# Quadpod calculations

## BACKGROUND

Tentipi has commissioned a firm of professional structural engineers to assess the partially constructed Stratus/Cirrus 72 tipi frame under the temporary configuration where a "quadpod" frame structure is required to support ladder access and support for a fall arrest rope system.

This document is a summary of the calculations. The full calculations are available for inspection at Tentipi's offices.

The calculations assess the suitability of the "quadpod" structure under three load cases:

- Vertical load from the fall arrest system.

- Ladder load (lateral).

- Nominal lateral load (relating to fall arrest) to account for a small degree of swinging in a fall situation.

The design of the fall arrest system itself is by others.

The analysis has been carried out based upon the quadpod configuration as set out in Tentipi's FieldReady Training Programme. If the frame is installed incorrectly, or the fixings to the ground are installed incorrectly it would invalidate these calculations and potentially undermine the stability of the frame in this temporary configuration.

**The calculations apply only to Tentipi-manufactured poles and hardware.**

# Quadpod calculations – load cases
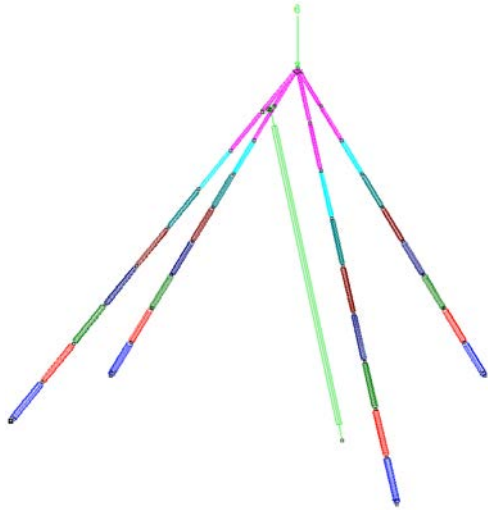


## WEIGHT

The weight of structural elements such as the timber elements and the ladder have been assessed.
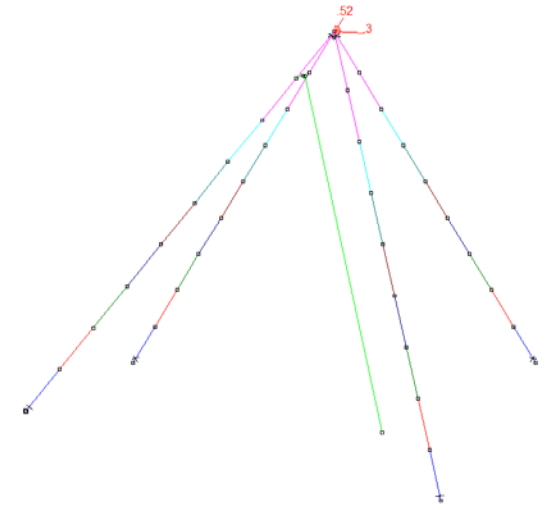
## FALL ARREST LOAD

6kN has been identified as a reasonable upper bound fall arrest load for use in structural design.

This is an industry standard figure and has been specified and justified by the supplier of the fall arrest apparatus recommended by Tentipi.
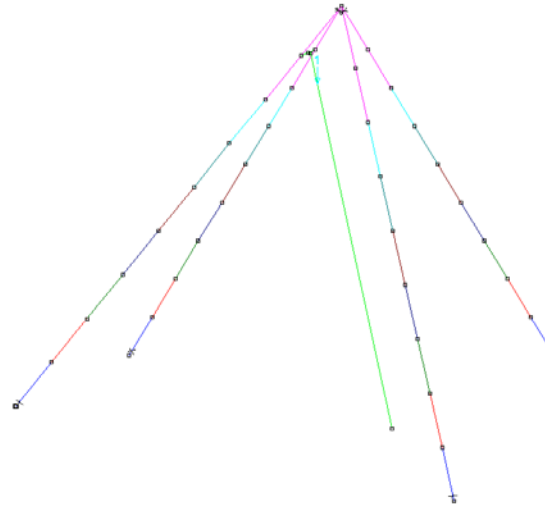
## LADDER LOAD (LATERAL)

Based upon a 100kg/220lbs person at the top of the ladder.
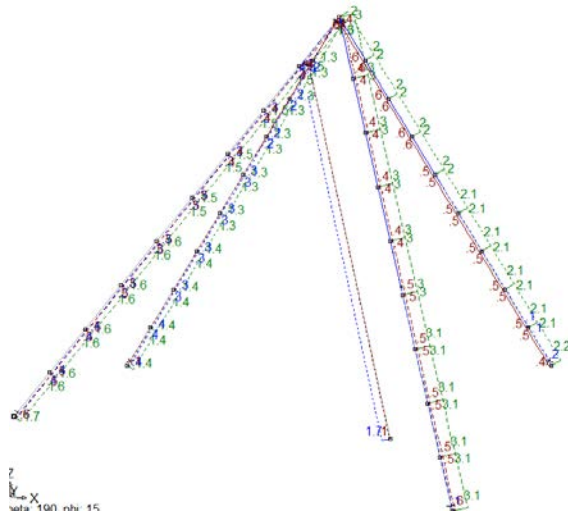
## NOMINAL LATERAL LOAD (RELATING TO A SMALL DEGREE OF INITIAL SWING IN FALL ARREST SITUATION)

10% of 6kN = 0.6kN taken independently of vertical load (conservative) for purposes of stability check.

Worst case direction for lateral load chosen.

# Quadpod calculations – structural analysis & member capacity check





### ANALYSIS RESULTS

Under all load cases the bases of the main poles are in compression, therefore the frame is stable overall. Shear loads are much less than those experienced under permanent construction cases therefore, providing ground stakes have been appropriately installed and tested, the frame will be stable.
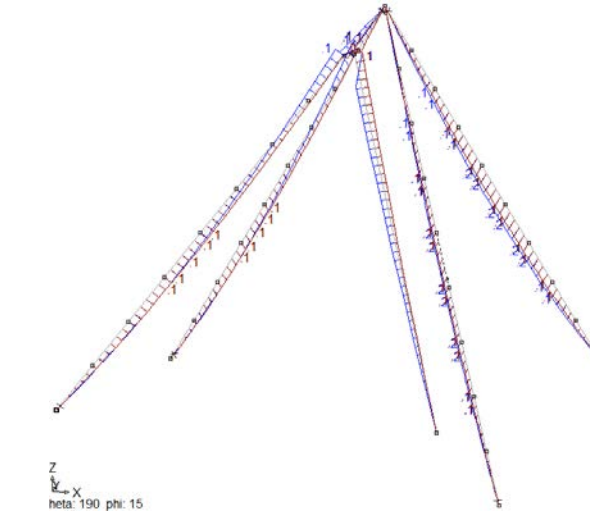
### COMBINED BENDING AND AXIAL CHECK

Calculations performed on worst case member.

Bending, shear and combined bending and axial checks all calculated and satisfactory.

### CONCLUSION

The correctly constructed quadpod has been assessed under a fall arrest load and is found to be acceptable and stable.

This relies on the quadpod being set up in accordance with the Tentipi guidelines, and that the stakes are installed correctly and tested to demonstrate they achieve the required capacity for the permanent configuration.

The minimum pole dimensions required are 97.5mm diameter at the thick end, 97.5mm diameter measured 205cm from the thick end, and 60mm diameter measured 15cm from the thin end.