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Lateral Load Transfer From Diaphragms to Resisting Elements
Part 1: Diaphragm Components & Connection to Resisting Elements
August 26, 2021

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AISC Live Webinars

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AISC Live Webinars

Course Description – Submitted for AIA CE Credit

Lateral Load Transfer From Diaphragms to Resisting Elements
Part 1 – Diaphragm Components & Connection to Resisting Elements
August 26, 2021

This two-part webinar will examine how loads flow through diaphragms and horizontal trusses to the vertical elements of the lateral force-resisting system. The first session of this two-part webinar will begin with a review of diaphragms and their components and the ASCE 7 provisions pertaining to diaphragms. Several case studies will be discussed to demonstrate effective detailing solutions for connecting to various types of lateral force-resisting systems.

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Learning Objectives – Submitted for AIA CE Credit

- List the components and force effects that should be considered in the safe design of diaphragms.
- Explain why ASCE 7 prescribes different seismic lateral loads for the design of diaphragms than for the design of the lateral force-resisting system vertical elements.
- Identify building configurations that can result in significant transfer forces, which must be accounted for in the structural design.
- Describe effective detailing practices for connecting diaphragm collectors to braced frames and shear walls.

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Lateral Load Transfer From Diaphragms to Resisting Elements

Part 1 – Diaphragm Components & Connection to Resisting Elements

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Seattle, Washington

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Lateral Load Transfer From Diaphragms to Resisting Elements

- The Role of Diaphragms
- Diaphragm Components
- ASCE Seismic Design Force Provisions
  - Diaphragms
  - Collectors
- Diaphragms to Shear Walls
- Diaphragms to Boundary Elements
- Boundary Element to Boundary Element
- Collectors to Shear Walls

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The Role of Diaphragms

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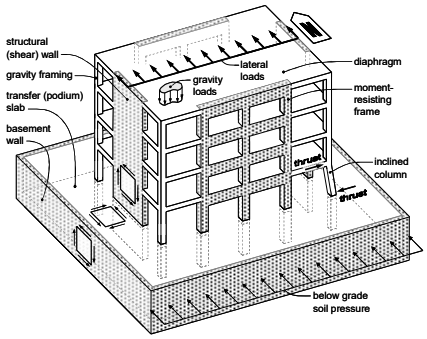
The Role of Diaphragms

- Gravity Forces
- Inertial Forces
- Wind Forces
- Transfer Forces
- Thrust from Inclined Columns



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Diaphragm Components

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Diaphragm Components

AISC 360, Section B3.5

Design of Diaphragms and Collectors

Diaphragms and collectors shall be designed for forces that result from loads as stipulated in Section B2. They shall be designed in conformance with the provisions of Chapters C through K, as applicable.

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Diaphragm Components

ASCE 7, Section 12.10.1

Diaphragms shall be designed for both the shear and bending stresses resulting from design forces. At diaphragm discontinuities, such as reentrant corners, the design shall ensure that dissipation or transfer of edge (chord) forces combined with other forces in the diaphragm is within shear and tension capacity of the diaphragm.

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Diaphragm Components

ASCE 7, Section 12.10.1

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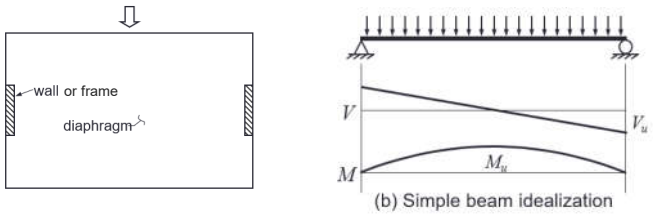
Diaphragm Components

Diaphragm Idealization



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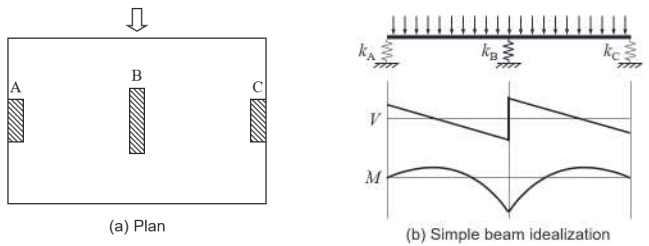
Diaphragm Components

Diaphragm Idealization



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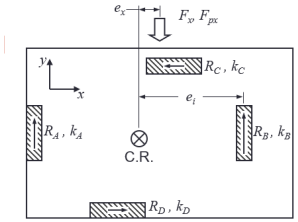
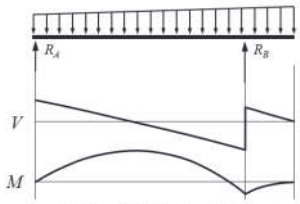
Diaphragm Components

Diaphragm Idealization



(a) Plan



(b) Simple beam idealization

Diaphragm Components

Flexible vs. Rigid ASCE 7-16, Section 12.3)

- Flexible
  - Prescriptive
  - Calculated

Diaphragm Components

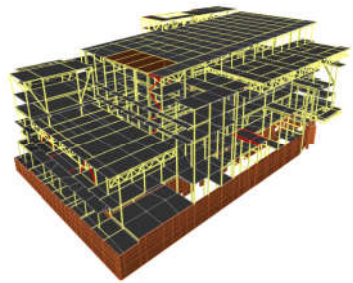
Flexible vs. Rigid ASCE 7-16, Section 12.3)

- Rigid
  - Prescriptive
  - Span-to-depth must be ≤ 3

Diaphragm Components

Flexible vs. Rigid ASCE 7-16, Section 12.3)

- All others (semi-rigid)
  - Diaphragm flexibility must be considered in the analysis



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Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

AISC 341, Section D1.5a

- Details shall be provided to transfer load between the diaphragm and boundary members, collector elements, and elements of the horizontal framing system.

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Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

AISC 341, Section D1.5b

- Diaphragm is the topping slab above the flutes designed per ACI 318
- Diaphragm is the slab on deck assembly using in plane shear tests (such as ICC-ES or IAPMO-UES report values)

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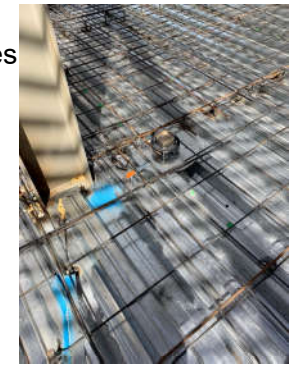
Diaphragm Components

Topping Slab Diaphragm Approaches

Topping slab designed per ACI 318

- Topping thickness
- Concrete compressive strength
- Reinforcement ratio



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Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

Slab on deck assembly

- Deck thickness (gage)
- Support (beam) spacing
- Stud count
- Deck attachments to support
- Deck sidelap attachments
- Minimum slab reinforcement

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Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

Support Fasteners

- Welds
- Mechanical fasteners

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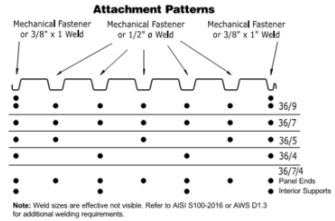
Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

Support Fasteners

- Welds
- Mechanical fasteners



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Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

Sidelap Fasteners

- Welds
- Screws
- Proprietary systems

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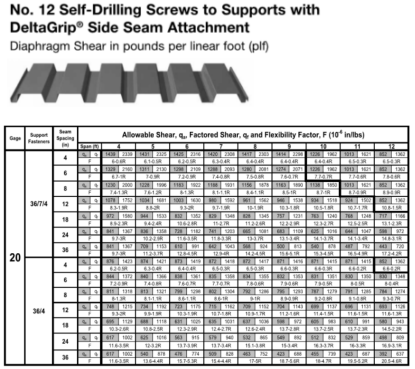
Diaphragm Components

Slab on Steel Deck Diaphragm Approaches

Design Tables

- Strength
- Stiffness



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Diaphragm Components

Steel Deck Institute Diaphragm Design Manual

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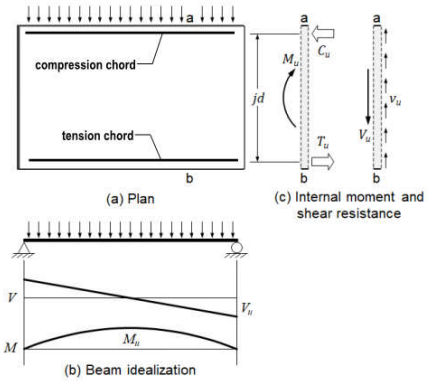
Diaphragm Components

Chords



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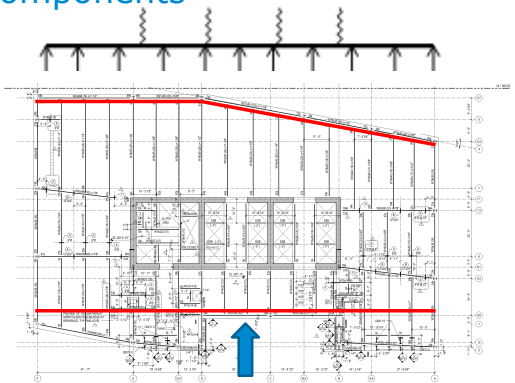
Diaphragm Components

Chords

- Steel Framing
- Slab Reinforcement



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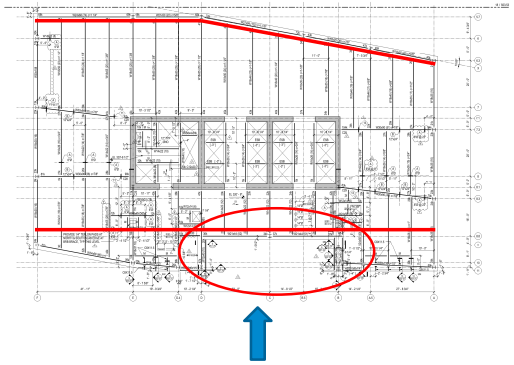
Diaphragm Components

Chords

- Steel Framing
- Slab Reinforcement



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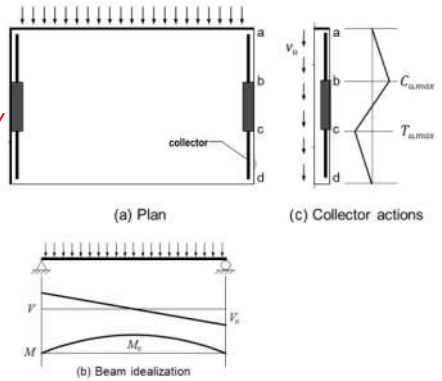
Diaphragm Components

Collectors (Drag Strut, Distributor)

- ASCE 7 Definition:

A diaphragm or shear wall boundary element parallel to the applied load that collects and transfers diaphragm shear forces to the vertical elements of the seismic force-resisting system or distributes forces within the diaphragm or shear wall.



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Diaphragm Components

Collectors

- Steel Framing
- Slab Reinforcement

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Diaphragm Components

Putting It Together

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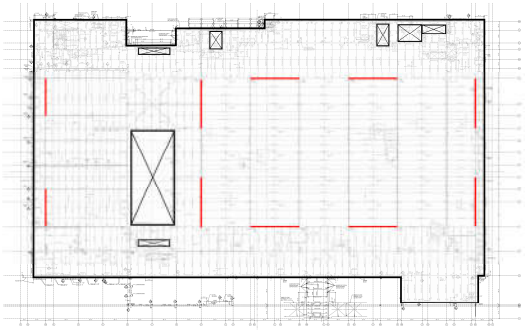
Diaphragm Components

Putting It Together



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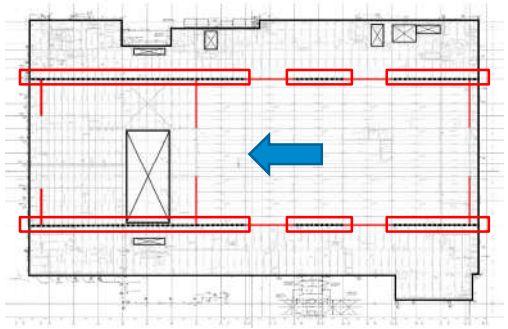
Diaphragm Components

Putting It Together - Collectors



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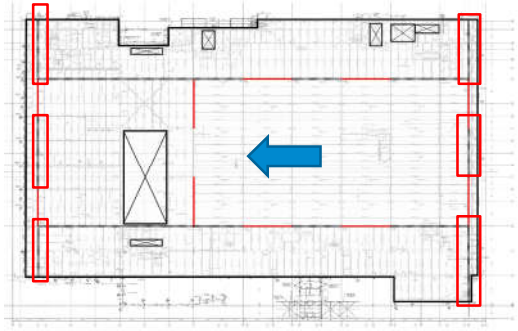
Diaphragm Components

Putting It Together - Chords



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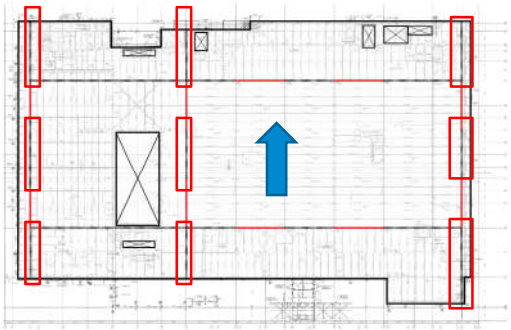
Diaphragm Components

Putting It Together - Collectors



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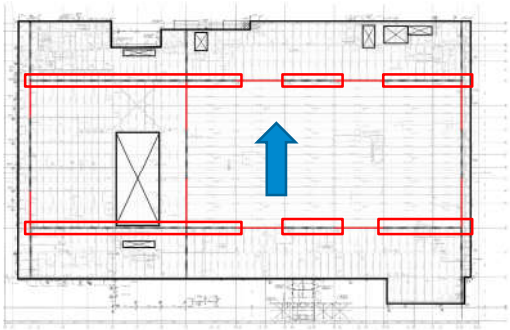
Diaphragm Components

Putting It Together - Chords



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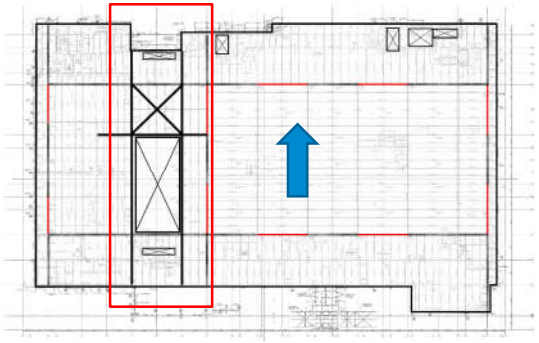
Diaphragm Components

Putting It Together – Large Openings



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ASCE 7 Diaphragm Seismic Force Provisions

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ASCE 7 Diaphragm Seismic Force Provisions

Wind Loading vs Seismic Loading

- Wind loads imposed by the cladding attachments at the exterior walls
  - IBC or ASCE 7 (other building codes)
  - Wind tunnel testing
- Seismic loads originate within the diaphragm and at masses being braced by the diaphragm, such as cladding
  - ASCE 7

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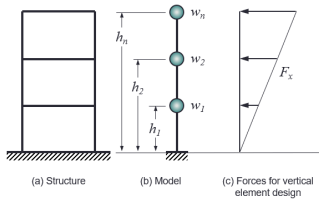
ASCE 7 Diaphragm Seismic Force Provisions



$$F_x = C_{vx} V \quad \text{(ASCE 7 Eq. 12.8-11)}$$

$$C_{vx} = \frac{w_x h_x^k}{\sum_{i=1}^{n} w_i h_i^k} \quad \text{(ASCE 7 Eq. 12.8-12)}$$

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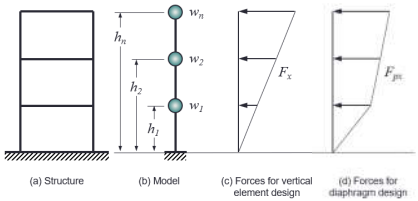
ASCE 7 Diaphragm Seismic Force Provisions



$$F_x = C_{vx} V \quad \text{(ASCE 7 Eq. 12.8-11)}$$

$$C_{vx} = \frac{w_x h_x^k}{\sum_{i=1}^{n} w_i h_i^k} \quad \text{(ASCE 7 Eq. 12.8-12)}$$

$$F_{px} = \frac{\sum_{i=x}^{n} F_i}{\sum_{i=x}^{n} w_i} w_{px} \quad \text{(ASCE 7 Eq. 12.10-1)}$$

but not be less than

$$F_{px,\min} = 0.2 S_{DS} I_e w_{px} \quad \text{(ASCE 7 Eq. 12.10-2)}$$

and need not exceed

$$F_{px,\max} = 0.4 S_{DS} I_e w_{px} \quad \text{(ASCE 7 Eq. 12.10-3)}$$

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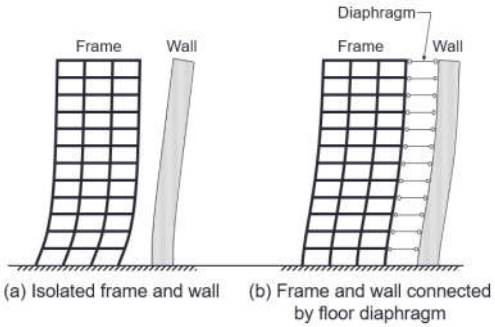
ASCE 7 Diaphragm Seismic Force Provisions

Transfer Forces



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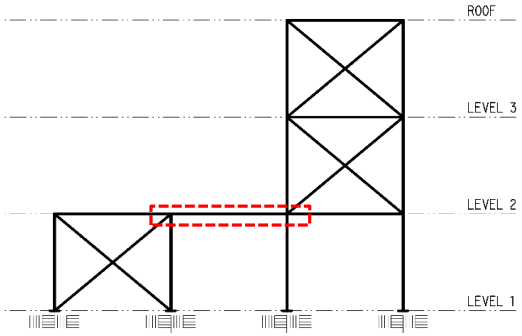
ASCE 7 Diaphragm Seismic Force Provisions

Transfer Forces



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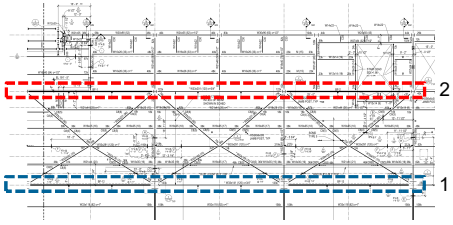
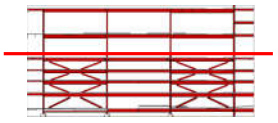
ASCE 7 Diaphragm Seismic Force Provisions

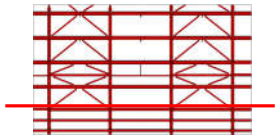
Transfer Forces



Plan



Elevation 2



Elevation 1

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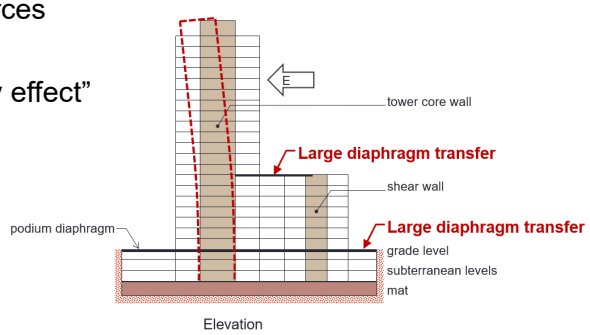
ASCE 7 Diaphragm Seismic Force Provisions

Transfer Forces

- "Backstay effect"



Elevation

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ASCE 7 Diaphragm Seismic Force Provisions

Transfer Forces for both diaphragms and collectors are…

- Additive to inertial forces
- Subject to the redundancy factor ρ, ***except***
- Subject to the overstrength factor Ω_0 where Out-of-Plane Offset irregularities exist (Type 4 Horizontal Structural Irregularities per Table 12.3-1)

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ASCE 7 Collector Force Provisions

Section 12.10.2.1

For structures assigned to SDC C through F,
collector design forces are the maximum of (a), (b), and (c):

(a) Forces resulting from application of F_x using the load combinations with overstrength factor Ω_0 of ASCE 7 Section 12.4.3.1;

(b) Forces resulting from application of F_{ox} using the load combinations with overstrength factor Ω_0 of ASCE 7 Section 12.4.3.1;

(c) Forces resulting from application of $F_{px,min}$ in the basic load combinations of ASCE 7 Section 12.4.2.

Transfer forces as previously described are additive

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ASCE 7 Diaphragm Seismic Force Provisions

Irregularities – SDC D-F

- Horizontal Irregularities (ASCE 7, Table 12.3-1)
  - Type 1a, Type 1b, Type 2, Type 3, Type 4
  - Torsional, Extreme Torsional, Reentrant Corner, Diaphragm Discontinuity, Out-of-Plane Offset
- Vertical Irregularities (ASCE 7, Table 12.3-2)
  - Type 4
  - In-Plane Discontinuity in Vertical LFR Element
- **Inertial forces** calculated per ASCE 7, 12.10.1 design forces shall be increased by 25% for connections of diaphragms to vertical elements and collectors and their connections to vertical elements
- Transfer forces subject to overstrength factor

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Diaphragm to Shear Wall Connections

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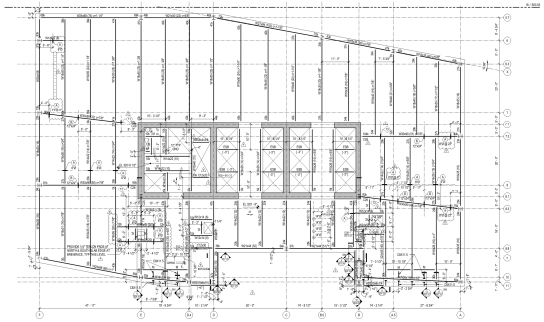
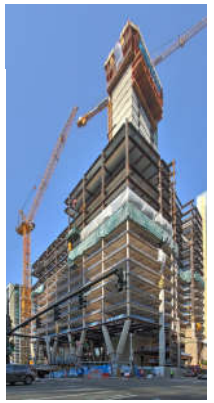
Diaphragm to Shear Walls

Diaphragm to Concrete





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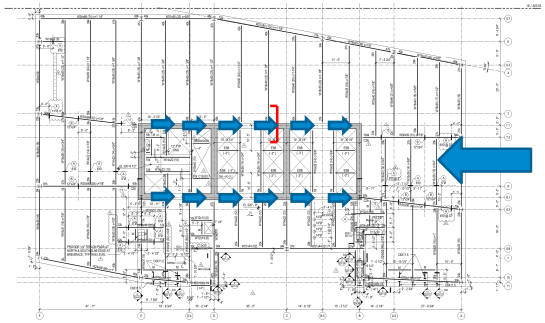
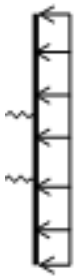
Diaphragm to Shear Walls

Diaphragm to Concrete





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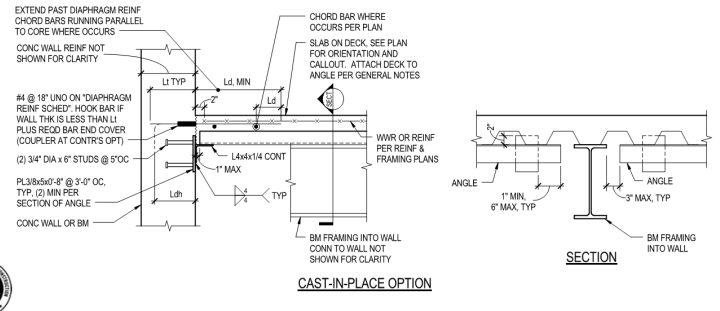
Diaphragm to Shear Walls

Diaphragm Connection to Concrete Wall



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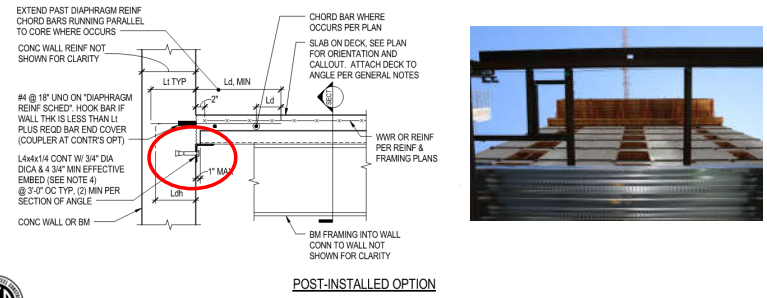
Diaphragm to Shear Walls

Diaphragm Connection to Concrete Wall



POST-INSTALLED OPTION

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

- Shear Friction Provisions per ACI 318

$$\emptyset V_n = \emptyset \mu A_{vf} f_y \quad \text{(ACI 318 22.9.4.2)}$$

- Subject to upper limits per ACI 318 Table 22.9.4.4
- Typically $V_n \leq 0.2 f'_c A_c \leq 800 A_c$ unless concrete is intentionally roughened

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

- What is coefficient of friction, μ?
- ACI 318 Table 22.9.4.2
  - 0.6λ concrete placed against hardened concrete
  - 1.0λ concrete placed against intentionally roughened surface
  - λ lightweight concrete factor (0.75 to 0.85)

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

- What is ∅?
- ACI 318 21.2.1
  - $\emptyset = 0.75$
- ACI 318 21.2.4
  - For seismic loads, $\emptyset = 0.6$ when the vertical elements are special moment frames or special structural walls

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

- Representative Project
- Special Concrete Walls Not Intentionally Roughened
  - Where $\emptyset = 0.6$
  - $\mu = 0.6\lambda$
- 4-1/2" NWT topping
- 5-1/4" LTWT topping
  - $f'_c = 4{,}000\ psi$

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

4-1/2" NWT

REINF	ρ	ϕV_n (K/FT)	ϕv_n	ρ	ϕV_n (K/FT)	ϕv_n
#4@18"	.0025	2.8	$0.8\sqrt{f'_c}$			
#4@12"	.0037	4.3	$1.3\sqrt{f'_c}$			
#5@12"	.0057	6.5	$1.9\sqrt{f'_c}$			
#5@6"	.0115	13.0	$3.8\sqrt{f'_c}$			
#5@4"	.0172	19.4	$5.7\sqrt{f'_c}$			

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

4-1/2" NWT

REINF	ρ	ϕV_n (K/FT)	ϕv_n	ρ	ϕV_n (K/FT)	ϕv_n
#4@18"	.0025	2.8	$0.8\sqrt{f'_c}$			
#4@12"	.0037	4.3	$1.3\sqrt{f'_c}$			
#5@12"	.0057	6.5	$1.9\sqrt{f'_c}$			
#5@6"	.0115	13.0	$3.8\sqrt{f'_c}$			
#5@4"	.0172	19.4	$5.7\sqrt{f'_c}$			

$$\emptyset V_{n,max} = \emptyset\, 8\sqrt{f'_c}\, A_c$$

63

Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

4-1/2" NWT **5-1/4" LTWT**

REINF	ρ	ϕV_n (K/FT)	ϕv_n	ρ	ϕV_n (K/FT)	ϕv_n
#4@18"	.0025	2.8	$0.8\sqrt{f'_c}$	.0025	2.5	$0.6\sqrt{f'_c}$
#4@12"	.0037	4.3	$1.3\sqrt{f'_c}$	.0037	3.8	$1.0\sqrt{f'_c}$
#5@12"	.0057	6.5	$1.9\sqrt{f'_c}$	.0057	5.7	$1.4\sqrt{f'_c}$
#5@6"	.0115	13.0	$3.8\sqrt{f'_c}$	.0115	11.3	$2.9\sqrt{f'_c}$
#5@4"	.0172	19.4	$5.7\sqrt{f'_c}$	.0172	17.0	$4.3\sqrt{f'_c}$

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Diaphragm to Shear Walls

Connection Design for Diaphragm Shear

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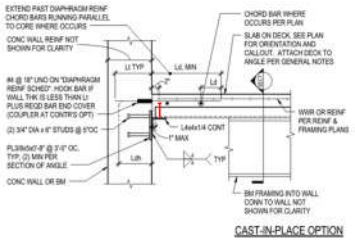
Diaphragm to Shear Walls

Diaphragm Connection to Concrete Wall – Alternate Load Path

- Headed studs to steel angle
- Steel angle to embed
- Embed to concrete



66

Diaphragm to Shear Walls

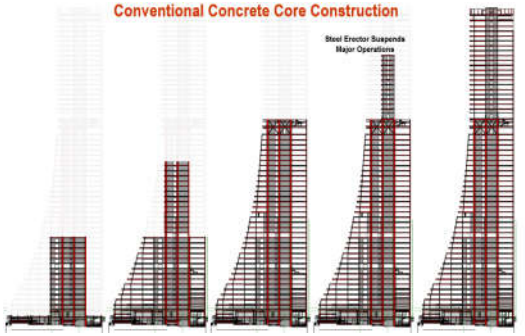
Diaphragm Connection to Concrete Wall – No Concrete

- Deck to steel angle weld
- Steel angle to embed
- Embed to concrete

67

Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)



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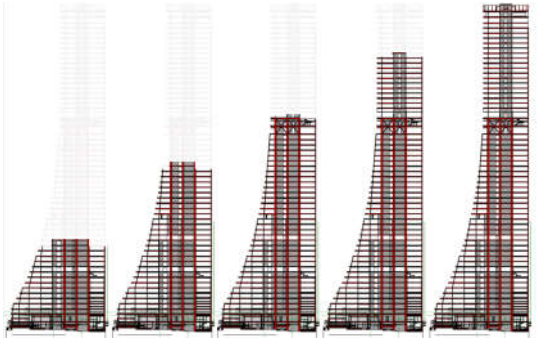
Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)



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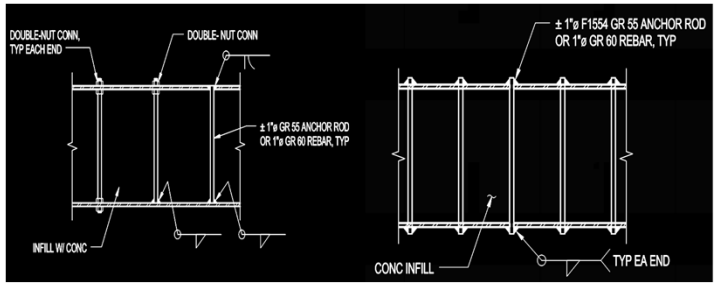
Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)



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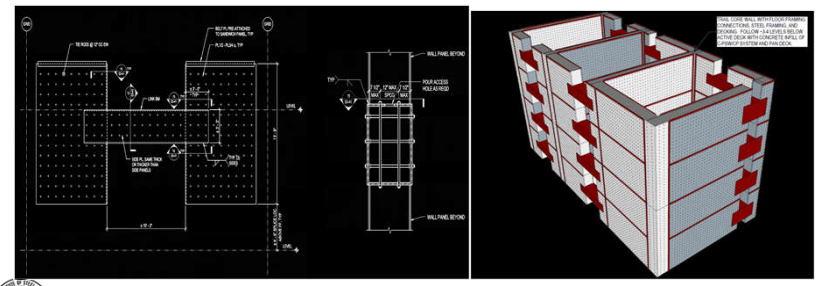
Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)



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Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)

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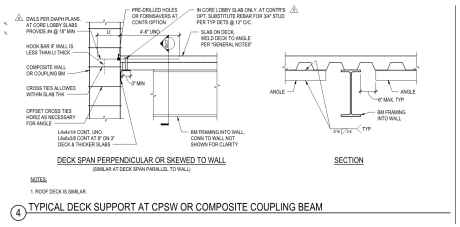
Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)

- Ledger angle shop welded to wall
- Pre-drilled holes for reinforcement



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Diaphragm to CPSW (SpeedCore)

Diaphragm Connection to Composite Plate Shear Wall (SpeedCore)

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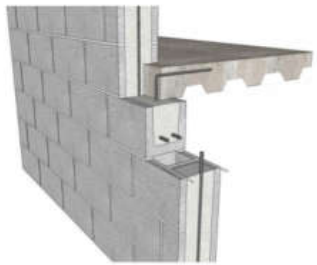
Diaphragm to Shear Walls

Connection Detail to Masonry Wall

- International Masonry Institute
  - Masonry Detailing Series



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Diaphragm to Boundary Element Connections

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Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements

- AISC 360 I7
  - *Composite slab diaphragms and collector beams shall be designed and detailed to transfer loads between the diaphragm, the diaphragm's boundary members and collector elements of the lateral force-resisting system*

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Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements

- AISC 341 D1.5a
  - *Details shall be provided to transfer loads between the diaphragm and boundary members, collector elements, and elements of the horizontal framing system*

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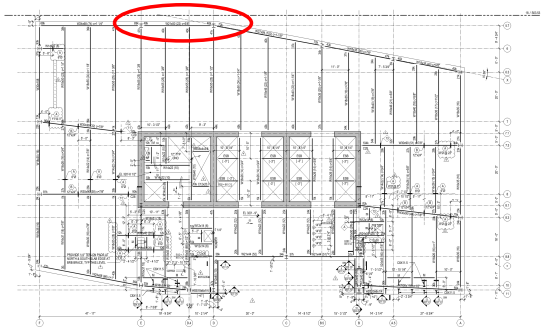
Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements



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Diaphragm to Boundary Elements

Boundary Element Design

AISC 360, Section I7 Commentary

- Design for the combined effects of axial load due to diaphragm forces and flexure due to gravity and/or lateral loads
- Axial capacity typically taken as the non-composite strength
- Flexural capacity can be either the composite or non-composite flexural strength (where appropriate)

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Diaphragm to Boundary Elements

Boundary Element Design

AISC Seismic Design Manual, 3rd Edition, Chapter 8

- Major axis buckling – full length of the member (web vertical)
- Minor axis and torsional buckling
  - Beams with bare steel deck with ribs parallel
  - Beams with bare steel deck with ribs perpendicular
  - Composite deck or slabs
- *Constrained axis torsional buckling may control

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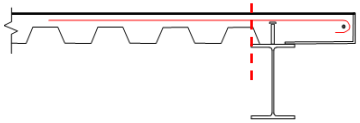
Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements

- Provide shear friction reinforcement at the boundary element
- $\mu = 1.4\lambda$ (monolithic concrete)



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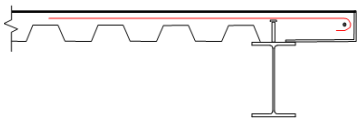
Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements

- 3” NLWT on 3” Deck (55 psf)
- SDL = 15 psf
- LL = 50 psf(r) +15 psf partition
  - 50 psf reduces to 33 psf
- S_{ds} = 0.90
- b_{trib} = 22’-6”



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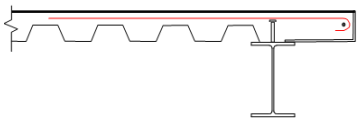
Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements

- Headed Studs
- Design Load Combinations
  - 1.2D+1.6L
    - U = 161 psf
  - $(1.2+0.2S_{ds})D + f_1L$
    - f_1=0.5
    - U = 121 psf
  - ~25% reduction



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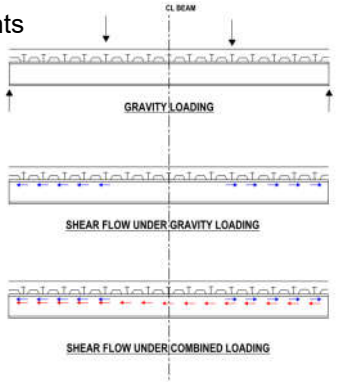
Diaphragm to Boundary Elements

Diaphragm to Steel Boundary Elements

- Headed Studs
- Design Load Combinations
  - 1.2D+1.6L
    - U = 161 psf
  - $(1.2+0.2S_{ds})D + f_1L$
    - f_1=0.5
    - U = 121 psf
  - ~25% reduction



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Boundary Element to Boundary Element Connections

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Boundary Element to Boundary Element

Steel to Steel

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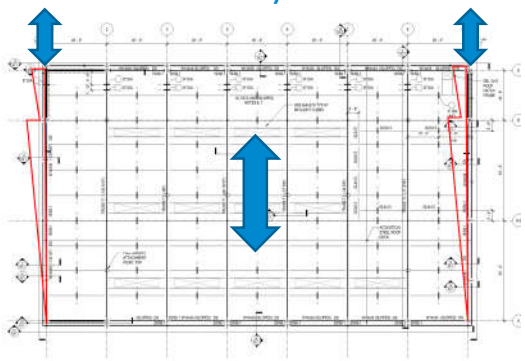
Boundary Element to Boundary Element

Steel to Steel

- Uniform shear stress
- Linearly varying axial force in collector line



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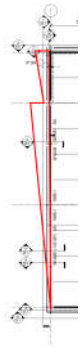
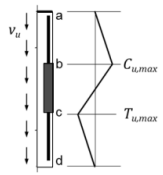
Boundary Element to Boundary Element

Steel to Steel

- Uniform shear stress
- Linearly varying axial force in collector line





(c) Collector actions

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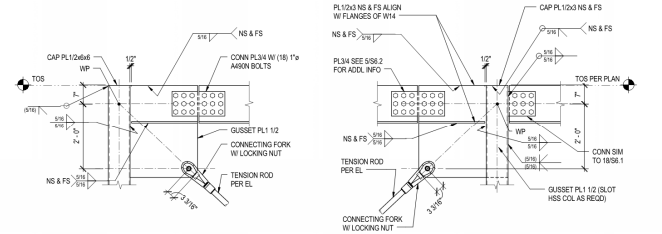
Boundary Element to Boundary Element

Steel to Steel – Extended Shear Plate



2 DETAIL 3/4" = 1'-0"

3 DETAIL 3/4" = 1'-0"

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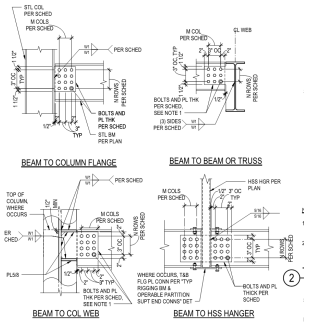
Boundary Element to Boundary Element

Steel to Steel – Extended Shear Plate

CONNECTION TYPE	BOLTS	M COLUMNS	N ROWS	PL THICKNESS (IN)	W1 (IN)	REMARKS
A	7/8" ø A325X	2	3	3/8	5/16	
B	7/8" ø A325X	2	3	1/2	5/16	
C	7/8" ø A325X	2	3	5/8	7/16	
D	7/8" ø A325X	2	4	3/8	1/4	
E	7/8" ø A325X	2	4	1/2	5/16	
F	7/8" ø A325X	2	6	1/2	5/16	
G	7/8" ø A325X	2	9	5/8	7/16	
H	7/8" ø A325X	2	10	5/8	7/16	
J	7/8" ø A325X	3	3	5/8	7/16	
K	7/8" ø A325X	3	4	3/4	1/2	
L	7/8" ø A325X	3	5	3/4	1/2	
M	7/8" ø A325X	3	11	3/4	9/16	
N	7/8" ø A325X	4	3	1	11/16	
P	1" ø A490X	2	5	1/2	3/8	
Q	1" ø A490X	2	7	3/4	1/2	
R	1" ø A490X	2	9	5/8	7/16	
S	1" ø A490X	2	10	3/4	1/2	
T	1" ø A490X	3	5	3/4	1/2	
U	1" ø A490X	4	5	3/4	1/2	



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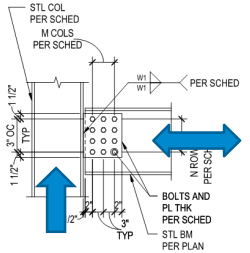
Boundary Element to Boundary Element

Steel to Steel – Extended Shear Plate

- AISC Manual of Steel Construction, Part 10
- Design Example Companion, Example Vol 1
  - Example II.A-19B

- Vertical shear
- Axial force
- Bolt Group
- Weld
- Eccentricities
- Net Section



BEAM TO COLUMN FLANGE

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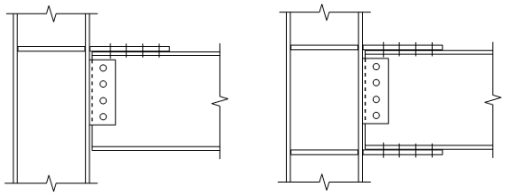
Boundary Element to Boundary Element

Steel to Steel – Flange Plates

- Vertical shear
- Axial force
- Bolt Group
- Weld
- Eccentricities
- Net Section
- Shear Lag
- Concentrated Forces (Stiffeners)



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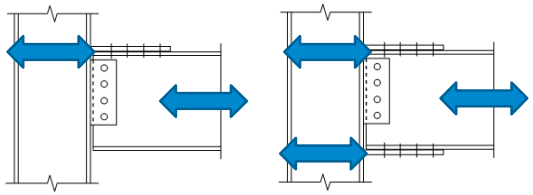
Boundary Element to Boundary Element

Steel to Steel – Flange Plates

- Vertical shear
- Axial force
- Bolt Group
- Weld
- Eccentricities
- Net Section
- Shear Lag
- Concentrated Forces (Stiffeners)



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Collector to Shear Wall Connections

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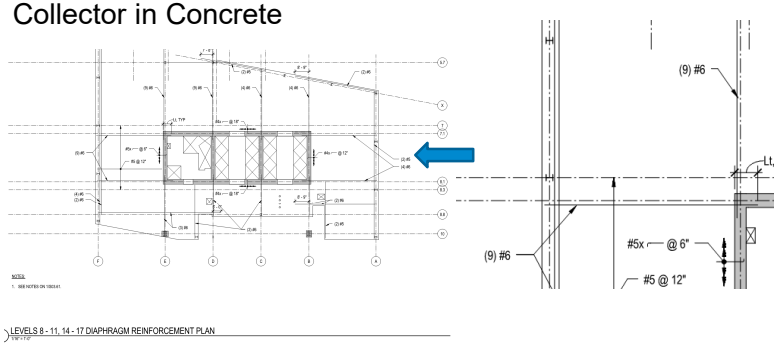
Collector to Shear Walls

Collector in Concrete



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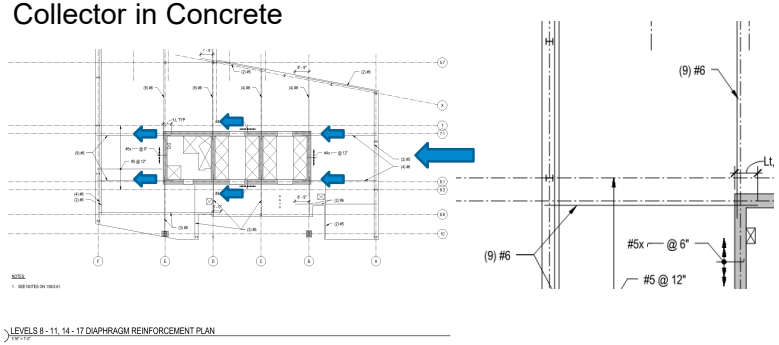
Collector to Shear Walls

Collector in Concrete



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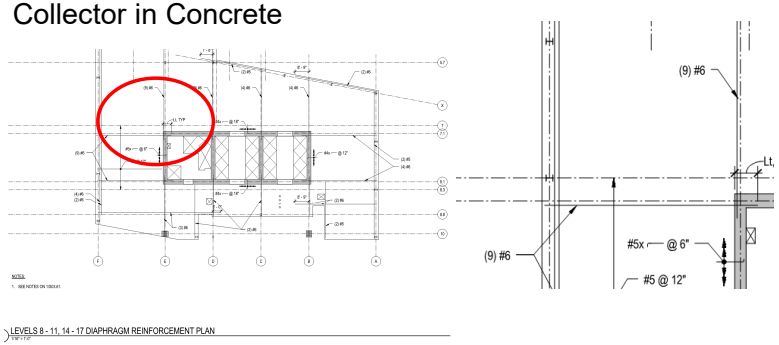
Collector to Shear Walls

Collector in Concrete



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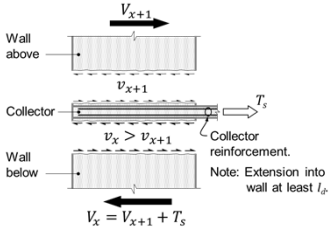
Collector to Shear Walls

Collector in Concrete

- Develop collector into the wall



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Collector to Shear Walls

Collector in Concrete

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Collector to Shear Walls

Concrete to Concrete

- Congestion escalates quickly
  - Typically 1-bar fits within the flute and 1-bar in the opposite direction over the flutes
- ACI 318 requirements for cover and spacing
- Coordinate with all trades

- Use the steel framing as collectors!

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Collector to Shear Walls

Steel to Concrete

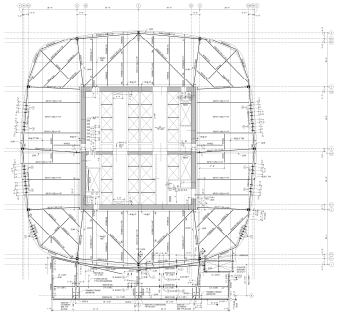

Photo by Jason O'Rear

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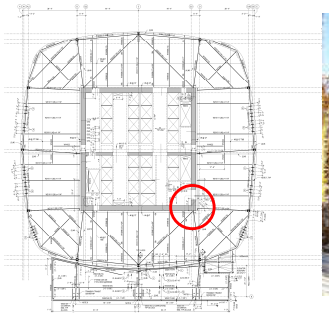
Collector to Shear Walls

Steel to Concrete



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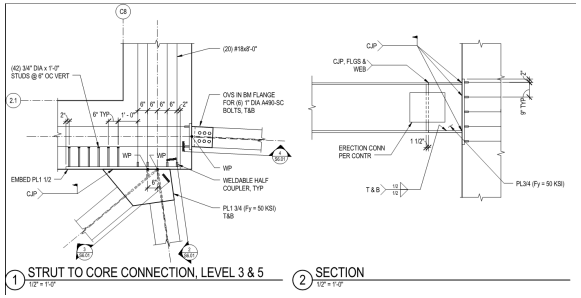
Collector to Shear Walls

Steel to Concrete



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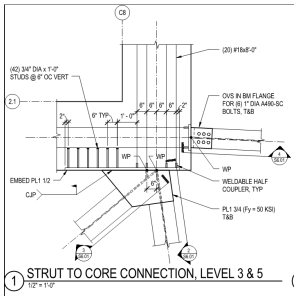
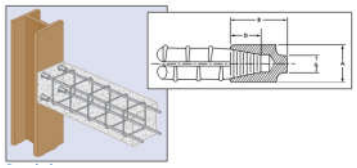
Collector to Shear Walls

Steel to Concrete





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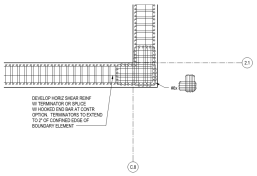
Collector to Shear Walls

Steel to Concrete



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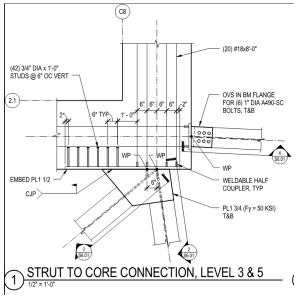
Collector to Shear Walls

Steel to Concrete



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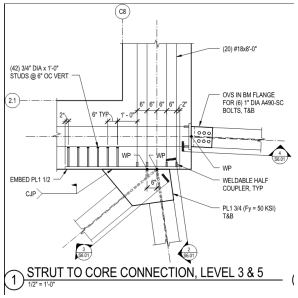
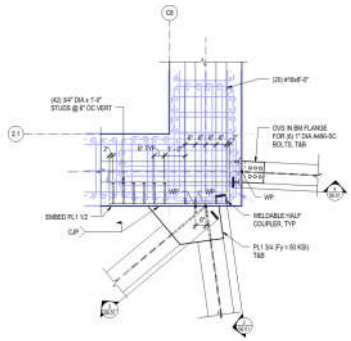
Collector to Shear Walls

Steel to Concrete





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Collector to Shear Walls

Steel to Concrete

- Connections are critical
- Member sizes may be selected based on facilitating connections
- Pay attention to M/E/P/FP slab penetrations nearby
- Coordinate with wall reinforcing
- Understand the required development length

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Collector to Shear Walls

Steel to Concrete

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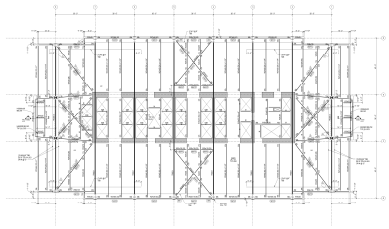
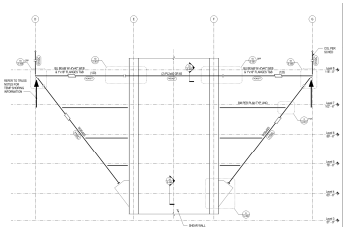
Collector to Shear Walls

Steel to Concrete





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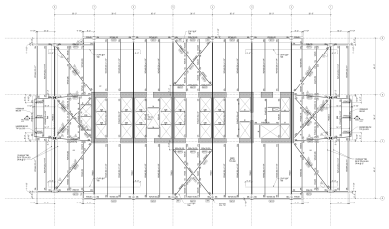
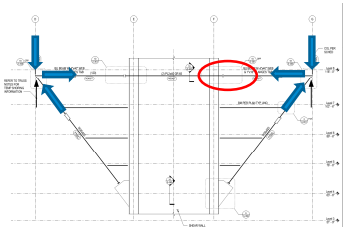
Collector to Shear Walls

Steel to Concrete





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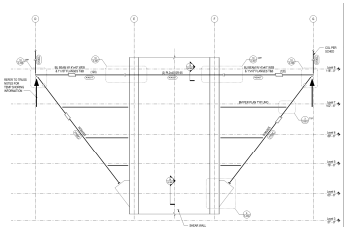
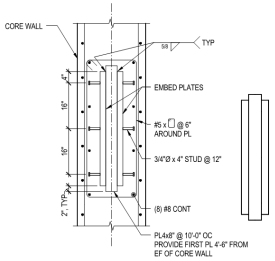
Collector to Shear Walls

Steel to Concrete





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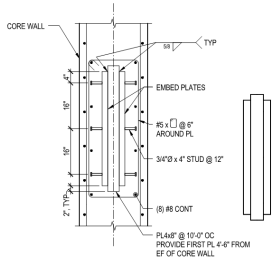
Collector to Shear Walls

Steel to Concrete



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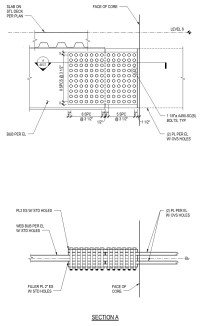
Collector to Shear Walls

Steel to Concrete



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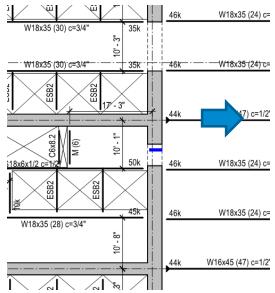
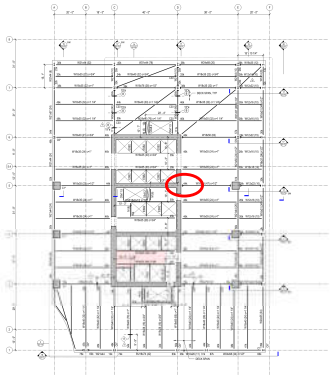
Collector to CPSW (SpeedCore)

Steel to CPSW





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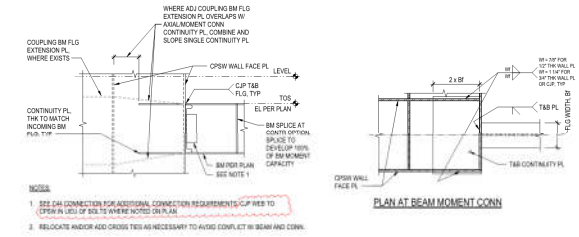
Collector to CPSW (SpeedCore)

Steel to CPSW



7 TYPICAL BEAM TO CPWS MOMENT CONNECTION

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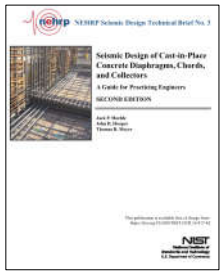
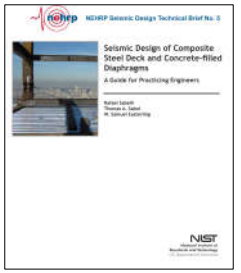
Guidance for Designers

- AISC *Seismic Design Manual*, *3rd Edition,* Part 8 (aisc.org/publications)
- National Earthquake Hazards Reduction Program (https://www.nehrp.gov/library/techbriefs.htm)





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AISC | Questions?

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CEU / PDH Certificates

For those participating at their own connection…

- Reporting attendance is not necessary.
- Certificates will be issued based on AISC's attendance record.
- You will be receiving certificates via email from registration@aisc.org.

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CEU / PDH Certificates

For those participating at one connection with a group…

- Main registrant will report attendance via an online form. (The link will be provided in an email from registration@aisc.org.)
  - Username: Same as AISC website username.
  - Password: Same as AISC website password.
- Once attendance has been reported, each group member will be receiving certificates via email from registration@aisc.org.

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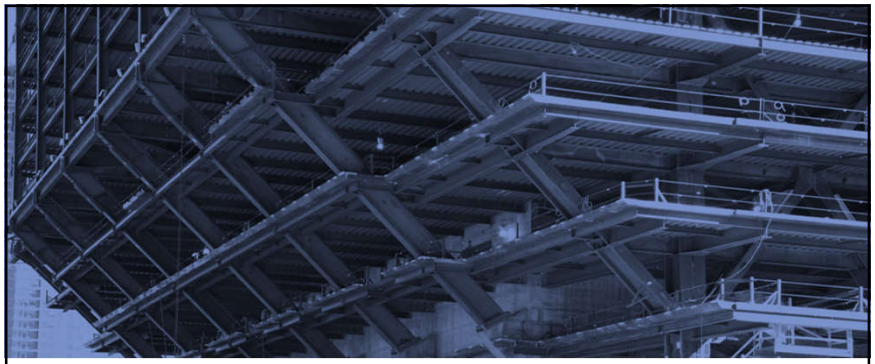

AISC | Thank you

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