

Memorandum

TO: All Design Staff
FROM: Bijan Khaleghi
DATE: October 28, 2011
SUBJECT: WSDOT Policy for use of Transformed Section Properties

This design memorandum describes WSDOT's policy in using transformed section properties for design of prestressed girders. The early findings of the NCHRP 12-83 "Reliability-based service and fatigue limit-states calibration" indicates that the live load reduction factor at service III limit state as indicated in the AASHTO LRFD Table 3.4.1-1 "Load Combinations and Load Factors" may not be applicable when transformed section properties are used. As a result, the following recommendation on Service III load combination shall be observed:

1. Transformed section properties shall not be used for design of prestressed girders. Use of gross section properties remains WSDOT's standard methodology for design of prestressed girders including prestress losses, camber and the flexural capacity.
2. In special cases transformed sections properties may be used for the design of prestressed girders with the approval of the State Bridge Design Engineer. In these cases the live load reduction factor at service III limit state load combinations shall be as follows:

$$\gamma_{LL} = 0.8 \text{ when gross section properties are used}$$

$$\gamma_{LL} = 1.0 \text{ when transformed section properties are used}$$

Background:

The early findings of the NCHRP 12-83 "Reliability-based service and fatigue limit-states calibration" indicates that the transformed section properties may not be used in conjunction with the 0.8 live load factor at service III limit state. The current live-load load factor of 0.80 at service III limit state is based upon "rough" calibration following trial designs to yield comparable member proportions as the provisions of the *Standard Specifications*.

Reliability-based service and fatigue limit-states calibration (NCHRP 12-83 by M&M) is underway with results available within the year. In the meantime, the use of transformed sections is discouraged and the live load factor at service III limit state is raised to 1.0.

If you have any questions regarding these issues, please contact Bijan Khaleghi at 705-7181.

cc: Mark Gaines, Bridge Construction - 47354
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BDM Revisions:

Chapter 5

Concrete Structures

5.6.2 Design Criteria

5.6.2 - B4

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