USE OF LOCALLY AVAILABLE AGGREGATES IN BASE LAYER OF FLEXIBLE PAVEMENTS

Soumen Layek[1*], Sukanta Karati[1]

[1]Sanaka Educational Trusts group of Institutions, Durgapur-713212

*Corresponding Author Email ID: layeksoumen007@gmail.com

ABSTRACT

The demand for aggregates in highway construction has significantly increased due to the continuous expansion of transportation infrastructure. In response to this growing need, the present study evaluated the potential use of locally available aggregates in the base and sub-base layers of flexible pavements. Aggregates form the structural skeleton of pavements and bear most traffic-induced loads. It was estimated that billions of tons of aggregates are consumed annually in highway projects worldwide. To assess the suitability of local aggregates, physical property such as impact value, abrasion, and crushing values tests were conducted as per Indian Standard specifications. A traffic survey was also undertaken to facilitate the design of the road based on actual loading conditions. The concept of using marginal or non-specification materials is not new; however, increasing focus on energy conservation and waste material utilization has renewed interest in alternative construction materials. While the full economic and environmental benefits of these materials are still under evaluation, their use holds considerable promise. The findings of this study suggest that locally sourced marginal aggregates can effectively serve in base or sub-base layers, offering a cost-efficient and sustainable solution with a potential to enhance pavement longevity.

Keywords: *Impact value, abrasion, and crushing values, Pavement, Marginal material, Low cost*

1. INTRODUCTION

The road transport industry plays an indispensable role in shaping the economic and social framework of both industrialized and developing nations. By interconnecting businesses to global markets, it drives trade, fosters employment, facilitates the equitable distribution of wealth, and promotes social integration. In this context, road transport forms the backbone of modern economic systems, contributing not only to economic expansion but also to sustainable development. With rapid advancements in vehicular technology, trucks, buses, coaches, and taxis have become safer, cleaner, quieter, and more efficient, representing a high standard of engineering and environmental consciousness. Transport infrastructure, particularly within and between urban areas, is a vital catalyst for economic growth, poverty alleviation, and job creation. It enables smoother and more cost-effective movement of goods, services, and people, which in turn influences the spatial distribution of economic activity. Consequently, any disruption or penalty imposed on road transport indirectly burdens the broader economy.

One of the major challenges in road construction is the scarcity and high cost of high-quality conventional aggregates. This has prompted researchers and engineers to explore alternative, locally available materials that can be effectively utilized in the base or sub-base layers of flexible pavements. Several studies have demonstrated the potential of using marginal aggregates and desert sands, especially when stabilized with suitable binders. For instance, Evans and Hicks (1982) examined the properties of basalt and hill sand for road construction applications, while Al-Abdul Wahab and Asi (1997) explored the use of emulsified asphalt and medium curing bitumen to stabilize marl and dune sand. Further, Asi et al. (1999) investigated the feasibility of using foamed asphalt technology to improve the engineering characteristics of desert sands in Saudi Arabia. These studies collectively highlight that local and marginal materials, when properly treated, can serve as viable alternatives to conventional aggregates in pavement layers. [Brandl, H.,1997]

In this context, the present study focuses on the Barjora-Gangajalghati Planning Area in Bankura