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Reclamation of the Road using Cement Treated Sub Base

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ABSTRACT

Reclamation of roads is a crucial process in maintaining and improving the quality and durability of existing roads. One effective method of road reclamation is cement-treated sub-base (CTSB), which involves mixing cement with the existing sub-base material to create a stronger and more durable foundation. This abstract aim to provide an overview of the benefits and challenges of using CTSB in road reclamation, including its impact on on-road performance, durability, and sustainability. The abstract also discusses the materials and methods used in the CTSB reclamation process, as well as key considerations for its successful implementation, such as the selection of suitable materials, proper soil stabilization, and appropriate cement dosage. Additionally, the abstract highlights some notable road reclamation projects that have successfully utilized CTSB. Overall, the use of CTSB in road reclamation has shown great promise as a cost-effective and sustainable solution for improving the quality and durability of existing roads, leading to reduced maintenance costs, increased safety, and improved transportation efficiency.

1. INTRODUCTION

Countries all over the world are developing rapidly and the infrastructure sector plays a vital role in the development of nations. In many developing countries, crushed rock and murram is used as base material for road pavement materials that are required in large quantities and are not easily available in many regions. The government of India is concentrating on the development of National Highways and State Highways for fast transportation and conveyance. Hence the requirement for construction materials is very huge. The material used for base layers in pavements is costly as it requires production, i.e. drilling, blasting, crushing, transportation, etc. Although this material fails under heavy traffic loads as well as heavy rainfall. Also, it is not easily available in city areas.

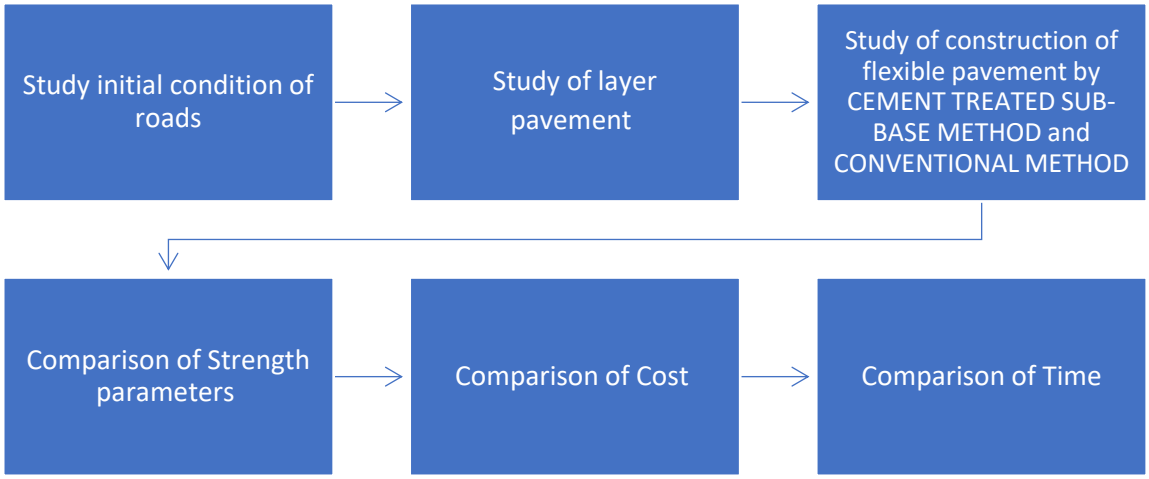
2. OBJECTIVES OF STUDY

- To see how CTSB technology affects the thickness of the flexible pavement
- Compare the total cost analysis for the CTB method over the conventional method
- Compare the time required to build the road

3. STUDY PLAN

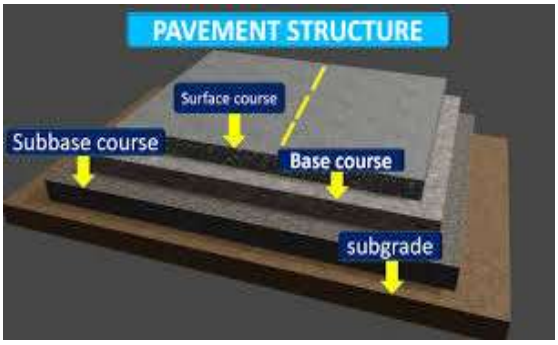
First, we did a case study on the damaged road near Shirdi and decided to study that method. We studied the conventional road and then we studied the adapted CTB method. We gathered all the data required to study from the site.

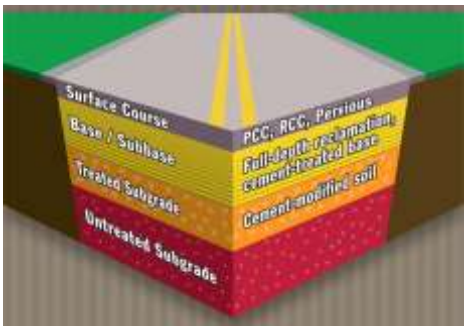
4. METHODOLOGY



4.1 Study the initial condition of the road

4.2 Study of layer pavement





1. Subgrade:

Material Used - Soil/moored/gravel/mixture of this material which is free from organic matter that is likely to deteriorate.

2. Subbase Course:

Material Used – Granular Sub Base (GSB) in one or more layers. GSB is made of Crushed Stones/gravel/Coarse Sand/ Moorum.

3. Base Course:

Material Used –

WMM (Wet Mix Mecadam). WMM consists of well-graded hard crushed aggregates and an adequate proportion of water mixed thoroughly in a mixing plant.

WBM (Water Bound Macadam). WBM consists of coarse aggregate, screenings, and binding material.

Function- It is to provide load distribution and contribution to sub-surface drainage.

4. Surface Course:

The surface Course Consists of a Prime Coat, Tack Coat, and Seal Coat.

The tack coat provides the bond between the existing layer and the new layer of pavement. Seal coats provide to seal the surfacing against the action of water and to develop skid resistance texture.

4.3 Study of construction of flexible pavement by CEMENT TREATED SUB-BASE METHOD and CONVENTIONAL METHOD

1. Study of construction of flexible pavement by CONVENTIONAL METHOD:-

Fig.1 Granular Sub-base spread

Fig.2 GSB compaction

Fig.3 Wet mix macadam spread and compact

Fig.4 Dense bituminous macadam

Fig.5 Tack coat spreading

Fig.6 Bituminous Concrete laying Laying

2. Construction of flexible pavement by CEMENT TREATED SUB-BASE METHOD:-

Fig.1 Cement Spreading

Fig.2 Mixing with CTSB machine

Fig.3 Compacted using sheep foot vibratory roller

Fig.4 Properly leveled using

Fig.5 Final layer is properly compacted by soil compacter

Fig.6 Paver

Fig.7 Rolling

Fig.8 CTSB Road

4.4 Comparison of Cost, Quantity of Material, and Time

Sr.no	Property	Conventional Method	Cement Treated Sub-base Method
1.	Quantity of Material (Per Km)	14265	12960
2.	Cost of construction (Per Km)	1,08,73,517.50	8924869.00
3.	Time of construction (Per Km)	Around 1 month	Per day 500m to 1km length

5. RESULT

Sr. no	Parameter	Conventional Method	Cement Treated Sub-base Method
1.	Time	The time required to construct this type of road is around 1 month.	The time required for this type of road is much lesser. Per day 500m to 1km length of the road is made.
2.	Economical	Traditional methods are expensive.	This method is 22% more economical than the traditional method.
3.	Natural material Requirement	Require much more natural material.	require less natural materials.
4.	Thickness of Road	The traditional method's road thickness is around 300mm.	In this method, roads are less thick around 200mm.
5.	Life of Road	Traditional method roads are not durable and require time-to-time repair.	This type of road is more durable and the sub-layer doesn't require any attention for 7-10 years.

6. CONCLUSIONS

1) Project cost was reduced by nearly 22% using CTSB compared to the conventional method.

2) Accelerated speed of the project completion with 40% less time required.

3) Because CTSB has a higher bearing strength than an unbound granular base, the base thickness is lowered by almost 400 mm.

4) Due to a robust Sub Base, bitumen use is reduced.

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