

Double Deck Prestressed Composite Truss Bridge Design

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1. Introduction

Mott MacDonald was commissioned by the Ministry of Transport, Quebec to investigate the feasibility for incorporating a light rail transit (LRT) on the 3.4km long new Champlain Bridge in Montreal, Canada. A double deck prestressed composite truss bridge design option was developed in the project, which is presented in the current paper.

2. Composite Truss Bridge

Prestressed composite truss bridges are of novel bridge construction. They consist of steel diagonal truss members, and top and bottom concrete slabs, and prestressing cables as shown in Fig 1.

The integration of the steel into the concrete means that the total weight of the bridge can be reduced typically 10-20% without compromising the stiffness of the structure. In addition to a reduction in the self-weight, this bridge system has the following advantages over the conventional prestressed concrete box girder bridge:

- No reinforcement cages and formwork are required for the web (ease of construction)
- An open/transparent appearance of the structure (aesthetic quality, reduction in wind loading)

Fig 2 shows the design option developed for the new Champlain Bridge project. As can be seen the LRT is positioned on the lower deck in order to protect it from the severe winter weather in Montreal and to avoid various operational and highway issues.

3. Conclusions

The outline of the pressed concrete truss bridge system and the recent design work with this system have been reported. Further investigation on the truss joint system will be required at a preliminary design stage for this composite truss option to be realised.

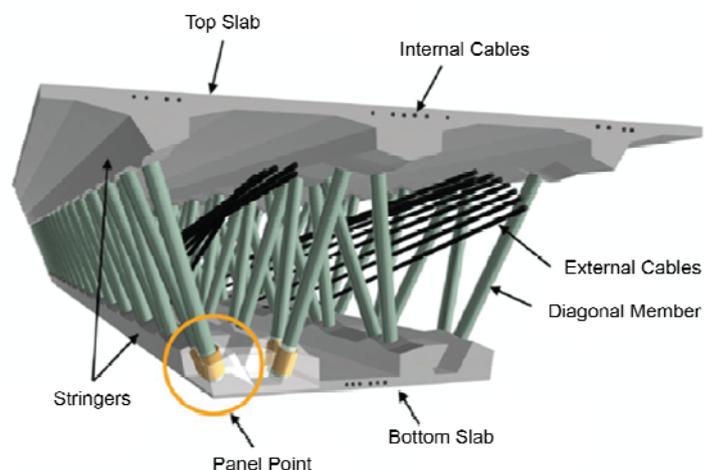


Fig. 1: Prestressed Composite Truss System



Fig. 2: Design Option Developed for the Project