

DIAPHRAGM SHEAR DEFLECTION EQUATIONS

Diaphragm shear deflection may be determined by the following equations:

Type of Loading	Loading Condition	Shear Deflection	Diagrams
Simple Span Diaphragm, Deflection at L_1	Uniform Load, w	$\Delta_w = \frac{q_{ave}L_1}{G'}$	
Simple Span Diaphragm, Deflection at center	Uniform Load, w	$\Delta_w = \frac{wL^2}{8bG'}$	
Simple Span Diaphragm, Deflection at center	Point Load, P	$\Delta_w = \frac{PL}{4bG'}$	
Simple Span Diaphragm, Deflection at 1/3 points	Point Load, P	$\Delta_w = \frac{PL}{3bG'}$	
Cantilever Diaphragm, Deflection at Free End	Uniform Load, w	$\Delta_w = \frac{WL^2}{2bG'}$	
Cantilever Diaphragm, Deflection at Free End	Point Load, P	$\Delta_w = \frac{PL}{bG'}$	

Where:

Δ_w = Diaphragm shear web deflection (in)

q_{ave} = Average diaphragm shear (lbs/ft)

L_1 = Distance between vertical resisting element (such as shear wall) and the point at which deflection is to be calculated (ft)

G' = Diaphragm shear stiffness factor (kips/in)

b = Depth of diaphragm (ft)

L = Diaphragm Length (ft)

P = Concentrated load (lbs)

w = Uniform load (lbs/ft)