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Framework for Town Planning Process in Metropolitan Cities of India

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Abstract - *Town Planning is not about the road system or the utilities but it's about the built environment and how we interact with it to improve our lives. Planning of these cities is done to adapt to the dynamic urban condition although constrained by the technical and bureaucratic process of master/development plan. Hence, this research paper aims to create a process framework for the town planning procedure. We built this process framework to help people understand the overall procedure, group the various processes involved into a classification structure and to give an overview of how they relate to each other for better understanding. This process framework is prepared with reference to the Model Building Bye-Laws (MBBL) coupled with my field study of the process along with inputs from various experts of the field. The developers, builders, and contractors can utilize the process framework in the future to get a holistic view of the town planning process. Also, they can directly use this stepwise method to facilitate themselves in completing the process efficiently without missing any detail.*

Key Words: **Town Planning, Built environment, Framework, Model Building Bye-Laws, Metropolitan region, Developers, Builders, Contractors.**

1.INTRODUCTION

While we have built cities over the centuries, they also have built us and defined who we are. As rapid industrial growth is coupled with an increasing level of urbanization, the recognition for viewing urban development as a whole integrated development was felt by the town planners. To manage the transformation of Indian cities and towns and to effectively manage the growth, effective urban planning is a must which includes planning protocols, processes, and institutions underpinned by effective legislation. It essentially means that the irregular landholdings and plots will have to be given regular shapes, they must be ordered, each plot must be given access to basic services such as water supply, access roads, drainage, etc. The land must be appropriated for providing roads, parks, social amenities, low-income housing and development controls ought to be prescribed to bring changes in the quality of the built environment and levy development or improvement charges to offset the cost incurred of developing the physical and social infrastructure [1,2]. The seven basic Motivations in town planning are as follows:

a) Health: It means providing hygienic conditions for a healthy relationship between human beings and their environment and providing an environment meeting nature protection criterion.

b) Wealth: It means providing equal opportunities to generate wealth for all the personnel involved- investor, developer, customer, etc.

c) Community: It means creating the conditions for a homogeneous and integral community, a common cultural idea existing in the public consciousness when the members of the society submit to a common idea of public benefit.

d) Beauty: It means creating an aesthetic harmonic environment.

e) Individualization: It is based on human values of rights and liberties and includes the idea of the sacred right of private property and private life.

f) Information: It is based on overcoming chaos in cognition, in activities and the environment.

g) Spirituality: It consists of historical and cultural heritage conservation, which concerns the sources of the society's self-perfection.

1.1 History of Town Planning in INDIA

Archaeologists in search of the origins of town, often trace the history of urban planning in India back to the cities during the Indus period from 2600–1900 BCE. The towns Dholavira, Mehrgarh, Harappa, and Mohenjodaro are generally defined by rectilinear streets and supported by a well-developed infrastructure and sit at the center of India's city planning heritage. Excavations of the Indus Valley Civilization, beginning at Harappa in 1921 and continuing to date, have divulged a network of interconnected cities, towns, and villages stretching from the Arabian Sea to Afghanistan. These towns were distributed along the banks of the Indus River and its present-day tributaries. The Indus Valley cities featured high-density human settlements, large-scale monumental architecture and efficient water supply and sewage systems [3, 4]. But then during the colonial era- the early part of the 20th century, major cities were consciously laid out according to military and political needs. The other underlying ideas of colonial planning in India were concerns of public health and sanitation, spatial and social segregation, colonial dominance and control.

The main objectives of the Maharashtra Regional and Town Planning Act, 1915 are:

a) Provisions for Regional Planning and Town planning Schemes.

b) Implementation of schemes i.e., Land Acquisition, Transfer of Development Rights and Plot Reconstitution Techniques.
c) To provide for the creation of New Towns through Development Authorities;
d) The Finance Aspect (Finance account and Audit)
e) Governance for Plan Enforcement/ Planning Authority [5].

1.2 Objectives of Model Building Bye-Laws

The Building Bye-Laws are legitimate tools that are used to regulate coverage, architectural design, height and overall development of town/cities various other construction aspects of buildings so as to achieve well-organized development of a sector/ zone. They are mandatory and serve to protect buildings against fire, earthquake, noise, structural failures and other hazards. If the laws are not implemented properly, it may lead to excessive coverage, encroachment and disorganized development resulting in haywire conditions, inconvenience for the users, disregard for building aesthetics, etc. It is in this context, the Bye-Laws were created for the guidance of the State Governments, Urban Local Bodies, Urban Development Authorities, Rural governing bodies, etc which is an improvement over the previous Model Building Bye-Laws established in 2004 by the Town and Country Planning Organization, Ministry of Urban Development, India [6]. The salient features of Bye-Laws are given as under
a) **Safety and security:** They give an idea about structural safety, disaster management and Bureau of Indian Standards (BIS) Codes of Structural Design Basis Report (SDBR) for various types of building. It also has preventive measures against "Soft Storeys" in multi-storeyed buildings and proof-checking of Structural Design for buildings.
b) **Barrier-Free Environment:** It has provisions for differently abled, elderly and children to be used during site development, access path/ walkway, Parking, Stair, Lifts, Toilets, and signage.
c) **Environmental Concerns:** It incorporates for green buildings and sustainability provisions, rainwater harvesting, wastewater reusing and recycling and installation of solar rooftop norms.
d) **Adoption for Modern Construction Technology:** This defines the structural safety and other provisions for high-rise building regulations with parking, peripheral open spaces including setbacks.
e) **Ease of Doing Business:** Additional provisions are made for online approval of building plans by adopting automated systems for scrutiny of plans, generation of report/ approvals and integrated systems of intimation of approval, compliance report from drawings for automatic generation of completion certificate and integration of various clearances at master plan levels for empowering architects, outsourcing non-discretionary verification jobs and formulation of citizen's charter.
f) **Rain Water Harvesting**: It has indicative provisions for Rain Water Harvesting (RWH) in various types of buildings along with the responsibility of Urban Local Bodies (ULBs) for RWH in public spaces, provisions for enforcement and monitoring.

2. FRAMEWORK

This is a process framework that essentially lists all the key processes required for the establishment of all types of buildings such as residential, commercial, industrial, etc. in a metropolitan city within India. The reason that we built this process framework is to help people understand and group processes into a classification structure. It also explains how the processes relate to each other and how they help to get things done. The details of the proposal/project framework are as follows:

1) Ownership of the land:

a) Property Card or 7/12 extract: A property card provides information about the ownership of a property and the history of holdings of land located in an urban area. You must check the property card of the seller and ensure his/her ownership of the land. It contains the following information about a property such as the:
i) Name of the landowner.
ii) Survey number of the land.
iii) Area of the land.
iv) Location coordinates.
v) Changes in ownership.
vi) Details of loans taken by the owner from government agencies, if any.
vii) Details of pending litigations, if any.
viii) Details of tax levied on the land- it includes paid and unpaid taxes.
b) City Survey Plan: Chain and Triangulation Survey (CTS) Number is an identification number allotted to a land plot. It is a revenue document or Record of Title held by the Government Revenue Department which has a record of the status and boundaries of the land and title as per their records.
c) Conveyance Deed: It is a binding contract that is enforceable in a court of law. Hence, it is through conveyance deed that a seller transfers all rights to the concerned buyer. The purchase of a property/land is not complete without a valid duly registered conveyance deed. The contents of the conveyance deed are as follows:
i) The actual demarcation of the property boundaries.
ii) Rights annexed to the property and its uses.
iii) The full chain of transfer of titles, that is all legal rights up until the present seller.
iv) The method of delivery of the property to the buyer by the seller himself.
v) A memo of the consideration, stating how and when it has been received.

vi) Any further applicable terms and conditions for the full transfer of ownership rights.

2) Developer:

a) Power of Attorney (POA) Constituted Attorney (C.A) to the owner: It is a written authorization given by the landowner to the developer, for the latter to represent or act on the former's behalf in a business/ legal matter and to develop the property. The owner who authorizes the developer to act is also known as the principal, grantor/donor (of the power). The one who is authorized to act is the agent or attorney.

b) Development Agreement: It is a wilful agreement between an appointed developer and the owner or controller of a property within the local jurisdiction area. It details the obligations of both parties and specifies the standards and conditions that govern the development of that particular property. Even though the agreements are voluntary, once signed/ stamped they are binding on both the parties and their successors for the specified period. It also assures the developer that the development regulations that apply to the project will not change during the term of the agreement.

3) Architect:

a) Development Plan (D.P) Remarks: It is a true part extract of the Sanctioned Development Plan published by the government giving details of the zone the plot is located in. Also, it is used to verify if there are any prior arrangements/ reservations on the property or nearby areas. It also talks about the existing and proposed roads near the plot and if there is any height restriction on the structure due to its proximity to defence establishments or commercial airports as provided by the Directorate General of Civil Aviation (DGCA).

b) Plot Reservations: It means a plot of land is reserved for a buildable public purpose such as schools, dispensaries, municipal markets, etc. where the landowner has an option of handing over the specified part of the land along with developed amenity to the Municipal Commission, for the intended public use. The owner receives compensation money in exchange for the transfer of reserved land which has to be free from any impediment.

c) Access road width: Plots which do not abut on a public street shall abut on a means of access/ right of way, the width and other requirements given in Table 1

Access road width (m)				
Access length in meters (m)	Area Served (sq. m)			
	Less than 1,500	More than 1,500 & up to 4,000	More than 4,000 & up to 10,000	More than 10,000
	Width in meters (m)			
Less than 75	6	7.5	9	12
More than 75 & up to 150	7.5	7.5	9	12
More than 150 & up to 300	9	9	9	12
Over 300	12	12	12	12

Table 1

d) Floor Space Index (FSI): It is the ratio of the total floor area of a building (Built-up area) to the total Plot area (land) on which it is built. It predominantly depends on the width of an abutting access road. The other factors involved are the zone, type of building and other amenities. Construction can only be built up to the FSI imposed by the government policies. It is also known as Floor Area Ratio (FAR).

FSI Indices in Residential, Commercial and Industrial zones

Sr. No.	Areas (1)	Zone (2)	Road Width (3)	Zonal (4)	Additional FSI on payment of premium (5)	Admissible TDR (6)	Permissible FSI (4+5+6) (7)
1	City	Residential/ Commercial	i) Less than 9m. ii) 9m to 12m. iii) 12m to 18m. iv) 18m to 27m. v) 27m and above	i) 1.33 ii) 1.33 iii) 1.33 iv) 1.33 v) 1.33	i) Nil. ii) 0.50 iii) 0.62 iv) 0.73 v) 0.84	i) Nil. ii) 0.17 iii) 0.45 iv) 0.64 v) 0.83	i) 1.33 ii) 2.0 iii) 2.4 iv) 2.7 v) 3.0
2	Suburbs and extended suburbs.	Residential/ Commercial	i) Less than 9m. ii) 9m to 12m. iii) 12m to 18m. iv) 18m to 27m. v) 27m and above	i) 1.00 ii) 1.00 iii) 1.00 iv) 1.00 v) 1.00	i) Nil ii) 0.50 iii) 0.50 iv) 0.50 v) 0.50	i) Nil. ii) 0.5 iii) 0.7 iv) 0.9 v) 1.0	i) 1.0 ii) 2.0 iii) 2.2 iv) 2.4 v) 2.5
3	City	Industrial	-	1.0	Nil	Nil	1.0
4	Suburbs and extended suburbs.	Industrial	-	1.0	Nil	Nil	1.0

Table 2

e) Zone: Firstly, one has to verify under which zone does the plot belongs to because for development, the intended land use shall conform to the permissible uses of the zone as given in Table 3.

Zoning Definitions		
Zone	Symbol	Broad Description
Residential Zone	R	R-1: Primary residential zone. R-2: Unplanned/Informal residential zone.
Commercial Zone	C	C-1: Retail shopping zone. C-2: Commercial district centre. C-3: Wholesale, godowns, warehouses markets. C-4: Service sector. C-5: Regulated/ Weekly markets.
Industrial Zone		I-1: Service and light industry. I-2: Extensive and heavy industry.

	I	I-3: Special industrial zone-hazardous, noxious and chemical.
Public and semi-public zone	PS	PS-1: Govt/Semi Govt/Public offices. PS-2: Govt land PS-3: Police headquarter or Station PS-4: Educational and research PS-5: Medical and health PS-6: Social, cultural and Religious (including cremations and burial grounds) PS-7: Utilities and services

Table 3

f) Impact on Environment: The possible proactive measures to improve resource efficiency and reduce negative environmental impacts include:
i) Mainstreaming the environmental priorities into the city and local development plans, to reconcile urban economic growth with better resource efficiency.
ii) Incorporating emerging ideas about the green urban economy through green urban infrastructure/ building to generate environmental and social opportunities.
iii) Integrating reduction strategies for greenhouse gas emissions in urban planning, which can reduce the impact that cities have on the global environment while improving the quality of life for urban residents.
iv) Undertaking environmental rehabilitation projects that can enhance ecosystem services to improve the quality of the environment.
v) Expanding access to energy through green energy supplies, which can provide electricity to households that were previously reliant on wood or kerosene.
vi) Underpinning each of these strategies with strong political support and commitment [7].

4) Project Feasibility Report:

A feasibility study includes vital information and data as the funding needed to complete the project, the market opportunity, government regulations, risk factors, strengths and weaknesses of the management team and the financials of the company. A feasibility study may sound like a business plan but it tends to be much longer and detailed about the market and finances involved. The major topics covered in a feasibility report are as follows:
a) Need for the project.
b) Site selection and accessibility to site.
c) Proposed infrastructure/ building details.
d) Technical feasibility.
e) Financial analysis.
f) Conclusion.
The various types of Feasibility reports are as follows:

i) Real Estate Feasibility for a Construction Project: This is the most common feasibility study. Real estate feasibility reports include features such as the land survey, zoning laws, impact on the surrounding environment, traffic-related issues and general impact on businesses in the area. Housing developments such as co-op societies, row house schemes, apartments or larger projects such as hotels, buildings or sky scrapers often create real estate feasibility studies before land acquisition and development.
ii) Comprehensive Feasibility: It is an inclusive report that considers some of the most common business practices that should be implemented before undertaking any project. It includes various data such as land acquisitions and real estate issues, economic and socio-cultural impact on the surrounding areas, and more. Such comprehensive studies can be found in business plan features if the client wants a very long and detailed analysis.
iii) Financial Economic Feasibility: An economic feasibility study is conducted when a company wants to know if the proposed amount of capital and financing is sufficient to complete a project successfully.

5) Consultants / Technical services:

Various consultants are required in order to complete an infrastructure/ building project successfully. The consultants are appointed depending on their qualifications, their experience, their capability to carry out the proposed work and their salary demands. The following are the most commonly appointed consultants
a) Architect/ Licensed surveyor
b) Site supervisor
c) Structural engineer
d) Fire consultant
e) Licensed plumber
f) Rainwater harvesting consultant
g) Solid waste management consultant
h) Advocate/ Solicitor on record
i) Consultant for HVAC (Heating/ Ventilation and Air Condition)

6) Building Planning:

a) Preparation of Detailed Plans: Plans are the instructions provided through drawings containing engineering data and details pertaining to structures, geometrics, soils and pavements, drainage, etc [8]. A typical set of abbreviated plans consists of the information necessary to describe the type of work and its limits such as:
i) The general plan, sketch, or line drawing
ii) Cross-section plan, if appropriate
iii) An estimate of quantities
iv) FSI/ Area calculation.
v) Tabulation of construction items, providing station, offset, and evaluation
vi) General notes

vii) Special details.

b) Estimation of the quantities of materials:

i) The summary of quantities of materials for the entire project may be placed on the typical cross-section sheets, if possible, without crowding otherwise, this information should appear on separate sheets following the typical sections.

ii) There should be a breakdown of the urban and rural quantities for projects that cross urban boundaries for better understanding and to avoid confusion during execution.

iii) The earthwork calculations may be performed by various methods such as cross-sectioning, a combination of aerial photography and photogrammetry or electronic computer methods that have demonstrated acceptable accuracy.

iv) Summarizing miscellaneous construction items such as drainage, signing, guardrail, earthwork and others in a tabular form. It is advisable to show the station and offset for the location of the item for large and complex projects to help in identifying locations where a specific item is to be installed.

v) It should also incorporate the materials to be used for various types of testing such as concrete cube testing, steel tension test, concrete slump test, etc.

c) Cost Estimation of the construction:

i) The engineer's estimate should be prepared and reviewed carefully to reflect as accurately as possible the expected costs of the work at the time of receipt of bids.

ii) There should be a traditional, consistent, and harmonious procedure for the preparation, review, and updating of estimates.

iii) The estimates should include various descriptions of the item, their estimated quantities, and units along with per unit cost (in both, words and numerals) for each proposed item of work.

iv) The estimate should reflect prices that are realistic for the areas, times, and characteristics of the work to be done. Regional and seasonal adjustments are very important.

v) Incentive/disincentive or escalation clauses should be considered before determining the estimated costs per unit because such clauses do affect the estimated amount considerably.

vi) Some other factors that can affect the estimated cost of a project such as labour rates, equipment rates, interest rates, time to complete, competition levels, and material shortages should be considered, and estimated costs are adjusted as necessary.

vii) The database of bidding prices should be current (within 4 weeks) at the time of estimate preparation and advertisement.

7) Project approval from Municipal Authority:

a) Proposal Submission: Every person who intends to carry out development such as erect, re-erect, make alterations, or demolish any infrastructure/ building, has to give notice through a registered Architect/Structural Engineer. The supervisor has to be registered/licensed to the authority of his profession in the prescribed form. The notice shall be accompanied by development plans wherever necessary. The plans and statements should be uploaded on the authority portal to be made accessible along with the notice. In the case of building schemes, where clearance is required from other agencies like fire services, plumbers, etc. the application can be made directly through the portal to the concerned authorities.

b) Approval of Plans:

i) The Authority shall either grant or refuse sanction to the plans and specifications. They may also sanction the plans with some required modification/ directions as it may deem necessary and thereupon shall inform of their decision to the concerned person via a notice in the prescribed form.

ii) Most of the developments require concession in Bye-Laws which is provided by the Municipal Commissioner of that metropolitan city. Only, after this concession/ relaxation, various other approvals can be granted for further process.

ii) The building plans should be accompanied by No Objection Certificates (NOCs) from all the relevant departments, such as the water department, fire department, sewage department, electricity department, etc.

iii) Once the plan has been scrutinized and objections have been pointed out, the Owner who has given the notice shall modify the plan to comply with the objections raised and resubmit the modified plans.

iv) The Authority shall scrutinize the resubmitted plans and if, there are still some objections that shall be intimated to the applicant for compliance. Only after this rigorous process, the plans shall be sanctioned.

v) It is further explicitly stated that the above provision of given sanctions shall be applicable in both cases where development is to be performed on a plot that is a part of an approved layout plan given by the Authority or an independent plot.

vi) The owner or the engaged competent professional for building plan design shall be fully responsible for any violation of Master Plan, Zonal Plan, Building Bye-Laws, architectural controls, lease deed conditions, etc. If defaulting, they shall be liable for action. Any development activity performed without proper approvals shall be deemed to be unauthorized and liable for action.

vii) Once a building permit is sanctioned, it shall remain valid for one year from the date of sanction for residential, industrial, and commercial buildings. Further, it can be re-evaluated by paying the required fees. However, the validity period of sanction in case of additions/alterations shall be one year from the date of sanction.

viii) The Authority shall revoke any development permit issued under the provisions of the Bye-Laws, wherever there has been any void statement, misrepresentation of facts in the application on which the development permit

was based. Also, if during construction it is found that the owner has breached any of the allocations of the Bye-Laws or sanctioned plan or compoundable limits of the plot, the permit can be revoked. Fresh sanction of development plans and occupancy certificate (OC) shall be provided by the authority only after the structure abides by the framework of Master Plan/ Zonal Plan/ Building Bye-Laws.

c) Building Permit: It chiefly highlights the conditions that must be complied with during different phases of construction. It is also known as Intimation of Disapproval (IOD) in Mumbai city. The conditions are divided into 3 parts:

(i) Immediately before commencement of the construction work.

(ii) During the construction work.

(iii) After the construction work is completed.

d) Commencement Certificate (CC): A commencement certificate is a document granted by the local municipal authority to authorize the developer to begin the construction of the project. CC is usually sanctioned, only after the developer has covered all the legal bases and obtained the relevant sanctions for the building's plan from various competent authorities. It is generally issued in two stages – the first being, approval upto the plinth level/ stilt slab level and the second is approval for the superstructure. The developer receives the commencement certificate only after a thorough inspection by the authorities of town planning and engineering departments. Hence, after obtaining all the required licenses and sanctions for the project, the developer lays the foundation of the superstructure and builds the boundaries of the project.

e) Occupation Certificate (OC)/ Building Completion Certificate (BCC): It is a certificate issued by the local municipal authority certifying that all necessary works have been completed as per the sanctioned plans and that the property is ready for occupation. It is issued only after clearance from the water, electricity, sewerage, fire-fighting departments, etc. It is not a good-to-have certificate, but a mandatory one. Till the developer does not obtain this certificate from the civic bodies, it is illegal for buyers to move into that property and commence any activity.

8) Execution of Construction:

a) Soil testing: It is important to conduct various soil tests to determine the bearing capacity of the soil, the physical and chemical composition of soil, the water table level, and to determine the depth and type of foundation based on the depth of hard strata.

b) Boundary Wall and Gates: Compound walls should be ideally built just before beginning major construction activities, to protect the site.

c) Earth Work: Excavation is to be carried out for the construction of foundations. It should be carried out as per the Defined dimensions specified in the drawing. Generally, the floor level of structures is higher than the natural ground level. Hence, there is filling and compacting work involved too.

d) Foundation/ Footing Work: After excavation, the foundation is laid out and the remaining excavated area around the foundation is backfilled with soil. It is necessary to check the levels of the foundation before concrete work. There are chances of patches where excavated depth slightly exceeds or vice versa. After levelling, the concrete is poured as per drawing specs. Generally, a concrete ratio of 1:4:8 is used for the foundation. At times, a concrete ratio of 1:5:10 or 1:6:20 is also used depending on the requirements.

e) R.C.C Structure / Superstructure construction: Superstructure is the structure above ground that is used for occupancy. Hence, to provide support various members of super-structure such as columns, beams, slabs, doors, windows, etc. are designed to provide strength for carrying the dead load of the structure as well as the expected live load on various parts of the structure in a safe and well-distributed manner. Initially, the brickwork is laid out according to the plan starting from the plinth level after which the roofing slab is cast and the process continues till the required floors are constructed. After this, The required water-proof or weather-proof coatings should be done.

f) Plastering and Painting of building structure: On completion of brickwork, plastering is to be done to make the building structurally strong, to protect it from the effect of weather and to give it an attractive look. Generally, cement plaster is used of thickness13 mm to 20 mm.

g) Roof / Heat Protective Coatings: There are various types of coatings used to reduce the effect of heat inside the structure. Some applications are a weather-resistant barrier, waterproofing coatings, rainscreen, green roof are some applications you can implement to reduce heat.

h) Electrical and Lighting: This work can be done after the masonry work has been completed to install the required electrical connections for the structure.

i) Flooring: Flooring work can commence after the initial wiring works and primer coat is done to the interior walls. The type of flooring used depends on various factors such as utilization, cost and level of finishing. The types of tiles used are ceramic tiles, vitrified tiles, clay tiles, etc. Granite, marble, wood and epoxy are some of the options you have in flooring.

j) Parking Spaces: The parking spaces mentioned below are parking spaces in basements, on a floor supported by stilts, on upper floors- covered or uncovered spaces in the plot or lock-up garages. The parking spaces shall be paved and marked for different types of vehicles. Off-street parking space must have adequate vehicular access to a street and required provisions for adequate manoeuvring of vehicles should be provided. The minimum sizes of parking spaces to be provided are shown below.

Minimum Size of Parking Spaces		
S. No.	Type of Vehicle	Minimum Size
1	Motor Vehicle (LMV)- Small	2.3 m X 4.5 m
1	Motor Vehicle (LMV)- Large	2.5 m X 5 m
2	Scooter/ Motor Cycle	1.0 m X 2.0 m
3	Bicycle	0.5 m X 1.4 m
4	Transport Vehicle	3.75 m X 7.5 m

Table 4

3. CONCLUSION

This research paper successfully establishes the process *framework* for the establishment of any new infrastructure/ building. It is important because there is no such readily available framework for this process. It gives an overview of the complete process that undergoes in establishing any new infrastructure/ building and demonstrates the detailed process within the designated zone of a metropolitan region. This *framework* can be used by the practicing Architects, Engineers, Builders and Developers in their professional work to have an overview of the whole process and to understand the step-by-step process which will aid them in completing the process quickly without missing any step/detail. It can be also be referred by the students who wish to work in the Town Planning department in the near future.

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