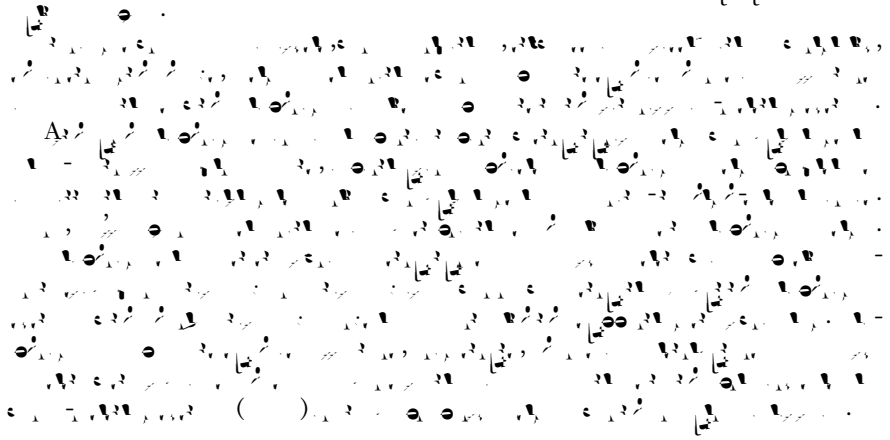
THE PROCESS OF DIAPHRAGM



Start with Codes

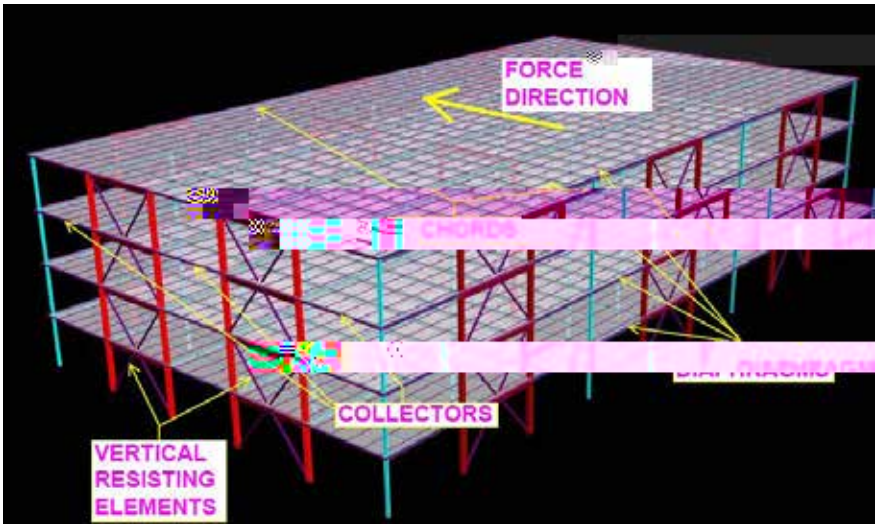
2016 *California Building Code* (16A)

/A 7-10: *Minimum Design Loads for Buildings and Other Structures*

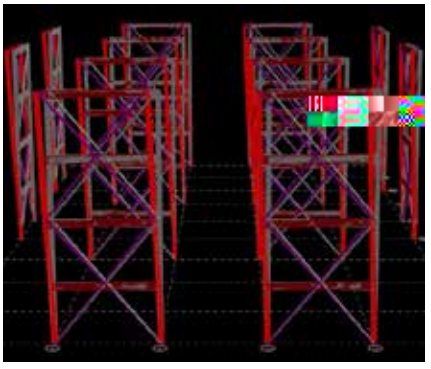
(-)

12.3-1 12.3-2 A 7-10.

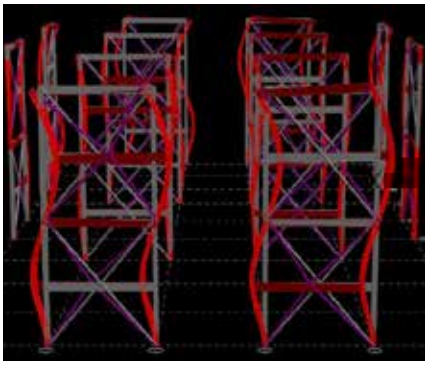
A conventional steel-framed building with a composite slab-on-metal-deck diaphragm.



Elements of an SFRS and diaphragm components.



Primary mode displaced shape.



Higher mode displaced shape.

A 7-10, 12.10-1, :

$$F_{px} = \frac{\sum_{i=x}^{n} F_i}{\sum_{i=x}^{n} w_i} w_{px}$$

0.2 $_{DS} I_e w_{px}$, Fpx, 0.4 $_{DS} I_e w_{px}$

, ρ, 1.0 Fpx ρ Fpx

Fpx Fpx Fpx

≤ A 7-10

Balance and Force

A , *Fpx* / ≤ .

A .

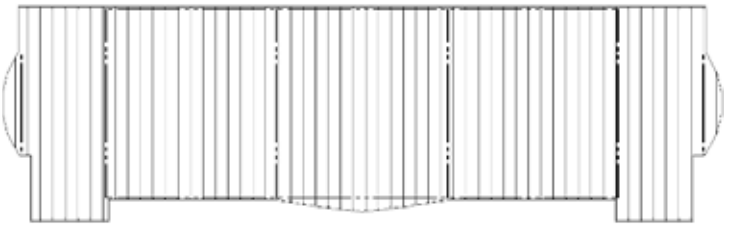
(/).

(*NEHRP Seismic Design Technical Brief No. 5*).

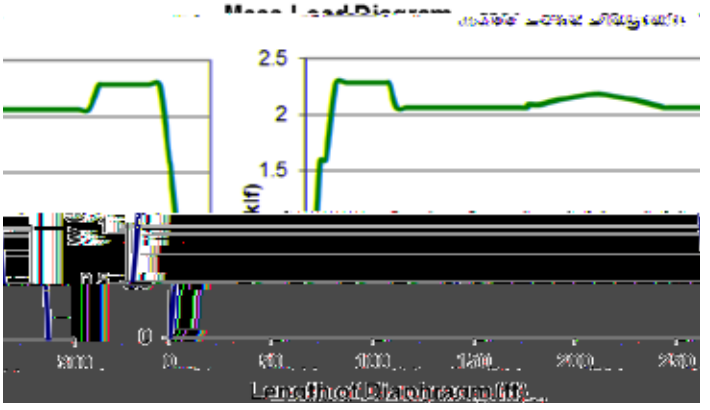
≤ ( ) *Diaphragm Design Manual*

Collectors, Chords and Connections

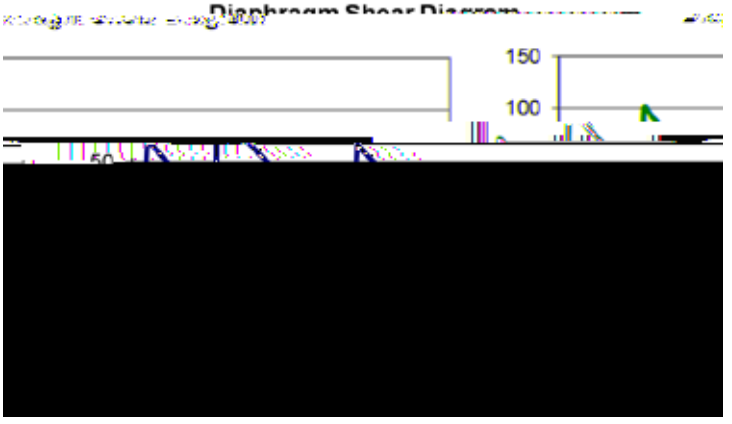
≤ . A 7



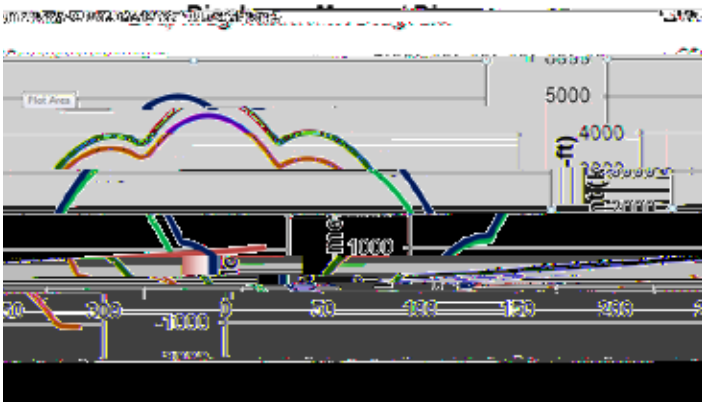
An example floor plan and SFRS elements for diaphragm analysis.



Mass load diagram of diaphragm.



Shear diagram of diaphragm.



Moment diagram of diaphragm (constructed with superposition of integrated shear diagram with linear moment correction due to M_T).

$\Omega_0 F_i$, $\Omega_0 F_{px}$ – F_{px}; A 7-10, 12.10-2. ( ), A (R>3), *Seismic Provisions for Structural Steel Buildings* (A /A 341) *Speci cation for Structural Steel Buildings* (A /A 360). ≤ . (*Speci cation Seismic Provisions* **www.aisc.org/speci cations**). / A 7-10.

( ) (A *Journal of Structural Engineering*, 2003). A . / ■

This article is based on Session N18 "Diaphragm Analysis, Design and Connection Considerations in Steel Seismic Force-Resisting Systems" from the 2018 NASCC: The Steel Conference, which took place April 11-13 in Baltimore. Visit ***www.aisc.org/nascc*** *roughly a month following the conference to view the presentation.*