

## **Terms of Reference**

### **Digital Door Numbering**

**A digital enabled street and door numbering system for the state of Telangana**

**1<sup>st</sup> Feb, 2018**

**Telangana Municipal Development Project (TMDP)  
O/o Commissioner and Director of Municipal Administration  
640, Kashana Building, A.C Guards,  
Hyderabad**

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## 1. Executive Summary

### 1.1. Context of the Project

Telangana is the newest state in the country and a rapidly growing economy. Internet penetration is increasing year on year and basic infrastructure is enabling many innovative and groundbreaking ideas and businesses to flourish in the state. However, with this rapid growth, there are also many infrastructural problems that Telangana faces like most other rapidly growing states, and the problem of communicating one's address seamlessly is one of the biggest, yet, often neglected problems.

Example of a typical address today:

*1-6-141/28/3/34/2*

*Sri Ram Nagar,*

*Suryapet.*

The above example is a clear representation of a non-standard, inadequate address. It doesn't mention a street name, or a landmark, or a post-code. ***Every address can be communicated in a different format and there is no way of identifying if the address is true or false.***

The current addressing systems have the following issues:

- Inconsistent format of addressing within the city limits or between cities
- Street, Road, Building, Dwelling relations are hard to establish
- Breakage in sequence due to rapid growth
- No consideration for property mutations, aggregations
- No consideration for future development of new areas
- No consideration for new roads / streets
- Missing digital linkage for the digital age
- Support for emergency services and other service delivery
- Record keeping is an issue, and needs continuous updating for departments such as Property Tax, Census, Emergency services, etc.
- A Citizen uses different formats of the same address subject to conversation with the person on the other end

Due to the rapid growth in cities, it has become increasingly difficult to uniquely identify a dwelling for delivering services like ambulance, police, and packages or for navigation. The current address schemes is not intuitive and have no fixed patterns due to various reasons, like consolidation of multiple independent plots into a single plot while building large apartment

complexes and corporate campuses or the process by which plots or dwellings are divided further when properties are bequeathed to the next generation.

The Postcodes used by India Post in their current format do not even address the last mile of delivering to a unique delivery point or dwelling and leaves it to the knowledge of the Postal delivery personnel. This makes the Postal department over-reliant on knowledge accrued over the years by its personnel but has not been able to institutionalize it by leveraging Technology.

Where as local city governments and state governments don't have a standard format for addresses that are followed, sometimes even within a city the way an address is communicated is different between two areas or even within the same colony.

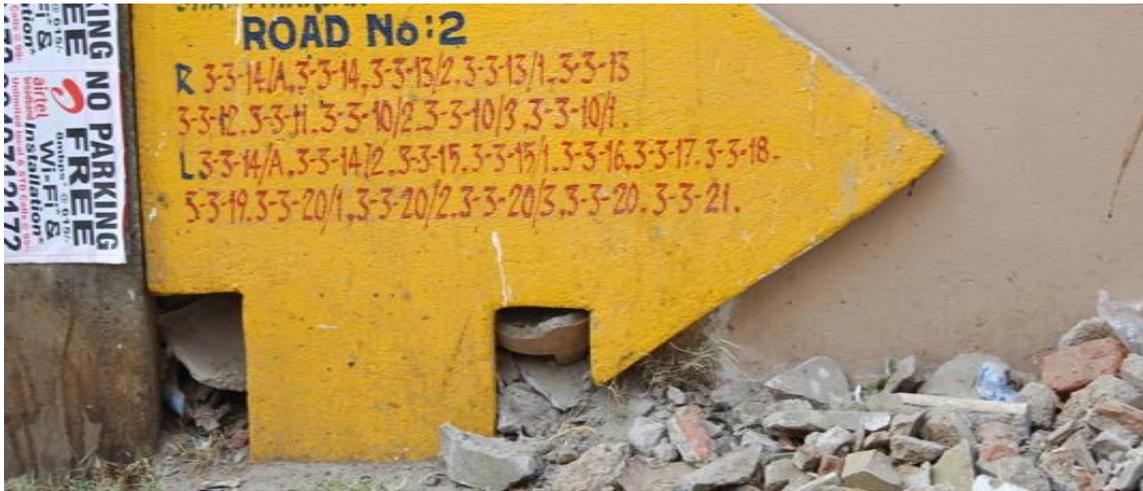
A 2005 **World Bank Report** titled "Street Addressing and the Management of Cities" cites "Designating a home address is a big problem" indeed, it is one of the most difficult to resolve in urban life, although it may not seem so. The problem is significant because individuals are as defined by their place of residence as they are by their height or the color of their hair or eyes. Today, one's home address is an integral part of personal identification data: it is found on voter identification and social security cards.

The benefits of a unique addressing solution of urban dwellings are further explained in the Report as:

- Access the database by subject:
  - According to type of occupancy, retrieve data individually or by group for dwelling or type of dwelling, economic use or type of economic use, ; data should be retrievable by street or neighborhood, or for the entire city;
  - According to address, retrieve data associated with the address or with a street, a neighborhood, or a zone to be identified;
- Store in memory all changes in occupancy for purposes of creating history files that will make it possible to observe trends;
- Easily change or retrieve a new address at any time;
- Add open parameters (data associated with the address) at any time and in unlimited quantity;
- Easily import and export data from/to other applications (street system, facilities, tax system) or another database;
- Print data retrieved and/or all data.

**Thus any optimal solution must aim for intuitiveness by representing a numbering scheme in a street addressing based geo-spatial solution allowing for location and navigation services to be provided effectively.**

*Examples of Challenges:*



*Confusing Street Signage*

## Organic vs Planned Blocks/Areas



### 1.2. Project Vision and Objectives

This project is envisioned as an Aadhaar Card for every house hold, with the successful completion of the property assessment survey across 72ULBs, every house hold was surveyed and geo tagged, now the objective is to formalize this geo tagging number into a usable scientific door numbering system that creates a standard format across the state.

The benefits of this project are immediate and long term - impacting day-to-day communication, governance and above all, create a basic infrastructure for public good.

Here is a list of benefits:

- Future proof system, one format that doesn't change with mutations and property amalgamations

Terms of Reference for Digital Door number (DDN)

- Gold standard of addressing
- Follows world bank guidelines on street addressing
- System driven methodology to avoid any human errors
- Works both physically and digitally
- Provides one format for all citizens to communicate without a hassle
- Integrate emergency services and save lives
- Reduce service delivery time by over 30%, because of better clarity on address and approach dynamics (road information, building picture, etc)

Here is a list of some governance related benefits:

- Become the model state for the country in innovation and digital governance
- One ID for all departments:
  - Connect all public utilities to one ID, ensuring a common language between all departments
- Impact day to day address communication



Transportation	Cab Services
Delivery	Food Delivery E-Commerce Delivery
Logistics	Courier Services
Emergency Services	Ambulance Law and Order
Retailers	Higher Store-foot fall Hyper-local commerce
Social Meets	Answers the <i>What's my address</i> question among friends.



### 1.3. Expected outcome:

By the end of the project, every household across 72ULBs should have a unique DDN. We intend to build this as a state of the art project for Telangana, by improving upon the inadequacies of the implementations elsewhere in the world.

For instance, addresses in the UK are 6 characters long Alpha-numeric codes that aid people navigate and get from point A to point B seamlessly.

The 6 character long alpha-numeric addresses that correspond to a number of different properties, and a property may comprise more than one delivery point (for example, a block of flats, wherein each has their own letter box).

For example, the 6 character long Alpha-numeric Post Code **E14 8JZ** when looked up in the website <http://www.royalmail.com/find-a-postcode> corresponds to 18 apartments in the following address:

Regatta Point  
1 Manila Street  
LONDON  
E14 8JZ

The UK address codes correspond to an area or a block but still doesn't get you to the door step. Hence, this project aims to overcome this inadequacy by providing a unique code for each dwelling or delivery point, thus making Telangana state the world first to have a unique addressing system for every door.

## 2 Rational of the Project

As outlined in section 1, the project has a very broad impact across multiple stake holders and is a core infrastructure for the digital economy of the future.

### 2.1 Title of the project:

The title for this project will be **“DIGITAL DOOR NUMBER”**. The name is self-explanatory and also straddles perfectly into an acronym **“DDN”**. Citizens and authorities alike, could use the acronym DDN, similar to

- What is your PAN number?
- What is your Aadhaar number?
- What is your Mobile number?
- What is your DDN number?

### 2.2 Project State (Pilot or Rollout)

The DDN project was successfully piloted in the city of Suryapet covering the households in Sri Ram Nagar. Now, the objective is to roll this project across 72 ULBs in the state on a mission mode basis.

## 2.3 Project Vision, Goal and Smart Objectives

### 2.3.1 Project Vision

The DDN project aims to create a **uniform addressing system for all dwellings** across the ULBs, using the latest geo-spatial and cloud computing technologies and combining them with standard methodologies in street addressing and door numbering. The project will create a **common addressing infrastructure** across the state and leverage the same for **effective governance at the household level**.

### 2.3.2 Goal of the Project

The goal of the project is to provide a digital friendly and future proof addressing system to all citizens to provide faster and better access to services from the government and private sector.

### 2.3.3 Smart Objectives

The following are the key objectives which DDN intends to achieve:

- Issue 100% dwellings a DDN within 5 months of project commencement
- Create web-services for private and public services to use DDN infrastructure
- Educate and spread awareness to all stake holders (Citizens, ULBs and Private sector), through media, press and call center during the project execution period
- Sync property database and DDN data for benefit/scheme analysis at the door level

### 3 Project Overview

#### 3.1 Project Implementation Model

This project requires a Technology Partner/Concessionaire with expertise and a rich background in similar projects.

Technology Partner/Concessionaire should use the data acquired during the property tagging exercise across the ULBs and readily convert them into DDNs. And technology Partner/Concessionaire should also use the field force to identify all the households (Residential and commercial) and vacant lands for which data was not captured during the property tagging exercise and assign the DDNs manually.

Once the DDNs are assigned to properties, attest a weather resistant board to all the households.

#### 3.2 Methodology and Implementation Model

As the DDN project is innovative in nature and welcomes all potential innovations within the scope of work and requirements it is best suggested to discover the Methodology, Approach and Implementation models during the public procurement process, which will bring about the most competitive and cutting edge practices.

#### 3.3 Stakeholder Analysis

The following are some of the key stakeholders in the project and how the project will benefit them:

StakeHolder	Interest
Citizens	Need a standard, user friendly address format for easier communication with fellow citizens and service providers
Emergency Services	Need for accurate address and geo-spatial information to respond on time and reach the spot faster
State Election Commission	To keep track of changes in booth level electoral rolls, and reduce expenditure during every election
Urban Local Bodies (ULB)	Standard door numbering to ensure all properties are recorded and identified for the sake of property tax revenue, Public distribution, etc
Revenue Department	Standard property numbering to ensure all properties are recorded and identified for the sake of revenue records

Roads and Bridges Department	To have a better way of communicating addresses for repairs, carpeting and road signage
Tourism	Provide tourists a singular format of addresses across their travels in the state
Electricity Board	Connect electricity id to DDN for better geo-spatial analysis, also use DDN to identify and tag all assets
Waterworks Department	Connect CAN to DDN for analysis, asset tagging and repair and maintenance work
Logistics	Provide a standard format for all 3 <sup>rd</sup> party logistics to deliver seamlessly to citizens
IndiaPost	Provide a standard format to Dept of Posts to use for all logistics within the Telangana state

### 3.4 Problems Addressed

At the core the problem of addressing is a large inefficiency that impacts a number of areas from the smallest of transactions to potentially life threatening. Below are a few areas of impact that a standardized digital addressing format will create:

- Emergency services can reach up to 30% in the golden hour period with a digital enabled address
- Today most ULBs don't know the full number of properties within their jurisdiction. Hence, DDN will enable full visibility, and once all properties are recorded, only the system will be able to issue a DDN for any property to receive benefits or services
- Today, only up to 50 deliveries can be done per person as compared to 100 in the USA. Digital enabled addresses with DDN will create more efficiency in logistics
- Every citizen uses a different format of his/her address subject to the person he is sharing it with, DDN enables one singular format
- Attaching Aadhaar, DDN will enable highly focused benefit and scheme delivery to the door level. Today the addresses are inconsistent and there is no verified address system that gives clarity of truth/false

*Keeping the above factors in mind, a person ID and place ID mapping is the need of the hour for the best and efficient governance.*

### **3.5 Project Type**

The DDN project is a digital infrastructure project and is a fundamental requirement to provide essential services and enable easier communication and logistics.

### **3.6 Project activities**

The following are the key activities/phases of the DDN project:

#### **3.6.1 Acquiring City and Locality boundaries**

Activity is to identify and digitize the boundaries of the City and localities across 72 ULBs

#### **3.6.2 Acquire locally available satellite imagery**

- Satellite imagery helps identify all major roads, buildings, etc. that are required for the DDN project. This includes the Slums and unorganized areas of the ULBs.

#### **3.6.3 Survey of Missing Roads**

- Survey for all missing streets and roads that are not visible from the satellite imagery, using a GPS enabled system. This includes the Slums and unorganized areas of the ULBs.

#### **3.6.4 Digitization of the Road network**

- Digitize the road network with-in the identified boundaries. This includes the Slums and unorganized areas of the ULBs.

#### **3.6.5 DDN creation process**

- For all the properties where the data already exists, system will create the DDNs. And field force will make the required modifications and add any other Meta data.
- For the properties missing from the above step, conduct a field survey to assign DDNs. This includes the slums and unorganized areas of the ULBs.

#### **3.6.6 Board affixing survey**

- DDN boards will be stuck to every door

#### **3.6.7 Old Address Quality Correction**

- Normalize all the captured old addresses to a consistent usable format for future reference

### 3.7 Timelines

This project is to be taken up on a mission mode, since this project is going to leverage most of the geo-coding information collected during the property survey. Hence, the timelines for execution of this project are expected to be relatively shorter.

### 3.8 Activity Timelines

The project is proposed for completion in 5 months. Below is the breakup of the activities in accordance with the timeline:

Activity	Timeline
<b>Digitization of ULB/Locality boundaries</b>	2 weeks
<b>Road code generation</b>	
<b>DDN creation</b>	18 Weeks
<b>Data normalization</b>	In parallel
<b>Dash board</b>	In parallel

## Terms of Reference for Digital Door number (DDN)

Detailed project plan is as following:

Task	Activities	Duration	Day 0	Weeks																		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Digitization of ULB/Locality boundaries	Identify the ULB and Locality boundaries	2W																				
	Convert the physical boundaries into digital form	1W																				
	Assign a two digit code to the ULB and 3 digit codes to localities	1W																				
	Sign off from CDMA/Commissioner	1W																				
Road code generation	Use the available satellite maps to draw the road network	2W																				
	Identify the missing roads on the field	1W																				
	Identify major and minor road across localities and ULBs	1W																				
	Generate Codes for streets	1W																				
DDN creation	System generation of the codes for Set 1 of the data and board installation	12W																				
	Code generation using the Survey for Set 2 of the data and installation	12W																				
	Board installation for Set 2 data	6W																				
Data normalization	Identify the data anomalies	10W																				
	Normalise the data using field force and support staff	10W																				
Dashboard	Access to data on dashboard	19W																				

### 3.9 High Level Technical scope of work for DDN

The Project Contract Period is 15 years the broad scope of the Project (during the contract period of 15 years), aimed at achieving the above objectives:

- Setup of a State Data Center (SDC)/Cloud based IT infrastructure to be hosted anywhere in India for access to the information generated and collected during the survey for the Authority and to act as a navigational tool for various uses;
- Create a map for the urban area with all legal, external roads available within the ULB boundaries using Satellite imagery and the data provided by the Authority. CDMA will provide latest maps for this purpose.
- To design, customize and implement a platform to auto-generate a smart and unique house number that is contiguous with pattern-based road-network encoding logic and can be accessed on web and mobile channels;
- For all dwellings and properties where data already exists with CDMA, remotely issue DDNs using the Lat/Lon and other meta data of the said property, approximately 12 lakh properties. Do modifications and add any relevant meta data on the filed using the surveyors.
- For properties not in the CDMA data base, including vacant lands, informal housing (slum dwellings) and units within previously tagged properties, conduct a door-to-door survey using a technology platform to generate the digital house number for all dwellings within the jurisdiction of the Authority through a mobile-based application ( with an upper limit of 2.5L across ULBs).

## Terms of Reference for Digital Door number (DDN)

- The survey should collect the following mandatory information:
  - Full Address including Old House Number, Landmark, Street Name, Sub-Locality, Locality, City, Pin Code, mobile/landline number of the dweller;
  - Meta-data to include picture; and
  - Dwelling type (Commercial/Residential/Mixed)
- Affix a weather-resistant board with printed digital door number for each dwelling after code generation and collecting the required information at the household level.
- Provide a dashboard to the Authority to track real-time the generation and progress of digital door number generation.
- Provide integration and interoperability support to the Authority for existing data systems of the Authority with the issued DDN, systems such as:
  - E-Gov modules such as, Property Tax, Land registration, DTCP, DPMS, Water Dept, MeeSeva, etc
- Provide training modules and documentation on usage of Webservices or APIs for successful integration into the E-Gov modules
- Provide a citizen information platform for access to the DDN platform with the following features:
  - Free DDN Search
  - Citizen engagement Platform
- Integrate with emergency service providers to immediately showcase citizen where a digital door number can be used for navigation by the ambulance/police/fire department. This can be augmented with more integration with the private sector for citizen convenience/commercial use.
- Provide maintenance support for the balance period post the initial Project management support by stationing full time resources at the Authority head office to help coordinate with new building approvals, updating the data base on a regular basis, integration into various DPMS systems and also address related issues.
- Conduct a study of number of street signages required and the necessary data of street codes/names to be compiled for printing and installation
- The total work includes:

Deploying requisite customized technology including the licenses to use the backend software along with their renewals, if any, requisite manpower, equipment, tools, operating systems, comprehensive maintenance, consumables and any other items/services that are required for implementing the Project and to carry out the operations complete in all respects. For avoidance of doubt, any upgraded version(s) of backend software(s) are also to be procured and maintained by the Partner/Concessionaire during the Contract Period.

### 3.9.1 Solution Level Requirements

S. No.	High Level Requirements	Description of the Requirements
1	Multi-channel Geo-Spatial solution	The unique addressing solution is based on an open-source Web and Mobile based Geo-spatial platform
2	Integration & Interoperability with other Government Departments and Private Entities	The success of the DDN Platform is singularly dependent on its ability to interoperate and integrate seamlessly with a host of departments, agencies and service providers applications. The DDN Solution aims to achieve this by providing easy to use web services that can be used to seamlessly integrate with other departments.
3	Facilitate efficient Governance through quick identification of Incident/ Grievance Location	Identify civic and governance issues by finding the location faster allowing Corporations to deploy appropriate resources to mitigate and de-escalate situations faced by both citizens and internal officials
4	Possibility to reuse and extend of existing Unique area based identifiers	The solution is aimed to extend or reuse to the extent possible any existing solution that uniquely identifies areas or a particular region.
5	Internet enabled Mobile-App based Survey Application to collect Citizen Address Information	The Solution is an internet enabled Mobile-App based Survey application that captures each individual dwelling address information in a format mutually agreed upon
6	Reachability and Credibility Index for each dwelling	The solution enables identifying ease of reachability and value of credibility for dwellings to help service providers make informed decisions
7	Contact Less status update mechanism	The solution provides the ability for residents to update status of their dwelling through a unique and secure access

### 3.9.2 Functional Level Requirements

The following additional functional requirements have been listed and these will be elucidated as part of the RFP process if the Project is approved.

Requirement Type	High Level Description
Functional	Multi-Channel Delivery through internet and mobile channels

## Terms of Reference for Digital Door number (DDN)

Functional	Address Uniqueness and Smartness taking future growth into account
Functional	Capabilities for Data Integration by other departments
Functional	Allows robust Concurrent Access to multiple profiles of users
Functional	Allows 3rd Party Access for other departments
Functional	Supports Org. Hierarchy and access levels to ensure role based authentication
Functional	Provides an Activation Platform to allow activation to be done economically
Functional	Data Quality and Integrity is of the highest level
Functional	Data Retrieval is quick and seamless, should be able to scan the DDN number.

### 3.9.3 Technical and Infrastructural Requirements

The following Technical and Infrastructural requirements will also need to be considered for the DDN project and the detailed requirements will need to be elucidated at the time of creating the RFP

- Scalable infrastructure through a Cloud based Hosting architecture
- Up-time and Disaster recovery
- Data Flexibility and Extensibility
- Access security and DDOS Attacks
- Inter-department information communication
- Data augmentation for new properties
- Integration-ready for other tech platforms like Kiosks
- Integration with navigation, routing and other GIS systems

### 3.10 Concession period

The Concession Period is 15 years which includes both Project Construction period and Operations & Maintenance period.

### 3.11 Escrow Details

The Selected Partner/Concessionaire shall have to execute an escrow agreement. Accordingly, has to deposit the following with an escrow agent:

- Source Code of the customized technology deployed in the Project;
- Software Interfaces of the deployed technology; and
- Executables of the software.

### 3.12 Data and Monetization

The database of address information (dwelling/property level) and any other information developed shall be the property of the Authority. For the avoidance of doubt, the Concessionaire shall have the exclusive right to use the developed database for revenue generation during the Contract Period, excluding advertisement rights on address board/plate.

On and from the COD till the Transfer Date, the Partner/Concessionaire shall have the sole and exclusive right to receive fee on any of the value-added services it can provide to third party, based on the databank created as part of the Project. Concessionaire shall explore revenue from third parties that need address information excluding CDMA. All such value-added services provided should be brought to the notice of the CDMA. The Partner/Concessionaire to do a KYC check and to take such other precautions before providing the service to any third party, if, in the reasonable opinion of the Authority, such services are a threat to national security and public interest.

### 3.13 Obligations of Partner/Concessionaire

- Provide the digitized road network map of Each ULB
- Create DDNs for all the houses within the ULB boundaries
- Share the DDN and Road network data with CDMA in soft and hard copies.
- Provide APIs to integrate DDN into various CDMA related applications like E-Gov, DTCP, Property Tax, DPMS, Land Registration etc.
  - CDMA has to work with the technology partner who developed the above mentioned applications to integrate the APIs given by Partner/Concessionaire.
- To create awareness and popularize the benefits of DDN to all the citizens, stakeholders using Social media, websites and business integrations.

- Provide training to all the ULB staff with Training Manuals, Testing applications and Computer based Training manuals.

### 3.14 Obligations of CDMA

- Support, cooperate and facilitate the Partner/Concessionaire in implementation and operation of the Project
- Shall support, cooperate and facilitate with the Partner/Concessionaire in procuring Applicable Permits and Approvals and their renewals, if any, from various Government Authorities and utilities;
- Shall support, cooperate and facilitate with the Partner/Concessionaire in utilizing the ground staff of the ULBs in surveying the houses;
- Provide to the Partner/Concessionaire any and all existing maps or data to help accurately identify buildings, properties, dwellings, road networks, areas, etc., for digital base map creation;
- Support in hosting the information collected on CDMA website or any suitable website developed for this purpose; and
- Support in integrations with various E-Gov, DTCP, Property Tax, DPMS, Land Registration applications and also any other application of CDMA (which required DDN availability).
  - Partner/Concessionaire will provide the required APIs and the final integration has to be done by CDMA or technology partner who developed the applications(like E-Gov, DTCP, Property Tax, DPMS, Land registrations etc)
- To create awareness and popularize the benefits of DDN to all the citizens, stakeholders both within the Government and outside the Government for successful adoption of the benefits of DDN and any other users of the developed database.

### 3.15 Project cost and financing:

The primary cost to the Government is going to be the below areas:

- Survey man power
  - It is required to have skilled man power with experience in using maps and geo-location solutions
- Material cost
  - A formidable, weather proof, low cost board or plate has to be stuck outside every door, and should also be tech enabled (QR or OCR)
- Project Management
  - A skilled project management team is required to ensure both quality and timely output
- Call Center
  - To support both survey staff and citizens for the 10 month period

## Terms of Reference for Digital Door number (DDN)

The technology Partner/Concessionaire is expected to take up the costs of technology development and will also take up the above-mentioned works at a cost to the CDMA.

A detailed breakdown of potential costs is given in the table below:

### 3.16 Detailed cost breakup:

#### 3.16.1 Expertise:

Sr.No	Key Person	Qualification	Total No	No of years of Relevant Work exp	Total Man Months
1	Team Leader	M.Sc/B.Sc ( Geography or GIS)	1	5	5
2	Sr. GIS Experts	B.E /B.Tech or B.Sc/B.Com (Computers)	5	3	25
3	GIS Experts	B.E /B.Tech or B.Sc/B.Com (Computers)	20	3	100
4	Surveyors	B.Sc or any other graduation	750	2	3750

**3.16.2 Milestones and Payments:**

Sr. No	Activity	Payment of Schedule
1	Generation of DDNs	40% of the amount
2	Installation of Boards on individual properties	<ul style="list-style-type: none"> <li>• 12% of the payment after 300000(Three Lakh) DDN board installations</li> <li>• 12% of the payment for after 600000(Six Lakh) DDN board installations</li> <li>• 12% of the payment for after 900000(Nine Lakh) DDN board installations</li> <li>• 12% of the payment for after 1200000(Twelve Lakh) DDN board installations</li> <li>• 12% of the payment for after 1500000(Fifteen Lakh) DDN board installations</li> </ul>

**3.16.3 Review Committee**

Each and every stage of report shall be reviewed by the Review Committee and payment will be released only after the approval by the Committee.

**3.16.4 Composition of Review Committee to monitor Consultant's work:**

- i) Commissioner and Director of Municipal Administration ..... Chairman
- ii) Project Director-TMDP ... Member
- iii) RDMA concerned .... Member
- iv) Deputy Director, O/o CDMA ... Member & Convener
- v) Municipal Commissioners concerned ... Member
- vi) Representative of Director Town and country planning ... Member

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