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Session Description

Session 8: Lateral Drifts and Façade Attachments

August 6, 2018

When buildings sway under wind and seismic loads, the facade systems must accommodate inter-story drifts between the building's floor levels. Finding ways to accommodate these drifts through the height of the building, particularly at corners and at the ground story, can be challenging. In this session, we will consider ways to detail facade attachments to accommodate a building's lateral drifts.

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Learning Objectives

- List the basic design strategies for accommodating the in-plane relative movement in a façade system that arises from building lateral drift.
- Explain the façade jointing challenges at building corners and how they can be detailed.
- Identify relevant code provisions for the design of façade systems for wind and seismic drift and their underlying performance objectives.
- Describe how the concepts of “mean recurrence interval” and “probability of exceedance” can be used to establish design criteria for building facades.

There's always a solution in steel.

Behind the Facade: Guidance for Supporting Facades on Steel-Framed Buildings

Session 8: Lateral Drifts and Façade Attachments

August 6, 2018

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Senior Principal
Simpson Gumpertz & Heger Inc.
Los Angeles, CA

structural STEEL

Syllabus for Night School Sessions

- Session 1
- Session 2
- Session 3
- Session 4
  - Accommodating Lateral Drifts
  - In-Plane Movements
  - Out-of-Plane Movements
  - Building Corners

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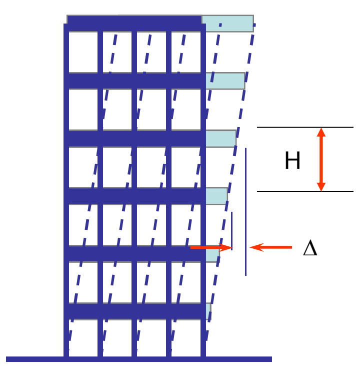
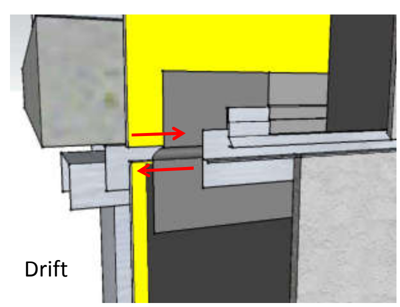
"DEALING WITH DRIFT"





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Background

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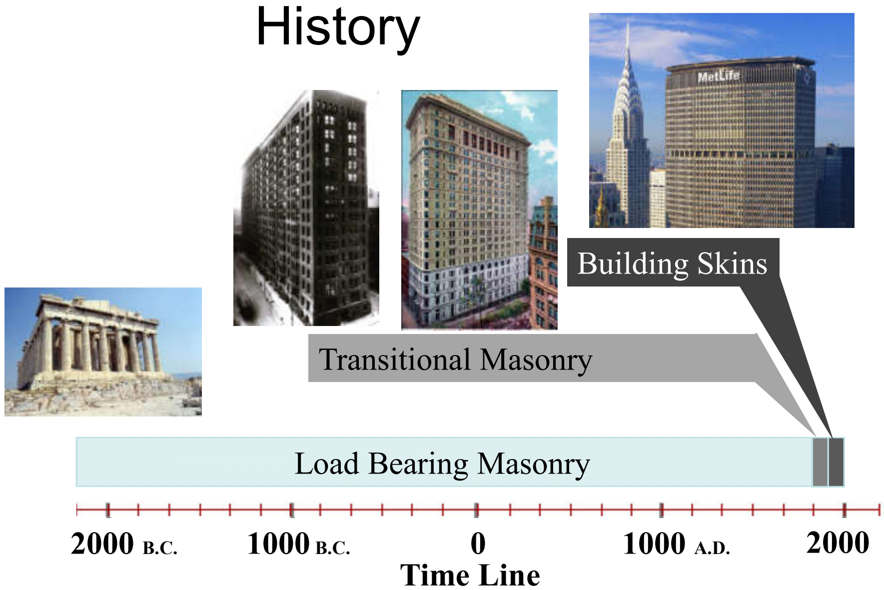
History



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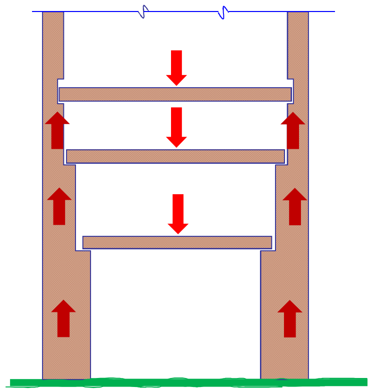
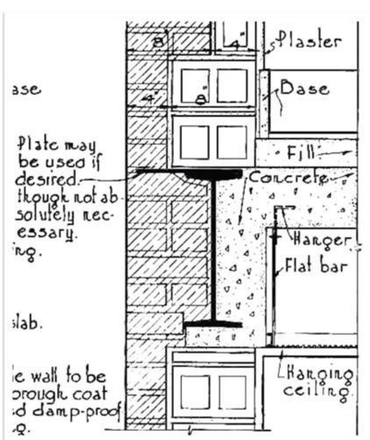
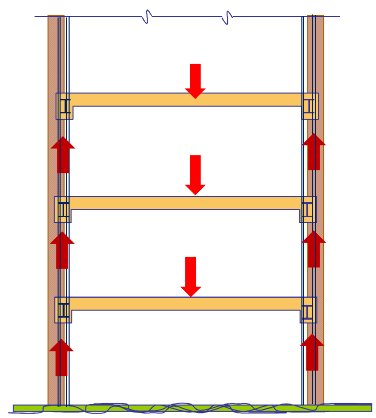
Load Bearing Walls

Monadnock Block

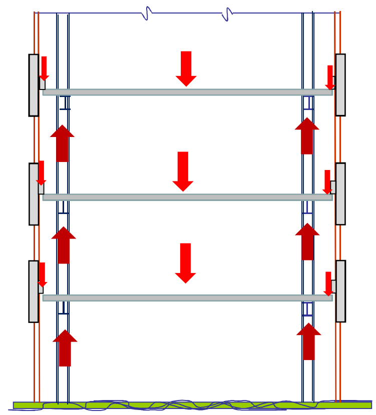


Transitional Buildings





Modern Non-Structural Wall Buildings – "Skinned"



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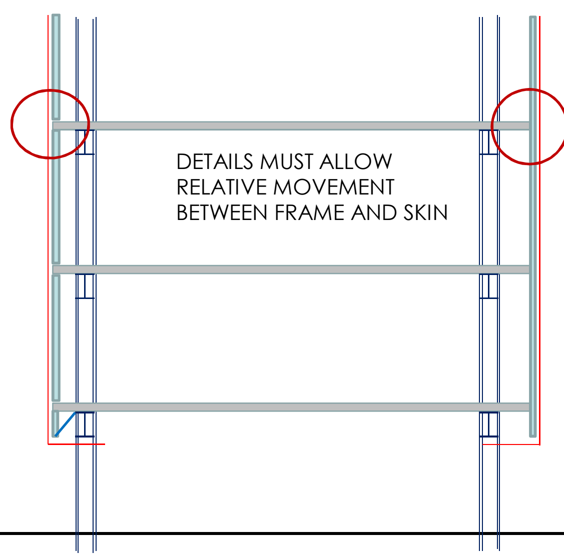
Modern Non-Structural Wall Buildings – "Skinned"



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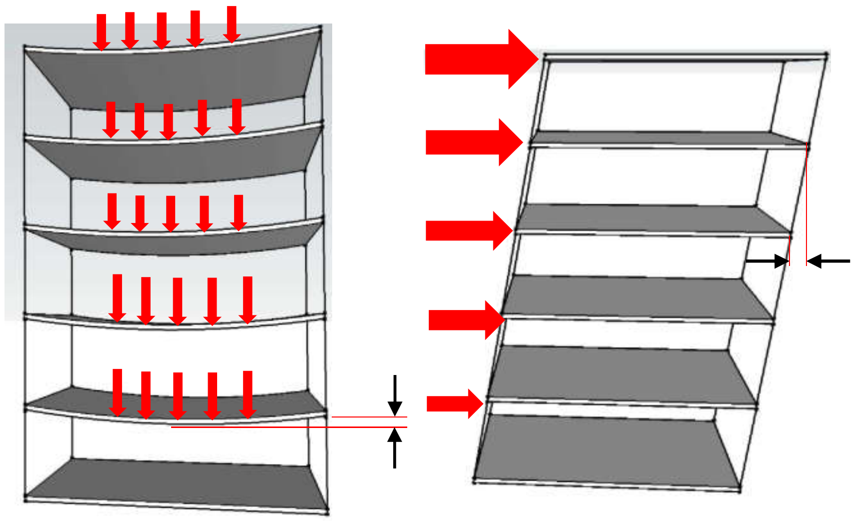
Structural Movement



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Why it matters….

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Accommodating Vertical Movement

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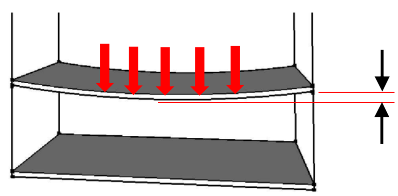
Floor and Roof Deflections Live, Snow, & Rain Loads



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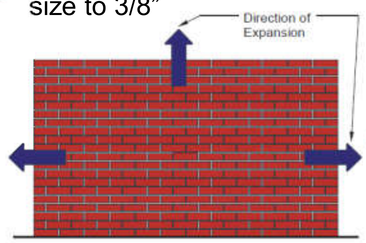
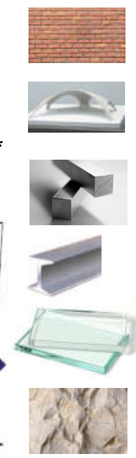
Facade Movements – Thermal and Moisture

$M = \Delta T * L * \alpha$

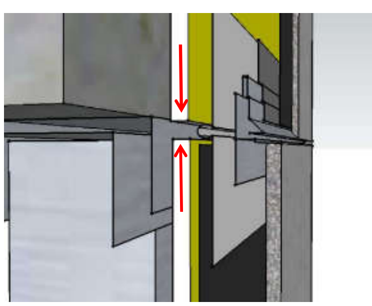
- M: Thermal movement
- ΔT: Max Temperature Range
- L: Length
- α: Coefficient of Linear Thermal Expansion

Moisture example:
A **1/2"** joint within a brick wall spaced @ 20'-0" O.C. will expand by 1/8" (0.05% * 20'-0"), reducing the joint size to 3/8"

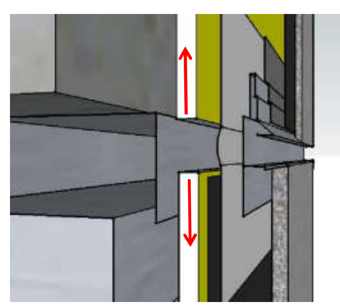




Accommodating Vertical Movement



Compression



Expansion

Transitions in Façade Support

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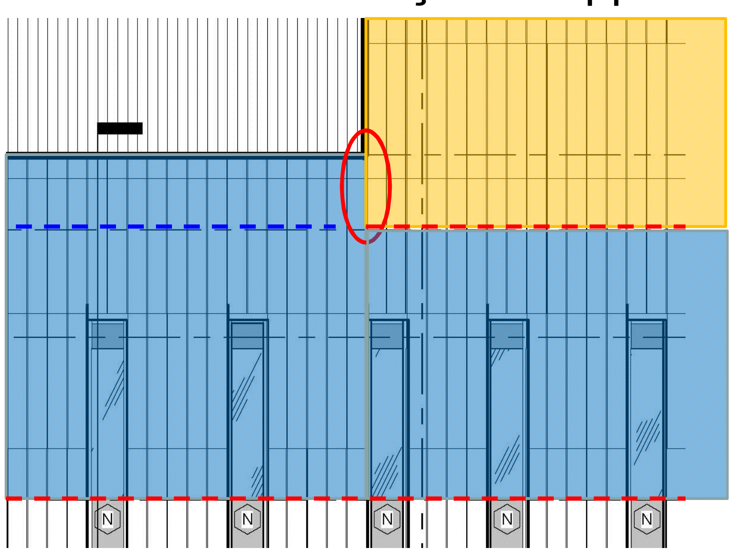
Transitions in Façade Support



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Transitions in Façade Support

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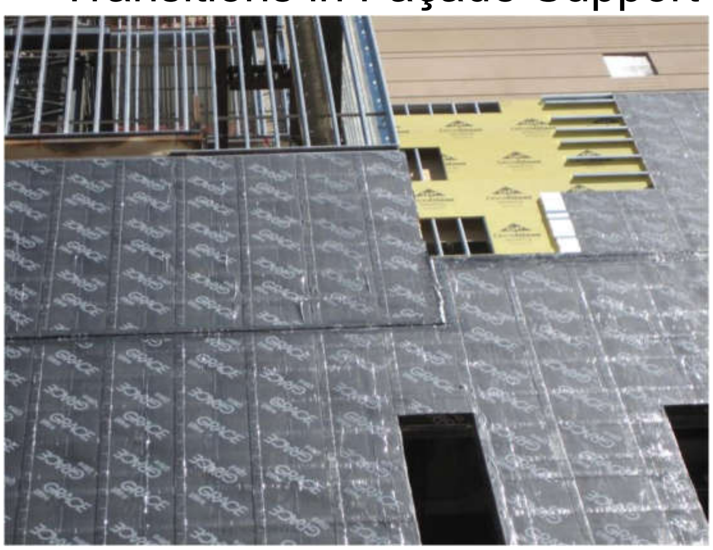
Transitions in Façade Support



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Accommodating Lateral Drift

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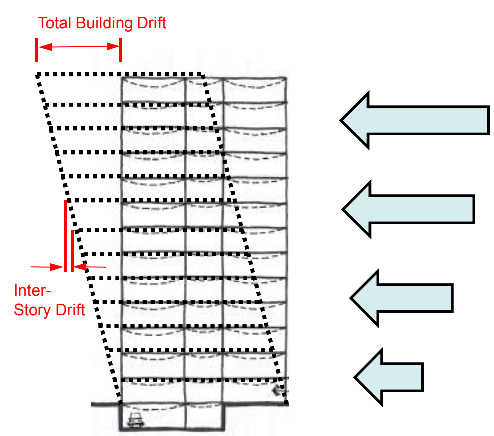
Inter-Story Drift

- The most common sources of horizontal building movement are **wind loads** and **seismic loads**



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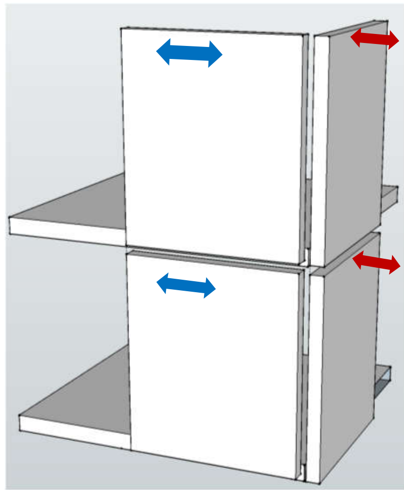
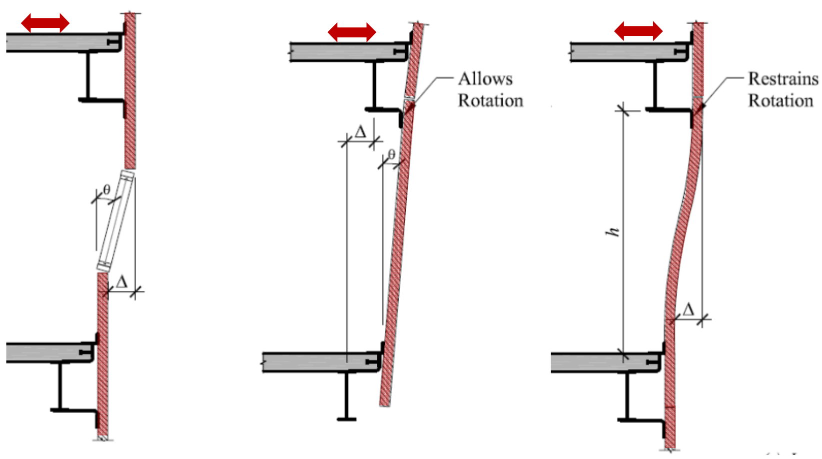
Drift: In-Plane and Out-of-Plane Movements

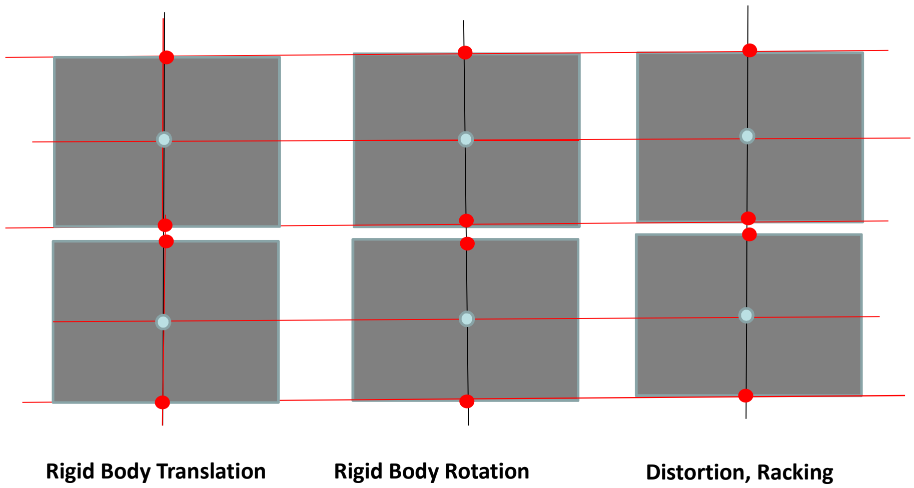


Out-of-Plane Movement from Drift



Rigid Body Translation **Rigid Body Rotation** **Distortion, Curvature**

Accommodating In-Plane Drift



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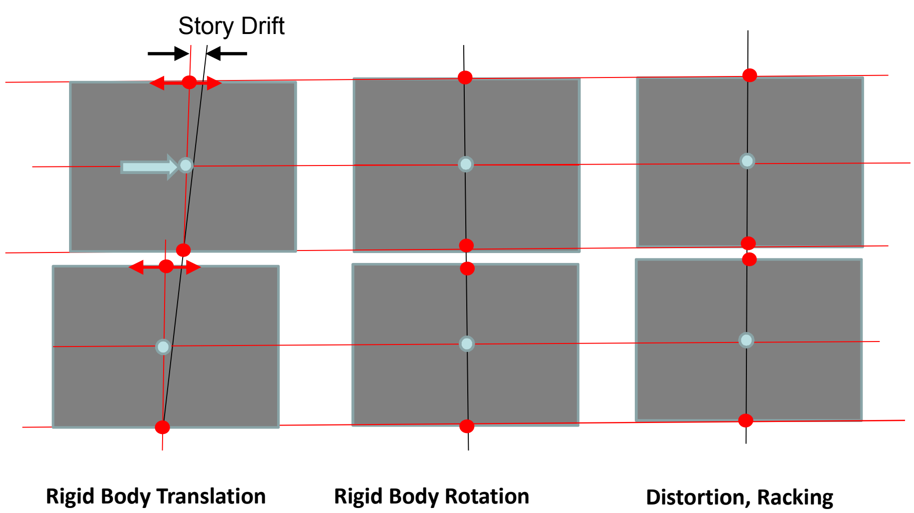
Accommodating In-Plane Drift



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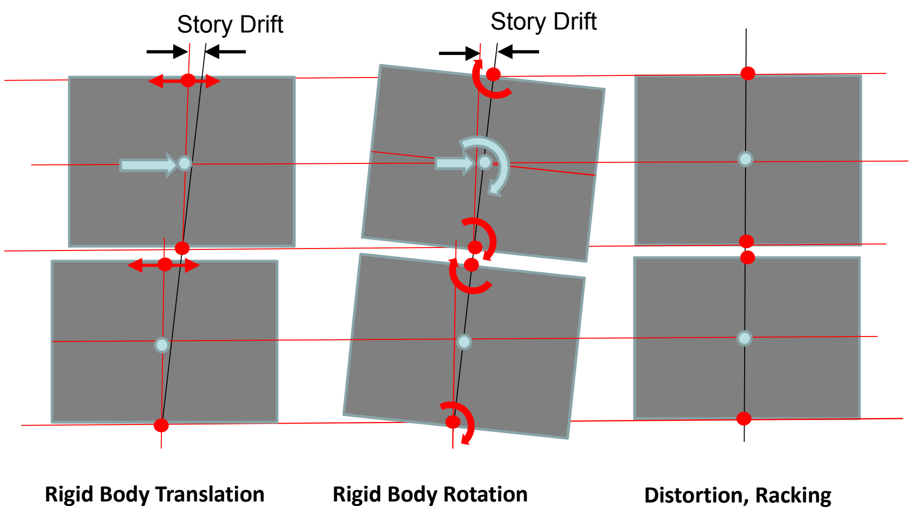
Accommodating In-Plane Drift



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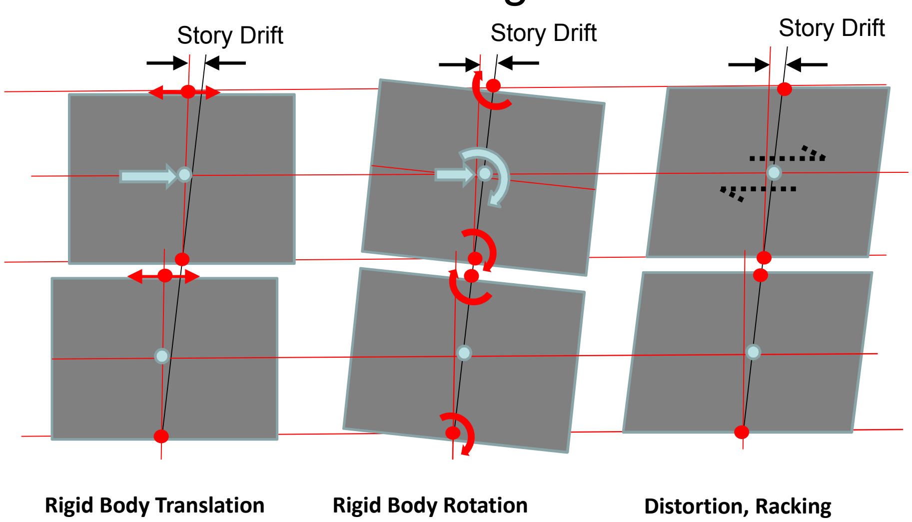
Accommodating In-Plane Drift



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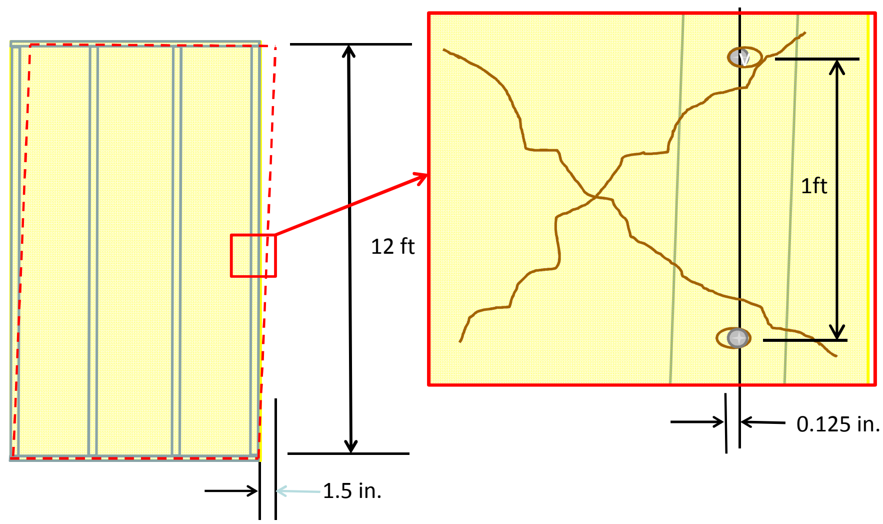
Racking Metal Stud Backup - Does it Matter?



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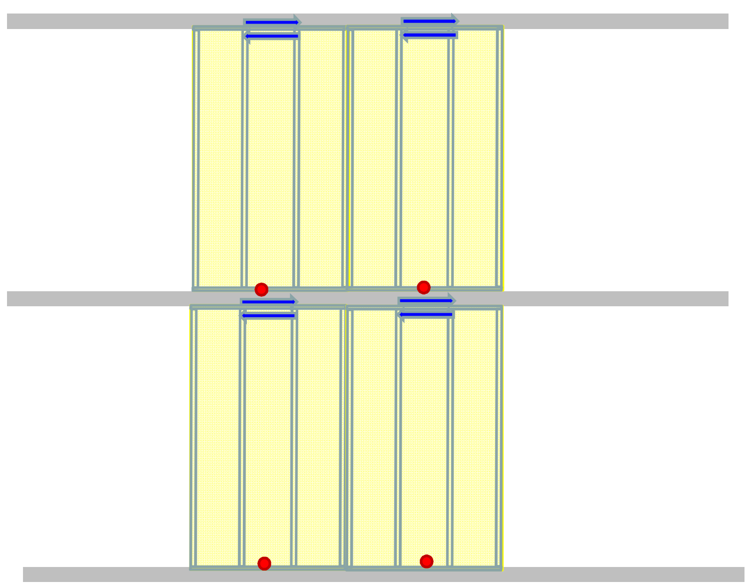

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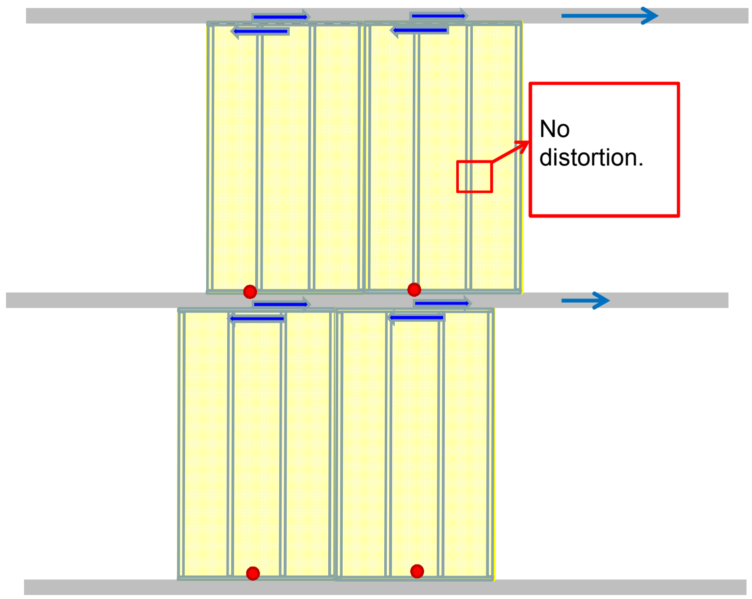

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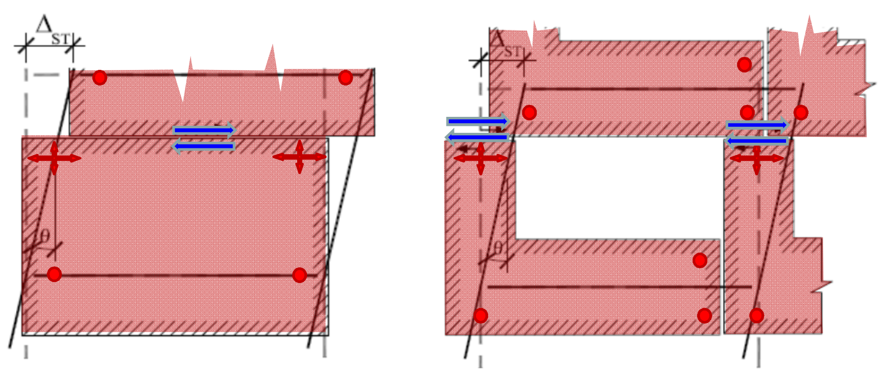
Rigid Body Translation Connections



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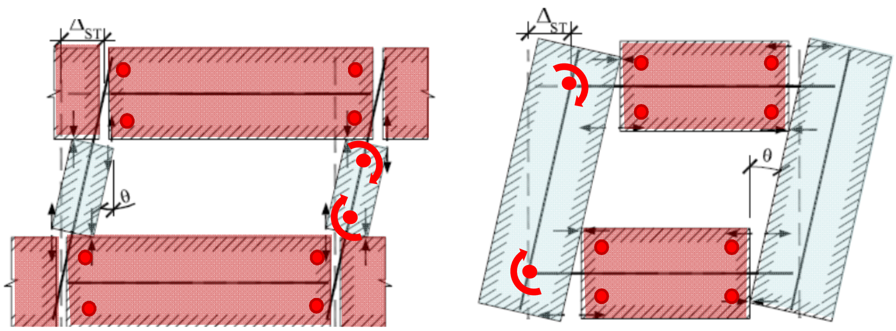
Rigid Body Rotation Mixed with Translation



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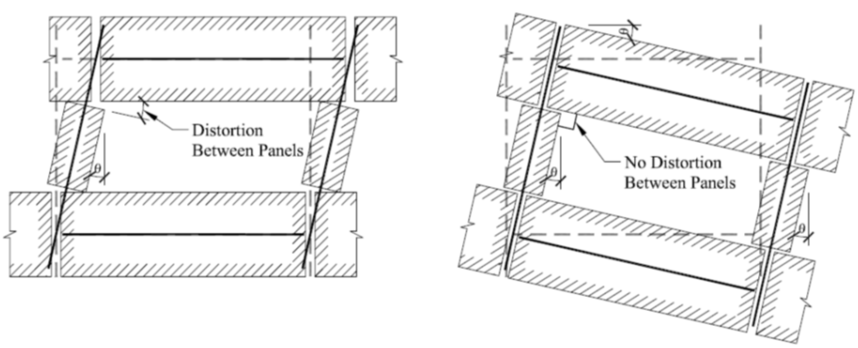
Shear and Flexural Deformations



(a) Frame Shear Deformation Movement on Joints

(b) Frame Flexural Deformation Less Movement at Joints

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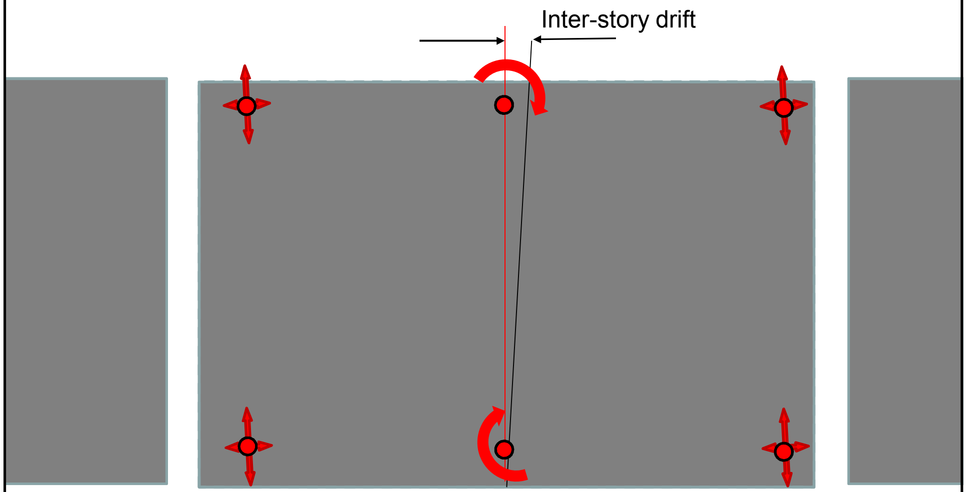
Rigid Body Rotation Connections



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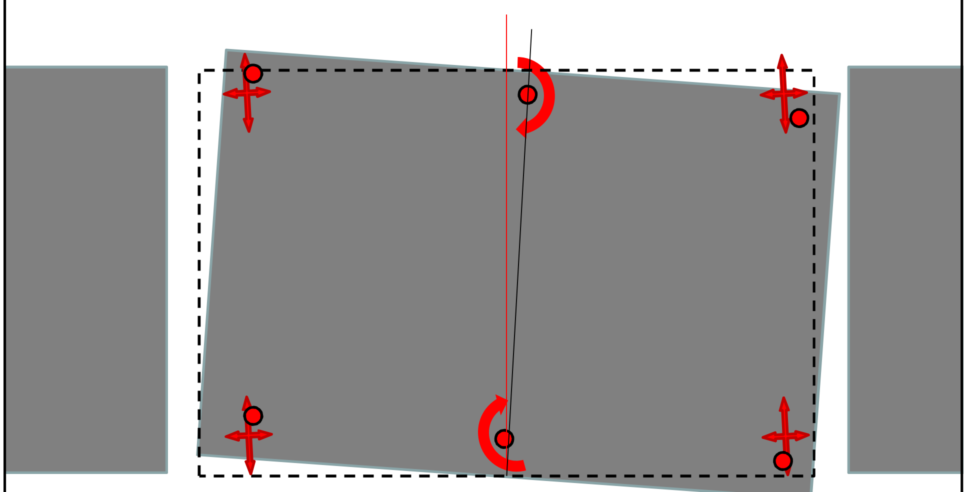
Rigid Body Rotation Connections



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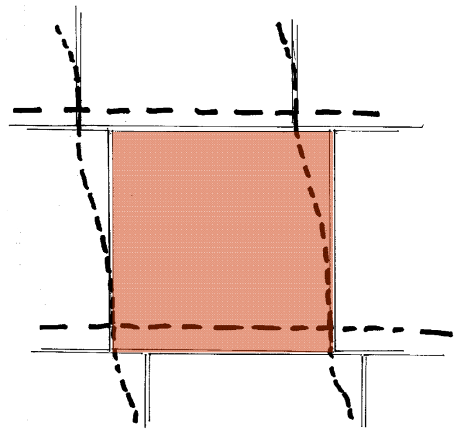
In-Plane Movements



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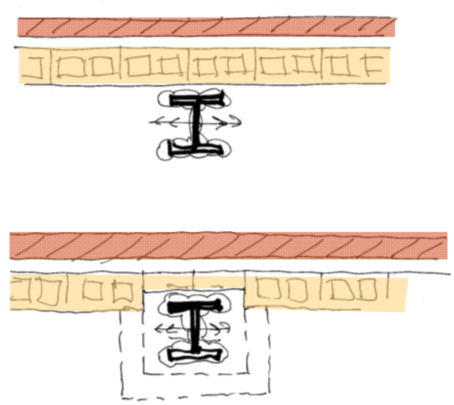
In-Plane Movements



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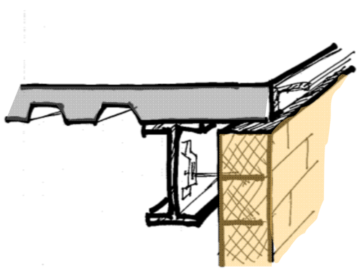
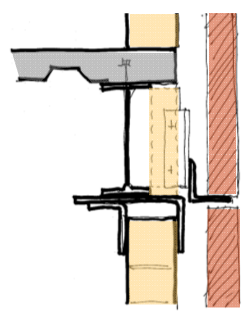
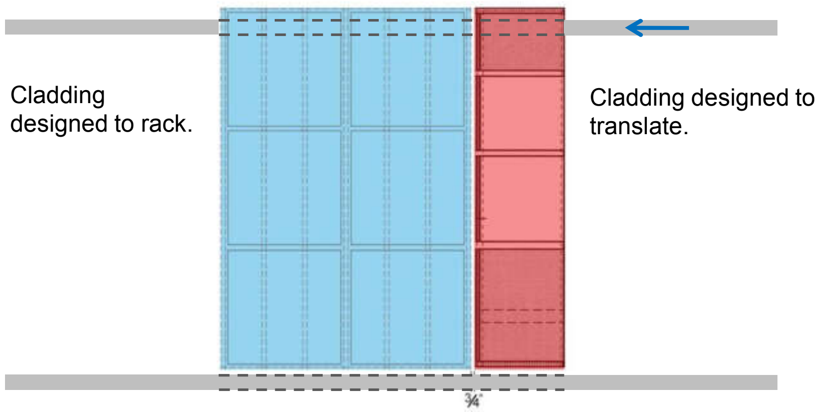
Top of Wall Connections





Lateral Drift – Mixed Systems



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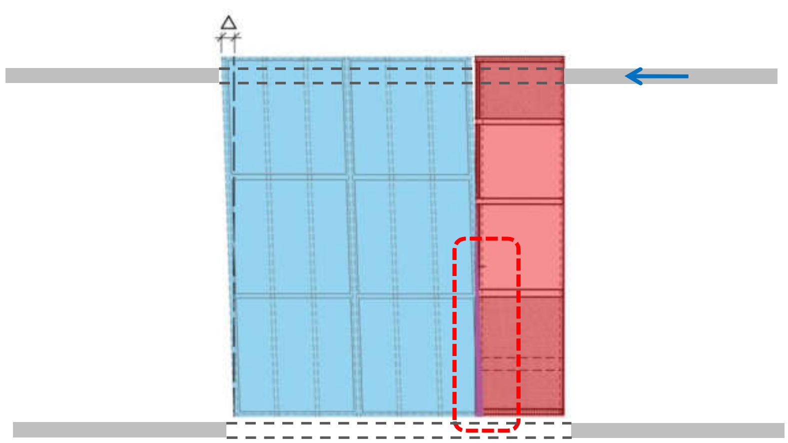
Lateral Drift - Mixed Systems



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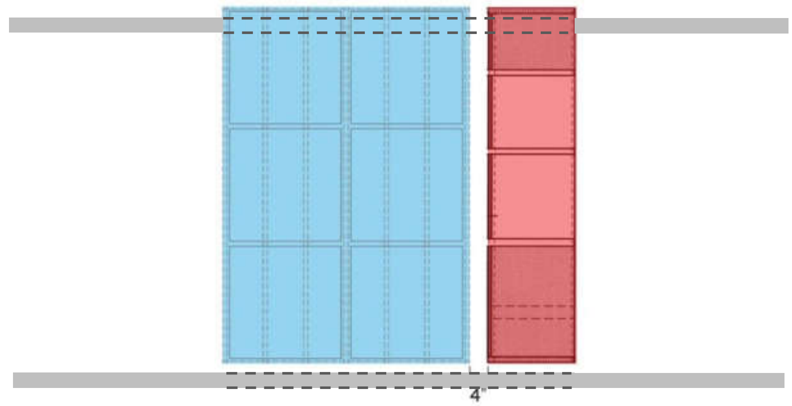
Lateral Drift - Mixed Systems



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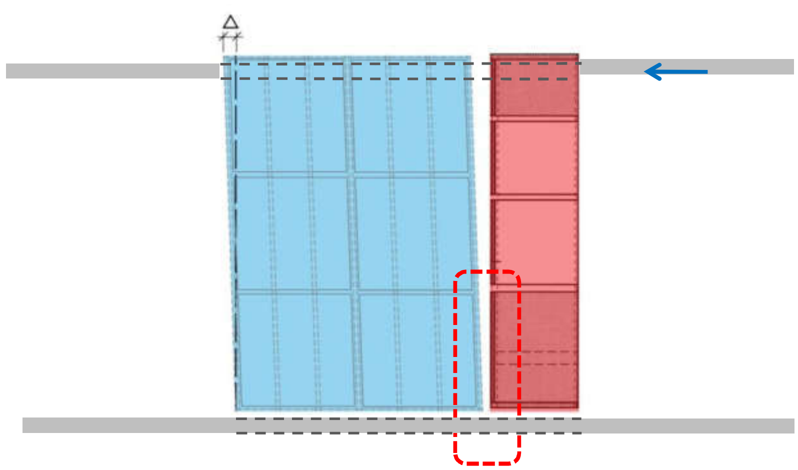
Lateral Drift - Mixed Systems



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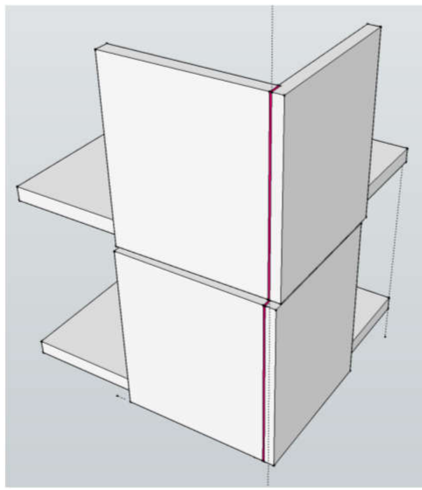
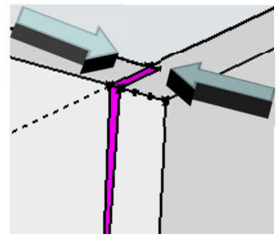
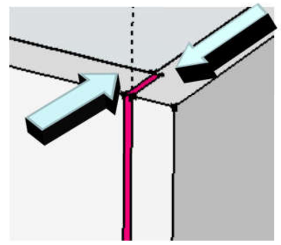
Corners







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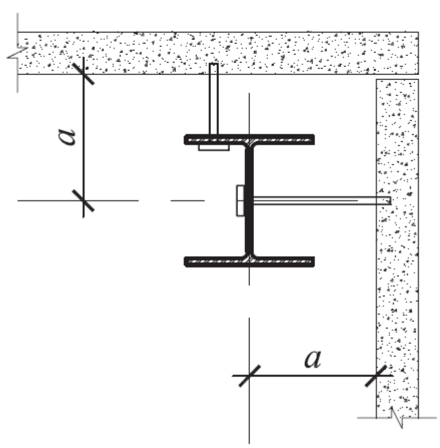
Potential Interference at Corners



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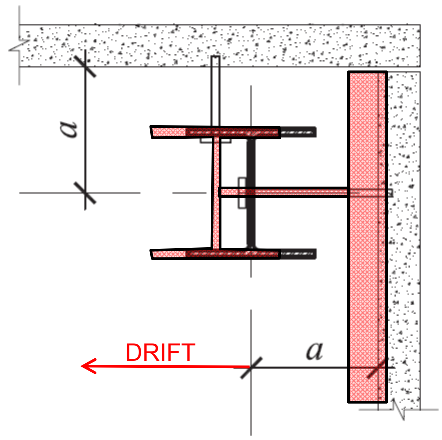
Potential Interference at Corners



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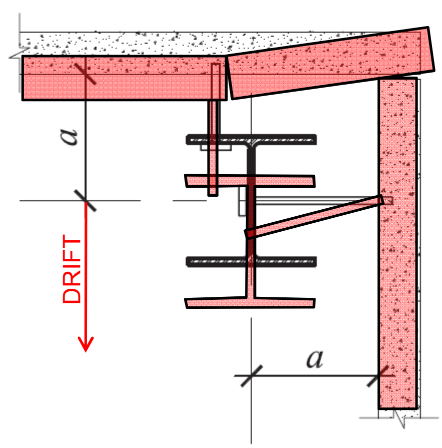
Potential Interference at Corners



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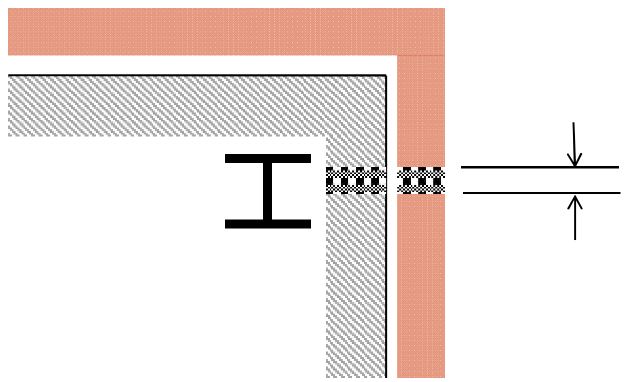
Translating System Corner – Large Joint



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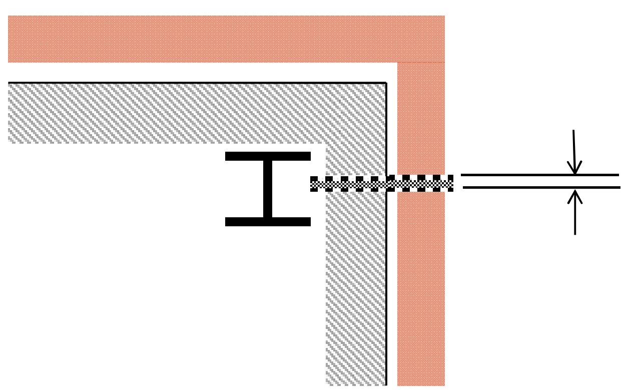
Translating System Corner – Large Joint



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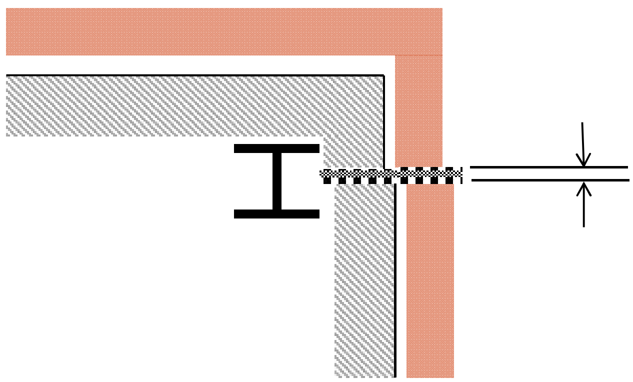
Translating System Corner – Large Joint



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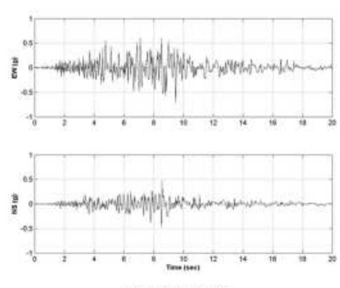
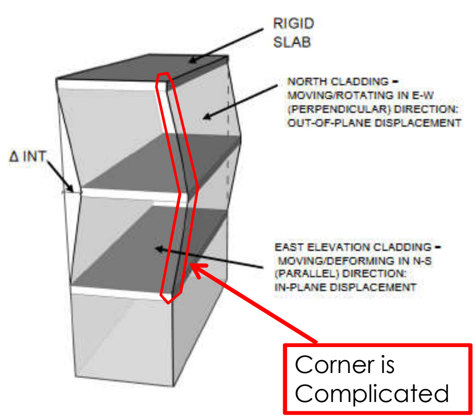
Earthquakes Cause Motion In All Directions





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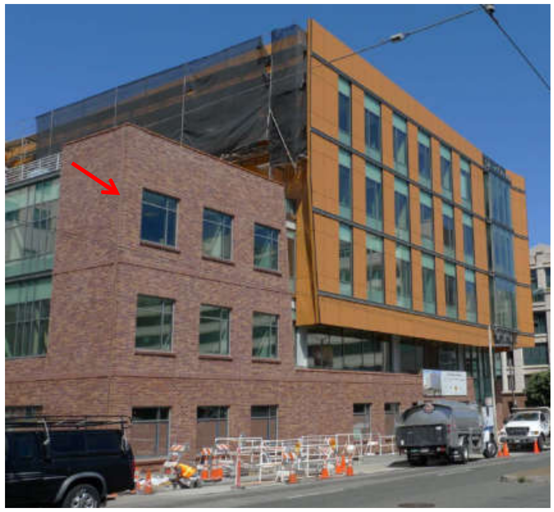
Example: Wide Joint at Corner



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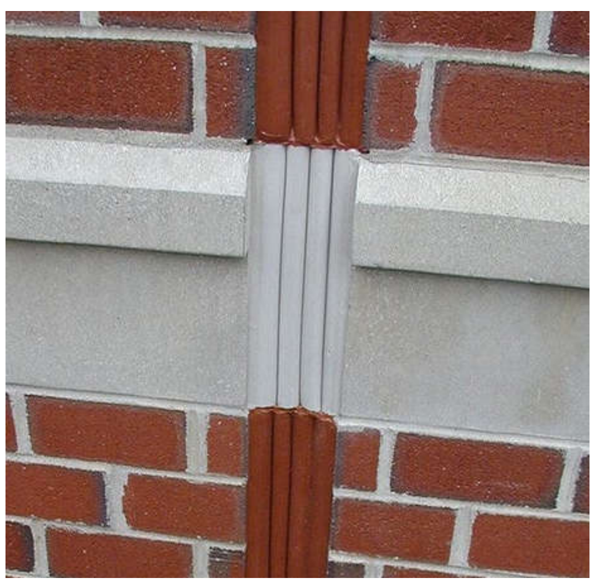

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Example: Hidden Joint at Corner

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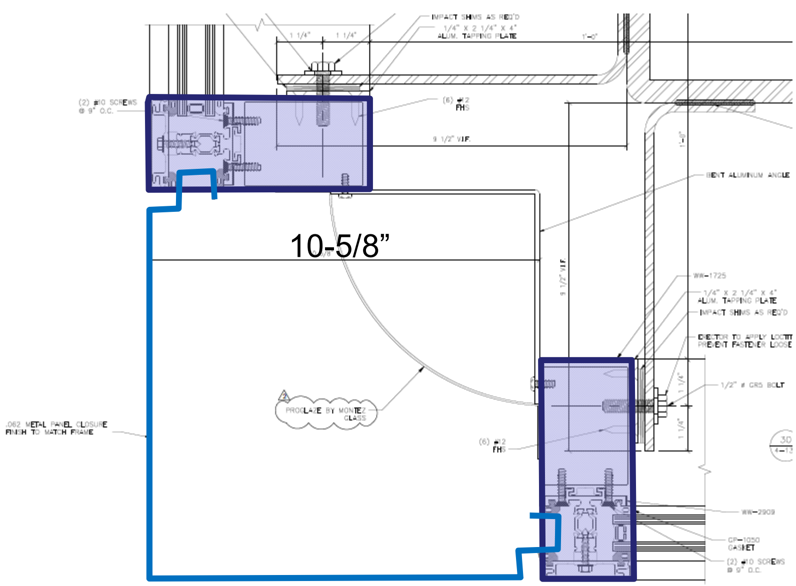
Example: Crumple Zone at Corner



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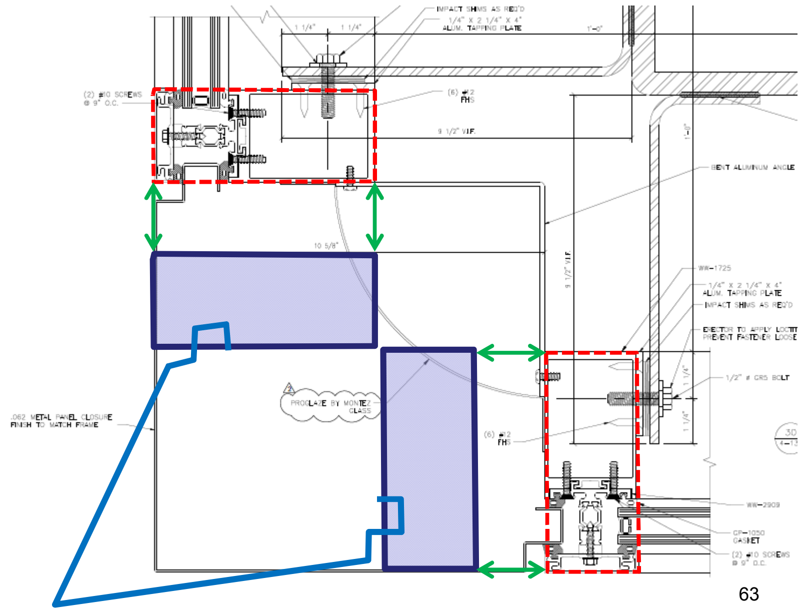
Translating System Corner – Crumple Zone



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Wind and Seismic Forces

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Demands - Wind

- Wind forces for main LFRS determines strength level drift.
- Wind forces on components and cladding determine façade attachment forces.

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Wind Load Demands

- **Out-of-plane forces – components and cladding**
  - Façade element strength
  - Façade attachments strength
- **Strength level drift – main LFRS**
  - Façade attachments must not fail due to displacement
  - Façade elements cannot become falling hazards
  - Connections must accommodate drift
- **Service level drift – not codified**
  - Performance of façade and joints

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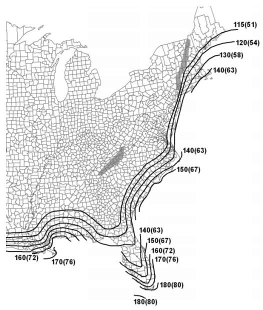
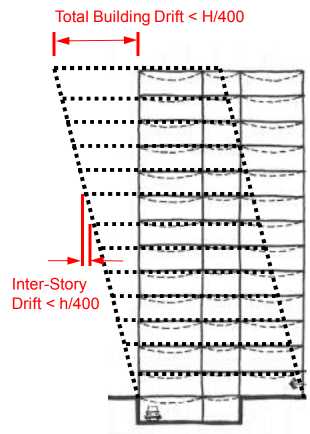
Wind Drift Design





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Design Wind Drift for Safety

- Code prescribed wind forces for safety:

Building Risk Category	MRI	Annual Probability of Exceedance
I	300 years	0.33%
II	750 years	0.14%
III	1700 years	0.06%
IV	1700 years	0.06%

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Serviceability Checks - Drift

- Serviceability checks may be for lower forces and drifts
- ASCE 7-16 Commentary suggests:

$$D + 0.5L + W_a$$

- Example: Boston, Risk Category II:
  - 10 year MRI – W_a = 39% of W
  - 25 year MRI – W_a = 50% of W
  - 50 year MRI – W_a = 58% of W
  - 100 year MRI – W_a = 69% of W

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Wind Deflections - IBC

TABLE 1604.3
DEFLECTION LIMITS[a, b, c, h, i]

CONSTRUCTION	L	S or W[f]	$D + L$[d, g]
Roof members:[e]			
Supporting plaster or stucco ceiling	$l/360$	$l/360$	$l/240$
Supporting nonplaster ceiling	$l/240$	$l/240$	$l/180$
Not supporting ceiling	$l/180$	$l/180$	$l/120$
Floor members	$l/360$	—	$l/240$
Exterior walls:			
With plaster or stucco finishes	—	$l/360$	—
With other brittle finishes	—	$l/240$	—
With flexible finishes	—	$l/120$	—
Interior partitions:[b]			
With plaster or stucco finishes	$l/360$	—	—
With other brittle finishes	$l/240$	—	—
With flexible finishes	$l/120$	—	—
Farm buildings	—	—	$l/180$
Greenhouses	—	—	$l/120$

Exterior Walls:
With plaster or stucco finishes ------ *l/360*
With other brittle finishes--------------*l/240*
With flexible finishes -------------------*l/120*

Footnote f:
The wind load is permitted to be taken as 0.42 times the "component and cladding" loads for the purpose of determining deflection limits herein. Where members support glass in accordance with Section 2403 using the deflection limit therein, the wind load shall be no less than 0.6 times the "component and cladding" loads for the purpose of determining deflection.

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Demands - Seismic

- Seismic forces for main LFRS determines strength level drift.
- Seismic forces on architectural components determine façade attachment forces.

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Seismic Load Demands

- **Out-of-plane forces *<u>and</u>* in-plane forces – Chapter 13, Architectural Components**
  - Façade element strength
  - Façade attachment strength
- **Strength level drift – Chapter 12, main LFRS**
  - Façade attachments must not fail
  - Façade elements cannot become falling hazards
  - Connections must accommodate drift
- **Service level drift – not codified**
  - Performance of façade and joints

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Chapter 13, Seismic Loads

$$F_p = \frac{0.4 a_p S_{DS} W_p}{\left(\frac{R_p}{I_p}\right)}\left(1 + 2\frac{z}{h}\right)$$

Table 13.5-1 Coefficients for Architectural Components

Architectural Component	a_p^a	R_p	Ω_0^b
Exterior nonstructural wall elements and connections[b]			
Wall element	1	2½	NA
Body of wall panel connections	1	2½	NA
Fasteners of the connecting system	1¼	1	1
Veneer			
Limited deformability elements and attachments	1	2½	2
Low-deformability elements and attachments	1	1½	2

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Seismic Displacements for Exterior Walls

13.3.2 Seismic Relative Displacements. The effects of seismic relative displacements shall be considered in combination with displacements caused by other loads as appropriate. Seismic relative displacements, D_{pI}, shall be determined in accordance with Eq. (13.3-6):

$$D_{pI} = D_p I_e \qquad (13.3\text{-}6)$$

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Attachment Design

13.5.3 Exterior Nonstructural Wall Elements and Connections. Exterior nonstructural wall panels or elements that are attached to or enclose the structure shall be designed to accommodate the seismic relative displacements defined in Section 13.3.2 and movements due to temperature changes. Such elements shall be supported by means of positive and direct structural supports or by mechanical connections and fasteners in accordance with the following requirements:

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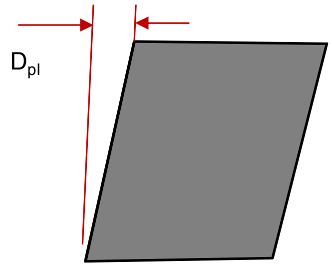
Attachments

1. Connections and panel joints shall allow for the story drift caused by relative seismic displacements (D_{pI}) determined in Section 13.3.2, or 0.5 in. (13 mm), whichever is greater.



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Attachments

2. Connections accommodating story drift through sliding mechanisms or bending of threaded steel rods shall satisfy the following:
   a. Threaded rods or bolts shall be fabricated of low-carbon or stainless steel. Where cold-worked carbon steel threaded rods are used, the rods as fabricated shall meet or exceed the reduction of area, elongation, and tensile strength requirements of ASTM F1554, Grade 36. Grade 55 rods shall also be permitted provided that they meet the requirements of Supplement 1; and

Ductility

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Attachments

b. Where threaded rods connecting the panel to the supports are used in connections using slotted or oversize holes, the rods shall have length to diameter ratios of 4 or less, where the length is the clear distance between the nuts or threaded plates. The slots or oversized holes shall be proportioned to accommodate the full in-plane design story drift in each direction, the nuts shall be installed finger-tight, and a positive means to prevent the nut from backing off shall be used; and

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Attachments

c. Connections that accommodate story drift by bending of threaded rods shall satisfy Eq. (13.5-1):

$$(L/d)/D_{pI} \geq 6.0[1/\text{in.}] \qquad (13.5\text{-}1)$$

where:

L = clear length of rod between nuts or threaded plates [in. (mm)];
d = rod diameter [in. (mm)]; and
D_{pI} = relative seismic displacement that the connection must be designed to accommodate [in. (mm)].

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Attachments

3. The connecting member itself shall have sufficient ductility and rotation capacity to preclude fracture of the concrete or brittle failures at or near welds.

Table 13.5-1 Coefficients for Architectural Components

Architectural Component	a_p[a]	R_p	Ω_0[b]
Exterior nonstructural wall elements and connections[b]			
Wall element	1	2½	NA
Body of wall panel connections	1	2½	NA
Fasteners of the connecting system	1¼	1	1
Veneer			
Limited deformability elements and attachments	1	2½	2
Low-deformability elements and attachments	1	1½	2

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13.5.9 Glass in Glazed Curtain Walls, Glazed Storefronts, and Glazed Partitions

13.5.9.1 General. Glass in glazed curtain walls, glazed storefronts, and glazed partitions shall meet the relative displacement requirement of Eq. (13.5-2):

$$\Delta_{\text{fallout}} \geq 1.25 D_{pI} \qquad (13.5\text{-}2)$$

or 0.5 in. (13 mm), whichever is greater, where:

Δ_{fallout} = the relative seismic displacement (drift) at which glass fallout from the curtain wall, storefront wall, or partition occurs (Section 13.5.9.2);

By testing AAMA 501.6

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Exceptions for Fallout Provision

- Glass with sufficient glass-to-frame clearances to accommodate seismic displacement;
- Fully tempered monolithic glass less than 10 feet above walking surfaces; and
- Single thickness laminated glass that is fully captured and wet glazed.

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EXCEPTIONS:

1. Glass with sufficient clearances from its frame such that physical contact between the glass and frame does not occur at the design drift, as demonstrated by Eq. (13.5-3), need not comply with this requirement:

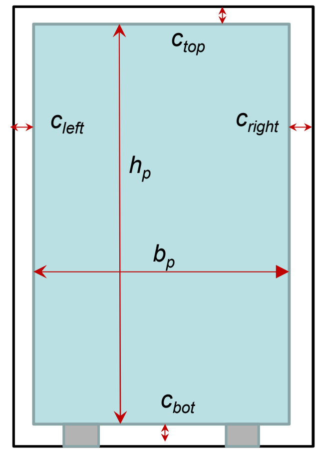
$$D_{clear} \geq 1.25 D_{pI} \qquad (13.5\text{-}3)$$

where D_{clear} = relative horizontal (drift) displacement, measured over the height of the glass panel under consideration, which causes initial glass-to-frame contact. For rectangular glass panels within a rectangular wall frame,

$$D_{clear} = 2c_1\left(1 + \frac{h_p c_2}{b_p c_1}\right)$$

where

h_p = the height of the rectangular glass panel;
b_p = the width of the rectangular glass panel;
c_1 = the average of the clearances (gaps) on both sides between the vertical glass edges and the frame; and
c_2 = the average of the clearances (gaps) at the top and bottom between the horizontal glass edges and the frame.



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Limit States for Design

- Code prescribed wind forces for safety:

Building Risk Category	MRI	Annual Probability of Exceedance
I	300 years	0.33%
II	750 years	0.14%
III	1700 years	0.06%
IV	1700 years	0.06%

- Seismic forces are based on 1,200 to 1,300 year MRI in lower and moderate seismic zones, 375 to 800 year MRI in high seismic zones

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Seismic Drift

Table 12.12-1 Allowable Story Drift, $\Delta_a^{a,b}$

Structure	Risk Category I or II	Risk Category III	Risk Category IV
Structures, other than masonry shear wall structures, 4 stories or less above the base as defined in Section 11.2, with interior walls, partitions, ceilings, and exterior wall systems that have been designed to accommodate the story drifts.	$0.025h_{sx}^{c}$	$0.020h_{sx}$	$0.015h_{sx}$
Masonry cantilever shear wall structures[d]	$0.010h_{sx}$	$0.010h_{sx}$	$0.010h_{sx}$
Other masonry shear wall structures	$0.007h_{sx}$	$0.007h_{sx}$	$0.007h_{sx}$
All other structures	$0.020h_{sx}$	$0.015h_{sx}$	$0.010h_{sx}$

[a] h_{sx} is the story height below Level x.
[b] For seismic force-resisting systems comprised solely of moment frames in Seismic Design Categories D, E, and F, the allowable story drift shall comply with the requirements of Section 12.12.1.1.

h/50 h/67 h/100

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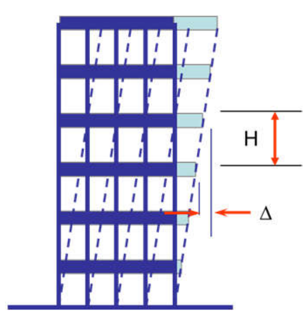
Performance Based Seismic Design
How Much Drift?



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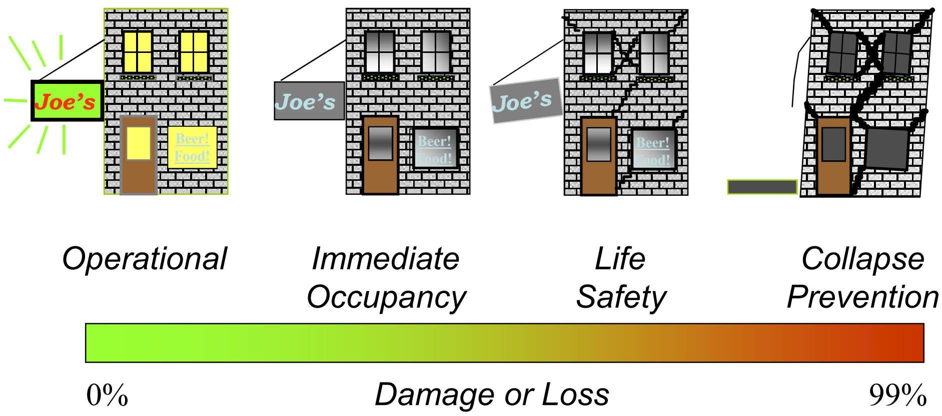
Performance Levels



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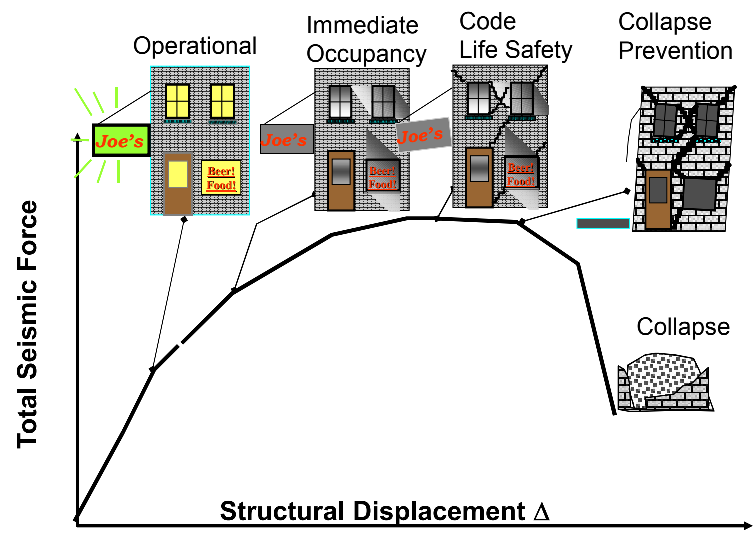
Drift & Performance Levels



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Code Design Story Drift

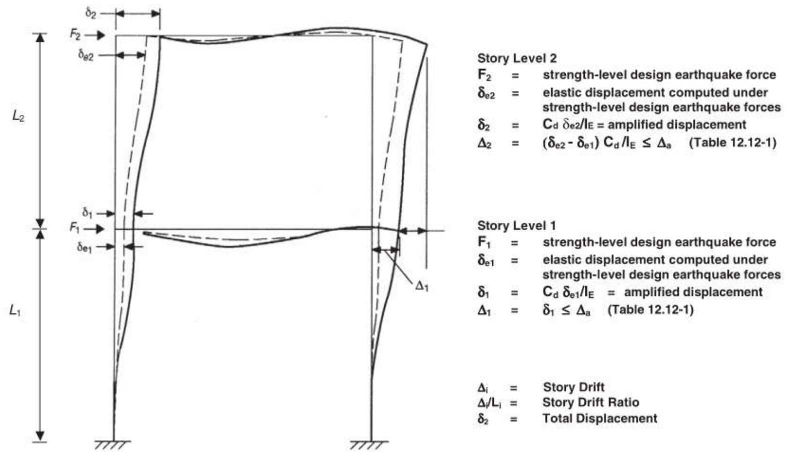


FIGURE 12.8-2 Story Drift Determination

Code Design Drift

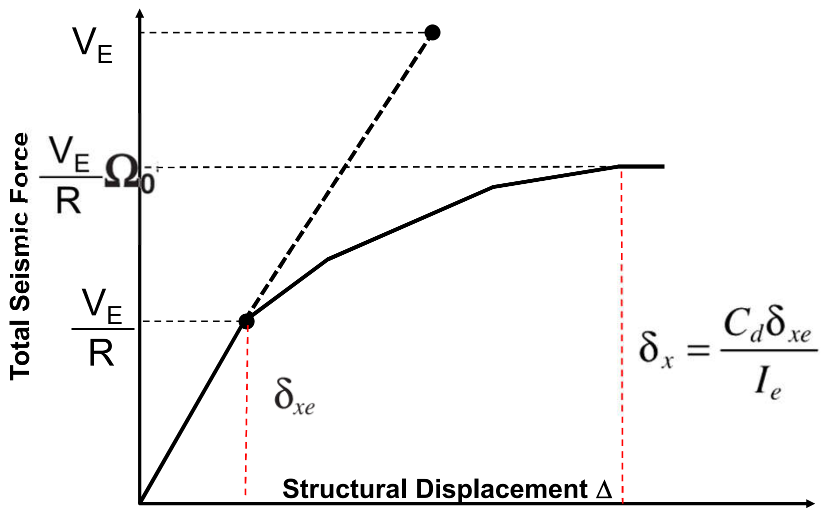
The deflection at level x (δ_x) (in. or mm) used to compute the design story drift, Δ, shall be determined in accordance with the following equation:

$$\delta_x = \frac{C_d \delta_{xe}}{I_e} \qquad (12.8\text{-}15)$$

where

C_d = the deflection amplification factor in Table 12.2-1
δ_{xe} = the deflection at the location required by this section determined by an elastic analysis
I_e = the importance factor determined in accordance with Section 11.5.1

Code Design Drift



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Seismic Performance Objectives

Hazard Level and Performance Goal:	Ground Motion & Return Period	Prescriptive Requirements
Risk-targeted Maximum Considered Earthquake (MCE_R) **Goal: Collapse Prevention**	Most severe earthquake considered by ASCE 7. The ground motion intensity depends on geographic location. Return period of event is >1000 years except at deterministic caps.	Building must have acceptably low probability of collapse in an MCE. CODE IMPLIED
Design Level Earthquake (DLE): **Goal: Life Safety**	2/3 of MCE ground motion intensity; return period ~400 to 1000 years, location dependent	Building must have a margin of safety against collapse and cladding components must not fall from building after a DE.
Service Level Earthquake (SLE): **Goal: Property Protection**	The term may be used in performance-based seismic design and throughout the cladding industry; however, the ground motion and return period for SLE are not codified.	Not codified/defined.

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Seismic Performance Objectives

Hazard Level and Performance Goal:	Ground Motion & Return Period	Prescriptive Requirements
Risk-targeted Maximum Considered Earthquake (MCE_R) **Goal: Collapse Prevention**	Most severe earthquake considered by ASCE 7. The ground motion intensity depends on geographic location. Return period of event is >1000 years except at deterministic caps.	Building must have acceptably low probability of collapse in an MCE.
Design Level Earthquake (DLE): **Goal: Life Safety**	2/3 of MCE ground motion intensity; return period ~400 to 1000 years, location dependent	Building must have a margin of safety against collapse and cladding components must not fall from building after a DE.
Service Level Earthquake (SLE): **Goal: Property Protection**	The term may be used in performance-based seismic design and throughout the cladding industry; however, the ground motion and return period for SLE are not codified.	Not codified/defined.

CODE REQUIRED

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Seismic Performance Objectives

Hazard Level and Performance Goal:	Ground Motion & Return Period	Prescriptive Requirements
Risk-targeted Maximum Considered Earthquake (MCE_R) **Goal: Collapse Prevention**	Most severe earthquake considered by ASCE 7. The ground motion intensity depends on geographic location. Return period of event is >1000 years except at deterministic caps.	Building must have acceptably low probability of collapse in an MCE.
Design Level Earthquake (DLE): **Goal: Life Safety**	2/3 of MCE ground motion intensity; return period ~400 to 1000 years, location dependent	Building must have a margin of safety against collapse and cladding components must not fall from building after a DE.
Service Level Earthquake (SLE): **Goal: Property Protection**	The term may be used in performance-based seismic design and throughout the cladding industry; however, the ground motion and return period for SLE are not codified.	Not codified/defined.

NOT CODIFIED

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Structural Drift Affects the Enclosure Damage

Stucco Wall System w/o Drift Joints

Damage State	Description of Damage	Likely Drift Range
None	No damage.	0 – 0.2%
Slight	Sporadic cracking. Some tearing of sealant joints. No damage to water barrier.	0.1% – 0.5%
Moderate	Cracking through-out. Most sealant joints torn. Some windows cracked. Water barrier damaged.	0.4% – 1.2%
Extensive	Severe cracking throughout. Significant plaster loss. Many windows broken. Sheathing fasteners loose. Water barrier damaged over significant at many locations of large area.	0.8% – 2.5%
Complete	Window frames damaged, studs deformed, stud anchorage deformed.	2.0% – 4.0%

Increasing Drift

Aluminum Curtain Wall – Stick Built

Damage State	Description of Damage	Likely Drift Range
None	No damage.	0 – 1.4%
Slight	Gasket seal failure at vulnerable locations, not widespread.	1.0% – 2.0%
Moderate	Cracked glass and gasket seal failure throughout significant area.	1.5% – 3.0%
Extensive	Cracked glass and gasket seal failure throughout. Significant glass fallout. Some deformed frames. Deformed anchorage.	2.5% – 3.5%
Complete	Nearly all panels either cracked or fallout. Most gasket seal failure. Significant deformed frames. Many deformed anchors requiring replacement.	3.0% – 5.0%

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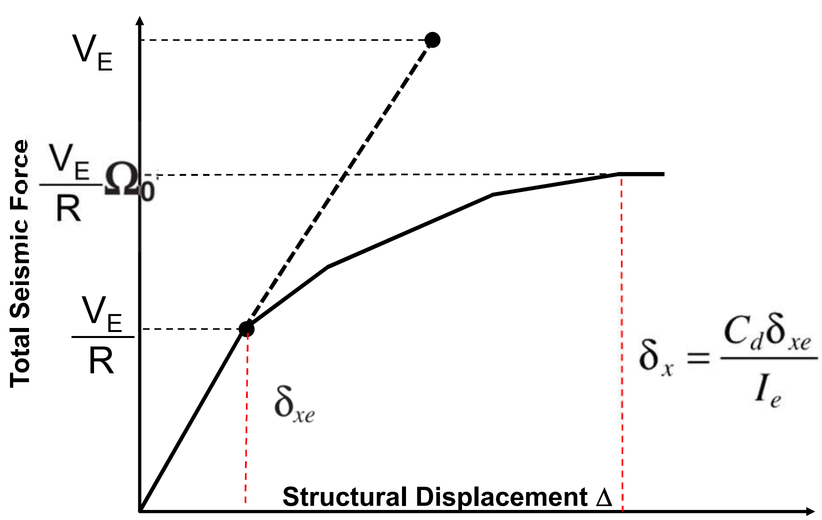
"Elastic" Earthquake



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Seismic Performance Objectives

Project Example

Performance Objective	Hazard Designation	Drift Δ (inches)
Collapse Prevention (Building will likely remain standing)	**MCE**	(usually not calculated)
Life Safety Moderate structural damage but no collapse; cladding must not fall from building; meet ASCE 7 requirements.	**2/3 MCE**	2.5 % = L/40 = 3-5/8" (12 ft story example)
Serviceability Structure to remain essentially elastic; no damage to exterior cladding components; building enclosure remains effective for water and air infiltration.	**SLE** Defined by owner 100 year return period 39% /50 year	0.5% = L/200 = 3/4" (12 ft story example)

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Performance Based Design Objectives –

Recent Project Example

Hazard Level		Target Performance Level of Exterior Wall Nonstructural Elements and Attachments	Target Performance Level of Enclosure Air and Water Barriers
EQ Probability of Exceedance	Mean Return Period (Years)		
2/3 MCE ~10%/50yr	Code Level (> 474)	Code provisions met. Falling hazards mitigated. Significant repair and/or replacement required.	No special provisions met. Repairs required especially at drift joints. Replacement of barriers may be required as part of cladding repair/replacement.
20%/50yr	225	Modest repair expected. Minor damage to cladding components. Repair required for aesthetics and performance, not safety.	Some repairs required where membranes bridge drift joints, terminations, and transitions. Modest cladding removal needed to repair membrane.
50%/50yr	72	Little to no repair is expected. Connections designed to be elastic. No visible damage to cladding.	Air and water barriers remain effective. No appreciable loss of performance of the enclosure as whole.

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MRI And Probability Of Exceedance In Given Years

Probability of Exceeding in Given Period				
MRI	Years			
	10	25	50	100
500	2%	5%	10%	18%
225	4%	11%	20%	36%
100	10%	22%	39%	63%
72	13%	29%	50%	75%
50	18%	39%	63%	86%

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There's always a solution in steel.

Question time

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Within 2 business days…

- You will receive an email on how to report attendance from: registration@aisc.org.
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Individual Webinar Registrants

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Within 2 business days…

- New reporting site (URL will be provided in the forthcoming email).
- Username: Same as AISC website username.
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8-Session and 4-Session Registrants

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One certificate will be issued at the conclusion of the full Night School course.

8-Session and 4-Session Registrants

Access to the quiz: Information for accessing the quiz will be emailed to you by Wednesday. It will contain a link to access the quiz. EMAIL COMES FROM NIGHTSCHOOL@AISC.ORG

Quiz and Attendance records: Posted Tuesday mornings.
www.aisc.org/nightschool - click on Current Course Details.

Reasons for quiz:

- EEU – must take all quizzes and final to receive EEU (8-Session registrants only)
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- REINFORCEMENT – Reinforce what you learned tonight. Get more out of the course.

NOTE: If you attend the live presentation, you do not have to take the quizzes to receive CEUs/PDHs.

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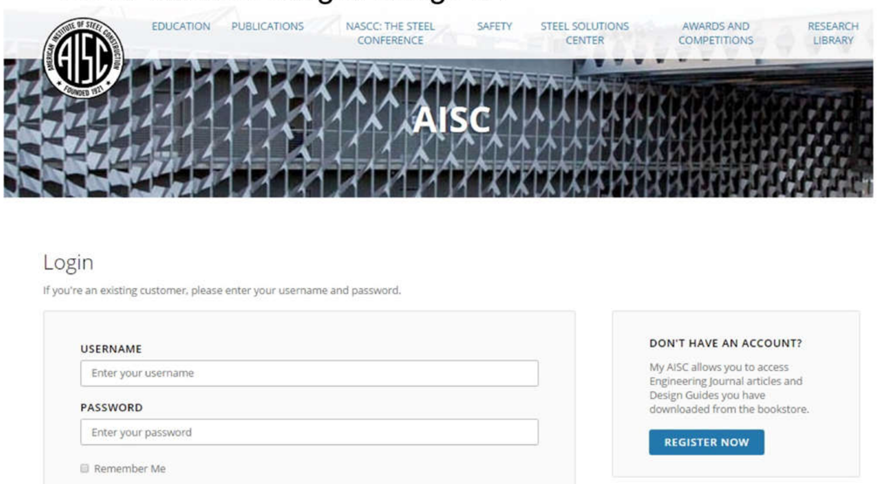

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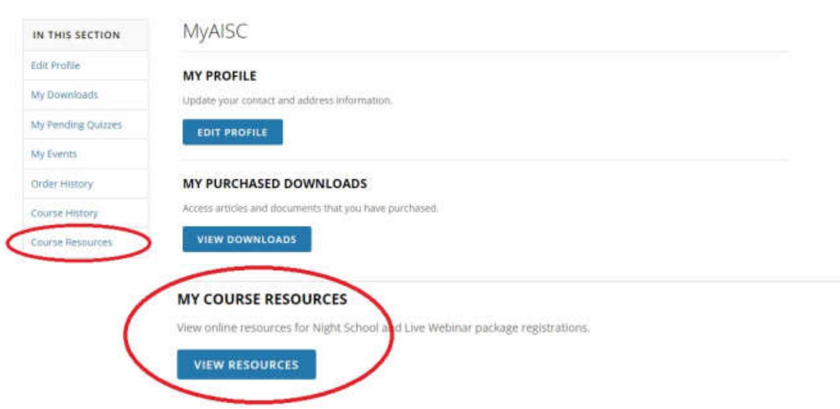

8-Session and 4-Session Registrants

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Course Resources

Event	Start Date
NS 13 8-Session Package-Night School 13 - Design of Industrial Buildings	1/30/2017 7:00:00 PM
NS 14 8-Session Package-Night School 14 - Fundamentals of Stability	6/5/2017 7:00:00 PM

8-Session and 4-Session Registrants

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Night School 13: Design of Industrial Buildings

8-SESSION PACKAGE RESOURCES

Event	Date	Handouts	Video	Quiz	Attendance
NS13 - Design Criteria	1/30/2017 7:00:00 PM	Handouts	View Passcode: NS13DSN	Pass Score: 80	Pending
NS13 - Economic Considerations	2/6/2017 7:00:00 PM	Handouts	Available 02/08/2017 5pm EST	Available 02/08/2017 5pm EST	Pending
NS13 - Lateral Load Systems and Details	2/13/2017 7:00:00 PM	Handouts	Available 02/15/2017 5pm EST	Available 02/15/2017 5pm EST	Pending
NS13 - Preliminary Design Procedures	2/27/2017 7:00:00 PM	Handouts	Available 03/01/2017 5pm EST	Available 03/01/2017 5pm EST	Pending
NS13 - Crane Girder Design and Frame Analysis	3/6/2017 7:00:00 PM	Handouts	Available 03/08/2017 5pm EST	Available 03/08/2017 5pm EST	Pending
NS13 - Frame Member and Connection Design	3/13/2017 7:00:00 PM	Handouts	Available 03/15/2017 5pm EST	Available 03/15/2017 5pm EST	Pending
NS13 - Transfer Crane Girder & Longitudinal Bldg Bracing Dsn	3/27/2017 7:00:00 PM	Handouts	Available 03/29/2017 5pm EST	Available 03/29/2017 5pm EST	Pending
NS13 - Building Envelope and Bracing Design	4/3/2017 7:00:00 PM	Handouts	Available 04/05/2017 5pm EST	Available 04/05/2017 5pm EST	Pending
NS13 - Final Exam	4/10/2017 7:00:00 PM			Available 04/12/2017 5pm EST	

8-Session and 4-Session Registrants

- Weekly “quiz and recording” email.
- Weekly updates of the master Quiz and Attendance record found at www.aisc.org/nightschool. Scroll down to Quiz and Attendance records.
    - Updated on Tuesday mornings.

8-Session and 4-Session Registrants

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    - Found in your registration confirmation/receipt.
    - Reminder email sent out Monday mornings.
- Link to handouts also found here.


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