

## Utilization of Coal Mixed Waste Aggregates for Flexible Pavement

The coal from coal mines as supplied to the thermal power plants for electricity production contains both coal and stones. The material which contains less than 40% coal is rejected due to its containment of less coal percent. and when it is feeded in the machinery stones present in coal causes harm to the machinery. Coal dust mixed aggregates are separated out and dumped at the thermal power plants due to their limited ways to use and therefore heaps are lying at NTPC Badarpur, Dadari and other thermal plant sites.

On the other hand, the natural aggregates resources are depleting very fast due to huge infrastructure developments, arising a need to identify the alternate resources to bridge the



**Figure: View of Waste Material at NTPC, Badarpur**

gap between demand and supply of construction materials.

CSIR-CRRI has developed design procedures to utilize coal mix waste aggregates to produce the following value added products

- Granular Sub Base (GSB) mixtures .
- Wet Mix Macadam(WMM) and
- Bituminous Layers (BM, DBM and BC) using conventional hot mix asphalt (HMA) and cold mix Asphalt (CMA) production technologies apart from BC mixes particularly with emulsion based Half Warm Mix Asphalt(HWMA)Technology ÷
- Pothole and-patch repair mixes

Based on laboratory studies, it is recommended to use coal mixed waste aggregates as an alternative to natural aggregate in road construction and patch repair works for maintenance purpose. Most Physical properties of the coal mixed waste aggregates were found at par with natural aggregates. Granular Sub-base (GSB) is the most appropriate layer where this material can be used immediately and is 100 percent replacement of natural aggregates. The mechanical properties such as Marshall's stability, Indirect tensile strength, Tensile strength ratio of various combinations of coal mixed waste aggregates satisfied the requirements as per IRC SP-100 (for CMA), IRC SP- 101 (for WMA) and MORTH-V Revision. This indicated their suitability for road construction and maintenance of bituminous road works.

In addition, these coal mixed waste aggregates are also proved suitable for preparation of emulsion based bituminous mixes which are used as patch repair mixes& for filling potholes . These mixes have been experimented on selected roads sections.



**A view of patch repaired (before and after)**

## **ADVANTAGES**

Coal Mixed Waste Aggregates offers many advantages if used for construction of roads using conventional hot mix asphalt (HMA), Emulsion based half warm mix asphalt (HWMA) and cold mix asphalt (CMA) technologies . Some of the common advantages associated with this are: Disposal as well as Utilization of Coal Mixed Waste Aggregates from Thermal Power Plants; Ease of Availability, Cost Saving and Energy savings. When used as cold and warm mixes, it also lower down pollution, odor etc thus reducing the environmental damages .

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