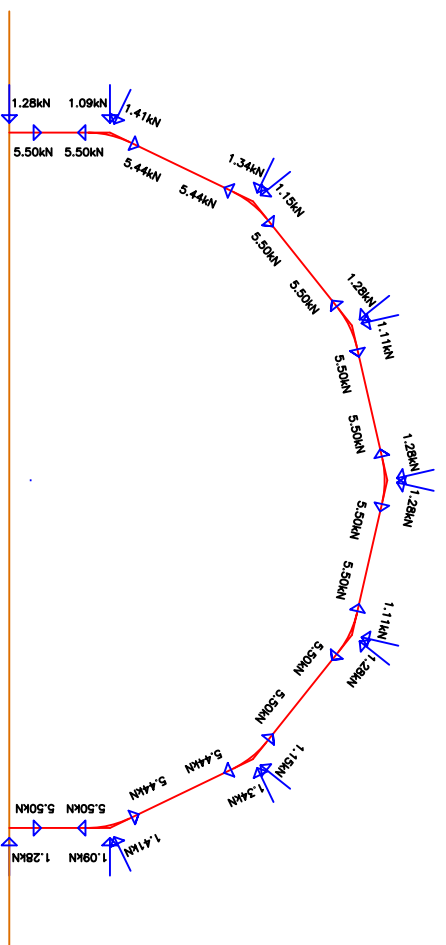
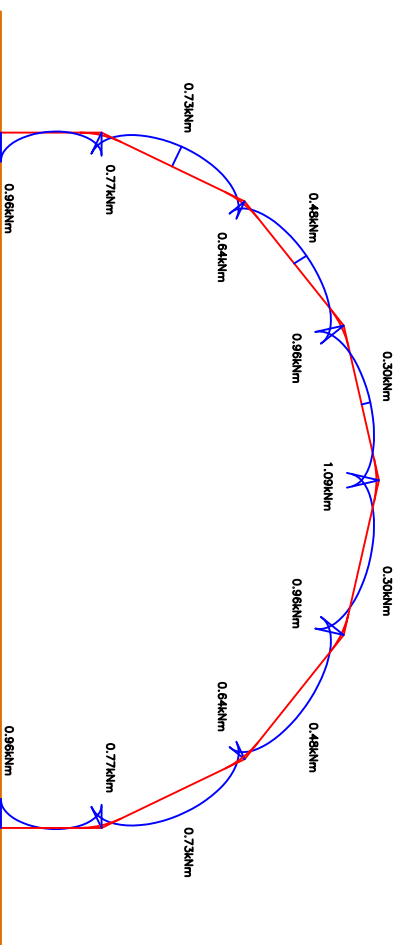


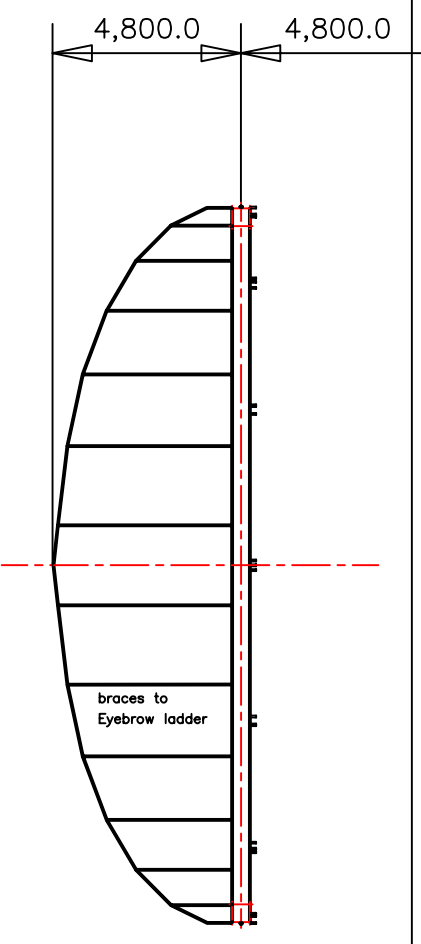
UNFACTORED WIND PRESSURES



AXIAL LOADS and SHEAR FORCES



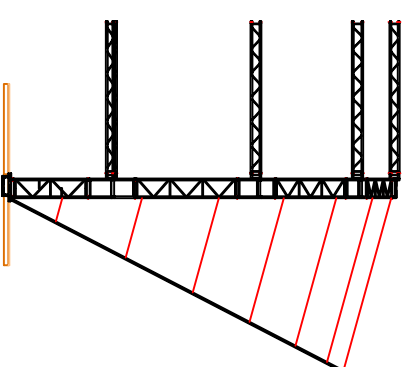
BENDING MOMENTS



PLAN

The arch framework to the Eyebrow is a 52cm deep ladder beam similar to half of a main frame truss.

The ladder comprises 50.8dia x 3.2mm outer tubes @ 0.47m centres, each tube having $A = 4.77\text{sqcm}$, $r = 1.69\text{cm}$.



SIDE ELEVATION

The Eyebrow will be compared with the forces applicable to a main frame.

The area of roof that applies to the Eyebrow is approximately 25% of that of a main frame, but the Cp factors at the front edge of the Eyebrow will be allowed for in the design of a main frame.

Consequently, the shear forces, axial loads, and bending moments, will be 50% of those used in the calculations for the arch frameworks, as shown.

The self-weight can be ignored, and a load factor of 1.2×1.2 (dynamic) = 1.44 is applied to the wind force condition.

The critical condition is at the centre of the arch, where the shear is 1.28kN, the axial force is 5.50kN +ve, and the bending moment is 1.09kNm

The arch is inclined at an angle of 65 degrees, and the forces in the main tubes is $5.50/2 + 1.09/(0.47 \times \sin 65) = 2.75 + 2.56 = 5.31\text{kN}$.

The arch is restrained @ 2.50m centres, and $l/r = 250/1.69 = 148$
 $p_s = 25\text{N/sqmm}$, and $\text{PRS} = 25 \times 4.77/(1.2 \times 10) = 9.9\text{kN} > 5.31\text{kN}$ therefore OK!
 The shear force is negligible!