

A REVIEW PAPER ON RECLAIMED ASPHALT PAVEMENT (RAP)

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Abstract - Reclaimed Asphalt Pavement (RAP) is an emerging technique in India, and the use of RAP is gradually gaining popularity. Using RAP does not only help in minimizing the cost of project but also ensures proper utilization of resources. The objective of this study is to understand the importance of using RAP for the construction of bituminous pavements. From this study and from previous research papers it can be concluded that using RAP is advantageous as RAP mixes can yield results equal or even higher than virgin mixes. If calculated and implemented appropriately RAP mixes have a constructive effect on various parameters like Marshall Stability, moisture resistance and density. This paper presents the importance of using RAP mixes.

Keywords: Reclaimed Asphalt Pavement (RAP), Marshall Stability, density, moisture resistance.

I. INTRODUCTION

RAP is a method by which bituminous pavements are constructed using reclaimed materials obtained from existing pavements. A review of previous research paper shows that RAP of various different percentages have been used in the construction of bituminous pavement varying from 10 to 70%. In rare cases up to 80% of RAP has been successfully used. The construction of a new pavement or overlays involves a huge consumption of aggregates of different sizes along with binder. This leads to high cost of project. Because of restrictions imposed on mining in various regions and heavy load on natural resources, it becomes necessary to recycle the pavements. RAP is a new technique in which aggregates from an existing pavement are scarified and are reused in the construction of a new pavement. Using RAP reduces the cost of the project marginally. The purpose of using RAP is more justified as from the past experience it has been observed that strength parameters either of same or better quality are produced by RAP mixes when compared to standard virgin mixes. The reduction in the cost of project is directly proportional to the percentage of RAP used though an ideal percentage should be analyzed which gives the optimal strength parameters and economics.

II. ADVANTAGES OF USING RAP MIXES

The underlying principle of economical construction is the base of usage of RAP. Following are some other important factors which shall further justify the need for using RAP.

- a) Sustainable development
- b) Optimizing the use of natural resources
- c) Reducing environmental impact
- d) Increase in restrictions on the dumping of reusable materials
- e) Reduction in material cost, energy cost and total job cost

They are explained briefly below:

- a) Sustainable development

Sustainable development means the utilization of resources without compromising with the needs of future, so reusing of asphalt materials leads to sustainable development.

b) Optimizing the use of natural resources

Reusing the RAP content gives optimal usage of natural resources.

c) Reducing environmental impact

The process of excavation of asphalt from Earth is detrimental to environment, so by reusing asphalt these negative environmental impacts can be minimized.

d) Increase in restrictions on the dumping of reusable materials

These days the restrictions on the dumping of reusable materials are increasing, with a future possibility of ban on their disposal into landfills.

e) Reduction in material cost, energy cost and total job cost

As RAP involves reuse of materials the material cost, energy cost and total job cost all are reduced.

III. PROCESS OF USING RAP

The use of RAP is gradually gaining popularity with the latest development in technology. Earlier pavements were scarified by excavators which gave huge blocks of RAP materials. Therefore it was difficult to use RAP materials in the construction of new pavements. Now with the latest development in technology, scrappers have been made available in the market which cut the pavement to desired thickness thereby making the use of RAP materials much easier. RAP is obtained not as a choice but mostly as compulsion in one or more of the following reasons:

a) Using successive layers over the years as overlay causes increased level of roads compared to build up areas in surroundings, which results in to drainage problems.

b) Realignment of the road makes the removal of existing pavement a necessity.

c) Infrastructure developments like construction of flyovers etc require removal of pavements.

The process of making RAP mix starts with the collection of RAP materials from the scarified pavement. The collected materials are then subjected to various tests like sieve analysis, residual binder, grading, Marshall Stability test etc. All the results of the tests of reclaimed materials along with virgin aggregates that have to be added are then analyzed and an optimal percentage of RAP is defined. The process of construction of RAP is carried out as the same conventional method of construction of bituminous pavement.

Various researches performed around the world on this topic revealed that:

1. RAP has been successfully used in the construction of a new pavement.
2. Percentage of RAP used varies from project to project and condition of RAP materials.
3. Up to 70% RAP has been successfully used in construction of a new pavement. Though 30-50% RAP is mostly adopted for most of the projects.
4. Preparing a bituminous mix with 100% use of RAP is not advisable.
5. If processed and used appropriately RAP can provide standards either equal or superior than all-virgin HMA.
6. Using RAP makes the project more economical

IV. SUMMARY AND CONCLUSIONS

RAP is a new technology with the help of which bituminous pavements can be constructed at a reduced cost as it involves the usage of old bituminous pavement materials. Also it ensures optimization of resources and supports sustainable development. Optimal percentage of RAP depends upon the composition of reclaimed bituminous material and type of layer in which it is to be used. Though 20%- 50% are mostly adopted.

V. GAPS IDENTIFIED

Although different percentages of RAP have been used in different projects, there is no optimal percentage of RAP that should be used. The percentage of RAP depends upon many parameters like age of RAP materials, binder content, availability of RAP, viscosity of binder etc. Such factors need further investigations and therefore more studies are required. Following are the major gaps:

1. No definite optimal percentage of RAP that can be used, in bituminous mix, has been specified.
2. This implies, that more studies are required, to narrow down the range of RAP for its application in different types of mixes.
3. Corrections also need to be established with respect to age of RAP and other factors example residual binder, percentages etc.

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