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Use of Reclaimed Asphalt Pavement (RAP) in Rigid Road Pavements

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Abstract: ***The production of Reclaimed Asphalt Pavement (RAP) has been increasing nowadays. Pakistan has almost 100,000 kilometers of road networks and almost 30% of RAP can be produced from it. This research aims at using RAP as an aggregate in rigid pavements.***
The RAP was replaced as an aggregate with virgin coarse aggregate (VCA) by the ratio 0 & 50 respectively. The mix design was done for 4000psi.
Concrete specimen were casted which were tested initially for slump, temperature and unit weight for fresh concrete. Later, after 28 days curing some of the hardened concrete specimen were tested for compression and splitting tensile under the UTM machine. Flexural Test was done on beams on UTM. While, modulus of adaptability was resolved with the help of data logger using UCAM programming. The outcome displayed that the compressive ,flexural and separating inflexibility lessened with the extension in RAP. Modulus of elasticity graphs showed that while the stressed decreased with increase in RAP, the ductility showed slight improvement.
Keyword: Rigid Pavement, RAP, UTM.

I. INTRODUCTION

The pavements are design in the form of concrete slabs with sufficient reinforcement. These pavements can be either Joined Reinforced Concrete Pavements (JRCP) or Continuously Reinforced Concrete Pavements (CRCP) depending upon the design criteria and client requirement. Rigid pavements are very stiff against heavy load. Unlike flexible pavements, rigid pavements do not fail that easy. Consequently, due to its high initial cost it is discouraged in countries like Pakistan . [1] In countries like Pakistan, the use of flexible pavement is very common.

The main reason behind this is that it is cheaply constructed. Moreover, these roads are more ductile due to the elastic behavior of bitumen. [2]

Flexible Pavement cost almost 300 to 150 rupees /sq.Ft. Hence its installation cost is cheap. Tragically, the versatile black-top requires upkeep and routine fixes predictably. Moreover versatile black-top self-destructs rapidly; breaks and potholes are most likely going to show up on account of poor waste and overpowering ve-hicular traffic. The common failures flexible pavement is subjected to are or can be rutting, potholes, alligator cracks etc. The main issue among these is rutting which haunts road users and designers.

A basic favored position of versatile black-top is that it may be opened for traffic inside 24 hours after acknowledgment. In addition to the fix and support of adaptable dark top is essential and shrewd. Today 96% of every cleared street and avenues in Pakistan are surfaced with black-top.

Practically all clearing black-top utilized today is acquired by preparing rough oils. Man-made black-top comprises of mixes of hydrogen and carbon with minor extents of nitrogen, sulfur and oxygen.

Therefore, due to its cheap maintenance and design, flexible pavement is preferred in Pakistan. Rutting is a huge trouble instruments in black-top asphalts as lasting twisting.

Rutting has turned into the significant mode adaptable asphalt disappointment on account of increment in truck weight in decades ago. Rutting is chiefly brought about by the amassing of lasting miss happening in various layers in various segment of layers in the asphalt structure. Studded tires use on asphalts can likewise cause rutting. Longitudinal abnormality in the greatness of rutting causes unpleasantness.

Improvement of rutting can prompt splitting and in the long run to finish breaking down or we can say dis-appointment. Expressways and auxiliary streets represents a noteworthy part of upkeep and related expenses .Rutting can also be determined by International Roughness Index (IRI). This can show the effect that it has on the operating road performance of vehicles. [3]

II. RESULTS

Compressive and flexural tests were performed on the specimens to check the compressive strengths and flexural strengths. The results of the said tests are discussed as follow:

A. Compressive Test

The results of R0 and R50 were calculated and came out to be the following….
Here R0 stands for a specimen having 0% Reclaimed Asphalt Pavement (RAP) and R50 stands for specmen having 50% RAP

Compressive test Results	
Specimen	Value(psi)
R0	4000
R 50	2300

B. Flexural Test

The flexural test was done for R0 and R50 as well. Whereas, R0 was specimen having 0% RAP and R50 had 50% RAP in it. The outcome of flexural test is known as modulus of rupture that is given in the table below;

Flexural Test Results	
Specimen	Value(psi)
R0	600
R 50	500

The results of flexural shows that the decrease is less while that of compressive shows that the decrease is more. This trend is due to the linear behavior of concrete.

The bar diagram of compressive are shown below;

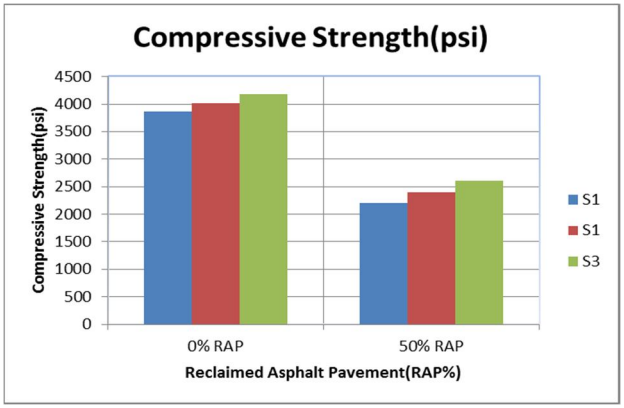

Figure 1 Compressive Results

This is the result of individual specimen and above is the average. These specimen shows that they were very near to each other and the trend was decreasing gradually.

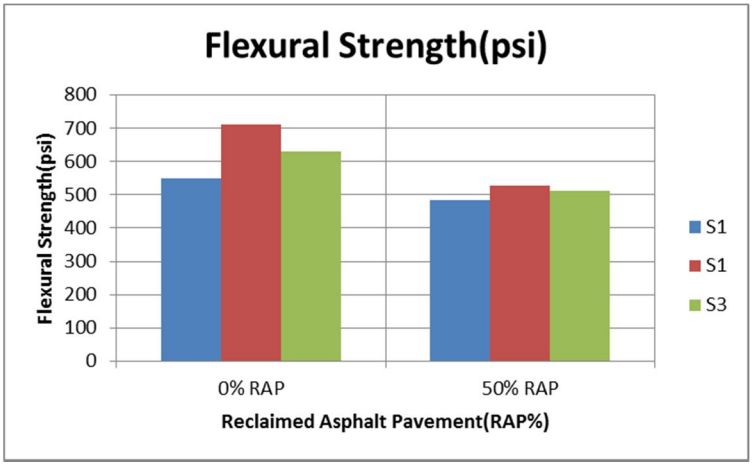

Figure 2 Flexural Strength

Flexural Strength also seems to decrease gradually and hence it is confirmed that strength decreases with the increase in RAP.

III. CONCLUSION

A. The results show that compressive strength decreased the most.
B. The workability was also affected with the increase in RAP.
C. Temperature also affects RAP by decreasing it.
D. RAP is cost efficient thus it can be used in rigid pavements for design.

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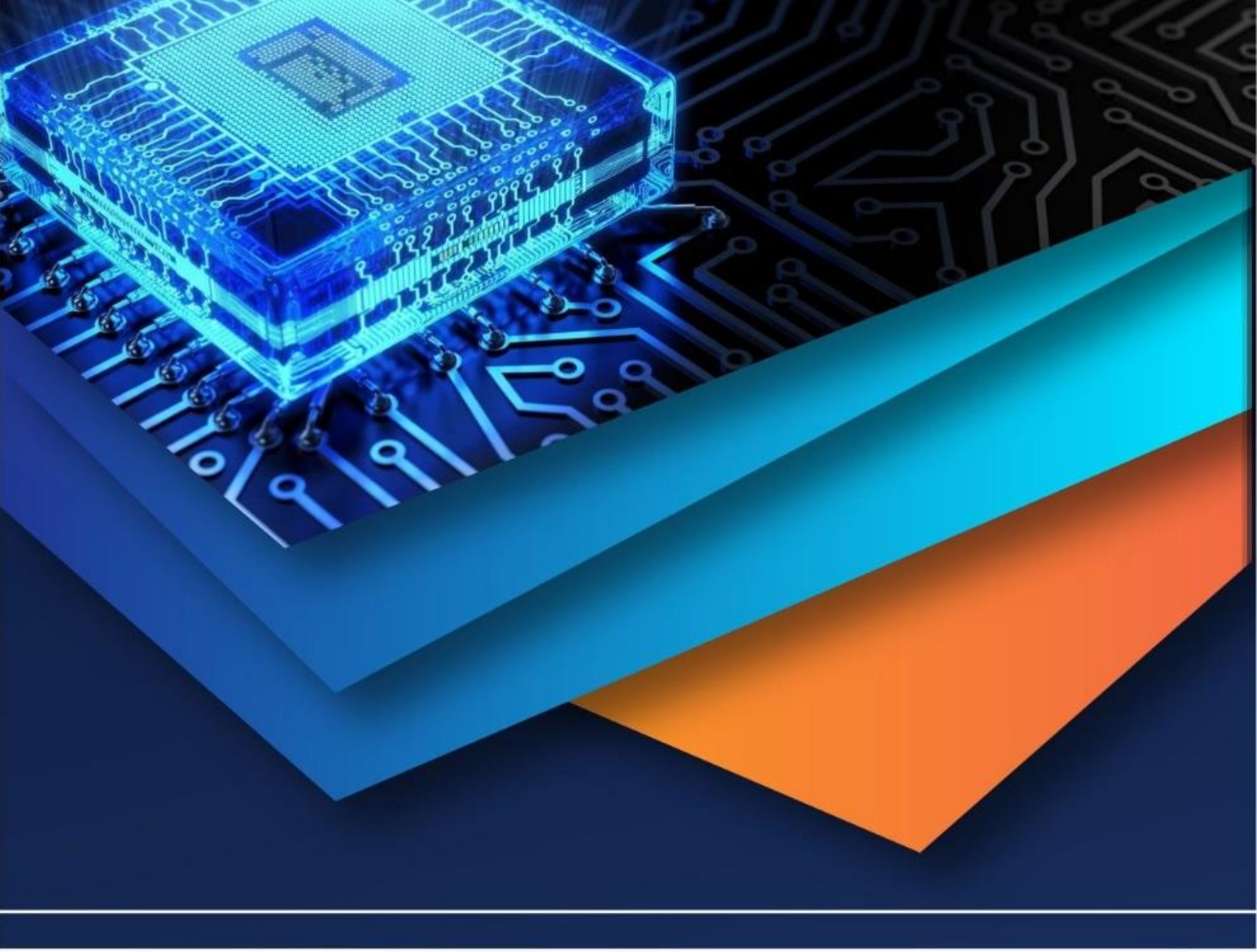

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