G. Design Procedure for Beam-to-Girder Connections

Design procedure for beam-to-girder connection is similar to that for the beam-to-column connection. The main difference is that the block shear rupture in the beam web must be considered.

Step 1: Design Load

$$V_u = \max\{(1.2V_D + 1.6V_L), 1.4V_D\} = \text{Total Shear load at the beam ends}$$

Step 2: Coped Beam Web Connection.

- **Bolt Shear and Bearing** (To determine number of bolts, n)
- **Edge Distance** Check edge distance.
- **Spacing for Web Block Shear**
  Old version of manual gives the following suggestion. The edge spacing to prevent block shear is determined using

  Table I-G.1 for shear yield, tension fracture (Old AISC 5-10).
  Table I-G.2 for tension yield, shear fracture (Old AISC 5-11).

  It is assumed that the bolt diameter is less than 1" and that $s = 3$". Therefore, the usual center-to-center spacing is satisfied. The basic formula is:

  $$V_u \leq R_{bs} = (C_1 + C_2)T$$

  where C_1 and C_2 are obtained from the top and middle of the chart and t is the web thickness. The known parameters are the load V_u, web thickness t, and C_2. Therefore, it is necessary to solve for C_1 and find edge spacing. Usually, the minimum horizontal spacing l_h from Table J3.7 is used. The coefficients C_1 and C_2 are different for the two tables. Choose the smaller of the edge distances from the tables.

  Use Tables 8-47a and 8-47b (AISC 8-215) from the new AISC manual.
- **Web Block Shear Capacity.**
  The block shear rupture may govern the strength of the web.

  $$V_u \leq 0.75(0.6F_yA_{gv} + F_uA_{nt}) \qquad \text{(Shear yield + tension fracture)}$$
  $$V_u \leq 0.75(0.6F_uA_{nv} + F_yA_{gt}) \qquad \text{(Tension yield + shear fracture)}$$

Step 3: Connection Angle.

Step 4: Girder Web.
Check if the girder web is thicker than the angle or half of the beam web. If it is (which is the usual case), then bearing and shear failure will occur in the beam web or the angle before it occurs in the girder web. Therefore, it is not necessary to check this part of the connection.