

# “A Performance Study of CTB & CTSB Method over Traditional Method (GSB, WMM) of Flexible Pavement”

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**Abstract:** - India is currently the fastest growing country in the world. Infrastructure and construction play a very important role in the development of the country. The relationship between them must be well connected to ensure the fastest delivery of all goods, equipment and people. The transport sector includes roads, railways, waterways, etc. In India, roads play an important role in all forms of transport. There are a number of road projects being worked on across the country and these will increase in the future. Many factors are taken into consideration when building a highway. And most importantly, the materials needed to build a highway. Material costs should be within budget and easily accessible. If it's not readily available and expensive, it will affect the whole project. In areas with heavy traffic and high rainfall, the thickness of the bark on the road surface increases compared to other areas. This will also add to the material needed to build the asphalt, which will impact the project budget. To solve this problem, the surface must be designed differently or the material must be changed to the right. In this regard, the cement treated under the concrete turns out to be an excellent alternative to the traditional GSB coating. By using CTB / CTSB, the thickness of the GSB and WMM layers can be reduced without affecting the road resistance parameters. You can save on equipment, machinery and fuel, making money. In this research work analyze performance of CTB & CTSB method over traditional method of flexible pavement. It is very important to check the properties of the material, strength and check their feasibility with various test parameters. This helps to design local roads and maintain a concrete foundation with increased elasticity.

**Keyword:** Flexible Pavement, Stabilization Performance Analysis, Thickness, (CTS) Cement Treated Sub-Base, (CTB) Cement Treated Base.

## I. INTRODUCTION

Transport contributes to the country's economic, industrial, social and cultural growth. This allows the transport of passengers and goods from one place to another. The most important modes of transport in our country are roads, railways, water and airways, eg. In

addition to this method, around 80% of passengers and 70% of freight can be transported locally. Roads can be divided into two main groups (smooth and hard road). Soft liner is a layer that has low tensile strength or something like that.

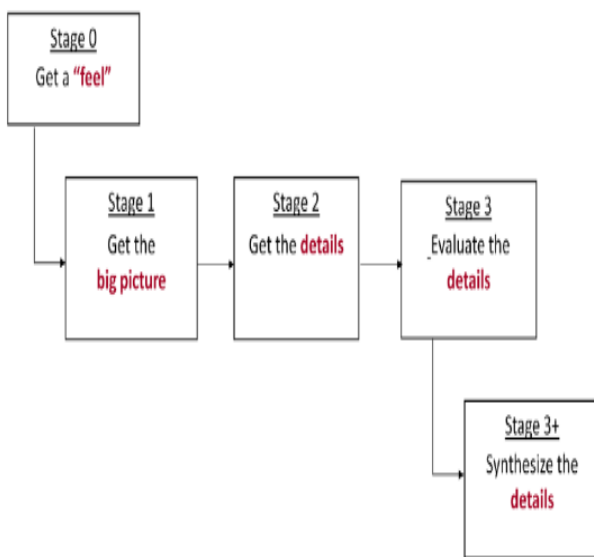
The structure changes under load, but if the bottom coating is wavy, the entire surface is disturbed. The load is transferred from the grain to the tip of the grain and a large compressive stress is on the road surface, so a solid layer must be pulled over it. A flexible layer has four layers; Wear a layer, a base coat, a base coat and a substrate. The treated base or base has a total / granular mixture with a suitable portion of Portland cement and sufficient water mixed for a large concentration. The basic factors that control the quality of the CTB are: the right concrete content, sufficient moisture, thorough mixing, sufficient density and hardness.

The infrastructure and construction sector plays a very important role in the development of the country. It must be well integrated to ensure the fastest transport of all goods, equipment and people. The transport industry includes roads, railways, waterways etc. In India, roads play an important role in all forms of transport. There are currently many road projects across the country which will increase in the future.

The Indian government has issued 3 lakh crore rupee road projects during the current financial year to reach the goal of 30 km of road construction per day. The transport sector accounts for 6% of GDP, of which 70% comes from road transport. The cost of road construction is approximately 50% of the total road construction costs. Many factors are taken into consideration when building a highway. And most importantly, equipment is needed to build a highway. Material costs should be within budget and easily accessible. If it's not available immediately and it's expensive, it affects the whole project. In areas with heavy traffic and heavy rainfall, the thickness of the shell on the roads increases compared to other areas. It also adds the material needed to build the asphalt, which affects the project budget.

## II. REVIEW PROCESS ADOPTED

The review process is divided into five stages in order to make the process simple and adaptable by every researcher. As it reflects from the literature that while beginning the finding of research objectives, it is necessary to start with a broader domain of any area / sub area of interest and narrow down to specific issue, the process described in the diagram includes the narrowing down. We have followed one of the typical processes to make a literature review and frame the objectives of research. The process diagram is shown in Fig. 1, which includes all five stages defined as under:



**Fig 1: Literature Review Process**

Stage 0: Get the Feel

Stage 1: Get Big Picture

Stage 2: Get the Details

Stage 3: Evaluate the Details

Stage 3 +: Synthesize the Details.

The review process was divided into five stages in order to make the process simple and adaptable.

## III. STRENGTHS

- For design traffic of 2 msa, the thickness of CT base and sub-base pavement is less than the thickness of conventional base and sub-base pavement up to a value of 10% effective CBR but for design traffic more than 30 msa thickness of CT base and sub-base pavement is less than the thickness of conventional base and sub-base pavement for all the values of CBR. [1]

- Researcher shows Test results that using CBETB in general sand is an effective treatment for increasing strength and durability, reducing water potential and increasing the bearing capacity of the coating, resulting in a significant increase in durability. [2]
- By using CBETB, the number of asphalt layers can be reduced due to increased load capacity, which reduces construction time and costs. [2]
- The researcher showed that the addition of Portland cement and bituminous emulsion increased the compressive strength, flexibility, pH and CBR of the mixture. [2]
- The total cost of building flexible asphalt with the CTB / CTB method is lower than the traditional method because it saves the cost of transporting necessary equipment, machinery, fuel consumption etc. [2]
- Many of the reasons for the roads are high traffic, heavy rainfall and poor drainage capacity. Even in the traditional way, the materials used in the base and weak base have less durability and strength. [3]
- CTB and CTB are stronger and more resistant than conventional materials. Therefore, the maintenance work required for CTB and CTB is low. [3]
- The use of CTB / CTB reduces the use of asphalt and the thickness of the repair is reduced to 100 mm. Travel time is longer than on normal roads. [3]
- The use of CTB / CTB saves the material needed to make simple roofing. Transportation costs, fuel consumption and necessary machinery are lower with the CTB / CTB method than with conventional methods. [4]
- Because it reduces material requirements, reduces initial construction costs, provides better performance than traditional materials, and reduces project maintenance which affects total life cycle cost. This also has environmental benefits. [4]
- Low consumption based on stability compared to conventional methods. [7]

## IV. LIMITATIONS

- WD loops can break and damage the RBS structure. [2]
- Soils with an organic content greater than 2% or a pH below 5.3 are usually not covered with concrete. [2]
- The high sulfate content in sand causes swelling and weight problems and can adversely affect concrete and stabilization systems. [2]
- Notice that short-term performance measurements have increased. [2]
- The resistance increases when the bituminous emulsion content rises to 3%, after which it decreases. [2]

- Increase thickness, more material requirements. [3]
- Roads that change in areas with heavy rain face many problems such as cracked surfaces, dikes, potholes, waves etc. [4]
- It is important to find alternative flooring materials that are inexpensive, strong enough to withstand the load, and require minimal maintenance during life on the road. [4]
- The demand for water is more in line with the CTB / CTSB method, which increases the cost of water transportation. [4]

**V. METHODOLOGY**

S. N	Authors	Year	Methods Used	Methodology
1.	Dewalegama, Udhara Ashani, Shivani Sharma, and S. N. Sachdeva	2018	CBR	<ul style="list-style-type: none"> <li>• Varying CBR from 3% to 15%</li> <li>• Design traffic varying for 2 msa to 150 msa</li> </ul>
2.	Baghini, Mojtaba Shojaei, Amiruddin Ismail, and Mohamed Rehan Bin Karim	2015	<ul style="list-style-type: none"> <li>• Unconfined Compressive Strength (UCS)</li> <li>• Flexural Strength</li> <li>• California Bearing Ratio</li> </ul>	<ul style="list-style-type: none"> <li>• Varying Bitumen Emulsion</li> <li>• Varying Cement Content</li> <li>• Varying Bitumen Emulsion Content</li> </ul>
3.	Ganesh D. Gavhane Prof. Abhishek M. Loya	2020	-	Comparison between Conventional Vs CTB/CTSB Method
4.	Singh, Sanjay	2019	<ul style="list-style-type: none"> <li>• UCS)</li> <li>• Sieve Analysis</li> </ul>	<ul style="list-style-type: none"> <li>• DLC Hammer</li> <li>• Casting Cost Comparison</li> </ul>

5.	Aher, D. D., et al.	2018	-	<ul style="list-style-type: none"> <li>• Varying Moisture Content</li> </ul>
6.	Phatangare, Sagar T	2017	<ul style="list-style-type: none"> <li>• (UCS)</li> </ul>	<ul style="list-style-type: none"> <li>• DLC Hammer Casting</li> <li>• Manually Casting</li> <li>• Cost of Materials</li> </ul>
7.	Prasad, Saket	2016	<ul style="list-style-type: none"> <li>• Compressive Strength of Cement Mortar Cubes</li> <li>• Sieve Analysis</li> </ul>	-

**Chart -1:** Name of the chart

**VI. OBJECTIVE OF STUDY**

- To Study the influence of CTB and CTSB technology on the thickness of the flexible asphalt strip.
- To explore the concepts of cement treated base and sub base in flexible pavement.
- To study the causes of failure of flexible pavement.
- Compare performance, required material levels, transportation costs, fuel consumption, machinery required by CTB / CTSB and traditional road construction methods.

**VII. CONCLUSION**

- Examination of the literature review presented above shows that most of the previous work was based on the feasibility of a cement-treated bed with less foundation than traditional methods and also for the basic stability of the road and concrete. Work is also underway to reduce road construction costs by reducing the thickness of the asphalt with primed concrete. However, we find that there are no studies or studies on the behavior of roads and plates treated with concrete after opening to traffic. A pitch estimation study will be conducted to verify pitch performance.

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