Deck Slab Reinforcement Details

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

**Material Properties**
- $f'_c = 3.6$ ksi - Normal Weight Concrete
- $f_y = 60$ ksi

**Notes**
- For Notes, see page 4 of this Memo to Designers.
- For deck slab thickness and reinforcement, see Table 10-20.1.

**Legend**
- Extra D bars are to be added when span $S > 11'-6"$
- Distance from girder to design section for negative moment (Art.4.6.2.1.6)
- Precast concrete I-shaped and T-shaped beams: $1/3$ the flange width.
- Steel girders: $1/4$ the flange width
- Concourse box girders: $1/2$ the girder web width
- Concrete girders: $1/5$ max

**Notes**
- Increase cover over bars and adjust slab thickness if required for environmental conditions. See Table 5.12.3-1 and MTD 8-2.
- Provide additional top transverse deck reinforcement in the overhangs when $S \leq 11'-6"$. See note 10.
# ATTACHMENT 1

## Deck Slab Design Parameters

<table>
<thead>
<tr>
<th>Design Loads/Moments</th>
<th>Load Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M_{DC}^+$: Moment due to deck self weight</td>
<td>Strength I (Art. 5.7.3.2)</td>
</tr>
<tr>
<td>$M_{DW}^+$: Moment due to 35 lb/ft² future wearing surface</td>
<td>$M' = 1.25 M_{DC} + 1.5 M_{DW} + 1.75 M_{LL}$</td>
</tr>
<tr>
<td>$M_{LL}^+$: See Table A4-1 and Note 4</td>
<td>Resistance Factor ($\phi$) = 0.9</td>
</tr>
</tbody>
</table>

**Distribution Reinforcement**

(Art. 9.7.3.2) See Note 11

$220/\sqrt{S_{eff}} \leq 67\%$

$S_{eff} = \text{Effective span length}$

## Deck Overhang Design Parameters

<table>
<thead>
<tr>
<th>Design Loads/Moments</th>
<th>Load Cases (Art. A13.4.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M_{DC}^+$: Moment due to overhang and barrier self weight</td>
<td>Case 1: Extreme Event II</td>
</tr>
<tr>
<td>$M_{DW}^+$: Moment due to 35 lb/ft² future wearing surface</td>
<td>$M' = 1.0 M_{DC} + 1.0 M_{DW} + 0.5 M_{LL} + M_{CT}$</td>
</tr>
<tr>
<td>$M_{LL}^+$: Moment due to live load plus impact (Art. 3.6.1.3.3 &amp; 4.6.2.1.3)</td>
<td>Where $M_{CT} = 1.2 F_H H_v / L_v$ (See Note 9)</td>
</tr>
<tr>
<td>$M_{CT}^-$: Moment due to traffic railing design force $F_H$ and $F_v$. See Table A13.2-1.</td>
<td>Resistance Factor ($\phi$) = 1.0</td>
</tr>
</tbody>
</table>

Case 2: Extreme Event II

$M' = 1.0 M_{DC} + 1.0 M_{DW} + 0.5 M_{LL} + M_{CT}$

Where $M_{CT} = F \cdot L_{OH}/L_v$

Resistance Factor ($\phi$) = 1.0

$L_{OH}$: Length of overhang (EOD to outerface of exterior girder)

## NOTES/LIMITATIONS:

The following Notes/Limitations apply to the design of concrete deck slabs, and the details shown in BDD 8-30.

1. Article (Art.) and table numbers correspond to those in the AASHTO LRFD Bridge Design Specifications and the corresponding California Amendments.
2. Design is based on approximate method of analysis – strip method (Art. 4.6.2.1).
3. Deck slab is designed for strength, service and extreme event limit states (Art. 9.5).
5. Design details are applicable only for decks supported on at least three girders and having a width not less than 14 feet between centerlines of exterior girders.
6. Overhang details are applicable for solid barriers only. Other types of barriers (example: “See-through” barriers) will require a special design.
7. For steel girders, the transverse reinforcement shown for the exterior deck span should be verified for overhang demands.
8. Overhang details are not designed for soundwall loading.
9. $F_H H_v / L_v$ is the moment due to vehicular impact force (Art. A13.2 and A13.4).
10. When the center-to-center spacing between the girders is less than or equal to 11 feet 6 inches, provide additional top transverse deck reinforcement in the overhang for a distance of 5 feet on either side of an expansion joint in the barrier rail, and at the ends of the barrier rail. This reinforcement shall consist of rebars that are the same size as that of the transverse bars, and shall be bundled with each alternating top transverse bar in the overhang. Extend these rebars for a minimum length of 25 bar diameters beyond the centline of the exterior girder. See BDD 8-30.
11. The positive moment region in the deck is assumed to be $0.5 S_{eff}$ for determining the number of ‘D’ bars. See BDD 8-30 for ‘D’ bars.