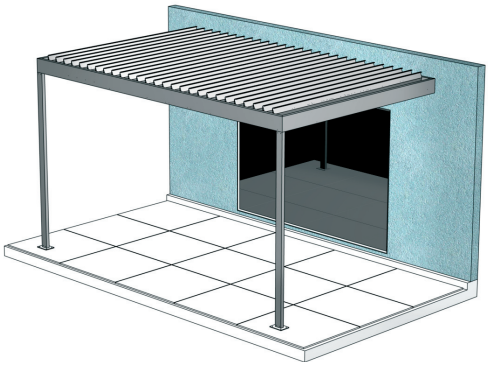
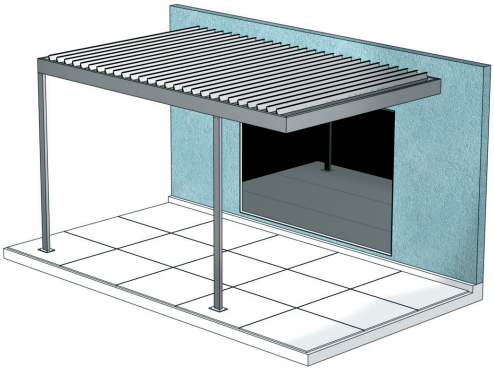
## THREE BASIC BEAM DESIGNS

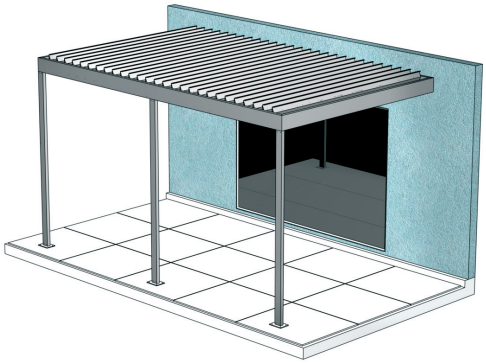
### // 1. SIMPLY SUPPORTED



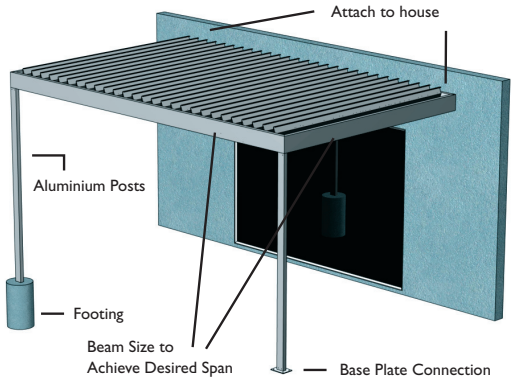
### // 2. SINGLE CANTILEVER



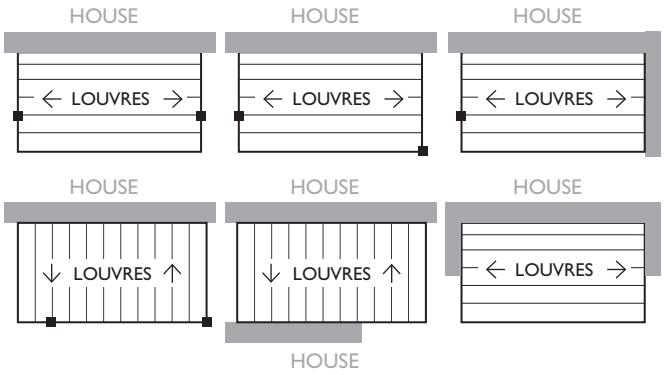
### // 3. CONTINUOUS SPAN



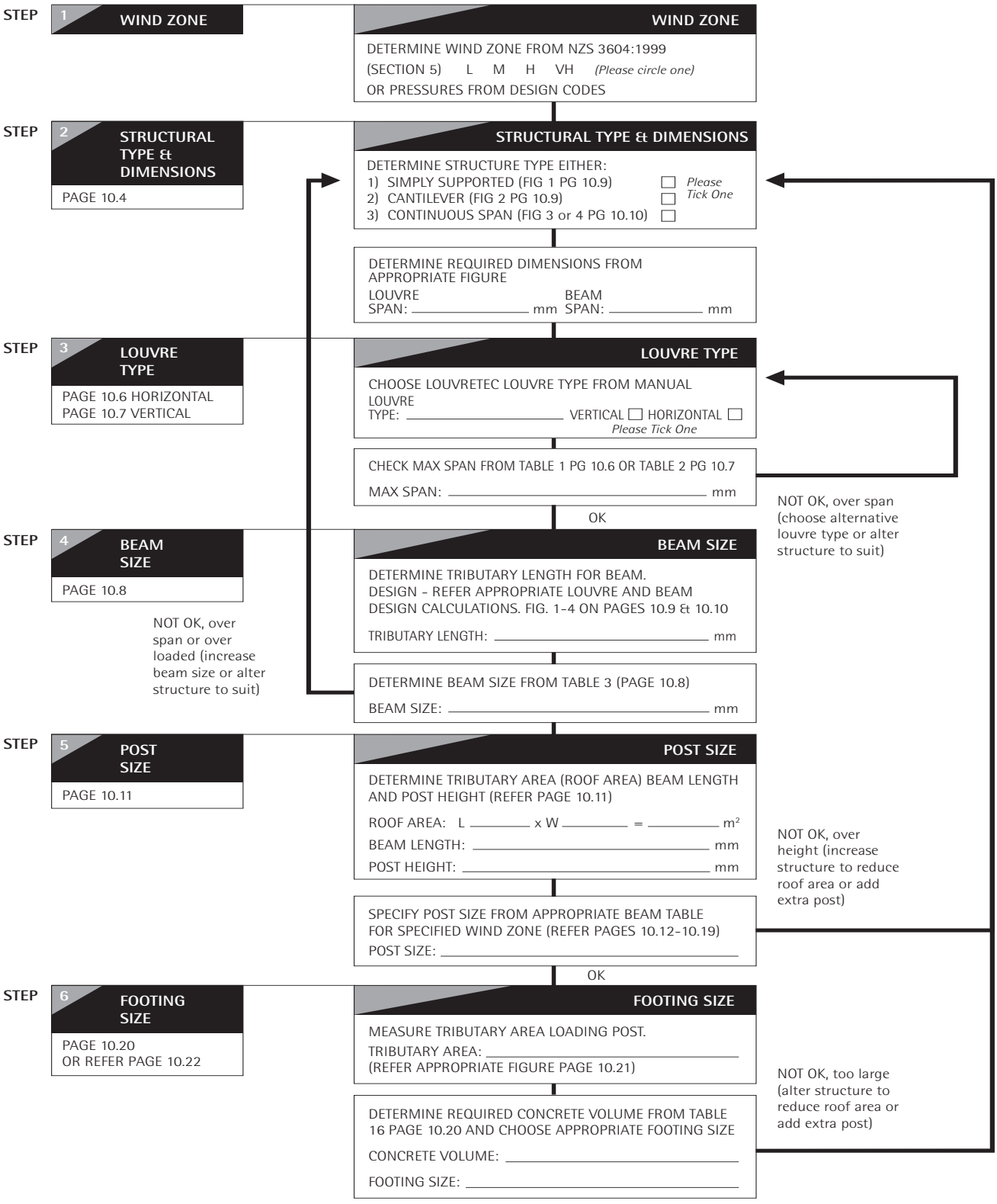
## TYPICAL ALUMINIUM BEAM & POST ASSEMBLY




## CONFIGURATIONS AVAILABLE




| Refer to section 12 for full engineering details. | |
|---|---|
| **ALUMINIUM BEAMS** | **ALUMINIUM POSTS** |
| 150 x 50 x 3<br>2/150 x 50 x 3 | 50 x 50 x 3 |
| 200 x 50 x 3<br>2/200 x 50 x 3 | 75 x 50 x 3 |
| 250 x 50 x 3<br>2/250 x 50 x 3 | 75 x 75 x 3 |
| 300 x 50 x 3<br>2/300 x 50 x 3 | 100 x 50 x 3<br>100 x 100 x 3 |


STEP 1 WIND ZONE
WIND ZONE
DETERMINE WIND ZONE FROM NZS 3604:1999
(SECTION 5) L M H VH (Please circle one)
OR PRESSURES FROM DESIGN CODES
STEP 2 STRUCTURAL TYPE & DIMENSIONS
PAGE 10.4
STRUCTURAL TYPE & DIMENSIONS
DETERMINE STRUCTURE TYPE EITHER:
1) SIMPLY SUPPORTED (FIG 1 PG 10.9)
2) CANTILEVER (FIG 2 PG 10.9)
3) CONTINUOUS SPAN (FIG 3 or 4 PG 10.10)
Please Tick One
DETERMINE REQUIRED DIMENSIONS FROM APPROPRIATE FIGURE
LOUVRE SPAN: _____ mm
BEAM SPAN: _____ mm
STEP 3 LOUVRE TYPE
PAGE 10.6 HORIZONTAL
PAGE 10.7 VERTICAL
LOUVRE TYPE
CHOOSE LOUVRETEC LOUVRE TYPE FROM MANUAL
LOUVRE TYPE: _____ VERTICAL ☐ HORIZONTAL ☐
Please Tick One
CHECK MAX SPAN FROM TABLE 1 PG 10.6 OR TABLE 2 PG 10.7
MAX SPAN: _____ mm
NOT OK, over span (choose alternative louvre type or alter structure to suit)
OK
STEP 4 BEAM SIZE
PAGE 10.8
NOT OK, over span or over loaded (increase beam size or alter structure to suit)
BEAM SIZE
DETERMINE TRIBUTARY LENGTH FOR BEAM.
DESIGN - REFER APPROPRIATE LOUVRE AND BEAM DESIGN CALCULATIONS. FIG. 1-4 ON PAGES 10.9 & 10.10
TRIBUTARY LENGTH: _____ mm
DETERMINE BEAM SIZE FROM TABLE 3 (PAGE 10.8)
BEAM SIZE: _____ mm
STEP 5 POST SIZE
PAGE 10.11
POST SIZE
DETERMINE TRIBUTARY AREA (ROOF AREA) BEAM LENGTH AND POST HEIGHT (REFER PAGE 10.11)
ROOF AREA: L _____ x W _____ = _____ m²
BEAM LENGTH: _____ mm
POST HEIGHT: _____ mm
NOT OK, over height (increase structure to reduce roof area or add extra post)
SPECIFY POST SIZE FROM APPROPRIATE BEAM TABLE FOR SPECIFIED WIND ZONE (REFER PAGES 10.12-10.19)
POST SIZE: _____
OK
STEP 6 FOOTING SIZE
PAGE 10.20
OR REFER PAGE 10.22
FOOTING SIZE
MEASURE TRIBUTARY AREA LOADING POST.
TRIBUTARY AREA: _____
(REFER APPROPRIATE FIGURE PAGE 10.21)
NOT OK, too large (alter structure to reduce roof area or add extra post)
DETERMINE REQUIRED CONCRETE VOLUME FROM TABLE 16 PAGE 10.20 AND CHOOSE APPROPRIATE FOOTING SIZE
CONCRETE VOLUME: _____
FOOTING SIZE: _____

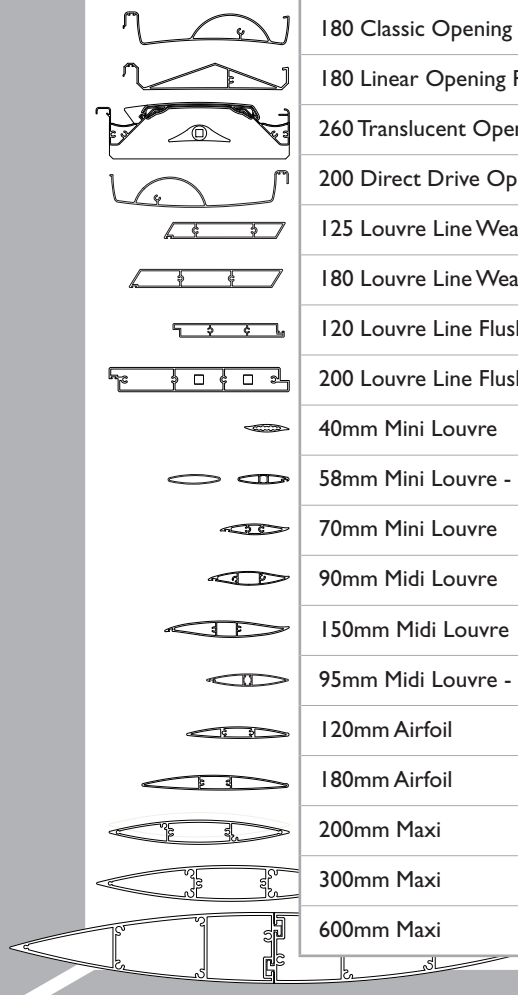
# engineering - louvre calculation

PLEASE REFER TO ENGINEERING REFERENCES AND DESIGN INFORMATION - PAGES 12.01, 12.02

// **STEP 1 - DETERMINE WIND ZONE**

// **STEP 2 - DETERMINE STRUCTURE TYPE**

LOUVRE TYPE HORIZONTAL

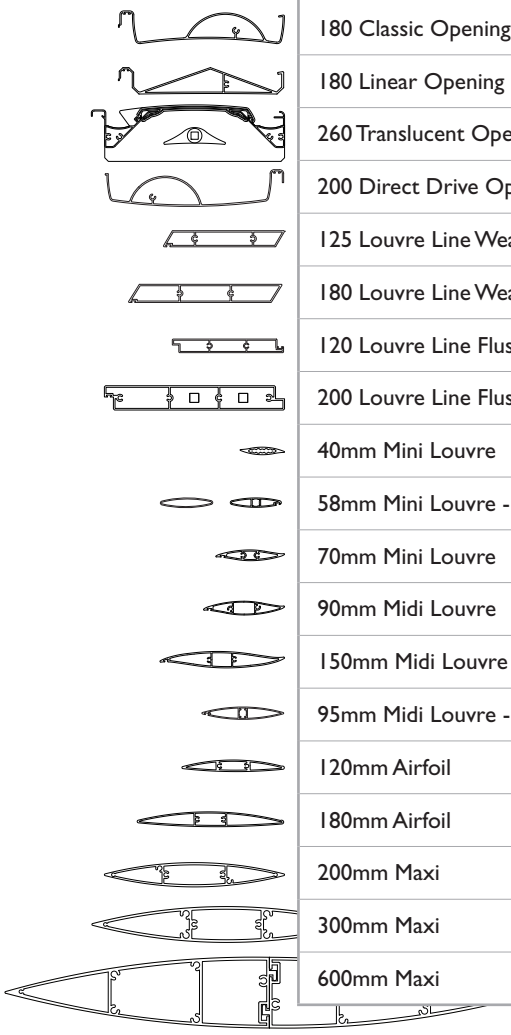


**SPANS FOR HORIZONTAL LOUVRES (ROOF OR WALL)** **TABLE 1**

| | Maximum Louvre Span (mm) | | | | |
|---|---|---|---|---|---|
| Wind Zone | Inside (self wt) | L | M | H | VH |
| Factored wind speed at building | | 115km/h | 133km/h | 158km/h | 179km/h |
| | | 32 m/s | 37 m/s | 44 m/s | 50 m/s |
| Ultimate limit state loads (kPa) | | +1.1 | +1.48 | +2.09 | +2.70 |
| | | -1.38 | -1.85 | -2.61 | -3.38 |
| **Louvre Type** | | | | | |
| 180 Classic Opening Roof | 4500 | 3900 | 3750 | 3200 | 2800 |
| 180 Linear Opening Roof | 3900 | 3750 | 3400 | 3000 | 2750 |
| 260 Translucent Opening Roof | 5200 | 3100 | 2700 | 2300 | 2050 |
| 200 Direct Drive Opening Roof | 4500 | 3900 | 3750 | 3200 | 2800 |
| 125 Louvre Line Weatherboard Panel | 2600 | 2500 | 2300 | 2050 | 1900 |
| 180 Louvre Line Weatherboard Panel | 3200 | 3050 | 2800 | 2500 | 2300 |
| 120 Louvre Line Flush Panel | 2600 | 2500 | 2300 | 2050 | 1900 |
| 200 Louvre Line Flush Panel | 3500 | 3350 | 3000 | 2650 | 2450 |
| 40mm Mini Louvre | 1500 | 1350 | 1200 | 1100 | 1000 |
| 58mm Mini Louvre - Slimline 60 | 1700 | 1600 | 1400 | 1300 | 1200 |
| 70mm Mini Louvre | 2050 | 1900 | 1700 | 1500 | 1400 |
| 90mm Midi Louvre | 2350 | 2000 | 1850 | 1600 | 1500 |
| 150mm Midi Louvre | 2900 | 2750 | 2500 | 2200 | 2000 |
| 95mm Midi Louvre - Slideline 100 | 2600 | 2300 | 2100 | 1850 | 1650 |
| 120mm Airfoil | 2400 | 2300 | 2100 | 1850 | 1700 |
| 180mm Airfoil | 3100 | 2950 | 2700 | 2400 | 2200 |
| 200mm Maxi | 3700 | 3700 | 3550 | 2950 | 2600 |
| 300mm Maxi | 4800 | 4800 | 4800 | 4200 | 3700 |
| 600mm Maxi | 7150 | 6550 | 5600 | 4700 | 4100 |

# engineering - louvre calculation

## LOUVRE TYPE VERTICAL



**SPANS FOR VERTICAL LOUVRES (WALL LOADING)** **TABLE 2**

| | Maximum Louvre Span (mm) | | | | |
|---|---|---|---|---|---|
| Wind Zone | Inside (self wt) | L | M | H | VH |
| Factored wind speed at building | | 115km/h | 133km/h | 158km/h | 179km/h |
| | | 32 m/s | 37 m/s | 44 m/s | 50 m/s |
| Ultimate limit state loads (kPa) | | 0.84 | 1.13 | 1.6 | 2.06 |
| **Louvre Type** | | | | | |
| 180 Classic Opening Roof | 5000 | 4400 | 4200 | 3850 | 3500 |
| 180 Linear Opening Roof | 4500 | 4100 | 3900 | 3500 | 3200 |
| 260 Translucent Opening Roof | 3700 | 3500 | 3100 | 2600 | 2300 |
| 200 Direct Drive Opening Roof | 5000 | 4400 | 4200 | 3850 | 3500 |
| 125 Louvre Line Weatherboard Panel | 3100 | 2900 | 2700 | 2500 | 2300 |
| 180 Louvre Line Weatherboard Panel | 3700 | 3500 | 3200 | 2850 | 2650 |
| 120 Louvre Line Flush Panel | 3100 | 2900 | 2700 | 2500 | 2300 |
| 200 Louvre Line Flush Panel | 4200 | 3800 | 3400 | 3000 | 2800 |
| 40mm Mini Louvre | 1600 | 1550 | 1400 | 1250 | 1150 |
| 58mm Mini Louvre - Slimline 60 | 1900 | 1800 | 1650 | 1500 | 1350 |
| 70mm Mini Louvre | 2300 | 2150 | 2000 | 1750 | 1600 |
| 90mm Midi Louvre | 2400 | 2300 | 2100 | 1900 | 1750 |
| 150mm Midi Louvre | 3300 | 3150 | 2900 | 2550 | 2350 |
| 95mm Midi Louvre - Slideline 100 | 2650 | 2600 | 2350 | 2150 | 1900 |
| 120mm Airfoil | 2800 | 2650 | 2400 | 2150 | 1950 |
| 180mm Airfoil | 3600 | 3400 | 3100 | 2750 | 2550 |
| 200mm Maxi | 4700 | 4450 | 4050 | 3500 | 3100 |
| 300mm Maxi | 6700 | 6400 | 5700 | 4900 | 4400 |
| 600mm Maxi | 7800 | 7450 | 6550 | 5600 | 5000 |

**Notes:**

This table is for louvres spanning vertically, and located within 1.0m of a building less than 10m in height. For a free standing structure specific design is required as loadings increase. The supporting structure and fixings must be checked / designed by a Chartered Professional Engineer and not taken from tables in this manual.

# engineering - beam calculation

## TO CALCULATE TRIBUTARY LENGTH FOR BEAMS

Typically the tributary length for simply supported beams only is half the length of the louvre span (refer note below)
Determining the Tributary length is shown through figures 1–4 on pages 10.09 and 10.10 of this engineering section.

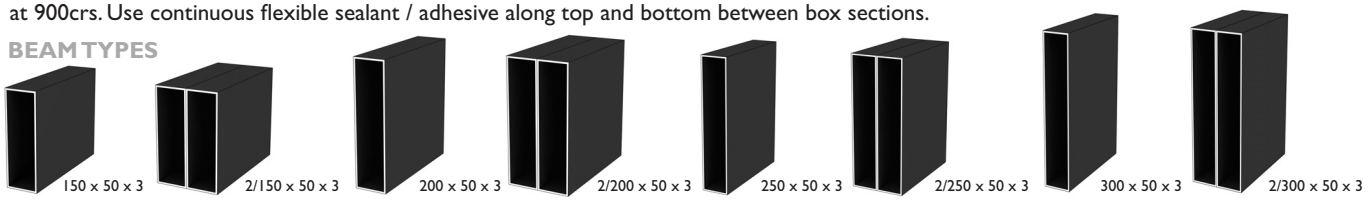
Note: Care must be taken when calculating the tributary length for mid beams on continuous spanning structures as half the louvre span on either side of the beam may not be equal.

**ROOF BEAM, SIMPLY SUPPORTED** — **TABLE 3**

| | | Max Beam Span (mm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tributary length of louvres | | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |
| Wind Zone | Beam Size (mm) | | | | | | | | | |
| L | 150x50x3 | 3900 | 3450 | 3150 | 2900 | 2750 | 2550 | 2400 | 2250 | 2150 |
| | 2 / 150x50x3 | 4900 | 4300 | 3900 | 3650 | 3450 | 3300 | 3150 | 3000 | 2900 |
| | 200x50x3 | 5000 | 4400 | 4000 | 3700 | 3400 | 3150 | 2950 | 2750 | 2600 |
| | 2 / 200x50x3 | 6250 | 5500 | 5000 | 4700 | 4400 | 4200 | 4000 | 3850 | 3700 |
| | 250x50x3 | 6100 | 5350 | 4900 | 4450 | 4050 | 3750 | 3500 | 3300 | 3100 |
| | 2 / 250x50x3 | 7550 | 6700 | 6100 | 5700 | 5350 | 5100 | 4900 | 4650 | 4400 |
| | 300x50x3 | 7150 | 6300 | 5700 | 5100 | 4650 | 4300 | 4000 | 3800 | 3600 |
| | 2 / 300x50x3 | 8850 | 7800 | 7150 | 6650 | 6300 | 6000 | 5750 | 5500 | 5250 |
| M | 150x50x3 | 3600 | 3150 | 2850 | 2600 | 2350 | 2200 | 2050 | 1900 | 1800 |
| | 2 / 150x50x3 | 4500 | 4000 | 3600 | 3350 | 3150 | 3000 | 2850 | 2700 | 2550 |
| | 200x50x3 | 4650 | 4050 | 3550 | 3200 | 2900 | 2700 | 2500 | 2350 | 2250 |
| | 2 / 200x50x3 | 5800 | 5100 | 4650 | 4300 | 4050 | 3800 | 3600 | 3350 | 3200 |
| | 250x50x3 | 5650 | 4900 | 4250 | 3800 | 3450 | 3200 | 3000 | 2800 | 2700 |
| | 2 / 250x50x3 | 7000 | 6200 | 5650 | 5250 | 4900 | 4500 | 4200 | 4000 | 3750 |
| | 300x50x3 | 6600 | 5650 | 4900 | 4350 | 3950 | 3650 | 3450 | 3250 | 3050 |
| | 2 / 300x50x3 | 8200 | 7250 | 6600 | 6150 | 5800 | 5400 | 5000 | 4750 | 4500 |
| H | 150x50x3 | 3200 | 2800 | 2400 | 2150 | 1950 | 1800 | 1700 | 1600 | 1500 |
| | 2 / 150x50x3 | 4050 | 3500 | 3200 | 2950 | 2750 | 2500 | 2400 | 2250 | 2100 |
| | 200x50x3 | 4100 | 3450 | 2950 | 2650 | 2400 | 2250 | 2100 | 2000 | 1900 |
| | 2 / 200x50x3 | 5200 | 4500 | 4100 | 3800 | 3450 | 3200 | 3000 | 2800 | 2650 |
| | 250x50x3 | 5000 | 4100 | 3550 | 3150 | 2900 | 2700 | 2500 | 2350 | 2250 |
| | 2 / 250x50x3 | 6300 | 5500 | 5000 | 4450 | 4050 | 3750 | 3500 | 3300 | 3150 |
| | 300x50x3 | 5800 | 4700 | 4050 | 3650 | 3300 | 3050 | 2850 | 2700 | 2550 |
| | 2 / 300x50x3 | 7400 | 6500 | 5900 | 5300 | 4850 | 4500 | 4200 | 3950 | 3750 |
| VH | 150x50x3 | 2900 | 2450 | 2100 | 1900 | 1700 | 1600 | 1500 | 1400 | 1350 |
| | 2 / 150x50x3 | 3700 | 3200 | 2900 | 2650 | 2400 | 2250 | 2100 | 1950 | 1850 |
| | 200x50x3 | 3700 | 3000 | 2600 | 2300 | 2100 | 1950 | 1850 | 1700 | 1650 |
| | 2 / 200x50x3 | 4750 | 4100 | 3700 | 3300 | 3000 | 2800 | 2600 | 2450 | 2300 |
| | 250x50x3 | 4400 | 3600 | 3100 | 2800 | 2500 | 2350 | 2200 | 2050 | 1950 |
| | 2 / 250x50x3 | 5800 | 5000 | 4350 | 3900 | 3550 | 3300 | 3100 | 2900 | 2750 |
| | 300x50x3 | 5050 | 4100 | 3550 | 3200 | 2900 | 2700 | 2500 | 2350 | 2250 |
| | 2 / 300x50x3 | 6800 | 5900 | 5200 | 4650 | 4250 | 3900 | 3650 | 3450 | 3250 |

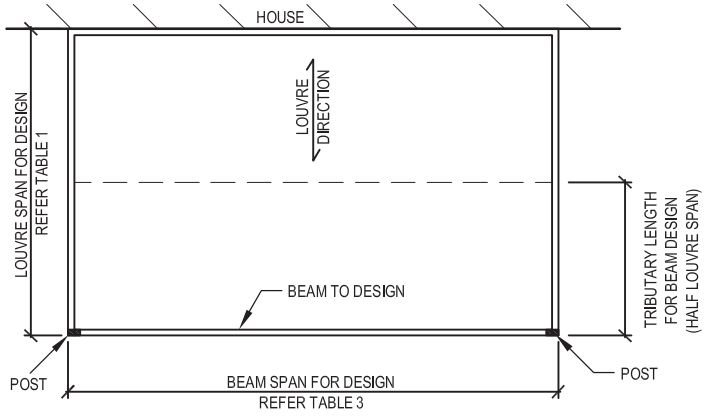
Fix double beams together with 2/10g x 25mm S/S Pan head self tapping screws 50mm in from top and bottom of box section at 900crs. Use continuous flexible sealant / adhesive along top and bottom between box sections.

## BEAM TYPES

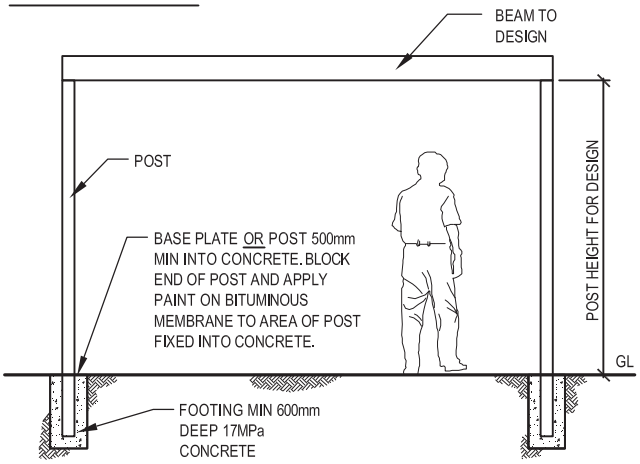


## TYPICAL DETAIL // **SIMPLY SUPPORTED BEAM** FIGURE 1

### Plan view / Louvre and Beam Design

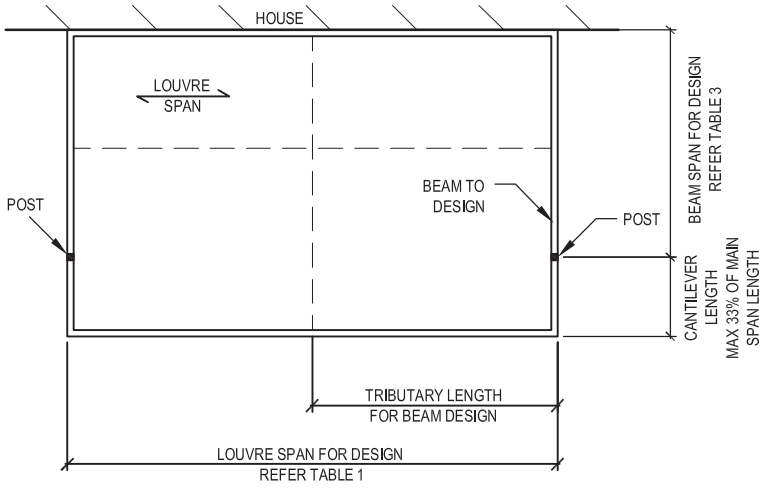



### Front Elevation

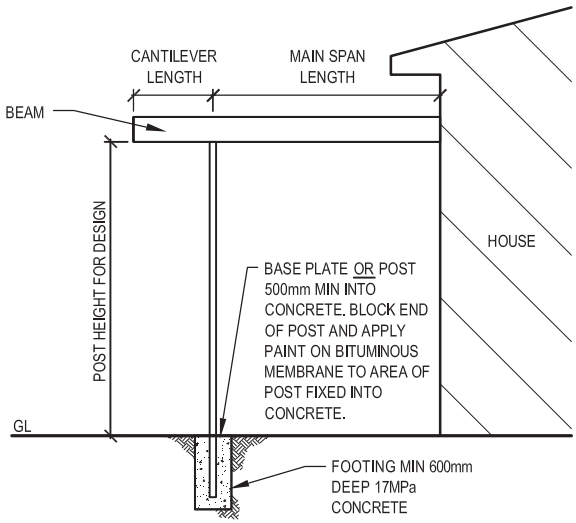



## TYPICAL DETAIL // **CANTILEVER BEAM** FIGURE 2

### Plan view / Louvre and Beam Design



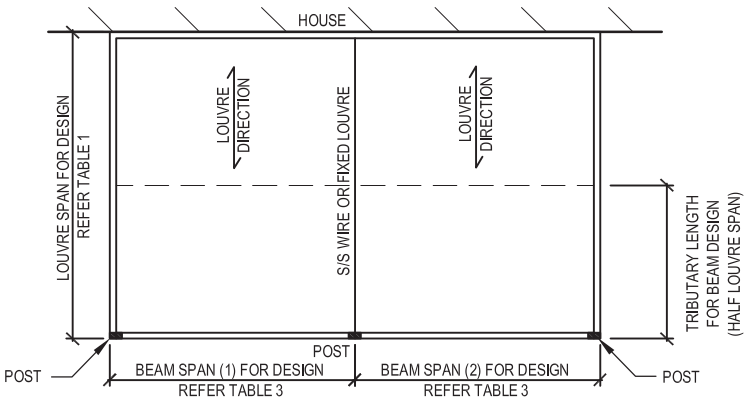

### Front Elevation



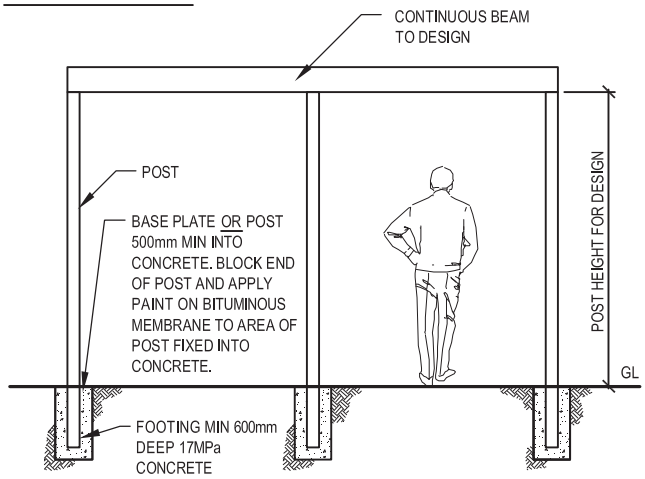

SCALE NTS

## TYPICAL DETAIL // CONTINUOUS BEAM SPAN OPTION 1 FIGURE 3

### Plan view / Louvre and Beam Design

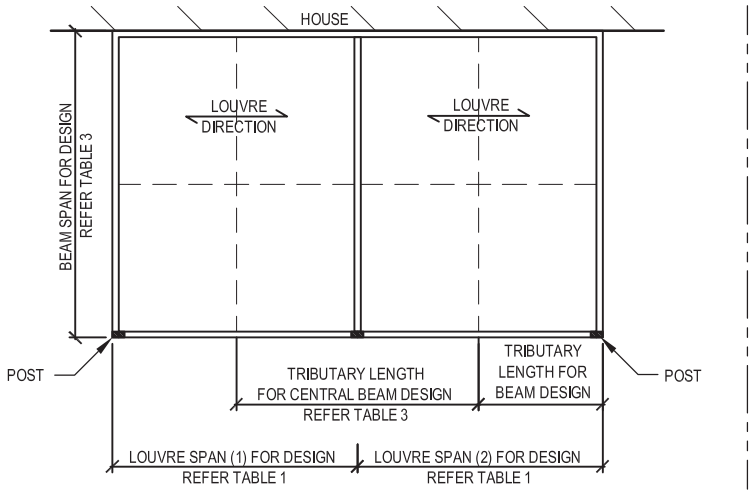



### Front Elevation

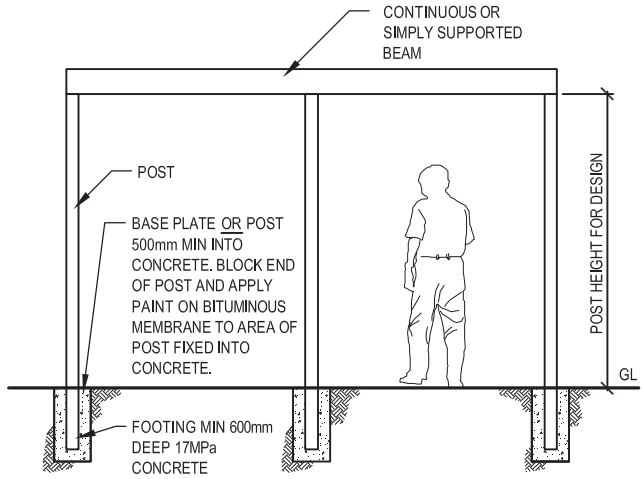



## TYPICAL DETAIL // CONTINUOUS BEAM SPAN OPTION 2 FIGURE 4

### Plan view / Louvre and Beam Design



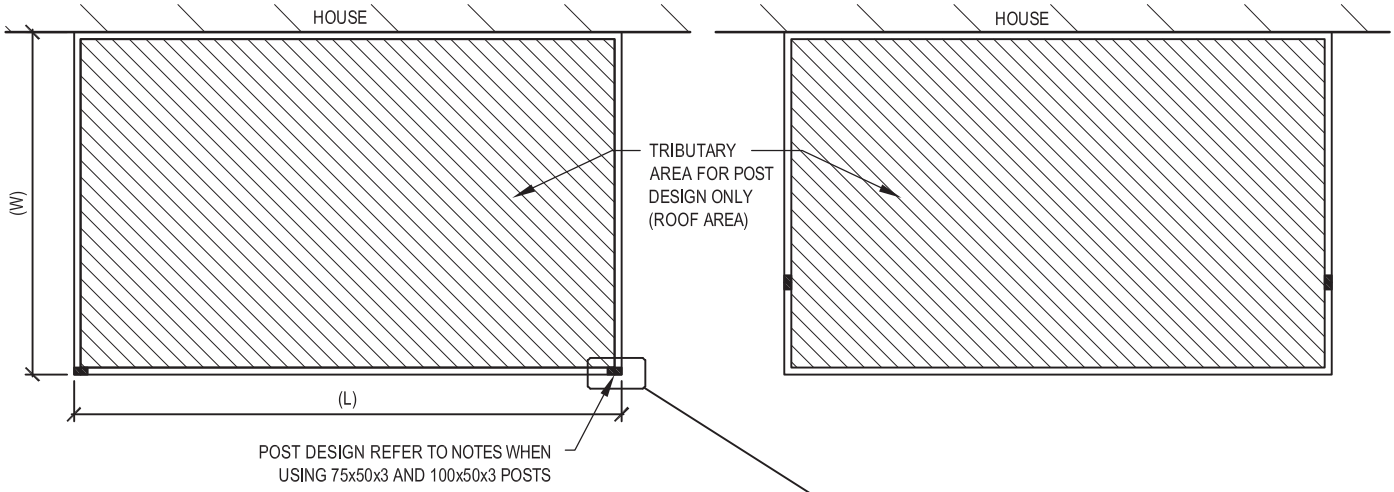

### Front Elevation



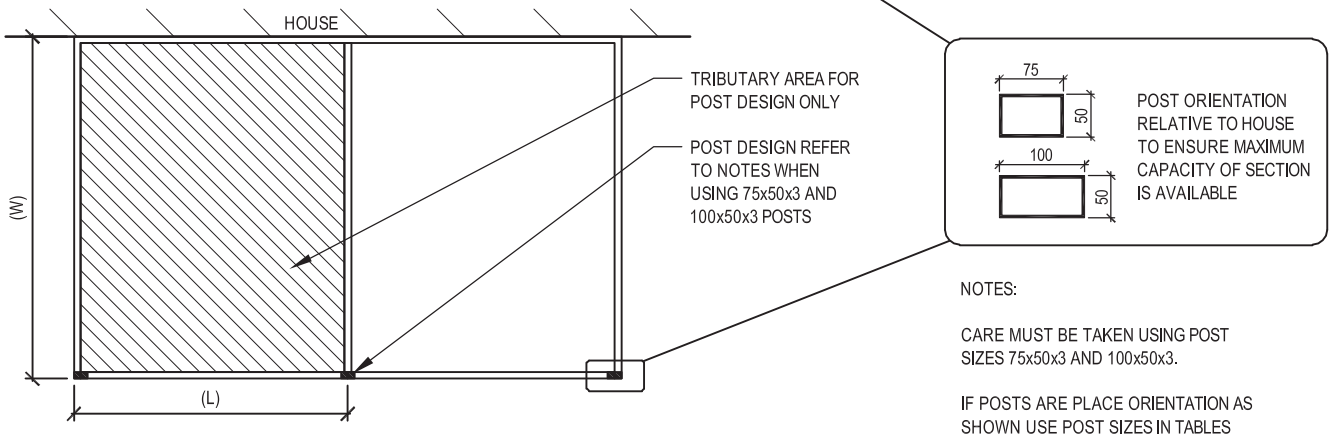

SCALE NTS

TYPICAL DETAIL // **DETERMINING TRIBUTARY AREA & BEAM** FIGURE 5

## Plan - Simply Supported & Cantilever Frame




## Plan - Continuous Beam Span



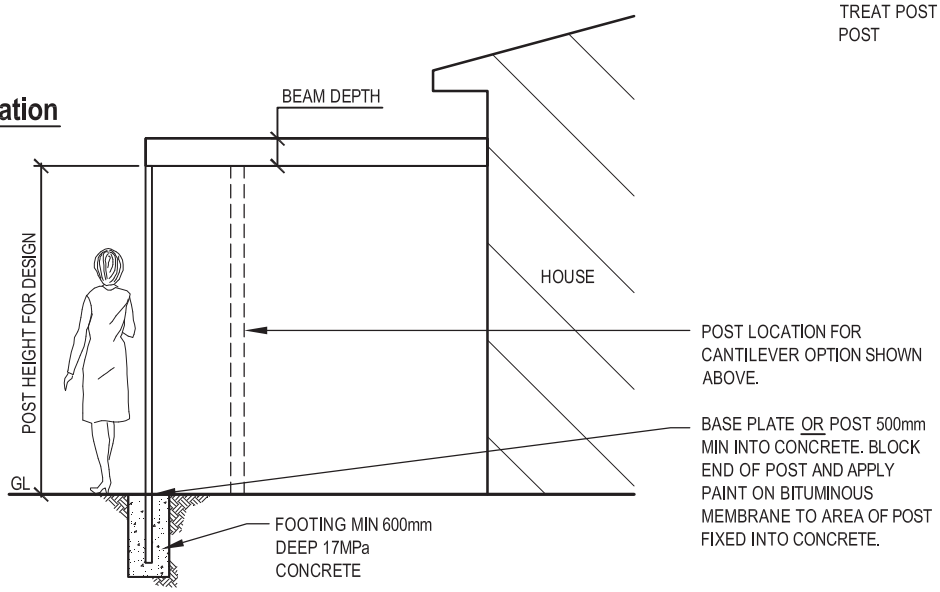

NOTES:

CARE MUST BE TAKEN USING POST SIZES 75x50x3 AND 100x50x3.

IF POSTS ARE PLACE ORIENTATION AS SHOWN USE POST SIZES IN TABLES

IF ORIENTATION IS 90° TO THAT SHOWN TREAT POST (FOR SIZING) AS A 50x50x3 POST

## Side Elevation




SCALE NTS

# engineering - post calculation

// **LOW WIND ZONE**

## SPECIFYING POSTS

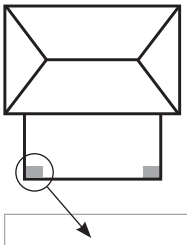
To use the following tables you need to have the beam length for design, know the tributary area (roof area) for the post and know the height of the post. Determining these values is shown in figure 5 on page 10.11

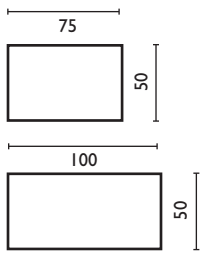
## TO CALCULATE TRIBUTARY AREA FOR POSTS

The tributary area for post design only is the total area of the roof, typically length multiplied by width.

## POST ORIENTATION

Care must be taken using post sizes 75x50x3 and 100x50x3. If posts are placed in orientation as shown use post sizes in tables. If orientation is 90° to that orientation treat post (for sizing) as a 50x50x3 post.






POST ORIENTATION RELATIVE TO HOUSE TO ENSURE MAXIMUM CAPACITY OF SECTION IS AVAILABLE

## POST LOADS

Wind speeds taken from NZS 3604; 1999, are ultimate limit state wind speeds

L = Low wind speed
M = Medium wind speed
H = High wind speed
VH = Very high wind speed

Wind pressure had been calculated using AS/NZS 1170.2.2002

P nl := (0.5 pair).V s it_ß_any$^2$.Cfig1.Cdyn.10$^{-3}$

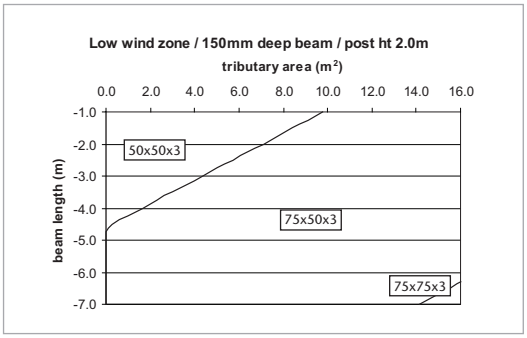
pair = 1.2 kg/m$^3$, kar = 1.0, ki = 1.0

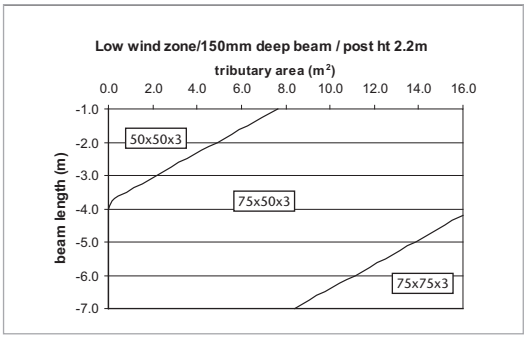
| **Pressure kPa** | **ULS capacity** | | | | **SLS deflection** | | | |
|---|---|---|---|---|---|---|---|---|
| **Wind Zone** | L | M | H | VH | L | M | H | VH |
| factored wind speed | 32 | 37 | 44 | 50 | 27 | 31 | 37 | 42 |
| vsit ß at building | m/s | m/s | m/s | m/s | m/s | m/s | m/s | m/s |

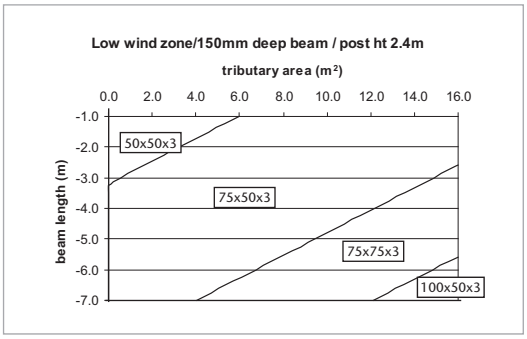
| Cfig value | Drag force on beam | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.45 coefficient | 0.89 | 1.19 | 1.68 | 2.18 | 0.63 | 0.84 | 1.19 | 1.53 |

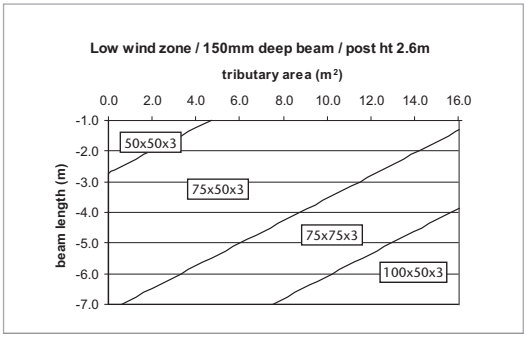
| Cfig value | Drag force on roof | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.04 coefficient | 0.02 | 0.03 | 0.05 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 |

## TABLE 4 // 150mm DEEP BEAM



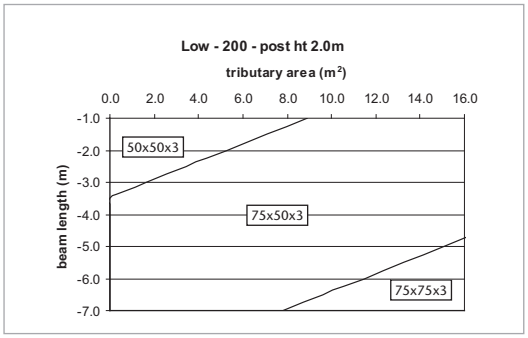



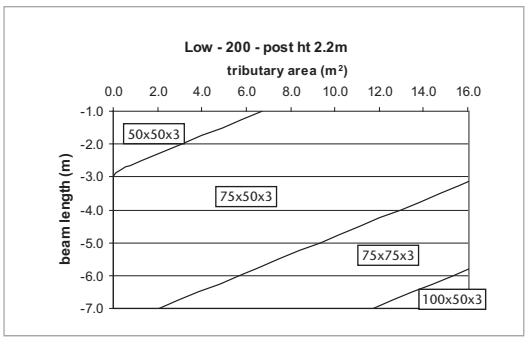



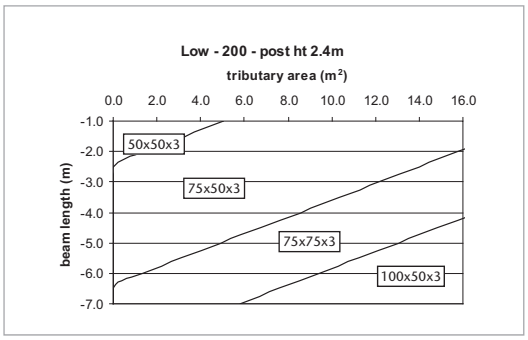
# engineering - post calculation

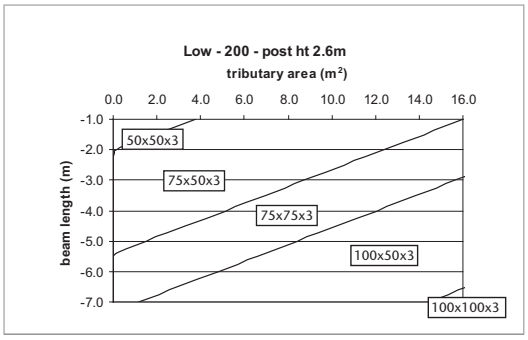
// **LOW WIND ZONE**

## TABLE 5 // 200mm DEEP BEAM

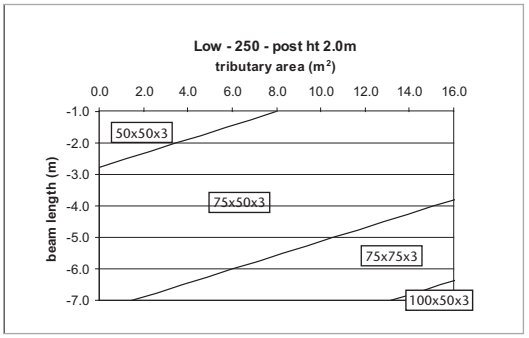


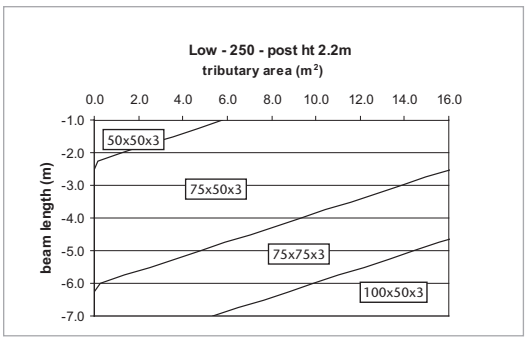



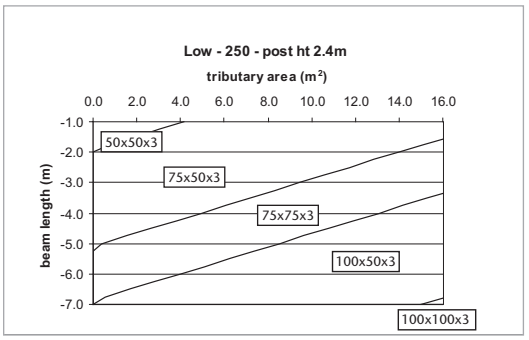



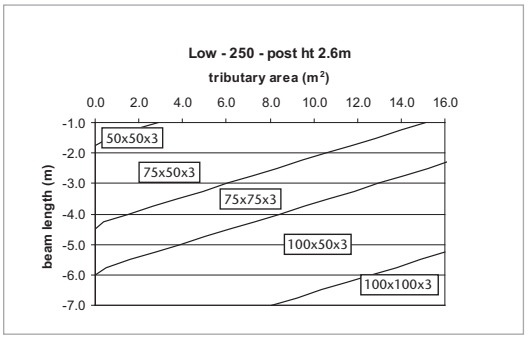




## TABLE 6 // 250mm DEEP BEAM



# engineering - post calculation

// **MEDIUM WIND ZONE**

## SPECIFYING POSTS

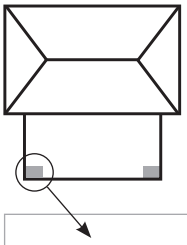
To use the following tables you need to have the beam length for design, know the tributary area (roof area) for the post and know the height of the post. Determining these values is shown in figure 5 on page 10.11

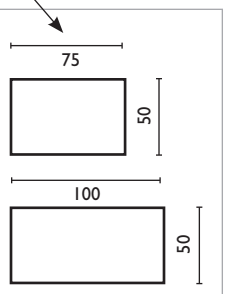
## TO CALCULATE TRIBUTARY AREA FOR POSTS

The tributary area for post design only is the total area of the roof, typically length multiplied by width.

## POST ORIENTATION

Care must be taken using post sizes 75x50x3 and 100x50x3. If posts are placed in orientation as shown use post sizes in tables. If orientation is 90° to that orientation treat post (for sizing) as a 50x50x3 post.






POST ORIENTATION RELATIVE TO HOUSE TO ENSURE MAXIMUM CAPACITY OF SECTION IS AVAILABLE

## POST LOADS

Wind speeds taken from NZS 3604; 1999, are ultimate limit state wind speeds

L = Low wind speed
M = Medium wind speed
H = High wind speed
VH = Very high wind speed

Wind pressure had been calculated using AS/NZS 1170.2.2002

P nl := (0.5 pair).V s it_ß_any$^2$.Cfig1.Cdyn.10$^{-3}$

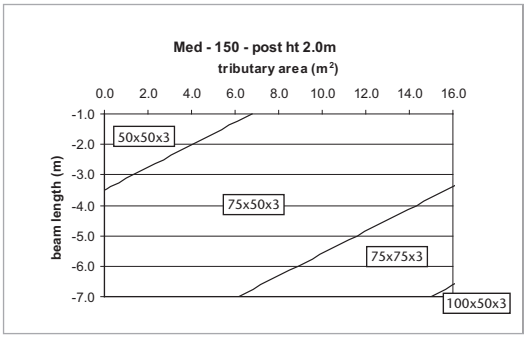
pair = 1.2 kg/m$^3$, kar = 1.0, ki = 1.0

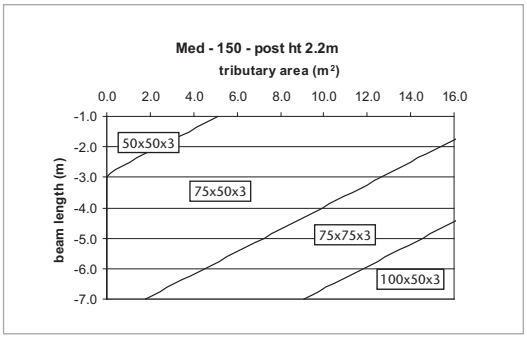
| **Pressure kPa** | **ULS capacity** | | | | **SLS deflection** | | | |
|---|---|---|---|---|---|---|---|---|
| **Wind Zone** | L | M | H | VH | L | M | H | VH |
| factored wind speed | 32 | 37 | 44 | 50 | 27 | 31 | 37 | 42 |
| vsit ß at building | m/s | m/s | m/s | m/s | m/s | m/s | m/s | m/s |

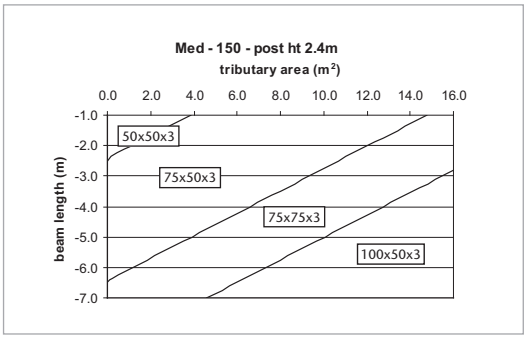
| Cfig value | Drag force on beam | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.45 coefficient | 0.89 | 1.19 | 1.68 | 2.18 | 0.63 | 0.84 | 1.19 | 1.53 |

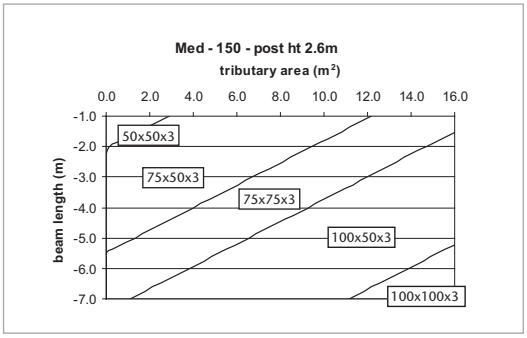
| Cfig value | Drag force on roof | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.04 coefficient | 0.02 | 0.03 | 0.05 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 |

## TABLE 7 // 150mm DEEP BEAM



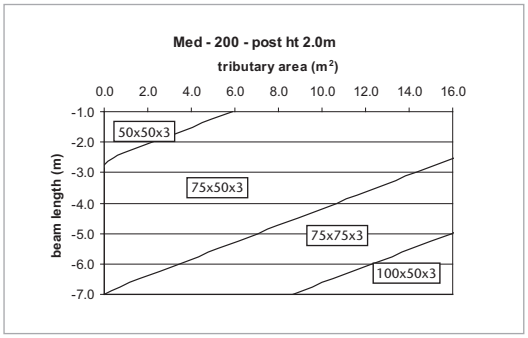



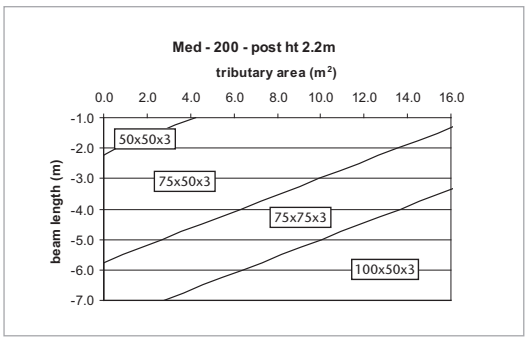



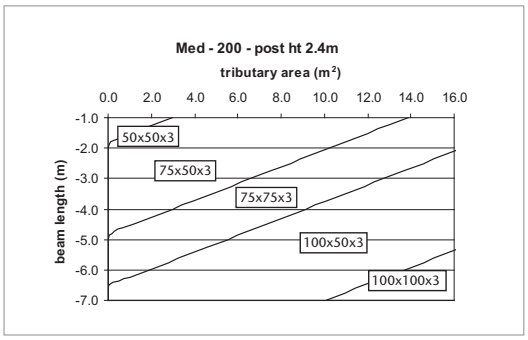
# engineering - post calculation

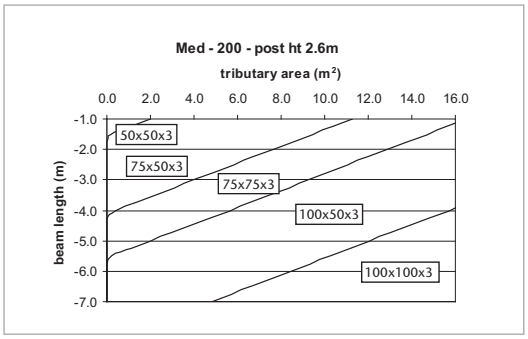
// **MEDIUM WIND ZONE**

## TABLE 8 // 200mm DEEP BEAM

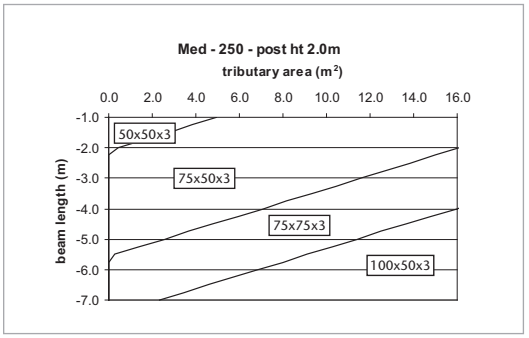


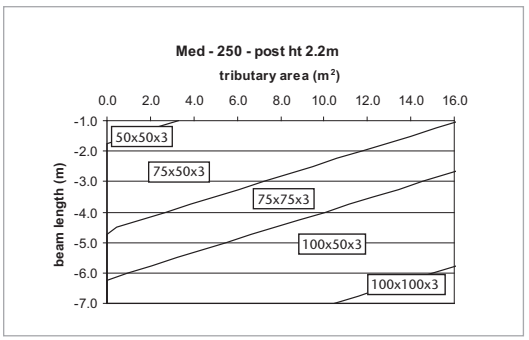



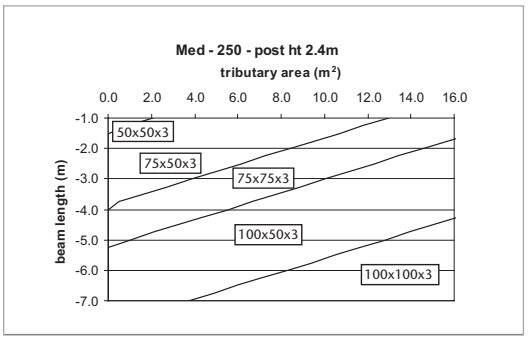



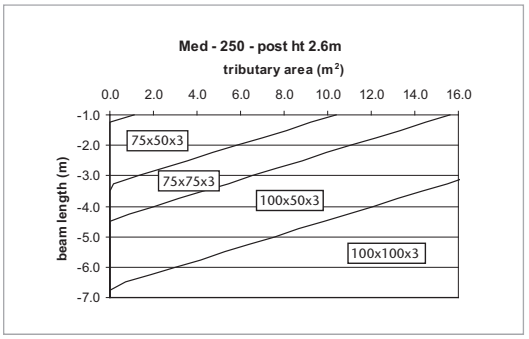




## TABLE 9 // 250mm DEEP BEAM



# engineering - post calculation

// **HIGH WIND ZONE**

## SPECIFYING POSTS

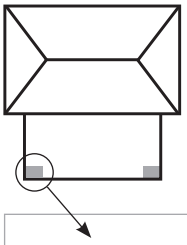
To use the following tables you need to have the beam length for design, know the tributary area (roof area) for the post and know the height of the post. Determining these values is shown in figure 5 on page 10.11

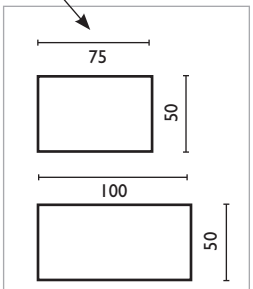
## TO CALCULATE TRIBUTARY AREA FOR POSTS

The tributary area for post design only is the total area of the roof, typically length multiplied by width.

## POST ORIENTATION

Care must be taken using post sizes 75x50x3 and 100x50x3. If posts are placed in orientation as shown use post sizes in tables. If orientation is 90° to that orientation treat post (for sizing) as a 50x50x3 post.






POST ORIENTATION RELATIVE TO HOUSE TO ENSURE MAXIMUM CAPACITY OF SECTION IS AVAILABLE

## POST LOADS

Wind speeds taken from NZS 3604; 1999, are ultimate limit state wind speeds

L = Low wind speed
M = Medium wind speed
H = High wind speed
VH = Very high wind speed

Wind pressure had been calculated using AS/NZS 1170.2.2002

P nl := (0.5 pair).V s it_ß_any$^2$.Cfig1.Cdyn.10$^{-3}$

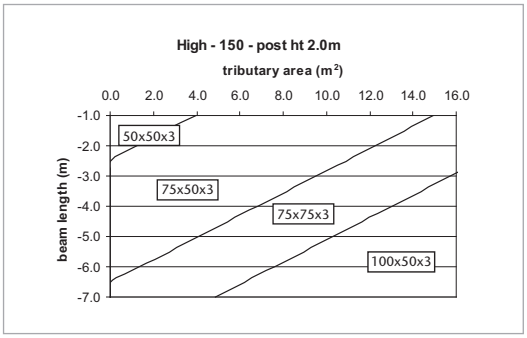
pair = 1.2 kg/m$^3$, kar = 1.0, ki = 1.0

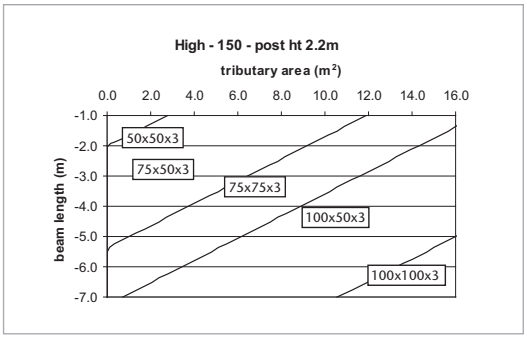
| **Pressure kPa** | **ULS capacity** | | | | **SLS deflection** | | | |
|---|---|---|---|---|---|---|---|---|
| **Wind Zone** | L | M | H | VH | L | M | H | VH |
| factored wind speed | 32 | 37 | 44 | 50 | 27 | 31 | 37 | 42 |
| vsit ß at building | m/s | m/s | m/s | m/s | m/s | m/s | m/s | m/s |

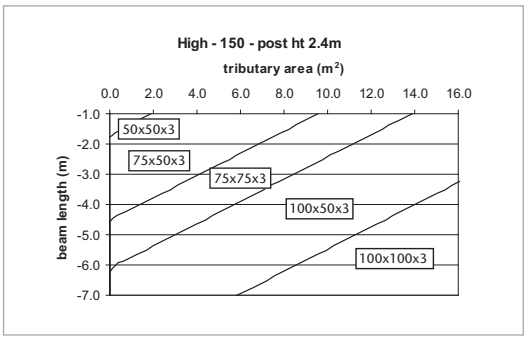
| Cfig value | Drag force on beam | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.45 coefficient | 0.89 | 1.19 | 1.68 | 2.18 | 0.63 | 0.84 | 1.19 | 1.53 |

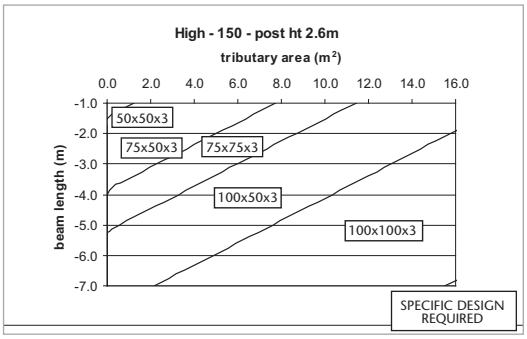
| Cfig value | Drag force on roof | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.04 coefficient | 0.02 | 0.03 | 0.05 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 |

## TABLE 10 // 150mm DEEP BEAM



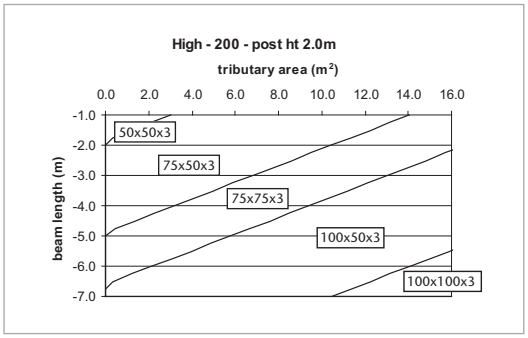



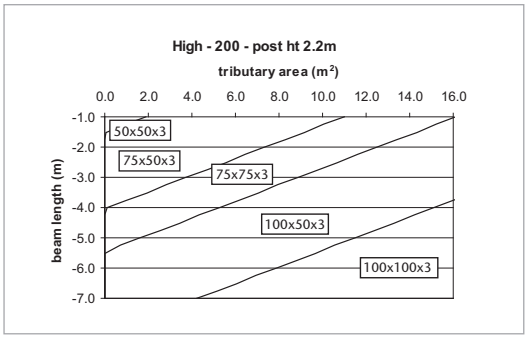



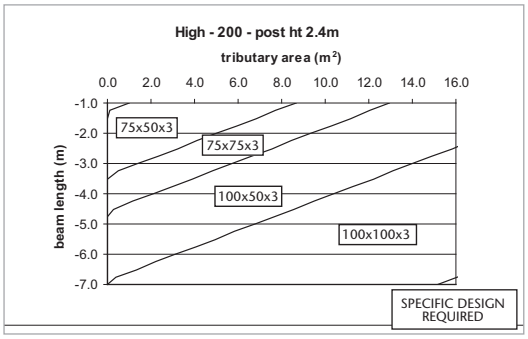
# engineering - post calculation

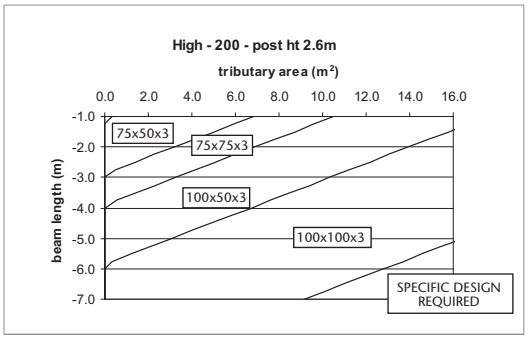
// **HIGH WIND ZONE**

## TABLE 11 // 200mm DEEP BEAM

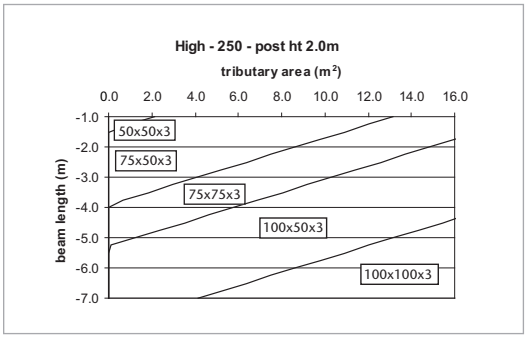


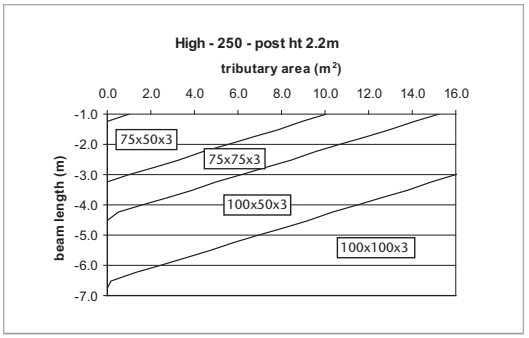



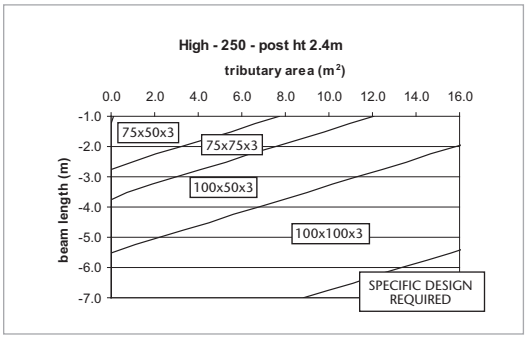



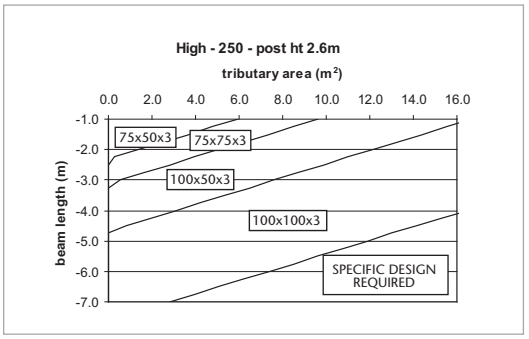




## TABLE 12 // 250mm DEEP BEAM



# engineering - post calculation

// **VERY HIGH WIND ZONE**

## SPECIFYING POSTS

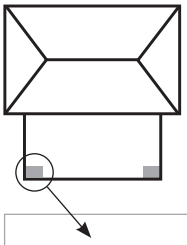
To use the following tables you need to have the beam length for design, know the tributary area (roof area) for the post and know the height of the post. Determining these values is shown in figure 5 on page 10.11

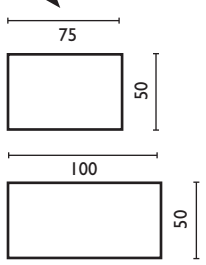
## TO CALCULATE TRIBUTARY AREA FOR POSTS

The tributary area for post design only is the total area of the roof, typically length multiplied by width.

## POST ORIENTATION

Care must be taken using post sizes 75x50x3 and 100x50x3. If posts are placed in orientation as shown use post sizes in tables. If orientation is 90° to that orientation treat post (for sizing) as a 50x50x3 post.






POST ORIENTATION RELATIVE TO HOUSE TO ENSURE MAXIMUM CAPACITY OF SECTION IS AVAILABLE

## POST LOADS

Wind speeds taken from NZS 3604; 1999, are ultimate limit state wind speeds

L = Low wind speed
M = Medium wind speed
H = High wind speed
VH = Very high wind speed

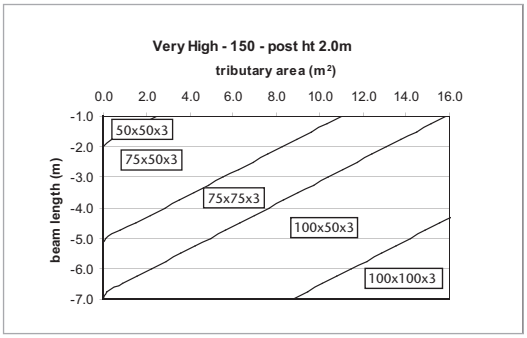
Wind pressure had been calculated using AS/NZS 1170.2.2002

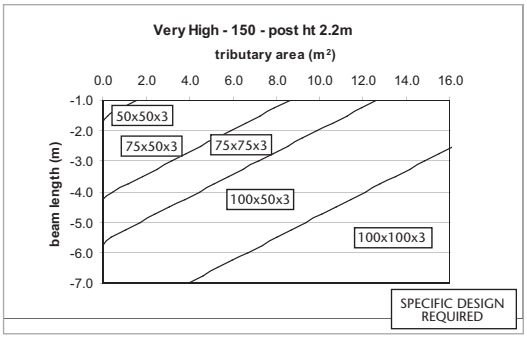
$P\ nl := (0.5\ pair).V\ s\ it\_ß\_any^2.Cfig1.Cdyn.10^{-3}$

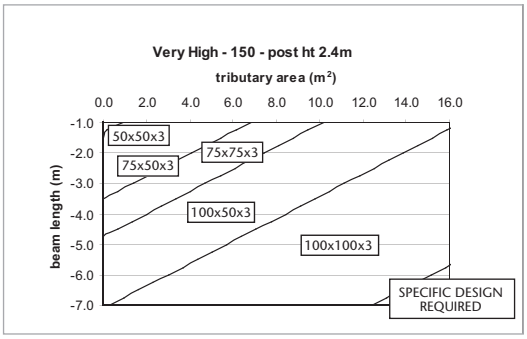
pair = 1.2 kg/m³, kar = 1.0, ki = 1.0

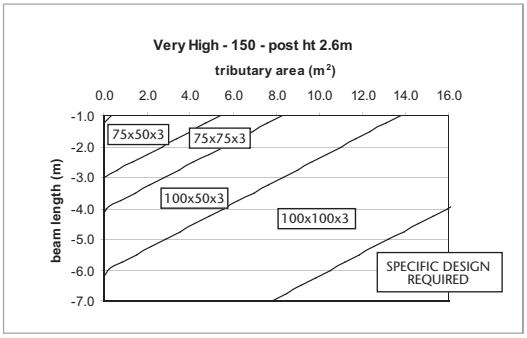
| **Pressure kPa** | **ULS capacity** | | | | **SLS deflection** | | | |
|---|---|---|---|---|---|---|---|---|
| **Wind Zone** | L | M | H | VH | L | M | H | VH |
| factored wind speed vsit ß at building | 32 m/s | 37 m/s | 44 m/s | 50 m/s | 27 m/s | 31 m/s | 37 m/s | 42 m/s |
| Cfig value 1.45 coefficient | Drag force on beam 0.89 | 1.19 | 1.68 | 2.18 | 0.63 | 0.84 | 1.19 | 1.53 |
| Cfig value 0.04 coefficient | Drag force on roof 0.02 | 0.03 | 0.05 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 |

## TABLE 13 // 150mm DEEP BEAM



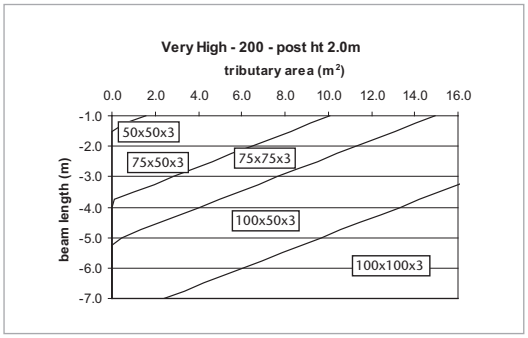



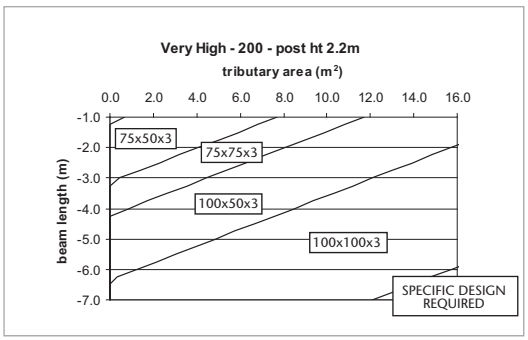



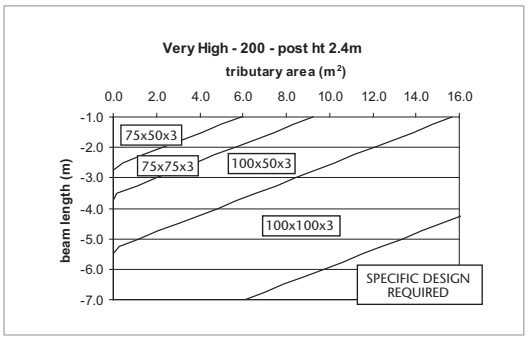
# engineering - post calculation

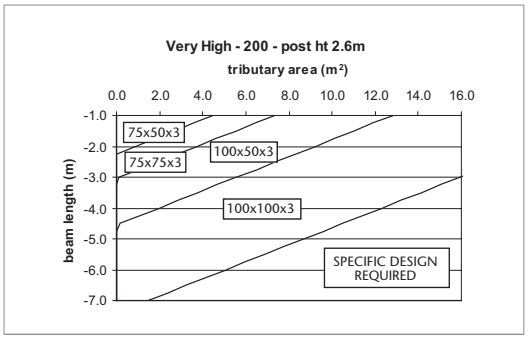
// **VERY HIGH WIND ZONE**

## TABLE 14 // 200mm DEEP BEAM

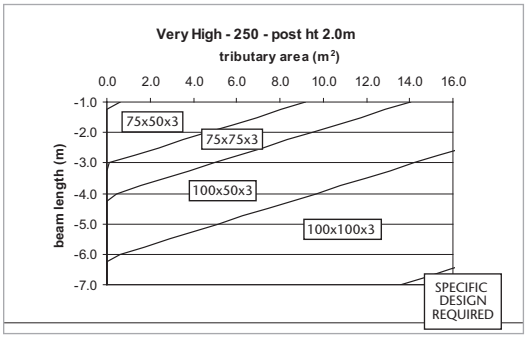


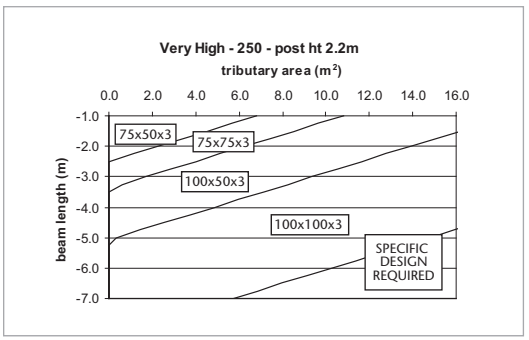



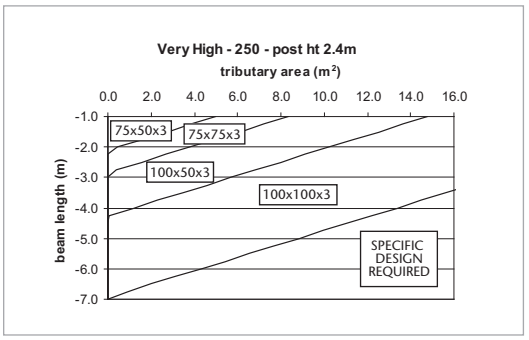



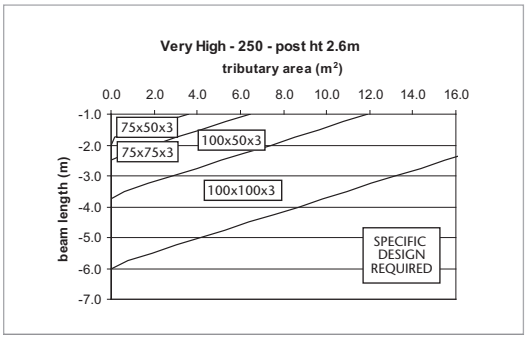




## TABLE 15 // 250mm DEEP BEAM



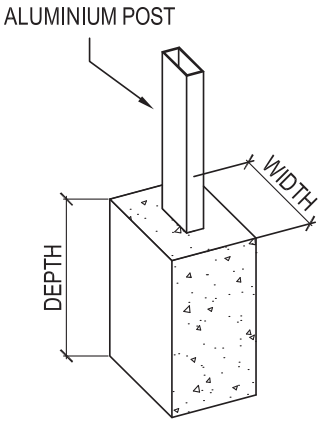



# engineering - footing volume calculation

## CONCRETE VOLUME // TO CALCULATE TRIBUTARY AREA FOR FOOTING SIZE

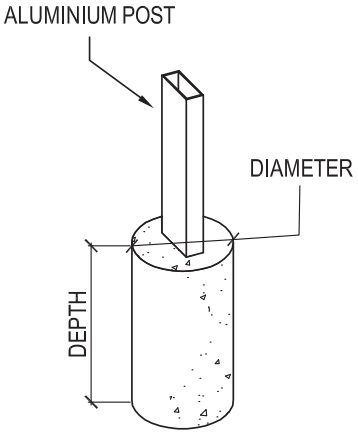
When calculating the tributary area for footing size please refer to specific structure design, figures 8-11 on page 10.21.

## SIZE OF FOOTING REQUIRED // SQUARE FOOTING




Apply Bituminous paint on membrane to area of post fixed into concrete block end of post.

## // CIRCULAR FOOTING




Apply Bituminous paint on membrane to area of post fixed into concrete block end of post.

## TABLE 16 // MINIMUM CONCRETE VOLUME FOR ROOF AREA TO RESIST UPLIFT

| | Concrete Volume Required $m^3$ | | | |
|---|---|---|---|---|
| **Wind Zone** | **L** | **M** | **H** | **VH** |
| **Tributary area $m^2$** | | | | |
| 1.0 | 0.03 | 0.05 | 0.07 | 0.09 |
| 2.0 | 0.07 | 0.10 | 0.14 | 0.18 |
| 3.0 | 0.10 | 0.14 | 0.21 | 0.27 |
| 4.0 | 0.14 | 0.19 | 0.27 | 0.36 |
| 6.0 | 0.21 | 0.28 | 0.41 | 0.54 |
| 8.0 | 0.28 | 0.38 | 0.55 | 0.72 |
| 10.0 | 0.34 | 0.47 | 0.69 | 0.90 |
| 12.0 | 0.41 | 0.57 | 0.82 | 1.08 |
| 14.0 | 0.48 | 0.66 | 0.96 | 1.26 |
| 16.0 | 0.55 | 0.76 | 1.10 | 1.44 |

Minimum footing size: 0.35 x 0.35 x 0.6m deep or 0.3m diameter by 0.6m deep

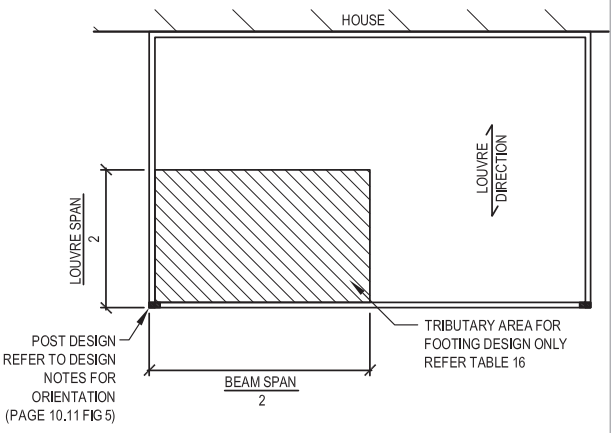
## TABLE 17 // FOOTING VOLUME FOR DIMENSIONS SHOWN

| Square Footing | | | | | | |
|---|---|---|---|---|---|---|
| width m | | m | | depth m | | volume $m^3$ |
| 0.35 | x | 0.35 | x | 0.6 | = | 0.07 |
| | | | | 0.8 | = | 0.10 |
| 0.4 | x | 0.4 | x | 0.6 | = | 0.10 |
| | | | | 0.8 | = | 0.13 |
| 0.45 | x | 0.45 | x | 0.6 | = | 0.12 |
| | | | | 0.8 | = | 0.16 |
| 0.5 | x | 0.5 | x | 0.6 | = | 0.15 |
| | | | | 0.8 | = | 0.20 |
| 0.65 | x | 0.65 | x | 0.6 | = | 0.25 |
| | | | | 0.8 | = | 0.34 |
| 0.7 | x | 0.7 | x | 0.6 | = | 0.29 |
| | | | | 0.8 | = | 0.39 |
| 0.75 | x | 0.75 | x | 0.6 | = | 0.34 |
| | | | | 0.8 | = | 0.45 |
| 0.8 | x | 0.8 | x | 0.8 | = | 0.51 |
| | | | | 1.0 | = | 0.64 |
| 0.85 | x | 0.85 | x | 0.8 | = | 0.58 |
| | | | | 1.0 | = | 0.72 |
| 0.9 | x | 0.9 | x | 1.0 | = | 0.81 |
| | | | | 1.0 | = | 0.81 |
| 1.0 | x | 1.0 | x | 1.2 | = | 1.20 |
| 1.1 | x | 1.1 | x | 1.2 | = | 1.45 |

| circular footing | | | |
|---|---|---|---|
| diameter m | | depth m | volume $m^3$ |
| 0.3 | x | 0.6 | 0.04 |
| | | 0.8 | 0.06 |
| | | 1.0 | 0.07 |
| | | 1.2 | 0.09 |
| | | 1.4 | 0.10 |
| 0.35 | x | 0.6 | 0.06 |
| | | 0.8 | 0.08 |
| | | 1.0 | 0.10 |
| | | 1.2 | 0.12 |
| | | 1.4 | 0.14 |
| 0.4 | x | 0.6 | 0.08 |
| | | 0.8 | 0.10 |
| | | 1.0 | 0.13 |
| | | 1.2 | 0.15 |
| | | 1.4 | 0.18 |
| 0.45 | x | 0.6 | 0.10 |
| | | 0.8 | 0.13 |
| | | 1.0 | 0.16 |
| | | 1.2 | 0.19 |
| | | 1.4 | 0.22 |
| 0.5 | x | 0.6 | 0.12 |
| | | 0.8 | 0.16 |
| | | 1.0 | 0.20 |
| | | 1.2 | 0.24 |
| | | 1.4 | 0.28 |

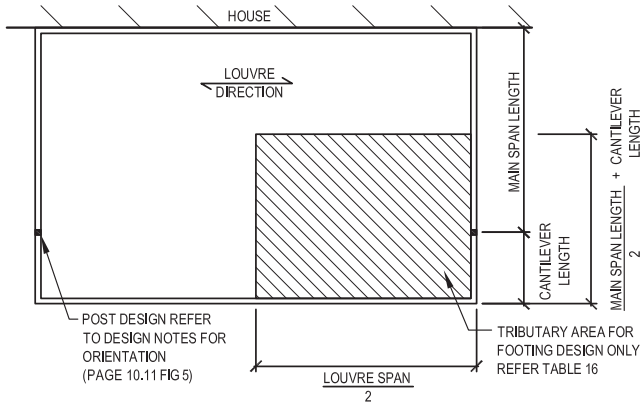
## TYPICAL DETAIL // SIMPLY SUPPORTED BEAM
FIGURE 8

### Plan view / Footing Design



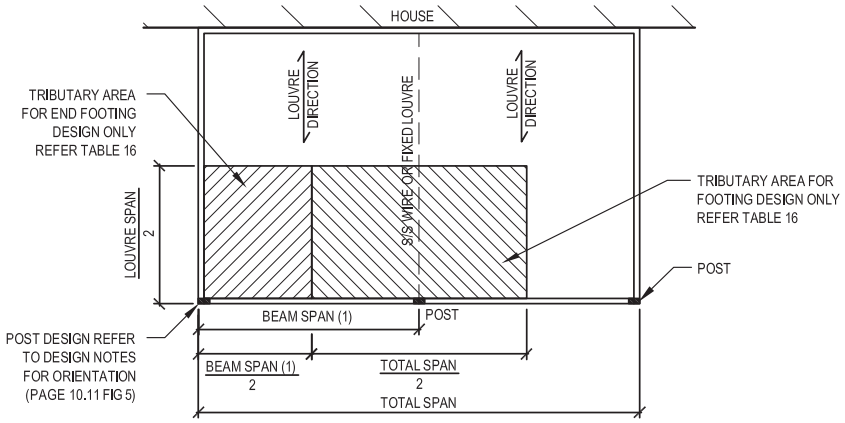

## TYPICAL DETAIL // CANTILEVER BEAM
FIGURE 9

### Plan view / Footing Design



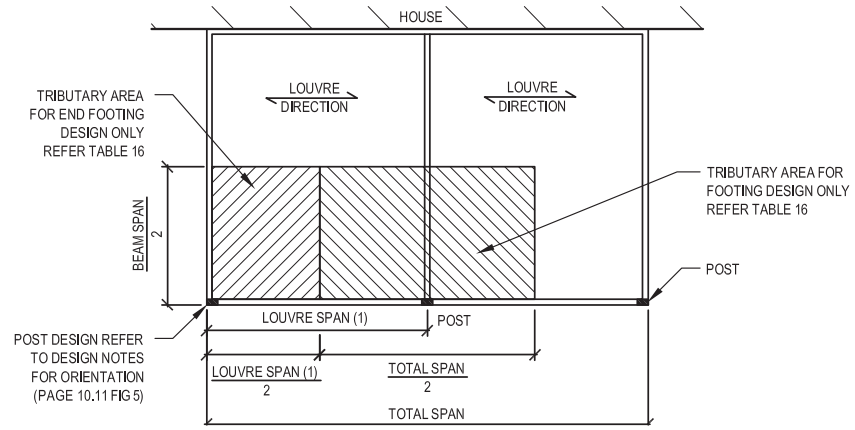

## TYPICAL DETAIL // CONTINUOUS BEAM SPAN OPTION 1 FIGURE 10

### Plan view / Footing Design




## TYPICAL DETAIL // CONTINUOUS BEAM SPAN OPTION 2 FIGURE 11

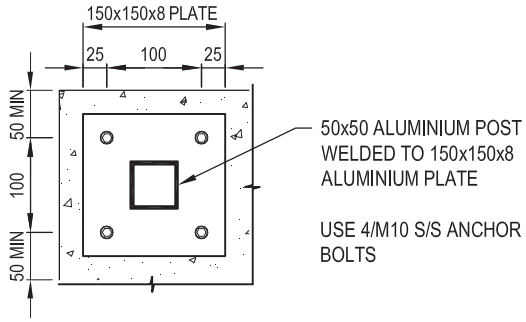
### Plan view / Footing Design

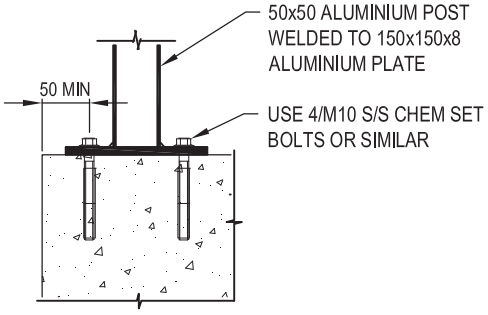



SCALE NTS

TYPICAL DETAIL // **BASE PLATE SIZE FOR 50X50 POST**

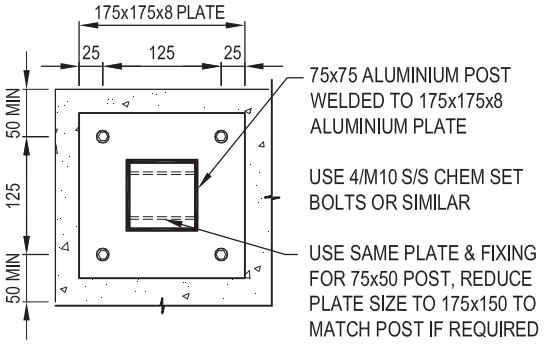
## 50x50 ALUMINIUM POST BASE PLATE

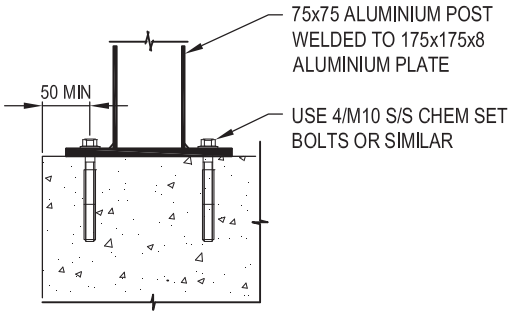


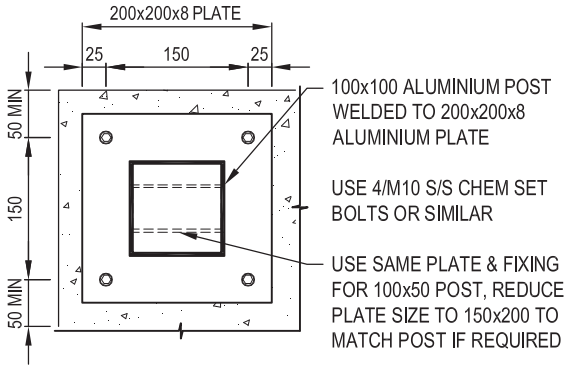

TYPICAL DETAIL // **BASE PLATE SIZES FOR VARIOUS POSTS**

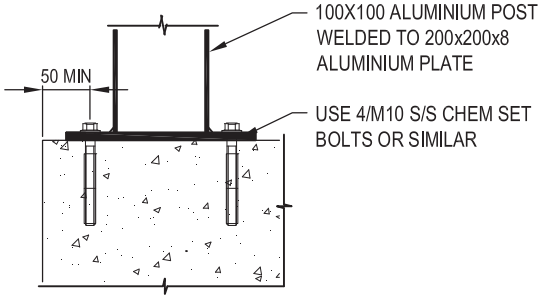
## 75x75 ALUMINIUM POST BASE PLATE
## 75x50




## 100x100 ALUMINIUM POST BASE PLATE
## 100x50




SCALE 1:8