3.2. SEISMIC DESIGN REQUIREMENTS FOR REINFORCED CONCRETE BEAMS

3.2.1. Geometrical requirements

3.2.1.1 – The distance between the centroidal axes of a beam and the column into which it frames shall be limited to less than $b_c / 4$.

3.2.1.2 – Width b_w of a beam shall satisfy the following expression:

$$b_w \leq \min\{(b_c + h_w), 2b_c\} \quad \textbf{(3.4)}$$

3.2.1.3 – The effective flange width b_{eff} may be taken as follows:

(a) In beams framing into exterior columns, the effective flange width b_{eff} is taken, in the absence of a transverse beam, as being equal to the width b_c of the column, or if there is a transverse beam of similar depth, equal to this width increased by $2h_f$ on each side of the beam.

(b) In beams framing into interior columns the above widths may be increased by $2h_f$ on each side of the beam.

3.2.1.4 – For a beam supporting columns discontinued below the beam, the following rules apply:

(a) There shall be no eccentricity of the column axis relative to that of the beam.

(b) The beam shall be supported by at least two direct supports, such as walls or columns.

3.2.2. Design shear forces of beams

3.2.2.1 – In beams the design shear forces shall be determined in accordance with the capacity design rule, on the basis of the equilibrium of the beam under: a) the transverse load acting on it in the seismic design situation and b) end moments $M_{i,d}$ (with i = 1,2 denoting the end sections of the beam), corresponding to plastic hinge formation for positive and negative directions of seismic loading:

$$V_{Ed} = V_{Ed,G} \pm \frac{M_{1,d} + M_{2,d}}{l_{cl}} \quad \textbf{(3.5)}$$

The plastic hinges should be taken to form at the ends of the beams or (if they form there first) in the vertical elements connected to the joints into which the beam ends frame.

3.2.2.2 – End moments $M_{i,d}$ may be determined as follows:

$$M_{i,d} = M_{Rb,i} \min\left(1, \frac{\sum M_{Rc}}{\sum M_{Rb}}\right) \quad \textbf{(3.6)}$$

The value of $\sum M_{Rc}$ shall be compatible with the the column axial force(s) in the seismic design situation for the considered sense of the seismic action.