6.1 Designation of Steel Bridge Members

6.1.1 GENERAL

This memo provides examples for showing steel bridge member designations on the plans for Fracture Critical Members (FCM), Primary Members, and Secondary Members of steel girder and truss bridges in accordance with STP 6.1. STP 6.1 addresses the requirements for identifying and designating steel bridge members.

AASHTO-CA BDS-8 Article 6.6.2.2 requires engineers to identify and designate steel bridge members as FCM, Primary Member, or Secondary Member on the contract documents. AASHTO-CA BDS-8 also introduces a new term “System Redundant Member” (SRM), where a member traditionally designated as a FCM for which redundancy is not known by engineering judgment, and a refined analysis has shown that its simulated fracture does not result in bridge collapse or a portion thereof. At the design stage, a refined analysis to identify SRMs is not required, and SRMs are not required to be designated on design plans.

6.1.2 STEEL GIRDER BRIDGES

In accordance with AASHTO-CA BDS-8 Table 6.6.2.1-1, steel girders shall be identified as Primary Members, and lateral bracing members and cross frames shall be identified as Secondary Members. Figure 6.1.2.1 shows a moment diagram for a three-span continuous steel girder bridge under Strength I of the AASHTO-CA BDS-8. Steel member designation examples for girder bridges are based on this moment diagram.
For a two-girder steel bridge, tension portions of a steel girder shall be identified and designated as *FCM* as shown in Figure 6.1.2.2.

For a steel girder bridge with 3 or more girders, tension portions of a steel girder are usually identified and designated as *Primary Tension Members (Non-Fracture Critical)* as shown in Figure 6.1.2.3.

For all steel girders, compression portions shall be identified and designated as *Primary Compression Members* as shown in Figures 6.1.2.2 and 6.1.2.3.

![Figure 6.1.2.2 FCM and Primary Compression Member Designations](image)
6.1.3 TRUSS BRIDGES

In accordance with AASHTO-CA BDS-8 Table 6.6.2.1-1, truss chords, diagonals, verticals, portal and sway bracing members, and gusset plates are Primary Members. Figure 6.1.3.1 shows an axial force sign diagram for a simple-span steel through truss bridge where “+” indicates a member in tension and “−” indicates a member in compression under Strength I of the AASHTO-CA BDS-8. Steel member designation examples for truss bridges are based on this axial force sign diagram.

Tension chords, diagonals, verticals, and their gusset plates for a truss bridge shall be identified and designated as FCM as shown in Figures 6.1.3.2 and 6.1.3.3.

All compression chords, diagonals, verticals and their gusset plates for a truss bridge shall be identified and designated as Primary Compression Member as shown in Figures 6.1.3.2 and 6.1.3.3.

Sway frame members and their gusset plates for a truss bridge shall be identified and designated as a Primary Tension Member.

Figure 6.1.3.2 shows member designations directly labeled on the plans and Figure 6.1.3.3 shows member designations tabulated on the plans.
NOTES:

“+” — Member in tension

“−” — Member in compression

Figure 6.1.3.1 Axial Force Sign Diagram for Steel Through Truss Bridge

NOTES:

FCM — Fracture Critical Member including Gusset Plates

C — Primary Compression Member including Gusset Plates

Figure 6.1.3.2 FCM and Primary Compression Member Designations (Directly Labeled)
## 6.1.4 REFERENCES
