CONNECTIONS IN PRECAST STRUCTURES

By

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Historic representation of Precast in INDIA

IOB Building, Chennai, 1959

Present Day presence of Precast Structure in INDIA

CONSTRUCTION SITE OF SHIRKEY, PUNE

Present Day presence of Precast Structure in INDIA

VIKAS SOUDHA, BANGALORE - B.G.SHIRKE, PUNE

Present Day presence of Precast Structure in INDIA

CHENNAI SILKS, VELACHERY – TEEMAGE, COIMBATORE

PERFORMANCE OF PRECAST STRUCTURES UNDER EARTHQUAKE LOADING

SEISMIC PERFORMANCE

Northridge earthquake - 1994

Precast parking structures

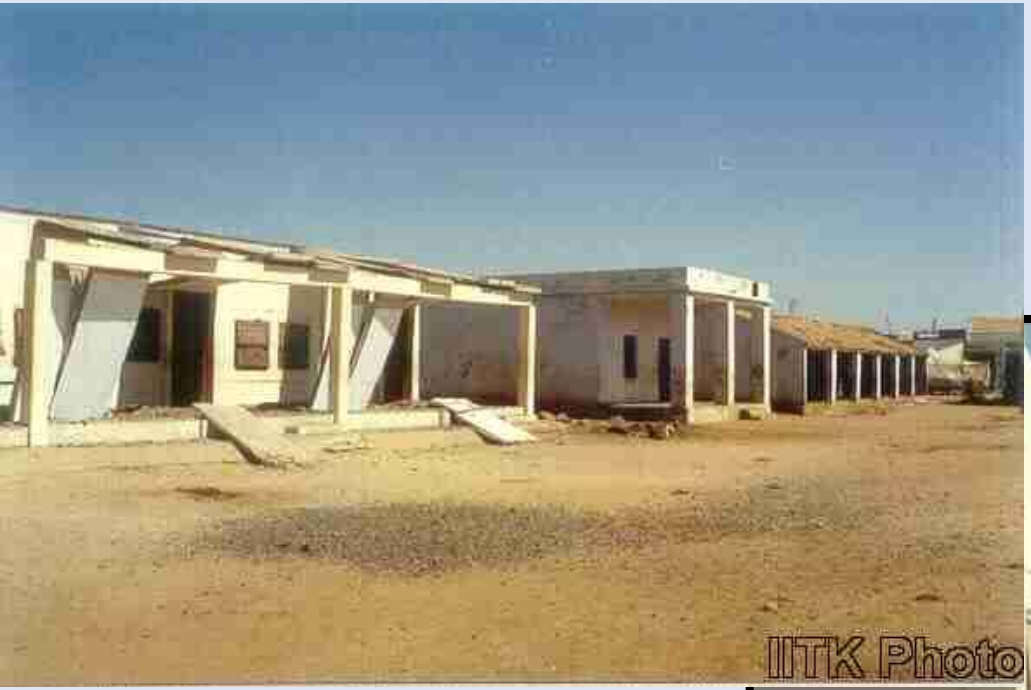
SEISMIC PERFORMANCE

Adana–Ceyhan (Turkey) Earthquake - 1998

Precast Factories

SEISMIC PERFORMANCE

Bhuj Earthquake - 2001



School Building

SEISMIC PERFORMANCE

Baja Earthquake - 2010

OBSERVATIONS

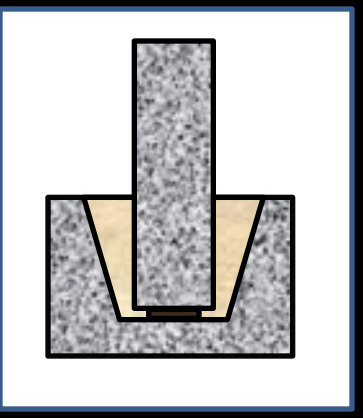
- Structural Elements were intact
- Joints and Connections failed due to inadequate detailing
- This particular aspect attracts the attention of researchers

MAJOR ISSUE

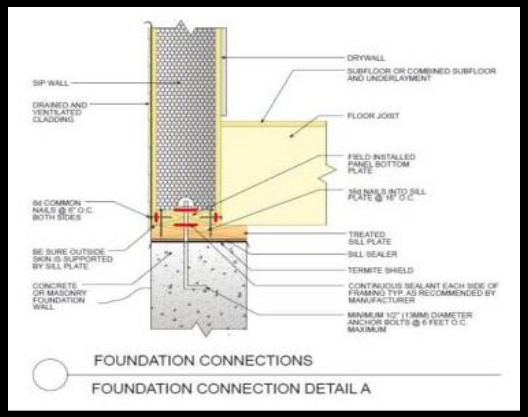
Poor Connections

NEED MORE ATTENTION

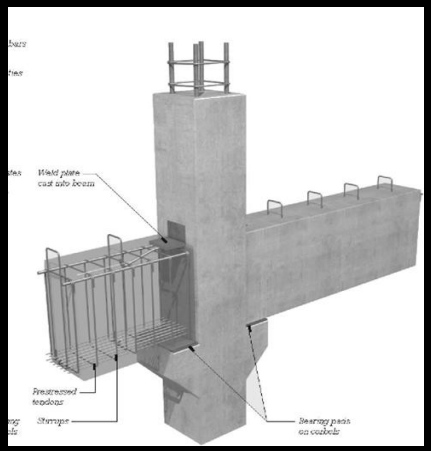
CONNECTIONS



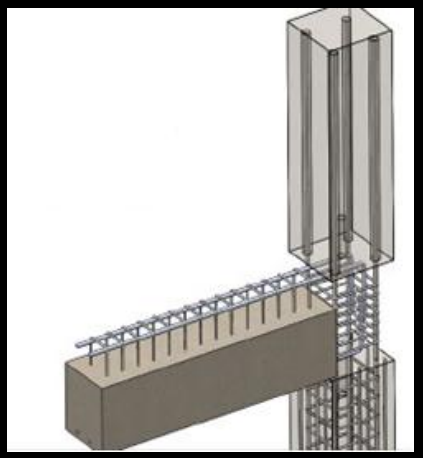
Column - Foundation



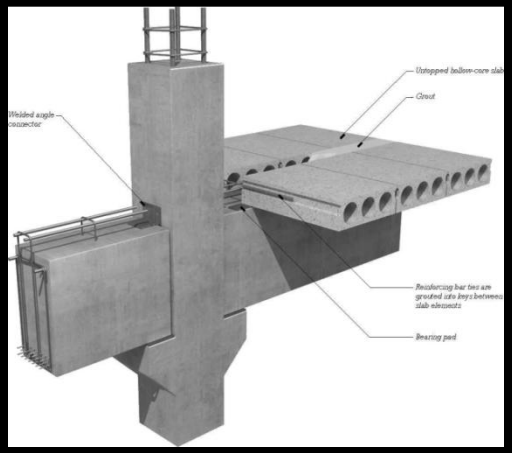
Wall - Foundation



Beam - Column



Column - Column

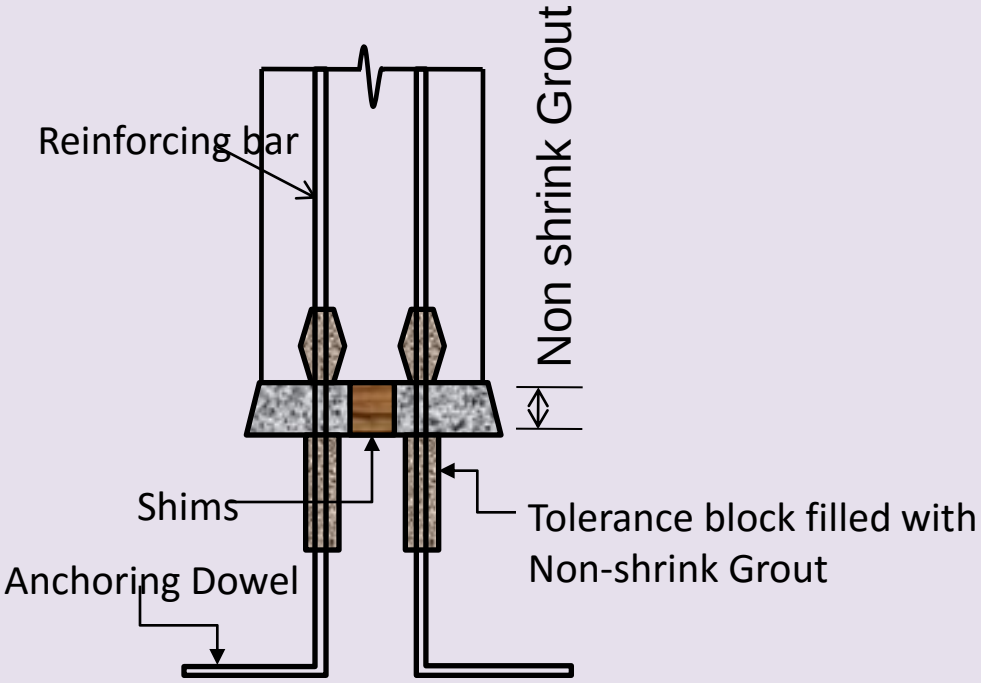


Beam - Slab

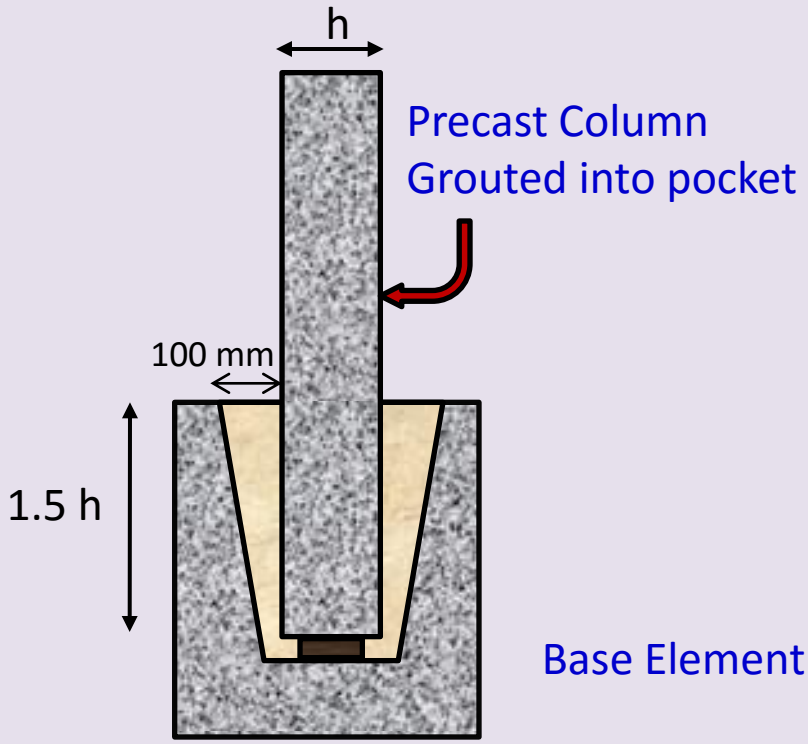
Wall - Wall

Stair - Slab

COLUMN TO FOUNDATION

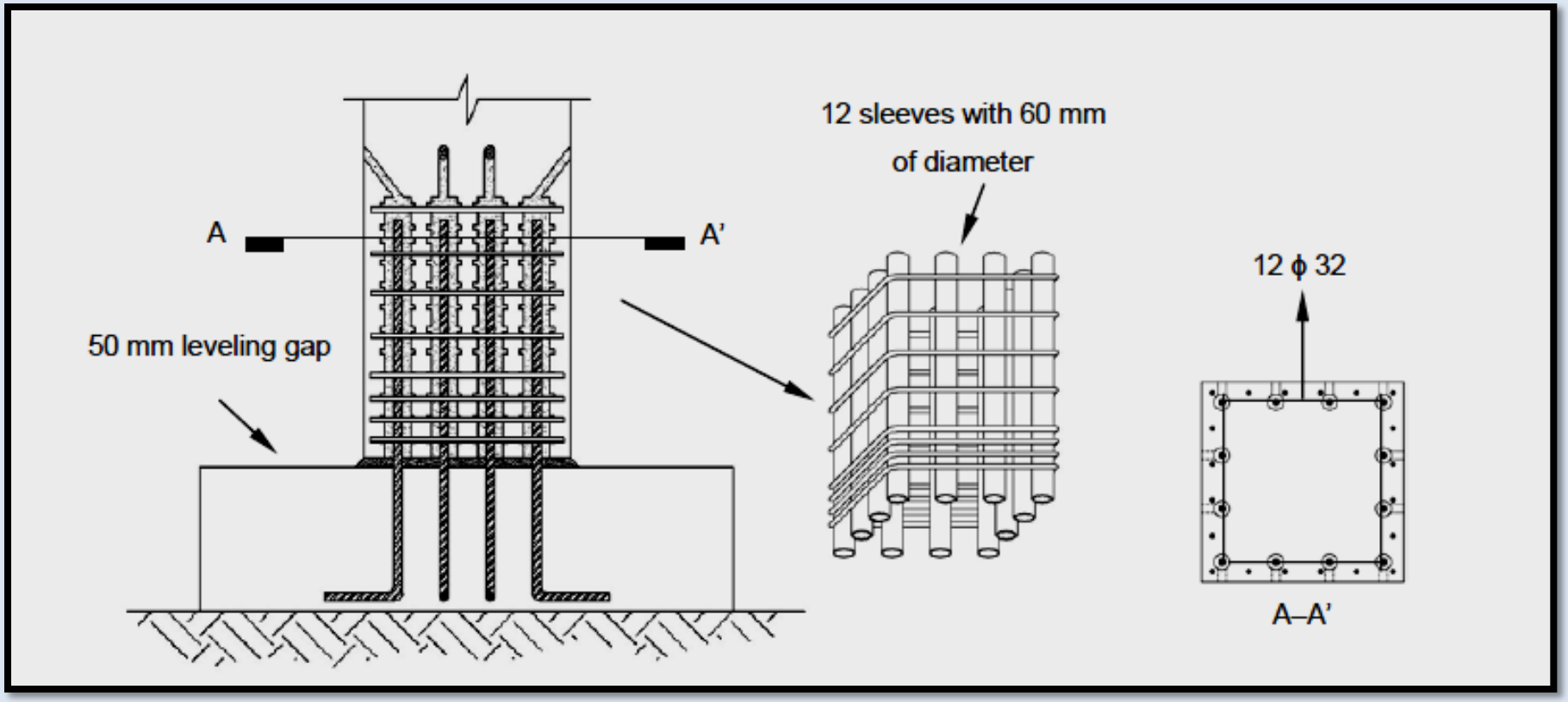


Mechanical Splices Connection



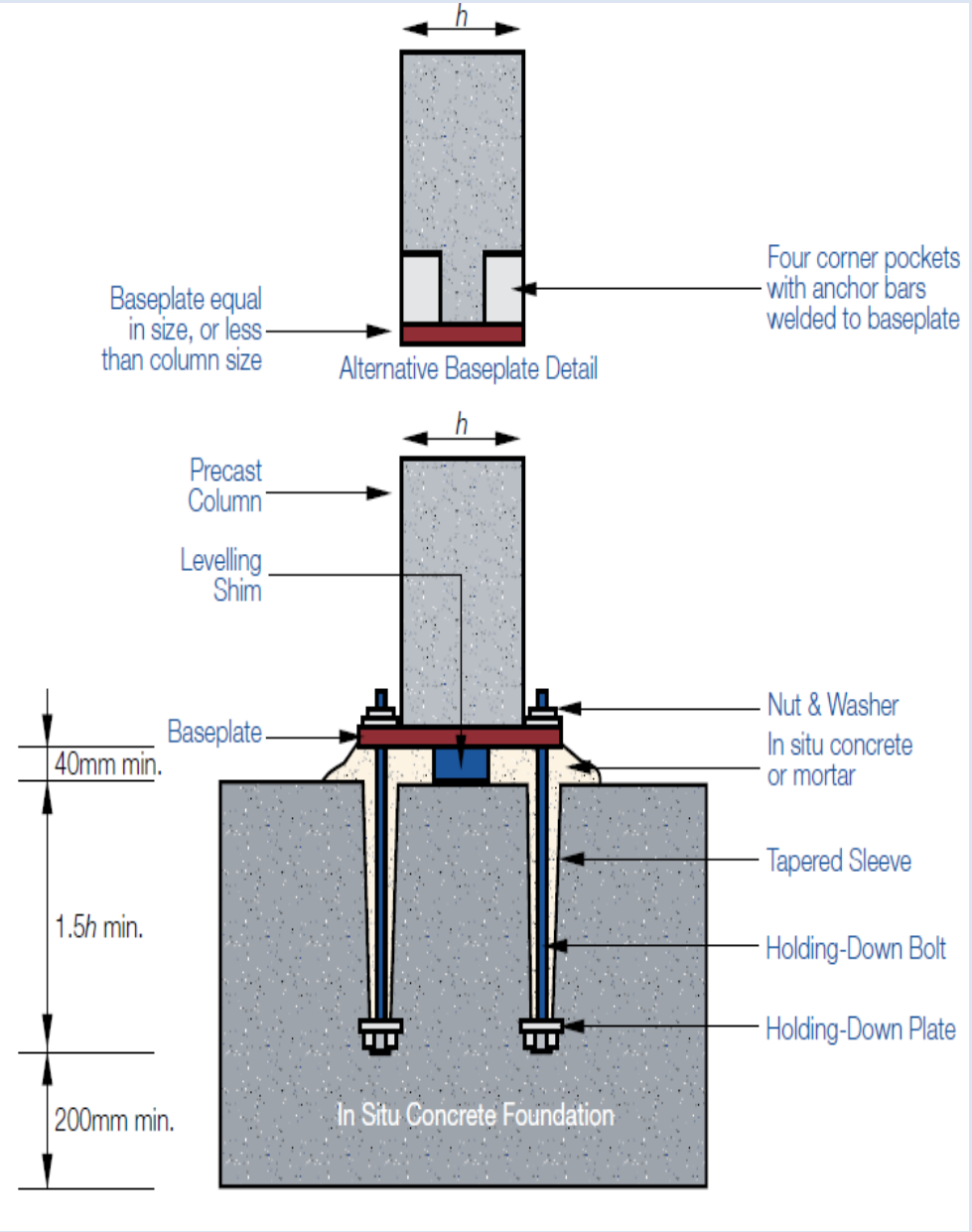
In situ Socket Foundation

COLUMN TO FOUNDATION



Mechanical Splices Connection

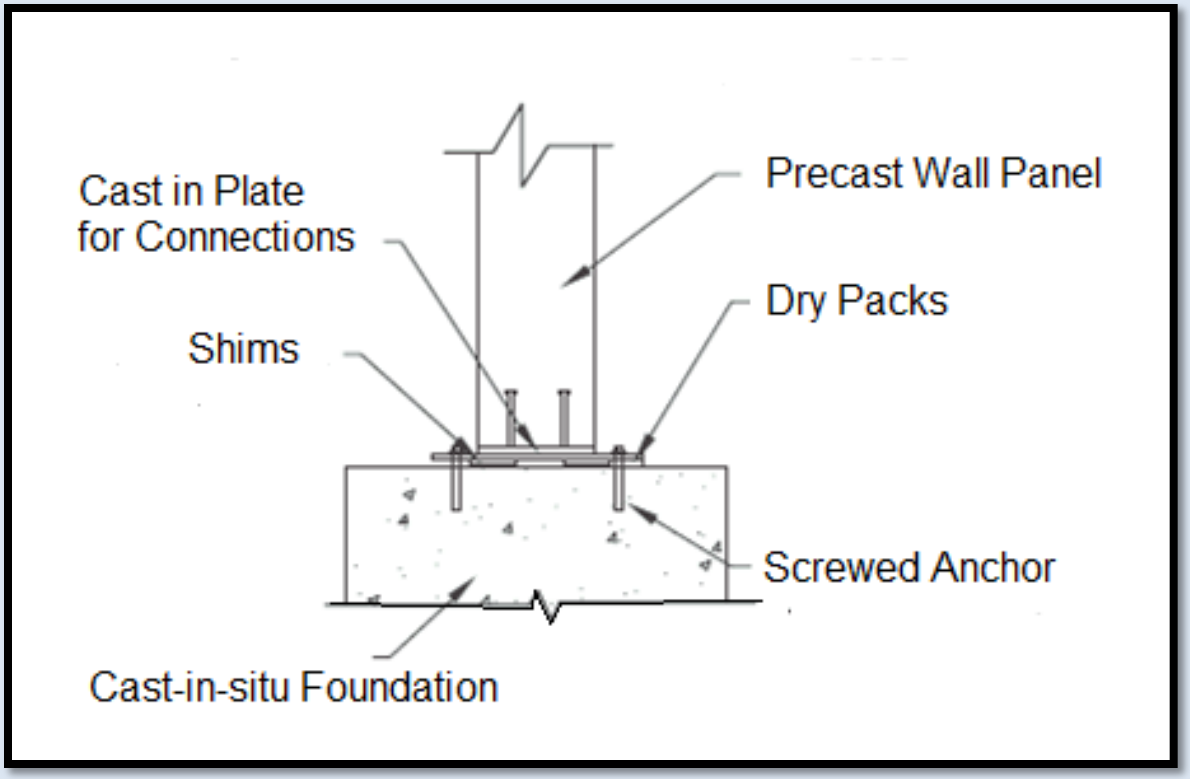
COLUMN TO FOUNDATION



Base Plate Connection

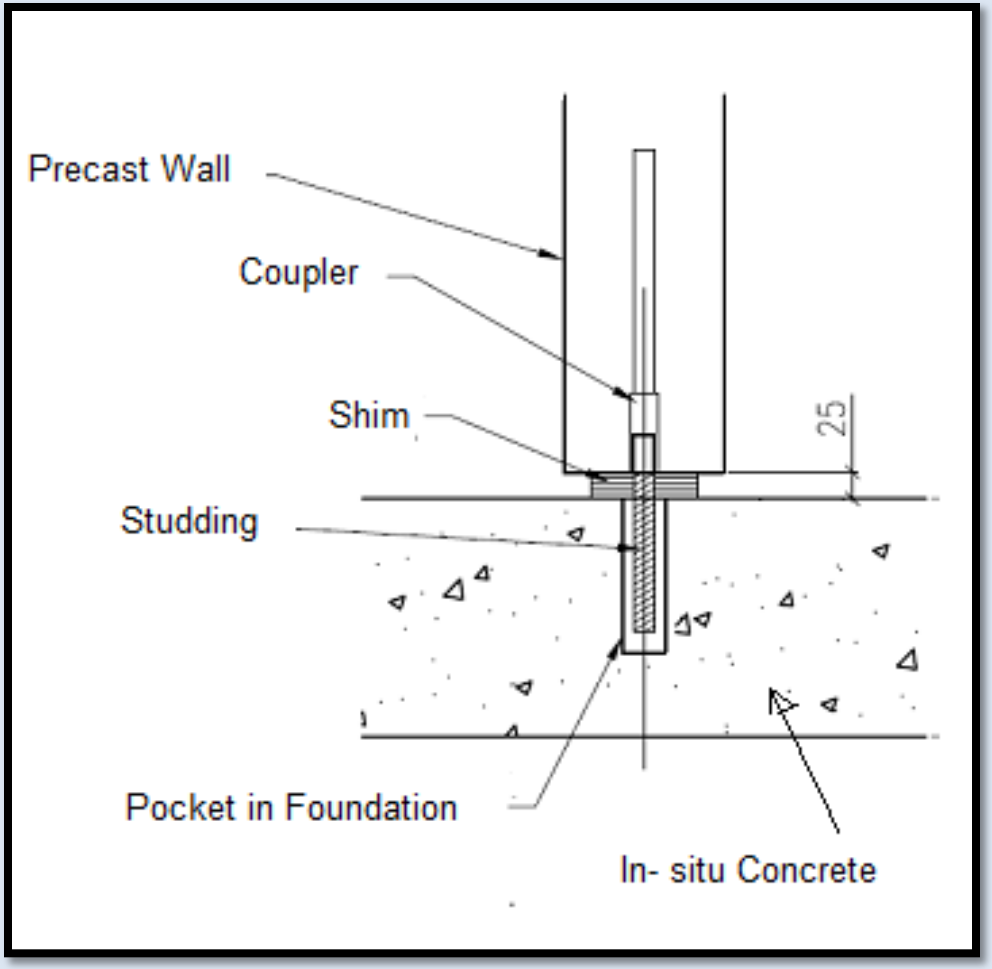
TYPICAL COLUMN FOUNDATION CONNECTION

WALL PANEL TO FOUNDATION



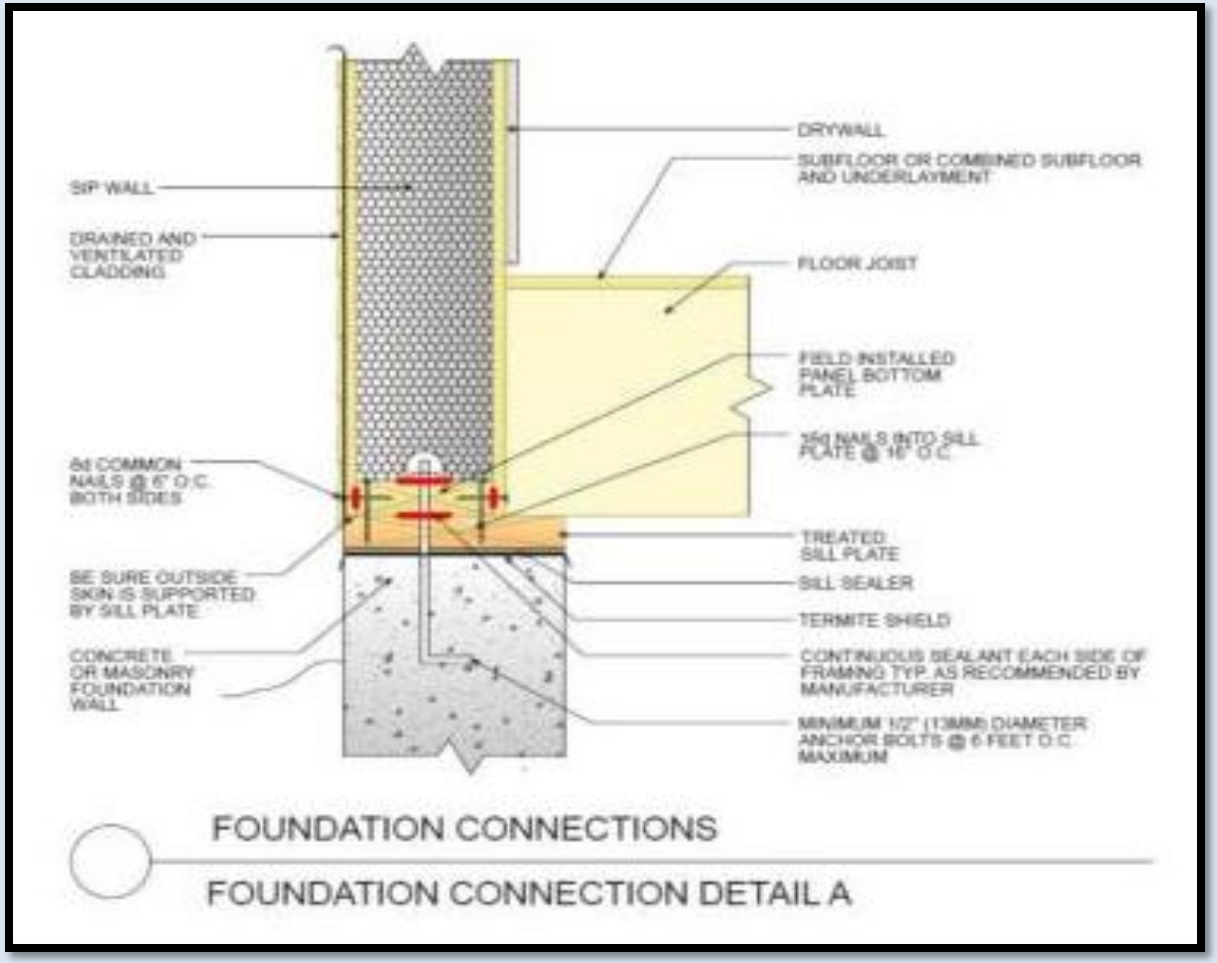
Wall Panel to Foundation using screwed anchors

WALL PANEL TO FOUNDATION



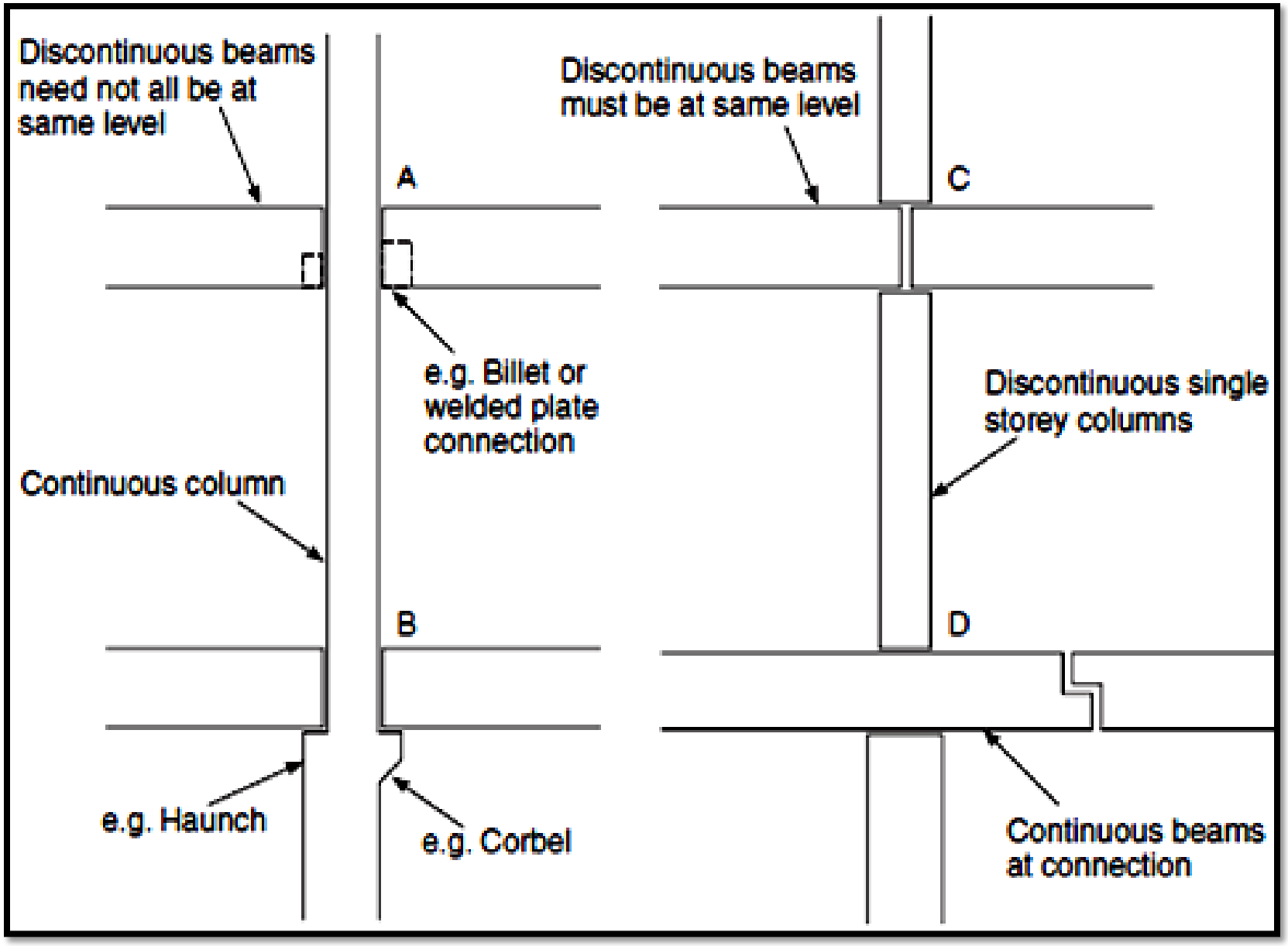
Wall Panel to Foundation Using Couplers

WALL PANEL TO FOUNDATION



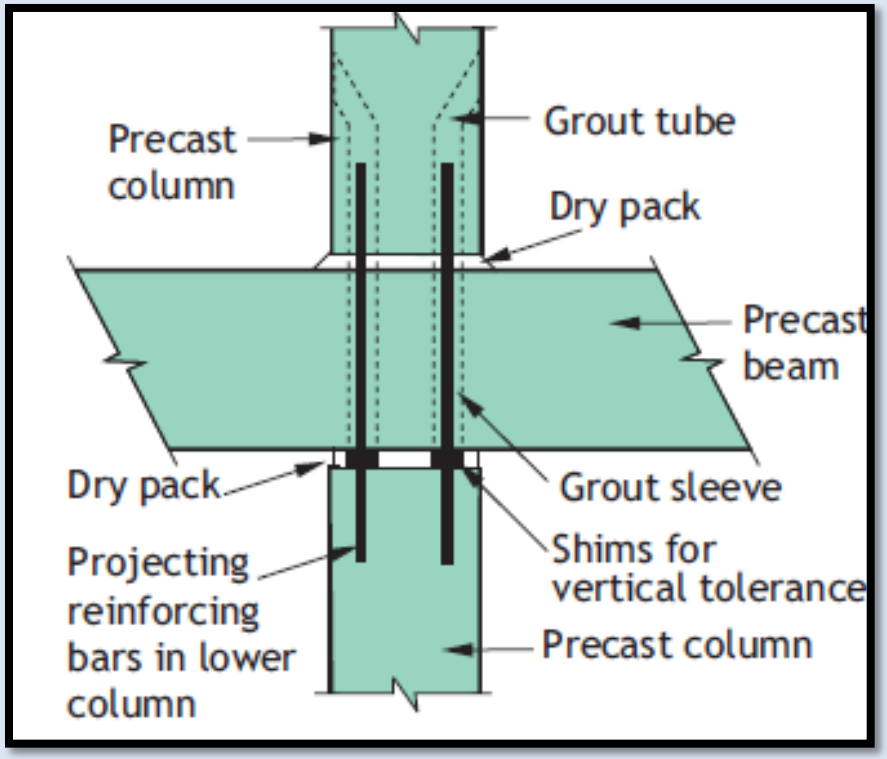
Foam Wall panel to foundation

BEAM – COLUMN CONNECTION

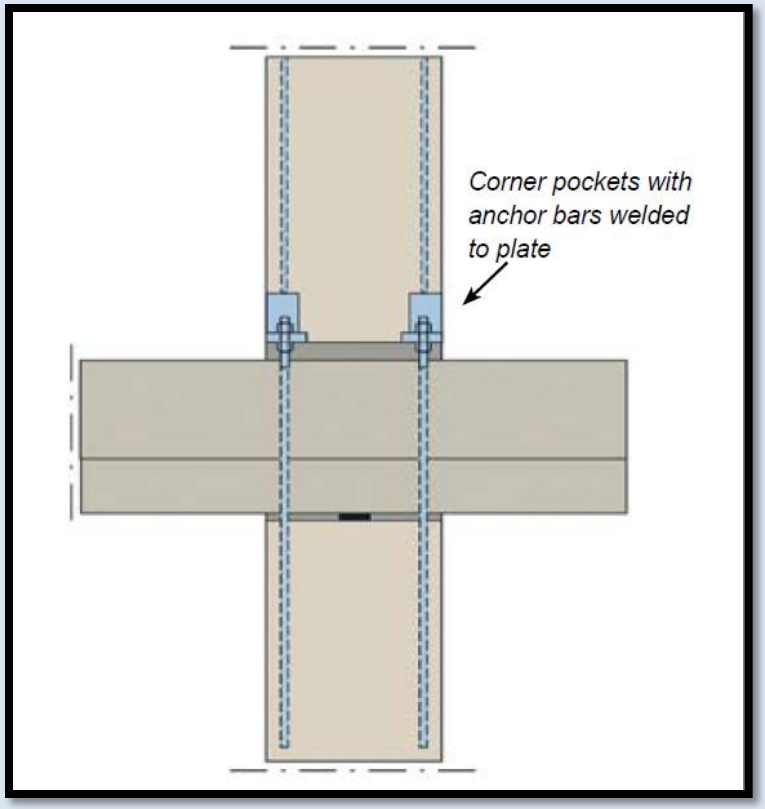


BEAM – COLUMN CONNECTION

Without Corbel



Connections with dowels

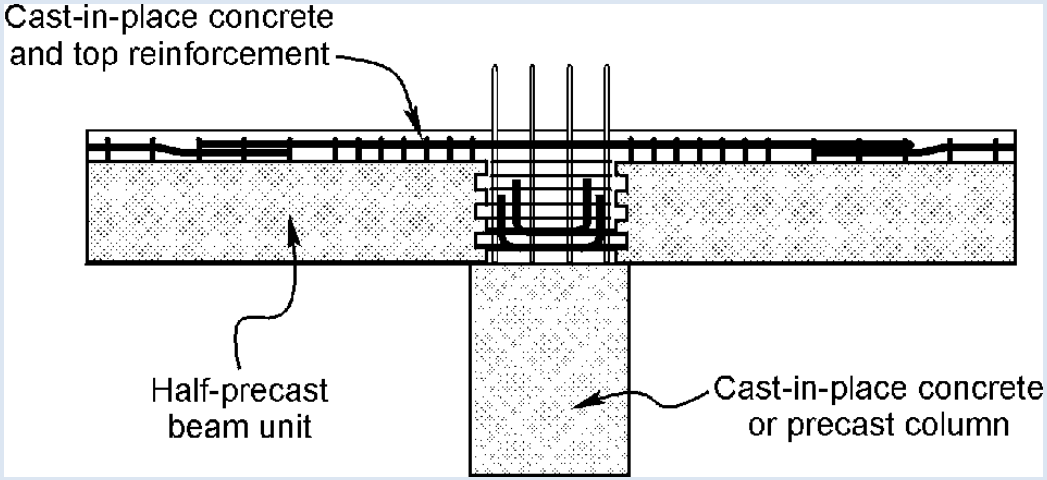


Connections with Mechanical Couplers

BEAM – COLUMN CONNECTION

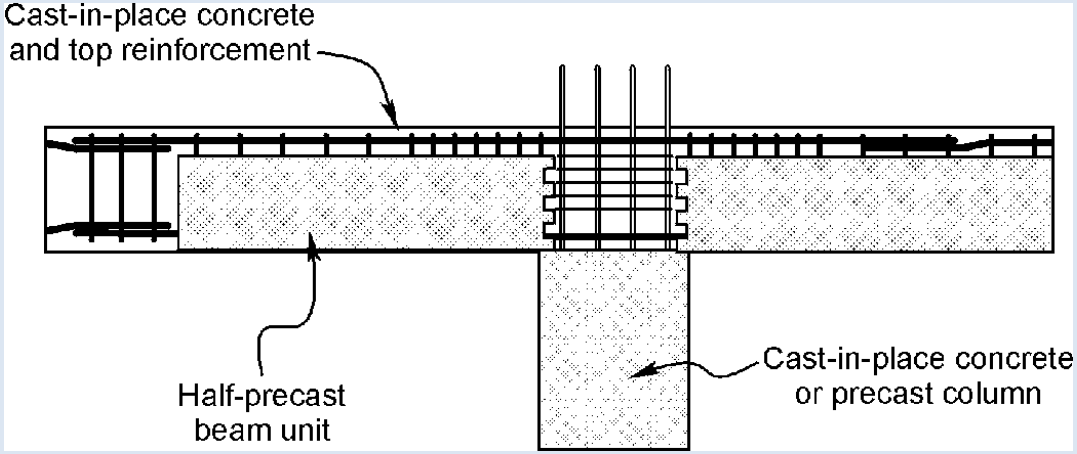
SEISMIC RESISTANT CONNECTIONS

Method: splice the beam bottom bars using anchorages in the joint core

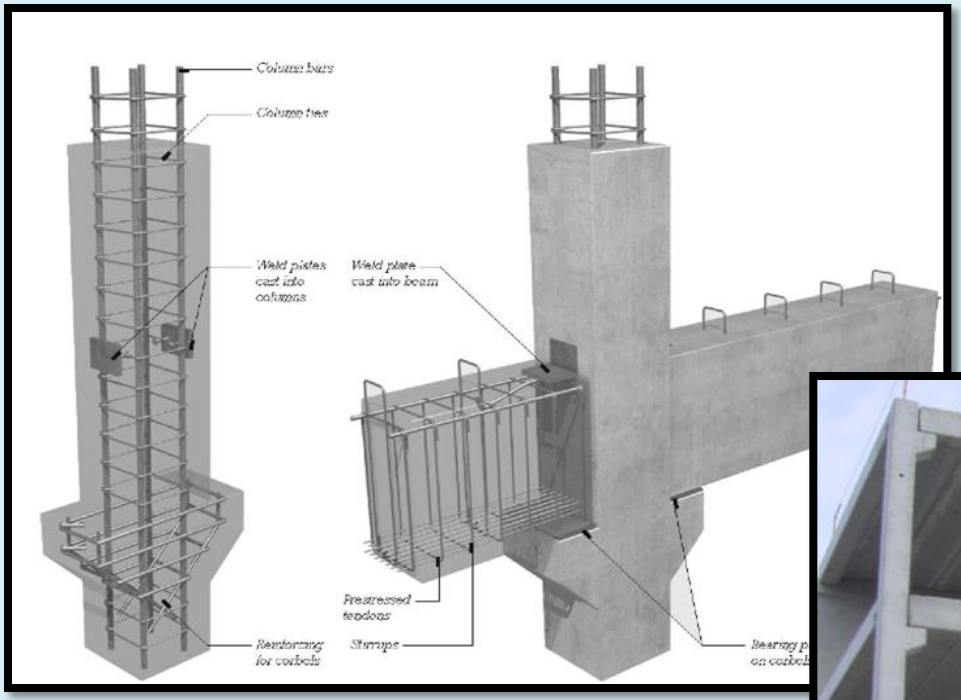


Using hooked bottom bars

Using straight bottom bars



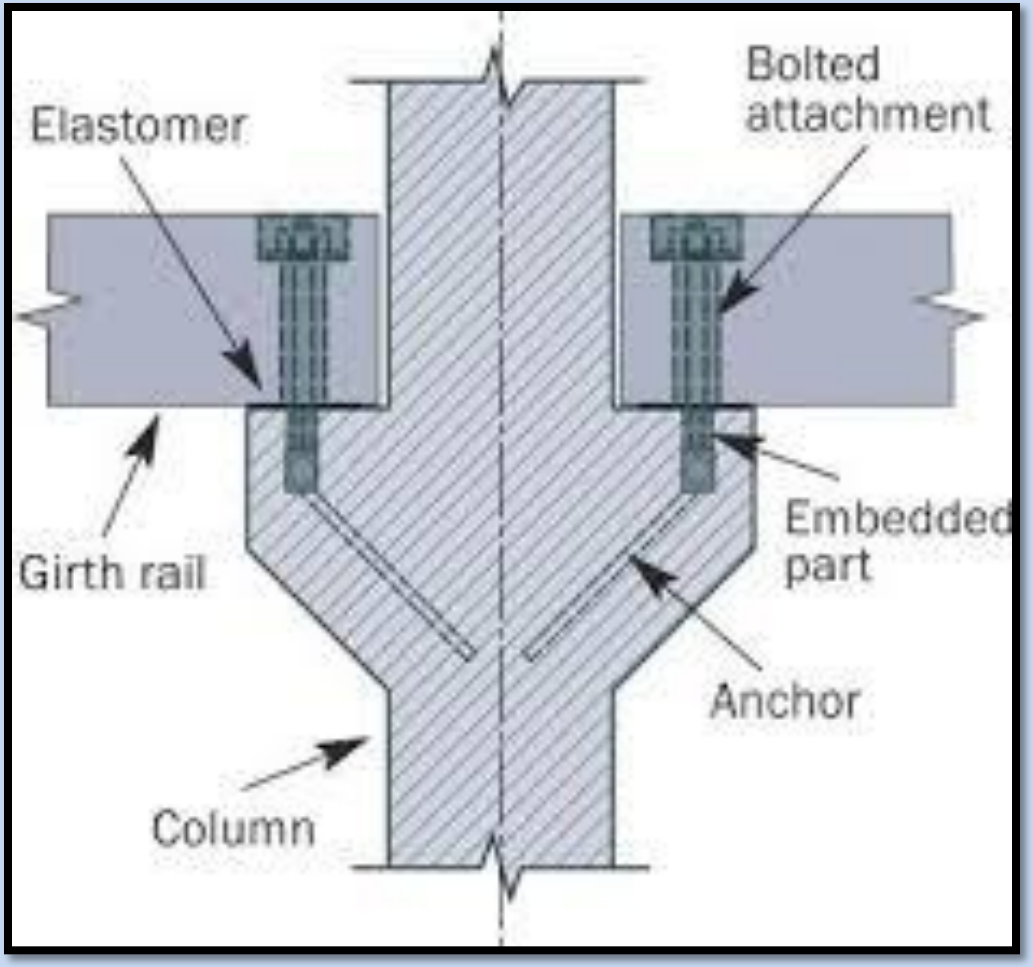
BEAM – COLUMN CONNECTION



With Corbel

BEAM – COLUMN CONNECTION

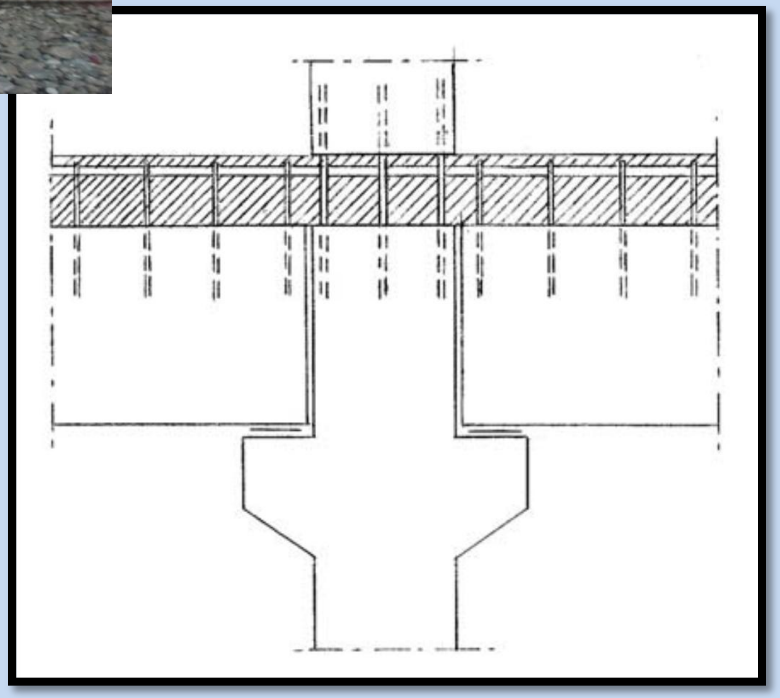
Details of Interior Joint With Corbel



BEAM – COLUMN CONNECTION

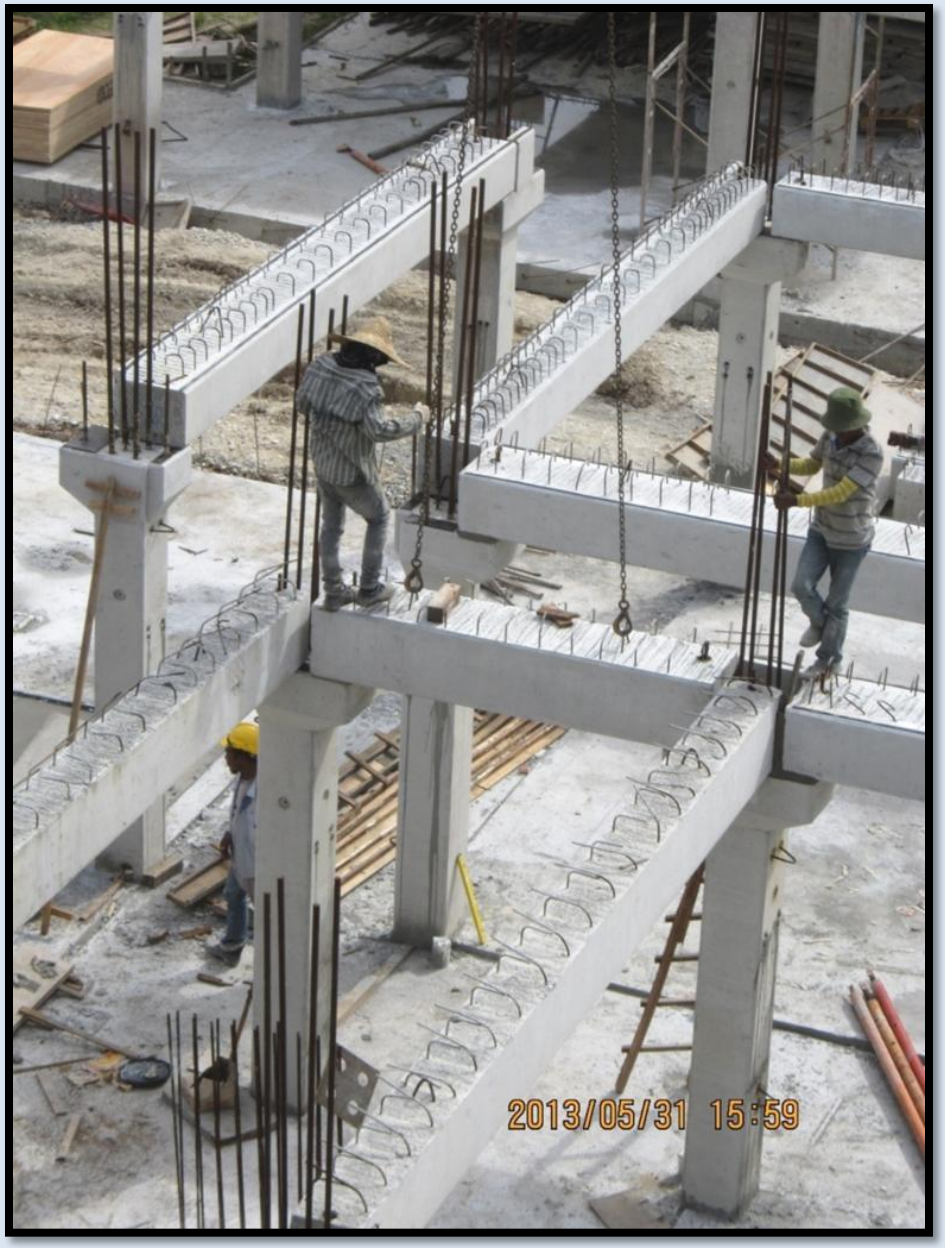
Hybrid / Emulative Connections

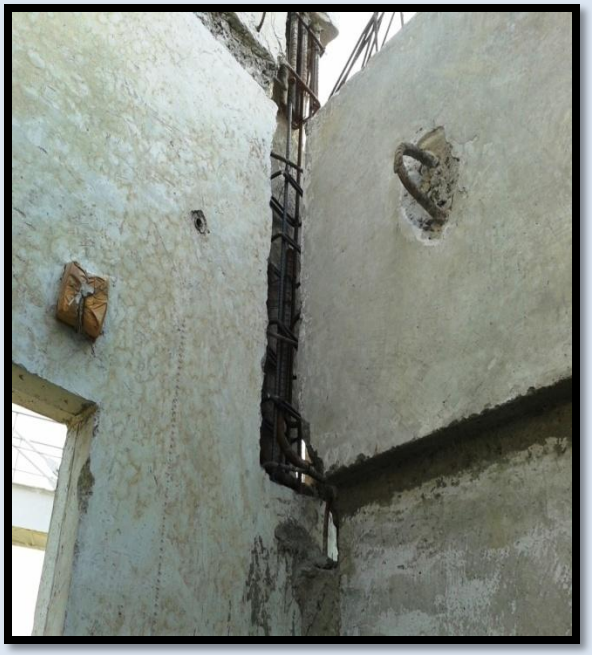
Cast – In – situ and corbel Connection



End Connections of Beams to the Corbels

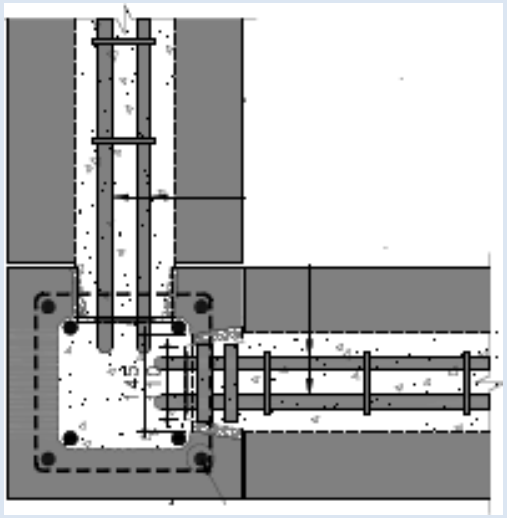
BEAM – COLUMN CONNECTION



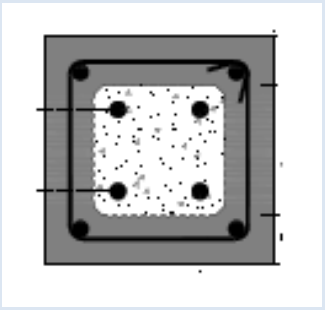


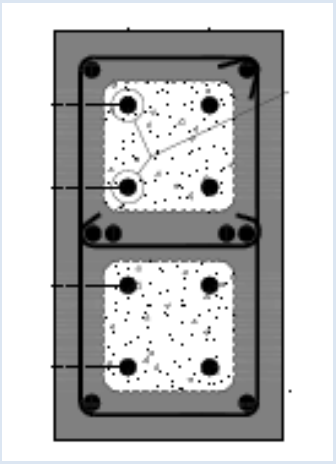
BEAM – COLUMN CONNECTION

Hybrid Connections

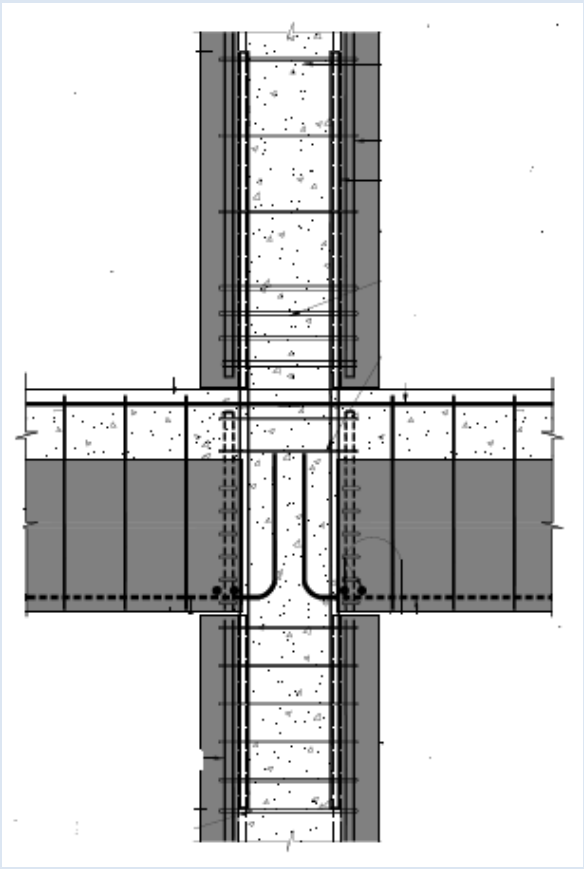


Plan view of the end connection





Cross section of columns

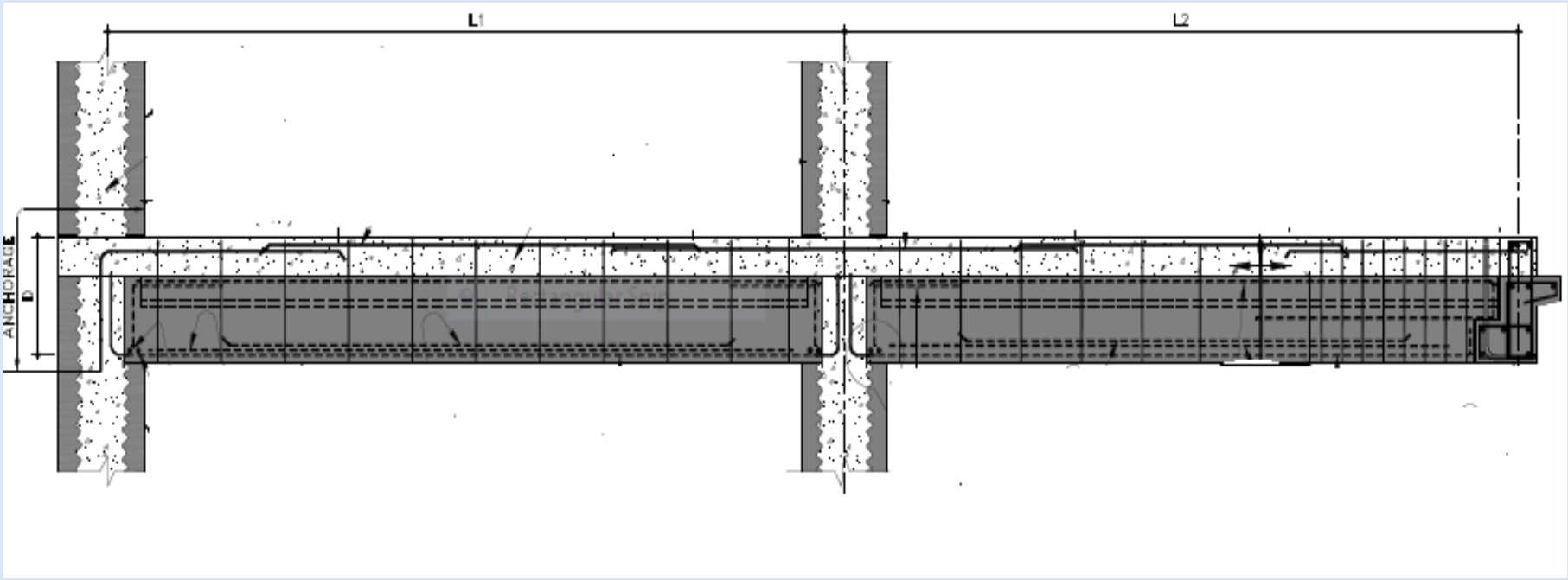


Sectional view of interior connection

Courtesy: B.G Shirke

BEAM – COLUMN CONNECTION

Hybrid Connections



Longitudinal View

Courtesy: B.G Shirke

BEAM – COLUMN CONNECTION

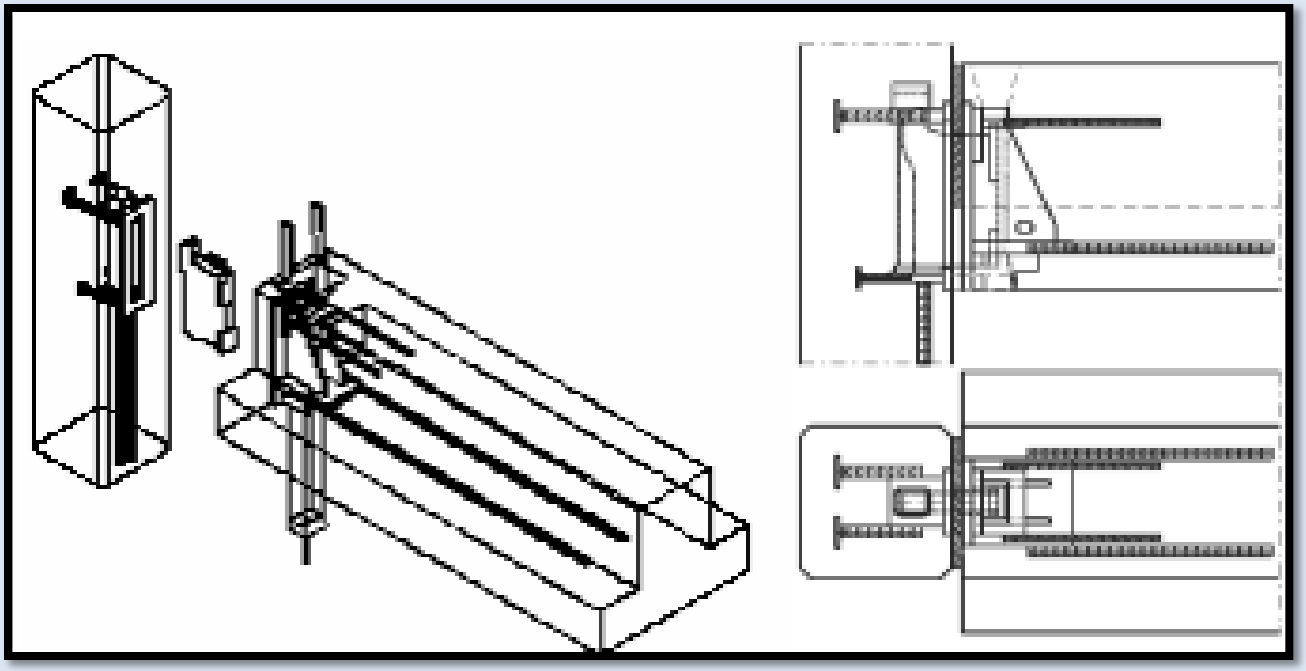
Hybrid Connections – with Shell Beams

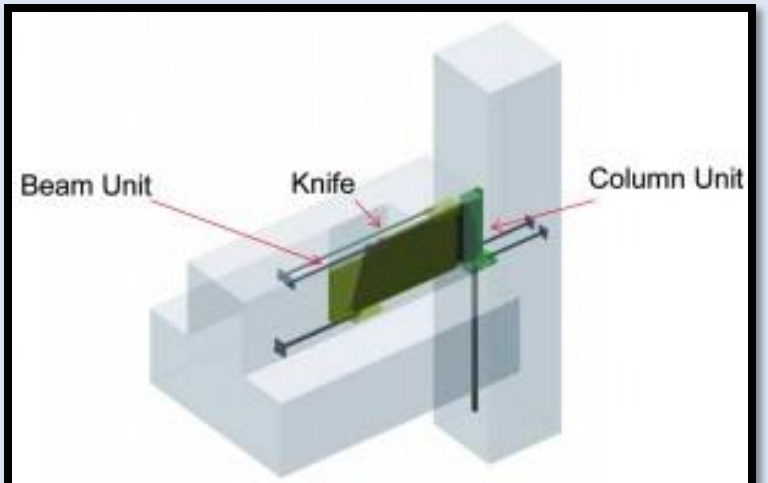
BEAM – COLUMN CONNECTION

Hybrid Connections – with Shell Beams

BEAM – COLUMN CONNECTION

Mechanical Connections





BEAM – COLUMN CONNECTION

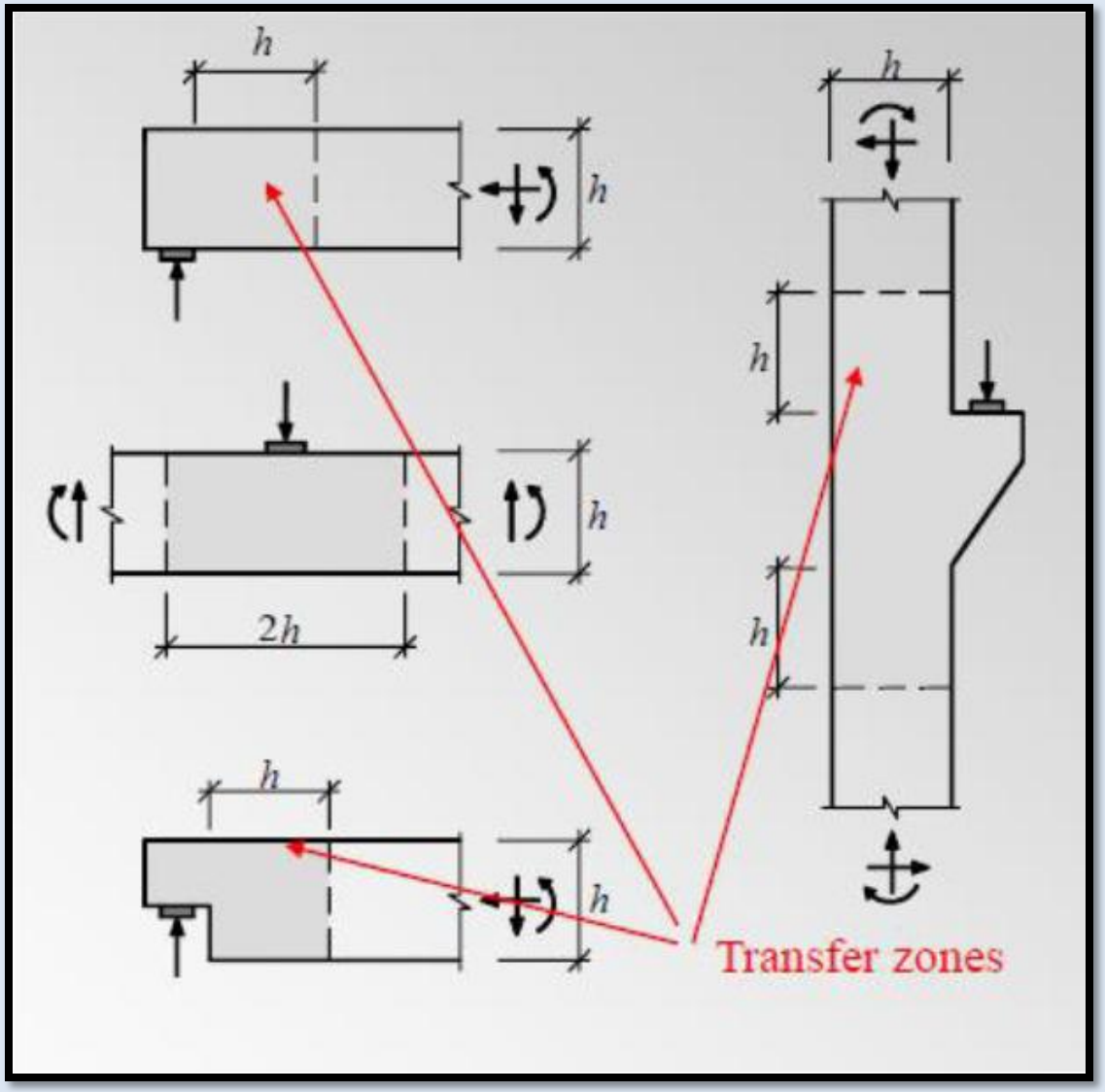
TYPICAL BEAM – COLUMN CONNECTION

Mechanical Connection

Billet Connection

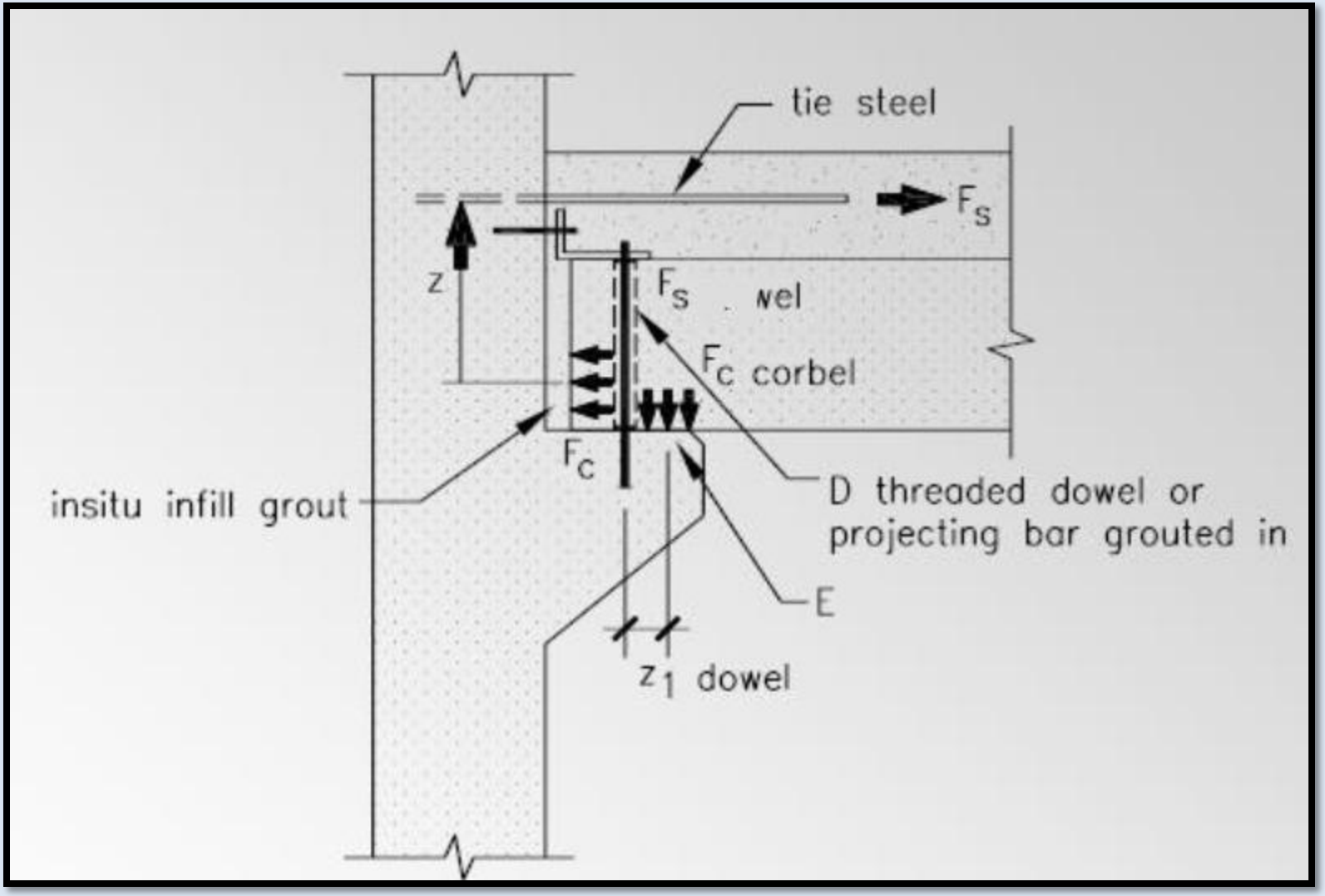
BEAM – COLUMN CONNECTION

Design Aspects



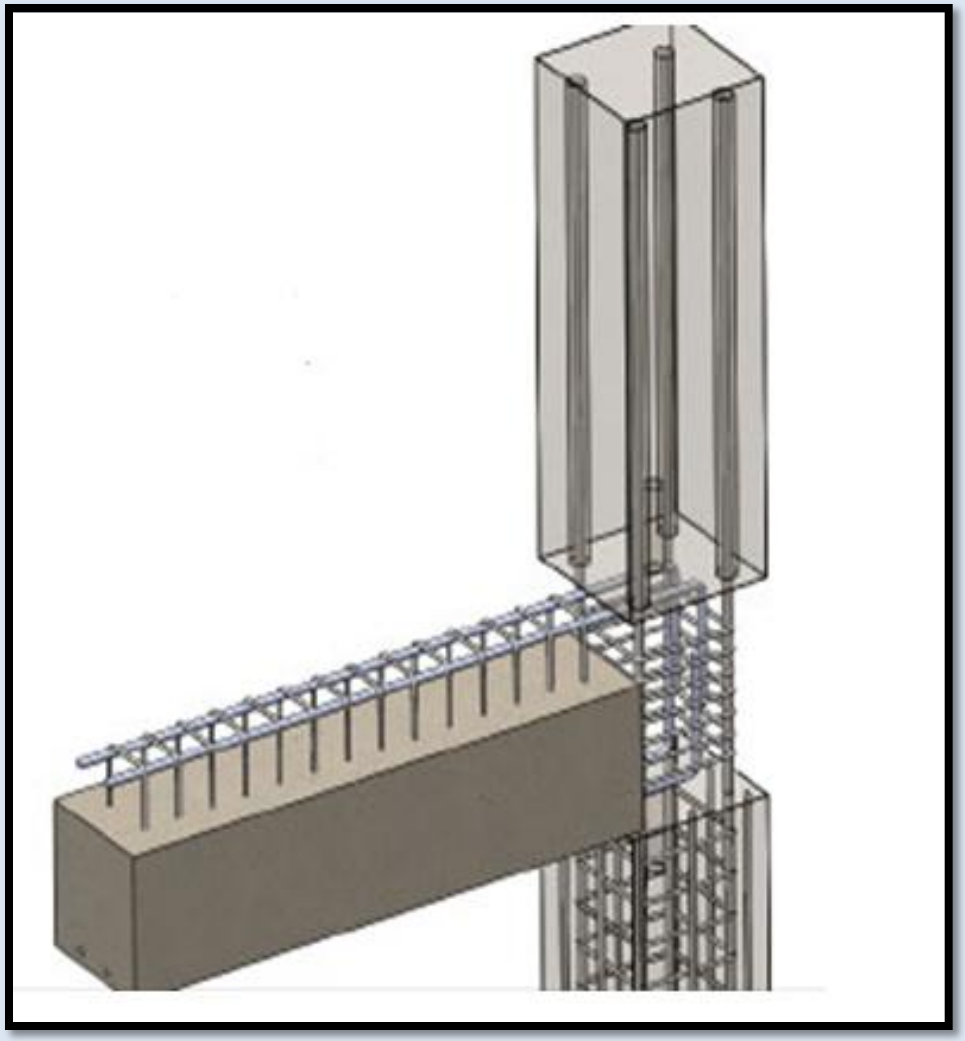
BEAM – COLUMN CONNECTION

Design Aspects



COLUMN – COLUMN CONNECTION

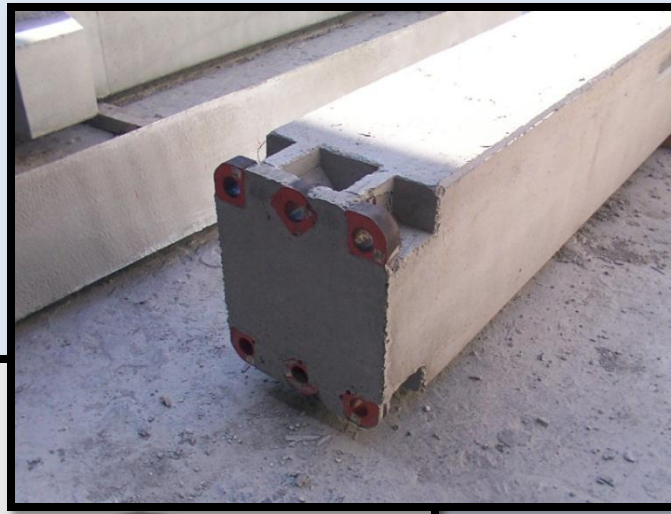
SPLICE SLEEVE

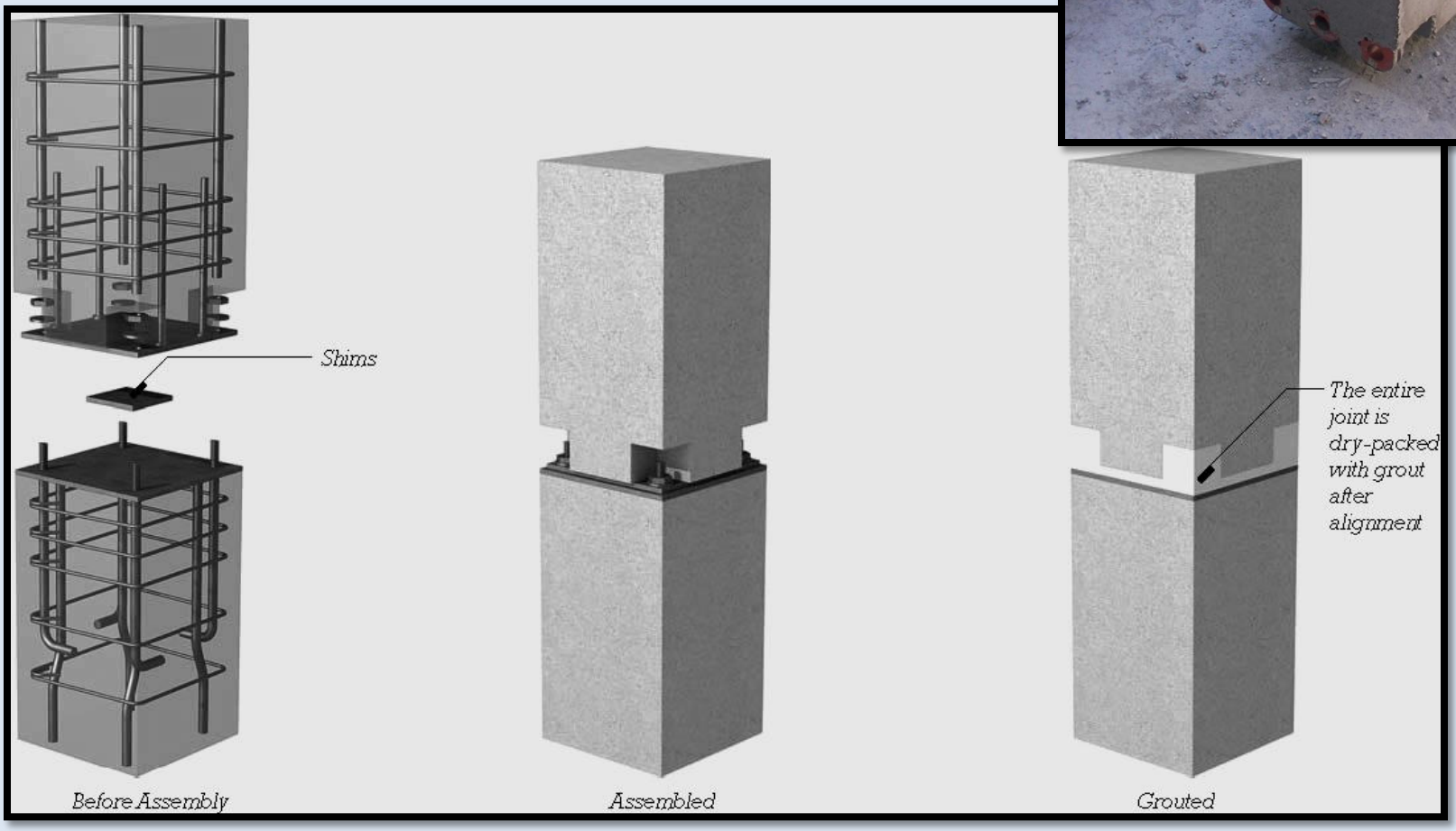


COLUMN – COLUMN CONNECTION

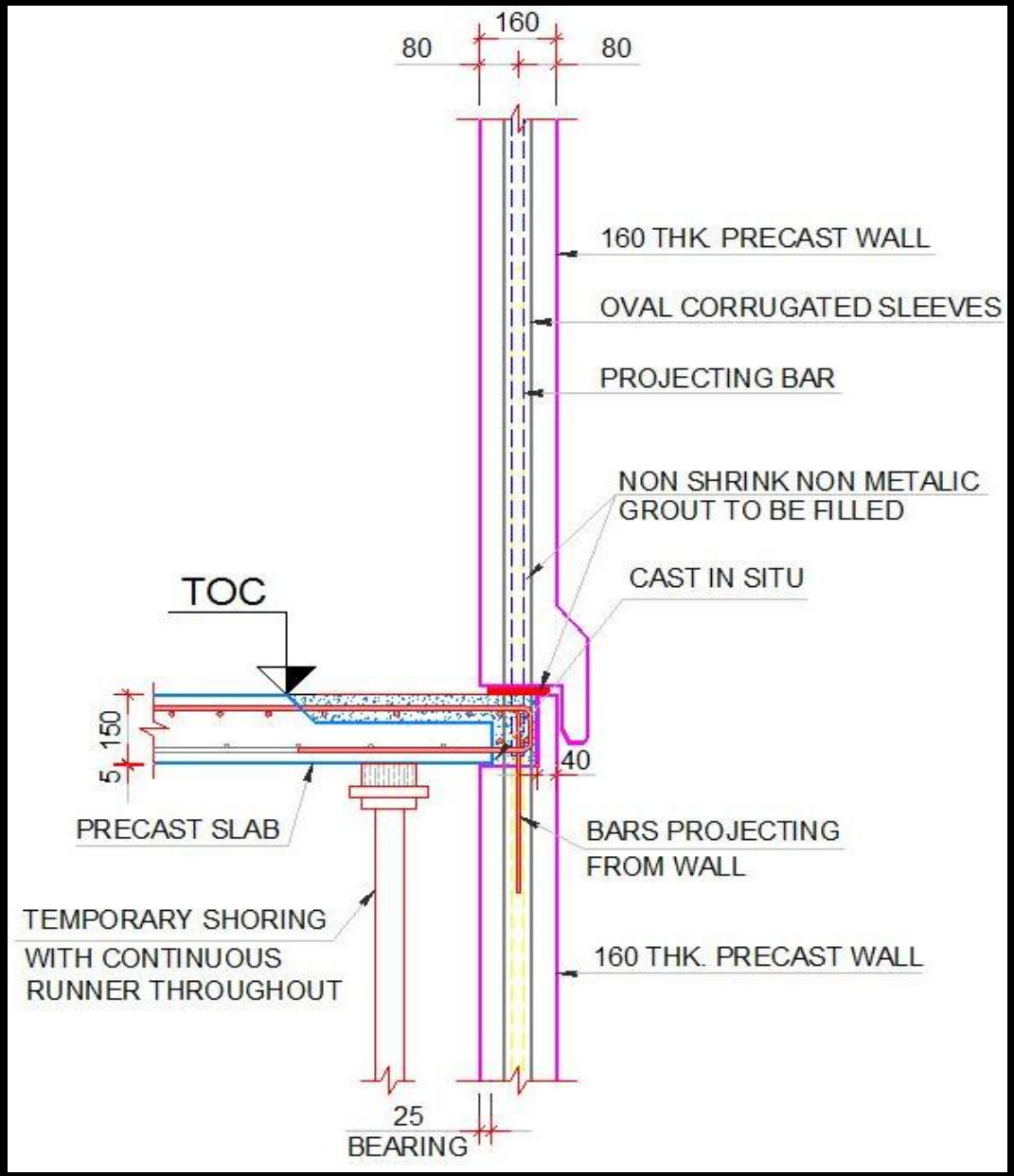
COLUMN – COLUMN CONNECTION

BOLTED CONNECTIONS

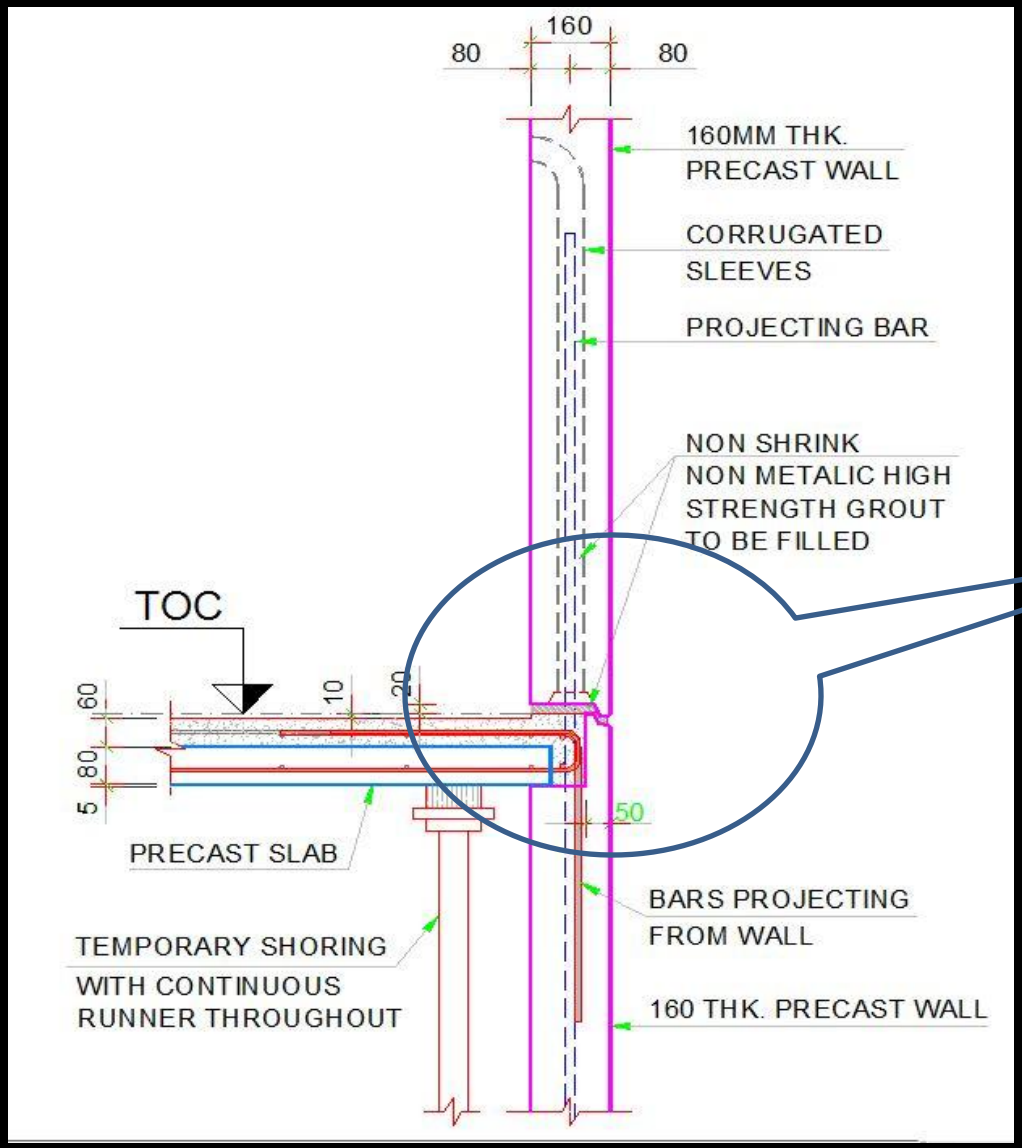


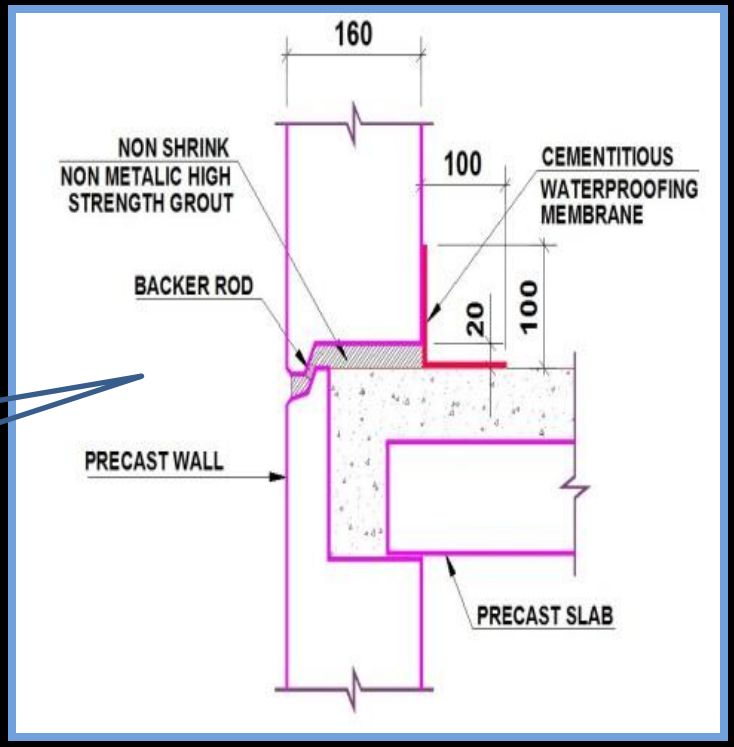


SLAB – WALL CONNECTION



SLAB – WALL CONNECTION





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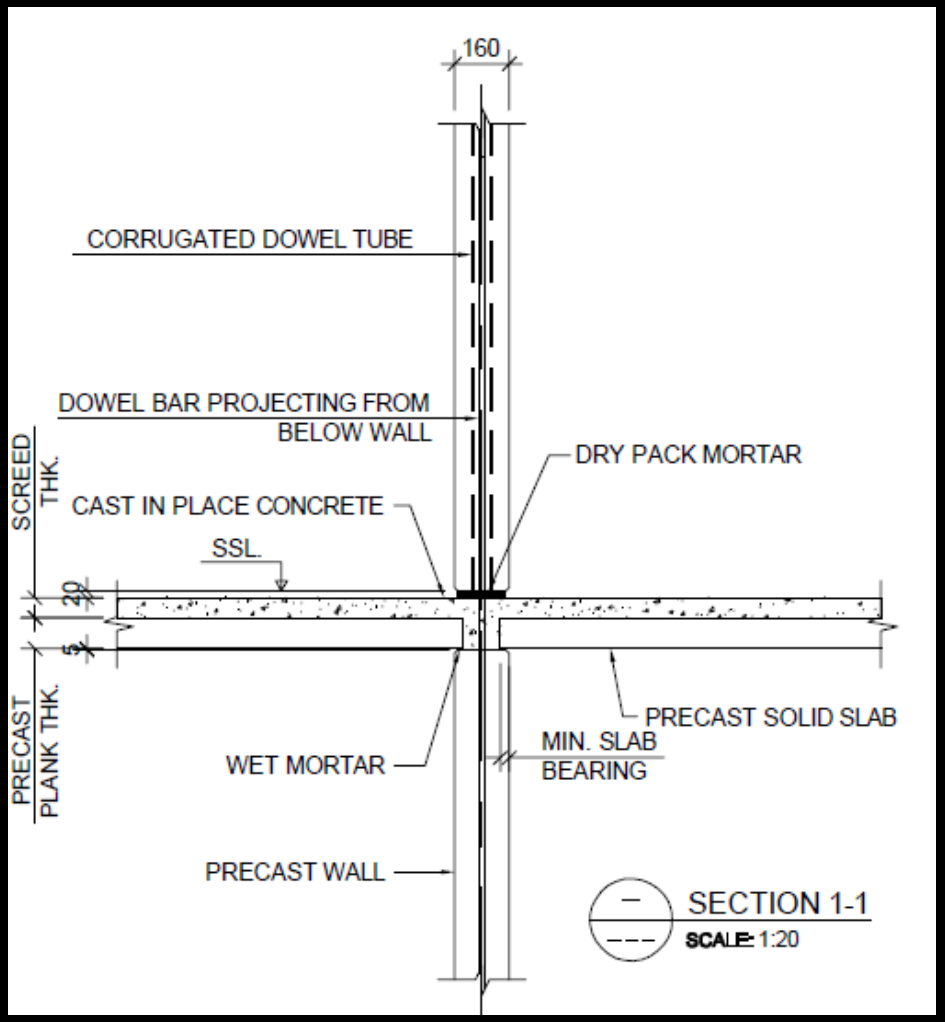
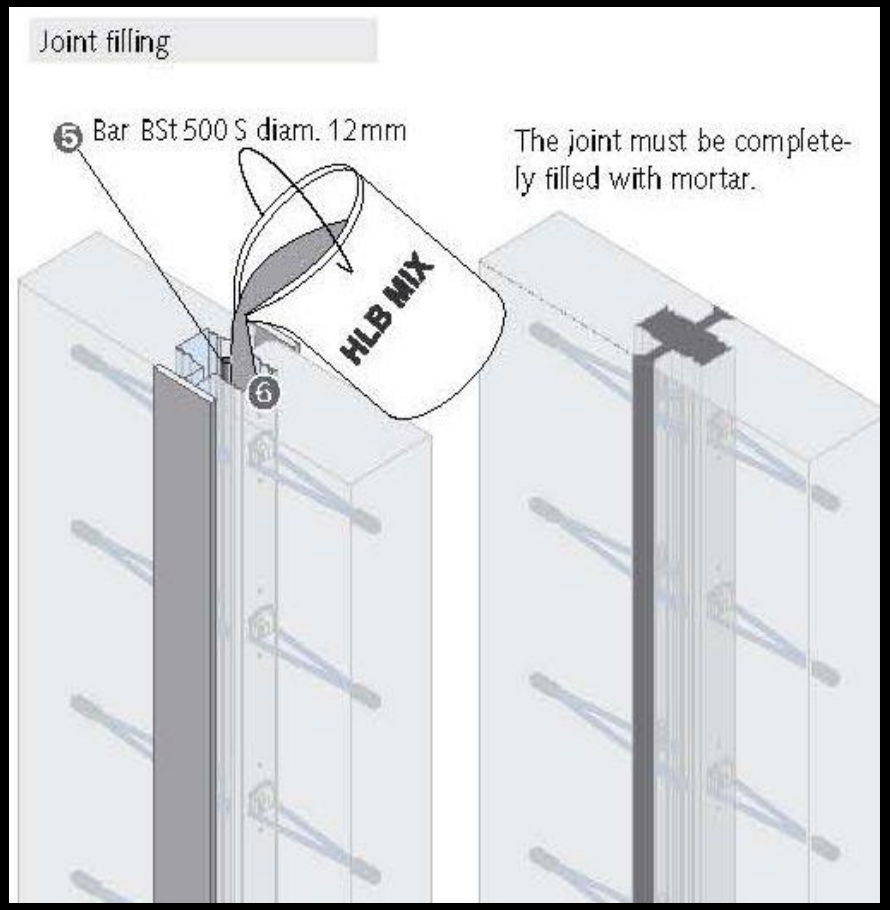
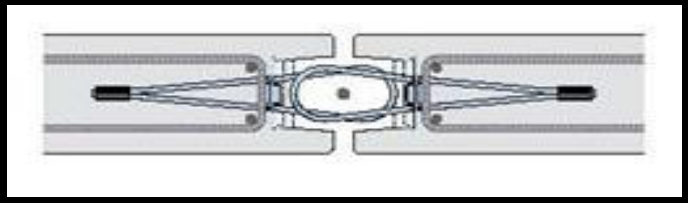
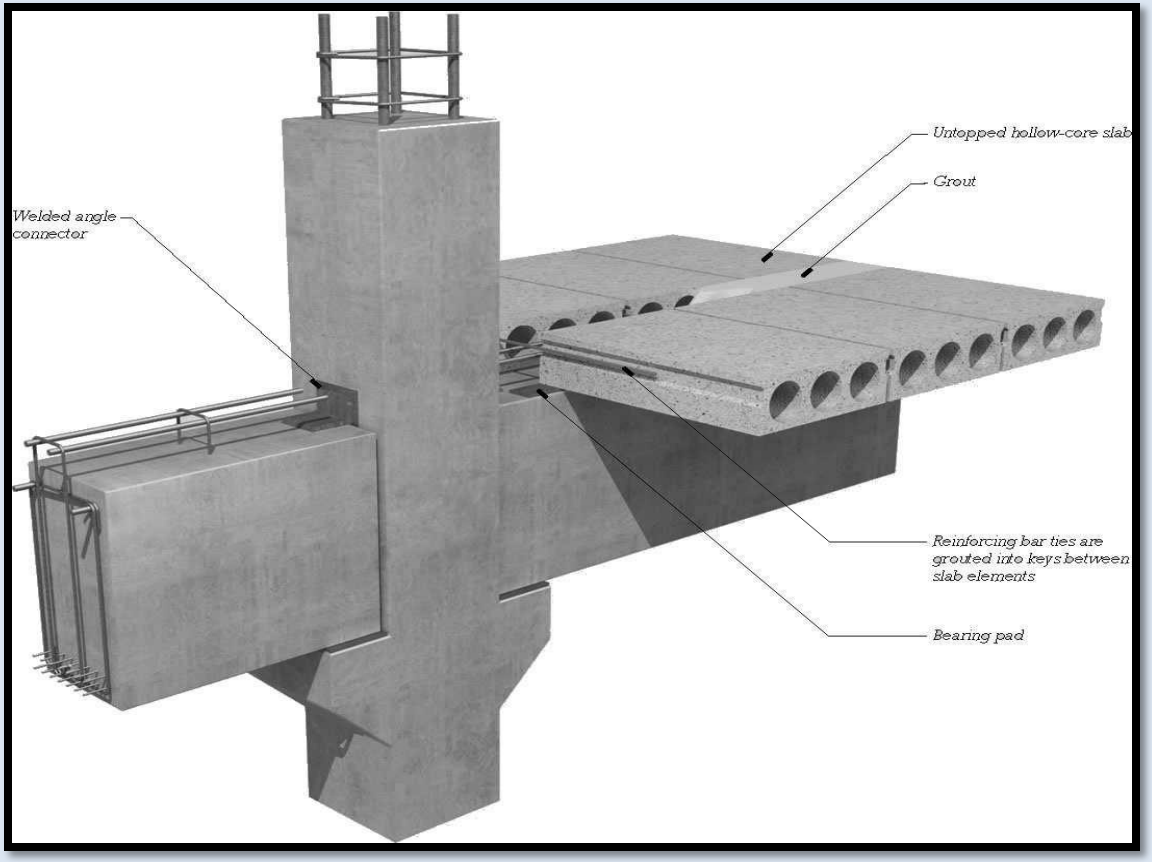




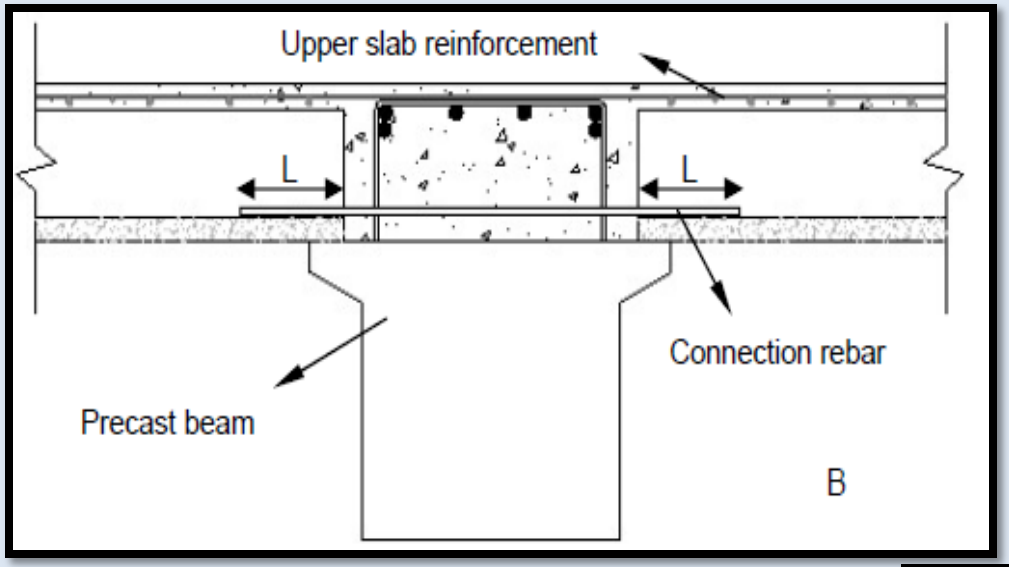


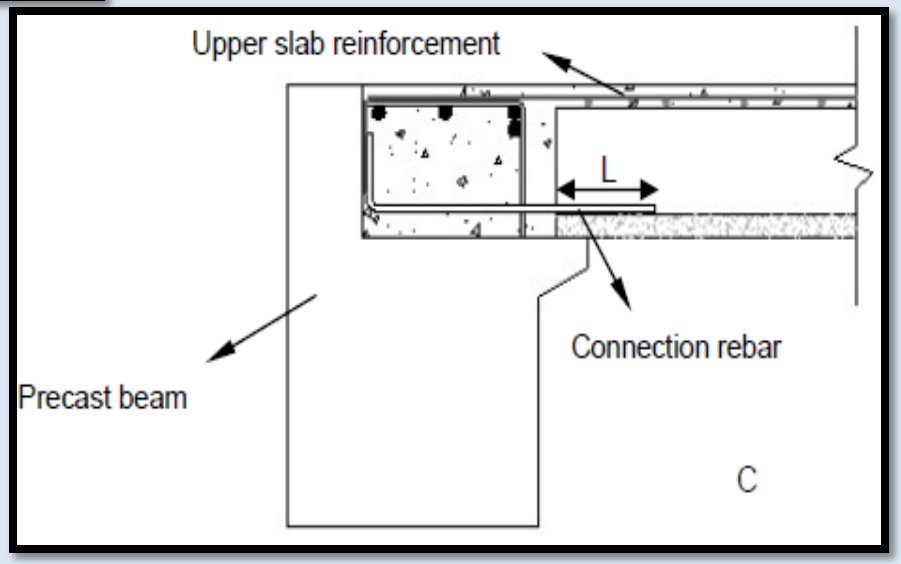
SLAB – BEAM CONNECTION



SLAB – BEAM CONNECTION

Use of Rebars





SLAB – BEAM CONNECTION

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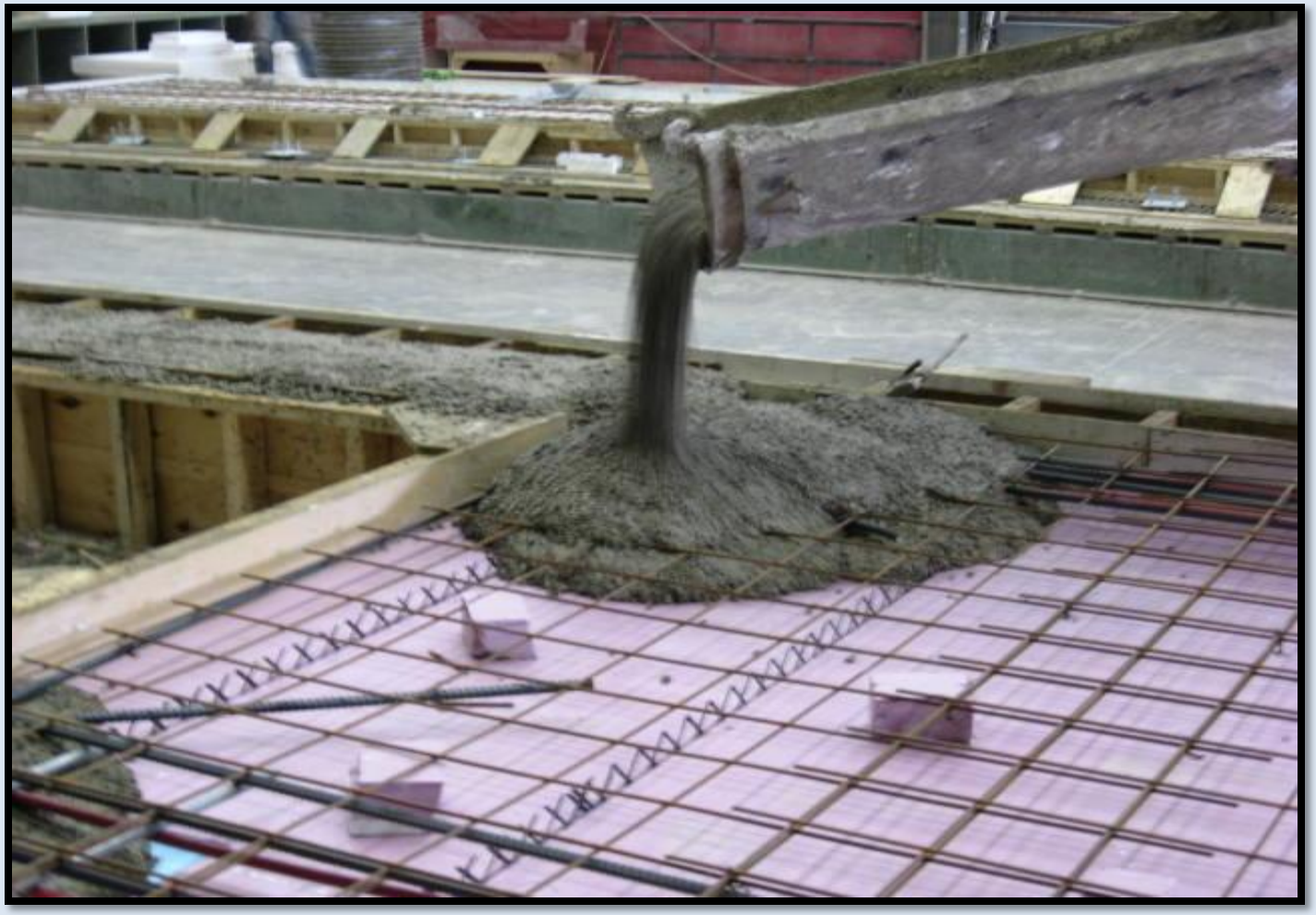
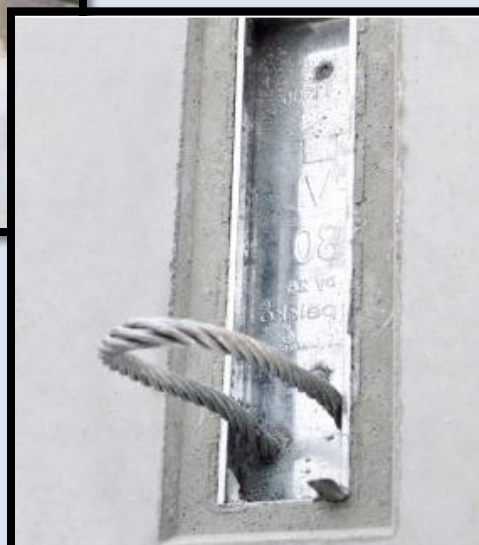


WALL – WALL CONNECTION



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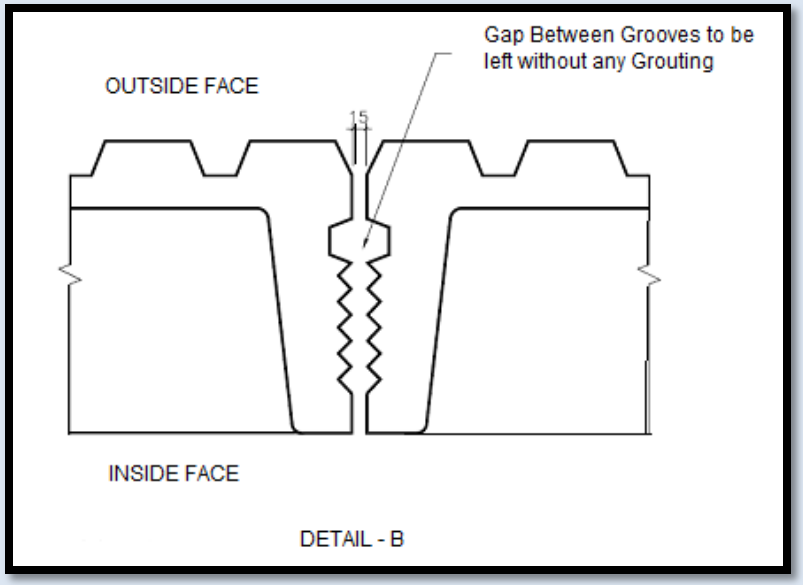

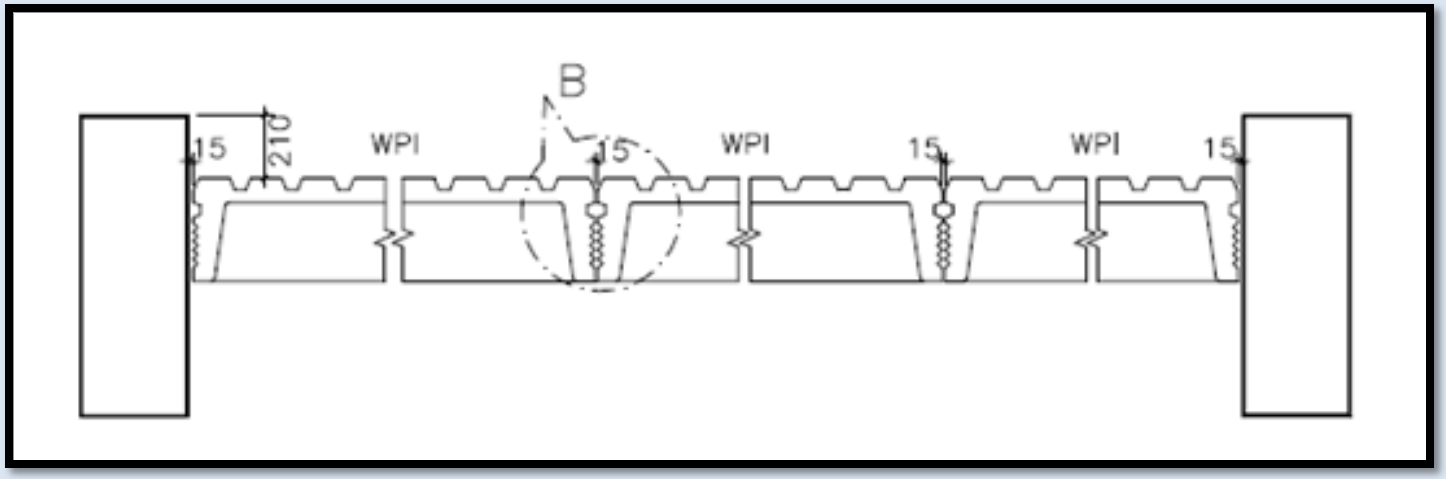

WALL – WALL CONNECTION

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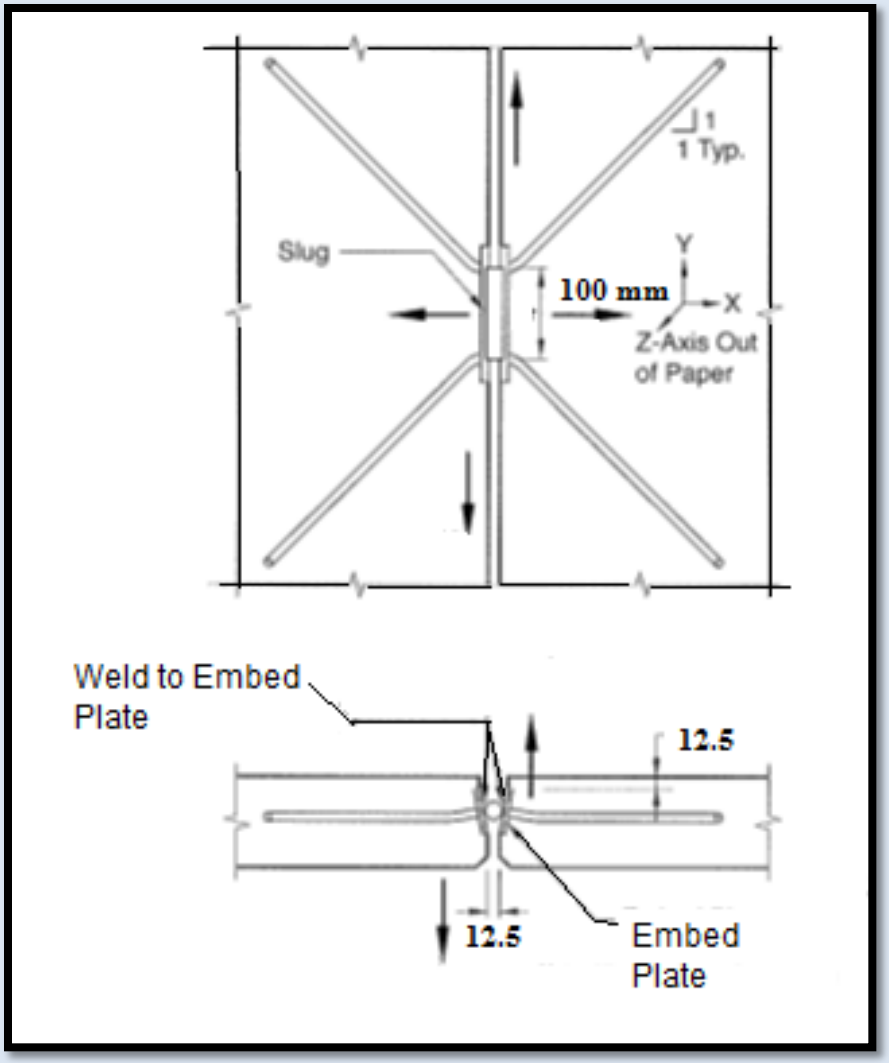
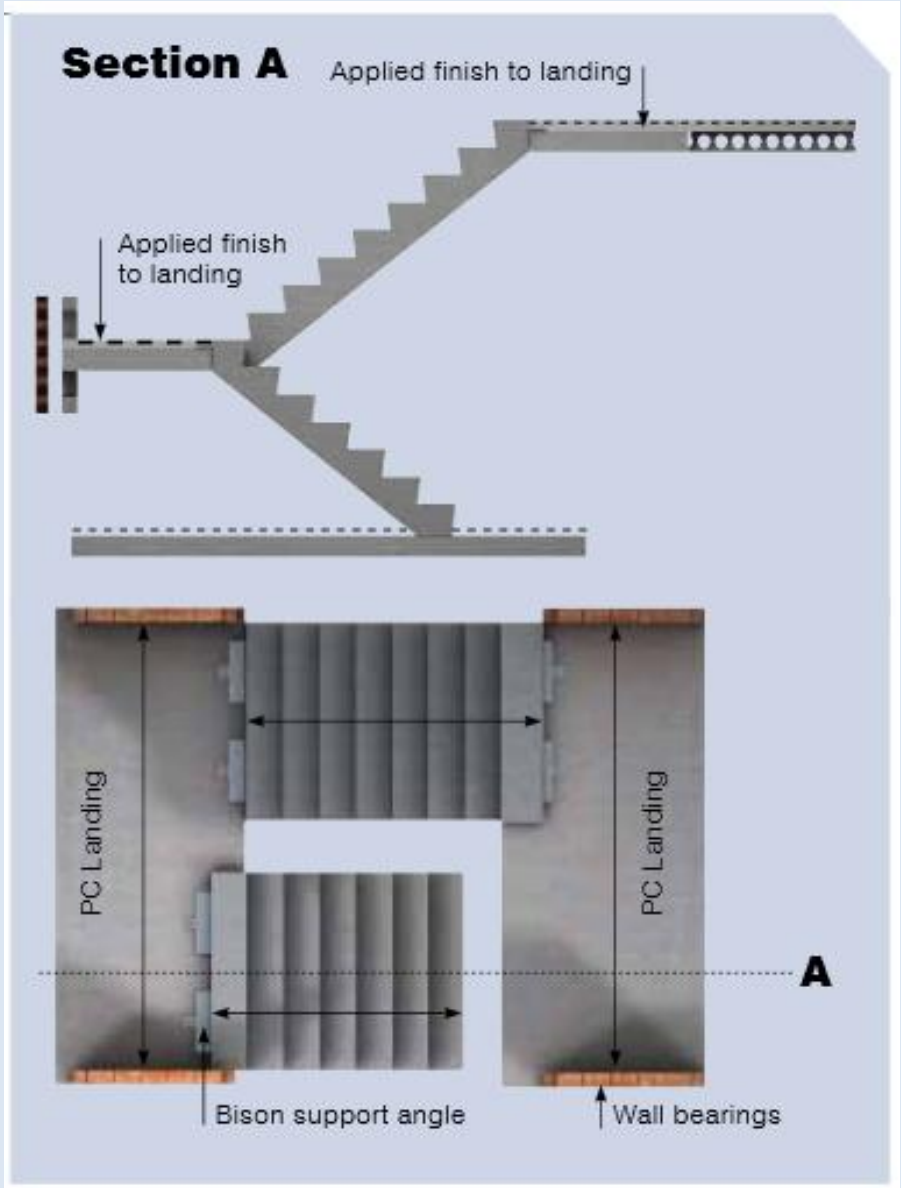


STAIRCASE TO SLABS

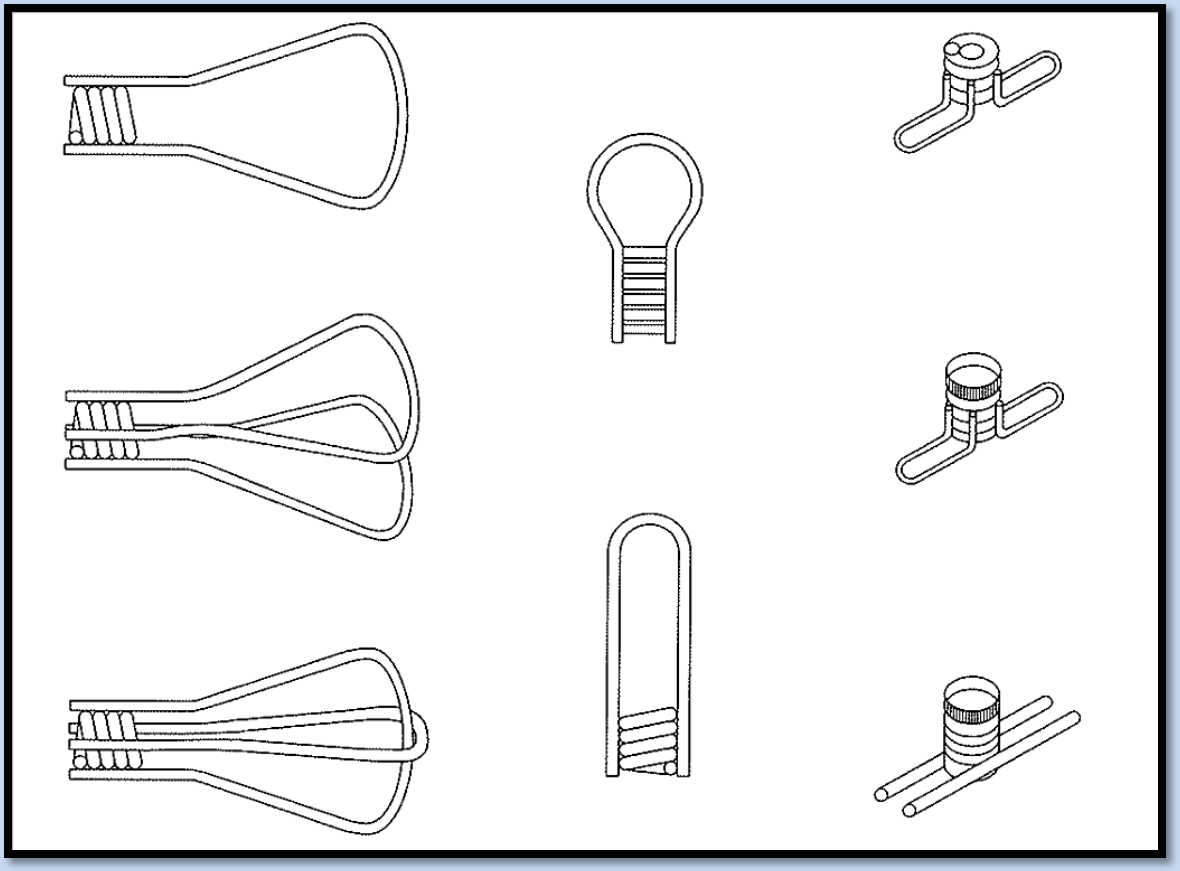
STAIRCASE TO SLABS

STAIRCASE TO SLABS



INSERTS

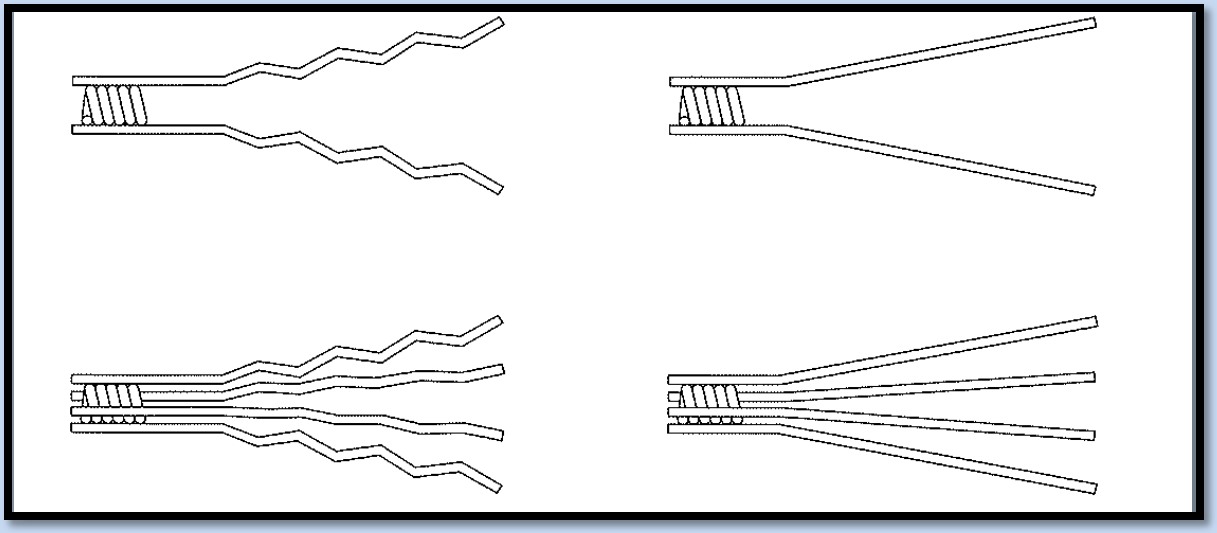
Primary Inserts



Loop-Type Wire Inserts

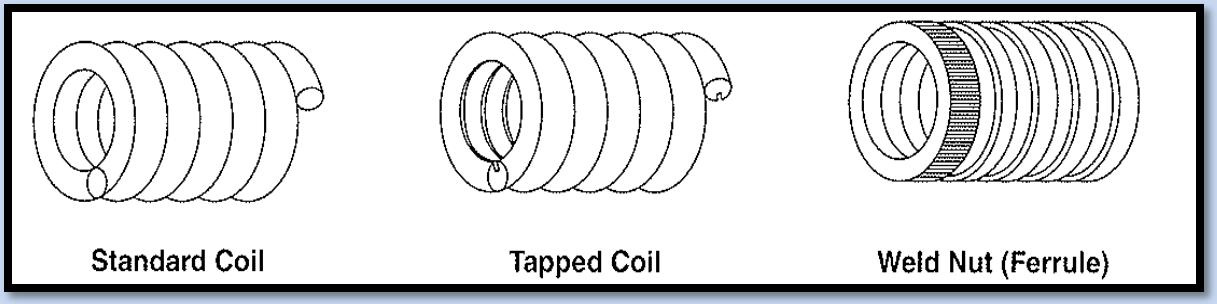
INSERTS

Primary Inserts



Open Wire Inserts

The Open Wire Inserts use one of the receptacles

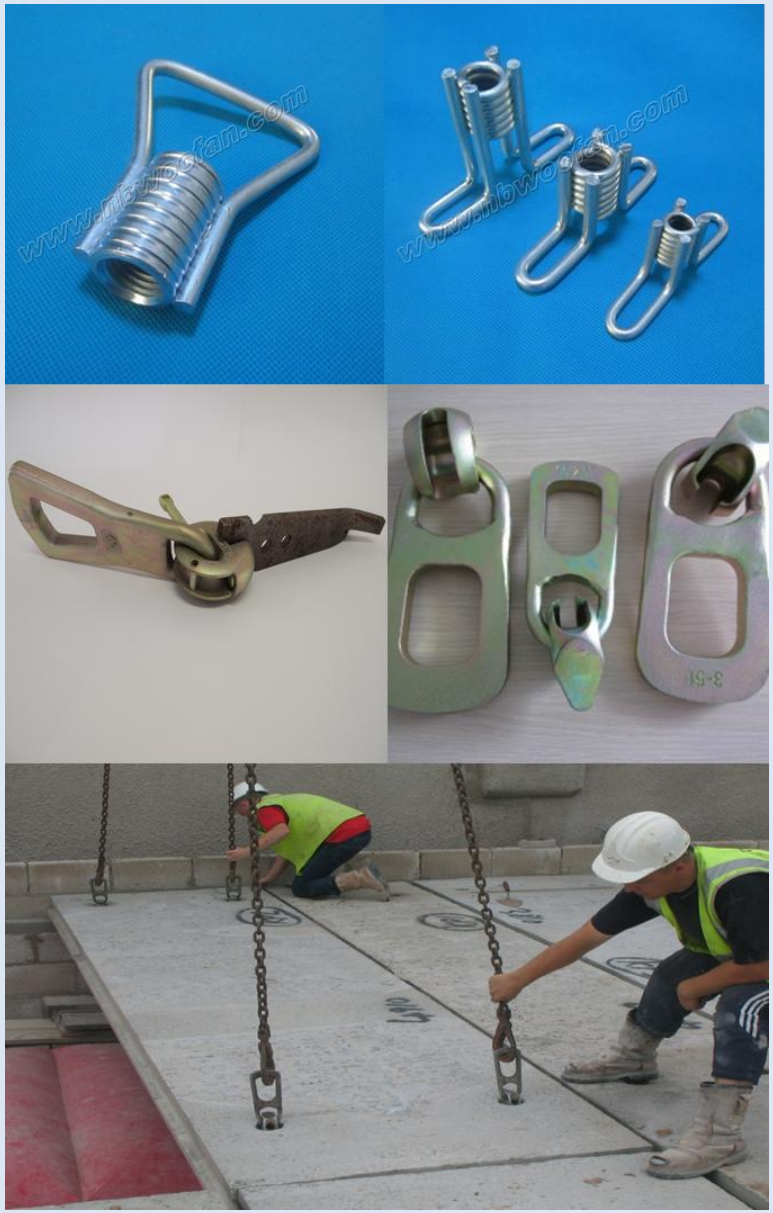


Receptacles for Wire Inserts

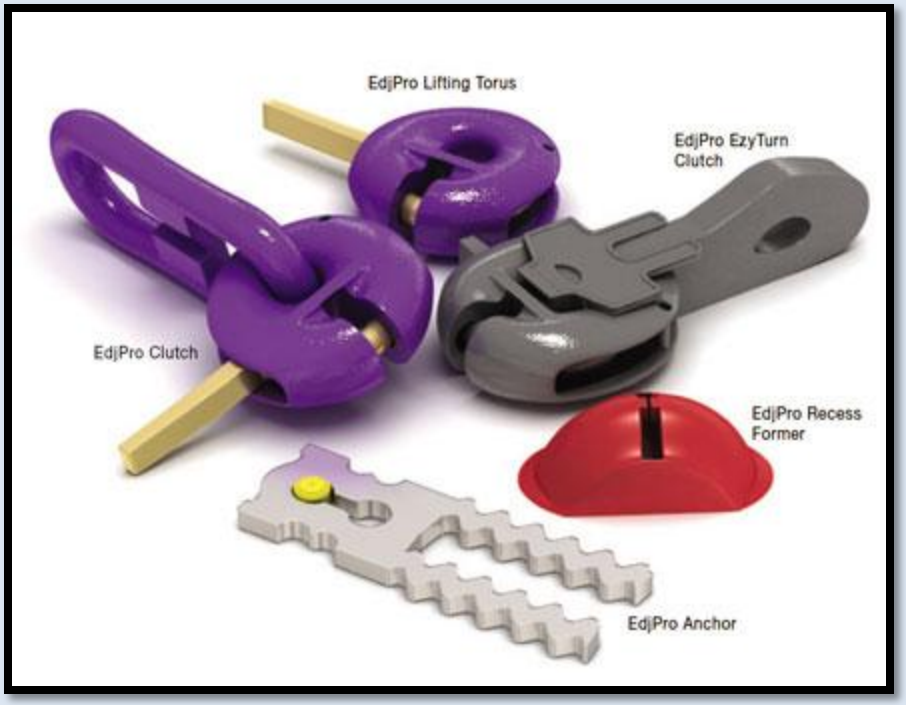
INSERTS

Secondary Inserts

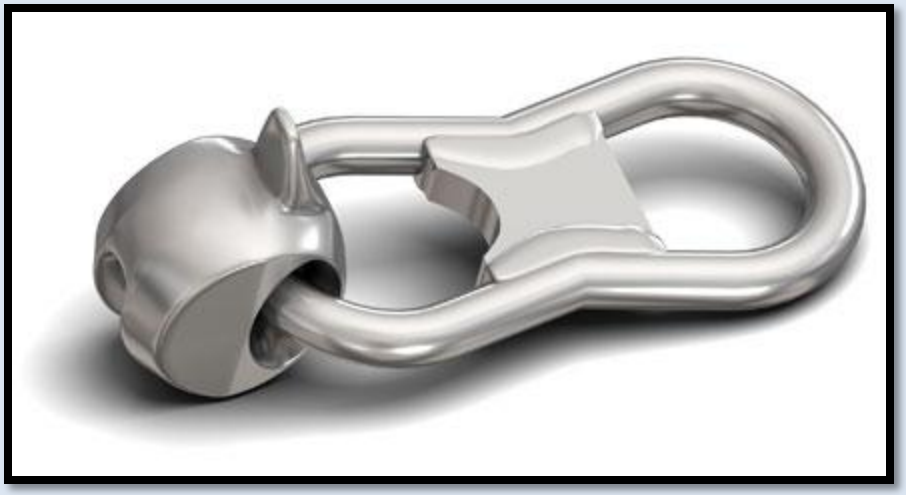
Used for Handling Purpose



INSERTS



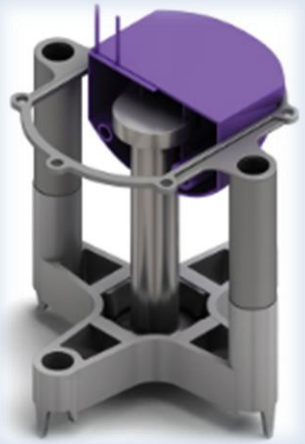
Edge lifting connectors

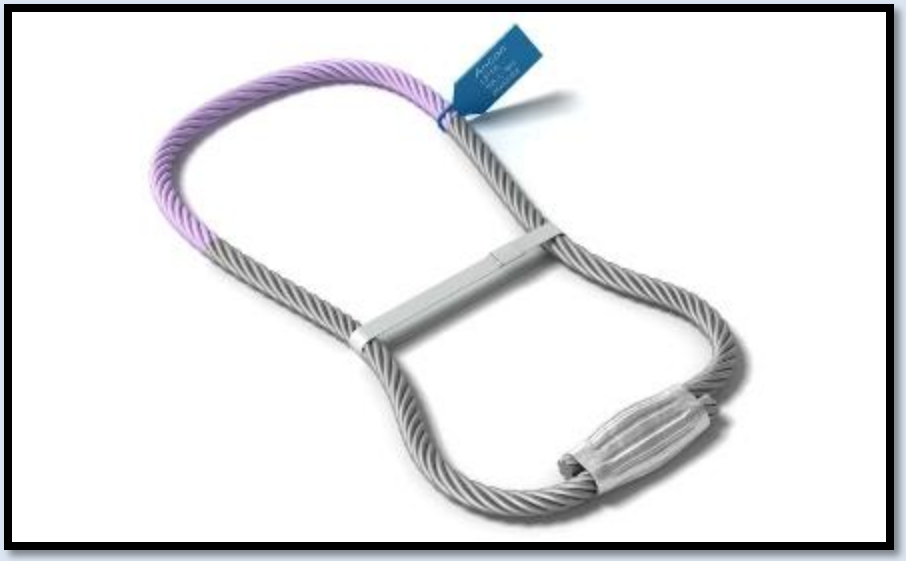


Panel Lifting

INSERTS

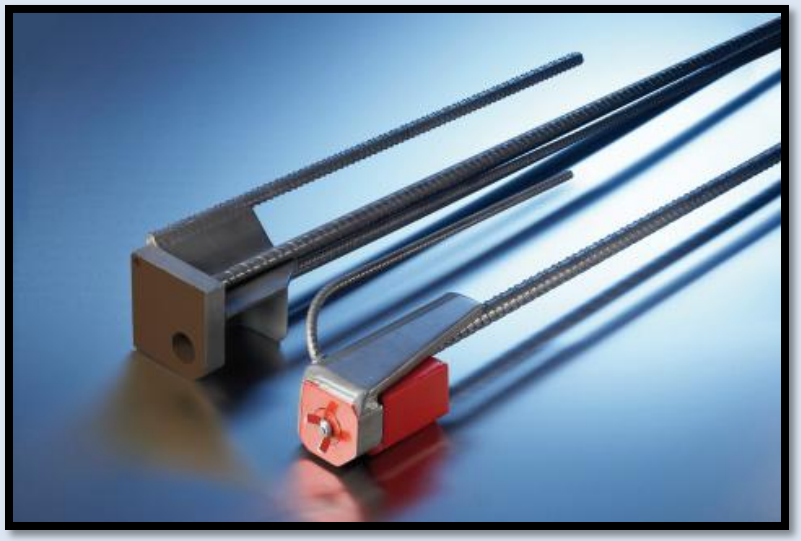
Lift up Links





Lifting loops

CONNECTING SHOES



Column Shoes

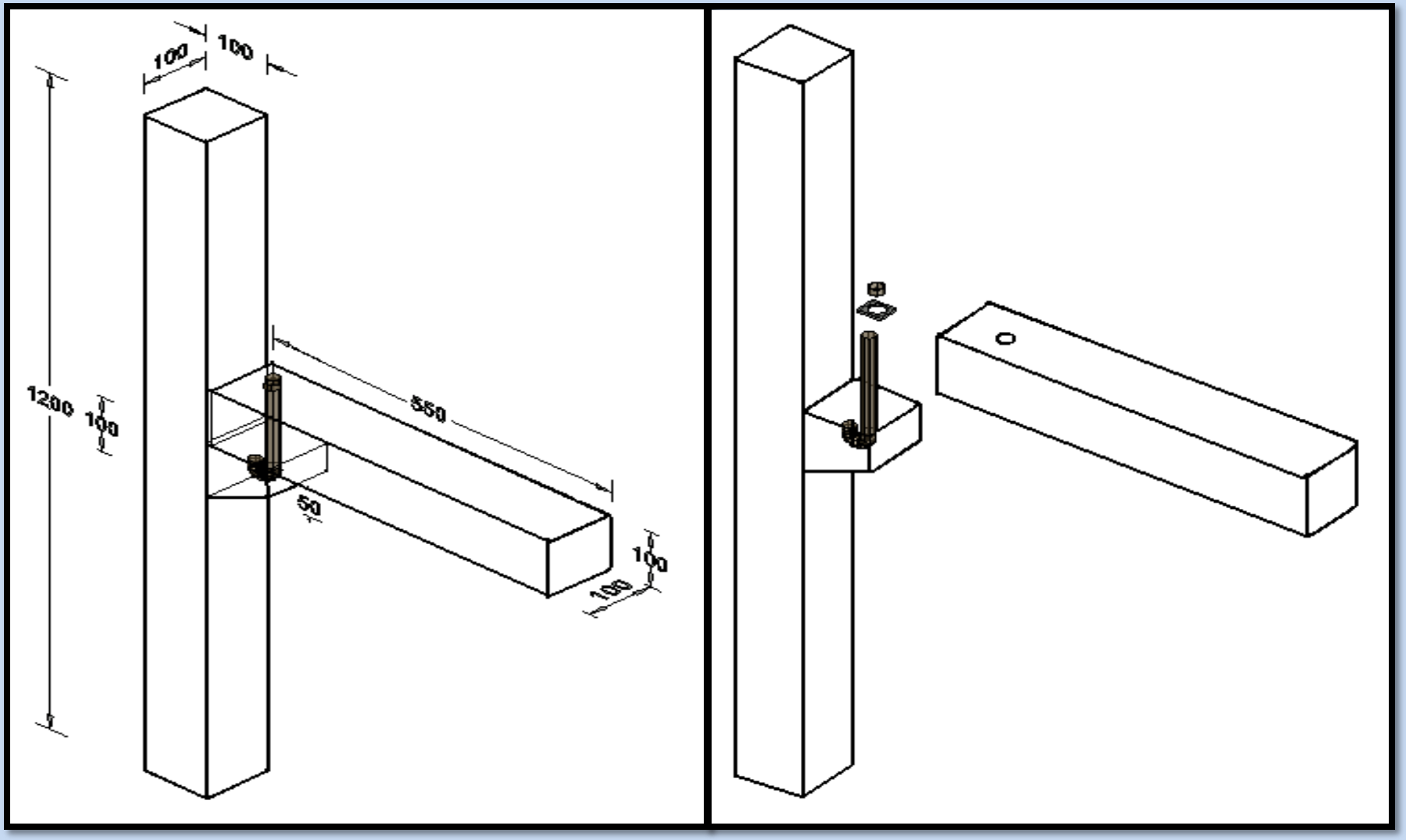
Beam Shoes

Wall Shoes

Piecko

RESEARCH IN PROGRESS
AT
ANNA UNIVERSITY

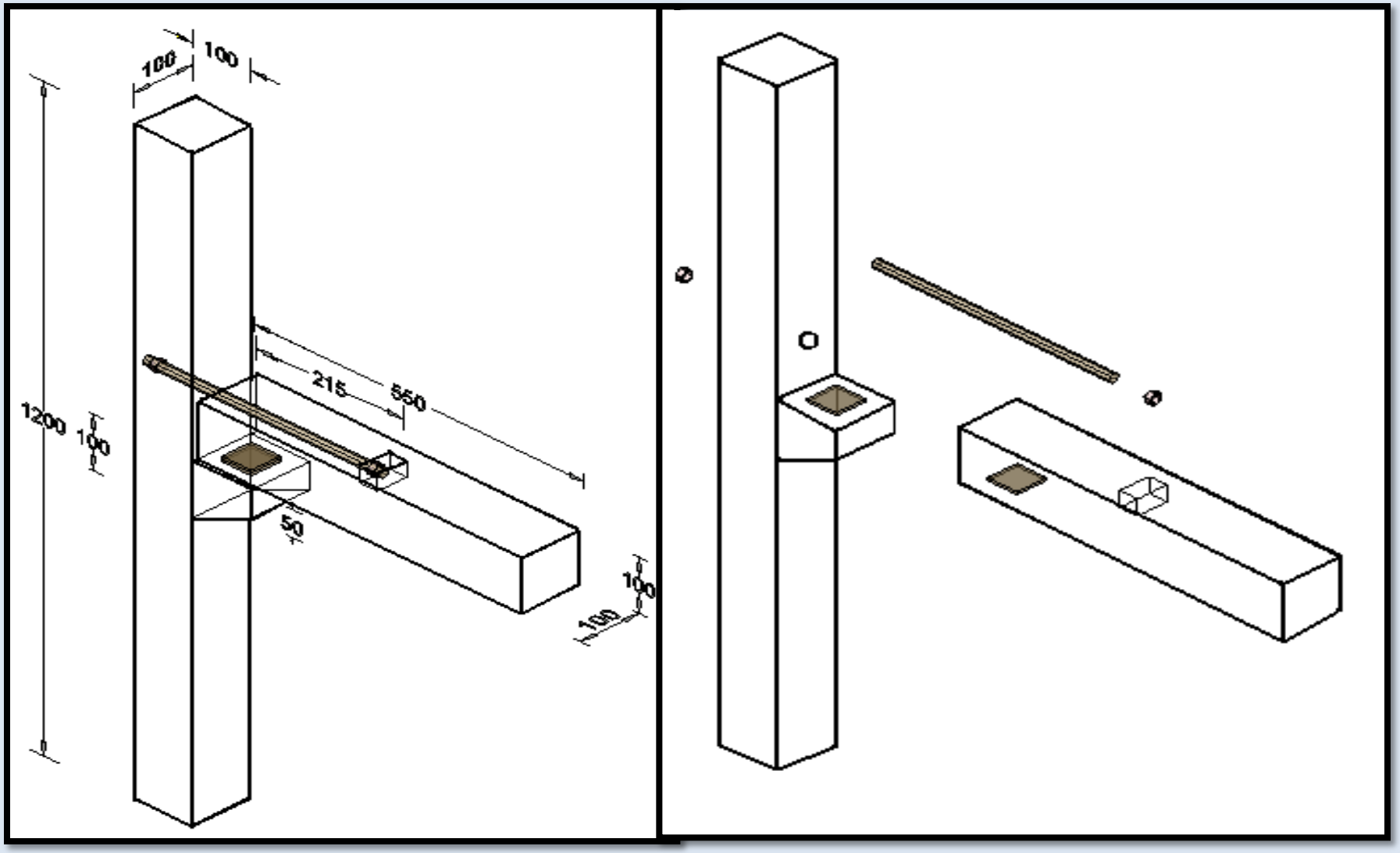
Precast Connection: Beam To Column Connection



J-bolt (PC-JB)

R.Vidjeapriya

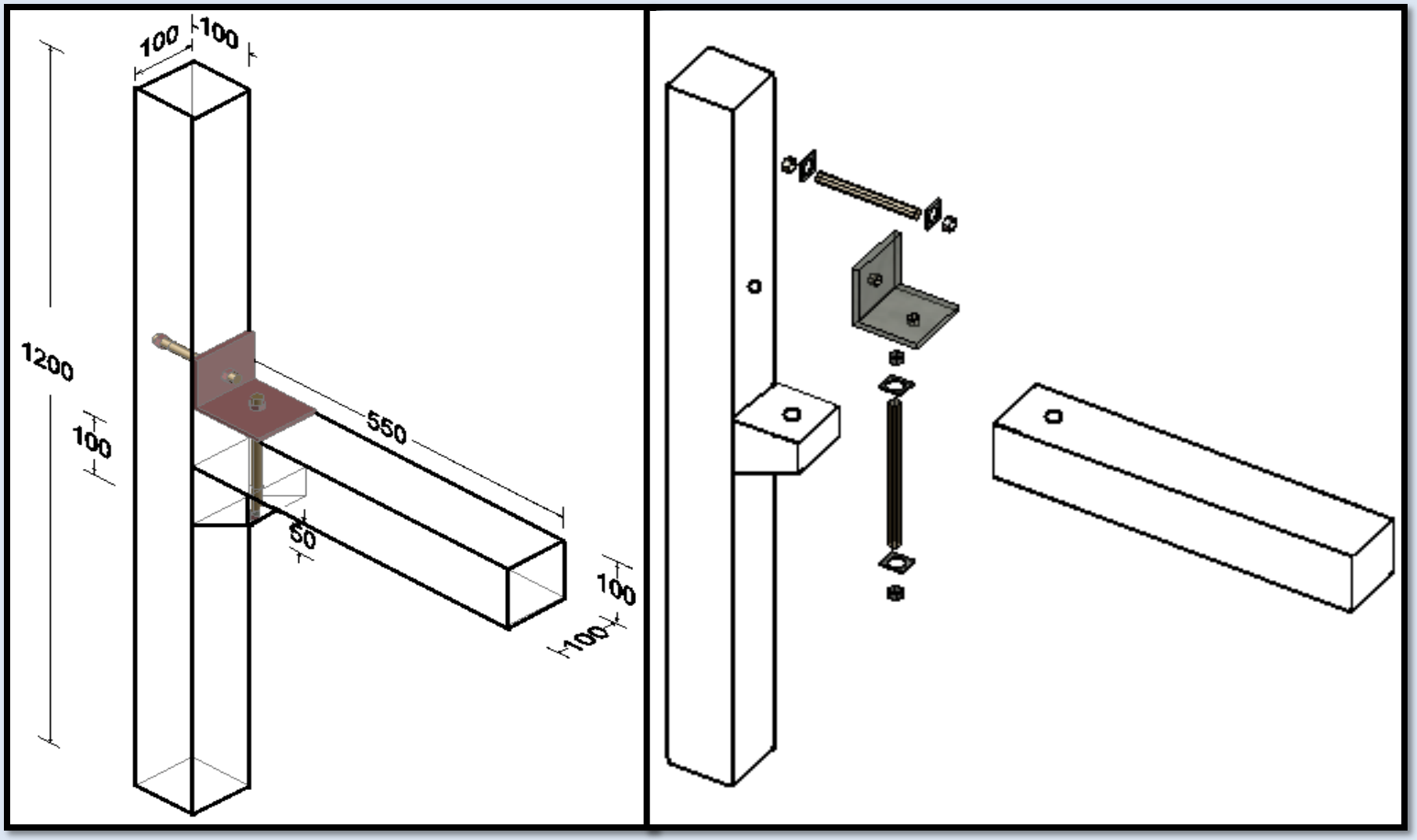
Precast Connection: Beam To Column Connection



Tie Rod (PC-TR)

R.Vidjeapriya

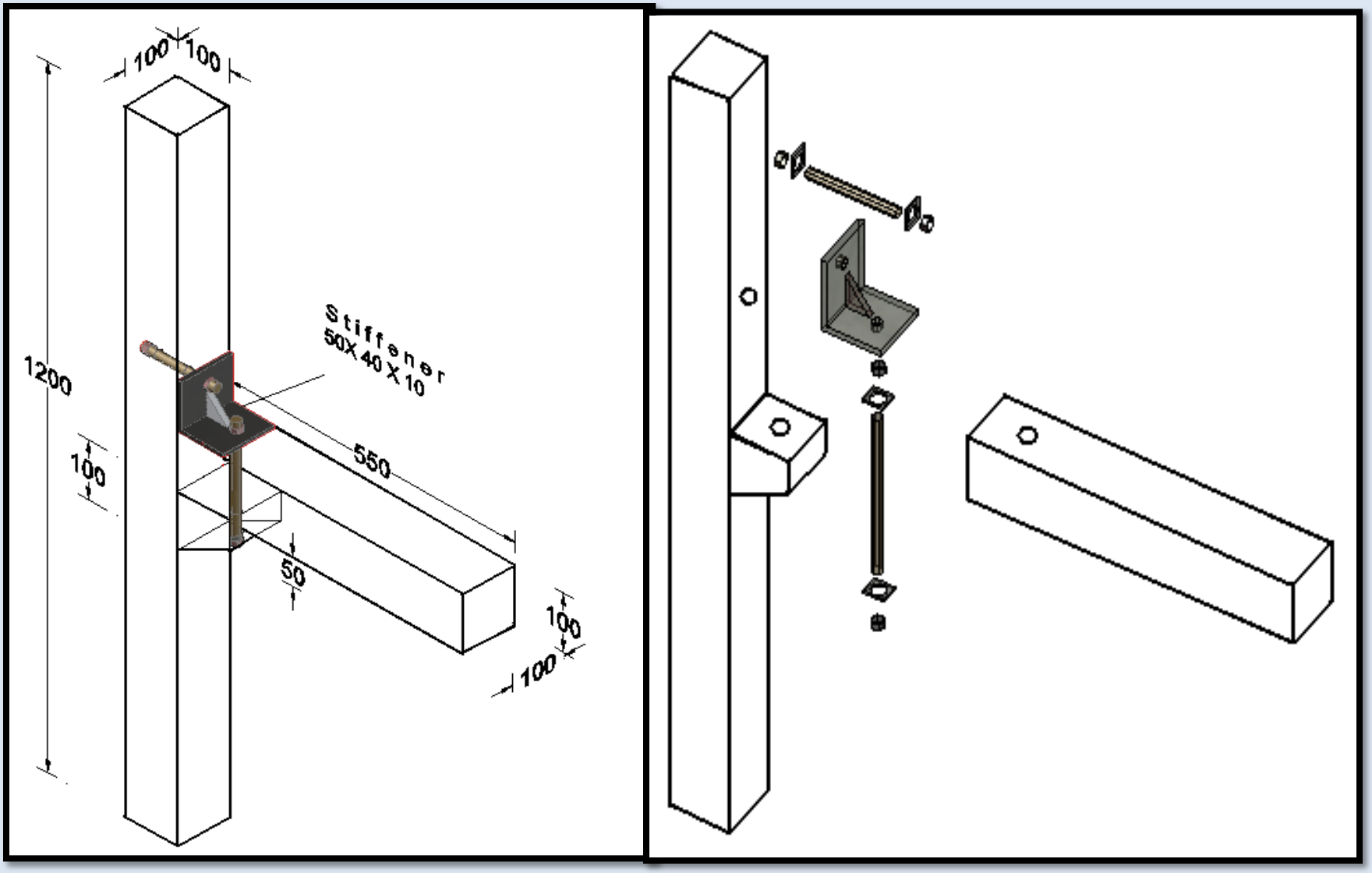
Precast Connection: Beam To Column Connection



Cleat Angle (PC-CL)

R.Vidjeapriya

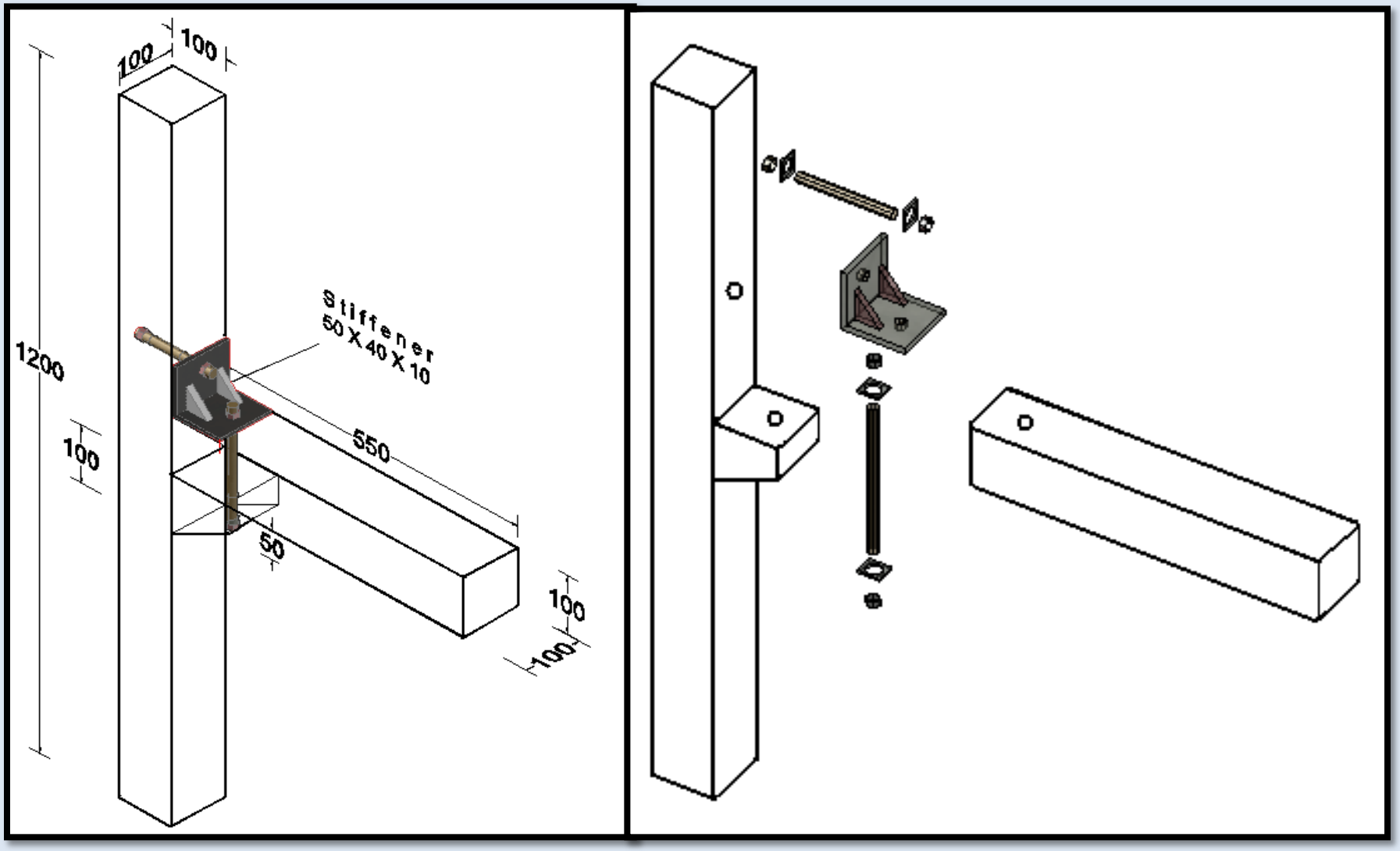
Precast Connection: Beam To Column Connection



Cleat Angle with Single Stiffener (PC-SS)

R.Vidjeapriya

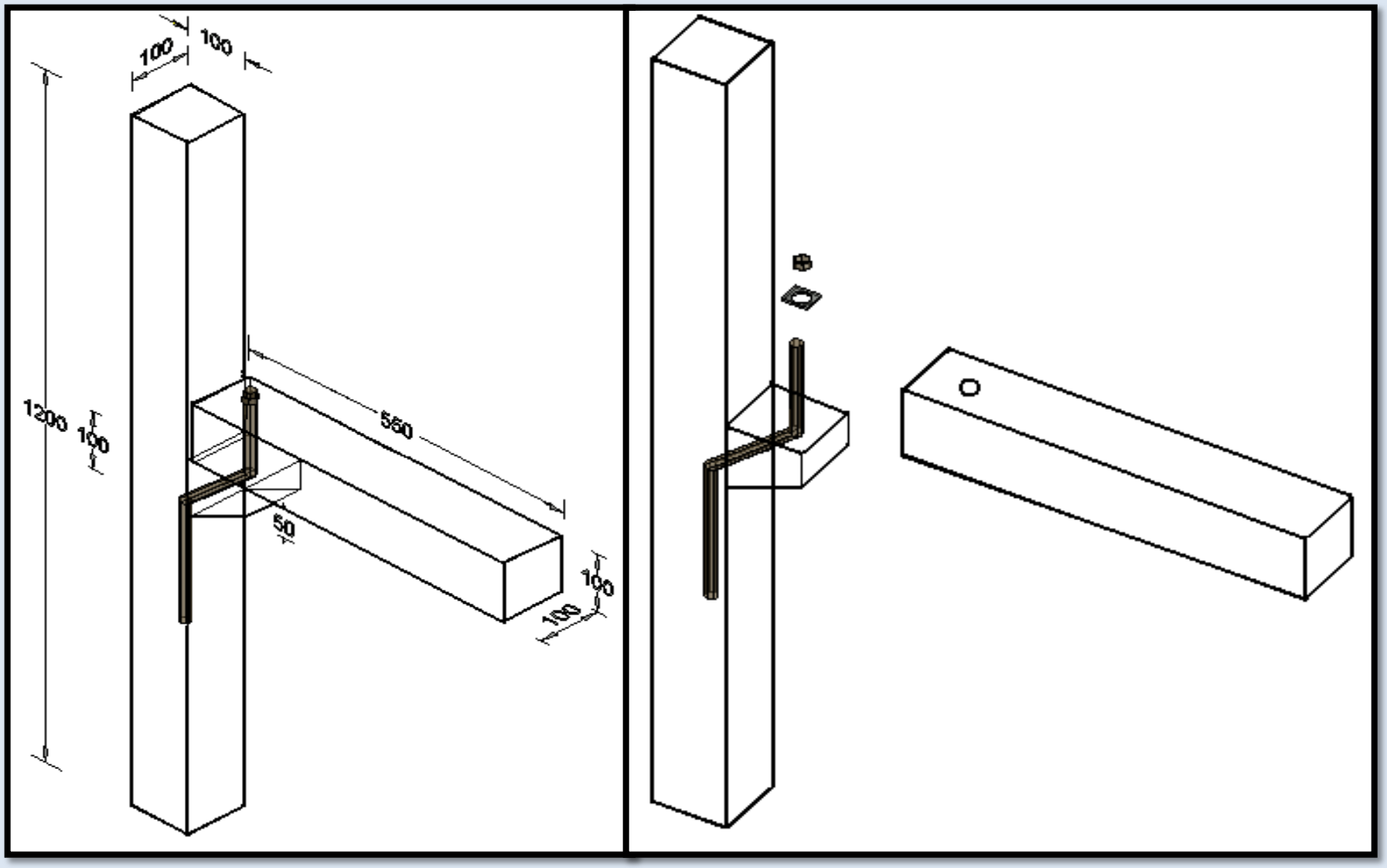
Precast Connection: Beam To Column Connection



Cleat Angle with Double Stiffener (PC-DS)

R.Vidjeapriya

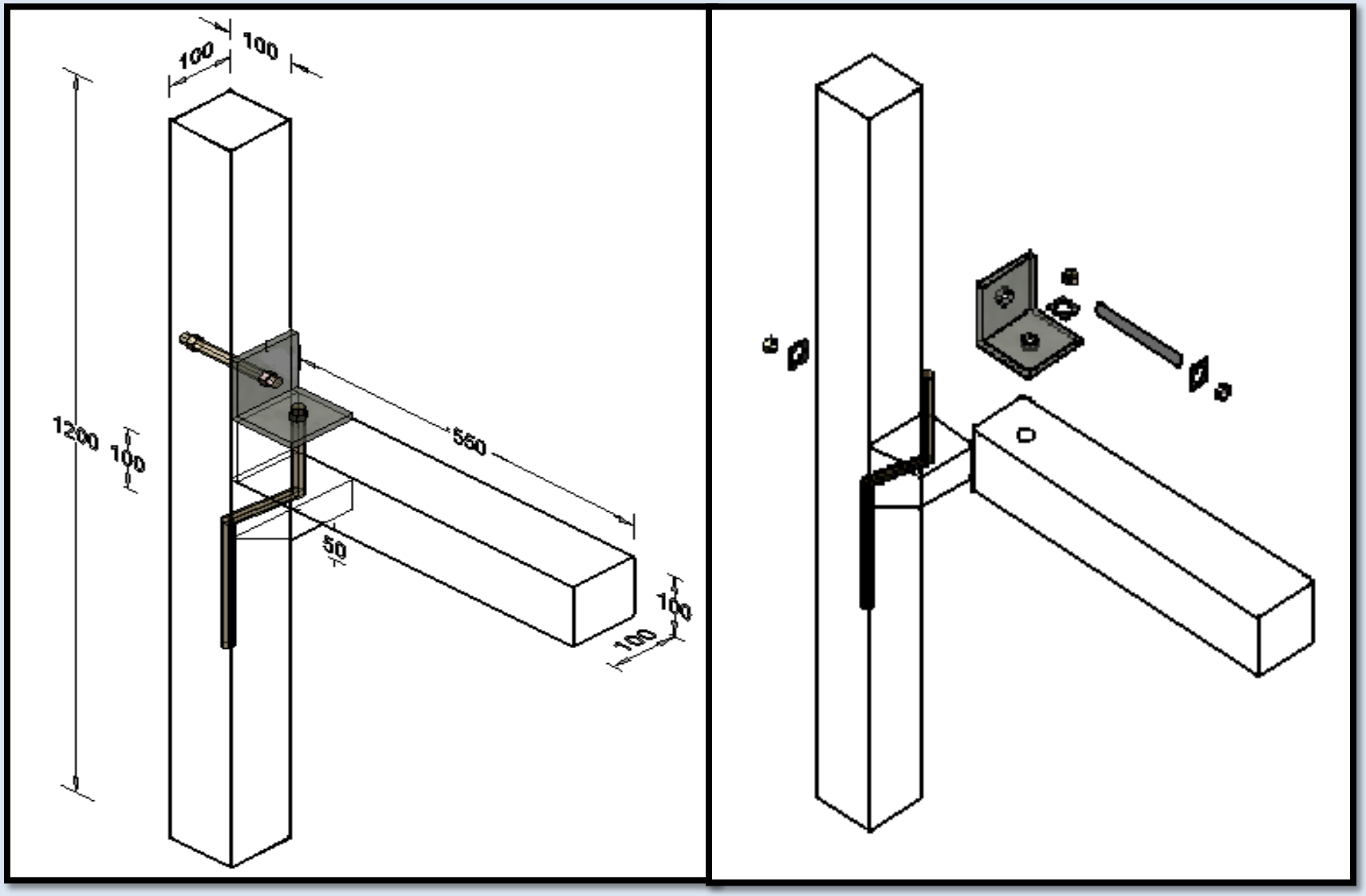
Precast Connection: Beam To Column Connection



Dowel Bar (PC-DW)

R.Vidjeapriya

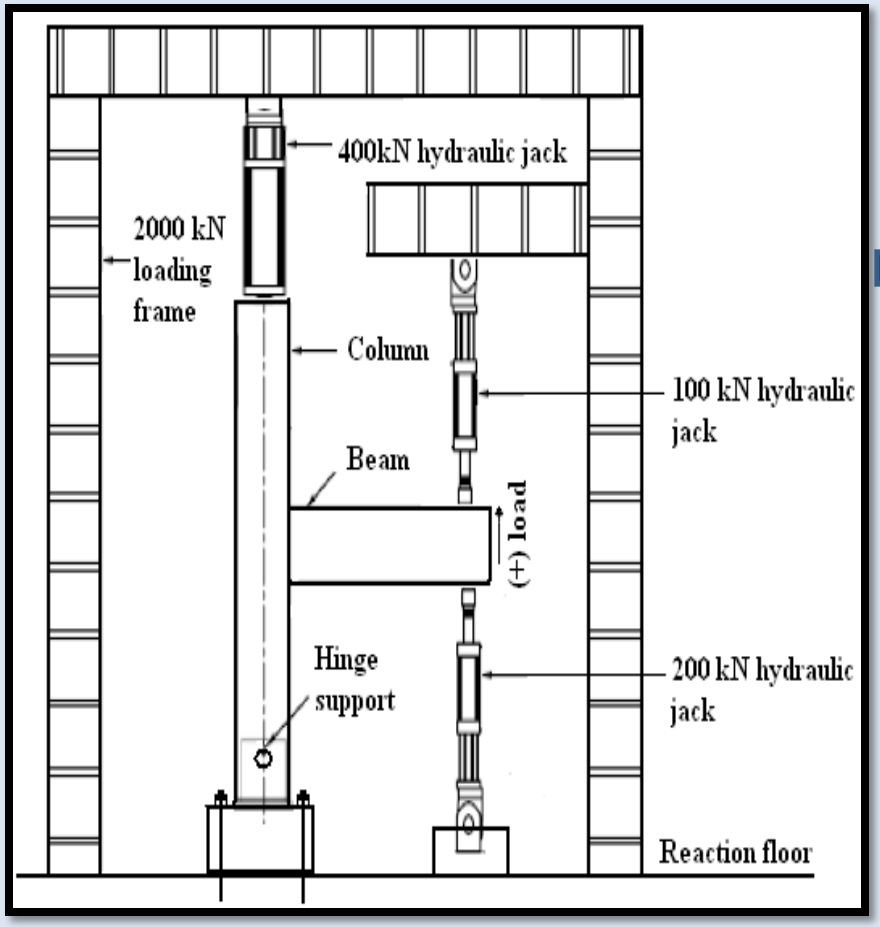
Precast Connection: Beam To Column Connection

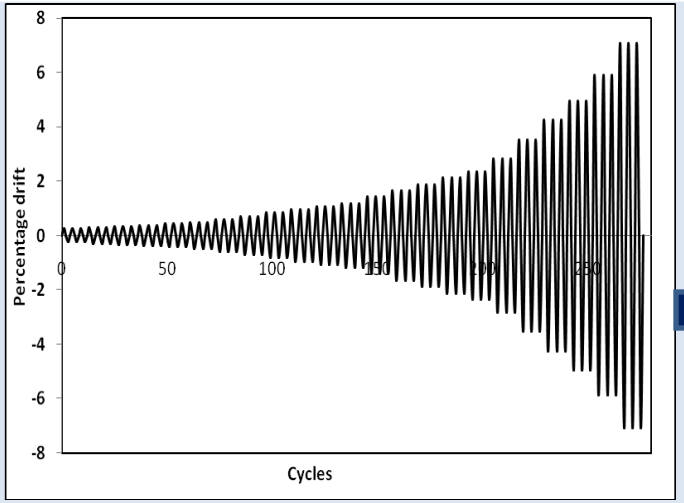


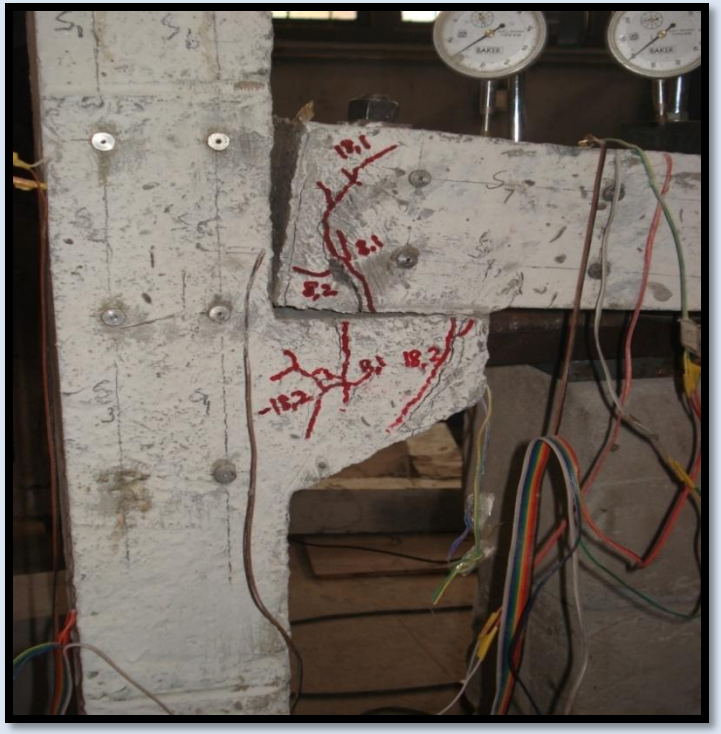
Dowel and Cleat Angle (PC-DWCL)

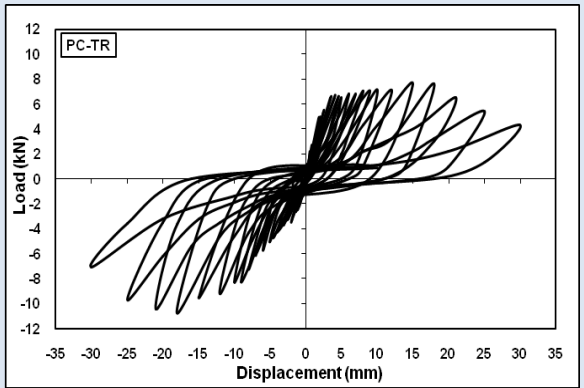
R.Vidjeapriya

Experimental Investigation



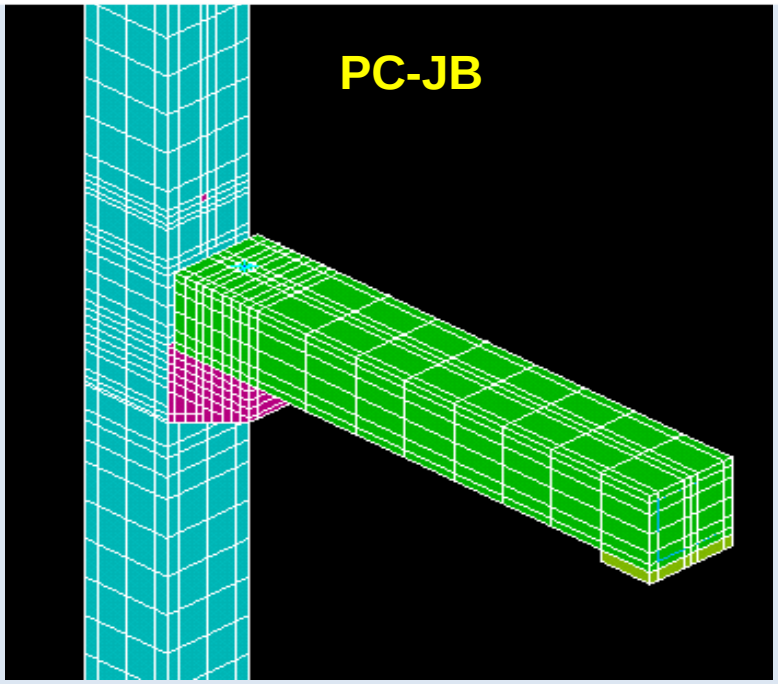


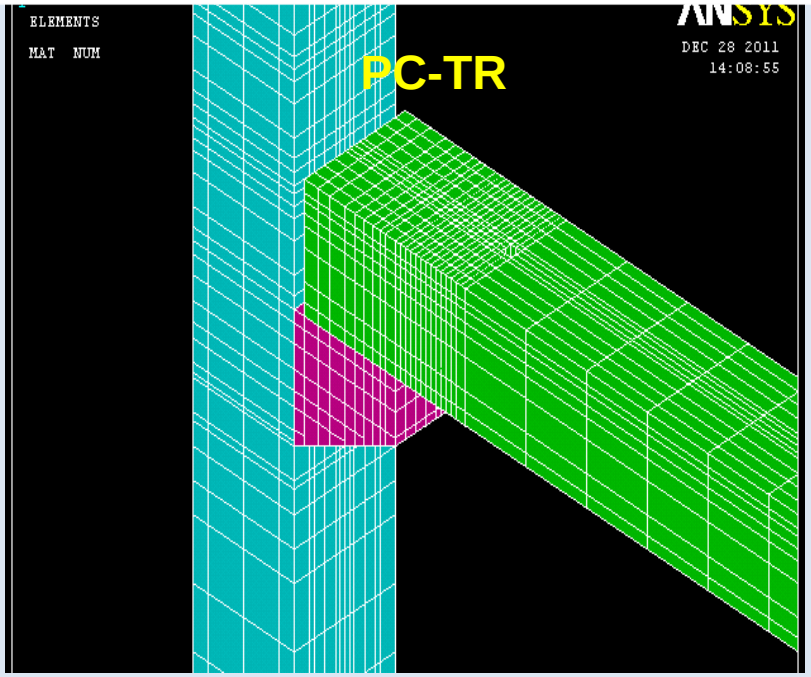


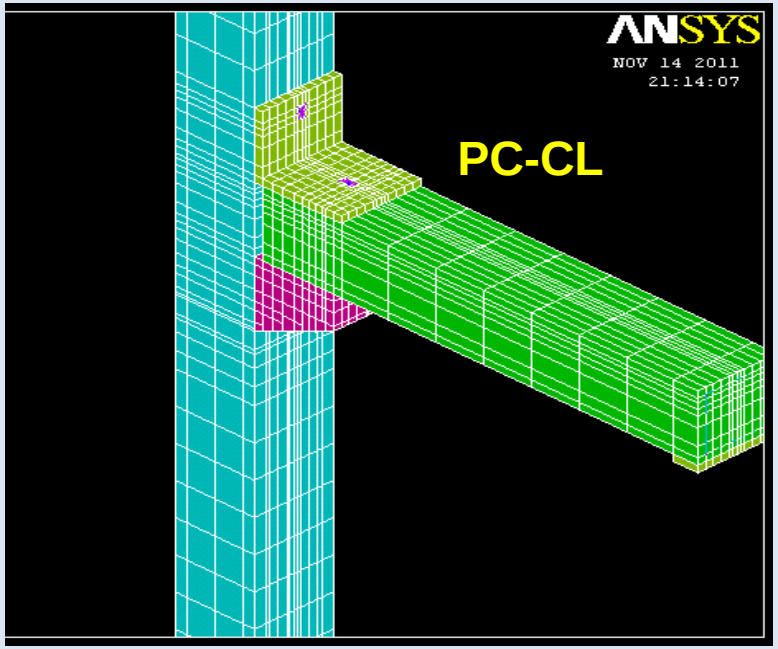


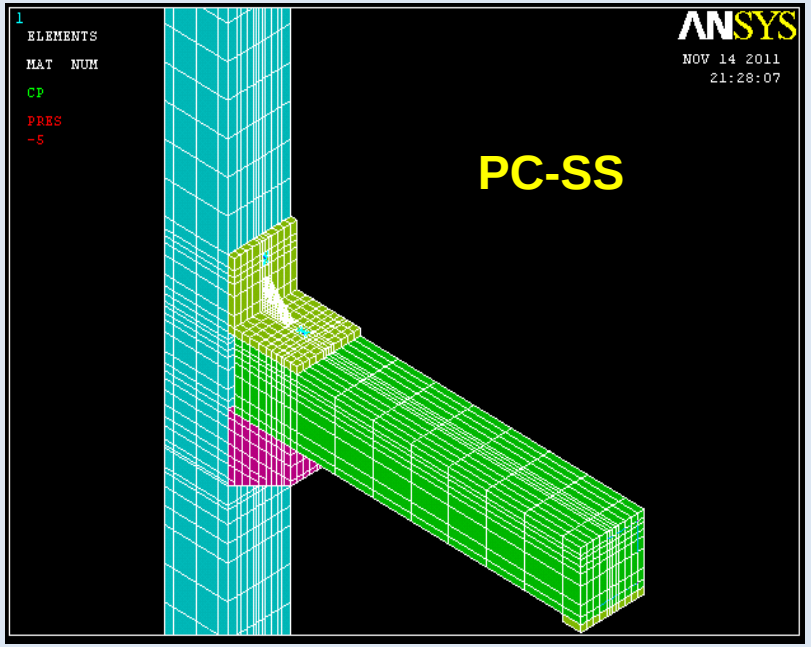
R.Vidjeapriya

Analytical Investigation





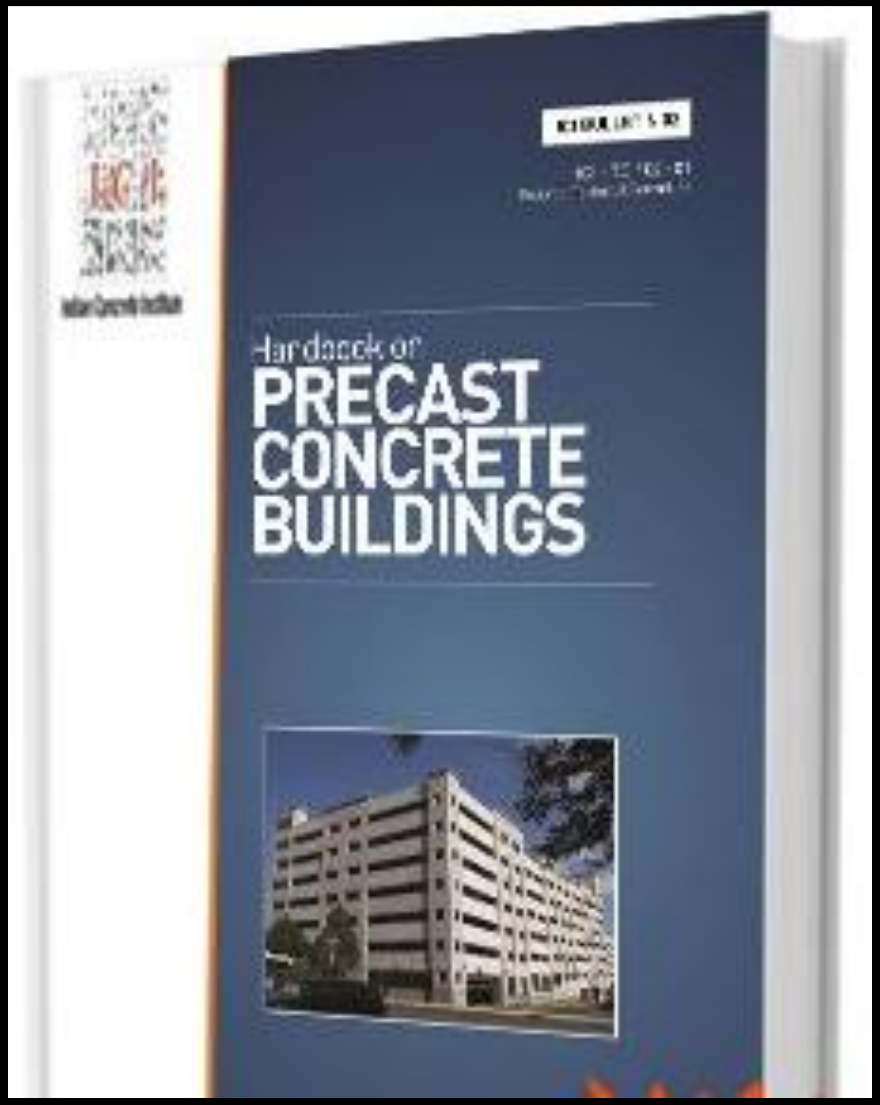




CURRENT PROJECTS

- Beam – Column Hybrid Connections- Ms.Rajeswari
- Column – Foundation Connections - Ms.Hemamathi
- Shear Wall – Slab Connections - Ms.Arthi
- Wall Panel Connections - Mr.Joyson

ICI HANDBOOK




THANKYOU