

# A REVIEW PAPER ON RURAL ROAD DEVELOPMENT

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## ABSTRACT

Roads are the basic need in the growth of any country and its people. It enhances and improves accessibility to the market and other places by making transportation easier. As the 66% and more population of India live in a rural area, which mostly depends on farming which needs more connectivity to market and consumer. The development of rural roads will provide a critical impetus to the country's economic increase. In this paper, we focus on the development of rural roads from the basic level. The development of rural roads will ensure access to critical services and opportunities and foster sustainable poverty reduction programs as well as employment generation through industrialization in rural areas.

## KEY WORDS

Rural Road, Poverty Reduction, Subsistence Farming System, Connect the Low Population Area by Road

## INTRODUCTION

In this paper, we focus on the construction of economical and sustainable roads in the rural area which helps to improve the connectivity of rural population to market another facility Centre. In India, rural roads are being deliberate and programmed in favor of the general improvement of rural roads and tried to offer all-weather connectivity with the same level of fulfillment. Roads reduce transportation fees and the fees of intake and manufacturing of goods and services with simpler get right of entry to markets and generation, improved roads amplify the farm and non-farm manufacturing through improved availability of applicable inputs and lower enter prices. Rural road accounts for 60 percent of the total road length in India so, we focus here on their construction cost and on their maintenance. Here we also evaluate the several types of roads and their construction cost based on the quality of soil present in rural areas in

various parts of the country and their saturation level and their climate condition. The road's sustainability also affects the growth of the rural areas, so we also focus on the materials which are used in construction to maintain the strength and load-bearing capacity of a road.

## RESEARCH OBJECTIVE

The main intention of this paper and research is to construct an economical and sustainable road network in rural areas by collecting the data based on the climatic condition and soil quality to improve the quality and roads and to know about the suitable materials. We also work on the strength of soil and its saturation to cure it of cracks and creeps. Sustainable roads help rural people to connect with urban areas for their health and education purposes.

## PROJECT DESCRIPTION AND DETAILS:

The following project includes the economical and sustainable construction of a road in rural areas by using the classical method. This process includes the estimation of material required based on the requirement in different villages and collects all the important pieces of machinery at on place, use of local labor to generate employment and make work smoother. After this we need to estimate the overall cost, which should be below the given target in between the given time.

## VILLAGE ROAD DESCRIPTION

In this project, the model village is chosen which contains highly saturated soil with sand in it, so we need to excavate and fill new soil which will be preferably more suitable for road construction to lower the cost raised by the excavation process RCC road can also be built, in the place of bituminous road. RCC road has more life in comparison to bituminous road its cost could be raised which will be cut down in maintenance cost required.

## FEATURES OF RURAL ROAD

- 1) It is constructed from local materials available at the site.
- 2) It can be further improved according to the requirements.
- 3) It is the initial stage of road construction].
- 4) Local labour is hired to construct the project, which improves the rate of employment as well as their skill.

## LITERATURE REVIEW

1. **Dr. Pradeepta Kumar Samanta (11 May 2015)** examined the rural areas account for 69 percent of India's total population. consequently, enhancing connectivity and accessibility to rural regions will provide a vital impetus to the united States's economic boom rural roads offer crucial links that foster effective get right of entry to and usage of a bunch of crucial social and bodily infrastructure. Rural street improvement enhances get right of entry to markets for both inputs and outputs through a reduction in transaction and exchange fee (shipping and planning price). The more availability of inputs increases their use by means of farmers. Therefore, agricultural productivity can boom. Rural roads also allow manufacturers to obtain additional effective possibilities, leading to a rise in production (Stifel and Minten, 2008). Jalan and Rivalino (2002) show that road density had a distinctly extensive advantageous effect on intake growth on the farm-family stage in rural regions of Southern China from 1985 to 1990.
2. **Prof. Pragya Sharma's (3 March 2021)** main intention of this study is to develop a road information system so that it will be useful for solving complex planning, Decision making, and management problems of rural roads in the study area. It covers the software of GIS to discover a most appropriate route by using the usage of community analysis.  
The objectives are to develop a spatial and attribute database for the street network of this study location to become aware of the increase facilities and rural hubs to pick the gold standard direction between two locations to put together an up-gradation and upkeep precedence list. Rural avenue improvement is provided on this look at: -government has prepared such a lot of plans like: - 1)2d 20-year development plan (1961-1981)2)3rd 20-year development plan (1981-2001)3)4th20year improvement plan (2001-2021) four) Rural Avenue development plan (2005-2025)
3. **R.Madhur (2011) Department of Civil EngineeringSree Data Institute of Engineering & Science**Rural roads are the tertiary road system in the total road network which provides accessibility for the rural habitations to market and another facility center. India, during the last five many years, rural roads are being planned and programmed within the context of typical rural improvement and attempted to offer all-weather connectivity with the identical stage of achievement. The lengthy-term avenue development plans for the u. s. a. furnished policy tips and priorities for rural roads, at the same time as the price range for rural roads had been allocated in the five yr. The authorities of India have undertaken a dedicated software known as Pradhan Mantra Gram Sadak Yojana (PMGSY)' to offer rural connectivity to all habitations underneath the Ministry of Rural development. more currently, Bharat Nirman, a time-bound business plan followed to provided rural infrastructure for the duration of 2005-09, rural roads were to upgrade the prevailing rural roads for ordinary network improvement that's extra goal.
4. **N. S. Srinivasan (Dr), Executive Director National Transportation Planning and Research Centre, Trivandrum Central Road Research Institute, New Delhi (21 Oct 2021)** highlights that Despite the highest place of rural roads in the planned development of rural oriented Indian economy.  
The paper deals with the impact of rural roads on agriculture, industry, health, communication, education, etc., and describes the planning targets and achievements during the last three decades of planning for rural roads and highlights the need to formulate long term plans and to sort out national policies and priorities.  
The paper presents some of the experience gained from the studies on rural roads conducted by the National Transportation Planning and Research Centre and suggests some recommendations which may accelerate the process of rural road development.
5. **Md. Lutfar Rahman Khan (3, December 1987): Rural Road** planning in developing countries is defined and differentiated from other types of road investmentsVarious approaches to the problem are assessed; a new network modeling approach is proposed, and a combinatorial tree design problem is formulated as the basic decision model; solution techniques of mathematical programming, exact enumerative, and heuristic methods are presented. Interest is given to the usage of solutions inside the context of actual-world decisions. In the framework of developing

countries, the innovative approach is more practicable than any conventional method.

6. **Prof.Nandan Patel, Dr. KhadeejaPriyan, Prof.Amit. A. Amin (2 Feb 2022).** This paper addresses a key aspect regarding Rural Roads Development. The Govt. of India is funding various projects associated with village road development consistently. PMGSY project is one of them.

The goal behind the agricultural avenue development is to offer sustainable and green rural connectivity for the rural network but the present techniques and practices will in popular advice innovation.

Difficult and distance away they are, which results in better value of creation. There are some factors which ought to be tended to inside the planning system of low volume street. The various material constituents are directly affected by the strength parameters of each layer.

Aware is truly reliable and useful for the development of current pavement performance as well as a maintenance practice.

7. **GUIDING & PRINCIPLES OF PMGSY AND DEFINITION** The spirit and the objective of the Pradhan Mantri Gram Sadak Yojana (PMGSY) are to provide good all-weather road connectivity to eligible unconnected Habitations. A habitation that was earlier provided all-weather connectivity would not be eligible even if the present condition of the road is bad.

The unit for this Programmed is a Habitation and now not a revenue village or a Panchayat. Habitation is a cluster of population, living in an area, the location of 2 which does now not alternate over the years. Desam, Dhanis, Tolas, Majras, Hamlets, and many others. are used terminology to describe the Habitations.

An Unconnected Habitation is one with a population of designated size (refer to Para 2.1 above) located at a distance of at least 500 m or more (1.5 km of path distance in case of Hills) from an All-weather Road or a connected Habitation. In the blocks bordering international boundary in the hill States (as

identified by the Ministry of Home Affairs), however, all habitations within a path distance of 10 km (about 6.21 mi) may be treated as a cluster for this purpose@.

The population, as recorded inside Census 2001, shall be the premise for figuring out the population length of the habitation. The population of all Habitations within a radius of 500 meters (1.5 km of path distance in case of Hills) may be clubbed together to determine the population size. In the blocks bordering international boundary in the hill States (as identified by the Ministry of Home Affairs), however, all habitations within a path distance of 10 km (about 6.21 mi) may be treated as a cluster for this purpose@. This Programme recommendations cluster method could permit the provision of connectivity to a larger variety of Habitations, especially within the Hill/ mountainous regions. (@Substituted vide MoRD letter No. P-17023/38/2005-RC dated twenty ninth February 2008)

The eligible Unconnected Habitations are to be linked to nearby Habitations already linked by using an All-weather Avenue or to another present Allweather street in order that services (educational, fitness, advertising centers, and many others.), which are not available in the unconnected Habitation, turn out to be to be had to the citizens.

A core network is that minimum network of roads (routes) this is vital to provide primary get entry to critical social and monetary offerings to all eligible unconnected habitations within the decided-on regions via at the least a single all-weather road connectivity.

A Core Network comprises Through Routes and Link Routes. Through Routes are the ones which collect traffic from several link roads or a long chain of 3 Habitations and lead it to Marketing centers either directly or through the higher category roads i.e., the District Roads or the State or National Highways. hyperlink Routes are the roads connecting a single Habitation or a set of Habitations to through Routes or District Roads main to market centers. Link Routes have dead ends terminating on a Habitation, while Through Routes arise from the confluence of two or more Link Routes and emerge onto a major road or to a Market Centre. It needs to be ensured that every road work that is taken up under the PMGSY is part of the core network. Even as preserving the objective of Connectivity in view, preference should take delivery of to those roads which also incidentally serve other Habitations. In other phrases, without compromising the simple goal

(masking one thousand+ Habitations first and 500+ Habitations subsequent and 250+ Habitations were eligible, remaining), choice must accept to those roads which serve a bigger population.

For this purpose, while Habitations within 500 meters from the road are considered as connected in the case of plain areas, this distance Pradhan Mantri Gram Sadak Yojana should be 1.5 km (of path length) in respect of Hills.

The PMGSY shall cover the handiest agricultural regions. city roads are excluded from the purview of this Programme. Even inside the rural areas, PMGSY covers handiest the agricultural Roads i.e., Roads that had been formerly labeled as 'other District Roads' (ODR) and 'Village Roads' (VR). different District Roads (ODR) are roads serving rural regions of production and providing them with an outlet to marketplace facilities, taluka (tehsil) headquarters, Block headquarters, or different major roads. Village Roads (VR) are roads connecting villages / Habitation or groups of Habitations and to the closest road of a better category. most important District Roads, state Highways, and countrywide Highways cannot be covered below the PMGSY, even though they take place to be in rural areas. This applies to New Connectivity roads in addition to upgradation works.

The PMGSY envisages the most effective single avenue Connectivity to be furnished. If a Habitation is already connected by way of an All-weather Road, then no new work can be taken up under the PMGSY for that habitation. Provision of connectivity to eligible unconnected Habitations might be termed as New Connectivity Since the purpose of PMGSY, inter alia, is to provide farm to market access, new connectivity may involve 'new construction' where the link to the habitation is missing and additionally if required, 'upgradation' where an intermediate link in its present condition cannot function as an all-weather road (see Para 3.12 below).

Upgradation, when approved, might usually involve building the base and surface guides of a present road to desired technical specifications and/or enhancing the geometrics of the street, as required following site visitors' conditions.

The number one cognizance of the PMGSY is to provide All-weather Avenue connectivity to the eligible unconnected Habitations. An All-weather Road is negotiable in all seasons of the year. this implies that the roadbed is tired Programme guidelines efficiently (with the aid of adequate cross-drainage structures which include culverts, minor bridges, and causeways),

but this does not necessarily suggest that it should be paved or surfaced, or black-topped. Interruptions to traffic as in step with authorized frequency and duration may be allowed.

There may be roads that are Fair-weather roads. In other words, they may be fordable most effective for the duration of the dry season, because of the lack of cross Drainage (CD) works. Conversion of such roads to All-weather roads via the availability of CD works could be dealt with as upgradation. It ought to be noted that on all the street works of the PMGSY, the provision of important CD works is taken into consideration as a vital element. 3.15 PMGSY does not permit repairs to Black-topped or Cement Roads, even if the surface condition is bad.

The Rural Roads constructed under the Pradhan Mantri Gram Sadak Yojana will be following the provisions of the Ministry of Rural Development's 5 Specification for Rural Roads and specifications as given in the Rural Roads Manual (IRC: SP20:2002). in the case of Hill Roads, for subjects no longer covered by the rural Roads guide, provisions of Hill Avenue manual (IRC: SP:forty eight-1998) may also practice.

## COST OF ROAD CONSTRUCTION

The projects under PMGSY are categorized in two diverse groups viz. "New Road Construction" and Road Upgradation." The data made available via government reports regarding the cost of construction and constructed length across various categories in a fiscal year is compiled state wise from the year 2000 to 2016. To make the data comparable across the states, the rates of construction per kilometer of constructed road were found out for each state and for each fiscal year. WHOLESale PRICE INDEX CORRECTION.

The wholesale rate index (WPI) is based totally on the wholesale rate of a few applicable commodities. In India, the change in this index is used to measure inflation in the Indian economy. In India WPI is published every week by the Office of Economic Adviser under ministry of Commerce and Industry.

The cost of construction depends on many economic variables and the study involves data from the year 2000 to 2016 and cannot be directly compared. To remove such problems, help of Wholesale Price Index (WPI) is taken. WPI is published every week by the Office of Economic Advisor of India to account for the inflation in the market. The WPI required for this study was available on two base years 1993-94 and 2004-05. The average of the

weekly WPI data across the fiscal year is taken and is presented in Table 1.

#### Average WPI Published by the Office of Economic Advisor

Base Year	2000-01	2001-02	2002-03	2003-04	2004-05
1993-04	155.7	161.3	166.8	175.9	187.3
2004-05	–	–	–	–	–
Base Year	2005-06	2006-07	2007-08	2008-09	2009-10
1993-04	195.6	206.2	215.7	233.9	242.9
2004-05	104.47	111.35	116.63	126.02	130.81
Base Year	2010-11	2011-12	2012-13	2013-14	2014-15
1993-94	–	–	–	–	–
2004-05	143.32	156.13	167.62	177.64	181.19
Base Year	2015-16				
1993-94	–				
2004-05	176.67				

TABLE 1

The WPI data from the 1993-94 base year had to be linked with the WPI data from 2004-05 base. To make the WPI on the same base year a linking factor had to be used. The linking factor used for this case was 1.873 [19]. The data from the 1993-94 base year was converted to 2004-05 base year using 1.873 as the conversion factor.

Therefore, we can write,

$$\begin{aligned}
 & (WPI\ 2004-05) \\
 &= (WPI\ on\ 1993-94) / \text{Linking Factor} \\
 &= (WPI\ on\ 1993-94) / 1.873
 \end{aligned}$$

Now the WPI for 2004 – 05 as the base year obtained is presented in the Table

Base Year	2000-01	2001-02	2002-03	2003-04
2004-05	83.12867	89.05499	93.91351	100
Base Year	2004-005	2005-06	2006-07	2007-08
2004-05	104.47	111.35	116.63	126.02
Base Year	2008-09	2009-10	2010-11	2011-12
2004-05	130.81	143.32	156.13	167.62
Base Year	2012-13	2013-14	2014-15	2015-16
2004-05	167.62	177.64	181.19	176.67

TABLE 2

This linked WPI is now used to take the rate of the constructed road to the Base year of 2004-05 eliminating the variation caused by inflation.

#### Rate on 2004~05 Base Year

$$= \{(Rate\ in\ Ith\ year) \times WPI\ of\ 2004\sim05\} / (WPI\ of\ Ith\ year)$$

Using the above equation, the corrected rate is obtained for the newly constructed road and the upgradation and is presented in Table 4.5 and in Table 4.6, respectively.

#### METHODOLOGY:

**1) Fixing of road alignment:** Road should be fixed such that it follows the SESE rule. (Short easy safe economical)

**2) Executing earthwork:** It includes cutting and filling of earth. Earth extracted from cutting work should be utilized for filling work of the same road alignment. This decreases the cost of construction.

In many cases, excavators or dozers are utilized for excavation. The excavating machine itself compacts the soil to a certain extent.

**3) Preparation subgrade:** subgrade is prepared by slight application of water followed by compaction with compacting machine, tamping rods, or manual compacting hammers.

In the presence of compacting gadgets, it must take delivery of priority. If not possible to use the compacting machine, wooden log or tamping rods, or other manual compacting methods can also be used.

**4) Preparation of surface course:** The surface course constitutes of small stone chips & earth

that are mechanically or manually compacted like subgrade with the slight application of water.

**5) Opening of traffic:** After complete drying; the road is opened for traffic. 1 to 3 days is provided for drying of the road.

## CONSTRUCTION OF RURAL ROAD

### A - For Bituminous Road

#### 1. Preparation of the Existing Base Course Layer

The existing surface is prepared by removing the potholes or ruts if any. The irregularities are filled in with premix chippings at least a week before laying surface course. If the existing pavement is extremely weak, a bituminous leveling course of adequate thickness is provided to lay a bituminous concrete surface course on a binder course instead of directly laying it on a WBM.

#### 2. Application of Tack Coat

It is desirable to lay AC layer over a bituminous base or binder course. A tack coat of bitumen is applied at 6.0 to 7.5 kg per 10 sq.m area, this quantity may be increased to 7.5 to 10 kg for non-bituminous base.

#### 3. Preparation and placing of Premix

The premix is prepared in a hot mix plant of a required capacity with the desired quality control. The bitumen may be heated up to 150–177 deg C and the aggregate temperature should not differ by over 14 deg C from the binder temperature. The hot mixed material is collected from the mixture by the transporters, carried to the location and is spread by a mechanical paver at a temperature of 121 to 163 deg C. The camber and the thickness of the layer are accurately verified. The control of the temperatures during the mixing and the compaction are of great significance in the strength of the resulting pavement structure.

#### 4. Rolling

A mix after it is placed on the base course is thoroughly compacted by rolling at a speed not more than 5 km per hour. The initial or breakdown rolling is done by an 8 to 12 tones

roller and the intermediate rolling is done with a fixed wheel pneumatic roller of 15 to 30 tones having a Tyre pressure of 7 kg per sq.cm. The wheels of the roller are kept damp with water. The number of passes required depends on the thickness of the layer. In warm weather rolling on the next day, helps to increase the density if the initial rolling was not adequate. The final rolling or finishing is done by an 8 to 10 tone tandem roller.



#### 5. Quality Control of Bituminous Concrete Construction

Routine checks are carried out at site to ensure the quality of the resulting pavement mixture and the pavement surface. Periodical checks are made for a) Aggregate grading b) Grade of bitumen c) Temperature of aggregate d) Temperature of paving mix during mixing and compaction. At least one sample for every 100 tones of the mix discharged by the hot mix plant is collected and tested for the above requirements. **Marshall tests** are also conducted. For every 100 sq.m of the compacted surface, one test of the field density is conducted to check whether it is at least 95% of the density obtained in the laboratory. The variation in the thickness allowed is 6 mm (about 0.24 in) per 4.5 m length of construction.

#### 6. Finished surface

The AC surface should be checked by a 3.0 m straight edge. The longitudinal undulations should not exceed 8.0 mm (about 0.31 in) and the number of undulations higher than 6.0 mm (about 0.24 in) should not exceed 10 in a length of 300 m (about 984.25 ft). The cross-traffic profile should not have undulations exceeding 4.0 mm (about 0.16 in).



- A layer of well graded soil-gravel mixture of maximum thickness 15 cm (about 5.91 in).
- Brick soling with one layer of W.B.M. of maximum total thickness 10 cm (about 3.94 in).
- Two layers of W.B.M. of maximum total thickness 15 cm (about 5.91 in).
- A layer of lean cement concrete of maximum thickness of 10 cm.

When sub-grade soil is extremely poor, the sub-base should be placed over a blanket of some granular material or stabilized soil.

## B - For RCC Road Construction

### 1. Preparation of sub-grade

- Sub-grade is natural soil on which concrete slab is laid.
- It is cleaned, shaped, and levelled.
- After cleaning, it is prepared to the required grade and profile.
- It should be seen that sub-grade has uniform strength over its entire width.
- If any local weak spots are found, they should be removed and strengthened by placing new material which is compacted.
- When concrete is to be directly placed on sub-grade, the surface should be saturated with water for 6 to 20 hrs. in advance of placing the concrete.
- This is done to ensure that sub-grade does not absorb water from the concrete.

### 2. Provision of Sub-base:

- When natural sub-grade is not very firm, a sub-base over the sub-grade is provided.
- Depending upon the type of soil, design load, intensity of traffic and economic consideration, the decision for providing the sub-base is taken.

The sub-base serves the following three purposes:

- It provides a capillary cut-off and the damage caused by mud pumping is prevented.
- Provides a strong supporting layer.
- It reduces the thickness of concrete slab and thus leads to lower cost of construction.

The sub-base may consist of any one of the following layers:

### 3. Placing the forms in cement concrete road:

- The forms may be made up of steel or timber.
- The steel forms are of mild steel channel sections and their depth is equal to the thickness of the pavement.
- Forms are properly braced and fixed to the ground by means of stakes.
- Forms are fixed in position by 3 stakes at back of each 3 m length.
- When the forms are fixed, they must be checked for their trueness.
- The maximum deviations permissible in the vertical plane is 3 mm (about 0.12 in) and in horizontal plane 5 mm (about 0.2 in) in 3 m length of the form.
- The forms are oiled before placing concrete in them.

### 4. Watering the prepared sub-grade or sub-base:

- After the forms are fixed, the prepared surface to receive concrete is made moist.
- If the sub-grade is dry, it should be sprinkled with as much quantity of water as it can absorb.
- It is advisable to wet the surface at least 12 hrs. in advance of placing the concrete.
- When insulating layer of water-proof paper is provided, the moistening of the surface prior to placing the concrete is not required.

### 5. Batching of materials and mixing:

- After determining the proportions of ingredients for the Concrete mix, the fine and coarse aggregates are properly proportioned by weight in weight-batching plant.
- They are then fed into the hopper along with the necessary quantity of cement which is also measured by weight.
- The ingredients of concrete are mixed in proper proportions in dry state. The mixing should preferably be done in a concrete mixer.
- The measured quantity of water is added so that the desired water cement ratio is obtained.

#### 6. Transporting and placing of concrete:

- After mixing, the concrete is transported to the site in wheel burrows or in pans which are manually carried.
- The mixed concrete is deposited rapidly on the sub-grade in layer of thickness not more than 50 mm to 80 mm or about two or three times the size of aggregates.
- The concrete should be placed over the entire width of bay in successive batches as a continuous operation and topmost layer is laid about 10 mm (about 0.39 in) higher than the actual profile for further tamping.
- The top layer should also be laid to the required camber and gradient, while placing the concrete it is rodded with suitable tool to eliminate voids.
- Segregation of concrete is avoided during transportation and placing. When reinforcement has been specified in road slab, concrete is placed in two stages.
- In the first stage, concrete is placed and compacted to the depth corresponding to the level of reinforcement shown on the drawings.
- Reinforcement is then placed on top of compacted concrete and the remaining thickness of slab is then completed in the second stage.

#### 7. Compaction of cement concrete road:

- After the concrete is placed in its position, it should be brought in its proper position by heavy screed or tamper fitted with suitable handles.
- The wooden tamper is at least 75 mm (about 2.95 in) wide, and its underside is shaped to the finished cross-section of the slab.
- Its weight is about 10 kg/m.

- It should have sufficient strength to retain its shape under all working conditions
- Its length is equal to the length of bay plus 60 mm (about 2.36 in).
- The underside of the tamper is provided by a metal plate of 5 mm (about 0.2 in) thickness as shown in Fig. 4.14.4.
- The tamper is placed on the side form and its handles are gripped by the men who use the tamper.
- Concrete is also compacted by means of a power-driven finishing machine or by vibrating hand screed.
- Up to 12.5 cm (about 4.92 in) thickness of slabs screed vibrators alone can be used for compaction.
- For greater thickness, an immersion vibrator is used.

#### 8. Floating

- After compaction, the entire slab surface is floated longitudinally with a wooden float board.
- The purpose of floating is to provide an even surface free from corrugations.

#### 9. Belting:

- After floating, the surface is further finished by belting just before the concrete becomes hard.
- The purpose of belting is to make the road surface non-slippery and skid resistant. This operation is sometimes omitted.

#### 10. Brooming:

- After belting, brooming is done by drawing brushes at right angles to the center line of road from edge to edge.
- Brooming is done just before the concrete becomes non-plastic.
- This operation is also sometimes omitted.

#### 11. Edging:

- After brooming, the edges of the slab are carefully finished with an edging tool before the concrete is finally set.

#### 12. Curing process of cement concrete road:

- Curing consists of checking the loss of water from the concrete slab and keeping the fresh concrete slab moist during hardening period.
- Initial curing is done for 24 hrs.
- By this time, the concrete becomes hard enough to walk upon and then wet mats are removed, and final curing is done for 2 to 3 weeks.

Final curing is done by any one of the following methods:

- Ponding Method.
- By covering the slab with 4 to 8 cm (about 3.15 in) thick layer of wet sand or earth.
- Spraying a suitable chemical such as sodium or calcium chloride on concrete surface.

### 13. Fillings of Joints and Edging:

- After curing, the surface is cleaned and washed.
- The joints are then properly filled-in attains with a suitable sealing compound.

### 14. Opening to traffic:

- Concrete road is opened to traffic when it attains the required strength or after 28 days (about 4 weeks) of curing.

## CONCLUSION

The planning for construction of good rural roads includes:

- A stand survey in the village has been proposed for the road and transportation sector.
- Basic needs: -medical facility in the village, food supply, education facility, and living lifestyle of the village.
- Social needs: -Transportation facility will reduce the time travelled required for travelling purposes. enhance agriculture as well as industrialization, hence the financial ability of the village.
- Economy needs: -The construction cost is reduced by the facility using naturally available materials.
- Improving rural roads reduces transport costs and stimulates marketing, this results in increased productivity and profitability.

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