Structural Report:

Load Tower Components

Client: VR Access Solutions Ltd

Reference: 1566-R1

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1 Introduction

This report discusses the results of physical tests on the VR Access Solutions Load Tower Components.

Tests were undertaken on the load bay beam and the board bearers under loading representative of a 10 kN/m^2 imposed UDL on the loading platform.

The load bay beam and board bearer were found to be suitable for the required loading, and deflection was within the limits set by BS EN 12811-1:2003 in all cases.

Indicative tests on the adjustable base jacks were completed to gauge their performance under load, and these are also described.

2 Load Bay Beam

2.1 SLS Loading

For a 2.5m x 2.5m load tower, SLS imposed loading on the beam:

10 kN/m^2 x 2.5m/2 x 1.25 (dynamic γ_f) = 15.6 kN/m

Deflections recorded were as follows:

Sample	Deflection (mm)
1	9.3
2	8.9
3	7.9

It can be seen in all cases deflection under SLS loading was less than the code permissible value of 25mm, and therefore the beam was acceptable under SLS loading.

2.2 ULS Loading

SLS loading was increased to 15.6 kN/m x 1.1 γ_m x 1.5 γ_f = 25.7 kN/m

In all cases the ULS load was safely held, and therefore the beam is considered acceptable under ULS loading. Deflections (for reference only) under ULS were recorded in the region of 15mm.

2.3 Failure Load

For reference purposes only, the UDL on the beams was increased until failure occurred (where possible). The results were as follows:

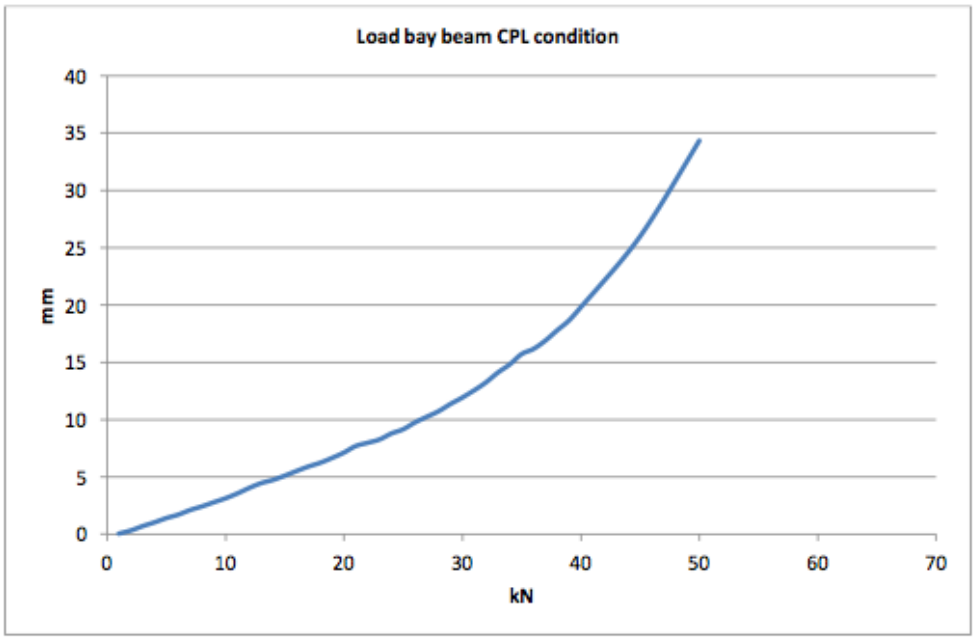
Sample	Load (kN)	Notes
1	111	No Failure (maximum available loading reached)
2	89	Weld Fracture
3	95	Weld Fracture

Total ultimate load is 25.7 kN/m x 2.5m = 64 kN. It can be seen from the table that the minimum safety factor to failure above ULS loading (including a dynamic safety factor) is 1.39.

2.4 Additional Study

A single load bay beam was subjected to a central point load until failure occurred. The following chart shows the load/displacement curve, where failure occurs at 50 kN due to weld fracture.

Note that this is a single sample to failure and should not be used for design purposes.



3 Board Bearer

3.1 SLS Loading

For a 2.5m board bearer at 0.3m centres, SLS imposed loading on the bearer:

10 kN/m^2 x 0.3m x 1.25 (dynamic γ_f) = 3.8 kN/m

Deflections recorded were as follows:

Sample	Deflection (mm)
1	10.7
2	9.2
3	10.1

It can be seen in all cases deflection under SLS loading was less than the code permissible value of 25mm, and therefore the bearer was acceptable under SLS loading.

3.2 ULS Loading

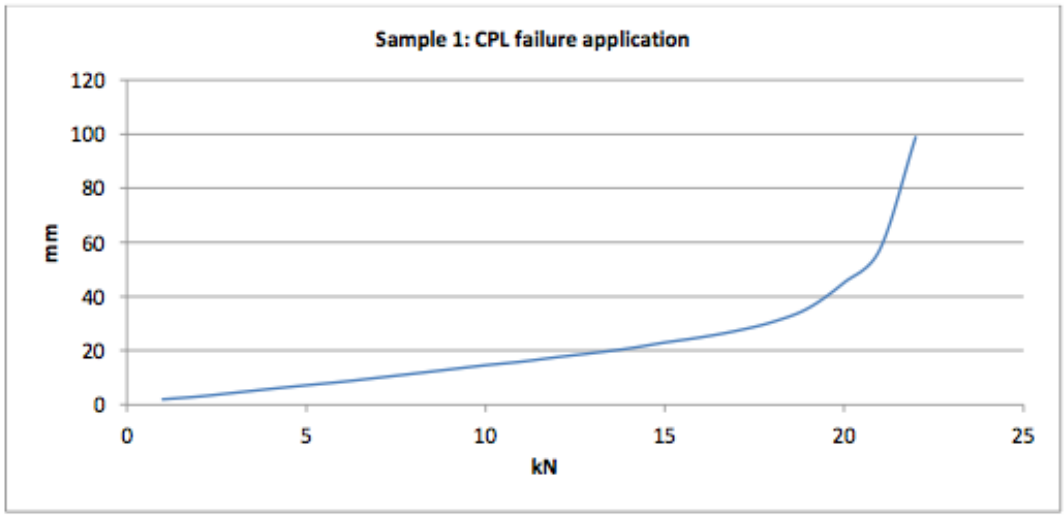
SLS loading was increased to 3.8 kN/m x 1.1 γ_m x 1.5 γ_f = 6.3 kN/m

In all cases the ULS load was safely held, and therefore the bearer is considered acceptable under ULS loading. Deflections (for reference only) under ULS were recorded in the region of 17mm.

3.3 Additional Study

A single board bearer was subjected to a central point load until failure occurred. The following chart shows the load/displacement curve, where failure occurs at 22 kN due to weld fracture and assumed section plasticity at the point of maximum moment.

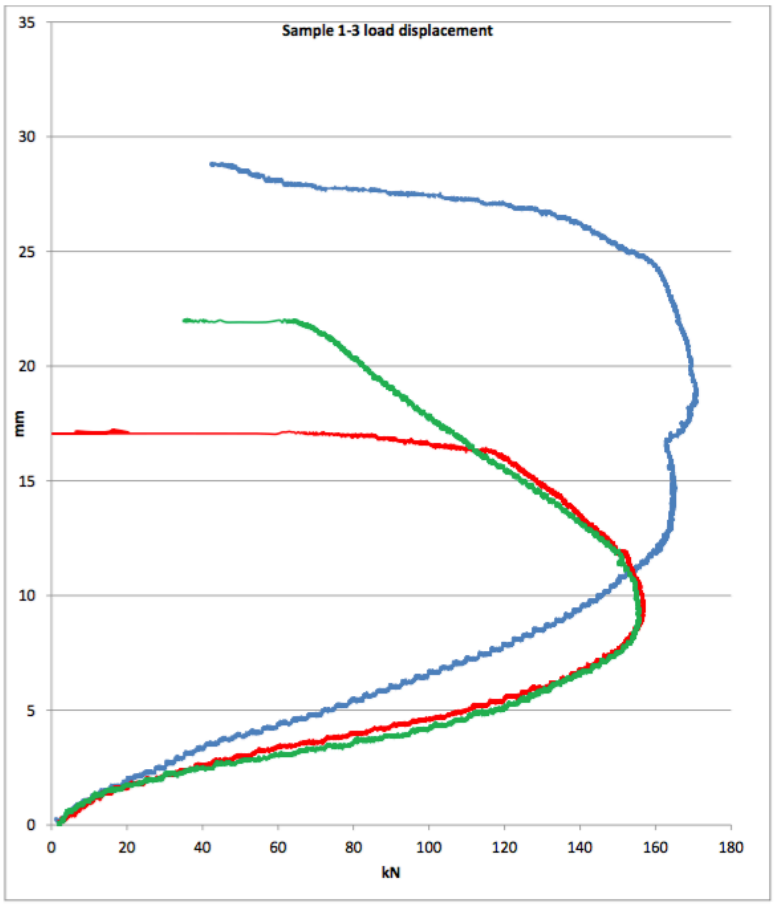
Note that this is a single sample to failure and should not be used for design purposes.



R^2=0.9953

4 Adjustable Base Jack

The adjustable base jack was tested under direct compression, a single sample for three different extensions, with the results shown on the graph below. It can be seen that all extensions checked failed at similar load, approximately 150kN. The blue curve is with the jack 100mm extended, the red curve 250mm, and the green curve 450mm.



For an average 150kN failure, adopting a safety factor of 3 would give a safe working load of 50kN.

However, each result is based on a single sample only and this value should not be used for design.

5 Summary

5.1 Load Bay Beam

The load bay beam was found to be capable of carrying an imposed UDL of 10 kN/m^2 (SLS) when built into a 2.5m x 2.5m loading tower.

5.2 Board Bearers

The board bearer was found to be capable of carrying an imposed ULD of 10 kN/m^2 (SLS) at a span of 2.5m, when installed at 0.3m centres.