AASHTO T-14

2014 Agenda Items

Proposed Revisions to LRFD BDS Section 6 and LRFD Construction Spec Section 11

Greg Perfetti, NC DOT
Chair, T-14 Technical Committee for Steel Design
Agenda Item 20
Article 6.4.9

• Description:
  • Add new Article 6.4.9 on ‘Dissimilar Metals’.
  • Intent is to prevent galvanic corrosion when steel components, including those made of stainless steel, are coupled with aluminum in presence of an electrolyte.

• Background:
  • Proposed revision a result of two failures (March 2011 and September 2012) of lighting fixtures in highway tunnels.
Agenda Item 21
Articles 6.6.1.2.1, 6.6.1.2.3 & 6.11.5

- Description:
  - Article 6.6.1.2.1 -> clarification to indicate that when the specified conditions are met, all dead load and live load stresses and live load stress ranges for fatigue design at all sections due to loads applied to the corresponding composite section may be computed assuming the concrete deck to be effective for both positive and negative flexure.

- Article C6.6.1.2.1 - > clarification of the calculation of the stress or torque range in cross-frame members using refined analyses to check fatigue on members subject to a net tensile stress.
  - Fatigue truck should be confined to one critical transverse position per each longitudinal position throughout the length of the bridge in the analysis.
  - Suggested factor of 0.75 applied to stress range caused by two different transverse positions over adjacent girders removed.
Agenda Item 21
Articles 6.6.1.2.1, 6.6.1.2.3 & 6.11.5 – cont’d

• Table 6.6.1.2.3-1 -> revision to Condition 4.1 to add case where groove welds may be used to connect a bearing stiffener to a flange. Although not a recommended detail, fatigue category is Category C’.

• Articles 6.11.5 & C6.11.5 - > revisions to refer back to the recommendation in Article C6.6.1.2.1 when calculating the stress range for checking load-induced fatigue, and the torque range for computing fatigue due to cross-section distortion, in cross-frame members in box girders.
Agenda Item 22
Article 6.6.2

Description:

- Articles 6.6.2 & C6.6.2 -> revision to ensure that contract documents reference the AASHTO M270 (ASTM A 709) specification, rather than Table 6.6.2-2, to ensure that latest Charpy V-notch requirements are used.
  - Table 6.6.2-2 moved to Commentary and retained for information purposes.

- Article 6.6.2 - > revision to exempt bearing sole plates from FCM requirement.
  - Sole plates welded to tension flanges typically in regions of low (to zero) tensile stress.
  - Components likely to be field welded, and a FCM designation of the welds can result in complications in the field welding.
  - Similar revision recently made in the AREMA Specification.
Agenda Item 23
Article 6.10.3.4

• Description:
  • Provides guidelines for checking the global stability of spans of slender unsupported straight or horizontally curved I-girder bridge erected units (i.e. with 3 or fewer girders) in their non-composite condition during the deck placement operation when:
    - Unit not braced by other structural units and/or by external bracing within the span; and
    - Unit does not contain any flange level lateral bracing or lateral bracing from a hardened concrete deck within the span.

• Intent is to avoid excessive 2nd order amplification of the lateral and vertical displacements of these units during deck placement.
• Global buckling refers to buckling of the bridge unit as a structural unit, and not buckling of the girders between cross-frames.
Agenda Item 23
Article 6.10.3.4 – cont’d

• For the span under consideration, the sum of the largest total factored positive girder moments during the deck placement should not exceed 50% of the elastic global lateral-torsional buckling resistance of the span acting as a system.
Agenda Item 24
Article 6.12.2.2.4

• Description:
  • Revisions are made to the flexural design provisions for tees and double angles as follows:
    ➢ The upper limit of $M_p$ is removed from the lateral torsional buckling resistance equation to avoid confusion as to whether or not the upper limit of $1.6M_y$ applies when the stem is in tension should yielding control the flexural resistance.
    ➢ A separate equation is introduced for calculating the inelastic local buckling resistance of the compression flange of double angles loaded in the plane of symmetry. The equation is the inelastic local buckling equation for single-angle legs taken from AISC (2010), which may be conservatively applied for this case according to AISC (2010).
    ➢ The local buckling check for the stem in compression is removed because the check is considered redundant. Lateral-torsional buckling and local buckling of the stem are essentially the same phenomenon for these sections.
Agenda Item 25
Various Articles

• Description:
  • New Articles 6.9.6 & 6.12.2.3.3: Provide an alternative design approach for circular composite concrete filled steel tubes (CFSTs) subject to axial compression or combined axial compression & flexure.
    ➢ For use as bridge piers, piles, drilled shafts and other structural elements in applications where fill plastic hinging of the composite section under a seismic event is not a concern.
    ➢ First major proposed update to the CFST provisions in the AASHTO LRFD BDS introduced approximately 25 years ago.
Agenda Item 25
Various Articles – cont’d

- Item that did not pass at the 2013 AASHTO SCOBS meeting in Portland, OR revised to reflect concerns primarily from MN, CA and AK.
  - Removed proposed connection details.
  - Retained current design provisions for composite columns in Articles 6.9.5 & 6.12.2.3.2, and postured the proposed provisions as an alternative design approach in new Articles 6.9.6 & 6.12.2.3.3.
  - Explicitly prohibit the proposed provisions for applications where full plastic hinging of the composite section during a seismic event is expected to occur.
  - Allow the use of either the PSDM or the SCM for determining the nominal flexural composite resistance of the CFST in the presence of axial load.
  - Proposed shear requirement removed in favor of existing requirement in Article 6.12.3.2.2.
  - Evaluated and incorporated numerous suggested editorial comments and enhancements.
Agenda Item 26
Various Articles

Description:

- Article 6.10.9:
  - Revisions are made to clarify the definitions & application of the shear-yielding resistance, shear-buckling resistance and post-buckling shear resistance due to tension-field action.
  - Definitions for Web Panel, End Panel and Interior Panel added in Article 6.2.

- Article 6.10.11.1.3:
  - Revisions are made to clarify and streamline the application of the equations for determining the minimum required moment of inertia of a transverse stiffener adjacent to one or more panels subject to tension-field action – current language left room for potential mixing and matching of the shear resistances of the adjacent panels, which was not the intent.
Agenda Item 27
Section 11, Articles 11.4.3.1 & 11.4.8.1.1 (w/ T-4)

• **Description:**
  
  • **Article 11.4.3.1:**
    
    - Disqualifies fillers, gusset plates, connection plates, web stiffeners and web splice plates from the requirement to cut and fabricate steel plates so that the primary direction of rolling is parallel to the direction of the main tensile and/or compressive stress.
    
    - Operation is inefficient and more costly and is not critical to the structural performance of the plates.

  • **Article 11.4.8.1.1:**
    
    - Allows for punching of holes in fillers, including those used in connections of fracture-critical members (FCMs). Large and thin fillers are difficult to drill. Consequences of cracking in service of fillers are not expected to be significant.
Agenda Item 28
Section 11, Article 11.5.6.4.1 (w/ T-4)

- Description:
  - Article 11.5.6.4.1:
    - Requires that the bolt length used be such that the end of the bolt is flush with or extends beyond the outer face of the nut after proper installation (with no minimum required projection specified) – language taken from Section 2.3.2 of the RCSC Specification.
    - Specifying a minimum required length projection can result in a reduction in the threads within the fastener grip, which reduces the fastener rotational capacity – may cause fracture of the bolts during installation, reduced clamping force, or jamming of the nut against the thread run-out on the bolt.
    - Extension of the bolt beyond the nut has no effect on bolt shear or tension capacity.
    - Three full threads within the grip is sufficient to provide the required ductility; for standard holes, up to two flat washers may be used under either or both the head and the nut to provide additional threads within the grip.
Agenda Item 29
Updates to AASHTO/NSBA Collaboration Documents

• G13.1 – Guidelines for Steel Girder Bridge Analysis
  ➢ TG 13 chair: Domenic Coletti, HDR

• S10.1 – Steel Bridge Erection Guide Specification
  ➢ TG 10 chair: Jamie Farris, TxDOT

• S8.1 – Guide Specification for Application of Coating Systems with Zinc-Rich Primers to Steel Bridges
  ➢ TG 8 chair: Tom Calzone, Carboline