INFORMATION SHEET
COLUMN DESIGN

NZ WOOD
For a better world

EXAMPLE 1

Select a sawn timber member to carry a permanent axial compressive load of 12 kN

N^*_c =	12	kN			

say the column is 2.4m long and restrained about the strong axis at the ends,

restrained about the weak axis @0.8 crs

Using MSG8 timber, actual size of 100x50 is 90x45

d =	90	mm	b =	45	mm

need to satisfy:

$N^*_c \leq \phi N_{ncx}$

and $N^*_c \leq \phi N_{ncy}$

about the strong axis x-x

k_{10}. L =	2400	
$S_2 = k_{10}.L/d$ or L_{ax} / d=	26.7	
k_8 =	0.41	from NZS3603 2.10

about the weak axis y-y

L_{ay} =	800	
$S_3 = k_{10}.L/d$ or L_{ay} / d=	17.8	
k_8 =	0.78	from NZS3603 2.10

f_c =	18	MPa
k_1 =	0.6	for a permanent load
ϕ =	0.8	
$\phi N_{ncx} = \phi.k_1.k_8.f_c.A$ =	14.3	kN
$\phi N_{ncy} = \phi.k_1.k_8.f_c.A$ =	27.2	kN

14.3kN and 27.2kN are greater than 12kN so design satisfied

What if the weak axis restraint was reduced to 1800 and a 90x25 T stiffener added?

L_{ay} =	1800	
$S=L.(A_{member}/12/I_{stiffener})^{0.5}$	26.8	
k_8 =	0.40	
$\phi N_{ncy} = \phi.k_1.k_8.f_c.A$ =	14.1	kN

14.1kN > 12 kN so OK to use a 90x25 T stiffener fixed to the column

EXAMPLE 2

Consider previous example with a short term transverse applied load causing a bending moment about the X-X axis of 240Nm. Weak axis restraint 800mm.

M^*_x =	0.24	kNm
$Z = b.d^2 / 6$ =	60750	mm^3
k_1 =	1.0	for short term load
f_b =	14	MPa for MSG8 timber

using k_8 and ϕ factors from example 1

we are considering the short term loading condition here, so the k_1 factor used throughout the calculation will be k1 = 1.0

$\phi M_{nx} = \phi.k_1.k_8.f_b.Z$ =	0.53	kNm
$\phi N_{ncx} = \phi.k_1.k_8.f_c.A$ =	23.8	kN
$\phi N_{ncy} = \phi.k_1.k_8.f_c.A$ =	45.4	kN
$N^*_c / \phi N_{ncx} + M^*_x / \phi M_{nx}$ =	0.96	< 1.0 so OK
$N^*_c / \phi N_{ncy} + (M^*_x / \phi M_{nx})^2$ =	0.45	< 1.0 so OK