

## **Application of Building Construction Rules on Residential Buildings: A Case Study on Chandgaon Residential Area in Chattogram**

**Arzu Akter Shermin<sup>1</sup>**  
**Dr. Muhammad Rashidul Hasan<sup>2</sup>**

### **Abstract**

Building construction is an important issue in urban planning that immensely impacts livability. Proper guidance in this regard is needed to build a planned city. To guide building construction in a planned way there are rules and regulations relating building construction (BC) in Bangladesh. But most of the buildings in the urban areas in Bangladesh are being constructed without following building construction rules or even without permission of the concerned authority. All these things are creating problems, which ultimately have resulted to a haphazard development of urban areas. This study is about the application of building construction rules on residential buildings in Chattogram City. Chattogram is the 2nd largest city of Bangladesh and Chandgaon residential area is an old planned residential area of this city that primarily belongs to the higher income people. This paper aims to examine the current practices of BC rules on residential building in Chandgaon residential area in Chattogram city, to identify the reasons for violation of BC rules as well as exploring the consequences due to these violations and to propose recommendations for effective application of BC rules. A field survey among the house owners of the buildings through questionnaire and face-to-face interview was conducted to collect necessary primary data. It is expected that this research would be an important document to shed light towards the state of implementation of BC rules, reasons behind subsequent violations and its consequences. It would further help to aware the relevant authorities as well as residential building owners to follow BC rules and thus to ensure a planned and healthy living in residential areas in a city.

**Keywords:** Building Construction Rules, Building Setback, Planned residential area, Development Authority.

### **Introduction**

Building construction is one of the important issues of urban planning. Proper guidance in this regard is needed to build a planned city (Hashemi, 2006). To guide building construction in a planned way there are building codes, building construction (BC) laws or bye-laws in Bangladesh. “The building codes or bye-laws are defined as the standards and specifications designed to minimum safeguard to the workers during construction;

---

<sup>1</sup> Undergraduate Student, Department of Urban and Regional Planning, Chittagong University of Engineering & Technology (CUET), Chattogram-4349, Bangladesh. Email: [aaarzuu.10@gmail.com](mailto:aaarzuu.10@gmail.com).

<sup>2</sup> Professor, Department of Urban and Regional Planning, Chittagong University of Engineering & Technology (CUET), Chattogram-4349, Bangladesh. Email: [mrhasan@cuet.ac.bd](mailto:mrhasan@cuet.ac.bd).

to the health and comfort of users; and to provide enough safety to the public" (Rangwala, 1996). It is intended to ensure soundness and stability of structures and the health and welfare for the occupants. But due to rapid urbanization and higher population growth rate, different income level people from different professions live in the city in different types of residential areas as owner or as a tenant. In this process, Individual or private developer companies are building houses on respective land to cater the residential demand of the city.

Chattogram is the 2<sup>nd</sup> largest city of Bangladesh. Initially Chittagong Town started to flourish as a tiny district town and expanding with its port activities only on the northern bank of river Karnaphully (Khaled, 2012). The city is getting urbanized day-by-day due to its seaport and related trade and business activities. The population of the city increases day by day with natural growth as well as migrant people coming towards the city in search of jobs opportunities at this city. As a developing country with massive population and poor economic situation, Bangladesh is facing an immense difficulty to ensure adequate and affordable housing for all which is a basic need as well. Over the years, Bangladesh is facing problem to provide adequate housing for all (Islam, 1996). Due to rapid growth of population and urbanization, development of residential areas in urban areas of Bangladesh are going on in an unplanned way. Chittagong city, having huge housing demand for its population, is not an exception in this regard. Chattogram Development Authority (CDA) took various initiatives in the past to establish housing facilities in different parts of the city, however those endeavors are inadequate against the demand for housing in the city.

Built environment of the residential areas in a city is a critical element for planning. To keep a healthy and sound living environment within residential area, proper application of Building Construction (BC) Rules is a prime requirement (Kawsar, 2016). It is an irony that general people in Bangladesh are usually not willing to follow the Building Construction (BC) Rules. So, it is high time to control the planned growth of the city as per the regulations prescribed by Chittagong Development Authority (CDA), as well as other rules relating to building and planning in Bangladesh. CDA follows building regulations of Chattogram Mohanagar Imarat Nirman Bidhimala, 2008 to control building constructions in the city. It provides more authority to CDA to monitor the development of the city and designate the responsibilities of building designers, structural engineers, site supervisors as well as other professionals and describes the penalties of violation and noncompliance. This paper attempts to identify the extent of violation of building construction rules, nature of the violation of rules and the underlying causes behind the violation. This investigation is concentrated on residential buildings only. This study explores the reason behind violation of BC Rules and it also analyzes the constraints to apply BC Rules for residential buildings at urban areas.

### Aim and Objectives

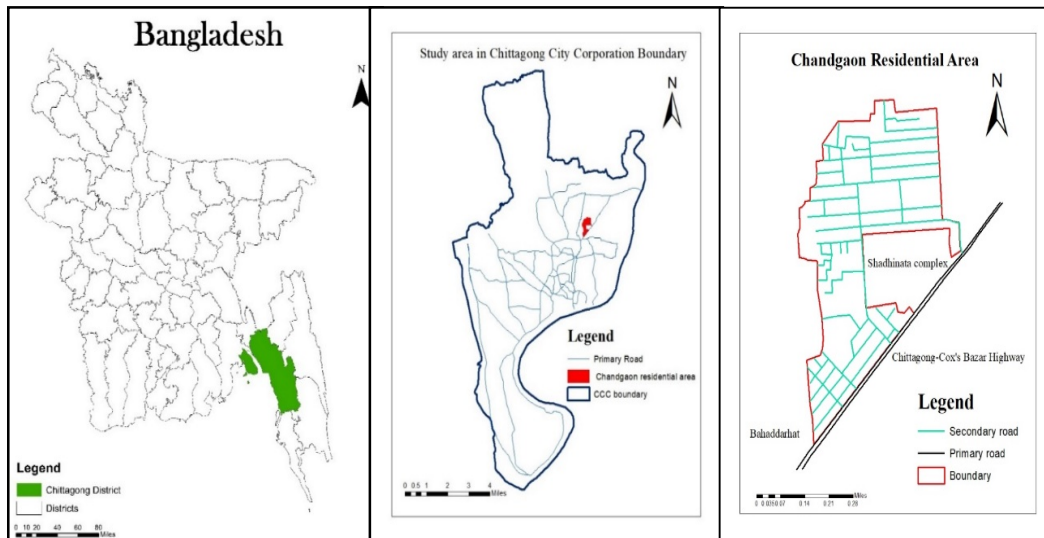
The aim of this research is to analyze the level of implementation of BC rules with special emphasis on setback, height and parking spaces, on residential building at CDA area.

The specific objectives of this study are:-

- ✓ To examine the current practices of BC rules on residential building in Chandgaon residential area in Chattogram city.
- ✓ To identify the reasons for violations of BC rules and investigating the consequences due to the violations.
- ✓ To propose recommendations for effective application of BC rules for planned development.

### Methodology of the Study

Chandgaon Residential Area of Chattogram City is selected as the study area. This is one of the oldest residential area that was planned during 1962-1980 by Chattogram development authority.



**Fig 1:** Location of the Study area.

Primarily a reconnaissance survey was conducted followed by questionnaire survey of the households in the study area. Yamane (1967) provides a simplified formula to calculate sample size. Sample size were determined through following equation,

$$n = N / [1 + N (e)^2]$$

Here, n is the sample size, N is the Total Number of Plot (746), e is the level of precision (5%) at confidence level 95%. Applying the figures to the equation, 260 households, divided into six zones, have been selected for survey.

**Table 1:**Sample distribution of the study area

Chandgaon Residential Area	Total Number of Plot	Sample size
Block A (West side)	92	32
Block A (East side)	84	29
Road no 1,2,3	117	41
Road no 4,5,6,7	115	40
Road no 8(a),8,9,10	179	62
Road no 11,12,13,14	159	56
<b>Total</b>	<b>746</b>	<b>260</b>

Sample of the respondents were selected through random sampling. Here each residential building is a sample unit and the owner of that building is the respondent. Through questionnaire survey, the primary data were collected to collect required information. A team was formed to carry the field survey in details. Secondary data was collected from review of Building Construction Rules, Chattogram City Master Plans and Detailed Area Plan of Chattogram Development Authority (CDA), various journal and conference papers, newspapers etc. Interviews of concerned stakeholders i.e. planners, architects, civil engineers, Ward Councilors, were conducted to know various issues relating to the study of implementation of building construction rules. Data have been analyzed by SPSS (Statistical Package for the Social Sciences) software. Several analyses were made on different issues regarding building construction such as setback violations including different uses of setback, extension of buildings at the upper portion, vegetations and greeneries in the setback area etc.

### Results and Discussion

The respondents of the survey for this study are mainly the landowners. When the landowners were not available for survey, their family members were considered as their representative.

**Table 2:** Age Level of respondents of Chandgaon Residential Area

Age	Frequency	Percentage
21-30	24	9.2
31-40	69	26.5
41-50	51	19.6
51-60	68	26.2
Above 61	48	18.5
Total	260	100

Source: Field survey, 2019

Table 2 shows that 26.5 percent respondents are aged within 31 to 40 years and 26.2 percent respondents are between 51 to 60 age group who have experiences and have sufficient knowledge about the residential development.

**Table 3:** Education level of respondents of Chandgaon Residential Area

Education state	Frequency	Percentage
Below SSC	2	0.8
SSC	2	0.8
HSC	27	10.4
Graduate	229	88.1
Total	260	100

Source: Field survey, 2019

Among the 260 respondents, most of them (88.1%) are graduate as shown in the Table 3. Only 0.8 percent are below SSC level and 10.4 percent have HSC certificate. As the main respondents are the land owners and this Chandgaon area was initially planned for the government employees, the level of education of building owners are quite relatively high.

**Table 4:** Occupation of respondents of Chandgaon Residential Area

Occupation	Frequency	Percentage
Business	59	22.7
Govt. service	115	44.2
Semi-govt. service	14	5.4
Private	60	23.1
Others	12	4.6
Total	260	100

Source: Field survey, 2019

Initially Chandgaon residential area was planned for the government employees. Later on, some businessman, semi-government, private employees purchased land in this area. From the Table 4 it is found that 44.2 percent respondents are in government service. The percentage of businessman is 22.7 whereas semi-government is 5.4 and private sector employee is 23.1 percent.

**Table 5:** Land ownership of Chandgaon Residential Area

	Frequency	Percentage
Family source (Inheritance)	5	1.9
Gift (Heba)	4	3.5
Purchased	251	96.5
Total	260	100

Source: Field survey, 2019

The source of land ownership are shown in the Table 5. Most of the land owner (96.5 percentage) purchased the land in the study area, only 1.9 percent owned land from family source and 3.5 percent possessed land as gift from family members.

**Table 6:**Frequency of Building construction over the years inChandgaon Residential Area

Construction Year	Frequency	Percentage
1970-1974	3	1.2
1975-1979	5	1.9
1980-1984	7	2.7
1985-1989	10	3.8
1990-1994	15	5.8
1995-1999	23	8.8
2000-2004	26	10.0
2005-2009	36	13.8
2010-2014	95	36.5
2015-2019	40	15.4
Total	260	100

Source: Field survey,2019

Most of the buildings (36.5 percent) are built in the year 2010 to 2014 that have been shown in the Table 6.Proportion of buildings constructed between 2015 to 2019 is 15.4 percent.

**Table 7:** Approval of plan for building construction of Chandgaon Residential Area

Plan approval	Frequency	Percentage
No	2	0.8
Yes	258	99.2
Total	260	100

Source: Field survey,2019

Before starting the building construction, 99.2 percent buildings took priorapprovalfrom the Chittagong Development Authority. From Table 7 it is observed that only 0.8 percent building are constructed illegally without building approval plan from development authority.

### **Status of Building Setback in Residential Plots**

Setback is generally defined as left over space around a building. The land contained in the setback belongs to the owner of the property. Setback requirements for different plots of varying sizes are defined in ChattogramMohanagarImaratNirman Bidhimala-2008. For this research, total plots of the study area have been categorized in four groups. For each group, minimum setback rules are stated in the Table 8.

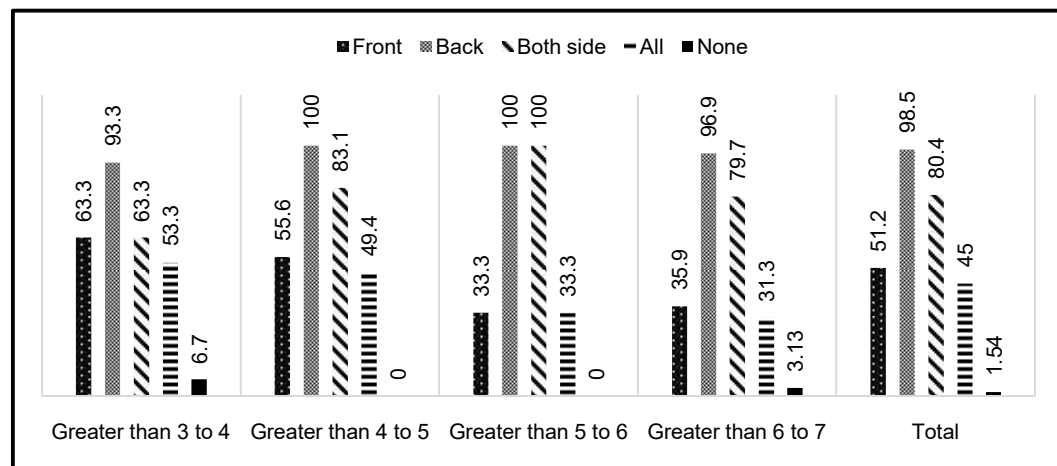
**Table 8:**Setback standards according to different size of plots

Plot size (Katha)	Minimum setback (m)		
	Front	Back	Both side
Greater than 3 to 4	1.5	1.5	1.00
Greater than 4 to 5	1.5	2.0	1.25
Greater than 5 to 6	1.5	2.0	1.25
Greater than 6 to 7	1.5	2.0	1.25

Source: CINB -2008

**Existing conditions of setback of the buildings**

The minimum standard of front setback for all categories of plots is 4.92ft (1.5 m) according to ChattogramMohanagarImaratNirman Bidhimala-2008. The minimum standards for rear and side setback for different sizes of plots according to the CMINB-2008 are given in Table 8.

**Figure 02:** Existing setback violations of the buildings in Chandgaon residential area

Source: Field survey,2019

Figure 2 reveals front, back, both side and all setback violations in percentage. From this figure, it is found that most of the buildings do not follow the minimum standards for setback. For the plot sizes ranging between 3 to 4 katha, only 6.7 percent buildings have not violated the setback rules whereas it is only 3.13 percent for 6 - 7 katha plots. The total amount of no setback violation is 1.54 percent of the total buildings. This table indicates a huge amount of setback violation in the back side of the buildings. Then side violations are also very common but most of the buildings tried to maintain front setback in their own way. This study finds that 51.2 percent respondents have front violation, 98.5 percent have rear setback violation, 80.4 percent have both side violation and 45 percent have all setback violation.



### Permissible Building Height

In this study more than 50 % building of the study area were constructed before the year 2008. According to the Building Construction Rules' 1996, permissible height of the building is determined based on the following formula.

Height = 2 x (road width + setback space from the road edge to building line)

**Table 9:** Violation of building height restriction

Katha	Plot No	Height violation	
		No.	%
Greater than 3 to 4	30	19	63.33
Greater than 4 to 5	160	132	82.5
Greater than 5 to 6	6	6	100
Greater than 6 to 7	64	54	84.34
Total	260	211	81.15

Source: Field survey, 2019

From the Table 9 it is clear that the larger the plot size, the higher the height violation. According to FAR standard given in Chittagong Imarat Nirman Bidhimala 2008, 84.34 percent buildings violated FAR guidelines in the amount of land greater than 6 to 7 katha. For Plot sizes of 5-6 katha, 100 percent of buildings have violated the building height regulations. Moreover 84.34 percent respondents of land owners greater than 6 to 7 katha, have violated height regulations. In Chandgaon Residential Area, the authority planned to allow buildings not more than six storied. Most of the roads are thirty feet wide for vehicular movement.

### Rules and Practices relating to Car Parking Facilities

It is very much essential to make provisions for parking facilities at the time of residential building construction. According to Building Construction Rules, sufficient space is required in every building for car entry and exit in the residential building. Parking spaces may be covered or without covered. If ramp facilities exist in the parking lot, then it is at least 1:8 roofs and the lot is at least 3 meter far from the road. This study reveals that 67.3 percent buildings have parking space and 32.7 percent buildings do not have proper parking facilities. Most of the buildings use the ground floor of the building as parking space without keeping garage or open space for parking.

### Light and Air Circulation Facilities

The standard for light and air circulation is not much detailed in the BC Rules. In every living room of building – doors, windows, fan and lights should be existed for smooth circulation of light and air facilities. The kitchen should be positioned at the back wall of the building.

Chandgaon residential area is planned residential area and mainly higher and higher middleclass people resides here. For these reasons, light and air circulation scenarios are comparatively better here (Source: Field Survey, 2019)

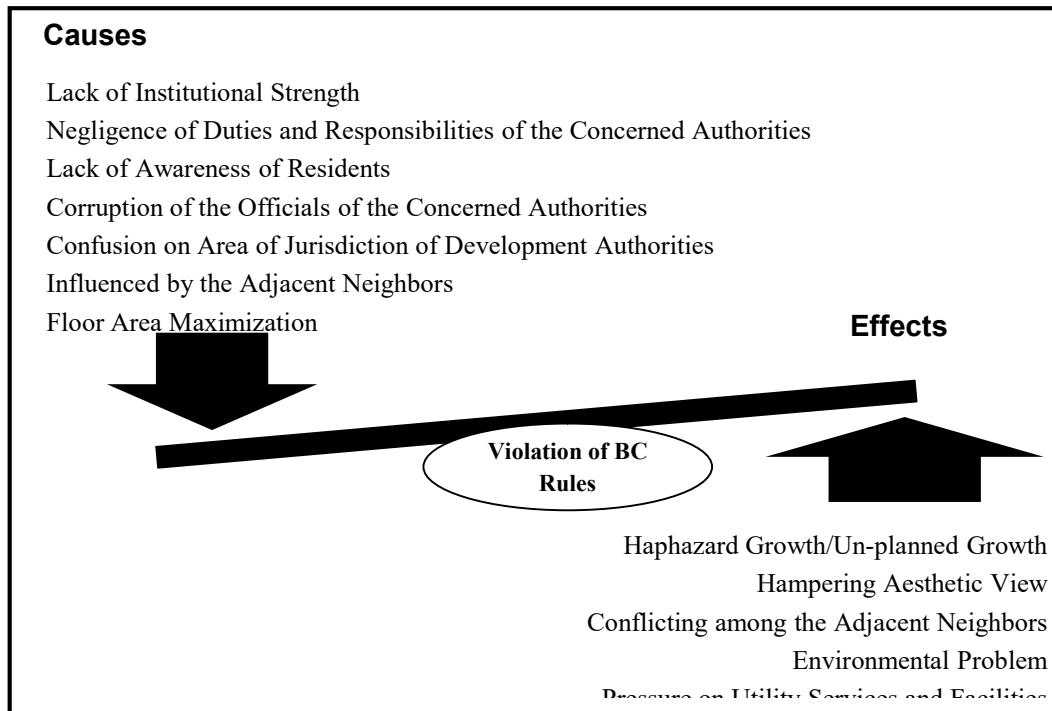
### **Use of Building Setback Area for Different Purposes**

Proper setback provides open space for landscaping and recreational use within the property boundary. If the rules and regulations are maintained properly that are related to the building setback then more open spaces can be found for various activities. Other uses include drains, waste dumping place, small passage etc. Sometimes children use setback area as play space for their recreation. This study found that only 1.29 percent of households have used the setback area for vegetable garden as setback area for the buildings are inadequate for plantation. People have a tendency not to use the setback area because of being very small due to the violation of the setback rules during building constructions.

### **Reasons for violation of BC rules and its consequences**

This study explores the nature and causes behind the violation of BC rules in residential area of Chattogram city. In Chandgaon Residential Area, most of the buildings have not been constructed according to setback rules. This is due to some specific causes like dishonesty of the building owners during construction of buildings and improper inspection by the Authorized Officers of Chattogram Development Authority. About 68% of the completed building in the study area was not constructed according to building construction rules. Different types of setback rules violation were ascertained during this study. For creating a healthy living environment of the city, Chattogram Development Authority (CDA) has created a planned housing estate with serviced plots. Since the completion of the project, only a few number of plot owners have constructed houses on their plots properly.

Figure-3 shows the principal and common causes and consequences relating to violation of BC rules. Besides the above reasons, there is another important reason for which the inhabitants of the study area usually violate BC Rules is that – though the National Building Code was formulated in 1993, however it has not been made mandatory to follow by the building owners or developers.



**Fig 03:** Reasons and effects of the violation of BC rules

**Table 10:** Percent of responses of dwellers on the reasons of violation of BC rules

Reasons	(%)	
	Yes	No
Lack of institutional strength	63	27
Negligence of duties and responsibilities of the Concerned Authorities	83	17
Corruption of the Officials of the Concerned Authorities	48	52
Confusion on rules & regulations	90	10
Lack of awareness of the residents	69	31
Influenced by the adjacent neighbors	81	19
Floor area maximization	92	08

Source: Field Survey, 2019.

Various reasons regarding violation of BC rules are identified in the study. Among these reasons; lack of institutional strength, negligence of duties and responsibilities of the Concerned Authorities, corruption of the Officials of the Concerned Authorities, confusion on rules, lack of awareness of the residents, influences of adjacent neighbors and greed for floor area maximization are notable. The main cause behind the violations of building construction rules in residential area is due to inappropriate monitoring by the authority during and after construction of the buildings. These irregularities are mainly due to the dishonesty by some officials of the development

authority. They have somehow allowed building owners and developers to violate the construction rules. Even sometimes without visiting the building in person, the inspectors submit report to authority. Lack of awareness of the residents is one of the most important reason for which peoples do not follow the BC rules. In the four study areas, maximum people do not know about the BC rules. Naturally people want to maximize their floor area to have large floor spaces and therefore they believe they can earn more if they can increase floor area by any means. When they submit their plan to the authority for approval of the plan, they show it having necessary compliances with the building construction rules. After getting the approval from the Authority, they construct their building as their wishes and requirement violating the permitted plan.

### **Problems Faced by the Dwellers for Violation of Different BC Rules**

The residents of the area are facing various problems due to the violation of the BC rules. Due to violation of setback rules, the buildings are congested to each other. So, the inhabitants of the buildings do not get adequate air and sunlight. 95.8 percent respondents think that building construction rules (setback, height and parking) are violated by their neighbors. Only 4.2 percent respondents have no concern on the building construction rules violations. Most people are not worried about the effects of these violations. Due to inadequate air and light people use more electricity that also increases electricity bill and family expenditure. Lack of natural ventilation system creates various health problems to the residents.

**Table 11:** Problems create in environmental aspect due to violation of rules

<b>Environmental problems</b>	<b>Frequency</b>	<b>Percentage</b>
Lack of sunlight	107	41.2
Lack of air circulation	77	29.6
Tree cutting	19	7.3
Odor problem	15	5.8
Lack of green cover	25	9.6
Heat generation	17	6.5
Total	260	100

Source: Field survey, 2019

Table 11 shows 41.2 percent people are not getting enough sunlight in their buildings. Only 5.8 percent respondents feel the odor problem due to the congestion of huge population, 6.5 percent think about heat generation, 29.6 percent feel the lack of air circulation. 7.3 percent think people are cutting trees disregarding the rules.

### **Social problems due to rules violation**

People usually keep 3 to 6 feet setback in the ground floor mainly for passage and then extend the buildings from upper floors violating setback rules. Such types of activities distort the normal design of buildings and reduce the space between two consecutive

buildings. As a result privacy between adjacent buildings is being hampered. It creates safety and security problems to the buildings. Such situation creates enormous problems at the time of building repair, reconstruction and maintenance.

**Table 12:** Problems create in social aspect due to violation of rules

Social aspects	Frequency	Percentage
Privacy problem	63	24.2
Confliction among neighbors	71	27.3
Disturbance	83	31.6
Over population	26	10
Traffic	1	.4
Pressure on utility service facilities	16	6.2
Total	260	100

Source: Field survey, 2019

Table 12 shows that 31.6 percent respondents feel disturbance due to building construction rules violation and 24.2 percent face privacy problems from the surroundings. In 27.3 percent circumstances, conflicts happen among neighbors, 10 percent respondent think about over population, 0.4 percent consider traffic generation and 6.2 percent feel the pressure on utility service facilities as major problems in Chandgaon residential area.

### Feedback from the officials of CDA

Key Informant Interview has been taken from the Chittagong Development Authority officials to understand their perspective regarding enforcement of building rules. According to them, they attempt to follow and implement Building Construction Act 1952. Initially this residential area was planned only for government employees but not all plots are occupied by them. Although it is a matured area now, still many plots are under construction or vacant. Many plots were developed in the beginning of twenty one century when the Bangladesh National Building Code (BNBC) 1993 and Chittagong Imarat Nirman Bidhimala 2008 was published. The authority had attempted to restrict the development of buildings not more than six storeys.

There are no punishments or inspection practice after the completion of building construction to find out the anomalies between approved and implemented plans. For this reason, the levels of violations of BC rules are extreme according to the officials of the authority. In a developing country like Bangladesh, where land is a very precious and constructing a building is a long term process, giving appropriate punishment to the violators is not easy going phenomena due to various social and political reasons and therefore demolishing buildings that didn't follow the rules are not practiced often.

The authority tries to inspire people in following the building construction rules during approval of the plan. Lack of skilled manpower, proper monitoring and corruption as

well, it becomes difficult to apply. Also lack of awareness influences the violation of building construction rules. Building owners usually think keeping some open space is a waste of land. This belief is engrossed in most of the landowners and to make more benefits they violate the rules and approved plans. Authority needs to take stringent measures to stop these violations to keep the built environment planned and sustainable for the dwellers of the neighborhood.

### Recommendations

Chittagong Development Authority officials never visit the site area after the completion of building construction to inspect if there are any inconsistency between the approved plan and constructed buildings. To encourage the people to follow the building construction rules, the respondents marked following suggestions as stated in Table 13.

**Table 13:** Suggestions of the respondents for inspiring people to follow Building Rules

Solution of Problems	Frequency	Percentage
Practicing penalty system	116	44.6
Making Authority responsible	46	17.7
Making rules more comprehensive	66	25.4
Increasing awareness	32	12.3
Total	260	100

Source: Field survey, 2019

From the Table 13, it is observed that 44.6 percent respondents are agreed to start practicing penalty system to encourage others. 25.4 percent advised to make rules more comprehensive to understand. 17.7 percent suggest to making Development Authority responsible and 12.3 percent think increasing awareness among people will increase the enforcement of building construction rules.

After discussion with the respondents and officials from Development Authority, following recommendations are given below.

**Enforcing law effectively** - There are lots of government agencies and authorities as well as laws and rules. But lack of proper enforcement, people tend to violate them. During the survey, it has been revealed that proper enforcement of law could minimize the violation of building and planning rules.

**Increasing awareness among people** - In most cases people were not clear about the intentions of building construction rules. They were not properly knowledgeable about the benefits of following the rules or the difficulties associated with the violation of the rules. In some point, they were not updated with the newly declared or upgraded laws and rules. The relevant authority (Chittagong Development Authority) should take necessary strategies like programs, advertisement, seminar to inform people about the rules, its benefits and adverse effects.

**Making the rules more comprehensive-** Most of the people are not properly cognizant with the language of laws which are pretty hard to understand for general people. The rules need to make more understandable for common people to comprehend easily.

**Enforcement of penalty and fines-** It is quite important to enforce appropriate punishment who violates the rules and approved plans. Monetary fines in large amount for violations will be very helpful to reduce the level of violations.

**Improving the manpower and capacity of the development authority-** Due to lack of effective skilled manpower, field inspection couldn't be done by the development authority. The development authority is not efficient enough with their manpower and technology to exercise their powers. Therefore necessary steps should be taken to improve the manpower and capacity of the development authority to inspect building development process.

### Conclusion

This research attempts to explore the applications of building construction rules in a residential area which is developed under the Chattogram Development Authority. Questionnaire survey of the key respondents (land owners), field observation, interview of the authority officials were done to find the results. This study found some important reasons for the violation of building rules and proposed some recommendations regarding the proper implementation of Building Construction Rules.

Findings from this study would be helpful to get an idea regarding applicability of building construction rules in a residential area planned by a government authority as well as comparing the applicability of building construction rules with privately developed planned residential areas. In addition, this study would be helpful to the concerned authority to know the perceptions of building owners and people of the neighborhood as well as to explore the reasons of violations of the building rules. According to the findings and recommendations of this study, necessary steps should be taken to improve the manpower and capacity of the development authority to inspect building development process for creating a sustainable environment in an urban residential neighborhood in Bangladesh.

### References

- Hashemi, K. M. A. (2006). *City Report of Chittagong*. Chittagong City Corporation Bangladesh.
- Islam, N. (1996). *Sustainability Issues in Urban Housing in a Low-income Country: Bangladesh*, 377.
- Khaled, M. C., Sultana, T., Biswas, S. K., & Karan, R. (2012). *Real Estate Industry in Chittagong (Bangladesh): A Survey on Customer Perception and Expectation*. 38.
- Kausar, M. M., & Hasan, R. M. (2016). *Urbanization and Planned Residential Area Development Practice According to Existing Standards*. 3<sup>rd</sup> International Conference on Advances in Civil Engineering Chittagong. CUET, Chittagong, Bangladesh.
- Rangwala, K.S. and Rangwala P. S., (1996), *Town Planning*, Charotar Publishing House, India