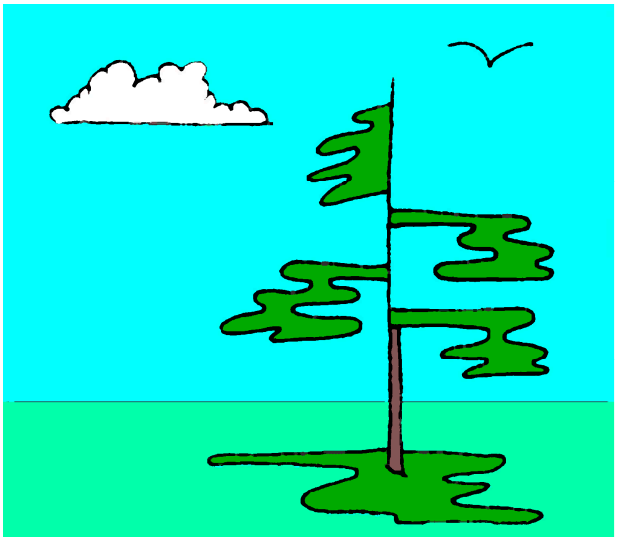
NorthWoods Software



Program Name: Loose_Lintel

Project Name: Name

Project Number: Number

Project Description: Describe

Project Designer: Dik

Last Revised (yy-mm-dd): 18-09-29

Reference: Reference?

Created using SMath Studio, a MathCAD workalike from https://en.smath.info/view/SMathStudio
The User is responsible to verify data using an alternative method

Menu:

..... Enter Data Space ..... Important Output ..... Logical Constructs Blue Text: Units
..... Summation

Defined Units:

$K := kip$ $lb := lbf$ kilopounds (force)

$ft\_K := kip\ ft$ Foot-Kips (Moment)

$kN\_m := kN\ m$ kiloNewton-Metres (Moment)

$Klf := \frac{kip}{ft}$ Kip per lineal Foot (Line Load)

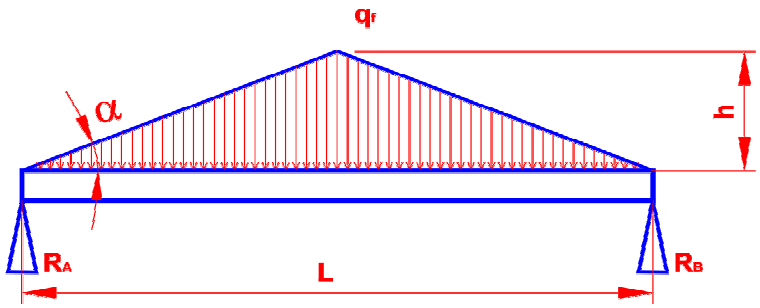
$kNpm := \frac{kN}{m}$ kiloNewton per metre (Line Load)

$kNpms := \frac{kN}{m^2}$

$sq\_in := in^2$ $sq\_mm := mm^2$

$cu\_in := in^3$ $cu\_mm := mm^3$

$qu\_in := in^4$ $qu\_mm := mm^4$



Material Properties:

$\Phi_s := 0.9$ $F_y := 300\ MPa$ $E_s := 29000\ ksi$

User Defined Functions:

```
Check(arg):=if arg=1
              Check:="...OK"
            else
              Check:="...NG"
```

$Check(2=3) = "...NG"$

$Check(2 \le 3) = "...OK"$

$Check(3 \ge 2) = "...OK"$

$$Sect := \begin{bmatrix} 1 & \text{"L90x90x6"} & 1.62\ sq\_in & .772\ cu\_in & 1.98\ qu\_in \\ 2 & \text{"L90x90x8"} & 2.13\ sq\_in & 1.01\ cu\_in & 2.56\ qu\_in \\ 3 & \text{"L90x100x6"} & 1.71\ sq\_in & .945\ cu\_in & 2.66\ qu\_in \\ 4 & \text{"L90x100x8"} & 2.26\ sq\_in & 1.24\ cu\_in & 3.44\ qu\_in \\ 5 & \text{"L90x125x6"} & 2.57\ sq\_in & 1.90\ cu\_in & 6.39\ qu\_in \\ 6 & \text{"L90x125x8"} & 3.18\ sq\_in & 2.33\ cu\_in & 7.80\ qu\_in \\ 7 & \text{"L100x100x6"} & 1.80\ sq\_in & .958\ cu\_in & 2.75\ qu\_in \\ 8 & \text{"L100x100x8"} & 2.38\ sq\_in & 1.26\ cu\_in & 3.56\ qu\_in \\ 9 & \text{"L100x150x8"} & 3.00\ sq\_in & 2.72\ cu\_in & 10.9\ qu\_in \end{bmatrix}$$

$sect := Sect_{Sect_{NDX},2}$

$area := Sect_{Sect_{NDX},3}$

$S_x := Sect_{Sect_{NDX},4}$

$I_x := Sect_{Sect_{NDX},5}$

Input Data:

$q_f := 55\ psf$ $\quad q_f = 2.63\ kPa$ Factored Unit Weight of Masonry

$L := 6\ ft$ $\quad L = 1.829\ m$ Length of Span

$\alpha := 60\ °$ Angle of Arch

Section Properties

$Sect_{NDX} := 3$

$sect = \text{"L90x100x6"}$

$area = 1.71\ sq\_in$ $\quad area = 1103\ sq\_mm$

$S_x = 0.95\ cu\_in$ $\quad S_x = 15486\ cu\_mm$

$I_x = 2.66\ qu\_in$ $\quad I_x = 1.11 \cdot 10^{6}\ qu\_mm$

$M_r := S_x \cdot F_y \cdot \Phi_s$

$M_r = 3.0839\ ft\_K$ $\quad M_r = 4.18\ kN\_m$

$Wt := area \cdot 3.4\ \frac{lb}{in^2 \cdot ft}$ $\quad Wt = 5.81\ \frac{lb}{ft}$

Calculation:

$h := \frac{L}{2} \cdot \tan(\alpha)$ $\quad h = 5.20\ ft$ $\quad h = 1.584\ m$ Height of Masonry Arch

$R_A := \frac{q_f \cdot h \cdot L}{4}$ $\quad R_A = 0.43\ K$ $\quad R_A = 1.91\ kN$ Reactions

$R_B := R_A$ $\quad R_B = 0.43\ K$ $\quad R_B = 1.91\ kN$

$M_f := \frac{q_f \cdot h \cdot L^2}{12} + \frac{1.25 \cdot Wt \cdot L^2}{8}$ Moment

$M_f = 0.89\ ft\_K$ $\quad M_f = 1.21\ kN\_m$

$\Delta := \frac{q_f \cdot h \cdot L}{2} \cdot \frac{L^3}{60 \cdot E_s \cdot I_x}$ $\quad \Delta = 0.07\ in$ $\quad \Delta = 1.76\ mm$

$\Delta_{ratio} := \frac{L}{\Delta}$ $\quad \Delta_{ratio} = 1041$

$Check(M_r \geq M_f) = \text{"...OK"}$

$Check(\Delta_{ratio} \geq 720) = \text{"...OK"}$

LTB and Wind Loading on Loose Lintel not considered
Deflection Ratio set for L/720