

DESIGN ASSUMPTIONS:

1. Live Load moments are from AASHTO, LRFD, Table A4-1.
2. The weight of 3" thick wearing surface is included in design calculations.
3. AASHTO, LRFD, Article 9.7.2.4 states that the ratio of the deck slab's effective length to the design depth should not exceed 18. The deck reinforcement tables limit this ratio to 15. Please refer to LRFD, C9.7.2.4 for more information.
4. Concrete Strength $f'_c = 4$ ksi;
Reinforcing Steel Yield Strength $f_y = 60$ ksi.
5. The design sections for Negative Moments were taken at the locations as per AASHTO LRFD Article 4.6.2.1.6. These locations are as follows:
 - 4" from the beam centerline for steel girders, assuming the width of the top flange is 16".
 - at the face of precast prestressed box beams.
 - at 15" from the beam centerline for NEBT beams.
6. Top (temperature and shrinkage) and bottom (distribution) longitudinal reinforcement has been calculated based on AASHTO, LRFD, Articles 5.10.8 and 9.7.3.2, respectively. In addition, the quantity of steel was checked against the recommended minimum amounts identified in a study* initiated by the Indiana Department of Transportation (INDOT). This study recommends additional reinforcement above current practice to control transverse crack widths in concrete decks. Based on this document, the total amount of longitudinal reinforcing steel required shall not be less than:

$$A_s = \frac{6\sqrt{f'_c}}{f_y} A_g$$

where:

A_g = gross area of section, in^2

A_s = total area of longitudinal reinforcement in cross-section, in^2

7. In addition to the strength and service limit state requirements as per AASHTO LRFD, the amount of the primary (transverse) deck reinforcement (top and bottom) was also checked against the above recommended minimum amount of reinforcing steel to minimize potential longitudinal deck cracking.
8. The transverse (primary) reinforcement bar spacing coincides with the pitch provided (6" and 7") in the most widely available S.I.P. forms.

* – Frosch, R.J., Blackman, D.T., and Radabaugh, R.D.,
"Investigation of Bridge Deck Cracking in Various Bridge
Superstructure Systems", Joint Transportation Research Program,
FHWA/IN/JTRP-2002/2.5, 160 pp.



LRFD BRIDGE
MANUAL, PART II

DECK SLAB REINFORCEMENT
DESIGN ASSUMPTIONS
GENERAL DECK DETAILS

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