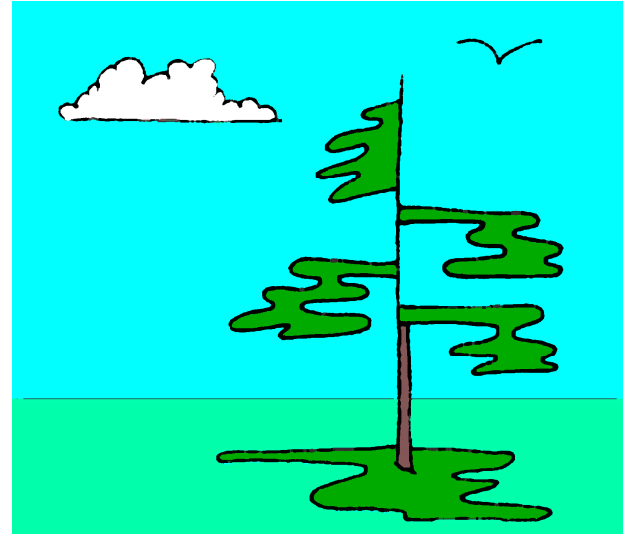


NorthWoods Software



Program Name: Load Combinations

Project Name: Name

Project Number: Number

Project Description: Describe

Project Designer: Dik

Last Revised (yy-mm-dd): 18-07-27

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:

$K := \text{kip}$	kilopounds (force)
$kN_m := kN\ m$	kiloNewton-Metres (Moment)
$Klf := \frac{\text{kip}}{\text{ft}}$	Kips per Lineal Foot (Line Load)
$kNpm := \frac{kN}{m}$	kiloNewtons per Metre (Line Load)
$kNsm := \frac{kN}{m^2}$	kiloNewtons per Square Metre (Area Load)
$ksf := \frac{\text{kip}}{\text{ft}^2}$	Kips per Square Foot (Area Load)
$Nsm := \frac{N}{m^2}$	Newtons per Square Metre (Area Load)
$lb := \text{lbf}$	Pounds Force Override

Loads (Area Load)

$D_A := 12\ \text{psf} = 0.5746\ \text{kPa}$	Dead Load
$L_A := 12\ \text{psf} = 0.5746\ \text{kPa}$	Live Load
$S_A := 12\ \text{psf} = 0.5746\ \text{kPa}$	Snow Load
$W_A := 12\ \text{psf} = 0.5746\ \text{kPa}$	Wind Load

$$PL_A := 12 \text{ psf} = 0.5746 \text{ kPa}$$

Pattern Load

$$E_A := 12 \text{ psf} = 0.5746 \text{ kPa}$$

Seismic Load

Loads (Concentrated Load)

$$D_C := 1 \text{ K} = 4.4482 \text{ kN}$$

Dead Load

$$L_C := 1 \text{ K} = 4.4482 \text{ kN}$$

Live Load

$$S_C := 1 \text{ K} = 4.4482 \text{ kN}$$

Snow Load

$$W_C := 1 \text{ K} = 4.4482 \text{ kN}$$

Wind Load

$$PL_C := 1 \text{ K} = 4.4482 \text{ kN}$$

Pattern Load

$$E_C := 1 \text{ K} = 4.4482 \text{ kN}$$

Seismic Load

Loads (Line Load)

$$D_L := 1 \text{ Kl f} = 14.5939 \text{ kNpm}$$

Dead Load

$$L_L := 1 \text{ Kl f} = 14.5939 \text{ kNpm}$$

Live Load

$$S_L := 1 \text{ Kl f} = 14.5939 \text{ kNpm}$$

Snow Load

$$W_L := 1 \text{ Kl f} = 14.5939 \text{ kNpm}$$

Wind Load

$$PL_L := 1 \text{ Kl f} = 14.5939 \text{ kNpm}$$

Pattern Load

$$E_L := 1 \text{ Kl f} = 14.5939 \text{ kNpm}$$

Seismic Load

Load Combinations (Area Load)

$$q_1 := 1.4 \cdot D_A$$

8.3.2 Table C.1 Case 1

$$q_2 := 1.25 \cdot D_A + 1.5 \cdot L_A$$

8.3.2 Table C.1 Case 2

$$q_3 := 1.25 \cdot D_A + 1.5 \cdot L_A + 0.5 \cdot S_A$$

$$q_4 := 1.25 \cdot D_A + 1.5 \cdot L_A + 0.4 \cdot W_A$$

$$q_5 := 1.25 \cdot D_A + 1.5 \cdot L_A - 0.4 \cdot W_A$$

$$q_6 := 0.9 \cdot D_A + 1.5 \cdot L_A$$

$$q_7 := 0.9 \cdot D_A + 1.5 \cdot L_A + 0.5 \cdot S_A$$

$$q_8 := 0.9 \cdot D_A + 1.5 \cdot L_A + 0.4 \cdot W_A$$

$$q_9 := 0.9 \cdot D_A + 1.5 \cdot L_A - 0.4 \cdot W_A$$

$$q_{10} := 1.24 \cdot D_A + 1.5 \cdot (0.75 \cdot PL_A)$$

13.8.4.3

$$q_{11} := 1.25 \cdot D_A + 1.5 \cdot S_A$$

8.3.2 Table C.1 Case 3

$$q_{12} := 1.25 \cdot D_A + 1.5 \cdot S_A + 0.5 \cdot L_A$$

$$q_{13} := 1.25 \cdot D_A + 1.5 \cdot S_A + 0.4 \cdot W_A$$

$$q_{14} := 0.9 \cdot D_A + 1.5 \cdot S_A$$

$$q_{15} := 0.9 \cdot D_A + 1.5 \cdot S_A + 0.5 \cdot L_A$$

$$q_{16} := 0.9 \cdot D_A + 1.5 \cdot S_A + 0.4 \cdot W_A$$

$$q_{17} := 0.9 \cdot D_A + 1.5 \cdot S_A - 0.4 \cdot W_A$$

$$q_{18} := 1.25 \cdot D_A + 1.4 \cdot W_A$$

8.3.2 Table C.1 Case 4

$$q_{19} := 1.25 \cdot D_A - 1.4 \cdot W_A$$

$$q_{20} := 1.25 \cdot D_A + 0.5 \cdot L_A + 1.4 \cdot W_A$$

$$q_{21} := 1.25 \cdot D_A + 0.5 \cdot L_A - 1.4 \cdot W_A$$

$$q_{22} := 1.25 \cdot D_A + 0.5 \cdot S_A + 1.4 \cdot W_A$$

$$q_{23} := 1.25 \cdot D_A + 0.5 \cdot S_A - 1.4 \cdot W_A$$

$$q_{24} := 0.9 \cdot D_A + 1.4 \cdot W_A$$

$$q_{25} := 0.9 \cdot D_A - 1.4 \cdot W_A$$

$$q_{26} := 0.9 \cdot D_A + 0.5 \cdot L_A + 1.4 \cdot W_A$$

$$q_{27} := 0.9 \cdot D_A + 0.5 \cdot L_A - 1.4 \cdot W_A$$

$$q_{28} := 0.9 \cdot D_A + 0.5 \cdot S_A + 1.4 \cdot W_A$$

$$q_{29} := 0.9 \cdot D_A + 0.5 \cdot S_A - 1.4 \cdot W_A$$

$$q_{30} := 1.0 \cdot D_A + 1.0 \cdot E_A$$

8.3.2 Table C.1 Case 4

$$q_{31} := 1.0 \cdot D_A - 1.0 \cdot E_A$$

$$q_{32} := 1.0 \cdot D_A + 0.5 \cdot L_A + 1.0 \cdot E_A$$

$$q_{33} := 1.0 \cdot D_A + 0.5 \cdot L_A - 1.0 \cdot E_A$$

$$q_{34} := 1.0 \cdot D_A + 0.25 \cdot S_A + 1.0 \cdot E_A$$

$$q_{35} := 1.0 \cdot D_A + 0.25 \cdot S_A - 1.0 \cdot E_A$$

$$q_{36} := 1.0 \cdot D_A + 0.5 \cdot L_A + 0.25 \cdot S_A + 1.0 \cdot E_A$$

$$q_{37} := 1.0 \cdot D_A + 0.5 \cdot L_A + 0.25 \cdot S_A - 1.0 \cdot E_A$$

$$q_{1f} := \max \left(\left[q_1 \ q_2 \ q_3 \ q_4 \ q_5 \ q_6 \ q_7 \ q_8 \ q_9 \ q_{10} \ q_{11} \ q_{12} \ q_{13} \ q_{14} \ q_{15} \ q_{16} \ q_{17} \ q_{18} \ q_{19} \ q_{20} \right] \right)$$

$$q_{2f} := \max \left(\left[q_{21} \ q_{22} \ q_{23} \ q_{24} \ q_{25} \ q_{26} \ q_{27} \ q_{28} \ q_{29} \ q_{30} \ q_{31} \ q_{32} \ q_{33} \ q_{34} \ q_{35} \ q_{36} \ q_{37} \right] \right)$$

$$q_f := \max \left(\left[q_{1f} \ q_{2f} \right] \right) \quad q_f = 39 \text{ psf}$$

Load Combinations (Concentrated Load)

$$q_1 := 1.4 \cdot D_C$$

8.3.2 Table C.1 Case 1

$$q_2 := 1.25 \cdot D_C + 1.5 \cdot L_C$$

8.3.2 Table C.1 Case 2

$$q_3 := 1.25 \cdot D_C + 1.5 \cdot L_C + 0.5 \cdot S_C$$

$$q_4 := 1.25 \cdot D_C + 1.5 \cdot L_C + 0.4 \cdot W_C$$

$$q_5 := 1.25 \cdot D_C + 1.5 \cdot L_C - 0.4 \cdot W_C$$

$$q_6 := 0.9 \cdot D_C + 1.5 \cdot L_C$$

$$q_7 := 0.9 \cdot D_C + 1.5 \cdot L_C + 0.5 \cdot S_C$$

$$q_8 := 0.9 \cdot D_C + 1.5 \cdot L_C + 0.4 \cdot W_C$$

$$q_9 := 0.9 \cdot D_C + 1.5 \cdot L_C - 0.4 \cdot W_C$$

$$q_{10} := 1.24 \cdot D_C + 1.5 \cdot (0.75 \cdot PL_C)$$

13.8.4.3

$$q_{11} := 1.25 \cdot D_C + 1.5 \cdot S_C$$

8.3.2 Table C.1 Case 3

$$q_{12} := 1.25 \cdot D_C + 1.5 \cdot S_C + 0.5 \cdot L_C$$

$$q_{13} := 1.25 \cdot D_C + 1.5 \cdot S_C + 0.4 \cdot W_C$$

$$q_{14} := 0.9 \cdot D_C + 1.5 \cdot S_C$$

$$q_{15} := 0.9 \cdot D_C + 1.5 \cdot S_C + 0.5 \cdot L_C$$

$$q_{16} := 0.9 \cdot D_C + 1.5 \cdot S_C + 0.4 \cdot W_C$$

$$q_{17} := 0.9 \cdot D_C + 1.5 \cdot S_C - 0.4 \cdot W_C$$

$$q_{18} := 1.25 \cdot D_C + 1.4 \cdot W_C$$

8.3.2 Table C.1 Case 4

$$q_{19} := 1.25 \cdot D_C - 1.4 \cdot W_C$$

$$q_{20} := 1.25 \cdot D_C + 0.5 \cdot L_C + 1.4 \cdot W_C$$

$$q_{21} := 1.25 \cdot D_C + 0.5 \cdot L_C - 1.4 \cdot W_C$$

$$q_{22} := 1.25 \cdot D_C + 0.5 \cdot S_C + 1.4 \cdot W_C$$

$$q_{23} := 1.25 \cdot D_C + 0.5 \cdot S_C - 1.4 \cdot W_C$$

$$q_{24} := 0.9 \cdot D_C + 1.4 \cdot W_C$$

$$q_{25} := 0.9 \cdot D_C - 1.4 \cdot W_C$$

$$q_{26} := 0.9 \cdot D_C + 0.5 \cdot L_C + 1.4 \cdot W_C$$

$$q_{27} := 0.9 \cdot D_C + 0.5 \cdot L_C - 1.4 \cdot W_C$$

$$q_{28} := 0.9 \cdot D_C + 0.5 \cdot S_C + 1.4 \cdot W_C$$

8.3.2 Table C.1 Case 4

$$q_{29} := 0.9 \cdot D_C + 0.5 \cdot S_C - 1.4 \cdot W_C$$

$$q_{30} := 1.0 \cdot D_C + 1.0 \cdot E_C$$

$$q_{31} := 1.0 \cdot D_C - 1.0 \cdot E_C$$

$$q_{32} := 1.0 \cdot D_C + 0.5 \cdot L_C + 1.0 \cdot E_C$$

$$q_{33} := 1.0 \cdot D_C + 0.5 \cdot L_C - 1.0 \cdot E_C$$

$$q_{34} := 1.0 \cdot D_C + 0.25 \cdot S_C + 1.0 \cdot E_C$$

$$q_{35} := 1.0 \cdot D_C + 0.25 \cdot S_C - 1.0 \cdot E_C$$

$$q_{36} := 1.0 \cdot D_C + 0.5 \cdot L_C + 0.25 \cdot S_C + 1.0 \cdot E_C$$

$$q_{37} := 1.0 \cdot D_C + 0.5 \cdot L_C + 0.25 \cdot S_C - 1.0 \cdot E_C$$

$$Q_{1f} := \max \left(\left[q_1 \ q_2 \ q_3 \ q_4 \ q_5 \ q_6 \ q_7 \ q_8 \ q_9 \ q_{10} \ q_{11} \ q_{12} \ q_{13} \ q_{14} \ q_{15} \ q_{16} \ q_{17} \ q_{18} \ q_{19} \ q_{20} \right] \right)$$

$$Q_{2f} := \max \left(\left[q_{21} \ q_{22} \ q_{23} \ q_{24} \ q_{25} \ q_{26} \ q_{27} \ q_{28} \ q_{29} \ q_{30} \ q_{31} \ q_{32} \ q_{33} \ q_{34} \ q_{35} \ q_{36} \ q_{37} \right] \right)$$

$$Q_f := \max \left(\left[Q_{1f} \ Q_{2f} \right] \right)$$

$$Q_f = 14.4567 \text{ kN}$$

Load Combinations (Line Load)

$$q_1 := 1.4 \cdot D_L$$

8.3.2 Table C.1 Case 1

$$q_2 := 1.25 \cdot D_L + 1.5 \cdot L_L$$

8.3.2 Table C.1 Case 2

$$q_3 := 1.25 \cdot D_L + 1.5 \cdot L_L + 0.5 \cdot S_L$$

$$q_4 := 1.25 \cdot D_L + 1.5 \cdot L_L + 0.4 \cdot W_L$$

$$q_5 := 1.25 \cdot D_L + 1.5 \cdot L_L - 0.4 \cdot W_L$$

$$q_6 := 0.9 \cdot D_L + 1.5 \cdot L_L$$

$$q_7 := 0.9 \cdot D_L + 1.5 \cdot L_L + 0.5 \cdot S_L$$

$$q_8 := 0.9 \cdot D_L + 1.5 \cdot L_L + 0.4 \cdot W_L$$

$$q_9 := 0.9 \cdot D_L + 1.5 \cdot L_L - 0.4 \cdot W_L$$

$$q_{10} := 1.24 \cdot D_L + 1.5 \cdot (0.75 \cdot PL_L)$$

13.8.4.3

$$q_{11} := 1.25 \cdot D_L + 1.5 \cdot S_L$$

8.3.2 Table C.1 Case 3

$$q_{12} := 1.25 \cdot D_L + 1.5 \cdot S_L + 0.5 \cdot L_L$$

$$q_{13} := 1.25 \cdot D_L + 1.5 \cdot S_L + 0.4 \cdot W_L$$

$$q_{14} := 0.9 \cdot D_L + 1.5 \cdot S_L$$

$$q_{15} := 0.9 \cdot D_L + 1.5 \cdot S_L + 0.5 \cdot L_L$$

$$q_{16} := 0.9 \cdot D_L + 1.5 \cdot S_L + 0.4 \cdot W_L$$

$$q_{17} := 0.9 \cdot D_L + 1.5 \cdot S_L - 0.4 \cdot W_L$$

$$q_{18} := 1.25 \cdot D_L + 1.4 \cdot W_L$$

8.3.2 Table C.1 Case 4

$$q_{19} := 1.25 \cdot D_L - 1.4 \cdot W_L$$

$$q_{20} := 1.25 \cdot D_L + 0.5 \cdot L_L + 1.4 \cdot W_L$$

$$q_{21} := 1.25 \cdot D_L + 0.5 \cdot L_L - 1.4 \cdot W_L$$

$$q_{22} := 1.25 \cdot D_L + 0.5 \cdot S_L + 1.4 \cdot W_L$$

$$q_{23} := 1.25 \cdot D_L + 0.5 \cdot S_L - 1.4 \cdot W_L$$

$$q_{24} := 0.9 \cdot D_L + 1.4 \cdot W_L$$

$$q_{25} := 0.9 \cdot D_L - 1.4 \cdot W_L$$

$$q_{26} := 0.9 \cdot D_L + 0.5 \cdot L_L + 1.4 \cdot W_L$$

$$q_{27} := 0.9 \cdot D_L + 0.5 \cdot L_L - 1.4 \cdot W_L$$

$$q_{28} := 0.9 \cdot D_L + 0.5 \cdot S_L + 1.4 \cdot W_L$$

$$q_{29} := 0.9 \cdot D_L + 0.5 \cdot S_L - 1.4 \cdot W_L$$

$$q_{30} := 1.0 \cdot D_L + 1.0 \cdot E_L$$

$$q_{31} := 1.0 \cdot D_L - 1.0 \cdot E_L$$

$$q_{32} := 1.0 \cdot D_L + 0.5 \cdot L_L + 1.0 \cdot E_L$$

$$q_{33} := 1.0 \cdot D_L + 0.5 \cdot L_L - 1.0 \cdot E_L$$

$$q_{34} := 1.0 \cdot D_L + 0.25 \cdot S_L + 1.0 \cdot E_L$$

$$q_{35} := 1.0 \cdot D_L + 0.25 \cdot S_L - 1.0 \cdot E_L$$

$$q_{36} := 1.0 \cdot D_L + 0.5 \cdot L_L + 0.25 \cdot S_L + 1.0 \cdot E_L$$

8.3.2 Table C.1 Case 4

$$q_{37} := 1.0 \cdot D_L + 0.5 \cdot L_L + 0.25 \cdot S_L - 1.0 \cdot E_L$$

$$Q_{1f} := \max \left(\left[q_1 \ q_2 \ q_3 \ q_4 \ q_5 \ q_6 \ q_7 \ q_8 \ q_9 \ q_{10} \ q_{11} \ q_{12} \ q_{13} \ q_{14} \ q_{15} \ q_{16} \ q_{17} \ q_{18} \ q_{19} \ q_{20} \right] \right)$$

$$Q_{2f} := \max \left(\left[q_{21} \ q_{22} \ q_{23} \ q_{24} \ q_{25} \ q_{26} \ q_{27} \ q_{28} \ q_{29} \ q_{30} \ q_{31} \ q_{32} \ q_{33} \ q_{34} \ q_{35} \ q_{36} \ q_{37} \right] \right)$$

$$Q_f := \max \left(\left[Q_{1f} \ Q_{2f} \right] \right)$$

$$Q_f = 3.25 \text{ Kl f}$$

$$Q_f = 47.43 \text{ kNpm}$$