

# A Review Paper on Road Construction

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**ABSTRACT:** Concrete pavement design has over the years become more important part for the promoting of concrete roads. High investing cost has to be motivated, and the benefits of a pavement with less maintenance over a longest design life have to be proved already before construction.<sup>[5]</sup>The rigid pavements which are made up of concrete seen some detrimental structural characteristics such as a very limited ductility, low resistance to cracking, low tensile strength ,brittle failure mechanism in tension etc.<sup>[1]</sup> Due to these undesirable characteristics of concrete, generally the reinforcement is provided with steel bar placed in the concrete structure in the appropriate positions to withstand the imposed tensile and shear stresses.<sup>[2]</sup>

**KEYWORDS:** less maintenance , concrete roads , Rigid Pavement, Reinforcement, Concrete

## I. INTRODUCTION

Concrete roads (rigid pavement), If we talk about economically, they are often the mostly used option to flexible pavements if we talk about today's costly life. Concrete is requires less maintenance and results in minimum disruption to road users when it properly method and designed and constructed using durable materials. Now days Concrete pavements have been used for local roads, airport runways, parking areas, streets, highways, industrial structures, and other types of construction. With experience of use of Rcc construction and use of rigid pavements in road project,<sup>[6]</sup> it has seen that in comparison to flexible pavements (asphalt-paved). Concrete surfaces also have a higher electiveness off its surface; this allows for improved visibility at night and reduced lighting on the road. We may also take note of the traffic that becomes minimum caused by concrete pavement construction which can be opened even after a couple of hours as opposed to flexible pavements construction, which in the turn cuts back on fuel consumption and exhaust gas emissions. Concrete roads are use to resist flexural loading from traffic loading it is also design this way and crack control , drying shrinkage, curling and warping. Flexural strength of concrete is normally higher than tensile strength but

will be low in homogenous materials. Higher flexural strength will result from the concrete in under load is having stronger materials at their edges.

Concrete pavements or rigid pavement is distribute stress over a large area it divided it in all horizontal direction therefore base layers undergo less pressure from axle loading as shown in figure.<sup>[2]</sup>

A. Method for Road construction

There some methods of road construction in civil egg.

1. Concrete
2. Asphalt
3. Composite
4. Bituminous
5. Recycling

B. Types of pavement

There are two type of pavement mainly uses in road construction.

1. Rigid pavement
2. Flexible pavement

Rigid pavement as known as concrete road .which is less flexible .Due to these undesirable characteristics of concrete, generally the reinforcement is provided in the form of continuous steel is placed in the concrete structure in the positions to withstand the imposed tensile and shear stresses

C. Test conducted on soil for road construction  
Types of tests conducted on soil for their load bearing capacity or its moisture content for a road construction project require the site survey to be carried out to understand the soil information. For road construction project, the properties of soil are required. Test on soil conducted before project are followed –

1. Classification of soil
2. Particle size distribution,
3. Moisture content determination,
4. specific gravity,
5. liquid limit, and

Plastic limit tests. We can take the soil tests can be laboratory tests or in-situ tests.

## II METHODOLOGY

### A. Methodology For Construction Of Concrete Road

#### 1. Site selection

National Highway 361( NH 361), is a national highway in India that runs entirely within the state of Maharashtra. Its western terminal is in Tuljapur near NH 52 and the eastern terminal is in Butibori near Nagpur at the NH 44. The total length of the Road NH-361 is 548 km. The Road is goes through the Sahyadri Mountains and is an important road connecting the Konkan region with Western Maharashtra, Marathwada and Vidharbha regions in the state of Maharashtra. The totals 58.765 Km length of road have been selected for four lane of AUSA CHAKUR section of NH-361 from km 55.835 to km 114.600 (design length 58.510 km). Actually period of completion of project is 24 month and concession period this road 15 years and Total price of this concrete road is Rs. 848.63 Crore.

#### 2. Site Survey

Site include different types type of survey such as Map Survey, reconnaissance survey, preliminary survey, engineering survey for highway, topographic survey.

#### 3. Map study

In the starting, various data in the forms of maps, aerial photographs, charts or graphs, etc. are collected. Topographical maps are done by the survey of India are available with 15m to 30m contour interval. Maps show the various topographical features like up, down of the area, river, hills, and valleys. With the proper map study we can get information on site.

Alignment is selected form following points -

- i) Alignment passing through valleys, lakes, and ponds.
- ii) Location of bridges for crossing rivers.
- iii) Available of mountains passing a mountain range.
- iv) Joining of two point at different elevation by planning a suitable ruling gradient.
- v) Determine the length of the roadway using contour Interval and ruling gradient

#### 4. Reconnaissance Survey

A field survey team examines and test the general character of a fairly broad stretch of land between the terminal stations points in the field, along the proposed alternative alignments marked on the map that means Reconnaissance Survey. In this type of survey, many basic and simple survey instruments like-

- 1 prismatic compass,
- 2 tangent clinometer,
- 3 barometers,
- 4 Abney level etc.

Are used to collect additional details fastly.

#### 5. Preliminary Survey

The survey instruments are used

- i chain type,
- ii leveling instrument,
- iii plane table theodolite and
- iv prismatic compasses.

#### B. Construction Process

This process covers the control of construction activities, machinery and work Environment so that at all stages of construction including the finished stage the product conforms to the specified requirements. Construction process is divided and /or supported by various sub processes as follows.

1. Planning and monitoring of project.
2. Execution of construction activities.
3. Quality control and Quality assurance.
4. Inspection and testing
5. Safety and housekeeping at work site.
6. Upkeep of Plant and Machinery.
7. Material storage and handling.
8. Identification and Trace ability.
9. Customer Property.

#### C. Construction of Cement Concrete (Cc) Pavement

The work shall consist of construction of

- i unreinforced,
- ii dowel bars,
- iii plain cement concrete pavements

in accordance with the requirements materials:

1. Cement: Ordinary Portland cement 43 & 53 grade, Portland slag cement, Portland pozzolana cement.

2. Chemical admixtures: Chemical admixtures are permitted to improve workability of concrete and setting time.

Silica fumes: Silica fumes are used as an admixture. It is used in proportion of 3 to 10 percent of cement.

3. Fibres: Fibres are used to reduce the shrinkage cracking and Post cracking. The fibres may be steel fibres or polymer Synthetic fibre.

#### 4. Aggregates:

A. Coarse aggregate: It should contain clean, hard, non porous, strong, and durable pieces of crushed stone or crushed gravel.

Requirements:

Abrasion value should be less than 35%

Combing EI and FI should be less than 35%

Water absorption should be less than 2%

Soundness for 5 cycle's sodium sulphate should be less than 12%, and magnesium sulphate should be less than 18%.

B. Fine aggregates: fine aggregates like sand. It shall consist of clean natural sand or crushed stone sand or a combination of two. It should be free from soft, clay, organic.

1. Water: It should be clean, free from oil, salts, acid and vegetable matter.
  2. Steel:•Dowel bars:- mild steel bars
  3. Tie bars :- HYSD bars.
- Joint fillers: Joint filler board for expansion joints is mainly up to 20 to 25 mm thickness.
4. Joint sealing compound: The joint sealing compound shall be of hot poured, elastomeric type or cold poly sulphide, silicon.
  5. Storage of materials: Materials should be placed with slope such that rain water should be drained off.
  6. Proportioning for concrete: The mix design is based on IS: 10262.
  7. Cement content: The cement content should be 360 kg/m<sup>3</sup>. And we should not be less than 310 kg/m<sup>3</sup> when blended with fly ash of 20%.
  8. Concrete strength: The flexural strength of the concrete should not be less than 4.5Mpa.
  9. Preparation of base: Clean DLC with mechanical broom or air compressor.
  10. Separation member: A Separation member shall we used between the concrete slab and the subbase. Separation member with PVC sheet 125 micron thick is used.

### III CONSTRUCTION PROCEDURE:

1. Batching and mixing: Batching and mixing of the concrete shall be done at a central plants with automatic controllers.
- Transporting: transit mixer and dumper.
2. Hauling and placing of concrete: Spreading, compacting and finishing not exceeding 90 min when temperature is 200c to 300c. 120 min if less than 250c. And work shall not proceed and reject when temperature is high.
  3. Compaction: Compaction is done by screed vibrators the compaction should be carried out immediately after the material is laid and levelled.
  4. Finishing: Finishing is done by flat and finishers.
  5. Texture: Texture is done by trimming and brushing.
  - 6 Curing: Covering the surface by gunny bags, pounding, sprinkling water continuously for 28 days and the surface. Tolerance should be (+ or -) 5mm.

### IV. CONCLUSION

The concrete pavement for roads perform well under less maintain drainage conditions and thus steer clear of wastage of resources on repeated treatment of flexible pavement. The proper design and planed of concrete pavement will definitely help to make it good, less maintains, less costly durable and cost effective.<sup>[5]</sup>

whose first priority function is to distribute the vehicle loads to the sub grade Pavements form

the basic supporting structure in highway transportation.<sup>[2]</sup> Every layer of pavement has a many of functions to perform which has to be considered during the design process.<sup>[3]</sup> Different types of pavements like rigid pavement and flexible pavement can be select depending upon the traffic requirements. It is has design properly and well planed and used good quality materials.

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