

|                                                                                   |                                      |          |      |          |                |  |
|-----------------------------------------------------------------------------------|--------------------------------------|----------|------|----------|----------------|--|
|  | Project                              |          |      |          | Job Ref.       |  |
|                                                                                   | The Old Ship Inn Beck Bank, Spalding |          |      |          | 26029          |  |
|                                                                                   | Part of Structure                    |          |      |          | SheetNo. /Rev. |  |
|                                                                                   | Notes                                |          |      |          | N 1 P01        |  |
| Calc. By                                                                          | Date                                 | Chk'd By | Date | Rev'd By | Date           |  |
| SKRS                                                                              | 29/03/2026                           |          |      |          |                |  |

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| Ref. | Calculations | Output |
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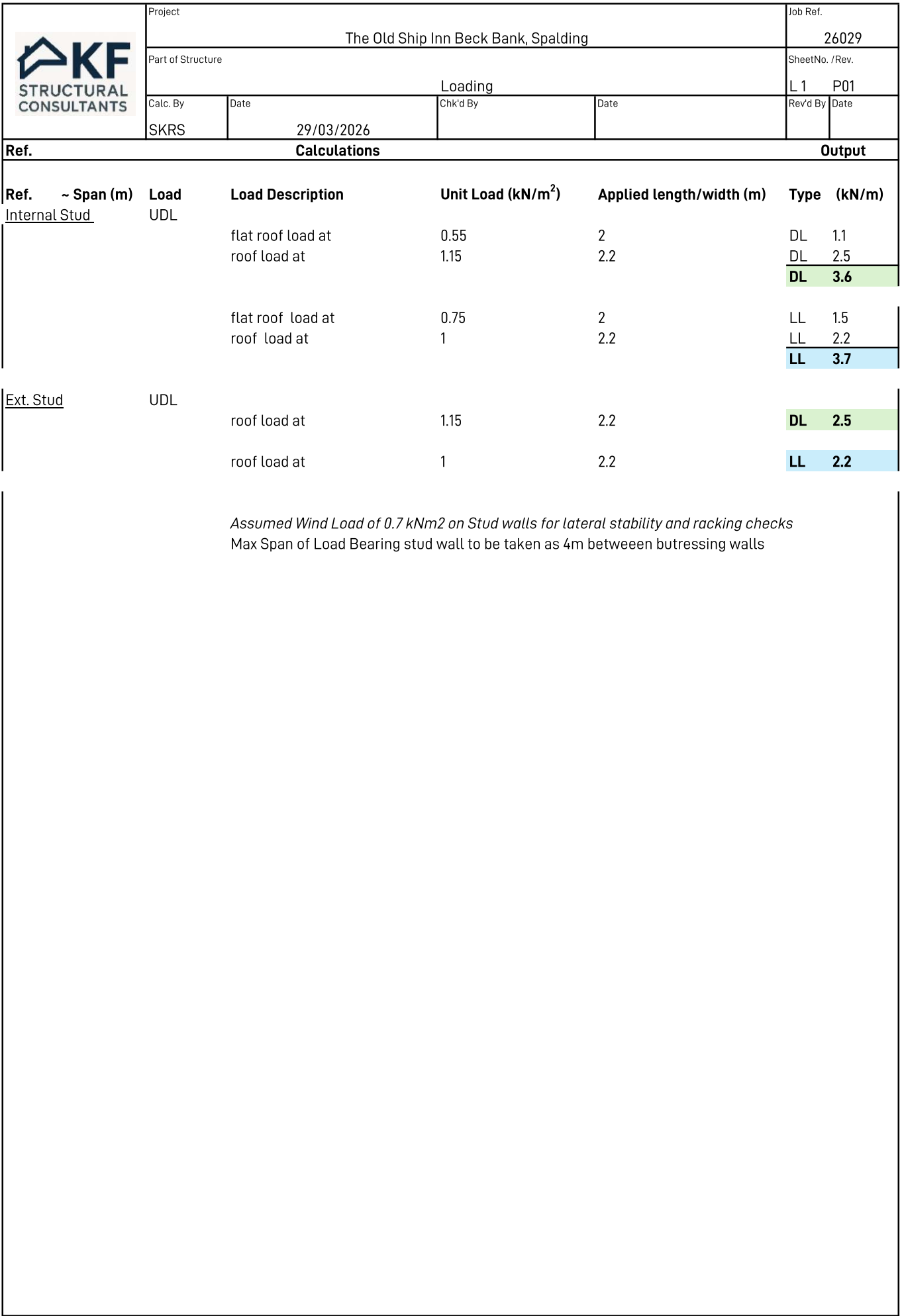
**HEALTH AND SAFETY**

We have not undertaken the role of Principal Designer under the Construction (Design and Management) Regulations 2015 and are not aware of any project or site-specific risks/ hazards. However, the contractor must satisfy themselves regarding any risks/ hazards that may exist prior to commencement on site.

**GENERAL**

- Dimensions used in the following calculations are for design only and shall not be used for constructional purposes. Dimensions must be taken from on-site measurements and/or the architect's drawings prior to order/fabrication of steelwork and/or commencement of works.
- Construction work shall not be started until designs have been approved by Building Control.
- These calculations relate solely to permanent works. The contractor is responsible for all temporary supports and must ensure that the structure is adequately supported during the works.
- Fireproofing of structural components shall be in accordance with the architect's details and Approved Document B of The Building Regulations.
- Any discrepancies between the published sketches and/or calculations must be reported to the engineer before any commencement of work.
- The structure (including lateral restraints, wall ties, noggins, strapping, head restraints, and the like) shall comply with the Building Regulations Approved Document A and BS 8103.
- All masonry wall junctions must be fully tooth bonded unless noted otherwise.

| <u>Issue Reference</u> | <u>Date</u> | <u>Cal. By</u> | <u>ISSUE INFORMATION</u> | <u>Checked By</u> | <u>Information</u> |
|------------------------|-------------|----------------|--------------------------|-------------------|--------------------|
| P01                    | 29/03/2026  | SKRS           |                          |                   | Initial Issue      |



|                                                 |                    |          |      |                             |      |
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Ref.

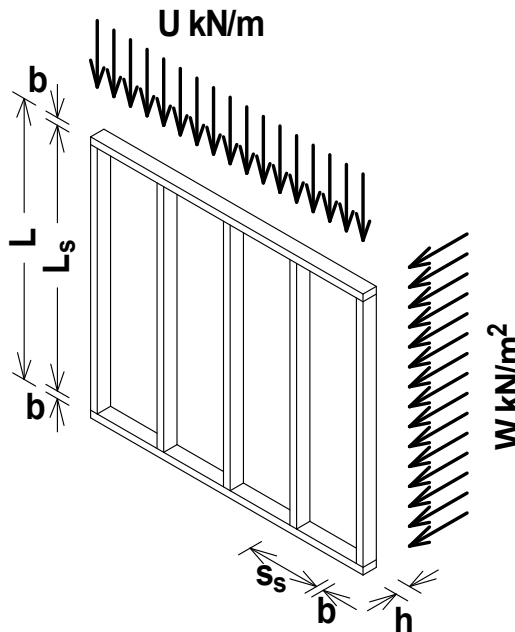
Calculations

Output

## INT. STUD DESIGN

### TIMBER STUD DESIGN (BS5268-2:2002)

TEDDS calculation version 1.0.05



#### Stud details

|                 |                     |            |                      |
|-----------------|---------------------|------------|----------------------|
| Stud breadth    | $b = 47 \text{ mm}$ | Stud depth | $h = 100 \text{ mm}$ |
| Number of studs | $N_s = 1$           | Stud grade | <b>C24</b>           |

#### Section properties

|                               |                              |                               |                             |
|-------------------------------|------------------------------|-------------------------------|-----------------------------|
| Cross sectional area          | $A = 4700 \text{ mm}^2$      | Section modulus               | $Z = 78333 \text{ mm}^3$    |
| Moment of inertia major axis  | $I_x = 3916667 \text{ mm}^4$ | Moment of inertia minor axis  | $I_y = 865192 \text{ mm}^4$ |
| Radius of gyration major axis | $r_x = 28.9 \text{ mm}$      | Radius of gyration minor axis | $r_y = 13.6 \text{ mm}$     |

#### Panel details - Studs restrained by sheathing in the plane of the panel

|                       |                        |                             |                            |
|-----------------------|------------------------|-----------------------------|----------------------------|
| Panel height          | $L = 2700 \text{ mm}$  | Stud length                 | $L_s = 2606 \text{ mm}$    |
| Standard stud spacing | $s_s = 600 \text{ mm}$ | Panel opening               | $O = 0 \text{ mm}$         |
| Loaded panel length   | $s = 600 \text{ mm}$   | Effective length major axis | $L_{ex} = 2215 \text{ mm}$ |
|                       |                        | Slenderness ratio           | $\lambda = 76.73$          |

#### Vertical loading details

|          |                                             |                                                |
|----------|---------------------------------------------|------------------------------------------------|
| Roof UDL | Dead loads<br>$U_{r,d} = 3.60 \text{ kN/m}$ | Imposed loads<br>$U_{r,i} = 3.70 \text{ kN/m}$ |
|----------|---------------------------------------------|------------------------------------------------|

#### Lateral loading

|              |                           |                    |                        |
|--------------|---------------------------|--------------------|------------------------|
| Wind loading | $W = 0.70 \text{ kN/m}^2$ | Wind load duration | <b>Very short term</b> |
|--------------|---------------------------|--------------------|------------------------|

#### Modification factors

|                      |              |                     |              |
|----------------------|--------------|---------------------|--------------|
| Section depth factor | $K_7 = 1.13$ | Load sharing factor | $K_8 = 1.10$ |
|----------------------|--------------|---------------------|--------------|

#### Check bending stress

|                            |                                          |                        |                                         |
|----------------------------|------------------------------------------|------------------------|-----------------------------------------|
| Permissible bending stress | $\sigma_{m,adm} = 16.292 \text{ N/mm}^2$ | Applied bending stress | $\sigma_{m,max} = 4.886 \text{ N/mm}^2$ |
|----------------------------|------------------------------------------|------------------------|-----------------------------------------|

**PASS - Applied bending stress under very short term loads is within permissible limits**



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|                                                 |                    |          |      |                             |      |
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#### Check compressive stress on stud

Permissible comp.stress  $\sigma_{c\_adm} = 6.390 \text{ N/mm}^2$  Applied comp.stress  $\sigma_{c\_max} = 0.932 \text{ N/mm}^2$   
**PASS - Applied compressive stress under very short term loads is within permissible limits**

#### Check compressive stress on rail

Permissible comp.stress  $\sigma_{cp1\_adm} = 5.204 \text{ N/mm}^2$  Applied comp.stress  $\sigma_{cp1\_max} = 0.932 \text{ N/mm}^2$   
**PASS - Applied compressive stress under very short term loads is within permissible limits**

#### Check combined axial compression and bending

Combined axial compression and bending value  $K = 0.461 < 1$   
**PASS - Combined compressive and bending stresses under very short term loads are within permissible limits**

#### Check stud deflection

Permissible deflection  $\delta_{adm} = 7.800 \text{ mm}$  Actual deflection  $\delta_{max} = 5.963 \text{ mm}$   
**PASS - Deflection due to wind loading is less than permissible limit**

#### Check compressive stress on stud

Permissible comp.stress  $\sigma_{c\_adm} = 5.442 \text{ N/mm}^2$  Applied comp.stress  $\sigma_{c\_max} = 0.932 \text{ N/mm}^2$   
**PASS - Applied compressive stress under medium term loads is within permissible limits**

#### Check compressive stress on rail

Permissible comp.stress  $\sigma_{cp1\_adm} = 3.717 \text{ N/mm}^2$  Applied comp.stress  $\sigma_{cp1\_max} = 0.932 \text{ N/mm}^2$   
**PASS - Applied compressive stress under medium term loads is within permissible limits**

Int. Stud ok with 47x100 C24 Timber studs at 600mm c/c, Provide same for ext. stud as less onerous loading. Above calculations have wind load applied of 0.7 kN/m<sup>2</sup>.

Racking check on following page.

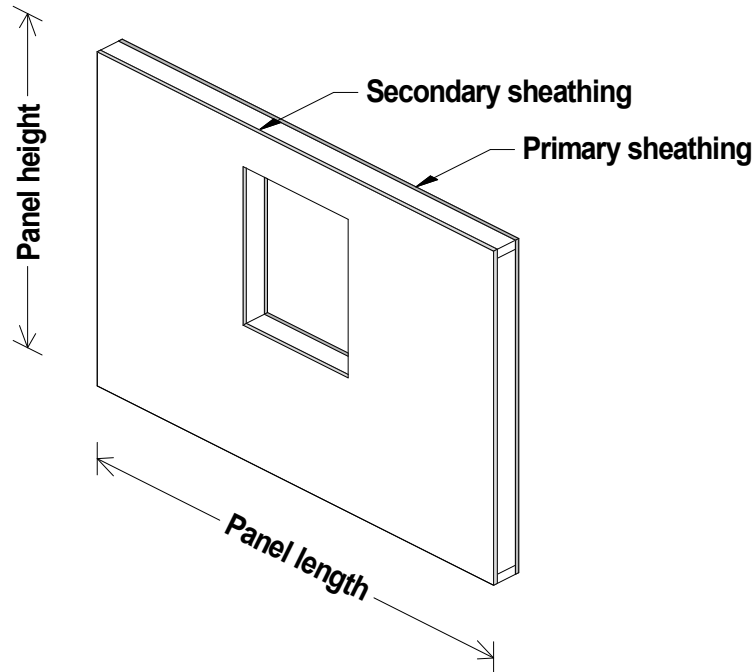
|                                                 |                    |          |      |                             |      |
|-------------------------------------------------|--------------------|----------|------|-----------------------------|------|
| Project<br>The Old Ship Inn Beck Bank, Spalding |                    |          |      | Job Ref.<br>26029           |      |
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| Calc. by<br>SKRS                                | Date<br>29/03/2026 | Chk'd by | Date | Rev'd by                    | Date |

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Calculations

Output

## RACKING



### TIMBER PANEL RACKING RESISTANCE – BS5268:SECTION 6.1:1996

TEDDS calculation version 1.0.05

**Dwellings not exceeding seven storeys**

#### **Wall panel details**

|                     |                           |                 |                            |
|---------------------|---------------------------|-----------------|----------------------------|
| Length of panel     | $L = 4.000 \text{ m}$     | Height of panel | $H_{wp} = 2.700 \text{ m}$ |
| Area of openings    | $A_a = 4.000 \text{ m}^2$ | Timber studs    | $\geq 38 \times 72$        |
| UDL on timber frame | $F = 10.000 \text{ kN/m}$ |                 |                            |

#### **Primary sheathing details**

|                          |                               |                        |                          |
|--------------------------|-------------------------------|------------------------|--------------------------|
| Primary board type       | <b>OSB</b>                    | Board thickness        | $T_p = 18.00 \text{ mm}$ |
| Nail diameter            | $D_p = 3.00 \text{ mm}$       | Perimeter nail spacing | $S_p = 150 \text{ mm}$   |
| Basic racking resistance | $R_{bp} = 1.680 \text{ kN/m}$ |                        |                          |

#### **Secondary sheathing details**

|                          |                               |                         |                          |
|--------------------------|-------------------------------|-------------------------|--------------------------|
| Secondary board type     | <b>Plasterboard</b>           | Board thickness         | $T_s = 12.50 \text{ mm}$ |
| Screw diameter           | $D_s = 3.50 \text{ mm}$       | Perimeter screw spacing | $S_s = 300 \text{ mm}$   |
| Basic racking resistance | $R_{bs} = 0.120 \text{ kN/m}$ |                         |                          |

#### **Racking resistance of wall panel**

|                          |                          |                               |                             |
|--------------------------|--------------------------|-------------------------------|-----------------------------|
| Total Racking resistance | $R_R = 4.222 \text{ kN}$ | Racking resistance of p/board | $R_{PO} = 0.249 \text{ kN}$ |
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### Racking Load Calculations and Check

4m (max bay length) x 2.7m (max height of studs) = 10.8m<sup>2</sup> = Area

Wind Pressure = 0.7 kN/m<sup>2</sup>

Force Applied – 0.7 x 10.8 = 7.6 kN

Racking Load = 7.6 kN /2 = 3.8 kN

Racking Resistance of Timber Stud Wall = 4.2 kN

**Therefore, Stud Wall considered adequate**



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Ref. Calculations Output

## FJ1

### TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

#### Joist details

|                       |            |                         |            |
|-----------------------|------------|-------------------------|------------|
| Joist breadth         | b = 47 mm  | Joist depth             | h = 200 mm |
| Joist spacing         | s = 400 mm | Service class of timber | 1          |
| Timber strength class | C24        |                         |            |



#### Span details

|                      |                           |                   |                         |
|----------------------|---------------------------|-------------------|-------------------------|
| Number of spans      | N <sub>span</sub> = 1     | Length of bearing | L <sub>b</sub> = 100 mm |
| Clear length of span | L <sub>s1</sub> = 4000 mm |                   |                         |

#### Section properties

|                       |                              |                 |                            |
|-----------------------|------------------------------|-----------------|----------------------------|
| Second moment of area | I = 31333333 mm <sup>4</sup> | Section modulus | Z = 313333 mm <sup>3</sup> |
|-----------------------|------------------------------|-----------------|----------------------------|

#### Loading details

|                             |                                             |           |                                             |
|-----------------------------|---------------------------------------------|-----------|---------------------------------------------|
| Joist self weight           | F <sub>swt</sub> = 0.03 kN/m                | Dead load | F <sub>d_udi</sub> = 0.75 kN/m <sup>2</sup> |
| Imposed UDL(Long term)      | F <sub>i_udi</sub> = 1.50 kN/m <sup>2</sup> |           |                                             |
| Imposed point load (Medium) | F <sub>i_pt</sub> = 1.40 kN                 |           |                                             |

#### Consider long term loads

|                         |               |                    |              |
|-------------------------|---------------|--------------------|--------------|
| Design bending moment   | M = 1.865 kNm | Design shear force | V = 1.865 kN |
| Design support reaction | R = 1.865 kN  | Design deflection  | δ = 9.536 mm |

#### Check bending stress

|                                                                |                                              |                        |                                              |
|----------------------------------------------------------------|----------------------------------------------|------------------------|----------------------------------------------|
| Permissible bending stress                                     | σ <sub>m_adm</sub> = 8.626 N/mm <sup>2</sup> | Applied bending stress | σ <sub>m_max</sub> = 5.951 N/mm <sup>2</sup> |
| <b>PASS - Applied bending stress within permissible limits</b> |                                              |                        |                                              |

#### Check shear stress

|                                                              |                                            |                      |                                            |
|--------------------------------------------------------------|--------------------------------------------|----------------------|--------------------------------------------|
| Permissible shear stress                                     | τ <sub>adm</sub> = 0.781 N/mm <sup>2</sup> | Applied shear stress | τ <sub>max</sub> = 0.298 N/mm <sup>2</sup> |
| <b>PASS - Applied shear stress within permissible limits</b> |                                            |                      |                                            |

#### Check bearing stress

|                                                                |                                              |                        |                                              |
|----------------------------------------------------------------|----------------------------------------------|------------------------|----------------------------------------------|
| Permissible bearing stress                                     | σ <sub>c_adm</sub> = 2.640 N/mm <sup>2</sup> | Applied bearing stress | σ <sub>c_max</sub> = 0.397 N/mm <sup>2</sup> |
| <b>PASS - Applied bearing stress within permissible limits</b> |                                              |                        |                                              |

#### Check deflection

|                                                           |                              |                   |              |
|-----------------------------------------------------------|------------------------------|-------------------|--------------|
| Permissible deflection                                    | δ <sub>adm</sub> = 12.000 mm | Actual deflection | δ = 9.536 mm |
| <b>PASS - Actual deflection within permissible limits</b> |                              |                   |              |

#### Consider medium term loads

|                         |               |                    |              |
|-------------------------|---------------|--------------------|--------------|
| Design bending moment   | M = 2.065 kNm | Design shear force | V = 2.065 kN |
| Design support reaction | R = 2.065 kN  | Design deflection  | δ = 9.179 mm |



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|                                                 |                    |          |      |                             |      |
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#### Check bending stress

Permissible bending stress  $\sigma_{m\_adm} = 10.783 \text{ N/mm}^2$  Applied bending stress  $\sigma_{m\_max} = 6.589 \text{ N/mm}^2$   
**PASS - Applied bending stress within permissible limits**

#### Check shear stress

Permissible shear stress  $\tau_{adm} = 0.976 \text{ N/mm}^2$  Applied shear stress  $\tau_{max} = 0.329 \text{ N/mm}^2$   
**PASS - Applied shear stress within permissible limits**

#### Check bearing stress

Permissible bearing stress  $\sigma_{c\_adm} = 3.300 \text{ N/mm}^2$  Applied bearing stress  $\sigma_{c\_max} = 0.439 \text{ N/mm}^2$   
**PASS - Applied bearing stress within permissible limits**

#### Check deflection

Permissible deflection  $\delta_{adm} = 12.000 \text{ mm}$  Actual deflection  $\delta = 9.179 \text{ mm}$   
**PASS - Actual deflection within permissible limits**

|                                                 |                    |          |      |                             |      |
|-------------------------------------------------|--------------------|----------|------|-----------------------------|------|
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| Calc. by<br>SKRS                                | Date<br>29/03/2026 | Chk'd by | Date | Rev'd by                    | Date |

Ref. Calculations Output

## RJ2

### TIMBER JOIST DESIGN (BS5268-2:2002)

Teds calculation version 1.1.04

#### Joist details

|                       |            |                         |            |
|-----------------------|------------|-------------------------|------------|
| Joist breadth         | b = 47 mm  | Joist depth             | h = 175 mm |
| Joist spacing         | s = 600 mm | Service class of timber | 1          |
| Timber strength class | C24        |                         |            |



#### Span details

|                      |                           |                   |                         |
|----------------------|---------------------------|-------------------|-------------------------|
| Number of spans      | N <sub>span</sub> = 1     | Length of bearing | L <sub>b</sub> = 100 mm |
| Clear length of span | L <sub>s1</sub> = 3600 mm |                   |                         |

#### Section properties

|                       |                              |                 |                            |
|-----------------------|------------------------------|-----------------|----------------------------|
| Second moment of area | I = 20990885 mm <sup>4</sup> | Section modulus | Z = 239896 mm <sup>3</sup> |
|-----------------------|------------------------------|-----------------|----------------------------|

#### Loading details

|                            |                                             |           |                                             |
|----------------------------|---------------------------------------------|-----------|---------------------------------------------|
| Joist self weight          | F <sub>swt</sub> = 0.03 kN/m                | Dead load | F <sub>d_udi</sub> = 0.75 kN/m <sup>2</sup> |
| Imposed UDL(Medium term)   | F <sub>i_udi</sub> = 0.60 kN/m <sup>2</sup> |           |                                             |
| Imposed point load (Short) | F <sub>i_pt</sub> = 0.90 kN                 |           |                                             |

#### Consider medium term loads

|                         |               |                    |              |
|-------------------------|---------------|--------------------|--------------|
| Design bending moment   | M = 1.358 kNm | Design shear force | V = 1.509 kN |
| Design support reaction | R = 1.509 kN  | Design deflection  | δ = 8.380 mm |

#### Check bending stress

|                                                                |                                               |                        |                                              |
|----------------------------------------------------------------|-----------------------------------------------|------------------------|----------------------------------------------|
| Permissible bending stress                                     | σ <sub>m_adm</sub> = 10.942 N/mm <sup>2</sup> | Applied bending stress | σ <sub>m_max</sub> = 5.661 N/mm <sup>2</sup> |
| <b>PASS - Applied bending stress within permissible limits</b> |                                               |                        |                                              |

#### Check shear stress

|                                                              |                                            |                      |                                            |
|--------------------------------------------------------------|--------------------------------------------|----------------------|--------------------------------------------|
| Permissible shear stress                                     | τ <sub>adm</sub> = 0.976 N/mm <sup>2</sup> | Applied shear stress | τ <sub>max</sub> = 0.275 N/mm <sup>2</sup> |
| <b>PASS - Applied shear stress within permissible limits</b> |                                            |                      |                                            |

#### Check bearing stress

|                                                                |                                              |                        |                                              |
|----------------------------------------------------------------|----------------------------------------------|------------------------|----------------------------------------------|
| Permissible bearing stress                                     | σ <sub>c_adm</sub> = 3.300 N/mm <sup>2</sup> | Applied bearing stress | σ <sub>c_max</sub> = 0.321 N/mm <sup>2</sup> |
| <b>PASS - Applied bearing stress within permissible limits</b> |                                              |                        |                                              |

#### Check deflection

|                                                           |                              |                   |              |
|-----------------------------------------------------------|------------------------------|-------------------|--------------|
| Permissible deflection                                    | δ <sub>adm</sub> = 10.800 mm | Actual deflection | δ = 8.380 mm |
| <b>PASS - Actual deflection within permissible limits</b> |                              |                   |              |

#### Consider short term loads

|                         |               |                    |              |
|-------------------------|---------------|--------------------|--------------|
| Design bending moment   | M = 1.585 kNm | Design shear force | V = 1.761 kN |
| Design support reaction | R = 1.761 kN  | Design deflection  | δ = 8.815 mm |



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#### Check bending stress

Permissible bending stress  $\sigma_{m\_adm} = 13.131 \text{ N/mm}^2$  Applied bending stress  $\sigma_{m\_max} = 6.606 \text{ N/mm}^2$   
**PASS - Applied bending stress within permissible limits**

#### Check shear stress

Permissible shear stress  $\tau_{adm} = 1.172 \text{ N/mm}^2$  Applied shear stress  $\tau_{max} = 0.321 \text{ N/mm}^2$   
**PASS - Applied shear stress within permissible limits**

#### Check bearing stress

Permissible bearing stress  $\sigma_{c\_adm} = 3.960 \text{ N/mm}^2$  Applied bearing stress  $\sigma_{c\_max} = 0.375 \text{ N/mm}^2$   
**PASS - Applied bearing stress within permissible limits**

#### Check deflection

Permissible deflection  $\delta_{adm} = 10.800 \text{ mm}$  Actual deflection  $\delta = 8.815 \text{ mm}$   
**PASS - Actual deflection within permissible limits**

|                                                 |                    |          |      |                             |      |
|-------------------------------------------------|--------------------|----------|------|-----------------------------|------|
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Ref. Calculations Output

## RJ1

### TIMBER RAFTER DESIGN (BS5268-2:2002)

TEDDS calculation version 1.0.03

#### Rafter details

|                               |                            |                          |                             |
|-------------------------------|----------------------------|--------------------------|-----------------------------|
| Breadth of timber sections    | $b = 47 \text{ mm}$        | Depth of timber sections | $h = 200 \text{ mm}$        |
| Rafter spacing                | $s = 600 \text{ mm}$       | Rafter span              | <b>Single span</b>          |
| Clear length of span on slope | $L_{cl} = 3002 \text{ mm}$ | Rafter slope             | $\alpha = 30.0 \text{ deg}$ |
| Timber strength class         | <b>C24</b>                 |                          |                             |

#### Section properties

|                                |                         |                       |                             |
|--------------------------------|-------------------------|-----------------------|-----------------------------|
| Cross sectional area of rafter | $A = 9400 \text{ mm}^2$ | Section modulus       | $Z = 313333 \text{ mm}^3$   |
| Radius of gyration             | $r = 58 \text{ mm}$     | Second moment of area | $I = 31333333 \text{ mm}^4$ |

#### Loading details

|                           |                             |                    |                             |
|---------------------------|-----------------------------|--------------------|-----------------------------|
| Rafter self weight        | $F_l = 0.03 \text{ kN/m}$   | Dead load on slope | $F_d = 1.00 \text{ kN/m}^2$ |
| Imposed snow load on plan | $F_u = 0.75 \text{ kN/m}^2$ | Imposed point load | $F_p = 0.90 \text{ kN}$     |

#### Modification factors

|                      |              |                     |              |
|----------------------|--------------|---------------------|--------------|
| Section depth factor | $K_7 = 1.05$ | Load sharing factor | $K_8 = 1.10$ |
|----------------------|--------------|---------------------|--------------|

#### Consider long term load condition

|                         |                      |                           |                             |
|-------------------------|----------------------|---------------------------|-----------------------------|
| Load duration factor    | $K_3 = 1.00$         | Total UDL perp. to rafter | $F = 0.548 \text{ kN/m}$    |
| Notional bearing length | $L_b = 7 \text{ mm}$ | Effective span            | $L_{eff} = 3009 \text{ mm}$ |

#### Check bending stress

|                                                                |                                          |                        |                                          |
|----------------------------------------------------------------|------------------------------------------|------------------------|------------------------------------------|
| Permissible bending stress                                     | $\sigma_{m\_adm} = 8.626 \text{ N/mm}^2$ | Applied bending stress | $\sigma_{m\_max} = 1.978 \text{ N/mm}^2$ |
| <b>PASS - Applied bending stress within permissible limits</b> |                                          |                        |                                          |

#### Check compressive stress parallel to grain

|                                                                    |                                          |                            |                                          |
|--------------------------------------------------------------------|------------------------------------------|----------------------------|------------------------------------------|
| Permissible comp. stress                                           | $\sigma_{c\_adm} = 6.266 \text{ N/mm}^2$ | Applied compressive stress | $\sigma_{c\_max} = 0.304 \text{ N/mm}^2$ |
| <b>PASS - Applied compressive stress within permissible limits</b> |                                          |                            |                                          |

#### Check combined bending and compressive stress parallel to grain

|                        |             |                                                                                       |  |
|------------------------|-------------|---------------------------------------------------------------------------------------|--|
| Combined loading check | $0.281 < 1$ | <b>PASS - Combined compressive and bending stresses are within permissible limits</b> |  |
|------------------------|-------------|---------------------------------------------------------------------------------------|--|

#### Check shear stress

|                                                              |                                     |                      |                                     |
|--------------------------------------------------------------|-------------------------------------|----------------------|-------------------------------------|
| Permissible shear stress                                     | $\tau_{adm} = 0.781 \text{ N/mm}^2$ | Applied shear stress | $\tau_{max} = 0.131 \text{ N/mm}^2$ |
| <b>PASS - Applied shear stress within permissible limits</b> |                                     |                      |                                     |

#### Check deflection

|                                                          |                                   |                  |                                   |
|----------------------------------------------------------|-----------------------------------|------------------|-----------------------------------|
| Permissible deflection                                   | $\delta_{adm} = 9.027 \text{ mm}$ | Total deflection | $\delta_{max} = 1.844 \text{ mm}$ |
| <b>PASS - Total deflection within permissible limits</b> |                                   |                  |                                   |

#### Consider medium term load condition

|                         |                       |                           |                             |
|-------------------------|-----------------------|---------------------------|-----------------------------|
| Load duration factor    | $K_3 = 1.25$          | Total UDL perp. to rafter | $F = 0.885 \text{ kN/m}$    |
| Notional bearing length | $L_b = 11 \text{ mm}$ | Effective span            | $L_{eff} = 3013 \text{ mm}$ |

#### Check bending stress

|                                                                |                                           |                        |                                          |
|----------------------------------------------------------------|-------------------------------------------|------------------------|------------------------------------------|
| Permissible bending stress                                     | $\sigma_{m\_adm} = 10.783 \text{ N/mm}^2$ | Applied bending stress | $\sigma_{m\_max} = 3.205 \text{ N/mm}^2$ |
| <b>PASS - Applied bending stress within permissible limits</b> |                                           |                        |                                          |

#### Check compressive stress parallel to grain

|                                                                    |                                          |                            |                                          |
|--------------------------------------------------------------------|------------------------------------------|----------------------------|------------------------------------------|
| Permissible comp. stress                                           | $\sigma_{c\_adm} = 7.584 \text{ N/mm}^2$ | Applied compressive stress | $\sigma_{c\_max} = 0.491 \text{ N/mm}^2$ |
| <b>PASS - Applied compressive stress within permissible limits</b> |                                          |                            |                                          |



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|                                                 |                    |          |      |                              |      |
|-------------------------------------------------|--------------------|----------|------|------------------------------|------|
| Project<br>The Old Ship Inn Beck Bank, Spalding |                    |          |      | Job Ref.<br>26029            |      |
| Part of Structure<br>Structure                  |                    |          |      | Sheet no./rev.<br>S 10 / P01 |      |
| Calc. by<br>SKRS                                | Date<br>29/03/2026 | Chk'd by | Date | Rev'd by                     | Date |

| Ref. | Calculations | Output |
|------|--------------|--------|
|------|--------------|--------|

#### Check combined bending and compressive stress parallel to grain

Combined loading check  $0.368 < 1$   
**PASS - Combined compressive and bending stresses are within permissible limits**

#### Check shear stress

Permissible shear stress  $\tau_{adm} = 0.976 \text{ N/mm}^2$  Applied shear stress  $\tau_{max} = 0.213 \text{ N/mm}^2$   
**PASS - Applied shear stress within permissible limits**

#### Check deflection

Permissible deflection  $\delta_{adm} = 9.039 \text{ mm}$  Total deflection  $\delta_{max} = 2.997 \text{ mm}$   
**PASS - Total deflection within permissible limits**

#### Consider short term load condition

Load duration factor  $K_3 = 1.50$  Total UDL perp. to rafter  $F = 0.548 \text{ kN/m}$   
Notional bearing length  $L_b = 10 \text{ mm}$  Effective span  $L_{eff} = 3012 \text{ mm}$

#### Check bending stress

Permissible bending stress  $\sigma_{m\_adm} = 12.939 \text{ N/mm}^2$  Applied bending stress  $\sigma_{m\_max} = 3.855 \text{ N/mm}^2$   
**PASS - Applied bending stress within permissible limits**

#### Check compressive stress parallel to grain

Permissible comp. stress  $\sigma_{c\_adm} = 8.793 \text{ N/mm}^2$  Applied compressive stress  $\sigma_{c\_max} = 0.352 \text{ N/mm}^2$   
**PASS - Applied compressive stress within permissible limits**

#### Check combined bending and compressive stress parallel to grain

Combined loading check  $0.342 < 1$   
**PASS - Combined compressive and bending stresses are within permissible limits**

#### Check shear stress

Permissible shear stress  $\tau_{adm} = 1.172 \text{ N/mm}^2$  Applied shear stress  $\tau_{max} = 0.256 \text{ N/mm}^2$   
**PASS - Applied shear stress within permissible limits**

#### Check deflection

Permissible deflection  $\delta_{adm} = 9.036 \text{ mm}$  Total deflection  $\delta_{max} = 3.274 \text{ mm}$   
**PASS - Total deflection within permissible limits**