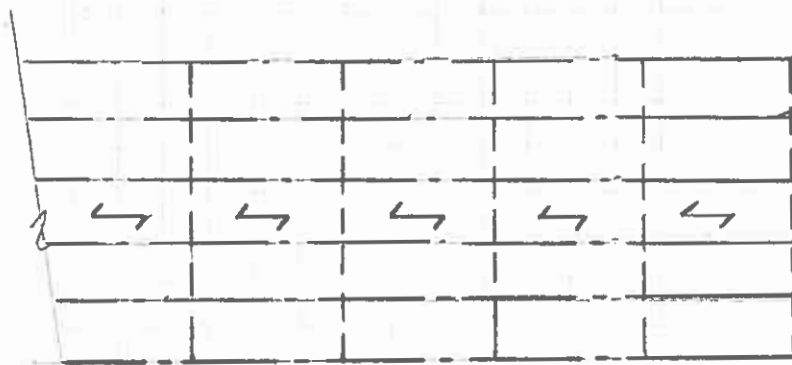


LOADING TABLE 1, BS 6399-1: 1996

DL <sup>0.2</sup> FELTED 20mm PLYWOOD, <sup>0.2</sup> JOISTS =  $0.4 \text{ kN/m}^2$

IL GENERAL DUTY WALKWAYS =  $5.0 \text{ kN/m}^2$



SUPPORT FRAMES  
TO JOISTS @  
 $1.0 \text{ m} \text{ c/c}$

↗ - DENOTES SPAN OF  
JOISTS @  $400 \text{ c/c}$

JOISTS

UDL =  $0.4 \times 0.4$  DL =  $0.16 \text{ kN/m}$   
 $0.4 \times 5.0$  IL =  $2.00 \text{ kN/m}$

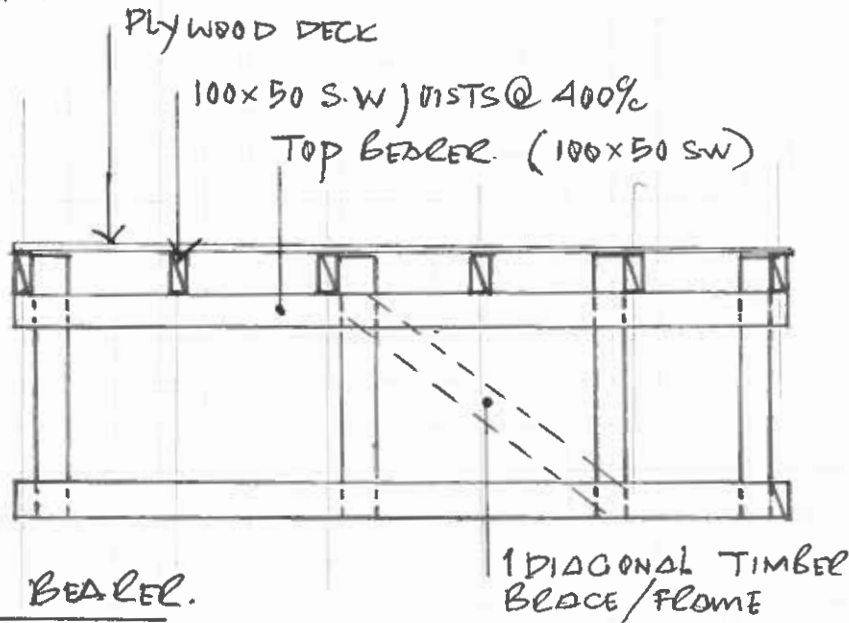
TRY  $100 \times 50 @ 400 \text{ c/c}$

SEE SUPER BEAM OUTPUT

MAXIMUM SPAN =  $1.2 \text{ m}$   
ALLOWABLE

|      |              |         |             |           |
|------|--------------|---------|-------------|-----------|
| NAME | ACCESS Ramps | Job No. | Designed by | Sheet No. |
|      |              |         | SAM         | 2.        |

### SUPPORT FRAME TO RAMP



TOP BEAMER.

MAX SPAN = 0.9m.  
 @ LOAD @ MIDSPAN =  $2.16 \times 1.0 = 2.16 \text{ kN}$

SEE SUPERBEDM OUTPUT

USE 100 x 50 SW C16 FOR: TOP BEAMER, POSTS & BRACE

CHECK BEDDING @ BASE OF FRAME

SAFE BEARING

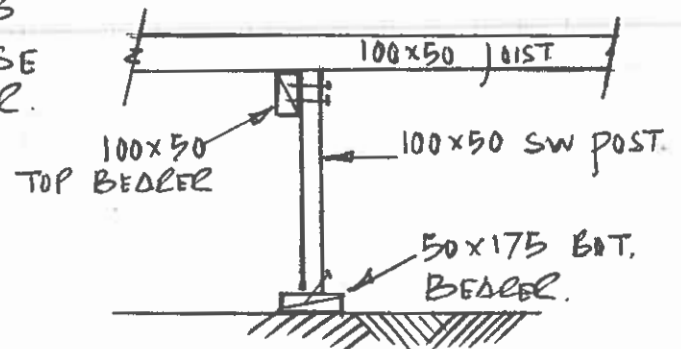
PRESSURE @ GROUND LEVEL =

UDL FRAME =  $5.4 \times 1.0$

WIDTH REQUIRED =  $\frac{5.4}{33}$

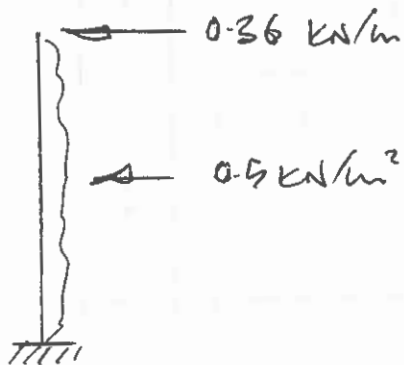
$= 33 \text{ kN/m}^2$   
 $= 5.4 \text{ kN/m}$   
 $= 0.163 \text{ m}$

FOR INTERNAL FRAMES USE  
50 x 175 SW BOT. BEAMER.



BALUSTRADE

TABLE 4. BS 6399-1 : 1996  
OCCUPANCY B & E (iv)



- BALUSTRADES AT SAME CENTRES AS SUPPORT FRAMES TO RAMP.

SEE SUPER BEAM 4 OUTPUT.

USE 100 x 100 SW C16 POSTS.

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Job:  
Job number:

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**Beam: Ramp support frame**

**Span: 0.9 m.**

|   | Load name | Loading w1 | Start x1 | Loading w2 | End x2 | R1comp | R2comp |
|---|-----------|------------|----------|------------|--------|--------|--------|
| U | T         | o.w.       | 0.1      |            | L      | 0.04   | 0.04   |
| P | T         | Floor      | 2.16     |            |        | 1.08   | 1.08   |
|   |           |            |          |            |        | 1.13   | 1.13   |

**Total load: 2.25 kN**

Load types: U:UDL P:PL T: Total (positions in m. from R1)

Maximum B.M. = 0.496 kNm at 0.45 m. from R1

Maximum S.F. = 1.13 kN at R1

Total deflection =  $0.034 \times 10^8 / EI$  at 0.45 m. from R1 ( $E$  in  $N/mm^2$ ,  $I$  in  $cm^4$ )

Timber beam calculation to BS5268 Part 2: 2002 using C16 timber

**Use 50 x 97 C16** 1.8 kg/m approx

$z = 78.41 \text{ cm}^3$   $I = 380 \text{ cm}^4$

Timber grade: C16 4 members acting together:  $K_8 = 1.1$

$K_3$  (loading duration factor) = 1.00  $K_7$  (depth factor) = 1.132  $K_8$  (load sharing factor) = 1.1

$E = 5,800 \times 1.24 = 7,192 \text{ N/mm}^2$  ( $E_{min} \cdot K_9$ )

**Bending**

Permissible bending stress,  $\sigma_{m,adm} = \sigma_{m,g} \cdot K_3 \cdot K_7 \cdot K_8 = 5.3 \times 1.00 \times 1.132 \times 1.1 = 6.60 \text{ N/mm}^2$

Applied bending stress,  $\sigma_{m,a} = 0.496 \times 1000 / 78.4 = 6.33 \text{ N/mm}^2$  OK

**Shear**

Permissible shear stress,  $\tau_{adm,||} = \tau_{g,||} \cdot K_3 \cdot K_8 = 0.67 \times 1.00 \times 1.1 = 0.74 \text{ N/mm}^2$

Applied shear stress,  $\tau_a = 1.13 \times 1000 \times 3/2 \times 50 \times 97 = 0.35 \text{ N/mm}^2$  OK

**Deflection**

Bending deflection =  $0.034 \times 10^8 / 7,192 \times 380 = 1.23 \text{ mm}$

Mid-span shear deflection =  $1.2 \times 0.496 \times 10^6 / ((E/16) \times 50 \times 97) = 0.27 \text{ mm}$

Total deflection =  $1.23 + 0.27 = 1.50 \text{ mm}$  ( $0.0017 L$ )  $\leq 0.003L$  OK

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Job number:

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**Beam: Ramp joists**

**Span: 1.2 m.**

|   | Load name | Loading w1 | Start x1 | Loading w2 | End x2 | R1comp | R2comp |
|---|-----------|------------|----------|------------|--------|--------|--------|
| U | T         | o.w.       | 0.1      |            | L      | 0.06   | 0.06   |
| U | T         | Floor      | 2.16     |            | L      | 1.30   | 1.30   |
|   |           |            |          |            |        | 1.36   | 1.36   |

**Total load: 2.71 kN**

Load types: U:UDL T: Total (positions in m. from R1)

Maximum B.M. = 0.407 kNm at 0.60 m. from R1

Maximum S.F. = 1.36 kN at R1

Total deflection =  $0.061 \times 10^8 / EI$  at 0.60 m. from R1 ( $E$  in  $N/mm^2$ ,  $I$  in  $cm^4$ )

Timber beam calculation to BS5268 Part 2: 2002 using C16 timber

**Use 50 x 100 C16** 1.9 kg/m approx

$z = 83.33 \text{ cm}^3$   $I = 417 \text{ cm}^4$

Timber grade: C16 Single member: No load sharing

$K_3$  (loading duration factor) = 1.00  $K_7$  (depth factor) = 1.128  $K_8$  (load sharing factor) = 1.0

$E = 5,800 \text{ N/mm}^2$  ( $E_{\min}$ )

**Bending**

Permissible bending stress,  $\sigma_{m,adm} = \sigma_{m,g} \cdot K_3 \cdot K_7 \cdot K_8 = 5.3 \times 1.00 \times 1.128 \times 1.0 = 5.98 \text{ N/mm}^2$

Applied bending stress,  $\sigma_{m,a} = 0.407 \times 1000 / 83.3 = 4.88 \text{ N/mm}^2$  OK

**Shear**

Permissible shear stress,  $\tau_{adm,||} = \tau_{g,||} \cdot K_3 \cdot K_8 = 0.67 \times 1.00 \times 1.0 = 0.67 \text{ N/mm}^2$

Applied shear stress,  $\tau_a = 1.36 \times 1000 \times 3/2 \times 50 \times 100 = 0.41 \text{ N/mm}^2$  OK

**Deflection**

Bending deflection =  $0.061 \times 10^8 / 5,800 \times 417 = 2.52 \text{ mm}$

Mid-span shear deflection =  $1.2 \times 0.407 \times 10^8 / ((E/16) \times 50 \times 100) = 0.27 \text{ mm}$

Total deflection =  $2.52 + 0.27 = 2.79 \text{ mm}$  (0.0023 L)  $\leq 0.003L$  OK

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Cantilever:

Length: 1.1 m.

|   |   | Load name | Loading w1 | Start x1 | Loading w2 | End x2 | Total kN |
|---|---|-----------|------------|----------|------------|--------|----------|
| R | T | Wall      | 0.5        | 0        |            | 1.1    | 0.55     |
| R | T | o.w.      | 0.05       | 0        |            | 1.1    | 0.06     |
| P | T | Wall      | 0.36       | 1.1      |            |        | 0.36     |
|   |   |           |            |          |            |        | 0.97     |

Total load: 0.97 kN

Load types: R:Part UDL P:PL T: Total (positions in m. from R1)

Maximum B.M. (RH cantilever) = -0.729 kNm

Maximum S.F. = 0.965 kN at R1

Maximum deflection =  $0.260 \times 10^8 / EI$  ( $E$  in  $N/mm^2$ ,  $I$  in  $cm^4$ )

Timber beam calculation to BS5268 Part 2: 2002 using C16 timber

Use 100 x 100 C16 3.7 kg/m approx

$z = 166.7 \text{ cm}^3$   $I = 833 \text{ cm}^4$

Timber grade: C16 4 members acting together:  $K_8 = 1.1$

$K_3$  (loading duration factor) = 1.00  $K_7$  (depth factor) = 1.128  $K_8$  (load sharing factor) = 1.1

$E = 5,800 \times 1.24 = 7,192 \text{ N/mm}^2$  ( $E_{min} \cdot K_9$ )

**Bending**

Permissible bending stress,  $\sigma_{m,adm} = \sigma_{m,g} \cdot K_3 \cdot K_7 \cdot K_8 = 5.3 \times 1.00 \times 1.128 \times 1.1 = 6.58 \text{ N/mm}^2$

Applied bending stress,  $\sigma_{m,a} = 0.729 \times 1000 / 166.7 = 4.37 \text{ N/mm}^2$  OK

**Shear**

Permissible shear stress,  $\tau_{adm, //} = \tau_{g, //} \cdot K_3 \cdot K_8 = 0.67 \times 1.00 \times 1.1 = 0.74 \text{ N/mm}^2$

Applied shear stress,  $\tau_a = 0.965 \times 1000 \times 3/2 \times 100 \times 100 = 0.14 \text{ N/mm}^2$  OK

RH cantilever deflection  $0.260 \times 10^8 / 7,192 \times 833 = 4.34 \text{ mm}$  (0.0039 L) OK