СЕКЦІЯ БУДІВЕЛЬНИХ КОНСТРУКЦІЙ

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DESIGN FEATURES OF ROAD PAVEMENTS

A road pavement structure is made of multiple layers of processed and compacted materials, in different thicknesses and in both unbound and bound forms, which together form a structure that primarily supports vehicle loads as well as providing a smooth riding quality [1].

A road pavement structure are composed of five component layers. Sub-grade is the completed and compacted earthwork on which a road pavements sits, followed by sub-base refers to the granular material that sits between the sub-grade and the base course of a road surface. The base course is the layer of stones or bricks laid in a double layer over the sub-base or directly over the sub-grade in the absence of a sub-base in a pavement as is thirdly in accordance from the sub-grade. The base coat, bearing course also called intermediate coat refers to the layer of hard stones that sits between the base course and the wearing course in a road surface. Finally, wearing course or surface course refers to the topmost layer of the pavement that is directly expose to traffic.

There are many different varieties of road pavements depending on the road usage, local environment, ground condition, and so on, and each pavement type has its own set of pros and downsides, benefits and limits. Two types of pavements are considered in design considerations: flexible and rigid pavement. The distinction between these two types of pavements is dependent on how loads are dispersed to the subgrade.

Surface course, base course, sub-base, capping, and geogrid are the layers that make up flexible pavement. Asphalt is used to create the top layer which are categorized either as Thin Surface Course System (TSCS) and Hot Rolled Asphalt (HRA). Flexible pavements can be Porous Asphalt, Fine or Coarse Grade Asphalt, Mastic Stone Asphalt and Composite [2].

Advantages of Flexible Pavement:

1. It is inexpensive and simple to construct.

2. Materials readily available in the area can be utilized to make road pavement.

3. Less monitoring is required.

Rigid Pavement is defined as pavement that cannot alter form without rupturing. The joint systems are in place to assist prevent cracks from forming, and concrete is a long-lasting option that requires little maintenance, despite its expensive cost. Rigid pavements are comprised of a concrete slab or reinforced

concrete slabs made up of aggregate, reinforced steel and Portland cement. The slab is either laid over a granulated sub-base or immediately on top of the capping layer.

The design of rigid pavement is centered on constructing a structural cement concrete slab that is strong enough to withstand traffic loads. The stiff pavement has a high modulus of elasticity and is rigid, allowing the load to be distributed across a large area of soil. The stiffness of the pavement is linked to rigidity, flexural strength, or slab action, which distributes the load over a large area of subgrade soil. Steel reinforcement is used to lay rigid pavement in slabs. The maximum flexural stress occurring in the slab due to wheel load and temperature fluctuations is a critical condition of stress in rigid pavement. The elastic theory is used to build and analyze rigid pavement [3].

Minor differences in subgrade strength have no impact on a rigid pavement's structural capability. The flexural strength of concrete, not the strength of the subgrade, is the most important aspect in the design of a rigid pavement. When the subgrade deflects beneath the rigid pavement as a result of slab motion, the concrete slab is able to bridge over localized failures and areas of inadequate support from the subgrade.

Advantages of Rigid Pavement:

1. Low-cost maintenance and constant traffic and flow.
2. A high level of functioning efficiency
3. It costs about half as much to install and maintain in the long run. However, the initial costs are somewhat substantial.
4. Rigid pavement has the potential to bridge minor subgrade irregularities.
5. Rigid pavements survive far longer, up to 30 years against 5 – 10 years for flexible pavements.

Conclusion. Each of these pavement types distributes weight differently over the subgrade. Because of the high stiffness of PCC, rigid pavement tends to spread the load over a large region of subgrade. The reinforced concrete slab provides the majority of the structural capability of a rigid pavement as we consider in our case study for sea ports design. Flexible pavement employs a more flexible surface course and disperses loads over a smaller surface area. For transmitting load to the subgrade, it uses a mixture of layers. Both flexible and rigid pavements can be constructed for a long life (more than 35 years) with little maintenance.

References

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