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Time, Cost and Material Management of Infrastructure Development in India

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Abstract: *Infrastructure is the basic need of any country or we can say that it is the bonemarrow of the nation. The facilities and structres adopted to serve the people are derectly dependent on the gdp, wealth, litracy rate, tourism and many more things of the country. Infrastructure includes the roads, railways, buildings, transportaion, waste collection and disposal facilities, water pipelines, waste water treatment, sanitary fittings, sewers, electricity services, cable (wired) connections services etc. The technologies and type of service system is adopted based on the intelligence of the population to be served and expenditure cost and budgets available to do the work. Each and every aspect of infrastructre is dependent on one another from the utilisation point of view, for example roads, pavement, pedestrian line, footpath, sewer line, water distribution line, electicity line, other network connection cables, all these services laid parallel to the roads, all are built in front or backside of houses and buildings.*

In india a large amount of budget is allocated for the development of infrastructre if a proper management and suitable technology is adopted to do the construction work and project executio, we can cut down the cost of construction, demoliton excavation. Andalso save our time which we spend every time to do the things separately, also facilitates the people with the probles faced by them everytime like discomfort, dusting, traffic conjestion, running waste water on the roads, noise etc. The budget saved by doing so can be utilised for the betterment of people of country such as qualitative education, relible products, lower tax collection, lower per capita expenses etc.this thesis work is purely based on urban planning. The manual method was used for the collection of field data. The collection of field data has been done during the period from 01-01-2021 to 21-12-2022.

Keywords: pavement, duct line, sewer, water recharging, urban traffic congestion

I. INTRODUCTION

This dissertation work is based on the pure practical study and actual data used on field. As our topic name is "**TIME, COST AND MATERIAL MANAGEMENT OF INFRASTRUCTURE DEVELOPMENT IN INDIA**" so here we are doing the detail study of roadside work sewer line(nallah) cables laying along the road, surface rain water disposal, electricity line etc. on a particular section of road of urban region. Here we will discuss in detail about the problems associated with this planning and constructing method such as overbudget expenditures, unhygienic, unhealthy, noise, dusty environment, traffic congestion etc. every time when any construction work started. This is not the problem of any district, any region, any state. This work failure system is adopted in pan India.

First, a road is laid for vehicles/traffic for transportation and travelling as this work is over a sewer line, municipal nalah is constructed at the sides or center of the road by excavating the rigid pavements. Again, when this work is finished water distribution pipe line is laid on both sides of road by digging the road. As this is going to finish, a network cable company take permission to setup its underground cable profile so they again demolish the certain section of road. In between any new technology /pattern comes in the country that is also implemented in the same manner by excavating the road in pouring the concrete. New electric poles are also interchange with old poles by such laborious works. This uncertainty is caused in whole country but nobody cares, because it is beneficial for the politicians of solving any

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problem at a point of time temporarily, contactors to do the same work number of times to gain the profit and tender, public is facing discomfort but they cannot express their problem to high
authorities. Over all it is the loss of money and resources of people of country, this problem indirectly affects everyone residing in the country.

In this dissertation work we will discuss the alternate of doing such projects and how can solve such problems and save our resources. We can find the solution for above problem by making amendments in the codes of road and pavement construction work, enforcements of law if necessary. Plan to do the all the roadside works simultaneously and provision for future implementation and repair of services. All the constructing bodies like public work department, watershed, municipal corporation, WRE, WRD, STATE RDC, NHAI, STATE HIHGWAY AUTHORITIES etc. must merge for doing such projects otherwise make a separate body for such type of multiple construction at a place at the same time.

II. LITERATURE REVIEW

Infrastructure development in a country refers to the construction, improvement, and maintenance of physical and organizational structures that are essential for the functioning of society and the economy. It encompasses a wide range of sectors, each with its own specifications, requirements, and considerations. Broadly, infrastructure can be categorized into **hard infrastructure** and **soft infrastructure**.

Hard Infrastructure:

This includes the physical systems and facilities needed to support economic activities and ensure the well- being of citizens. The key areas under hard infrastructure are:

Transportation Infrastructure:

- **Roads and Highways:** Design, construction, and maintenance of road networks (national highways, local roads, expressways). Pavement design (material, thickness, load capacity). Traffic management systems (signage, signals, surveillance). Safety standards (barriers, pedestrian crossings).
- **Railways:** Building and upgrading railway systems for both passenger and freight movement Track design (gauge, rail type, ballast, and alignment). Signal and control systems (electronic interlocking, automation). Station facilities and accessibility standards.
- **Airports and Ports:** Development of air transport and maritime infrastructure Runway and taxiway design (material, length, capacity). Terminal building design (security, capacity, facilities). Cargo handling systems.
- **Public Transit (Metro/Subways/Bus Systems) Specifications:** Route planning and network integration. Rolling stock design and maintenance. Station and terminal layout.

Energy Infrastructure:

- **Power Generation and Distribution Specifications:** Types of power plants (thermal, hydro, wind, solar, nuclear). Grid design and capacity (substations, transformers). Renewable energy integration and storage solutions.
- **Oil and Gas Infrastructure Specifications:** Pipeline construction and safety standards. Storage tanks, refineries, and distribution systems.
- **Electrical Grid and Transmission Lines Specifications:** Transmission line design (voltage levels, conductor types). Power distribution to residential, commercial, and industrial users.

Water Supply and Sanitation Infrastructure:

Water treatment plants (capacity, filtration, and disinfection). Pipeline networks (material, pressure rating, pipe sizes). Sewage treatment plants (design, capacity, and discharge standards). Stormwater drainage systems. Sewer networks (pipe material, diameter, slope).

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Telecommunications Infrastructure:
Fibre optic cables, mobile towers, satellite networks. Data centre design, capacity, and security.
Network architecture (backhaul, access networks). Communication protocols (5G, Wi-Fi, fibre-to-the-home). Satellite launch and ground infrastructure. Communication, navigation, and weather satellites.
Soft Infrastructure:
This encompasses the services and systems that are needed to support social and economic activities. Soft infrastructure often requires regulatory frameworks, human resources, and organizational capabilities.

Healthcare Infrastructure:
Hospitals and Clinics: Building medical facilities that meet health standards and patient needs.
Hospital design (capacity, specialized departments, emergency rooms). Medical equipment (advanced diagnostic tools, surgical equipment). Healthcare personnel training and staffing.
Public Health Systems: Network of health centres, mobile clinics, and vaccination programs.
Access to health services in remote areas. Public health campaigns (disease prevention, hygiene, and vaccination).
Educational Infrastructure:
Schools and Universities: Development of institutions for basic, secondary, and higher education.
Classroom design (capacity, acoustics, lighting). Laboratories, libraries, and sports facilities and IT infrastructure for e-learning.

Training and Vocational Centres: Specifications:
Skill development centres focused on labour market needs. Curriculum standards and certification processes.

Social Infrastructure:
Housing and Urban Development: Specifications:
Affordable housing units and urban planning. Social housing policies and programs.
Public Safety Infrastructure (Police, Fire, and Emergency Services): Specifications:
Fire stations, police stations, and emergency response systems. Public security systems (surveillance, data management).

Environmental Infrastructure:
Waste Management: Systems for collecting, recycling, and disposing of waste. composting facilities. Hazardous waste management protocols.
Green Infrastructure: Parks, forests, and green spaces to support biodiversity and improve urban environment Urban greenery planning (tree planting, rooftop gardens). Ecological corridors and water management.
Regulatory and Institutional Frameworks:
Regulations and Standards: Establishing legal and technical standards for infrastructure projects

Specifications:
Building codes, safety regulations, environmental impact assessments (EIA). Quality assurance and testing of materials and systems.
Public-Private Partnerships (PPP): In many cases, infrastructure projects are funded through PPP models. Contractual agreements outlining the roles and responsibilities of the public and private entities.
Technological and Digital Infrastructure:
Smart Infrastructure: Integration of ICT and digital technologies into physical infrastructure **Specifications:**
IoT devices for monitoring traffic, energy usage, and public services. Smart grids, smart cities, and automation technologies

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Key Considerations in Infrastructure Development:

Sustainability: Infrastructure projects should incorporate environmental sustainability, focusing on energy efficiency, renewable resources, and reducing emissions.

Resilience: Infrastructure should be designed to withstand natural disasters (earthquakes, floods) and adapt to changing conditions.

Financing: Long-term financing strategies (loans, bonds, international aid) for large-scale projects.

Innovation: Adoption of new technologies (AI, robotics, 3D printing) to improve efficiency and reduce costs.

Social Impact: Ensuring that infrastructure development contributes to social equity and access for all citizens.

Infrastructure development is a cornerstone for economic growth, social stability, and environmental sustainability. Each country has unique challenges and priorities when it comes to infrastructure, so specifications and approaches may vary depending on geographical, economic, and social conditions.

from the particulars mentioned above we have discussed the fewer topic in detail:

- road /pavement work specifications
- sanitary and wastewater system
- potable water distribution system
- fiber optical/network cable layout

III. DATA COLLECTION

Here we find out the Indian standard specification of different work set by the government and board.

SPECIFICATIONS OF DOUBLE LINE RIGID PAVEMENT IN INDIA:

In India, double-line rigid pavement typically refers to a type of road construction where two lanes of traffic are separated by a central divider or median, and the road is constructed with a rigid pavement (usually concrete). Rigid pavements are made of materials like Portland Cement Concrete (PCC), which are more durable and able to withstand higher traffic loads compared to flexible pavements (asphalt).

The specifications for double-line rigid pavements are generally governed by the guidelines issued by the Indian Road Congress (IRC) and the Ministry of Road Transport and Highways (MoRTH). The most referenced standard is the IRC: 58 – 2015, which provides guidelines for design and construction of concrete pavements.

Here are the key specifications and considerations for constructing double-line rigid pavements in India:

1. General Design Considerations:

Road Classification: The design of rigid pavements in India depends on the road classification, which is defined based on traffic volume, road function, and expected life. The classifications range from National Highways to Rural Roads.

Design Traffic Load: Pavement thickness and other specifications depend on the anticipated traffic load, measured in terms of Standard Axle Loads (ESAL).

Subgrade Strength: The strength and type of subgrade are critical factors in the design of rigid pavements. The California Bearing Ratio (CBR) is often used to assess subgrade strength. Minimum CBR for design purposes is typically around 5%.

Pavement Structure**:**

The rigid pavement is generally composed of the following layers:

Subgrade: This is the natural soil or compacted earth foundation under the pavement structure. It should be free of organic material and have a proper CBR value to support the load.

Sub-base Layer: This is a layer of granular material (like crushed stone or gravel) placed over the subgrade. The thickness of the sub-base is generally 150-300 mm, depending on the subgrade strength.

Base Layer: This layer is made of granular materials (like crushed stone or crushed gravel) or lean concrete. The thickness of the base can vary between 100-200 mm, depending on the traffic volume and subgrade conditions.

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Concrete Pavement: This is the actual rigid pavement layer, typically made of Portland Cement Concrete (PCC), with a minimum compressive strength of **25 MPa** after 28 days of curing.

The typical concrete mix ratio for rigid pavements is often **1:2:4 (cement: sand: coarse aggregate)**, or a higher-strength mix may be required for areas with high traffic loads. The pavement is usually reinforced with steel bars (reinforced concrete), which are placed according to the design specifications. Pavement thickness varies, typically ranging from **200 mm to 300 mm** or more, depending on traffic load, soil type, and climate conditions.

Design Criteria:

Concrete Mix: The concrete used should be designed to achieve the required compressive strength of at least 25 MPa (in standard 28-day tests). For higher traffic roads, concrete mix strength may be increased to 30 MPa or more. Joints: Joints are essential to control cracking in rigid pavements due to shrinkage and thermal stresses.

Contraction Joints: These are provided to control the formation of cracks. Typically, they are spaced at intervals of 3.5 to 5 meters, depending on the pavement thickness.

Expansion Joints: These are provided to allow for the expansion of concrete. The spacing of expansion joints varies based on environmental conditions and material properties.

Construction Joints: These joints are provided at the end of each day's work to allow for the continuation of construction.

Joint Sealant: The joints should be sealed with appropriate sealants to prevent water infiltration and debris accumulation.

Surface Finish: The surface of the rigid pavement should be finished to provide proper texture. This typically involves: Broom finish to provide a rough texture for traction. Trowel finish for smoother, controlled surfaces in certain areas.

Thickness of the Pavement**:**

The thickness of the concrete pavement is influenced by factors such as traffic load, subgrade type, and climate. For a double-line rigid pavement, the thickness typically follows the below guidelines:

For low traffic volumes (urban roads, rural roads): 200–250 mm thickness.

For moderate to high traffic volumes (national highways, arterial roads): 250–300 mm thickness.

The actual design thickness may vary based on the traffic load, subgrade strength, and environmental conditions.

Material Specifications:

Cement: Ordinary Portland Cement (OPC) conforming to **IS 269 or IS 8112** is used. The cement should be free from impurities and should meet the prescribed standards for strength and durability.

Aggregates: **Coarse aggregates** should conform to IS 383 (Indian Standard for coarse and fine aggregates). They should be durable and free from contaminants like clay, silt, or organic matter**. Fine aggregates** should meet the requirements of IS 1542 (Standard for sand).

Water: The water used in the mix must be clean and potable, free from impurities and chemicals that could affect the quality of the concrete.

Reinforcement: Steel reinforcement used should conform to IS 1786 (for high-strength deformed bars).

Construction Process**:**

Batching and Mixing: The concrete mix is prepared either at a batching plant (centralized) or on- site using mixers.

Paving: Concrete is placed on the prepared subgrade using mechanical pavers or hand labour000, depending on the scale of the project.

Curing: Proper curing is critical for achieving the desired strength and durability. Typically, curing is done using water, curing compounds, or polyethylene sheets to retain moisture in the concrete for 7-14 days.

Finishing: After laying the concrete, finishing is done to smooth the surface, and proper texture is applied for skid resistance.

Drainage Considerations:

Proper drainage is crucial to the longevity of rigid pavements. Drainage systems (surface and sub-surface) are necessary to prevent water from accumulating under the pavement, which can weaken the structure.

Side drains and cross-drainage measures must be incorporated into the design, especially in areas prone to heavy rainfall.

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Quality Control and Testing:

Environmental considerations should focus on the minimization of dust, noise, and pollution during construction, as well as the sustainable disposal of construction debris.

Summary of Key Specifications for Double-Line Rigid Pavement:

Parameter	**Specification**
Pavement Type	Rigid Concrete Pavement (Portland Cement Concrete)
Concrete Mix Strength	Minimum 25 MPa (higher for higher traffic roads)
Pavement Thickness	Typically, 200-300 mm depending on traffic load
Subgrade CBR	Minimum 5% for proper support
Joint Spacing	3.5–5 meters for contraction joints
Curing Period	Minimum 7 days (preferred 14 days)
Drainage	Surface and sub-surface drainage must be included

These specifications are broad guidelines. The actual design and implementation will depend on specific site conditions, traffic patterns, climate, and engineering standards, and should always follow the most recent **IRC and MoRTH guidelines and Indian Standards (IS).**

POTABLE WATER DISTRIBUTION SYSTEM ADOPTED ALONG THE ROAD IN INDIA SPECIFICATION:

The Potable Water Distribution System along roads in India is a critical component of urban and rural infrastructure, ensuring that clean and safe drinking water is delivered to households, businesses, and other users. The design, construction, and maintenance of such systems must comply with various standards and specifications set by national agencies such as the Indian Standards (IS), the Indian Roads Congress (IRC), and the Ministry of Urban Development (MoUD). These standards ensure that the water distribution systems are durable, efficient, and capable of providing potable water to communities.

FIBRE OPTICAL/NETWORK CABLE LAID ALONG THE ROAD IN INDIA SPECIFICATIONS: The installation of fibre optic cables along roads in India is an essential part of the infrastructure required for high-speed communication networks, including broadband, internet, and telecommunication services. The fibre optic network provides a faster, more reliable, and higher-capacity means of communication compared to traditional copper cables. These networks are vital for supporting modern urban development, industrial needs, and rural connectivity.

The specifications for laying fibre optic cables along roads in India are governed by several standards and guidelines provided by government agencies, industry bodies, and specific telecommunication regulations. These include guidelines for the installation, construction, and protection of fibre optic cables to ensure that they are durable, safe, and efficient.

CASE STUDY:

Gopalganj locality of Sagar district MP. -

Main road of Gopalganj from Bharat chowk to government bus stand is recently affected by this type of irregular work in different time intervals from January 2023 to December 2023. Interior service roads of whole Gopalganj locality is also indulge in this problematic system of construction, which almost takes 2-3 months on an average for 200 meters of construction work. The above images are captured by us in the month of November while demolishing the road and excavation for laying water pipeline and while sewer line correction is made.

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Nagar parishad Barodiya Kalan Malton dist. Sagar MP. -

Barodiya Kalan village was announced and declared as Nagar parishad on 4th December 2021 from gram panchayat. Before Nagar parishad at the time of gram panchayat in five-year plan from 2018 to 2023 all the village roads are renewed with concrete pavement using high grade of good quality concrete which was the superior work at village level I have ever seen. In the same term plan a sewer line with proper width and depth of reinforced concrete was also laid in whole village, which was really a appreciable work. Water pipeline facility was not available in that village at that point of time. Over hanged electricity supply cables are also implemented by replacing the naked aluminium wires, adding street lights in the pan village. This amazing work has come in existence by great efforts of SARPANCH/PRADHAN of the village DAYARAM CHOURASIYA. The work has been done for 15 years of service life of construction with maintenance and repairing.

As this village is added to the urban area by converting it to the Nagar parishad Chetra with high command and control of politicians. all the works relating to infrastructure were repeated by demolishing the old construction and separate tender/projects are made for drinking water pipelines for whole Nagar parishad. New lamps and street lights installed along with the underground cable installation, new sewer lines are made on both sides of road, new footpath constructed for pedestrian, new water pipelines are earth

worked on sides of road etc. So, from above we have clearly seen that different works are carried out without checking validity and necessity of the utilities by wasting money of taxpayers or government. As we know it is difficult to redevelop a highly dense and crowded city which was a old culture and construction specially in our country India. If it is possible to develop a new region /city/area / growing city/developing

area in a better serviced environment, we need to detail exercise and make plan/projects for that area so that residentials can take advantage of good service and enjoy the sophisticated environment. In the last **2 years of period total 100 million** of Indian rupees were invested in the Nagar parishad barodiya Kalan approximately. Where we can save up to 50% of money if it will be monitored properly

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Tender For Work Of Water Supply System Of Barodiya Kalan Town Under Amrut 2.0 (Third Call), Sagar-Madhya Pradesh

Government Departments has published Tender For Work Of Water Supply System Of Barodiya Kalan Town Under Amrut 2.0 (Third Call). Submission Date for this Tender is 20-05-2023. Water Supply Project Tenders in Sagar Madhya Pradesh. Bidders can get complete Tender details and download the document.

Tender Notice

TDR	37535508
Tendering Authority	Click Here To View Tendering Authority.
Tender Brief	Tender For Work Of Water Supply System Of Barodiya Kalan Town Under Amrut 2.0 (Third Call)
Bidding Type	Open Tender
Competition Type	Indian
State	Madhya Pradesh
City	Sagar
Last Date of Bid Submission	20-05-2023

Tender Details

Work Of Water Supply System Of Barodiya Kalan Town Under Amrut 2.0 (Third Call)

Key Value

Document Fees	INR 50000 /-
EMD	INR 1957500.0 /-
Tender Value	INR 39.15 Crore /-

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खैरा नाका कॉलोनी में घरों में अब भी गंदा पानी आ रहा, पुलिया के नीचे पाइप लाइन टूटी, नहीं हुआ सुधार

भास्कर संवाददाता | खुर्ई

खैरानाका पर पानी सप्लाई की समस्या हल नहीं हो पा रही है। जिससे वार्डवासी परेशान हो रहे हैं। सड़क की पुलिया निर्माण के दौरान पानी की पाइप लाइन टूट गई थी। जिसका सुधार कार्य-खनन में करके पुलिया बना दी, लेकिन पाइप लाइन में लीकेज रह गया। जिससे पानी सप्लाई के दौरान पहले 15 मिनट तक नाली की तरह काला पानी आता है। इसमें बदबू भी आती है। उसके बाद थोड़ा साफ पानी आना शुरू होता है। ऐसे में लोग उपयोग नहीं कर पा रहे हैं।

नीतू विश्वकर्मा ने बताया कि प्रतिदिन काला पानी आ रहा है, जिससे इस पानी का उपयोग पीने के लिए नहीं कर पाते हैं। पीने का पानी लेने हैंडपंप पर जाना पड़ रहा है। पानी खराब होने से त्वचा रोग होने की समस्या भी हो रही है। कई बार शिकायत के बाद भी पाइप लाइन का सुधार नहीं हुआ है। वार्डवासियों का कहना है कि खैरानाका के लोगों को सबसे ज्यादा पानी की समस्या का सामना करना पड़ रहा है। सीवरेज कंपनी ने बार-बार खुदाई पाइप लाइन क्षतिग्रस्त कर दी हैं, जो सुधार के बाद भी लीकेज रहती हैं। जिससे पानी का प्रेशर भी नहीं आता है। अभी ठंड में कम पानी की जरूरत है, गर्मियों में जलसंकट बढ़ेगा। अगर ऐसी स्थिति रही तो पीने का पानी लेने के लिए दूर तक जाना होगा।

पानी की पाइप लाइन को दोबारा सुधरवाया जाएगा- नगर पालिका सीएमओ राजेश मेहतेले का कहना है कि निर्माण के काम के दौरान जिस कंपनी ने पाइप लाइन क्षतिग्रस्त की है और उसका सुधार ठीक से नहीं कराया है। उस कंपनी से दोबारा खुदाई कराकर पाइप लाइन सुधार कराया जाएगा। जिससे आमजन को पानी की समस्या से न जूझना पड़े। वहीं नगर में काम कर रही कंपनियों को निर्देश दिए हैं कि पानी की पाइप लाइन कहीं भी क्षतिग्रस्त हो तो सीएमओ कंपनी को बताकर तत्काल सुधार कराया जाए, जिससे आमजन परेशान न हो। लोगों के घर तक वापस से साफ पानी की सप्लाई हो सके।

खैरा नाका पर लीकेज होने से गन्दा पानी आ रहा है।

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Home › Indian Tenders › Tender Notice : 33698373

Construction Of Madawan Gouri To Barodiya Kalan Road Including Electrification Work Total Length - 6.30 Km, sagar-Madhya Pradesh

Government Departments has published Construction Of Madawan Gouri To Barodiya Kalan Road Including Electrification Work Total Length - 6.30 Km. Submission Date for this Tender is 12-09-2022. Electrification Work Tenders in sagar Madhya Pradesh. Bidders can get complete Tender details and download the document.

Tender Notice

TDR	33698373
Tendering Authority	Click Here To View Tendering Authority.
Tender Brief	Construction Of Madawan Gouri To Barodiya Kalan Road Including Electrification Work Total Length - 6.30 Km
Bidding Type	Open Tender
Competition Type	Indian
State	Madhya Pradesh
City	Sagar
Last Date of Bid Submission	12-09-2022

Tender Details

Construction Of Madawan Gouri To Barodiya Kalan Road Including Electrification Work Total Length - 6.30 Km

Key Value

Document Fees	INR 20000 /-
EMD	INR 656210.0 /-
Tender Value	INR 6.56 Crore /-

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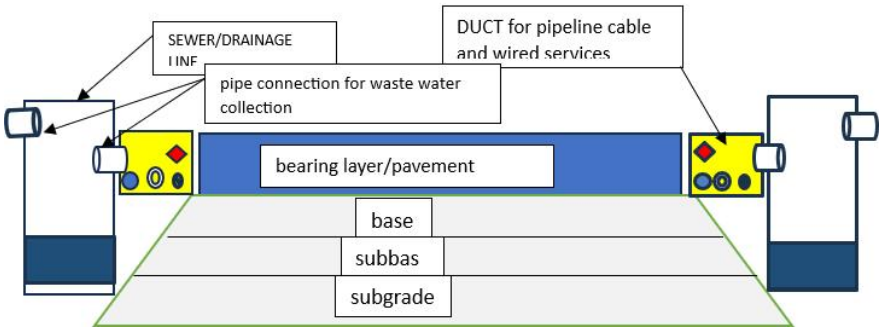
IV. METHODOLOGY

To overcome this type of unsophisticated irregular construction work we can adopt a well- planned managed construction work to facilitate the user and resident public, which we are discussing below-

DIAGRAM -1



WE NEED TO MAKE DETAILED ESTIMATE BY CONSIDERING THE FOLLOWING PARAMETERS: -
width of pavement or number of lanes of road required for traffic in that area.
total no. of houses/residents to be served on both sides of road.
water pipeline supply gauge provided for domestic use.
LPG gas pipeline service in that area for domestic use.
Electricity line cable service
cable services for different network access.
volume of waste water generated by the residentials per day, to design the sewer line on both sides of road.
All the factors are considered by government while designing any superstructure accurately whatever be those are sewer line, pavement work, excavation etc. but there is a problem of implementation of each facility separately which is the cause of problem and comfortless.
The above design shown in **diagram-1** is totally based on doing all the works together if any facility is not available in that area at the time of construction make a provision for future implementation at that place.
Following steps should be followed for construction work: -
Make a smooth finished road of specified parameters as per the quality and guidelines of standardized codes of Indian government in that area.
As the road work is over, provide a sewer line on either or both sides of road of required dimension in breadth and depth as per the Indian standard codes of sanitation. Keep in mind that the sewer line top surface is at higher elevation than pavement surface so that the excess rain water or surface water can be drained off into the sewer line.
A concrete duct parallel to the sewer line and road surface is provided as shown in the above diagram, for providing the different services to the public like cable service, water pipeline, gas pipeline, electricity line etc. through the duct. Make an outlet in front of every house and plot to serve the public with all services.
The duct line can be laid between the road and sewer line as shown **in figure-1**, it can be laid from the front and back sides of houses as shown **in figure -2**, it can also be laid in between the walls of sewer line as shown in **figure-3**. We can choose any of the above option to set up the duct line as per the restrictions and need of that area.
The size of duct should **2 feet wide and 1feet depth**. Depth can be variable as per the volume of service line pass through it.
With the provision of duct repairing and maintenance of the pipeline and cable services are easier.
Duct can also be provided on both sides of road as of sewer line as per the demand of that area or region.
Pipe connection or holes must be provided in the bottom layer of duct line and at the level of pavement surface to discharge excess rainwater in to the sewer line.

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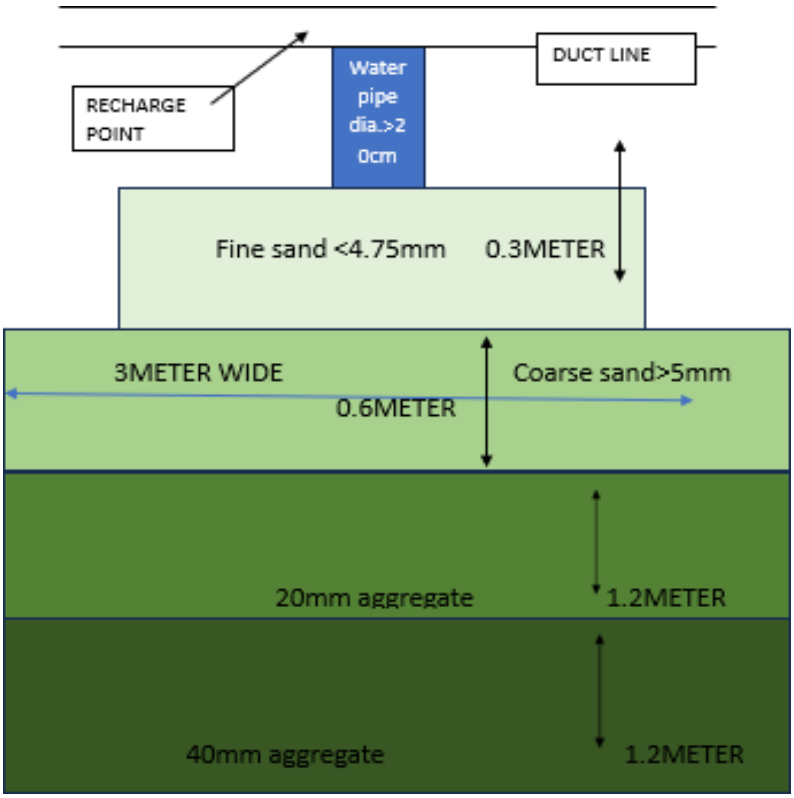
Water recharge points are also provided in the duct line at every **100-meter** interval along the length so that the excess rain water can be store in the earth crust. where ever possible to construct and chances of heavy rain accumulation. The design of water recharge points is shown in **DIAGRAM-2** below-

DIAGRAM-2 CROSS SECTION OF WATER RECHARGE POINT IN THE DUCT LINE



Service connection for accessing different service, must be provided in front of each house and property, so that we do not to extra efforts while giving new connections as shown in **figure -4.**

For water recharging we need to excavate 3.5-meter depth below earth surface with cross section of 3*3 m2 area so that water can be flow and filtered faster

In the above design we have clearly shown that bottom layer is filled with larger size stones greater than 40 mm up to 1.2 m thickness, then again fill 20mm stone upto 1.2 m thickness, over it pour coarse grained sand for about 0.6m thickness. then finally packed the chamber with top layer which is fine grained sand up to 0.3m thick. Through this portion water can move easily to sub surface.

V. CONCLUSION

To work like above proposed design all the working department of government

Relating with that area and different customer service must be merged to take decisions and make plan for that area as per the need of the locality

Funds, time, cost and material must be saved by doing work like this

Management, maintenance, repair can be done easily.

Discomfort, noise, traffic issue can be minimized for the public.

Water harvesting system also implemented

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SCOPE OF FUTURE RESEARCH WORK

Scope in this field is that, how can be exactly put this plan to the ground, with the exact coordination of departments and officials.

Make a full proof plan for the recently developing area where government wants to provide all the facilities, and by implementing the design make it ideal place for the other work carried out in the country.

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