SCOTT TECH CONSULTING
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

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Ref: ST0480

Design Quintessence
Attention: Ian Wood
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RE: STRUCTURAL CERTIFICATE FOR ALUMINIUM CROWD BARRIER

STRUCTURAL CERTIFICATE

Preface

The Global Truss crowd barrier is a difficult product to certify for use as there is no specific Australian Standard that applies to this barrier design specifically. As a guide we have used AS/NZS 1170.1-2002 Table 3.3 –Minimum imposed actions for barriers.

In checking the member capacities we have used the Australian Aluminium code AS/NZS 1664.1:1997.

Modelling

Figure 1 shows the model used to check the capacity of the crowd barrier. In order to model the frame there have been some assumptions made as follows:

1. The barrier has an inherent tendency to slide depending on the surface that it bears on. In the analysis we have assumed that that the frame is restrained against sliding.

2. The model shows stub columns below the barrier. These are a tool used to try and model how the frame interacts with the ground. These members are defined as compression members only thus only participating in the analysis when the barrier pushes against the ground. This modelling technique allows us to check any members that may lift of the ground as part of the analysis process.

3. In essence this structure has been designed to resist loads from people pushing towards a stage. Thus in modelling the expected loads on the frame we have limited the load directions to what could be reasonably expected from a crowd loading situation.

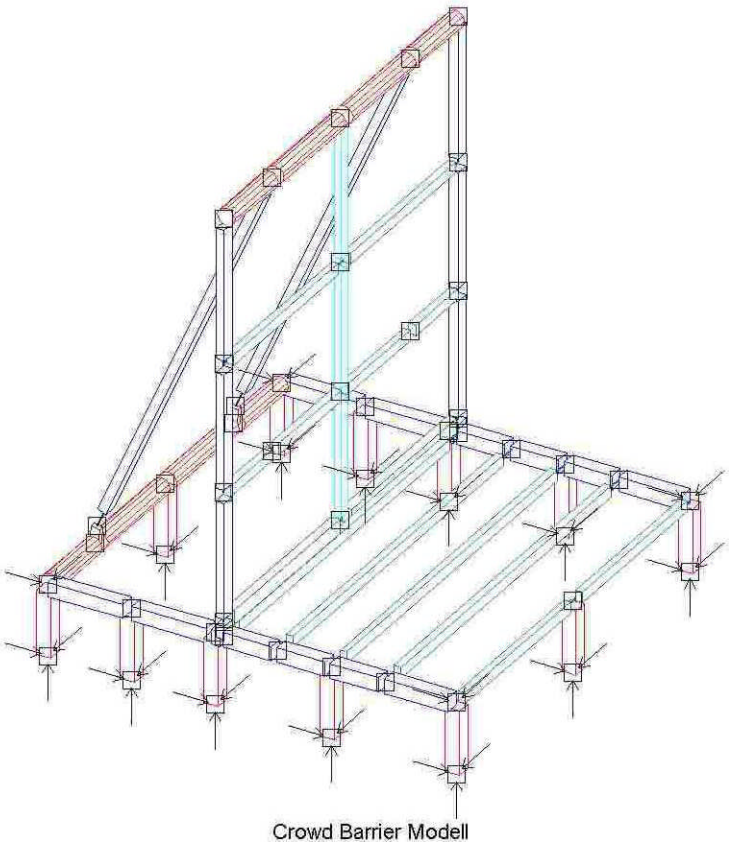


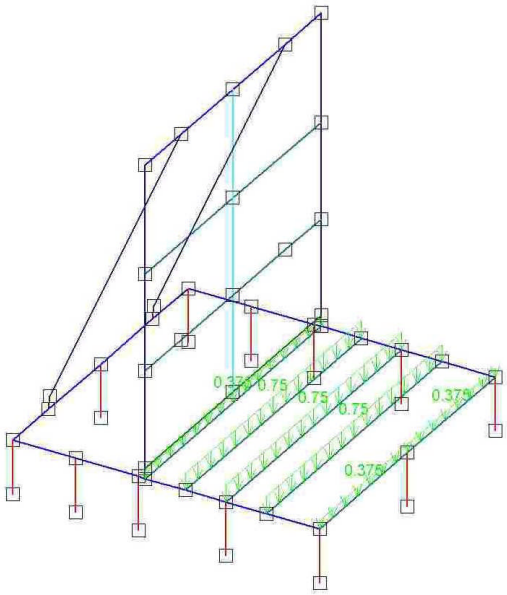
Figure 1

Applied Loadings

AS/NZ1170.1 under crowd loading conditions recommends that the following loadings be applied to a barrier.

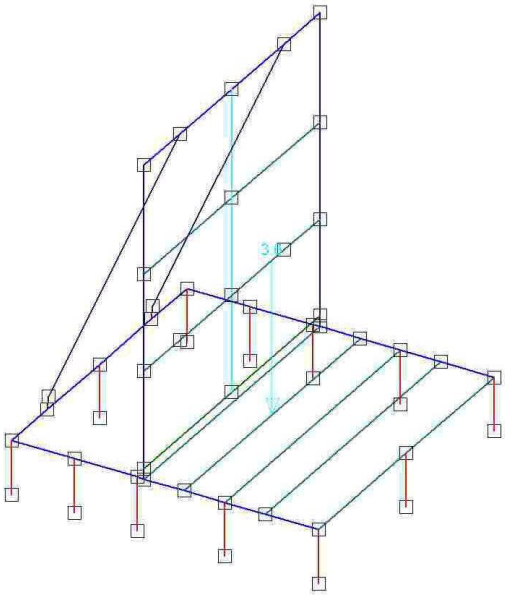
Top edge	3kN/m	horizontal
	0.75kN/m	vertical
	0.6kN	point load in any direction
Infill panels	1.5kPa	horizontal
	1.5kN	in any direction

As a result of our analysis and in keeping with the capacities of the members and the expected loading directions, the following loads (see Figure 2 to 9) have been applied to the barrier. In applying these loads for the analysis we have assumed that the vertical loadings (Floor Loading 1 - 5kPa) will be present during any horizontal loads. Top Rail Load 5 – Figure 7 has been limited to 0.5kN acting back towards the crowd.



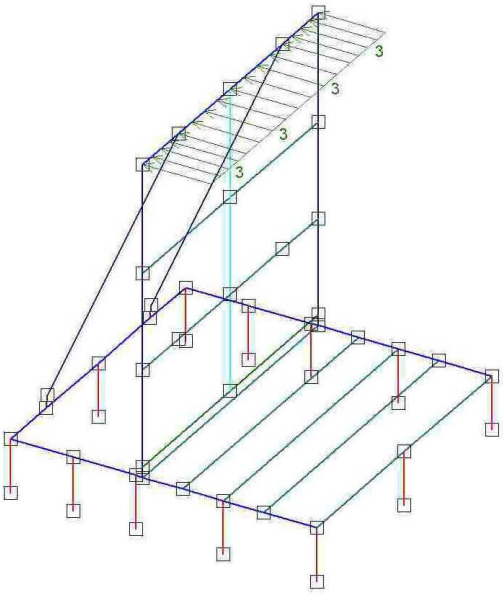
Floor Loads 1

Figure 2



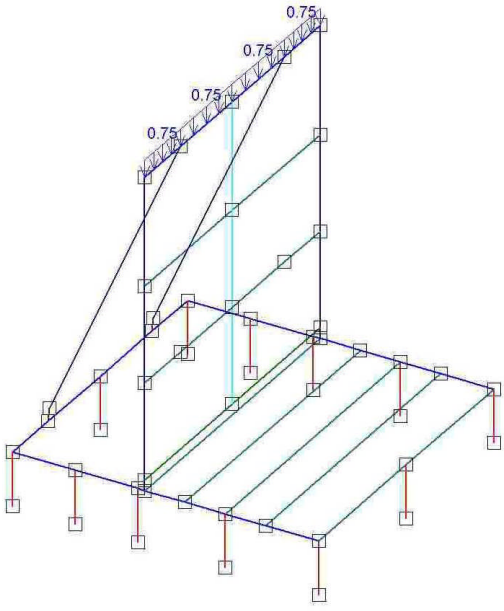
Floor Loads 2

Figure 3



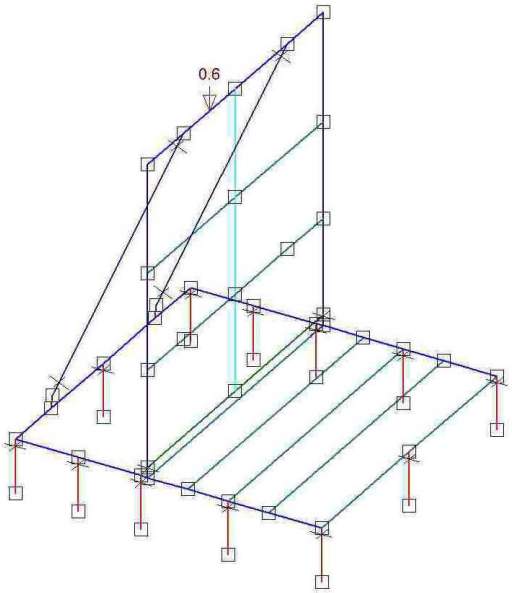
Top Rail Load 2

Figure 4



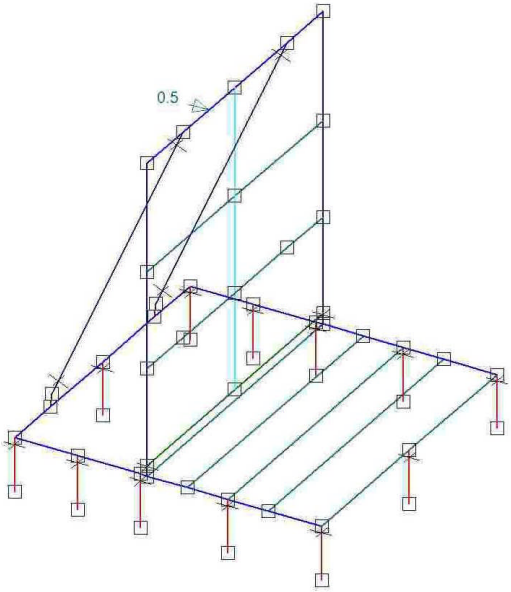
Top Rail Load 3

Figure 5



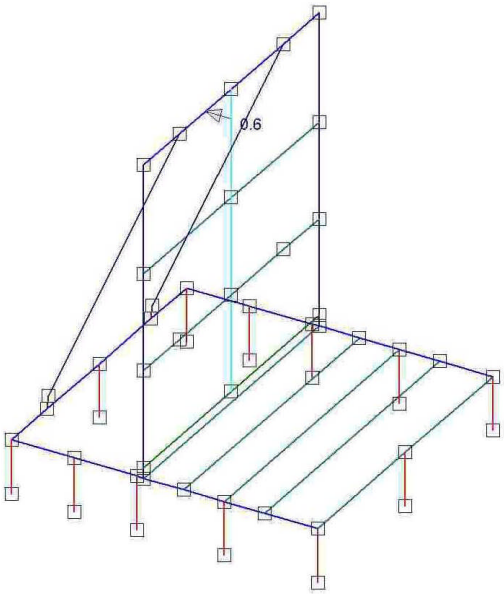
Top Rail Load 4

Figure 6



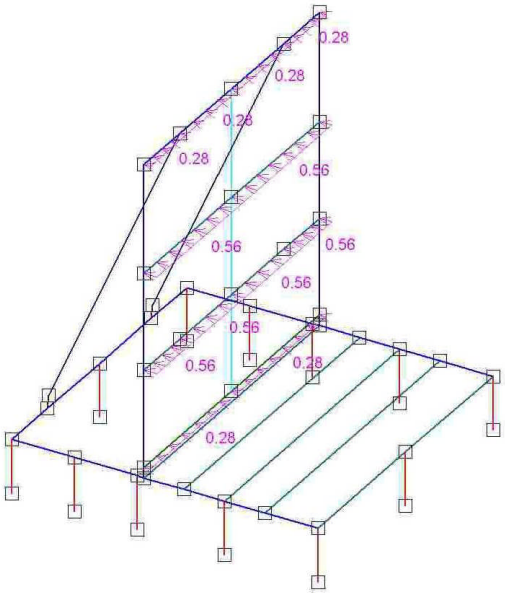
Top Rail Load 5

Figure 7



Top Rail Load 6

Figure 8



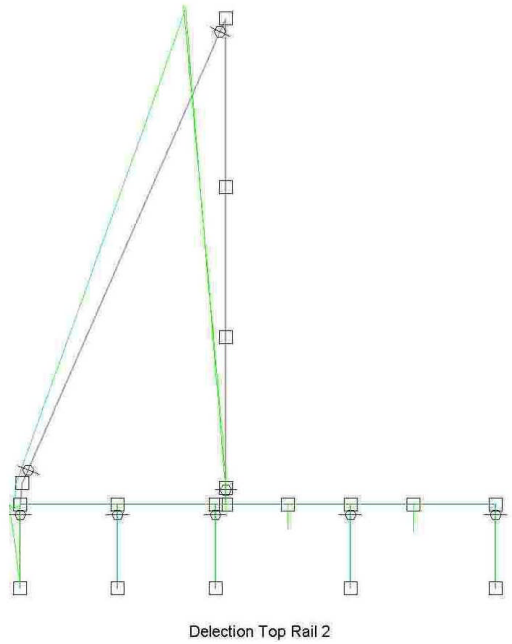
Infill Load 1

Figure 9

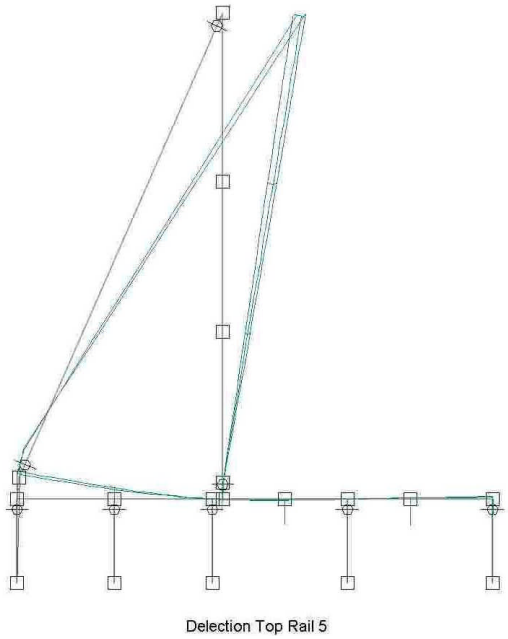
Member Capacities

Based on the above loadings (Figure 2-9), with appropriate live load factors in accordance with AS1170.1, and based on the assumptions listed above, we find that the crowd barrier has adequate capacity to resist these applied loads.

Figures 10 & 11 show representative deflections expected under the worst combination of these loadings. Please note that the analysis has only been considered for the direction of loads as indicated in figures 2 to 9.



Deflection (horizontal at top rail) = 7mm
Figure 10



Deflection (horizontal at top rail) = 16mm
Figure 11

Maintenance checking

In accordance with the manufacturer's specifications, it is important to visually check the crowd barriers for damage or over stressing before use.

In association with other checks, we would recommend closely checking the locations of expected high stress on a regular basis. (See Figure 12)

Point 1: Check weld between CHS & RHS for cracking and deformation

Point 2: Check bottom rail SHS for deformation / bowing under vertical steel plates members.

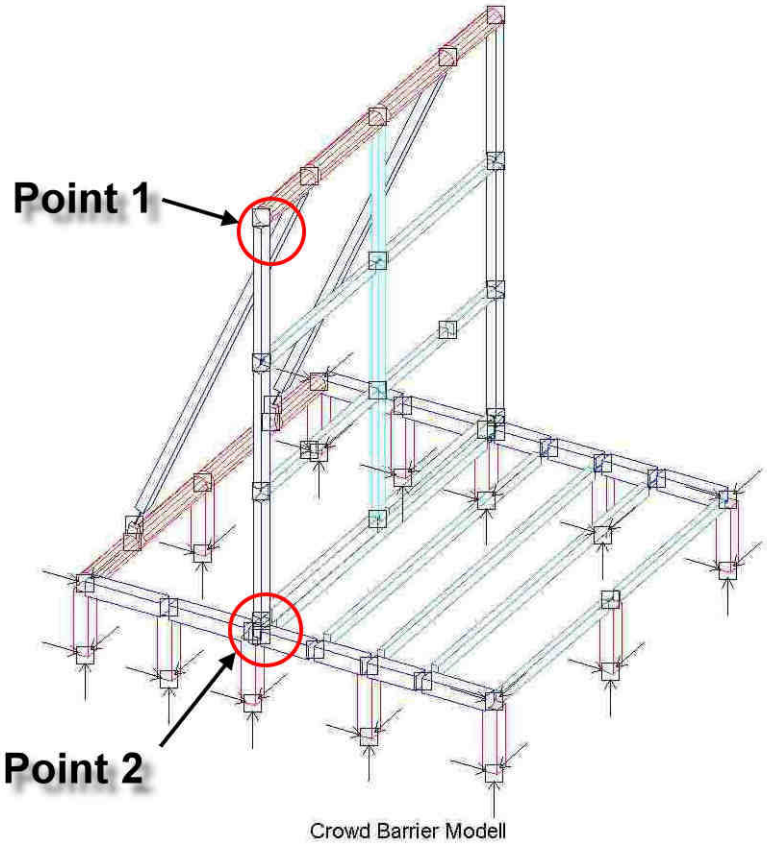
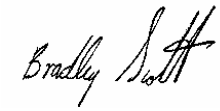


Figure 12

Therefore it is our opinion, that the crowd barrier has adequate member capacity to resist the stated loads (as shown in Figures 2-9) provided that the appropriate care is taken to limit any sliding that may occur on the bearing surface.

Scott Tech Consulting



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