Engineering Report: Concrete Pavement Requirements for Different Straddle Carriers

The following is a summary of the key findings of an Engineering Report by Consulting Civil Engineers (CCE), into the effects of using Mini Straddle Carriers on industrial pavements.

CCE compared 8-wheel, 4-wheel and 3-wheel Mini Straddle Carriers and their effect on concrete slabs:

- The major concern to the pavement design is the wheel point load which generates the critical stress to the pavement.
- Based on literature review for industrial pavements, pavement thickness typically ranges from 150mm to 200mm.
- Standard pavement thickness is generally adequate for an 8-wheel Mini Straddle Carrier, even with a 35t lifting load. This is because more wheels means a better load distribution.
- However it becomes inadequate for the 4-wheel and the 3-wheel carriers, even with a reduced load of 26t. The pavement will be damaged if the 3-wheel or 4-wheel carriers travel and operate on it.
- Cracking of the concrete will start from the bottom and may not immediately be visible. The damage may start from the first time of overloading.
- Once the damage becomes visible, fixing the pavement will involve major works, is time consuming and costly. For example, after 3 years the damage to a 200mm2 area would cost approximately $35,000 to repair and the new concrete requires 28 days to cure before it can be driven on.

Concrete Construction Costs for Greenfield Yard

The following table provides an estimate of the costs involved in catering to mini straddle carrier concrete slab thickness requirements when cementing a new 2,000m2 yard:

Concrete Slab Thickness & Design	8 Wheel Mini Straddle Design	4 Wheel Mini Straddle Design	3 Wheel Mini Straddle Design	Cost (2,000m2)
165mm thick, single reinforcement	✔			$157,000
215mm thick, single reinforcement	✔	✔		$198,000
250mm thick, double reinforcement	✔	✔	✔	$233,000

Notes: The report used the Australian Codes or technical design guides such as C&CAA and Austroads for pavement structural design. The complete report can be supplied on request.

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