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Design of Facade Attachments

Session L3: Lateral Drifts and Facade Attachments
May 23, 2019



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Course Description

Lateral Drifts and Facade Attachments
May 23, 2019

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 facade system that arises from building lateral drift.
- Explain the facade jointing challenges at building corners and how they can be detailed.
- Identify relevant code provisions for the design of facade 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.



Design of Facade Attachments

Session L3: Lateral Drifts and Facade Attachments
May 23, 2019



Alec Zimmer, PE
Senior Project Manager
Simpson Gumpertz & Heger Inc.
Waltham, MA



Syllabus for Night School Sessions

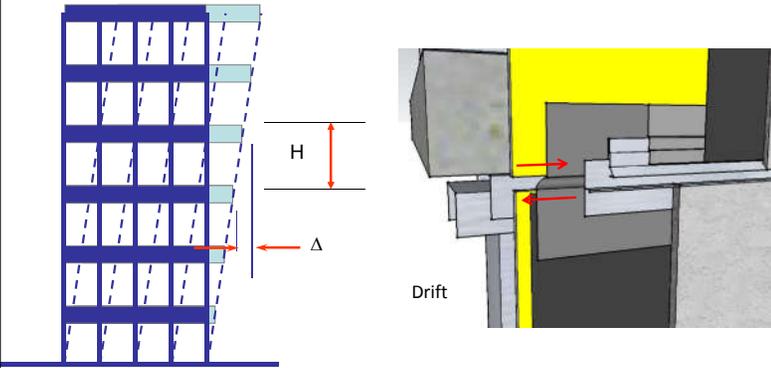
- Session R1
- Session L1
- Session L2
- **Session L3**
 - Accommodating Lateral Drifts
 - In-Plane Movements
 - Out-of-Plane Movements
 - Building Corners



9

Dealing with Drift

Dealing with Drift



10

Dealing with Drift

History of Facade Construction



2000 B.C. 1000 B.C. 0 1000 A.D. 2000

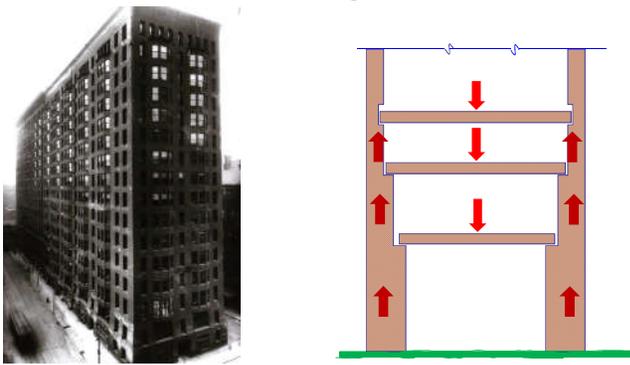
Time Line



11

Dealing with Drift

Load Bearing Walls



Monadnock Block



12

Dealing with Drift

Transitional Buildings

Plaster
Dase
Fill
Concrete
Hanger
Flat bar
Slab
Hanging ceiling

Plate may be used if desired, though not absolutely necessary.

13

Dealing with Drift

Modern Non-Structural Wall Buildings (Skinned)

14

Dealing with Drift

Modern Non-Structural Wall Buildings (Skinned)

SLAB-TO-SLAB FRAMED

BALLOON FRAMED

DETAILS MUST ALLOW RELATIVE MOVEMENT BETWEEN FRAME AND SKIN

15

Dealing with Drift

Structural Movement

16

Dealing with Drift

Why it Matters...




17

Accommodating Vertical Movement

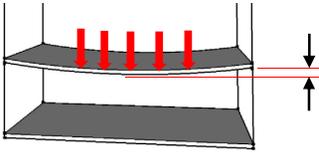
Accommodating Vertical Movement




18

Accommodating Vertical Movement

Floor and Roof Deflections Live, Snow, and Rain Loads




19

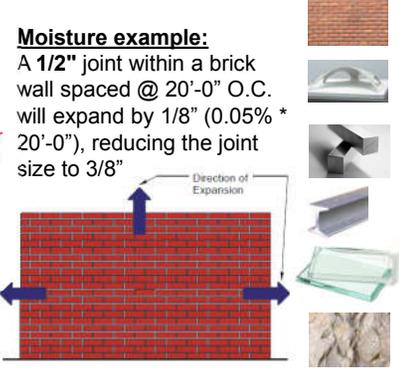
Accommodating Vertical Movement

Thermal and Moisture Movements

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

Thermal movement
 Max Temperature Range
 Length
 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"




20

Accommodating Vertical Movement

Movement in Horizontal Joints

Compression Expansion



21

Accommodating Vertical Movement

Movement in Horizontal Joints

Effect on horizontal joint due to vertical movement.

▼ Undeformed
▼ Deformed
▼ Undeformed



22

Accommodating Vertical Movement

Movement in Vertical Joints

▼ Undeformed
▼ Deformed
▼ Undeformed

Effect on vertical joint due to vertical movement.



23

Accommodating Vertical Movement

Transitions in Facade Support



24

Accommodating Vertical Movement

Transitions in Facade Support



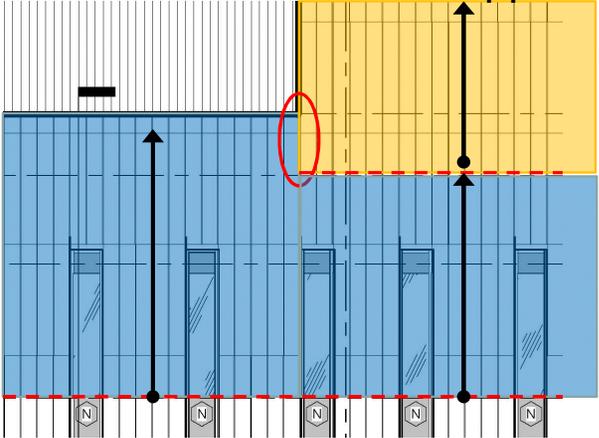
Parapet at low roof



25

Accommodating Vertical Movement

Transitions in Facade Support



26

Accommodating Vertical Movement

Transitions in Facade Support



27

Accommodating Vertical Movement

Transitions in Facade Support



28

Accommodating Lateral Drift

Accommodating Lateral Drift



A photograph showing the interior of a building under construction. The steel frame consists of vertical columns and horizontal beams. Diagonal bracing is installed between the columns to provide lateral stability. Workers are visible on the floor.

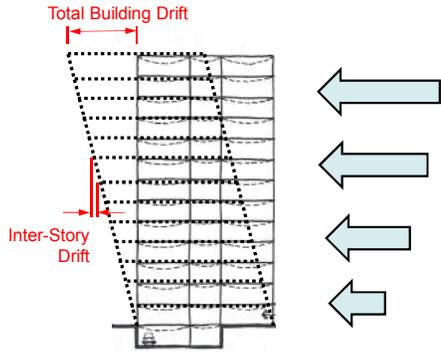


29

Accommodating Lateral Drift

Inter-Story Drift

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



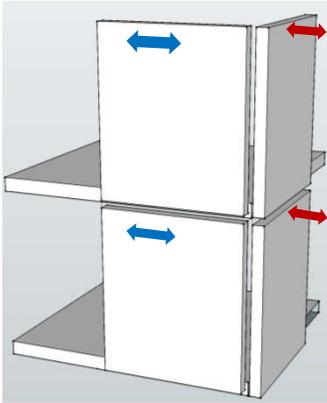
A schematic diagram of a multi-story building frame. The frame is shown in a deformed state due to lateral loads. A red arrow at the top indicates the 'Total Building Drift'. A red arrow between two floors indicates the 'Inter-Story Drift'. Four blue arrows on the right represent the lateral loads applied to each floor.



30

Accommodating Lateral Drift

In-Plane and Out-of-Plane Movements



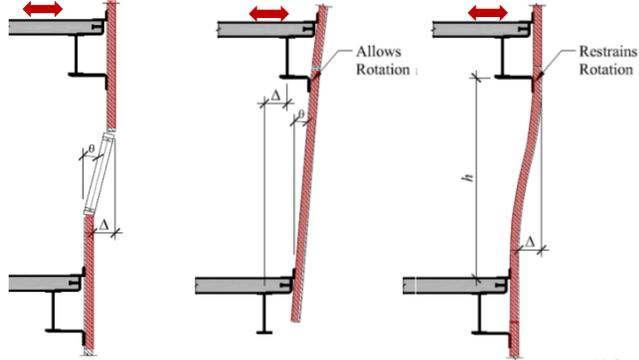
A 3D perspective diagram of a wall section. Blue arrows indicate in-plane movements (horizontal sliding). Red arrows indicate out-of-plane movements (rotation and lateral displacement).



31

Accommodating Lateral Drift

Out-of-Plane Movement from Drift

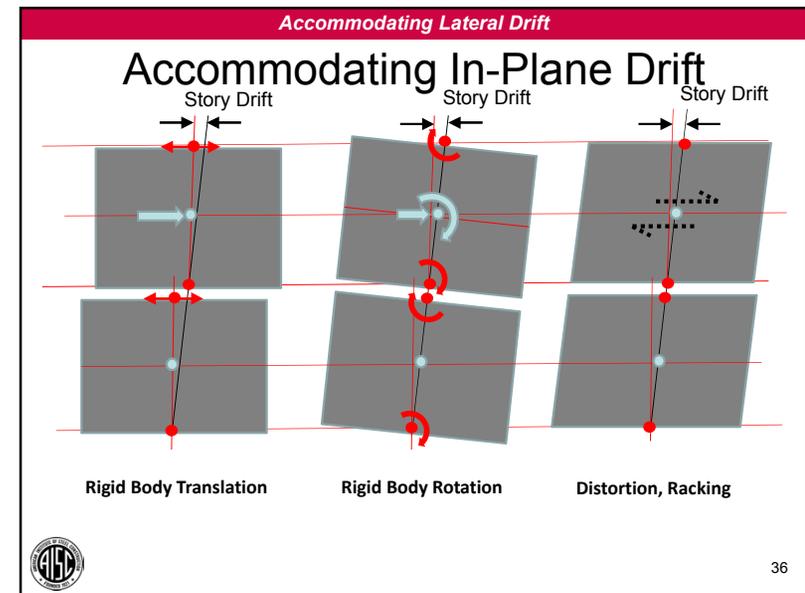
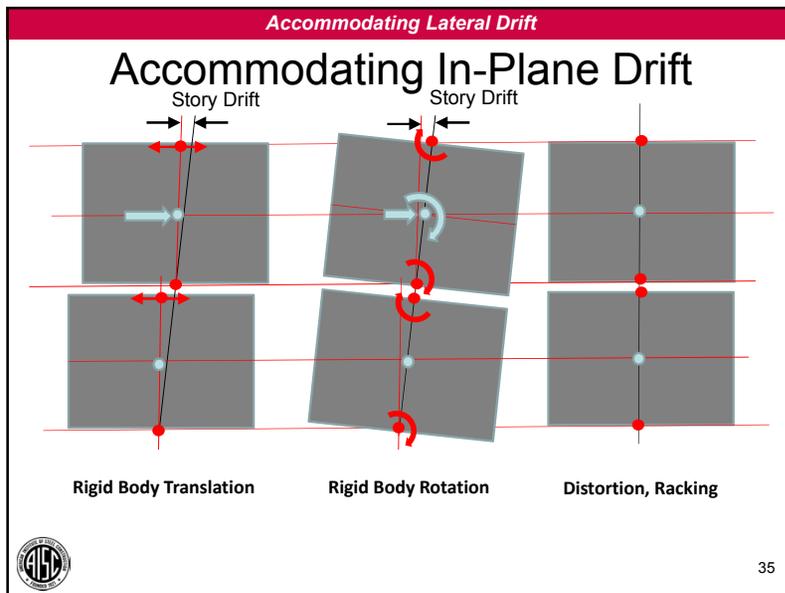
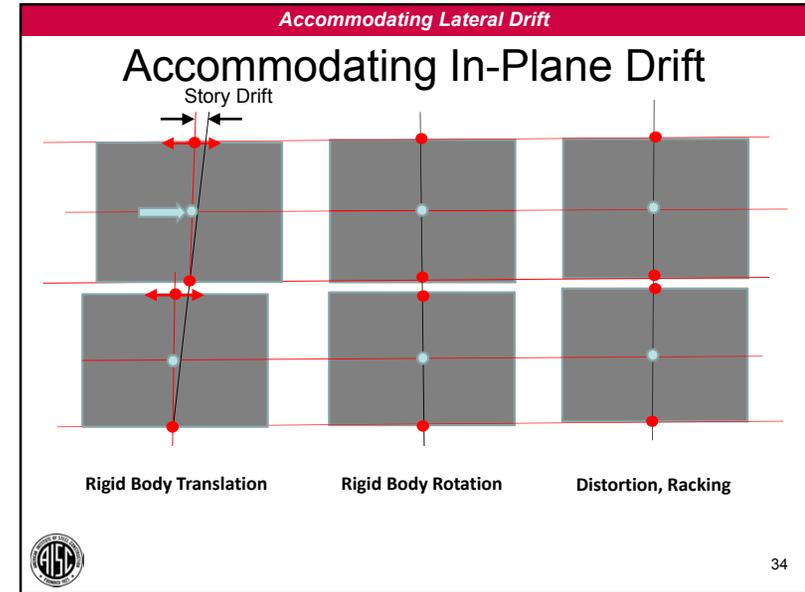
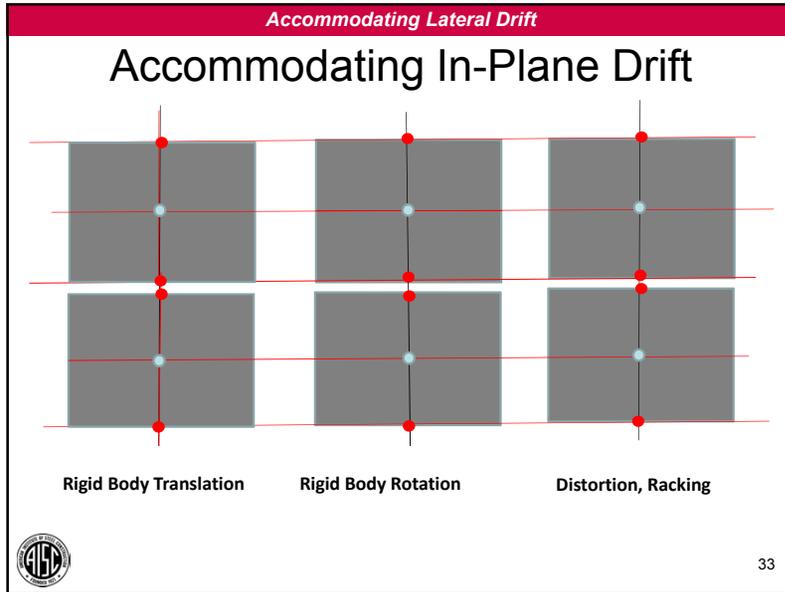


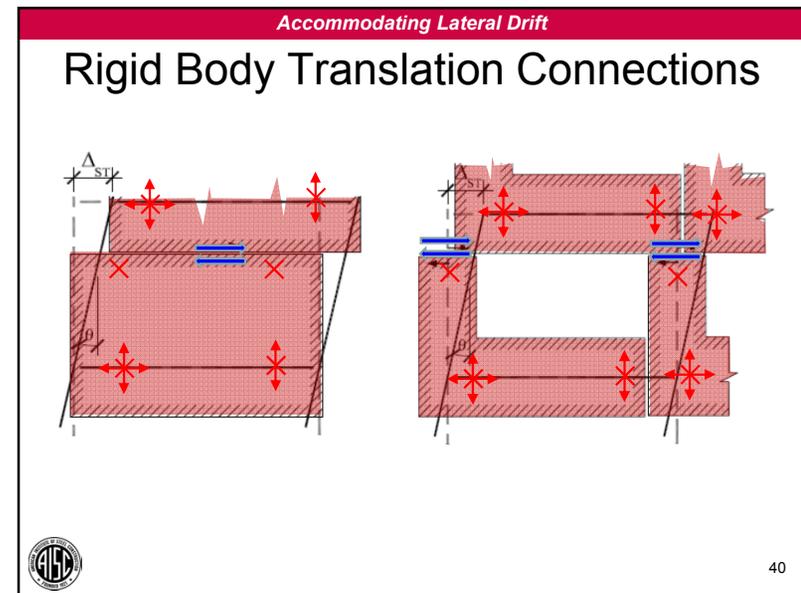
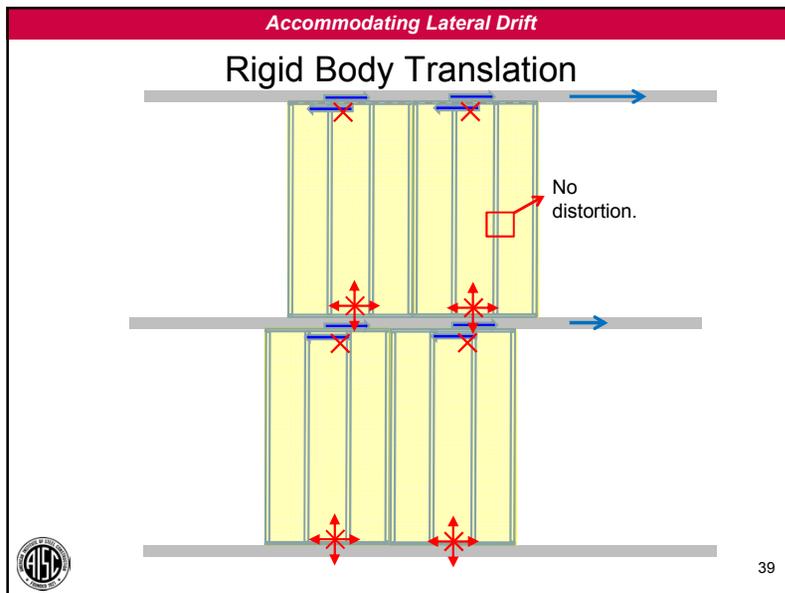
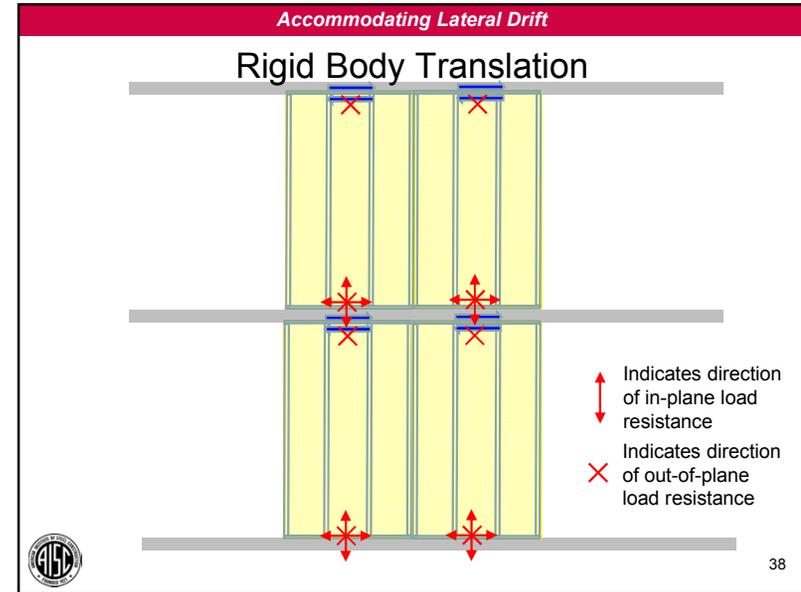
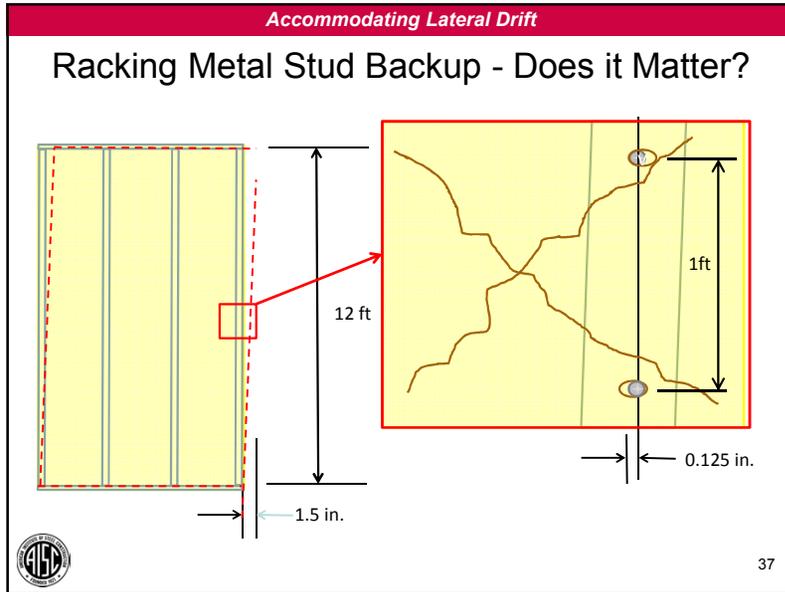
Three diagrams illustrating different types of out-of-plane movement from drift:

- Rigid Body Translation:** Shows a vertical member moving horizontally as a rigid body.
- Rigid Body Rotation:** Shows a vertical member rotating as a rigid body. Labels include Δ , β , and θ . A note says "Allows Rotation".
- Distortion, Curvature:** Shows a vertical member deforming due to drift. Labels include Δ and θ . A note says "Restrains Rotation".



32





Accommodating Lateral Drift

Rigid Body Rotation Mixed with Translation

41

Accommodating Lateral Drift

Shear and Flexural Deformations

(a) *Frame Shear Deformation Movement on Joints* (b) *Frame Flexural Deformation Less Movement at Joints*

42

Accommodating Lateral Drift

Rigid Body Rotation Connections

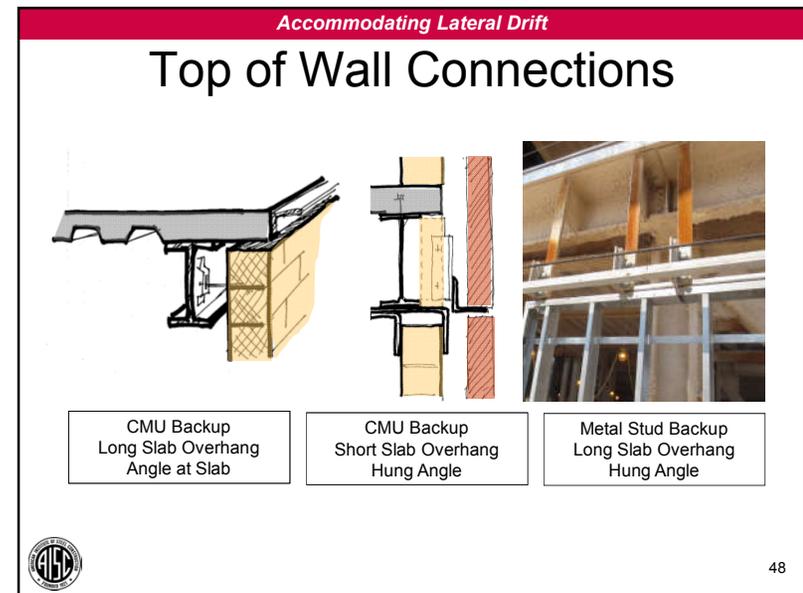
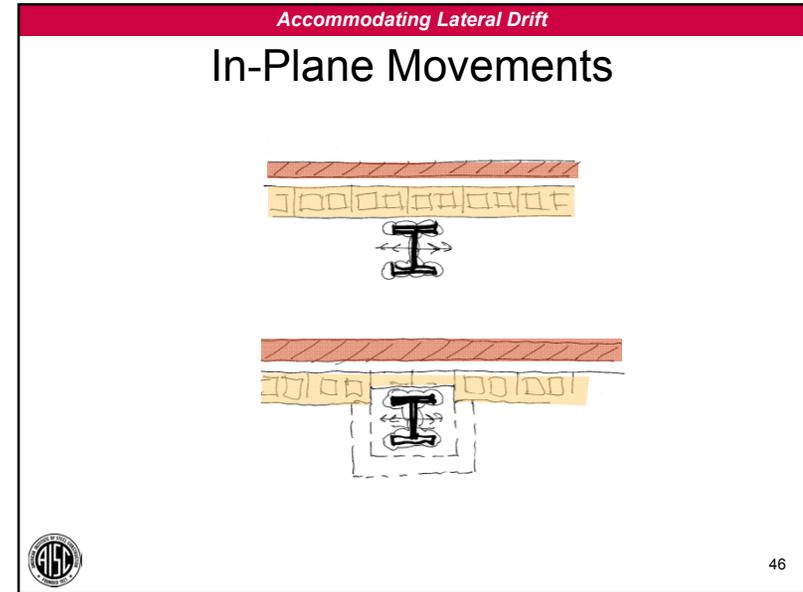
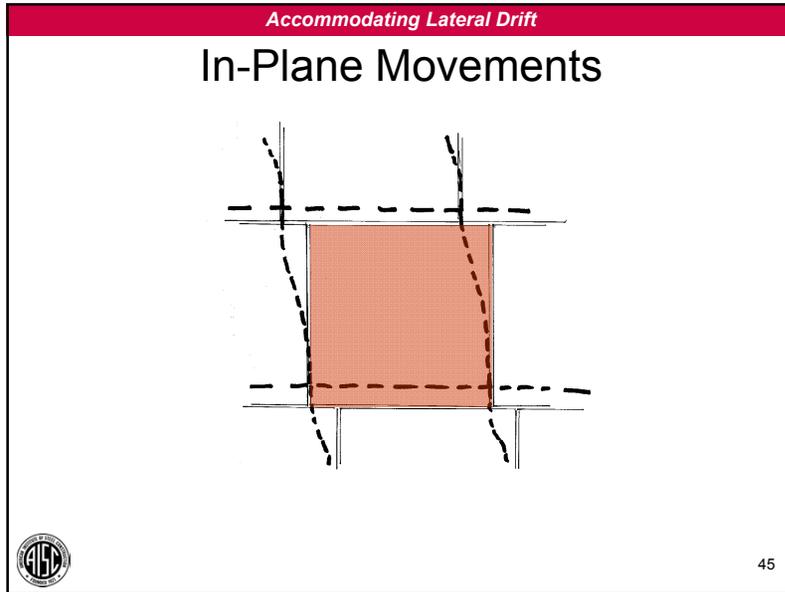
Inter-story drift

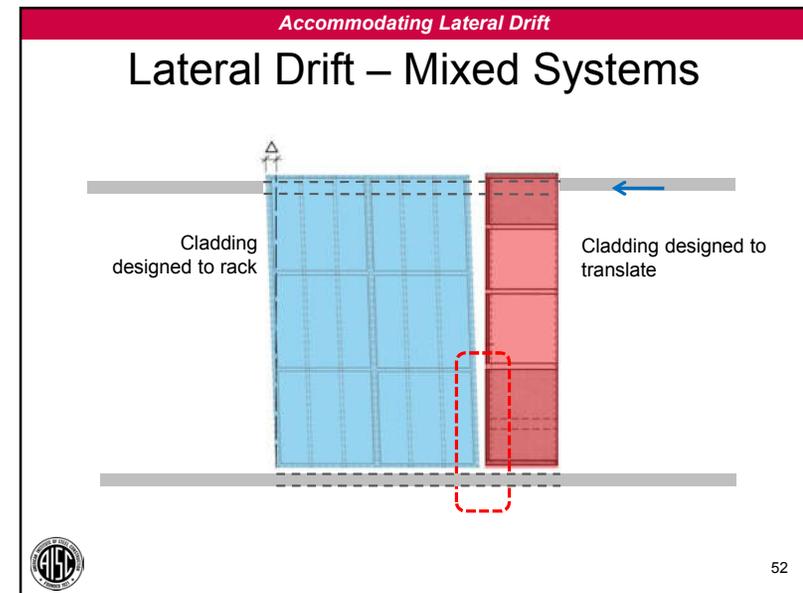
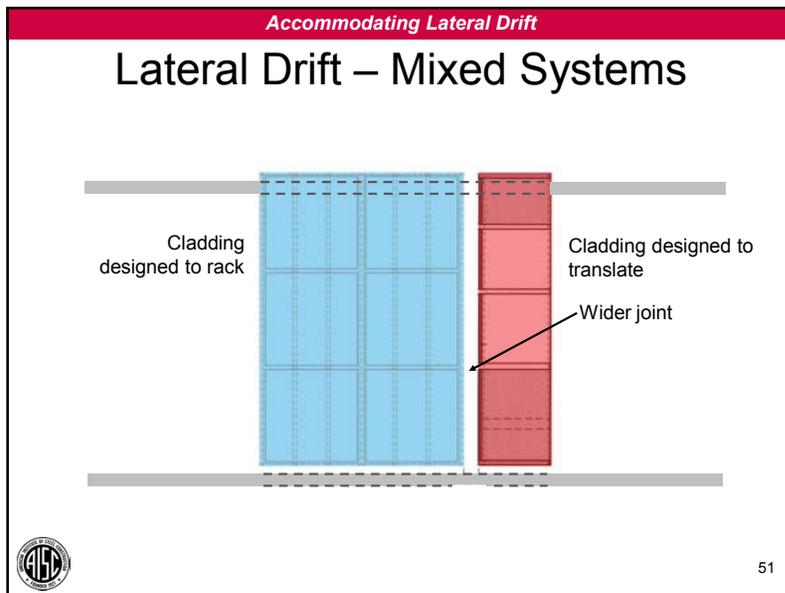
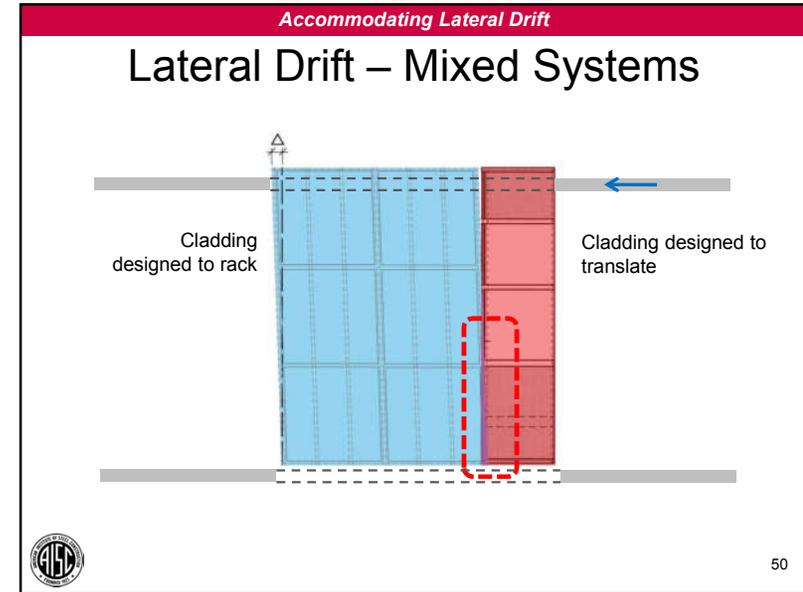
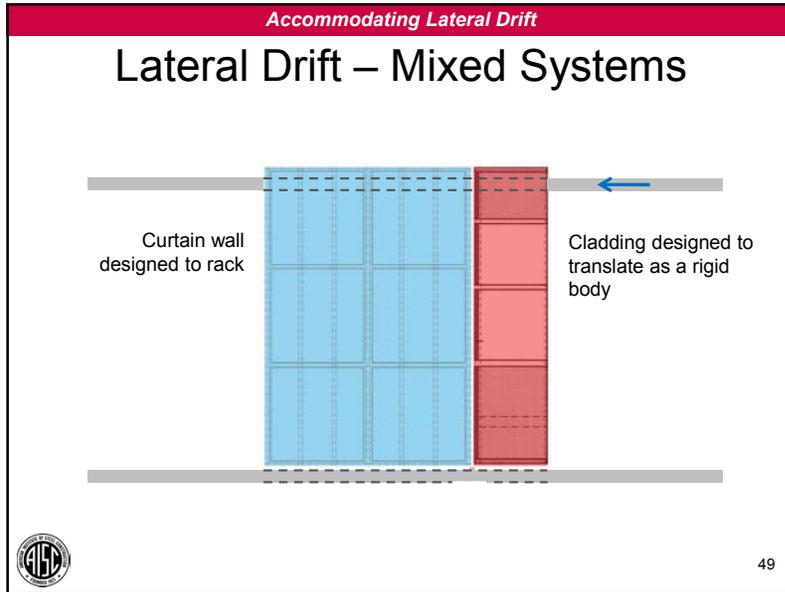
43

Accommodating Lateral Drift

Rigid Body Rotation Connections

44





Accommodating Lateral Drift

Corners are Complicated

The diagram illustrates a 3D corner of a building. A red line highlights the corner joint. Labels include: RIGID SLAB, NORTH CLADDING - MOVING/ROTATING IN E-W (PERPENDICULAR) DIRECTION: OUT-OF-PLANE DISPLACEMENT, EAST ELEVATION CLADDING - MOVING/DEFORMING IN N-S (PARALLEL) DIRECTION: IN-PLANE DISPLACEMENT, and Corner is Complicated. Two seismic response graphs show acceleration components over 20 seconds. The top graph is labeled ΔINT .

53

Accommodating Lateral Drift

Corners are Complicated

A 3D perspective view of a building corner. The main image shows the corner with a red line indicating the joint. Two inset images show the corner from different angles, with blue arrows indicating lateral drift and a red line showing the cladding's path.

54

Accommodating Lateral Drift

Potential Interference at Corners

A plan view diagram of a column-beam joint. The column is an I-beam. The beam is a rectangular slab. The distance from the column centerline to the edge of the slab is labeled a . The diagram is labeled "Plan View - Original Configuration".

55

Accommodating Lateral Drift

Potential Interference at Corners

A plan view diagram of a column-beam joint showing lateral drift. The column is an I-beam. The beam is a rectangular slab. The distance from the column centerline to the edge of the slab is labeled a . A red arrow labeled "DRIFT" points to the left. The diagram is labeled "Plan View - Distortion in East-West Direction".

56

Accommodating Lateral Drift

Potential Interference at Corners

Plan View – Distortion in North-South Direction

57

Accommodating Lateral Drift

Translating System Corner: Large Joint

Plan View – Original Configuration

58

Accommodating Lateral Drift

Translating System Corner: Large Joint

Plan View – Distortion in North-South Direction

59

Accommodating Lateral Drift

Translating System Corner: Large Joint

Plan View – Original Configuration

60



Accommodating Lateral Drift

Translating System Corner: Large Joint

Plan View – Distortion in Both Directions

61

Accommodating Lateral Drift

Example: Wide Joint at Corner

62

Accommodating Lateral Drift

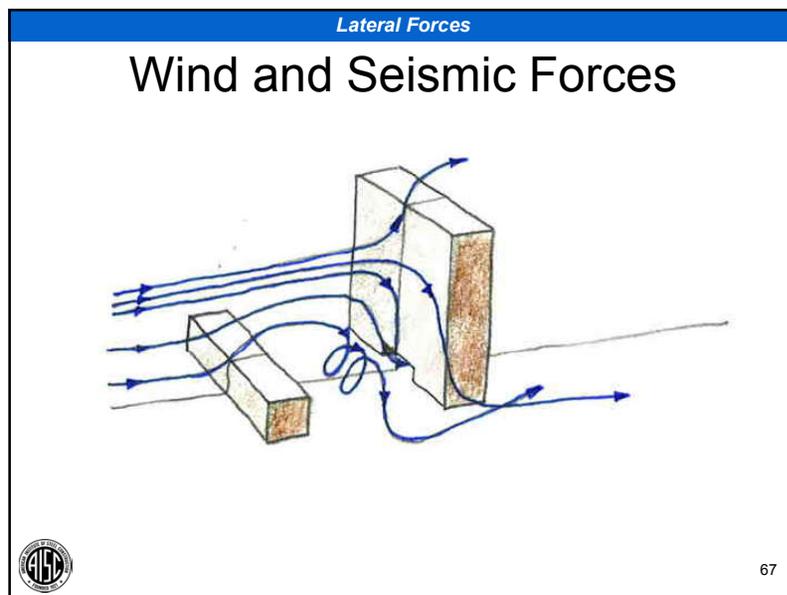
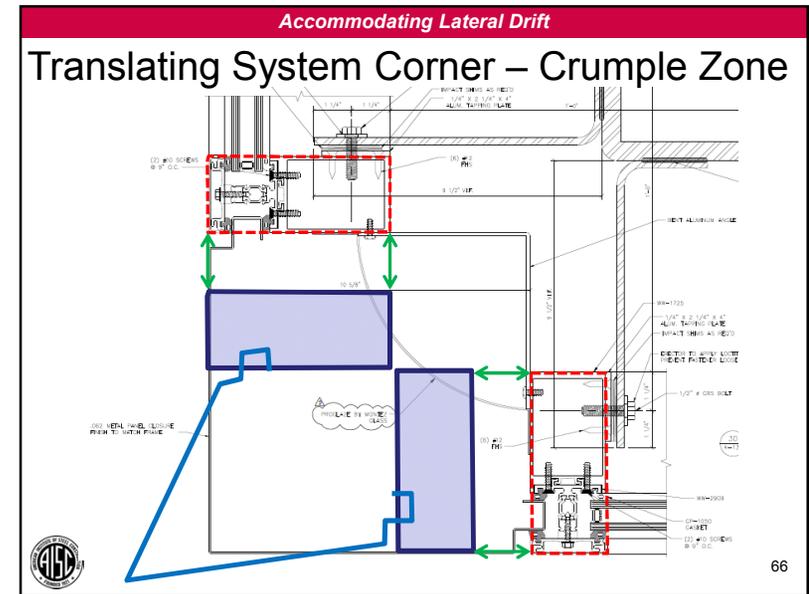
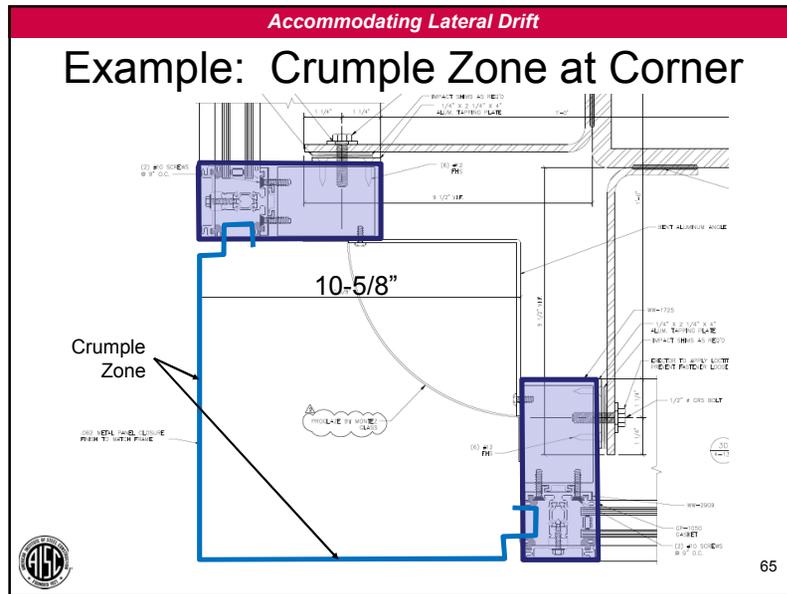
Example: Wide Joint at Corner

63

Accommodating Lateral Drift

Example: Hidden Joint at Corner

64



Lateral Forces

Demands - Wind

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

68

Lateral Forces

Wind Load Demands

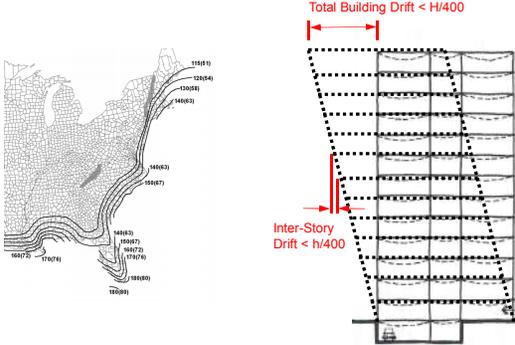
- **Out-of-Plane Forces – Components and Cladding**
 - Facade element strength
 - Facade attachments strength
- **Strength-Level Drift – Main LFRS**
 - Facade attachments must not fail due to displacement
 - Facade elements cannot become falling hazards
 - Connections must accommodate drift
- **Service Level Drift – not codified**
 - Performance of facade and joints



69

Lateral Forces

Wind Drift Design




70

Lateral Forces

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%



71

Lateral Forces

Serviceability Checks for 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_{ult}
 - 25 year MRI – $W_a = 50\%$ of W_{ult}
 - 50 year MRI – $W_a = 58\%$ of W_{ult}
 - 100 year MRI – $W_a = 69\%$ of W_{ult}



72

Lateral Forces

(Out-of-Plane) Wind Deflections IBC 2015 Table 1604.3

CONSTRUCTION	L	S w/ W ^f	D-1 ^g
Roof members:			
Supporting plaster or stucco ceiling	l/360	l/360	l/240
Supporting suspended 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^h			
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

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.

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

73

Lateral Forces

Demands - Seismic

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

74

Lateral Forces

Seismic Load Demands

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

75

Lateral Forces

Chapter 13, Seismic Loads

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

Table 13.5-1 Coefficients for Architectural Components

Architectural Component	a_p^a	R_p	Ω_0^b
Exterior nonstructural wall elements and connections^c			
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

76

Lateral Forces

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_{pl} , shall be determined in accordance with Eq. (13.3-6):

$$D_{pl} = D_p I_e \quad (13.3-6)$$


77

Lateral Forces

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:

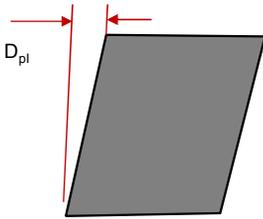


78

Lateral Forces

Attachment Design

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




79

Lateral Forces

Attachment Design

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, they shall meet or exceed the requirements of ASTM F1554, Grade 36. Grade 55 rods shall also be permitted provided that they meet the requirements of Supplement 1; and

Ductility



80

Lateral Forces

Attachment Design

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



81

Lateral Forces

Attachment Design

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

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

where:

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



82

Lateral Forces

Attachment Design

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_r^a	R_p	α_b^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	¼	1	1
Veneer			
Limited deformability elements and attachments	1	2½	2
Low-deformability elements and attachments	1	1½	2



83

Lateral Forces

Attachment Design

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):

$$\Delta_{\text{fallout}} \geq 1.25D_{pl} \quad (13.5-2)$$

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



84

Lateral Forces

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.



85

Lateral Forces

Attachment Design

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:

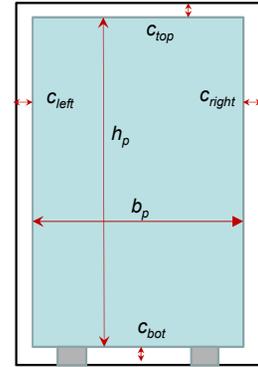
$$D_{clear} \geq 1.25D_{pl} \quad (13.5-3)$$

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.




86

Lateral Forces

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



87

Lateral Forces

Seismic Drift

Table 12.12-1 Allowable Story Drift, Δ_a^{Δ} ^b

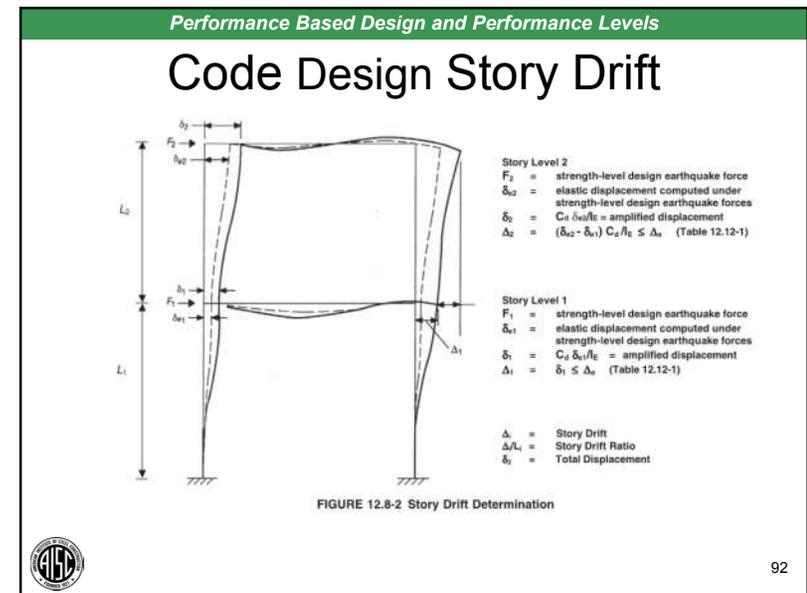
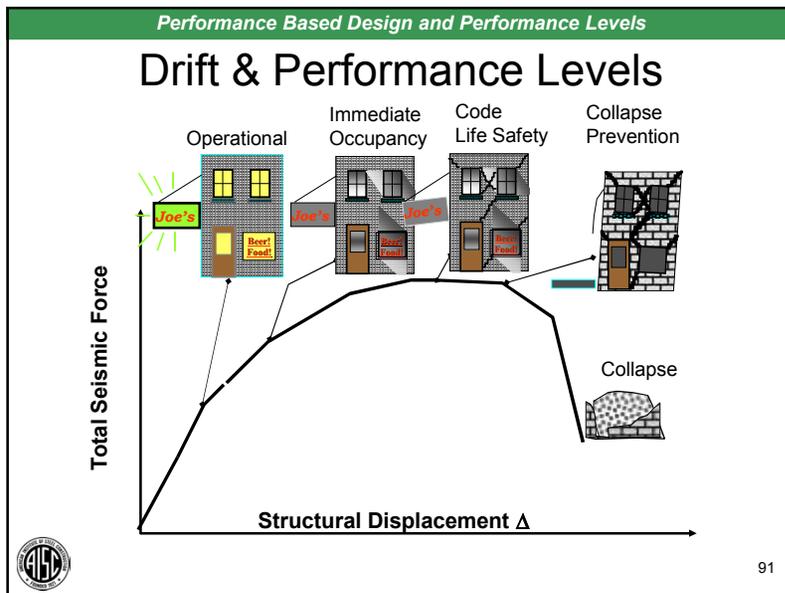
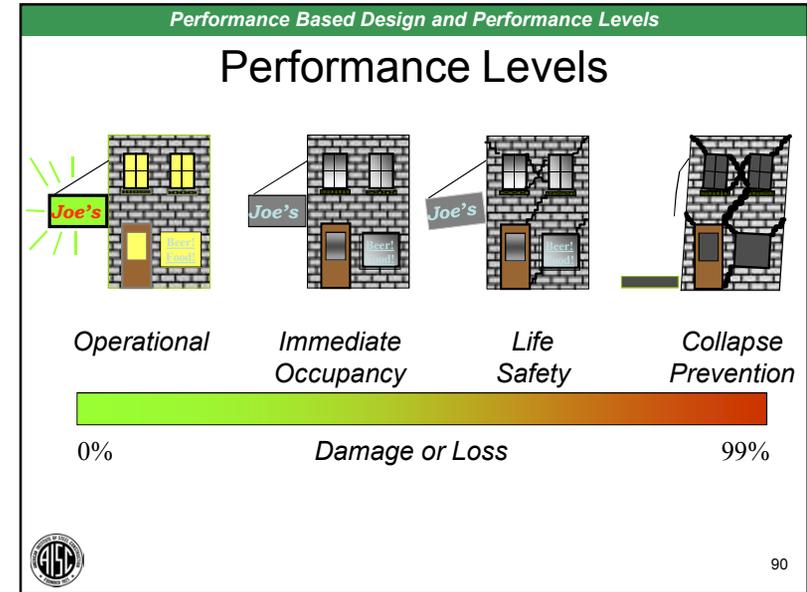
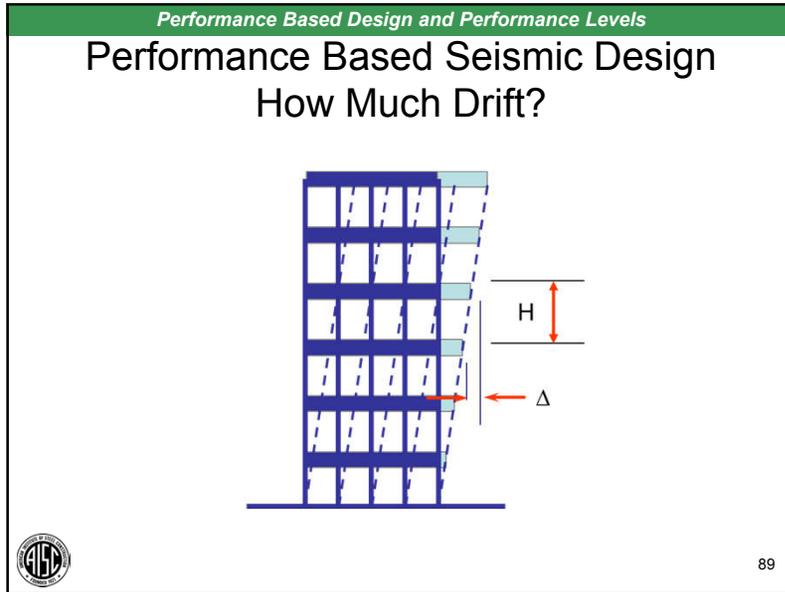
Structure	Risk Category		
	I or II	III	IV
Structures, other than masonry shear wall structures, 4 stories or less above the base as defined in Section 11.2, with interior walls, partitions, ceilings, and exterior wall systems that have been designed to accommodate the story drifts.	0.025 h_{sx} ^c	0.020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

^a h_{sx} is the story height below Level x.
^bFor 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



88



Performance Based Design and Performance Levels

Code Design Story 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:

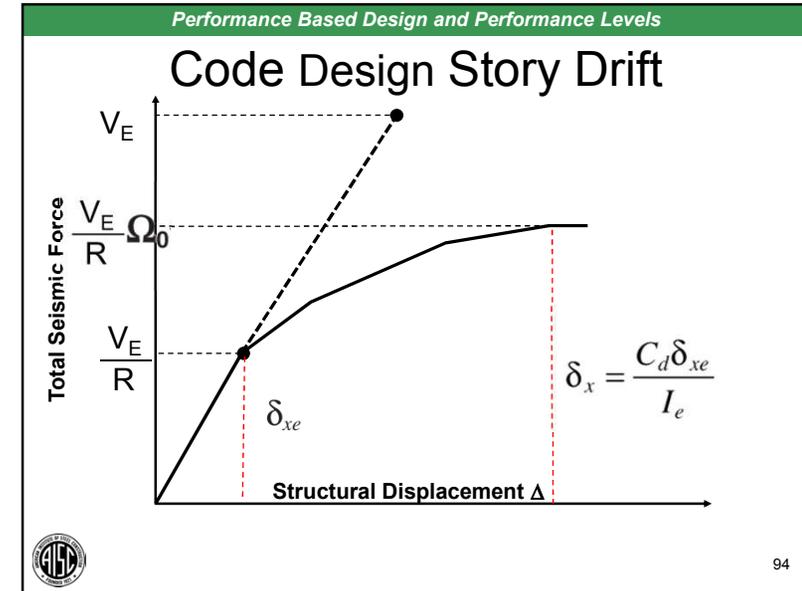
$$\delta_x = \frac{C_d \delta_{xe}}{I_e} \quad (12.8-15)$$

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



93



Performance Based Design and Performance Levels

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.



95

Performance Based Design and Performance Levels

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. CODE REQUIRED
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.



96



Performance Based Design and Performance Levels

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. <div style="text-align: center; color: red; font-weight: bold; font-size: 1.2em;">NOT CODIFIED</div>

97

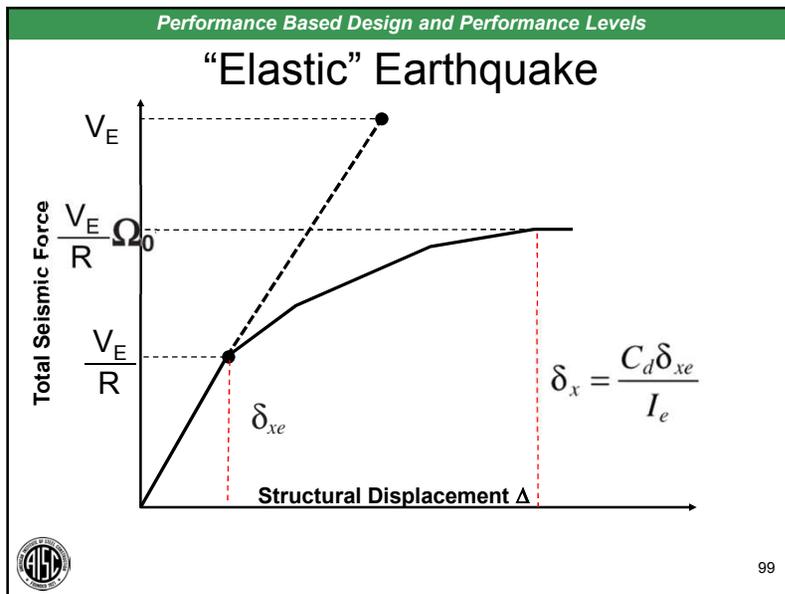
Performance Based Design and Performance Levels

Effects Enclosure Damage

Stucco Wall System w/o Drift Joints			Aluminum Curtain Wall – Stick Built		
Damage State	Description of Damage	Likely Drift Range	Damage State	Description of Damage	Likely Drift Range
None	No damage.	0 – 0.2%	None	No damage.	0 – 1.4%
Slight	Sporadic cracking. Some tearing of sealant joints. No damage to water barrier.	0.1% – 0.5%	Slight	Gasket seal failure at vulnerable locations, not widespread.	1.0% – 2.0%
Moderate	Cracking through-out. Most sealant joints torn. Some windows cracked. Water barrier damaged.	0.4% – 1.2%	Moderate	Cracked glass and gasket seal failure throughout significant area.	1.5% – 3.0%
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%	Extensive	Cracked glass and gasket seal failure throughout. Significant glass fallout. Some deformed frames. Deformed anchorage.	2.5% – 3.5%
Complete	Window frames damaged, studs deformed, stud anchorage deformed.	2.0% – 4.0%	Complete	Nearly all panels either cracked or fallout. Most gasket seal failure. Significant deformed frames. Many deformed anchors requiring replacement.	3.0% – 5.0%

Increasing Drift

98



Performance Based Design and Performance Levels

MRI and Probability of Exceedance

Probability of Exceedance 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%

100

Performance Based Design and Performance Levels

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)



101

Performance Based Design and Performance Levels

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.



102



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AISC | Questions?

Single-Session Registrants

CEU / PDH Certificates

- You will receive an email on how to report attendance from: registration@aisc.org.
- Be on the lookout: Check your spam filter! Check your junk folder!
- Completely fill out online form. Don't forget to check the boxes next to each attendee's name!



Smarter. Stronger. Steel.

Single-Session Registrants

CEU / PDH Certificates

- Reporting site (URL will be provided in the forthcoming email).
- Username: Same as AISC website username.
- Password: Same as AISC website password.



4-Session Registrants

CEU / PDH Certificates

One certificate will be issued at the conclusion of the course.



4-Session Registrants

Attendance and PDH Certificates

- For Session R1, you must pass the quiz to receive credit for the session.
- For Sessions L1 – L3, you have two options to receive credit for the session.
 - Option 1: Watch the live session. Credit for live attendance will be displayed on the Course Resources table within two days of the session.
 - Option 2: Watch the recording and pass the associated quiz.

Videos and Quizzes

- Session R1 video recording and quiz access has been available since you registered.
- For Sessions L1 – L3, find access by the end of the day, Friday, after the live air date. (An email will be sent from webinars@aisc.org.)
- All video recordings and quizzes are available until 8:00 a.m. ET on June 17.
- Quiz scores are displayed in the Course Resources table.

Distribution of Certificates

All certificates will be issued after the course is completed (the week of June 17). Only the registrant will receive a certificate for the course.



4-Session Registrants

Course Resources

Find all your handouts, quizzes and quiz scores, recording access, and attendance information in one place!



4-Session Registrants

Course Resources

Go to www.aisc.org and sign in.

The screenshot shows the AISC website header with navigation links: EDUCATION, PUBLICATIONS, STEEL SOLUTIONS CENTER, AWARDS AND COMPETITIONS, TECHNICAL RESOURCES. Below the header is a large image of a modern building facade with the AISC logo. The main content area contains a login form with fields for USERNAME and PASSWORD, a 'Remember Me' checkbox, and a 'LOGIN' button. To the right of the form is a 'DON'T HAVE AN ACCOUNT?' section with a 'REGISTER NOW' button. At the bottom of the form, there are links for 'Forgot Username?' and 'Forgot Password?'.

4-Session Registrants

Course Resources

Go to www.aisc.org and sign in.

The screenshot shows the MyAISC user profile page. On the left, there is a 'MyAISC' sidebar with links: Edit Profile, My Downloads, My Pending Quizzes, My Events, Order History, Course History, and Course Resources (circled in red). The main content area has sections for 'MY PROFILE' (with an 'EDIT PROFILE' button), 'MY PURCHASED DOWNLOADS' (with a 'VIEW DOWNLOADS' button), and 'MY COURSE RESOURCES' (with a 'VIEW RESOURCES' button, also circled in red). The 'MY COURSE RESOURCES' section includes the text: 'View online resources for Night School and Live Webinar package registrations.'

4-Session Registrants

Course Resources

The screenshot shows the AISC website header with navigation links: EDUCATION, PUBLICATIONS, AWARDS AND COMPETITIONS, TECHNICAL RESOURCES, STEEL SOLUTIONS CENTER. Below the header is a large image of a modern building facade with the AISC logo. The main content area shows a breadcrumb trail: AISC > MY ACCOUNT > COURSE RESOURCES. Below this is a 'Course Resources' section with a table listing various events.

Event	Start Date
Session Overview on Steel	1/15/2010 12:00:00 AM
4-Session Package: Design of Facade Attachments	5/9/2019 1:00:00 PM
101-21-8-Session Package-Foreign School 18 - Fundamentals of Corrosion Design	10/5/2017 7:00:00 PM
101-21-8-Session Package-Foreign School 18 - Session: Design on Steel	1/5/2019 7:00:00 PM
101-21-8-Session Package-Foreign School 11: Design of Facade Attachments	7/6/2018 7:00:00 PM
101-21-8-Session Package-Foreign School 18: Steel Construction: 100 To Tomorrow Out	10/15/2019 7:00:00 PM
101-21-8-Session Package-Foreign School 18: Connection Design	1/4/2019 7:00:00 PM
101-21-8-Session Package-Foreign School 20: Classical Methods of Structural Analysis	6/5/2019 7:00:00 PM
8-Session Package-Session Design on Steel - Concrete & Steel	7/18/2018 1:00:00 PM

4-Session Registrants

Course Resources

The screenshot shows the AISC website header with navigation links: EDUCATION, PUBLICATIONS, AWARDS AND COMPETITIONS, TECHNICAL RESOURCES, STEEL SOLUTIONS CENTER. Below the header is a large image of a modern building facade with the AISC logo. The main content area shows a breadcrumb trail: AISC > MY ACCOUNT > COURSE RESOURCES > DESIGN OF FACADE ATTACHMENTS PACKAGE RESOURCES. Below this is a 'Design of Facade Attachments' section with a '4-SESSION PACKAGE RESOURCES' table.

Event	Date	Platform	Video	Quiz	Attendance
RJ: Facade Fundamentals	N/A	Standards	3000	Pass/Fail	N/A
L1: Facade Attachments Part 1	May 9 2019 1:30PM EDT	Standards	Available 05/11/2019 5:00PM EDT	Available 05/11/2019 5:00 PM EDT	Pending
L2: Facade Attachments Part 2	May 10 2019 1:30PM EDT	Standards	Available 05/12/2019 5:00PM EDT	Available 05/12/2019 5:00 PM EDT	Pending
L3: Facade Attachments - Building Lateral Drifts	May 23 2019 1:30PM EDT	Standards	Available 05/25/2019 5:00PM EDT	Available 05/25/2019 5:00 PM EDT	Pending
Total Exam	N/A			Available 5/27/2019 5:00 PM EDT	



