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Final Report of the Adhoc Transbay Task Group

Background

After cracks were found in steel plate girder flanges at the Transbay Transit Center in San Francisco, AISC established an Adhoc task group to study and consider the recommendations made by the Metropolitan Transportation Commission and to determine if any changes need to be made to the present requirements in AISC Steel *Specification* as well as what guidance may be appropriate for inclusion in the AISC Steel *Manual*. The task force members were: Duane K. Miller, PE, ScD, The Lincoln Electric Company (retired) (chair), Robert J. Conner, PhD, Purdue University, James M. Fisher, PE, PhD, CSD Structural Engineers (retired), Chris Hewitt, SE, PE, Simpson Gumpertz & Heger, Larry S. Muir, SE, PE, The Steel Connection, Thomas M. Murray, PhD, Virginia Tech, Thomas J. Schlaflly, AISC, Jim Schoen, Nucor-Yamato Steel, Eric Bolin, PE, AISC (secretary), Lawrence F. Kruth, PE, AISC (Ex-Officio), and Cindi Duncan, AISC (Ex-Officio).

The Task Group began meeting in November of 2019 and has met three times in person and had 32 virtual meetings. The input was received from the Metropolitan Transportation Commission review and comments from members of the AISC Committee on Specifications.

The Task Group prepared multiple specific recommendations for changes to the AISC *Specification*, additions to the *Manual* for guidance, research proposals, and education proposals. All of these proposals are being submitted to AISC Committee on Specifications and the Committee on Manuals for their evaluation and potential inclusion in the 2028 edition of the AISC *Specification* and the 2029 edition of the AISC *Manual of Steel Construction*. (Note that some of these suggestions reflect changes already made in the 2022 *Specification*.)

Recommendations

Specification Proposals

1. In Chapter B – Design Basis, add a new section, B3.14, to address the potential for brittle fracture.
2. Address strain-sensitive details in Chapter B – Design Basis, Chapter J – Design of Connections, and Chapter M – Fabrication and Erection by adding new sections B3.14a, J1.1, and M2.13.
3. In Chapter A – General Provisions, add Section A3.1f to address strain-sensitive connections.
4. In Chapter M – Fabrication and Erection, replace section M2.2 Thermal cutting with new language addressing inspection of thermally cut surfaces other than bolt holes.
5. In Chapter M – Fabrication and Erection, add section M2.12 and commentary addressing the radius requirements for reentrant corners.
6. In the 2022 AISC *Specification*, a new glossary term has been included for Weld Access Holes.
7. In the 2022 AISC *Specification* in Chapter B – Design Basis, Chapter F – Design of Members for Flexure, Chapter H – Design of Members for Combined Forces and Torsion, and Chapter M – Fabrication and Erection, the sections regarding bolt holes were revised to add the word “bolt” in front of the word “hole” to clarify that the requirements address bolt holes and no other holes.
8. Relocate requirements in Section F13.1 and H4 to a new Section J5 addressing flexural strength reduction due to holes in the tension flange.
9. In Chapter B – Design Basis, add new requirements and commentary to section B4.3b addressing net tension checks for bolt holes for statically loaded structures.
10. In Chapter A – General Provisions, revise Section A4.1v to require in the documents issued for construction that members are subject to cyclic loading that may lead to fatigue be identified.
11. In Chapter B – Design Basis, revise section B3.11 to address Design for Cyclic Loading.
12. Change the title of Appendix 3 from “Fatigue” to “Cyclic Loading” and revise the language to reflect new requirements.
13. In the new Appendix 3 – Cyclic Loading, add a User Note to section 3.6 addressing nondestructive examination for fatigue.
14. Revise the glossary terms for “Cyclic Loading” and “Fatigue.”
15. Add a new glossary term for “Reentrant Corner.”
16. Recommend that the Committee of Specifications clarify the language in Section J1.6 on weld access holes to make the requirements more straightforward.
17. Research is presently being performed on high-strength steels. As the research is completed, the Committee on Specifications should consider including the conclusions of the research in the 2028 specification.
18. Add additional commentary regarding low-temperature applications of steel.
19. Add additional commentary regarding “late inspections” such as inspections for cracks after erection.

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Recommendations

Manual Proposals

1. Add a discussion on triaxial stresses
2. Add a discussion on through-thickness loading
3. Expand the discussion on welding considerations and appurtenances
4. Add a section on recommendations for avoiding fatigue and brittle fracture in Section 2.
5. Add a new section on redundancy.

Research Proposals

1. Research the variability in CVN data
2. Research surface conditions from heavy plate thermal cutting
3. Research surface conditions from plasma cutting
4. Additional research is recommended on reentrant corners

Education Proposals

1. Education on variabilities in steel section properties, including shapes and plates
2. Produce a Design Guide on Fracture Resistant Design
3. Review and revise Design Guide 18 – *Steel Framed Parking Structures* relative to fatigue.
4. Evaluate developments regarding “key elements” as various municipalities are proposing and see if changes are required in the *Specification* to address these issues.



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