Index 450-199 Prestressed I-Beams Build-Up & Deflection Data

Design Criteria

AASHTO LRFD Bridge Design Specifications; Structures Detailing Manual (SDM); Structures Design Guidelines (SDG)

Design Assumptions and Limitations

Use this standard in conjunction with Indexes 450-010, 450-036, 450-045, 450-054, 450-063, 450-072, 450-078, 450-084, 450-096 and 450-120.

Unless otherwise required as a design parameter, beam camber for computing the theoretical build-up must be based on 120-day old beam concrete.

Consider the effects of horizontal curvature with bridge deck cross slope when determining the minimum theoretical build-up over the tip of the inside flange. Consider that the vertical curve geometry is along the effective alignment along a chord at the centerline of the beam, which may be different from the alignment parallel to the Profile Grade Line.

For a given size and type of beam, beam camber and associated Dim B and Dim D will vary due to span lengths and beam spacings. Dim B and Dim D will also vary from span to span along the length of a bridge due to deck geometry. To provide for better aesthetics and potentially easier detailing of the supporting pedestals, where possible adjust the values of Dim B and Dim D over equal height beams in adjacent spans so as to allow the beam bottom flanges to line up. Dim B and Dim D do not necessarily have to be the same value for a single beam. See the following sketch:
Plan Content Requirements

Complete the following "Build-Up and Deflection Data Table for AASHTO Type II and Florida-I Beams" and include it on the superstructure detail sheets. See Introduction I.3 for more information regarding use of Data Tables.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>REQUIRED THEORETICAL BUILD-UP OVER Q, BEAM</th>
<th>NET BEAM CAMBER (PRESTRESS - DEAD LOAD OF BEAM) @ RELEASE</th>
<th>NET BEAM CAMBER (PRESTRESS - DEAD LOAD OF BEAM) @ 120 DAYS</th>
<th>DEAD LOAD DEFLECTION DURING DECK POUR @ 120 DAYS</th>
<th>BUILD-UP CASE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN NO.</td>
<td>BEAM NO.</td>
<td>AT BEGIN SPAN DIM B</td>
<td>AT Q SPAN DIM C</td>
<td>AT END SPAN DIM D</td>
<td></td>
</tr>
</tbody>
</table>

NOTES: Work this sheet with Standard Plans Index 450-199.

Payment

Include estimated build-up concrete quantities with the estimated deck concrete quantities. Do not break out estimated build-up concrete quantities.

In the absence of more refined calculations, the following method to calculate estimated concrete build-up quantities may be used:

For Case 1, 2 & 3:

\[
V = \frac{LW \left[ C + \left( \frac{B + D - 2C}{6} \right) \right]}{27}
\]

For Case 4:

\[
V = \frac{LW \left[ \frac{B+D}{2} + \left( \frac{2}{3} \left( C - \frac{B+D}{2} \right) \right) \right]}{27}
\]

Where:

\[
V = \text{Total Volume of build-up per beam (CY)}
\]

\[
L = \text{Beam Length (ft)}
\]

\[
W = \text{Width of beam top flange (ft)}
\]

\[
B; C; D = \text{Build-up Thickness (ft)}
\]