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Comparison of Concrete and Asphalt in Road Construction - Which is Better?

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Abstract: ***This Roads plays an important role in economic development and growth, as well as providing significant social benefits. They are critical to a country's growth and development. Furthermore, a road network is critical in the fight against poverty because it provides access to employment, social, health, and education services. Roads connect more people and places, promoting economic and social growth. As a result, road infrastructure is the most valuable of all public properties. Type of roads are being considered when constructing it, whether it is concrete reinforced or asphalt. Different factors are being considered in order to build an economical yet durable highways. This study is focused on comparing two types of roads and which one is best to use in terms of durability, life longevity, maintenance, cost and effect in environment; concrete or asphalt road. This study aims to help the government reduce cost but provide a durable, economical and environmentally friendly road to users.***

Keywords: durability, life longevity, maintenance, cost and effect in environment.

I. INTRODUCTION

This Among the country's existing infrastructures, road infrastructure is one of the most important components of social and economic development. Because the value of the road network extends beyond national borders, it is necessary to expand and upgrade it in order to improve economic performance, as weak infrastructure hinders foreign investment and competition from expanding. They have the ability to connect businesses with input suppliers, as well as other businesses and their markets. An effective network, on the other hand, can transport enormous amounts of human capital to and from places of employment, educational institutions, social activities, and areas where people may acquire goods and services, such as shops.

Governments must build assets at the lowest possible capital costs (not just in the short term, but over the long run, over the asset's whole useful life), with funding directed to projects that have the highest benefit-to-cost ratio. Otherwise, more spending could just result in larger budget deficits. It includes the following characteristics of roads, the durability, cost of maintenance, life span and effect in environment. This study aims to help in choosing what kind of road is better to build. Comparison of concrete and asphalt will help us determine which is better.

II. CONCRETE ROAD

Concrete are a construction material made of a mixture of cement, sand, stone, and water that hardens to a stone like mass. In the Philippines the standard on roads is set by the Department of Public Works and Highway (DPWH) in terms of its mixture of cement, sand, stone and water, its strength, its quality and other specification of a road. Concrete roads are widely used in every province, city even barangays in the Philippines it just differs in terms of its size or width of the road. Concrete road is durable and safe, which are considerably less prone to wear and tear defects like cracking, stripping, loss of texture, and potholes that can occur with flexible pavement surfaces. Considering these facts that is why most of the time concrete are use for the roads and its lifespan for about 37 – 40 years when properly constructed and low in maintenance.

III.ASPHALT ROAD

Asphalt is a mixture of aggregates, binder and filler, used for constructing and maintaining roads. Aggregates used for asphalt mixtures could be crushed rock, sand, gravel or slags. Most of the time we rarely see asphalt pavement in the Philippines. For asphalt road the standards specification is also set by the Department of Public Works and Highways (DPWH). Asphalt is safe, smooth and durable. It can be built constructed to last indefinitely. Asphalt is fast to construct, maintain and recyclable. Area where asphalt is mostly used are parking areas, ports, airport runways, bicycle lanes, sidewalks and also play- and sport areas. In terms of its lifespan its only half of the lifespan of the concrete about 17 years if constructed properly and be maintained every 3 or 5 years.

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IV. CONCRETE ROAD VERSUS ASPHALT ROAD

Comparing the two elements in road construction namely concrete and asphalt both have a good quality and we just need to know when we have to maximize its quality here on this study, we compare both in terms of durability, speed of construction, repair and maintenance, cost and which is environmentally friendly is a mixture of aggregates.

V. CONCRETE ROAD

Concrete are a construction material made of a mixture of cement, sand, stone, and water that hardens to a stone like mass. In the Philippines the standard on roads is set by the Department of Public Works and Highway (DPWH) in terms of its mixture of cement, sand, stone and water, its strength, its quality and other specification of a road. Concrete roads are widely used in every province, city even barangays in the Philippines it just differs in terms of its size or width of the road. Concrete road is durable and safe, which are considerably less prone to wear and tear defects like cracking, stripping, loss of texture, and potholes that can occur with flexible pavement surfaces. Considering these facts that is why most of the time concrete are use for the roads and its lifespan for about 37 – 40 years when properly constructed and low in maintenance.

A. Durability

1) Concrete is more durable to asphalt for the reason that it is less flexible to asphalt in which asphalt tend to easy break when expose to extreme weather condition
2) A good quality of concrete road can last for 40 years whereas asphalt roads can only last for almost 10 years.
3) The most significant benefit of a concrete road is its long service life, which is attributable to its outstanding durability. According to several studies conducted in the United States, where concrete roads have been used and monitored for years, the average lifetime of a concrete road is roughly 34 years, which is twice the physical life of asphalt, which is 17 years.

B. Speed of Construction

[2] The estimated time of laying concrete is 70 square meter per hour, while laying asphalt is 171.30 square meter per hour. In addition, newly laid concrete road has a curing period of 14 days while asphalt can be used after a few hours after laying.

C. Repair and Maintenance

[2] In repairing a concrete road the whole span of slab should be removed and replaced whereas in asphalt road patching will do. And asphalt must be re-laid or repaired for its life span of 10 years.
[2] Concrete roads are maintenance-free or have a very minimum maintenance. On the contrary, asphalt is more prone to maintenance, but it can be easily re-layered over the old layer.

D. Cost

Asphalt road is a bit costly than the concrete road; [4] a concrete road can cost 1,120.05 pesos in every square meter while [5] asphalt road can cost 3,197.69 Philippine Peso per square meter.

E. Environmentally Friendly

Both materials for asphalt and concrete are not eco friendly since both are chemical but asphalt it can be said that it is more hazardous when compare with cement but asphalt are tag as ecofriendly since it is recyclable it can be reuse.

VI. CONCLUSIONS

In comparing the concrete and asphalt both are good for road construction but vary in terms of its use. On this study it's clear that using concrete road for urban area is much more appropriate and asphalt for rural areas are much advisable, location where extreme weather condition concrete is advisable rather than asphalt concrete, in terms of lifespan concrete is at its advantage, in terms of cost asphalt is way cheaper, in terms of road maintenance its lesser in concrete road thou asphalt are recyclable, concrete road were eco-friendly compare to asphalt, it terms of duration to accomplished asphalt have the upper hand, in terms of tire skid other say asphalt is better. If we ask road users like vehicles owner private/government asphalt is much better to use. In comparing concrete road vs concrete asphalt, it does have its own advantage and dis advantage its up to the project manager to decide what to use on a specific project. In the Philippines, as we observe most of the time, we choose concrete for road way even farm to market road up to national road although national road tends to use asphalt for maintenance hard to admit but asphalt in the Philippines cost more compare in concrete cement but easy to install but as we observe what lacks is the knowledge on proper installation of asphalt if use for maintenance of road, we also observe that at some area the lifespan of road concrete are not maximize and being replace even its

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just a year old which is not economical at all, so it's better to use asphalt road if you tends to replace the road constructed to be more economical since its recyclable and easy to construct since most of the time government funds should be use economically, so we may also conclude if possible areas which is not expose for extreme weather condition asphalt road is better for those rural areas like municipal and barangay roads but in urban areas it's better to use concrete road for main roads like the national and provincial roads but considering Philippines as tropical country which is exposed to extreme rain weather condition even floods for newly constructed road its more economical for concrete road when it needs for maintenance its better to repaved for asphalt road.

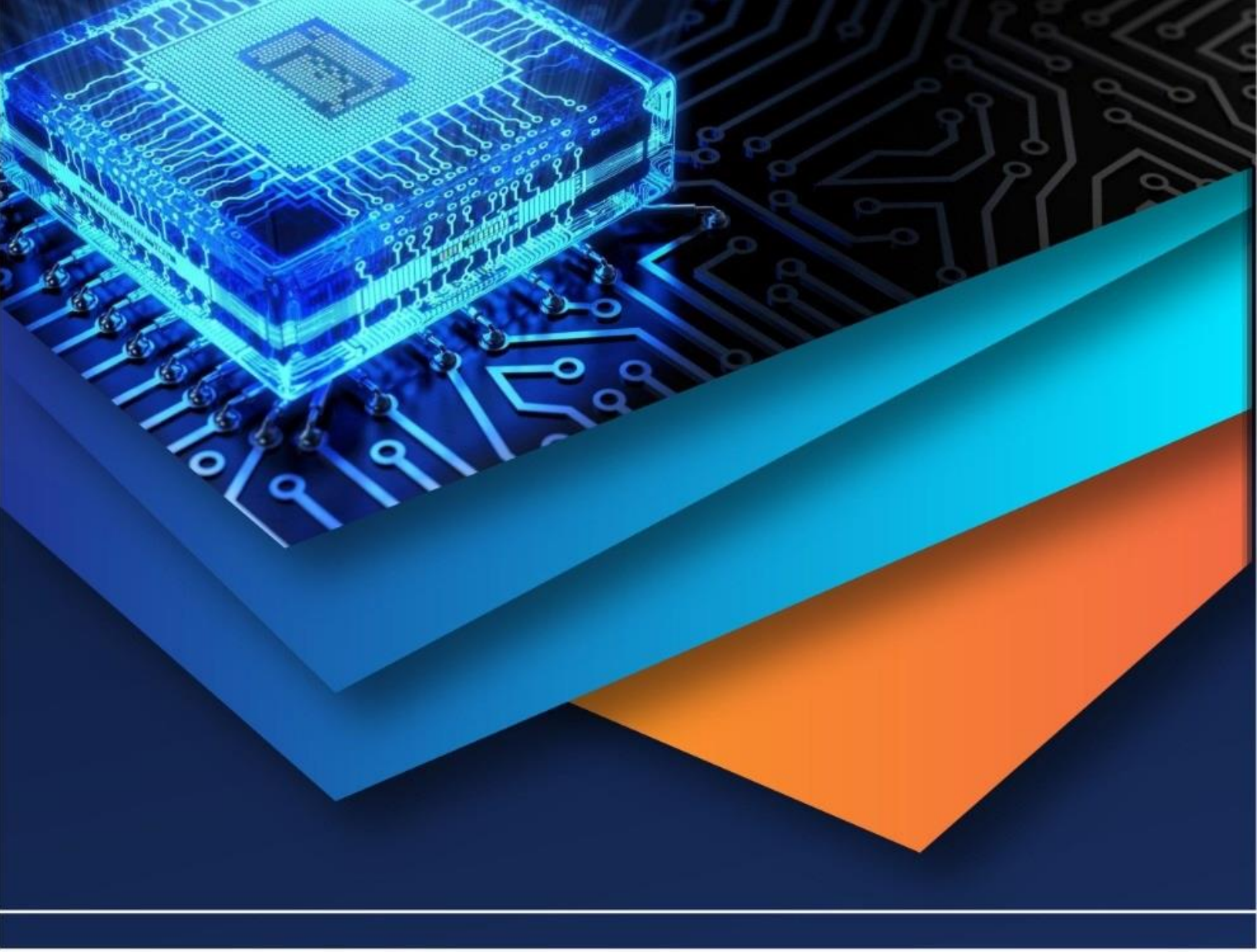
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