type of construction work and to ensure security in the adjoining houses)

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.64 Estda:

Date: 21 Falgun 1425
05 March 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and to send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	S. M. Imran Hossain 20/02/2019	About construction work violating approved design

Enclosure: as stated 01(one) copy of allegation

Director Zone-2
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 5.3.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.42 Estha:

Date: 6 Falgun 1425
18 February 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	Md. Insaf Ali Osmani 08.01.2019	Stopping/removal of commercial activities in residential building of House no-12, Road-12, Sector-10
2.	Delowar Hossain Chowdhury 24.01.2019	Construction of structure on the boundary wall by the Allotee of adjacent Plot no-32, Alawal Avenue, Sector-6, Uttara R/A
3.	Md. Monir Hossain 30.01.2019	Application for taking necessary action against construction of multistoried building without taking any approval form RAJUK
4.	Mohammad Shah Alam 27.01.2019	Eviction of unauthorized and unapproved market, rikshawa garage from different Plots of Sector-14 of Uttara R/A
5.	Locals 31.01.2019	About reestablishment of unauthorized structure from the western side of Uttara Diabari Round Terrace after eviction by RAJUK
6.	Md. Abul Kalam 27.01.2019	Application for clearance of approval of design for construction of building in Plot no-40 and 42 of Road no-2, Sector-3, Uttara Commercial area
7.	Md. Aminur Rahman 03.02.2019	About reconsideration of the decision regarding solution of the problem in the matter of garage in the light of papers issued by RAJUK and land office

Enclosure: as stated 07(seven) copy of allegation

Director Zone-2
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 18.2.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.43 Estha:

Date: 6 Falgun 1425
18 February 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	Md. Abdul Alim Chowdhury 05.02.2019	Appeal under section 15 of the Building Construction Act, 1952.
2.	Mohammad Mohsin 10.02.2019	Application for eviction of building without design
3.	Md. Shawkat Hossain 28.01.2019	Allegation about construction of multistoried (8-storied) building violating approved design of RAJUK and violating the order of RAJUK to keep stop of construction work and abstracting the only road of our passage with a motive misusing muscle power and constructing risky multistoried building very close to the boundary wall of my residential house and thus firming our dwelling house.
4.	Mahmud Hossain 30.01.2019	About reply of the final notice served vide memo no.25.39.0000.106.32.148.2017 dated-12.11.2018

Enclosure: as stated 04(four) copy of allegation

Director Zone-4
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 18.2.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.44 Estha:

Date: 6 Falgun 1425
18 February 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	Md. Nagor Hossain 08.01.2019	Application for stopping construction of unapproved under construction risky multistoried building.
2.	Md. Monowar Islam Gong 07.02.2019	About eviction of illegal shops from parking place.
3.	Zakir Hossain 07.02.2019	About construction work of building without RAUJK following rules in 147/14/B-1, Pিরerbagh, Mirpur, Dhaka
4.	Md. Aminul Islam Joarder 06.02.2019	About construction of new building unlawfully leaving no space of Govt. road.
5.	Md. Akter Hamid Khan 04.02.2019	About informing illegal approval of construction.
6.	Abdul Mottaleb 10.02.2019	Application for eviction of illegal establishment
7.	Md. Belal Mia 07.02.2019	About construction of risky multistoried building shed like Rana Plaza of Saver without any approval in water body in the DAP Plan by some Kamrul, a financier of BNP and Jamat in mouza Sataish of Tongi in the district of Gazipur.
8.	Mahmudul Haque 28.01.2019	About undertaking construction work causing damage to my house by the owner of my adjacent house and taking no protection measure of multistoried building.
9.	Md. Nizam Uddin Gong 27.01.2019	About reconstruction work of violating rules/design in House no-812, Middle Manipur, Mirpur-2, Dhaka-1216
10.	Mrs. Rawsan Ara Gong 03.02.2019	Application for dismantling and removing of illegally constructed tin-shed flat and offices in the 6 th floor of Oroni Garden, Plot-15/A, 16/A, 20 of Janata Housing, Road no-15, Mirpur-1, Dhaka-1216
11.	Md. Jahangir Kabir Gong 10.02.2019	Application for taking necessary action by RAJUK for construction of 10 storied building not following RAJUK approved design and illegally construction of boundary wall.

Enclosure: as stated 11(eleven) copy of allegation

Sd/- 18.2.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Director Zone-3
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.46 Estha:

Date: 7 Falgun 1425
19 February 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	Mejor Sheikh Mujibur Rahman (Rtd), 12.02.2019	Illegally construction of road by penetrating personal road of my house excluding fixed road shown in the metropolitan map
2.	Md. Nurul Islam Gong 04.02.2019	Allegation against construction of house illegally on the only road of our old house and thus restricting movement of the inhabitation of three houses. This is a threat to our existence and security. For this reason application for taking necessary action to open the road

Enclosure: as stated 02(two) copy of allegation

Director Zone-3
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 18.2.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.47 Estha:

Date: 7 Falgun 1425
19 February 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	S. K. Selim Reza 11.02.2019	Recommendation for stopping illegal construction on a land of 1 (one) katha only in 299/1/A, East Nakhalpara, Tejgaon, Dhaka
2.	Dr. Md. Abdul Hannan 12.02.2019	About giving sample signature

Enclosure: as stated 02(two) copy of allegation

Director Zone-4
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 18.2.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.62 Estha:

Date: 21 Falgun 1425
05 March 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	Md. Ataur Rahman 13.02.2019	About solution of my application sent to you on 17.12.2018
2.	Kazi Niaz Mohammad 20.02.2019	Disposal of appeal lawsuit and meanwhile application for stopping of construction work
3.	M. Shah Jalal 20.02.2019	About construction of multistoried buildings violating RAJUK rules form Mirpur DOHS road to Balughat Bazar crossing
4.	Md. Abul Hossain 20.02.2019	Eviction/allegation about illegal establishments
5.	Md. Nurul Islam 14.02.2019	Allegation for construction of building illegally leaving no space for road.

Enclosure: as stated 05(five) copy of allegation

Director Zone-3
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 05.03.19
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

Rajdhani Unnayan Kartipakkha
RAJUK Building, Dhaka

Memo no: 25.39.0000.046.000.06.27.19.63 Estha:

Date: 21 Falgun 1425
05 March 2019

Subject: About disposal of allegation

With reference to the above mentioned subject it is requested to resolve the under mentioned allegations (enclosed) submitted to the Chairman, RAJUK for illegally constructed/under construction building and send progress of implementation to the under signed.

Serial no	Applicant's name and submission date of allegations	Subject of allegations
1.	Md. Mohiuddin Milon 20.02.2019	Application for stopping of construction work of House no-112

Enclosure: as stated 01(one) copy of allegation

Director Zone-4
Rajdhani Unnayan Kartipakkha, Dhaka

Sd/- 05.3.2019
(Tanjila Khanam)
Director (Development control-1)
Rajdhani Unnayan Kartipakkha, Dhaka

CHAPTER 3. REPORT ON FIELD OBSERVATIONS OF BUILDINGS

3.1 BACKGROUND

Situational Analysis is the first task of the project on developing the “Building Code Implementation and Enforcement Strategy.” The Terms of Reference of the project requires that the consultant prepares an initial assessment on various code enforcement violations. The present section reports on an analysis of violations of different aspects of the code provisions. Information regarding such violations were obtained through field observations. The present section describes the code provisions that were checked during field observations, building types inspected, overall methodology of the inspections and the findings.

Bangladesh National Building Code (BNBC) was made to regulate the technical details of building construction and to maintain the standard of building construction with the objectives to provide safe and healthy habitat by regulating all activities related to buildings such as planning, design and construction. It was also intended to provide guidance for a uniform start of practice in planning, design, construction aspects as well as service facilities such as electrical, mechanical, sanitary and other services.

BNBC was first drafted in 1993 by the House Building Research Institute (HBRI). 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. This year it was also published as a gazette from Bangladesh government. In 2017, the HBRI published the second and significantly modified version of BNBC. However, the updated version is not yet published as a gazette by the government. For that reason, BNBC-1993 (2006) has been considered for the purpose of this study.

Bangladesh National Building Code, BNBC-1993 (2006), contains total ten parts:

- Part-1 consists of the scope of the code, definitions of terms and abbreviations of names.
- Part-2 consists of administrative and enforcement part.
- Part-3 consists of general building requirements, control and regulations part.
- Part-4 consists of provisions and requirements for fire protection.
- Part-5 consists of the specifications of building materials e.g. masonry, steel, cement, concrete, flooring materials, timber etc.
- Part-6 specifies the requirements of structural design of buildings, structures and other components.
- Part-7 describes the requirements for construction practices, safety and demolitions.

- Part-8 consists of the building services e.g. HVAC system, lighting, electrical installations, water supply, sanitations, Lifts, escalators, moving walks etc.
- Part-9 specifies the provisions of any alteration, addition and changes of use of existing buildings.
- Part-10 describes the specifications and requirements for various types of signs and outdoor display.

Provisions of Parts 3, 4, 6, 7 and 8 have mainly been checked during the building inspections carried out for the present study.

3.2 OBJECTIVES

The main objectives of the current study are-

- i. Identifying criteria from BNBC-1993 (2006) which are possible to assess without detailed analysis.
- ii. Prioritizing the criteria according to their ease of data collection and importance.
- iii. Proposing a methodology for assessment of buildings.
- iv. Identifying challenges during data collection procedure.
- v. Finding percentages of compliance with code for each criterion.
- vi. Determine reasons for violations.

3.3 SCOPE OF THE STUDY

Current study focuses on the buildings that were built after 2006. Mainly residential and some commercial buildings have been considered for this purpose. The geographical distribution of the inspected buildings over the Dhaka Metropolitan Development Plan (DMDP) area of RAJUK's jurisdiction are shown in Figure 3-1.

The scope of the study is given below-

- i. BNBC-1993 (2006) is used for compliance checking purpose.
- ii. Both fully constructed buildings and under construction buildings are within the scope of this study.
- iii. Only RCC buildings are considered for making the checklist of code compliance and survey. Other types of buildings are excluded from consideration.
- iv. Criteria which cannot be assessed easily by using BNBC-1993 (2006) are checked by using common recognized practices of structural engineering. (Details are given in the checklist).

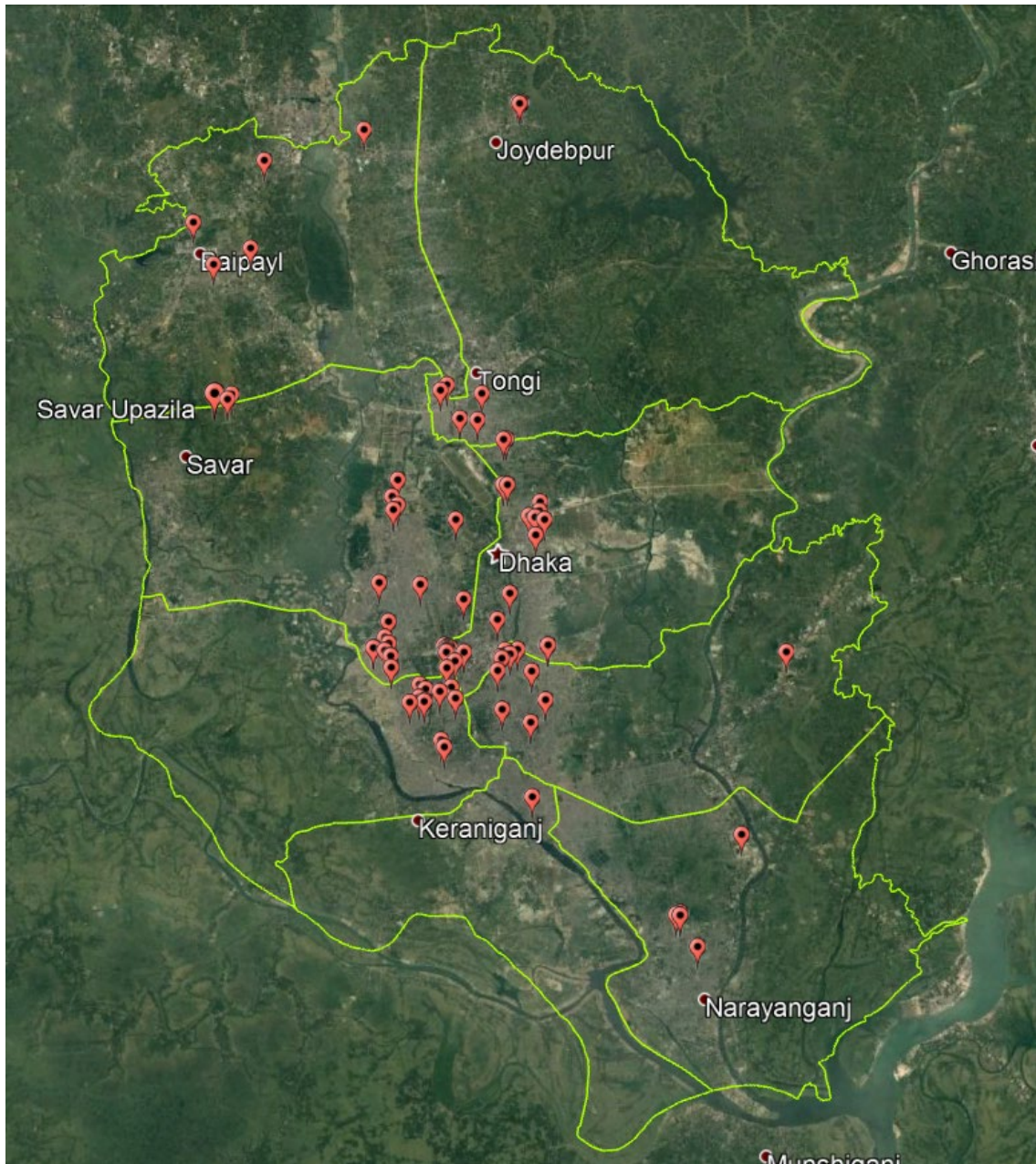


Figure 3-1: Geographical distribution of the inspected buildings

3.4 METHODOLOGY

Current study can be divided into four phases. Making a checklist from BNBC-1993 (2006) for the code compliance is the first phase. The second phase involves survey in different buildings and data collection. In the third phase, the criteria for the checklist are prioritized according to the ease of gaining data and for each criterion of the code, compliance has been examined. In the last phase, reasons of violations of code provisions as perceived by architects, engineers and developers have been recorded through interviews.

3.4.1 Making Checklist from BNBC-1993 (2006)

BNBC-1993 (2006) has been followed for obtaining building assessment criteria. The checklist is divided into seven main parts:

- a. Architectural requirements of constructed or under construction buildings.
- b. Structural requirements of constructed or under construction buildings.
- c. Construction practices and safety provisions for under construction buildings.
- d. Fire safety requirements of constructed buildings.
- e. Plumbing requirements.
- f. Mechanical requirements.
- g. Electrical requirements.

Structural requirements part has been sub-divided into two sections-

- i. The structural criteria that can be assessed without structural drawing and
- ii. The structural criteria that can be assessed when structural design drawing is available.

To select the criteria for assessment from BNBC-1993 (2006), the main focus has given on whether the criteria can be assessed visually i.e. without detailed structural analysis or not. Criteria which can be assessed without much effort are selected for assessment. Only RCC building criteria have been considered to make the checklist. The whole checklist is given in Annex 3A of this report.

3.4.2 Survey and Data Collection

Mostly residential buildings have been selected for data collection. Few commercial and industrial buildings have also been assessed. Survey team has tried to gain permission for measurement and taken oral interview from the caretaker or owner of the buildings. Measurements have taken using simple instruments i.e. laser meter and steel tape (Figures 3-2 and 3-3).



Figure 3-2: Laser meter



Figure 3-3: Steel tape

Data were manually recorded on spot and afterwards data were recorded electronically in Microsoft Excel. Oral questionnaire involved the date of construction, presence of permit for work, occupancy type of the building etc. Design drawings are assessed where available.

Challenges faced during survey procedure

- a. Permission for data collection could not be gained from some buildings due to absence of owner or caretaker at that specific time. So, time is an important factor for gaining accessibility. If possible, usual office hours have to be avoided while surveying is being done randomly. Another solution can be making an appointment with the owner of the building prior to the day of surveying.
- b. For already constructed buildings, generally permission of taking measurements could be gained only from ground floor, caretakers usually do not give permission to go upstairs.
- c. No structural drawing or data was provided in most of the fully constructed buildings. According to the caretakers of the building, drawings are not kept in the buildings in most of the cases.
- d. In case of under-construction buildings, persons present on the construction sites were sometimes unwilling to share the structural drawing with the surveyor team. A criterion for satisfying BNBC for HVAC and lifts and escalators systems couldn't be found for this case. Fire protection arrangements couldn't be observed since such arrangements were still not installed.
- e. Information regarding construction safety varies from phase to phase. For proper inspection of under construction building, visits during different phases of construction is needed to be done.
- f. As all units of a building could not be observed for permission issues, all air conditioning units and ventilation systems could not be checked.

3.4.3 Prioritizing Criteria and Examining Compliance with Code

After conducting several surveys, it has been found that some data can be obtained easily and some are difficult to obtain. Based on the ease of collecting data and their importance for proper living quality the checklist has been sorted. The architectural part of the checklist has been divided into three categories:

- i. **Priority category-1** contains the factors that can be assessed easily and has significant impact.

- ii. **Priority category-2** and
- iii. **Priority category-3** with less importance and ease of collecting data comparatively.

Structural data have been sorted according to different elements of a building e.g. foundation, beam, column, slab, RC wall etc.

Data from under-constructed buildings have been sorted into four categories:

- i. **Category-1** includes planning requirements i.e. approval for temporary structures, requirements for site preparation and provision of first aid attendant.
- ii. **Category-2** includes provisions for protection of public and workers, protection of public and private property.
- iii. **Category-3** includes safety requirements of workmen, site precautions and toilet facilities.
- iv. **Category-4** includes requirements for excavation and foundation works, using pile rig, erection operations and protection for construction hazards.

In case of Fire Protection, data has been sorted in categories:

- i. **Category-1** includes architectural requirements in the building for fire protection which should be acted as Means of Egress while the Building is on fire applicable for all occupancy type (residential, commercial & Industrial)
- ii. **Category-2** includes requirements for Fire Protection Plumbing e.g. water sources and arrangements for fire protection.
- iii. **Category 3** includes special requirements based on occupancy.

3.5 DATA COLLECTION

The survey locations that have been covered are mainly part of DMDP (Dhaka Metropolitan Development Plan) area. The location covered are- Nikunja-2, Uttara, Bashundhara Residential area, Gulshan, Pallabi, Mirpur, Mohakhali, Banasree, Banani, Monipuri Para, Mohammadpur, Farmgate, Moghbazar, Dhanmondi, Old Town, Kamalapur, Bijoy Nagar, Narayanganj, Gazipur, Bhatara and Savar as shown in Figure 3-1.

Details of the collected data are shown below:

Total Number of Buildings Surveyed	87
Number of fully constructed building	77
Number of under construction building	10

Among the 87 buildings surveyed:

- Architectural drawing (RAJUK approval document) was shown in 35 buildings and structural detailed drawing was shown in 32 buildings.
- 5 buildings were commercial, 3 buildings were mixed use type (commercial-residential and commercial-office buildings), 9 buildings were industrial and the remaining were residential buildings.
- 13 buildings were above ten storied and the remaining buildings were in between one to ten storied.

3.6 DATA ANALYSIS

3.6.1 Architectural requirements

Some general information of buildings has been collected. They are listed below-

Height restriction from Civil Aviation	3.5% violation
Separation of buildings in the same plot	Separation gap for buildings in the same plot has been maintained in 100% case
Land use classification	Residential, commercial, industrial or mix use type
Occupancy type	A2 for residential, F1,F3 for commercial and G1, G2 for industrial
Number of buildings in the plot:	1 building for 100% residential and commercial buildings of the plot
Air-conditioned or not	8% air conditioned

3.6.1.1 Priority category-1

For this priority category the trend found is shown in Figure 3-4.

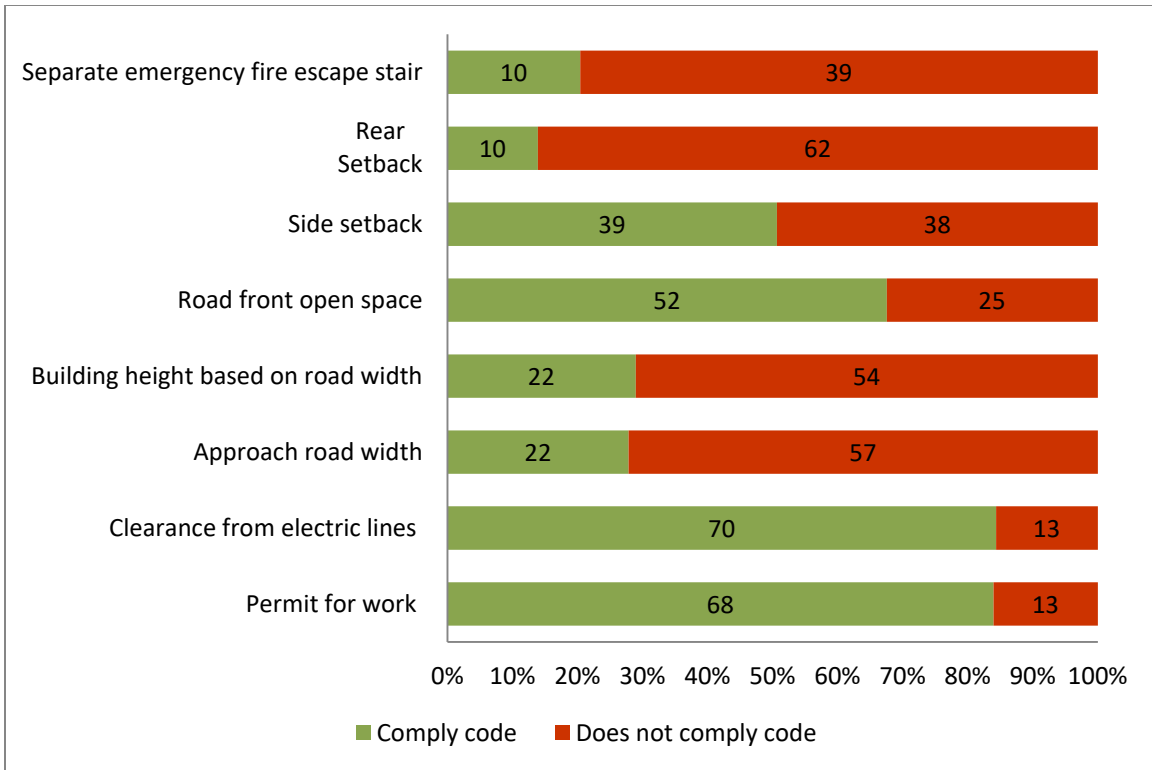


Figure 3-4: Percentage of code compliance for priority category-1

For the 87 samples surveyed, it is found that:

- 84% owners or caretakers of the buildings claim to have permit for work. Among them 52% of the owners have shown the evidence of permission and the rest have given assurance verbally.
- Clearance from electric lines criteria is not always maintained fully. About 84% of the surveyed buildings show compliance with code while the rest don't comply with the code.
- The approach road width criterion is considered for new development. Based on plot size there is a width requirement for approach road. It is maintained only in 28% of the buildings. The mean deviation of road width is approximately 3.75 meter.
- In BNBC-1993 (2006), there is a clause in part 3 (section 1.8.2) about the regulation of maximum limit of building height based on road width. This criterion is maintained in only 29% of the buildings. Detailed analysis has been done on this part in following section. For industrial buildings, this criterion is not violated since large front open space is maintained.
- The minimum requirement for road front open space has been maintained by 68% of the buildings.
- Side setback has been maintained in 51% buildings and rear setback has been maintained in only 14% buildings.
- Approximately 20% of the buildings have ensured separate emergency fire escape stair.

Building height based on road width

In BNBC-1993 (2006), height limit of buildings should be based on approach road width and front open space. However, among the buildings surveyed, 71% violate this criterion. A detailed analysis on this violation has been presented in this section.

In Figure 3-5, percentages of buildings for different ranges of height violation (%) have been shown. It has been obtained that, the mean violated height is approximately 8.22 meter.

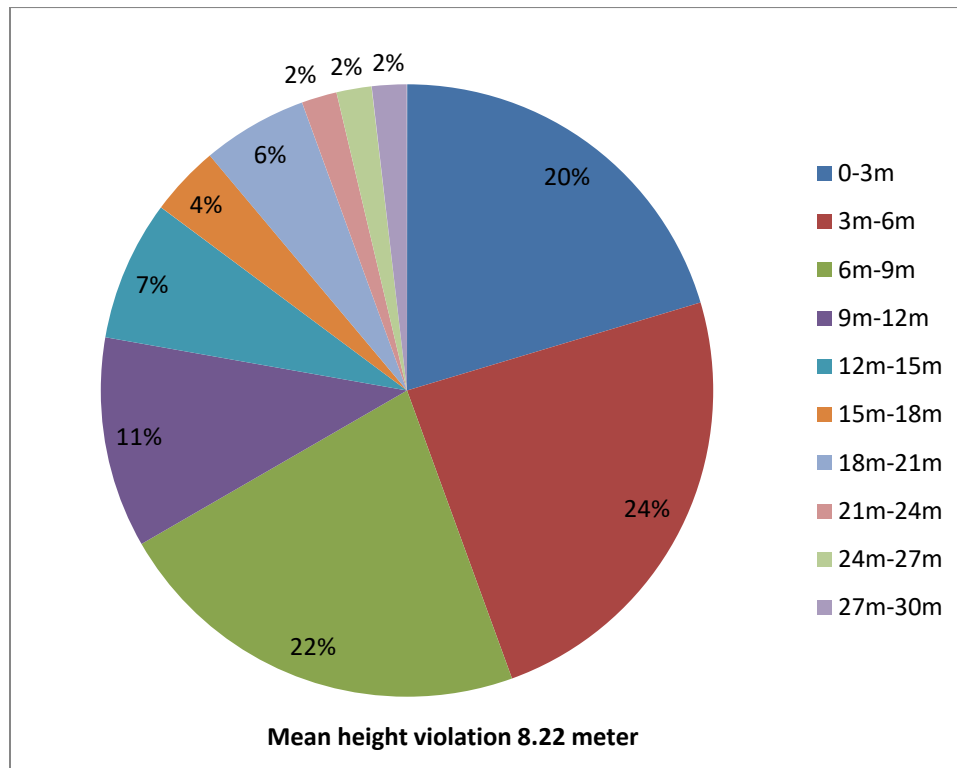


Figure 3-5: Percentage of building for different ranges of height violation

From Figure 3-5, it is evident that,

- On an average, buildings are constructed 8.22 meter higher than their acceptable limit.
- Among the buildings that violate the acceptable height limit, 20% exceeds their height limitation up to 3 meter, 24% building exceeds the limit by 3 meter to 6 meter, 22% building exceeds the limit by 6 meter to 9 meter, 11% building exceeds the limit by 9 meter to 12 meter, 7% building exceeds the limit by 12 meter to 15 meter.

Another attempt has been made to determine whether height violation is common in buildings above ten stories or buildings less than ten stories. Figure 3-6 shows a comparison of height violation between tall (above ten stories) and short (one to ten stories) buildings. It is obtained that, 72% short buildings and 54% tall buildings exceed their allowable height limit.

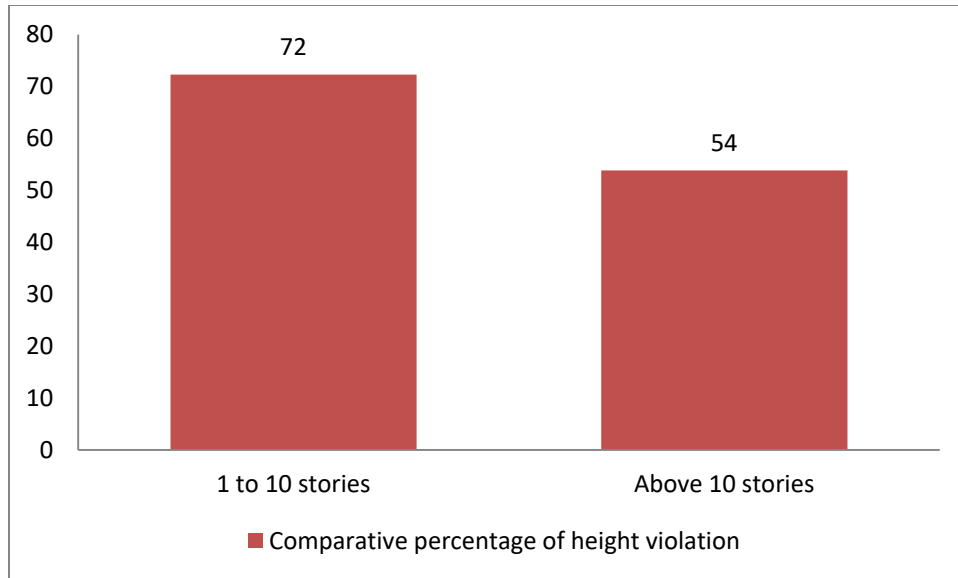


Figure 3-6: Comparative percentage of height violation for tall and short buildings

Finally, height violation of building without having RAJUK permit has been compared with the buildings having RAJUK permit in Figure 3-7. It can be shown that, percentage of height violation without having RAJUK permit 31% whereas violation in buildings having RAJUK permit is 74%.

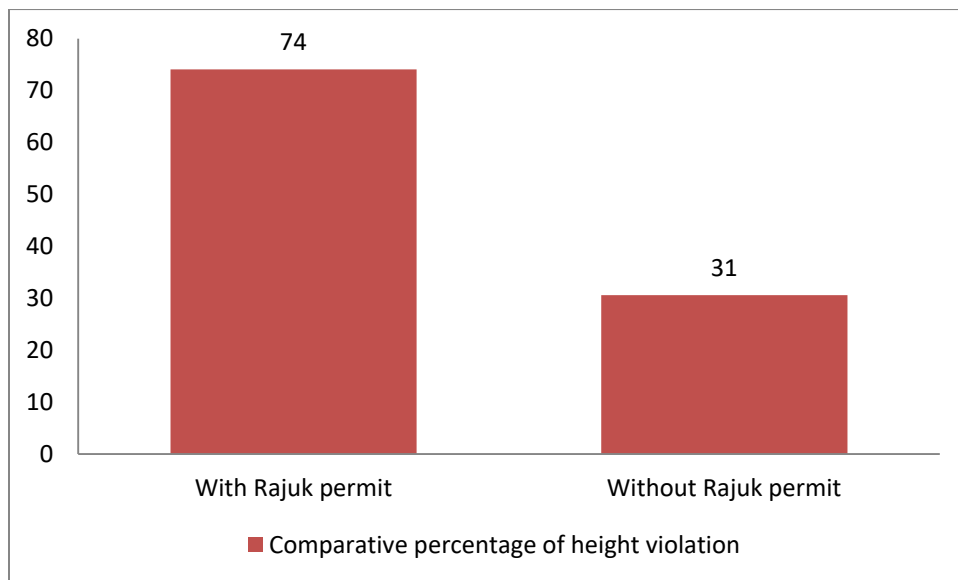


Figure 3-7: Percentage of building that violates height restriction with or without RAJUK permit

3.6.1.2 Priority category-2

- For this priority category the trend found has been shown in Figure 3-8. It is found that-
- Warning sign for not using lift while on fire is provided for only in 16% buildings.

- Minimum clear head room under false ceiling is maintained for 58% of the buildings.
- Width specification of staircase is followed in 70% buildings.
- Minimum height of parapet is maintained in 60% buildings.
- Ramp grade of parking should be 1V:8H which is maintained in 50% of the buildings.
- And provision of providing fire alarm is followed in 81% of the buildings.

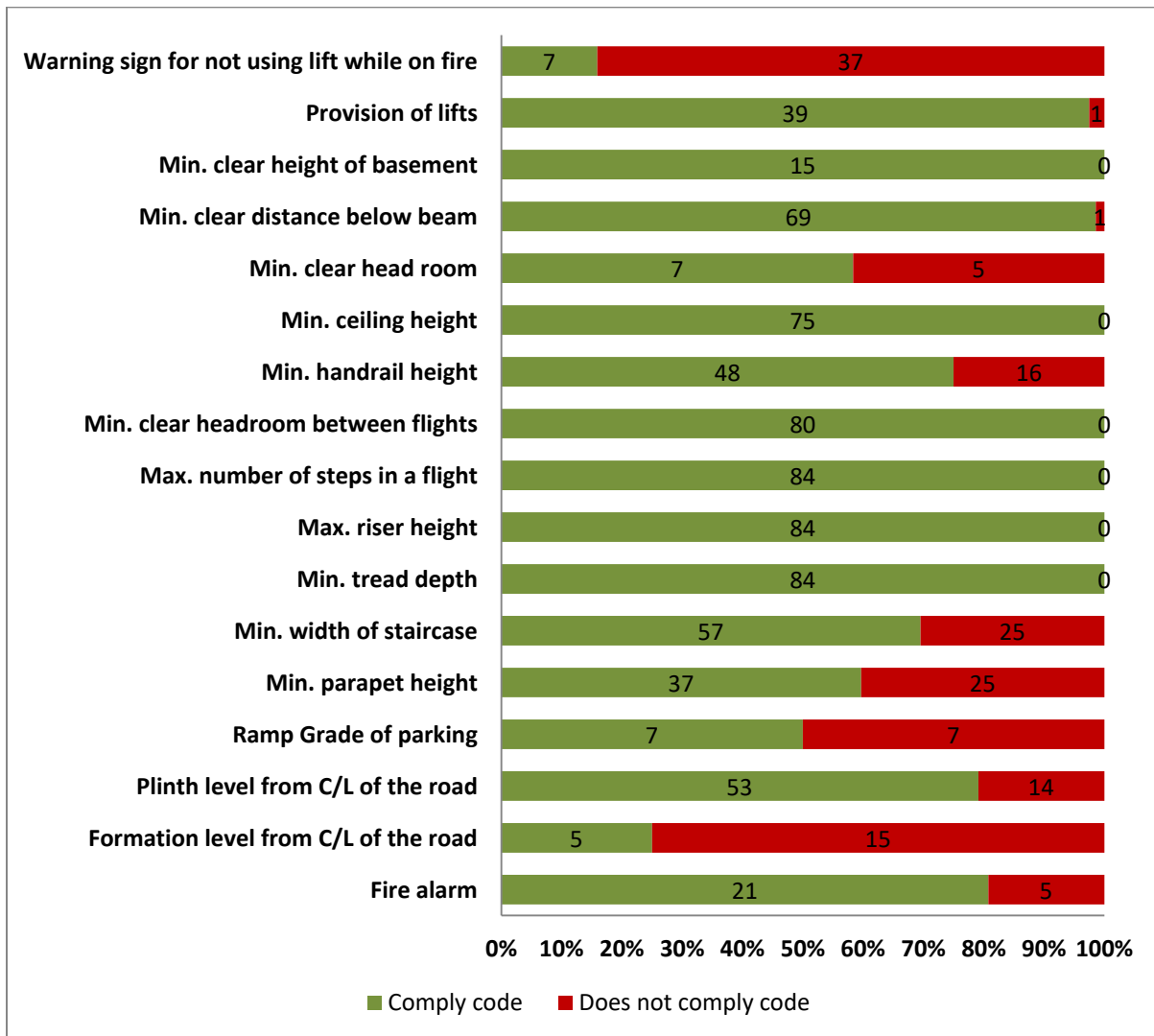


Figure 3-8: Percentage of code compliance for priority category-2

3.6.1.3 Priority category-3

For this priority category the trend found has been shown in Figure 3-9, It is evident that-

- Requirement of total open area is maintained in 55% of the buildings.
- Provision of providing smoke detector is followed in 58% of the buildings.

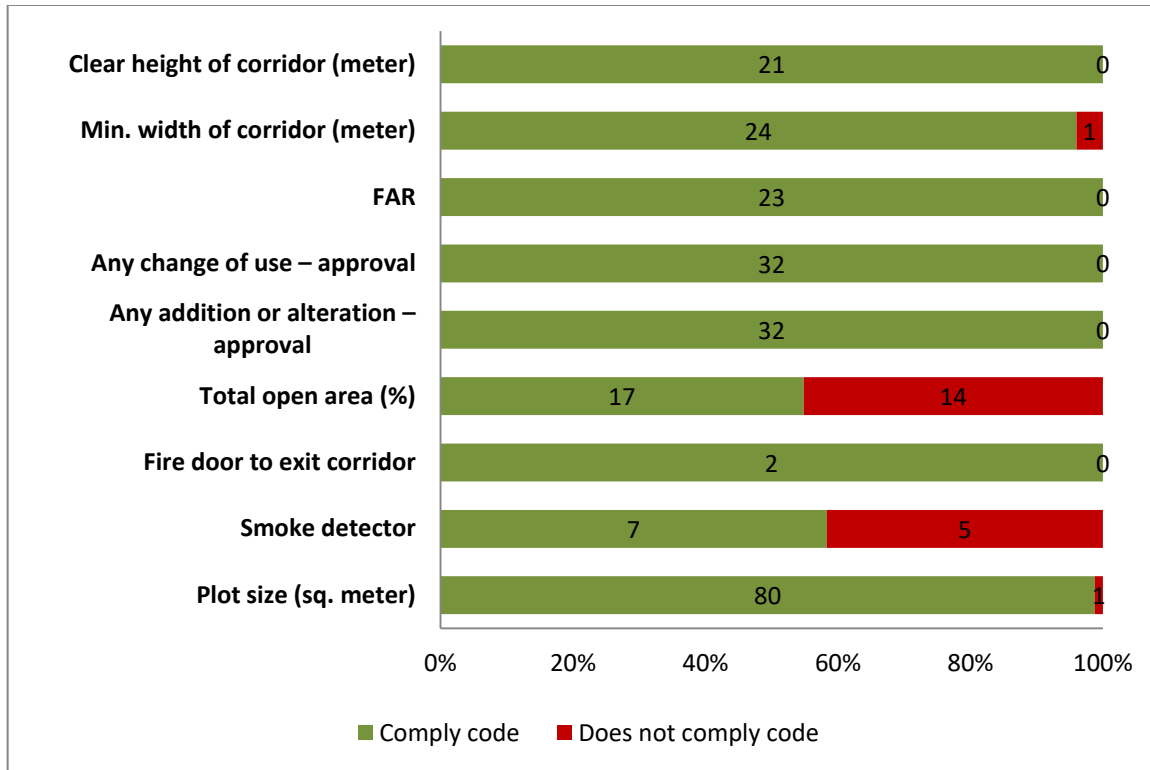


Figure 3-9: Percentage of code compliance for priority category-3

3.6.2 Structural requirements

3.6.2.1 Structural criteria compliance with data collected without drawing

The following information have been found during survey-

Building or non-building structures	100% building structures	
Structure Importance category	100% of standard occupancy	
Slenderness	No slender building	
Torsional irregularity	32% with torsional irregularity	68% with no torsional irregularity
Soft story check	60% with possibility of being soft story	40% with no possibility of being soft story
Unsupported masonry wall	2.5% with unsupported masonry wall	In 97.5%, no unsupported masonry wall
Pounding effect	4.25% with possibility of pounding effect	95.75% with no possibility of pounding effect

Among the buildings:

- The foundation types found were- RC single footing, RC combined footing, pile foundation, mat foundation and precast piling with mat foundation.
- Not posting of live load has been found.
- Information about one-way slab thickness could not be obtained.
- Column dimensions have been measured from field and their factor of safety have been calculated based on National Tripartite Plan of Action on Fire Safety and Structural Integrity (NTPA) 2013. Figure 3-10 shows a comparison among the factor of safety of central, edge and corner column.

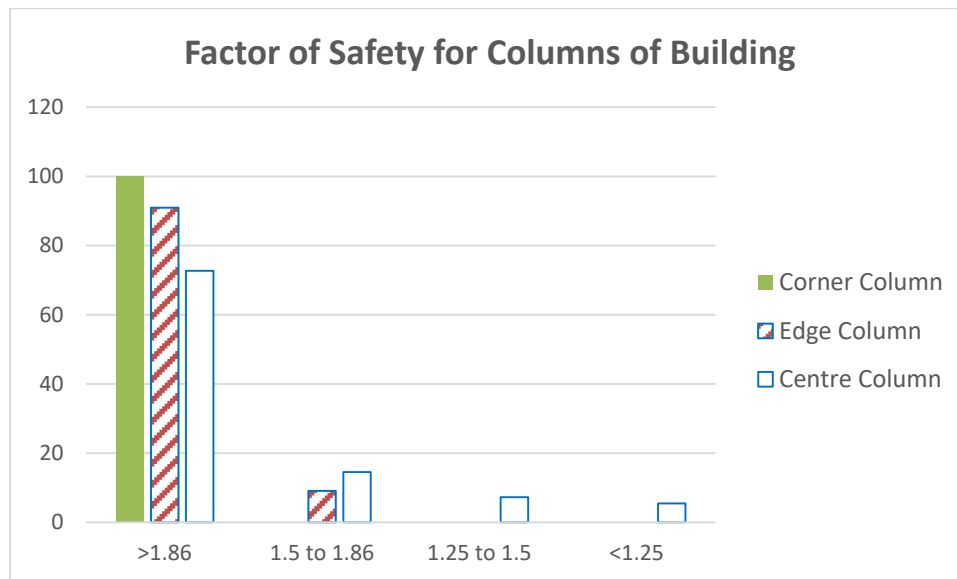


Figure 3-10: Factor of Safety for Columns of Building

- 5 flat plate buildings have been found. Shear check has been done on this type of slab. Factor of safety obtained for two buildings is greater than 1.499 and for remaining is greater than 1.859.
- No flat slab structure has been found.
- Percentage of code compliance has been shown in Figure 3-11 for beam, slab and wall. Minimum thickness of RC beam, cantilever slab is maintained in approximately 93% of the buildings.
- Thickness of two way slab has been checked from serviceability criterion. This criterion is maintained in 94% of the buildings.

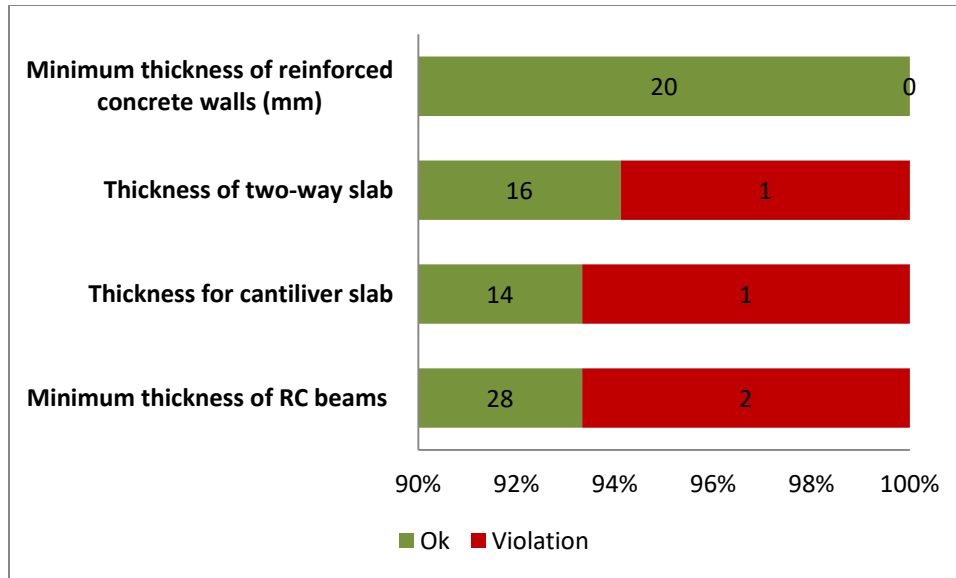


Figure 3-11: Percentage of compliance for structural part (without drawing)

3.6.2.2 Structural criteria compliance with data collected with drawing

The following Figure 3-12 shows the trend found for structural category (data obtained from structural drawing). It is obtained that-

- Specifications of stirrup spacing in beams are followed by 66% of the buildings and specifications of tie spacing are followed by 73% of the buildings.
- Corner reinforcement is provided for 71% of the buildings.
- Cover for reinforcement in columns is maintained in approximately 77% of the buildings.

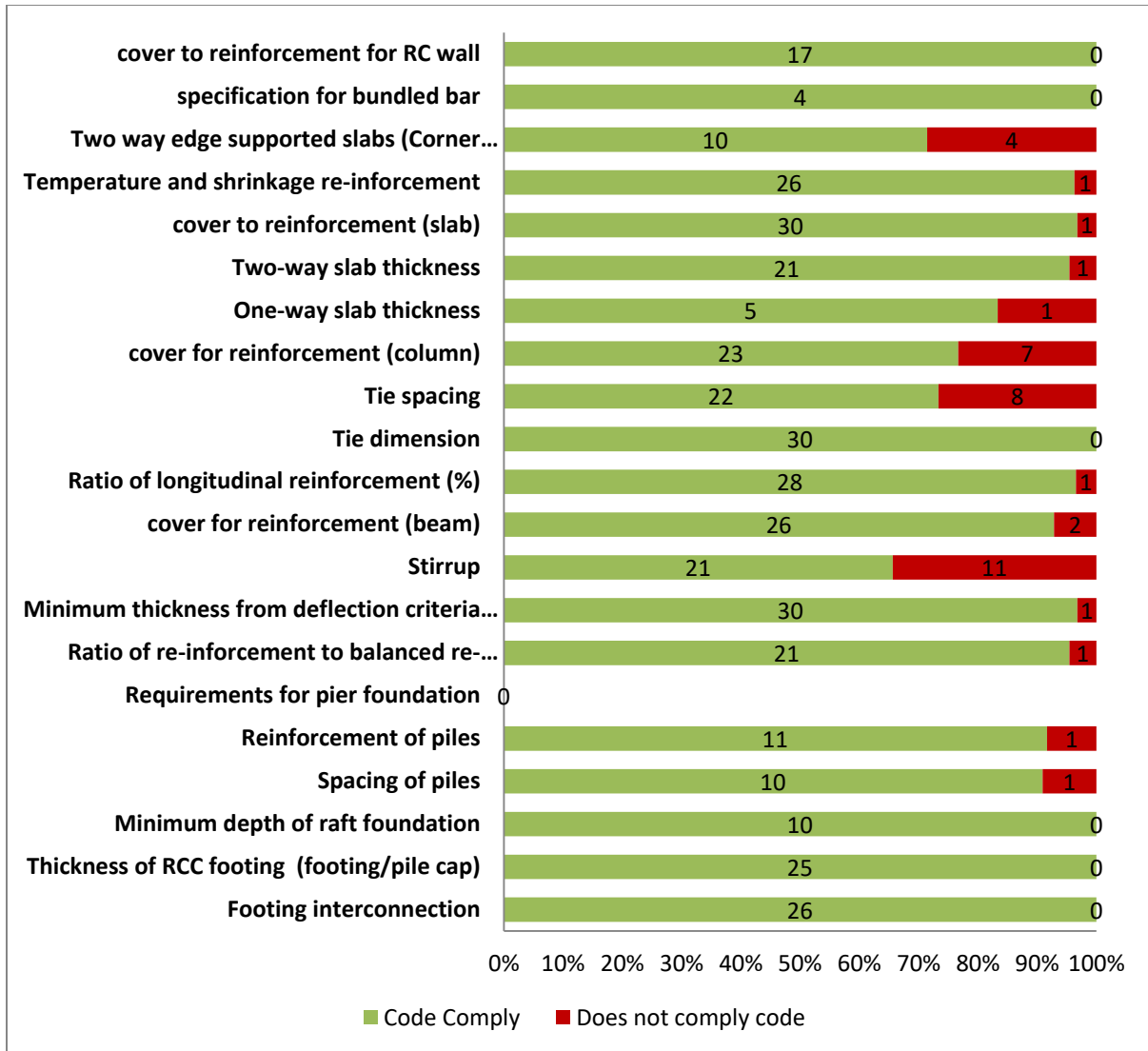


Figure 3-12: Percentage of code compliance for structural part with drawing

3.6.3 Construction practices and safety provisions for under-construction buildings

The percentages of buildings that violate the BNBC regarding under-construction safety and practice requirements issues have been discussed in this section. All the criteria have been analyzed based on the four categories.

3.6.3.1 Category-1 (Planning)

In Figure 3-13 percentages of violation have been plotted for category 1.

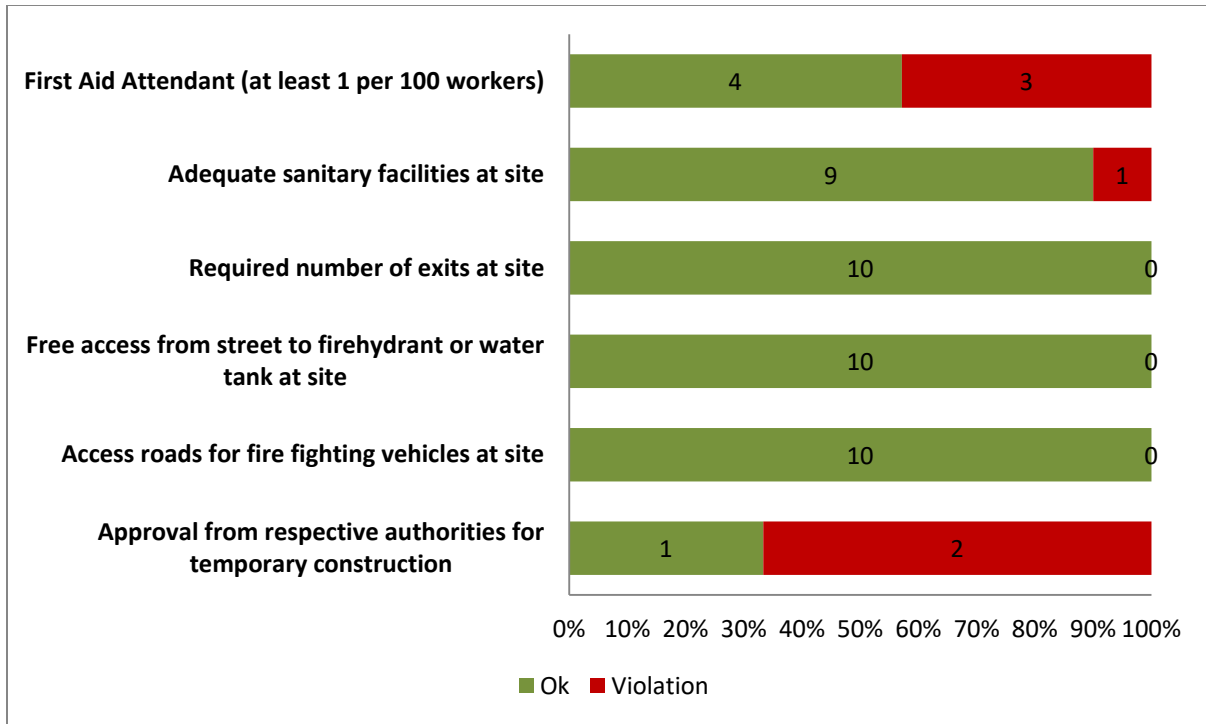


Figure 3-13: Percentage of code violation for category 1

It is found that-

- Necessary approval needed for temporary structures (that might interfere the right of way or utility services) are not taken for approximately 67% of the buildings.
- Sanitary facilities are provided in 90% cases.
- Provision of keeping at least one first aid attendant per 100 workers is not being followed for 42% buildings

3.6.3.2 Category-2 (Protection of public and workers or public and private property)

In Figure 3-14 percentages of violation have been plotted for category 2.

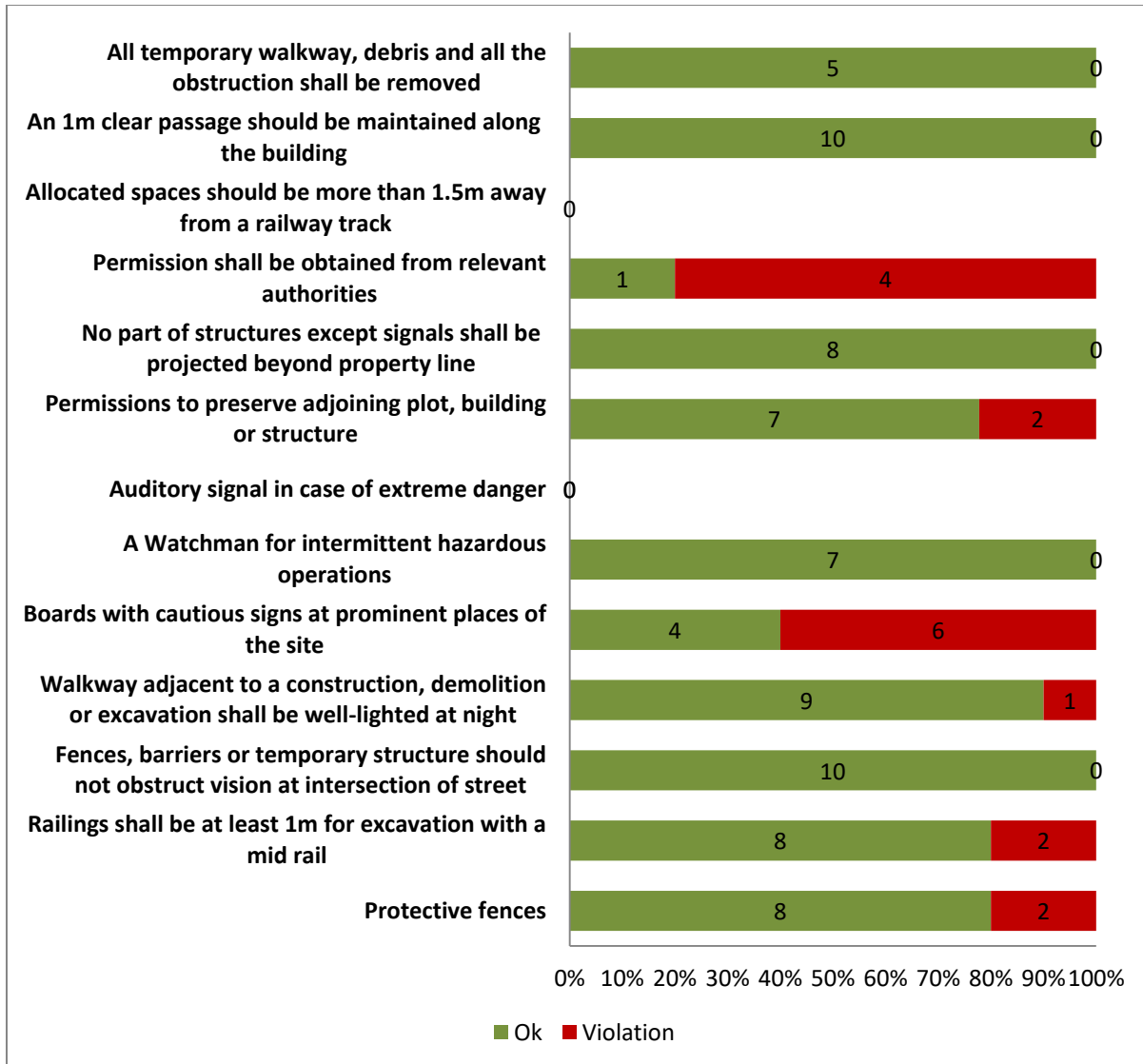


Figure 3-14: Percentage of code violation for category 2

It is found that:

- Necessary permission is not obtained from relevant authorities to use footpaths temporarily in 80% of under-constructed buildings.
- Necessary permission is not obtained by the owner to preserve the adjoining property in 23% of under-constructed buildings.
- Board with cautious signs at prominent places of site is absent for 60% of the buildings.

3.6.3.3 Category-3 (safety requirements of workmen, site precautions and toilet facilities)

In Figure 3-15 percentages of violation have been plotted for category 3.

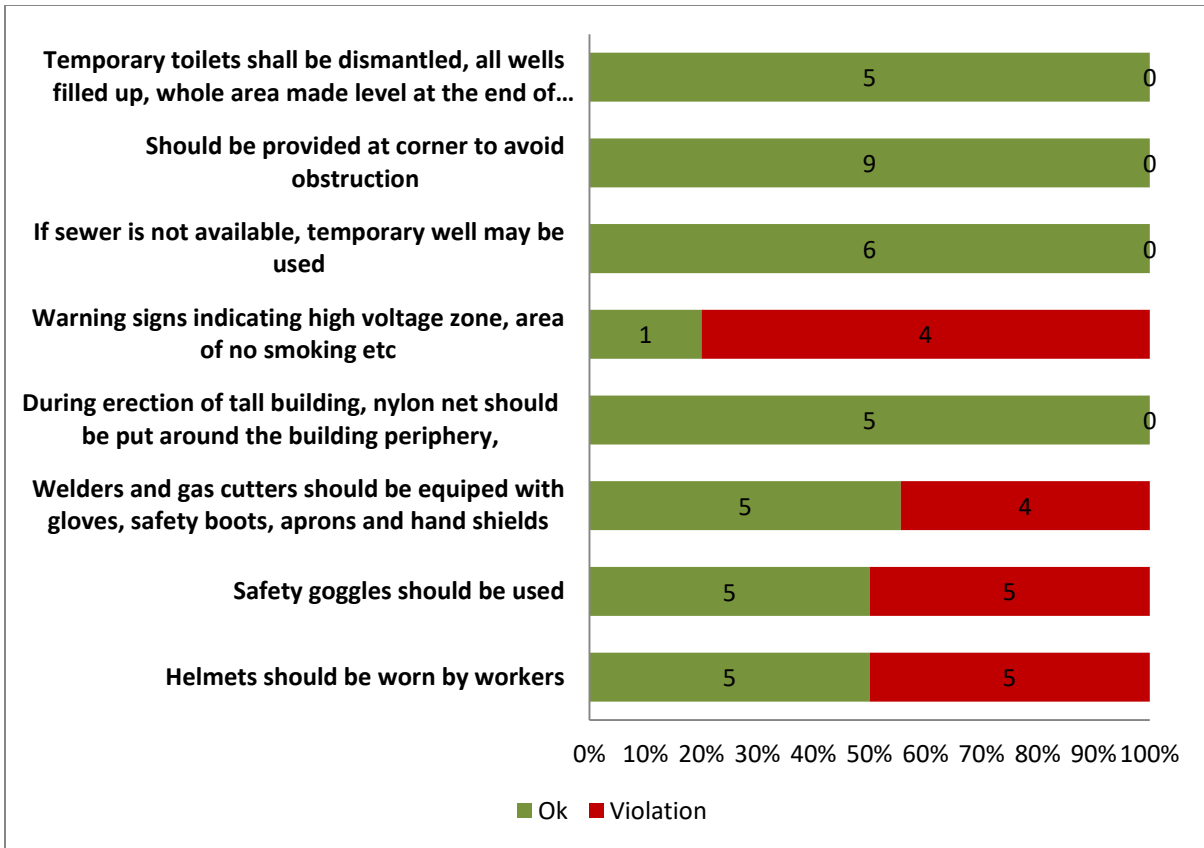


Figure 3-15: Percentage of code violation for category 3

It is found that:

- Warning signs indicating no smoking zone or high voltage zone is absent in 80% of the buildings.
- Safety goggles, helmets are not worn by the workers in 55% of the buildings.

3.6.3.4 Category-4 (Excavation and foundation works, using pile rig, erection operations and protection for construction hazards)

In Figure 3-16 percentages of violation have been plotted for category 4.

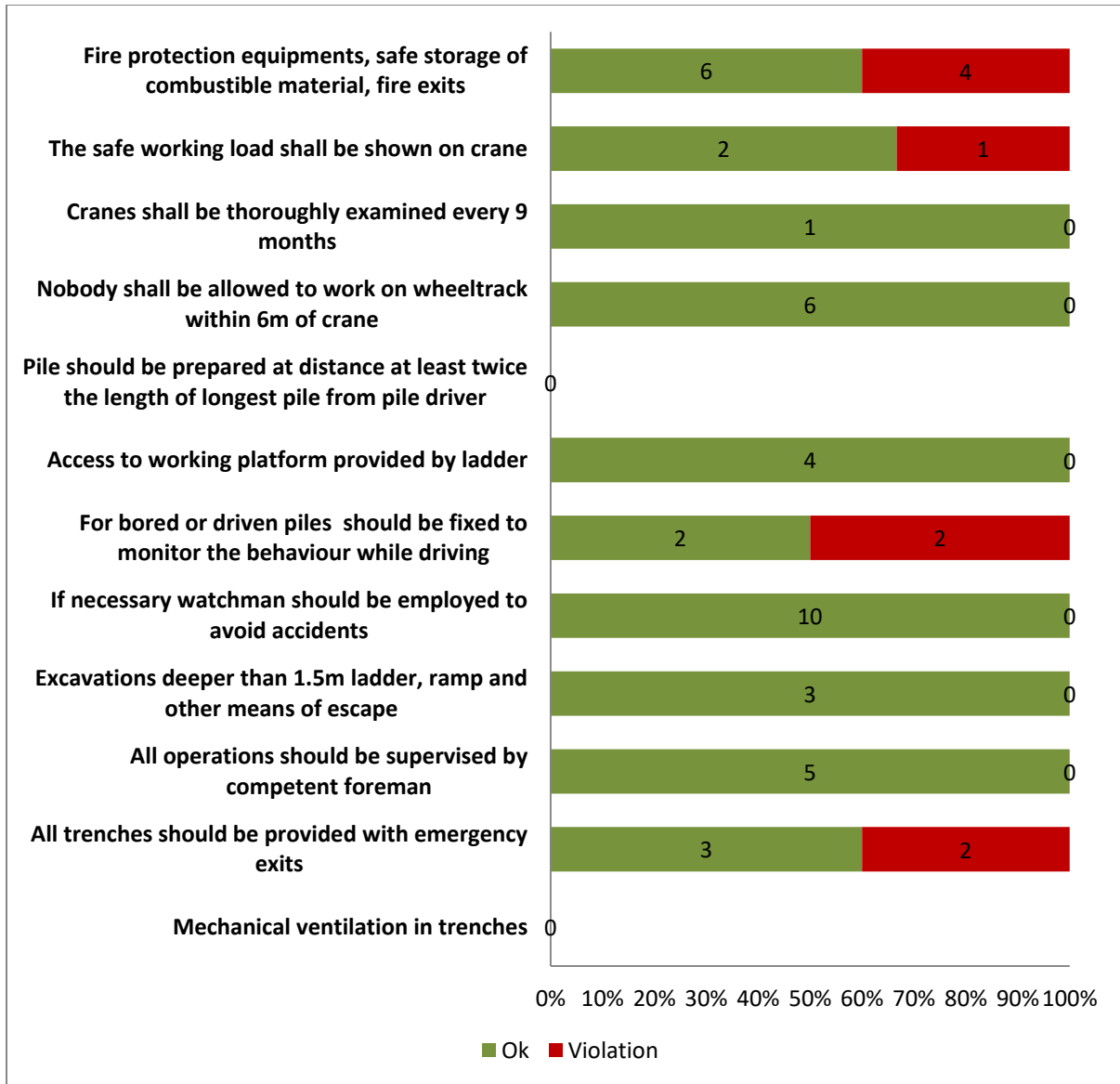


Figure 3-16: Percentage of code violation for category 4

It is found that:

- Trenches are not provided with emergency exits in almost 40% cases.
- No monitoring devices for bored or driven piles during erection to monitor the behaviour.

3.6.4 Fire Protection Requirements

All data are analyzed for 29 criteria selected from clauses of BNBC-1993 (2006) for fire protection. 23 of these criteria are checked for all occupancy type, other 6 criteria are checked based on occupancy type.

Details of the collected data for fire protection are shown below:

Total Number of Buildings Surveyed	47
Number of fully constructed building	39
Number of under construction building	8
Number of Residential Buildings surveyed	40
Number of Commercial Buildings surveyed	2
Number of Industrial Buildings surveyed	5

3.6.4.1 Category-1 Means of Escape/Egress

This category of fire protection compliance is applicable for all occupancy types.

For this category the Figure 3-17 shows the percentage compliance and noncompliance by green and red colour respectively. Values inside the coloured lines are values of number of samples for which the criterion could be analyzed.

For example, for the criterion of minimum width of doorways,

- Number of buildings for which data was found = 47
- Number of buildings comply code =27
- Number of buildings does not comply code = 20
- Percentage of compliance = 57%

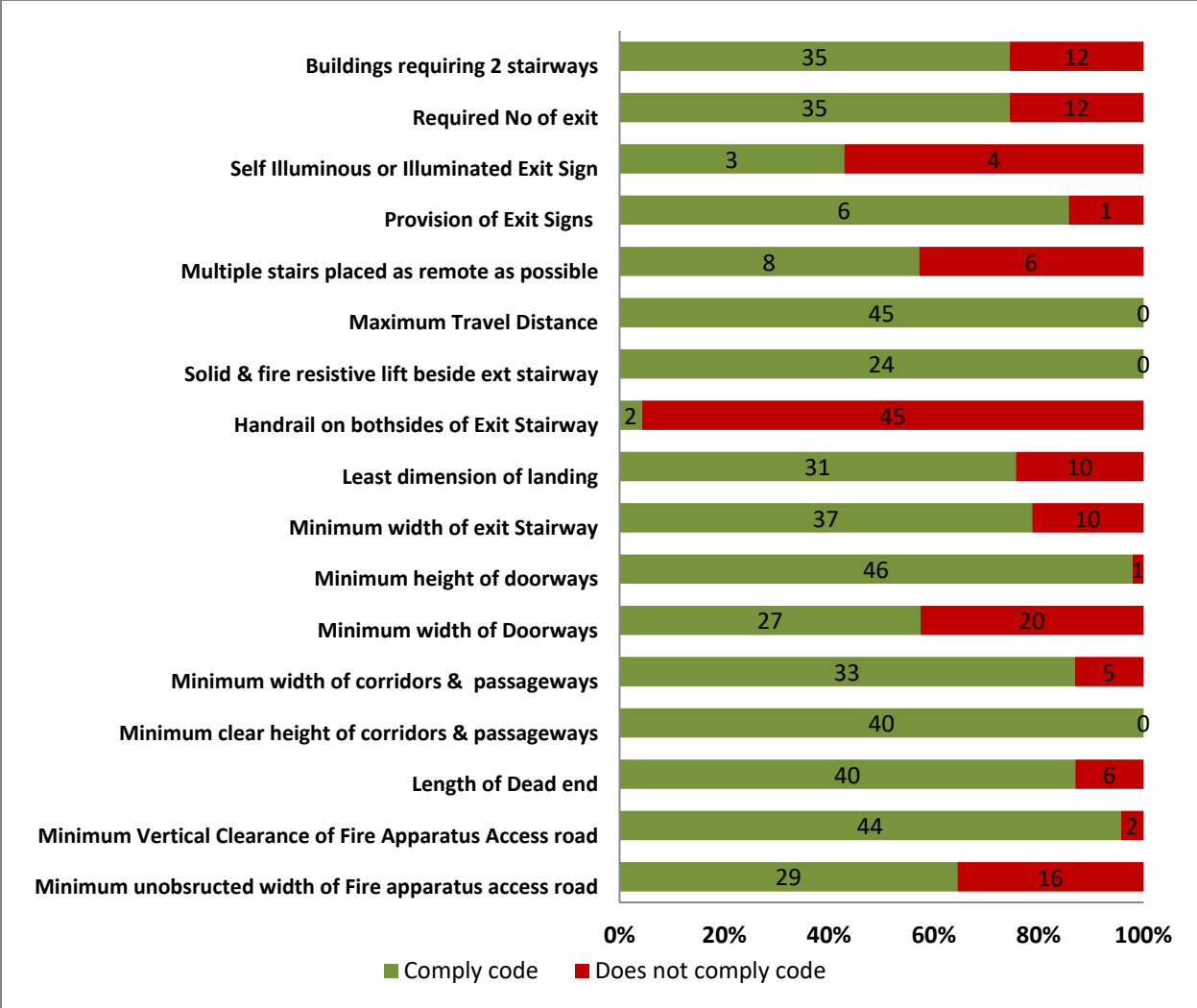


Figure 3-17: Percentage of code compliance for category-1

For the 47 samples surveyed, it is found that:

Fire Apparatus Access Road

- Minimum Requirement of Unobstructed width of 4.5m has been followed by 64% of the buildings.
- The criterion of minimum vertical clearance of 5m was followed by 96% of the buildings.

Corridors & Passageways

- In the buildings where corridor to fire exit is not found, lobby is considered as passageways and measurements have been taken and compared with the code.
- In BNBC-1993 (2006), there is a clause that where no exit door is available, the length of dead end shall not exceed 10m. This criterion was violated by 13% of the buildings.

- Minimum required clear height of corridors and passageways as per BNBC-1993 (2006) for Fire Protection was maintained by 100% of the buildings.
- Minimum required width of corridors & passageways varies with occupant load & facilities. 13% of the buildings violated this clause of BNBC-1993 (2006).

Doorways

- Minimum required width of 1m for fire protection is violated by 43% of the buildings.
- 98% buildings maintained minimum required height of doorways of 2m.

Stairways

- Buildings which do not have fire exit/escaping stairways, in the times of building on fire normal stairs would be acted as fire escaping stair. So for buildings without fire exit stairway, measurements have been taken from normal stairs and then checked by the codes of fire exit stair.
- Minimum required width of exit stairway varies depending on their occupancy type. This code of BNBC-1993 (2006) was maintained by 79% of the buildings.
- BNBC-1993 (2006) mentioned that least dimension of landing shall not be less than the width of stairway. 76% of the buildings complied with this code.
- In BNBC-1993 (2006), there is a clause that exit stairway should have handrails and guardrails on both sides. Only 4% of the surveyed buildings maintained this code
- As per BNBC-1993 (2006), lift shaft shall be solid & fire resistive if placed beside exit stairway. 100% of the buildings complied with this code.

Length of travel

Maximum allowed travel distance depending on occupancy varies and from surveyed no building violated this criterion.

- For more than one exits, exits should be placed as remote as possible is the code of BNBC-1993 (2006). 57% of the buildings complied with this code.

Exit Signs & Illumination

Exit signs & illuminations are needed for occupancies other than residential buildings. So these criteria were checked for only commercial & industrial buildings.

- 86% buildings maintained the provision of exit signs
- 43% of the buildings which require self illuminous or illuminated exit signs were found to comply the code of Exit sign illumination.

Required Number of Exits

- There is a clause in BNBC-1993 (2006) which buildings can be served by one means of escape and for other buildings minimum required no of exits are specified on the basis of occupant loads. 74% of the buildings maintained this criterion.
- Clause regarding buildings requiring 2 stairways was violated by 26% of the buildings surveyed.

In this category,

- All buildings complied with these three criteria: maximum travel distance, minimum clear height of corridor & passageways, solid and fire resistive lift shell beside exit stairway.
- Maximum violation was observed on providing handrails and guardrails on both sides of exit stairway. It was found that handrails are not provided along wall side of the exit stairs.
- Almost all buildings maintain minimum vertical clearance for fire apparatus access road and minimum height of doorways.

3.6.4.2 Category-2 Fire Protection Plumbing & arrangements

This category includes fire protection plumbing and fire protection systems in the buildings.

Fire protection Plumbing

According to BNBC-1993 (2006) Part 4 Chapter 4, water stored in storage tank for fire protection operation shall not be used for any other purposes. So it was found that only 64% of the buildings stores water for fire protection.

Fire Protection System

Though as per BNBC-1993 (2006), fixed firefighting arrangement is not required to be installed in residential buildings, still 27% of the residential buildings have provided standpipe and hose system. As per specific requirement for industrial buildings, automatic sprinkler is required for occupancy G2. Instead 4 out of the five industrial buildings have provided standpipe and hose system. And the fifth industrial had no firefighting arrangement.

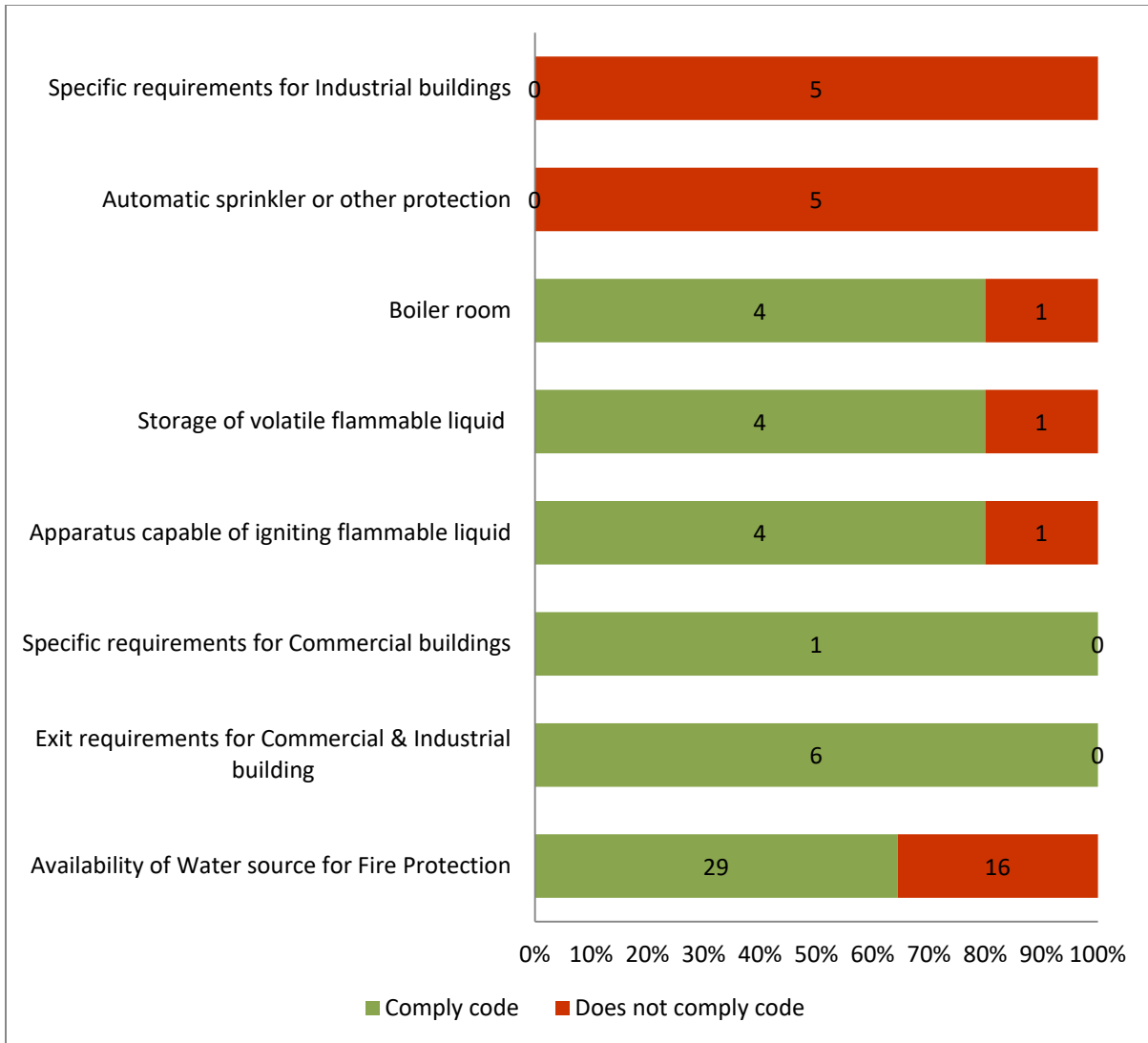


Figure 3-18: Percentage of code compliance for category-2 & category-3

3.6.4.3 Category-3 Requirements based on occupancy

In this category, exit requirements for commercial and industrial buildings and special firefighting requirements for commercial & industrial buildings are taken into account.

Exit requirement for Commercial & Industrial Building

According to BNBC-1993 (2006), for both commercial and industrial buildings, at least two exits shall be provided for each floor including basement. In this study, survey of 2 commercial and 5 industrial building was conducted. 6 of these buildings had two or more exits.

Specific requirements for Commercial buildings

Code of BNBC-1993 (2006) of this criterion is provided in annexure with codes of all other criteria. Among 2 commercial buildings, one was under construction so that building could not be checked. The other commercial building was Occupancy F1 type, had computer installation and electrical switch board/ substation. As per code, the building should have automatic fire alarm system, automatic carbon di oxide fire extinguisher or fixed vaporizing liquid fire extinguisher with portable fire extinguisher and the commercial building had all these required arrangements, thus complied the code completely.

Special hazard for Industrial buildings

Four criteria have been checked under this part for 5 industrial buildings.

- According to BNBC-1993 (2006), no apparatus generating flames capable of igniting flammable vapour shall be permitted within a room or part of building using or storing volatile flammable liquid. 80% of the industrial buildings met this requirement.
- Room or part of building using or storing volatile flammable liquid shall be covered by exhaust ventilation system, this criteria was also maintained by 80% of the industrial buildings.
- Boiler rooms and areas containing heating plants shall be effectively segregated from rest of the occupancy, one out of five industrial buildings violated this criteria.
- Automatic sprinkler or other protections like installation of vents shall be made in all buildings of occupancy G2, all 5 buildings violated this criteria i.e. 100% violation

Specific requirements for industrial occupancy G2

Since all the industrial buildings had area above 750sqm, they shall be fitted with automatic sprinkler system and/ or automatic fire alarm and portable fire extinguisher. Automatic fire alarm was found in only one of the five industrial buildings. No sprinkler or functioning fire extinguisher system was found in any of these buildings. So this provision was violated by all buildings.

Recommendations regarding fire protection

- Awareness shall be increased among architects in case of designing corridors, lobbies, doorways & placement of the multiple stairways so that architectural design satisfies the required dimension of means of egress for fire protection.
- Awareness shall be increased among house owners so that at least sufficient amount of water is stored in storage tank only for firefighting.
- By observing recent fire incidents and their consequences, government should take steps for installation of fire hydrants along roadside for firefighting.

3.6.5 VISUAL ASSESSMENT OF BUILDING SERVICES OF PLUMBING INSTALLATION

In Figure 3-19 percentages of violation have been plotted for plumbing system in 37 buildings

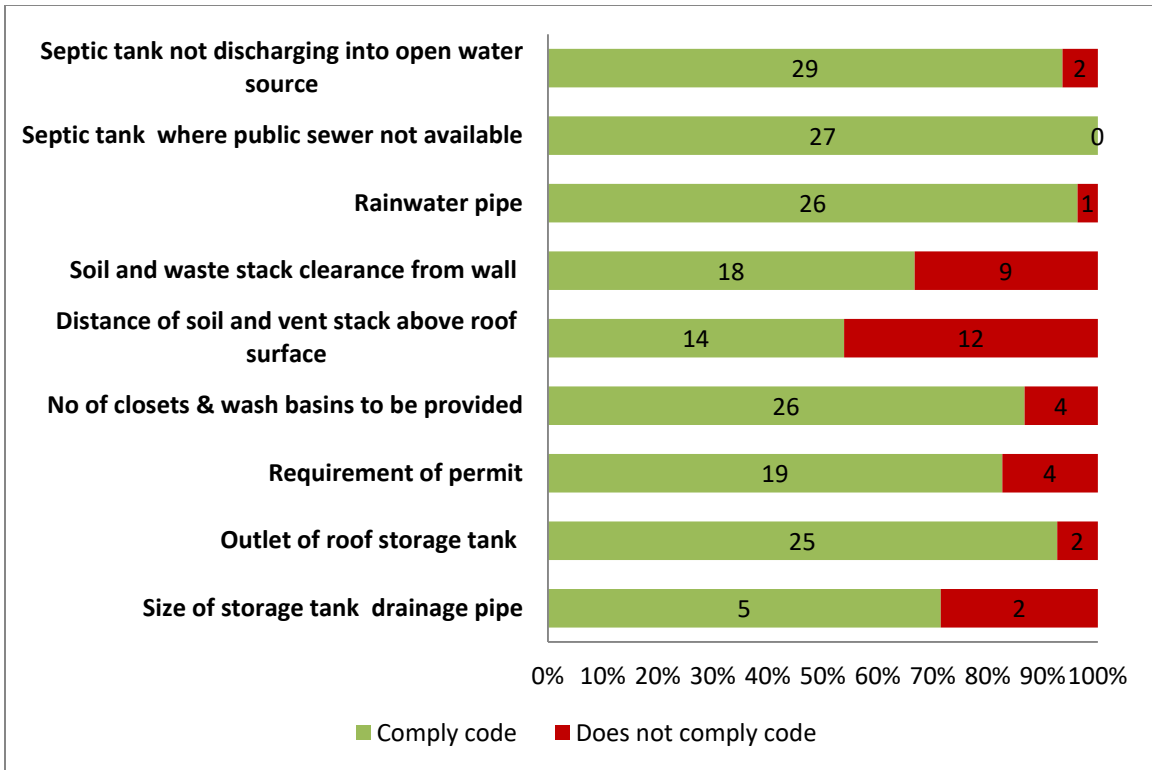


Figure 3-19: Percentage of code violation for plumbing system

Among 37 buildings surveyed it is observed that-

- Minimum distance of soil and vent stack above roof surface is being maintained in 54% of the buildings
- Soil and waste stack clearance from wall is followed by 67% of the buildings.
- Size of storage tank drainage pipe is maintained in 71% of the buildings

3.6.6 VISUAL ASSESSMENT OF BUILDING SERVICES OF MECHANICAL INSTALLATION

3.6.6.1 Heating ventilation and Air Conditioning requirements

Among the 27 buildings surveyed-

- 4 buildings were under construction and Air conditioning system could not be checked.
- There were provisions for mechanical exhaust systems for under construction buildings.
- As most of the buildings were residential building, Air handing unit, central Air conditioning system, ducting systems, equipment room for air conditioning and ventilation etc. not found.
- Mechanical exhaust system was only required for kitchen.

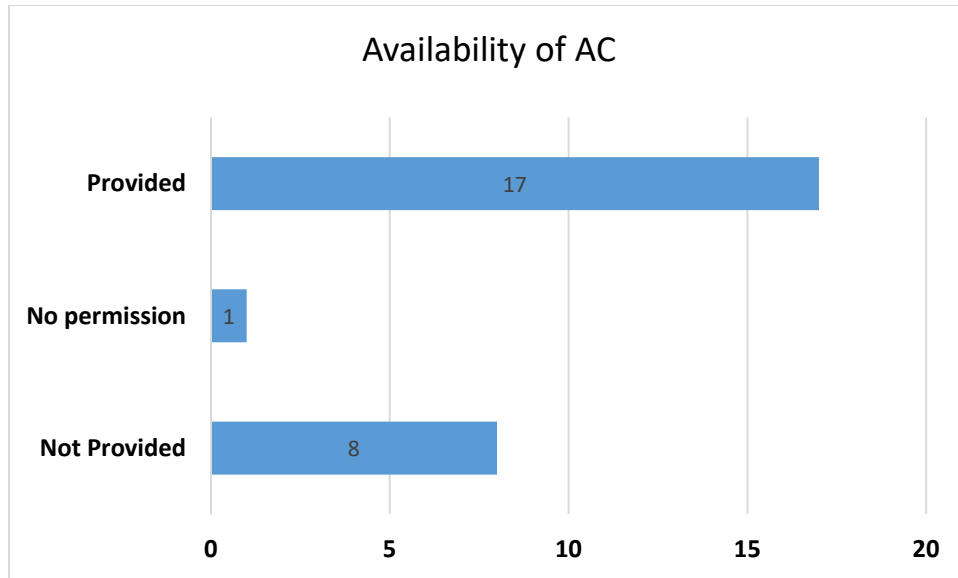


Figure 3-20: Air conditioning system availability of inspected buildings

In Figure 3-21 percentages of violation have been plotted for HVAC system

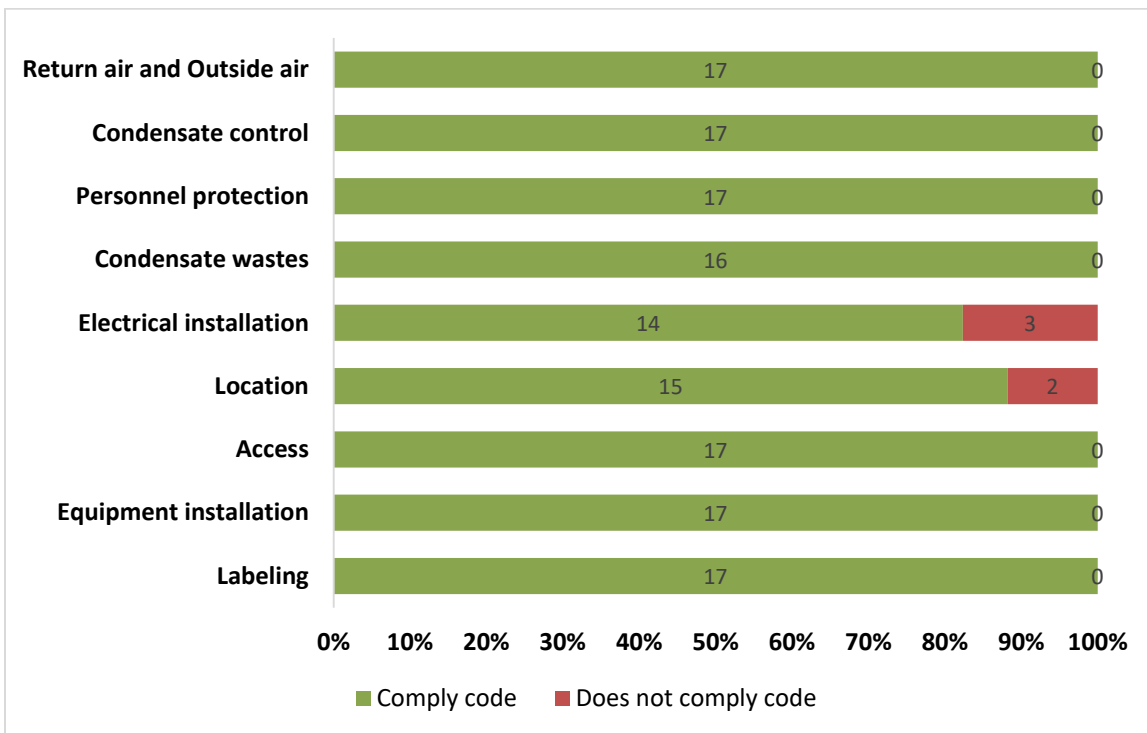


Figure 3-21: Percentage of code violation for AC system

Mechanical exhaust system is needed for rooms and areas having air with dust particles sufficiently light enough to float in the air, odors, fumes, spray, gases, vapors, smoke or other noxious or impurities in such quantities as to be irritating.

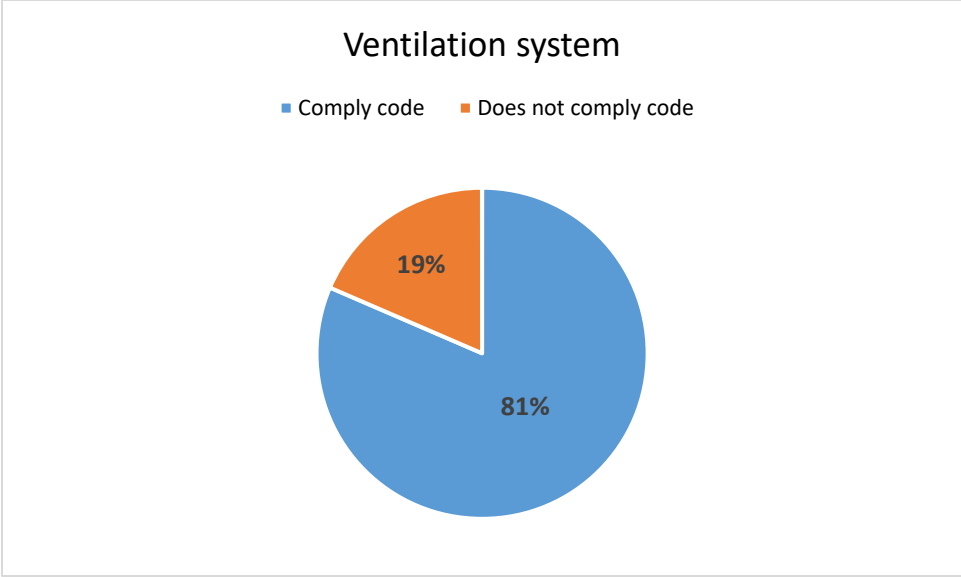


Figure 3-22: Percentage of code violation for ventilation system

3.6.6.2 Lift escalators and moving walks

Escalators and moving walks are mainly provided in commercial or hospital buildings. However lifts are essential if the building is more than 6 storied. For under construction buildings all the criteria could not be found as lifts and machine room were not installed.

Figure 3-23 shows the lift availability of inspected buildings

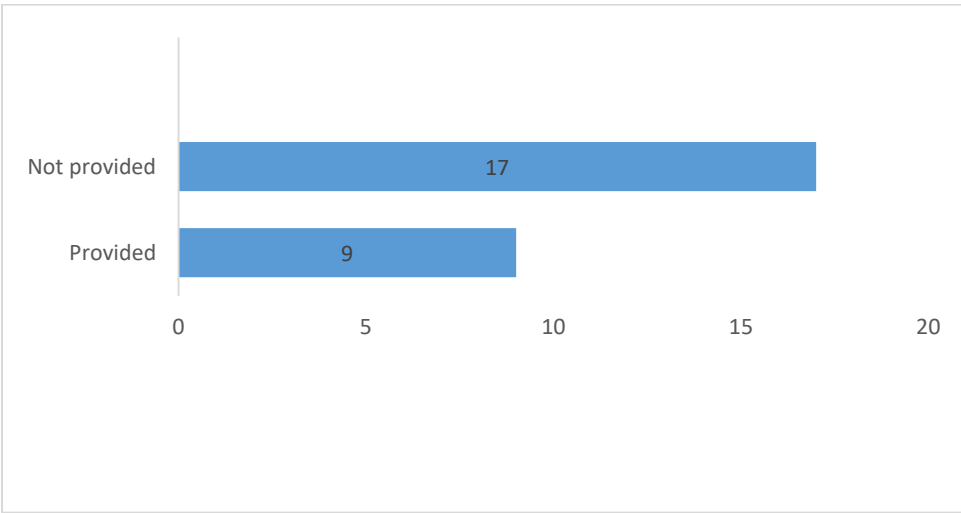


Figure 3-23: Lift availability of inspected buildings

For visual inspection various aspects were not measured according to criteria of BNBC-1993 (2006). In Figure 3-24 percentages of violation have been plotted for lift system in accordance with visual inspection

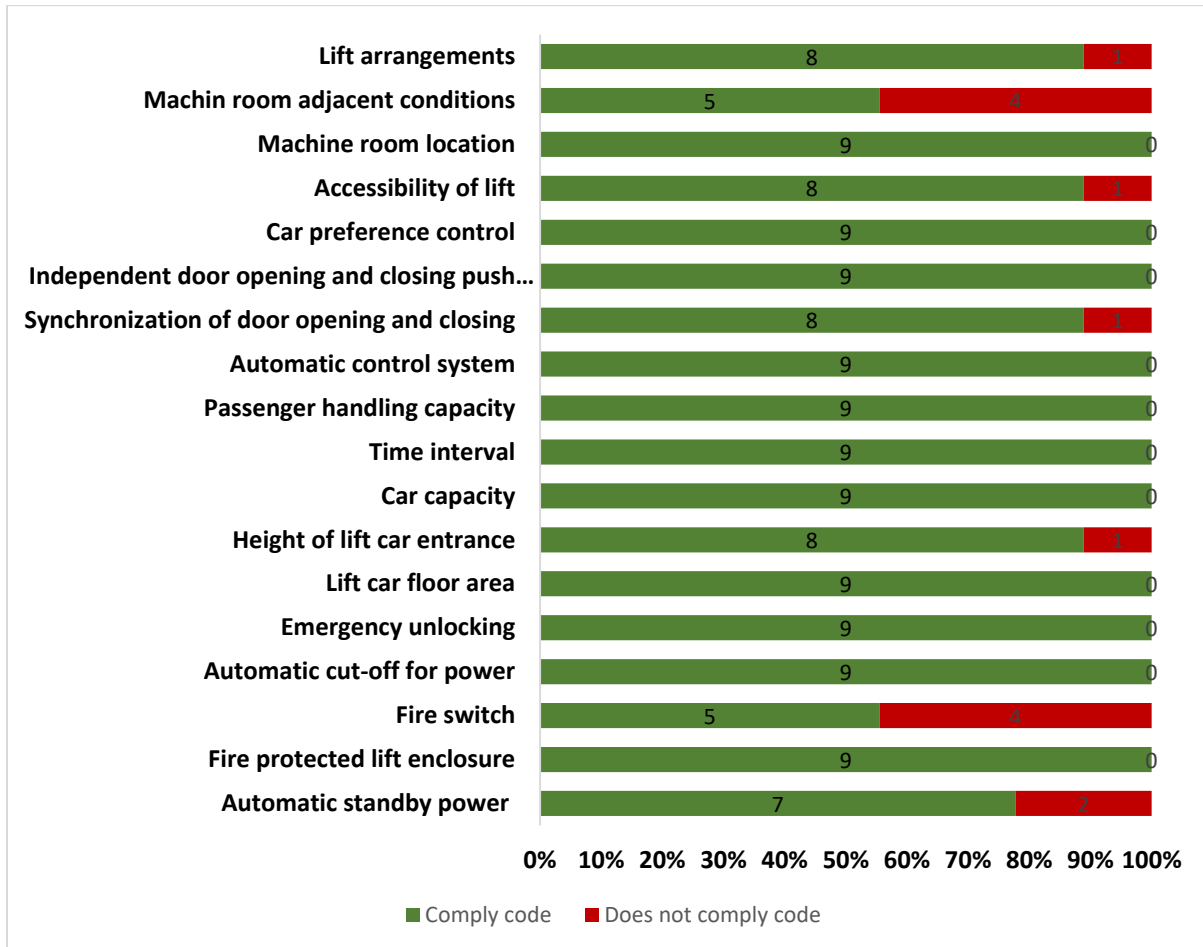


Figure 3-24: Percentage of code violation for lift escalators and moving walks

3.6.7 VISUAL ASSESSMENT OF BUILDING SERVICES OF ELECTRICAL INSTALLATION

3.6.7.1 Prioritizing criteria and examining compliance with code

The Electrical part of the checklist has been divided into two priority categories:

- i. **Priority category 1** – this level contains the factors that has significant impact on electrical installation and safety during construction to avoid major electrical hazards.
- ii. **Priority category 2** – this level contains the factors with less importance and ease of collecting data comparatively.

3.6.7.2 Data Analysis

3.6.7.2.1 Under-constructed buildings

Data from 07 under-constructed buildings have been sorted upon following requirements:

Section	General Requirement
Wiring System	All permanent and temporary wiring are done by a licensed electrician. No working platforms are placed within 3 m of an un-insulated live electric wire. Overhead wires/cables are so laid that clearances are maintained. Protection for all electrical wiring laid on floor.
Guarding of Cables	All cables and signal cords are guarded wherever such cables and cords pass through or cross working spaces. Relative agencies consulted for proper protection of underground cables.
Lifts	Lifts are installed as per instruction of the manufacturer and under proper guidance. Entry to the empty lift well shall be blocked.
Construction Machinery	Construction machinery shall conform to standard specification of work. The machinery shall be operated by competent operators only. Regular maintenance and checking for construction machines. Every part of electric generators, motors and rotary converters are securely fenced. Exhausts opening outside the building with minimum clearance combustible materials.
Flame Cutting and Welding	Welding and flame cutting are done in ventilated area. Suitable protection against electric arc are provided for all welding and flame-cutting operations. When working on aluminum structures, protection for the back of the head and eyes are ensured. Leather gauntlet gloves with canvas or leather cuffs, shall be worn by welders. CO2 or DCP type fire extinguisher are kept near flame cutting and welding.

I. Priority category 1

For this priority category the trend found has been shown in Figure 3-25

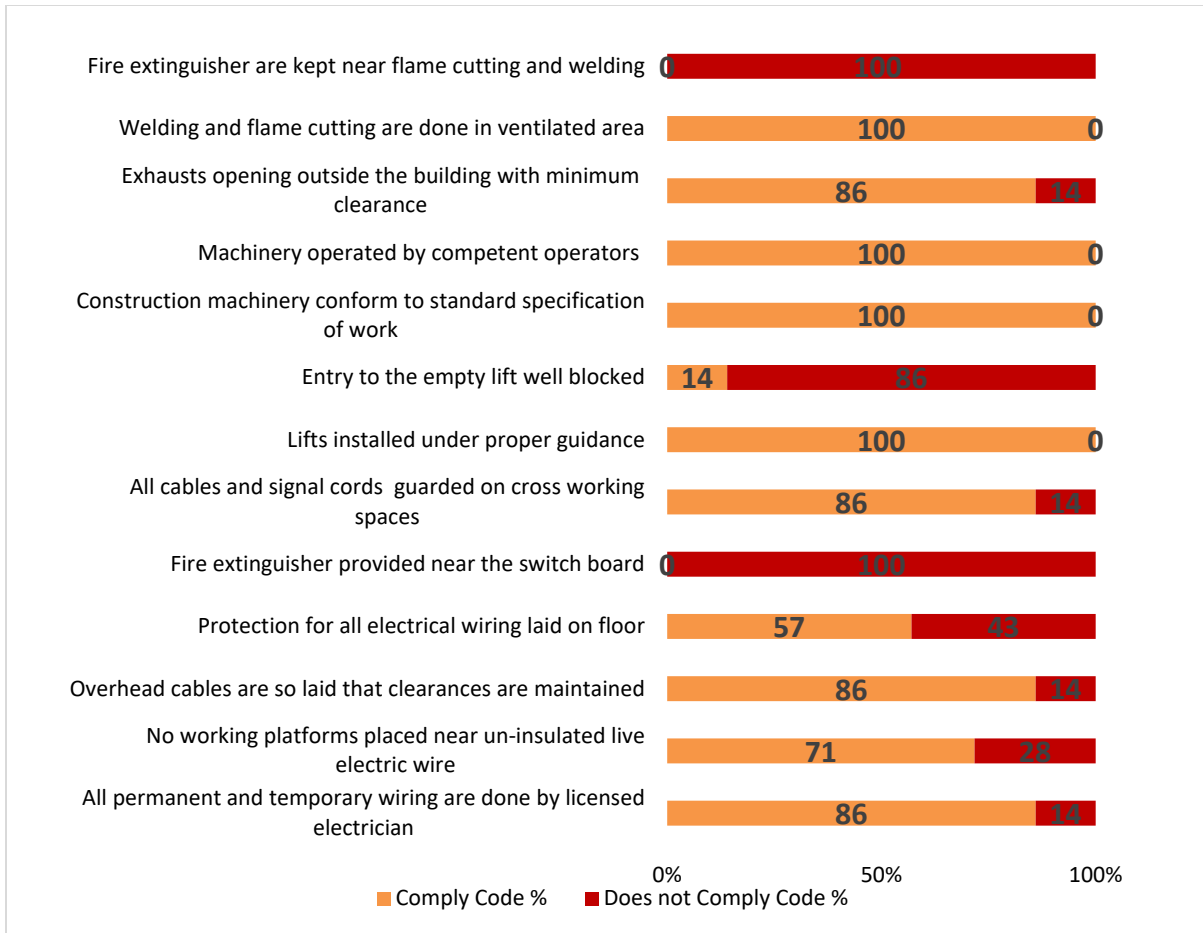


Figure 3-25: Percentage of code compliance for priority category-1

For the 07 (seven) samples surveyed, it is found that:

- All temporary and permanent wiring procedures are maintained in 86% of the buildings. Overhead clearance of cables are not maintained in 14% of the buildings. Uninsulated electric wire found in 28% of the buildings.
- Temporary energy meter and panel boards are installed in unprotected areas in some buildings. Risk of severe water damage.
- No fire extinguisher is provided near flame cutting and welding or any switch board.
- Entry to the empty lift are guarded in only 14% of the buildings. Although Lifts will be installed as per instruction of the manufacturer and under proper guidance according to authorized engineer on the site.
- In all of the buildings, the machineries are operated by competent operators only. Exhausts opening outside the building with minimum clearance 200mm from combustible materials are maintained in 86% of the buildings. Welding and flame cutting are done in ventilated area or ground floor in most cases.

II. Priority category 2

For this priority category the trend found has been shown in Figure 3-26

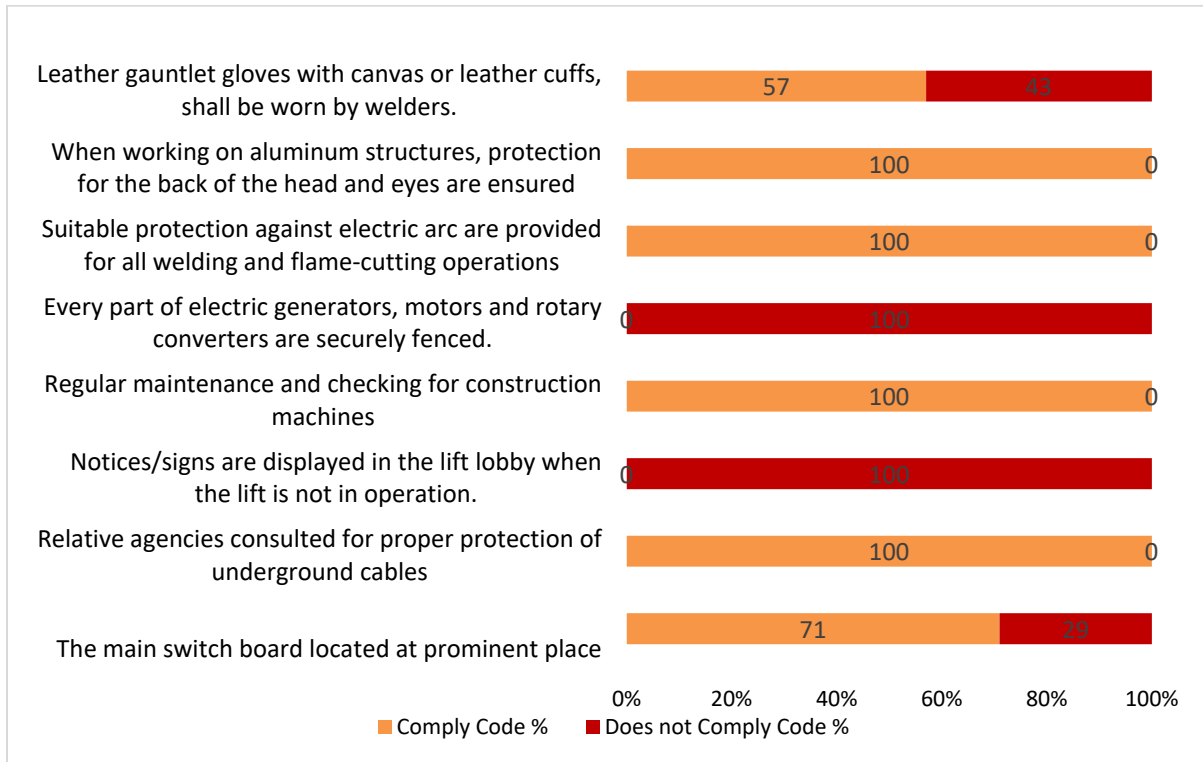


Figure 3-26: Percentage of code compliance for priority category 2

For the 07 (seven) samples surveyed, it is found that:

- Suitable protection against electric arc are provided for welding and flame-cutting operations in all the buildings. Protective gears are provided in 57 % of the buildings but lack of interest is shown by workers to use it.
- No Notices/signs are displayed in the lift lobby in any of the buildings.
- Every part of electric generators, motors and rotary converters are not securely fenced in any of the buildings.

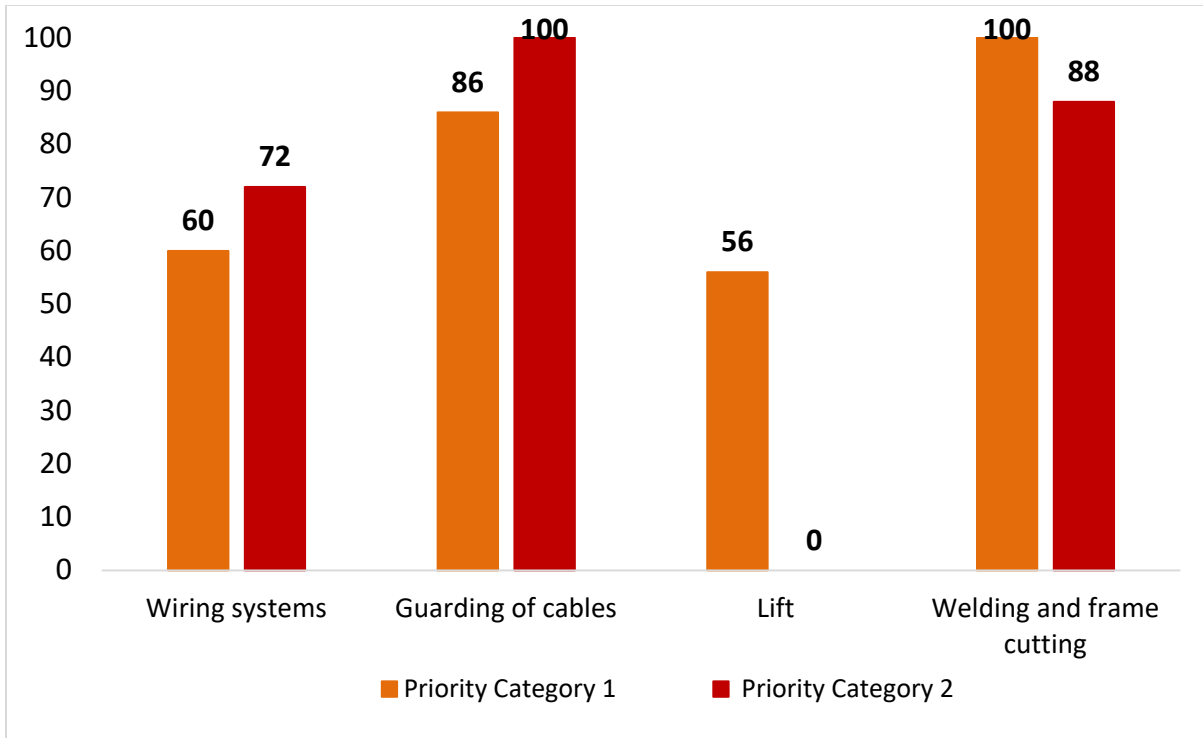


Figure 3-27: Comparison between percentage of code compliance for priority category 1 &2

From Figure 3-29, we found that:

- Wiring systems for higher priority are maintained in 60% of the buildings whereas 72% of the time medium priority is maintained.
- Guarding of cables and operations with construction machinery are maintained above 80% of the time for both high and medium priority level.
- Welding and flame cutting operations for higher priority level are maintained for all of the buildings.

3.6.7.3 Fully Constructed buildings

Data from 53 Fully Constructed buildings have been sorted upon following requirements:

Section	General requirements
Substation and stand by supply	Substation are required based on power demand above 50KW. Standby generator on the basis of electrical load
Earthing and lightning protection	Earth conductors must not have any joints. Electrode penetrate into permanently below ground water level (resistance not more than 1 ohm). Proper lightning protection should be provided.
Distribution of supply and cabling	Nominal voltage, nature of current and frequency, prospective short circuit current, type and rating of overcurrent protective device, max demand of power consumption must be taken in consideration. Proper guarding of cables with insulation must be ensured.
Protective covering, positioning and marking	Protective covering on energy meter panel, DB/SDBs are installed on accessible space with identical signs.

I. Priority category 1

For this priority category the trend found is shown in Figure 3-28.

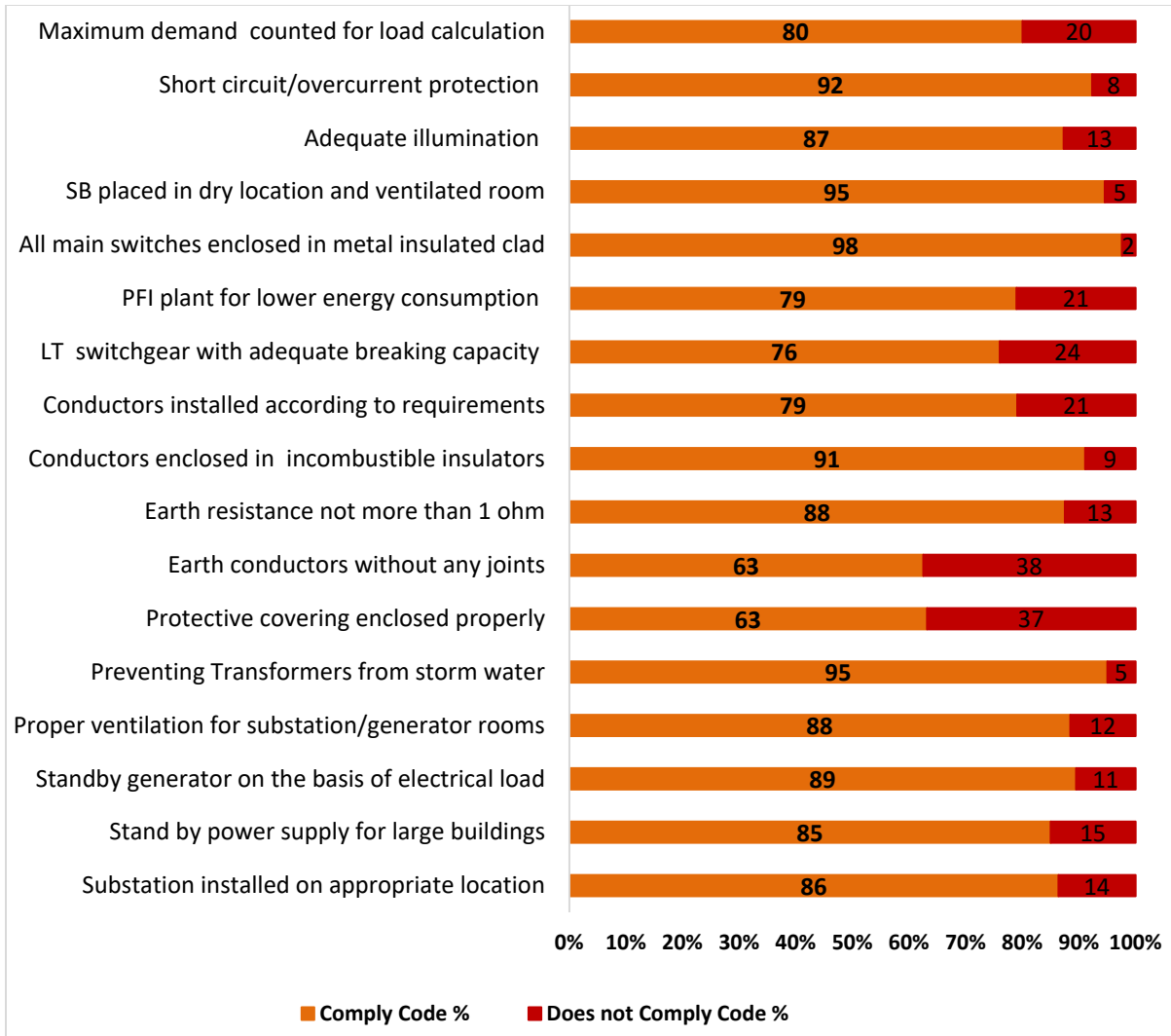


Figure 3-28: Percentage of code compliance for priority category-1

For the 53 samples surveyed, it is found that:

- In 80% of the buildings maximum demand in counted for load calculations. Substation installed on lowest floor level and above highest flood level for 86% of the buildings.
- Stand by power supply for emergency power backup is provided in 85% of the large residential/commercial buildings.
- Short circuit/overcurrent protection provided for all sub circuits in 92% of the buildings. LT switchgear, fuse gear with adequate breaking capacity are maintained in 76% of the buildings.
- Proper earthing method was not implemented in 38% of the buildings. In most cases Earth conductors had joints which is not permitted according to BNBC-1993 (2006) (Code: 2.8.3.3).

II. Priority category 2

For this priority category the trend found has been shown in Figure 3-29.

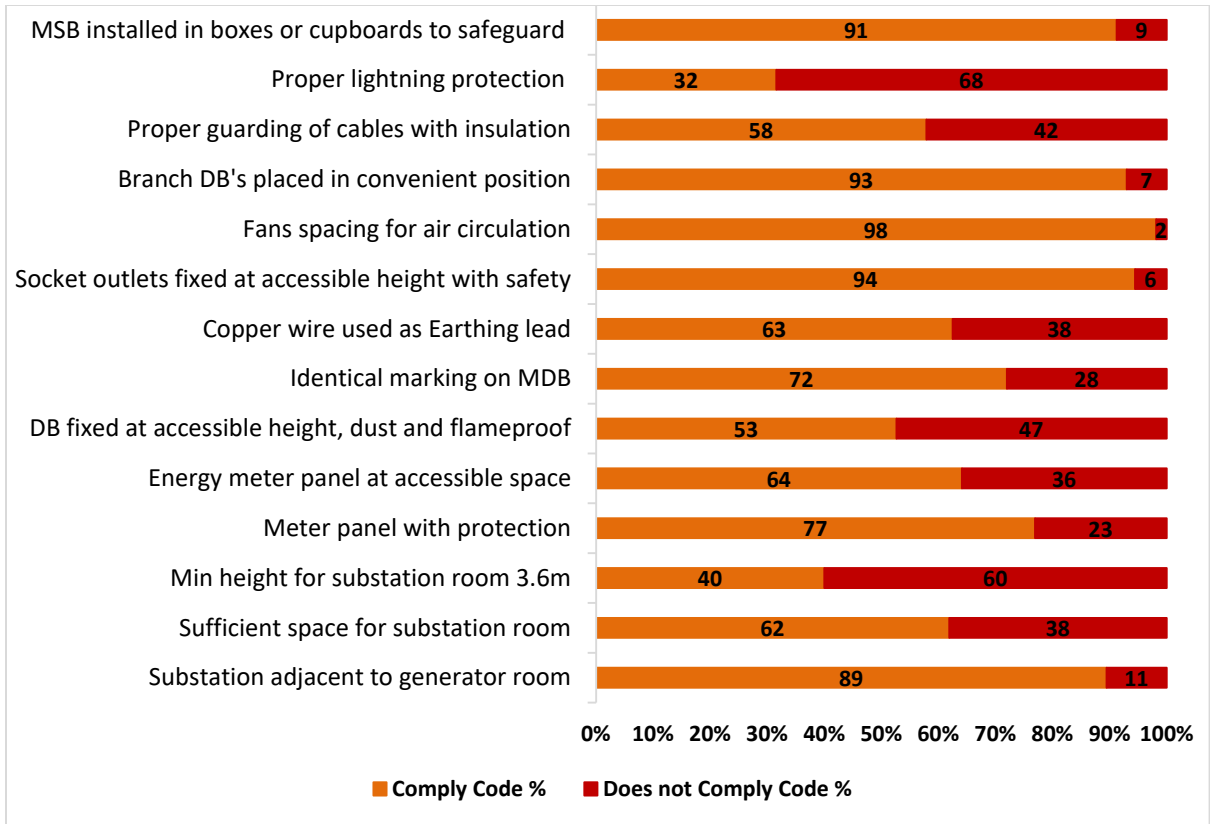


Figure 3-29: Percentage of code compliance for priority category 2

For the 53 samples surveyed, it is found that:

- In 89% of the buildings Generating set are installed close to substation building for quick transfer of electrical load with proper ventilation.
- Proper height and area are not maintained in above 40% of the buildings for generator and substation rooms.
- In 68% of the buildings, proper lightning protection method is not followed.
- Energy meter panel and Distribution boards (DB) have protective covering over 80% of the buildings.
- Proper guarding of cables with insulation do not comply BNBC-1993 (2006) for 42% of the buildings.

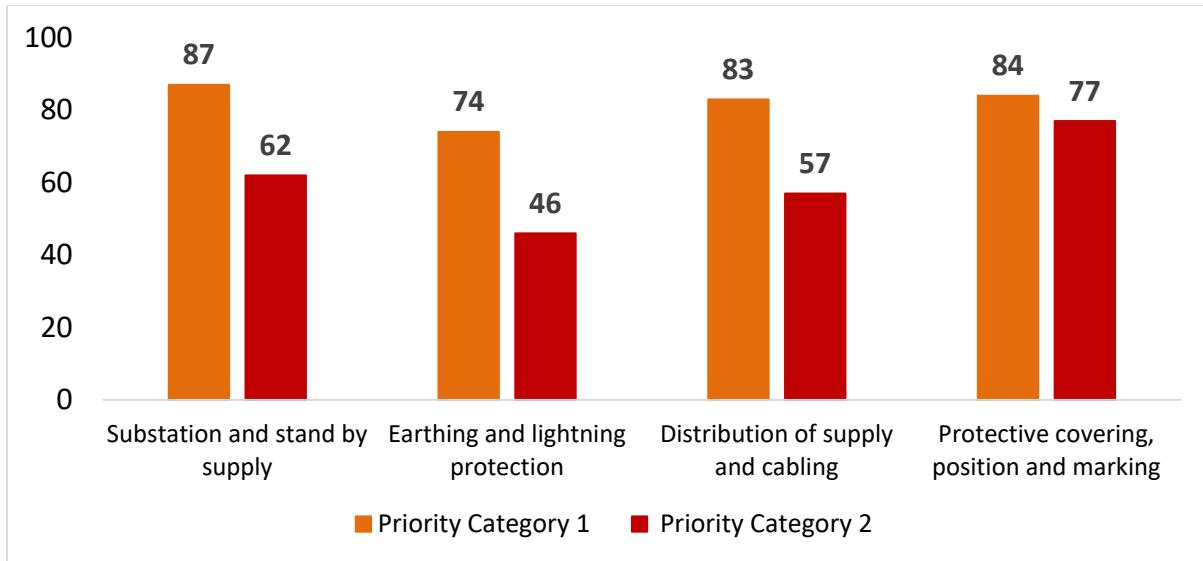


Figure 3-30: Comparison between percentage of code compliance for priority category 1 & 2

FINDINGS

- 87% of the buildings follow BNBC-1993 (2006) (Code No: 2.6) for substation and generator requirements of higher priority. 60% of the buildings do not comply with criteria of less significance.
- Above 70% of the buildings maintain Earthing protection, distribution of supply and cabling with protective covering, position and marking for higher priority.

3.7 REASONS OF VIOLATIONS

The findings of the field observations were shared with a number of architects, engineers and developers. Their views regarding what they think could be the probable reasons were recorded through interviews. Their views on architectural, structural and construction issues are given in Tables 1 to 5.

Table 3.1 Probable reasons of violations of architectural provisions (Priority Category-1)

Criteria	Probable reason of violation
Permit for work	N/A
Clearance from electric line	<ul style="list-style-type: none"> • Lack of consciousness and awareness of the occupants or the owner about safety.
Approach road width	<ul style="list-style-type: none"> • Inadequacy of proper monitoring from the authority during construction
Building height based on road width	<ul style="list-style-type: none"> • Inadequacy of proper monitoring from the authority after construction. • Lack of social awareness and knowledge of safety

Criteria	Probable reason of violation
Road front open space	<ul style="list-style-type: none"> Inadequacy of proper monitoring from the authority during construction. Lack of social awareness
Side setback	<ul style="list-style-type: none"> Inadequacy of proper monitoring from the authority during construction.
Rear Setback	<ul style="list-style-type: none"> Inadequacy of proper monitoring from the authority during construction. Lack of interest due to the maximum leftover setback.
Separate emergency fire escape stair	<ul style="list-style-type: none"> Inadequacy of proper monitoring from the authority during construction. Owner's intention on using more space for functional purpose.

Table 3.2 Probable reasons of violations of architectural provisions (Priority Category-2)

Criteria	Probable reason of violation
Fire alarm	<ul style="list-style-type: none"> Ignorance and carelessness on probable hazard. Tendency on cutting off the budget
Formation level from C/L of the road	<ul style="list-style-type: none"> Insufficient knowledge of client about minimum height of the formation level.
Plinth level from C/L of the road	<ul style="list-style-type: none"> Insufficient knowledge of client about minimum height of the plinth.
Ramp Grade of parking	<ul style="list-style-type: none"> Inadequacy of proper supervision during construction. Owner's intention on using more space for functional purpose.
Height of parapet/handrail	<ul style="list-style-type: none"> Inadequacy of proper supervision during construction.
Width of staircase	<ul style="list-style-type: none"> Inadequacy of proper supervision during construction. Clients intention on using more space for functional purpose.
Tread width	<ul style="list-style-type: none"> Inadequacy of proper supervision during construction. Lack of knowledge about comfortability and safety.
Riser height	N/A
Max. number of steps in a flight	N/A
Clear headroom between flights	N/A

Criteria	Probable reason of violation
Handrail height (stair)	<ul style="list-style-type: none"> Inadequacy of proper supervision during construction. Lack of knowledge about safety.
Ceiling height	N/A
Clear head room (under false ceiling)	<ul style="list-style-type: none"> Inadequacy of proper supervision during construction. Insufficient knowledge of client about clear story height and comfortable use of space.
Clear distance below beam	N/A
Clear height of basement	<ul style="list-style-type: none"> Carelessness on construction.
Provision of lifts	<ul style="list-style-type: none"> Non approved extension of building
Warning sign for not using lift while on fire	<ul style="list-style-type: none"> Ignorance on putting proper signage.

Table 3.3 Probable reasons of violations of architectural provisions (Priority Category-3)

Criteria	Probable reason of violation
Plot size	N/A
Fire door to exit corridor	N/A
Total open area	<ul style="list-style-type: none"> Inadequacy of proper monitoring from the authority during and after construction.
Approval for any addition or alteration	N/A
Approval for any change of use	N/A
FAR	N/A
Width of corridor	N/A
Clear height of corridor	N/A

Table 3.4 Probable reasons of violations of structural provisions (checked without drawing)

Criteria	Probable reason of violation
Torsional Irregularity	<ul style="list-style-type: none"> Restriction of architectural plan Lack of knowledge about code
Soft Story possibility	<ul style="list-style-type: none"> Lack of knowledge about code and analysis Restriction of architectural plan in some cases
Unsupported Masonry Wall	<ul style="list-style-type: none"> Cost reduction by lowering the thickness Lack of knowledge about out of plane failure of wall

Criteria	Probable reason of violation
Pounding effect possibility	<ul style="list-style-type: none"> • Violation of set back and illegal approach of slab extension

Table 3.5 Probable reasons of violations of structural provisions (checked with drawing)

Criteria	Probable reason of violation
Corner reinforcement	<ul style="list-style-type: none"> • Lack of knowledge about code and detailing of slab
Stirrup spacing in beams	<ul style="list-style-type: none"> • Negligence and lack of knowledge about code and the detailing
Tie spacing in column	<ul style="list-style-type: none"> • Negligence and lack of knowledge about code and the detailing

Table 3.6 Probable reasons of violations of construction provisions

Criteria	Probable reason of violation
Necessary approval for temporary structures	<ul style="list-style-type: none"> • Negligence and lack of knowledge • Complicated approval procedure for getting approval
One First Aid attendant per 100 workers	<ul style="list-style-type: none"> • Negligence and lack of knowledge
Permission for adjoining property	<ul style="list-style-type: none"> • Unwillingness about getting the permission
Signs of caution	<ul style="list-style-type: none"> • Negligence and lack of knowledge about cautions signs
Warning signs	<ul style="list-style-type: none"> • Negligence and Lack of knowledge
Safety goggles and helmets	<ul style="list-style-type: none"> • Not accustom to use • Negligence and lack of knowledge
Trenches not provided with emergency exits	<ul style="list-style-type: none"> • Lack of knowledge regarding the emergency exists

3.8 SUMMARY AND CONCLUSION

In this study, an attempt is made to establish a methodology for checking the compliance of existing buildings in Dhaka city with BNBC-1993 (2006). For this purpose, a checklist was developed based on importance and data availability. There are seven categories of criteria i.e. architectural, structural, under-construction safety and practices, fire safety, plumbing, mechanical and electrical. 87 buildings were surveyed for preliminary compliance check. Buildings built after 2006 were considered. Several residential and a few commercial buildings were inspected. Excel files were developed to record the collected data and analyze the compliance with code. Percentages of code compliance have been analyzed and a detailed analysis has been presented for these buildings.

From the observations, it was found that there are major violations with regard to very basic architectural issues like setback, allowable building height and minimum approach road width. There is substantial violation on minor issues that are nonetheless important from a disaster management point of view. These include signs warning not to use the lift in case of fire or the signs for high voltage zone or area of no smoking, etc. In most cases, handrails on both sides of the fire safety stair were not found. In none of the industrial buildings, specific requirements for fire safety were satisfied. During construction, fire extinguishers were never found near locations of welding or near the switchboards. Parts of electric generators, motors and rotary converters were never found securely fenced. No warning sign was displayed in the lift lobby when there was no lift installed. Proper lightening protection was seldom found. In many cases the height of substation room was not enough.

In the present study, we also tried to identify reasons for these violations through interviewing architects, engineers and developers. The most obvious reason for many of the violations is lapses in inspection by RAJUK. Another evident reason is lack of knowledge on the part of designers and builders and lack of awareness on the part of the owners. Complicated approval procedure was also mentioned as one of the reasons for violations. Thus accountability in the inspection/monitoring process, capacity building, knowledge dissemination, awareness development and simplified approval procedure should be considered in developing strategies for code enforcement.

ANNEX 3A. CHECKLIST FOR BUILDING ASSESSMENT

3A.1 ARCHITECTURAL PART (40)

3A.1.1 Priority Category 1 (8)

1	Part-2; Chapter-3 (3.2.1 and 3.2.2)	Permit for work (Exemptions of Govt. utility services)	Permit is needed for all works except railway, national highway, national waterway, telecommunications, broadcasting etc.	
2	Part-3; Chapter-1 (1.5.2)	Clearance from electric lines (meter)	Low to medium voltage lines: Vertically - 2.5 m, Horizontally - 1.25m High voltage line up to 33 KV: Vertically - 3.5m, Horizontally- 1.75m High voltage line beyond 33 KV: Vertically - 3.5+0.3m for each additional to 33 KV, Horizontally- 1.75m 0.3m for each additional to 33 KV	
3	Part-3; Chapter-1 (1.6.2)	Approach road width (meter)	Row type or detached or semi-detached; plot size; existing development or new development	
4	Part-3; Chapter-1 (1.8.2)	Building height based on road width (meter)	For type I building: road width greater than 23 m: no height restriction for 2(front road width + front open space)<10.6 m - height : 12m 10.6 m to 13.6m - 14m 13.6m to 16.6m - 17m 16.6m to 19.6m - 20m 19.6m to 22.6m - 23m 22.6m to 25.6m - 26m 25.6m to 28.6m - 29m etc.	
5	Part-3; Chapter-1 (1.7.9)	Road front open space (meter)	If less than 5 stories: 4.5 m from center-line of road or 1.5 m from road front property line which is greater	Distance of building from property line (meter)
			If greater than 5 stories: 4.5 m from centerline of road or 2 m from road front property line which is greater	Distance of building from road C/L (meter)
				Comment

6	Part-3; Chapter-1 (1.7.10)	Side setback (meter)	<p>1. Residential (Not higher than 10 storeys or 33m) (Plot size : not over 135 m²): Rear open space - 1.25m & Side Open Space - nil)</p> <p>2. Residential (Not higher than 10 storeys or 33m)(Plot size : 135 m² to 200m²): Rear open space - 1.5m & Side Open Space - 1.25m)</p> <p>3. Residential (Not higher than 10 storeys or 33m)(Plot size : 200 m² to 265m²): Rear open space - 1.75m & Side Open Space - 1.25m)</p> <p>4. Residential (Not higher than 10 storeys or 33m)(Plot size : 265 m² to 330m²): Rear open space - 2.5m & Side Open Space - 1.25m)</p>
7		Rear Setback (meter)	<p>5. Residential (Not higher than 10 storeys or 33m)(Plot size : 330 m² to 660m²): Rear open space - 3m & Side Open Space - 1.25m)</p> <p>6. Residential (Not higher than 10 storeys or 33m) (Plot size : Over 660 m²): Rear open space - 4m & Side Open Space - 1.25m)</p> <p>7. Residential (higher than 10 storeys or 33m) (Plot size : any): Rear open space - 4m & Side Open Space - 3m)</p> <p>8. Business and mercantile (not higher than 10 storeys or 33m) (Plot size : any): Rear open space - 1.5m & Side Open Space - 1.5m)</p> <p>9. Business and mercantile (higher than 10 storeys or 33m) (Plot size : any): Rear open space - 2m & Side Open Space - 2m)</p>
8	Part-3; Chapter-1 (1.8.2.6)	Separate emergency fire escape stair	Above 6 stories, should be present

3A.1.2 Priority Category 2 (17)

9	Part-3; Chapter-2 (2.8.7)	Fire alarm	minimum Height 20 m with capacity of 8 person
10	Part-3; Chapter-1 (1.5.3)	Formation level from C/L of the road (mm)	<p>Not lower than adjacent road level not higher than 450mm from the surface level of center-line of adjacent front road (not flood prone area) (if flood prone area): authority decides</p>
11	Part-3; Chapter-1 (1.5.3)	Plinth level from C/L of the road (mm)	At least 450 mm above surface level
12	Part-3; Chapter-1 (1.9.2)	Ramp Grade of parking	Shall not be steeper than 1V:8H

13	Part-3; Chapter-1 (1.12.14)	Min. parapet/handrail height (meter)	1m	
14	Part-3; Chapter-1 (1.12.5)	Min. width of staircase	A. Residential Building- 1.15m (Flats or apartments)	Occupancy type
			B. Educational Building- 1.5m	Width (m)
			C. Health care building- 1.5m	Minimum width (m)
			D. Health Care building- 2m E. Assembly building- 2m F. Business or mercantile Building- 1.5m (F1) ; 2m (F3)	Comment
15	Part-3; Chapter-1 (1.12.5.2)	Min. tread width (mm)	minimum 215 mm	
16	Part-3; Chapter-1 (1.12.5.2)	Max. riser height (mm)	Maximum 215 mm	
17	Part-3; Chapter-1 (1.12.5.3)	Max. number of steps in a flight:	Maximum number 15	
18	Part-3; Chapter-1 (1.12.5.4)	Min. clear headroom between flights (meter)	2.15 m	
19	Part-3; Chapter-1 (1.12.5.6)	Min. handrail height (meter)	0.9 m (from nose to top of the handrail)	
20	Part-3; Chapter-1 (1.12.2.1 a)	Min. ceiling height (meter)	Type 1. Residential, Business and mercantile (non-air conditioned)- 2.75m (2.44m permissible for one third portion)	Type
			Type-2. Residential, Business and mercantile (air conditioned)- 2.44m	Ceiling height
				Min. height
				Comment
21	Part-3; Chapter-1 (1.12.2.1 b)	Min. clear head room (meter)	2.44 m under false ceiling	
22	Part-3; Chapter-1 (1.12.2.1 b)	Min. clear distance below beam (meter)	2.15m	

23	Part-3; Chapter-1 (1.12.11.7)	Min. clear height of basement (meter)	2.15 m
24	Part 8; Chapter-5 (5.2.1)	Provision of lifts	For more than six stories or 20m height
25	Part 8; Chapter-5 (5.2.10.3)	Warning sign for not using lift while on fire	Exist/Not exist

3A.1.3 Priority Category 3 (15)

26	Part-3; Chapter-1 1.8.2.7	Height restriction from Civil Aviation	Yes/No
27	Part-3; Chapter-1 (1.5.5)	Plot size (sq. meter)	Minimum size of Residential plots: 65 m ² Business or mercantile building: 200 m ² Industrial plots : 300 m ² "
28	Part-3; Chapter-1 (1.7.8)	Separation of buildings in the same plot	For grid iron layout: end to end- not less than 2m Open space between longer sides of building- not less than 0.5*height Staggered layout: .4*height of shielding building on south or east Front to end layouts: open space between buildings shall not be less than 3m.
29	Part-3; Chapter-2 (2.5.2)	Smoke detector	Exists or not exist
30	Part-4; Chapter-3 (3.7.1)	Fire door to exit corridor	Exists or not exist
31	Part-3; Chapter-1 (1.7)	Total open area (%)	Type 1: For educational, institutional and health care: not less than 50% of total area Type2: For residential, industrial storage: not less than 33%

32	Part-2; Chapter-3 (3.1.1)	Any addition or alteration – approval (Exemptions are allowed)	Approval is not needed for opening or closing of window, door, ventilators etc., providing internal door, partitions, false ceiling, gardening, re-flooring, construction of sunshades, solid boundary walls less than 1.5 m and open boundary walls less than 2.75 m.	
33	Part-2; Chapter-3 (3.2.8)	Any change of use – approval	Approval needed if there is alteration from plan	
34	Part-3; Chapter-1 (1.8.3)	FAR	Depends on occupancy type, type of construction(degree of fire resistance)	
35	Part-4; Chapter-3 (3.7.2)	Min. width of corridor (meter)	Type 1: less than 50 occupant-0.9 m	Type
			Type 2: more than 50 occupant-1.1m	Width provided (m)
			Type 3: Health care building-2.4 m	Minimum limit (m)
			Type 4: Educational Building-1.8 m	Comment
36	Part-4; Chapter-3 (3.7.4)	Clear height of corridor (meter)	2.4 m	
37	Part-3; Chapter-1 (1.3)	Land use classification	Notedown	
38	Part-3; Chapter-1 (1.4)	Occupancy type	Types include residential or educational or business or hazardous etc. type of use	
39	Part-3; Chapter-1 (1.5.1)	Number of buildings in the plot:	Notedown	
40	Part-3; Chapter-1 (1.18)	Air-conditioned or not	Notedown	

3A.2 STRUCTURAL PART (39)

3A.2.1 Compliance Check Without Drawing (18)

1	Part-6; Chapter-1 (1.9.1)		Design documents	Design report, Structural drawings
2	National Tripartite Plan of Action (NTPA)-2013	Central Column	Factor of safety	
		Edge Column	Factor of safety	
		Corner Column	Factor of safety	
3	Part-6; Chapter-1 (1.2.2)	General design requirements	Building or non-building structures	Enclose a space and used for various occupancies- building structure; water tank, bridge
4	Part-6; Chapter-1 (1.2.6)		Structure Importance category	Table 6.1.1 (Essential facilities, hazardous facilities. Special occupancy structures, standard occupancy structure, Low risk structure)
5	Part-6; Chapter-1 (1.4.5)		Posting of live loads	Fig. 6.1.1 (Library stack room, parking garage, file room, machine or plant room, industrial or storage usage)
6	Part-6; Chapter-1 (1.1.2)		Slenderness	Slender- if Building height/minimum width ratio is greater than 5
7	Part-6; Chapter-1 (1.3.5 table-6.1.4)		Torsional irregularity	Note down
8	Part-6; Chapter-1 (1.3.5 table-6.1.3)		Soft story check	If height of first floor/height of ground floor <0.7 - soft story (no partition wall)
9	ASCE 31-03 Art-3.9.1		Unsupported masonry wall	Note down

10	Part-6; Chapter-6 (6.2.10.2)		Thickness for cantilever slab	$\geq l/10$
11	Part-6; Chapter-3 (3.13.2)	Foundation	Type	Note down
12	Part-6; Chapter-6 (6.2.10)	Beams	Minimum thickness of RC beams (deflection criteria)	Thickness- 1. Simply supported- $l/16$ 2. One end continuous- $l/18.5$ 3. Both ends continuous- $l/21$ 4. Cantilever- $l/8$
13	Part-6; Chapter-6 (6.2.10.2)	Slab	Minimum thickness of one way slabs (deflection criteria)	Thickness- 1. Simply supported- $l/20$ 2. One end continuous- $l/24$ 3. Both ends continuous- $l/28$ 4. Cantilever- $l/10$
14	Design of Concrete Structure by Nilson (7th Ed)		Thickness of two-way slab	Perimeter/180
15	Part-6; Chapter-6 (6.4.3.1 table 6.6.5)	Flat-plate, flat slabs, edge-supported slabs	Minimum thickness of flat slab or flat plate slabs	Value depends on: With drop panels or without drop panels; exterior panels or interior panels; with edge beam or without edge beam; length of the slab
16	Part-6; Chapter-6 (6.4.3.2)		Size of drop panel (flat slab)	Extend in each direction from centerline of support a distance not less than one sixth of corresponding span length projection below slab is one-quarter of slab thickness
17	Part-6; Chapter-6 (6.4.7.2)		Punching shear check	Factor of safety

18	Part-6; Chapter-6 (6.9.3.3)	Reinforced concrete walls	Minimum thickness of reinforced concrete walls (mm)	Load bearing walls should not less than 125 mm, exterior basement walls not less than 200mm
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3A.2.2 Compliance Check With Drawing (21)

1	Part-6; Chapter-1 (1.8.5.2)	General design requirements	Footing interconnection	Footing and pile caps shall be completely interconnected by strut ties or other means
2	Part-6; Chapter-6 (6.10.2.7)	Foundation requirements	Thickness of RCC footing (footing/pile cap), (mm)	If resting on soil- 150 mm If resting on pile- 300 mm
3	Part-6; Chapter-3 (3.9.2)		Minimum depth of raft foundation (meter)	In cohesive soil- 1.5 m In cohesion-less soil- 2m
4	Part-6; Chapter-3 (3.11.1.9)		Spacing of piles	For hard stratum- 2.5 times shaft dia For frictional resistance piles- 3 times shaft dia
5	Part-6; Chapter-3 (3.11.1.13)		Reinforcement of piles	Clear cover- 75 mm (from surface of pile cap) Rebar extend to- within 100 mm of the edge of the pile cap
6	Part-6; Chapter-3 (3.10)		Requirements for pier foundation	Belled Thickness at the edge- 300mm Side slope- 45 degree Least permissible dimension- 600 mm
7	Part-6; Chapter-6 (6.2.4.2)		RC Beams	Ratio of reinforcement to balanced reinforcement ratio

8	Part-6; Chapter-6 (6.2.10)		Minimum thickness from deflection criteria (not attached to structures likely to be damaged by large deflection)	Thickness- 1. Simply supported- $l/16$ 2. One end continuous- $l/18.5$ 3. Both ends continuous- $l/21$ 4. Cantilever- $l/8$
9	Part-6; Chapter-8 (8.3.10.4)		Stirrup	b. Maximum stirrup spacing upto- 2 times of member depth (from the face of support at member ends) First stirrup ≤ 50 mm c. Spacing $\leq (d/4, 8 \times \text{dia of smallest main bar}, 24 \times \text{dia of stirrup}, 300\text{mm})$ d. Spacing $\leq d/2$ (throughout the length)
10	Part-6; Chapter-8 (8.1.8)		cover for reinforcement (mm)	40 mm
11	Part-6; Chapter-6 (6.3.6.1)	Columns	Ratio of longitudinal reinforcement (%)	not less than 0.01 and not more than 0.08 of the gross area
12	Part-6; Chapter-8 (8.1.10)		Tie dimension	Ties- minimum 10 mm dia bars spiral- minimum 10 mm dia , spacing between 25 to 75 mm
13	Part-6; Chapter-8 (8.3.10.5)		Tie spacing	a. Tie spacing upto lo $\leq (\text{max. cross-sectional dimension}, 1/6 \text{ of clear span of member})$

				<p>450mm) First tie $\leq s/2$ b. Spacing (s) \leq 8*dia of smallest main bar, 24*dia of tie bar, 300mm, 1/2 of smallest dimension c. Spacing $\leq 2*s$</p>
14	Part-6; Chapter-8 (8.1.8)		cover for reinforcement	40 mm
15	Part-6; Chapter-6 (Table 6.6.3)	Slab	One-way slab	<p>Thickness- 1. Simply supported- $l/20$ 2. One end continuous- $l/24$ 3. Both ends continuous- $l/28$ 4. Cantilever- $l/10$</p>
16	Design of Concrete Structure by Nilson (7th Ed)		Two-way slab	Required Thickness- Perimeter/180 (inch)
17	Part-6; Chapter-8 (8.1.8)		cover to reinforcement (mm)	20 mm
18	Part-6; Chapter-8 (8.1.12)		Reinforcement check (A_b/sh)	Temperature and shrinkage reinforcement check- Minimum reinforcement ratio 0.0014

19	Part-6; Chapter-6 (6.5.6.5)		Two way edge supported slabs	Corner reinforcement- one fifth of longer span, top is parallel to beam corner bisector
20	Part-6; Chapter-8 (8.1.7.8)		specification for bundled bar	maximum number of bar in a bundle 4 and dia of bar maximum 35mm
21	Part-6; Chapter-8 (8.1.8)	RC Wall	cover to reinforcement for RC wall (mm)	20 mm

3A.3 UNDER-CONSTRUCTION PART (40)

1	Part-7; Chapter-1 (1.2.2)	Planning	Approval for temporary structures that are likely to interfere with right of way or utility services	Approval from respective authorities
2	Part-7; Chapter-1 (1.2.3)		Site to be prepared to provide site facilities	Access roads for fire fighting vehicles
3				Free access from street to fire-hydrant or water tank
4				Required number of exits
5				Adequate sanitary facilities
6	Part-7; Chapter-1 (1.2.4)		First Aid Attendant (at least 1 per 100 workers)	Record of all accidents and actions should be kept

7	Part-7; Chapter-1 (1.4.2)	protection of public and workers	Protective fences or railing for adjacent roads, footpaths or excavations	1. For construction work within 1.5m from roads shall be enclosed with minimum 2.4m high fence 2. For construction work more than 1.5m away from roads, fence at least on the side of the site nearest to the roads	
8				Railings shall be at least 1m for excavation with a mid-rail	
9				Fences, barriers or temporary structure should not obstruct vision at intersection of street	
10	Part-7; Chapter-1 (1.4.5)		Notices and signs	Walkway adjacent to a construction, demolition or excavation shall be well-lighted at night	
11				Boards with cautious signs, painted in bright colour (preferably red) at entry and prominent places of the site	
12	Part-7; Chapter-1 (1.4.6)		Watchman and signals	A Watchman for intermittent hazardous operations	
13				Auditory signal in case of extreme danger	
14	Part-7; Chapter-1 (1.5.2)		Protection of public and private property	Adjoining property	Permissions to preserve adjoining plot, building or structure (obtained by owners)

15				No part of structures except signals shall be projected beyond property line (temporary protective guards or devices may be projected beyond with approval)
16	Part-7; Chapter-1 (1.5.3)		Temporary roads and footpath usage conditionally	Permission shall be obtained from relevant authorities
17				Allocated spaces should be more than 1.5m away from a railway track
18				An 1m clear passage should be maintained along the building
19				Owner, upon completion of construction, shall immediately remove all temporary walkway, debris and all the obstruction
20	Part-7; Chapter-3 (3.1.2)	General	Safety of workmen	Helmets conforming to BDS 1265 and BDS 1266 should be worn by workers
21				Safety goggles should be used for drilling, cutting, welding and works that can cause hazards to eye
22				Welders and gas cutters should be equipped with gloves, safety boots, aprons and hand shields

23	Part-7; Chapter-3 (3.1.3)		Site precautions	During erection of tall building, nylon net should be put around the building periphery, 3m to 4m below working level	
24				Warning signs indicating high voltage zone, area of no smoking etc	
25	Part-7; Chapter-3 (3.1.4)		Toilet facilities should be provided	If sewer is not available, temporary well may be used	
26				Should be provided at corner to avoid obstruction	
27				Temporary toilets shall be dismantled, all wells filled up, whole area made level at the end of project	
28	Part-7; Chapter-3 (3.2.8)		Excavation and foundation works	Precaution against health hazard during excavation	Mechanical ventilation where gases are likely to be present in trenches
29					All trenches should be provided with emergency exits
30	Part-7; Chapter-3 (3.2.9)			Piling and deep foundation	All operations should be supervised by competent foreman
31					Excavations deeper than 1.5m ladder, ramp and other means of escape

32	Part-7; Chapter-3 (3.2.11)		Fencing, warning signs and watchman	If necessary watchman should be employed to avoid accidents especially at night
33	Part-7; Chapter-3 (3.2.12)		Safety measures for adjoining structures and service lanes during excavation	For bored or driven piles in the vicinity of structures (which are likely to be damaged) tell tales should be fixed to monitor the behaviour while driving
34	Part-7; Chapter-3 (3.3.2)	Pile rig	Safe operations of pile rig	Access to working platform and top of pulley shall be provided by ladder
35	Part-7; Chapter-3 (3.3.3)		Pile preparation	Pile should be prepared at distance at least twice the length of longest pile from pile driver
36	Part-7; Chapter-3 (3.8.5)	Erection operations	Safety measures for adjoining structures and service lanes during excavation	Nobody shall be allowed to work on wheel-track within 6m of crane unless effective steps are taken to warn him
37				Cranes shall be thoroughly examined every 9 months and results are registered
38				The safe working load shall be shown on crane, no crane should be loaded beyond the limit

39	Part-7; Chapter-3 (3.10.2)	Construction hazards	Protection requirements for fire hazards should be ensured	Fire protection equipments, safe storage of combustible material, fire exits
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3A.4 FIRE PROTECTION

Serial No	Clause	Topic	Sub Topic	Short description of criteria/limit
1	Part 4 Chapter 1: 1.3.3.1	Fire Apparatus Access Road	Width	Minimum Unobstructed Width = 4.5m
2			Vertical Clearance	Minimum Vertical Clearance = 5m
3	Part 4 Chapter 3 : 3.7.1, 3,7,2 & 3.7.4	Corridors & Passageways	length of dead end	The length of dead end in which no exit door is available shall not exceed 10m
4			minimum clear height of corridors & passageways	The minimum clear height of corridors & passageways shall not be less than 2.4m
5			width of corridors & passageways	Minimum required width of corridors & passageways : for occupant load > 50 = 1.1m for occupant load < or equal to 50 = 0.9m Healthcare building = 2.4m Educational building = 1.8m
6	Part 4 Chapter 3: 3.9.3, 3.9.5	Doorways	Width	Minimum width = 1m
7			Height	Minimum height = 2m
8	Part 4 Chapter 3: 3.10.1	Exit Stairway	Minimum width of Exit Stairway	Minimum width of Exit Stairway
9	Part 4 Chapter 3: 3.10.2		Least Dimension of Landing	Least Dimension of Landing ≥ width of stairway

10	Part 4 Chapter 3: 3.10.5		Handrail on both sides	Exit stairway should have guard & handrail on both sides
11	Part 4 Chapter 3: 3.10.7		Lift shaft beside exit stair	Exit stairway shall not be built beside lift shaft unless the enclosure of lift shaft is solid & fire resistant
12	Part 4 Chapter 3: 3.14.3	No of Exits	Minimum Required No of exits	Minimum Required No of exits: Occupant load (500 or less) = 2 Occupant load (501 to 1000) = 3 Occupant load (1000 or more) = 4
13	Part 4 Chapter 3: 3.14.2		Buildings served by one means of escape	Buildings served by one means of escape for A2, maximum storey = 6 & maximum no. of dwelling units = 6; for F, maximum occupant load = 100 & maximum travel distance = 25m
14	Part 4 Chapter 3: 3.14.4			Buildings (> 6 storeys & floor area > 500 sq.m) should have at least 2 stairway
15	Part 4 Chapter 3: 3.15.1	Length of Travel	Maximum Travel Distance	Maximum Travel Distance: for Occupancy A, B, C, D, E, J = 25m; for Occupancy F, H = 30m; for Occupancy G = 45m
16	Part 4 Chapter 3: 3.15.2		Multiple exits as remote as possible	For more than one exit, whether exits are placed as remote as possible or not?
17	Part 4 Chapter 3: 3.16.1.1	Exit Signs & Illuminations	Exit Signs	Exit signs are clearly visible or not? (except A1,A2 & main exit)
18	Part 4 Chapter 3: 3.16.1.3		Illumination	Either shall be self illuminous or shall be illuminated by two electric lamps
19	Part 4 Chapter 4: 4.2.2	Water source for Fire Protection		Public Water Supply System / Independent system for Fire Protection
20		Fire Protection Water Arrangement		Standpipe & Hose System / Sprinkler system

21	Part 4 Chapter 4: 4.2.3	Checks where Standpipe & Hose System is available	Standpipe Sizes	Standpipe Sizes for upto 5 storeys = 75mm for upto 10 storeys = 100mm 10 to 20 storeys = 150 mm 20 to 54 storeys = 200mm
22			Accessible hose station	Is hose station easily accessible or not?
23			Maximum hose length	30m
24	Part 4 Chapter 3: 3.22.1	Exit Requirements for Occupancy F (Business & Mercantile)		At least two exits shall be provided for every floor including basement
25	Part 4 Chapter 5: 5.7.1	Specific Requirements for Offices (Occupancy F1) (search for any of the following)	i) Office Building (> 2 storey or > Floor area 500sq.m)	Manually operated electric fire alarm system shall be provided with portable extinguisher
			ii) Other Marcantile Building (> 2 storey or > Floor area 500sq.m)	Automatic Fire Alarm System required along with portable extinguisher
			iii) Laboratories with precision instruments	Automatic fire Alarm system & fixed automatic CO2 fire extinguisher shall be provided in addition to portable extinguisher
			iv) Buildings dealing with flammable liquids	Automatic foam/ CO2/dry chemical fire extinguishing system with portable fire extinguisher
			v) Solvent Storage in office	Automatic foam/ CO2/dry chemical fire extinguishing system with portable fire extinguisher
			vi) Computer Installation	Automatic fire Alarm system & fixed automatic CO2 or fixed vaporizing liquid fire extinguisher shall be required in addition to portable extinguisher

			vii) Electrical Switch Board room / Substation	Automatic fire Alarm system & / or fixed automatic CO2 or fixed vaporizing liquid fire extinguisher shall be installed in addition to portable extinguisher
			viii) Space Under False Ceiling	Automatic Fire Alarm System shall be installed
			ix) Office building less than 2 storeys & 500 sq.m floor area	No provision required other than portable except portable fire extinguisher
26	Part 4 Chapter 5: 5.7.3	Specific Requirements for Large shop & Markets (Occupancy F3) (search for any of the following)	i) Shopping Arcade with central corridors open to sky	Automatic Fire Alarm System required along with portable extinguisher
			ii) Shopping Centre Under Covered Roof with Area more than 500 sq.m	Automatic fire alarm & venting system with fixed & portable CO2 extinguisher shall be installed. Provision for portable fire pump with relevant accessories & conservation of water shall be provided along with trained personnel
			iii) Underground Shopping Complex	Automatic fire alarm ,Sprinkler & fixed & portable CO2 fire extinguisher shall be installed
27	Part 4 Chapter 2: 2.12.7	Special Hazard for Occupancy G Industrial	Apparatus capable of ignition	a1)No apparatus generating flames capable of igniting flammable vapour shall be permitted within a room or part of building using or storing volatile flammable liquid
			Storage of flammable liquids	a2) Room or part of building using or storing volatile flammable liquid shall be covered by exhaust ventilation system
			Boiler room	b) Boiler rooms and areas containing heating plants shall be effectively segregated from rest of the occupancy
			Provision of Automatic Sprinkler	d) Automatic sprinkler or other protections like installation of vents shall be made in all buildings of occupancy G2

28	Part 4 Chapter 3: 3.23.1	Exit requirement of Industrial Building		At least two exits shall be provided for each floor including basement for industrial building
29	Part 4 Chapter 5: 5.8.2	Specific Requirements for Industrial G2	Area upto 750sqm	i) Area upto 750 sqm shall be installed with automatic fire alarm & portable fire extinguishers
			Area above 750sqm	ii) Area above 750 sqm shall be fitted with automatic sprinkler system and/or automatic fire alarm & portable fire extinguishers

3A.5 PLUMBING PART

			Tank Capacity (V) in Litres (l)	Diameter of Drainage Pipe (mm)
1	Part-8; Chapter-6 (6.7.2.1)	Size of storage tank drainage pipe (mm)	$V \leq 2800$	25
			$2800 < V \leq 5500$	38
			$5500 < V \leq 11000$	50
			$11000 < V \leq 19000$	63
			$19000 < V \leq 28000$	75
			$28000 < V$	100
2	Part-8; Chapter-6 (6.7.2.2)	Outlet of roof storage tank (mm)	at least 50mm above tank bottom	
3	Part-8; Chapter-7 (7.4.1)	Requirement of permit	Issued by authority for existing or new building	
4	Part-8; Chapter-7 (7.6.2.2)	How many water closets, wash basin etc to be provided	A Residential Single Buildings A1 Detached Single Family Dwelling A4 Minimum Standard Housing Water Closets: 1 per dwelling or apartment Wash Basins: 1 per dwelling or apartment Bathtubs or Shower: 1 per dwelling or apartment Other Fixtures: 1 kitchen sink per dwelling or apartment	
5	Part-8; Chapter-7 (7.9.5.7)	Distance of soil and vent stack above roof surface (m)	Shall run at least 2m above roof surface	
6	Part-8; Chapter-7	Soil and waste stack clearance	Minimum clearance 50mm from wall	

	(7.9.5.8)	from wall (mm)	
7	Part-8; Chapter-7 (7.9.10.9)	Rainwater pipe	Rainwater pipe shall not be used as soil, waste or vent pipe
8	Part-8; Chapter-7 (7.9.11.1)	Septic tank	Septic tank where public sewer is not available
9	Part-8; Chapter-7 (7.9.11.5)	Septic tank	Septic tank shall not discharge into open water course

3A.6 MECHANICAL PART

3A.6.1 HEATING, VENTILATION AND AIR CONDITIONING SYSTEM

Serial no	CLAUSE			
1	3.3.3.2	EQUIPMENT ROOM FOR HVAC	Equipment room	Equipment room shall not be located such that noise and vibration directly transfer to acoustically sensitive area
2	3.3.3.3		Selection of equipment	Equipments shall be selected which produce low sound power level
3	3.3.3.4		Noise control	a) Air duct: Shall not allow noise transfer b) Plenum chamber: Sound absorbent material or sound attenuator shall be used c) Flow control devices: Shall be selected that noise generation do not exceed approved levels
4	3.3.3.5		Vibration Control	Vibration isolator shall be installed under the machinery and shall also be used between a machinery and all pipe work and duct work
5	3.4.3.1	EXHAUST AIR SYSTEMS	General	Exhaust air systems serving kitchen/toilets shall be independent exhaust systems and shall not be combined with exhaust air ducts serving other areas

6	3.5.1	3.5 AIR CONDITIONI NG EQUIPMENT	General	
7	3.5.1.3		Labeling	All mechanical equipment and appliance shall bear permanent and legible factory applied name plate on which shall appear construction and operation data including safety requirements
8	3.5.1.5		Equipment installation	Equipment noise and vibration transmitted to the occupied space shall not exceed the recommended value for the space
9	3.5.1.6		Access	All mechanical equipment and appliances shall be accessible for inspection,service,repair and replacement without removing permanent construction
10	3.5.1.7		Location	Where an appliance is located in remote location,a walkway having a minimum width of 600 mm shall be provided. Appliances located outdoors and may be adversely affectd by sun or water shall be adequately protected
11	3.5.1.8		Electrical installation	Permanent lighting shall be provided to illuminate the area in which an appliance is located
12	3.5.1.9		Condensate wastes	Condensates from air cooling coils,fuel burning condensing appliances and the overflow from evaporative coolers shall be collected and discharged to an approved plumbing and disposal area
13	3.5.1.10		Personnel protection	A suitable and substantial metal guard shall be provided around exposed flywheels,fans,pulleys,belts and moving machinery
14	3.5.2		Cooling by Refrigeration	
15	3.5.2.1		General	Direct refrigerent systems containing Group 2 refrigerents shall not serve an air cooling or AC system used for human

				comfort
16	3.5.2.3		Access	Equipment installed on the roof or an exterior wall shall be accessible under all weather conditions. A portable ladder or other portable temporary means may be used for access to equipment
17	3.5.2.6		Condensate control	When cooling coil is located in the attic or furred space where condensate may cause damage,an additional water tight pan of corrosion resistant metal should be installed beneath the cooling coil to catch the overflow condensate
18	3.5.2.7		Return air and Outside air	Prohibited sources: i. Closer than 3 m from an appliance vent outlet, a vent opening or a plumbing drainage system ii. Where it pick up objectionable odors, fumes or flammable vapours iii. A hazardous or insanitary location iv. A room or space having any fuel burning appliances therein
19	3.5.3		Evaporative cooling	
20	3.5.3.2		Location	Evaporative coolers shall normally be installed outdoor. It may be installed indoor if duct is provided
21	3.5.3.3		Access	Evaporative coolers shall be accessible for inspection,service and replacement without removing permanent construction
22	3.5.3.4		Installation	An evaporative cooler supported by building structure shall be installed on a substantial level base and shall be secured directly or indirectly to the building structure
23	3.7.2.1	VENTILATION SYSTEMS	Where required	Every space intended for human occupancy shall be provided with ventilation by natural or mechanical

				means during the period when the room or space is occupied
24	3.7.4		Mechanical Exhaust	
25	3.7.4.1		Where required	All rooms and areas having air with dust particles sufficiently light enough to float in the air, odours, fumes, spray, gases, vapours, smoke or other noxious or impurities in such quantities as to be irritating
26	3.7.4.2(a)		Design of exhaust system	a) General: Ducts conveying explosives or flammable vapors, fumes or dusts shall extend directly to the exterior of the building without entering other spaces. Exhaust duct shall not extend into or through ducts or plenums
27	3.7.4.2(b)			b) Exhaust air inlet: The inlet to the exhaust system shall be located in area of heaviest concentration of contaminants

3A.6.2 LIFTS, ESCALATORS AND MOVING WALK

Serial	CLAUSE		
1	5.2	ESSENTIAL REQUIREMENTS FOR LIFTS	
2	5.2.1.1	General	Lifts shall be provided in buildings more than six storeys or 20 m in height
3	5.2.1.2	Stretcher facility in lifts	When passenger lifts are installed in any building having more than ten storeys or a height more than 32 m, each floor served by these lifts must have access to at least one lift with a stretcher facility

4	5.2.1.3(a)	Standby Power	(a)One or more lifts shall be provided with standby power in a building which has more than ten storeys,hospital and health care buildings
5	5.2.3.1(b)		(b) Standby power shall be provided by an approved self contained generator set to operate automatically whenever there is a disruption of electrical power supply to the building
6	5.2.2	Safety Considerations	
7	5.2.2.1	Fire Protection	Lift well enclosures and machine room shall be constructed with fire resistant material.In case of fire, the lift well enclosure shall not give off harmful gas or fumes
8	5.2.2.2	Fire Switch	When required fire switch shall be provided,the function of which is to enable the fire authority
9	5.2.2.5	Power cut off	Efficient automatic devices shall be provided and maintained in each lift to cut off power from the motor if the car over travels either top or bottom terminal landing
10	5.2.2.7	Emergency unlocking	There shall have arrangement for emergency unlocking of the landing and lift door with a special key from any landing for evacuation as well as maintenance
11	5.2.3	Lift Cars	
12	5.2.3.1		Lift cars shall have net inside area for different loading capacities not more than that shown in table 8.5.1
13	5.2.3.7		Height of the entrance to the lift car shall not be less than 2 m
14	5.3	DESIGN CONSIDERATIONS	

15	5.3.1.1	Number of lifts and Capacity	The number of lifts,car capacity and speed of the lift shall be slected to have the most effective lift system
16	5.3.1.2		The average Interval shall not be more than shown in table 8.5.3. The travel time shall not exceed 150 seconds
17	5.3.1.3		The passenger handling capacity(H) of a lift system for different occupancies in terms of the number passengers to be handled in the building in five minute peak period shall not be less than that indicated in table 8.5.3
18	5.3.3	Location and arrangement of lift	
19	5.3.3.2		The lifts shall be easily accessible from all entrances to the building. For maximum efficiency they should be grouped near the centre of the building. Walking distance from the lift to the farthest office or suite shall not exceed 60 m
20	5.3.3.3	Arrangement of lifts	a) When more than one lifts are installed in a group, they shall be arranged side by side or in two rows facing each other. Separation of lifts in the group shall be avoided. b) The lobby in front of the lifts shall be wide enough to allow sufficient space for waiting passengers and proper vision of hall button and hall lanterns
21	5.3.4	Location of Machine Room	The machine room shall,as far as practicable,be placed immediately above the lift well
22	5.3.4.4		Machine room shall not be located adjacent to or above sleeping rooms in residential and hotel building
23	5.3.6	Control System	

24	5.3.6.1		The control operation of the lift system,leveling,door opening and closing,response to hall calls etc. shall be fully automatic. All contol equipment shall be efficient and fail safe
25	5.3.6.5		Opening and closing of car doors and landing doors shall be fully automatic and shall operate in full synchronization with one another .
26	5.3.6.7		Independent door closing push button shall be provided in the lift car to allow instant door closing. Similarly door opening push button shall be provided to reverse the closing motion of the doors or hold them open
27	5.3.6.9		Each lift shall have key operated switch to transfer from normal passenger control to a car preference control.

3A.7 ELECTRICAL PART

3A.7.1 UNDER CONSTRUCTION BUILDINGS

3A.7.1.1 PRIORITY CATEGORY 1

Serial	Source	Section	Short Description of criteria/limit
1.	Part 7, chapter 3(Code No: 3.9.1)	Wiring System	All permanent and temporary wiring are done by an licensed electrician.
			No working platforms are placed within 3 m of an un-insulated live electric wire.
			Overhead wires/cables are so laid that clearances are maintained.
			Protection for all electrical wiring laid on floor.
			One CO2 or DCP extinguisher provided near the switch board.
2.	Part 7, chapter 3(Code No: 3.9.2)	Guarding of Cables	All cables and signal cords are guarded wherever such cables and cords pass through or cross working spaces.

3.	Part 7, chapter 3(Code No: 3.9.3)	Lifts	Lifts are installed as per instruction of the manufacturer and under proper guidance
			Entry to the empty lift well shall be blocked
4.	Part 7, chapter 3(Code No: 3.9.4)	Construction Machinery	Construction machinery shall conform to standard specification of work.
			The machinery shall be operated by competent operators only.
			Exhausts opening outside the building with minimum clearance combustible materials.
5.	Part 7, chapter 3(Code No: 3.9.6)	Flame Cutting and Welding	Welding and flame cutting are done in ventilated area
			CO2 or DCP type fire extinguisher are kept near flame cutting and welding

3A.7.1.2 PRIORITY CATEGORY 2

Serial	Source	Section	Short Description of criteria/limit
1.	Part 7, chapter 3(Code No: 3.9.1)	Wiring System	The main switch board located at prominent place
2.	Part 7, chapter 3(Code No: 3.9.2)	Guarding of Cables	Relative agencies consulted for proper protection of underground cables
3.	Part 7, chapter 3(Code No: 3.9.3)	Lifts	Notices/signs are displayed in the lift lobby when the lift is not in operation.
4.	Part 7, chapter 3(Code No: 3.9.4)	Construction Machinery	Regular maintenance and checking for construction machines
			Every part of electric generators, motors and rotary converters are securely fenced.
5.	Part 7, chapter	Flame Cutting and Welding	Suitable protection against electric arc are provided for all welding and flame-cutting operations

	3(Code No: 3.9.6)		When working on aluminum structures, protection for the back of the head and eyes are ensured
			Leather gauntlet gloves with canvas or leather cuffs, shall be worn by welders.

3A.7.2 FULL CONSTRUCTED BUILDINGS

3A.7.2.1 PRIORITY CATEGORY 1

Serial	Source	General Requirements	Short Description of criteria/limit																						
1.	Part 8, chapter 2(Code No: 2.4.1)	Load estimation	<p>Maximum demand need to be counted for load calculation.</p> <table border="1"> <thead> <tr> <th rowspan="2">Types of occupancy</th> <th colspan="2">Minimum Load Densities</th> <th rowspan="2">AC</th> </tr> <tr> <th colspan="2">Unit Load (Watts/m²)</th> </tr> <tr> <td></td> <th colspan="2">Non A/C</th> <td></td> </tr> </thead> <tbody> <tr> <td>Residence/ Dwelling : Single family</td> <td>20</td> <td></td> <td>75</td> </tr> <tr> <td>Residence/ Dwelling : Multi-family (other than hotels)</td> <td>20</td> <td></td> <td>75</td> </tr> <tr> <td>Industrial building (excluding the loads for machines)</td> <td>16</td> <td></td> <td>-</td> </tr> </tbody> </table>	Types of occupancy	Minimum Load Densities		AC	Unit Load (Watts/m ²)			Non A/C			Residence/ Dwelling : Single family	20		75	Residence/ Dwelling : Multi-family (other than hotels)	20		75	Industrial building (excluding the loads for machines)	16		-
Types of occupancy	Minimum Load Densities		AC																						
	Unit Load (Watts/m ²)																								
	Non A/C																								
Residence/ Dwelling : Single family	20		75																						
Residence/ Dwelling : Multi-family (other than hotels)	20		75																						
Industrial building (excluding the loads for machines)	16		-																						
2.	Part 8, chapter 2(Code No: 2.6)	Substation in building	In Multistory, substation should be installed on lowest floor level but direct access from street for installation and removal of equipment. Floor level must be above highest flood level.																						
3.	Part 8, chapter 2(Code No: 2.6.4)	Provision for Stand by Supply	Stand by power supply is recommended for large residential/commercial buildings																						
			Standby generator on the basis of electrical load																						
			Generating set should be used in substation building for quick transfer of electrical load with proper ventilation																						
4.	Part 8, chapter 2(Code No: 2.6.3)	Lay out	Proper ventilation for transformer rooms																						
			Arrangements for preventing Transformers from storm water																						
5.	Part 8, chapter 2(Code No: 2.7.3.6)	Energy Meters	Protective covering enclosed in glass window with hinged door																						

6.	Part 8, chapter 2(Code No: 2.8)	Earthing	Grounding conductor should be made of copper or other metal. Earth conductors must not have any joints. If joints are unavoidable then must be maintained well so that resistance does not increase.
			Electrode penetrate into permanently below ground water level(resistance not more than 1 ohm)/copper rods/copper plates/ galvanized iron pipes.
7.	Part 8, chapter 2(Code No: 2.5.4)	Conductors and accessories	Conductors shall be enclosed in earthed metal or incombustible insulators
8.	Part 8, chapter 2(Code No: 2.7)	Distribution of supply and cabling	Electrical apparatus, conductors(SP,TP) should be installed according to requirements
			Nominal voltage, nature of current and frequency, prospective short circuit current, type and rating of overcurrent protective device, max demand of power consumption must be taken in consideration
9.	Part 8, chapter 2(Code No: 2.7.3)	Equipment and accessories	LT switchgear: switchgear, fuse gear must have adequate breaking capacity
			Installation of PFI plant for lower energy consumption
10.	Part 8, chapter 2(Code No: 2.7.5)	Main switch and Switch Boards	All main switches should be enclosed in metal insulated clad
			SB should be placed in dry location and ventilated room with no storage batteries or exposed chemical fumes. Or should be totally enclosed or made flameproof and not above gas stoves/sinks or within 2.5m of washing unit/ weatherproof
			Appropriate protection shall be provided at SBs and DBs for all circuits and sub circuits against short circuit and overcurrent

3A.7.2.2 PRIORITY CATEGORY 2

Serial	Source	General Requirements	Short Description of criteria/limit
1.	Part 8, chapter 2(Code No: 2.6)	Substation in building	In complex or group of buildings substation preferably located in a separate building and adjacent to generator room
			Sufficient space for substation room
			Min height for substation room 3.6m

2.	Part 8, chapter 2(Code No: 2.7.3.4)	Energy meters	Should be installed in residential building at accessible space, height convenient for reading(not less than 1 m above ground)
3.	Part 8, chapter 2(Code No: 2.7.5.6)	Location of DB	DB shall be fixed on a wall not more than 2m floor level, dust proof and flameproof Arranged so that it is not possible to open two at a time and Metal case should be marked 'DANGER 415 Volt' or other identical marking
4.	Part 8, chapter 2(Code No: 2.8)	Earthing	Copper wire used as earthing lead must not be smaller than 8 SWG (12mm ²)
5.	Part 8, chapter 2(Code No: 2.3.2)	Socket outlet and plugs	Socket outlets shall be fixed at min height of 200mm from floor level, interlocked plug for safety
6.	Part 8, chapter 2(Code No: 2.3.5)	Fans	Fans spaced at 3 to 3.5m (max) in both direction for air circulation
7.	Part 8, chapter 2(Code No: 2.5.3)	Layout and installation	Branch DB's should be placed in convenient position
8.	Part 8, chapter 2(Code No: 2.7.4)	Cables	Proper method of installation of cables and conductors are be followed or not
9.	Part 8, chapter 2(Code No: 2.7.5)	Main switch and Switch Boards	Location should be accessible for fireman or authorized personnel to disconnect in state of emergencies MSB should be installed in boxes or cupboards to safeguard
10.	Part 8, chapter 2(Code No: 2.9)	Lightning protection of buildings	Proper Lightning protection

CHAPTER 4. STAKEHOLDER INTERVIEWS

4.1 MEETINGS HELD

Meetings held with various stakeholders are summarized in Table 4-1 below. A stakeholders' list is included in Annex 5 of the Inception Report for Project S-9. Meetings conducted through 6 December 2018 were listed in Table 3, Chapter 5, of the Inception Report for Project S-9. For the sake of completeness, those meetings are included in Table 4-1.

4.2 MEETING NOTES

Detailed notes on some of the consultations conducted through 6 December 2018 were provided in Annex 5 of the Inception Report. A complete set of notes on most the consultations conducted so far is included in Annex 4A. There were a few meetings at which notes were not taken or, if taken, the notes were not transcribed.

4.3 FINDINGS FROM STAKEHOLDER INTERVIEWS

Key findings from: (1) stakeholder consultations that took place through 5 November 2018, (2) the Inception Workshop of 8-9 December 2018, and the Project Implementation Concept Workshop of 14 March 2019 were summarized in Chapter 7 of the Inception Report for Project S9. Significant findings from subsequent stakeholder consultations are summarized below. The meeting numbers are the same as those in Table 4-1 and will enable the reader look up the details of each meeting, if that is of interest.

#13 Bangladesh Association of Construction Industry (BACI)

- Although, in the public works department, there is a provision for third party supervision for quality control, it is not practiced in other sectors.
- No legal regulatory provision exists to keep inefficient and incapable construction firms from entering the construction industry by political backing.
- Third party inspections should be conducted following a specific quality check system.

#14 The Institution of Engineers, Bangladesh (IEB)

- No structural inspection is performed by RAJUK.
- Occupancy certificates mostly are not obtained and, in some cases, are approved 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.
- Awareness on the part of clients, engineers, and regulatory organizations is extremely important to help enforce building codes.

#15 Bangladesh Association of Consulting Engineers (BACE)

- RAJUK should talk to organizations such as IEB, IAB, BACI, BACE on the issue of quality control, material testing, geotechnical conditions, and inspection to enforce and implement BNBC through third party check.

#16 RAJUK Zone 4

- Design Engineers / Architects responsible for changing approved design plans have been reported to their certifying institutions (IEB or IAB), but no actions are taken.
- There exists a lack of adequate training for zonal officials, particularly senior officials and inspectors who have critical positions.
- There is no coordinated decision-making process between MIS department, field practitioners and the offices of authorized officers.
- Authorized Officers have no authority over inspectors and other subordinates to influence their performance.
- No worker safety issues are taken care of during inspection and monitoring process.
- There is no adequate and proper equipment, logistics and TA/DA provisions for field visits.
- Job descriptions of offered positions are not appropriately descriptive and explanatory.
- Induction training for young professionals for 40 days needs to be better organized [this refers to training at IEB's Engineering Staff College].

#18 RAJUK PIU

- Currently there are 10 Authorizing Officers in RAJUK against of 24 approved positions.

#19 Tarique Hassan & Associates Ltd.

- Training is needed for the technical people. They learn only theoretical things at universities and the practical stuff in the course of time.
- Programs or seminars for certification are needed.
- BNBC should be updated. It should be a continuous process.

#20 RAJUK HQ Development Control

- RAJUK checks only architectural designs according to the Building Construction Act 1952 and *Bidhimala* 2008.
- RAJUK checks whether the architects or engineers are registered with IAB and IEB.
- Structures are to be designed and constructed as per BNBC, but this is not checked by RAJUK.
- Lack of manpower in RAJUK limits its ability to check all types of designs.
- RAJUK leaves BNBC follow-up to the responsibility of client and building designers.

#23 DCon

- There is corruption and a lack of transparency in the approval process of RAJUK.

- Public Works Department follows BNBC but RAJUK follows *Bidhimala*, which contains only the architectural parts of BNBC.

#31 MIST

- Bangladesh fire safety and civil defense checks for fire drawing of taller building which are 7 storied or above (tall buildings, commercial buildings, warehouses, workshops). But fire safety check is completely missing for low-rise residential buildings which are shorter than 7 storied.
- A continuous education campaign should start for RAJUK technical professionals.

#32 RAJUK PIU

- The RAJUK zonal offices and authorized officers should be given magistracy power and separate police force to enforce BNBC. In case of dismantling of certain unauthorized works, RAJUK personnel face law and order situation at site.
- Authorizing officers in most of the cases do not have adequate knowledge of BNBC.
- The main vision of RAJUK is to increase the approval of occupancy certificates using Electronic Construction Permitting (ECP) and in compliance with the BNBC..
- Approximately 99% of building do not have the Occupancy Certificate.
- It is required that an Authorized Officer be graduate engineer, architect or planner. But in reality, a diploma engineer or a surveyor at times holds that position.
- RAJUK used to issue accreditation certificates to professionals until 2008, based on IAB or IEB membership without any examination or viva. After approval of *Bidimala* 2008, accreditation board of IEB has taken the prerogative from RAJUK to issue professional certificates according to Rule 41 of *Bidimala*.
- IEB judge the professional based on academic level, experience level & test (written examination + Viva) level. But, IEB don't provide any further training or academic study to accredited engineers.
- Electronic construction permitting (ECP) system will cover pre-construction, construction, and post-construction monitoring and will issue occupancy certificate to qualifying client . Later, RAJUK will send this occupancy certificate to different utility service providers.

#33 The Institution of Engineers Bangladesh (IEB)

- In U.S. codes, setback distances are based solely on fire safety considerations.
- Continuing education for accredited professionals needs to be added to IEB accreditation process
- IEB has an engineering staff college; its effectiveness, however, is questionable.
- For investigating buildings with more than 6 stories, RAJUK probably should engage third party accredited contractors.
- Out of 30,000 civil engineers in Bangladesh, only 500 professionals have signatory authority under RAJUK's plan.
- After the collapse of spectra building in 2004 then followed by the collapse of both Rangs Bhaban and Rana Plaza, the government decided on District Council as the regulatory body outside of RAJUK jurisdictional area.
- BNBC 2017 should be approved very quickly.

- A committee headed by Prof. Jamilur Reza Choudhury made a proposal that every zone of RAJUK shall register 8 to 10 professional engineering consultants. Every construction in each zone should be under that zonal authority and must be designed by one of the consultants. The regulatory body of RAJUK with consultant jointly will verify whether the BNBC is followed.
- The developer function and authority function of RAJUK should be separated as far as possible.
- Eng. Md. Nurul Huda has mentioned that currently there are 54 different service organizations working in Dhaka city related with building constructions, but without any coordination among those organizations.

#34 Institute of Architects Bangladesh (IAB)

- A single architect or engineer is often found to sign more than 100 drawings in a month. This is not humanly possible. This is not only neglect of professionalism but also a clear sign of malpractice. ECP must take care of all this in the future.
- Careful consideration needs to be given third party contractors, so that owners do not need pay huge amounts at different stages of the approval process.
- Fire service and civil defense is said to maintain two layout plans for the same building. One is for record keeping, for their benefit, that is signed and approved. The other plan is for field execution, and is not necessarily similar to the approved plan.

#35 University of Asia Pacific

- Civil society can act as a pressure group to the government to speed up the approval process of BNBC and third-party inspection.

#36 Projects S-6 and S-7

- In many parts of the world, electronic signatures are legally accepted; they cannot be altered by malpractice.
- List of stakeholders should be expanded to include PWD, Bangladesh Army Cantonment Board, Bangladesh Garment Manufacturers and Exporters Association (BGMEA), and Bangladesh Export Processing Zone Authority (BEPZA)
- Both S-9 and S-6 have outreach campaigns in their respective work plans.
- RAJUK inspectors should be welcome at the construction site, instead of facing law and order situations. No outreach campaign in regard to BNBC enforcement is responsible for the current situation.

4.4 FINDINGS FROM OTHER SOURCES

- RAJUK ranks are demoralized because of too many deputed people from the outside.
- More than 70% of inspectors are diploma engineers.
- A RAJUK Chief Engineer cannot be appointed a Member. This is not good for morale. It would be logical for the government to appoint one of the Chief Engineers as Member, Development Control and the Chief Planner as Member, Planning.
- The Anti-Corruption Commission held a public hearing on January 27, 2016 on RAJUK's services. There were many complaints. Some of the common complaints were : payment is demanded for

land records that are presumably lost, mutations are cumbersome, files do not move without money being paid, files are claimed to be missing or it is claimed that it will take time to look for them and then they appear upon payment of money.

- RAJUK Rule 26, Correction of Approved Design, is not clear and thus creates confusion and problems.
- Both IAB and IEB sources have indicated that 54 government, semi-government and autonomous agencies and seven ministries have jurisdiction over some aspect of building construction, and that there is no coordination among these agencies. The consultants were unable to secure the list of 54 agencies from either IAB or IEB. They have, however, been able to compile a list of 37 agencies. This list is included in Annex 4B.

4.5 SUMMARY – MOST DISTURBING FINDINGS

No occupancy certificate is taken out for 99% of buildings. This makes a mockery of the entire regulatory process. Refusal to connect utilities until a valid occupancy certificate can be produced has been suggested most often as a remedy. However, there are apparently political downsides to an implementation of this suggestion.

No legal regulatory provision exists to keep inefficient and incapable construction firms from entering the construction industry by political backing.

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.

Design Engineers / Architects responsible for changing approved design plans have been reported to their certifying institutions (IEB or IAB), but no actions have been taken.

Authorized Officers have no authority over inspectors and other subordinates to influence their performance.

Too many vital RAJUK positions are open. There are 10 authorized officers in place, whereas 24 positions are approved.

Fire safety check is completely missing for low-rise residential buildings which are shorter than 7-storied.

Four to five engineers sign 90% of the drawings issued by RAJUK (this is not independently verified). It has been suggested that a number be put on the number of jobs for which an engineer can sign the drawings in a month.

Buildings are built to heights beyond what is authorized by RAJUK. The Frauq Rupayan Tower, the site of a recent fire that killed 26 people, is a prominent example of that. It was built to 23 stories tall, while the approved height was 18 stories.

There is corruption and a lack of transparency in the approval process of RAJUK. While this perception is widespread, the consultants are not competent to judge to what extent the perception reflects reality or what the extent of the corruption is. Most, however, agree that the best way to eradicate it is through Electronic Construction Permitting, electronic record keeping, and so forth.

Table 4-1: List of Meetings with Stakeholders

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
1.	Oct.	27	2018	Sthapona Consultants	- Dr. S.K. Ghosh, Team Leader - Dr. Aminul Islam, Practice Leader - Dr. Ahmadul Hassan - Eng. Md. Shajal Khan	- Eng. Md. Mehedi Hasan, CEO & Chief Consultant
2.	Oct.	28	2018	Dep. of Civil Engineering, BUET	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Eng. Abdul Latif Helaly, Project Director - Eng. Abdul Siddik Hossain	- Dr. Ahsanul Kabir, Professor & Department Head - Prof. Mehedi Ahmed Ansary - Prof. Raquib Ahsan
3.	Oct.	28	2018	Department of Architecture, BUET	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Eng. Abdul Latif Helaly, Project Director - Eng. Abdul Siddik Hossain	- Prof. Nasreen Hossain, Department Head - Prof. Raquib Ahsan
4.	Oct.	28	2018	Japan Institute of Disaster Prevention and Urban Safety (JIDPUS), BUET	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Eng. Abdul Latif Helaly, Project Director - Eng. Abdul Siddik Hossain	- Dr. Raquib Ahsan, Director - Tasnim Tarannum Isaba, Lecturer - Shamontee Aziz, Lecturer - Ishfaq Aziz, Lecturer

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
5.	Oct.	28	2018	Fire Service and Civil Defense	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Eng. Abdul Latif Helaly, Project Director - Eng. Abdul Siddik Hossain	- Brigadier General Ali Ahmed Khan, Director General - Major S. M. Muzahid Monir
6.	Oct.	30	2018	Asia-Pacific University	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader) - Eng. Abdul Latif Helaly, Project Director - Eng. Abdul Siddik Hossain - Mr. Mahboob, Procurement Specialist at RAJUK/URU/WB	- Prof. Jamilur Reza Chowdhury, Vice Chancellor
7.	Oct.	31	2018	Ahsanullah University of Science & Technology	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Eng. Abdul Siddik Hossain - Mr. Mahboob, Procurement Specialist at RAJUK/URU/WB	- Prof. A. M. M. Safiullah, Vice Chancellor - Dr. Md. Abdur Rouf, Professor
8.	Nov.	4	2018	Military Institute of Science & Technology	Dr. S.K. Ghosh, Team Leader Dr. Ahmadul Hassan, Executive Director Dr. Aminul Islam, Practice Leader	- Prof. Dr. Md. Zoynul Abedin - Prof. Col. Md. Masudur Rahman, Department Head
9.	Nov.	5	2018	Rangs Properties Ltd.	- Dr. S.K. Ghosh, Team Leader - Dr. Aminul Islam, Practice Leader - Eng. Iffat Huq - Eng. Abdul Siddik Hossain	- Angelo Afnan Hamid, Project Manager - Md. Habib Ul Alam, Project Manager - S M Ahsan Mico, Head of Design

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
10.	Nov.	5	2018	Housing and Building Research Institute (HBRI)	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Eng. Abdul Siddik Hossain	- Md. Shamim Akhtar, Director General - Md. Abdul Wahed, Principal Research Engineer
11.	Nov	4	2018	World Bank	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, Executive Director - Dr. Aminul Islam, Practice Leader - Mr. Md. Mahboob Hassan, Procurement Specialist, RAJUK/URU/WB	- Swarna Kazi - S. M. Mehedi Hasan
12.	Nov	5	2018	Japan International Cooperation Agency (JICA)	- Dr. S.K. Ghosh, Team Leader - Dr. Aminul Islam, Practice Leader - Eng. Abdul Siddik Hossain	- Takumi Tsuchiya - Md. Anisuzzaman Chowdhury
13.	Dec	4	2018	Bangladesh Association of Construction Industry (BACI)	- Dr. Ahmadul Hassan - Dr. Aminul Islam, Practice Leader - Eng. Iffat Huque - Eng. Md. Shajal Khan - Eng. Abdul Siddik Hossain	- Eng. Muniruddin Ahmed, President - Md. Shahidul Islam, Secretary - S.M. Rafiqul Islam, Chairman of GBB Power Ltd - Eng. Abu M Masud, Icon Engineering - Eng. Mahmudul Hassan, Member - Eng. Shafiqul H Talukdar, Starlite Services Ltd. - Eng. Aftab Uddin Ahmed, Former President of BACI

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
14.	Dec	6	2018	Institution of Engineers Bangladesh (IEB)	<ul style="list-style-type: none"> - Dr. Aminul Islam, Practice Leader - Eng. Iffat Huque - Eng. Md. Shajal Khan - Eng. Abdul Siddik Hossain 	<ul style="list-style-type: none"> - Eng. Mollah Mohammad Abul Hossain, Vice-President Service sand Welfare - Eng. Md. Nuruzzaman, Vice-President, Human Resources Development - Eng. Khandker Manjur Morshed, Honorary General Secretary - Eng. Md. Hamidul Hoqoe, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB), and a number of IEB committee members
15.	Dec	6	2018	Bangladesh Association of Consulting Engineers (BACE)	<ul style="list-style-type: none"> - Dr. Aminul Islam, Practice Leader - Eng. Iffat Huque - Eng. Md. Shajal Khan - Eng. Abdul Siddik Hossain 	<ul style="list-style-type: none"> - Dr. M. Shamim Z. Bosunia, President, BACE - Shahidul Hassan Khan, General Secretary, BACE - Eng. Abu Hasan M Eunos, Chairman, Dexterous Consultants Ltd.
16.	Jan	3	2019	RAJUK Zone 4	<ul style="list-style-type: none"> - Alberto Herrera, ICC - David Walls, ICC - Dr. M. Aminul Islam, SDE 	<ul style="list-style-type: none"> - Eng. Mobarak Hossain, Authorized officer - Arch. Sonia Shahnaz, Asst. Authorized Officer - Eng. Rangon Mondal, Asst. Authorized Officer - Md. Abul Kalam Azad, Chief Building Inspector, Zone-3 - Md. Badal Hosain, Building Inspector, Zone-3
17.	Jan	3	2019	RAJUK PIU & World Bank	<ul style="list-style-type: none"> - Alberto Herrera, ICC - M. Aminul Islam, SDE 	<ul style="list-style-type: none"> - Eng. A. Latif Helaly, Project Director, URU, RAJUK - Eng. Dewan Rakibul Islam, DRR Management Analyst, WB - Eng. Emdad, RTI - Rahat Sikder, RTI - PIU Project Engineers, Architects and Planners

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
18.	Jan	21	2019	RAJUK PIU	- Dr. Ahmadul Hassan, SDE - Alberto Herrera, ICC - M. Aminul Islam, SDE - Iffat Huque, SDE	- Aminur Rahman, Deputy Project Director (DPD), RAJUK, Urban Resilience Unit - Project Engineers, Architects, and Planners
19.	Jan	27	2019	Tarique Hasan & Associates Ltd.	- Alberto Herrera, ICC - David Walls, ICC - M. Aminul Islam, SDE	- Tarique Hasan, Architect and Partner Architect
20.	Jan	28	2019	RAJUK HQ Development Control 1	- Alberto Herrera, ICC - David Walls, ICC - Dr. M. Aminul Islam, SDE - Iffat Huque, SDE	- Tanzila Khanam, Director, Development and Control, RAJUK. - Assistant Authorizing Officer, Dev. & Control - Mahfuzul Karim, Law Officer RAJUK
21.	Jan	31	2019	IAB		
22.	Jan	31	2019	RANGS		
23.	Jan	31	2019	D Con	- Alberto Herrera, ICC - David Wallace, ICC - M. Aminul Islam, SDE	- CEO - Architect - Partner Architect
24.	Feb	3	2019	MIST	- Alberto Herrera, ICC - David Walls, ICC - Shahid Alam, SDE	- Prof. Zoynul Abedin - Lt. Colonel Mohammed Russedul Islam
25.	Feb	3	2019	BACE	- Alberto Herrera, ICC - Mr. David, ICC - Iffat Huque, SDE - Eng. Abdul Siddik Hossain, SDE	- Prof. Shamim Z. Basunia
26.	Feb	4	2019	RAJUK Zone 3 and 4	- Alberto Herrera, ICC - David, ICC	- RAJUK Zone 3 Authorized officer
27.	Feb	6	2019	RAJUK	- Alberto Herrera, ICC - David, ICC - Eng. Shahid Alam, ICC - Dr. Aminul Islam, ICC (SDE) - Dr. Hassan, ICC (SDE)	- Eng. Abdul Latif Helaly, URU PD - Mir Musharraf, RAJUK Ex Member (Admin) - Mr. Zoardar, URU PIU - Dr. Rahat Sikdar, RTI (e. Gen) - Eng. Shadia, PIU - Eng. Pretom, PIU - Eng. A. R. Khan, PIU

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
28.	Feb	13	2019	RAJUK	- Dr. Ahmadul Hassan, SDE - Alberto Herrera, ICC - Shahid Alam, SDE - Dr. Aminul Islam, SDE - Iffat Huque, SDE	- RAJUK Officials and URP Consultants
29.	Feb	17	2019	JICA office	- Eng. A. Latif Helaly, RAJUK, PD, URU Component - Dr. Ahmadul Hassan, SDE - Dr. M. A. Islam, SDE	- Akihiro Ishihara, Director Intl Building Analysis, Ministry of Land, Infrastructure, Transport and Tourism - Tatsuo Narafu, JICA Senior Advisor, Disaster Management - Koishiro Yamamoto, Deputy Director, Team 2 Urban and Regional Development Group, Infrastructure and Peacebuilding Dept. - JICA Local Reps Tsochiya, Takumi and Anisuzzaman Chowdhruy
30.	Mar	12	2019	RAJUK Head Office	- Dr. S.K. Ghosh, Team Leader - Mr. Mark A. Johnson, Project Advisor, ICC - Dr. Ahmadul Hassan, SDE - Mr. Alberto Herrera, ICC - Md. Shahid Alam, SDE - Eng. Abdul Siddik Hossain	- Md. Abdur Rahman, Chairman, RAJUK - Eng. Abdul Latif Helaly, Project Director - Eng. Aminur Rahman Sumon, Deputy Project Director - Major Eng. Shamsuddin Ahmed Chowdhury, Member
31.	Mar	12	2019	MIST	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, SDE - Mr. Alberto Herrera, ICC - Md. Shahid Alam, SDE Eng. - Abdul Siddik Hossain	- Prof. Zoynul Abedin, Team Leader of Drafting BNBC

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
32.	Mar	16	2019	RAJUK PIU	<ul style="list-style-type: none"> - Dr. S.K. Ghosh, Team Leader - Mr. Mark A. Johnson, Project Advisor, ICC - Prof. Zoynul Abedin, Project Manager - Dr. Ahmadul Hassan, SDE - Mr. Alberto Herrera, ICC - Md. Shahid Alam, SDE Eng. - Abdul Siddik Hossain 	<ul style="list-style-type: none"> - Eng. Md. Abdus Sabur, President of IEB - Eng. Md. Nurul Huda, Retired Additional Secretary and former Chairman of RAJUK - Eng. Khandker Manjur Morshed, Honorary General Secretary - Eng. Md. Hamidul Hoque, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB) - Some IEB committee members
33.	Mar	16	2019	Institute of Engineers Bangladesh (IEB)	<ul style="list-style-type: none"> - Dr. S.K. Ghosh, Team Leader - Mr. Mark A. Johnson, Project Advisor, ICC - Prof. Zoynul Abedin, Project Manager - Dr. Ahmadul Hassan, SDE - Mr. Alberto Herrera, ICC - Md. Shahid Alam, SDE - Eng. Abdul Siddik Hossain 	<ul style="list-style-type: none"> - Eng. Md. Abdus Sabur, President of IEB - Eng. Md. Nurul Huda, Retired Additional Secretary and former Chairman of RAJUK - Eng. Khandker Manjur Morshed, Honorary General Secretary, - Eng. Md. Hamidul Hoque, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB) - Some IEB committee members
34.	Mar	18	2019	Institute of Architects Bangladesh (IAB)	<ul style="list-style-type: none"> - Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, SDE - Mr. Alberto Herrera, ICC - Md. Shahid Alam, SDE - Ar. Hasib Ahmed, SDE 	<ul style="list-style-type: none"> - Eng. Shah Alam Zahiruddin - Ar. Jalal Ahmed - Ar. Mubasshar Hussain - Ar. Dewan Shamsul Arif - Ar. Mamnoon Murshed Chowdhury

No.	Date			Organization Visited	ICC/SDE Team Members	Participants
	Mo.	Day	Year			
35.	Mar	18	2019	University of Asia Pacific	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, SDE - Md. Shahid Alam, SDE	- Dr. Jamilur Reza Choudhury
36.	Mar	19	2019	Package S-06, Package S-07, URP, WB/RAJUK	- Dr. S.K. Ghosh, Team Leader - Dr. Ahmadul Hassan, SDE - Mr. Alberto Herrera, ICC - Md. Shahid Alam, SDE - Iffat Huque, SDE - Eng. Abdul Siddik Hossain - Eng. Tanjiba Rahman	- Dr. H. Kit Miyamoto - Michelle Pinkowski, RTI - Eric Mousset, RTI - Eng. Emdadul Islam

ANNEX 4A. STAKEHOLDER MEETING NOTES

Meeting No.: #1

Date: 10/27/2018

Organizer: ICC/SDE Team

Stakeholder: Sthapona Consultants

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Aminul Islam (Practice Leader)
- Dr. Ahmadul Hassan
- Eng. Md. Shajal Khan

Participants:

- Eng. Mehedi Hasan, CEO & Chief Consultant

Purpose: The meeting is held to help understand and hear the issues and complaints from the perspective of private structural engineering companies.

During the meeting, complaints are raised regarding issues related to code design and quality control:

- Quality Control Issues:
 - RAJUK's current role in approving building plans is only based on checking architectural space allocations like FAR and setbacks.
 - Most of the buildings investigated in recent times have inadequacies. This is due to the lack of proper knowledge of ethics and codes, and use of improper construction methods and poor construction materials.
 - Before the year 2000 most design engineers avoided earthquake loads in their design, either by their judgment or due to client's influence.
 - The Alliance will now be working as Safety Monitoring Organization (SMO)
- Building Code Issues:
 - The frequency of code update and review is very low in Bangladesh.
 - BNBC 1993 has 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 resonance under dynamic loads.
 - There are no provisions for wind loads on double arch roof domes in the current code.
 - In the current code, the load combination (1.4 Dead + 1.4025 Eq) has no use.
 - The code provisions require a very high minimum reinforcement of 1.5% for pre-cast pile.
 - In the current code, the soil-structure interaction is not properly mentioned.

Meeting No.: #2

Date: 10/28/2018

Organizer: ICC/SDE Team

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Ahmadul Hassan (Executive Director)
- Dr. Aminul Islam (Practice Leader)
- Eng. Abdul Latif Helaly (Project Director)
- Eng. Abdul Siddik Hossain

Stakeholder: BUET, Department of Civil Eng.

Participants:

- Dr. Ahsanul Kabir, Professor & Department Head
- Dr. Mehedi Ahmed Ansary, Professor
- Dr. Raquib Ahsan, Professor

During the meeting, the background of Bangladesh National Building Code (BNBC) and its development was discussed and concluded:

- In 1992, Housing and Building Research Institute (HBRI) invited Development Design Consultants Ltd (DDC) to prepare Bangladesh National Building Code (BNBC). The first draft of BNBC was prepared in 1993, but not approved until 2006 by Dr. Jamilur Reza Choudhury in the Caretaker Government.
- In 2010, HBRI invited BUET and other consultants for the revision of BNBC. The submission was done in 2012 and the steering committee approved it in 2015.
- In 2017, BNBC was submitted to the Prime Minister to be published.
- BNBC 1993 allows the assignment of multiple authorities as building officials to take responsibility of building approvals.
- In the latest BNBC version, Administration and enforcement of code has been included in Part 2.
- Currently, in the City Corporation Area, Building Construction Act is being implemented by inspectors.

After the discussion, participants from BUET Department of Civil Engineering have raised the following issues:

- RAJUK only requires architectural drawings in its approval process for Low rise buildings (up to 10 storied).
- Local Government currently issues buildings approvals without acting on code enforcement.

Later the following was recommended:

- Engineers with education diploma should be addressed and required in the building code.
 - Bangladesh Building Regulation Authority (BBRA) should take responsibility to regulate building code within Bangladesh.
 - For high rise buildings (above 10 stories), both architectural and structural drawings must be submitted to RAJUK for approval. With approvals to be obtained from 12 different responsible organizations such as, Dhaka WASA, city corporation, police, environmental department etc.
 - RAJUK should form a committee specifically to issue building approvals for high rise buildings with more than 40 stories.
 - Building inspectors or contractors should use a follow up schedule for all construction stages.
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Meeting No.:	#3	Date:	10/28/2018
Organizer:	ICC/SDE Team	Stakeholder:	BUET, Department of Architecture
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Dr. Ahmadul Hassan (Executive Director) ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Abdul Latif Helaly (Project Director) ▪ Eng. Abdul Siddik Hossain 	Participants:	<ul style="list-style-type: none"> ▪ Dr. Nasreen Hossain, Professor & Department Head ▪ Dr. Raquib Ahsan, Professor

The six components of Bangladesh Urban Resilience Project were briefly explained by Eng. Abdul Latif Helaly, project director, to the department of architecture at BUET.

During the discussion the following issues were reported:

- Less than 2% of all buildings have building occupancy certificate.
- Although BNBC include architecture and fire safety provisions in parts 3 and 4, respectively, it is not being followed as building owners tend to select the lowest-bidding contractors.
- Absence of geotechnical course in architectural schools course curriculum

The department of architecture recommended that:

- Awareness regarding fire safety in buildings should increase.
- Land owners must be educated on urban resilience
- RAJUK needs to issue approvals in stages.
- The use of utility service connections to help control code enforcement.

Meeting No.:	#4	Date:	10/28/2018
Organizer:	ICC/SDE Team	Stakeholder:	BUET, Japan Institute of Disaster Prevention and Urban Safety
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Dr. Ahmadul Hassan (Executive Director) ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Abdul Latif Helaly (Project Director) ▪ Eng. Abdul Siddik Hossain 	Participants:	<ul style="list-style-type: none"> ▪ Dr. Raquib Ahsan, Director ▪ Tasnim Tarannum Isaba, Lecturer ▪ Shamontee Aziz, Lecturer ▪ Ishfaq Aziz, Lecturer

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

During the meeting JIDPAS made a presentation on the Institute’s professional excellence and advancement in earthquake engineering, which includes:

- Training capacity on earthquake resistant structural design and geotechnical investigation.
- Skilled staff to conduct building vulnerability assessment
- JIDPAS has prepared a microzonation seismic map after undertaking detailed assessment of seismic exposure and evaluation of buildings and socio-economic exposure.
- JIDPAS conducted training program for RAJUK Engineers, Architects and Planners.

Meeting No.:	#5	Date:	10/28/2018
Organizer:	ICC/SDE Team	Stakeholder:	Fire Service and Civil Defense
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Dr. Ahmadul Hassan (Executive Director) ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Abdul Latif Helaly (Project Director) ▪ Eng. Abdul Siddik Hossain 	Participants:	<ul style="list-style-type: none"> ▪ Brigadier General Ali Ahmed Khan, Director General ▪ Major S. M. Muzahid Monir

Purpose: 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.

Current preparedness of Fire Service and Civil Defense in Dhaka city is evaluated at:

- 13 fire stations. (Originally, 17 stations have been proposed)
- Nearly 60 thousand volunteers.
- A response time of about 20 to 25 minutes.
- Availability of fire safety monitoring firms (nos 6)
- Fire detection tools are available.

The main challenges that face Fire Service and Civil Defense are reported as follows:

- Unregulated construction.
- Lack of fire hydrants.
- Traffic jams and narrow roads.
- Lack of water source availability near fire incidents.
- Change of construction plans after RAJUK approval.
- Soft story of parking in residential buildings.

Fire Safety and Civil Defense in Dhaka recommends:

- All buildings should be designed with fire protection water reservoir.
- All buildings should have high water pressure and escape routes.
- Steel buildings should have fire isolation and sprinklers.
- Enforcement of land adjustment plans.
- Use of central database to send code enforcement messages to volunteers.
- Improvement of electrical line plans along with fire safety plans.

Meeting No.:	#6	Date:	10/30/2018
Organizer:	ICC/SDE Team	Stakeholder:	Asia-Pacific University
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Dr. Ahmadul Hassan (Executive Director) ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Abdul Latif Helaly (Project Director) ▪ Eng. Abdul Siddik Hossain ▪ Mr. Mahboob, Procurement Specialist, RAJUK/URU/WB 	Participants:	<ul style="list-style-type: none"> ▪ Prof. Jamilur Reza Chowdhury, Vice Chancellor

During the meeting, Prof. Jamilur Reza Chowdhury provided a chronological overview of BNBC development with enfaces on seismic provisions and code enforcement:

- The first seismic zonation was undertaken by the Geological Survey of Bangladesh in 1979.
- After the tragic collapse of Rana Plaza which resulted in hundreds of deaths, the high court raised orders to the government to force implement the national building code all over the country.

In addition, the interviewee pointed out issues in BNBC associated with wind risk analysis, and explained an undergoing storm surge study and follow-up initiative to prepare a master plan for coastal cyclone shelters.

Throughout the discussion with Prof. Chowdhury the following was suggested:

- The BNBC should be updated regularly.
- Formation of building regulatory authority.
- RAJUK to assign accredited professional firms as third party investigators of building structural designs.
- The government should provide design code enforcement professionals.
- Enforcement agencies should be formed to undertake code enforcement processes.
- Utility connection could be held until design check approval is granted.
- For RC structures with prefabricated steel roof sheds, the primary structure and the roof shed should be modeled separately.
- Pitch roof live load reduction factor should be included in the current BNBC as in ASCE.

Meeting No.: #7

Date: 10/31/2018

Organizer: ICC/SDE Team

Stakeholder: Ahsanullah University of

- Participants:**
- Dr. S.K. Ghosh (Team Leader)
 - Dr. Ahmadul Hassan (Executive Director)
 - Dr. Aminul Islam (Practice Leader)
 - Eng. Abdul Siddik Hossain
 - Mr. Mahboob, Procurement Specialist, RAJUK/URU/WB

- Participants:**
- Science & Technology
 - Prof. A. M. M. Safiullah, Vice Chancellor
 - Dr. Md. Abdur Rouf, Professor

Purpose:

Meeting No.: #8

Date: 11/04/2018

Organizer: ICC/SDE Team

Stakeholder: Military Institute of Science & Technology

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Ahmadul Hassan (Executive Director)
- Dr. Aminul Islam (Practice Leader)

Participants:

- Prof. Dr. Md. Zoynul Abedin
- Col. Md. Masudur Rahman, Professor and Department Head

Purpose:

Meeting No.: #9

Date: 11/05/2018

Organizer: ICC/SDE Team

Stakeholder: Rangs Properties Ltd.

- Participants:**
- Dr. S.K. Ghosh (Team Leader)
 - Dr. Aminul Islam (Practice Leader)
 - Eng. Iffat Huq
 - Eng. Abdul Siddik Hossain

- Participants:**
- Angelo Afnan Hamid, Manager, Coordination Project Management
 - Md. Habib Ul Alam, Project Management
 - S. M. Ahsan Mico, Head of Design
-

Purpose:

Meeting No.: #10

Date: 11/05/2018

Organizer: ICC/SDE Team

Stakeholder: Housing and Building Research
Institute (HBRI)

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Ahmadul Hassan
(Executive Director)
- Dr. Aminul Islam (Practice
Leader)
- Eng. Abdul Siddik Hossain

Participants:

- Md. Shamim Akhtar,
Director General
- Md. Abdul Wahed,
Principal Research
Engineer

Purpose:

Meeting No.: #11

Date: 11/04/2018

Organizer: ICC/SDE Team

Stakeholder: The World Bank

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Ahmadul Hassan
(Executive Director)
- Dr. Aminul Islam (Practice
Leader)
- Mr. Md. Mahboob Hassan,
Procurement Specialist,
RAJUK/URU/WB

Participants:

- Swarna Kazi
- S. M. Mehedi Hasan

Purpose:

Meeting No.: #12

Date: 11/05/2018

Organizer: ICC/SDE Team

Stakeholder: Japan International

Participants:

- Dr. S.K. Ghosh (Team Leader)

Participants: Cooperation Agency (JICA)

- Dr. Aminul Islam (Practice Leader)

- Takumi Tsuchiya

- Eng. Abdul Siddik Hossain

- Md. Anisuzzaman Chowdhury

Purpose:

Meeting No.:	#13	Date:	12/04/2018
Organizer:	ICC/SDE Team	Stakeholder:	Bangladesh Association of Construction Industry (BACI)
Participants:	<ul style="list-style-type: none"> ▪ Dr. Ahmadul Hassan ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Iffat Huque ▪ Eng. Md. Shajal Khan ▪ Eng. Abdul Siddik Hossain 	Participants:	<ul style="list-style-type: none"> ▪ Eng. Muniruddin Ahmed, President, BACI ▪ Md. Shahidul Islam, Secretary, BACI ▪ S.M. Rafiqul Islam, Chairman, GBB Power Ltd ▪ Eng. Abu M Masud, Icon Engineering ▪ Eng. Mahmudul Hassan, Member, BACI ▪ Eng. Shafiqul H Talukdar, Starlite Services Ltd. ▪ Eng. Aftab Uddin Ahmed, Former President, BACI

Purpose: BACI is a platform for professional engineers in large scale construction industry in Bangladesh; it implements most of the public sector big construction projects such as roads and highways.
BACI is currently implementing construction sector capacity building with ADB support on construction labor training, certificate course and ISO Certification as a mandatory requirement.

During the meeting BACI raised the following issues:

- In the design code, concrete mix designs are not well defined.
- RAJUK does not have the adequate capacity to ensure proper application of BNBC.
- Although in public works department there is a provision for third party supervision for quality control, it is not practiced in other sectors.
- No legal regulatory provision to control inefficient and incapable construction firms entering the construction industry by political backing.

BACI recommended that:

- Each firm should acquire a qualifying BACI membership as a requirement.
- Third party inspection should be conducted following a specific quality check system.

Meeting No.:	#14	Date:	12/06/2018
Organizer:	ICC/SDE Team	Stakeholder:	Institution of Engineers
Participants:	<ul style="list-style-type: none"> ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Iffat Huque ▪ Eng. Md. Shajal Khan ▪ Eng. Abdul Siddik Hossain 	Participants:	Mollah Mohammad Abul Hossain, Vice-President (Service and Welfare), <ul style="list-style-type: none"> ▪ Eng. Md. Nuruzzaman, Vice-President (Human Resources Development), ▪ Eng. Khandker Manjur Morshed, Honorary General Secretary, ▪ Eng. Md. Hamidul Hoque, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB) ▪ and a number of IEB committee members

The participants pointed out the following issues:

- No structural inspection is performed by RAJUK.
- Occupancy certificate mostly are not obtained, and in some cases are approved 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.
- Awareness for clients, engineers and regulatory organizations is extremely important to help enforce building codes.
- Research and Development Cell of IEB can help support to address the burning issues related to urban resilience.

Meeting No.:	#15	Date:	12/06/2018
Organizer:	ICC/SDE Team	Stakeholder:	Bangladesh Association of Consulting Engineers (BACE)
Participants:	<ul style="list-style-type: none"> ▪ Dr. Aminul Islam (Practice Leader) ▪ Eng. Iffat Huque ▪ Eng. Md. Shajal Khan ▪ Eng. Abdul Siddik Hossain 	Participants:	<ul style="list-style-type: none"> ▪ Dr. M. Shamim Z. Bosunia, President, BACE ▪ Shahidul Hassan Khan, General Secretary, BACE ▪ Eng. Abu Hasan M Eunus, Chairman, Dexterous Consultants Ltd.

- RAJUK should talk to Professional Engineers organizations and Associations such as IEB, IAB, BACI, BACE, BASI on the issue of quality control, material testing, geotechnical conditions, and inspection to enforce and implement BNBC through Third Party Check.
- 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.
- The gap between engineering design and actual implementation by laborers needs to be reduced in order to mitigate the risks posed by seismic activities. To achieve this Prof. Bosunia proposed:
 - 1) To review on-site practices and educate the construction personnel on properly implementing the design specifications.
 - 2) 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.

Meeting No.: #16	Date: 01/03/2019
Organizer: ICC/SDE Team	Stakeholder: RAJUK Zone 4
Participants: <ul style="list-style-type: none"> ▪ Alberto Herrera, ICC ▪ David Walls, ICC ▪ Dr. M. Aminul Islam, SDE 	Participants: <ul style="list-style-type: none"> ▪ Eng. Mobarak Hossain, Authorized officer ▪ Arch. Sonia Shahnaz, Asst. Authorized Officer ▪ Eng. Rangon Mondal, Asst. Authorized Officer ▪ Md. Abul Kalam Azad (Chief Bulding Inspector)- Zone-3 ▪ Md. Badal Hosain, Building Inspector, Zone-3

During the meeting the following issues are pointed out:

- Design Engineers / Architects responsible for changing approved design plans have been reported to their certifying institutions (IEB or IAB), but no actions are taken.
- Lack of adequate training for zonal officials, particularly senior officials and inspectors who have critical positions.
- There is no coordinated decision-making process between MIS Department, field practitioners and the office of authorized officers.
- MIS is not directly involved in the approval process and inspection requirements. It engages consulting firms for automation with narrow scope, which does not reflect the real field requirements.
- Authorized Officers have no authority over inspectors and other subordinates to influence their performance.
- No workers safety issues are taken care for in during inspection and monitoring process.
- There is no adequate and proper equipment, logistics and TA/DA provisions for field visits.
- Job descriptions of offered positions are not appropriately captured and explained.
- Induction training for young professionals for 40 days needs to be better organized.

To solve some of these issues, it is discussed that:

- There should be incentives provision for building occupancy certificate holders.
- There should be a third Party professional control check to alert clients of their building plan in advance.

Other notes:

- There are 2000 architects registered with RAJUK.

Meeting No.: #17

Date: 01/03/2019

Organizer: ICC/SDE Team

Stakeholder: RAJUK PIU (World Bank)

Participants:

- Alberto Herrera, ICC
- M. Aminul Islam, SDE

Participants:

- Eng. A. Latif Helaly, Project Director, URU, RAJUK
- Eng. Dewan Rakibul Islam, DRR Management Analyst, WB
- Eng. Emdad, RTI
- Rahat Sikder, RTI
- PIU Project Engineers, Architects and Planners

Purpose:

Meeting No.: #18	Date: 01/21/2019
Organizer: ICC/SDE Team	Stakeholder: RAJUK PIU
Participants: <ul style="list-style-type: none"> ▪ Dr. Ahmadul Hassan, SDE ▪ Alberto Herrera, ICC ▪ M. Aminul Islam, SDE ▪ Iffat Huque, SDE 	Participants: <ul style="list-style-type: none"> ▪ Aminur Rahman, Deputy Project Director, RAJUK, Urban Resilience Unit ▪ Project Engineers/ Architects / Planners

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- Purpose:** Understand RAJUK building permit approval process
- During the meeting the pre- construction approval process is explained as follows:
 - First the client submits Construction Permit Form (Form no. 301) and attach the necessary drawings, required documents, and permit fee payment receipt to the respective zonal office.
 - Then an authorized officer receives the documents and records the data.
 - The application is then forwarded to a tracer to check the location in the Detailed Area Plan Map and validates the submission to an inspector for further verification of the site.
 - Note: As per Building Construction Act 1952, the authorized officer has the right and authority to visit any construction site at any time of the day.
 - The authorized officer sends the documents to a building inspector, who is a usually a fresh graduate in civil engineering or architecture. He visits the site and checks all drawings and documents to prepare an observation report in a prescribed format, then submit to the Chief Building Inspector.
 - The Chief Building Inspector re-checks the application and passes it to the Assistant Authorization Officer for evaluation.
 - The Authorized Officer rechecks all the designs, documents, and process the application to Building Construction Committee if all the documents are correct for final review and clearance. Otherwise a letter is issued to the client by the Authorizing Officer informing client for resubmission of plan with corrections
 - Building Construction Committee meets 3 to 4 times in a month to review and approve plans

 - The provision is to have 15 inspectors for each Zone, but currently only 10 inspectors are working.
 - The inspectors produce three reports: the prescribed form for inspection, a sketch (of the construction site, showing measurements and construction area), and an additional hand sketch of site surrounding features.
 - Chief Inspectors are usually experienced with at least 5 years of experience.
 - Committee members evaluate plans as per Emarat Bidhimala.
 - Currently, there are 10 Authorizing Officers in RAJUK against the provision of 24 positions.
 - There is a total of 8 zones, each having 3 committees, requiring a total of 24 committees.
 - 70% of plans are for 8 story buildings or less, and the other 30% are for buildings above 8 stories.
 - Plans are approved through a 5-member committee:
 - Zonal Director (Chairman of the Committee)
 - 1 Architect (within or outside RAJUK)

- 1 Authorized Officer (Coordinator)
- 2 Civil Engineers (1 within and 1 outside RAJUK)
- An Authorized Officer does not have the authority to cancel the plans alone; a permission from committee is needed. The regulations allow 45 days for plans approval, but the authority takes approximately 30 days.
- Techno Haven software was introduced but lack of manpower, skills and capacity the software is not in use.
- Yearly, 5000-6000 new buildings are approved.
- In the last 2 years, 8000 cases were filed against RAJUK and less than 1% of 8000 cases filed by RAJUK. Most cases are still unsolved.
- The legal department of RAJUK is headed by Law Director with 2 law officers, 4 logistics officers and 3000 panel members.
- There are 2 benches in high court.
- 0.4 million buildings are 2 storied and above. Among these, 60% are not approved by RAJUK.
- An update of BNBC (2017) has been approved by the law minister but Government circular / gazette notification is still pending. It is expected to be updated by April.
- As per BNBC, Chief Building Officer is to be elected among architects, civil engineers or planners. If no one is elected in a given time period, then the high court gives verdict on interim authority delegated to the Authorized Officer of RAJUK to perform the role of Building Officer.

Meeting No.: #19

Date: 01/27/2019

Organizer: ICC/SDE Team

Stakeholder: Tarique Hasan & Associates

Participants:

- Alberto Herrera, ICC
- David Walls, ICC
- M. Aminul Islam, SDE

Participants: Ltd.

- Tarique Hasan, Architect
- Partner Architect

Purpose: The firm is internationally awarded and its employees claim to be environmentally conscious.

During the meeting the following issues have been raised:

- 80% of the lands are private in Dhaka and RAJUK do not look after private lands.
- Bribery and corruption of the government people is a huge barrier against a successful code implementation.
- RAJUK lacks proper manpower of consultants and certified inspectors.
- In high class areas people are more conscious and codes are maintained. It's the low class areas where codes are violated and people are less conscious.
- E-CP system should be permitted as soon as possible. If the system is electronically developed then the system can become smooth. BNBC should be synchronized with other projects so that it saves time and unnecessary harassments.
- For the duration of the approval process personal relationship helps but the clients suffer. Small projects take 2 to 3 months. Bigger projects take almost a year. These have to go through 12 organizations. For foreign projects it takes so much time that the foreign funds finish before the projects can finish.
- Fee and payments of the structural engineers and architects are very poor.
- Driveway and car parking in the code is very small, 4.5 meters. It should be more than that.
-

The participants recommend that:

- There should be some programs or campaigns to inspire people to follow the rules. We need to convince the technical personnel to follow the setback guidelines so that the clients are bound to follow the codes as well.
- RAJUK should have the capacity and manpower of professionals who will be able to check the measurements and calculations properly before approving plans.
- There should be a payment guideline from the government.
- Awareness and knowledge about building code and safety issues should be spread among people.
- Training is needed also for technical people. They only learn the theoretical concepts in universities and they learn practicality in course of industrial experience.
- Programs, such as campaigns or seminars, for certifications are needed.
- BNBC updating should be a continuous process.
- RAJUK should inspect the sites and see the progress at least once per month.
- Law punishment for violating the code should be practiced.

Meeting No.:	#20	Date:	01/28/2019
Organizer:	ICC/SDE Team	Stakeholder:	RAJUK HQ Development
Participants:	<ul style="list-style-type: none"> ▪ Alberto Herrera, ICC ▪ David Walls, ICC ▪ Dr. M. Aminul Islam, SDE ▪ Iffat Huque, SDE 	Participants:	Control <ul style="list-style-type: none"> ▪ Tanzila Khanam, Director, Development and Control, RAJUK. ▪ Assistant Authorizing Officer, Dev. & Control ▪ Mahfuzul Karim, Law Officer RAJUK

During the discussion the law officer Mhfuzul Karim pointed out that:

- RAJUK filed a total 6941 cases during 2017 to 2018. Among these 262 were resolved in favor of RAJUK while 6 were won by the building owners.
- There are only one law officer and two assistant law officers full time at RAJUK. In addition, there is panel of 150 lawyers available under contractual arrangement, along with 7 legal advisors that work for RAJUK when requires.
- Most of the legal cases filed are mainly on problems related to set-back space and distance, building beyond approved height, use of residential places for commercial use, and land dispute.

During the discussion it is noted that:

- RAJUK only supervise the architectural designs according to the Building Construction Act Bidhimala 1952.
- RAJUK Checks whether the Architects or Engineers are registered with IEB and IAB.
- Structures are to be designed and constructed as per BNBC code, but this is not supervised by RAJUK.
- Lack of manpower in RAJUK limits its ability to check all types of designs.
- RAJUK leaves BNBC follow-up to the responsibility of client and building designers.
- Regarding electrical and fire safety issues, clearance certificates are needed from 10 concerned agencies for ten or more story buildings, but not for structures below 10 stories.
- Building Construction Act does not have any rules for NOC.
- The whole plan approval process used to follow 16 steps, but it has been shrunk to only 4 steps.

Meeting No.: #21

Date: 01/31/2019

Organizer: ICC/SDE Team

Stakeholder: IAB

Participants:

Participants:

Purpose:

Meeting No.: #22

Date: 01/31/2019

Organizer: ICC/SDE Team

Stakeholder: RANGS

Participants:

Participants:

Purpose:

Meeting No.: #23

Date: 01/31/2019

Organizer: ICC/SDE Team

Stakeholder: D Con

Participants:

- Alberto Herrera, ICC
- David Wallace, ICC
- M. Aminul Islam, SDE

Participants:

- CEO, Architect and
- Partner Architect

Key Points:

- The main problem with BNBC implementation and enforcement is lack of proper regulatory institutional set-up associated with shortage of professional manpower, lack of transparency and corruption in the approval process of RAJUK.
- Public Works Department follow BNBC but RAJUK follows Building Construction Act 1952, which is revised to partially follow BNBC.
- Building construction act 1952, follows the architectural parts of BNBC only.
- Private contractors always try to reduce costs, and there is no effective regulatory measures and code enforcement to stand accountable for deviation on quality ground.
- PMC – Project Management Consultants group should be present in the private sector as it is present in the government sector.

Meeting No.: #24	Date: 02/03/2019
Organizer: ICC/SDE Team	Stakeholder: MIST
Participants: <ul style="list-style-type: none"> ▪ Alberto Herrera, ICC ▪ David Walls, ICC ▪ Shahid Alam, SDE 	Participants: <ul style="list-style-type: none"> ▪ Professor Zoynul Abedin, PhD ▪ Lt. Colonel Mohammed Russedul Islam-MIST

Discussion key points:

- In U.S: they update the professionals and technical people about the codes every 3 years.
- Dr. Zoynul Abedin expressed doubt whether people would be actually interested to be trained for BNBC.
- Short term training like seminars and lectures on BNBC chapters could be feasible and could be done, but long term trainings can make people less interested.
- Professor Zoynul Abedin suggested that there should be software to complete the checking of designs in accordance with BNBC.
- He also suggested the arrangement of weekly meeting between all authorized personnel from different official bodies to check and finalize plans and processes. If an official sends a representative as a replacement, the representative should be given full authority and responsibility to make decisions. Similar meetings can also be held for occupancy certificates, deviations, and demolition of existing buildings.
- There should be a coordinator responsible for meeting timelines and filing delay complaints.
- The meetings should be conducted in conference rooms with modern facilities, and to be given top priority.
- Code follow up updates should be reported to everyone.
- Engineers' qualification criteria should be justified and compared to other countries.
- Digital copies of designs should be kept as resistance against bribery.
- Physical penalty for breaking code rules should be minimal otherwise it can't be executed; long term jail punishment is not feasible.

Meeting No.: #25

Date: 02/03/2019

Organizer: ICC/SDE Team

Stakeholder: BACE

Participants:

- Mr. Alberto Herrera, ICC
- Mr. David, ICC
- Iffat Huque, SDE
- Eng. Abdul Siddik Hossain, SDE

Participants: ▪ Prof. Shamim Z. Basunia

-
- IEB does not provide any training.
 - There is a need for training on Codes and Standards from different countries for capacity building
 - IEB provides Professional Certification through their Registration Board in specific fields, and the scope is included in the certificate
 - RAJUK adds its recognition to the certificate.
 - It is difficult for RAJUK to handle structural inspections
 - RAJUK Committees and their members need to be reviewed, they may be ineffective and need a new system.
 - Highly qualified people needed in RAJUK

Meeting No.: #26

Date: 02/04/2019

Organizer: ICC/SDE Team

Stakeholder: RAJUK Zone 3 and 4

Participants:

- Mr. Alberto Herrera, ICC
- Mr. David, ICC

Participants:

- RAJUK Zone 3 Authorized officer

- There are 8 Zone Directors, one in each zone
 - 2 directors oversee and coordinate 4 zones from central offices
 - Building Committee meets once a week
 - Each zone has its own system/calendar to hand our permits to the clients
 - The Act of 2008 (Bidhimala) establishes the fees for construction area.
 - The approval process does not consider BNBC directly, but it is considered indirectly along with other requirements (land, civil defense (fire requirements), etc.) as well as electrical, plumbing, mechanical, to issue the Certificate of Occupancy.
 - Staff needs for training for soft skills and technical skills
 - There is shortage of resources, materials and manpower
 - Lack of support at different levels (safety on site visits)
 - Lack of quality
 - Social and cultural aspects to be considered when applying regulations
 - No equipment, shortage of computers, materials for online processes
 - Consider incentives as promoting from within
 - Inspections to be monitored by technical people on-site.
 - RAJUK does not enforce workers safety as it is not considered in the Bidhimala.

Meeting No.: #27	Date: 02/06/2019
Organizer: ICC/SDE Team	Stakeholder: RAJUK
Participants: <ul style="list-style-type: none"> ▪ Mr. Alberto Herrera, ICC ▪ Mr. David, ICC ▪ Eng. Shahid Alam, ICC ▪ Dr. Aminul Islam, ICC (SDE) ▪ Dr. Hassan, ICC (SDE) 	Participants: <ul style="list-style-type: none"> ▪ Eng. Abdul Latif Helaly, URU PD ▪ Mir Musharraf , RAJUK Ex Member (Admin) ▪ Mr. Zoardar, URU PIU ▪ Dr. Rahat Sikdar, RTI (e. Gen) ▪ Eng. Shadia, PIU ▪ Eng. Pretom, PIU ▪ Eng. A. R. Khan, PIU

- During the meeting Eng. Helaly shared URU background with the ICC team as follows:
 - Prior to URU there was Earthquake Megacity Initiatives and 60 workshops along with blended trainings which led to establish an investment project called URU. URU mainly will intervene in the areas of capacity strengthening of GoB and resilience building across the Dhaka City. Rapid assessment on 5000 building, preliminary detail assessment on 1000 building and detail engineering assessment on 200 building will be carried out under this project. Since there was no sub soil information in DAP, a Micro Zonation Map will be produced through RSLUP intervention. Then DAP will be revised with the inclusion of vulnerability and earthquake information.
- Later David presented their findings in brief on training needs, staffing needs and some institutional needs of RAJUK.
- Also shared HBRA Structure, Typical Building Department Implementation and Enforcement Structure, RAJUK Organizational Structure which is mostly extracted from BNBC and or DPP.
- Job responsibilities were defined and indicated whether URU could go under Development Control Wing or establish a new wing under RAJUK.
- Eng. Shahid Alam emphasized that empowerment of the Zonal Offices and Authorizing Officers is badly needed. Authorizing officers can't conduct or decide a demolition on their own discretion which typically requires big span of coordination.
- RAJUK should have reserve police forces to ease their field operations as well as maintain staff security.
- There is very limited avenue for promotion of the RAJUK staff.
- Rahat Sikdar mentioned about the deliverable from Package 6 and checked with Package 9 whether there was potentially any duplication.
- Ideally there should be two layers of staff under BNBC package like, one is zonal level and another on a central level to be attached to the central structure of URU.
- There should be single office with Structural evaluation and integrity unit which was missing in the structure. Suggested to put a central office under URU rather than having zonal offices.
- Position titles should be adjusted in the structure as per local context.
- Demolition Unit and Fire & Safety Unit should be included in the URU and or BNBC Enforcement.

- There should be proposal for resilience activities at both national and sub-national levels, while earthquake vulnerability and other risk factors are equally existing in the sub-national (rural) areas. Besides, intervention with capital city, URU should intervene for the Hill Resiliencies, Coastal Resiliencies, River Erosions Resiliencies, Drought Resiliencies under a Rural Resilience Unit. PD proposed for a Model Resilience Village for the future reference. URU should elaborate with multi-hazard and multisector interventions.

Meeting No.: #28	Date: 02/13/2019
Organizer: ICC/SDE Team	Stakeholder: RAJUK
Participants: Dr. Ahmadul Hassan, SDE Alberto Herrera-ICC Shahid Alam, SDE Dr. Aminul Islam, SDE Iffat Huque, SDE	Participants: RAJUK Officials and URP Consultants

A brief presentation on the RTI functionality, structure and placement of Urban Resilience Unit (URU) was delivered by Mr. Peter Medway, RTI Organizational Capacity Development Expert. The structure is positioned within RAJUK's existing Management Framework options of URU in the first phase of the Urban Resilience Project (URP) ending June 2020.

After discussion with the RAJUK board of officers and experts, RAJUK Chairman decided upon the following options for the function, structure and location of the URU in the first phase (Short-Term Option) of the URP:

- The function of the URU will be as a "Center of Excellence" that will provide research and development, capacity development, performance management and communications technical assistance and capacity support to RAJUK for resilient building construction. In phase one the URU will design, build, test, train, transfer and introduce new systems and processes including mechanisms to enforce the building code. During the short term this role will remain with the relevant departments of RAJUK and URU will coordinate and mobilize different service package output stated in the DPP.
- The structure of the URU will be as proposed in the exhibit-1 structure / function option 1 "Center of Excellence" (Name of the functions: Research and Development, Capacity Development, Performance Management, Communication).
- The URU will be placed within the RAJUK organizational structure as a Technical Support Team under the administrative authority of the Chairman, RAJUK.
- RAJUK will form an Advisory Group, headed by the Chairman, RAJUK, with the Chief Resilience Officer (CRO), URU serving as Member Secretary. The members of the existing 5 wings of RAJUK, representatives of an appropriately qualified institution (e.g. BUET etc.) and representatives of professional (e.g. IAB / IEB, PIB, etc.), Advisory Group. The objective is to advice to better integrate URU outputs in RAJUK and other related sectors.
- It was agreed in principle that URU will eventually be a long term possible self-sustained entity in association with and under the administrative control of Ministry of Housing and Public Works. This entity will include Service Delivery in addition to Technical Assistance Group (Centre of Excellence). Implementation modalities will be finalized based on lessons learnt during the first phase of the URP and after further discussion among the stakeholders.
- Participants reached to a conclusion that the URU may proceed to implement these decisions for the first phase of the URP. RAJUK chairman instructed all RAJUK Departments and external stakeholders to extend their full support and cooperation to the project director of urban resilience project to create and operationalize URU in all matters that will enable RAJUK to make Dhaka City more resilient in terms of earthquake and other disasters.

Meeting No.: #29

Date: 02/17/2019

Organizer: ICC/SDE Team

Stakeholder: JICA Office

Participants:

- Eng. A. Latif Helaly, RAJUK PD, URU Component
- Dr. Ahmadul Hassan, SDE
- Dr. M. A. Islam, SDE

Participants:

- Akihiro Ishihara, Director Intl Building Analysis, MLIT (Ministry of Land, Infrastructure, Transport and Tourism)
- Tatsuo Narafu, JICA, Senior Advisor (Disaster Management)
- Koishiro Yamamoto, Deputy Director, Team 2 Urban and Regional Development Group. Infrastructure and Peacebuilding Dept.
- JICA Local Reps Tsochiya, Takumi and Anisuzzaman Chowdhury

Purpose: Explaining the scope of S9 and content of the Situational Analysis Report. During the meeting the following was clarified:

- Situational Analysis Report should be discussed and delivered by end of the month [April 2019] of when Dr.Ghosh visits Bangladesh.
- JICA mentioned the Building Resiliency and Capacity Building as the areas in which their interests stand, specifically in building design and construction monitoring.

Meeting No.: #30	Date: 03/12/2019
Organizer: ICC/SDE Team	Stakeholder: RAJUK Head Office
Participants: <ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Mr. Mark A. Johnson (Project Advisor, ICC) ▪ Dr. Ahmadul Hassan, SDE ▪ Mr. Alberto Herrera, ICC ▪ Md. Shahid Alam, SDE ▪ Eng. Abdul Siddik Hossain 	Participants: <ul style="list-style-type: none"> ▪ Md. Abdur Rahman, Chairman, RAJUK ▪ Eng. Abdul Latif Helaly (Project Director) ▪ Eng. Aminur Rahman Sumon (Deputy Project Director) ▪ Major Eng. Shamsuddin Ahmed Chowdhury (Retd), Member (Development)

Key points discussed:

- RAJUK Chairman mentioned about the vast increase of RAJUK activities. As a result, 8 out of 24 Authorized Officers have been created. In addition, the implementation of Bidimala is also enforced, but with absence of adequate inspectors for supervision during construction things don't go as planned.
- Mr. Alam mentioned that for buildings up to six stories RAJUK can function as it is with introduction of ECP, FASP and FRCM. But for building above 6 stories, a 3rd party should be involved. The Chairman more or less agreed with the principle as it reduces changes in RAJUK's system.
- In regard to engage of 3rd party, Chairman RAJUK mentioned about a committee headed by Dr. Jamilur Reza Choudhury, who almost finalized the report. Chairman RAJUK talked to Dr. Jamilur regarding this matter.
- Dr. Ghosh mentioned that BNBC 2017 needs an urgent approval, and he requested the chairman of RAJUK to pursue the matter with the government. The chairman of RAJUK agreed with the proposal.
- In chapter 3 of Bidhimala, it is written that one or more committee can be formed to implement the roles of Bidhimala, these committees are: Building Construction Committee, Special Project Approval Committee, Urban Development Committee, Other Committees whenever required will be nominated and approved by ministry.
- In the Act of Fire Service and Civil Defense & department of environment (DOE), it is written that if the building is 10 stories or 33 meters then NOC letter is required from 16 different departments. Now RAJUK has sent a letter to the ministry to simplify the procedure to get the NOC letter from 4 departments only such as, Fire Service and Civil Defense, Civil Aviation Department, KPI and RAJUK.
- Association of diploma engineers in BNBC 2017 raises concerns, that is why it is taking longer time to be gazetted. Chairman of Rajuk will try to accelerate the approval process as early as possible.
- Previously, 45 days was allocated to get the final approval of plan from RAJUK, now 8 zonal offices of RAJUK have reduced the time to 20 days. In case of emergency, that time can be reduced to 7 days only.

- In 8 zones, 8 meetings are conducting in a week to give the clearance.
- Director of Development Control-1 assisting the member and director of Development Control-2 is a member secretary of the special committee. These two directors are very beneficial for RAJUK and they coordinate the activates in 8 zonal offices.
- RAJUK can directly recruit assistant authorized officers and promot them to authorized officers after 7 years.
- Total 8 Authorized Officers are working whereas 24 positions are existing. In case of short fall of authorized officer, executive engineer from public works department (PWD) can join as authorized officer. Currently, two executive engineers of PWD are working as authorized officers for RAJUK namely Mr. Nuruzzaman and Mr. Sardar Mahbob.
- The Authorized Officers are appointed by the government and not by RAJUK; this causes a difficulty for RAJUK chairman to fill up the shortage.
- RAJUK Chairman sent a letter to the ministry for recruitment modification of authorized officer from PWD. The chairman mentioned in the letter that senior Sub-division (SD) engineer who has 7 years experience can join as an authorized officer.
- Fire safety checking is completely missing for building with less than 7 stories. But fire safety department is giving certificate for more than 7 stories buildings even though they do not monitor.
- RAJUK should increase manpower for fire safety & construction monitoring.
- Md. Shahid Alam has suggested RAJUK Chairman to hire a third party to monitor structural design, fire safety, supervision and quality control for special projects and taller building (≥ 7 stories) initially. If it works fruitfully then smaller buildings could as well be covered by 3rd party.
- Land use clearance and drawing permit will be given electronically through the platform of Electronic Construction Permit (ECP) system.

Meeting No.:	#31	Date:	03/12/2019
Organizer:	ICC/SDE Team	Stakeholder:	Team Leader of Drafting BNBC,
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Dr. Ahmadul Hassan, SDE ▪ Mr. Alberto Herrera, ICC ▪ Md. Shahid Alam, SDE ▪ Eng. Abdul Siddik Hossain 	Participants:	MIST <ul style="list-style-type: none"> ▪ Professor Zoynul Abedin, PhD

Key points discussed:

- BNBC and Bidimala include fire safety requirements in separate chapters.
- RAJUK doesn't enforce any fire safety requirement.
- Bidimala refers to BNBC for structural design provisions.
- Bangladesh fire safety and civil defense checks for fire safety plans for buildings of 7 stories or higher only.
- BNBC code was written by competent professional engineers, but the Bidimala was done by non-professional engineers; civil society workers, lawyers, ministry representatives and two professors from BUET.
- Corruption is the main reason for the need of strengthened regulatory body.
- A continuous education campaign should start for RAJUK technical professionals.
- RAJUK needs to update the Bidimala to BNBC 2017 specially fire safety requirement.
- Assigned RAJUK engineers should be technically sound and skilled by providing them with sufficient training and support literature, e.g. design examples.
- Resilience training should extend to the following:
 - Land owners
 - Inspectors
 - Technical Professionals
 - Non-technical professionals

Meeting No.: #32	Date: 03/16/2019
Organizer: ICC/SDE Team	Stakeholder: PIU, RAJUK
Participants: <ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Mr. Mark A. Johnson (Project Advisor, ICC) ▪ Professor Zoynul Abedin, PhD (Project Manager) ▪ Dr. Ahmadul Hassan, SDE ▪ Mr. Alberto Herrera, ICC ▪ Md. Shahid Alam, SDE ▪ Eng. Abdul Siddik Hossain 	Participants: <ul style="list-style-type: none"> ▪ Eng. Abdul Latif Helaly (Project Director) ▪ Md. Mahboob Hossain (Senior Procurement Specialist) ▪ Md. Saifur Rahman Joarder (Procurement Specialist) ▪ Eng. Aminur Rahman Sumon (Deputy Project Director)

- Approval of Inception Report includes changes in workplan and payment schedule.
- Inception report will be approved by next week based on some conditions such as minutes of workshop meeting (comments received from different stakeholders) and payment schedule.
- Main task is to put some strategy for the stakeholders/owners so that they are influenced to follow and respect the building code.
- To create compelling strategy for developers & planners so that they follow the building code.
- Electronic construction permitting (ECP) system should have transparency.
- The most important strategic option should be that RAJUK should function as a regulatory body. In order to implement that strategic option for a regulatory body (RAJUK), the following tasks must be performed:
 - Make proper human resource by providing training (regarding BNBC Code & Dhaka Imarat Nirman Bidhimala).
 - Infrastructure (Some authority is given to make it enforceable. Check for any accountability is missing in respect to the authority)
 - The RAJUK zonal offices and authorized officers should be given magistracy power and separate police force to enforce BNBC. In case of dismantling of curtain unauthorized works RAJUK Authorized officer face law and order situation at site.
 - Approach to implement the building code (might be come out in situational analysis by consulting with URU man power).
- Interviews with stakeholders is very important for making the conceptual mechanism of framework.
- Regarding the payment schedule, it requires approval from the World Bank and as well as it requires approval from the ministry.
- Workplan has two components, one component is task and the other component is time. Changes in time and in deliverable will affect the workplan and payment schedule.
- RAJUK has 4 major departments: Planning, development and development control and financial.
- Authorized officers in most of the cases do not have adequate knowledge on BNBC. Also out of 24 positions of authorized officers, one third posts are vacant.

- RAJUK as a regulatory body requires a BNBC implementation strategy. Direct stakeholders of RAJUK are mentioned below:
 - Land Owner
 - Engineering Professional
 - Legal people (Practicing Advocate, Barrister)
 - Others/Government Agency (Utility service provider, Fire service provider)

While Indirect stakeholders of RAJUK:

- Civil society
 - General people
- The main vision of RAJUK to increase the approval of occupancy certificate using Electronic Construction Permitting (ECP) system compliance with BNBC code.
 - Monitoring should be according to building categorization:
 - Low-rise buildings
 - High-rise buildings
 - Special projects
 - Key point installation (KPI)
 - There are 3 types of KPI exist in Bangladesh such as α -category (President house, president office, Prime minister house, office, etc.), β -category (All electrical sub-stations, TNT office, WASA office) and γ -category (All police stations, Border Guards Bangladesh, BGB & Bangladesh Army cantonment).
 - The above mention buildings categorization is documented in key point installation development committee (KPI DC) 2013 which made by Defense ministry.
 - Low-rise buildings are up to 10 stories or 33m, and high-rise buildings are those greater than 10 stories or 33m.
 - Special project are as defined in role 8 of Dhaka Imarat Nirman Bidhimala.
 - During pre-construction stage: RAJUK only approves the architectural plans.
 - During construction stages: two types of forms are required i.e Form no. 307 (Owner/Professional). This form 307 must be submitted to RAJUK before 15 days of project start date. Another Form no. 309 (active up to plinth level construction)
 - For post-construction stage: Form no. 401 (Declaration from owner) & Form no. 402 (Declaration from professional) must be submitted with as-built architectural, structural, plumbing & electrical drawing. In this stage, all the documents should be submitted per rule 19 of Bidimala. According to rule 19, the design adequacy and accuracy for all types of submitted drawings liable to concerned architect and engineer.
 - Approximately, 99% of the building don't have Occupancy Certificate.
 - The qualification of Authorized Officer must be a graduate engineer, architect or planner. But in reality, some diploma engineers or surveyor are holding the position.

- Dhanmondi area is controlled by the Ministry of Housing and Public Works; Gulshan area controlled by Rajuk; Mirpur, Lalmatia controlled by National Housing Authority Bangladesh (NHA). 70% land of Dhaka city is the planned area and remaining 30% land is the unplanned area where C type developer is constructing building.
- During the preconstruction stage, for up to 6 stories buildings, PIU RAJUK wants to rely on individual professionals for providing accreditation of professional strengthen. RAJUK can do the structural plan check using the software FASP (Fast Automated Structural Plan Check), but for buildings above 6 stories, structural drawings must be checked and vetted by two separate third party groups.
- RAJUK used to give accreditation certificate to professionals until 2008 based on IAB & IEB membership without any examination or viva. After the approval of Bidimala 2008, accreditation board of IEB has taken the power from RAJUK to give professional certificates according to Role 41 of Bidimala.
- IEB has professional staff college where Bangladesh Professional Engineers Registration Board (BPERB) exists.
- IEB judges professionals based on academic level, experience level & test (written examination + Viva) grade. But, IEB doesn't provide any further training or academic study to accredited engineers.
- The government or the regulatory body needs to create a demand for the updating process of accredited professionals.
- According to Detailed Area Plan (DAP), RAJUK jurisdictional area 1528 Sq. km has a total of 2.1 million structures where only 0.45 million structures are above 6 stories buildings.
- Building Construction (BC) act 12 tells about indemnity of authorized officer. As per BNBC, the authorized officers are not responsible for structural checking of buildings under construction.
- Electronic construction permitting (ECP) system will cover checks for pre-construction, construction and post-construction stages and final issuing of occupancy certificate for clients. Later, RAJUK will send this occupancy certificate to different utility service provider.
- Mr. Aminul Islam Sumon, DPD, categorically mentioned that like in many parts of the world, RAJUK should control the professionals and the 3rd party professionals will control the clients.
- RAJUK does not have enough man power or technologies, and logistics to control/supervise the clients on one-to-one basis. In that way, architectural and structural integrity, fire safety aspects and other important issues sometimes remain unnoticed to RAJUK.
- Mr. Sumon mentioned that in regard to preparation of structural plan, structural vetting, fire safety and earthquake matter should be dealt by a qualified 3rd party that stays engaged with RAJUK.

Meeting No.:	#33	Date:	03/16/2019
Organizer:	ICC/SDE Team	Stakeholder:	Institute of Engineers Bangladesh (IEB)
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Mr. Mark A. Johnson (Project Advisor, ICC) ▪ Professor Zoynul Abedin, PhD (Project Manager) ▪ Dr. Ahmadul Hassan, SDE ▪ Mr. Alberto Herrera, ICC ▪ Md. Shahid Alam, SDE ▪ Eng. Abdul Siddik Hossain 	Participants:	<ul style="list-style-type: none"> ▪ Eng. Md. Abdus Sabur (President of IEB, Bangladesh) ▪ Eng. Md. Nurul Huda, Additional Secretary (Retd.), Former Chairman of RAJUK ▪ Eng. Khandker Manjur Morshed, Honorary General Secretary, Eng. Md. Hamidul Hoque, Vice Chairman, Bangladesh Professional Engineers Registration Board (BPERB) and many IEB committee members

- In the American code, setback distances of structures will be dictated solely based on fire safety considerations.
- Fire safety requirements are being enforced by Bangladesh Fire Safety & Civil Defense department for tall buildings with 7 stories or above. For residential building up to 6 stories, fire safety is not being checked neither by RAJUK nor fire safety & civil defense.
- BNBC requires construction inspection before a certificate of occupancy is issued. However, RAJUK inspection is totally confined on checking architectural requirements only (i.e setback distance, FAR).
- Continuing education for accredited professionals need to be added to IEB accreditation process
- IEB has an engineering staff college with built-in program, but its advantage is questioned.
- For investigating buildings with more than 6 stories, RAJUK probably should engage third party accredited contractors.
- Out of 30,000 civil engineers in Bangladesh, only 500 professionals are signatory authority in RAJUK's plan.
- Detailed Area Plan (DAP) is not fully approved yet and some regions of DAP lacks authorized officer to certify the plan.
- Although the building plan approval authority in Dhaka is RAJUK, but the authority's monitoring activity is insufficient.
- In BNBC, a regulatory body is required to control and monitor construction implementation.
- Many buildings exist outside of RAJUK jurisdiction area. The regulatory body should also consider those building during inspection. Besides, the regulatory body should be separated of RAJUK or PWD.

- There are provisions for rain water harvesting in buildings. Currently, in Dhaka city, ground water table is lowering day by day.
- After the collapse of spectra building in 2004 then followed by the collapse of both Rangs Bhaban and Rana Plaza, the government decided on District Council as the regulatory body outside of RAJUK jurisdictional area.
- BNBC 2017 and the existing DAP should be approved very quickly.
- Another DAP will be prepared for the next 20 years (2016-2035).
- RAJUK jurisdictional area is 1528 square km, and is divided into 8 zones with 24 authorized officers.
- A committee headed by Prof. Jamilur Reza Choudhury made a proposal that every zone of RAJUK shall register 8 to 10 professional engineering consultants. Every construction in each zone should be under that zonal authority and must be designed by one of the consultants. The regulatory body of RAJUK with consultant jointly will verify whether the BNBC code is followed.
- RAJUK is the authority at the same time RAJUK is working as developer (can be discuss outside of the project). The developer function and authority function of RAJUK should be separated as far as possible but under the same chairman with separated department.
- The regulatory system of RAJUK can be compared to regulatory system of neighboring countries such as India.
- Eng. Md. Nurul Huda has mentioned that currently there are 54 different service organizations working in Dhaka city related with building constructions, but without any coordination between those organizations.
- There is contradiction between laws as Local Government Engineering Department (LGED) and Ministry of Works doing the same thing.
- PWD controls the area of City Corporation. RAJUK controls CDA, KDA & RDA and rest of the area is under control of Rural Department of Local Government.
- For the approval of BNBC 2017, appointment shall be taken from 3 departments: Prime Minister Office, Ministry of LGRD and Ministry of PWD.
- World Bank project for the next 5 years will provide special trainers to train in staff colleges (procurement courses will be taken). The participants will come from governmental offices (including both non-engineers and engineers), engineers from private firms and RAJUK engineers. Course durations will be: 3, 7, 14 and 21 days.
- IEB has four individual boards namely, Bangladesh Professional Engineer Registration Board, Accreditation Board, Ethics Board and Safety Board.

Meeting No.: #34

Date: 03/18/2019

Organizer: ICC/SDE Team

Stakeholder: Institute of Architects

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Ahmadul Hassan, SDE
- Mr. Alberto Herrera, ICC
- Md. Shahid Alam, SDE
- Ar. Hasib Ahmed, SDE

Participants: Bangladesh, IAB Office

- Ar./Eng. Shah Alam Zahiruddin
- Ar. Jalal Ahmed
- Ar. Mubasshar Hussain
- Ar. Dewan Shamsul Arif
- Ar. Mamnoon Murshed Chowdhury

-
- Dr. SK Ghosh briefly represented project S-09 including:
 - Statistical presentation of earthquakes in recent years in Japan.
 - Adaptation of building codes in Japan helped to prevent earthquake hazard happening last 30-40 years.
 - Importance of building code implementation shows that there are no damages afterwards.
 - Objectives of the project (S-09).
 - Electronic Construction Permit (ECP) system is under implementation in RAJUK.
 - U.S code and standard system of implementations.
 - Short presentation on BNBC.
 - International Building Code, 2018.
 - Some pictorial presentation of Code related books (e.g Bidhimala, BNBC, IBC etc.)
 - Critical elements of code implementation and enforcement.
 - BNBC or part of it (mainly the inspection section) need to be translated into Bengali.
 - Discussion about the implementation of BNBC 2017 and Bidhimala 2008.

 - Later, the following topics were discussed:
 - Professionals Credentials.
 - Continuous education facilities for professionals on periodical basis.
 - Suggestions on structural drawing monitoring 3rd party of accredited professionals.
 - Inspection system in USA. (Jurisdictional inspection, Special inspection (periodic), Structural observation.)
 - Suitability of inspection jobs to new graduates.
 - During the meeting Mr. Mamnoon Murshed Chowdhury emphasized on giving careful attention to 3rd party investigators, so that owners do not need to pay huge amounts at different levels of plan preparation, checking, vetting and approval process.
 - He also mentioned that a single particular architect and engineer is found to sign more than 100 of drawings in a month. For any professional architect and engineer this is not humanly possible. This is not only a kind of neglect of professionalism but also clear sign of malpractice. The ECP must take care of all these eventualities in future.
 - Dr. Jalal Ahmed, President of IAB, talks on the commentary issues on BNBC.
 - The accreditation process for engineers and Architects is also discussed.

- Dr. Jalal mentioned that IAB has their own standard of accreditation. Therefore, IAB does not recognize architects graduating from institutions that fall short of their standards. Only architects from IAB accredited schools can get the practitioner certificate.
- The Imarat Nirman Bidhimala was made with the help of construction rules from Sri Lanka, Singapore, and India and so on as references. However, separate drawings for separate agencies (talked about the fire safety drawings vs. the RAJUK approval drawing) are making the approval process difficult and questionable.
- Ar. Mobassar Hussain raised various issues regarding the housing sector in Bangladesh, especially for fire safety drawings. He mentioned the fire service and civil defense maintain two kinds of layout plans. One is left for as record keeping for their benefit, that is signed and approved. While the other plan drawing is kept for field execution, which does not necessarily similar to the approved plan.

Meeting No.: #35

Date: 03/18/2019

Organizer: ICC/SDE Team

Stakeholder: University of Asia Pacific

Participants:

- Dr. S.K. Ghosh (Team Leader)
- Dr. Ahmadul Hassan, SDE
- Md. Shahid Alam, SDE

Participants:

- Dr. Jamilur Reza Choudhury

Purpose:

Meeting Key Points:

- Dr. S.K. Ghosh briefed about the current situation, progress and focus of the project so far. He also described what it meant to implement and enforce from the perspective of the project.
- Dr. Jamilur Reza Choudhury agreed with the approach taken and appreciated all review and comments on Bidhimala 2008. He also mentioned that Bidhimala doesn't emphasize on the inspections.
- It was raised by Dr. Choudhury that third party inspection can be a solution that is now under process but hasn't been official yet. Dr. Ghosh agreed that it should be implemented immediately.
- The civil society can act as a pressure group to the government to speed up the approval process of BNBC and third-party inspection.
- Dr. Choudhury highlights that together with Prof. Abu Sayeed, Mr. Shamimuzzaman, Dr. Syed Rezwana along with the professional associations like IEB and IAB should all get together to support the initiatives taken by World Bank.
- Dr. Ghosh highlighted that fire safety is only checked for buildings higher than 10 stories, but protocols should be maintained for buildings lower than 10 stories as well, and it should be added to Bidhimala.
- The immediate solution should be BNBC approval from the Government.

Meeting No.:	#36	Date:	03/19/2019
Organizer:	ICC/SDE Team	Stakeholder:	Package S-06 & Package S-07,
Participants:	<ul style="list-style-type: none"> ▪ Dr. S.K. Ghosh (Team Leader) ▪ Dr. Ahmadul Hassan, SDE ▪ Mr. Alberto Herrera, ICC ▪ Md. Shahid Alam, SDE ▪ Iffat Huque, SDE ▪ Eng. Abdul Siddik Hossain ▪ Eng. Tanjiba Rahman 	Participants:	URP, WB/RAJUK <ul style="list-style-type: none"> ▪ Dr. H. Kit Miyamoto ▪ Michelle Pinkowski, RTI ▪ Eric Mousset, RTI ▪ Eng. Emdadul Islam

Key points discussed:

- Dr. Ghosh mentioned about the code implementation and enforcement matters and explained by definition that implementation and enforcement are two different things that should be addressed properly.
- Michelle questioned the overlap of activities between S-6, S-7 and S-9. It is clarified that with properly coordinated meetings all overlap problems can be addressed. Dr. Ghosh also mentioned that the S-9 has contribution over S-6. For proper enforcement of BNBC the 3rd party should be in place within next 2 years.
- Dr. Kit Miyamoto described in short the Electronic Construction Permit (ECP) approval process, Fast Automated Structural Plan (FASP) check, Fast Remote-Control Monitoring (FRCM) and the procedure for structure plan, preparation and plan check during construction. He mentioned that once these systems are in place, the inspectors can more professionally comply with the approved plans.
- Dr. Ahmadul Hassan explained the organogram of RAJUK. He mentioned that RAJUK manpower should be properly trained both in house and on zones.
- The PEng program is currently under way by IEB but should be conducted more professionally.
- Mr. Eric mentioned that in many parts of the world the electronic signature is legally accepted and it cannot be altered by any malpractice.
- Mr. Alam mentioned that the coverage of stakeholders should be expanded to include PWD, Bangladesh Army Cantonment Board, BGMEA and BEPZA.
- Both S-9 & S-6 have outreach campaigns in their respective work plans. It was agreed in the meeting on what the outreach campaign should cover; educate the public and professionals.
- RAJUK inspectors should be welcome at the construction site instead of facing with law and order situation which is primarily because of the fact that there is little or no outreach campaign in regard to BNBC enforcement.

ANNEX 4B. AGENCIES WITH JURISDICTION OVER ASPECTS OF BUILDING CONSTRUCTION IN THE DHAKA METROPOLITAN AREA

SL No	Name of Organizations	Function
1	Cabinet Division	Cabinet division is the apex body which controls all the ministries, autonomous, semi-autonomous bodies.
2	Ministry of Food and Disaster Management	Ministry that deals with cyclone, earthquake or any kind of natural disaster.
3	Ministry of Planning	The Ministry of Planning oversees the financial policies of the Bangladeshi Government, responsible for socioeconomic planning and statistics management. It contains three Divisions: <ul style="list-style-type: none"> • Planning Division • Statistics and Informatics Division • Implementation Monitoring & Evaluation Division
4	Ministry of Housing and Public Works	The Ministry of Housing and Public Works is a ministry of the government of the People's Republic of Bangladesh which is the controlling ministry of RAJUK and National Housing Authority. This ministry is the custodian of BNBC and the <i>Bidhimala</i> and of course the implementation and enforcement part of it.
5	Ministry of Power, Energy and Mineral Resources	The Ministry of Power, Energy and Mineral Resources (abbreviated as MPEMR) or Ministry of Energy is a ministry of the Government of Bangladesh. It is mainly responsible for all policies and matters relating to electricity generation, transmission and distribution from conventional and non-conventional energy sources including hydroelectricity. It also deals with the Import, Distribution, Exploration, Extraction, Pricing and other policy related details of the primary fuels. The MPEMR has two Divisions headed by two secretaries: <ul style="list-style-type: none"> • Power Division • Energy and Mineral Resources Division
6	Ministry of Civil Aviation and Tourism	The Ministry of Civil Aviation and Tourism is a ministry of the government of the People's Republic of Bangladesh responsible for the formulation of national policies and programmes for development and regulation of Civil Aviation and the regulation of the Bangladeshi tourism industry and the promotion of the Bangladesh as a tourist destination. This ministry controls the Civil Aviation Authority and in term determines the criteria for height of the buildings of Dhaka city, especially in air funnel zone.

SL No	Name of Organizations	Function
7	Ministry of Land	The Ministry of Land is the government ministry of Bangladesh responsible for formulating and implementing national policy on lands and other subjects which come under its purview.
8	Ministry of Industries	The Ministry of Industries is primarily responsible for developing new policies and strategies for promotion, expansion and sustainable development of Industrial sector of Bangladesh. The Current minister is Alhaj Kamal Ahmed Mojumder.
9	Ministry of Local Government, Rural Development and Cooperatives	The Ministry of Local Government, Rural Development and Co-operatives is a ministry of the government of the People's Republic of Bangladesh. It is responsible for the housing and building, regional and rural policy, municipal and cities administration and finances, and the conduct of elections. The Ministry of Local Government, Rural Development and Co-operatives contains two Divisions: <ul style="list-style-type: none"> • Local Government Division • Rural Development and Co-operatives Division
10	Bangladesh Export Processing Zones Authority (BEPZA)	The Bangladesh Export Processing Zone Authority is an agency of the Government of Bangladesh and is administered out of the Prime Minister's Office. Its objective is to manage the various export processing zones in Bangladesh. BEPZA currently oversees the operations of eight export processing zones (EPZ). A ninth zone is scheduled to open in the future. Recently government has announced that in 15 years 100 new EPZ and SEZ will be established.
11	Deputy Commissioner's Office, Dhaka	Deputy Commissioners control and liaise disaster management i.e earthquake, flood, fire etc. in collaboration with law enforcing agency of the country.
12	Soil Research and Development Institute (SRDI)	Soil Resources Development Institute or SRDI is an autonomous national research institute working as a statutory organization that carries out research on soil and surveys on soil quality to improve agriculture in Bangladesh and is located in Dhaka, Bangladesh
13	Bangladesh Inland Water Transport Authority	Bangladesh Inland Water Transport Authority also known as BIWTA is the authority who controls the inland water transport in Bangladesh. It's also responsible for managing development and maintenance of inland water transport system.

SL No	Name of Organizations	Function
14	Department of Environment (DOE)	Department of Environment is a government department responsible for the protection of the environment in Bangladesh and is in Dhaka, Bangladesh. The department is headed by a Director General. It is under the Ministry of Environment and Forests. This department has influence over many departments including RAJUK when it comes to environmental and pollution issues.
15	Bangladesh Navy	The Bangladesh Navy is the naval warfare branch of the Bangladesh Armed Forces, responsible for Bangladesh's 118,813 square kilometres (45,874 sq mi) of maritime territorial area, and the defense of important harbours, military bases and economic zones. The primary role of the Bangladesh Navy is to protect the country's economic and military interests at home and abroad. The Bangladesh navy is also a front-line disaster management force in Bangladesh and participates in humanitarian missions abroad.
16	Military Institute of Science & Technology (MIST)	Military Institute of Science and Technology commonly known as MIST is an advanced Engineering University of Bangladesh. It is the Institution of Bangladesh Armed Forces for Engineering education. It is a Governmental educational institution, which is under the affiliation of Bangladesh University of Professionals(BUP), a Public university governed by the Armed Forces of Bangladesh.
17	Survey of Bangladesh	The Survey of Bangladesh (SOB) is the national mapping authority of Bangladesh. The agency functions under the Ministry of Defense and is headed by the Surveyor General of Bangladesh. They maintain all the cadastral survey map prepared during the colonial era. This map is required for acquisition of land for RAJUK or RHD.
18	Public Works Department (PWD)	Public Works Department or PWD is a government department responsible for the construction of buildings and structures of government organization and agencies in Bangladesh and is located in Dhaka, Bangladesh. It is under the Ministry of Housing and Public Works. Most of the work done by the department are designed by the government Department of Architecture. It is a sister organization of RAJUK and has interchange arrangement for transfer and posting of officials at the level of Chairman/Members/Authorized Officers of RAJUK. When it comes to construction of building for their own, they wouldn't take approval from RAJUK. It is assume that plan, design and construct building as per BNBC.

SL No	Name of Organizations	Function
19	National Housing Authority (NHA)	National Housing Authority, on behalf of the Bangladesh Government, undertaking various steps (ie. Site and services plot project and multi-storied flat project) up to upazilla level to overcome the problem at National level. RAJUK and NHA both working under the ministry of Housing and public works and performs the same nature of work except that NHA deals with housing scheme for marginal people.
20	Housing and Building Research Institute	Housing and Building Research Institute (HBRI) is an autonomous organization under Government of Bangladesh Ministry of Housing and Public Works. HBRI played a pivotal role in preparation of BNBC of the ministry of housing and public works.
21	Dhaka Electric Supply Company Limited (DESCO)	Dhaka Electric Supply Company Limited, commonly known as DESCO, is a Public Limited Company which distributes electricity at the Northern parts of Dhaka City and Tongi Town of Gazipur District. The company was created on November 1996 under the Companies Act 1994 as a Public Limited Company. The company is now under the Power Division of the Bangladesh Ministry of Power, Energy and Mineral Resources.
22	Titas Gas Transmission & Distribution Company Limited (TGTDC)	The Titas Gas Transmission and Distribution Company is the largest natural gas distributor in Bangladesh. As of 2005, they employed 2,678 staff (1,975 regular employees and 700 officials) and served 987,507 domestic customers, 7,947 commercial customers, and 3,046 industrial customers. It is responsible for gas distribution in Dhaka, capital of Bangladesh, and Mymensingh.
23	Dhaka Electric Supply Authority (DESA)/DPDC	Dhaka Power Distribution Company Limited (DPDC) is a Public Limited Company under the Power Division of the Ministry of Power, Energy and Mineral Resources, Government of Bangladesh, that manages the distribution of electricity to the customers of the Dhaka City Corporation area. The Company, created as a part of the Power Sector Reform Programme, was registered on 25 October 2005 under the Companies Act, 1994. DPDC started commercial operation on 1 July 2008 taking over from Dhaka Electricity Supply Authority (DESA). All the assets and liabilities of DESA were transferred to DPDC through an agreement signed on September 2008.

SL No	Name of Organizations	Function
24	Roads and Highways Department	Roads and Highways Department is a government department that is responsible for the construction and maintenance of highways and bridges and It also has a broader plan to replace ferry routes with bridges in Bangladesh and is located in Dhaka, Bangladesh. RHD enjoys immunity regarding approval of buildings for their own.
25	Bangladesh Railway	Bangladesh Railway also known as Bangla Rail is the state-owned rail transport agency of Bangladesh. It operates and maintains all railways in the country and is overseen by the Directorate General of Bangladesh Railway. The Bangladesh Railway is governed by the Ministry of Railways and the Bangladesh Railway Authority. Its reporting mark is "BR". Bangladesh Railway enjoys immunity regarding approval of buildings for their own.
26	Dhaka Transport Co-ordination Board	Dhaka Transport Coordination Authority is the main government agency responsible for public transport in Dhaka, the capital of Bangladesh, and transport in most of Dhaka division. It is the government agency responsible for moderating and mediating negotiations between transport labor unions and transport owners. Under the Revised Strategic Transport Plan any changes to transport infrastructure will need approval from the Dhaka Transport Coordination Authority. It is also responsible for mass transport projects in Dhaka.
27	Dhaka Metropolitan Police (DMP)	Dhaka Metropolitan Police (DMP) came into being on 1st February 1976. Mr. E.A. Chowdhury the first Commissioner. DMP functions are divided into five operational Divisions with an Addl. Commissioner each in the command assisted by a band of Deputy Commissioners, Addl. Deputy Commissioners, and Assistant Commissions with their willingness and sagacious co-ordination. They are: <ol style="list-style-type: none"> 1. Detective and Criminal Intelligence Division 2. Crime and Operations Division 3. Traffic Division, 4. Protection and Protocol Division 5. Public Order Management and Headquarters Division.

SL No	Name of Organizations	Function
28	Bangladesh Rifles	The Border Guards Bangladesh formerly known as the Bangladesh Rifles, is the oldest uniformed force of Bangladesh. It is a paramilitary force under the Ministry of Home Affairs. BGB is primarily responsible for the border security of the country, in Bangladesh the force is known as "The Vigilant Sentinels of the National Frontier". The Present Director General is Maj. Gen. Shafeenul Islam.
29	Directorate of Ansar and VDP	The Bangladesh Ansar (also known as the Ansar Bahini) is a paramilitary auxiliary force responsible for the preservation of internal security and law enforcement in Bangladesh. It is administered by the Ministry of Home Affairs of the Government of Bangladesh.
30	Rapid Action Battalion	Rapid Action Battalion or RAB, is an elite anti-crime and anti-terrorism unit of the Bangladesh Police. It consists of members of the Bangladesh Police, Bangladesh Army, Bangladesh Navy, Bangladesh Air Force, Border Guard Bangladesh and Bangladesh Ansar. It was formed on 26 March 2004 as RAT (Rapid Action Team) and commenced operations on 14 April 2004.
31	Local Government Engineering Department	Local Government Engineering Department (LGED) is one the largest engineering agencies of the country. Role of LGED in strengthening of rural economy through development of rural transportation and improvement of rural markets and growth centers are visible across the country. Contribution of these infrastructures are enormous in achieving the ever-increasing national growth. People living in rural areas now have the access to metaled roads within two kilometers while the rural infrastructures play pivotal role in the improvement of lifestyle and reducing poverty.
32	Dhaka City Corporation	Dhaka North City Corporation (DNCC) is an autonomous body that governs 36 northern wards of Dhaka. It is one of two municipal corporations in Dhaka, the other being Dhaka South City Corporation. Annisul Huq was the first mayor of the Dhaka North City Corporation, after being elected in April 2015.Md. Atiqul Islam is the current mayor of DNCC since 7 March 2019.

SL No	Name of Organizations	Function
33	Dhaka Water Supply & Sewerage Authority (WASA)	Dhaka Water Supply & Sewerage Authority (DWASA) was established on 1963 as an independent organization with the mandate of Water Supply and Sewage disposal to the city dwellers of Dhaka. It's activities have been reorganized by 'WASA Act, 1996' and according to this act, DWASA is now operating as an autonomous body with corporate culture in its management & operation.
34	Key Point Installations (KPIDC)	The Key Point Installation (KPI) are under the control of Minister of Defense. Buildings for KPI needs approval from RAJUK. RAJUK ensures that the KPI structures strictly adhere to the BNBC code with special compliance of fire safety and earthquake measures.
35	Dhaka Transport Coordination Agency (DTCA)	Dhaka Transport Coordination Authority is the main government agency responsible for public transport in Dhaka, the capital of Bangladesh, and transport in most of Dhaka division. It is the government agency responsible for moderating and mediating negotiations between transport labor unions and transport owners. Under the Revised Strategic Transport Plan any changes to transport infrastructure will need approval from the Dhaka Transport Coordination Authority. It is also responsible for mass transport projects in Dhaka.
36	Mass Rapid Transit (MRT)	The Dhaka Metro is an approved metro rail system under construction in Dhaka, the capital and largest city of Bangladesh. Together with a separate BRT (Bus Rapid Transit) system it has been long called for to solve the extreme amount of traffic jams and congestion that occur throughout the entire city on a daily basis, among the heaviest in the world. It is a part of the 20-year long Strategic Transport Plan (STP) chalked out by the Government's Transport Coordination Authority (DTCA).
37	Urban Development Directorate (UDD)	The UDD generally liaise with the PWD, RAJUK and MRT during design and construction.

CHAPTER 5. TRAINING NEEDS ASSESSMENT

5.1 INTRODUCTION AND OBJECTIVES

This chapter of the Situational Analysis Report details the Training Needs Assessment methodology and findings on training related to building codes and the building construction regulatory process. The objective of this assessment is to determine the gap that exists between the training that is needed for the staff at RAJUK for properly enforcing the building construction rules and regulations stipulated in the BNBC-2017, which is in the process of being adopted, as well as those in the *Bidhimala* and the training that is currently being provided. It is critical that education and training based on the adopted building regulations be provided for building inspectors, plan reviewers and other government officials as well as the design and construction community, building professionals, and others in the building sector.

Section 2.6 of Part 2 of the BNBC-2006 provides that violation of the code would be considered an offense and that the authority should take necessary legal action. However, it prescribes no procedure or mechanism for the institution of legal proceedings, which needs to be addressed.

The revised BNBC-2017 includes retrofitting code requirements for the first time as a means to strengthen existing, vulnerable buildings. It also provides guidelines for making buildings more accessible for persons with disabilities, and includes energy conservation and worker construction safety requirements. Training needs will be much more extensive with these expanded provisions that are included in the revised code.

The Training Needs Assessment will provide the basis for recommendations for the implementation of a Strategic Training Plan (STP).

5.2 METHODOLOGY OF ASSESSMENT

The assessment consisted of research to obtain data and become familiar with the RAJUK regulatory system, interviews of RAJUK officials, and site visits in Dhaka by ICC code specialists in January/February 2019. The specialists' site visits consisted of meetings, interviews and information gathering with government officials, industry representatives, and technical training providers.

Training in the following six functional areas were assessed based on the current BNBC and *Bidhimala* 2008 :

- Code Administration.
- Plan Review.
- Site Inspection.
- Permitting.
- Enforcement.
- Design and Construction Industry.

The interview questions focused on the types of training available, which organizations were providing training, and if there was any training or continuous education required for professionals or regulatory staff. Surveys were also conducted as part of the interview process. The data collected and other general observations from various meetings resulted in a clear understanding of competency levels and training gaps.

ICC representatives/code specialists Alberto Herrera and Dave Walls, and SDE representatives Iffat Huque, Dr. Aminul Islam, Md. Shahid Alam, Engr Hasib Zaman and Fathiya Zaman participated in the meetings and interviews. In assessing the current state of the industry, they focused on strengths, weaknesses and opportunities related to enforcement of the current BNBC and related training activities.

The ICC and SDE held meetings with the RAJUK Director of Developmental Control, RAJUK Zone Offices 3 and 4, the Institution of Engineers, Bangladesh (IEB), Institute of Architects Bangladesh (IAB), Bangladesh University of Engineering and Technology (BUET), Military Institute of Science and Technology (MIST), and several practicing engineering, architectural and development firms. A list of meetings and schedules with the various organizations and individuals is provided in Annex 5A.

5.3 KEY FINDINGS

The key findings from the Training Needs Assessment are listed below:

1. RAJUK staff's academic credentials either met or exceeded what is required for satisfactorily performing their duties. A minimum of Diploma Engineer or higher is typically required. However, it was also found that staff's construction trade experience was somewhat limited.
2. The responsibilities of the RAJUK staff are similar across its eight planning zones and include building permitting/plan review/inspections. However, procedures for processing permits and inspections may vary from one zone to another. The RAJUK staff surveyed indicated that the BNBC is not currently enforced by any of the RAJUK planning zones.
3. RAJUK staff noted that their training opportunities are lacking, varying in both topics and consistency. Training on such topics as administrative procedures, zoning criteria, and the architectural provisions of *Bidhimala* 2008 has been infrequent. Overall, RAJUK staff believes there is a need for additional training (both at home and abroad), including training for the construction industry on procedures relating to permit and inspection processes.
4. Some limited code technical training has been delivered to RAJUK staff on the architectural provisions of *Bidhimala* 2008. These architectural provisions are the same as some of the architectural provisions addressed in the BNBC. It was noted that no training has been provided to RAJUK staff regarding BNBC-2017, given that BNBC-1993 (2006) has not been enforced.
5. RAJUK staff did not mention the BNBC as a training need since it is not currently in their authority to enforce; however, they indicated it would need to be included in training when the requirement changes.

6. In the private sector, training is provided to architects through the IAB. The topics of training are mostly related to architectural needs and included only occasional training on *Bidhimala* 2008. IAB training does not address any version of the BNBC.
7. Training is provided to professional engineers through a subsidiary of the Institution of Engineers, Bangladesh (IEB). Topics include an introduction to the BNBC, seismic design of RC structures, computer aided project management, etc. A sample of courses provided by IEB are listed in Annex 5B.
8. Little or no support material is available to better understand the code and the rules (*Bidhimala*) or to facilitate their application. In the U.S., this is covered by code commentaries, which are documents that address and explain the reason for each section of the code, as well as handbooks tailored specifically to the code, and a series of checklists, study guides and other materials to enhance the knowledge of the regulations.
9. Currently, the training received by RAJUK personnel is typically conducted in classroom-style seminars.
10. Internet connectivity and reliability is low, and not suitable for online training.

Training needs identified during interviews with RAJUK planning zone Authorizing Officer and staff are as follows:

- Specific procedures for performing field inspections, especially FAR and set-back rules.
- Specific procedures for performing plan reviews.
- Training on job roles and responsibilities.
- Training on inspector soft skills (i.e., how to interact on a job site).
- Training on the use of permitting software.
- Consistent training on *Bidhimala* 2008.
- Ethics training.
- Training for the building industry on RAJUK procedures.

The training must be ongoing and consistent among the eight planning zones. Consideration must be given to how this training can best be delivered, how technology must be enhanced to further that goal, and how to foster a professional environment that prioritizes such training.

5.4 AREAS OF IMMEDIATE TRAINING NEEDS

To address the training needs in the six functional areas of Code Administration, Plan Review, Site Inspection, Permitting, Enforcement and Advisory Support for Builders, the training audiences and needs in Table 5-1 have been identified for immediate consideration:

Table 5-1: Training audiences and needs

Target Audience	Areas of Immediate Training Need
<p>All segments of society (public sector, private sector, general public, etc.)</p>	<p>1. Awareness training of all segments of the society (through electronic and print media). Until and unless all those involved and affected, such as elected officials, executives of various ministries and the general population, support the overall goals of the initiatives, they will not have lasting success.</p>
<p>Executives and officials in charge of activities related to building code adoption, administration and training. All staff of building safety departments in all zones will also benefit from this training.</p>	<p>2. Effective building code implementation leading to building safety and resiliency of communities. This provides a general understanding of why effective building code implementation is critical and results in improved resiliency and likely prevention of economic devastation.</p>
<p>Technical staff of engineering offices, architectural offices, and other interested professionals involved in the building construction industry.</p>	<p>3. Being an effective code official. It addresses the various characteristics of gaining knowledge and experience in technical building code topics, technology and other relevant areas, and using that knowledge and experience effectively.</p> <p>4. Ethics in code administration. Regardless of the building codes adopted and the processes in place for effective administration, if those involved in code administration are not ethical, long-term success will not be attained.</p> <p>5. ICC’s “When Disaster Strikes” Institute. This is a two-day training event addressing the immediate steps needed to take place after first responders have completed their search and recovery operations. It includes processes and technical information in identifying and classifying buildings that are safe or unsafe for occupancy after a disaster.</p> <p>6. Processing and documentation of permitting, plan review and inspection (training on online tools that might be chosen or developed). This is critical for records management and effective use of resources.</p> <p>7. Plan review process. An accurate and high-quality plan review has a huge impact on the quality of the finished project.</p>

	<p>8. Reinforced concrete special inspection. Structural strength and performance of concrete buildings will largely depend on reinforced concrete special inspections. It involves sampling and testing of concrete mix, placement and curing operations.</p> <p>9. Masonry special inspection. Structural strength and performance of masonry buildings will largely depend on reinforced masonry special inspections. It involves sampling and testing of grout, prism assembly and placement operations.</p> <p>10. Concrete materials and testing. Addresses the identification of materials used in concrete mix design, the quality of such materials, and the processes and procedures of sampling and testing such materials.</p>
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5.5 CURRENT OBSTACLES TO EFFECTIVE TRAINING

Effective training is dependent on:

1. Timeliness.
2. Subject matter relevance.
3. Quality of training curricula.
4. Quality of training delivery.
5. Quality of relevant workbooks.
6. Availability of support publications.
7. Proper facilities and tools.
8. Continuity.
9. Follow-ups.
10. Evaluation of training results.

The level of interest and engagement of trainees are also critical components needed for effective training to take place. If trainees are not interested and engaged or do not recognize any advantage in becoming more knowledgeable about the codes, the training program will not be successful. The following are some of the obstacles to effective training in Dhaka observed as a result of meetings, visits and interviews:

- 1 Lack of continuity. Training is conducted infrequently, as evidenced from interviews.
- 2 Little or no support materials to better understand the code and the rules or to facilitate their application.

- 3 Internet reliability and connectivity for online training are not consistent or reliable.
- 4 Lack of organized professional chapters of code administration professionals, professional associations and organizations that would meet on a regular basis and facilitate exchange of opinions, make available brief training on specific topics related to the code, and allow learning from code enforcement peers. Such an organization for building code personnel does not currently exist in Dhaka.
- 5 Lack of awareness training for the public on the benefits of the BNBC and the need for safe buildings.

Addressing these obstacles would require advance planning, organization and, for some items, allocation of appropriate budgetary resources.

5.6 CONCLUSIONS

There is no doubt that RAJUK is trying to improve the safety and resiliency of construction in Dhaka. On the path to strengthen the safety and resiliency of buildings, Bangladesh has taken the important step of updating BNBC-1993 (2006) to the new BNBC-2017, which is expected to be put into effect soon.

Bangladesh officials recognize that a large seismic event could be catastrophic. There is urgency in ensuring that new construction meets updated codes and standards. Training is a critical component of this effort, and as identified in this report, to date, a plan for consistent or uniform training has not been developed. Such a plan would help to ensure that all professionals and workers of the building construction industry are trained to the updated BNBC.

While there is a general lack of training on the codes and its processes, it can be resolved. It will, however, take time, money, and a combined effort on the part of many people and organizations. An organized and coordinated effort among the Universities and other educational systems, the professional organizations, and RAJUK will move the construction practices in Dhaka towards meeting their goal of code compliance. A strategic training plan addressing the needs identified in this document that not only includes training on the technical provisions of the BNBC but also includes training on the understanding of the need for codes and standards will go a long way to remove obstacles. These are challenging but doable and must include a long-term vision.

ANNEX 5A. LIST OF MEETINGS

	Date	Organization	ICC/SDE Team	Interviewees
1	January 21, 2019	Rajuk Project Office	Dr. Ahmadul Hassan, SDE Alberto Herrera, ICC M. Aminul Islam, SDE Iffat Huque, SDE	Aminur Rahman, DPD, RAJUK URU Project Engineers/ Architects of RAJUK
2	January 27, 2019	Tarique Hassan and Associates	Dr. M. Aminul Islam, SDE Alberto Herrera, ICC Dave Walls, ICC	Tarique Hasan, Architect and Partner Architect
3	January 28, 2019	Rajuk Headquarters	Alberto Herrera, ICC Dave Walls, ICC Iffat Huque, SDE	Tanzila Khanam, Director, Development and Control, RAJUK. Assistant Authorizing Officer, Dev. & Control
4	January 28, 2019	Rajuk Headquarters	Alberto Herrera, ICC Dave Walls, ICC	Mahfuzul Karim, Law Officer RAJUK
5	January 31, 2019	D Con Design Studio	M. Aminul Islam, SDE Alberto Herrera, ICC Dave Walls, ICC	R.A. Limon CEO, Architect and Partner Architect
6	January 31, 2019	Rangs Properties	Dave Walls, ICC Engr Hasib Zaman	Partner Engineers
7	January 31, 2019	Institute of Architects Bangladesh (IAB)	Alberto Herrera, ICC Dave Walls, ICC Iffat Huque, SDE	Ar. Jalal Ahmed FIAB President, Institute of Architects Bangladesh (IAB) Vice-President (Asia), Commonwealth Association of Architects (CAA)
8	February 3, 2019	Military Institute of Science and Technology (MIST)	Shahid Alam, SDE M. Aminul Islam, SDE Alberto Herrera, ICC Dave Walls, ICC	Professor Zoynul Abedin, PhD Lt. Colonel Mohammed Russedul Islam-MIST
9	February 3, 2019	Institute of Engineers Bangladesh (IEB)	Iffat Huque, SDE Alberto Herrera, ICC Dave Walls, ICC	Professor Eng. Shamin Bosunia IEB
10	February 4, 2019	RAJUK	Md. Shahid Alam SDE Alberto Herrera, ICC Dave Walls, ICC	Mr. Latif Helaly, PD RAJUK RTI Reps RAJUK personnel
11	February, 6, 2019	RAJUK	Md. Shahid Alam SDE Dr. Ahmadul Hassan, SDE Alberto Herrera, ICC Dave Walls, ICC	Mr. Latif Helaly, PD RAJUK

ANNEX 5B. SCHEDULE OF TRAINING FOR ENGINEERS IN APRIL



01 March 2019

In the name of Allah, the most beneficent, the most merciful ENGINEERING STAFF COLLEGE, BANGLADESH (ESCB)

A Corporate body of The Institution of Engineers, Bangladesh (IEB),
Headquarters : Ramna, Dhaka-1000, Bangladesh

Tel: +88-02-9574144; E-mail: escbieb@gmail.com, info@eso-bd.org; Web: www.eso-bd.org

TRAINING SCHEDULE: March 2019 – April 2019

Course No.	Course Title	Batch No.	Duration	Day and Time	Registration Fee Per Participant	Last Date for Receiving Nomination	Venue
941.	Computer Aided Project Management	41 th	30-Mar -2019 To 08-Apr-2019	On Every Saturday, Monday & Wednesday: 6:00 PM to 9:00 PM. 15 hours, 05 classes.	Tk. 4,500.00, Tk. 4,000.00 for IEB members	26-Mar-2019	Training Lab, ESCB City Campus, IEB Headquarters.
942.	Seismic Design and Construction of RC Structures (Design and Construction of Earthquake Resistant Structures)	12 th	05-Apr-2019 and 06-Apr-2019	Friday & Saturday: 10:00 AM to 5:00 PM 12 hours, 2 classes.	Tk. 4,000.00 per participant.	01-Apr-2019	Training Lab, ESCB City Campus, IEB Headquarters.
943.	Introduction to Building Construction Regulations and Bangladesh National Building Code (BNBC)	24 th	6-Apr-2019 To 10-Apr-2019	On Every Day: 6:00 PM to 9:00 PM. 15 hours, 5 classes.	Tk. 3,500.00, Tk. 3,000.00 for IEB members.	02-Apr-2019	Training Lab, ESCB City Campus, IEB Headquarters.
944.	Electrical Machines Operation, Maintenance & Trouble Shooting	7 th	11-Apr-2019 To 13-Apr-2019	Thursday: 6:00 PM to 9:00 PM, Friday & Saturday: 10:00 AM to 5:00 PM	Tk. 4,500.00, Tk. 4,000.00 for IEB members, Tk. 3,500.00 for fresh graduate engineers.	07-Apr-2019	Training Lab, ESCB City Campus, IEB Headquarters.
945.	Instrumentation and Control Engineering	6 th	12-Apr-2019 To 03-May-2019	On every Friday: 10:00 AM to 5:00 PM. 24 hours, 4 classes.	Tk. 4,500.00, Tk. 4,000.00 for IEB members.	08-Apr-2019	PLC Lab, ESCB City Campus, IEB Headquarters.
946.	Plumbing Technology	36 th	15-Apr-2019 To 18-Apr-2019	Every Day: 6:00 PM to 9:00 PM. 12 hours, 4 classes.	Tk. 3,000.00	11-Apr-2019	ESCB City Campus, IEB Headquarters.
947.	Programming of PLC for Industrial Automation, Maintenance and Trouble Shooting of PLC System	96 th	16-Apr-2019 To 12-May-2019	Every Sunday, Tuesday & Thursday: 6:00 PM to 9:00 PM. & Friday: 9:00 AM to 1:00 PM. 50 hours, 15 classes.	Tk. 8,000.00, Tk. 7,500.00 for IEB members, Tk. 7,000.00 for fresh graduate engineers.	12-Apr-2019	PLC Lab, ESCB City Campus, IEB Headquarters.
948.	Project Management Using PRIMAVERA			Every Day: 6:00 PM to 9:00 PM. 30 hours, 10 classes.	Tk. 6,500.00, Tk. 6,000.00 for IEB members, Tk. 5,500.00 for fresh graduate engineers.	00-Jan-2019	Training Lab, ESCB City Campus, IEB Headquarters.
949.	AC INVERTER DRIVES			On Every Saturday, Monday & Wednesday: 6:00 PM to 9:00 PM. 21 hours, 7 classes.	Tk. 5,500.00, Tk. 5,000.00 for IEB members, Tk. 4,500.00 for fresh graduate engineers.		PLC Lab., ESCB City Campus, IEB Headquarters.
950.	Training Course on "Siemens S7-300 & S7-400 PLC".			Every day: 05:00 PM to 9:00 PM 24 hours, 6 classes.	Tk. 12,000.00 per participant.		Training Lab, ESCB City Campus, IEB Headquarters.
951.	Training Course on Professional Skill Development			On Every Saturday, Monday & Wednesday: 6:00 PM to 9:00 PM. 36 hours, 12 classes.	Tk. 8,000.00, Tk. 7,500.00 for IEB members, Tk. 7,000.00 for fresh graduate engineers.		Training Lab, ESCB City Campus, IEB Headquarters.
952.	Training Course on Construction Site Management for Field Level Engineers			Every Day: 6:00 PM to 9:00 PM. 09 hours, 3 classes.	Tk. 5,000.00, Tk. 4,500.00 for IEB members,		Training Lab, ESCB City Campus, IEB Headquarters.

CHAPTER 6. STAFFING NEEDS ASSESSMENT

6.1 INTRODUCTION AND OBJECTIVES

This chapter of the Situational Analysis Report provides an assessment of the current technical staffing in plan review, inspection functions, and the administration of permit issuance of RAJUK and its eight planning zones; the manpower levels necessary for the impending approval, implementation and enforcement of the 2017 Edition of the Bangladesh National Building Code (BNBC). It also provides recommendations regarding best practices as Bangladesh moves forward to this major endeavor of adopting the new building code.

An adequate level of staff is critical for making sure that the design and construction of buildings within RAJUK's jurisdiction comply with the rules and regulations stipulated in the BNBC and *Bidhimala*, and that any violations by the builders or the building owners are addressed and resolved in a timely manner. This staff includes permit administrators, plan reviewers, inspectors, and complaint resolution officers.

Staffing needs for implementation and enforcement of the BNBC by RAJUK will increase significantly with the final approval of BNBC-2017. The document has been prepared in several distinct parts addressing different aspects of building construction and services, with cross references as necessary. Part 1 gives a general introduction to the code and lists the definitions and abbreviations of general terms used in the code. Part 2 outlines the administrative requirements necessary for enforcement of the code. Considering the difficulty of maintaining adequately trained technical personnel for enforcing and verifying compliance with the diverse provisions of the code, a professional practice-based certification, enforcement and administration structure has been prescribed. General planning and architectural requirements for buildings, based on classifications in accordance with occupancy and fire resistance, are specified in Part 3. Additionally, the code outlines the Bangladesh Building Regulatory Agency (BBRA) (see Annex 6A) as a mechanism for enforcement of the code.

Considering the limited amount of training and education on the BNBC currently being provided by the universities and colleges, professional organizations, and RAJUK or other governmental agencies, meeting these needs will be challenging. Training for administrative processes, plan review skills, and inspection skills is also very limited. This research does not assume that RAJUK will directly employ all of these staff; but rather may rely on external agencies for much of the staffing needs.

The Staffing Needs Assessment will provide the basis for recommendations for the implementation of a Strategic Staffing Plan.

6.2 METHODOLOGY OF ASSESSMENT

The staffing needs assessment consisted of research to obtain data and become familiar with the RAJUK regulatory system, interviews of RAJUK officials, and site visits in Dhaka by ICC code specialists in January/February 2019. The specialists' site visits consisted of meetings, interviews and information gathering with government officials, industry representatives, and technical training providers.

Staffing in the following five functional areas were reviewed:

- Code Administration.
- Plan Review.
- Site Inspection.
- Permitting.
- Enforcement.

The survey questions during interviews focused on staffing in these aforementioned areas based on the enforcement of the BNBC and *Bidhimala* 2008. The assessment encompassed the current scope, practices, and workload in terms of the number of permits issued by the RAJUK zones. This level of assessment was necessary in order for the survey team to gain a fundamental understanding of the differences in the system by which codes are administered and enforced in Dhaka, compared to the systems employed in the United States, where code enforcement practices are currently in full use.

ICC representatives/code specialists Alberto Herrera and Dave Walls, and SDE representatives Iffat Huque, Dr. Aminul Islam, Md. Shahid Alam, Engr Hasib Zaman and Fathiya Zaman participated in the meetings and interviews.

The ICC and SDE held meetings with one of the RAJUK Directors of Developmental Control, RAJUK Zone Offices 3 and 4, the Institution of Engineers, Bangladesh (IEB), Institute of Architects Bangladesh (IAB), Bangladesh University of Engineering and Technology (BUET), Military Institute of Science and Technology (MIST), and several practicing engineering, architectural and development firms. A list of meetings and schedules with the various organizations and individuals is provided in Annex 5A and is not repeated in this chapter.

6.3 KEY FINDINGS

6.3.1 Code Administration

There are different committees for buildings that are a maximum of 8 stories, or less than 33 meters in height, or 5,000 square meters; and buildings that are a minimum of 9 stories, or 33 meters in height and above, or larger than 5,000 square meters.

While most staff members interviewed were seen to be knowledgeable in the procedures of the RAJUK approval process and with a strong sense of professional responsibility, many positions necessary to adequately perform the tasks of code administration remain unfilled, and RAJUK staff turnover is estimated to be very high, particularly in technical positions. In Dhaka, approximately 98% of the building inventory falls under the jurisdiction of RAJUK (excluding military and paramilitary facilities). Considering RAJUK's limited scope and problematic staffing levels, it leaves many buildings at the risk of not meeting even the most basic levels of current requirements.

6.3.2 Plan Review

- (a) The current focus of plan review and inspection is limited to proper siting and appropriate land use. A site inspection to verify the building layout and building location on the lot also takes place. The current average turnaround time for plan review is 20 days from receipt of a complete set of plans that is not returned for corrections. This is a reduction from the 45- day mandate from *Bidhimala*.
- (b) Once BNBC-2017 is mandated to be enforced by RAJUK, the number of plans submitted with sufficient detail is projected to drop until the industry gets up to speed on the new code. The number of plan rechecks is projected to increase as well and, as a result, the responsibility for plan review will broaden. The average turnaround time is also projected to increase with the implementation of BNBC-2017, due to unfamiliarity as well as to the additional plan check requirements.
- (c) Structural plan reviews are not currently conducted by RAJUK or any other governmental agency, and there are concerns that buildings are not always designed or constructed in compliance to the requirements of the BNBC. In order to fully implement BNBC-2017, structural plan review and inspections will be necessary. This, in turn, will necessitate hiring and training staff to provide structural plan review duties. These duties can also be augmented by utilizing third-party providers, preferably pre-approved by RAJUK using qualification criteria yet to be established. These qualifications should include accreditation and registration that can establish the credentials of these providers.
- (d) RAJUK staff does not evaluate or require any quality control of material used in construction.
- (e) In order to fully implement and enforce BNBC-2017, plan review will be necessary in a number of nonstructural areas, including but not limited to height and area by occupancy class, means of egress, disabled access regulations, installation of gypsum wallboard, fire barriers, fire sprinklers, and wall penetrations. In addition, mechanical, plumbing, electrical and other plan reviews will be necessary. This can be accomplished through the municipal building departments or through third-party outside agencies answerable to the building departments.
- (f) Construction safety measures of BNBC-2017 will also need to be enforced.
- (g) The above will substantially increase overall manpower requirements, whether absorbed within the department or outsourced. If outsourced, the department will likely need, at a minimum, to employ mechanical, plumbing and electrical engineers or specialist agencies in order to provide oversight and review of these approved agencies.

6.3.3 Site Inspections

- (a) Few inspections are currently conducted due to resource limitations and other challenges. Responsibility for inspections is assigned to each zone; procedures within the eight zones can vary due to a lack of established inspection procedures by RAJUK.

- (b) Each of the eight zones has an Authorizing Officer in charge of the zone inspection staff and processes. Staff includes a chief building inspector that supervises the building inspectors and oversees inspection activities.
- (c) Information obtained through interviews of zoning personnel indicated that each zone has approximately 30 inspection positions allotted. RAJUK indicated that it has 135 inspectors for eight zones, which is 105 positions less than allotted. Although this number changes at various times, the staffing shortage poses a significant challenge for the inspectors. These numbers given above vary slightly depending on the source and timing of the information gathered.
- (d) Building Inspectors or Chief Inspectors in Development Control at RAJUK must at a minimum be diploma engineers (two-year diploma). An Assistant Authorized Officer or Authorized Officer must hold a graduate degree in engineering or a related degree.
- (e) Staff also indicated that there is a shortage of transportation and equipment to conduct inspections during construction. The inspectors typically use their personal cell phones when they are out of the office.
- (f) Inspectors also noted that having uniforms would allow contractors to more easily recognize their identity.

6.3.4 Permitting

- (a) Permit issuance is controlled within a Permit Center of each zone, with all affected agencies and entities represented.
- (b) Planning Zones 3 and 4 are developing and testing an electronic permitting program; however, after two years of software development, the system is still not ready.
- (c) A single permit is issued for each building project, but No Objection Certificates (NOCs) must be obtained from four different governmental agencies. Having all parties represented in a single permit center (if possible) would be efficient and would represent an excellent approach to serving stakeholder needs.
- (d) During construction, the applicant is responsible for the acts of any technical person in charge of the permitted building. If the technical person, without any valid reason, provides wrong information or conceals any information regarding any particular design or specifications; provides wrong information about structural design, fire extinguishers or other security arrangement; or fails to provide any information, such acts shall be treated as negligence under the rules and regulations of *Bidhimala*. After the plan review is complete, the plans are sent to a Building Construction (BC) Committee. The plans are approved based on two building categories: eight stories and below; and nine stories and above. This approval is based on the following:
 - Town Improvement Act, 1953
 - Building Construction Act, 1952

- *Dhaka Mohanagar Imarat Bidhimala, 2008*

6.3.5 Other Observations

- (a) The responsibilities of the RAJUK staff are similar across its eight planning zones and include building permitting/plan review/inspections. However, procedures for processing permits and inspections may vary from one zone to another.
- (b) The RAJUK Authorizing Officers are all full-time employees. There are no part-time or contract Authorized Officers or third-party plan review or inspection agencies/personnel.
- (c) Typically new staff members are assigned to an existing staff member with experience for on-the-job training. This training lasts for two months. Once it is determined that new staff members are capable of performing the duties on their own, they are expected to work independently. There are no established criteria or procedure to objectively determine when a new staff member is ready to act independently.
- (d) Current career development pathways in RAJUK are linked mostly to seniority, initial qualification, and length of service rather than performance, attitude, and potential. For example, an Assistant Authorized Officer of the Development Control Department must be in that post for seven years before being eligible for promotion. In principle, Authorized Officers have no career path upwards. This acts as a disincentive to outstanding performance and makes recruitment from within the cadre of Assistant Authorizing Officers harder. This in turn necessitates short-term deputation from other departments or services, leading to a gap between skills and knowledge and the requirements of the position.
- (e) There are no continuing professional development (CPD) opportunities or requirements in RAJUK.
- (f) Staff compensation is generally considered adequate, which includes a basic salary component, housing allowance, medical allowance, and transportation allowance. However, other research indicated a belief by some staff that salaries are too low relative to the cost of living. Table 6-1 shows the different grades of the base salaries.
- (g) There are also some concerns that staff are often required to pay out of pocket for travel expenses for site inspections, typically for public transportation, which impacts the overall compensation.
- (h) The survey also indicated the need for better facilities, new equipment, updated software and vehicles.
- (i) The Zonal Directors categorically mentioned that they would need enforcement powers and, in some instances, police force assistance in order to implement provisions of the BNBC.

Table 6-1: RAJUK salary scales

Position Name	Grade	Base Salary Range per Month (Min - Max) in BDT
Chief Engineer	4	50000 - 71200
Authorized Officer	6	35500 - 67010
Deputy Director	6	35500 - 67010
Law Officer	7	29000 - 63410
Director	5	43000 - 69850
Building Inspector	10	16000 - 38640
Chief Building Inspector	10	16000 - 38640

- (j) Additional staffing and compensation are directly related to budget plans and resource allocations, which will need to be decided and implemented at the Ministry level.

6.4 COMPARISON OF RAJUK PROCEDURE WITH TYPICAL U.S. MODEL

6.4.1 Code Administration and Plan Review

Within RAJUK’s eight planning zones, plan review is performed only for zoning requirements and the architectural provisions (setbacks, floor area ratio, and building height) of the Building Construction Act of 1952 , as printed in AJUK’s *Bidhimala* 2008.

In the U.S. model, responsibility for plan review is typically divided between two government entities – the Building Department for all codes other than Fire Code (although many fire provisions for new buildings are in the building code); and Fire Prevention Services for the Fire Code. In some cases these represent two separate departments within city or county government (particularly large jurisdictions), while other times plan reviews are combined into one department under the direction of the jurisdiction's Building Official. In some cases they are supplemented by accredited or otherwise approved third-party plan review agencies.

6.4.1 Site Inspection

In RAJUK’s jurisdiction, inspections by the eight planning zone inspectors are typically limited to zoning requirements such as setbacks, height, and Floor Area Ratio (FAR), and the architectural requirements of the *Bidhimala*. Inspections for setbacks are made when the plinth level is complete. FAR, setbacks, and building height are checked during the construction process. Inspections of the architectural provisions of the *Bidhimala* are not consistent across planning zones, and were developed within each zone without any coordination with other zones. RAJUK officers are empowered with authority to inspect construction work at any time from sunrise to sunset to check buildings under construction for compliance with the approved plans, designs, and specifications. The officer can stop work, order

corrections, or order the removal of the structure if the work is being performed in violation of approved plans or special project clearance, or the work is a threat to environment, life, or property.

In the U.S. model, code inspections are typically performed by building and fire department personnel. The jurisdictions are sometimes supplemented by accredited or approved special inspectors and third-party inspection agencies when necessary. These are mostly engaged from the private sector. In some circumstances, planning department, public works, and/or environmental department personnel provide specialized inspections. The inspection requirements are specified in the building codes. The type, size, and complexity of the construction project dictate the number of inspections necessary to complete the project. For example, a foundation for a small building typically requires no more than two inspections while a more complex building with large spread footings or piers may require multiple inspections to complete the foundation.

6.4.2 Permitting

Within RAJUK's jurisdiction, approval of construction permits requires drawings that include setbacks (plot plan), architectural plans meeting the provisions of the *Bidhimala*, drainage information, a soils report (where required for a Special Project Permit), fire safety information, parking plans, a statement of the building's intended use, and elevations. No structural plans are required for permit approvals. Per the *Bidhimala*, RAJUK has 45 days to make a determination regarding an application for a construction permit. If additional information is requested, it must be done within the first 15 days, leaving RAJUK 30 days thereafter to make a decision. After the plan review is complete, the plans are sent to a Building Construction (BC) Committee. The plans are approved based on two building categories: eight stories and below; and nine stories and above.

In the U.S. model, approval of construction permits require drawings that include setbacks (plot plan including drainage information), architectural plans meeting code requirements including provisions for persons with disabilities, structural drawings and calculations, an electrical plan, a mechanical plan, a plumbing plan, a soils report (where required), fire safety code provisions, parking plans, a statement of the building's intended use, material specifications, and elevations. Depending on the type and size of the project, additional information may be required. Typically, 30 days are allotted for turnaround time for approval, once a complete set of plans is submitted and accepted for a permit. Plans must be approved by the planning department, public works and fire department, and in some cases the environmental health department, prior to acceptance by the building department.

6.4.3 Enforcement

Violations of *Bidhimala* are typically addressed as shown below:

- i. Building Inspector, upon receiving a complaint or on a scheduled site survey, submits a prescribed inspection form along with a sketch identifying the deviation and status of the project. A file is opened to process the complaint.
- ii. Chief Building Inspector reviews and processes the complaint. Also, upon a physical survey, may place a complaint.

- iii. Assistant Authorizing Officer reviews and processes the complaint. Also, upon a physical survey, may place a complaint.
- iv. Authorizing Officer reviews the complaint and order to issue notice in accordance with the code of civil procedure. Also, upon a physical survey, may place a complaint.
- v. Director of Developmental Control reviews and approves the processed complaint. Also, upon a physical survey, may place a complaint.

Once the complaint is approved by the director it is sent to the law officer for eviction/mobile court. This process can take from several months to six years. Currently, several thousand cases of construction violations are pending in the Dhaka court system. A majority of these cases are found in favor of RAJUK, although some are found in favor of the building owner. As a result, very few buildings receive the Occupancy Certificate, but utility companies provide connections to the buildings upon request and the owners occupy the buildings while the complaints are being resolved.

In the U.S. system, correction notices are issued following a progress inspection or special inspection by the enforcing authority. The correction notice identifies any portion of the construction that is not in compliance with the code or approved set of plans for that particular phase of construction. The contractor is not allowed to continue to the next phase of construction until all violations are corrected. If the contractor continues without clearance of violations and approval by the inspector, no additional inspections are conducted for the project and a stop work order may be issued for serious violations. A stop work order (also known as a red tag) does not allow the contractor to do any work until the violation has been resolved and the order lifted. If a contractor violates the stop work order, they can be fined and/or be sentenced to time in jail. Ultimately, if all of the violations are not corrected or resolved to the satisfaction of the inspector, an occupancy certificate is not issued and the utility companies are not permitted to connect their services to the building. Additionally, for financed projects, the lending institution typically does not release funds to the owner or builder without a certificate of occupancy.

6.5 CONCLUSION

There is currently no enforcement of the BNBC structural provisions by RAJUK or any governmental agency in Dhaka. Building structural safety plans are not reviewed for code compliance during the permitting process. The Building Construction Act of 1952 (BCA) does require structural drawings to contain the lateral force resisting systems and special detailing of the structural elements prescribed by the BNBC to improve safety during an earthquake or other event, but it is not enforced. Table 6-2 provides a summary of construction permits received, approved, and rejected by RAJUK in the last few years.

The BNBC provides a critical component of a building compliance and regulatory scheme as it provides the necessary information for the design of resilient buildings. The design and construction industry are another component and they are required to comply with the BNBC. They must be held accountable through the code enforcement process.

Table 6-2: Construction permits processed by RAJUK from 2014 through 2017

	2014/2015			2015/2016			2016/2017		
	Received	Approved	Rejected	Received	Approved	Rejected	Received	Approved	Rejected
Zone-1	45	44	1	181	174	7	355	323	32
Zone-2	644	632	12	562	420	142	529	484	45
Zone-3	736	705	31	531	487	44	1346	1208	138
Zone-4	725	698	27	1041	1006	35	1227	1184	43
Zone-5	466	456	10	249	245	4	229	226	3
Zone-6	732	712	20	1176	1009	167	1290	1140	150
Zone-7	158	151	7	155	138	17	137	133	4
Zone-8	251	239	12	330	284	46	441	429	12
Total 3	757	3637	120	4225	3763	462	5554	5127	427

As noted in the report, staffing levels are below the allotted positions making it difficult for the RAJUK staff to fulfill their duties under the existing system. The technical expertise of staff is somewhat limited and it is difficult to attract highly qualified personnel. Resources to staff are limited as well, making it challenging to carry out their specified duties.

The inability to hire and maintain staffing levels could be caused by a variety of reasons. This shortfall of staffing could potentially result from limited opportunities for career advancement and better paid opportunities in the private sector, among other factors. Concerns of a hostile work environment at job sites with limited support could also be a factor.

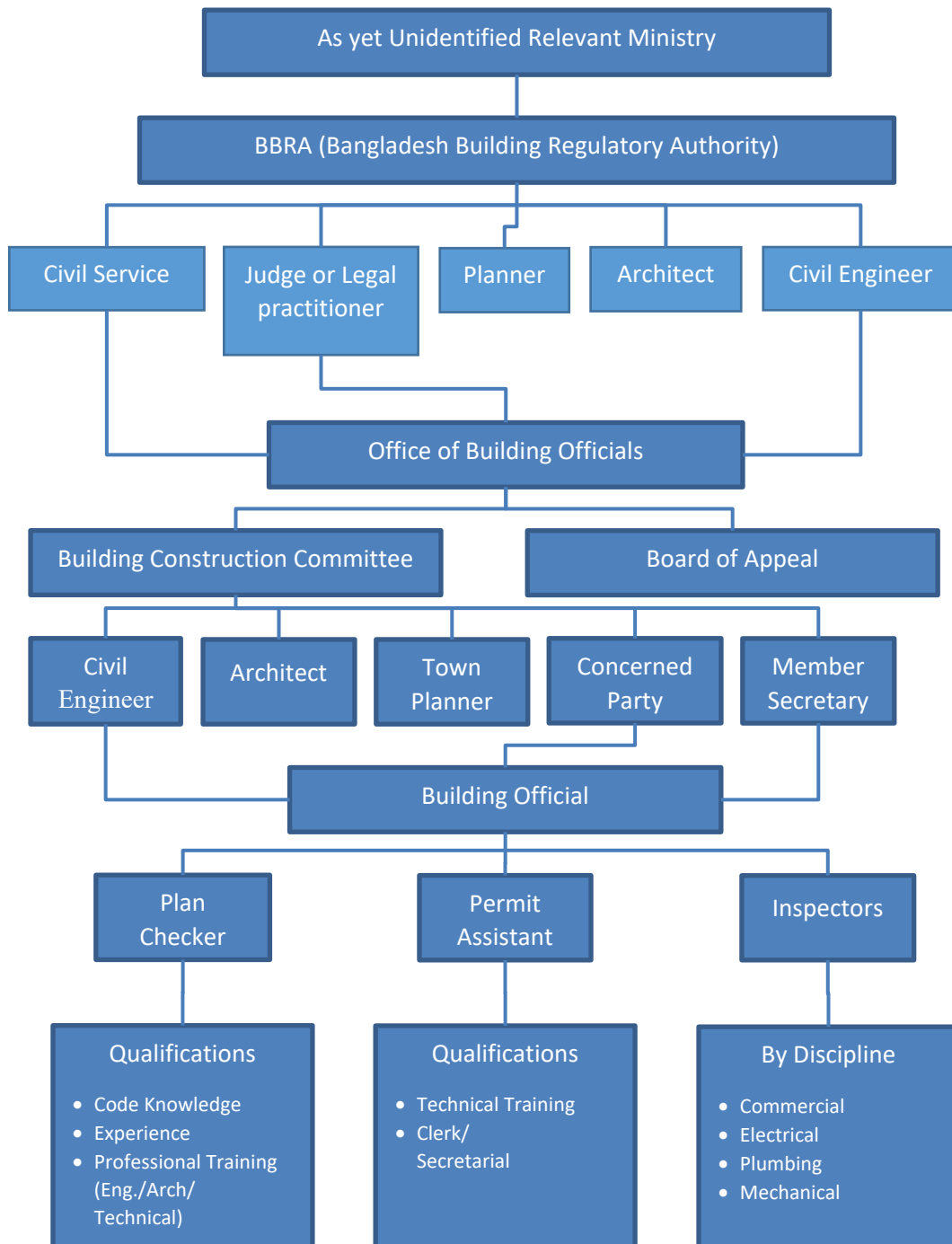
Hiring a complete cadre of educated, skilled, and trained staff will be necessary to carry out the enforcement of BNBC-2017. Significant changes will need to be instituted to attract and maintain qualified staff to enforce the full thrust of BNBC-2017.

For information purposes, the staffing levels of seven jurisdictions in the United States along with their respective populations are shown in Table 6-3. It should be noted that these jurisdictions perform complete inspections as required in their adopted building codes, and in some cases might be doing the permitting and inspection of utilities and engineering as well. This information is not intended to imply a required level of staffing for RAJUK planning zones.

Table 6-3: Staffing levels in seven U.S. jurisdictions

Jurisdiction 1:	Population 15,700; Number of staff in the Building Safety Department: 5
Jurisdiction 2:	Population 111,000; Number of staff in the Building Safety Department: 14
Jurisdiction 3:	Population 135,000; Number of staff in the Building Safety Department: 20
Jurisdiction 4:	Population 189,000; Number of staff in the Building Safety Department: 31
Jurisdiction 5:	Population 249,000; Number of staff in the Building Safety Department: 18
Jurisdiction 6:	Population 1,600,000; Number of staff in the Building Safety Department: 231
Jurisdiction 7:	Population 3.9 million; number of staff in the Building and Safety Division: 1,000

**ANNEX 6A. BANGLADESH BUILDING REGULATORY AUTHORITY (BBRA)
ORGANIZATIONAL CHART AS DESCRIBED IN BNBC-2017**



CHAPTER 7. STAKEHOLDERS' WORKSHOP

As indicated in Section 1.2 of this report, a task under situational analysis calls for a discussion of findings and conclusions from Tasks 1, 2, and 3 with RAJUK and with a Project Working Group (PWG) consisting of stakeholders at a stakeholders' workshop. Task 1 consisted of a review of documentation provided by RAJUK and obtained from other sources concerning code enforcement violations and resolution (see Chapter 2 of this report). Task 2 was devoted to field observations: visits to building sites, picked with and without RAJUK's guidance, to find out first-hand about building code enforcement (see Chapter 3 of this report). Task 3 consisted of extensive interviews with building officials, building inspectors, design professionals, contractors, construction managers, and developers (see Chapter 4 of this report).

The Workshop held in Dhaka on March 14, 2019 for Validation of the Inception Report for Project S-9 was utilized for the purposes of Task 4 as well. The presentation made by the Project S-9 Team Leader is included in Annex 7A. It may be noted that the long segment titled "Outcome of Project" is really devoted to situational analysis. The Workshop records are included in Annex 7B. It should be evident from the records that much of the discussion centered on the same part of the presentation. The discussion added clarity to the assessment already arrived at by the consultants concerning the situation that currently exists with respect to BNBC implementation and enforcement by RAJUK.

ANNEX 7A. INCEPTION REPORT PRESENTATION

This Annex includes the presentation made by the Project S-9 Team Leader at the workshop held in Dhaka on March 14, 2019 for Validation of the Inception Report for Project S-9.



Building Code Implementation and Enforcement Strategy (S9)
for Urban Resilience Unit (URU)
Rajdhani Unnayan Kartripakkha (RAJUK)

INCEPTION REPORT

Presented by

International Code Council (ICC) Inc.

and

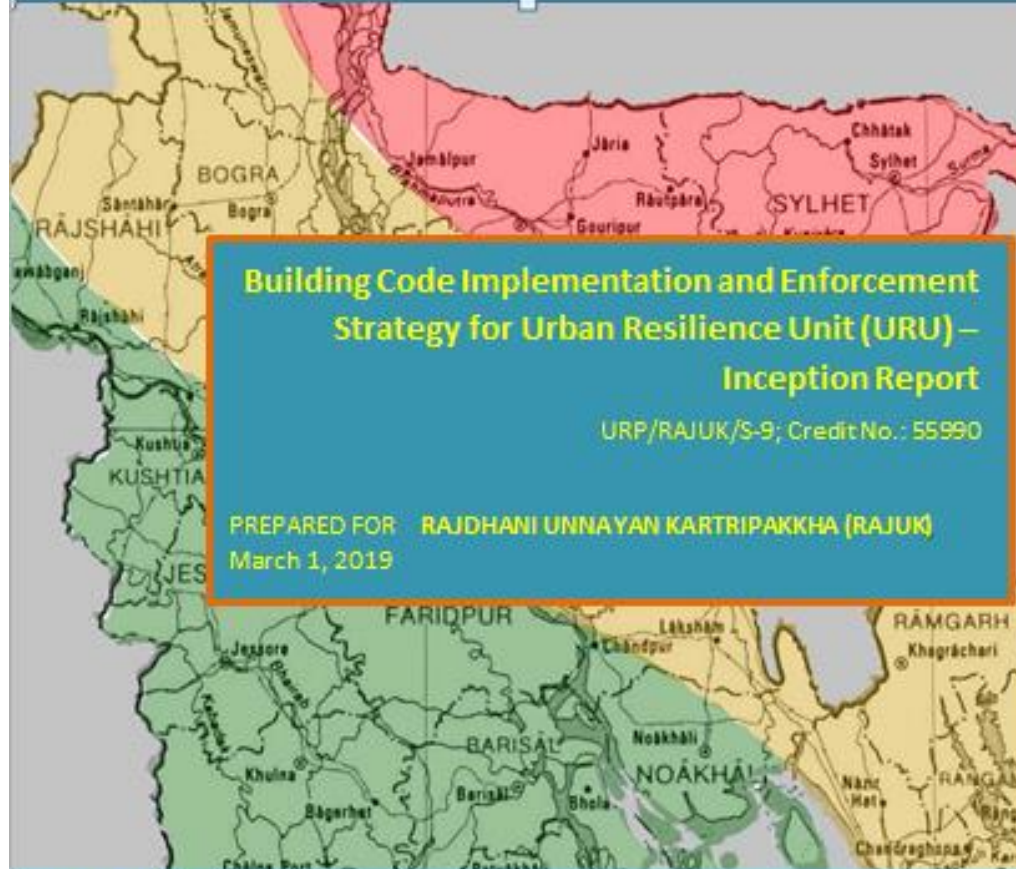
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March 14, 2019





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

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

PREPARED FOR RAJDHANI UNNAYAN KATRIPAKHA (RAJUK)
March 1, 2019

PREPARED BY



Smart Development Engineering (SDE) Limited





Inception Report Contents

Chapter 1 Introduction and Background

Chapter 2 Scope of the Inception Report

Chapter 3 Objectives, Finalization of Methodology and Work Plan

Chapter 4 Inception Workshop

Chapter 5 Stakeholder Consultations

Chapter 6 Project Implementation Concept Workshop

Chapter 7 Key Findings

Chapter 8 Work Plan Including Proposed Revisions



Inception Plan Contents

- **References**

- **Abbreviations**

Annex 1 Terms of Reference

Annex 2 Building Code Enforcement Instruments

Annex 3 Inception Workshop

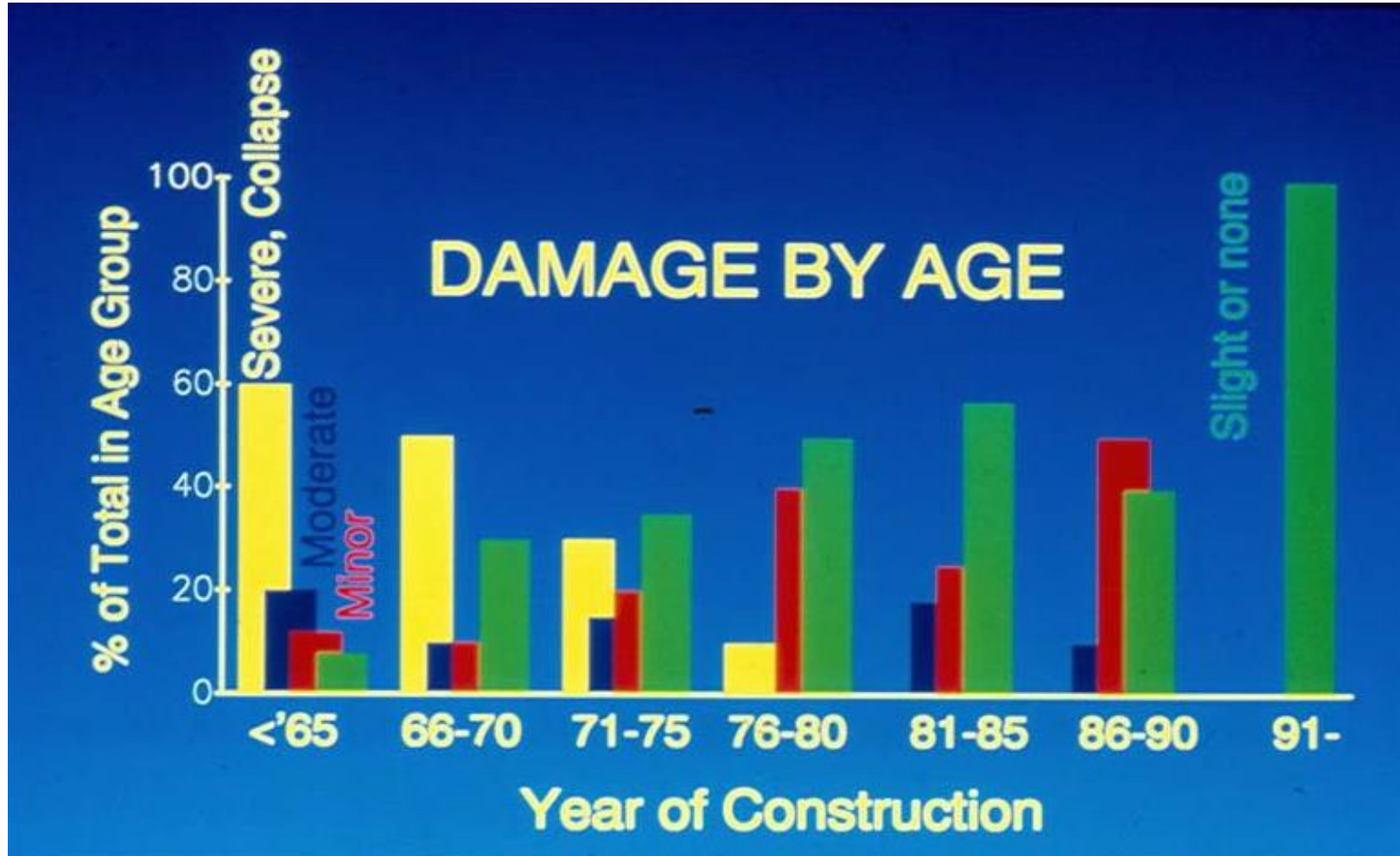
Annex 4 RAJUK Process and Resources

Annex 5 Stakeholder Consultations

Annex 6 Project Implementation Concept Workshop



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CODE
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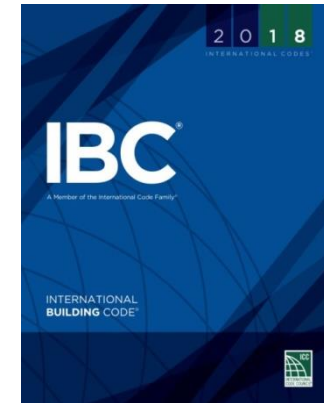
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Joint Venture Partners



- Nonprofit U.S. corporation
- Develops building codes and standards used to design, construct and maintain residential/commercial buildings
- 64,000+ member organization with 380 Chapters Globally
- Staff of more than 260 engineers, architects and administrators



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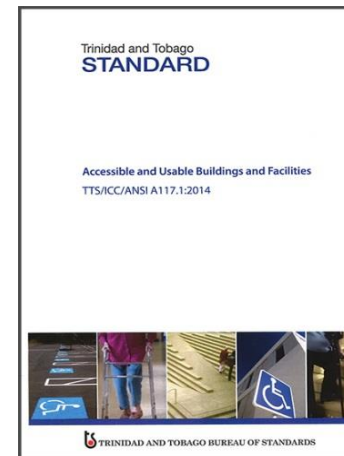
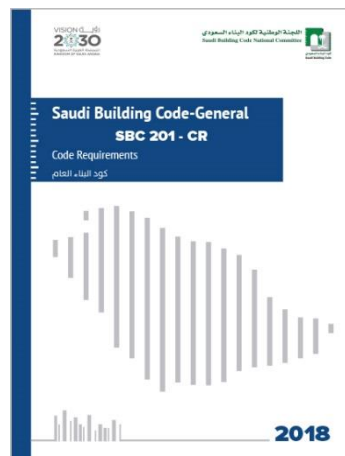
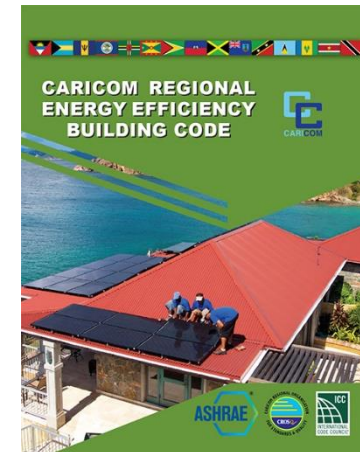
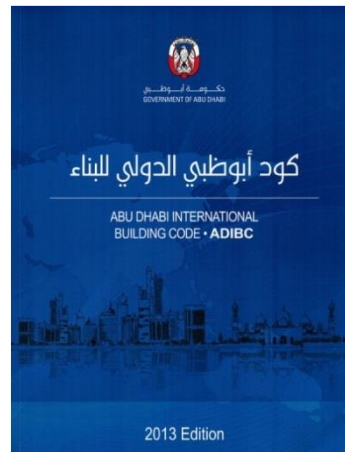


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Joint Venture Partners

Experience in Working with Clients on Building Regulatory Capacity

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





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



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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





ICC and SDE Teams

ICC: Mark Johnson, Dr. S. K. Ghosh, Alberto Herrera, Dave Walls, Dr. Pro Dasgupta, Bodhi Rudra, Tayseer Tasbahji, and others

SDE: Dr. Zoynul Abedin, Dr. Aminul Islam, Dr. Raquib Ahsan, Shahid Alam, Iffat Huque, Shajal Khan, Siddik Hossain, Fathiya Zaman, and others + Dr. Ahmadul Hassan





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OBJECTIVES





Scope of Work

According to Section 1, Context, of 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.”



Scope of Work

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.”



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



Objectives

Implementation and enforcement of 2017 BNBC in its entirety

Public awareness and education campaign to emphasize earthquake resistance



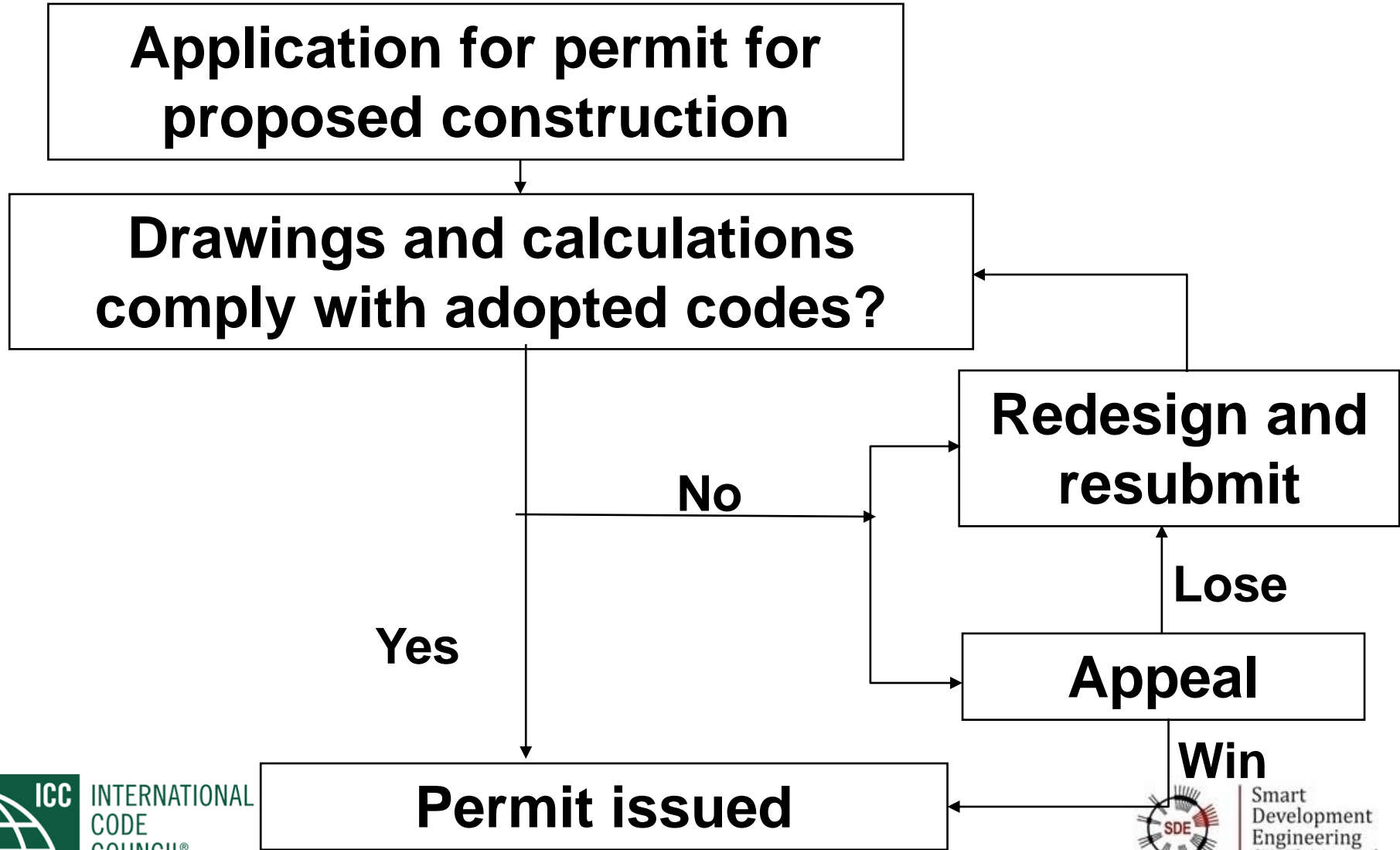


OUTCOME OF PROJECT



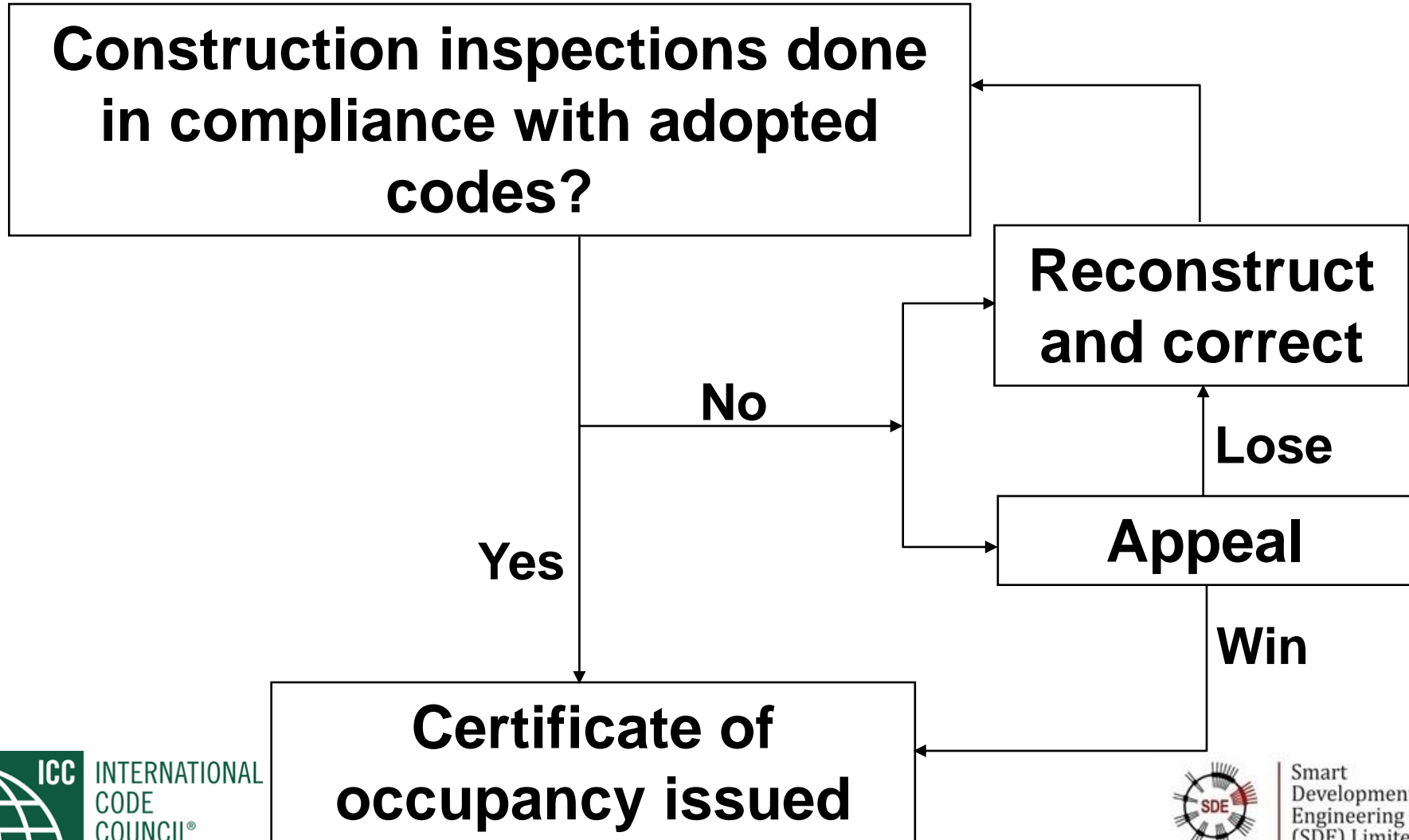


CONSTRUCTION PERMIT





CERTIFICATE OF OCCUPANCY





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U.S. Codes and Standards System

Legal Code

2019 California Building Code

Model Code

2018 IBC

Standards

ASCE 7-16

ACI 318-14

AISC 360-16, 341-16

URP/RAJUK/S-9 Component



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Bangladesh Codes and Standards System

Legal Code

Building Construction Act, 1952

RAJUK'S Dhaka Mahanagar Imarat Bidhimala

Model Code

BNBC

Standards

Issued by BSTI and other organizations such as ASTM





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International Codes 2018

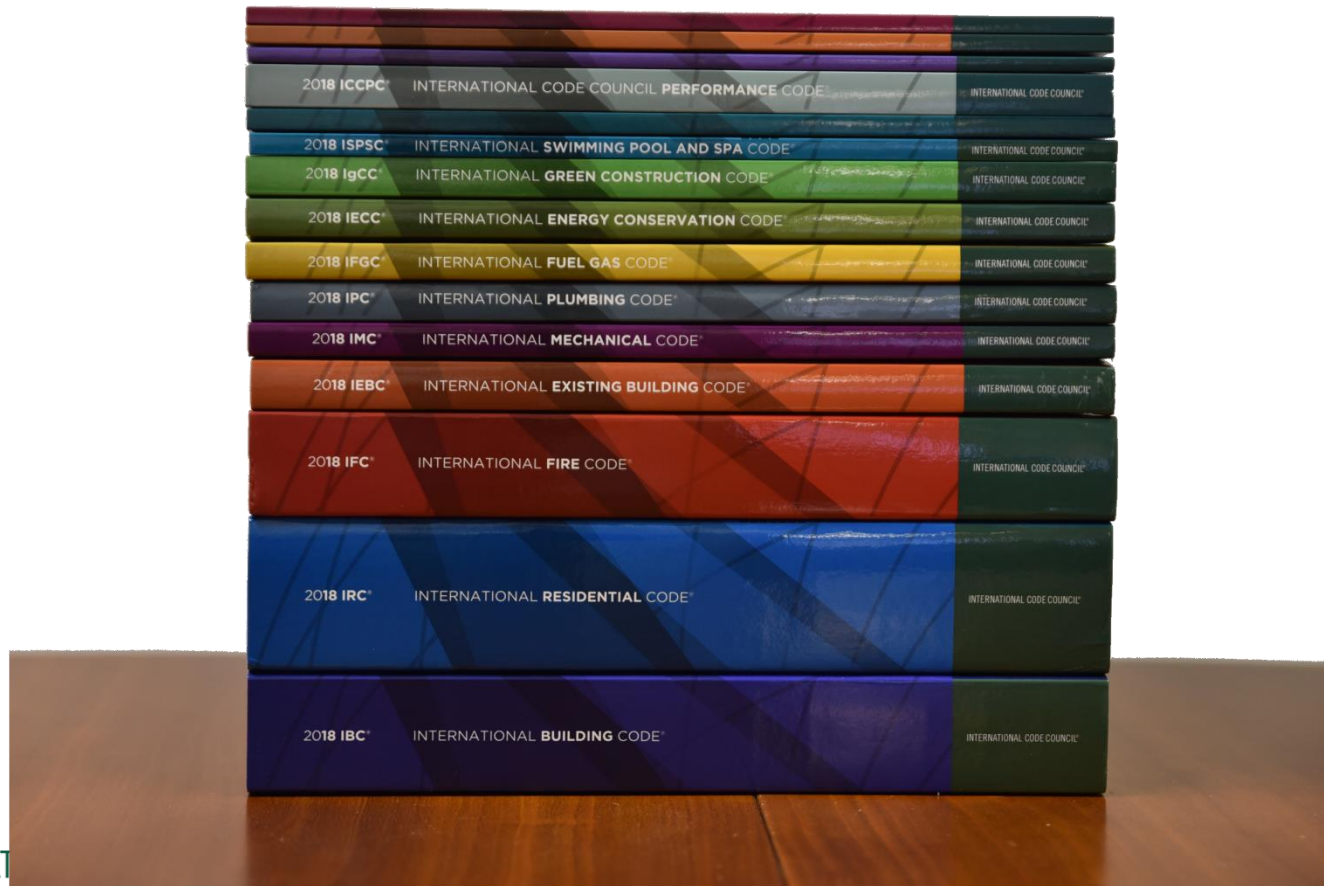
- International Building Code
- International Energy Conservation Code
- International Existing Building Code
- International Fire Code
- International Fuel Gas Code
- International Green Construction Code
- International Mechanical Code
- ICC Performance Code
- International Plumbing Code
- International Private Sewage Disposal Code
- International Property Maintenance Code
- International Residential Code
- International Swimming Pool and Spa Code
- International Wildland Urban Interface Code
- International Zoning Code





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2018 I-Codes Complete Set



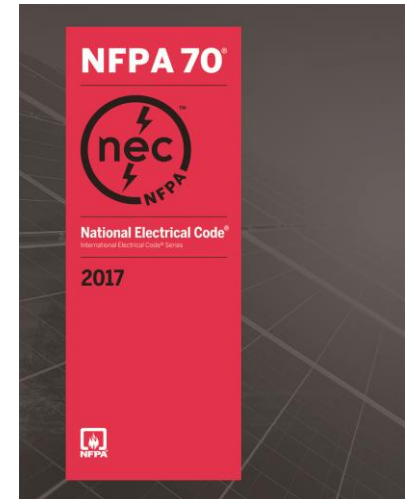
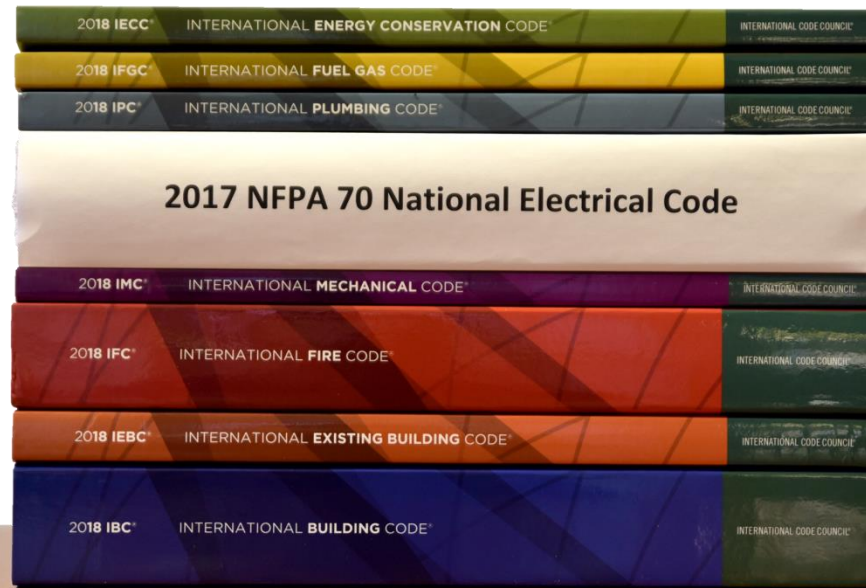
URP/RAJUK/S-9 Component



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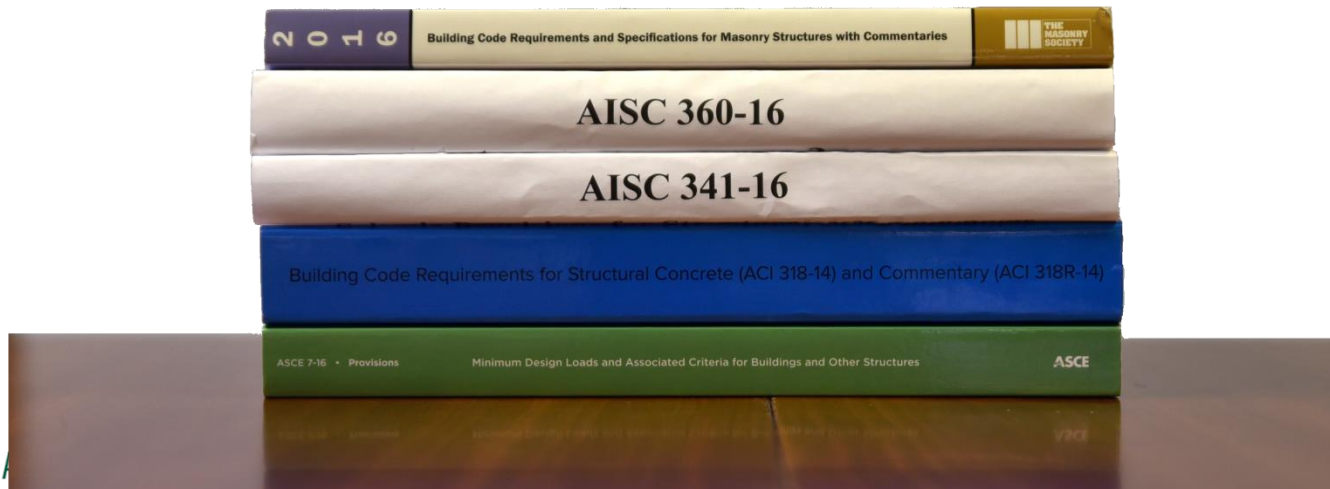
2018 I-Codes + 2017 NFPA Electrical Code





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Major US Standards excluding Wood



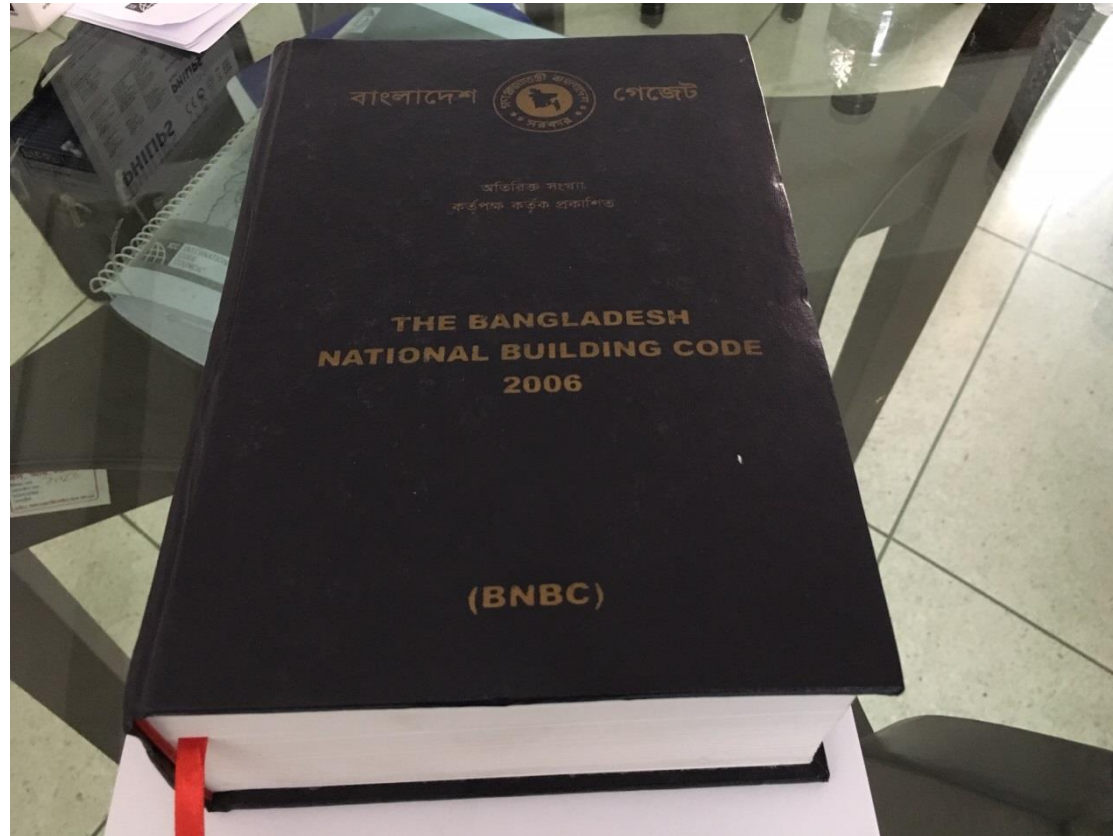
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Bangladesh National Building Code 2006

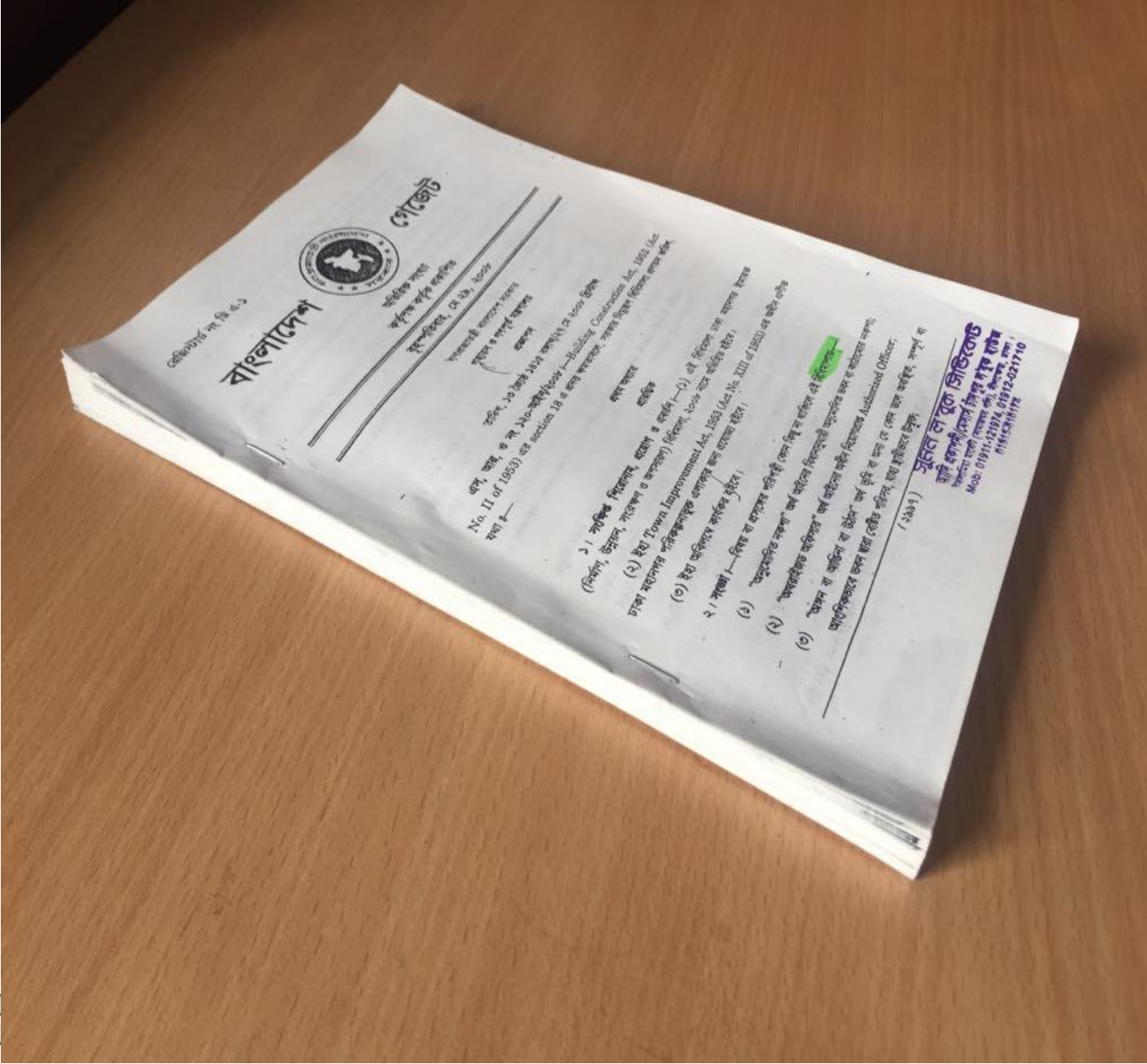




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Bangladesh National Building Code 2017





গাজেট নং ১৩৯৩

বাংলাদেশ



গাজেট

সচিবালয়
কর্তৃপক্ষ কর্তৃক প্রকাশিত

সূত্র-সংখ্যা, গে ১৩, ১৩৯৩
সূত্র-সংখ্যা ও তারিখ: ১৩৯৩
প্রকাশ

এম. আই. ও. নং ১৩৯৩ (১৩৯৩) এর
No. II of 1953) এর section 18 এ
যথাঃ—

- ১। স্বতন্ত্র নিয়োগ, প্রদান ও কার্য (১) এই বিধিতে এবং মন্ত্রণালয়
- (২) ইয়া Town Improvement Act, 1953 (Act No. XIII of 1953) এর
- (৩) ইয়া অধিকারে কার্যক্রম গ্রহণ হইবে।
- ২। সূত্রা—বিষয় বা প্রকল্প পরিচালনা করা যিহু বা হইবে এই বিধিতে
- (১) "অনুবেশিত নগর" অর্থ অধিকারিত্বের অধীনস্থ অর্থনৈতিক অঞ্চল
- (২) "অধিকারিত্ব নগর" অর্থ অধিকারিত্বের অধীনস্থ অর্থনৈতিক অঞ্চল
- (৩) "অধিকারিত্ব নগর" অর্থ অধিকারিত্বের অধীনস্থ অর্থনৈতিক অঞ্চল

সুনীল লেভেল জিভিকেন্ট
সূত্র-সংখ্যা, গে ১৩, ১৩৯৩
সূত্র-সংখ্যা ও তারিখ: ১৩৯৩



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Bangladesh National Building Code (BNBC)

- Part 1: Scope and Definition
- Part 2: Administration and Enforcement
- Part 3: General Building Requirements, Control and Regulation
- Part 4: Fire Protection
- Part 5: Building Materials
- Part 6: Structural Design
- Part 7: Construction Practices and Safety
- Part 8: Building Services
- Part 9: Addition and Alteration to Existing Buildings
- Part 10: Signs and Out-Door Display





BNBC Part 6: Structural Design

- **Chapter 1 Definitions and General Requirements**
- **Chapter 2 Loads on Buildings and Structures**
- **Chapter 3 Soils and Foundations**
- **Chapter 4 Bamboo**
- **Chapter 5 Concrete Material**
- **Chapter 6 Strength Design of Reinforced Concrete Structures**
- **Chapter 7 Masonry Structures**
- **Chapter 8 Detailing of Reinforcement in Concrete Structures**



BNBC Part 6: Structural Design

- **Chapter 9 Prestressed Concrete Structures**
- **Chapter 10 Steel Structures**
- **Chapter 11 Timber Structures**
- **Chapter 12 Ferrocement Structures**
- **Chapter 13 Steel-concrete Composite Structural Members**



BNBC Part 8: Building Services

Chapter 1 ELECTRICAL AND ELECTRONIC ENGINEERING SERVICES FOR BUILDINGS

Chapter 2 AIR-CONDITIONING, HEATING AND VENTILATION

Chapter 3 BUILDING ACOUSTICS

Chapter 4 LIFTS, ESCALATORS AND MOVING WALKS

Chapter 5 WATER SUPPLY

Chapter 6 SANITARY DRAINAGE

Chapter 7 RAINWATER MANAGEMENT

Chapter 8 FUEL GAS SUPPLY



RAJUK BCR Content Overview

- First Chapter: Introduction
- Second Chapter: Clearance and Application for Approval, Approval and Certificate for Occupancy, etc.
- Third Chapter: Committee
- Fourth Chapter: List, Classifications, etc. of Technical Persons
- Fifth Chapter: Procedures of Building Construction
- Sixth Chapter: Health & Security
- Seventh Chapter: Miscellaneous



RAJUK BCR Content Overview

- Appendix 1: Means of Egress
- Appendix 2: Public Accessibility Minimum Provisions
- Appendix 3: Classification of Buildings Based on Occupancy



Implementation vs. Enforcement

What is Implementation?

The act of implementing or putting into effect

What is Enforcement?

The act or process of enforcing

Implementation and Enforcement are not interchangeable terms



Implementation of the BNBC 2017

Secure final Government of Bangladesh Approval

Have RAJUK and other code enforcement authorities adopt the 2017 BNBC

Launch an awareness campaign

Develop a Commentary to the 2017 BNBC

Develop support literature

Train design professionals, code enforcement personnel, contractors, owners, educators, students, and other stakeholders such as financial institutions



RAJUK Adoption of BNBC 2017

A joint committee of RAJUK and developers of the BNBC 2017 need to decide which parts of BNBC 2017 are practical for RAJUK to enforce directly

The provisions to be enforced directly by RAJUK must be integrated into an update of *Bidhimala* 2008. This will involve translation of certain BNBC provisions into Bangla.

Enforcement of BNBC 2017

Critical Elements of Code Enforcement

- Regulatory mandate
- Clarity of agencies/departments responsible for enforcement
- Plan Review by certified individuals
- Inspection by qualified individuals certified in areas they inspect
- Plan Review and Inspections can be accomplished by jurisdiction or through use of third parties





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Code Enforcement in the U.S.

- Structural and Nonstructural Plan Review
- MEP Plan Review
- Structural and Nonstructural Inspection
- MEP Inspection





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Nonstructural Plan Review (Firesafety)



URP/RAJUK/S-9 Component



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2018 IBC

Chapter 1 Scope and Administration.

Chapter 2 Definitions.

Chapter 3 Use and Occupancy Classification.

Chapter 4 Special Detailed Requirements Based on Use and Occupancy.

Chapter 5 General Building Heights and Areas.

Chapter 6 Types of Construction.

Chapter 7 Fire and Smoke Protection Features.

Chapter 8 Interior Finishes.



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2018 IBC

Chapter 9 Fire Protection Systems.

Chapter 10 Means of Egress.

Chapter 11 Accessibility.

Chapter 12 Interior Environment.

Chapter 13 Energy Efficiency.

Chapter 14 Exterior Walls.

Chapter 15 Roof Assemblies and Rooftop Structures.





BNBC Part 3

PART 3: GENERAL BUILDING REQUIREMENTS, CONTROL AND REGULATION

Chapter 1 General Building Requirements **Fifth Chapter of *Bidhimala***

Chapter 2 Classification Of Buildings Based On Occupancy **Appendix 3 of *Bidhimala***

Chapter 3 Classification Of Building Construction Types Based On Fire Resistance



BNBC Part 4

PART 4 FIRE PROTECTION

Chapter 1 General Provisions

1.3 GENERAL REQUIREMENTS

1.3.1 Height and Area Limitation

1.3.2 Open Space or Fire Separation Requirement

1.3.3 Access Facilities for Fire Service

Chapter 2 Precautionary Requirements

2.1 OCCUPANCY CLASSIFICATION

2.2 CLASSIFICATION OF CONSTRUCTION TYPES



BNBC Part 4

Chapter 3 Means of Egress **Appendix 1 of Bidhimala**

Chapter 4 Equipment and In-built Facilities Standards

Chapter 5 Requirements for Fire Detection and Extinguishing System

- Appendix A Fire Drill and Evacuation Procedure 4-55
- Appendix B Fire Protection Considerations for Venting in Industrial and Storage Buildings 4-63
- Appendix C Selection and Sitting of Fire Detection System



RAJUK BCR Content Overview

Sixth Chapter: Health & Security

Rule 59

(f) Fire Safety :

- (1) For proper safety of the users of a Building all arrangements of fire extinguisher safety, where applicable, shall have to be ensured as per Annexure-1.
- (2) In all Buildings 'Emergency Exit' sign with direction of exit (where applicable) must be displayed.
- (3) The mechanical device for going up and down shall not be used as a Fire Exit.



Bangladesh Fire Service and Civil Defense

Which establishment needs Fire License under this law?

- Workshop
- Warehouse
- High-rise building
- Commercial building and establishment



Bangladesh Fire Service and Civil Defense

Workshop: Building or place which is used for processing combustible materials.

High-rise Building: Any building which is minimum 7 stories or 24 meters high.

Commercial Building: Building which is used for Bank, Insurance or other financial institutions, commercial and industrial purposes, Government related jobs and shopping complex.

Warehouse: includes any establishment and building which is used to stoking, preserving, pressing, shorting, selling and buying combustible materials.



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Structural Plan Review



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IBC Structural Provisions

CHAPTER 16 STRUCTURAL DESIGN

1601 General

1602 Notations

1603 Construction Documents

1604 General Design Requirements

1605 Load Combinations

1606 Dead Loads

1607 Live Loads

1608 Snow Loads

1609 Wind Loads

1610 Soil Lateral Loads

1611 Rain Loads

1612 Flood Loads

1613 Earthquake Loads

1614 Atmospheric Ice Loads

1615 Tsunami Loads

1616 Structural Integrity





IBC Structural Provisions

CHAPTER 17 SPECIAL INSPECTIONS AND TESTS

CHAPTER 18 SOILS AND FOUNDATIONS

CHAPTER 19 CONCRETE

CHAPTER 20 ALUMINUM

CHAPTER 21 MASONRY

CHAPTER 22 STEEL

CHAPTER 23 WOOD

CHAPTER 24 GLASS AND GLAZING



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RAJUK BCR Provisions Concerning Structural Design

21. Structural Design of a Building : (1) The engineer enlisted under the provisions of these Rules & Regulations and engaged by the applicant shall prepare, as per the Code, the structural design of the Building following proper scale.



RAJUK BCR Provisions Concerning Structural Design

21. Structural Design of a Building (2) As per the policy mentioned in the Code, the structural design of a Building shall have to be prepared keeping in mind its Seismic Design.



RAJUK BCR Provisions Concerning Structural Design

21. Structural Design of a Building (3) Following points must be included in the structural design of a Building, where applicable:

- (a) Detailed Foundation Design of a Building based on the soil test report of the site.
- (b) Measurements and locations of basement walls, other walls, column, beam, floor, all framing members including the roof and technical information about the used construction materials.



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MEP Plan Review



URP/RAJUK/S-9 Component



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IBC Provisions Beyond Structural

CHAPTER 25 GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

CHAPTER 26 PLASTIC

CHAPTER 27 ELECTRICAL

CHAPTER 28 MECHANICAL SYSTEMS

CHAPTER 29 PLUMBING SYSTEMS

CHAPTER 30 ELEVATORS AND CONVEYING SYSTEMS

CHAPTER 31 SPECIAL CONSTRUCTION

CHAPTER 32 ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY

CHAPTER 33 SAFEGUARDS DURING CONSTRUCTION





RAJUK BCR – Building Services Drawings

22. Drawings relating to Building Services : Engineer(s) enlisted under these Rules & Regulations and engaged by the applicant shall prepare the drawings relating to Building Services as per Code and following proper scale, and the following items relating to services used in a Building shall be included in those drawings :



RAJUK BCR – Building Services Drawings

22. Drawings relating to Building Services :

- (a) Lay-out plan and drawings of water supply, sewerage, drainage, gas supply, etc.
- (b) Lay-out plan, drawings and specifications of electrical installation, sub-station, electrical circuit diagram, etc.
- (c) Plan, design and lay-out of air conditioning system (if any), drawings of installation of lift and escalator (if any), and
- (d) Detailed drawings of all other Building Services.



RAJUK BCR – Building Services Drawings

24. General Worth-knowing matters relating to Construction & Construction Permit : (2) All necessary drawings relating to various mechanical and electrical facilities of a Building, such as : lighting arrangement, electrical installation, air conditioning, heating system, ventilation system, acoustic control, sound-proof lift, escalator, moving walk must be prepared by the relevant professional persons enlisted under Rule-41.



RAJUK BCR – Building Services Drawings

24. General Worth-knowing matters relating to Construction & Construction Permit : (3) Arrangements must be made for controlling noise coming from the generator, air conditioner, sub-station and from other electrical and mechanical installations, and it must be ensured that smoke, water, etc. coming from the aforesaid machines do not obstruct general airflow in the site or in the adjacent plots, and also it must be ensured that they do not hamper peace and comfort in those areas.



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Structural and Nonstructural Inspection



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2018 IBC Section 110 Inspection

110.1 General. Construction or work for which a *permit* is required shall be subject to inspection by the *building official* and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. ... It shall be the duty of the *owner* or the owner's authorized agent to cause the work to remain visible and able to be accessed for inspection purposes. Neither the *building official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.



2018 IBC Section 110 Inspection

110.2 Preliminary inspection. Before issuing a *permit*, the *building official* is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

110.3 Required inspections. The *building official*, upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.11.



2018 IBC Section 110 Inspection

110.3.9 Other inspections. In addition to the inspections specified in Sections 110.3.1 through 110.3.8, the *building official* is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the department of building safety.

110.3.11 Final inspection. The final inspection shall be made after all work required by the building *permit* is completed.



2018 IBC Chapter 17

SPECIAL INSPECTIONS AND TESTS





Inspection Requirement of BNBC 2017

BNBC 2017 Part 2 Chapter 3

3.10 INSPECTION

All works relating to a building or structure regulated by the provisions of this Code for which permits are required shall be subject to inspection by the Building Official. Modalities and frequency of such inspections shall conform to the requirements put forward by the approving authority.



RAJUK BCR Content Overview

Third Chapter: Committee

Rule 37

Supervision & Control of Construction & Development works by Urban Development Committee : (1) The Committee, based on complaints received or being prompted by its own will, can get the Buildings already constructed or under the process of construction under these Rules inspected and examined regularly by suitable professional manpower.



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Issues Requiring Special Attention

Quality Assurance





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Issues Requiring Special Attention

Construction Safety



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Issues Requiring Special Attention

Existing Buildings

BNBC Part 9





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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 – Feb 27, 2019

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

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

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



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Tasks, Deliverables, Dates

2. Situational Analysis

2.4 Review

Nov 28, 2018 – Mar 29, 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 – Apr 30, 2019

Preparation of a final situational report considering input from stakeholders.



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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 – Mar 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:



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- a) Weakness in the legislative framework; and
- b) A lack of competent resources.



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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.





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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.

8 Months

Feb 28, 2020 – Oct 27, 2020



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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.



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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.

Jan 28, 2019 – May 30, 2019





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.

6 Months

May 30, 2019 – Nov 27, 2019





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.





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Tasks, Deliverables, Dates

8. Annual Program Evaluation Report

3 Months

Feb 28, 2021 – May 30, 2021





Revised Work Schedule

		Form TECH-5 (FOR FTP AND STP) Work Schedule and Planning for Deliverables																																			
No.	Deliverables, D-i	*Total duration (31 months)																																			
		From	To	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			
D-1	Deliverable #1: Submission of Inception Report																																				
	Deliverable #2: Submission of Situational Analysis Report																																				
	1) Documentation review																																				
	2) Field observation																																				
D-2	3) Interviews																																				
	4) Review of findings and conclusions																																				
	5) Preparation of Final Situational Report																																				
	6) Conducting training needs survey																																				
	7) Staffing needs survey																																				
	Deliverable #3: Submission of Concept Note Report																																				
	1) Workshop with PWG																																				
D-3	2) Tergated desk research																																				
	3) Investigate incentives																																				
	4) Resolving (a) weakness in legislative framework (b) lack of competent resource																																				
	5) Draft concept note																																				
	Deliverable #4: Submission of Proposed Program for Building Code and Construction Code Enforcement Initial and Final Report																																				
D-4	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 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																																				



Revised Payment Schedule

One revision has been proposed to the Payment Schedule, to make payment more commensurate with effort involved. Two other changes have been proposed, to reflect changes made to the Work Plan.



Coordination

- Coordination with other funded programs, particularly S-6 and S-7 is vital and is ongoing.
- Coordination with JICA is also important and ongoing.



Questions?

Thank you





Revised Payment Schedule

Advance	10% of contract amount	To be adjusted in equal portions against 2 nd , 3 rd , 4 th and 5 th payments.	Within xx days of signing of contract on October 28, 2018
1 st Payment	5% of contract amount	Upon submission of “Inception Report.”	January 27, 2019
2 nd Payment	10% of contract amount Propose 20%	Upon submission of “Situation Analysis Report”	April 29, 2019
3 rd payment	10% of contract amount	Upon submission of “Concept Note Report”	February 27, 2020
4 th Payment	10% of contract amount	Upon submission of “Proposed Program for Building Code and Construction Code Enforcement Report” initial and final	October 27, 2020
5 th Payment	15% of contract amount	Upon submission of “Training and Capacity building Report”	December 28, 2020 May 30, 2019
6 th Payment	10% of contract amount	Upon submission of “Education and Outreach Campaign Report.”	March 29, 2021 November 27, 2019
7 th Payment	20% of contract amount	Upon submission of “Monitoring and Evaluation Report”	May 30, 2021
8 th & Final	20% of contract	Upon submission of “Annual Program	May 30, 2021

ANNEX 7B. WORKSHOP MEETING RECORDS

This Annex includes the meeting records from the workshop held in Dhaka on March 14, 2019 for Validation of the Inception Report for Project S-9.



Meeting Records

- **Project Name:** URP; Component C; RAJUK, S-9 Building Code Implementation and Enforcement Strategy within RAJUK Jurisdiction
- **Related Department:** RAJUK, Bangladesh.
- **Topics:** Inception Report and Methodology Validation Workshop.
- **Venue:** The World Bank, Sher-e-Bangla Nagar, Dhaka.
- **Date:** March 14, 2019
- **Attached Documents:**
 1. Agenda
 2. List of Attendees
 3. Presentation Slides
 4. Photos
- **Welcome speech:** by Abdul Latif Helaly, PD (URU), RAJUK PART
- **Presentation of Inception Report and Methodology by Dr. S K Ghosh, ICC on the following:**
 1. Objectives;
 2. Outcome of the Project;
 3. Scope of work;
 4. Project Deliverables;
 5. Project Execution and Implementation;
 6. Project Work Plan:



STAKEHOLDER CONSULTATIONS AND FEEDBACK: Key findings of the Inception Report.

1. Md. Zafar Ullah, DG PCMU, Ministry of Planning, mentioned that if BNBC 2017 is not approved yet, then all project works of S-9 component will be of no use. He also mentioned that for monitoring purposes, third party inspection service providers should be involved, and questioned why the consultants should be involved in monitoring.

- Dr. S. K. Ghosh fully agreed with Mr. Zafar Ullah's comment and added that the ICC-SDE JV is working on a strategy as to how a third party system can be introduced within RAJUK. He also mentioned that third party plan-checkers are necessary for checking and vetting of the building plans, else the structural and fire safety aspects cannot be ensured. In regard to the approval of BNBC 2017, Dr. Ghosh mentioned that he will be available to discuss the matter at the appropriate levels within RAJUK and other concerned parties to assist expediting the process.
- Regarding the approval of BNBC 2017, Dr. Mehedi Ahmed Ansary, Professor of BUET, requested Mr. Abdul Latif Helali, PD, URU to take Dr. S. K. Ghosh and other Team Leaders of URP components, as well as Dr. Jamilur Reza Chowdhury to meet with the Honorable Minister and Secretary of the Ministry of Housing and Public Works and sensitize them about the importance of BNBC 2017. Dr. Ghosh accepted to participate in such meetings and assist on this matter at any time.

2. Md. Anisuzzaman Chowdhury, Program Manager, JICA asked Dr. S K Ghosh whether the S-9 component has any overlap with other components and JICA's proposed 5-year plan.

- Dr. S K Ghosh said that the ICC-SDE JV is working on that and will have meetings with JICA and others components shortly.

3. Dr. Mehedi Ahmed Ansary, suggested introducing a pilot project in any of RAJUK's Zones based on discussions with Mr. Abdur Rahman, RAJUK's Chairman.

- Well noted and taken into consideration for necessary action.

4. Mr. Mamnoon Murshed Chowdhury, Vice-President of National Affairs at IAB, mentioned as a practicing Architect, that Bidhimala Annex 1 is being implemented and that there are provisions in Bidhimala to call for inspections;he pointed to Sections 15 and 19 of Bidhimala 2008. Mr. Chowdhury also wondered how ECP will have interface with BNBC implementation.

- Dr Ghosh mentioned that ICC/SDE are in the process of thoroughly reviewing the entire document (Bidhimala 2008) and that Dr. S. K. Ghosh appreciated Mr. Mamnoon's comments. About the interface with ECP, Dr. Ghosh mentioned that, hopefully, during the pre-construction stage, RAJUK zonal offices will be supplied with appropriate software FASP (Fast Automated Structural Permitting System) so that the BC committee can instantly check the structural drawings of a building. During construction stage, the inspectors will use FRCM (Fast Remote-Sensing Construction Monitoring) software.



5. Mr. Mahboob Hossain, Sr. Procurement Specialist, URP/RAJUK expressed his pleasure about the clear and systematic presentation of the Inception Report by Dr. S K Ghosh. He mentioned that the participants of the Workshop could easily understand the Inception Report and Methodology of S-9 Component. He also mentioned that the presentation of Dr. S K Ghosh is very specific and focused.

6. He is also pleased enough finding the definition and extent of the scope in the area of implementation and enforcement in the presentation which is well explained. But expressed his concerns about the strategy and according to him it is not well explained in the inception report. To him, it is very important as it will explain the action plan needs to apply to the concerned stakeholder. He also put stress on identification of stakeholders. Properly identifying the stakeholders will help in further research quantifying the authority and accountability on them.

7. All the contractual matters need to be addressed separately for approval. Changing any contractual matters in the inception report will not relieve the consultant to fulfill their obligations.

8. Since in the contract, it is agreed to provide updated work plan quarterly. It implies, work plan will be changing in the passage of time. On that point of view, it is advised to keep the work plan in the annexure, not in main chapter.

9. How RAJUK will be benefited from the project i.e how RAJUK use the outcome of this consultancy to other consultancies of URU-RAJUK?

Reply of ICC-SDE,JV

- In reply to the question no 6, Dr. S K Ghosh appreciated the comment of Mr. Mahboob and assured him that the situation analysis is still in progress and once it is complete, the strategy as mentioned by Mr. Mahboob can be best explained.
- In reply to the question no 7-9, Dr. S K Ghosh viewed as these issues are well noted and will be taken into consideration as required



10. Mr. Eric Mousset of RTI asked if the BNBC needed to be revised in view of the switch from manual to Electronic Construction Permitting (ECP) system.
- Dr. S. K. Ghosh mentioned that everything will go to an electronic system and that it is more for RAJUK to decide what revisions, if any, may be necessary to the BNBC. He said that there is inertia in every system and doesn't know how much resistance there will be from the users, because it depends on the tolerance level of those affected.



11. Ms. Michelle Pinkowski of RTI International stated that any changes in the BNBC will need to be reflected in corresponding changes to the Bidhimala.
- Dr. Ghosh agreed with her comment, and added that the changes in the Bidhimala should be holistic. Once BNBC 2017 is gazetted, the consultants will help RAJUK with revisions to the Bidhimala.
12. Engr. Sheikh Tajul Islam, Secretary, Civil Engg Division, IEB, asked how the engineer & inspector will check the structural integrity of a building during construction.
- Dr. S. K. Ghosh replied that the authorized officer, assistant authorized officer and inspector of RAJUK will be supplied with laptop and appropriate electronic gear to inspect and monitor by FRCM.

Dr. S. K. Ghosh at this point said that Dhaka is not only the capital City of Bangladesh, but being one of the the most populous cities in the world, has many special needs and characteristics. It is also the economic center and



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cultural hub of the country. As such, the Government of Bangladesh cannot take any risk of a major disaster in this city caused by an earthquake, and therefore the Implementation and enforcement of the BNBC are of great importance.

In concluding the meeting, Dr. Mehedi Ahmed Ansary expressed his hope that the S-9 component can bring changes and transparency in the RAJUK system by implementing and enforcing the BNBC and thanked everybody for their patient listening and participation in the workshop. Dr. Ansary also thanked the World Bank for organizing such a meaningful workshop in their premises, which will eventually help RAJUK and the Government of Bangladesh to make Dhaka a Resilient City.

Dr. S.K Ghosh, ICC



MEETING AGENDA

URBAN RESILIENCE PROJECT (URP), RAJUK PART

VALIDATION OF INCEPTION REPORT

14 March 2019

For validation of the Inception Report of S-09 Component a meeting was held in the World Bank premises at Shere-Bangla-Nagar, Dhaka. The purpose of this meeting was to present the Inception Report and receive endorsement from principal stakeholders for Package S-09. The S-09 Package primarily deals with the “Building Code Implementation and Enforcement Strategy for BNBC”.

THURSDAY, 14 MARCH 2019

01:30 - 2:00	Participant Registration
14:00 - 14:15	Opening Welcome speech and Objective of the Meeting by; Mr. S.K Ghosh
14:15 - 14:30	Opening Remarks by; Mr. Abdul Latif Helaly, Project Director of Urban Resilience Unit
14:30 - 16:00	Presentation of Inception Report of S-09 Component by; Dr. S K Ghosh, ICC, Team Leader of S-09 Component
16:00 - 16:30	Q/A and Comments from stakeholders
16:30 - 16:40	Tea Break
16:40	Closing



List of Attendees

Name	Organization	Designation
Dr. S K Ghosh	International Code Council (ICC), USA	Team Leader, S-9
Mr. Mark Johnson		Project Advisor/ Code Enforcement Expert
Mr. Alberto Herrera		Administrator/ Coordinator and Capacity Development Specialist
Ms. Michelle Pinkowski	RTI	
Mr. Peter Medway		
Dr. Eric Mousset		
Engr. Emdadul Islam		
Dr. Rahat Sikdar		
Mr. Rafiul Alam		
Engr. Shafiul Alam		
Mr. Glenn Whaley		
Dr. Mehedi Ahmed Ansary	BUET	Professor, Dept. of Civil Engg.
Dr. Raquib Ahsan		Professor, Dept. of Civil Engg.
Dr. Nasreen Hossain		Head, Dept. of Architecture
Dr. Md. Shamsuzzoha Bayzid		Assistant Professor, CSE
Dr. Anindya Iqbal		Associate Professor, CSE
Md. Anwar Hossain	FSCD	Assistant Director
Jalal Ahmed	IAB	President
Seikh Tajul Islam	IEB	Secretary, Civil Engg. Division
Abdul Latif Helaly	URP/RAJUK	PD
Md. Aminur Rahman sumon		DPD
Md. Mahboob Hossain		Senior Procurement Specialist
Md. Shahjahan		Senior FM & PS
Abul Khair		Assistant Engineer



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Md. Saifur Rahman Joarder		Procurement Specialist
Tapan Kumar		Assistant Engineer
S M Shafiquzzaman		Assistant Engineer
Abdur Rahman Khan		ARE
Shadia Masud		Assistant Engineer
Apel Mahmud		Assistant Engineer
Makid Ehsan		Authorized Officer, Zone-08
Engr. Md. Nurul Islam	RAJUK	Superintendent Engineer
B S Pushpendue Biswas		Assistant Engineer
Pretom Sikder		Assistant Engineer
Anisuzzaman Chowdhury	JICA	Program Manager
Takumi Tsuchiya		
Md. Zafar Ullah	PCMU	Director General
Md. Khayrul Hasan		Director, URP-PCMU
Dewan Rakibul Islam	World Bank	
Sadettin Sezer	NKY-Protek-Sheltech JV	
Sean Serkan Postaci		Senior Structural Engineer
Abbas Fathi Azar		
Md. Masudur Rahaman	Dohatec	Project Manager
M A Rased		Team Leader
Dr. Ahmadul Hassan	SDE	Executive Director
Syed Ahsanul Haque (Rubel)		
Iffat Huque		
Md. Shahid Alam		Technical Advisor
Abdul Siddik Hossain		Structural Engineer
Tanjiba Rahman Tishi		Urban planner and GIS
Maisun Maliha Ansary		Coordinator
Hasib Uz Zaman		Structural Engineer

CHAPTER 8. STATE OF BNBC IMPLEMENTATION AND ENFORCEMENT

8.1 CONSTRUCTION PERMIT AND CERTIFICATE OF OCCUPANCY

An Authority Having Jurisdiction (AHJ) over structures within its territory regulates construction of such structures through two instruments: a construction permit and a certificate of occupancy.

An individual or an entity that wishes to construct a structure on a piece of land on which the individual or entity is legally entitled to construct such structure must apply for a construction permit to the AHJ (Figure 8-1) before construction can start. The application must be accompanied by drawings, design calculations, and other documentation as per rules of the jurisdictions. The submission requirements vary widely among jurisdictions. Some may require only basic drawings. Some may require complete design calculations in addition to detailed drawings

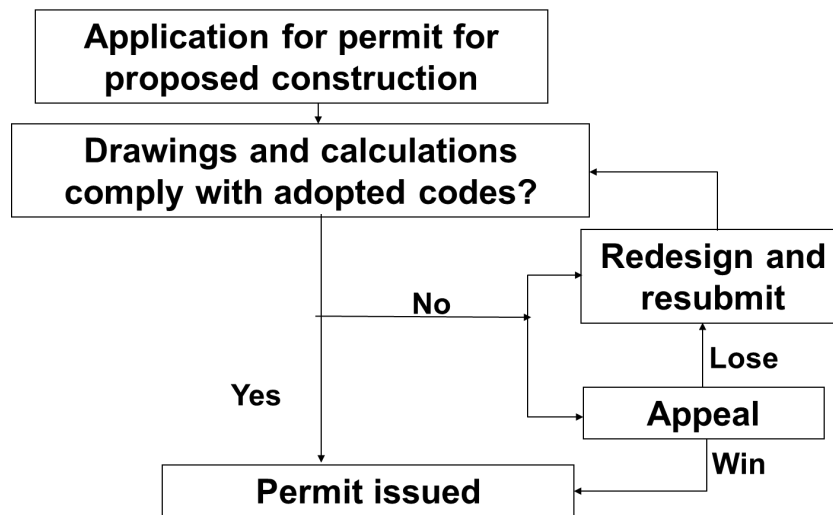


Figure 8-1: Construction Permit

The AHJ will issue a permit to the applicant if they are satisfied that the drawings (and the calculations, if they are required to be submitted) are in compliance with the codes adopted by the jurisdiction. The codes typically adopted are a building code, a fire code, a mechanical code, a plumbing code, an electrical code, and other associated codes. Oftentimes, plan checkers for the AHJ will ask questions which must be answered by designers representing the applicant. If the drawings and supporting documentation are found to be in compliance with applicable codes, a construction permit is issued. If a construction permit is denied, an application is typically allowed to file an appeal via an established process. If the appeal is won, a construction permit is issued. If the appeal is lost, the drawings and/or calculations must be revised to bring them into compliance with the applicable codes. Once the AHJ is satisfied of such compliance, a construction permit is issued.

Upon completion of construction and before the structure can be occupied, the owner or developer must apply to the AHJ for a certificate of occupancy (Figure 8-2). The AHJ will issue such a certificate

only if they are satisfied that all inspection required by codes adopted by the jurisdiction have been carried out in compliance with the codes and that any violation of drawings, specifications, or applicable codes printed out by inspectors have been rectified. If a certificate is denied, the owner or developer must rectify all deficiencies found to the satisfaction by the AHJ, at which point, a certificate of occupancy is issued.

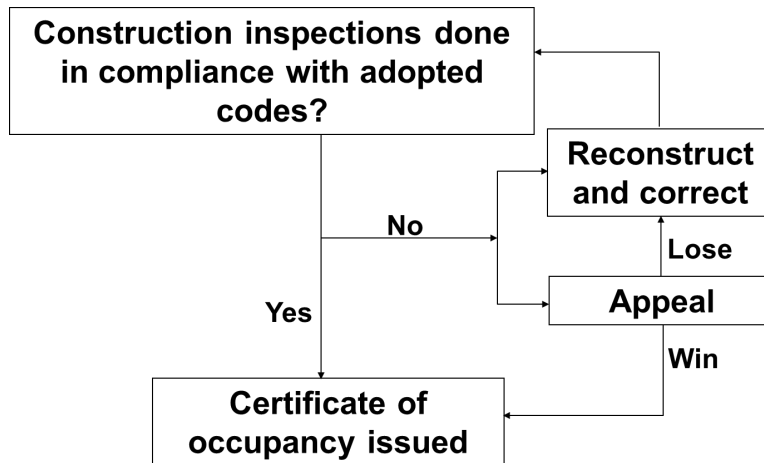


Figure 8-2: Certificate of Occupancy

8.2 CODES AND STANDARDS SYSTEM IN THE U.S.

As mentioned in the previous section, a jurisdiction (a city or a county, or a state in the United States, an authority such as RAJUK or a municipal corporation in Bangladesh) would typically adopt a building code, a fire code, a mechanical code, an electrical code and so forth. If attention is focused on the building code for the time being, the soon-to-be-adopted building code in the State of California is the 2019 *California Building Code*. Incidentally, in the U.S., the state legislations (as opposed to federal congress or local city or village councils) have final authority over building codes. In California, the state directly regulates hospitals and schools, for which the applicable building code is the *California Building Code*. For other construction, the state has delegated its regulating authority to local governments. So, for an office building or an apartment building in Los Angeles, the applicable code is the *City of Los Angeles Building Code*, which is the *California Building Code*, as amended by the City of Los Angeles. By state law, the amendments can make the state code more stringent but cannot make it less stringent.

The 2019 *California Building Code* is based on (Figure 8-3) the 2018 *International Building Code (IBC)*. In other words, it is the 2018 IBC with state amendments. The 2018 IBC is a so-called model code in the sense that it has no authority until it is adopted through legislative action by a local jurisdiction. At this time, for all practical purposes, the IBC is the only model code in the entire U.S. Until the turn of the last century, there were three regional model codes, which have now merged into the IBC. Of the thousands of local jurisdictions in the U.S., all (with rare exceptions) are based on one edition or another of the IBC.

Legal Code

2019 California Building Code

Model Code

2018 IBC

Standards

ASCE 7-16

ACI 318-14

AISC 360-16, 341-16

Figure 8-3: U.S. Codes and Standards System

The International code council (ICC), that publishes the IBC, does not have the resources to develop regulations governing minimum design loads, concrete design and construction, steel design and construction, and so forth. So, the IBC relies on a set of referenced standards, the principal amongst which are the ASCE 7 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, published by the American Society of Civil Engineers (ASCE); ACI 318 *Building Code Requirements for Structural Concrete*, published by the American Concrete Institute; AISC 360 *Specification for Structural Steel Buildings* and AISC 341 *Seismic Provisions for Structural Steel Buildings*, published by the American Institute of Steel Construction; TMS 402 *Building Code Requirements for Masonry Structures*, published by the Masonry Society; and the *National Design Specifications* (NDS) and the *Special Design Provisions for Wind and Seismic* (SDPWS), published by the American Wood Council.

Going beyond just the building code, 2018 editions of 14 additional model codes are also available from the ICC (Figure 8-4). While probably no jurisdiction adopts all 15 codes, many adopt a number of them. It may be noted that the 15 do not include an electrical code. The electrical code typically adopted by the local jurisdiction in the US is the *National Electrical Code* (NFPA 70) published by the National Fire Protection Association. Another NFPA code often adopted by the US jurisdiction is the *National Life Safety Code* (NFPA 101).

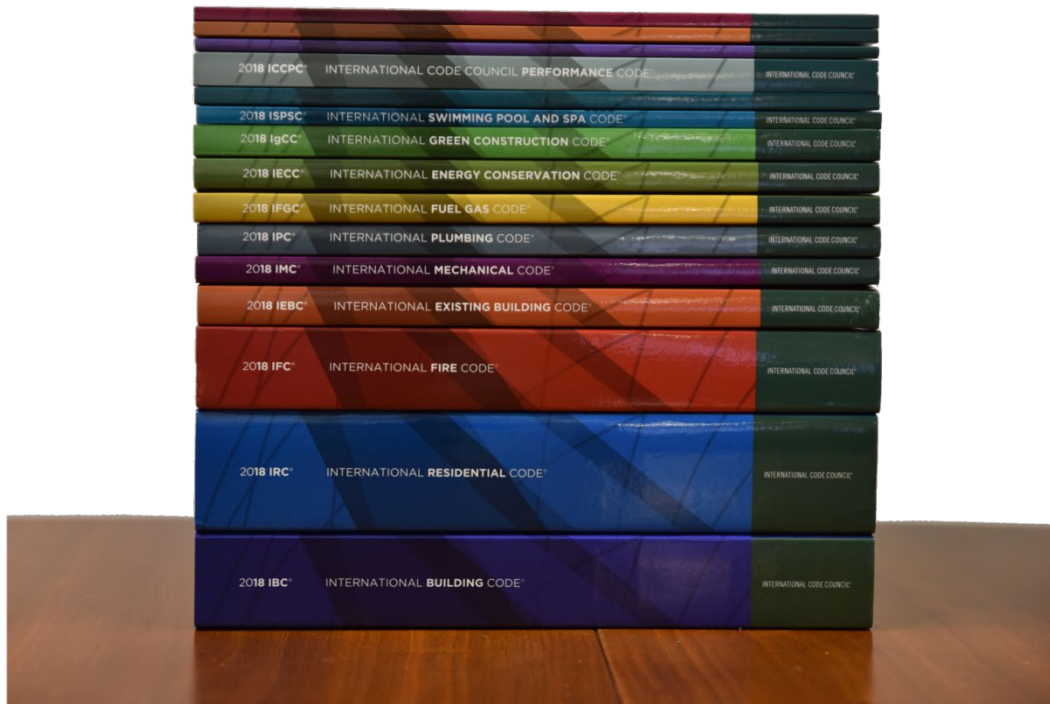


Figure 8-4: A complete set of all fifteen 2018 International Codes

In Canada, there are currently four model codes issued by the National Research Council of Canada (NRCC):

- The *National Building Code of Canada 2015*
- The *National Plumbing Code of Canada 2015*
- The *National Fire Code of Canada 2015*
- The *National Energy Code of Canada for Buildings 2015*

The codes reference standards are issued by CSA Group (formerly, Canadian Standards Association) and other organizations – notably, ASTM International (formerly, American Society for Testing of Materials).

The *National Building Code of Canada* (NBCC) covers the fire safety and fire protection features that are required to be incorporated in a building at the time of its original construction. Building codes typically no longer apply once a building is occupied, unless the building is undergoing alteration or change of use, or is being demolished.

The *National Fire Code of Canada* (NFCC) includes provisions for:

- the ongoing maintenance and use of the fire safety and fire protection features incorporated in buildings
- the conduct of activities that might cause fire hazards in and around buildings

- limitations on hazardous contents in and around buildings
- the establishment of fire safety plans
- fire-safety at construction and demolition sites

Such a clear distinction between the fire provisions of the building code and the fire code does not exist in the U.S. While the IBC, like the NBCC, contains fire-safety requirements for new buildings, the IFC essentially repeats the same fire-safety requirements and then also includes fire-safety requirements for existing buildings, as the NFCC does. The important thing to point out is that the IBC is enforced by the building department of a local jurisdiction, while the IFC is enforced by the fire department.

Another code fairly widely adopted in the U.S. is the NFPA 101 *Life Safety Code* (LSC). It is very similar to the IFC in that it contains fire safety features in buildings (i.e. means of egress, when sprinkler systems and fire alarms and emergency lighting are required). It also specifies similar fire safety features as in the IBC – examples include providing fire rated enclosure walls around vertical shafts to prevent fire spread and protect exit stairs. The LSC scope does make it clear that it is not a building code and limits its requirements to those necessary for safety to life from a fire in a building. It does not address property protection, leaving that to the building code.

Another feature about the LSC is that each occupancy type has two Chapters for the applicable provisions. One chapter emphasizes what is required for new buildings. The sister chapter would apply to existing buildings. This is primarily because older buildings were built under older codes and cannot be expected to meet new requirements; thus the LSC allows existing life safety provisions to remain in existence.

One reason why the NFPA LSC is adopted in addition to the IFC by many local jurisdictions is that many fire departments are members of NFPA, which has been around as an organization even longer than the old legacy code organizations that used to publish the regional model codes that predated the IBC.

Having all three codes (IBC, IFC and LSC) adopted can be problematic because they all cover common territory (typically means of egress, sprinkler and fire alarm thresholds and interior finishes). The general premise is that a building must follow the most stringent of applicable requirements. It is challenging to have to look at all three to see what is required.

The information in Table 8-1 is off the website of the Village of Palatine, a Chicago suburb and the home of S. K. Ghosh Associates LLC. What is seen in Table 8-1 is fairly typical of jurisdictions around the United States. An appendix to a model code or standard requires separate legislative adoption. This is why many appendices are mentioned separately.

Table 8.1 Codes adopted by the Village of Palatine, Illinois, U.S.A.

Palatine Building Code Information
The Village of Palatine has adopted the following codes, they become effective January 1, 2019.
International Residential Code, 2015 Edition (with amendments).
(a) Appendix A, Sizing and Capacities of Gas Piping
(b) Appendix B, Sizing of Venting Systems Serving Appliances Equipped with draft hoods
(c) Appendix C, Exit Terminals of Mechanical Draft and Direct-Vent Venting Systems,
(d) Appendix E, Manufactured Housing used as Dwellings
(e) Appendix F, Passive Radon Gas Control Methods
(f) Appendix H, Patio Covers
(g) Appendix K, Sound Transmission
(h) Appendix M, Home Day Care R-3 Occupancy
International Building Code, 2015 Edition
(a) Patio Covers, Appendix I
International Mechanical Code, 2015 Edition
International Fuel Gas Code, 2015 Edition
International Energy Conservation Code, 2015 Edition
International Existing Building Code, 2015 Edition
International Fire Code, 2015 Edition
(a) Fire Apparatus Access, Appendix D
(b) Fire Protection Systems-Non-compliant Conditions, Appendix I
(c) Building Information Sign, Appendix J
International Swimming Pool and Spa Code, 2015 Edition
Life Safety Code, NFPA 101, 2000 Edition
National Electric Code, 2017 Edition

Illinois Plumbing Code, 2014 Edition

Illinois Accessibility Code, Latest Edition

Village of Palatine Code Amendments:

Building Code: Chapter 6

Fire Prevention: Chapter 7

Effective, January 1, 2016, the State of Illinois Adopted the 2015 International Energy Conservation Code

The Law requires all new commercial and residential construction for which a building permit application is received by a municipality or county to follow a comprehensive statewide energy conservation code. Renovations, alterations, additions, and repairs to most existing commercial and residential buildings must follow the Illinois Energy Conservation Code.

The Law requires design and construction professionals to follow the latest published edition of the International Energy Conservation Code which is currently the 2015 International Energy Conservation Code and the American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) Standard 90.1, 2013.

As of June 1, 2013, all new residential construction in this State shall include passive radon resistant construction. New residential construction means any original construction of a single-family home or a dwelling containing 2 or fewer apartments, condominiums, or town houses.

8.3 CODES AND STANDARDS SYSTEM IN THE DHAKA METROPOLITAN AREA

Legal Code

Building Construction Act, 1952

RAJUK'S Dhaka Mahanagar Imarat Bidhimala

Model Code

BNBC

Standards

Issued by BSTI and other organizations such as ASTM

Figure 8-5: Codes and Standards System in the Dhaka Metropolitan Area

The current model code in Bangladesh is BNBC-1993 (2006). As indicated in Section 1.2 of this report, in 2006, the Building Construction Act of 1952 was amended to include a new Section 18 A, empowering

the government to promulgate BNBC-1993 (2006) as a legally binding document. Although an updated BNBC-2017 is available, has been approved by the Ministry of Housing and Public Works (MoHPW) and vetted by the Law Ministry, it has not been gazetted so far and, therefore, cannot be enforced. Anticipating that it cannot be long before BNBC-2017 is gazetted and recognizing that it does not make a lot of sense to enforce an outdated code, much of the discussion here is centered around BNBC-2017.

It is important to recognize the scope of the BNBC. Figure 8-6 shows a picture of the ICC codes of interest in Bangladesh and the NFPA 70 *National Electrical Code*.

Figure 8-7 shows a picture of the major standards adopted by just the 2018 IBC, excluding the wood standards that are not directly applicable in Bangladesh (note: the AISC 360 and the AISC 341 in the picture are mock-ups).

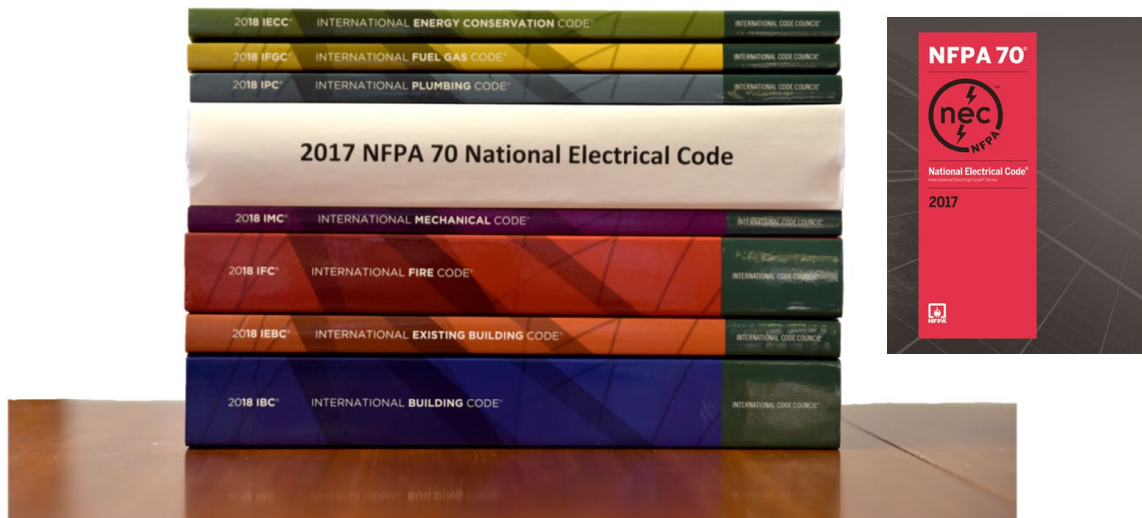


Figure 8-6: International codes of interest in Bangladesh and the NFPA 70 *National Electrical Code*

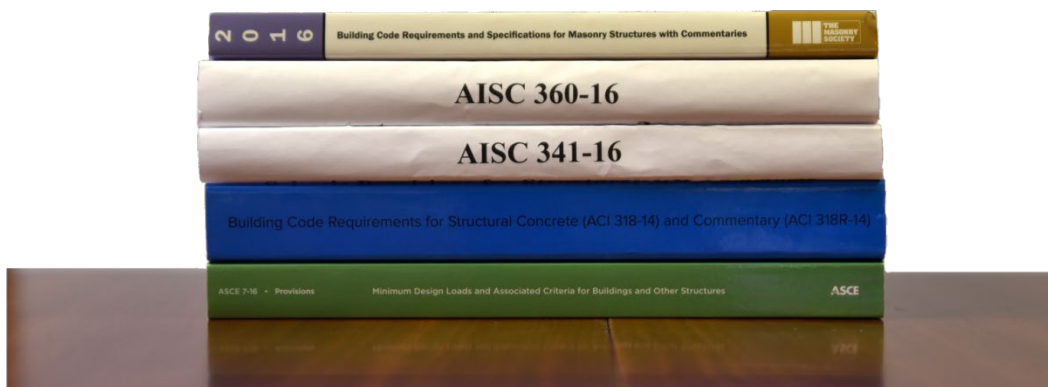


Figure 8-7: Major standards adopted by the IBC, excluding the wood standards: the National Design Specifications and the Special Design Provisions for Wind and Seismic

The scope of the BNBC (Figure 8-8) is the same as the combined scope of all the documents in Figures 8-6 and 8-7.



Figure 8-8: BNBC-1993 (2006) (left); BNBC-2017 (mock-up) (right)

The contents of BNBC-2017 are shown in Table 8-2.

Table 8.2 The contents of BNBC-2017

Part 1: Scope and Definition
Part 2: Administration and Enforcement
Part 3: General Building Requirements, Control and Regulation
Part 4: Fire Protection
Part 5: Building Materials
Part 6: Structural Design
Part 7: Construction Practices and Safety
Part 8: Building Services
Part 9: Addition and Alteration to Existing Buildings
Part 10: Signs and Out-Door Display

The very extensive Part 6 on structural design requirements has the contents shown in Table 8-3.

Table 8.3 The contents of Part 6, Structural Design, of BNBC-2017

Chapter 1 Definitions and General Requirements
Chapter 2 Loads on Buildings and Structures
Chapter 3 Soils and Foundations
Chapter 4 Bamboo
Chapter 5 Concrete Material
Chapter 6 Strength Design of Reinforced Concrete Structures

- Chapter 7** Masonry Structures
- Chapter 8** Detailing of Reinforcement in Concrete Structures
- Chapter 9** Prestressed Concrete Structures
- Chapter 10** Steel Structures
- Chapter 11** Timber Structures
- Chapter 12** Ferrocement Structures
- Chapter 13** Steel-concrete Composite Structural Members

The important Part 8 consists of a number of chapters listed in Table 8-4.

Table 8.4 The Contents of Part 8, Building Services, of BNBC-2017

- Chapter 1** Electrical and Electronic Engineering Services for Buildings
- Chapter 2** Air-Conditioning, Heating and Ventilation
- Chapter 3** Building Acoustics
- Chapter 4** Lifts, Escalators and Moving Walks
- Chapter 5** Water Supply
- Chapter 6** Sanitary Drainage
- Chapter 7** Rainwater Management
- Chapter 8** Fuel Gas Supply

Although RAJUK's *Bidhimala* predates the BNBC, *Bidhimala* 2008 (Figure 8-9) defines BNBC-1993 (2006) as the Code and refers to it for important design and inspection requirements. The contents of *Bidhimala* 2008 are listed in Table 8-5.

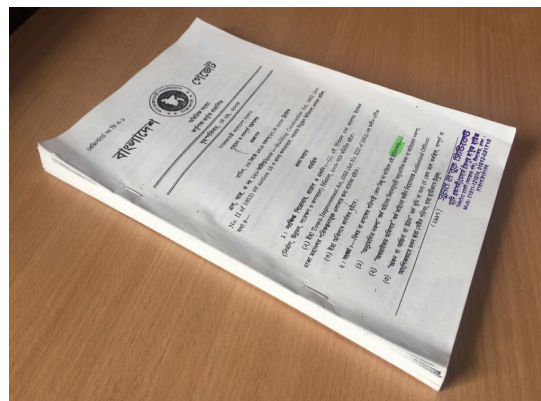


Figure 8-9: RAJUK's *Bidhimala* 2008

Table 8.5 The contents of RAJUK's *Bidhimala* 2008

First Chapter:	Introduction
Second Chapter:	Clearance and Application for Approval, Approval and Certificate for Occupancy, etc.
Third Chapter:	Committee
Fourth Chapter:	List, Classifications, etc. of Technical Persons
Fifth Chapter:	Procedures of Building Construction
Sixth Chapter:	Health & Security
Seventh Chapter:	Miscellaneous
Appendix 1:	Means of Egress
Appendix 2:	Public Accessibility Minimum Provisions
Appendix 3:	Classification of Buildings Based on Occupancy

8.4 RAJUK'S ENFORCEMENT OF *BIDHIMALA 2008*

The requirements of the Fifth Chapter of *Bidhimala 2008* are architectural (setback distance, floor area ratio, etc.). These are somewhat similar to (but not exactly the same as) the architectural requirements of the BNBC. However, the requirements of the BNBC are much more detailed. The Sixth Chapter has Rule 59 with one subsection each on (a) Light and Airflow, (c) Water Supply, Sewerage and Drains, (d) Removal of Wastes, (e) Bare Electric Cables & Other Utilities, (f) Fire Safety. Subsection (a) is the longest at seven sentences. The subsection on Fire Safety consists of three sentences. Rule 64 in the Seventh Chapter is titled: Special Rules Relating to Accessibility of All including Handicapped Persons.

RAJUK is mandated to enforce the BNBC through an order of the High Court. The BNBC (both the current and 2017 versions) also indirectly refers to the Authorized Officers (who belong to the development authorities like RAJUK of Dhaka, Chittagong Development Authority etc.) as Building Officials. However, RAJUK cannot play that role – definitely not fully. Their current practice is essentially to enforce the architectural requirements of *Bidhimala 2008*.

8.4.1 Structural Design

Bidhimala 2008 contains the following rules concerning structural design (the Code is defined as the current edition of the BNBC):

Rule 21. Structural Design of a Building:

- (1) The engineer enlisted under the provisions of these Rules & Regulations and engaged by the applicant shall prepare, as per the Code, the structural design of the Building following proper scale.
- (2) As per the policy mentioned in the Code, the structural design of a Building shall have to be prepared keeping in mind its Seismic Design.

- (3) Following points must be included in the structural design of a Building, where applicable:
 - (a) Detailed Foundation Design of a Building based on the soil test report of the site.
 - (b) Measurements and locations of basement walls, other walls, columns, beams, floors, all framing members including the roof, and technical information about the construction materials used.

Rule 41. Preparing list of Technical Personnel :

- (1) As per these Rules, any professional person engaged in making drawings, supervision of construction works, preparation of reports or in other works must be enlisted in relevant professional organization of Bangladesh.
- (2) The relevant professional organization shall supply to the authority an updated list of the professional persons with necessary information regarding them.
- (4) The enlisted professional persons shall be empowered under these Rules to make drawings relating to the Project, inspect and supervise the Project, put signatures and prepare reports for those drawings with necessary information.

Rule 43. Classification of Technical Personnel : ...

- (2) The authority shall not consider any drawing or report for approval other than those prepared by the persons described in by-law (1) and enrolled by the concerned professional organization.
- (4) The applicant shall engage the concerned technical person according to his/her qualification, and if more than one technical persons are engaged on a Project, in that case the architect shall coordinate between the architectural design and implementation of the Project. Also, during construction and at the end of construction the architect and the engineer will bear responsibility of preparing the construction drawings and the completion reports of their respective areas.
- (5) The concerned professional organization will bear the responsibility of ensuring the enrolled professional person's qualities of work and service, professional sincerity and efficiency, and the professional organization will also inform the authority of facts relating to membership of the concerned person such as : if the membership has been postponed, abolished, terminated or if any action has been taken against him/her.

Rule 66. Special Provision :

- (2) the issue of adequacy of designs of the foundation and structure of that Building must be endorsed by an enlisted engineer having specific experience as per these Rules after examining the soil test report,

To ensure that structural design is in compliance with BNBC-1993 (2006), RAJUK depends on the stamp(s) of accredited professional(s) on drawings.

8.4.2 Design of Electrical, Mechanical, Plumbing Systems

Bidhimala 2008 contains the following rules concerning the design of electrical, mechanical, and plumbing systems:

Rule 22. Drawings relating to Building Services : Engineer(s) enlisted under these Rules & Regulations and engaged by the applicant shall prepare the drawings relating to Building Services as per Code and following proper scale, and the following items relating to services used in a Building shall be included in those drawings :

- a. Lay-out plan and drawings of water supply, sewerage, drainage, gas supply, etc.
- b. Lay-out plan, drawings and specifications of electrical installation, sub-station, electrical circuit diagram, etc.
- c. Plan, design and lay-out of air conditioning system (if any), drawings of installation of lift and escalator (if any), and
- d. Detailed drawings of all other Building Services.

Rule 24. General Worth-knowing matters relating to Construction & Construction Permit : (3) Arrangements must be made for controlling noise coming from the generator, air conditioner, sub-station and from other electrical and mechanical installations, and it must be ensured that smoke, water, etc. coming from the aforesaid machines do not obstruct general airflow in the site or in the adjacent plots, and also it must be ensured that they do not hamper peace and comfort in those areas.

To ensure that the design of electrical, mechanical, and plumbing systems is in compliance with BNBC-1993 (2006), RAJUK also depends on the stamp(s) of accredited professional(s) on drawings.

8.4.3 Inspection

BNBC-2017 has a Section 3.10 on Inspection under Part 2, Chapter 3 – Permits and Inspections. It reads:

All works relating to a building or structure regulated by the provisions of this Code for which permits are required shall be subject to inspection by the Building Official. Modalities and frequency of such inspections shall conform to the requirements put forward by the approving authority.

This is in contrast with the 2018 IBC, which requires jurisdictional inspection, special inspection, and structural observation, instead of leaving modality and frequency of inspections to local jurisdictions.

The following are the IBC requirements for **JURISDICTIONAL INSPECTION**

110.1 General. Construction or work for which a *permit* is required shall be subject to inspection by the *building official* and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. ... It shall be the duty of the *owner* or the *owner's* authorized agent to cause the work to remain visible and able to be accessed for

inspection purposes. Neither the *building official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

110.2 Preliminary inspection. Before issuing a *permit*, the *building official* is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

110.3 Required inspections. The *building official*, upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.11 [not reproduced here].

110.3.9 Other inspections. In addition to the inspections specified in Sections 110.3.1 through 110.3.8, the *building official* is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the department of building safety.

110.3.11 Final inspection. The final inspection shall be made after all work required by the building *permit* is completed.

SPECIAL INSPECTION is defined as Inspection of construction requiring the expertise of an *approved special inspector* [all defined terms are written in italics in the IBC] in order to ensure compliance with this code and the *approved construction documents*. Work or operations requiring special inspection are clearly spelled out in Section 1705 of the IBC. Special inspection may have to be continuous or periodic.

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

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

SPECIAL INSPECTOR is 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 is the visual observation of the structural system by a *registered design professional* for general conformance to the *approved construction documents*.

For the next BNBC update, it will be worthwhile to consider including inspection requirements comparable or similar to those in Section 105 and Chapter 17 of the IBC.

RAJUK is enforcing the inspection requirements of *Bidhimala* 2008, which are the following:

Rule 15. Duties & responsibilities of the applicant relating to Construction.

- (8) Being informed of the completion of the construction work up to the plinth-level, the authority shall arrange inspection of the work and shall either give consent by means of

a prescribed form (Form-311) for continuing the work beyond the plinth-level or refuse to allow further construction work by means of a prescribed form (Form-312) within 7 (seven) days, otherwise the construction work will continue.

Rule 17. Safety & Supervision relating to Construction :

- (5) As and when required, the applicant shall assist the authority during their inspection by providing technically efficient personnel and by supplying necessary information, drawings and other documents, and also by carrying out all tests at their own costs.

Rule 19. Completion Report :

- (4) The authority shall inspect the Building within 15 (fifteen) days of receipt of the application in presence of the applicant and the technical person(s).

Rule 23. Renewal of Occupancy Certificate :

- (4) As per by-law (2) the authority shall inspect the Building within 15 (fifteen) days of receipt of the application

Rule 28. Inspection, Duties & Responsibilities of Authority : The authority or any officer empowered by the authority can inspect the construction work of a Building or the Project any time from sunrise to sunset and can check if the work is being carried out as per approved design, report and specifications.

The inspection requirement of Rule 15 is apparently routinely carried out, although it is limited to the architectural requirements of the *Bidhimala* only. The post-construction inspections are apparently carried out relatively seldom, because very few owners bother to apply for a certificate of occupancy or a renewal of certificate of occupancy.

8.5 IMPLEMENTATION OF BNBC-2017

Implementation and enforcement are not interchangeable terms. Implementation is the act of putting into effect. Enforcement, on the other hand, is making sure that rules are followed, that violations are rectified, that violators are penalized or punished.

The following are the steps that would to proper implementation of BNBC-2017:

1. Secure final Government of Bangladesh Approval
2. Have RAJUK and other code enforcement authorities adopt the BNBC-2017
3. Launch an awareness campaign
4. Develop a Commentary to BNBC-2017
5. Develop support literature

6. Train design professionals, code enforcement personnel, contractors, owners, educators, students, and other stakeholders such as financial institutions

8.5.1 Government Approval of BNBC-2017

As noted in Section 1.5 of this report, BNBC-2017 has been approved by the Ministry of Housing and Public Works and also vetted by the Ministry of Law. However, it is still awaiting notification through public gazette. Without such notification, the document cannot be legally enforced. Discussion in this section has pointed out how dated BNBC-1993 (2006) has become. Delay in government approval of BNBC-2017 is adding to the vulnerability of the building stock. BNBC-2017 needs to be put into effect without any further delay. The urgent need for prompt government approval needs to be impressed upon the government by all concerned stakeholders.

Tables included in Annex 8A show how the fire safety requirements of the BNBC have evolved from the current 1993 (2006) edition of the BNBC to its 2017 draft.

When it comes to seismic design provisions which are of the particular interest to Project S-9, BNBC-1993 (2006) was based on the 1991 edition of the Uniform Building Code (1991 UBC) Seismic design provisions in the U.S. have undergone several cycles of changes:

- From 1991 to 1994 UBC
- From 1994 to 1997 UBC
- From 1997 UBC to 2000 IBC (based on the 1997 NEHRP Provisions)
- From 2000 to 2003 IBC (based on the 2000 NEHRP Provisions and ASCE 7-02)
- From 2003 IBC to 2006 and 2009 IBC (based on ASCE 7-05)

These change cycles are reflected in BNBC-2017, the seismic design provisions of which are based on those of ASCE 7-05. Seismic Design provisions in the U.S. have evolved further because of changes

- From 2006, 2009 IBC to 2012, 2015 IBC (based on ASCE7-10)
- From 2012, 2015 IBC to 2018 IBC (based on ASCE 7-16)

Since concrete is the most widely used material of construction in Bangladesh it may be worth noting that while the concrete design and construction provisions of BNBC-1993 (2006) were based on ACI 318-89, those of BNBC-2017 are based on ACI 318-08. The 2017 draft thus captures changes

- From ACI 318-89 to ACI 318-89 (Revised 1992)
- From ACI 318-89 (Revised 1992) to ACI 318-95
- From ACI 318-95 to ACI 318-99
- From ACI 318-99 to ACI 318-02
- From ACI 318-02 to ACI 318-05 and

- From ACI 318-05 to ACI 318-08

Concrete design and construction provisions in the U.S. have evolved further

- From ACI 318-08 to ACI 318-11
- From ACI 318-11 to ACI 318-14
- From ACI 318-14 to ACI 318-19 (soon to be published)

8.5.2 Update of RAJUK's *Bidhimalal* 2008

A joint committee of RAJUK and developers of the BNBC-2017 need to decide which parts of BNBC-2017 are practical for RAJUK to enforce directly

The provisions to be enforced directly by RAJUK must be integrated into an update of *Bidhimala* 2008. This will involve translation of certain BNBC provisions into Bangla.

8.5.3 Awareness Campaign

Once BNBC-2017 is gazetted, everyone involved in and associated with the construction industry needs to be informed of the changes and its implications. Design professionals and enforcers need to know the details of the significant changes that have been made. Others probably do not need the details but must understand the implications. The awareness campaign needs to target the following segments:

1. Design professionals: engineers and architects. The campaign aimed at them needs to be coordinated with IAB and IEB. This campaign importantly needs to have a strong training element to it.
2. Code enforcers: RAJUK (and other development authorities) and Bangladesh Fire Service and Civil Defense need to be informed at all levels. Messages tailored to their needs must go out to Development Authority and Fire Service Management permit issuing staff, and inspectors. The two latter categories would also need details of the changes.
3. University faculty: The civil engineering and architectural faculty at various universities need to be involved so that they can convey the changes to their students. The knowledge will be useful in their consulting work as well.
4. Students: Senior Civil Engineering and Architectural students need to be taught about BNBC-2017 provisions through the courses they take. Seminars aimed at them are also a good idea.
5. Contractors: Those who will transform drawings into actual constructions, including site supervisors, need to be informed about the new code and their responsibilities under it.
6. Owners/Developers: This segment of the construction industry, though small in number, is exceedingly important. Unless owners are sufficiently aware of the building codes, and

understand the importance of code compliance, construction quality will continue to be compromised.

7. Legal Professionals: The legal profession plays an important and vital role in the construction industry and need to be well versed in not only code requirements but their interpretation.
8. Financial Institutions/Insurers: Banks and other financial institutions lending money for construction and insurers need to be aware of the building code and insist on compliance.
9. Utility Companies, Other Government Agencies: Safety can be enhanced if utility companies providing services to newly constructed as well as existing buildings, and governmental agencies (for instance, Dhaka Water Supply and Sewage Authority) are aware of the building code and the importance of code compliance.
10. Public at Large: This segment in some ways is the most challenging. However, unless the public is aware of the building code and its importance, widespread code compliance will be virtually impossible to accomplish.

RAJUK can start the public awareness campaign by writing to stakeholders on the list of stakeholders in Annex 5 of the inception report for Project S-9.

8.5.4 BNBC-2017 Commentary

Most major U.S. standards come with Commentaries developed by the same committees that develop the standards. ACI 318 Building Code Requirements for Structural Concrete uses a two-column format as shown in Figure 8-10. The provisions of the standard itself are printed in the left-hand column; the commentary to a provision is printed in their facing right-hand column. The commentary to ASCE 7-16 is now in a separate volume (Figure 8-11). In prior editions, the commentary used to be printed following the standard in the same volume. Design professionals and other users of the standards find these commentaries to be indispensable.



Figure 8-10: ACI 318-14 – provisions and commentary in facing columns

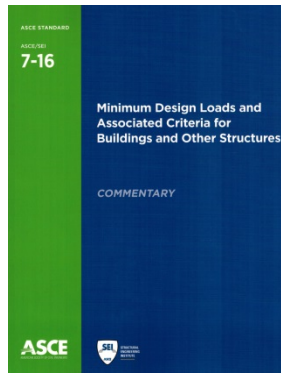


Figure 8-11: ASCE 7-16 commentary

The IBC itself is not developed by a committee; it is developed through a process. The same thing is true of the other I-Codes. ICC staff develops a commentary to each edition of the IBC (Figure 8-12) which the ICC then publishes. These commentaries are fairly widely used by the building development personnel and professionals.

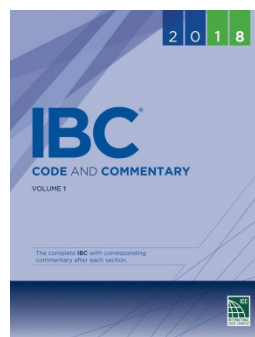


Figure 8-12: 2018 IBC and its commentary

Many professionals in Dhaka have told the ICC team that they need an authentic commentary to the BNBC. The development of such a commentary to BNBC-2017 will greatly improve code compliance on the part of the practitioner, because they will have a much deeper understanding of code provisions and their intent. This is a major undertaking. Funding will be required. The Housing and Building Research Institute (HBRI) may be the right agency to coordinate the effort. A committee including the professionals who developed BNBC-2017 will need to be formed.

8.5.5 Code Support Literature

ICC publishes a wide array of the code support literature. Some of the most widely used publications are illustrated in Figures 8-13, 8-14, 8-15, and 8-16.

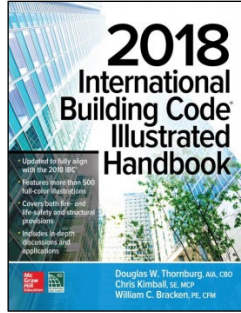


Figure 8-13: 2018 IBC Illustrated Handbook

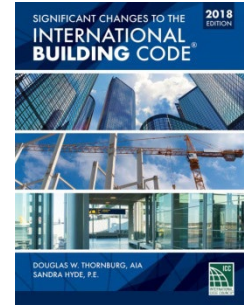


Figure 8-14: 2018 IBC Significant Changes



Figure 8-15: 2015 IBC SEAOC Structural/Seismic Design Manual Volume 1: Code Application Examples

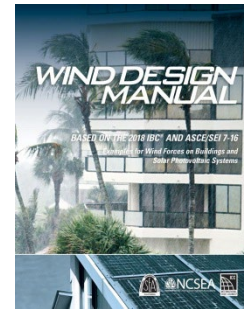


Figure 8-16: Wind Design Manual Based on the 2018 IBC and ASCE/SEI 7-16 Examples for Wind Forces on Buildings and Solar Photovoltaic Systems

Many of the standard development organizations (SDO's) also develop literature supporting their standards. Two of the more widely used publications are illustrated in Figures 8-17 and 8-18.

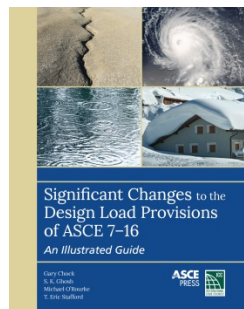


Figure 8-17: ASCE 7-16 Significant Changes

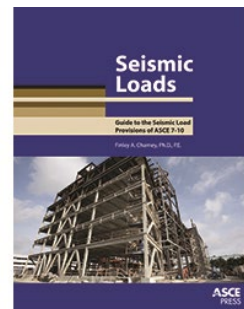


Figure 8-18: Guide to the Seismic Load Provisions of ASCE 7-10

S. K. Ghosh Associates LLC, an ICC subsidiary, publishes a series of 4-, 6-, or 8-page laminated publications called Codemasters (Figure 8-19) that are quite popular. Each publication is a step-by-step guide to seismic design, wind design, allowable stress design of masonry, etc. by the IBC.

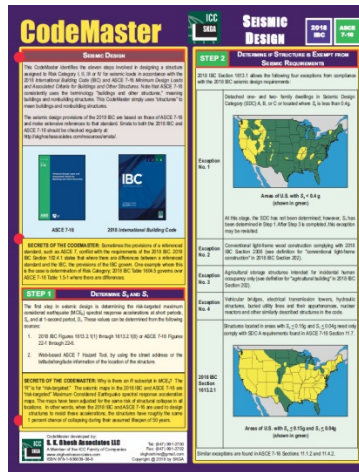


Figure 8-19: SKGA’s 2018 IBC Seismic Design CodeMaster

All the code support literature the practitioner can benefit from will, of course, not be possible to develop even in a matter of years. However, a strong, meaningful beginning can be made with a book of seismic design examples using BNBC-2017. This also will require funding and will need to be developed by a small group of professionals led by someone with commitment, knowledge and ability.

8.5.6 BNBC-2017 Training Program

This is different from the public awareness program of Section 8.5.3 in that this is aimed strictly at users of the building code. There needs to be a “Train the Trainers” part and a “training of professionals” part.

It is envisioned that the “Train the Trainers” program will be conducted by national and international consultants selected by RAJUK. It will be aimed at college professors and top professionals, and will provide them with the knowhow to provide training of professionals and semi-professionals on an ongoing basis.

The training of professional will be initially conducted by the same national and international consultants but then will be taken over the trained trainers. It will be aimed at code enforcement personnel at RAJUK (and other Development Authorities) and Bangladesh Fire Service and Civil Defense. Training of plan checkers and inspectors will need to be somewhat different. The training will also be aimed at design professionals, engineers and architects. The architects training will of necessity be different from engineers training. The training programs will need to be planned in consultation with IAB and IEB.

8.6 ENFORCEMENT OF BNBC-2017

The following are the contents of an excellent ICC slide on the critical elements of successful building code enforcement:

- Regulatory mandate
- Clarity of agencies/departments responsible for enforcement
- Plan Review by certified individuals
- Inspection by qualified individuals certified in areas they inspect
- Plan Review and Inspections can be accomplished by jurisdiction or through use of third parties

8.6.1 Mandate

The regulatory mandate comes from the legally adopted building code. It has been pointed out that the BNBC leaves the modality and frequency of inspections to the approving authority, which would be RAJUK in the Dhaka metropolitan area. It would be more desirable for the BNBC to contain more explicit inspection requirements, as in the IBC.

8.6.2 Clear understanding by Regulators

The inspection requirements to be enforced need to be in *Bidhimala*, because that is the document RAJUK enforces. This is the situation now, except inspection is limited to the architectural requirements of the *Bidhimala* only and it is typically done only when construction has been completed up to the plinth level. The important post-construction inspection required by the *Bidhimala* is more frequently not carried out because owners do not bother to apply for construction permits.

8.6.3 Plan Review

Every U.S. Building Department is basically divided into two parts: a part that does plan review by certified individuals and the other part that does inspections by qualified individuals certified in areas they inspect. Annex 8B shows the organizations of two major U.S. Building Departments along these lines: City and County of San Francisco and the City of Los Angeles. RAJUK is divided along the same lines, as shown in Figure 8-20.

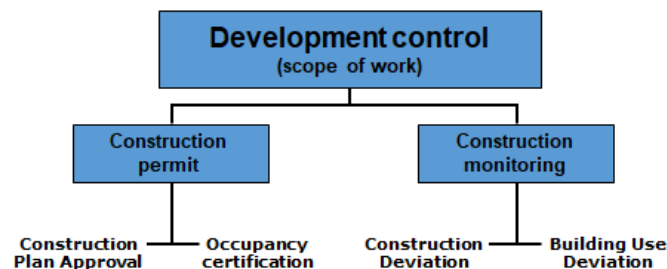


Figure 8-20: Organization of the Development Control division of RAJUK

8.6.3.1 Structural and Nonstructural Plan Review

RAJUK’s process for issuing a construction permit is illustrated in Figure 8-21.

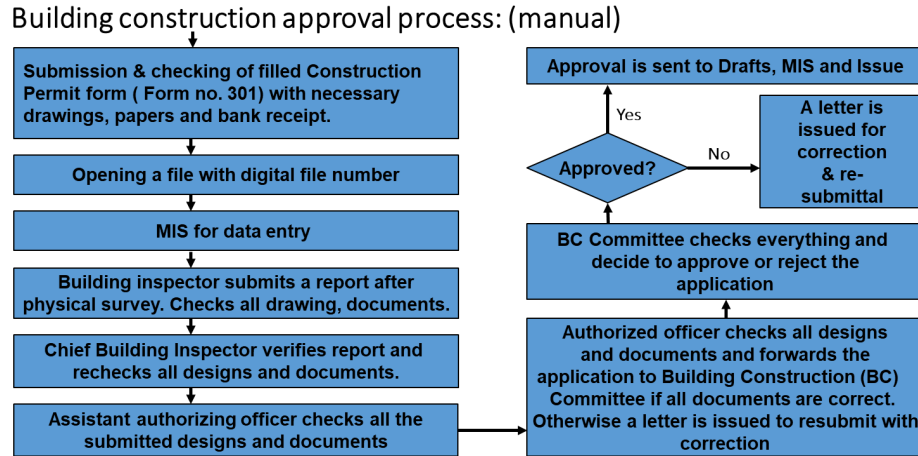


Figure 8-21: RAJUK’s building construction approval process

In addition, for buildings above 10 stories or 33 m in height, No Objection Certificates (NOCs) used to be required from the 11 agencies listed Table 8-6.

Table 8.6 List of agencies from which NOC was required for buildings above 10 stories or 33 m.

Number	Agency
1	Ministry of Defence or Key Point Installation Defence Committee (KPIDC)
2	Department of Environment (DOE)
3	Bangladesh Fire Service and Civil Defence
4	Dhaka Water Supply and Sewerage Authority (WASA)
5	Dhaka Power Distribution Company (DPDC)
	Dhaka Electric Supply Company Ltd. (DESCO)
6	Titas Gas
7	Dhaka Metropolitan Police (DMP)
8	Dhaka Transport Co-Ordinate Authority (DTCA)
9	Civil Aviation Authority Bangladesh (CAAB)
10	National Housing Authority (NHA)
11	Ministry of Housing and Public Works

Very recently, the number of agencies from which NOCs need to be obtained has been reduced from 11 to the following four:

1. RAJUK Department of Planning
2. RAJUK Special Committee (for special buildings)
3. Civil Aviation Authority of Bangladesh
4. Fire Service and Civil defense

There are three Building Construction (BC) committees per zone (one for each sub-zone) for a total of 24 authorizing officers. Each building construction committee consists of five members: the zonal director as chair, two civil engineers (one inside, one outside RAJUK), one architect (inside or outside RAJUK), and the sub zonal authorizing officer as member secretary. Buildings that are up to eight stories tall are approved by these BC committees.

There are two additional BC committees attached to the RAJUK head office, who only deal with buildings of eight stories and above:

- (1) For Zones 1 to 4: Committee headed by Member, Development Control and
- (2) For Zone 5 to 8: Committee headed by Member, Planning.

Each committee consists of two civil engineers and one architect.

Depending on the location of the building in Dhaka City, the concerned authorizing officer attends the relevant BC Committee meeting as Member Secretary.

The process, while reasonably rigorous, is confined to only architectural drawings. Structural drawings, when submitted, are not checked because RAJUK does not have the needed trained manpower. To what extent fire safety requirements are checked is not clear. In the United States, the setback requirements are based solely on fire safety considerations. That is not the case in Bangladesh. So enforcing proper setback distances is definitely not the same as enforcing fire safety requirements. The fire safety requirements of the *Bidhimala* in their entirety are reproduced below:

Rule 59. Health & Security :

(f) Fire Safety :

- (1) For proper safety of the users of a Building all arrangements of fire extinguisher safety, where applicable, shall have to be ensured as per Annexure-1.
- (2) In all Buildings 'Emergency Exit' sign with direction of exit (where applicable) must be displayed.
- (3) The mechanical device for going up and down shall not be used as a Fire Exit.

This is a far cry from what is contained in BNBC-2017.

In the U.S., a plan check is always for compliance with the structural as well as the nonstructural provisions of the legal code of the local jurisdiction, which is based on one edition or another of the IBC. Table 8-7 shows the contents of the 2018 IBC. Chapters 3 through 15 are the nonstructural chapters; most of them are devoted to fire safety. Comparable contents are found in Part 4 and parts of Part 3 of BNBC-2017 (Table 8-2). Chapters 16 through 24 of the IBC are the structural chapters. Comparable contents are found in Parts 5 and 6 of BNBC-2017. As noted in Section 8.4.1 above, to ensure that structural design is in compliance with BNBC-1993 (2006), RAJUK depends on the stamp(s) of accredited professional(s) on drawings. The architectural requirements of the *Bidhimala* are checked. The fairly minimal fire safety requirements of the *Bidhimala* are presumably also checked. But this falls far short of checking compliance with the fire safety requirements of the BNBC.

Table 8.7 The contents of the 2018 *International Building Code* (IBC)

<p>Chapter 1 Scope and Administration.</p> <p>Chapter 2 Definitions.</p> <p>Chapter 3 Use and Occupancy Classification.</p> <p>Chapter 4 Special Detailed Requirements Based on Use and Occupancy.</p> <p>Chapter 5 General Building Heights and Areas.</p> <p>Chapter 6 Types of Construction.</p> <p>Chapter 7 Fire and Smoke Protection Features.</p> <p>Chapter 8 Interior Finishes.</p> <p>Chapter 9 Fire Protection Systems.</p> <p>Chapter 10 Means of Egress.</p> <p>Chapter 11 Accessibility.</p> <p>Chapter 12 Interior Environment.</p> <p>Chapter 13 Energy Efficiency.</p> <p>Chapter 14 Exterior Walls.</p> <p>Chapter 15 Roof Assemblies and Rooftop Structures.</p> <p>CHAPTER 16 STRUCTURAL DESIGN</p> <p>1601 General</p> <p>1602 Notations</p> <p>1603 Construction Documents</p> <p>1604 General Design Requirements</p> <p>1605 Load Combinations</p> <p>1606 Dead Loads</p> <p>1607 Live Loads</p> <p>1608 Snow Loads</p> <p>1609 Wind Loads</p> <p>1610 Soil Lateral Loads</p> <p>1611 Rain Loads</p>
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1612 Flood Loads
1613 Earthquake Loads
1614 Atmospheric Ice Loads
1615 Tsunami Loads
1616 Structural Integrity

CHAPTER 17 SPECIAL INSPECTIONS AND TESTS

CHAPTER 18 SOILS AND FOUNDATIONS

CHAPTER 19 CONCRETE

CHAPTER 20 ALUMINUM

CHAPTER 21 MASONRY

CHAPTER 22 STEEL

CHAPTER 23 WOOD

CHAPTER 24 GLASS AND GLAZING

CHAPTER 25 GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

CHAPTER 26 PLASTIC

CHAPTER 27 ELECTRICAL

CHAPTER 28 MECHANICAL SYSTEMS

CHAPTER 29 PLUMBING SYSTEMS

CHAPTER 30 ELEVATORS AND CONVEYING SYSTEMS

CHAPTER 31 SPECIAL CONSTRUCTION

CHAPTER 32 ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY

CHAPTER 33 SAFEGUARDS DURING CONSTRUCTION

CHAPTER 34 [Previously EXISTING STRUCTURES, now blank]

CHAPTER 35 REFERENCED STANDARDS

8.6.3.2 MEP (Mechanical, Electrical, Plumbing) Plan Review

The purpose of this plan review in the U.S. is to check compliance with Chapters 27 through 30 of the IBC. If there is an energy code adopted by the jurisdiction, compliance with the provisions of that code is checked. The same is true of a Green Building Code, if adopted by the jurisdiction. In smaller jurisdictions, structural and nonstructural plan review and MEP plan review may be done by the same individual. In larger jurisdictions, they are done by different individuals. Also, third-party plan checking is more and more common. Local jurisdictions, instead of maintaining sizeable building departments, contract out to third-party plan checking firms, who do the actual plan review.

In Bangladesh, compliance with the provisions in Part 8 of the BNBC (Table 8-2) needs to be checked. As noted in Section 8.4.2, to ensure that the design of electrical, mechanical, and plumbing systems is in

compliance with BNBC-1993 (2006), RAJUK also depends on the stamp(s) of accredited professional(s) on drawings.

8.6.4 Inspections

Paralleling what they do with plan review, U.S. building departments carry out structural and nonstructural inspections as well as MEP inspections. In smaller jurisdictions, these may be done by the same inspector, but that is very untypical in larger jurisdictions. The use of third-party firms to do inspections is also fairly common. The purpose of these inspections is to ensure that construction complies with the requirements of applicable codes.

8.6.4.1 Structural and Nonstructural (Fire Safety) Inspections

In the U.S., structural inspections are aimed at ensuring that the applicable requirements of Chapters 16 through 24 of the IBC are complied with during the construction of a structure. Similarly, nonstructural inspections are carried out to ensure that the applicable (mostly fire safety) requirements of IBC Chapters 3 through 15 are complied with during (and, in some cases, after) construction.

It has been established already that no structural inspections are carried out by RAJUK or anyone else. All inspections are limited to checking compliance with the architectural requirements of RAJUK’s *Bidhimala*. As pointed out in Section 8.4.2, the *Bidhimala* requires inspection of a building when its construction reaches the plinth level. This inspection is apparently carried out fairly routinely. The *Bidhimala* also requires RAJUK to carry out inspections upon receipt of an application for certificate of occupancy or a renewal certificate of occupancy, which is required by the *Bidhimala* every five years. The post-construction inspections are apparently carried out relatively seldom, because very few owners bother to apply for a certificate of occupancy or a renewal of certificate of occupancy.

According to *Bidhimala* 2008 Rule 28, “The authority or any officer empowered by the authority can inspect the construction work of a Building or the Project any time from sunrise to sunset and can check if the work is being carried out as per approved design, report and specifications.” Some of these inspections are apparently triggered by complaints or violations alleged by third parties. RAJUK’s construction monitoring process is illustrated in Figure 8-22.

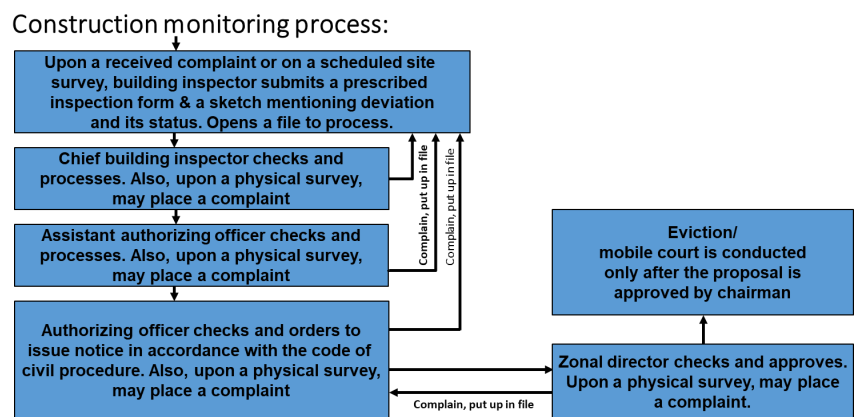


Figure 8-22: RAJUK's construction monitoring process.

It should be obvious that checking compliance with the architectural requirements of the *Bidhimala* does not ensure compliance with the fire safety requirements of the BNBC. Fire safety is checked by Bangladesh Civil Defense and Fire Service for the following :

Workshop: Building or place which is used for processing combustible materials.

High-rise Building: Any building which is at least 7 stories or 24 meters high.

Commercial Building: Building which is used for bank, insurance or other financial institutions, commercial and industrial purposes, government related jobs, or as shopping complex.

Warehouse: includes any establishment and building which is used to stocking, preserving, pressing, sorting, selling, and buying combustible materials.

According to the Bangladesh Fire Prevention and Fire Fighting Act of 2003, a fire license needs to be taken out for each of the above establishments and the license needs to be renewed annually. Additionally, an owner/developer needs to secure a No Objection Certificate (NOC) for a tall building or a commercial building. A fire license process flow chart is illustrated in Figure 8-23. A process flow chart for clearance certificate for a high-rise or commercial building is illustrated in Figure 8-24. Both flow charts are reproduced from a blog post by Md. Ashiful Alam.^{8.1}

It should be noted that Bangladesh Fire Service and Civil Defense checks a building or facility for compliance with Bangladesh Fire Safety act of 2003. The fire safety requirements of BNBC-2017 are more comprehensive.

More importantly, there are no fire safety checks by RAJUK or Bangladesh Fire Service and Civil Defense or anyone else for buildings that do not belong to any of the four categories listed above. Thus there are no fire safety checks of any kind for a 6-story residential building in which several hundred people may sleep at night. This is a glaring gap that cannot be allowed to continue to exist.

8.6.4.2 MEP Inspections

No MEP inspections are carried out by RAJUK personnel. However, the followings two rules out of *Bidhimala* 2008 are relevant in this regard.

Rule 18. Occupancy Certificate :

- (1) After the construction work of a Building is completed partially or fully, a certificate called Occupancy Certificate will require to be obtained before using it or living in it.
- (2) In order to obtain an Occupancy Certificate an applicant shall have to attach the following documents and drawings with his/her application to help the authority preserve them in their files :
 - (a) Completion report.

- (b) As-built Architectural Drawings.
 - (c) Structural design of the Building.
 - (d) All drawings related to Building services.
- (3) All responsibilities of design adequacy and design suitability of all designs mentioned in by-law (2) shall fall on the shoulders of the professionals (architects and engineers) associated with the drawings.

Rule 19. Completion Report :

- (1) The applicant shall submit a Completion Report based on a partial or full completion of a construction project by means of a prescribed form (Form-401) and shall submit an application to the authority for an Occupancy Certificate for a partial or full use of the Project. But the Building or the structure cannot be used under any condition either partially or fully until Occupancy Certificate for its partial or full use is obtained from the authority.
- (2) The technical person(s) engaged in the Project shall confirm in writing by means of a form (Form-402) that the construction work has been completed under his/her/their supervision following usual practice.
- (3) The technical person(s) engaged in the Project shall submit a supervision report for the works supervised by him/her/them.

Thus, before issuance of an occupancy certificate, MEP drawings are required to be submitted to RAJUK. The technical professional for the project submits a supervision report; supervision presumably includes supervision of the MEP systems. The technical professional certifies that construction (again, presumably including MEP systems) has been completed under his supervision.

Fire License Process Flow Chart

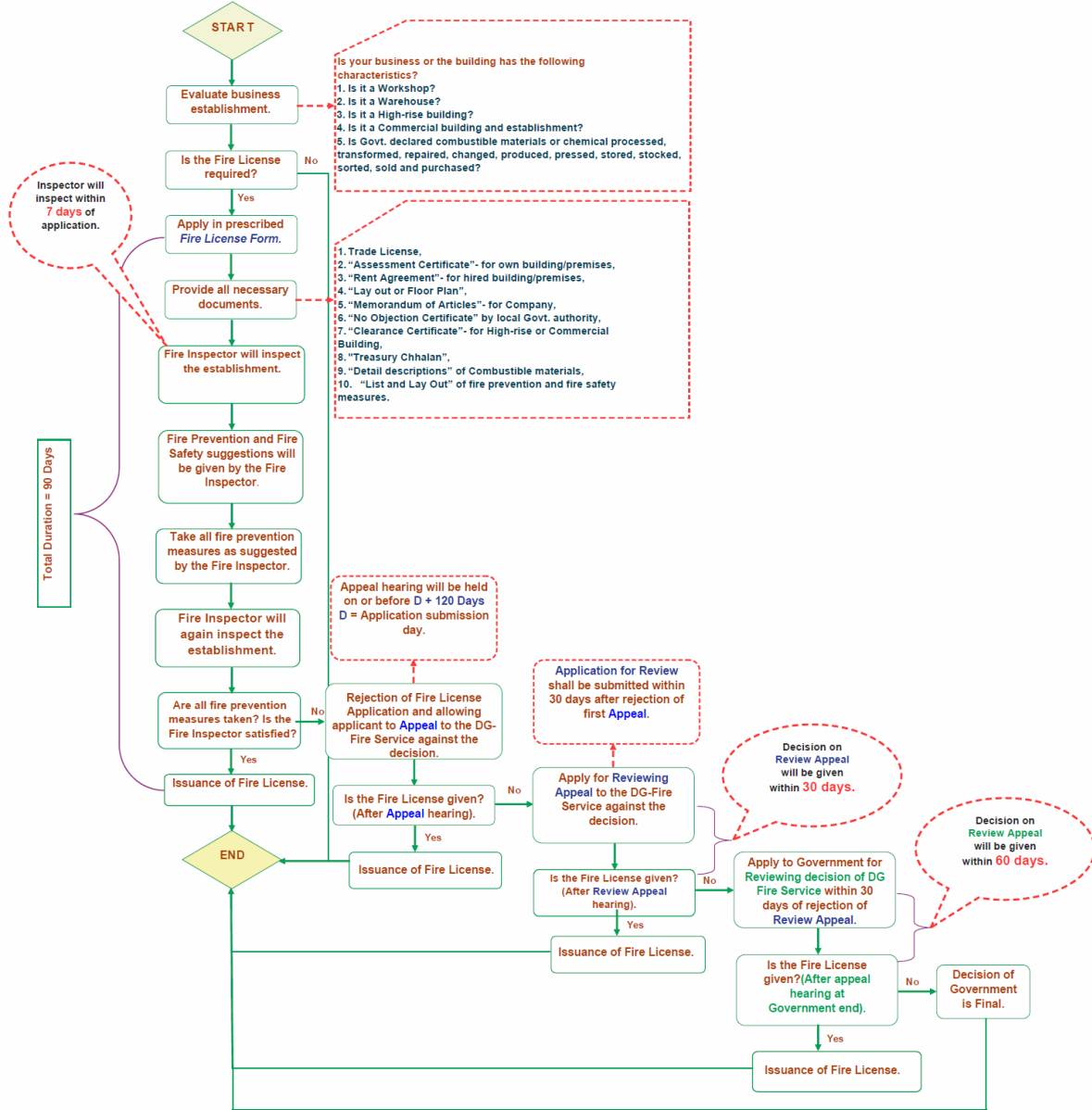


Figure 8-23: Fire license process of Bangladesh Fire Service and Civil Defense

Process Flow Chart for Clearance Certificate of High-Rise or Commercial Building

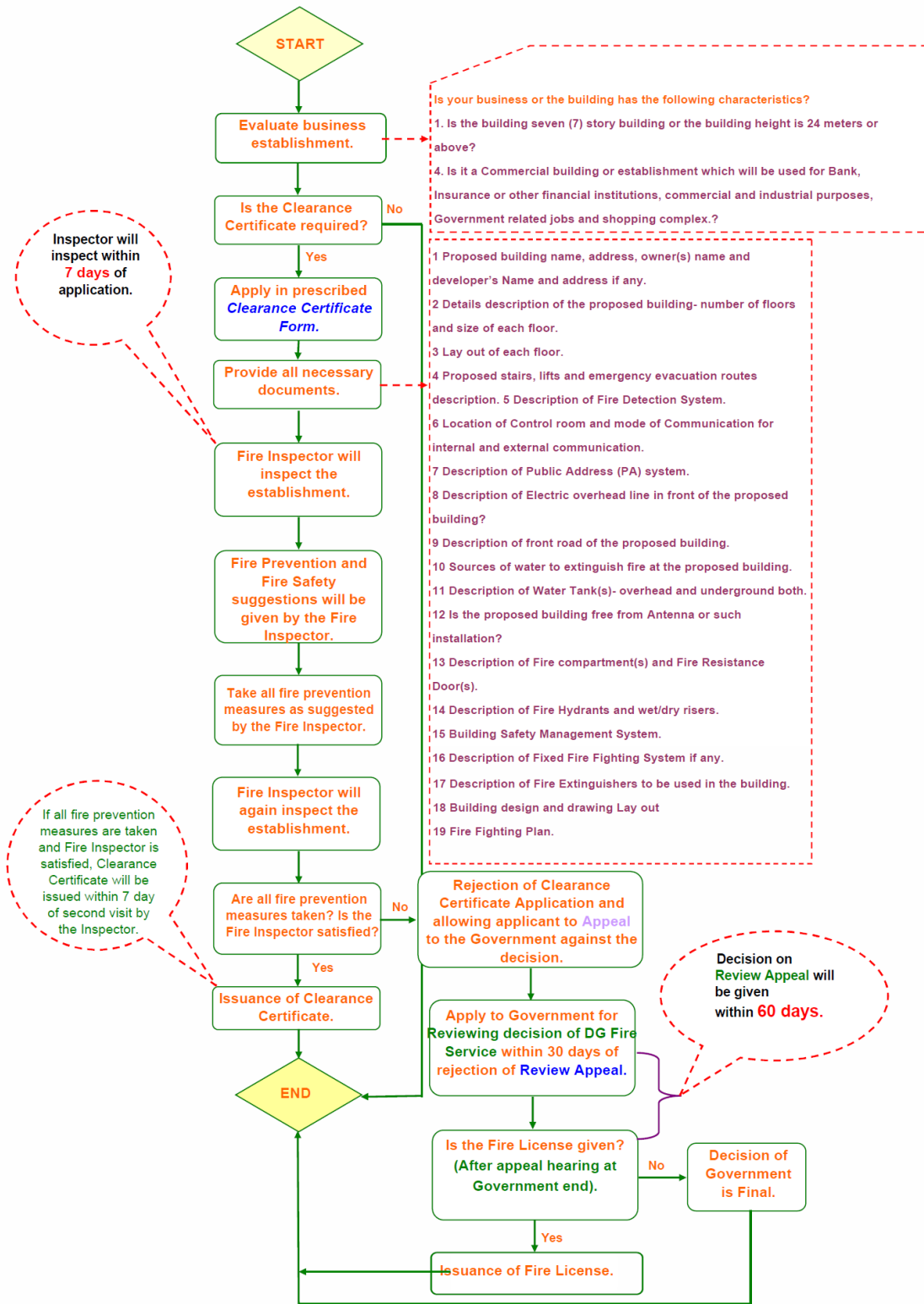


Figure 8-24: Bangladesh Fire Service and Civil Defense process flowchart for high-rise or commercial buildings

8.7 ACCREDITATION

As indicated in this and other chapters, RAJUK routinely accepts the stamps of accredited professionals on drawings as assurance that design complies with BNBC requirements. Compliance of construction with BNBC requirements is similarly handled. This makes the accreditation of design professionals and professionals entrusted with site supervision highly important.

The institution of architects Bangladesh IAB appears to be administering an accreditation program that works. IAB has their own standard of institutional accreditation (<http://iab.com.bd/Site/Accreditation>). IAB does not recognize architects graduating from institutions that fall short of their standards. Only architects from IAB accredited schools can be admitted to membership of IAB.

Third, fourth, and fifth year students of 5-year degree programs at accredited institutions are admitted as student members. The graduates from such a program are admitted into associate membership. Full membership requires: (1) two years of associate membership, (2) two years of experience in an architectural office under the supervision of an IAB member or four years of full-time teaching experience, and (3) passing an examination or membership or fellowship of a recognized foreign architectural Institute (<http://portal.iab.com.bd/portal/apply/applymembership>).

Institution of Engineers, Bangladesh administers its accreditation program through the Bangladesh Professional Engineers Registration Board (BPERB). The registration procedure is outlined in Table 8-6.

Table 8-8: IEB registration procedure for Professional Engineers

REGISTRATION PROCEDURE FOR APPLICATION WITH PRE-REQUISITES

Registration procedure for an applicant starts with the following:

A) Pre-requisites:

1. Accredited bachelor degree in engineering recognized by IEB
2. Corporate member of Institution of Engineers, Bangladesh (IEB)
3. Minimum 7 (seven) years professional experience must be required including a minimum of 2 (two) years' experience in responsible position where he/she had to manage projects or parts of large projects / engineering activities independently and having responsibility for the financial & technical outcome of work of an engineering nature.
4. Evidence of achieving a level of Five 5 days / 30 hours **Continuing Professional Development (CPD)** in the last twelve (12) months of seeking PEng examination. The quality of CPD has to match with the core competence of IEB.

B) Sponsor's / Referee's Reports from 3 (three) Fellows of IEB with at least 10 (ten) years standing or PEng having 03 (three) years standing.

C) Completed Application with CV and Work Experience.

D) Competence & Commitment Report (3000-4000 words) on 5 (five) Core Professional Competence Standards.

E) Written Examination (WE) in a controlled condition on questions on Code & Rules of Ethics and Communication Skill by the Assessors. The answer should be within 1500-2000 words.

- F) Oral Interview.
- G) Assessment by Assessors and Final Result.

It can be seen that the procedure is quite rigorous. However, the majority of engineers work in the government sector, where registration is not required. Even in the private sector, registration is not commonly required.

It should be noted that neither IAB nor IEB has continuing education requirements for accredited professionals. This is certainly a drawback.

8.8 ENHANCED SEISMIC VULNERABILITY OF BUILDINGS IN DHAKA

The earthquake that shook Mexico City at 7:18 am on September 19 reportedly measured 8.1 on the Richter scale and was one of the strongest ever felt in that region. It was followed the next day by a less intense but longer duration aftershock. Even though the epicenter of the initial quake was located 240 miles from Mexico City (and several miles off the Pacific Coast) (Figure 8-25), the city suffered heavy losses in a relatively small but densely built downtown area. It is estimated that over 260 buildings collapsed and approximately 3,200 buildings were damaged, with most damage occurring during the more intense initial tremor. It was fortunate that the earthquake occurred early in the morning, but even so well over 7,000 persons lost their lives and many times more were injured and left homeless. Many perished in a number of hospitals which, along with several public school buildings, accounted for a disproportionate number of building collapses.



Figure 8-25: Epicenter of the 1985 Mexico Earthquake with respect to Mexico City

Following inspection of damage in the Mexico earthquake (Figure 8-26), S. K. Ghosh and Mark Kluver wrote a paper,^{8.2} from which the following is quoted, because much of it is directly relevant to Dhaka, Bangladesh.

The Mexico buildings that collapsed contained deficiencies in design, detailing and/or construction that would have been in violation of UBC provisions applicable to high seismic regions. Those Mexico City engineers who chose to design buildings closer to UBC standards found that their buildings had performed very well. The following observations are based on the inspection of the vast majority of buildings that exhibited good performance, as well as those that suffered various degrees of damage including collapse:

1. The earthquake resistance of a structure is not determined by the basic construction material used. Collapse or serious damage was observed in a number of steel buildings, even though most of Mexico City's construction is of reinforced concrete.
2. Heavy damage was found in buildings that lacked symmetry in plan or elevation. Structural engineers refer to such buildings as being irregular with respect to shape or location of stiffening elements such as walls including stairwell and elevator enclosures. Irregular building configurations do not increase lateral loads on the overall structure, but impose increased strength or deformability demands on some elements of the structure through torsional rotation of the building. End buildings of city blocks which had stiff infill party walls on only two adjacent sides received much more damage than intermediate buildings where stiff infill walls were more symmetrically distributed on three sides. In addition, it was observed that buildings with soft first stories (i.e., stories in which walls had been discontinued, thereby causing large changes in stiffness) often suffered significant damage.



Figure 8-26: The Ministry of Transportation and Telecommunication building following the Mexico earthquake of 1985

3. Stiffer shear-wall buildings performed much better than flexible frame buildings in the earthquake. While most flexible buildings remained standing, they often incurred heavy nonstructural damage. The prevalent type of construction in Mexico City consisted of flexible reinforced concrete beam-column frames with unreinforced (clay brick or concrete block) masonry infill. This type of construction is unsuitable in high seismic zones and is not permitted

in the UBC. Whereas the UBC would require that the contribution of the masonry infill as well as the frame be accounted for in seismic-resistant design, it is general practice in Mexico to assume that only the frame resists lateral forces. However, the flexible frame will drift several times more than the brittle clay brick infill, resulting in extensive damage to the unreinforced infill. The masonry infill should have either been reinforced or isolated from the rest of the structure. (The latter solution is probably impractical in the Mexican context.) Sometimes explosive failure of the infill caused structural damage to the frame members. On occasion there were reinforced concrete bracing elements placed in the masonry infill. These probably kept the masonry infill intact longer into the seismic excitation. However, once the infill was damaged, the bracing elements not only failed, but may also have concentrated added stresses in frame member locations that were not designed accordingly.

4. It is reported that very little if any building code enforcement is provided by Mexico City. This includes plan checking as well as general inspection. Only conceptual drawings need to be submitted to the building department for permit issuance. These drawings need only include information such as building layout, height and elevation, plans necessary for a zoning-type review. In addition, the building contractor often uses plans that contain limited detail, with little guidance or involvement from the design engineer or architect. An emergency building code was adopted following the recent earthquake which will, among other things, improve engineering review (including peer review for some buildings) and require submission of more detailed drawings at the approval stage.
5. There were many instances of buildings losing a few of the upper stories, with the rest of the structure standing. The Mexico City code apparently does not recognize the so-called "whiplash" effect associated with long-period vibration, in recognition of which a portion of the design base shear is concentrated at the tops of flexible buildings per the design requirements of the UBC. This may have been responsible, at least in part, for the failure of upper-story columns. Also, for reasons of economy (which is influenced by different factors in Mexico than in this country), the column sizes were often decreased from the lower to the upper stories of a building. This practice further lessened the lateral load resistance of the upper-story columns versus those below.
6. Widespread damage was caused by hammering of one building on another. This was attributed to inadequate separation between buildings, especially when they were of dissimilar height, geometry and stiffness. The most severe damage occurred when floors of adjoining structures were situated at different levels, causing the heavy slab elements of one building to collide against and break the relatively fragile columns at the near end of the adjacent building. This problem could be solved by building stiffer buildings or by increasing the width of seismic joints or spaces between buildings.
7. Many cases of "pancaking" of concrete frame buildings were observed. The column ties were spaced too far apart to adequately confine the concrete core and provide sufficient shear resistance. In addition, vertical reinforcement was on the heavy side (possibly driving larger

shear forces into the columns). The Mexico City code did not require any special seismic detailing prior to 1957. Increased detailing requirements of their 1977 code edition were still far short of current UBC requirements covering concrete construction in regions of high seismicity.

8. There were many cases of flat plate-column and waffle-column construction, apparently without any special detailing of the slab-column joints. The problem was often exaggerated by extremely heavy slab construction. Consequently, several cases of punching shear failure of slab-column joints were observed. In addition, many of the flat-plate and waffle-slab buildings contained peripheral beams which were obviously much stronger than their supporting columns. This resulted in a "weak column-strong beam" type of frame configuration. Such design forces hinging in the columns rather than in the less critical beams, resulting in collapses of entire portions of buildings rather than the loss of only one or more floor segments. The U. B.C. requires that columns be stronger than the beams framing into them, to greatly reduce probability of major collapse.
9. Concrete quality is generally poor throughout Mexico City, but not so poor as to cause problems in and of itself. Concrete is typically mixed at the jobsite by hand or in unsophisticated concrete mixers, resulting in compressive strengths of between 2500 and 3000 psi for the majority of concrete placed. There is also widespread use of cold-worked (Torsteel) which is less ductile than normal hot-rolled American steel. How much effect this had on overall seismic behavior of buildings is difficult to assess. The lack of column tie reinforcement appears to have been a much more important factor.
10. There were numerous foundation-related problems associated with the settlement of soft soils on the old lake bed underlying Mexico City. Slight to excessive tilting of buildings due to differential foundation settlement was commonly observed, even where there was no obvious additional damage to be seen. Building settlement in some instances was attributed to loss of friction on friction piles. Damage was also observed in end-bearing piles at the foundation-pile interface. The ongoing settlement of the soft lake bed soils, which caused prior stress buildup and other weakening effect in foundation systems, prevented an accurate assessment of the new damage caused by the recent earthquake.

The following conclusions were drawn in the paper by Ghosh and Cluver:^{8.2}

The factors that led to heavy losses in Mexico City can be divided into three areas: severity of the earthquake; planning, design and construction of buildings; and soil conditions. The earthquake was of a long duration with a long period of vibration, which created a destructive resonance in buildings having similar natural periods. Local building codes sometimes did not outlaw inappropriate types of construction or require minimum seismic detailing to resist the high lateral loads that were caused by the severe shock. This was coupled with lesser code enforcement, material quality and construction control than is commonly found in the high seismic regions of the U.S. The city's soft compressive subsoils amplified peak ground acceleration by a factor of almost five in addition to creating excessively large differential

settlements that compounded foundation problems. It is questionable that these conditions could be duplicated in seismically active regions of the United States, and certainly not to the degree found in Mexico. The Mexico City experience appears to validate the earthquake design provisions found in the *Uniform Building Code*, providing no observable phenomenon that would warrant significant changes in those standards.

Most of the observations above are directly relevant to the situation in Dhaka, with the possible exception of Item 5. The UBC distribution of seismic forces along the height of the building was adopted by the BNBC from the beginning. So any building designed by the BNBC (presumably buildings designed and constructed since 2006) should be free of the problem discussed in item 5. However, of particular concern are buildings with unreinforced masonry infills and soft-story buildings, which are everywhere in Dhaka (Figures 8-27 and 8-28).



Figure 8-27: Very typical multistory building in Dhaka with unreinforced masonry infill. The building also has a soft story at the bottom.

Unreinforced masonry has not been allowed for use in regions of moderate and high seismicity by U.S. building codes for more than three decades now. This prohibition includes unreinforced masonry buildings, infills, as well as parapets. This is a prohibition that needs to be urgently considered for the BNBC.

Item 4 above also describes the current situation in Dhaka almost exactly. There are provisions about the design of soft-story buildings (Figure 8-28) in the BNBC. The question is if they are being followed. The comment applies to flat plate-column frames (slabs supported directly on columns without any column-line beams – Figure 8-29). These are sophisticated structural elements, two-way or punching shear around the columns being a particular problem. The designs need to be carefully checked by RAJUK or a third-party plan-checker.



Figure 8-28: Two random examples of soft-story buildings



Figure 8-29: Multistory building with flat plates

8.9 AN ORGANIZED, REGULAR, TRANSPARENT CODE CHANGE PROCESS

The above makes the case for an organized, regular, transparent process by which the BNBC can and will be changed every five years or so. In the U.S., the predominant model code, the IBC, is updated every three years. That may be a little too frequent for Bangladesh. A five- or six-year interval may be optimal. The problem with too long a cycle is that a code change that barely misses being included in an edition because of time running out will then have to wait many years and the profession and the public will lose out.

Details of the U.S. process can be found at the web link below.

<https://www.iccsafe.org/products-and-services/i-codes/code-development/>

Obviously, the counterpart of the International Code Council (ICC), the private, non-profit organization that administers the U.S. process, does not exist in Bangladesh. Whether the Bangladesh Standards and Testing Institution (BSTI) can be strengthened and expanded to fill this role needs to be explored.

The U.S. system, where code changes are generated by stakeholders including code users and they are processed by the ICC through an infrastructure that has evolved over decades, will not work in Bangladesh. A much better model would be a U.S. standard writing body such as the ASCE 7 Committee. Committees will need to be set up for various areas covered by the BNBC. For instance, there will need to be a committee for structural design (Part 6) of BNBC. Under this committee, there will need to be subcommittees on live loads, wind loads, seismic design, concrete design, steel design, and so forth. The members of the committees should be mostly professionals and not ex-officio high-level government employees. It is expected that these subcommittees will generate most of the code changes. The subcommittee on seismic design, for instance, will need to examine changes in the seismic provisions of ASCE 7 since the last edition of BNBC and decide how much of those changes should be implemented in the BNBC. Code changes will need to be prepared in a prescribed format and will need to go through balloting by the subcommittee and then the full committee. Rules for conduct of meetings of the committees and subcommittees and for processing of ballots will need to be set up. It will be most desirable to provide all stakeholders and code users with an opportunity to propose changes to the BNBC edition being revised for a certain period of time. Each change will be processed by the subcommittee that has jurisdiction over the topic of the change.

There will need to be a correlating or coordinating committee that, with the help of a paid staff, will put the entire document together. The structure of the entire set-up can be visualized as in Figure 8-30.

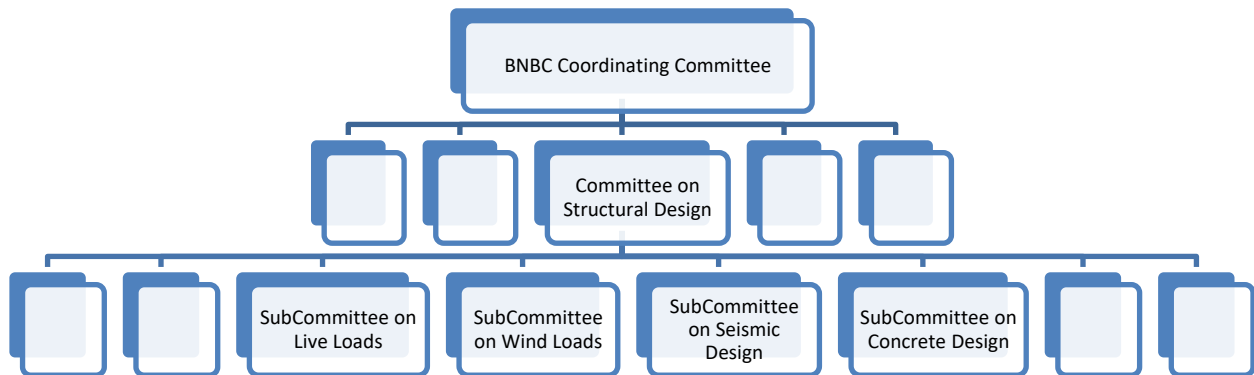


Figure 8-30: A proposed set-up to process regular, systematic changes to the BNBC

It will be logical for the BSTI Council to appoint the BNBC Coordinating Committee. The coordinating committee should appoint committee chairpersons and also the members of each committee in consultation with the chairperson of that committee. Each committee chairperson, in consultation with the coordinating committee chairperson, will appoint subcommittee chairpersons. Each subcommittee

chairperson, in consultation with the chairperson of the parent committee, will appoint subcommittee members.

Importantly, all rules and procedures will be in writing, transparent and open to the public. The BSTI Council will decide how the rules are approved and on the process for their possible amendment.

The above are just ideas at this stage. Many details will need to be worked out. Setting up this infrastructure is a major undertaking that will require funding and government support. This is obviously outside the scope of the current project and pertains to the entire country, not just RAJUK's jurisdiction. The subject is discussed here out of a strong belief that the country will be ill served in the absence of the proposed infrastructure.

8.10 SUMMARY

Chapter 8 points out that the design of a structure must be in compliance with applicable codes. A jurisdiction makes sure of such compliance through plan review, before issuing a construction permit.

The construction of a structure must also be in compliance with applicable building codes. A jurisdiction makes sure of such compliance through proper inspections, before issuing a certificate of occupancy.

The codes and standards system of the U.S. and that of the Dhaka metropolitan area are described and compared.

Although RAJUK is mandated to enforce BNBC-1993 (2006), they essentially enforce only the architectural requirements of *Bidhimala* 2008, which are close to those of the BNBC. To ensure that structural design is in compliance with BNBC-1993 (2006), the RAJUK depends on the stamp(s) of accredited professionals on drawings. To ensure that the design of mechanical, electrical, and plumbing (MEP) systems is in compliance with BNBC-1993 (2006), RAJUK also depends on the stamp(s) of accredited professionals on drawings.

The difference between code implementation and code enforcement is pointed out. The steps required for proper implementation of BNBC-2017 are enumerated.

Enforcement of BNBC-2017 would entail structural and nonstructural (primarily fire safety) plan review, MEP plan review, structural and fire safety inspections, and MEP inspections. It is pointed out that RAJUK is now carrying out only architectural plan review and inspections only to check compliance with the architectural requirements of *Bidhimala* 2008. For compliance with other BNBC requirements, RAJUK depends on stamp(s) of accredited design professionals on drawings and on Form 402 submitted by the accredited professional(s) engaged in a project, on which the professional confirms that construction work has been completed under his/her/their supervision. A supervision report for works supervised is also required to be submitted.

The accreditation requirements of IAB and IEB are explained.

It is pointed out that the seismic vulnerability of Dhaka City is enhanced by: (1) a large number of concrete frame buildings with unreinforced masonry infill, (2) a significant number of buildings with soft stories, and (3) the use of concrete flat plate construction in many buildings.

Finally, a case is made for the establishment of an organized, transparent, systematic process by which the BNBC can be changed at regular intervals with input from concerned stakeholders.

REFERENCES

- 8.1. Alam, M. A., *Salient Features of Fire Prevention and Fire Fighting Law, 2003*,
<https://expertisesolution.blogspot.com/2011/03/salient-features-of-fire-prevention-and.html>,
2011
- 8.2. Ghosh, S. K. and Kluver, M., "The Mexico City Earthquake – Impressions and Tentative
Conclusions," *Building Standards Magazine*, International Conference of Building Officials, 1986

ANNEX 8A. EVOLUTION OF THE FIRE SAFETY REQUIREMENTS OF THE BNBC

Tables included in this Annex show how the fire safety requirements of the BNBC have evolved from the current 1993 (2006) edition of the BNBC to its 2017 draft.

Here at first comparison has been made between BNBC 2006 & BNBC 2017 on the same criterion. And criteria from RAJUK bidhimala which couldn't be compared with BNBC are listed.

BNBC 2006 Part Two Chapter One

Purpose & Applicability

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017
1.1	Purpose			Similar
1.2	Scope			Missing
1.3	Terminology			Missing
1.4.1	Applicability	Construction		Similar
1.4.2		Removal		Similar
1.4.3		Demolition		Similar
1.4.4		Alteration		Similar
1.4.5		Maintenance		Similar
1.4.6		Repair		Similar
1.4.7		Land Development		Dissimilar
1.5	Alternative Provisions	Approval		Missing
		Modification		Missing

BNBC 2006 Part Two Chapter Two

Organization & Enforcement / Establishment of Authority

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017
2.1	Code Enforcement Agency	Building Official		
2.1.2		Merging the jurisdiction under Small Local bodies		Similar 18
2.1.3		Organization		Missing
2.1.4		Qualification of the Building Official		Similar 16
2.1.5		Restriction on the building Official		Similar; Elaborated 19
2.1.6		Damage Suit		Similar 20
	Administrative jurisdiction of Building Official		Missing	17
	Establishment of Authority		Missing	10
	Head office of the Authority		Missing	11
	Constitution of Authority		Missing	12
	Responsibilities of the Authority		Missing	13
	Office of the Building Officials		Missing	14
	Building Construction Committee		Missing	15
2.2	Powers and duties of the Building Official			Almost similar 21
2.3	Board Of Appeals			Similar 22
2.4	Requirement of certification of work			Similar 23

2.5	Limits of professional conduct			Similar; More Elaborated 24
2.6	Violation and penalties			Similar 25
2.6.2	Height Control near Aerodomes			Missing
2.6.3	Professional violation			Similar 26
2.6.4	Obligation of offender			Similar 27
2.6.5	Conviction no bar to further prosecution			Similar 28
2.7	Power to make rules			Missing

BNBC 2006 Part Two Chapter Three

Permits & Instructions

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017
3.1.1	Permits	Requirement of permits		Slightly Dissimilar
	Type of Permits		Missing	3.2
	Land Use Clearance		Missing	Mostly missing, just validity of permits are provided
3.1.2	Permits Obtained Prior to Adoption of Code			Similar
	Constitution of Building Permit Committees		Missing	3.3

		Operation and Maintenance of Utility Services		Slightly Dissimilar
3.2.3	Information Accompanying the application			Dissimilar
	Disposal of Application		Missing	3.5
3.2.4	Preparation & Signing of Plans			Dissimilar More Elaborated
3.2.5	Notice for Land Adjoining Government or Corporate bodies formed Under Statute			Missing
3.2.6	Fees			Similar
3.2.7	Duration of Permit			Missing
3.2.8	Deviation from Approved Plan			Missing
3.2.9	Cancellation of Permit			Missing
3.2.10.	Granting or Refusal of Permit			Missing
3.3.1	Responsibilities & Duties of the owner	General		Similar
		Employment of Technical Personnel	Missing	3.8.2
3.3.2		Right of Entry		Similar
3.3.3		Permits from Other Agencies		Similar
		Information on Progressive Work	Missing	3.8.5
		Safety Measures	Missing	3.8.6
3.3.4		Notice of Completion		Similar
3.3.5		Documents at Site		Similar
		Live Load Posted	Missing	3.8.9
	Responsibilities & Duties of the technical personnel		Missing	3.9
3.4	Inspection			Similar
3.5	Unsafe Building			Similar

3.6	Demolition of the building			Similar
3.7	Validation of the Code			Similar
3.8	Architectural & Environmental Control			Similar
	Making Implementation Procedure		Missing	3.15

Points from RAJUK Bidhimala which couldn't be compared with BNBC

RAJUK bidhimala has thorough description on **Application & Approval for Different Permits** in Chapter two, **Different types of Committee Formation** for all kind of supervision & development in Chapter Three & Chapter Four includes **List & Classification of Technical personnel**

Chapter two : Application & Approval of Permits	
3	Approval of Building Drawing & Approval of Living Utility
4	Land Use Clearance
5	General Terms & Conditions for Approval of Land Use Clearance
6	Approval, Rejection & Appeal of Land Use Clearance
7	Validity of Land Use Clearance
8	Special Project Permit for large and specialized projects
9	Approval of Special Project Permit
10	Validity of Special Project Permit
11	Cancellation of Special Project Permit
12	Appeal for Special Project Permit
13	Building Permit

14	Disposal of Application of Building Permit
15	Duties & Responsibilities of Applicants related to Building Construction
16	Duties & Responsibilities of Technical Personnel
17	Inspection & Security Regarding Building Construction
18	Occupancy Certificate
19	Completion report
20	Asbuilt Architectural Drawing
21	Structural design
22	Building services
23	Renewal of Occupancy Certificate
24	General Notices for Building Permit
25	Validity Of Building Permit
26	Correction of Approved Design
27	Approval, Correctin & Alteration fee for Building Construction, Pond Excavation & Cutting Of Mountains
28	Inspection & Duties & Responsibilities of Authority
29	Notice, Suspention & Demolition of Unapproved Structures
Chapter three : Committee	
30	Committee Formation
31	Building Official Committee
32	Approval Committee Of Special Project
33	Urban Development Committee
34	Urban Development Committee Formation

35	Functions of Urban Development Committee
36	Disposal of Appeal by Urban Development Committee
37	Inspection & Control of Construction & Development Works by Urban Development Committee
38	Provision of Advice to Authority by Urban Development Committee
39	Meeting of Urban Development Committee
40	Sub Committee Formation by Urban Development Committee
Chapter Four : List & Classification of Technical Personnel	
41	Formulation of List of Technical Personnel
42	Application for Enrollment
43	Classification of Technical Personnel

BNBC 2006 Part Three Chapter One

General Building Requirement

Here at first comparison has been made between BNBC 2006 & BNBC 2017 on the same criterion. And then provision of rule in RAJUK bidhimala for this criterion has been found out And its similarity with BNBC 2006 & BNBC 2017 has been checked.

Clause No.	Architectural Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
1.3	Occupancy Classification of Building			Dissimilar; Well Classified	Similar	Dissimilar	Appendix 3	
1.3	Construction Type Classification of Building			Dissimilar			Missing	
1.4	Land Use Classification			Similar			Not mentioned separately	
1.5	Requirements of Plots	General requirements		Similar				
		Clearance from Overhead Electric Lines		Similar	Similar	Similar	Rule 59.E	
		Road, Plinth & Formation Level	Road level missing					
		Boundary Wall		Similar	Dissimilar	Dissimilar	Rule 59.B	Thoroughly explained
1.5.5	Plot Sizes			Dissimilar; More Detailed			Missing	
1.6	Means of Access			Dissimilar	Dissimilar		Rule 54	
1.6.5	Internal Access Road			Dissimilar	Dissimilar		Rule 54	
1.6.6	Pedestrian Walkway			Dissimilar; Universal accessibility is included	Dissimilar		Rule 54	
1.7	Open Spaces within a plot	Separation distance for variation of occupancy & height	Absent	Described			Rule 46	Absent
		Front Open Space		Similar	Dissimilar	Dissimilar		Mandatory Open Space (Rule 46.5) & excluded area from MGC (Rule 51)
		Rear & Side Open Space		Dissimilar	Dissimilar	Dissimilar		
		Restriction for Corner Plots	Absent	Described				Absent
1.7.11	Interior Courtyard			Similar	Similar	Similar	Rule 59.A.5	Some clauses are missing
1.7.12	Permitted Construction in Mandatory Open Space		Max one-third open space can be covered	Similar; Max 50% open space can be covered	Dissimilar	Similar	Rule 46 Rule 47	
1.8	General Height & Area Limitation	Height Limitation based on road width		Similar	Dissimilar	Dissimilar	Rule 52	Some clauses are missing
		Area limitation based on FAR	Well Specified; Max Permissible FAR based on type occupancy and construction		Dissimilar	As per 1.9.3.1	Rule 51	FAR is tabulated based on occupancy type, plot size & approach road width
1.9	Off-street Parking Spaces			Dissimilar	Dissimilar	Dissimilar	Rule 56	
1.10.	Street Encroachment			Similar	Dissimilar	Dissimilar	Rule 55	
1.11	Community Space & Amenities			More Detailed	Dissimilar	Dissimilar	Rule 58	Some clauses are missing
		Plinth & Formation Level		Similar			Missing	

1.12	Requirements of Parts of Building	Ceiling Heights		Similar	Similar	Similar	Rule 58.E	
		Room Sizes		Similar except Min width of habitable room	Similar except clear distance under beam = 2.15m	Similar except min. habitable room width =2.9m & clear distance under beam = 2.15m	Rule 58.A	Some clauses are missing
		Kitchen		Similar	Similar	Similar	Rule 58.B	
		Bathroom & Toilets		Similar Well Tabulated	Similar	Similar	Rule 58.C & 59.A.7	
		Stairways		Dissimilar More elaborated	Slightly dissimilar	Dissimilar	Rule 58.D	
		Mezzanine Floor		Similar			Missing	
		Lofts		Similar			Missing	
		Cabins or chambers		Similar			Missing	
		Store Rooms		Similar			Missing	
		Private Garage		Dissimilar			Missing	
		Basement		Similar	Dissimilar	Dissimilar	Rule 47	Some clauses are missing
		Entrance		Elaborated			Missing	
		Roof Drainage		Similar			Missing	
Parapet		Similar			Missing			
Septic Tank		Similar			Missing			
1.13	Landscaping			Similar	Dissimilar	Dissimilar	Rule 60	Thoroughly narrated about Landscaping Park
1.15	Existing Building			Similar				
1.16	Buildings & Places of Architectural value			Similar	Similar	Similar	Rule 61	Thoroughly explained
1.17	Ventilation, Lighting & Sanitation			Detailed, includes additional clause	Similar	Similar	Rule 59.A.14	Some clauses are missing
1.19	Provision of Lifts & Escalator			Better Described			Missing	
1.23	Rat Proofing & Termite Proofing		Better Described				Missing	
1.24	Requirements of Buildings	In Flood prone & Coastal Regions		Similar	Dissimilar	Dissimilar	Rule 62	Some clauses are missing
		In Other Disaster prone Area	Missing	Clause No. 1.27			Missing	
	Universal Accessibility		Missing	Appendix D			Rule 64 & Appendix 2	Compared to BNBC 2017 just mentioned
	Special Provision for storage of Dangerous Goods & their Classification		Missing	Clause No. 1.28			Missing	

BNBC 2006 Part Three Chapter Two

Classification of Buildings based on Occupancy

Clause No.	Architectural Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
2.1	Occupancy Classification			Dissimilar				
		Residential Buildings		Dissimilar				Not Mentioned separately
		Educational facilities		Dissimilar				Not Mentioned separately
		Institution for Care		Dissimilar				Not Mentioned separately
		Health Care		Similar				Not Mentioned separately

2.1	Classification of Each Occupancy type	Business & Mercantile	Together	Separate Classification; Dissimilar				Not Mentioned separately
		Industrial Buildings		Similar				Not Mentioned separately
		Storage Buildings		Similar				Not Mentioned separately
		Assembly Buildings		Similar				Not Mentioned separately
		Hazardous Buildings		Dissimilar				Not Mentioned separately
		Miscellaneous		Dissimilar				Not Mentioned separately
		Garage	Missing					Not Mentioned separately
	Utility	Missing					Not Mentioned separately	
2.2	Change of Use			Similar				
2.3	Mixed Occupancy			Dissimilar	Dissimilar	Dissimilar	Rule 57	Some clauses are missing
2.4	General Requirements of all Occupancies			Dissimilar Elaborated				Not Mentioned separately
2.5	Requirements of each Occupancy type	Residential Buildings		Dissimilar				Not Mentioned separately
2.6		Educational facilities	Well Described	Dissimilar				Not Mentioned separately
2.7		Institution for Care		Similar				Not Mentioned separately
2.8		Health Care		Similar				Not Mentioned separately
2.10.		Business & Mercantile	Well Described	Dissimilar				Not Mentioned separately
2.11		Industrial Buildings	Well Described	Dissimilar				Not Mentioned separately
2.12		Storage Buildings		Similar				Not Mentioned separately
2.9		Assembly Buildings		Similar				Not Mentioned separately
2.13		Hazardous Buildings		Dissimilar Well Described				Not Mentioned separately
2.14		Miscellaneous		Similar				Not Mentioned separately
	Garage	Missing	2.15					Not Mentioned separately
	Utility	Missing	2.16					Not Mentioned separately
	A-Z list of Occupancy Classification		Missing	Well Tabulated				Not Mentioned
Chapter Three	Building construction Type classification based on Fire resistance			Dissimilar More Detailed				Not Mentioned

Here at first comparison has been made between BNBC 2006 & BNBC 2017 on the same criterion. And then provision of rule in RAJUK bidhimala for this criterion has been found out And its similarity with BNBC 2006 & BNBC 2017 has been checked.

BNBC 2006 Part Four Chapter One

General Provision

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
1.2	Terminology		Few Definitions are missing	Similar			Missing	
1.3.1	General Requirements	Height & Area limitation		Similar				
1.3.2		Open Space Requirement		Similar				
1.3.3		Access Facilities for Fire Service		Slightly Dissimilar				
1.5	Fire Test & Resistance Ratings			Similar				

BNBC 2006 Part Four Appendix A

Guideline for Fire Drill & Evacuation Procedure

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
A.1	Introduction			Similar			Missing	
A.2	Fire Reporting			Similar				
A.3	Fire Drill			Dissimilar (A.7) More Detailed				
	Supervision of Fire Safety & Emergency Action & Plans		Missing	A.3				
A.4	Signs & Floor Plans	General		Dissimilar				
		Sign Depicting Floor Number		Dissimilar				
		Stairs and Elevators Identification		Dissimilar				
		Stair re-entry Provision		Similar				
		Command Station		Similar				
		Two Way Communications and Fire Alarm		Similar				
A.4.7 & A.4.8	Fire Safety Plan			Well Discussed (A.6)				
A.4.8.4	Fire Safety Staff			Slightly Dissimilar A.4				
A.4.8.5	Organization Chart for Fire Drill & Evacuation Assignment			Similar A.8				

A.4.8.6	Instruction to Inmates of the Building			Almost Similar A.9			
A.4.8.11.1-2	Text For Instruction			Dissimilar A.10			

BNBC 2006 Part Four Chapter Two

Precautionary Requirements

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
2.1	Occupency Classification			Dissimilar			Missing	
2.2	Classification of Construction Types			Dissimilar				
2.3	Fire Zones			Similar				
2.4	Mixed Occupency			Detailed				
2.5	Openings in Separation Wall			Slightly Dissimilar				
2.6	Smoke & Heat Vent			Dissimilar				
2.7	Electrical, Gas & HVAC services			Similar				
2.8	Surface Finishes			Similar				
2.9	Glazing			Similar				
2.10.	Skylights			Similar				
2.11	Fire Lifts			Dissimilar				
2.12	Special hazards	Residential		Similar				
		Educational		Similar				
		Institutional		Similar				
		Health Care		Similar				
		Bussiness		Similar				
		Mercantile		Similar				
		Industrial		Similar				
		Storage		Similar				
		Assembly	More Detailed					
		Hazardous		Dissimilar				
		Garage	Missing					
		Utility	Missing					
		Miscellaneous Buildings	Missing					

BNBC 2006 Part Four Chapter Three

Means of Egress/Escape(previously used)

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
3.1	Scope			Similar				
3.2	Components of Means of Escape			Similar	Similar	Similar	Appendix A.01	

3.3	General Requirement		Many clauses missing	Dissimilar More Elaborated	Similar	Dissimilar More Elaborated	Appendix A.02	
3.4	General Provision of Exits			Similar	Similar	Similar	Appendix A.03	
3.5	Occupant Load			Dissimilar	Similar	Dissimilar	Appendix A.04	
3.6	Capacity of Exit Components			Dissimilar	Similar	Dissimilar	Appendix A.05	
3.7	Corridors & Passageways			Dissimilar	Similar except Min fire rating of door	Dissimilar	Appendix A.06	
3.8	Assembly Seating & Waiting			Dissimilar More Detailed	Similar	Dissimilar	Appendix A.07	Few Clauses are missing
3.9	Doorways		Few Clauses are missing	Similar	Similar	Similar	Appendix A.08	Completely alike 2006 but BNBC 2017 has more clauses
3.10.	Stairways		Many clauses missing	Dissimilar More Elaborated	Similar	Dissimilar More Elaborated	Appendix A.09	Many clauses missing
3.11	Ramps		Many clauses missing	Similar More elaborated	Dissimilar	Dissimilar	Appendix A.10	Few Clauses are missing
3.12	Horizontal Exits			Slightly Dissimilar	Similar	Slightly Dissimilar	Appendix A.11	
3.13	Smoke Proof Disclosures		Few Clauses are missing	Slightly Dissimilar			Missing	
3.14	Number of Exits			Dissimilar	Dissimilar	Dissimilar	Appendix A.12	
3.15	Travel Path			Dissimilar	Similar	Dissimilar	Appendix A.13	
3.16	Means of Exit signs & Illumination			Dissimilar			Missing	
3.17	Exit Requirements for Occupencies		Described	Dissimilar; Tabulated (table 4.3.8)	Similar	Dissimilar	Appendix A.14	Only exit of Storage is mentioned; Others are missing

BNBC 2006 Part Four Chapter Four

Equipment & In-Built Facilities

Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	Comment
4.1	Scope		Fire Classification missing	Dissimilar				
4.2.1	Fire Protection Plumbing/Fixed Type Fire Hydrant System	Water Quantity for Fire Protection		Dissimilar More Elaborated				
4.2.2		Water Sources for Fire Protection		Dissimilar More Elaborated				
4.2.3		Design Considerations for Standpipe and Hose System		Almost Similar				

4.2.4		Design Consideration of Sprinkler System		Similar except ceiling area for a sprinkler (4.2.10)			
		Wet Riser	Missing	4.2.4			
		Down Comer	Missing	4.2.5			
		High Velocity Water Spraying Projector System	Missing	4.2.6			
		Water Mist Technology	Missing	4.2.7			
		Drenchers	Missing	4.2.8			
		Dry Riser System	Missing	4.2.9			
4.2.5		Water supply for Fire Protection in Tall Building		Dissimilar 4.5			
4.2.6		Fire Pump		Dissimilar 4.2.2.5			
4.2.7	Inspection, Testing and Maintenance			Slightly Dissimilar 4.2.12			
	Fixed Installation other than Water	Centrally Fixed Installation Discharging Extinguishing Agent other than Water	Missing	4.3.1			
4.8		Dry Chemical Extinguishing System		Similar			
4.9		Wet Chemical Extinguishing System		Similar			
4.6		Carbon di oxide Extinguishing System		Missing			
4.7		Halogenated Extinguishing System		Missing			
4.5		Foam Installation		Dissimilar			
		Vaporizing liquid Installation	Missing	4.3.1.3			
		Dry Powder Installation	Missing	4.3.1.4			
		Gaseous Installation	Missing	4.3.1.5			
		Localised Fixed	Missing				
4.10.	Portable Fire Extinguisher			Dissimilar (4.4)			
4.3 & 4.4	Fire Detection & Alarm System			Dissimilar (4.6)			

Missing

BNBC 2006 Part Four Chapter Five

Requirements for Fire Detection & Extinguishing System

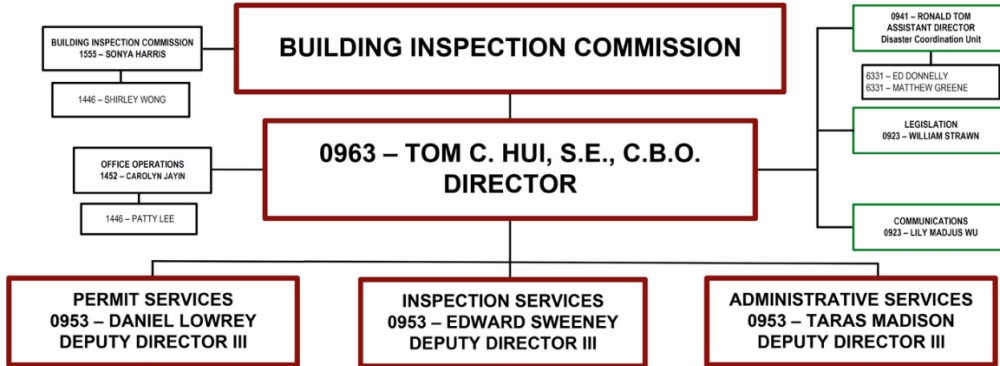
Clause No.	Topics	Sub Topics	BNBC 2006	BNBC 2017	RAJUK Bidhimala			Comment
					Similarity with BNBC 2006	Similarity with BNBC 2017	Rule No.	
5.1	Scope			Dissimilar				
		Design Scenerio I	Missing	5.1.2				
		Design Scenerio II	Missing	5.1.3				
		Design Scenerio III	Missing	5.1.4				
		Fire Protection Plan	Missing	5.1.6				

	Special Recommendation		Missing	5.2			
5.2	Occupancy A : Residential			Dissimilar More Elaborated			
5.3	Occupancy B : Educational			Dissimilar			
5.4	Occupancy C : Institution for Care			Dissimilar			
5.5	Occupancy D : Health Care Facilities			Similar			Missing
5.7	Occupancy E : Business		Discussed Together	Dissimilar			
5.7	Occupancy F : Mercantile			Dissimilar			
5.8	Occupancy G : Industrial			Dissimilar More Elaborated			
5.9	Occupancy H : Storage			Similar			
5.6	Occupancy I : Assembly			Similar			
5.10.	Occupancy J : Hazardous			Similar			
	Occupancy K : Garages		Missing				
	Occupancy L: Utilities		Missing				
5.11	Occupancy M : Miscellaneous			Similar			

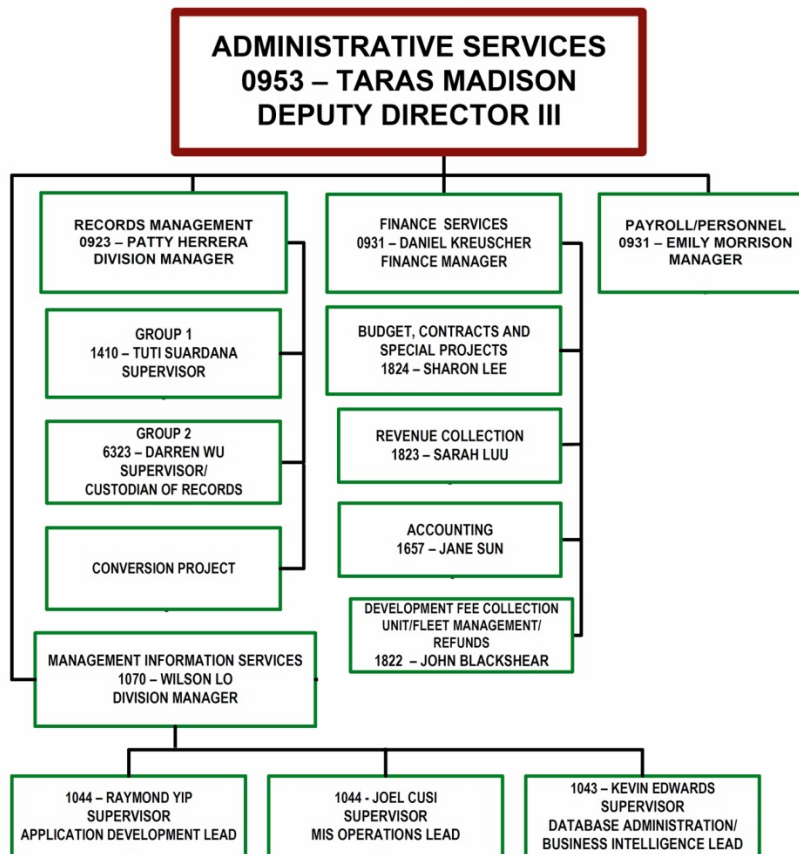
ANNEX 8B – ORGANIZATIONS OF TWO MAJOR U.S. BUILDING DEPARTMENTS

8B.1 CITY AND COUNTY OF SAN FRANCISCO

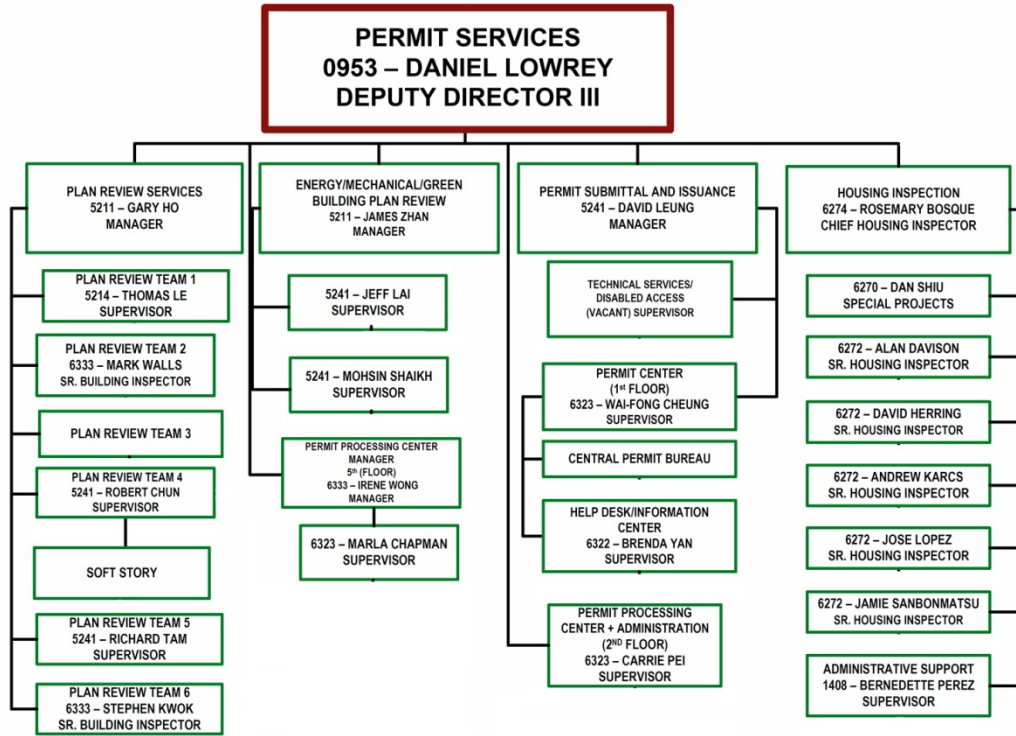
DEPARTMENT OF BUILDING INSPECTION ORGANIZATIONAL CHART



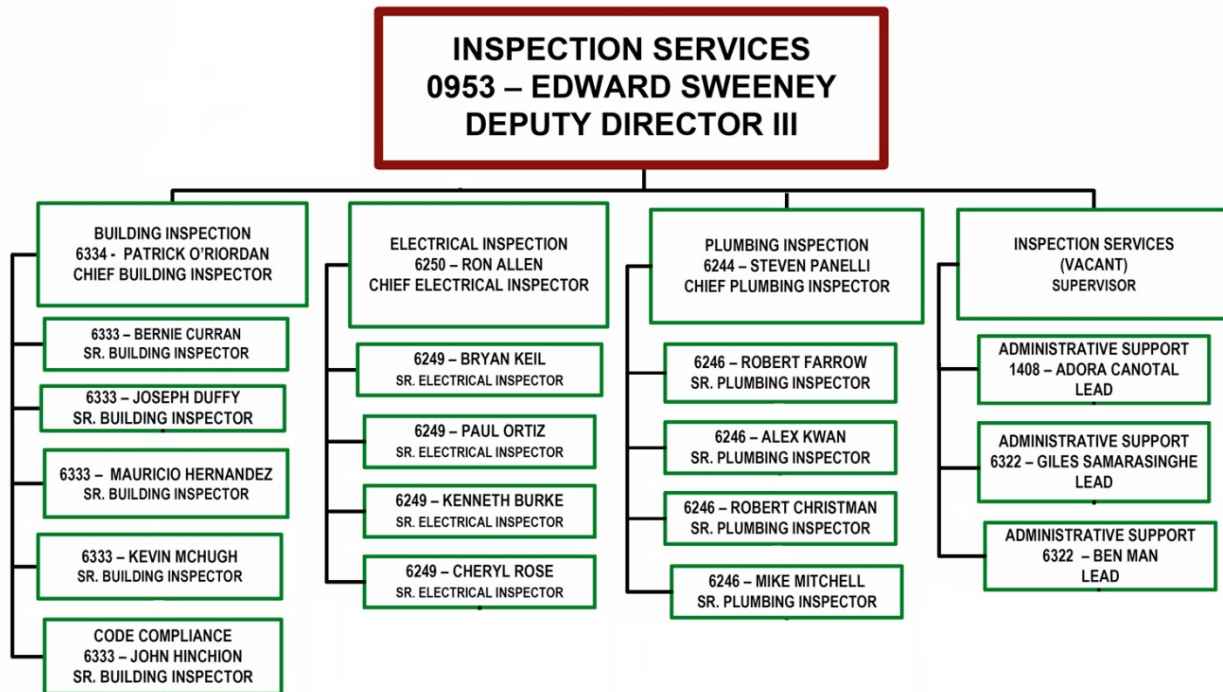
8B.1.1 Administrative Services



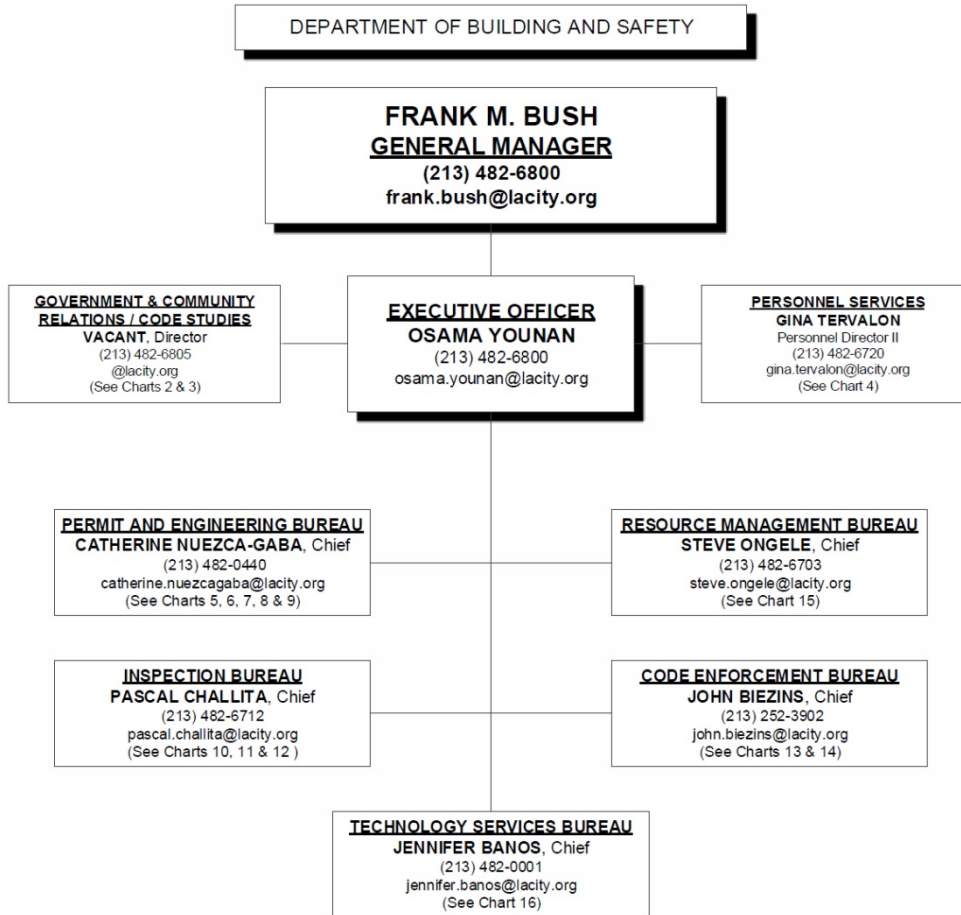
8B.1.2 Permit Services



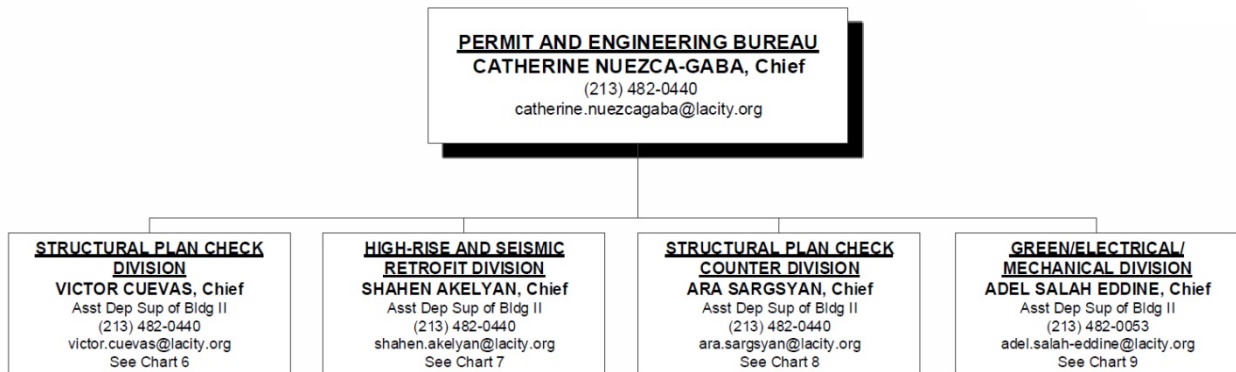
8B.1.3 Inspection Services



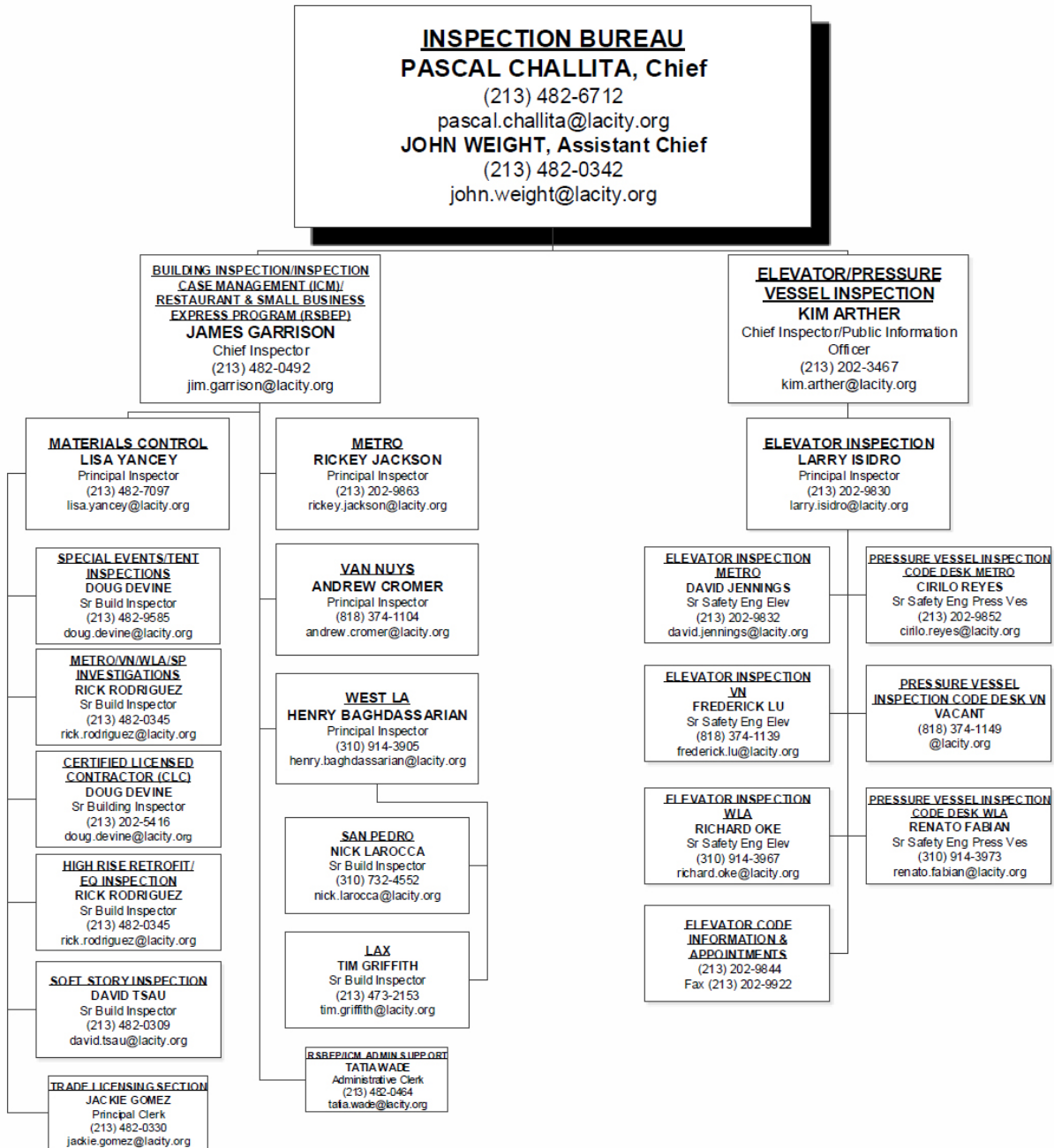
8B.2 CITY OF LOS ANGELES



8B.2.1 Permit and Engineering Bureau



8B.2.2 Inspection Bureau



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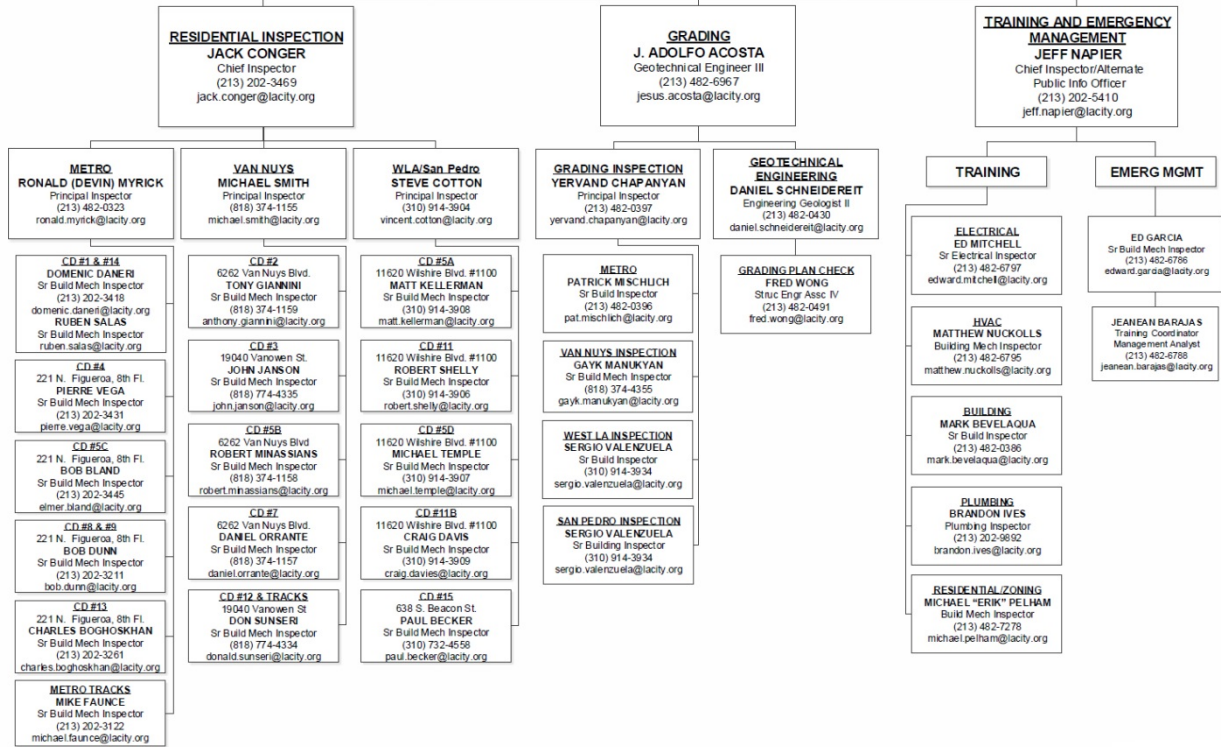
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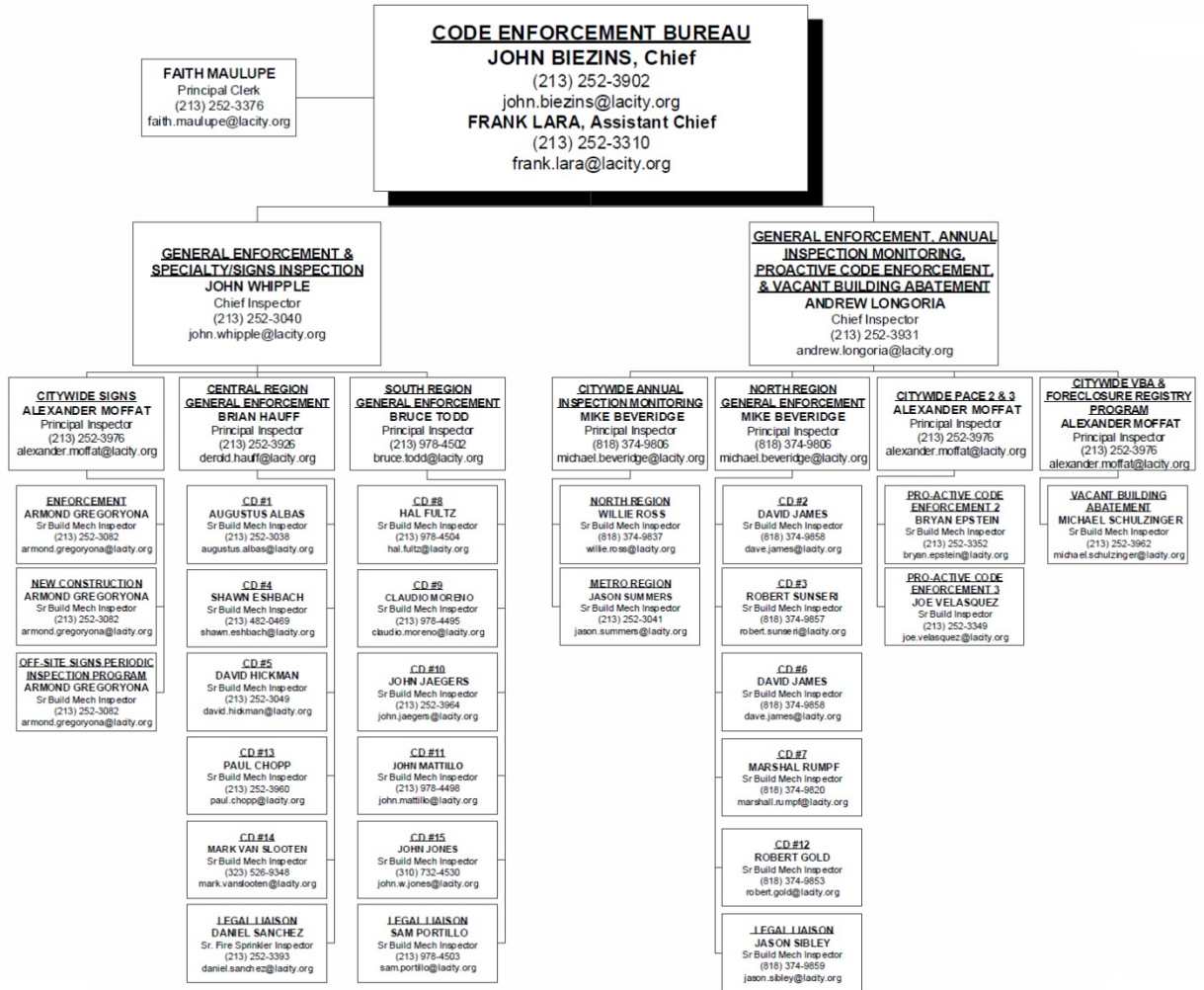
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