

Pre-Cast ArchPanel™ and Cast-in-Place Steel-Free Concrete Bridge Deck Slabs

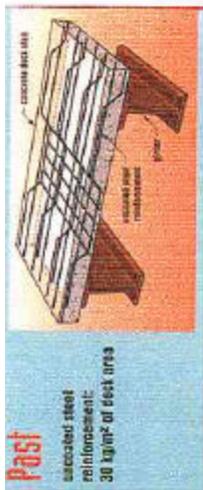
A steel-free concrete bridge deck slab is totally devoid of steel reinforcement:

- The cast-in-place version comprises concrete which is reinforced only with randomly distributed, chopped, polypropylene fibres. The top flanges of the adjacent girders are joined at intervals by steel straps. The size of the straps and the length of the intervals are determined by the application requirements. This configuration allows for the removal of all internal steel reinforcement, thereby enhancing substantially the durability of the deck and greatly reducing the initial cost. It is patented in several of the G7 countries.
- The pre-cast ArchPanel™ uses the patented steel-free concrete bridge deck technology for concrete slab on girder construction. Proper profiling of the concrete deck panels, combined with a system of external steel straps, harness the arching action in the slab. The straps may be encased in plastic for high risk corrosive environments. The ArchPanel™ can have a thickness of as little as 150 mm.

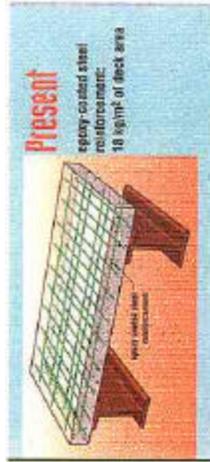
Full scale experimental testing has shown that the cast-in-place version of the deck panel did not fail until over 100 tonnes had been exceeded. The ArchPanel™ tests exceeded 70 tonnes. Failure in both versions was by punching. The cast-in-place version has been re-tested following the repair of the punctured areas. Tests show that the deck regained nearly its full strength after the repair.

The first commercial cast-in-place slab was used in the Salmon River Bridge, Kemptown, Nova Scotia, Canada (1995). The pre-cast version required some innovative modifications, which were two years in development. It was first used in the Lindquist Bridge, in Kelowna, British Columbia (1997). Since 1995, three other bridges across Canada have incorporated the steel-free cast-in-place deck slab: Chatham, Ontario; Crowchild Trail, Calgary, Alberta; Waterloo Creek, British Columbia steel-free. The pre-cast ArchPanel™ is now being installed in a high profile wharf rehabilitation demonstration project in Hall's Harbour, Nova Scotia. This project marks the first marine application of the ArchPanel™. Other applications for the ArchPanel™ are bridges in remote locations for which strength is important and inner city overpasses and expressways where speed of construction is paramount. Many of these projects are being supported by ISIS Canada. The cast-in-place deck slab is now in the Canadian Highway Bridge Design Code (CHBDC), currently in the press. Japan is reviewing the technology and reporting excellent laboratory results. Meetings with the AASHTO Code Committee are in progress to eventually have it incorporated into the AASHTO Bridge Code.

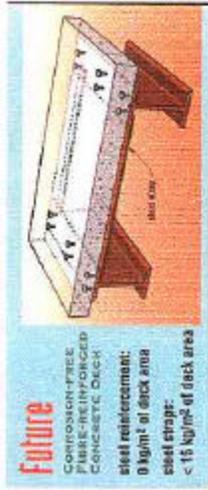
The benefits of the steel-free concrete bridge deck will be felt in many ways in the near and distant future. The steel-free deck slab improves quality and durability by eliminating corrosion caused by de-icing salts. This slab is also less expensive on a first cost basis. On a life cycle cost basis it is even less expensive. Also, maintenance and repairs can be accomplished without the normal disruption of traffic.



Past
 scattered steel reinforcement
 30 kg/m² of deck area



Present
 epoxy-coated steel reinforcement
 18 kg/m² of deck area



Future
 CORROSION-FREE
 FIBRE-REINFORCED
 CONCRETE DECK
 steel reinforcement:
 0 kg/m² of deck area
 steel straps:
 < 15 kg/m² of deck area



Testing the full-size ArchPanel™ Deck.



Success!



Cast in place results



Marketing the ArchPanel™ in Las Vegas.

ArchPanel™ results.

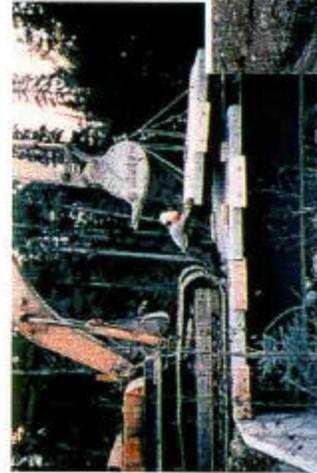


3.



Salmon River Bridge

1. Welding the straps.
2. The view from below the deck.
3. The bridge is open.



Placing the ArchPanels™ on the Lindquist Bridge

