

## MATRIX PRECAST BEAM AND BLOCK- LOAD CALCULATIONS

### **S6004**

|                          |         |          |                  |   |     |                   |      |
|--------------------------|---------|----------|------------------|---|-----|-------------------|------|
| B600 weight              | 14.1 Kg |          |                  |   |     |                   |      |
| 600                      | Block   | Load     | <u>(Service)</u> |   |     | <u>(Ultimate)</u> |      |
| Weight (kN/m)            | 0.7     | Joist    | 0.237            | x | 1.4 | 0.332             | kN/m |
| Layout                   | S6004   | Block    | 0.705            | x | 1.4 | 0.987             | kN/m |
| Load width (m)           | 0.600   | Finishes | 0.690            | x | 1.4 | 0.966             | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5     | SIL      | <u>0.900</u>     | x | 1.6 | <u>1.440</u>      | kN/m |
|                          |         |          | 2.532            |   |     | 3.725             | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |         |        |     |        |       |     |        |
|--------------------|---------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv = | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | √       | 15.179 | =   | 3.896  | -     | 0.1 | 3.80 m |
| Clear span ult. =  | √       | 18.505 | =   | 4.302  | -     | 0.1 | 4.20 m |

Hence 3.80m maximum allowable - Mserv. critical

### **S5004**

|                          |         |          |                  |   |     |                   |      |
|--------------------------|---------|----------|------------------|---|-----|-------------------|------|
| B500 weight              | 11.4 Kg |          |                  |   |     |                   |      |
| 500                      | Block   | Load     | <u>(Service)</u> |   |     | <u>(Ultimate)</u> |      |
| Weight (kN/m)            | 0.57    | Joist    | 0.237            | x | 1.4 | 0.332             | kN/m |
| Layout                   | S5004   | Block    | 0.570            | x | 1.4 | 0.798             | kN/m |
| Load width (m)           | 0.500   | Finishes | 0.575            | x | 1.4 | 0.805             | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5     | SIL      | <u>0.750</u>     | x | 1.6 | <u>1.200</u>      | kN/m |
|                          |         |          | 2.132            |   |     | 3.135             | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |         |        |     |        |       |     |        |
|--------------------|---------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv = | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | √       | 18.026 | =   | 4.246  | -     | 0.1 | 4.15 m |
| Clear span ult. =  | √       | 21.988 | =   | 4.689  | -     | 0.1 | 4.59 m |

Hence 4.15m maximum allowable - Mserv. critical

**S4004**

B400 weight 9.3 Kg

| 400                      | Block | Load     | (Service)    |   |     | (Ultimate)   |      |
|--------------------------|-------|----------|--------------|---|-----|--------------|------|
| Weight (kN/m)            | 0.465 | Joist    | 0.237        | x | 1.4 | 0.332        | kN/m |
| Layout                   | S4004 | Block    | 0.465        | x | 1.4 | 0.651        | kN/m |
| Load width (m)           | 0.400 | Finishes | 0.460        | x | 1.4 | 0.644        | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5   | SIL      | <u>0.600</u> | x | 1.6 | <u>0.960</u> | kN/m |
|                          |       |          | 1.762        |   |     | 2.587        | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |                |        |     |        |       |     |        |
|--------------------|----------------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv =        | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | $\sqrt{\quad}$ | 21.812 | =   | 4.670  | -     | 0.1 | 4.57 m |
| Clear span ult. =  | $\sqrt{\quad}$ | 26.646 | =   | 5.162  | -     | 0.1 | 5.06 m |

Hence 4.57m maximum allowable - Mserv. critical

**S3004**

B300 weight 6.5 Kg

| 300                      | Block | Load     | (Service)    |   |     | (Ultimate)   |      |
|--------------------------|-------|----------|--------------|---|-----|--------------|------|
| Weight (kN/m)            | 0.325 | Joist    | 0.237        | x | 1.4 | 0.332        | kN/m |
| Layout                   | S3004 | Block    | 0.325        | x | 1.4 | 0.455        | kN/m |
| Load width (m)           | 0.300 | Finishes | 0.345        | x | 1.4 | 0.483        | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5   | SIL      | <u>0.450</u> | x | 1.6 | <u>0.720</u> | kN/m |
|                          |       |          | 1.357        |   |     | 1.990        | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |                |        |     |        |       |     |        |
|--------------------|----------------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv =        | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | $\sqrt{\quad}$ | 28.321 | =   | 5.322  | -     | 0.1 | 5.22 m |
| Clear span ult. =  | $\sqrt{\quad}$ | 34.641 | =   | 5.886  | -     | 0.1 | 5.79 m |

Hence 5.22m maximum allowable - Mserv. critical

**D7004**

|                          |         |           |                  |   |     |                   |      |
|--------------------------|---------|-----------|------------------|---|-----|-------------------|------|
| B600 weight              | 14.1 Kg |           |                  |   |     |                   |      |
| 600                      | Block   | Load      | <u>(Service)</u> |   |     | <u>(Ultimate)</u> |      |
| Weight (kN/m)            | 0.705   | 2/ Joists | 0.474            | x | 1.4 | 0.664             | kN/m |
| Layout                   | D7004   | Block     | 0.705            | x | 1.4 | 0.987             | kN/m |
| Load width (m)           | 0.700   | Finishes  | 0.805            | x | 1.4 | 1.127             | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5     | Grout     | 0.115            | x | 2.4 | 0.276             | kN/m |
|                          |         | SIL       | <u>1.050</u>     | x | 1.6 | <u>1.680</u>      | kN/m |
|                          |         |           | 3.149            |   |     | 4.734             | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |         |        |     |        |       |     |        |
|--------------------|---------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv = | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | √       | 24.409 | =   | 4.941  | -     | 0.1 | 4.84 m |
| Clear span ult. =  | √       | 29.123 | =   | 5.397  | -     | 0.1 | 5.30 m |

Hence 4.84m maximum allowable - Mserv. critical

**D6004**

|                          |         |           |                  |   |     |                   |      |
|--------------------------|---------|-----------|------------------|---|-----|-------------------|------|
| B500 weight              | 11.4 Kg |           |                  |   |     |                   |      |
| 500                      | Block   | Load      | <u>(Service)</u> |   |     | <u>(Ultimate)</u> |      |
| Weight (kN/m)            | 0.57    | 2/ Joists | 0.474            | x | 1.4 | 0.664             | kN/m |
| Layout                   | D6004   | Block     | 0.570            | x | 1.4 | 0.798             | kN/m |
| Load width (m)           | 0.600   | Finishes  | 0.690            | x | 1.4 | 0.966             | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5     | Grout     | 0.115            | x | 2.4 | 0.276             | kN/m |
|                          |         | SIL       | <u>0.900</u>     | x | 1.6 | <u>1.440</u>      | kN/m |
|                          |         |           | 2.749            |   |     | 4.144             | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |         |        |     |        |       |     |        |
|--------------------|---------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv = | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | √       | 27.961 | =   | 5.288  | -     | 0.1 | 5.19 m |
| Clear span ult. =  | √       | 33.27  | =   | 5.768  | -     | 0.1 | 5.67 m |

Hence 5.19m maximum allowable - Mserv. critical

**D5004**

B400 weight 9.3 Kg

| 400                      | Block | Load      | (Service)    |   |     | (Ultimate)   |      |
|--------------------------|-------|-----------|--------------|---|-----|--------------|------|
| Weight (kN/m)            | 0.465 | 2/ Joists | 0.474        | x | 1.4 | 0.664        | kN/m |
| Layout                   | D5004 | Block     | 0.465        | x | 1.4 | 0.651        | kN/m |
| Load width (m)           | 0.500 | Finishes  | 0.575        | x | 1.4 | 0.805        | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5   | Grout     | 0.115        | x | 2.4 | 0.276        | kN/m |
|                          |       | SIL       | <u>0.750</u> | x | 1.6 | <u>1.200</u> | kN/m |
|                          |       |           | 2.379        |   |     | 3.596        | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |                |        |     |        |       |     |        |
|--------------------|----------------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv =        | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | $\sqrt{\quad}$ | 32.309 | =   | 5.684  | -     | 0.1 | 5.58 m |
| Clear span ult. =  | $\sqrt{\quad}$ | 38.34  | =   | 6.192  | -     | 0.1 | 6.09 m |

Hence 5.58m maximum allowable - Mserv. critical

**D4004**

B300 weight 6.5 Kg

| 300                      | Block | Load      | (Service)    |   |     | (Ultimate)   |      |
|--------------------------|-------|-----------|--------------|---|-----|--------------|------|
| Weight (kN/m)            | 0.325 | 2/ Joists | 0.474        | x | 1.4 | 0.664        | kN/m |
| Layout                   | D4004 | Block     | 0.325        | x | 1.4 | 0.455        | kN/m |
| Load width (m)           | 0.400 | Finishes  | 0.460        | x | 1.4 | 0.644        | kN/m |
| SIL (kN/m <sup>2</sup> ) | 1.5   | Grout     | 0.115        | x | 2.4 | 0.276        | kN/m |
|                          |       | SIL       | <u>0.600</u> | x | 1.6 | <u>0.960</u> | kN/m |
|                          |       |           | 1.974        |   |     | 2.999        | kN/m |

$$M = \frac{wl^2}{8} \quad l = \sqrt{(8 \times M)/w}$$

l = effective span

Clear span = effective span - 100mm

|                    |                |        |     |        |       |     |        |
|--------------------|----------------|--------|-----|--------|-------|-----|--------|
| <u>4 Wire</u>      | Mserv =        | 4.804  | kNm | Mult = | 8.616 | kNm |        |
| Clear span serv. = | $\sqrt{\quad}$ | 38.938 | =   | 6.240  | -     | 0.1 | 6.14 m |
| Clear span ult. =  | $\sqrt{\quad}$ | 45.973 | =   | 6.780  | -     | 0.1 | 6.68 m |

Hence 6.14m maximum allowable - Mserv. critical

## Imposed load 1.5- Span table

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| S6004 | S5004 | S4004 | S3004 | D7004 | D6004 | D5004 | D4004 |
| 3.80  | 4.15  | 4.57  | 5.22  | 4.84  | 5.19  | 5.58  | 6.14  |