

Assessing the Needs for Intermediate Diaphragms in Prestressed Concrete Bridges

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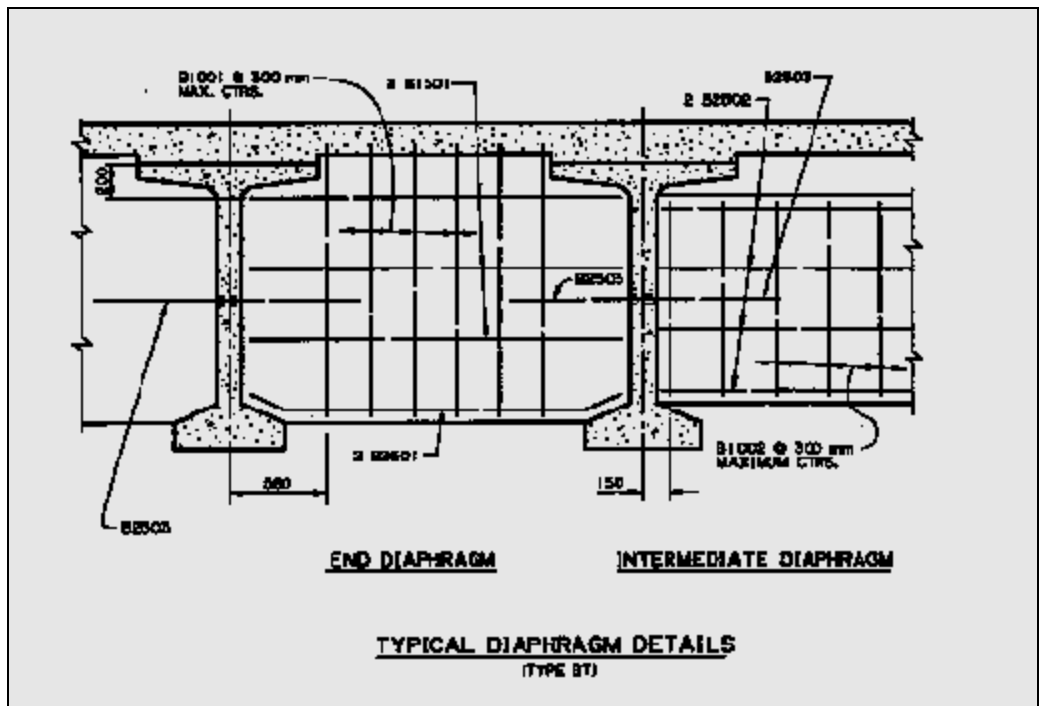
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Problem

The advantage of using intermediate diaphragms in bridges is a much-debated topic. An intermediate diaphragm (ID) is a transverse component of a bridge that connects adjacent longitudinal girders. IDs are used to transfer lateral load to the deck, distribute vertical load between girders, and support girders during construction. Due to the high labor cost of constructing diaphragms and the uncertainty regarding their actual benefit, the use of IDs needs to be justified.

Objective

The objectives of this research include an assessment of the need for IDs in concrete highway bridges. It is anticipated that this project will determine the conditions in which IDs can be omitted and how to choose and design appropriate IDs when needed. The ultimate objective is to achieve more economical bridge construction in Louisiana while meeting the construction, serviceability, and strength capacity requirements of design code specifications.



Construction detail for intermediate diaphragms



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Description

This research will examine the correlation between presence of IDs and other bridge performance parameters. Performance of bridges with and without IDs will be compared through numerical and experimental investigations. Results will be field-verified on a selected bridge.

Finite element modeling will consider vertical live loads as well as lateral loads. Most prior research has focused on vertical load distribution without consideration of lateral loads.

The use of steel diaphragms, in lieu of cast-in-place concrete diaphragms, will also be investigated through this research. Finally, a cost analysis will establish cost indices for the use of IDs in typical bridges.

Implementation Potential

Appropriate selection and design of IDs directly affects the serviceability, safety, and economy of the transportation infrastructure. Procedures developed through this project will be recommended for incorporation into design specifications. Engineers will be able to compare designs with and without IDs. Results of this research will be directed toward a reduction in the cost of bridge construction and maintenance.