

Tree Column Location Plan
Scale 1:200

- Notes:
- Foundation design by others (specialist sub-contractor). Arup's design responsibility stops at the super structure and does not include foundation design.
 - All steel to be grade E350 unless noted otherwise.
 - Architectural setting out of Safdarjung Station and platforms by others.
 - Drawings to be read together with the latest revision of Structural Specification 284197-ARP-ZZ-RP-ZX-000005.
 - All dimensions are in millimetres (mm) and all levels are in metres (m), unless noted otherwise.
 - No dimensions shall be scaled from this drawing
 - Fabrication / shop drawings shall be approved by the Engineer prior to commencing fabrication.

GOOD FOR CONSTRUCTION

By: Francis Archer

Date: 09-02-2024

02	09/02/24	Good for Construction
01	17/10/23	Good for Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
General Arrangement
Tree Column Location Plan

Scale at A1	1:200	By/Chkd/Appd PB/EB/FA&FB
Role	Structural	
Status	S4 - Submission	

Arup Job No	284197	Rev	02
ID	284197-ARP-ZZ-01-DR-SX-020502		

APPROVED

By: Himanshu Singhal

Date: 16-05-2024



Foundation design by others (specialist sub-contractor).
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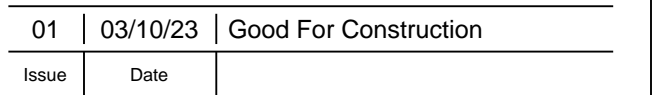
Architectural setting out of Safdarjung Station and platforms by others.

Drawings to be read together with the latest revision of Structural Specification
 284197-ARP-ZZ-ZF-RR-ZX-000005.

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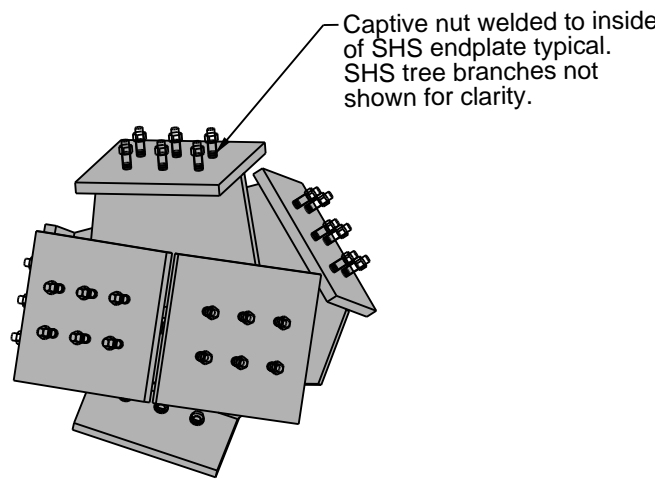
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Project Title

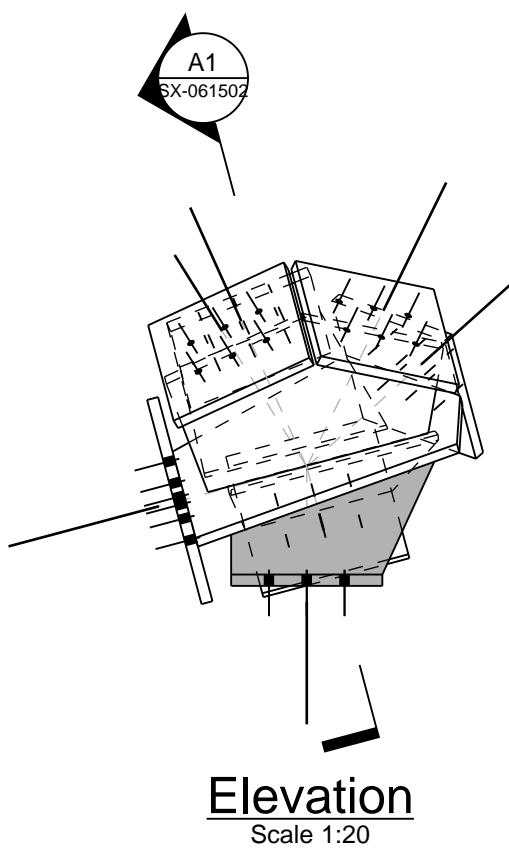
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Scale at A1	1:20	By/Ckld/Appd PB/EB/FA&FB
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 01
ID	284197-ARP-AC-00-DR-SX-061501	

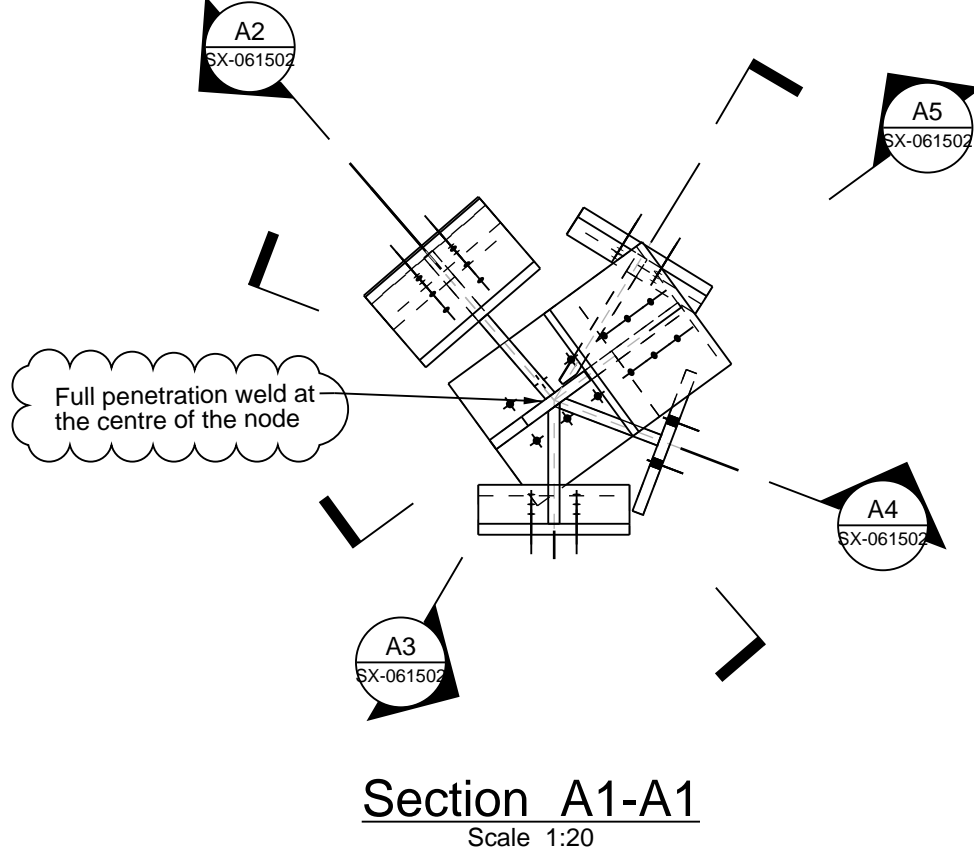
Note: Some plates hidden for clarity



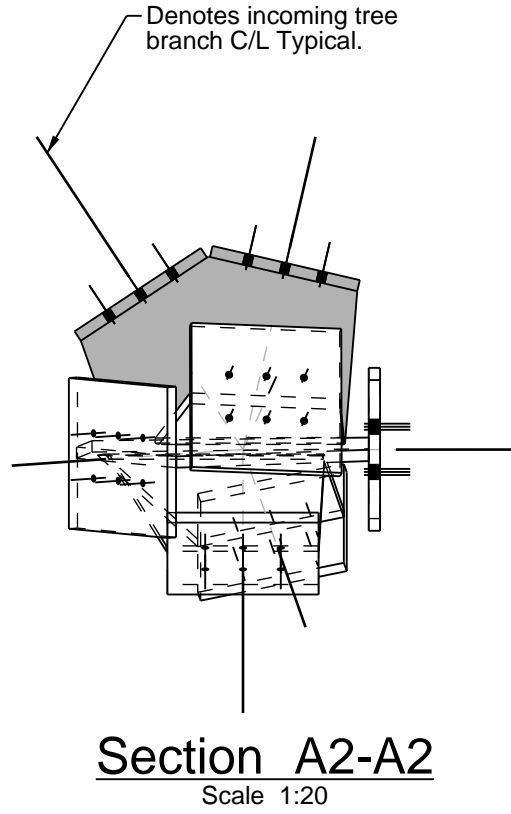
Tree Column - Node Type A 3d View
NTS



Elevation
Scale 1:20

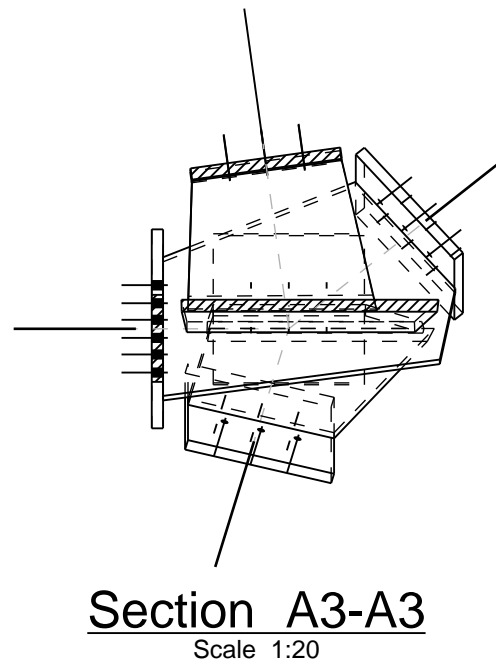


Section A1-A1
Scale 1:20

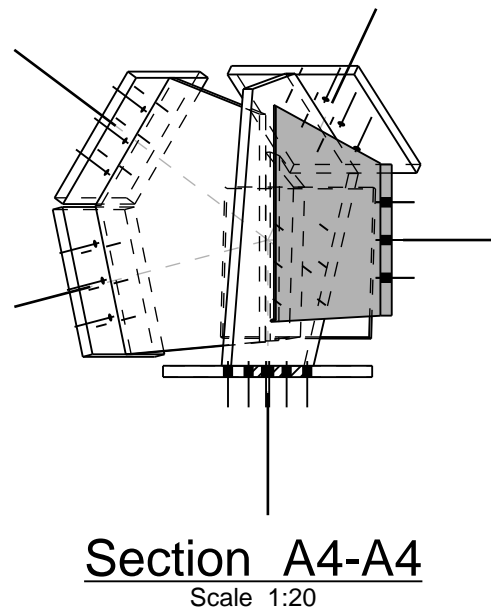


Section A2-A2
Scale 1:20

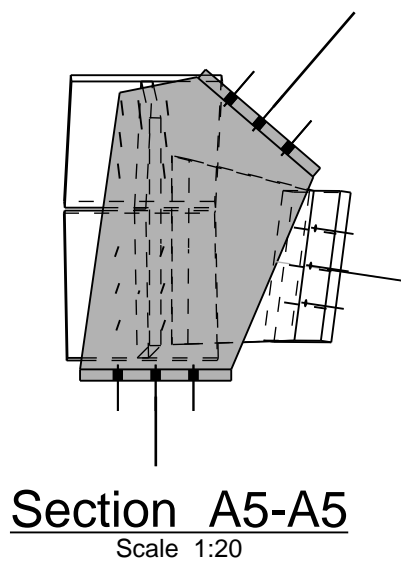
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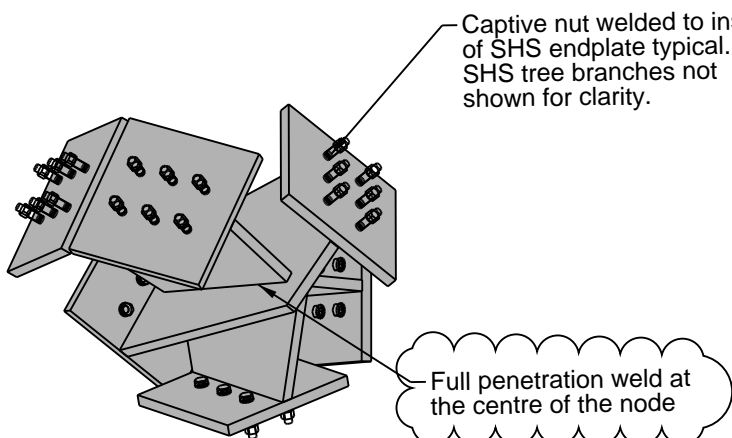
Section A3-A3
Scale 1:20



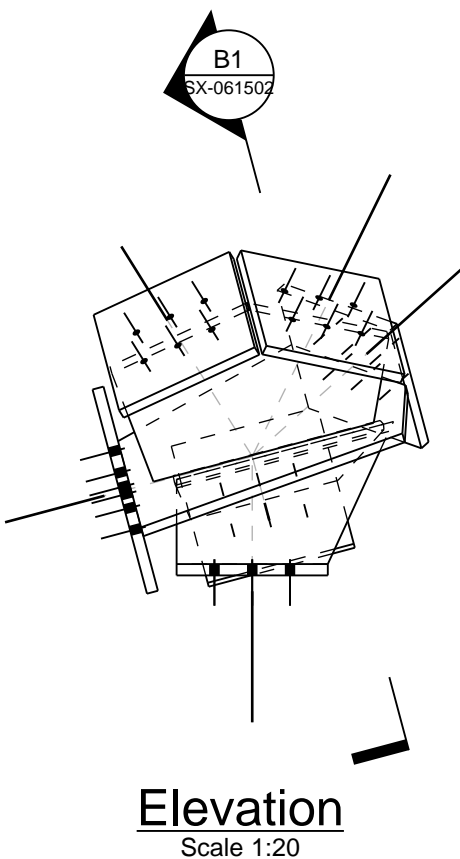
Section A4-A4
Scale 1:20



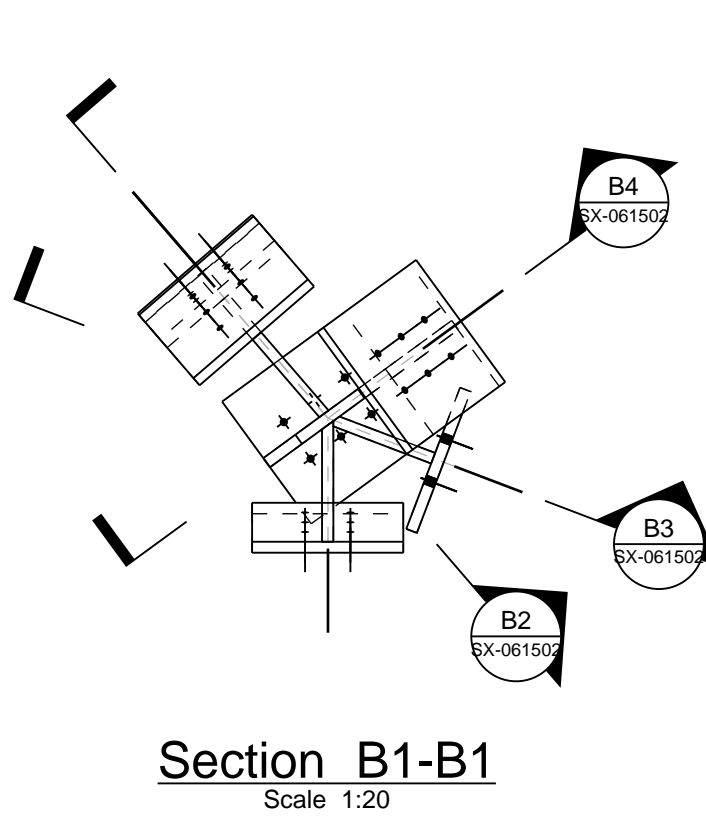
Section A5-A5
Scale 1:20



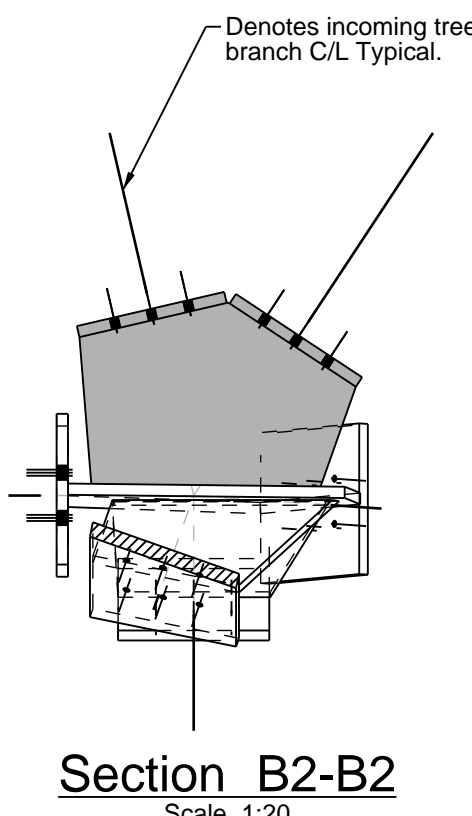
Tree Column - Node Type B 3d View
NTS



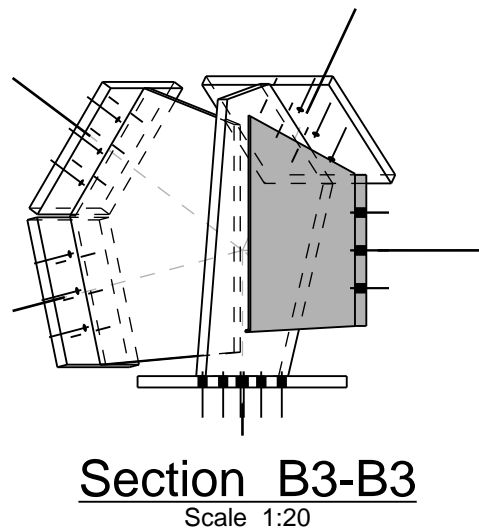
Elevation
Scale 1:20



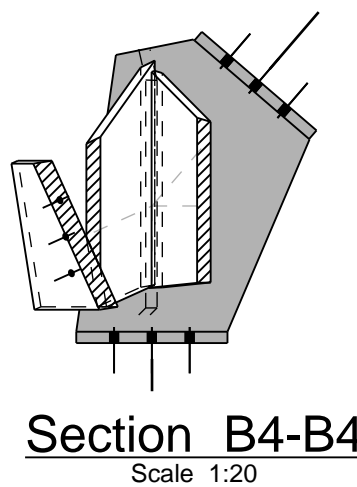
Section B1-B1
Scale 1:20



Section B2-B2
Scale 1:20



Section B3-B3
Scale 1:20



Section B4-B4
Scale 1:20

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GOOD FOR CONSTRUCTION

By: Francis Archer

Date: 19-06-2024

02	19/06/24	Good For Construction
01	03/10/23	Good For Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Tree Column Node Details

Scale at A1	1:20	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	02
ID	284197-ARP-AC-01-DR-SX-061502		

Refer to drawings:
284197-ARP-AC-ZZ-DR-SX-061504
284197-ARP-AC-ZZ-DR-SX-061505
284197-ARP-AC-ZZ-DR-SX-061506
for all plate thicknesses, welds and bolt information

APPROVED

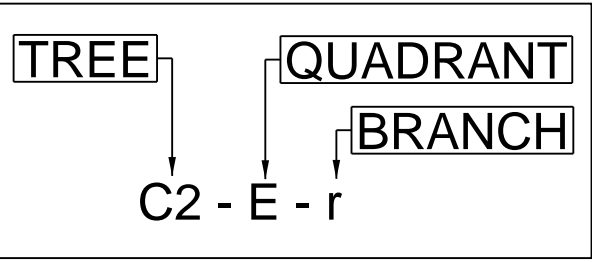
By: Himanshu Singhal

Date: 03-07-2024

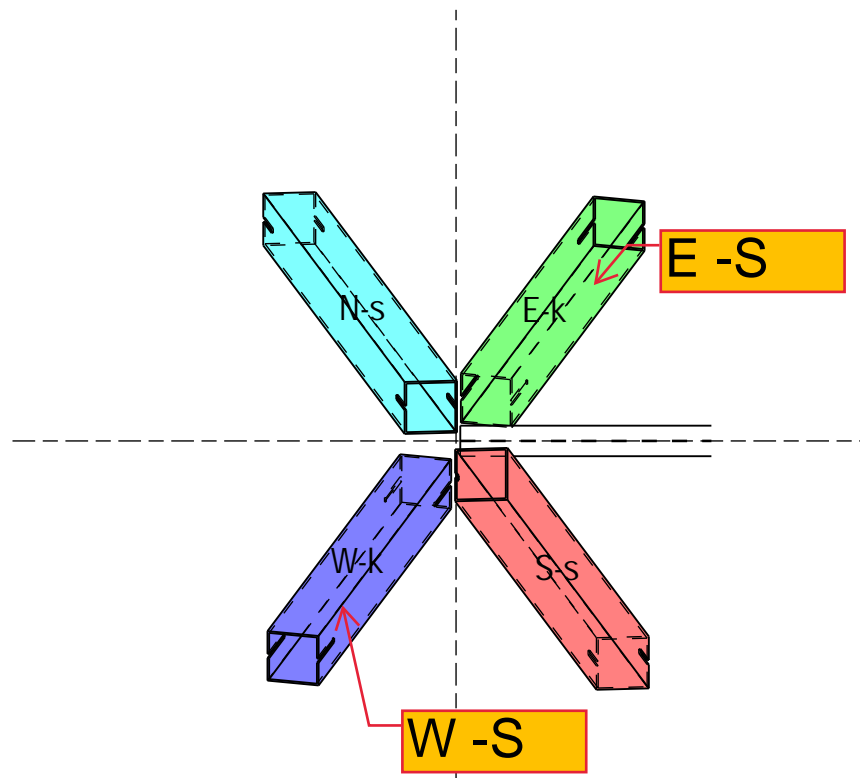
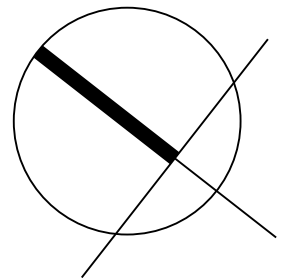
A1
1
2
3
4
5
6
7
8
9
10
11

- N North Quadrant members
- E East Quadrant members
- S South Quadrant members
- W West Quadrant members

Key to Tree Quadrants

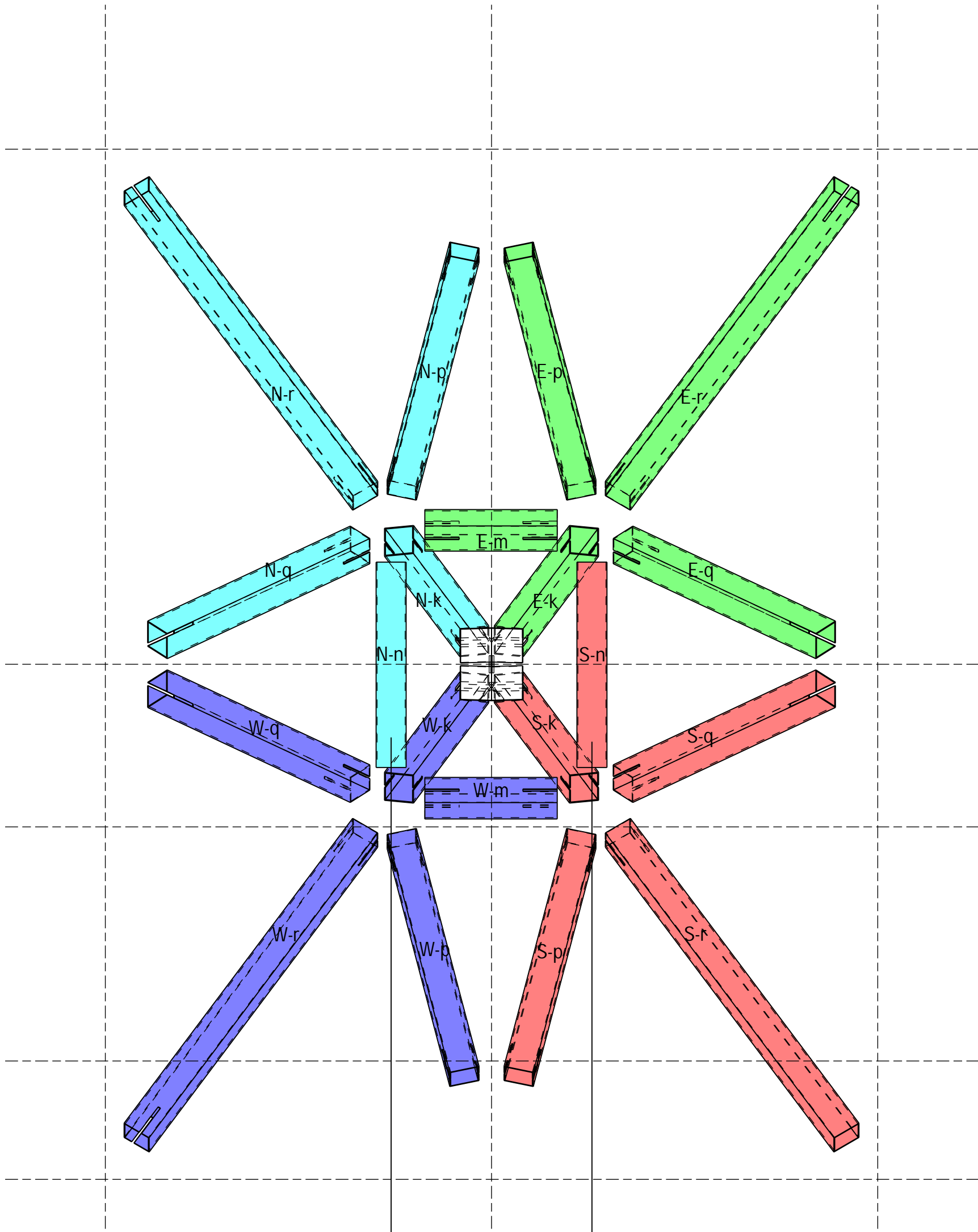


Key to member ID



UPPER PLAN
(members up to roof)
Scale 1:50

For Section ID details refer to drawings
284197-ARP-AC-ZZ-DR-SX-061503 to
284197-ARP-AC-ZZ-DR-SX-061506



LOWER PLAN
(members centred below deck level)
Scale 1:50

Tree C1

Member ID	Section ID + Tesion Suffix
C1-N-k	k-11.5-H-T1200
C1-E-k	k-11.5-L-T400
C1-S-k	k-16-L-T400
C1-W-k	k-8-H-T800
C1-E-m	m-8-L-T1200
C1-W-m	m-8-L-T1200
C1-S-n	n-11.5-H-T400
C1-N-n	n-8-H-T2000
C1-E-p	p-11.5-H-T400
C1-S-p	p-11.5-H-T400
C1-N-p	p-8-H-T2000
C1-W-p	p-8-H-T2000
C1-S-q	q-8-H-T1200
C1-E-q	q-8-H-T1200
C1-W-q	q-8-H-T800
C1-N-q	q-8-L-T1200
C1-S-r	r-11.5-H-T400
C1-E-r	r-8-H-T400
C1-W-r	r-8-L-T1200
C1-N-r	r-8-L-T400
C1-N-s	s-11.5-L-T2000
C1-E-s	s-8-L-T1200
C1-W-s	s-8-H-T2000
C1-S-s	s-8-L-T800

Tree C1

Member ID	Section ID + Tesion Suffix
C2-S-k	k-11.5-H-T400
C2-W-k	k-11.5-H-T400
C2-E-k	k-8-L-T1200
C2-N-k	k-8-L-T1200
C2-W-m	m-11.5-L-T400
C2-E-m	m-8-L-T800
C2-S-n	n-8-H-T800
C2-N-n	n-8-H-T800
C2-E-p	p-8-L-T1200
C2-N-p	p-8-L-T1200
C2-S-p	p-8-L-T400
C2-W-p	p-8-L-T400
C2-W-q	q-8-H-T400
C2-S-q	q-8-H-T400
C2-E-q	q-8-H-T2000
C2-N-q	q-8-H-T2000
C2-S-r	r-11.5-H-T400
C2-W-r	r-11.5-H-T400
C2-E-r	r-8-L-T800
C2-N-r	r-8-L-T800

Tree C3

Member ID	Section ID + Tesion Suffix
C3-E-k	k-11.5-H-T1200
C3-N-k	k-11.5-L-T400
C3-W-k	k-16-L-T400
C3-S-k	k-8-H-T800
C3-E-m	m-8-L-T1200
C3-W-m	m-8-L-T1200
C3-N-n	n-11.5-H-T400
C3-S-n	n-8-H-T2400
C3-W-p	p-11.5-H-T400
C3-N-p	p-11.5-H-T400
C3-E-p	p-8-H-T2000
C3-S-p	p-8-H-T2000
C3-N-q	q-8-H-T1200
C3-W-q	q-8-H-T800
C3-S-q	q-8-H-T800
C3-E-q	q-8-H-T2000
C3-W-r	r-11.5-H-T400
C3-N-r	r-8-H-T400
C3-S-r	r-8-L-T1200
C3-E-r	r-8-L-T400
C3-E-s	s-11.5-L-T2000
C3-N-s	s-8-L-T1200
C3-S-s	s-8-H-T2000
C3-W-s	s-8-L-T800

Tree B1

Member ID	Section ID + Tesion Suffix
B1-W-k	k-11.5-H-T800
B1-N-k	k-11.5-H-T800
B1-E-k	k-16-H-T400
B1-S-k	k-16-L-T400
B1-E-m	m-8-L-T1200
B1-W-m	m-8-L-T1200
B1-S-n	n-16-H-T400
B1-N-n	n-8-H-T2000
B1-S-p	p-16-H-T400
B1-E-p	p-16-L-T400
B1-W-p	p-8-H-T1200
B1-N-p	p-8-L-T1200
B1-W-q	q-8-H-T1200
B1-S-q	q-8-H-T1200
B1-E-q	q-8-L-T1200
B1-N-q	q-8-L-T800
B1-S-r	r-11.5-L-T400
B1-E-r	r-16-H-T400
B1-N-r	r-8-H-T400
B1-W-r	r-8-H-T400
B1-W-s	s-11.5-L-T2000
B1-N-s	s-8-H-T2000
B1-E-s	s-8-L-T800
B1-S-s	s-8-L-T800

Tree B1

Member ID	Section ID + Tesion Suffix
B2-E-k	k-16-L-T400
B2-N-k	k-16-L-T400
B2-S-k	k-8-L-T1200
B2-W-k	k-8-H-T2000
B2-E-m	m-11.5-L-T400
B2-W-m	m-8-L-T1200
B2-N-n	n-8-H-T400
B2-S-n	n-8-H-T400
B2-E-p	p-8-L-T400
B2-N-p	p-8-L-T400
B2-W-p	p-8-L-T800
B2-S-p	p-8-L-T800
B2-E-q	q-11.5-L-T400
B2-N-q	q-11.5-L-T400
B2-W-q	q-8-H-T2000
B2-S-q	q-8-H-T2000
B2-N-r	r-16-H-T400
B2-E-r	r-16-H-T400
B2-W-r	r-8-L-T800
B2-S-r	r-8-L-T800

Tree B3

Member ID	Section ID + Tesion Suffix
B3-S-k	k-11.5-H-T800
B3-E-k	k-11.5-H-T800
B3-N-k	k-16-H-T400
B3-W-k	k-16-L-T400
B3-E-m	m-8-L-T1200
B3-W-m	m-8-L-T1200
B3-N-n	n-16-H-T400
B3-S-n	n-8-H-T2000
B3-W-p	p-16-H-T400
B3-N-p	p-16-L-T400
B3-S-p	p-8-H-T1200
B3-E-p	p-8-L-T1200
B3-S-q	q-8-H-T1200
B3-W-q	q-8-H-T1200
B3-N-q	q-8-L-T1200
B3-E-q	q-8-L-T800
B3-W-r	r-11.5-L-T400
B3-N-r	r-16-H-T400
B3-E-r	r-8-H-T400
B3-S-r	r-8-H-T400
B3-S-s	s-11.5-L-T2000
B3-E-s	s-8-H-T2000
B3-N-s	s-8-L-T800
B3-W-s	s-8-L-T800

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APPROVED WITH COMMENTS



03	09/02/24	Good For Construction
02	19/12/23	Good For Construction
01	03/10/23	Good For Construction
Issue	Date	

ARUP

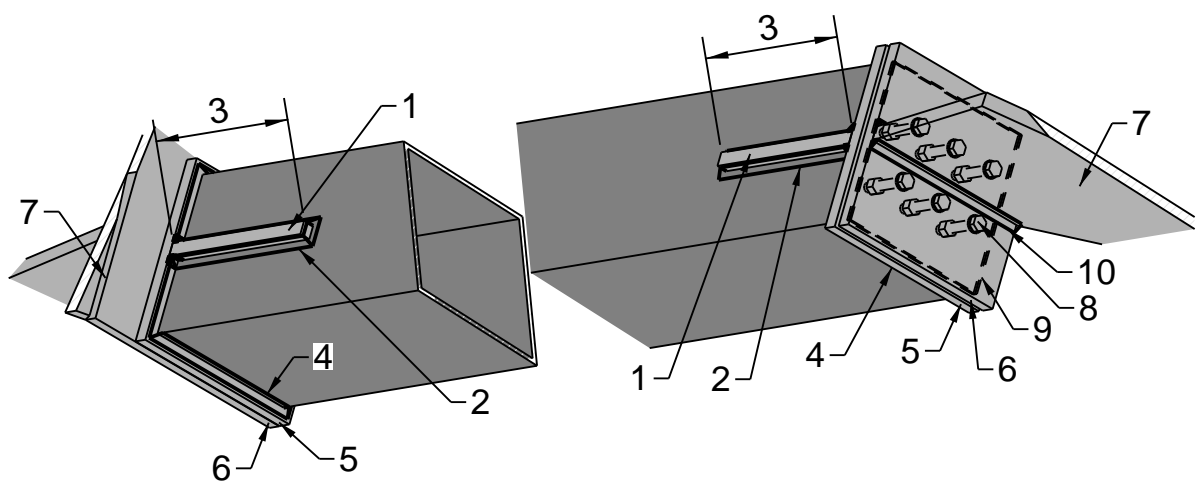
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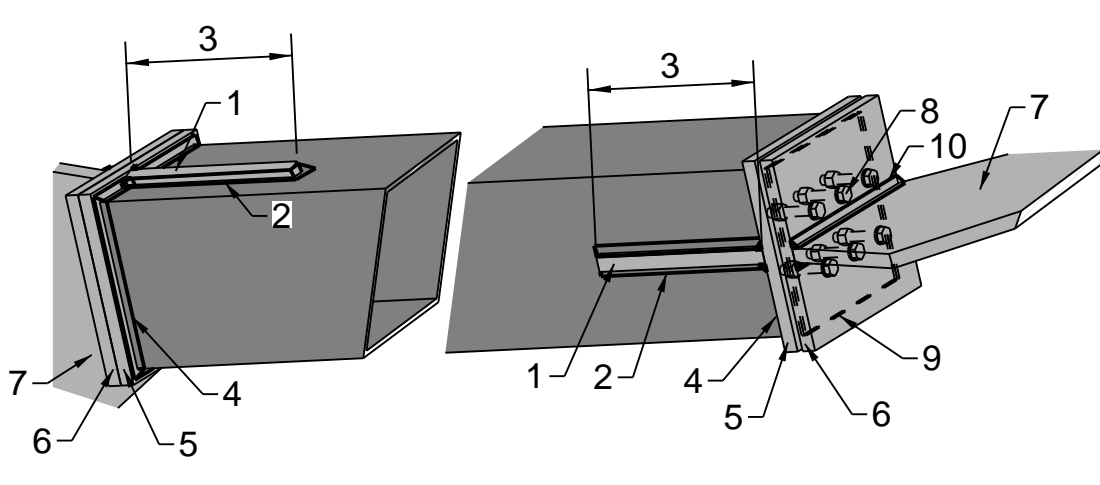
Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Tree Columns Member and Section IDs

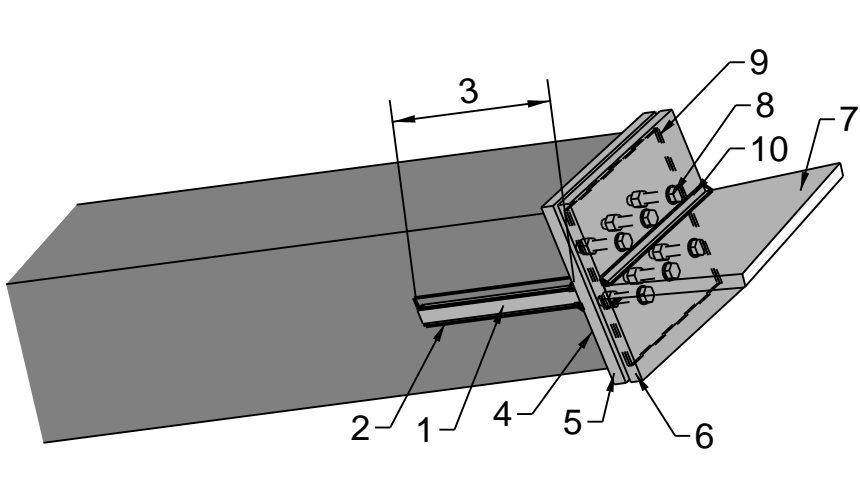
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Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	03
ID	284197-ARP-AC-ZZ-DR-SX-061503		



Member element - 3D view
Branch p
Scale 1:15



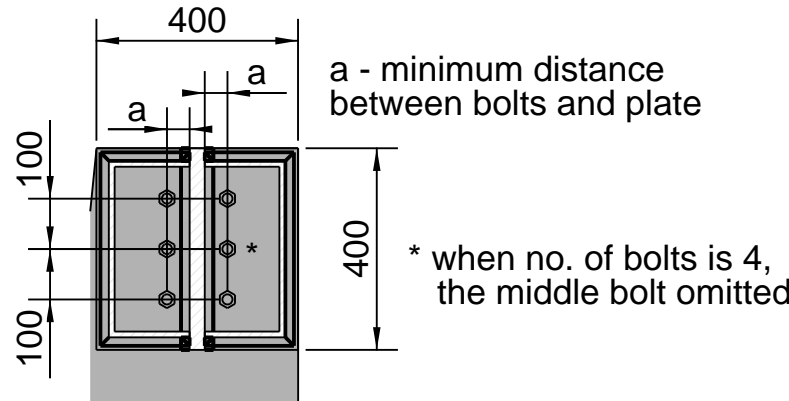
Member element - 3D view
Branch r
Scale 1:15



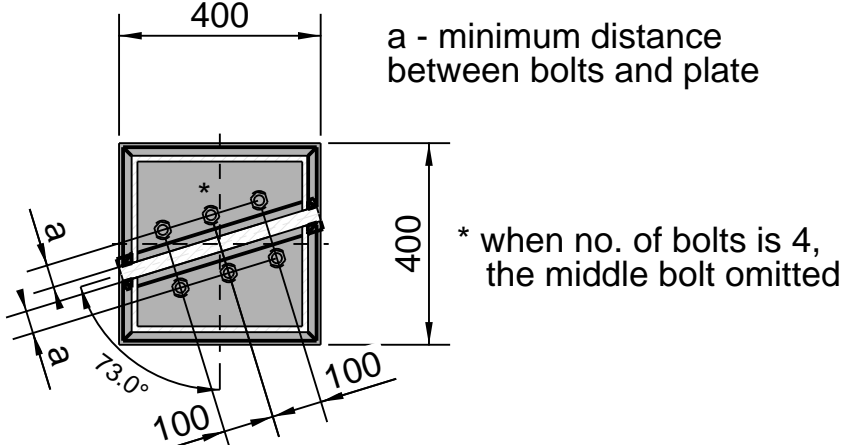
Member element - 3D view
Branch s
Scale 1:15

- KEY FOR NODE ELEMENTS:
- 1 - Stiffener plate thickness
 - 2 - Stiffener weld
 - 3 - Stiffener plate length
 - 4 - End plate weld
 - 5 - End plate to SHS
 - 6 - Connecting end plate (belongs to the connecting node fabrication or beam fabrication)
 - 7 - Connection plate (belongs to the connecting node fabrication or beam fabrication). See tekla model for the precise shape of these plates
 - 8 - End plate bolts (diameter and number)
 - 9 - Shim plates for fitting tolerance, 2x 6mm
 - 10 - Weld between connection plate (7) and connecting end plate (6)

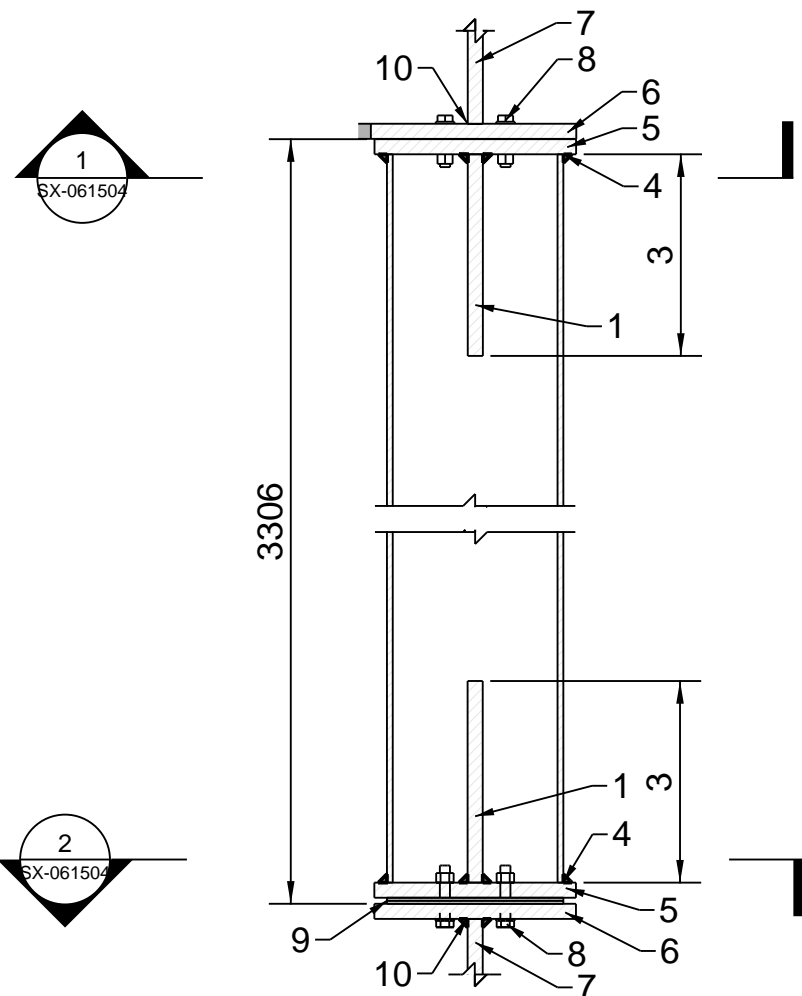
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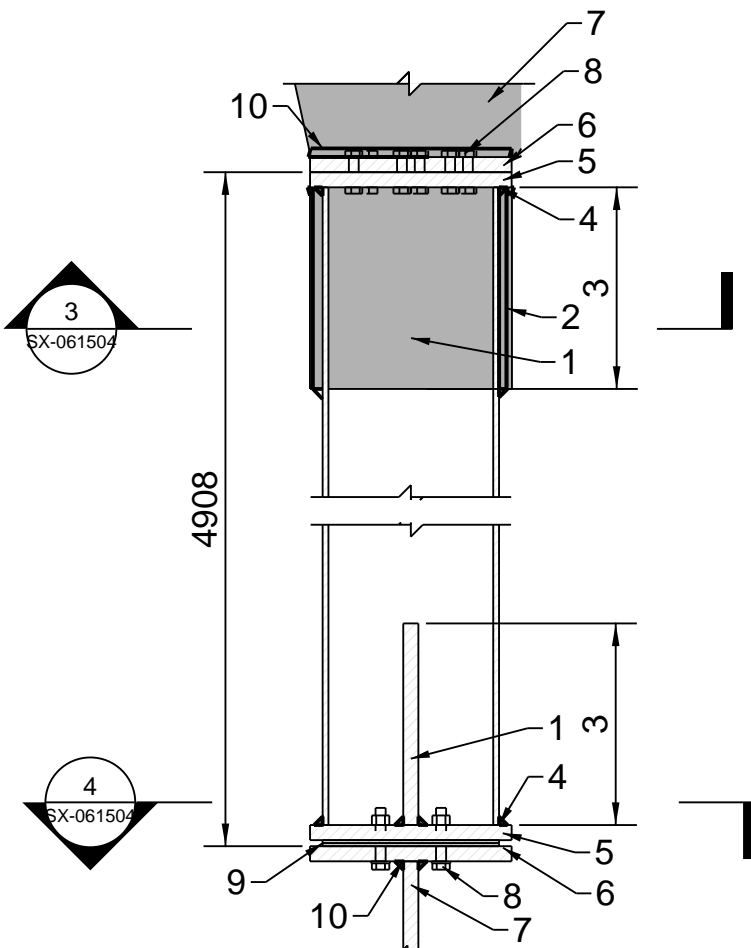
Section 1-1
Scale 1:15



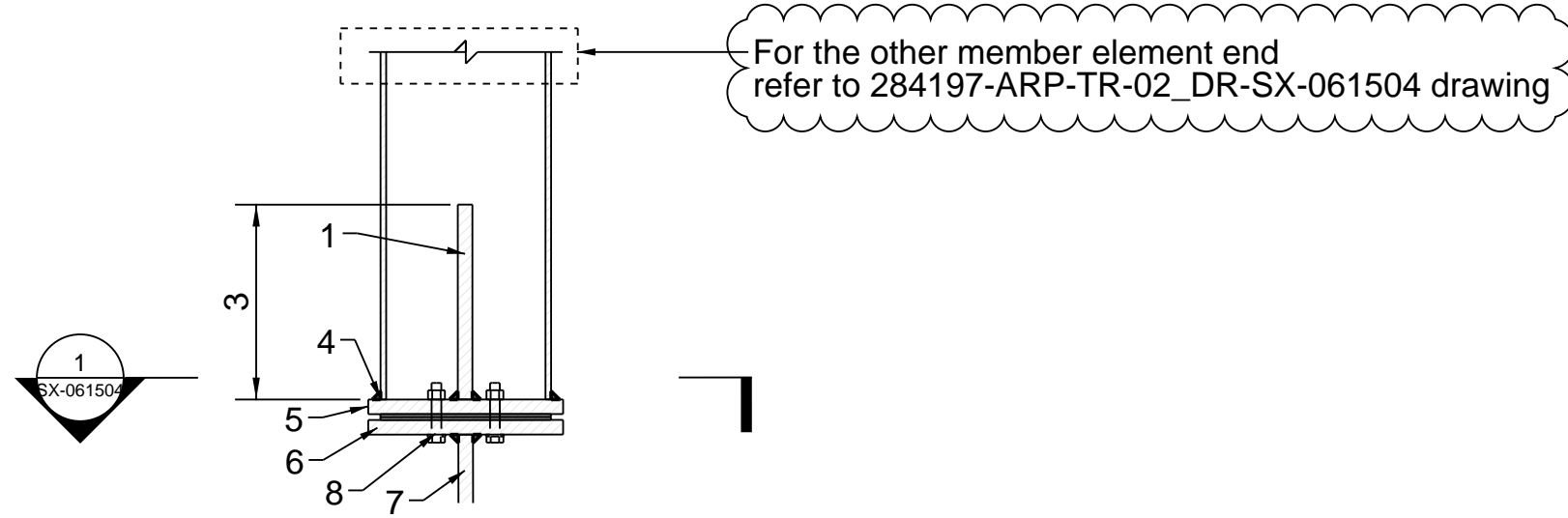
Section 3-3
Scale 1:15



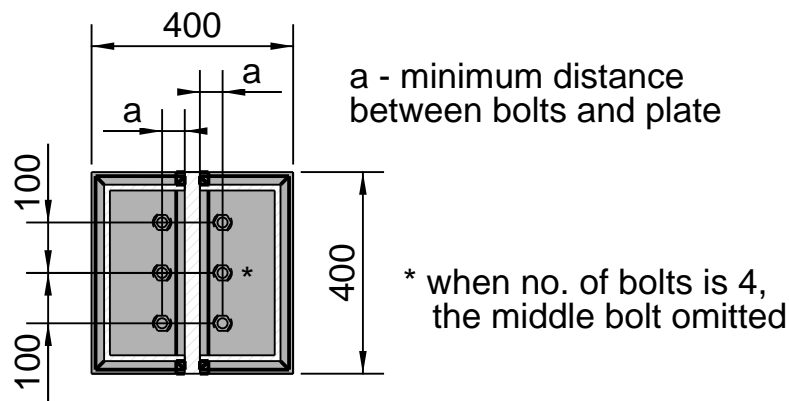
Member element - Front view
Branch p
Scale 1:15



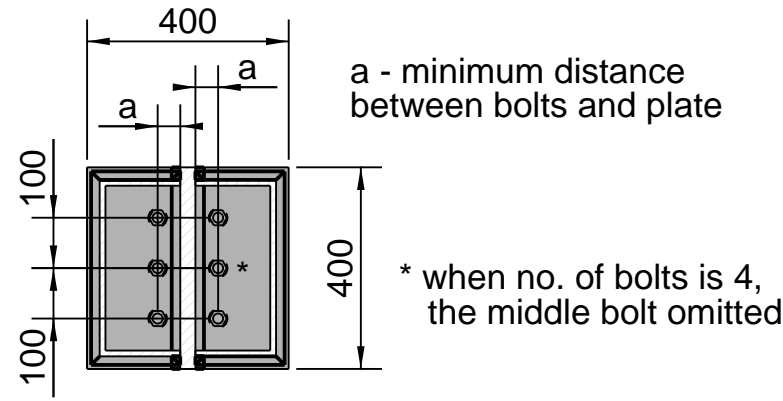
Member element - Front view
Branch r
Scale 1:15



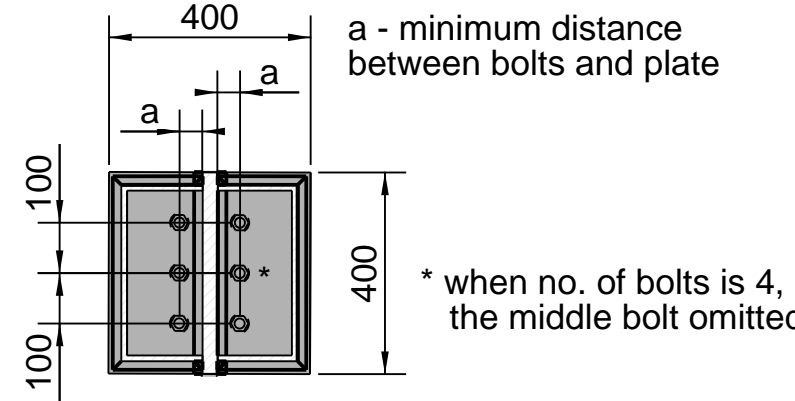
Member element - Front view
Branch s
Scale 1:15



Section 2-2
Scale 1:15



Section 4-4
Scale 1:15



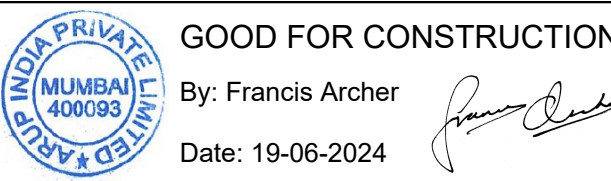
Section 5-5
Scale 1:15

SECTION ID		
BRANCH TYPE	350X350 SHS WALL THICKNESS	HEAVY OR LIGHT GAUGE END FIXTURES
s, r, or p	8 L	
s, r, or p	8 H	
s, r, or p	11.5 L	
s, r, or p	11.5 H	
s, r, or p	16 L	
s, r, or p	16 H	

							TENSION SUFFIX														
							T400			T800			T1200			T2000			T2400		
section wall thickness	7 connection plate	10 connection plate weld	1 stiffener plate	2 stiffener weld	3 stiffener length	4 end palte weld	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia
mm	mm	mm	mm	mm	mm	mm	mm			mm			mm			mm			mm		
8	20	12	20	12	200	12	20	4	20	30	6	20	30	6	24	Not applicable			Not applicable		
8	24	*18/12	24	12	300	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
11.5	30	12	30	12	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
11.5	36	12	36	16	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
16	40	12	40	16	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
16	50	12	50	16	500	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36

* For the Sections noted below 18mm weld is to be used. For the rest 12mm weld is sufficient

Tree	Member ID	Section ID + Suffix
C1	C1-N-p	p-8-H-T2000
	C1-N-n	n-8-H-T2000
	C1-W-p	p-8-H-T2000
C3	C3-E-p	p-8-H-T2000
	C3-S-n	n-8-H-T2400
	C3-S-p	p-8-H-T2000
B2	B2-W-q	q-8-H-T2000
	B2-S-q	q-8-H-T2000



02	19/06/24	Good For Construction
01	03/10/23	Good For Construction
Issue	Date	

ARUP

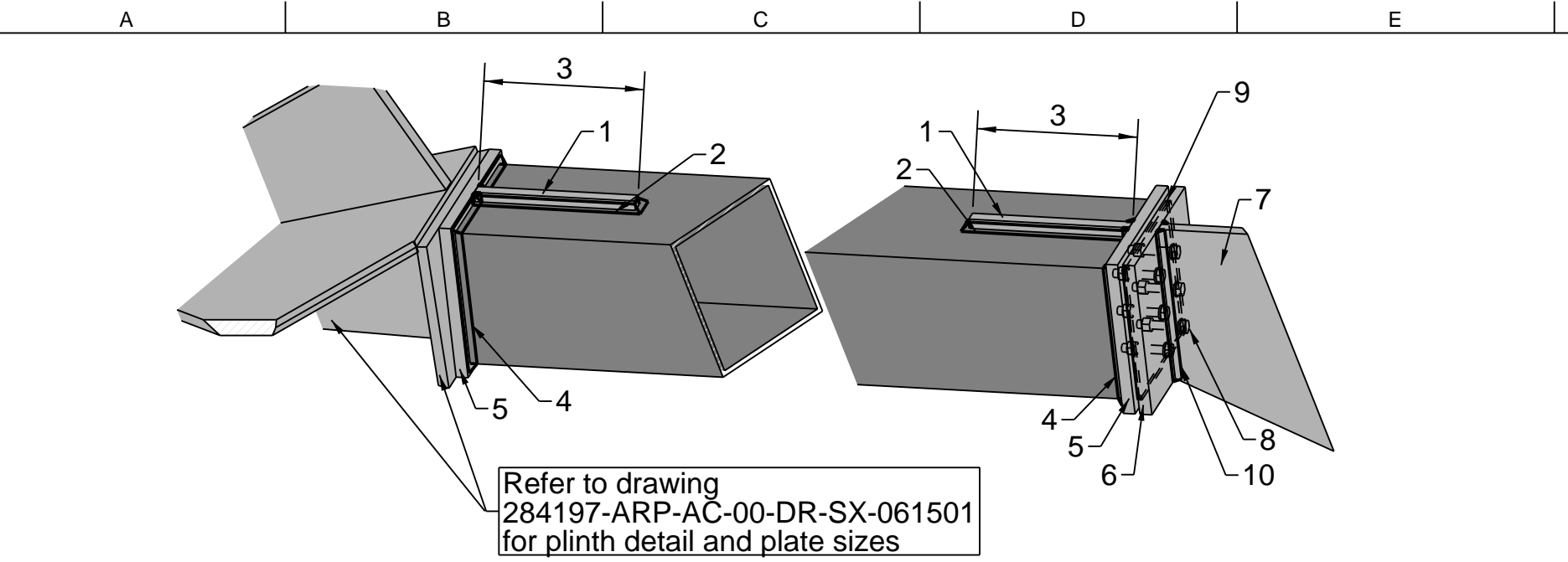
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

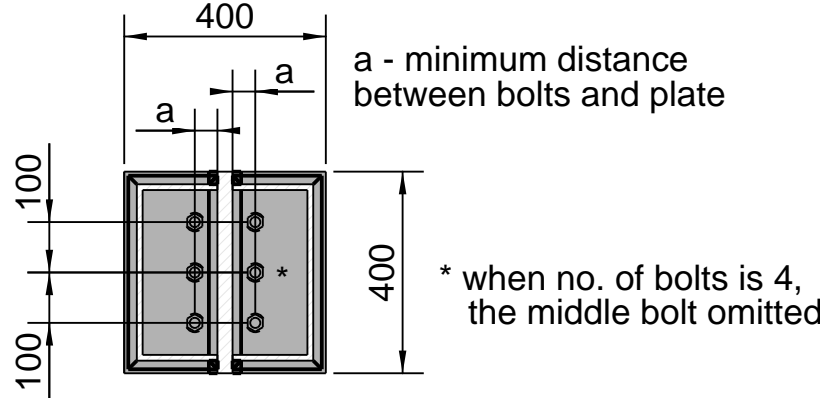
Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Section IDs and properties
for branch types p, r or s

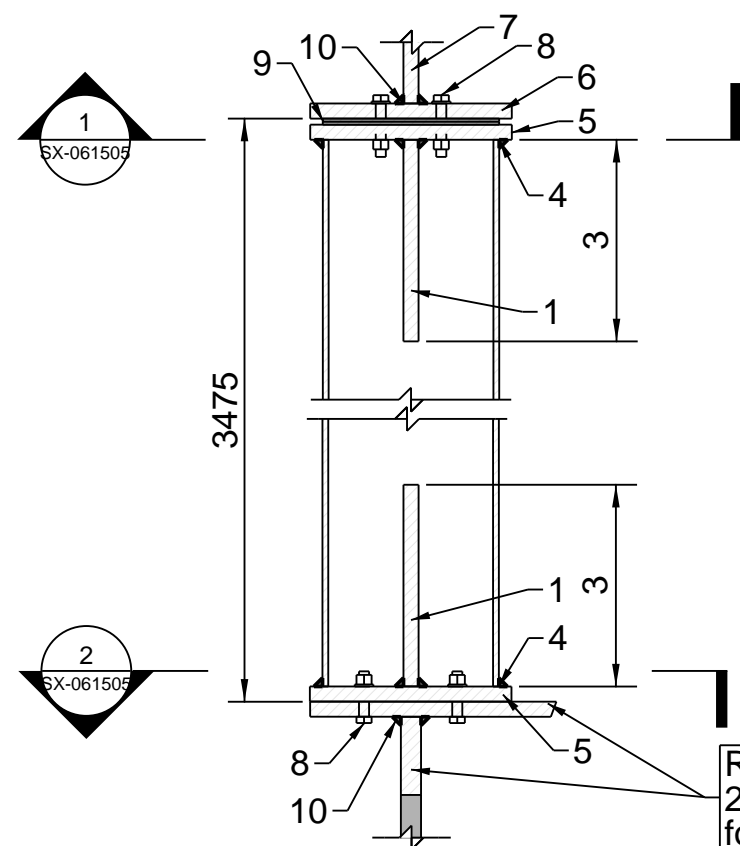
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Role	Structural	Status	S4 - Submission
Arup Job No	284197	Rev	02
ID	284197-ARP-AC-ZZ-DR-SX-061504		



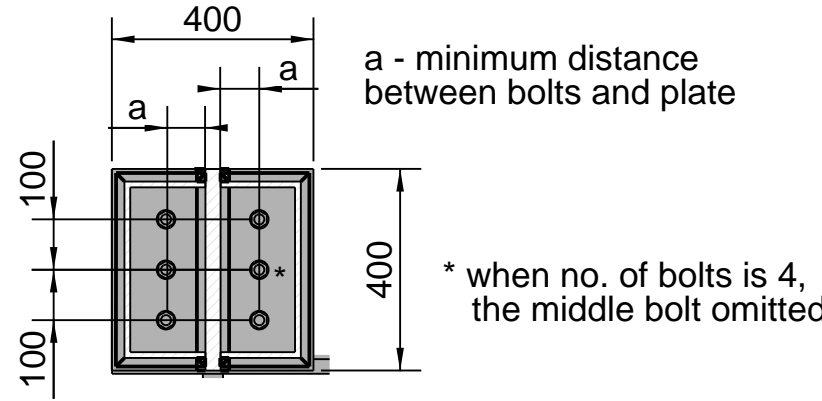
Member element - 3D view
Branch k



Section 1-1
Scale 1:15



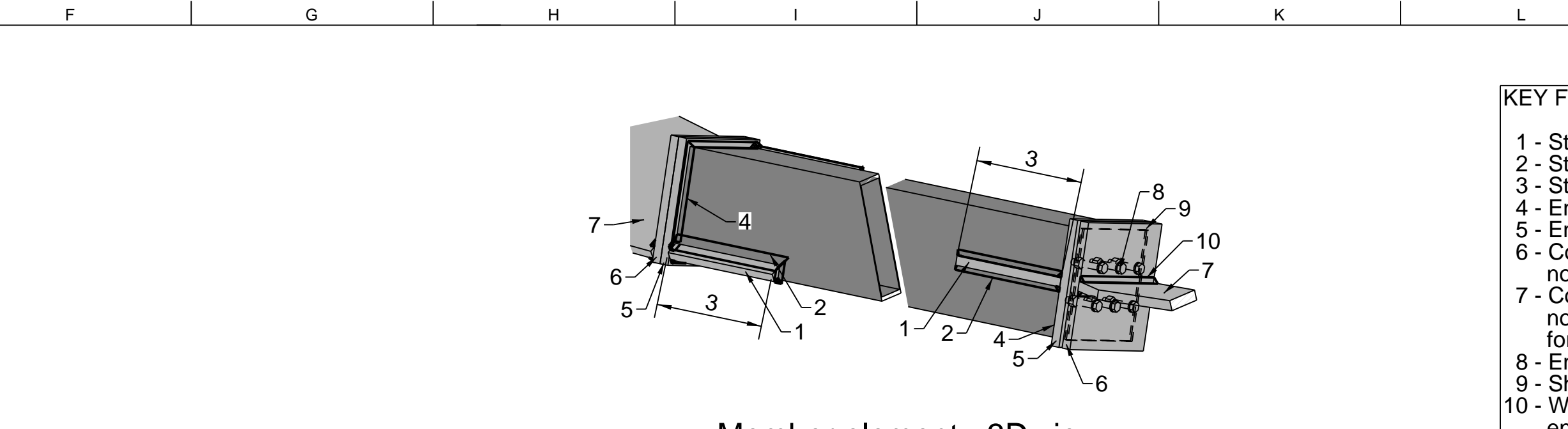
Member element - Front view
Branch k



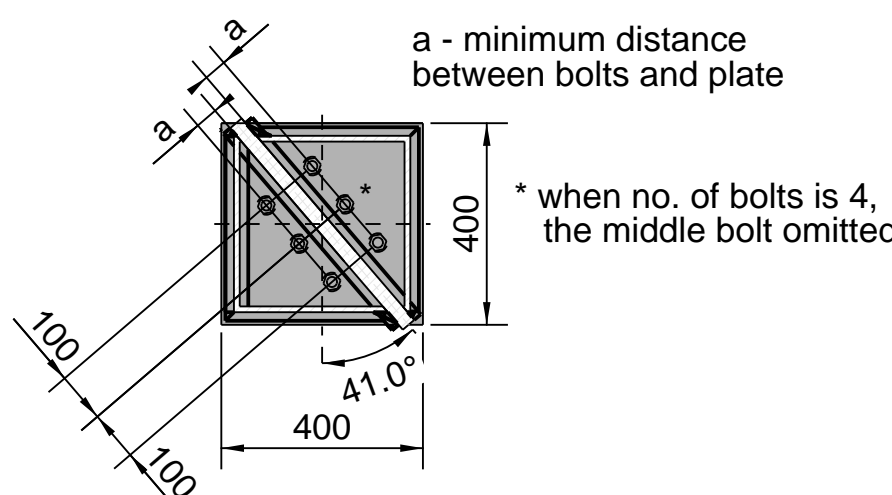
Section 2-2
Scale 1:15

SECTION ID		
BRANCH TYPE	350X350 SHS WALL THICKNESS	HEAVY OR LIGHT GAUGE END FIXTURES
k, or q	8 L	
k, or q	8 H	
k, or q	11.5 L	
k, or q	11.5 H	
k, or q	16 L	
k, or q	16 H	

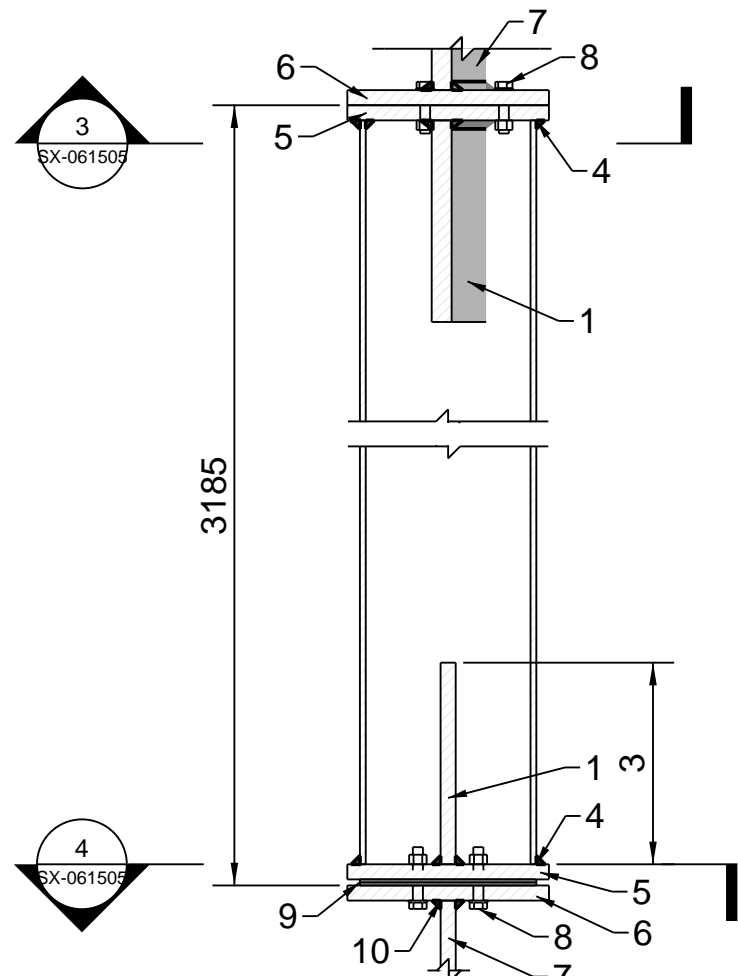
k, or q	8 L
k, or q	8 H
k, or q	11.5 L
k, or q	11.5 H
k, or q	16 L
k, or q	16 H



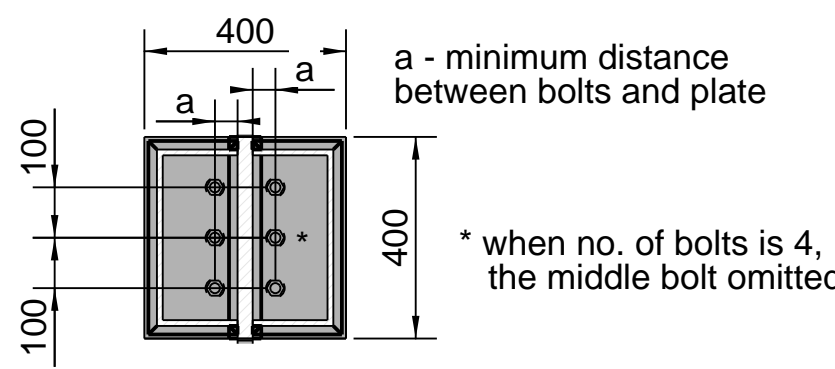
Member element - 3D view
Branch q



Section 3-3
Scale 1:15



Member element - Front view
Branch q



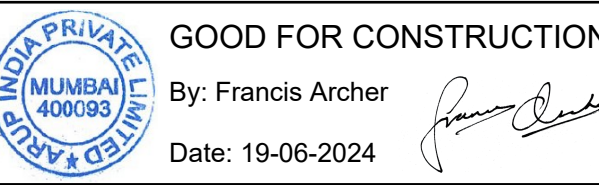
Section 4-4
Scale 1:15

KEY FOR NODE ELEMENTS:

- 1 - Stiffener plate thickness
- 2 - Stiffener weld
- 3 - Stiffener plate length
- 4 - End plate weld
- 5 - End plate to SHS
- 6 - Connecting end plate (belongs to the connecting node fabrication or beam fabrication)
- 7 - Connection plate (belongs to the connecting node fabrication or beam fabrication). See tekla model for the precise shape of these plates
- 8 - End plate bolts (diameter and number)
- 9 - Shim plates for fitting tolerance, 2x 6mm
- 10 - Weld between connection plate (7) and connecting end plate (6)

Notes:

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02	19/06/24	Good For Construction
01	03/10/23	Good For Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Section IDs and properties
for branch types k or q

Scale at A1	1:15	By/Chkd/Appd PB/EB/FA&FB
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 02
ID	284197-ARP-AC-ZZ-DR-SX-061505	

* For the Sections noted below
18mm weld is to be used. For the
rest 12mm weld is sufficient

Tree	Member ID	Section ID + Suffix
C1	C1-N-p	p-8-H-T2000
	C1-N-n	n-8-H-T2000
	C1-W-p	p-8-H-T2000
C3	C3-E-p	p-8-H-T2000
	C3-S-n	n-8-H-T2400
	C3-S-p	p-8-H-T2000
B2	B2-W-q	q-8-H-T2000
	B2-S-q	q-8-H-T2000

							TENSION SUFFIX														
							T400			T800			T1200			T2000			T2400		
section wall thickness	7 connection plate	10 connection plate weld	1 stiffener plate	2 stiffener weld	3 stiffener length	4 end palte weld	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia	5 and 6 end plate	8 no. of bolts	8 grade 10.9 bolts dia
mm	mm	mm	mm	mm	mm	mm	mm			mm			mm			mm			mm		
8	20	12	20	12	200	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
8	24	*18/12	24	12	300	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
11.5	30	12	30	12	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
11.5	36	12	36	16	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
16	40	12	40	16	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
16	50	12	50	16	500	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36



- 1 - Stiffener plate thickness
- 2 - Stiffener weld
- 3 - Stiffener plate length
- 4 - End plate weld
- 5 - End plate to SHS
- 6 - Connecting end plate (belongs to the connecting node fabrication or beam fabrication)
- 7 - Connection plate (belongs to the connecting node fabrication or beam fabrication). See tekla model for the precise shape of these plates
- 8 - End plate bolts (diameter and number)
- 9 - Shim plates for fitting tolerance, 2x 6mm
- 10 - Weld between connection plate (7) and connecting end plate (6)

- Foundation design by others (specialist sub-contractor), Arup's design responsibility stops at the super structure and does not include foundation design.
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284197-ARP-ZZ-ZZ-ARP-ZX-000005.
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02	19/06/24	Good For Construction
01	03/10/23	Good For Construction
Issue	Date	

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title	Client	Start Date	End Date	Status
Innovative Design of Modular Railway Station Components in Brownfield Projects	Safdarjung Station	2023-01-15	2023-06-30	Completed

Drawing Title

Details

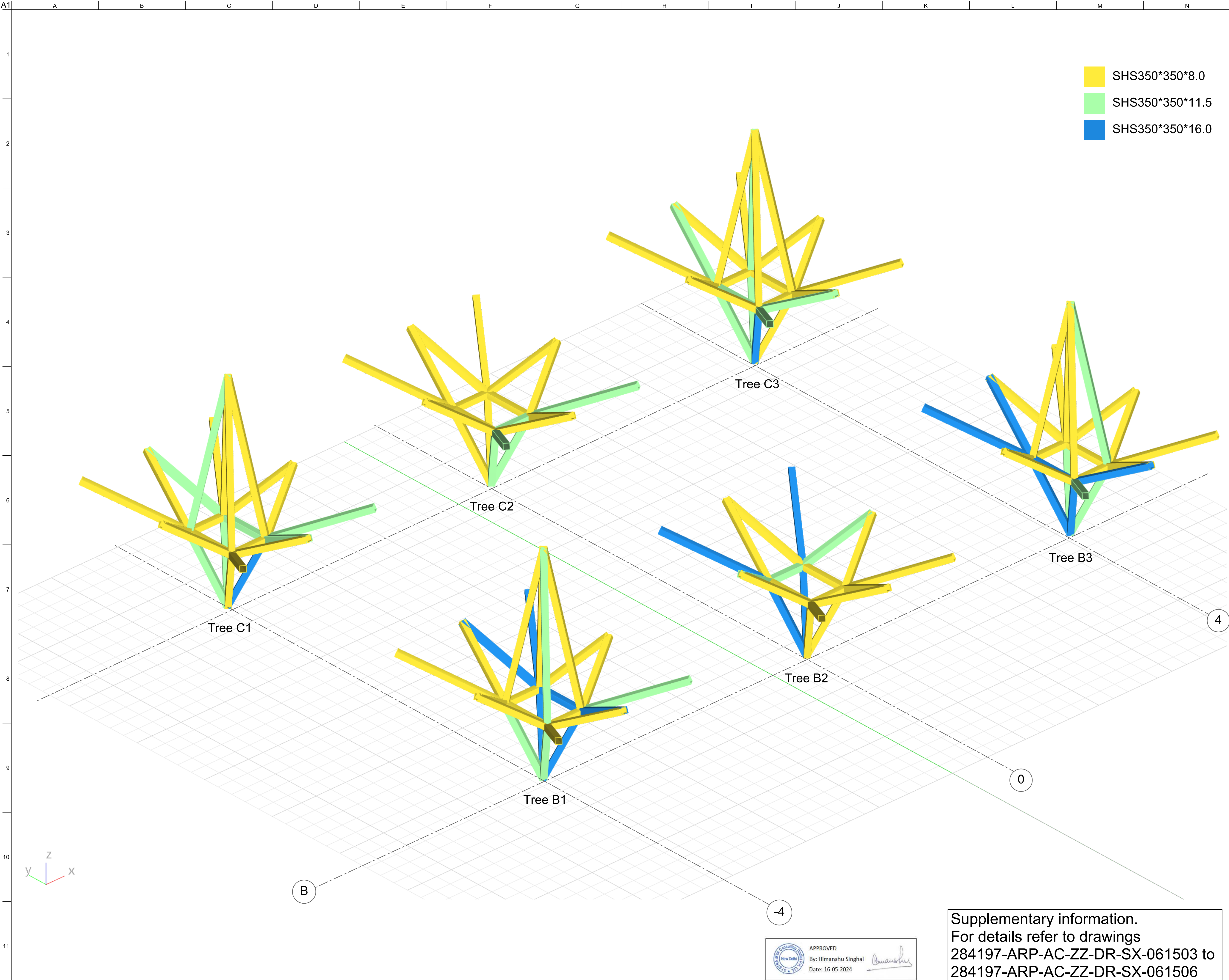
Section IDs and properties
for branch types m or n

Scale at A1	1:15	By/Ckcd/Appd PB/EB/FA&FB
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 02
ID	284197-ARP-AC-ZZ-DR-SX-061506	

section wall thickness	7	10	1	2	3	4	5 and 6	8	8	5 and 6	8	8	5 and 6	8	8	5 and 6	8	8	5 and 6	8	8
connection plate	connection plate weld	stiffener plate	stiffener weld	stiffener length	end palte weld	end plate	no. of bolts	grade 10.9 bolts dia	end plate	no. of bolts	grade 10.9 bolts dia	end plate	no. of bolts	grade 10.9 bolts dia	end plate	no. of bolts	grade 10.9 bolts dia	end plate	no. of bolts	grade 10.9 bolts dia	
mm	mm	mm	mm	mm	mm	mm	mm			mm			mm			mm			mm		
8	20	12	20	12	200	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
8	24	12	24	12	300	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
11.5	30	12	30	12	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
11.5	36	12	36	16	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
16	40	12	40	16	400	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36
16	50	12	50	16	500	12	20	4	20	30	6	20	30	6	24	40	6	30	40	6	36

* For the Sections noted below
18mm weld is to be used. For the
rest 12mm weld is sufficient

Tree	Member ID	Section ID + Suffix
C1	C1-N-p	p-8-H-T2000
	C1-N-n	n-8-H-T2000
	C1-W-p	p-8-H-T2000
C3	C3-E-p	p-8-H-T2000
	C3-S-n	n-8-H-T2400
	C3-S-p	p-8-H-T2000
B2	B2-W-q	q-8-H-T2000
	B2-S-q	q-8-H-T2000



- SHS350*350*8.0
- SHS350*350*11.5
- SHS350*350*16.0

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GOOD FOR CONSTRUCTION
By: Francis Archer
Date: 03-10-2023



01	03/10/23	Good for Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details;
Tree Columns Section sizes mark-up

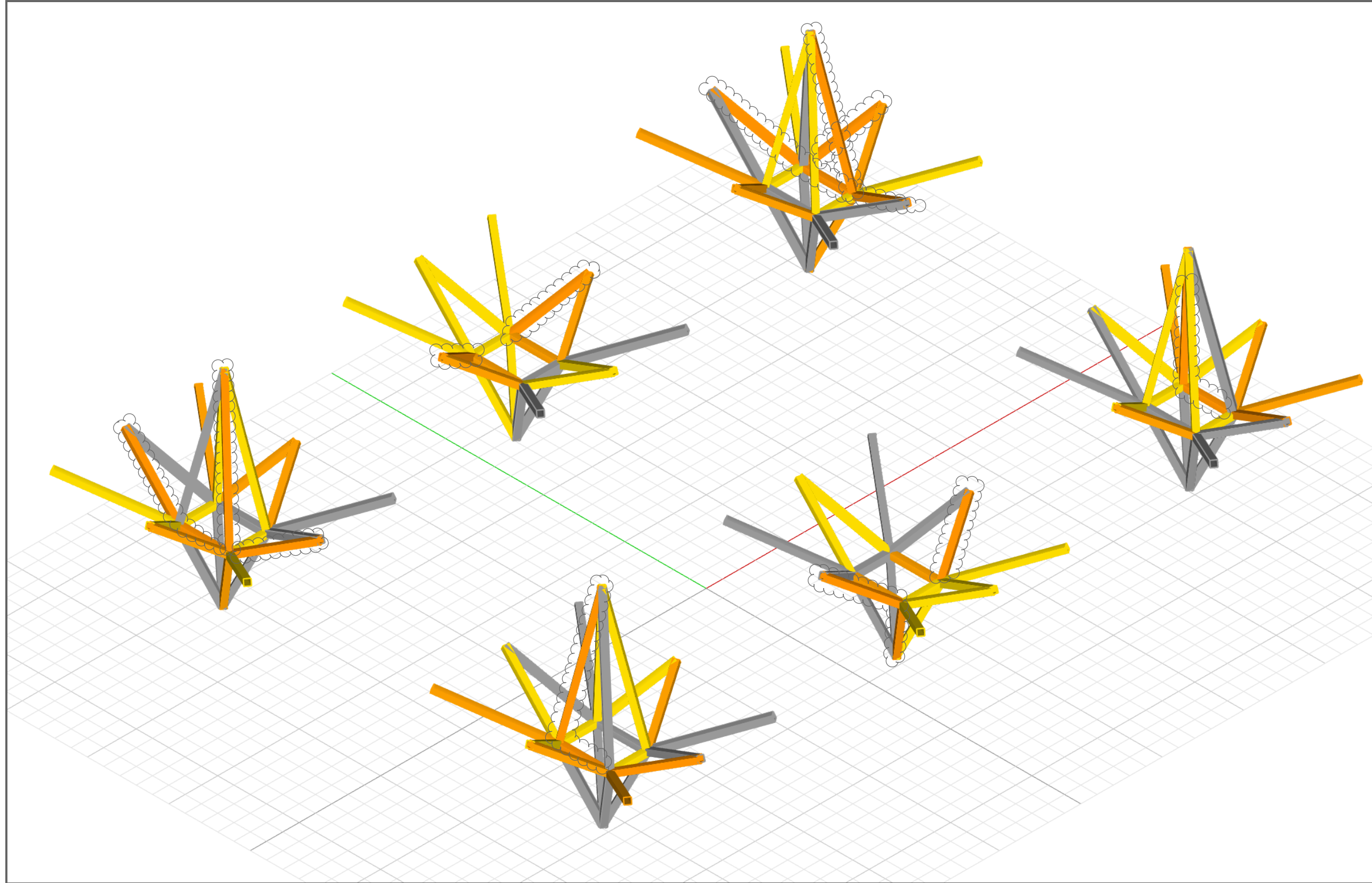
Scale at A1	NTS	By/Chkd/Appd	EB/FA/FA
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	01
ID	284197-ARP-AC-ZZ-DR-SX-061507		

Supplementary information.
For details refer to drawings
284197-ARP-AC-ZZ-DR-SX-061503 to
284197-ARP-AC-ZZ-DR-SX-061506

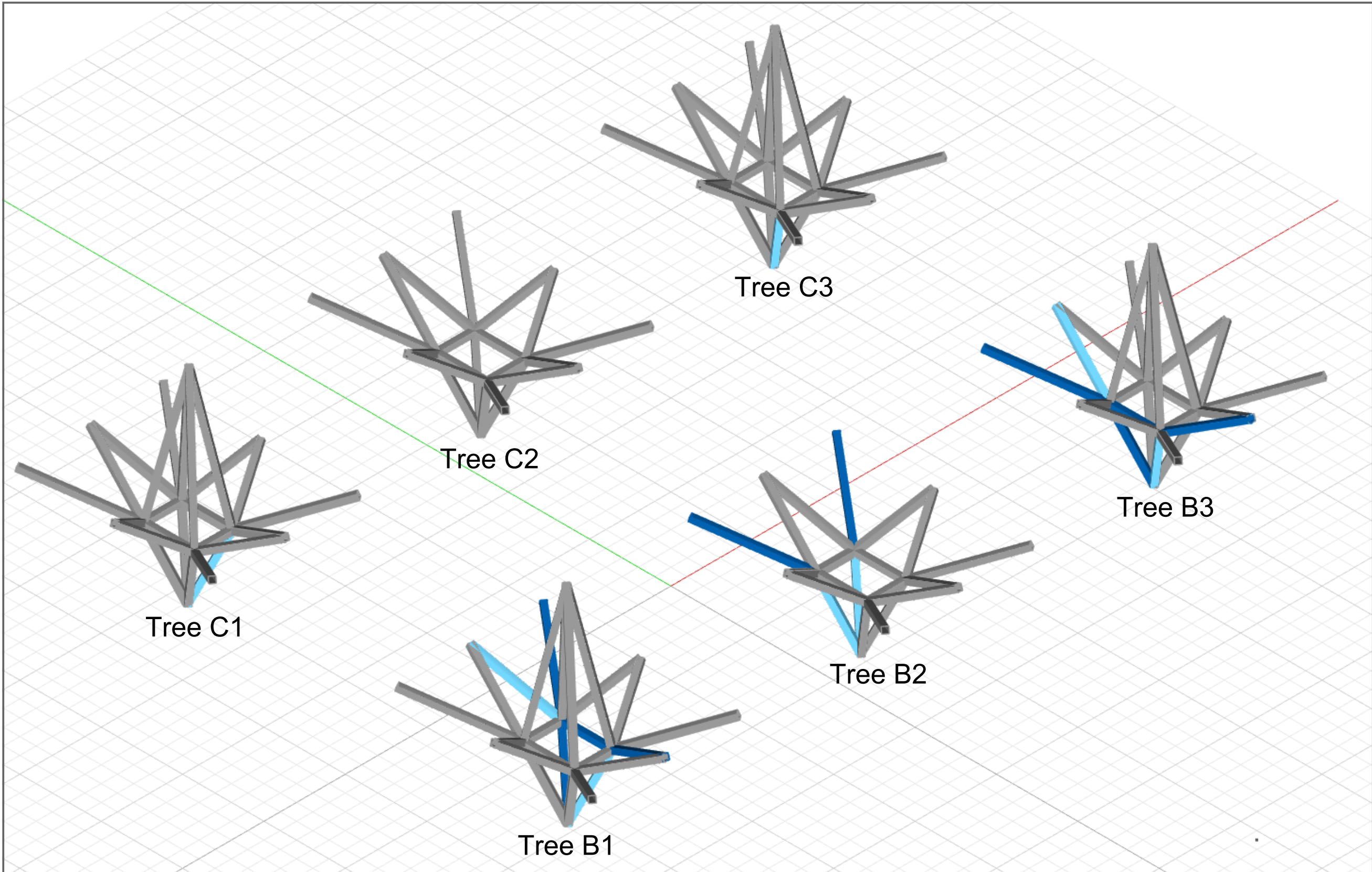


APPROVED
By: Himanshu Singhal
Date: 16-05-2024

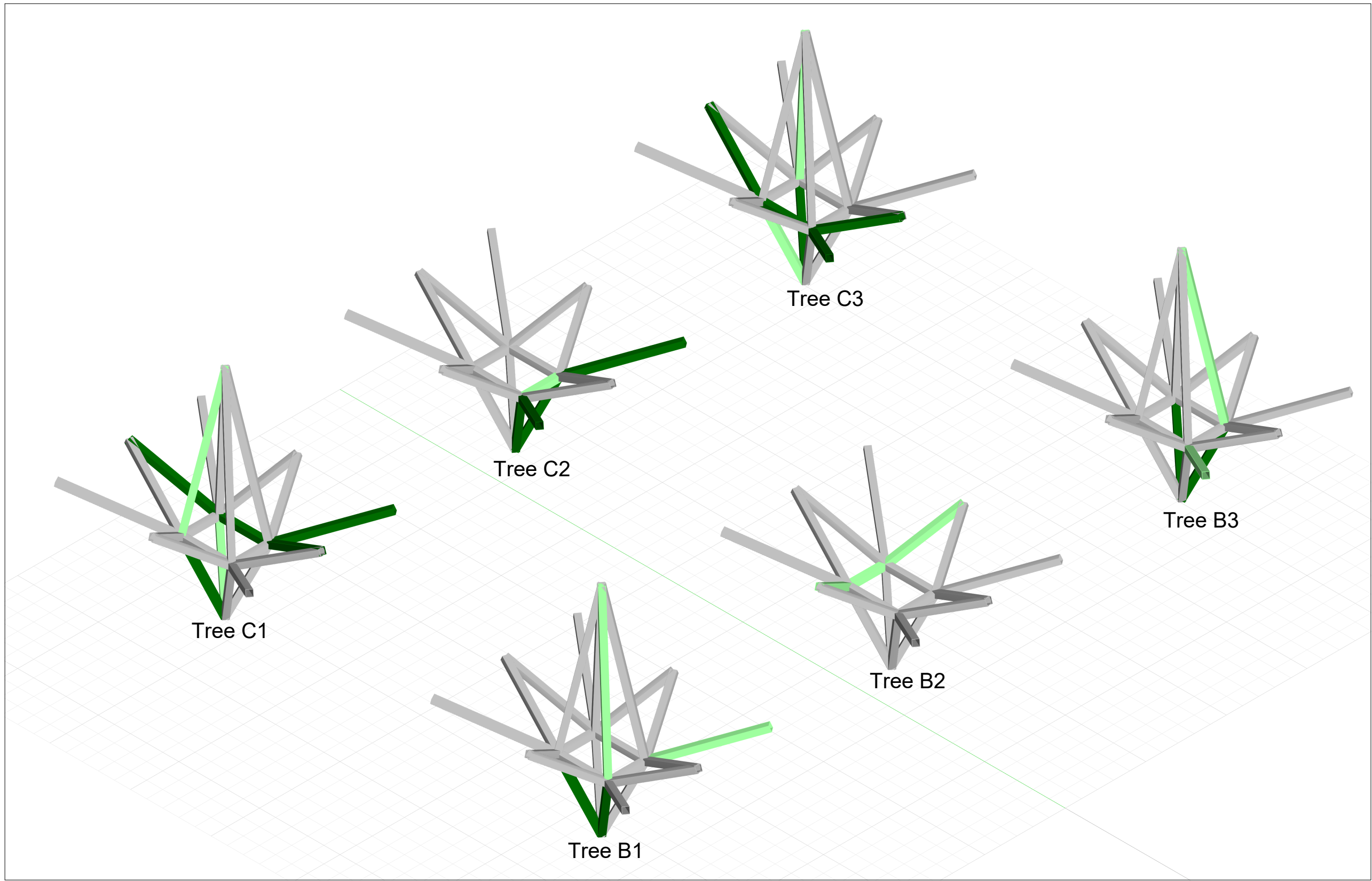




Tree Members SHS 350*350*8
Light
Heavy



Tree Members SHS 350*350*16
Light
Heavy



Tree Members SHS 350*350*11.5
Light
Heavy

- Notes:
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INDIA PRIVATE
MUMBAI
400005
APPROVED

GOOD FOR CONSTRUCTION
By: Francis Archer
Date: 26-04-2024

03	26/04/24	Good for Construction
02	19/12/23	Good for Construction
01	03/10/23	Good for Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

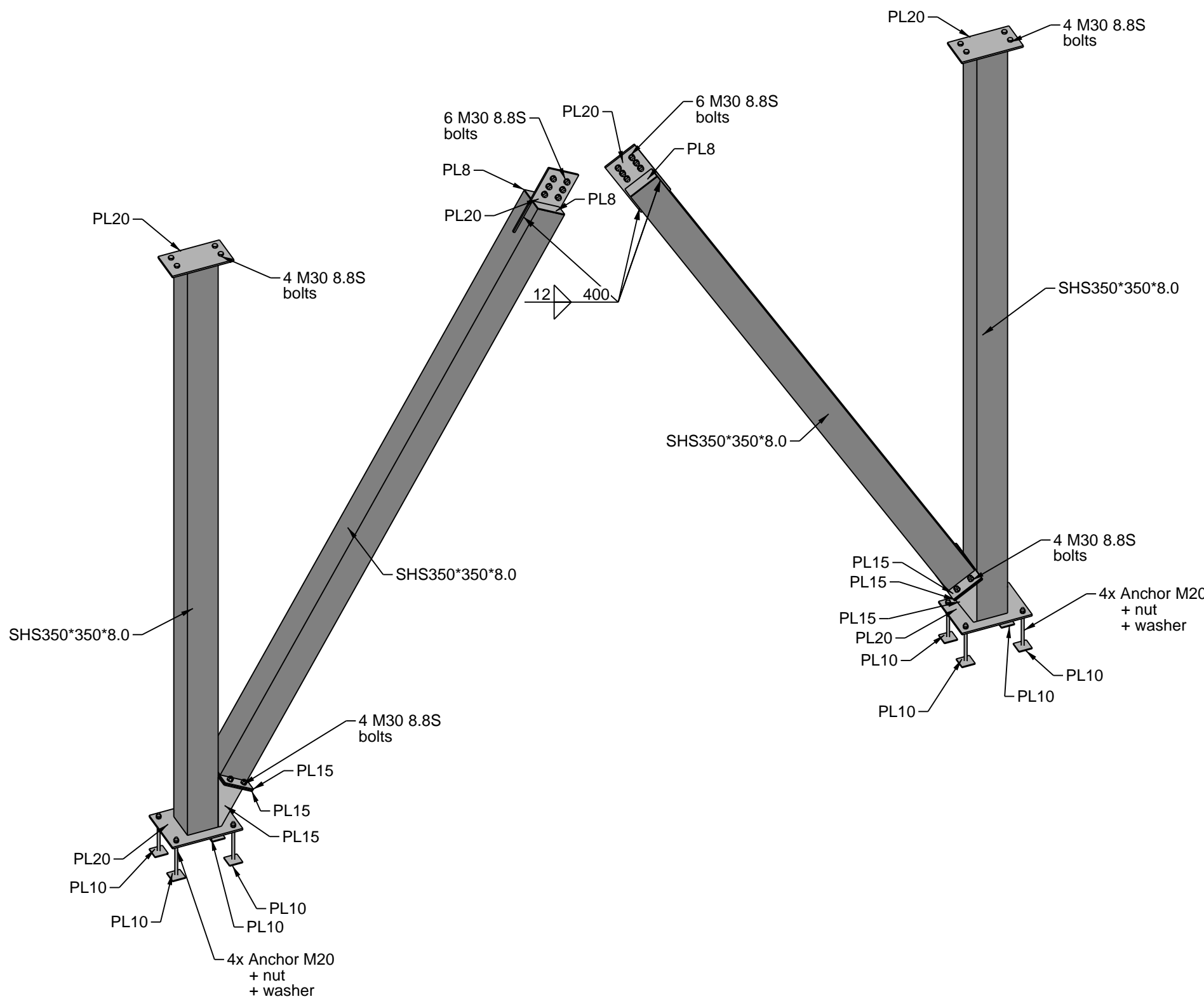
Drawing Title
Details;
Tree Columns Section sizes mark-up
Heavy vs light sections

Scale at A1	NTS	By/Chkd/Appd EB/FA/FA
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 03
ID	284197-ARP-AC-ZZ-DR-SX-061508	

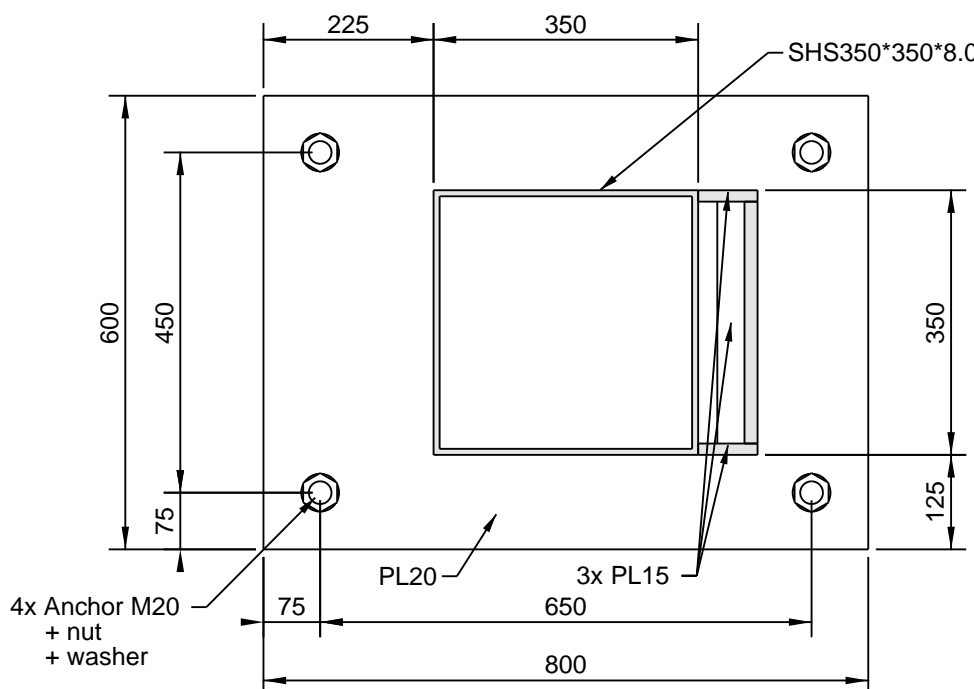
NEW DELHI
APPROVED

APPROVED
By: Himanshu Singhal
Date: 03-07-2024

Supplementary information.
For details refer to drawings
284197-ARP-AC-ZZ-DR-SX-061503 to
284197-ARP-AC-ZZ-DR-SX-061506



Tree Column Type D
NTS



Base plate detail
NTS

Notes:

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INDIA PRIVATE LIMITED

MUMBAI 400033

GOOD FOR CONSTRUCTION

By: Francis Archer

Date: 13-08-2024

02	13/08/24	Good For Construction
01	09/02/24	Good For Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
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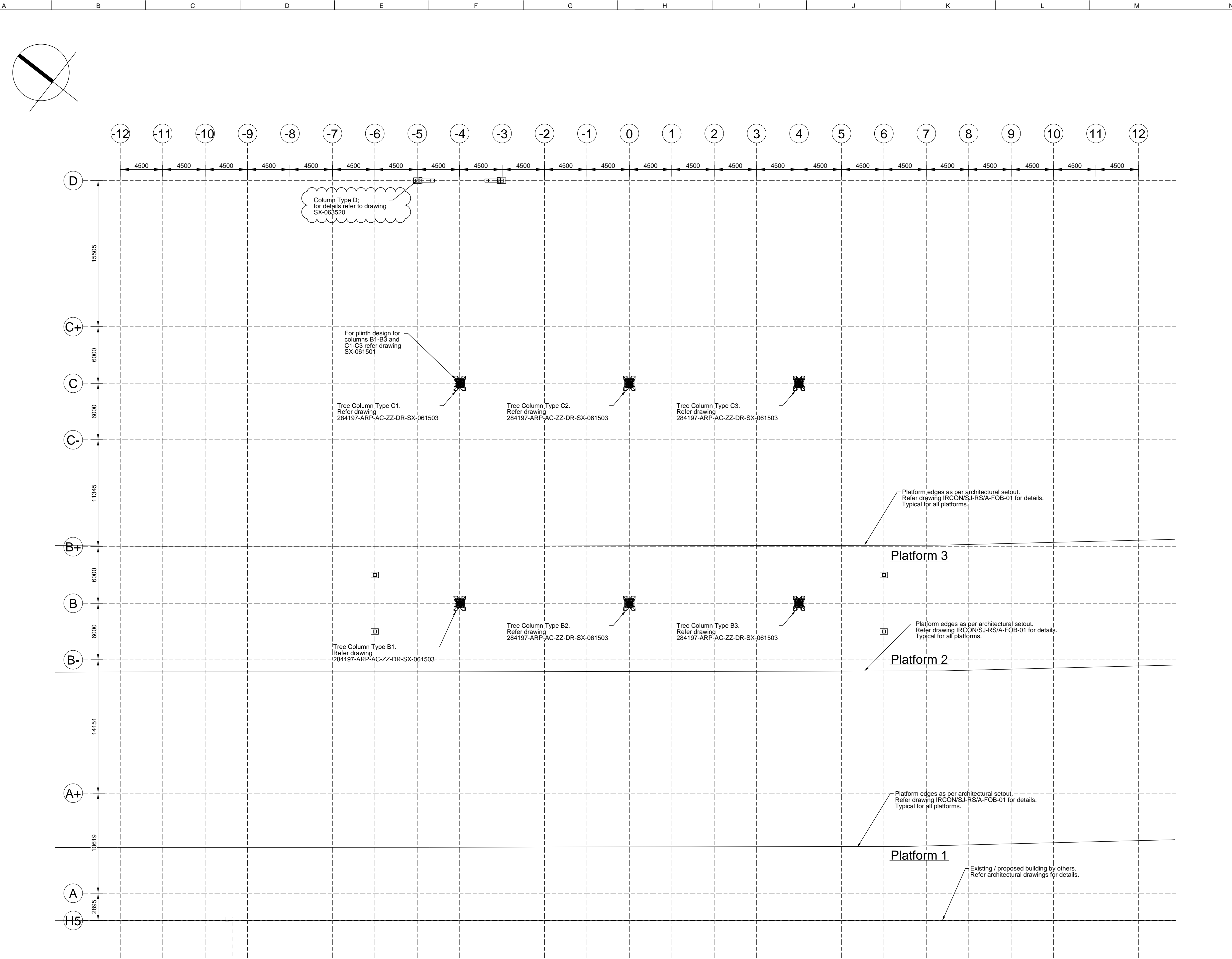
Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Tree Column Type D Details

Scale at A1	1:10 1:50	By/Chkd/Appd AR/EB/FA&FB
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 02
ID	284197-ARP-FB-ZZ-DR-SX-063520	

1
2
3
4
5
6
7
8
9
10
11



Plan at Platform Level
Scale 1:200

APPROVED
By: Himanshu Singhal
Date: 03-07-2024

- Notes:
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GOOD FOR CONSTRUCTION
By: Francis Archer
Date: 09-02-2024

02	09/02/24	Good For Construction
01	17/10/23	For Comments
Issue	Date	

ARUP

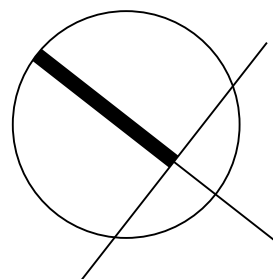
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
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Client
Rail Land Development Authority
Ministry of Railways

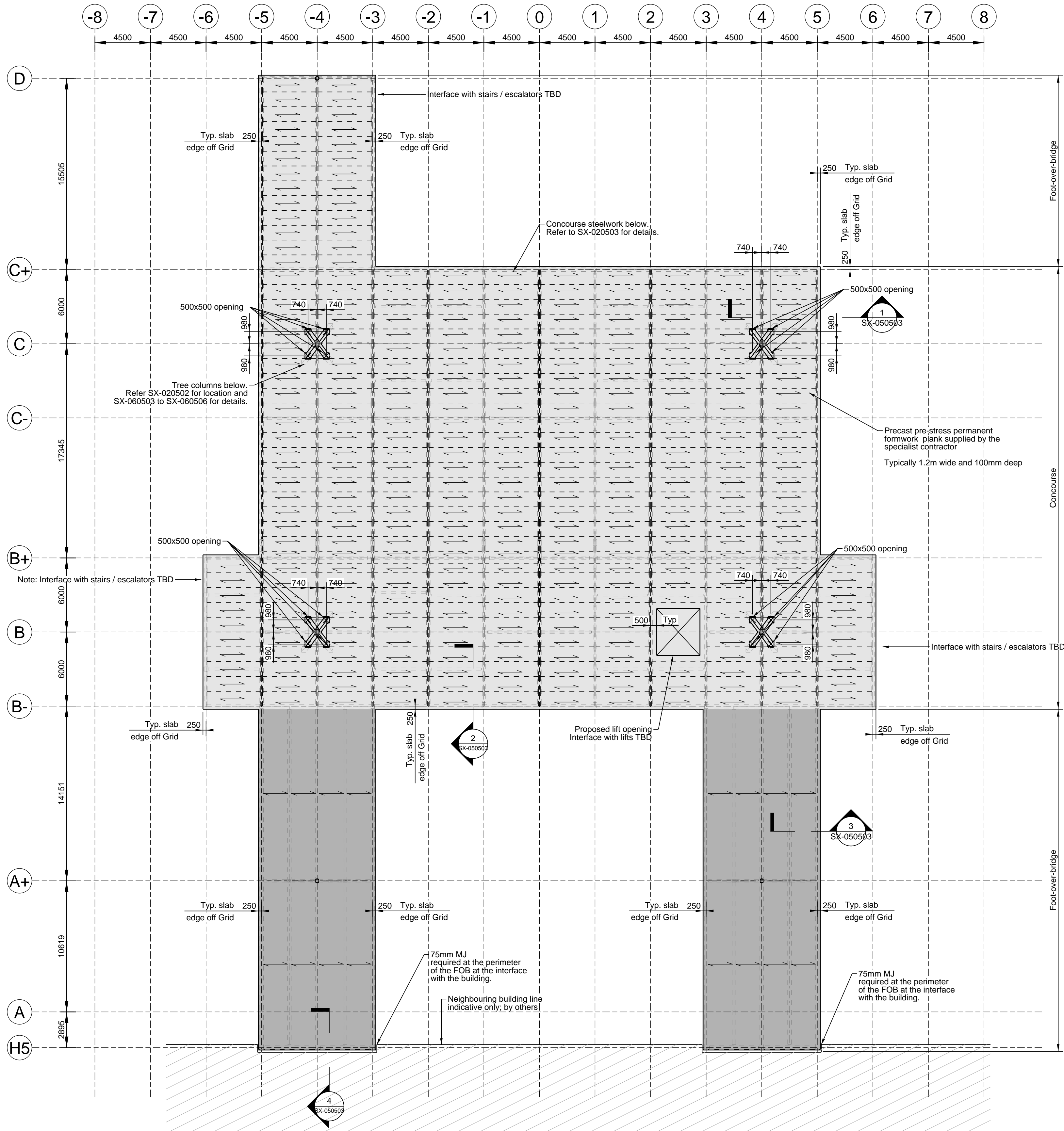
Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
General Arrangement
Plan at Platform Level

Scale at A1	1:200	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	02
ID	284197-ARP-ZZ-00-DR-SX-020501		



Note: Clear cover to reinforcement for deck slab = 25mm



Plan at +9.400 TOC
Scale 1:200



Precast pre-stress permanent form-work plank supplied by the specialist contractor; Typically 1.2m wide and 100mm deep

Metal deck Tata Comflor 60 (1.20 mm) or similar approved

Note: Denotes precast plank and metal deck span direction. All panels are spanning horizontally U.O.N.

- Notes:
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01	17/10/23	Good for Construction
Issue	Date	

ARUP

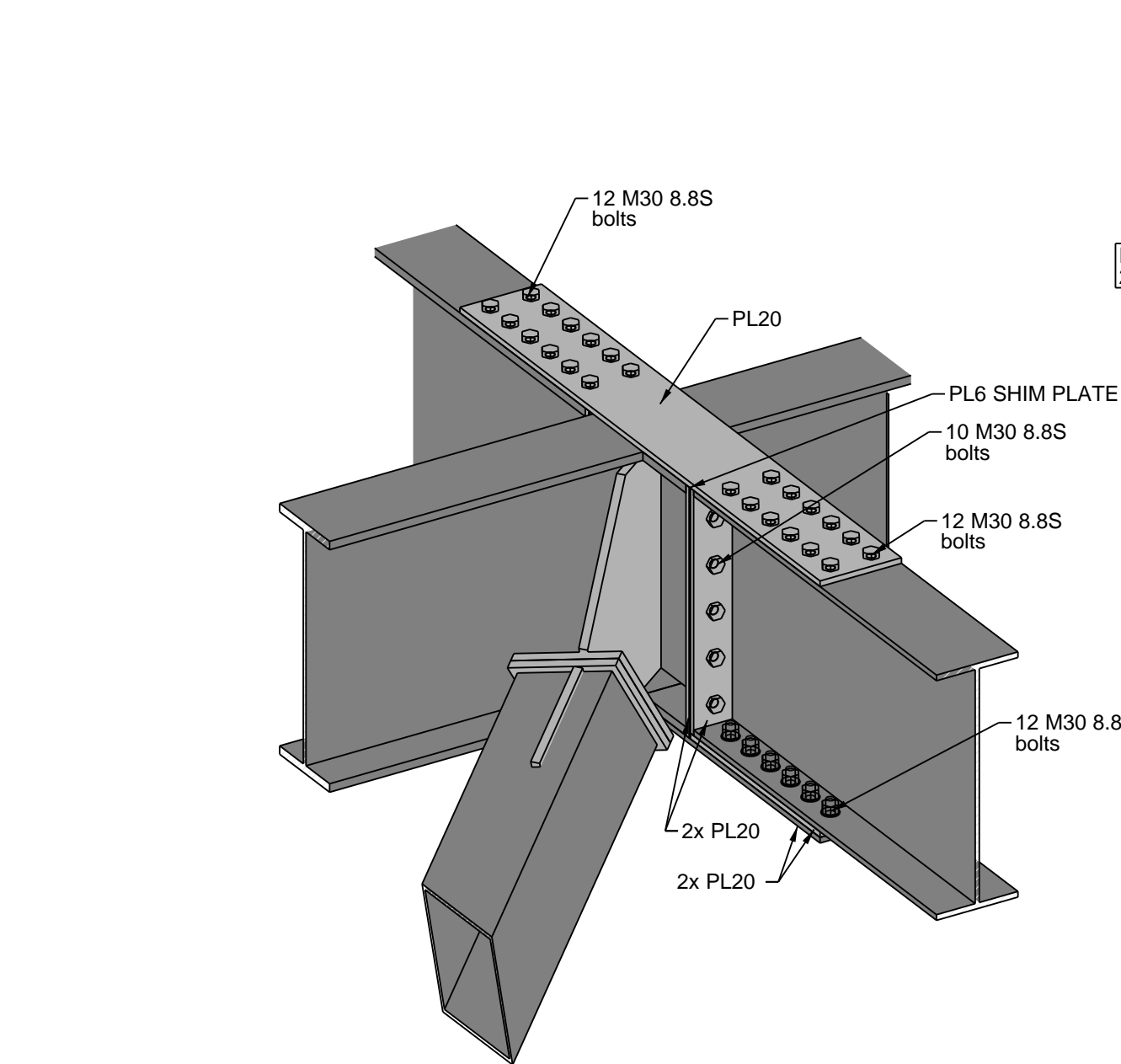
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

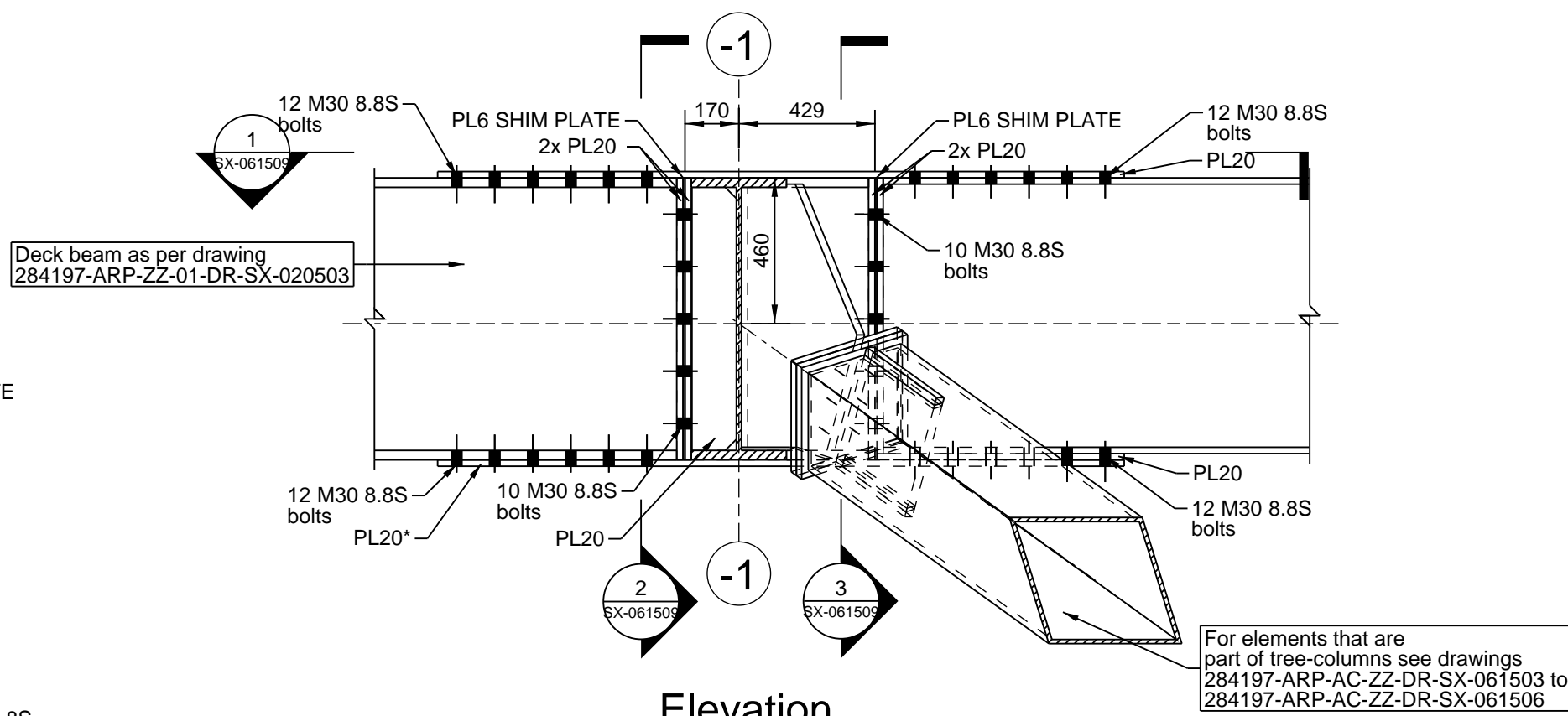
Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
General Arrangement
Concourse and Foot-over-bridges
Precast planks and deck layout

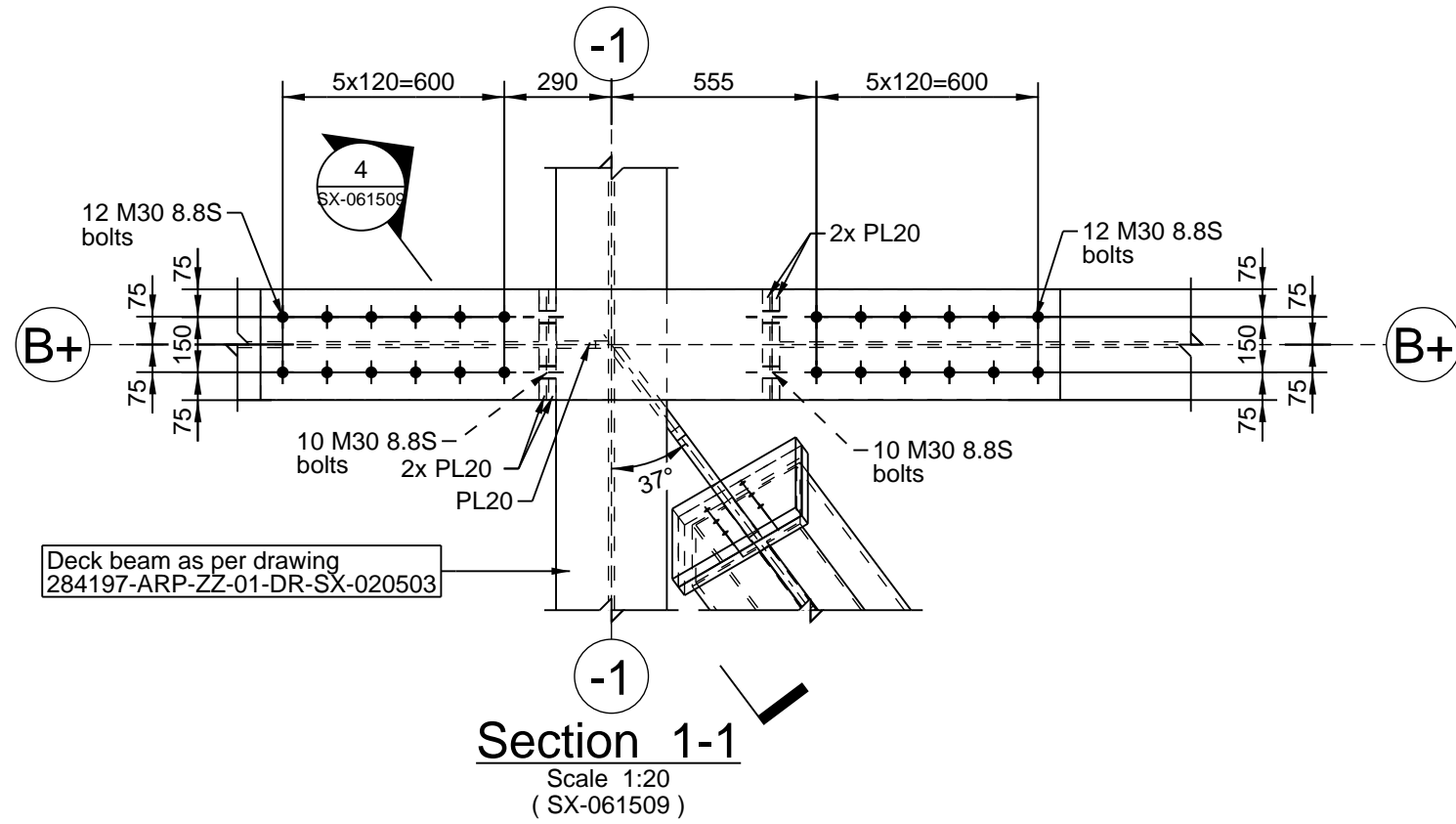
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Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	01
ID	284197-ARP-ZZ-01-DR-SX-020504		



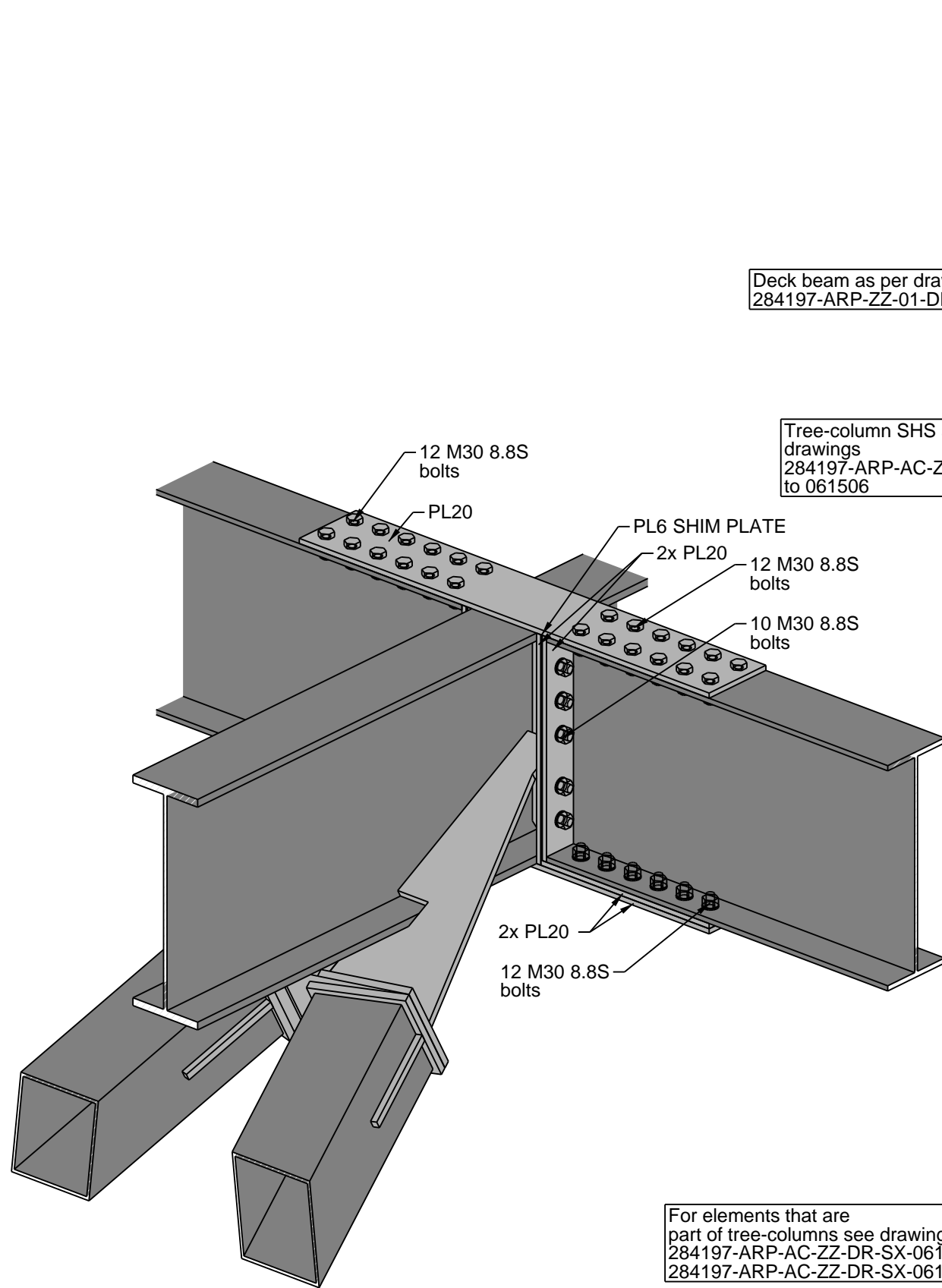
Deck Connection 1
NTS



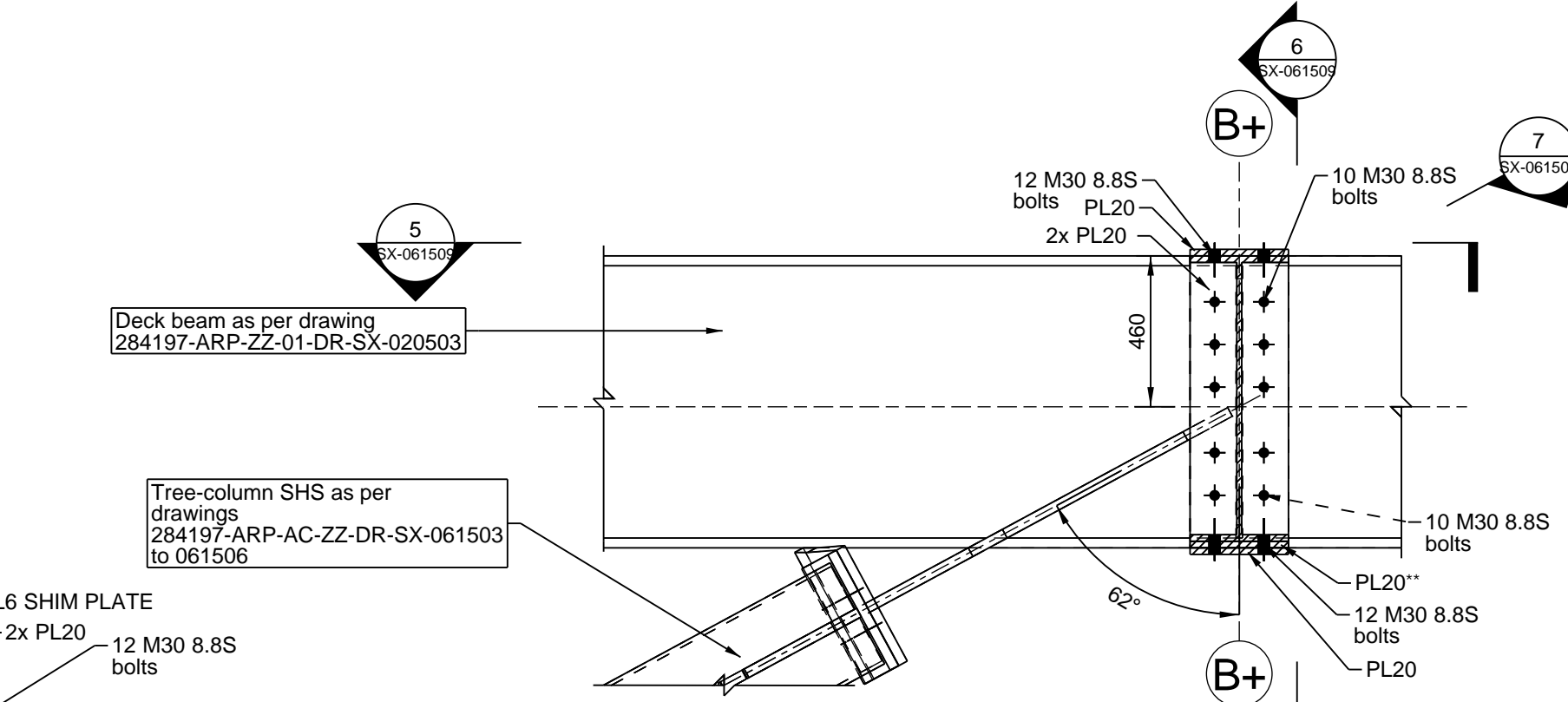
Elevation
Scale 1:20
(SX-061509)



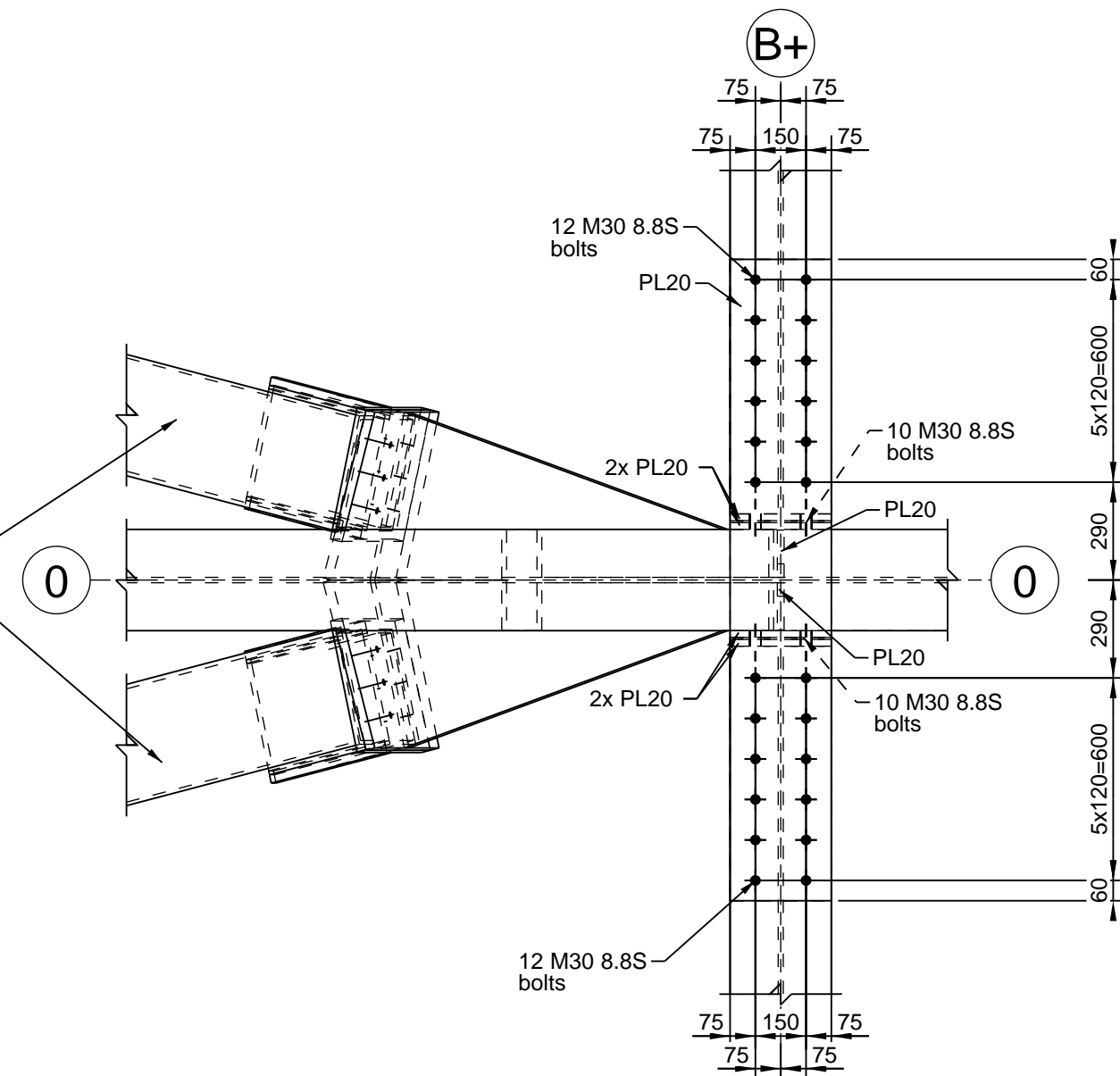
Section 1-1
Scale 1:20
(SX-061509)



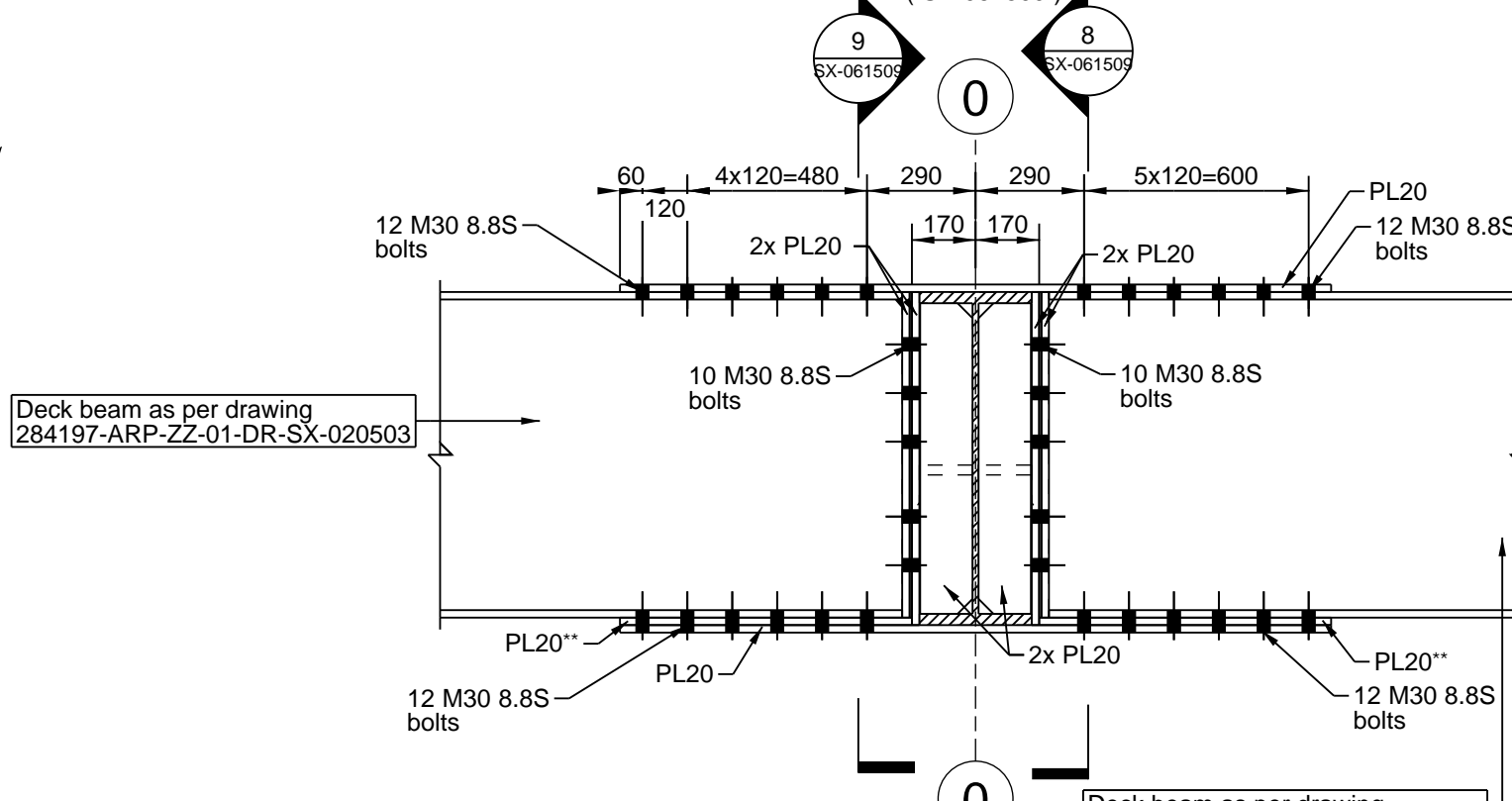
Deck Connection 2
NTS



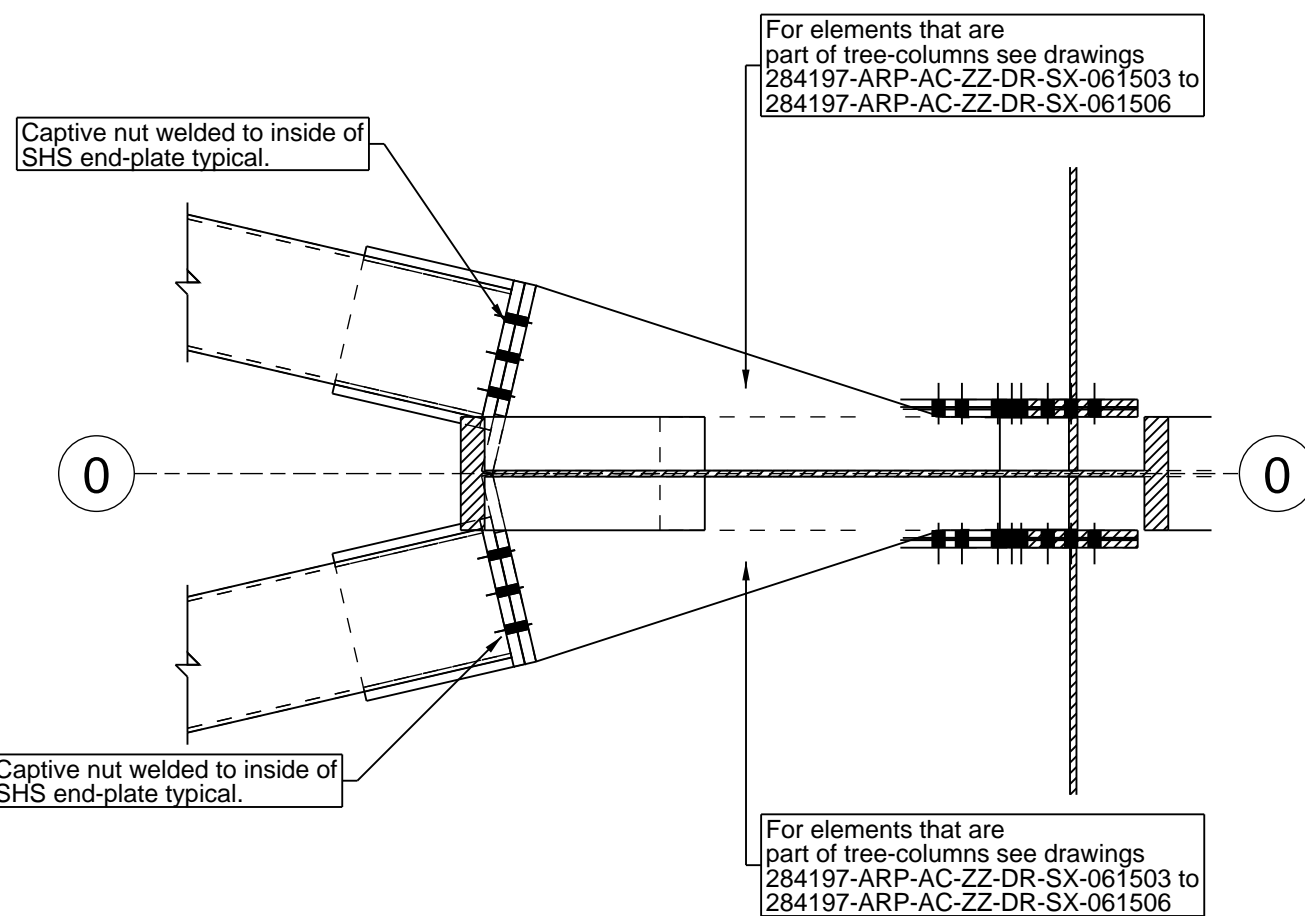
Elevation
Scale 1:20
(SX-061509)



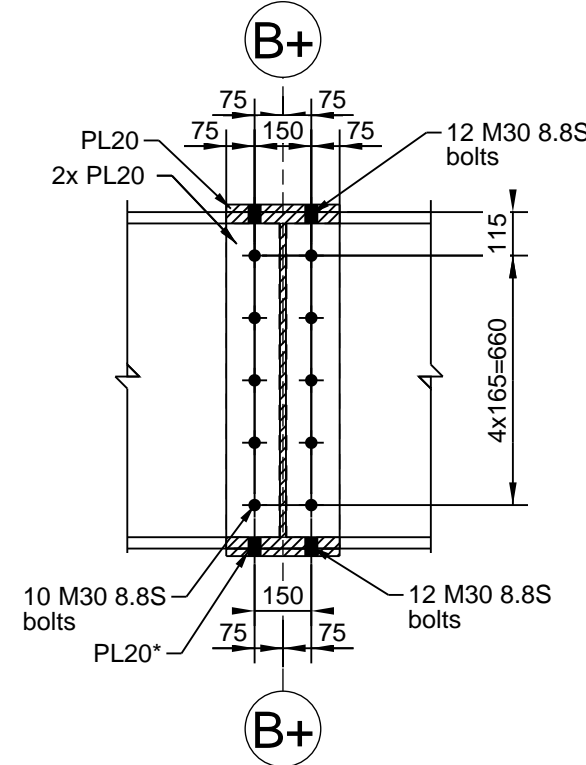
Section 5-5
Scale 1:20
(SX-061509)



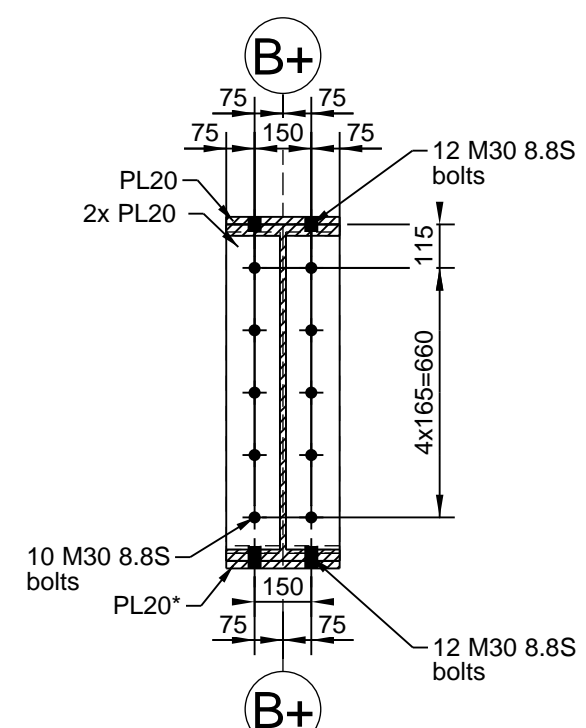
Section 6-6
Scale 1:20
(SX-061509)



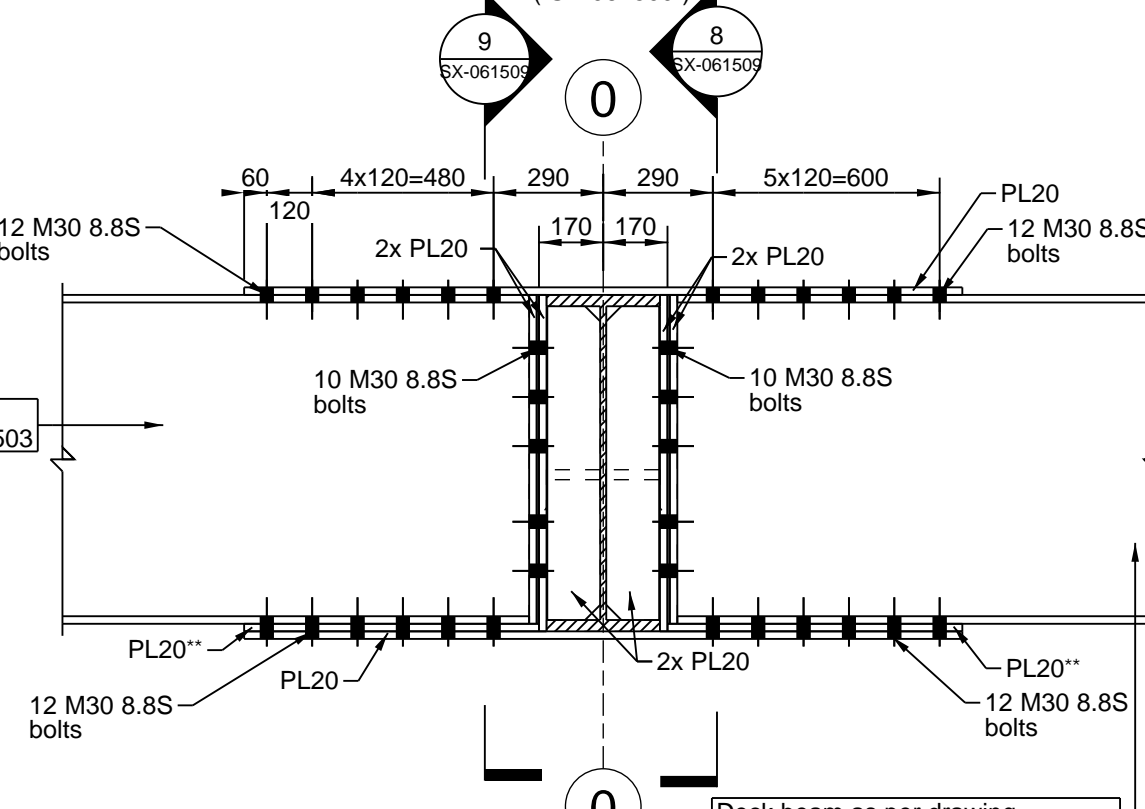
Section 7-7
Scale 1:20
(SX-061509)



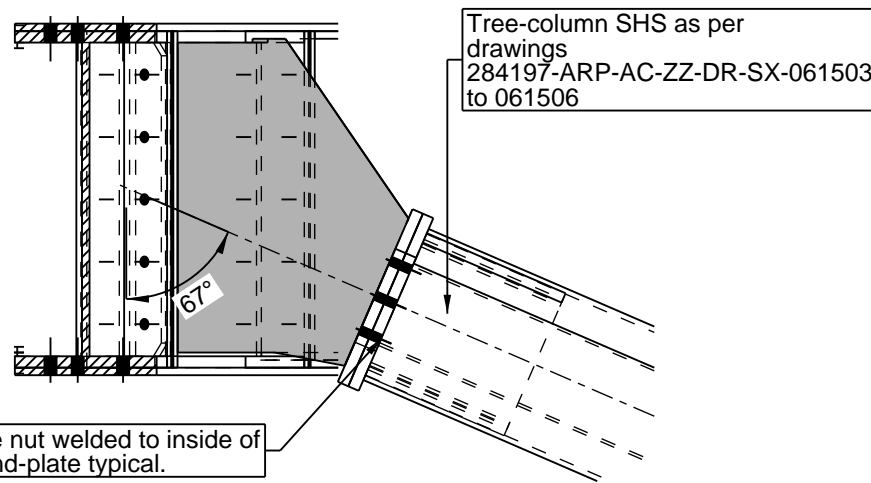
Section 2-2
Scale 1:20
(SX-061509)



Section 3-3
Scale 1:20
(SX-061509)

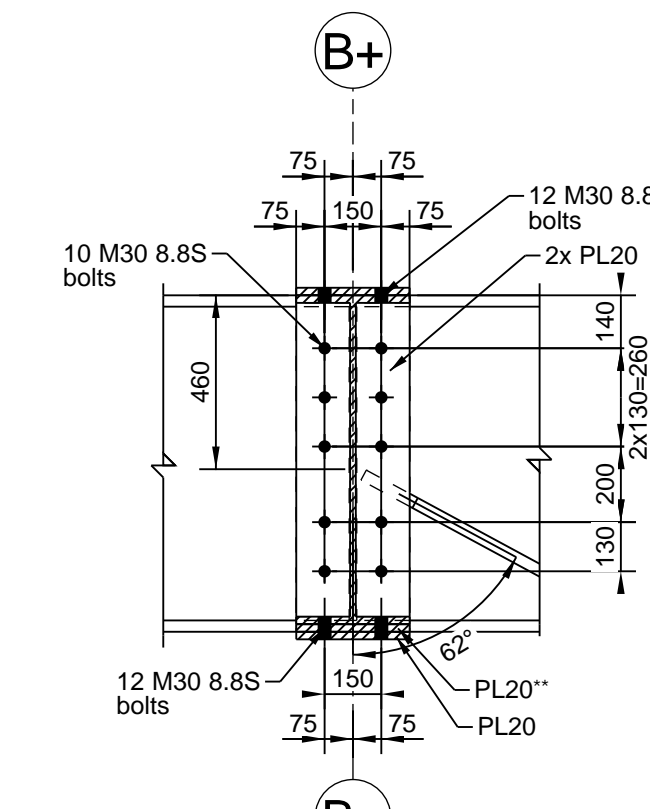


Section 6-6
Scale 1:20
(SX-061509)



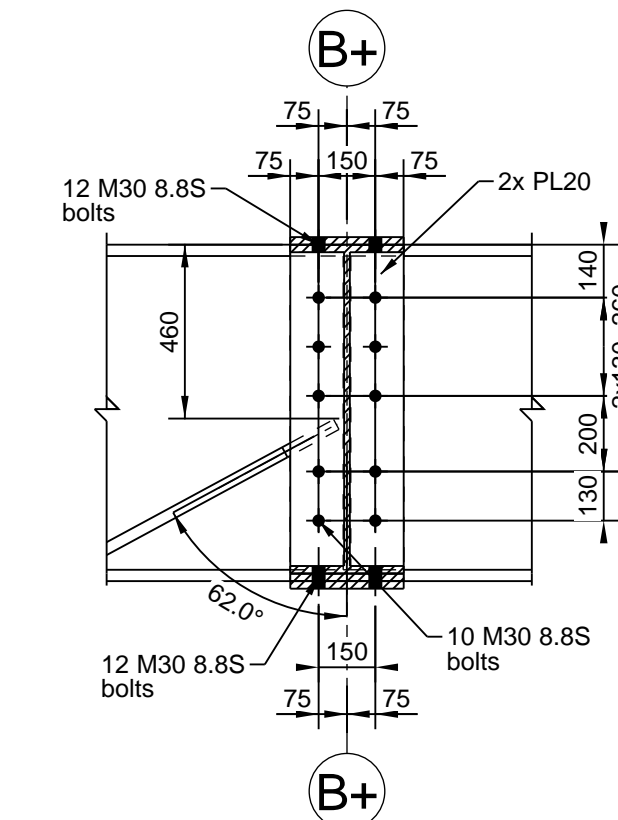
Section 4-4
Scale 1:20
(SX-061509)

* at the intersection between GL-(B+) and GLs 5 and (-5)
additional PL 20 is required, to resolve the difference in depth
between deck beams



Section 8-8
Scale 1:20
(SX-061509)

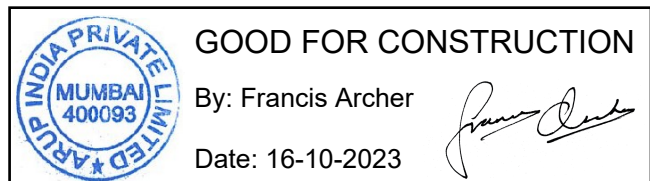
** at the intersection between GL-(C-)
and GLs 4 and (-4) this is PL30, to resolve
the difference in depth between deck beams



Section 9-9
Scale 1:20
(SX-061509)

Notes:

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01	16/10/23	Good for Construction
Issue	Date	

ARUP

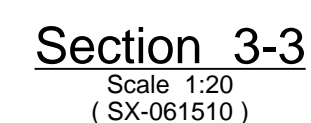
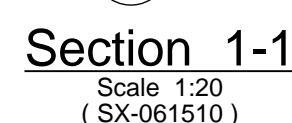
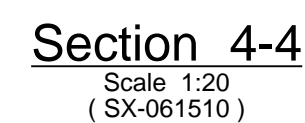
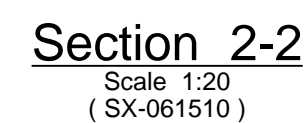
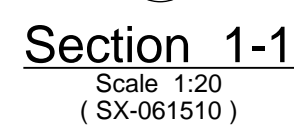
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Air Concourse Connections;
Typical type connection 1 and 2

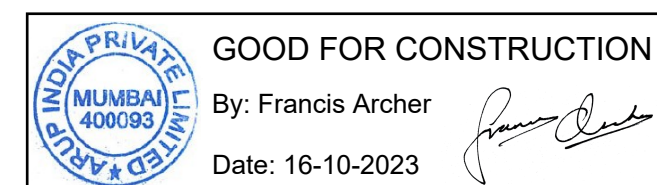
Scale at A1	1:20	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	01
ID	284197-ARP-AC-01-DR-SX-061509		



Note: Some parts hidden for clarity.

Notes:

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01	16/10/23	Good for Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title

Innovative Design of Modular Railway Station Components in Brownfield Projects

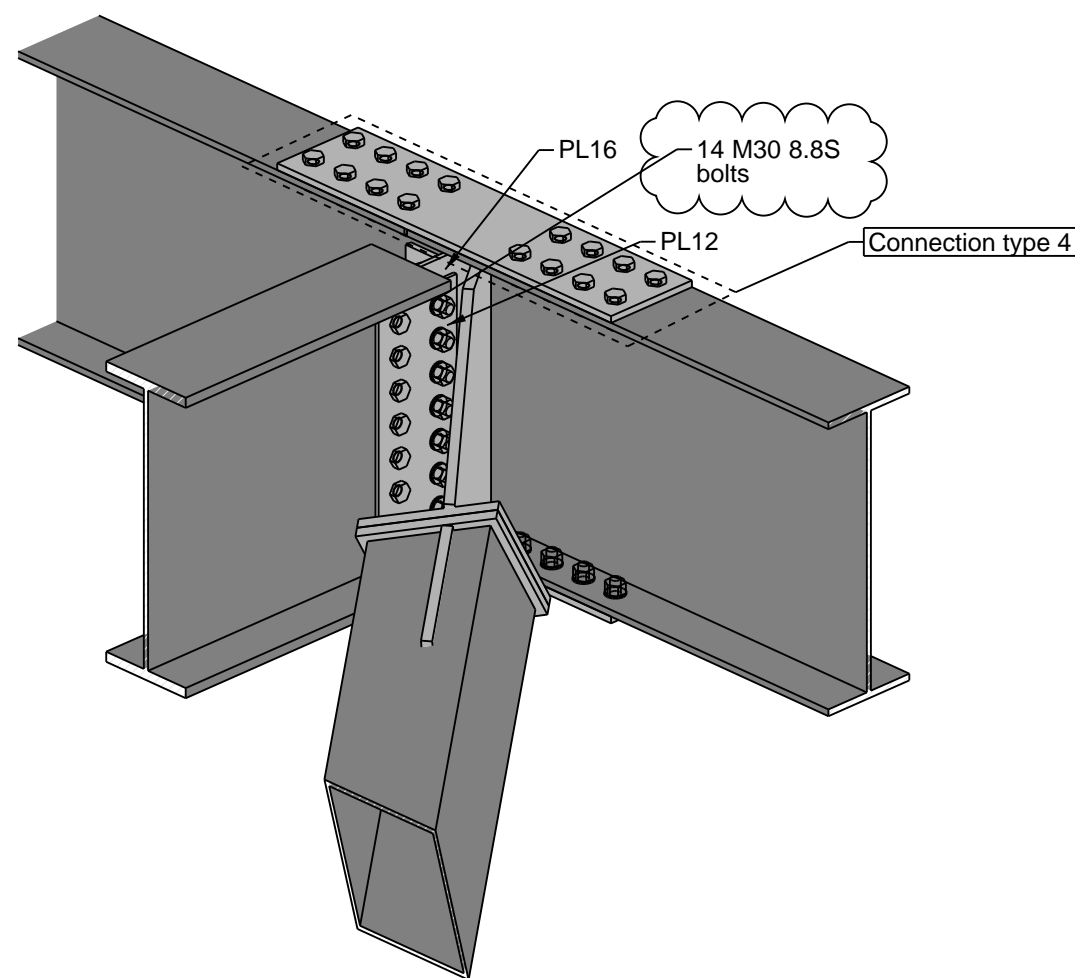
Safdarjung Station

Drawing Title

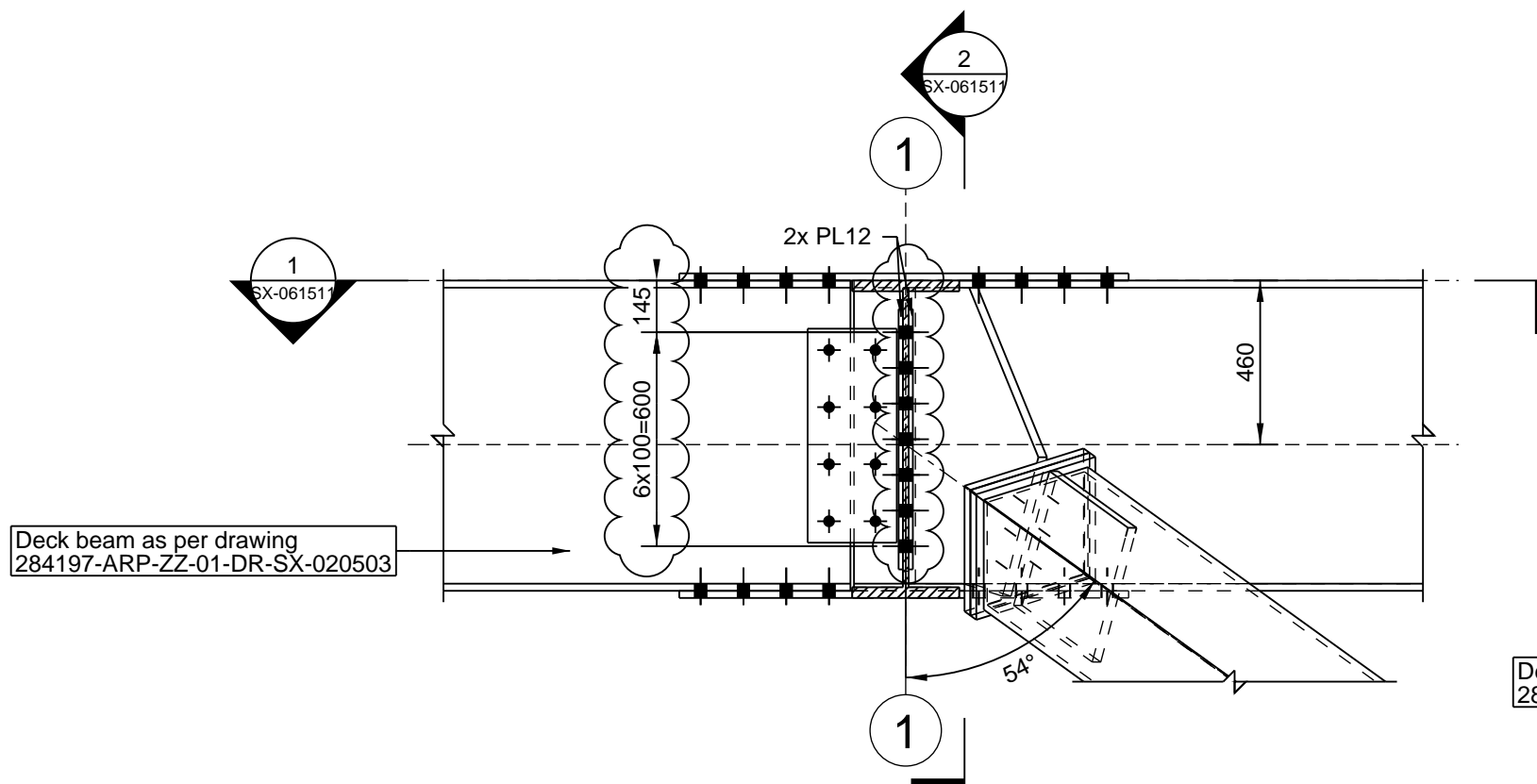
Details

Air Concourse Connections;
Typical type connection 3a and 4

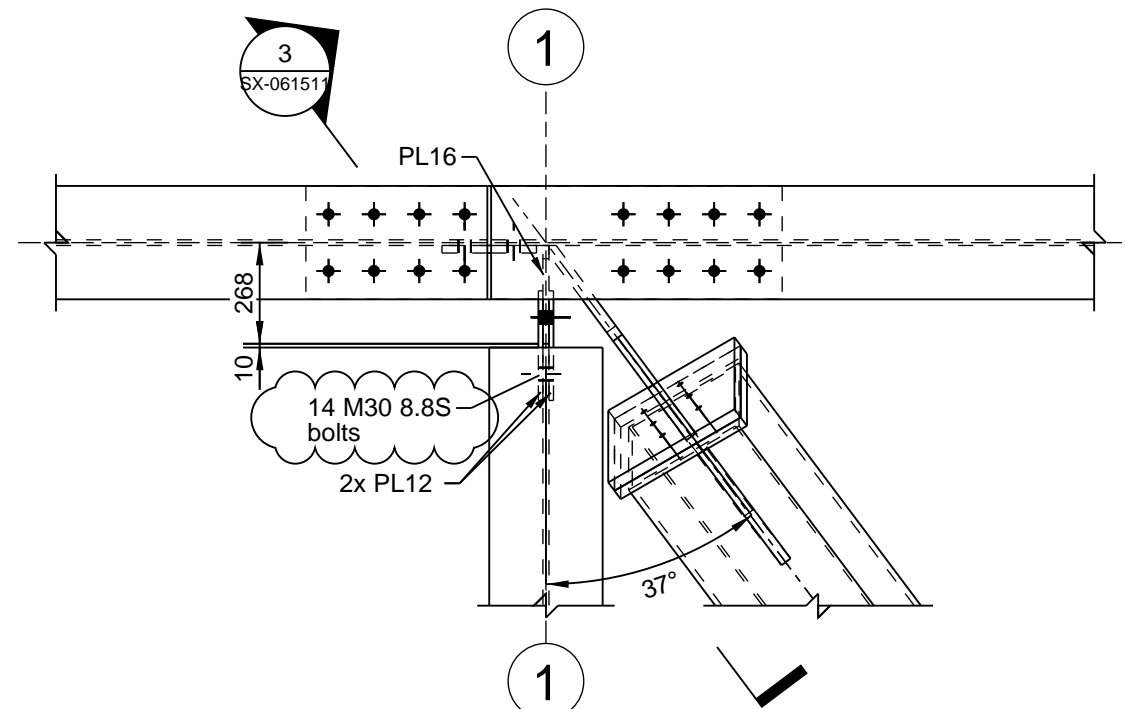
Scale at A1	1:20	By/Chkd/Appd PB/EB/FA/ABF
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 01
ID	284197-ARP-AC-01-DR-SX-061510	



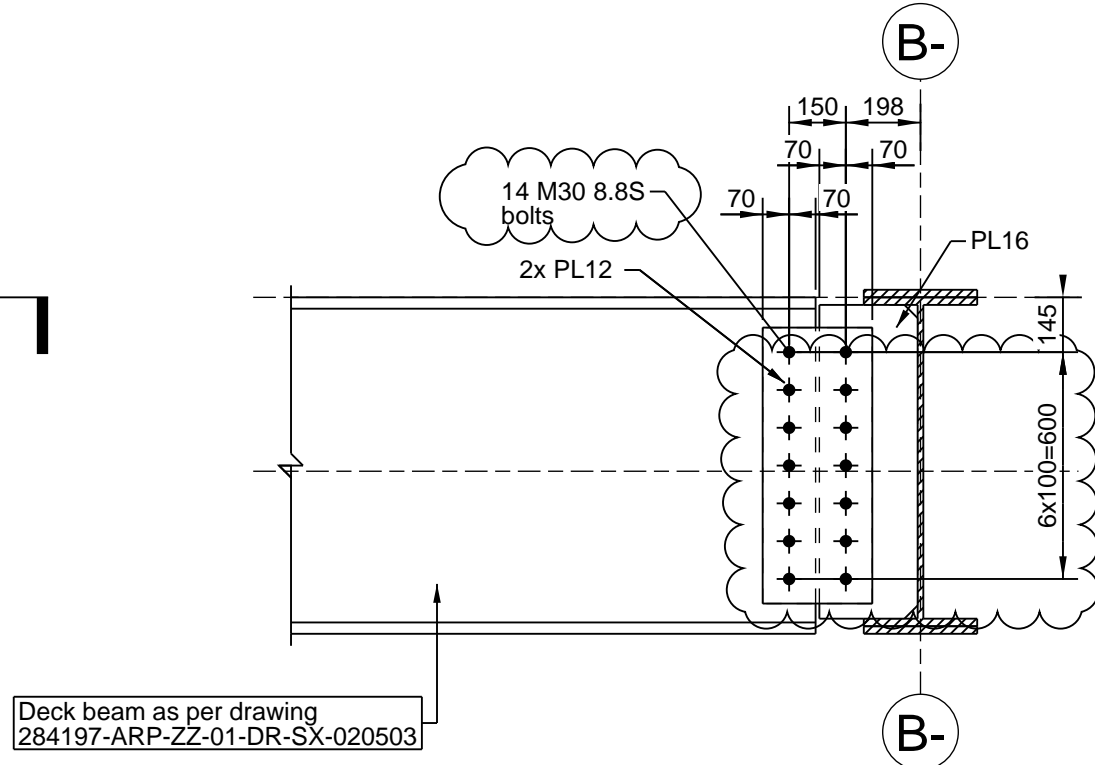
Deck Connection 5
NTS



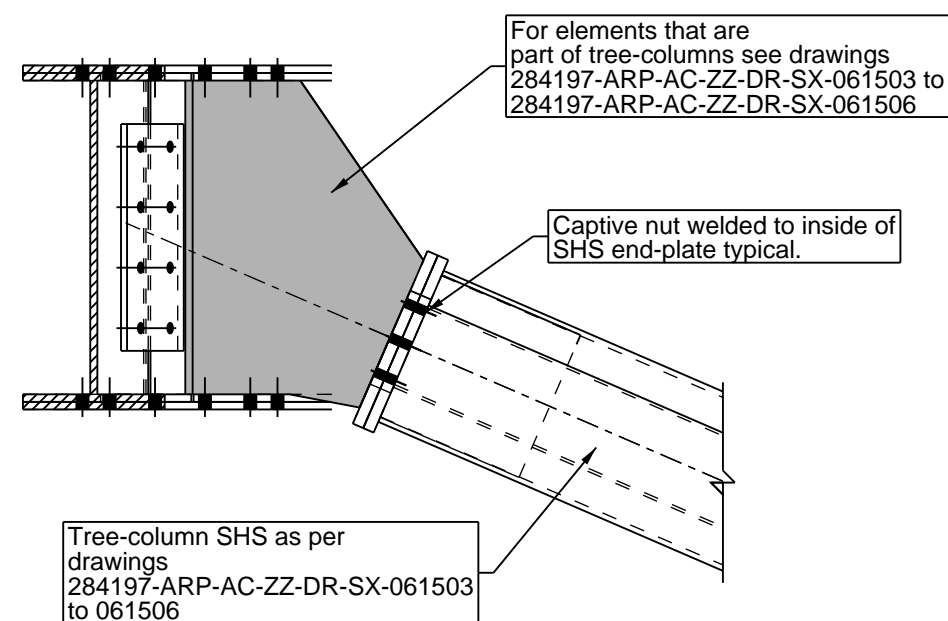
Elevation
Scale 1:20



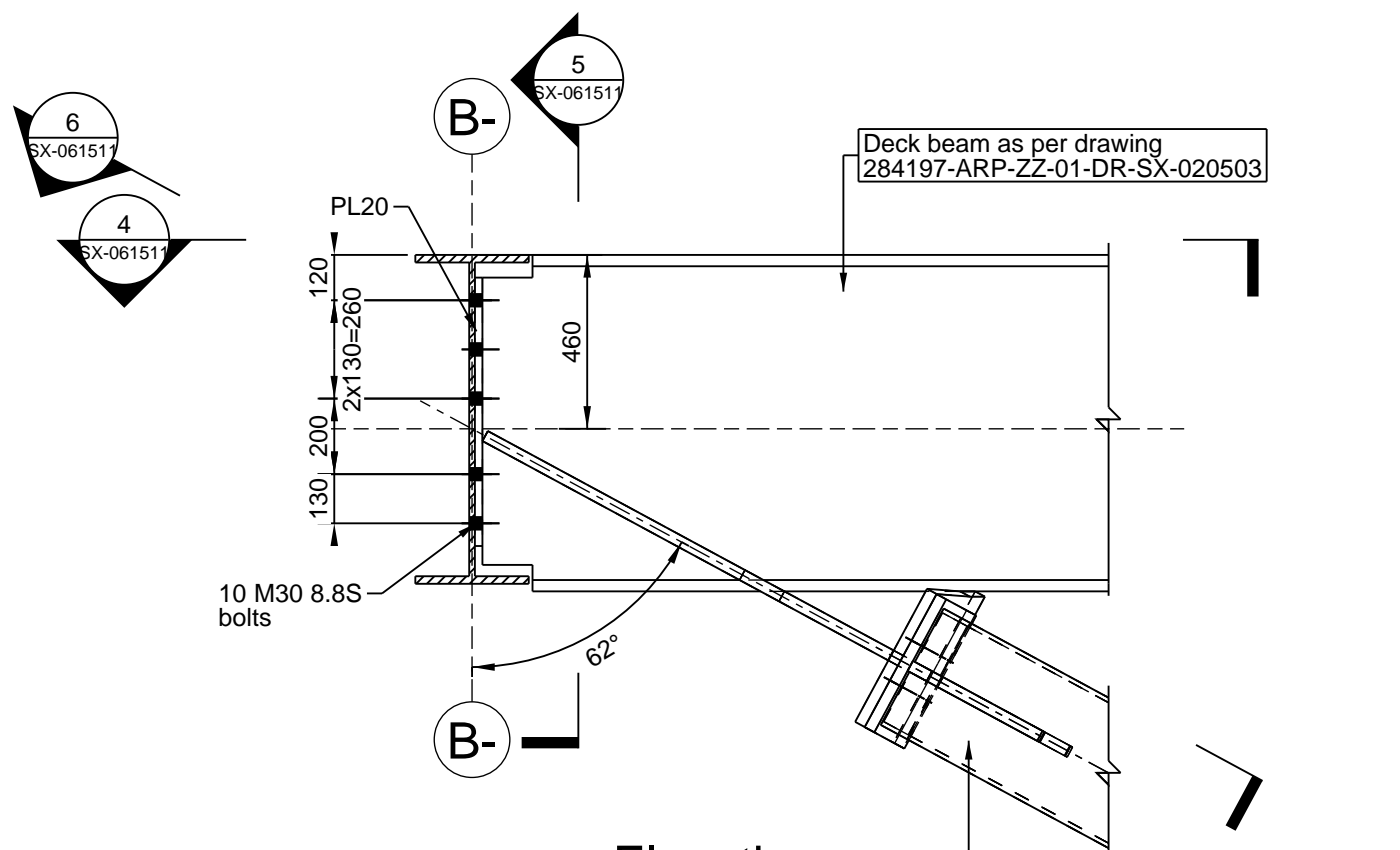
Section 1-1
Scale 1:20
(SX-061511)



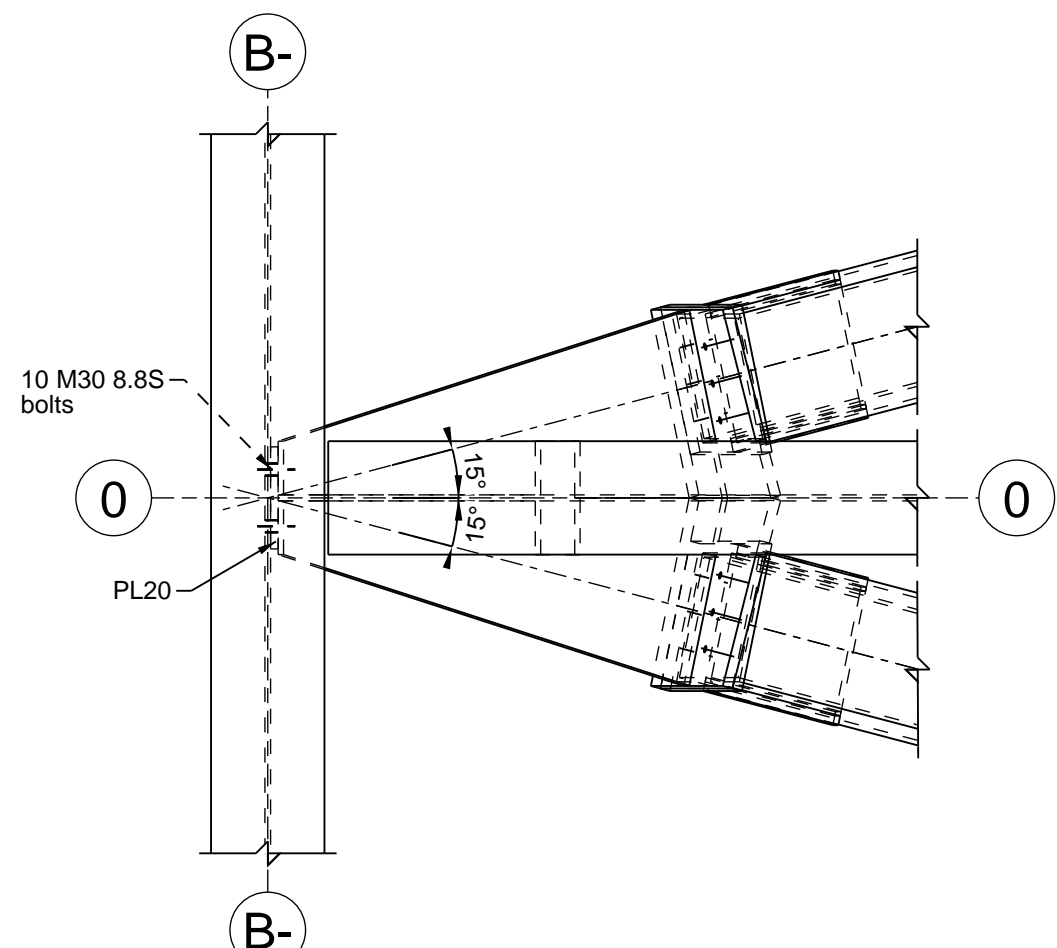
Section 2-2
Scale 1:20
(SX-061511)



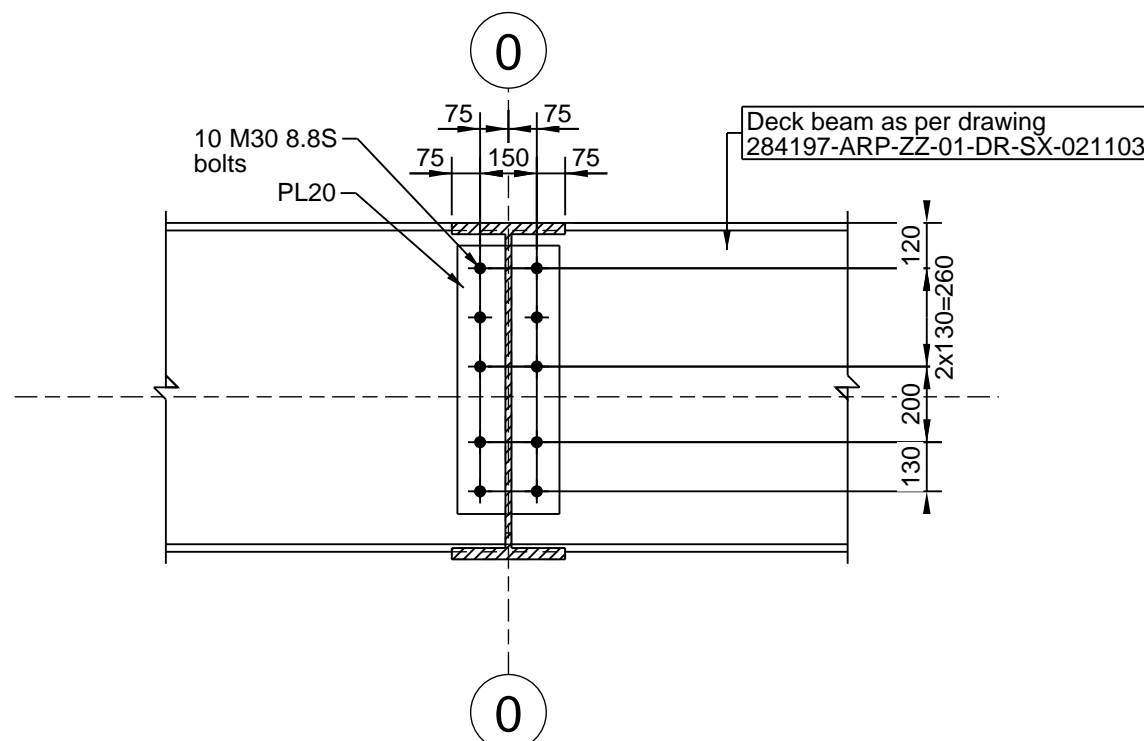
Section 3-3
Scale 1:20
(SX-061511)



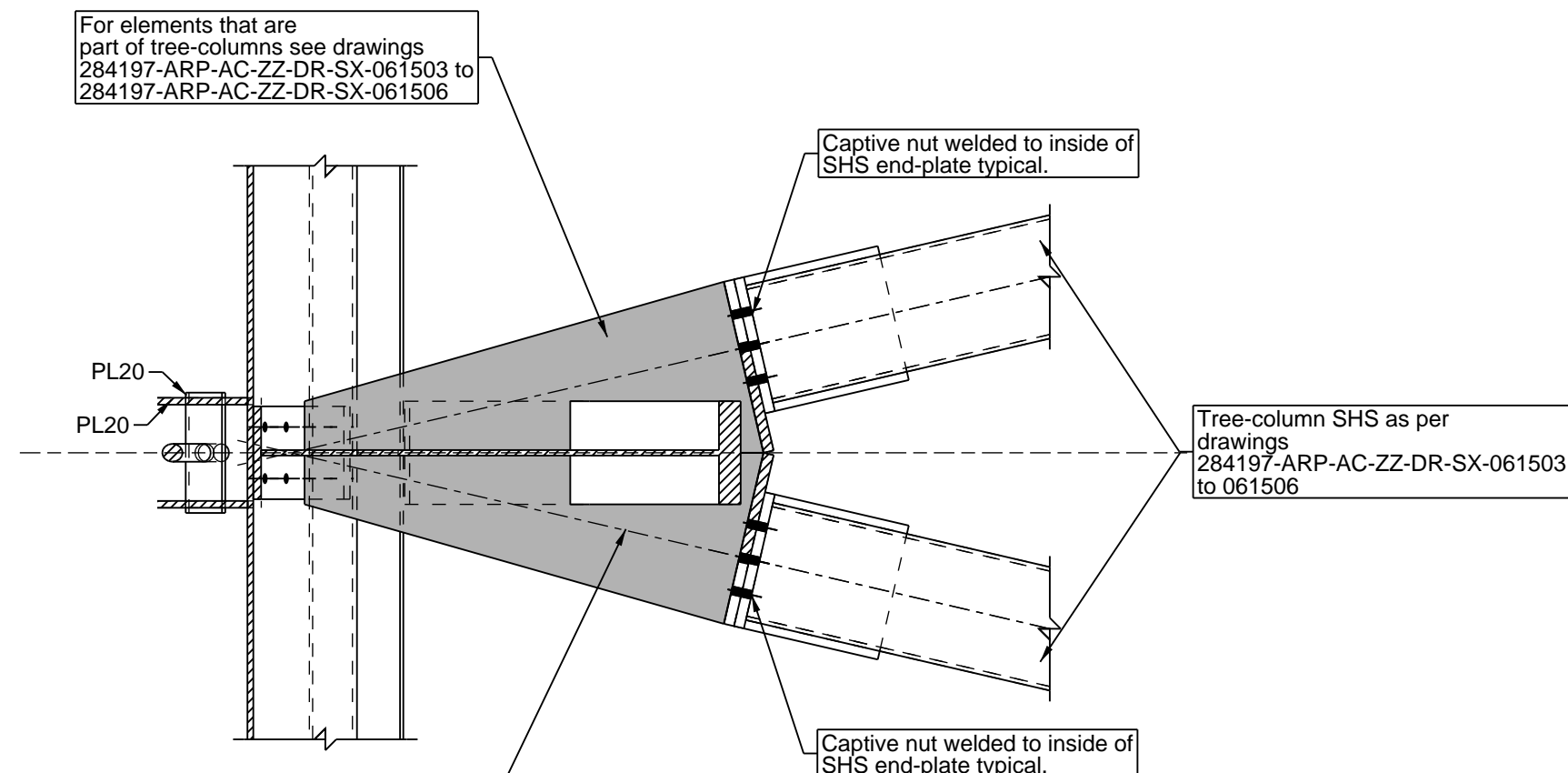
Elevation
Scale 1:20



Section 4-4
Scale 1:20
(SX-061511)



Section 5-5
Scale 1:20
(SX-061511)

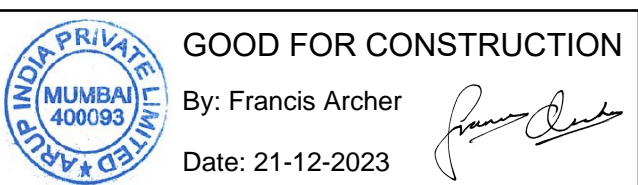


Section 6-6
Scale 1:20
(SX-061511)

Note: Some parts hidden for clarity.

Notes:

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02	20/12/23	Good for Construction
01	16/10/23	Good for Construction
Issue	Date	

ARUP

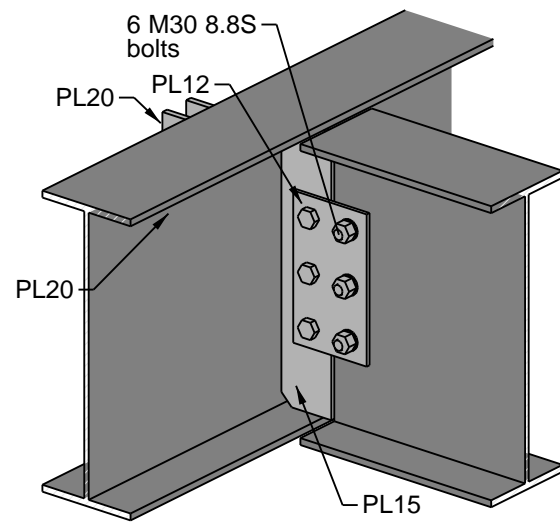
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

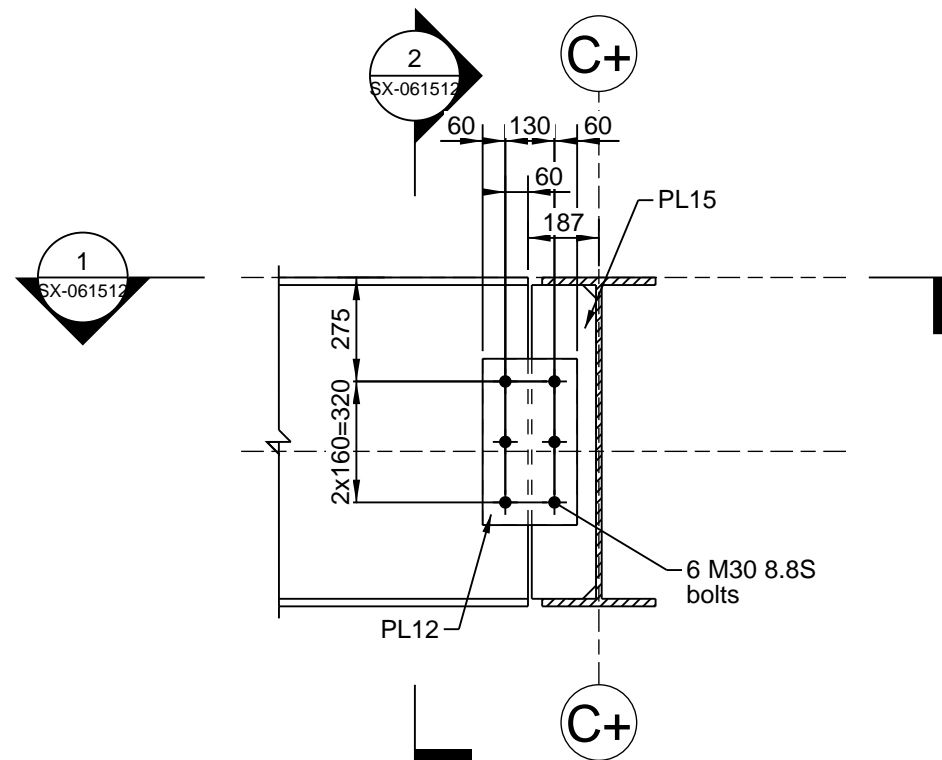
Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Air Concourse Connections;
Typical type connection 5 and 6

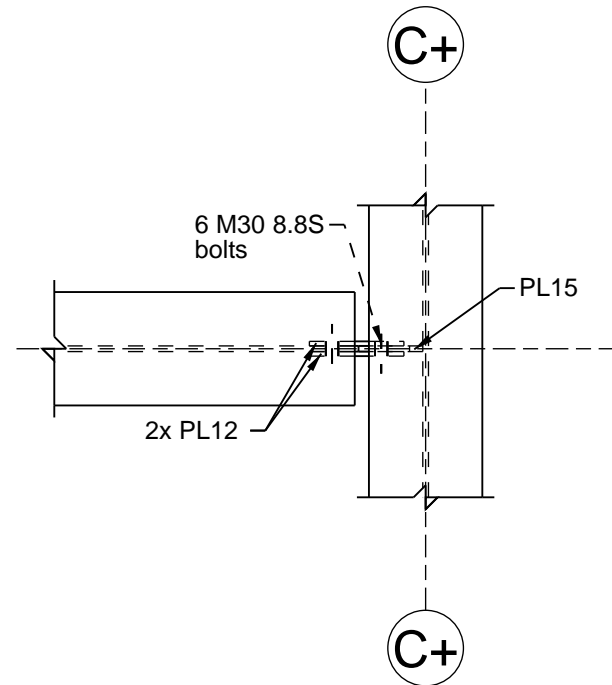
Scale at A1	1:20	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural	Status	S4 - Submission
Arup Job No	284197	Rev	02
ID	284197-ARP-AC-01-DR-SX-061511		



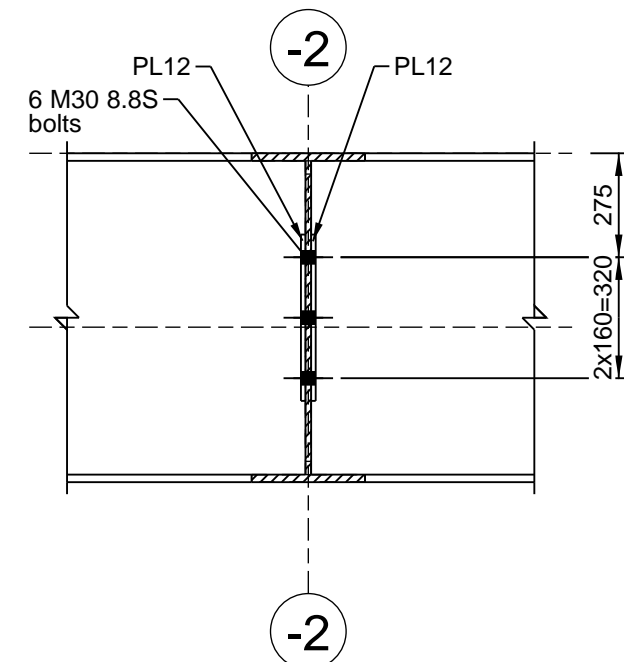
Deck Connection 7
NTS



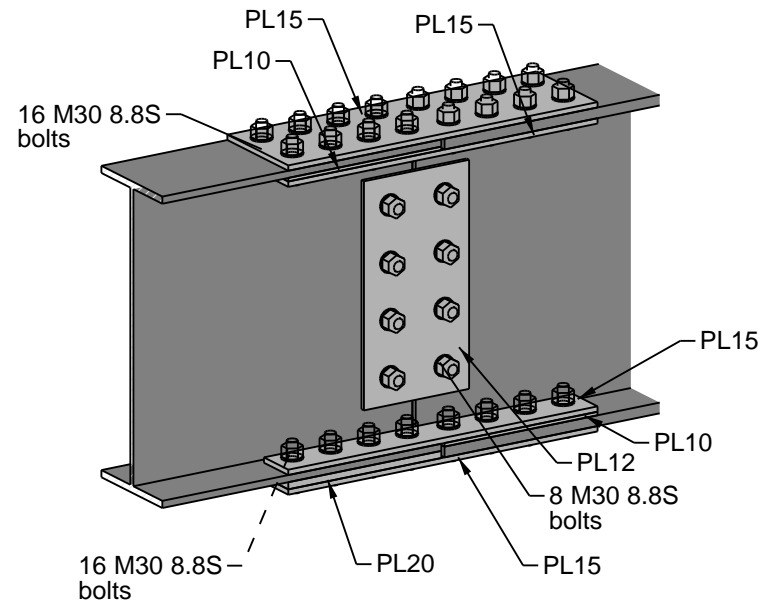
Elevation
Scale 1:20



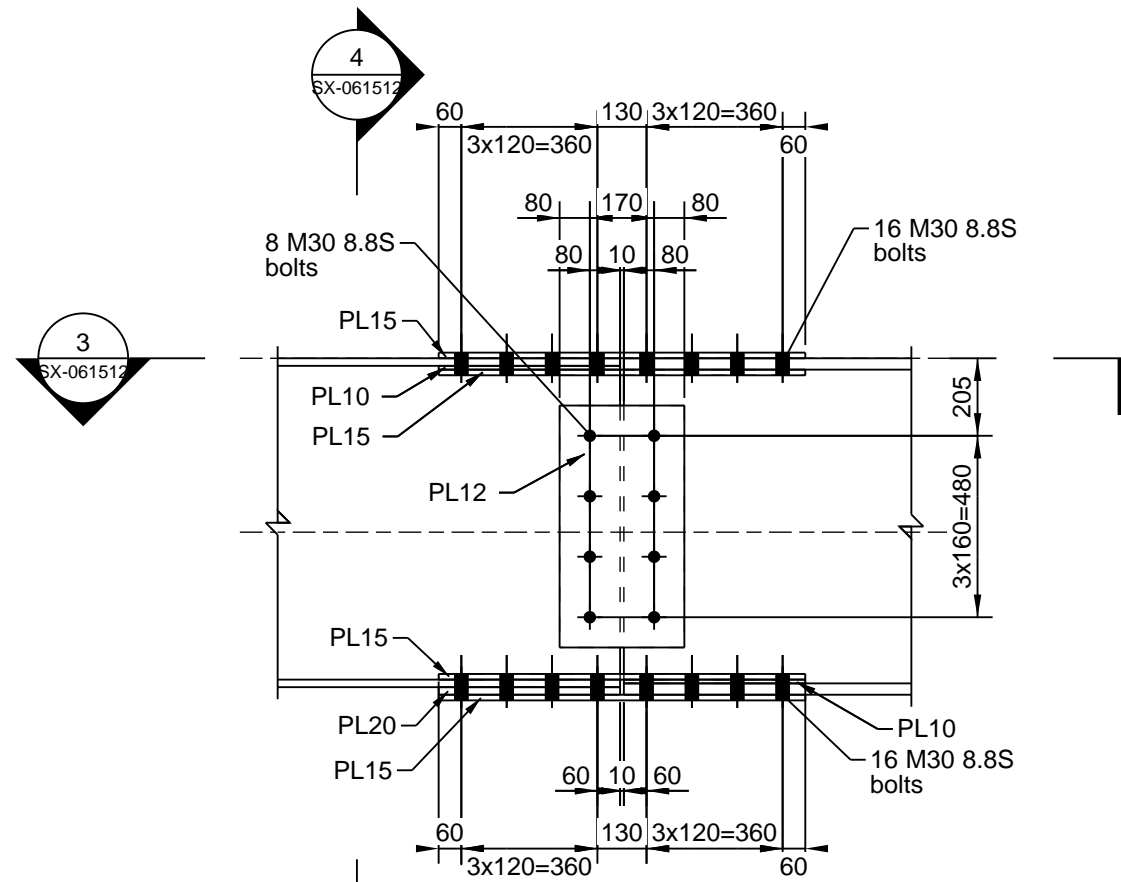
Section 1-1
Scale 1:20



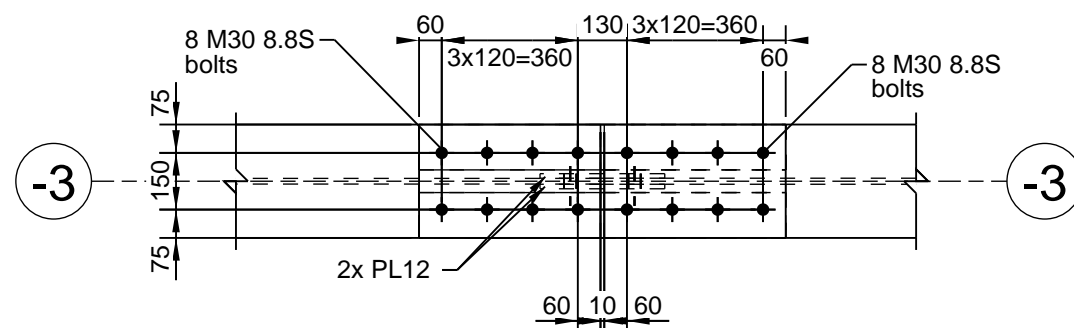
Section 2-2
Scale 1:20
(SX-061512)



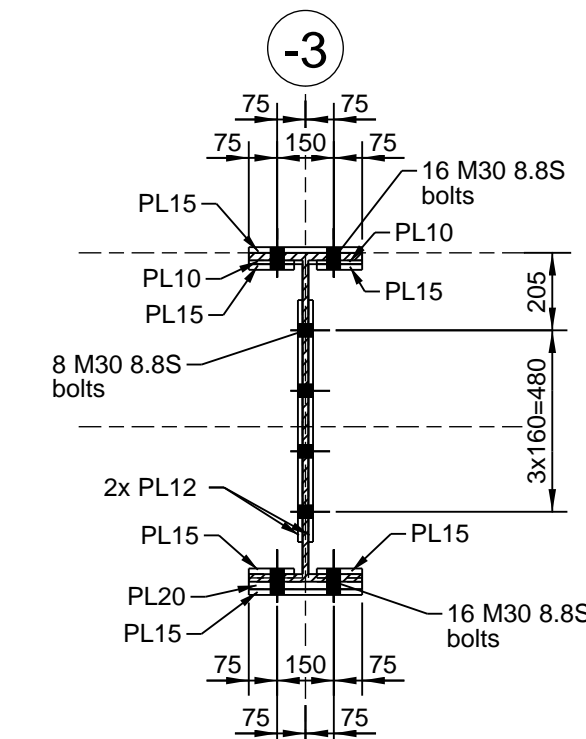
Deck Connection 8
NTS



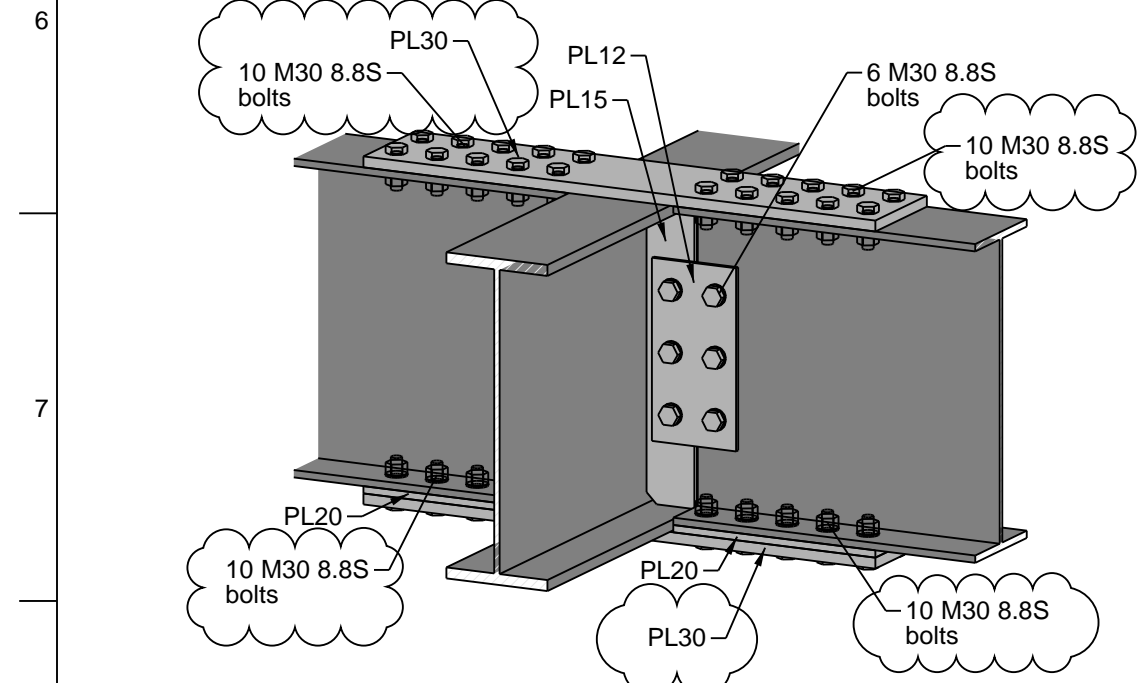
Elevation
Scale 1:20



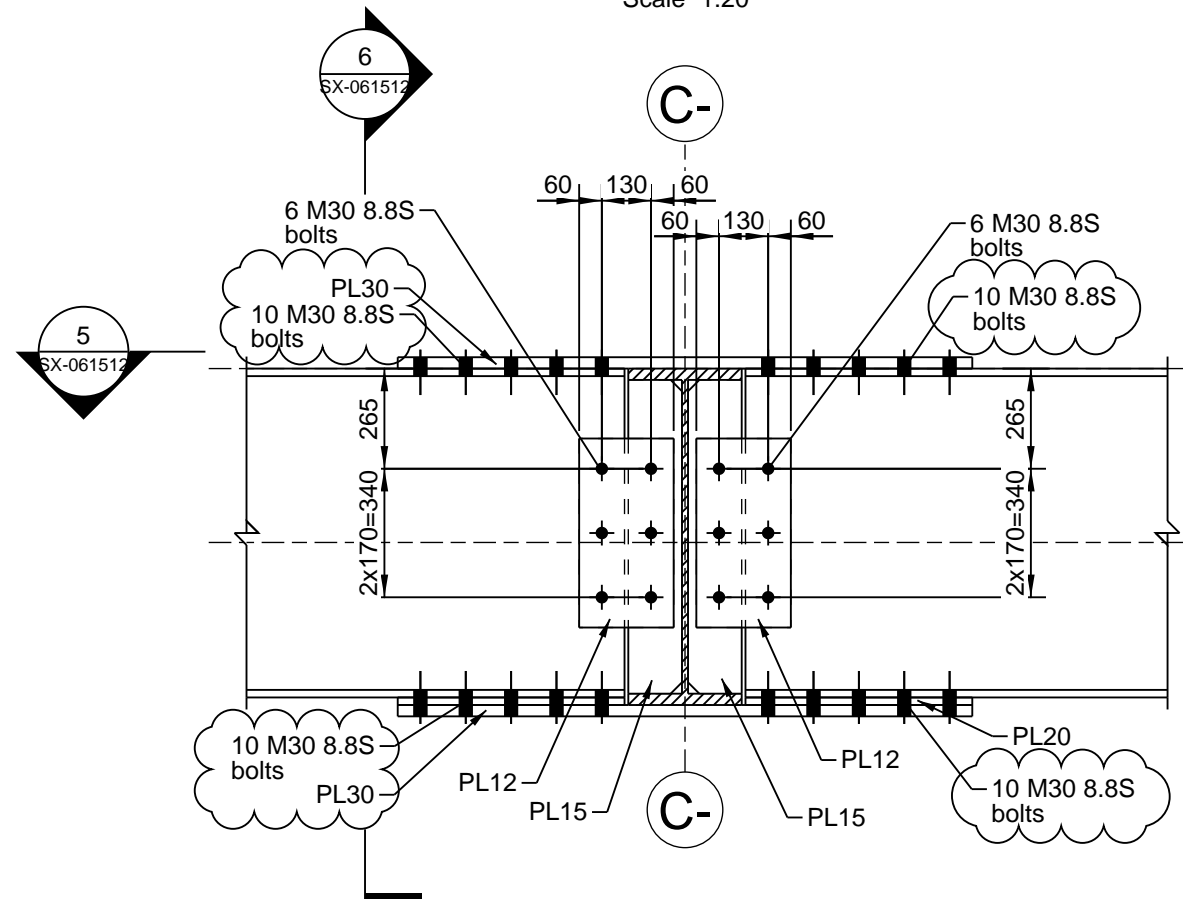
Section 3-3
Scale 1:20
(SX-061512)



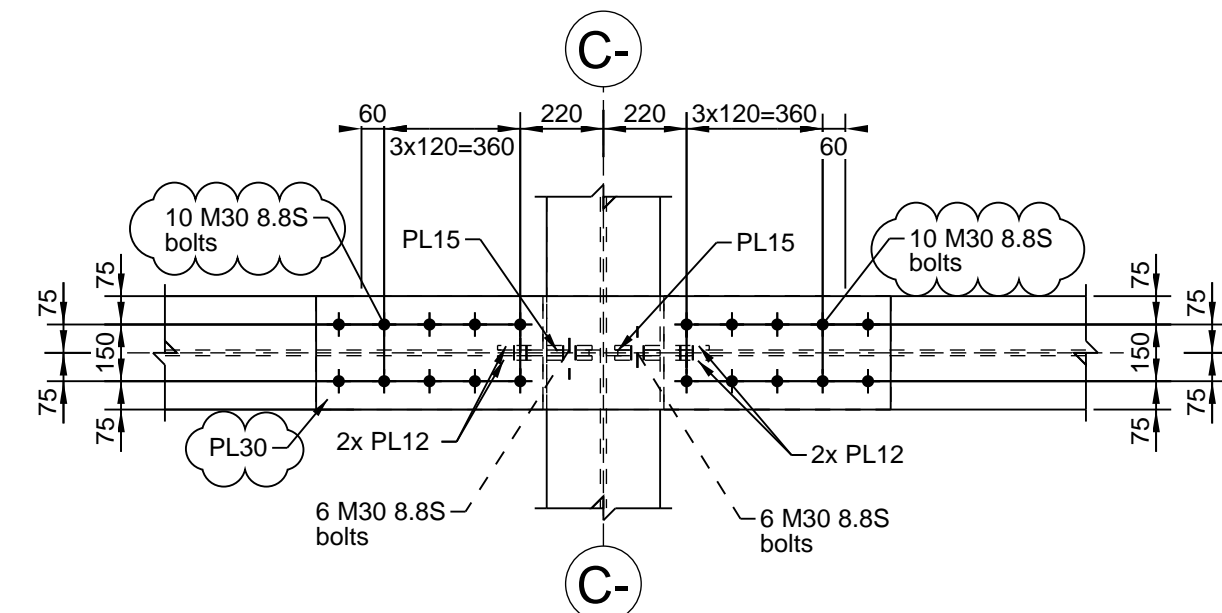
Section 4-4
Scale 1:20
(SX-061512)



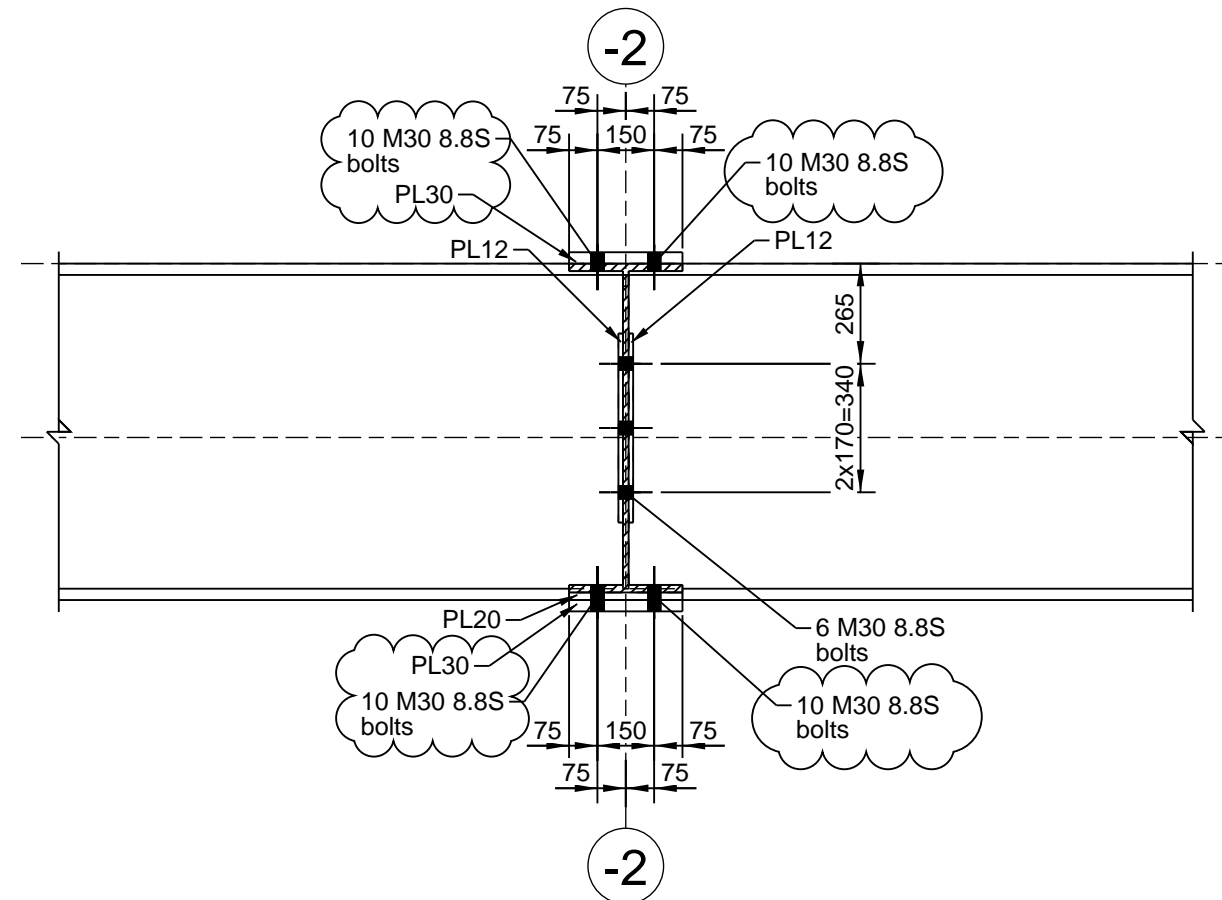
Deck Connection 9
NTS



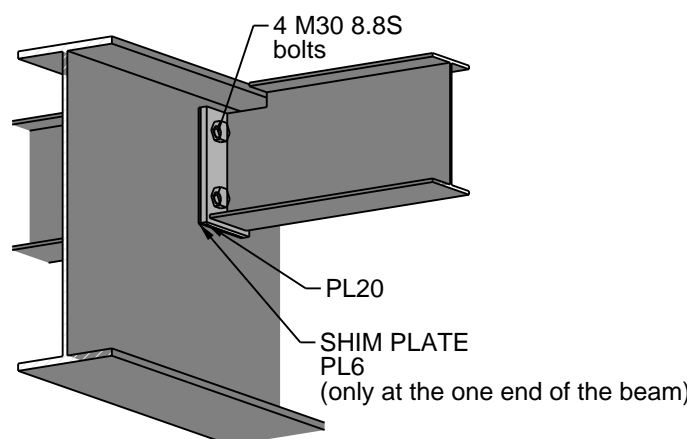
Elevation
Scale 1:20



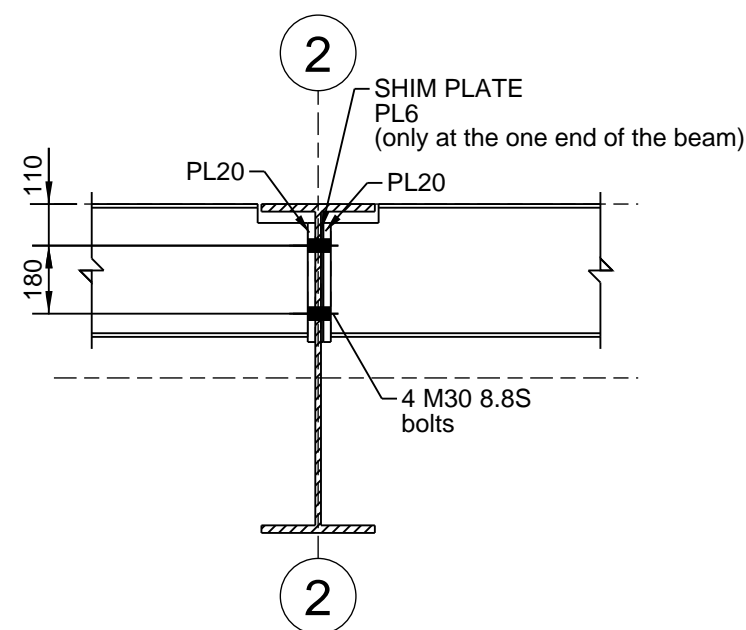
Section 5-5
Scale 1:20
(SX-061512)



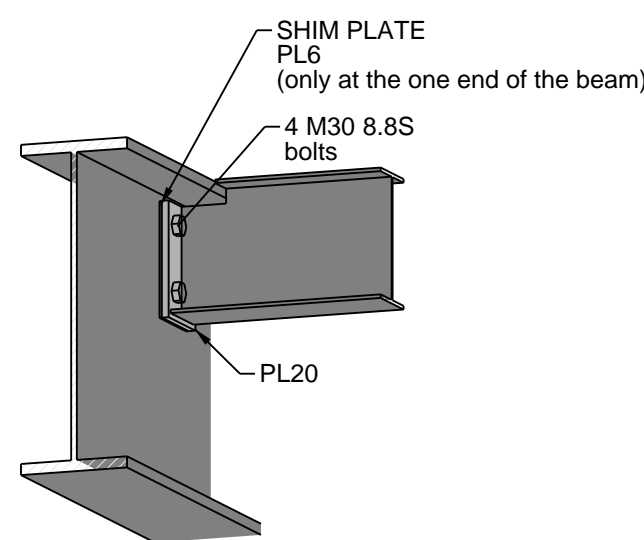
Section 6-6
Scale 1:20
(SX-061512)



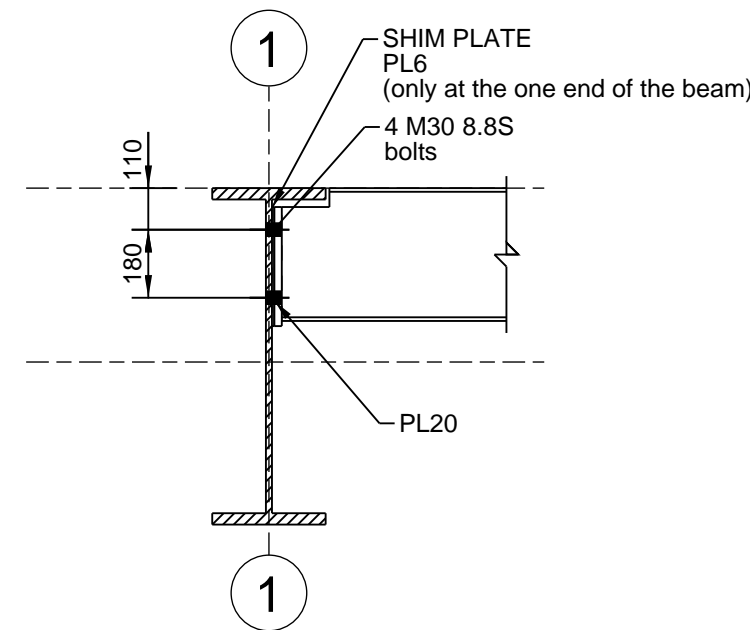
Deck Connection 12
NTS



Elevation
Scale 1:20



Deck Connection 13
NTS



Elevation
Scale 1:20

Notes:

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03	19/06/24	Good for Construction
02	22/02/24	Good for Construction
01	16/10/23	Good for Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

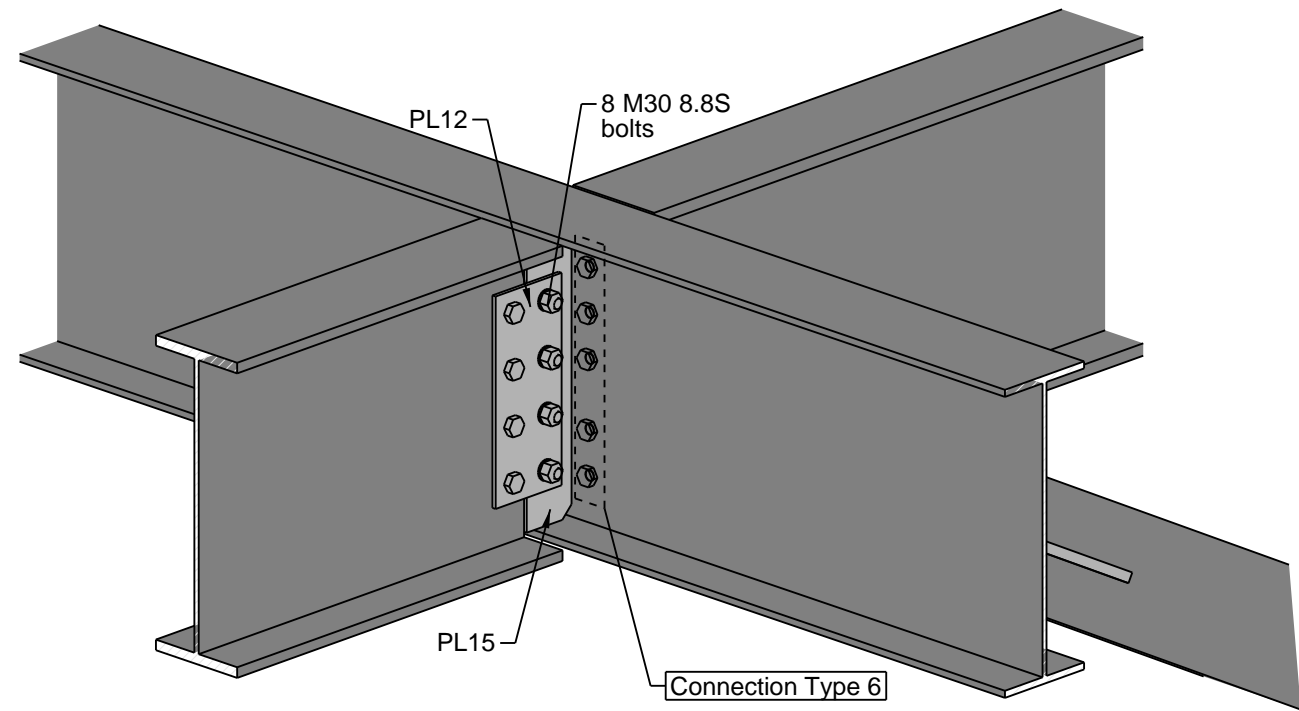
Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

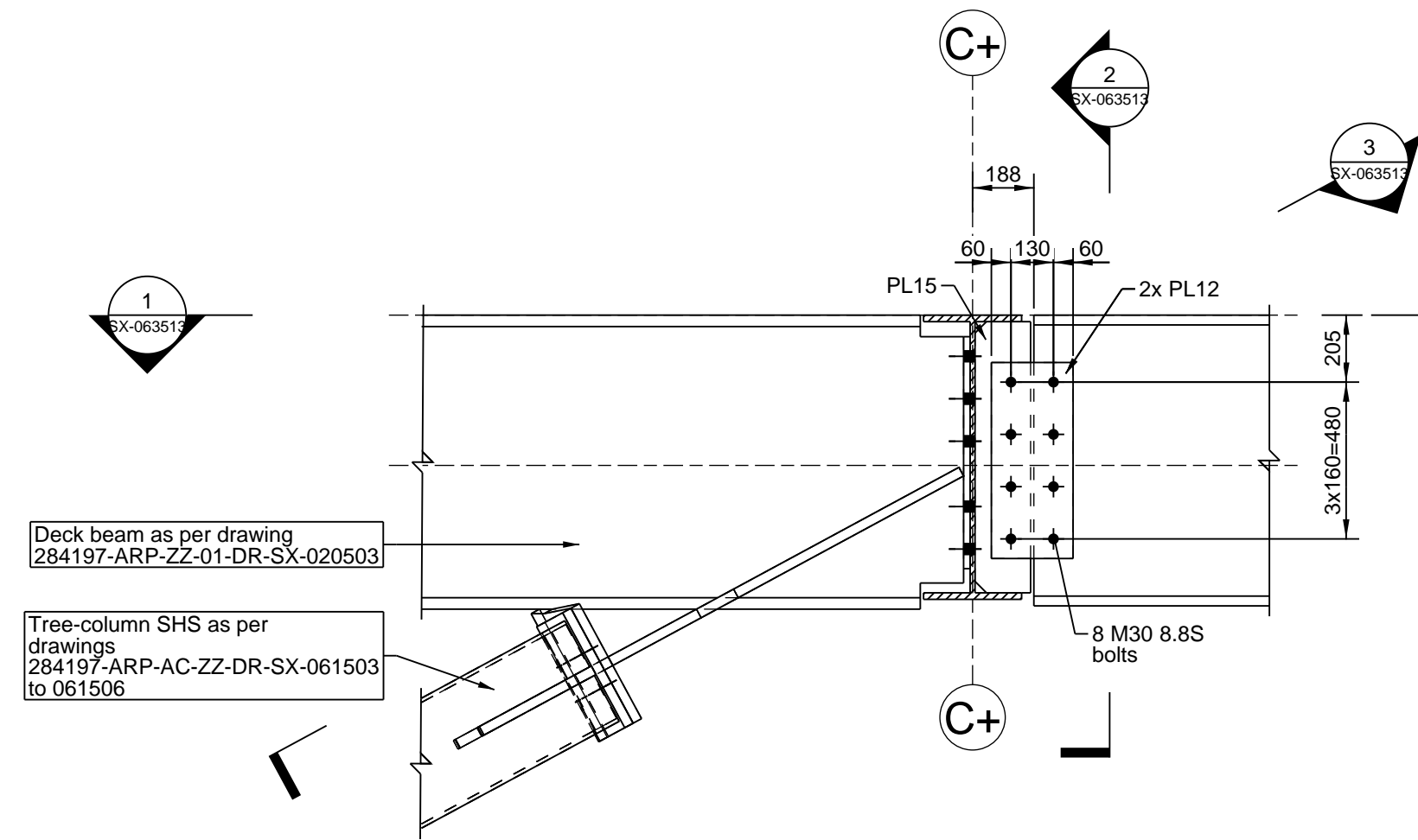
Drawing Title
Details
Air Concourse Connections;
Typical type connection 7,8,9,12,13

Scale at A1	1:20	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	03
ID	284197-ARP-AC-01-DR-SX-061512		

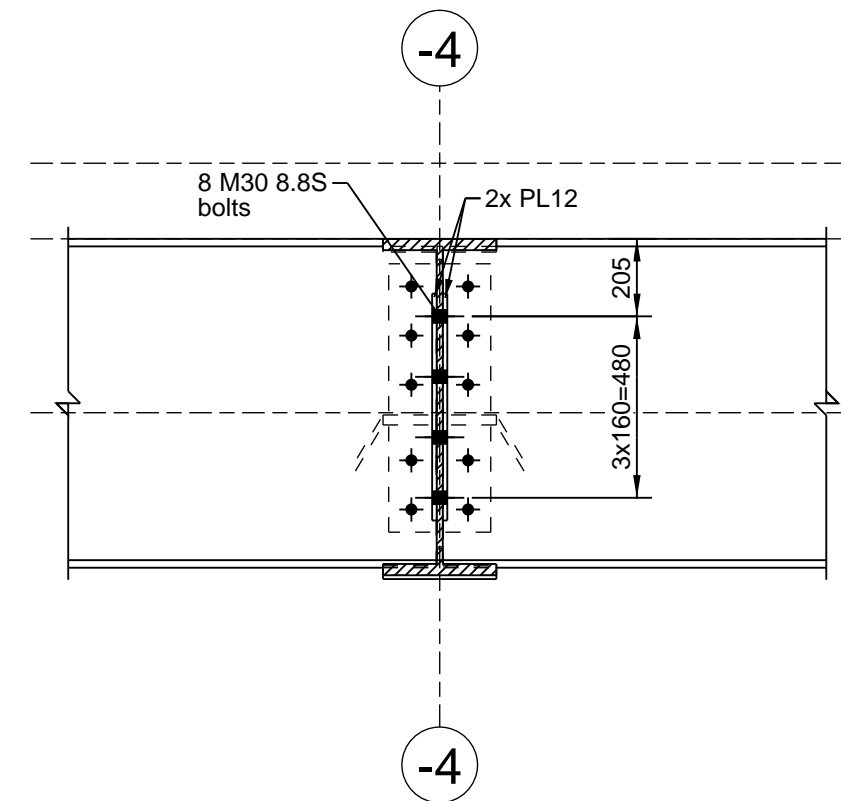
Note: Some parts hidden for clarity.



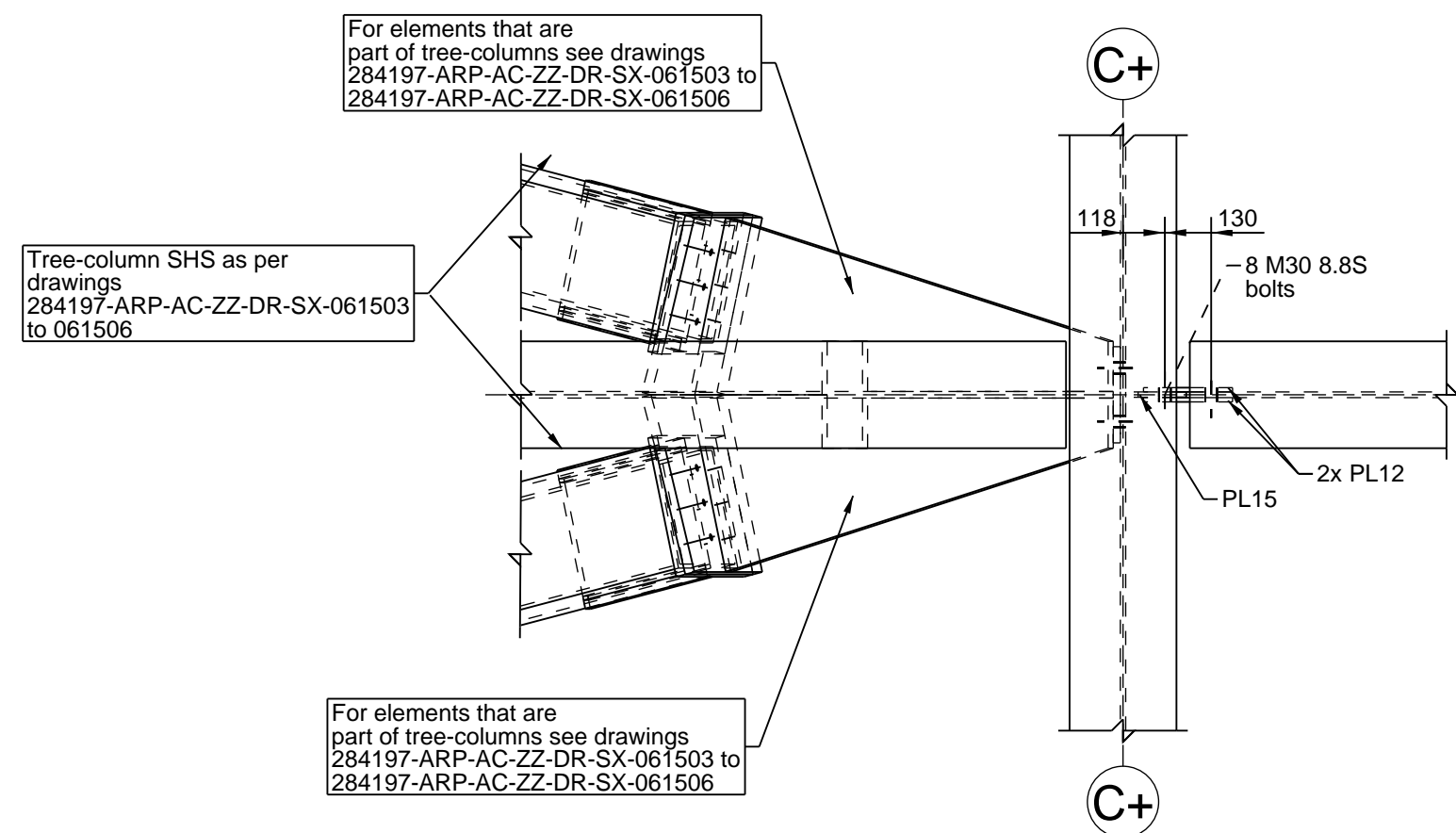
Deck Connection 10
NTS



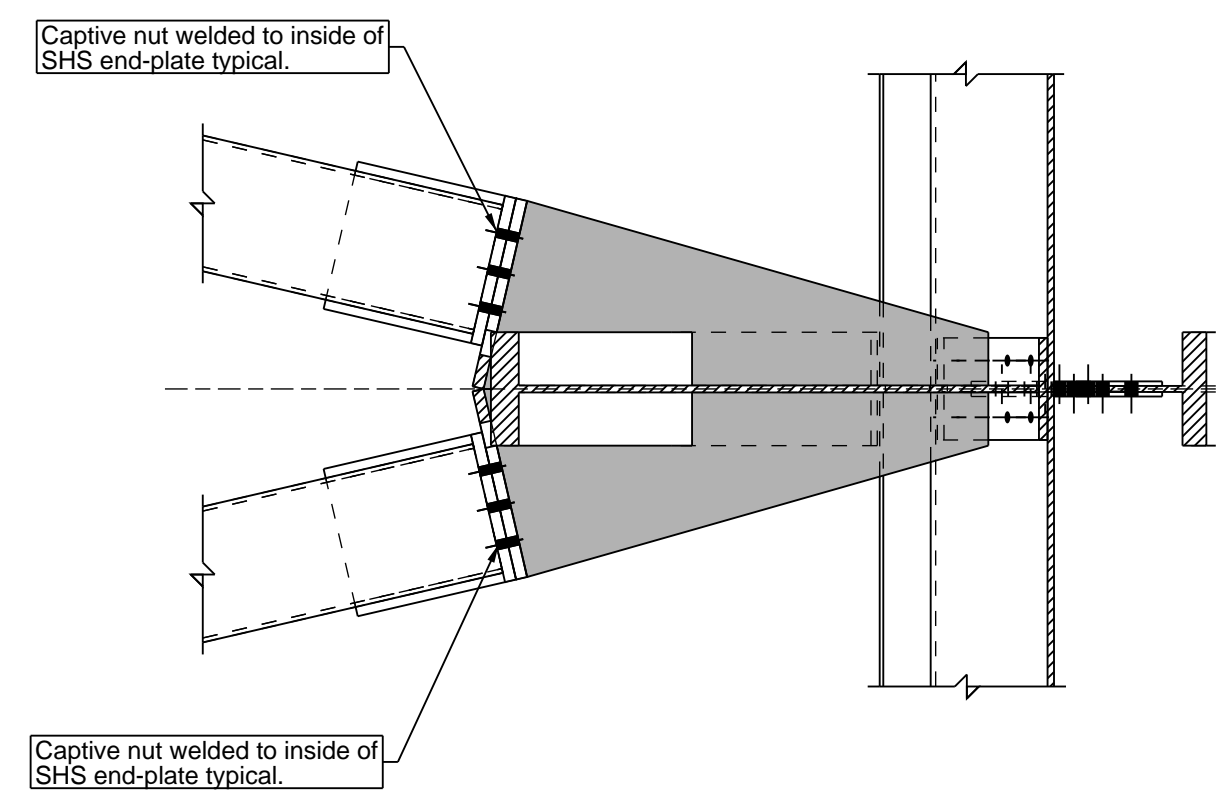
Elevation
Scale 1:20



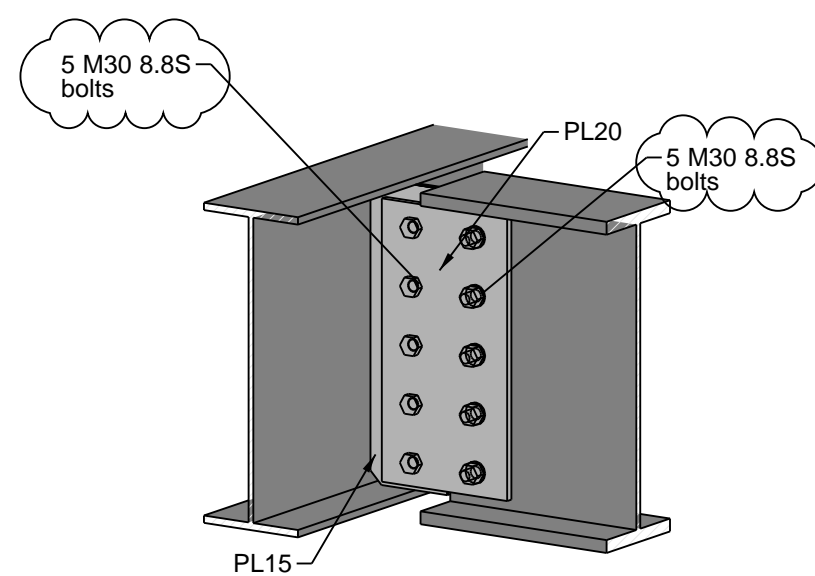
Section 2-2
Scale 1:20
(SX-063513)



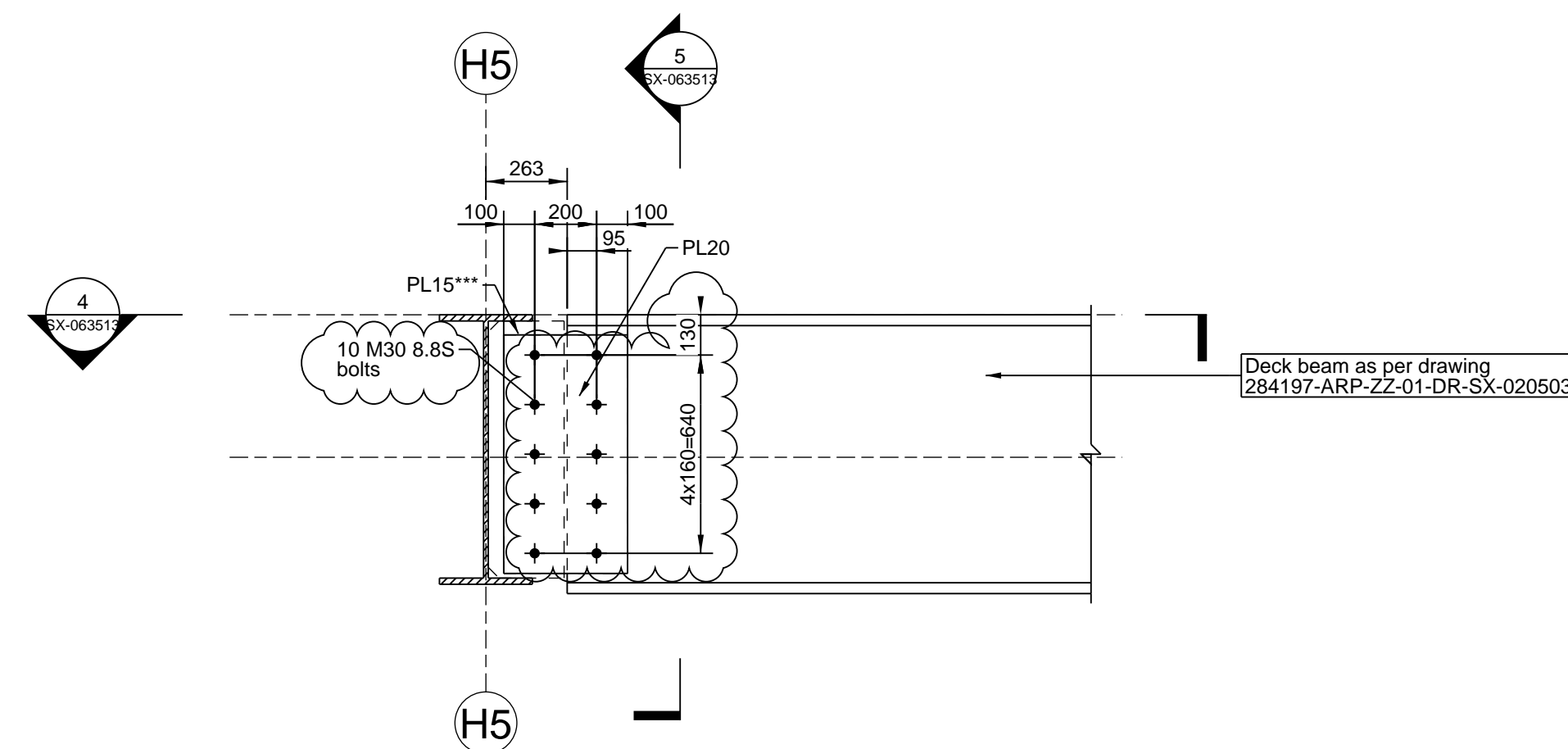
Section 1-1
Scale 1:20
(SX-063513)



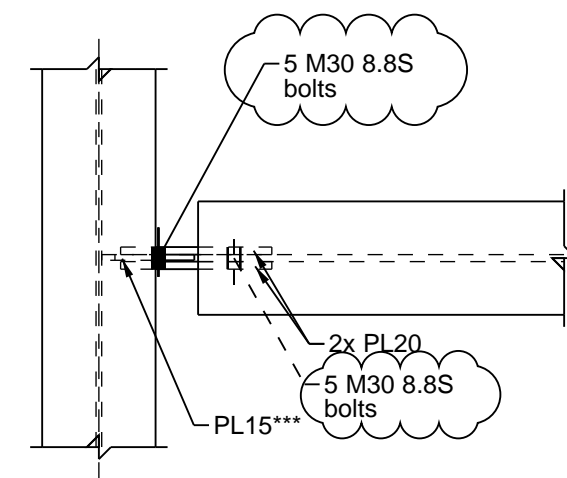
Section 3-3
Scale 1:20
(SX-063513)



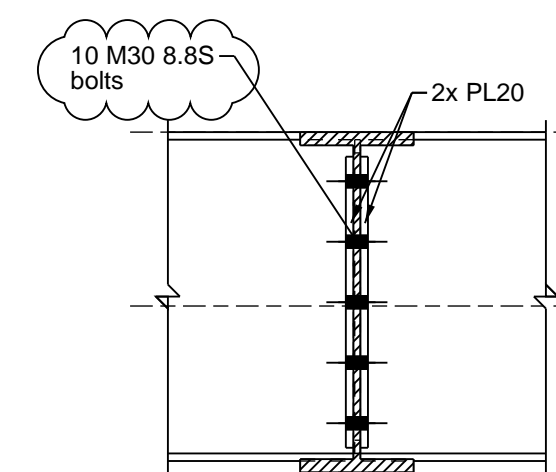
Deck Connection 11
NTS



Elevation
Scale 1:20



Section 4-4
Scale 1:20
(SX-063513)



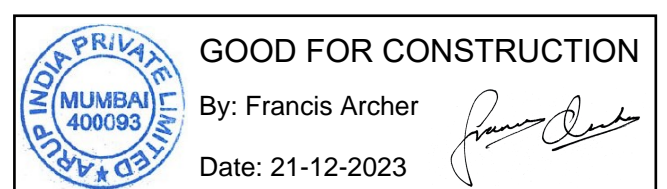
Section 5-5
Scale 1:20
(SX-063513)

*** Shim plates to be added as needed, to accommodate for the variation in web thickness' between connecting beams

Note: Some parts hidden for clarity.

Notes:

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02	19/12/23	Good for Construction
01	16/10/23	Good for Construction
Issue	Date	

ARUP

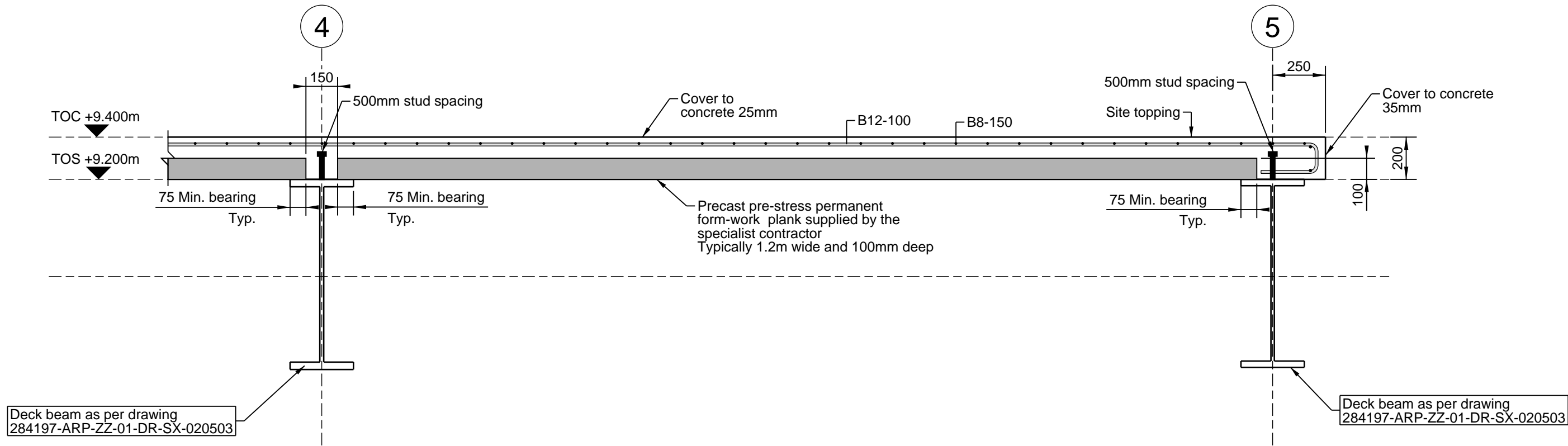
Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

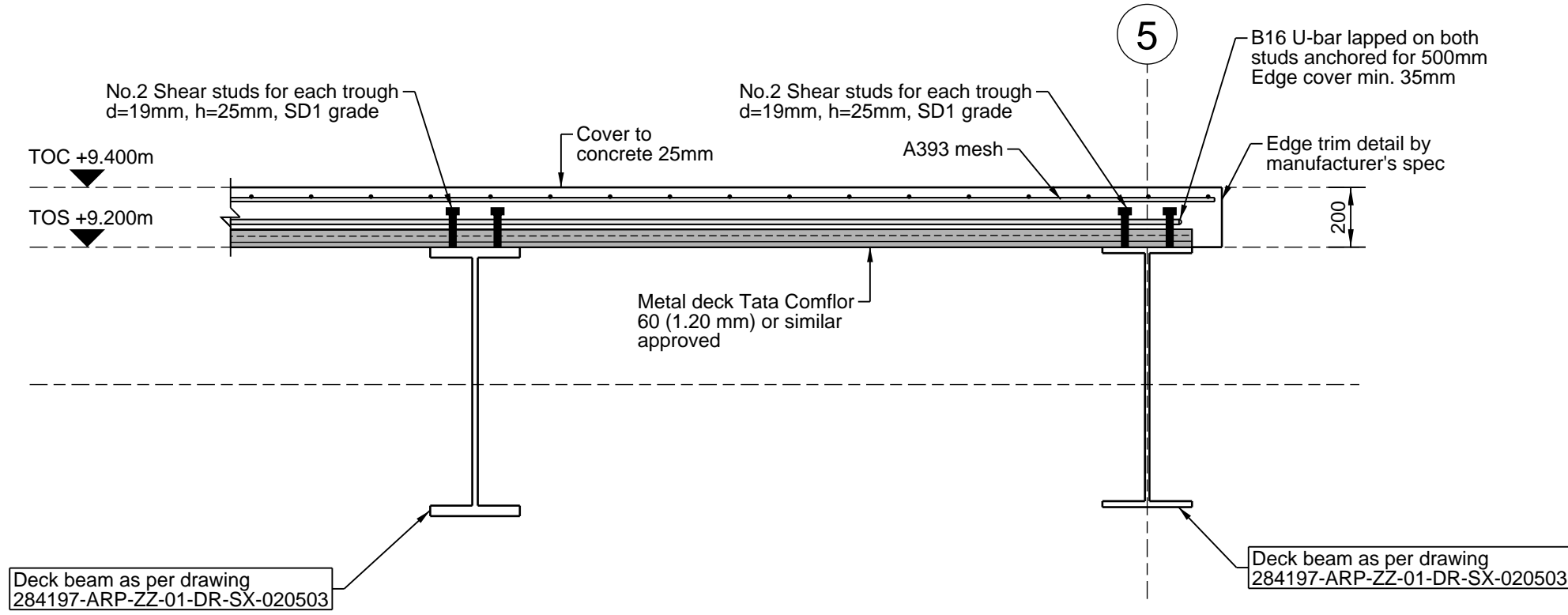
Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
Details
Foot-over-bridge details
Typical type connection 10 and 11

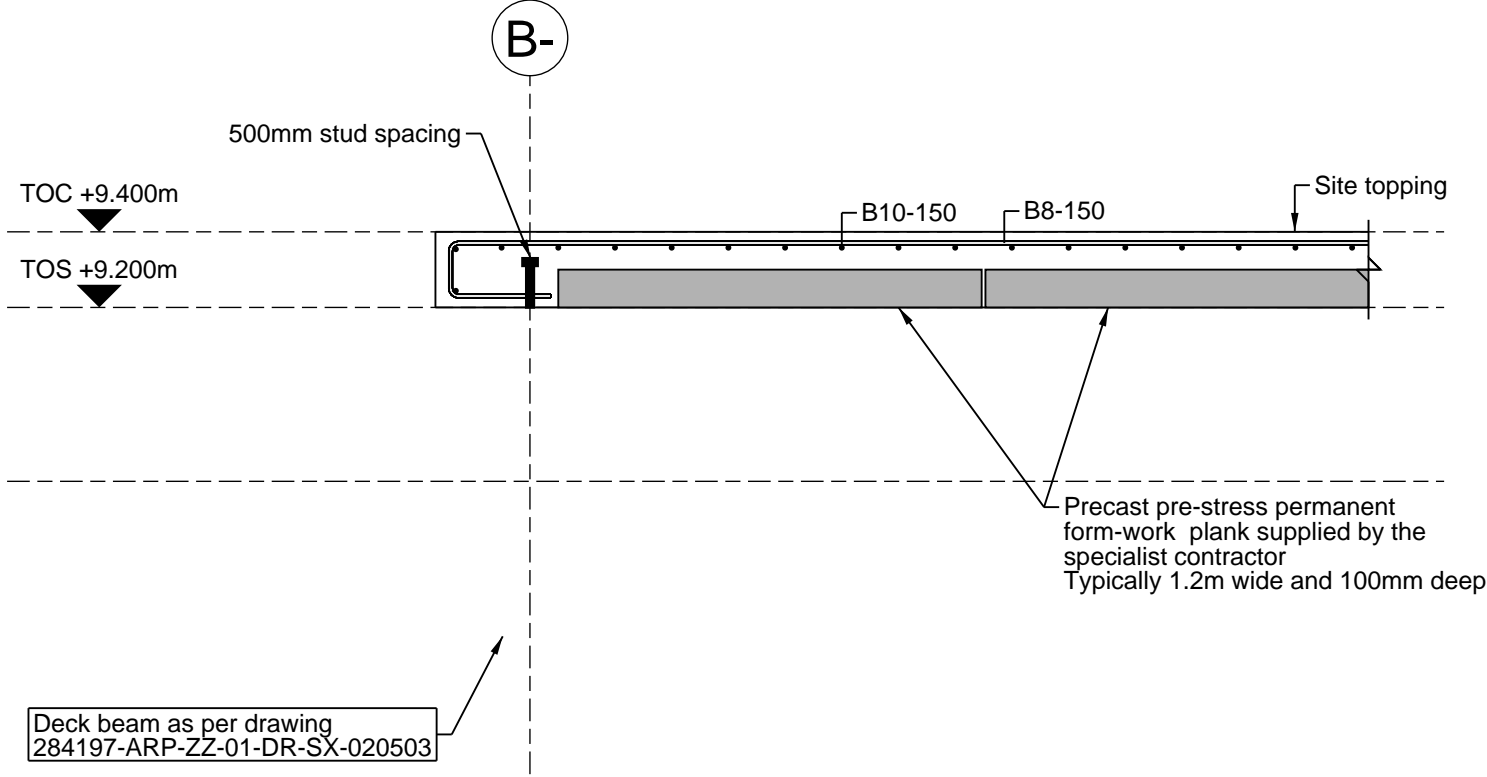
Scale at A1	1:20	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	02
ID	284197-ARP-FB-01-DR-SX-063513		



Section 1-1
Scale 1:20
(SX-020504)

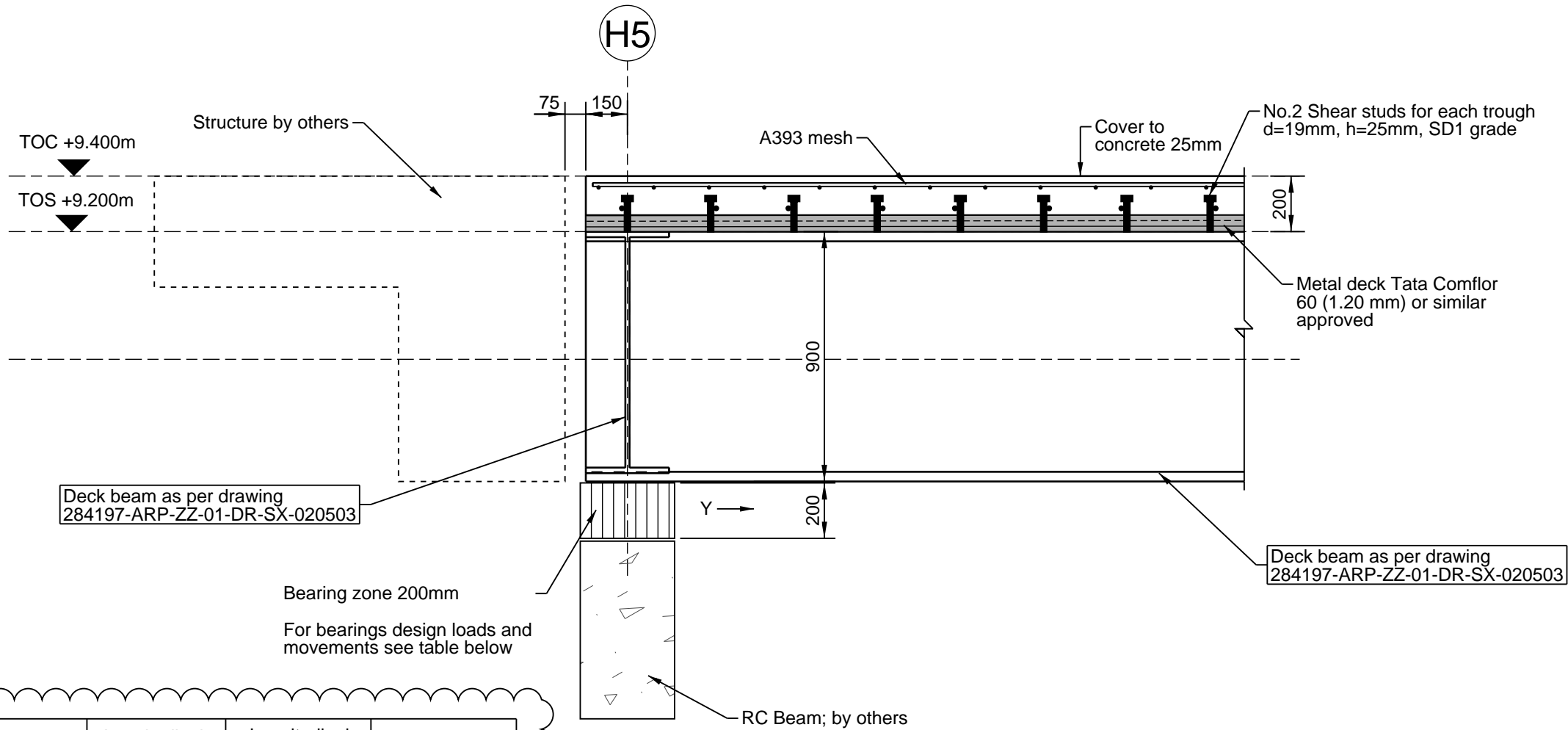
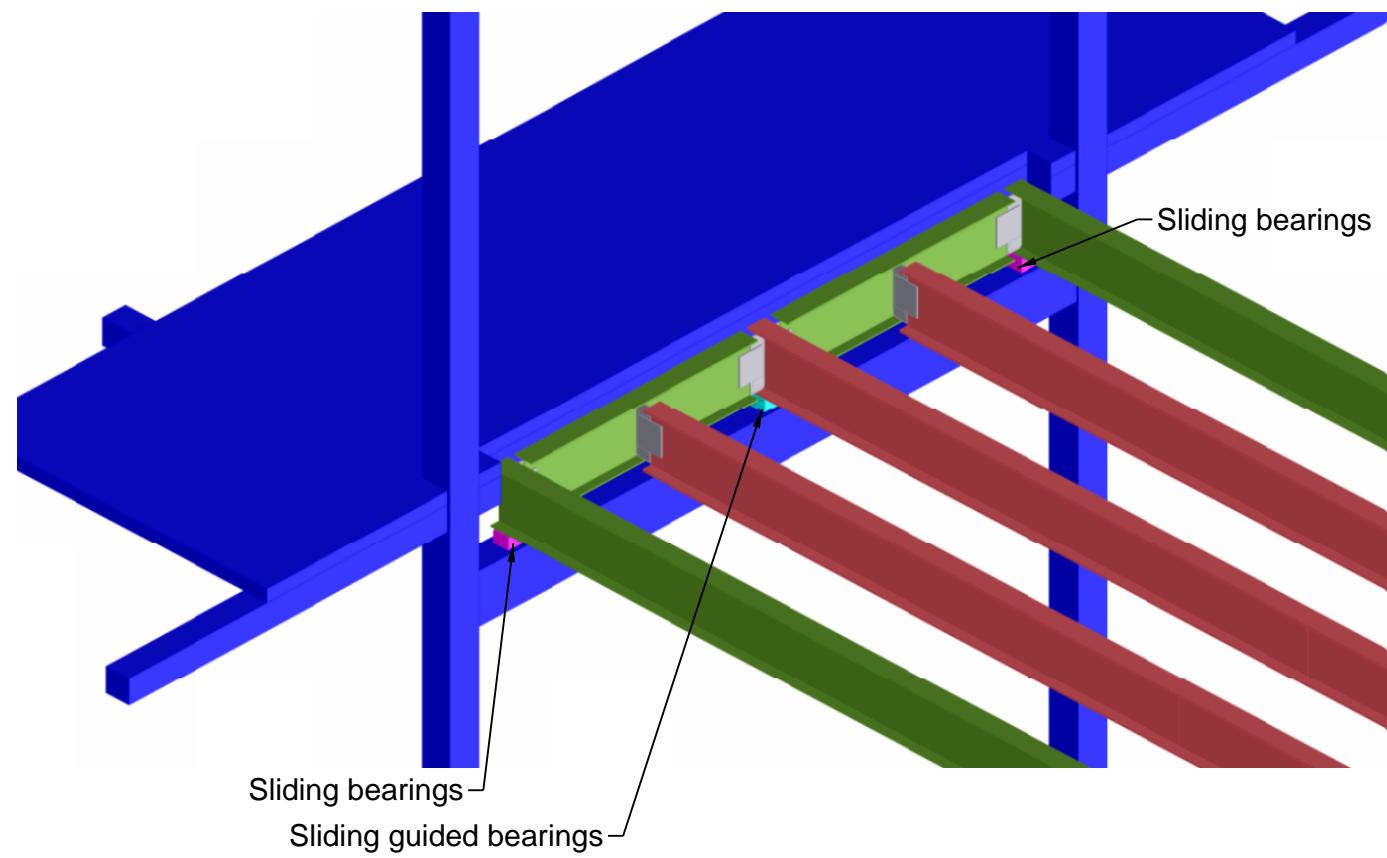


Section 3-3
Scale 1:20
(SX-020504)



Section 2-2
Scale 1:20
(SX-020504)

Concrete topping M35



Grid location	Type	Vertical ULS load	Horizontal ULS load	Longitudinal movement (y direction)	Longitudinal movement (x direction)	Rotation about x axis
		[kN]	[kN]	[mm]	[mm]	[m rad]
H5: -4 and H5: +4	Sliding guided elastomeric bearing	1900	550	60	0	12
H5: -5, H5: -3, H5: +3, H5: +5	sliding elastomeric bearing	900	0	60	5	12

Section 4-4
Scale 1:20
(SX-020504)

Note: Clear cover to reinforcement for deck slab = 25mm

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INDIA PRIVATE

MUMBAI 400093

FIELD OFFICE

GOOD FOR CONSTRUCTION

By: Francis Archer

Date: 22-02-2024

02	22/02/24	Good for Construction
01	17/10/23	Good for Construction
Issue	Date	

ARUP

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title

Sections
Concourse and Foot-over-bridges
Deck details and interface with the
neighbouring building

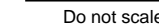
Scale at A1 1:20 By/Chkd/Appd PB/EB/FA&FB

Role Structural

Status S4 - Submission

Arup Job No 284197 Rev 02

ID 284197-ARP-ZZ-ZZ-DR-SX-050503



Additional top flange restraining members may be needed for the temporary condition prior to concrete curing. These should be decided together with the Contractor after the launching methodology is developed.

* Full strength splice locations to be decided by the Contractor

** At locations with precast planks (North FOB and Concourse), shear studs at spacing of 500mm

Notes:

Foundation design by others (specialist sub-contractor).
Others design responsibility stops at the super structure
and does not include foundation design.

All steel to be grade E350 unless noted otherwise.

Architectural setting out of Safdarjung Station and
platforms by others.

Drawings to be read together with the latest revision of
Structural Specification
284197-AR-ZZ-ZZ-PR-000005.

All dimensions are in millimetres (mm) and all levels
are in metres (m), unless noted otherwise.

No dimensions shall be scaled from this drawing

Fabrication / shop drawings shall be approved by the
Engineer prior to commencing fabrication.

04	26/04/24	Good for Construction
03	22/02/24	Good for Construction
02	14/11/23	Good for Construction
01	16/10/23	Good for Construction
Issue	Date	

Arup IP Limited
Off Western Express Highway Andheri (East)
5th Floor Jet Prime Suren Road
Mumbai
www.arup.com

Rail Land Development Authority
Ministry of Railways

Project Title

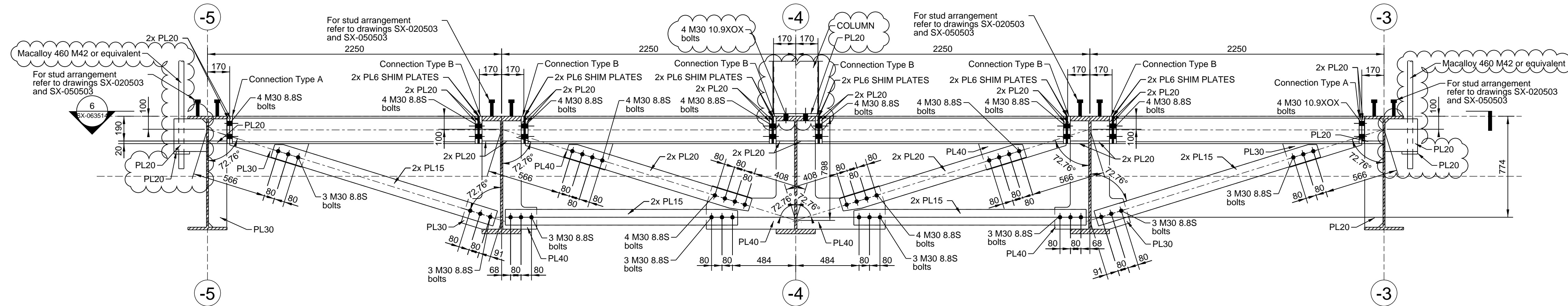
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title

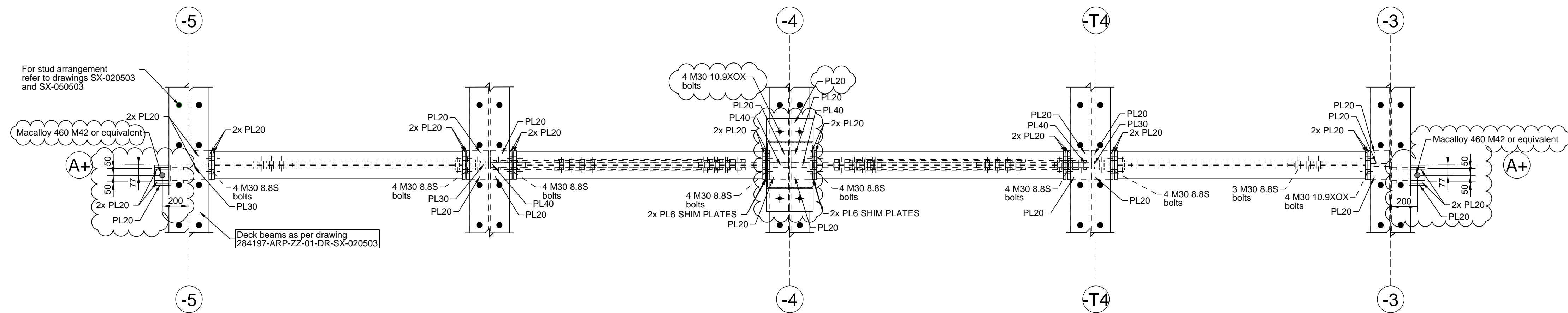
General Arrangement
Concourse and Foot-over-bridge
Steelwork Plan

Scale at A1	1:2000	By/Crkd/Appd PB/EB/FA&FB
Role	Structural	
Status	S4 - Submission	
Arup Job No	284197	Rev 04
ID	284197-ARP-ZZ-01-DR-SX-020503	

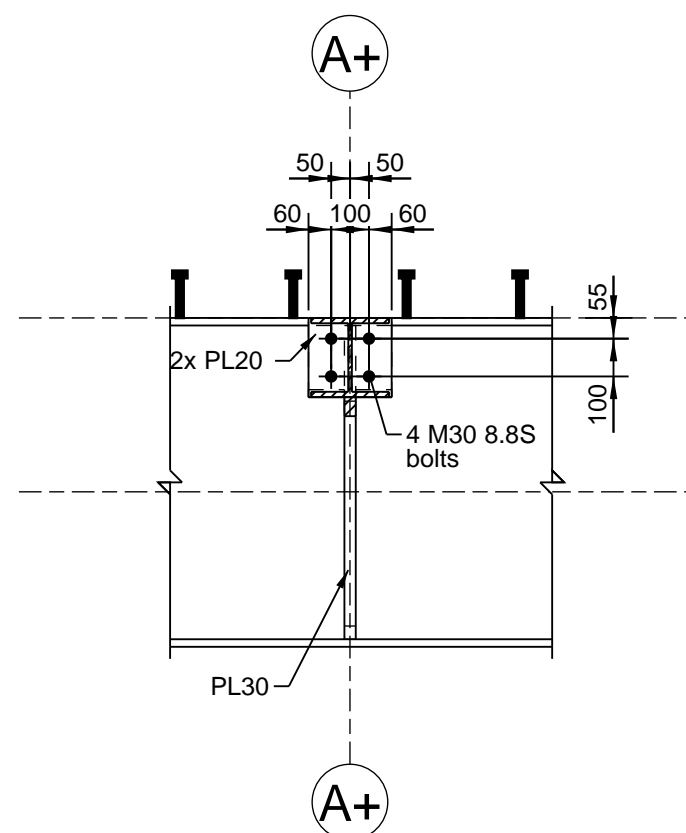
17.000 17.000 17.000



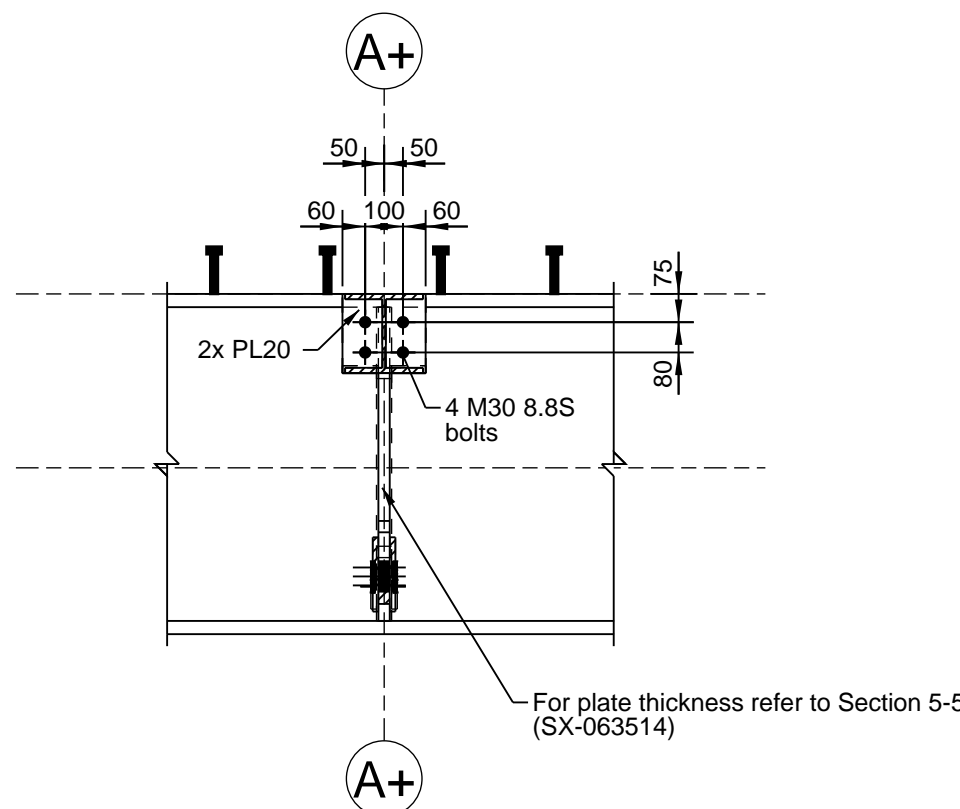
Section 5-5
Scale 1:20
(SX-020503)



Section 6-6
Scale 1:20
(SX-063514)



Connection Type A
Scale 1:20
(SX-063514)



Connection Type B
Scale 1:20
(SX-063514)

Notes:

- Foundation design by others (specialist sub-contractor). Arup's design responsibility stops at the super structure and does not include foundation design.
- All steel to be grade E350 unless noted otherwise.
- Architectural setting out of Safdarjung Station and platforms by others.
- Drawings to be read together with the latest revision of Structural Specification 284197-ARP-ZZ-RP-ZX-000005.
- All dimensions are in millimetres (mm) and all levels are in metres (m), unless noted otherwise.
- No dimensions shall be scaled from this drawing
- Fabrication / shop drawings shall be approved by the Engineer prior to commencing fabrication.

GOOD FOR CONSTRUCTION
By: Francis Archer
Date: 14-11-2023

02	14/11/23	Good for Construction
01	17/10/23	Good for Construction
Issue	Date	

ARUP

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www.arup.com

Client
Rail Land Development Authority
Ministry of Railways

Project Title
Innovative Design of Modular
Railway Station Components
in Brownfield Projects
Safdarjung Station

Drawing Title
General Arrangement and Details
Foot-over-bridge
Truss at GL-A+

Scale at A1	1:20	By/Chkd/Appd	PB/EB/FA&FB
Role	Structural		
Status	S4 - Submission		
Arup Job No	284197	Rev	02
ID	284197-ARP-FB-01-DR-SX-063514		

APPROVED
By: Himanshu Singh
Date: 17-07-2024