

ARMS Incorporated  
PO Box 521  
Hamilton Hill WA 6963  
WA 6012

Attention Lynne De Vine

Dear Lynne

**P18107-RPT-001\_0 – Engineer’s report three statues, McCallum Park**

Hartley structural have assessed the stability of three statues to be installed at McCallum Park.

Each statue was assessed for :

- Overturning due to wind / earthquake loading
- Overturning due to people climbing on the statues
- Bearing due to worst overturning result
- Sliding from wind / earthquake loading

## Statue dimensions & weight

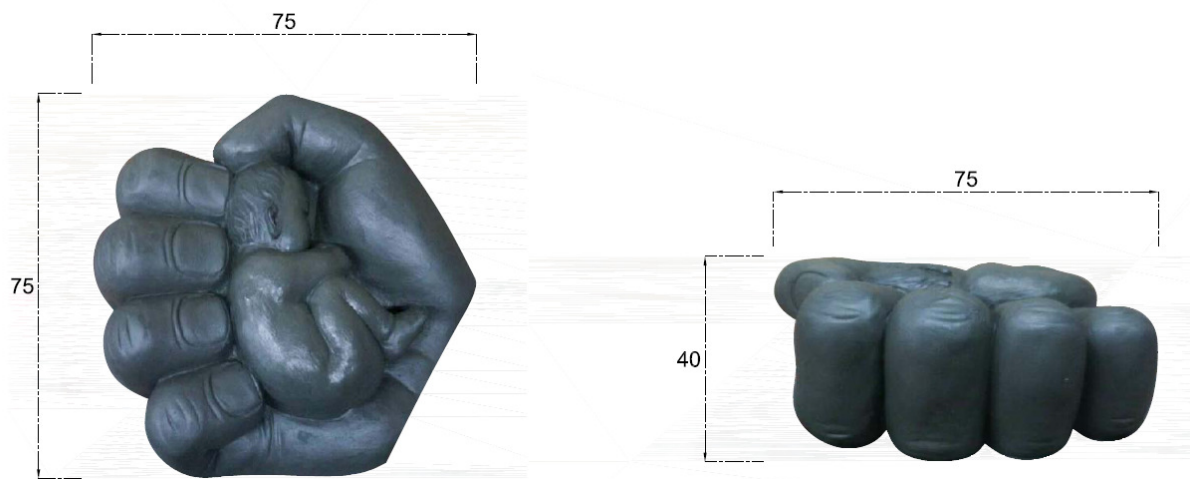
### Mother statue



Gross weight 2200kg

Figure 1 - Dimensions & weight of mother statue

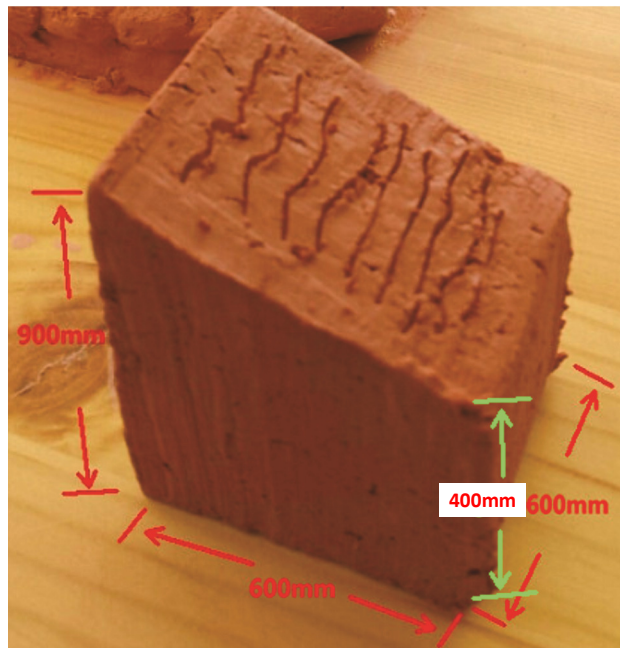
Child / hand statue



Gross weight 400kg

Figure 2 - Dimensions & weight of Child / hand statue

Desk statue



Gross weight 700kg

Figure 3 - Dimensions & weight of desk statue

## Assessment criteria

The following design criteria was used for the assessment

- Statues are importance level 3, being located in a public park.
- The following wind loading design criteria was used
  - 1 : 1000 year storm event
  - Terrain category 2 .
- The following earthquake loading design criteria was used
  - 1 : 1000 year earthquake
  - The greater result from earthquake design category I & II.
- The allowable bearing capacity is 75kPa – soft clay / sand.
- A person loading of two 150 kg people hanging 0.5m off the top edge of the statue.

## Results

If the factor of safety (FoS) exceeds 1.00 then the action is deemed to have passed the assessment criteria.

Action	Stabilising	Destabilising	FoS
Overturing due to wind / earthquake	8.8 kNm	4.4 kNm	1.99
Overturing due to two people	8.8 kNm	2.7 kNm	3.26
Bearing	75 kN	49 kN	1.52
Sliding	6.6 kN	6.3 kN	1.05

**Table 1 - Assessment results for mother statue**

Action	Stabilising	Destabilising	FoS
Overturing due to wind / earthquake	1.2 kNm	0.1 kNm	8.77
Bearing	75 kN	8 kN	9.96
Sliding	0.9 kN	0.7 kN	1.40

People loading not considered because the height is less than half the plan dimensions

**Table 2 - Assessment results for the hand / child statue**

Action	Stabilising	Destabilising	FoS
Overturing due to wind / earthquake	2.1 kNm	0.8 kNm	2.69
Overturing due to two people	2.1 kNm	2.4 kNm	0.88
Bearing	75 kN	86 kN	0.87
Sliding	2.1 kN	1.7 kN	1.21

**Table 3 - Assessment results for desk statue**

## Findings

The assessment of the statues indicates that the mother statue and the child / hand statue pass the assessment criteria. However the desk statue would be unstable under people loading.

## Conclusions and recommendations

It is recommended that a concrete footing be prepared for the desk statue as detailed in Figure 4. The recommended construction sequence would be to pour the footing base first. The following day, resin fix four dowel bars to the underside of the statue and place the statue on four 100 x 100 x 100 concrete blocks. Pour the footing pedestal with letter box formwork. Break off the letter boxes while the concrete is green. The footing and pedestal are to have grade 20 / 20 / 20 concrete with 50 cover to the reinforcement.

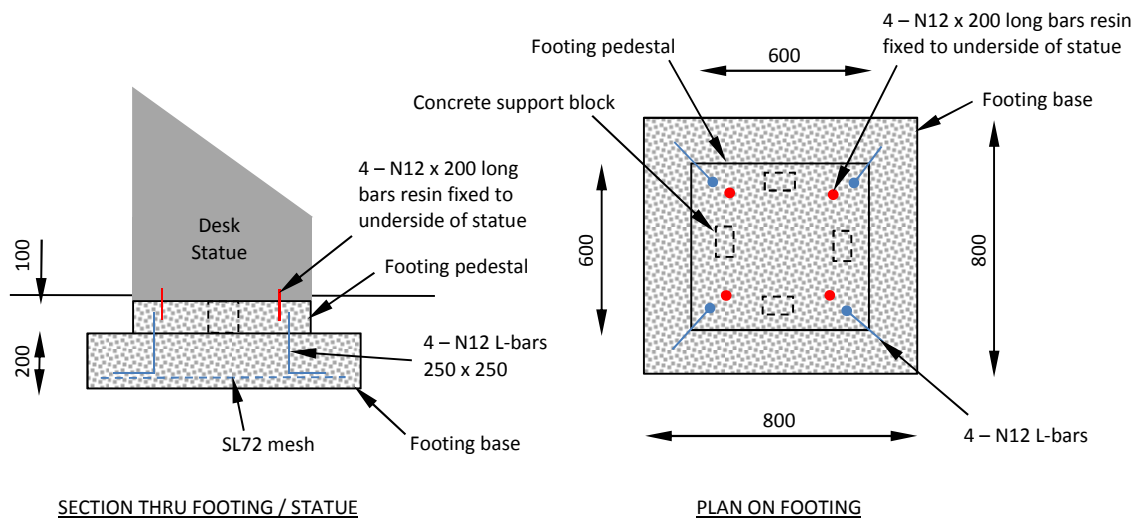


Figure 4 - Typical statue footing detail

For the mother statue it is recommended that 150mm of the ground that matched the statue foot print be removed and replaced with inert gravel which is compacted to at least 95% M.M.D.D.

It might be appropriate to construct a concrete footing for the child / hand statue to make it heavier and more difficult to steal. Alternatively the subgrade can be prepared as described for the mother statue.

If you have any queries please do not hesitate to contact me.

Yours faithfully

Rick Hartley  
Chartered Professional Engineer  
FIEAust 2451796  
Mobile No 0435 584 787  
Email [rickhartley@bigpond.com](mailto:rickhartley@bigpond.com)