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Steel-Free Concrete Bridge Deck

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STEEL-FREE CONCRETE BRIDGE DECK

THE NEED

Steel-free concrete replaces reinforced concrete in bridge decks and similar structures in marine environments and in northern climates having snow and ice. It is to eliminate the source of deterioration, the steel reinforcing bars in slabs exposed to deicing salts. Eliminating corrosion makes concrete deck slabs virtually maintenance-free, which makes life cycle costs of steel-free concrete decks much lower than reinforced concrete decks.

FIGURE 1 EXAMPLE STEEL-FREE CONCRETE BRIDGE DECK

THE TECHNOLOGY

Shear connectors make the steel-free concrete deck composite with the steel girders that support it. Top flanges of girders attempt to displace outward when a truck drives across the deck. External transverse steel straps below the bridge deck and between the bridge girders prevent this outward displacement by providing a lateral restraining force to the girder and concrete deck. In response, compressive membrane forces develop in the concrete deck. Ultimate load can be greater than the load at which the same deck would fail if it were reinforced conventionally. In fact, the tension capacity of the steel straps in the steel-free deck replaces conventional reinforcing steel. The

external steel straps can be inspected and maintained in a similar fashion to steel girders.

THE BENEFITS

- Improvement of quality and durability by eliminating corrosion caused by de-icing salts
- Maintenance and repairs without the normal disruption of traffic

STATUS

Two versions are available: 1. The cast-in-place version 2. The pre-cast ArchPanel™ version.

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. Meeting with American Association State Highway Transportation Officials (AASHTO) Code Committee are in progress.

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REFERENCES

1. News Release, 2000 Nova Award Nominations.

REVIEWERS

Peer reviewed as an emerging construction technology

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