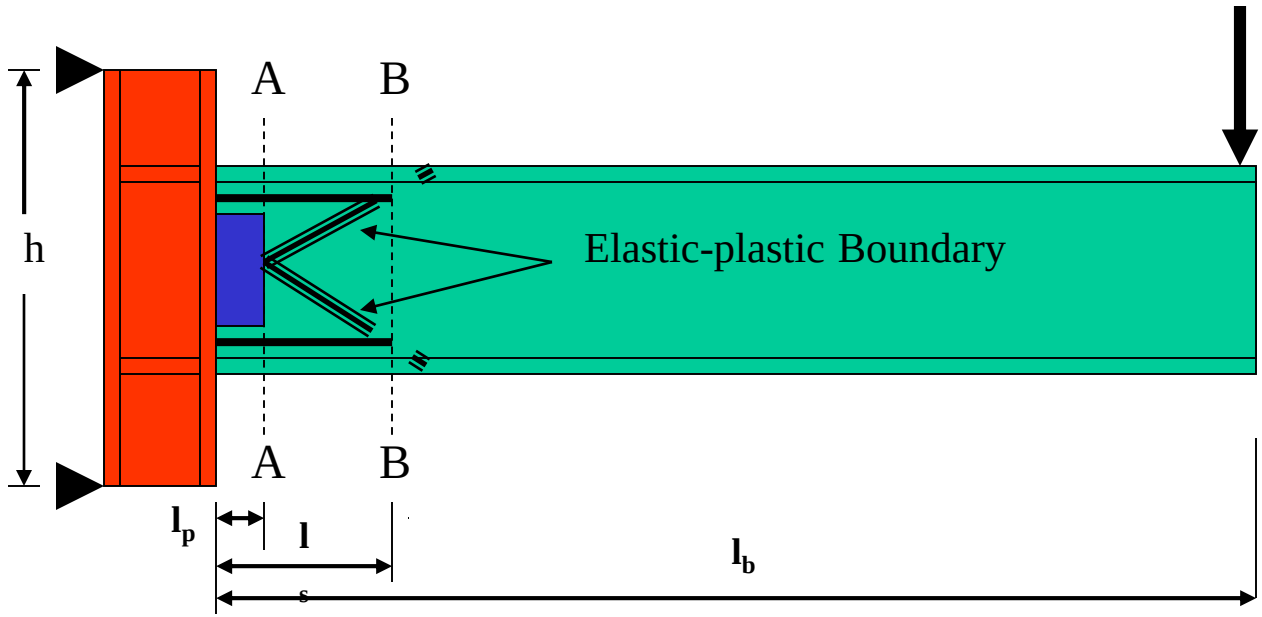
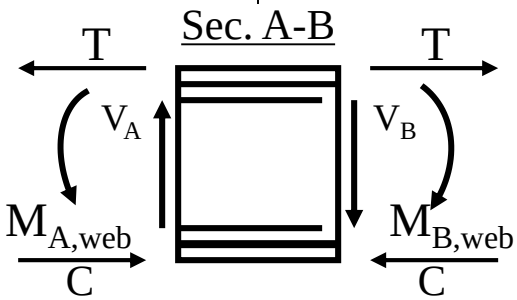
Seismic Force Distributions in SlottedWeb™ Connections



$P_u = Z_b\ F_y / [\ l_b - l_p]$

ATC-24 Test Assembly with l_b = (clear span)/2
h = story height
l_s = slot length
l_p = plate width



Equations of Equilibrium:

$V_A = V_B = P_u$; $T = C = F_y A_{flg}$

$M_{A,web} = M_{B,web} + P_u \times [\ l_s - l_p\ ]$

$M_{A,flg} = M_{B,flg} = T \times [d_{beam} - t_{flg}]$

Slot Lengths are typically $l_s \leq l_p + l_b/10$ based upon the web hinge length (A-B) and typically $l_s \leq d_{beam}/2$

Notes: The slotted connection is kinematic so that the connection force distributions are independent of the moment frame interstory drift, which increases its fatigue life. The web resists both moment and all of the beam shear whereas the flanges resist only moment. SSDA design rationale, verified by ATC-24 tests and FE analyses, proportions a shear plate thickness that forces the beam web hinging region outboard of the welded shear plate.