The Santa Sophia Catholic College

ACSE SEMINAR IN THE PUB

ARTIST IMPRESSION

ARTIST IMPRESSION


EUCALYPTUS TERETICORNIS
FOREST RED GUM
ACACIA IMPLEXA
HICKORY WATTLE

Catholic Education Diocese of Parramatta

End client. Owner and operator of the new $123m K-12 private school. Expected to cater up to 1900 students

BVN

Project architect and interior architect

TSA

Project manager

Buildcorp

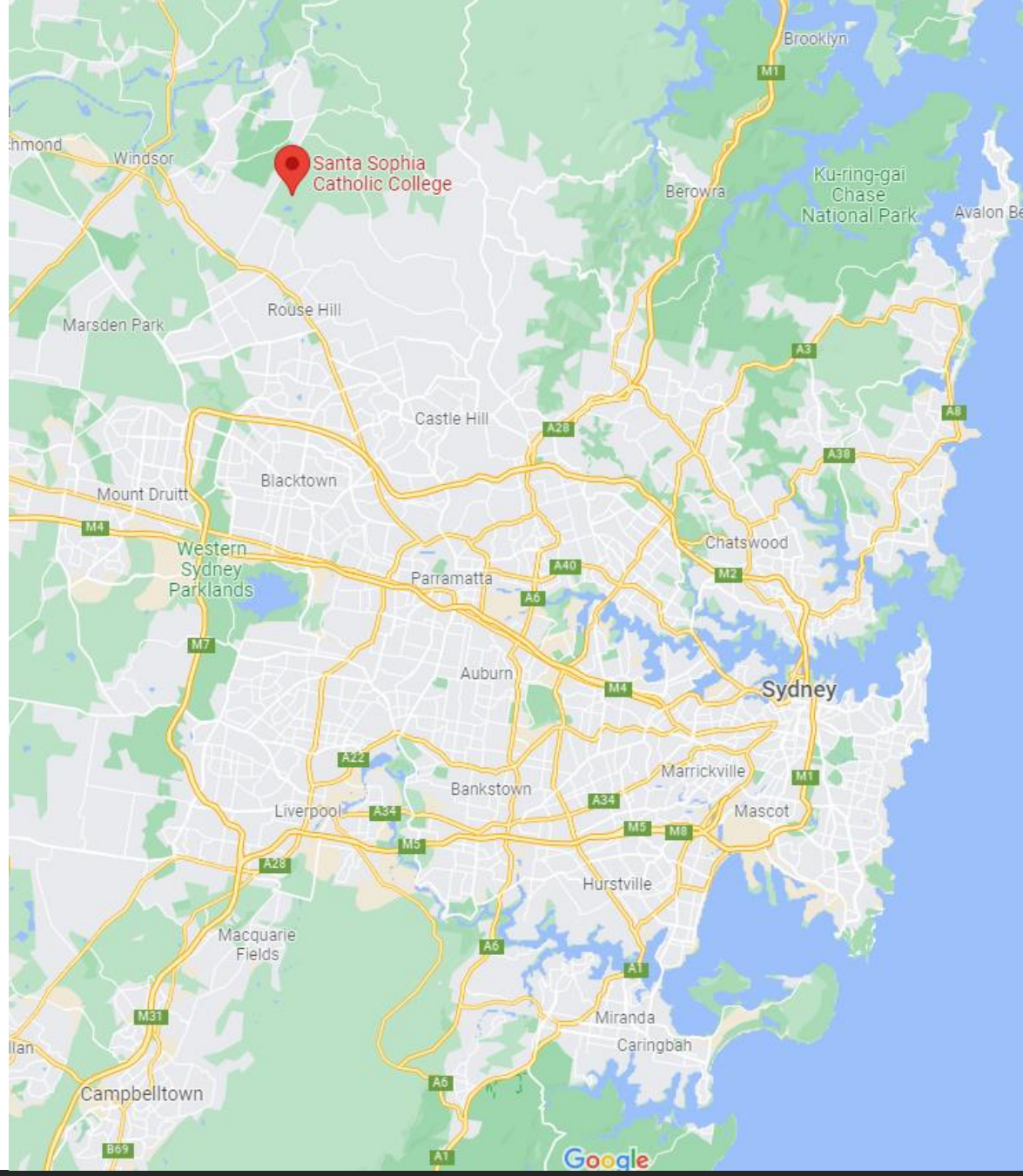
Head building contractor

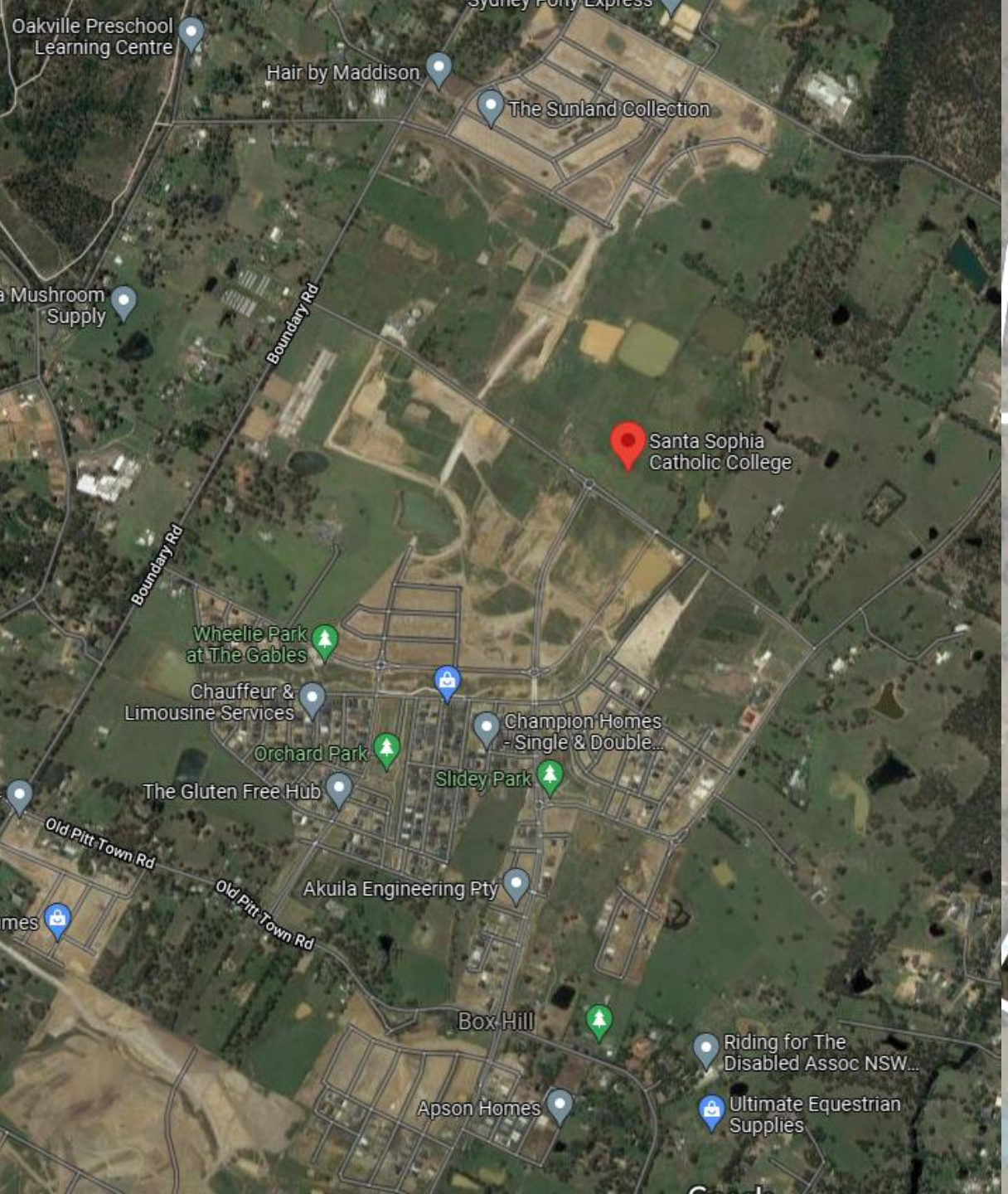
NORTHROP

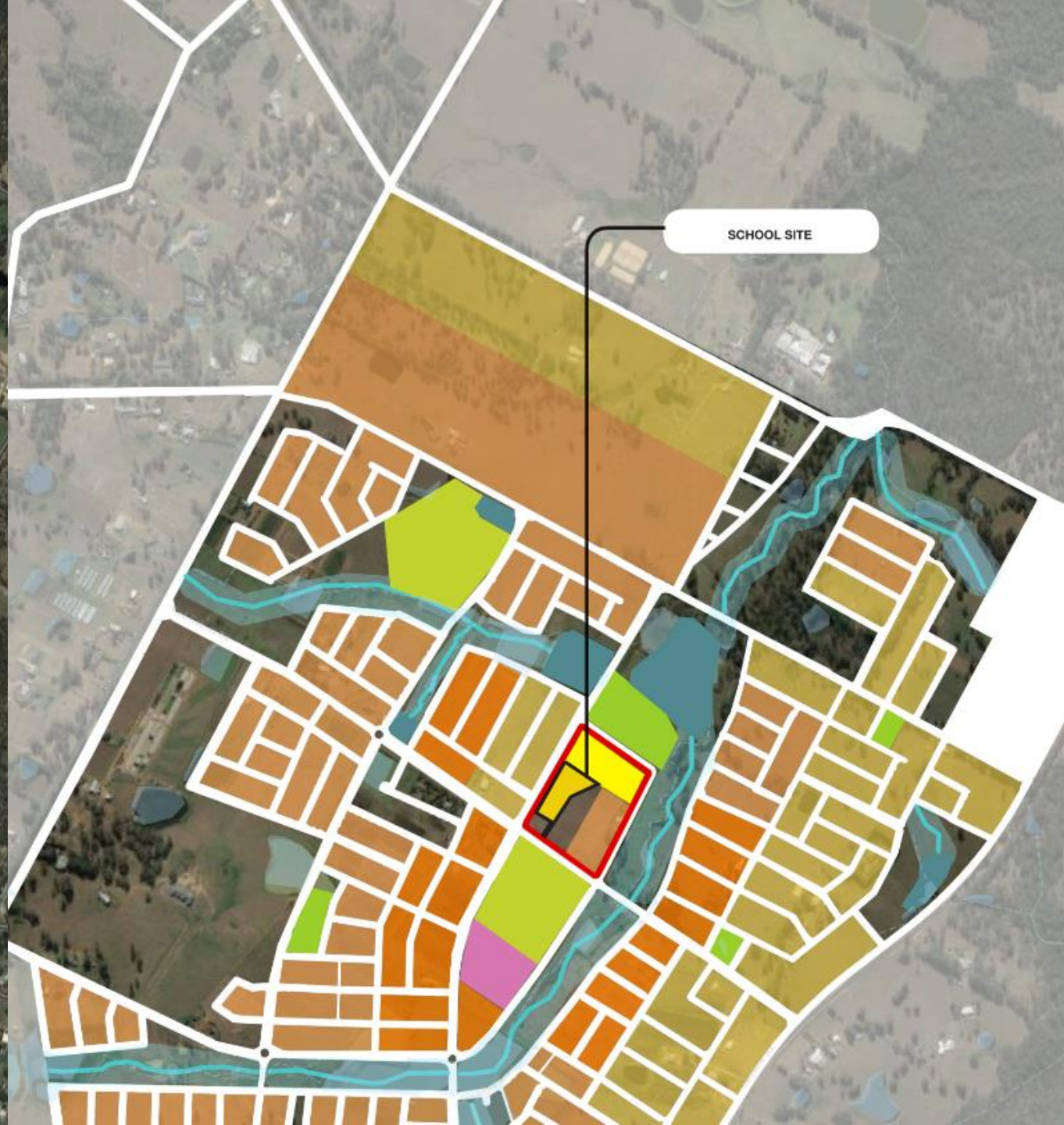
Structural engineer

BlueScope

Assisted Northrop with early stage concept design advice. Ongoing technical support. Fielders decking supplier.




Oakville Preschool Learning Centre
Hair by Maddison
The Sunland Collection
Mushroom Supply
Boundary Rd
Santa Sophia Catholic College
Boundary Rd
Wheelie Park at The Gables
Chauffeur & Limousine Services
Champion Homes - Single & Double...
Orchard Park
Slidey Park
The Gluten Free Hub
Old Pitt Town Rd
Old Pitt Town Rd
Akuila Engineering Pty
Box Hill
Riding for The Disabled Assoc NSW...
Apson Homes
Ultimate Equestrian Supplies


SCHOOL SITE

DESIGN OPTION 1

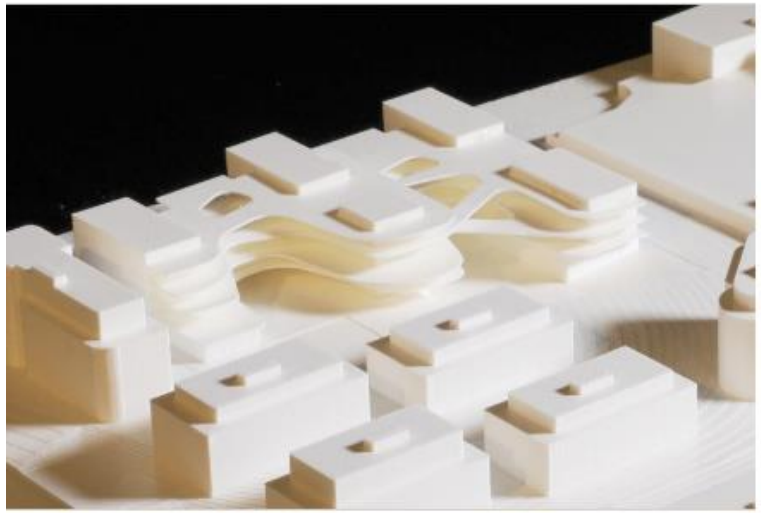
This massing option was explored and presented to the client with option 2. It was found to be the preferred option.

DESIGN OPTION 2

Developed and presented to the client.

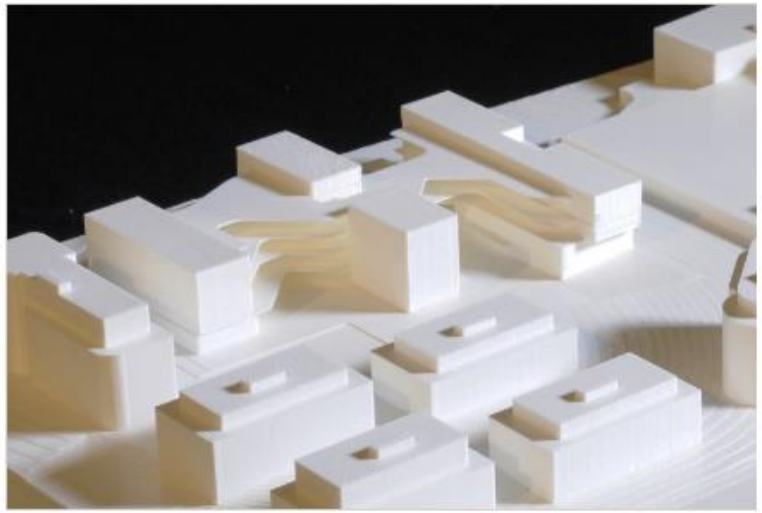
DESIGN OPTION 3

A design development of option 1. The full ribbon was found to be too enclosed and lacked a presence to the plaza or an urban address.



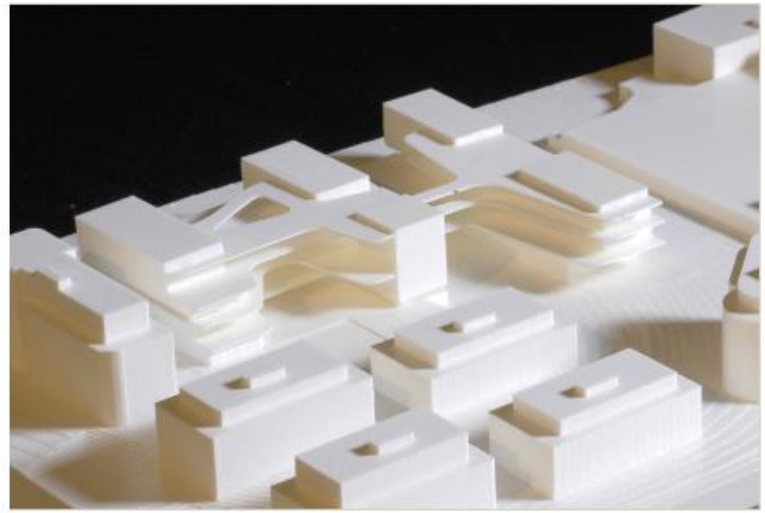
DESIGN OPTION 3A

Stacking play areas, creating bridges between buildings and introducing voids.



DESIGN OPTION 3B

Removing bridges and introducing play areas to the north of the site.



DESIGN OPTION 3C

Re- introducing voids to improve lighting conditions in the deeper floor plates.

The Design Journey: The Beginning

December 2018

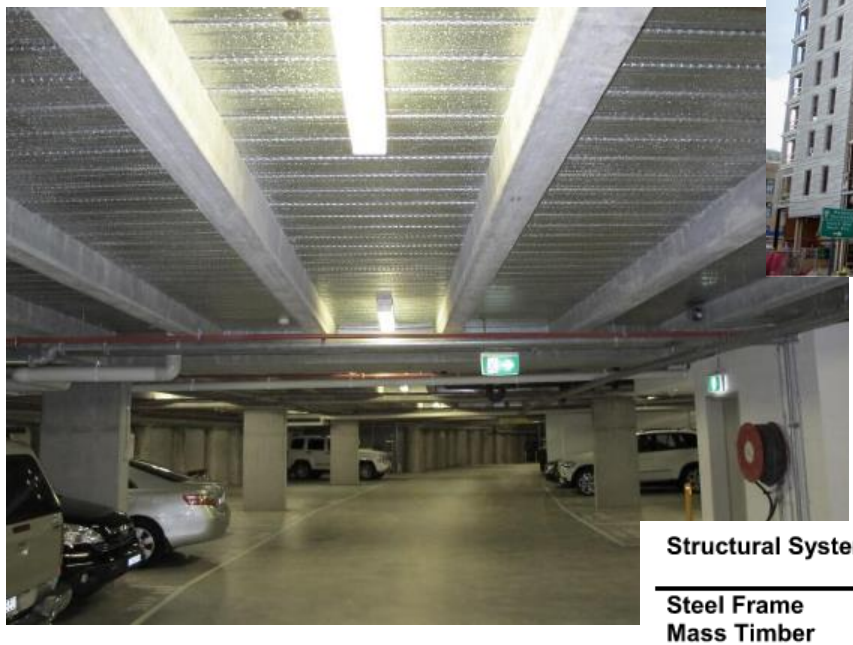
Northrop work with Buildcorp to develop a ‘rapid build’ scheme for a new ‘modular’ school ECI proposal

Modular with a Difference

Prefabbed ‘modules’ lock in contractors at an early stage during design development

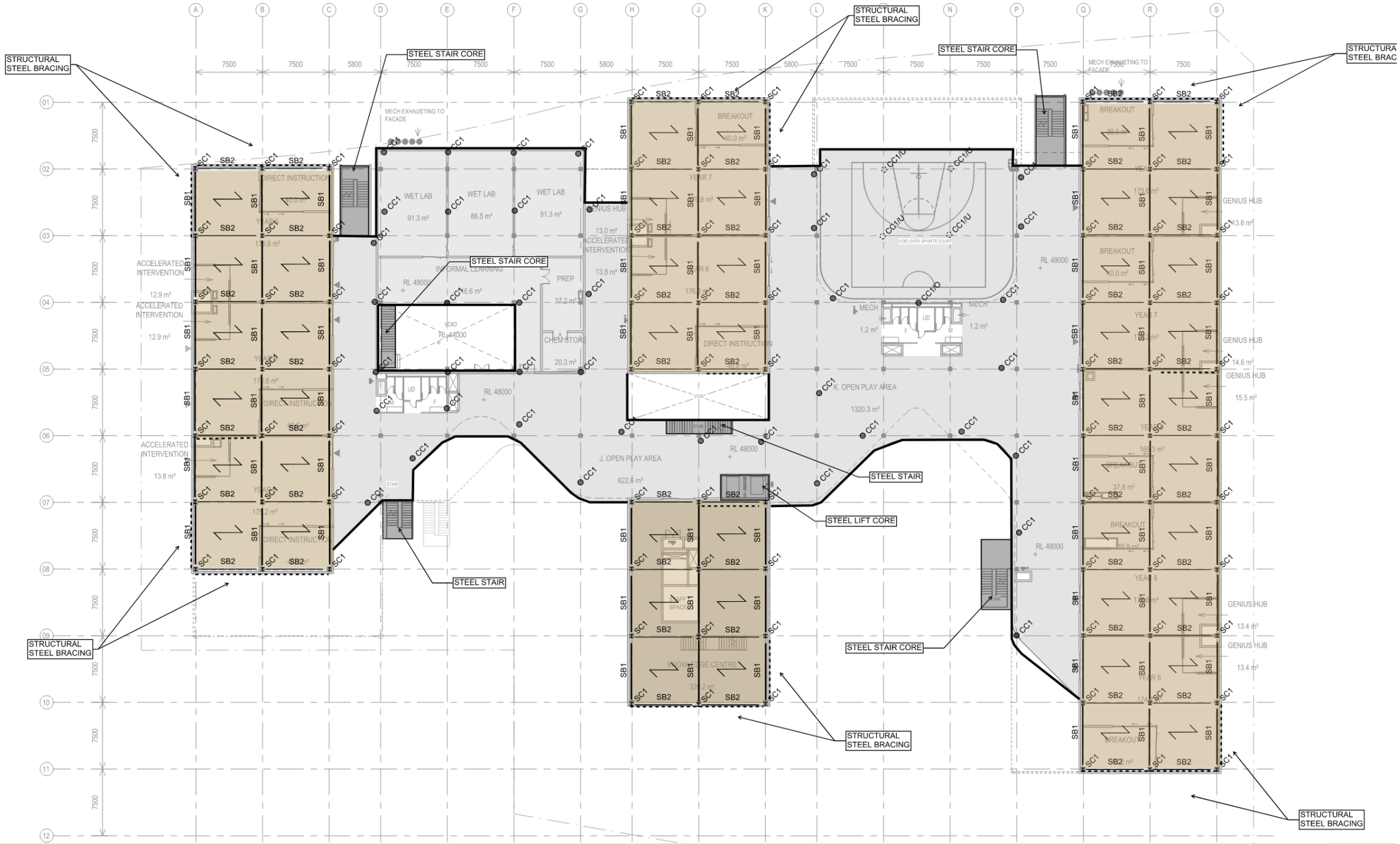
One supplier increases the procurement risk & decreases potential for market competition

Stick with off-site fabrication for structure. Leverage Buildcorp’s joinery business Euroline to prefabricate joinery/internal finishes

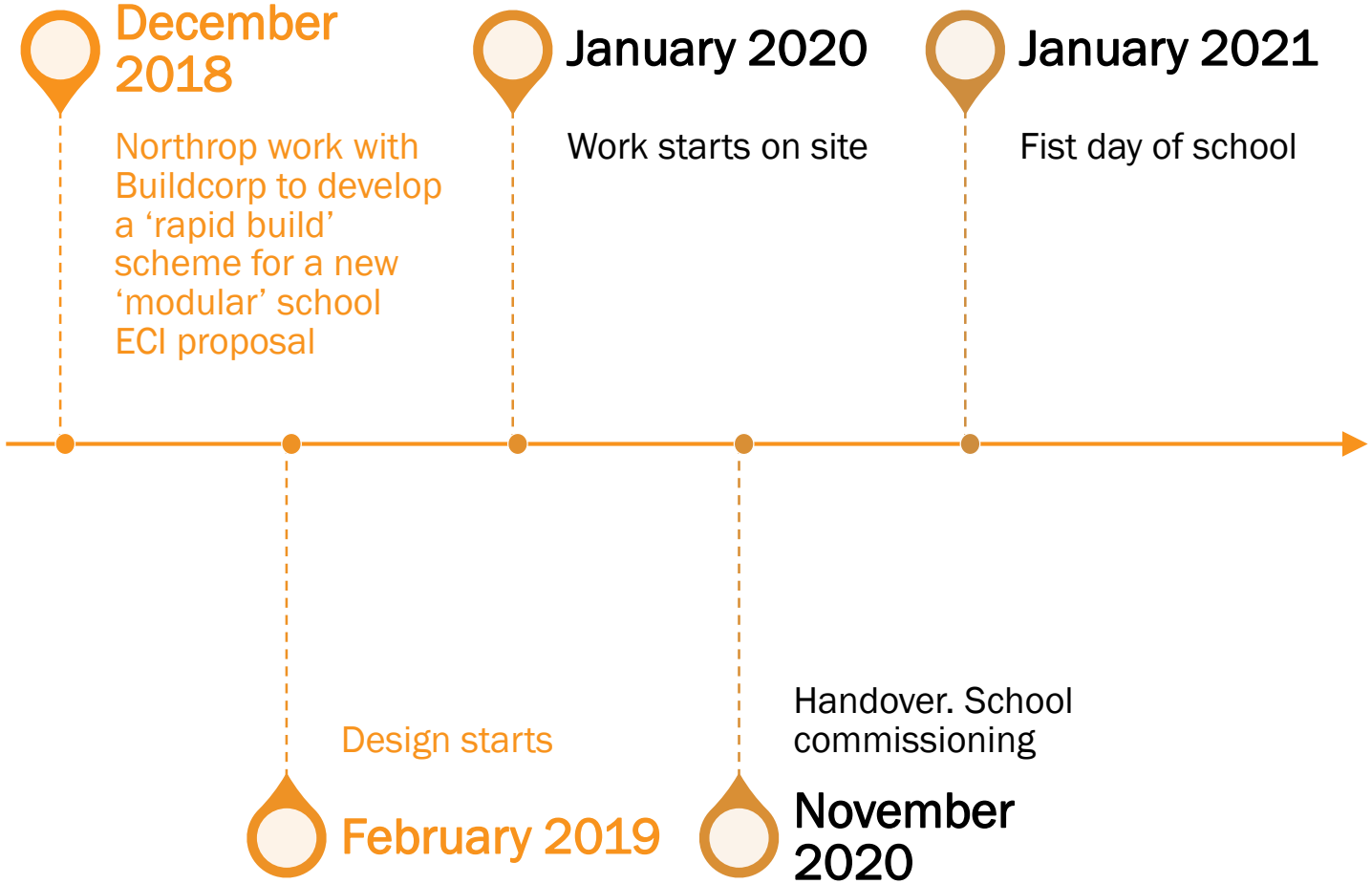


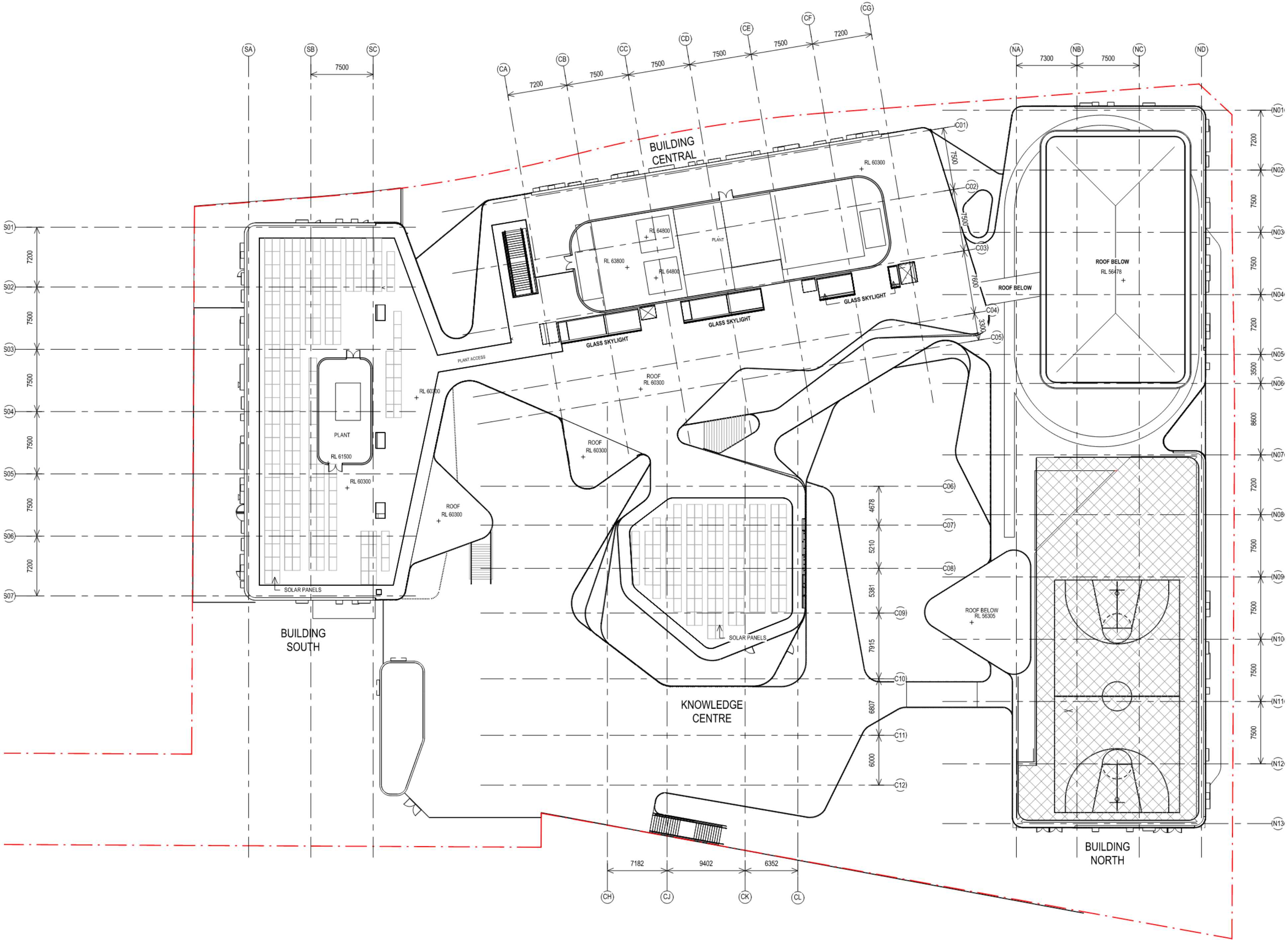
Structural System	Product Availability	Speed of Construction	Cost
Steel Frame	Readily Available	High	Medium
Mass Timber	Restricted Availability	High	Medium
Precast Concrete	Limited Availability	Medium	Low

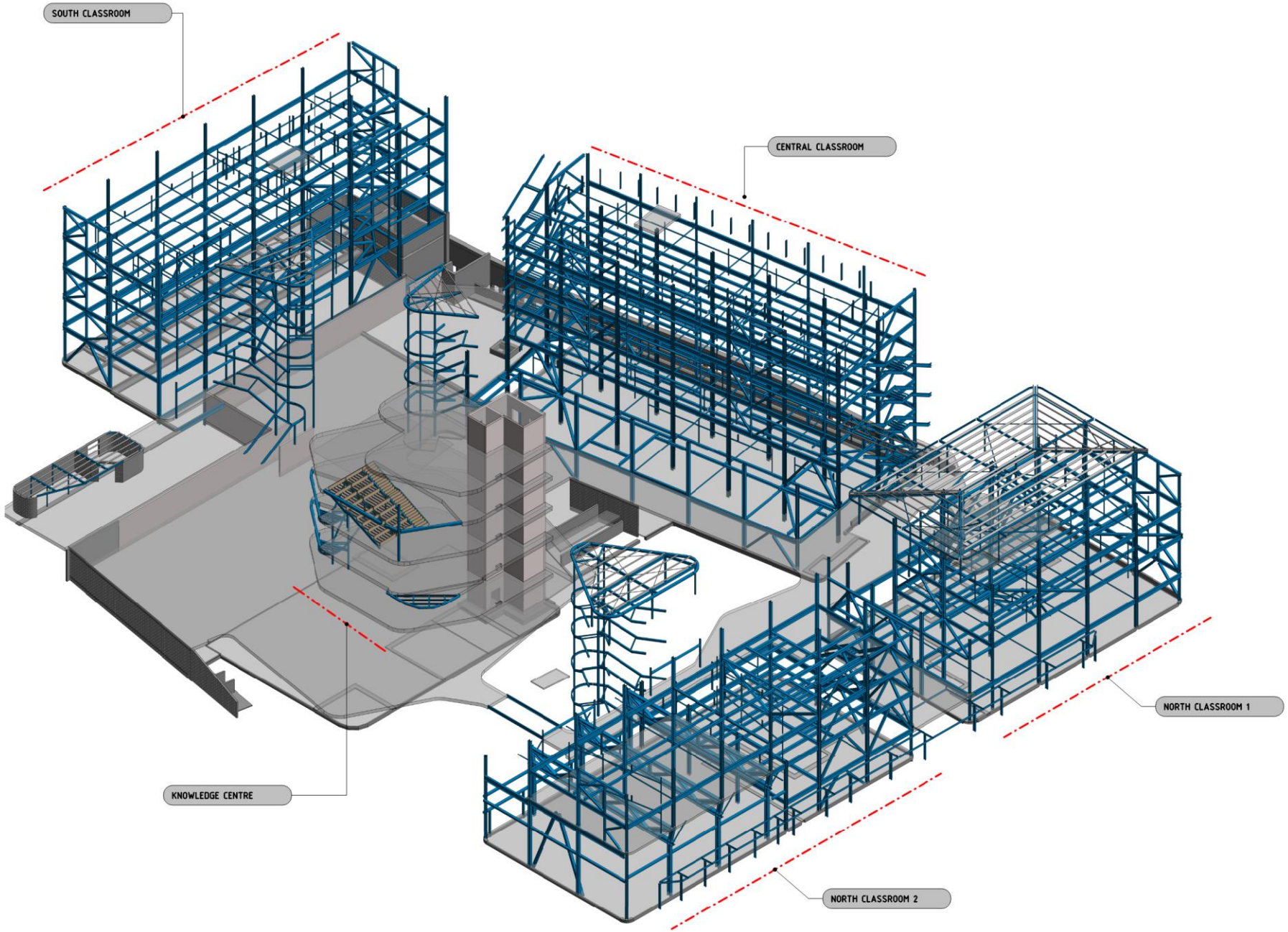
Table 2.5.1 – Structural system matrix


STRUCTURAL STEEL BRACING
STEEL STAIR CORE
STRUCTURAL STEEL BRACING
STEEL STAIR CORE
STRUCTURA STEEL BRAC
MECH EXHAUSTING TO FACADE
DIRECT INSTRUCTION
WET LAB
WET LAB
WET LAB
GENIUS HUB
ACCELERATED INTERVENTION
INFORMAL LEARNING
PREP
CHEM STORE
STEEL STAIR CORE
VOID
RL 44000
RL 48000
ACCELERATED INTERVENTION
ACCELERATED INTERVENTION
DIRECT INSTRUCTION
BREAKOUT
YEAR 7
YEAR 6
VOID OVER SPORTS COURT
MECH
MECH
K. OPEN PLAY AREA
1320.3 m²
STEEL STAIR
J. OPEN PLAY AREA
622.6 m²
STEEL LIFT CORE
STEEL STAIR
STEEL STAIR CORE
STRUCTURAL STEEL BRACING
STRUCTURAL STEEL BRACING
STRUCTURAL STEEL BRACING
GENIUS HUB
GENIUS HUB
GENIUS HUB
GENIUS HUB
YEAR 8
BREAKOUT
7500
5800

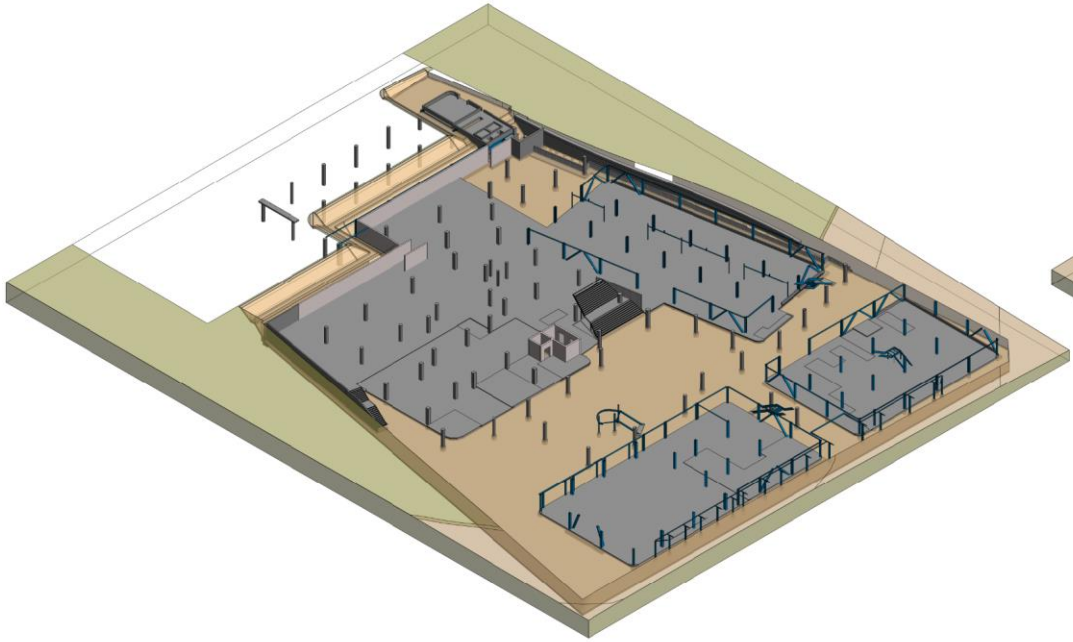
The Design Journey: Start of Design



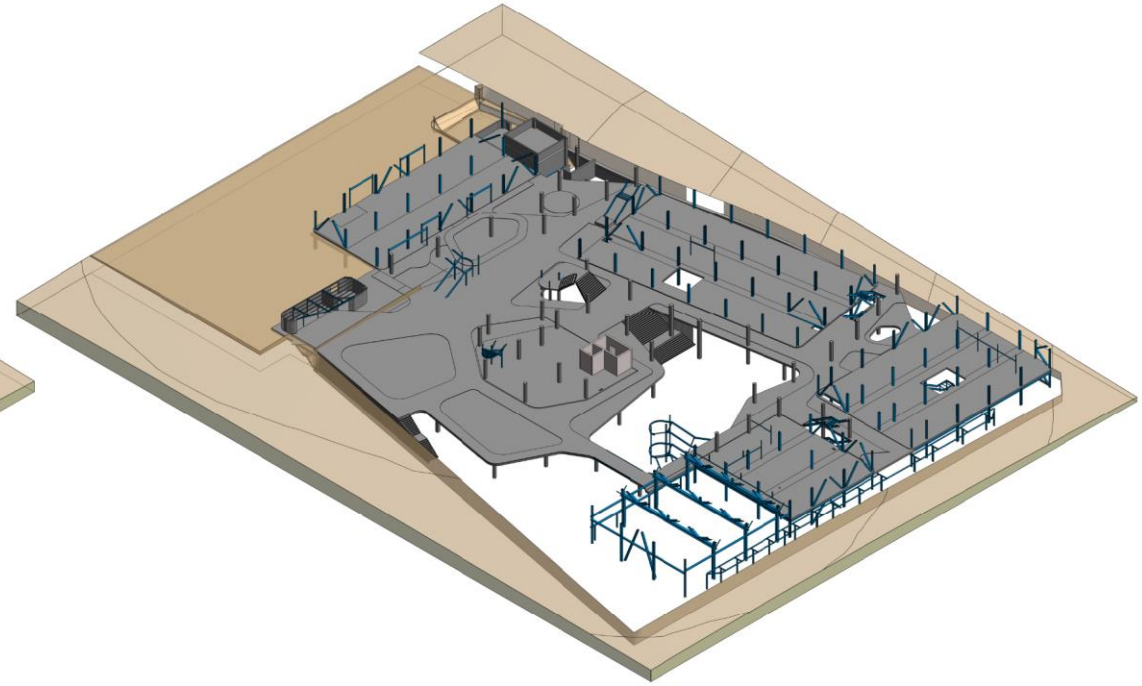

BUILDING CENTRAL
BUILDING SOUTH
KNOWLEDGE CENTRE
BUILDING NORTH
PLANT
RL 61500
RL 60300
SOLAR PANELS
GLASS SKYLIGHT
PLANT ACCESS
ROOF
RL 60300
RL 63800
RL 64800
ROOF BELOW
RL 56478
ROOF BELOW
RL 56305



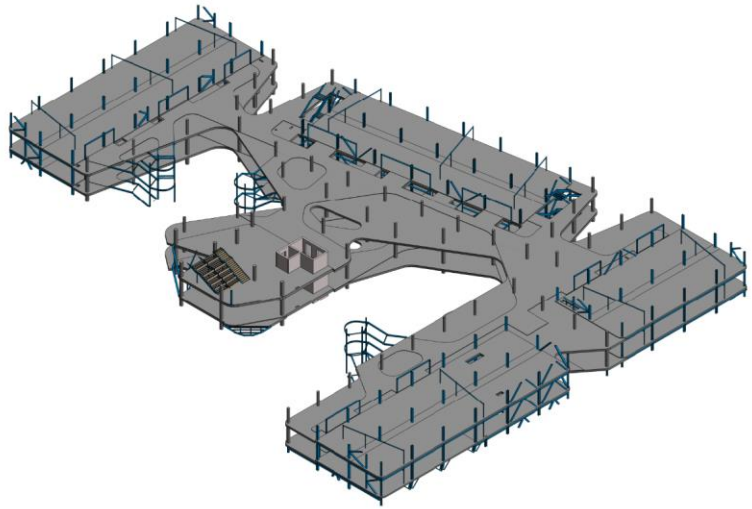
3D - OVERALL SITE



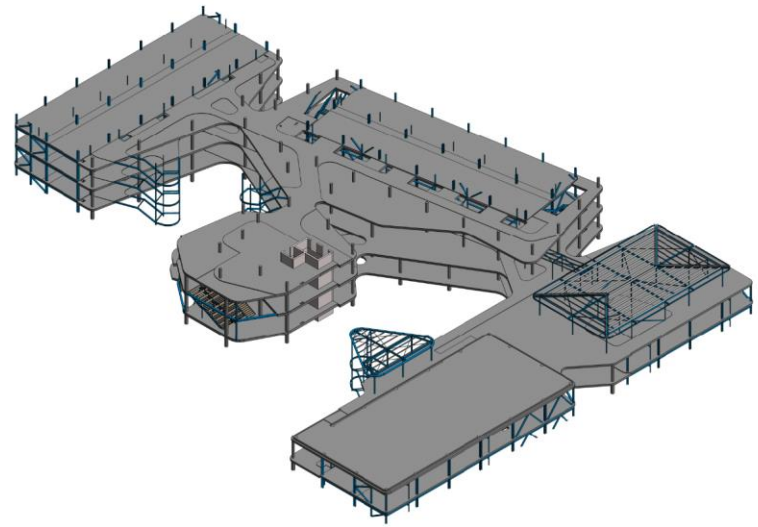
LEVEL 00 - 3D VIEW



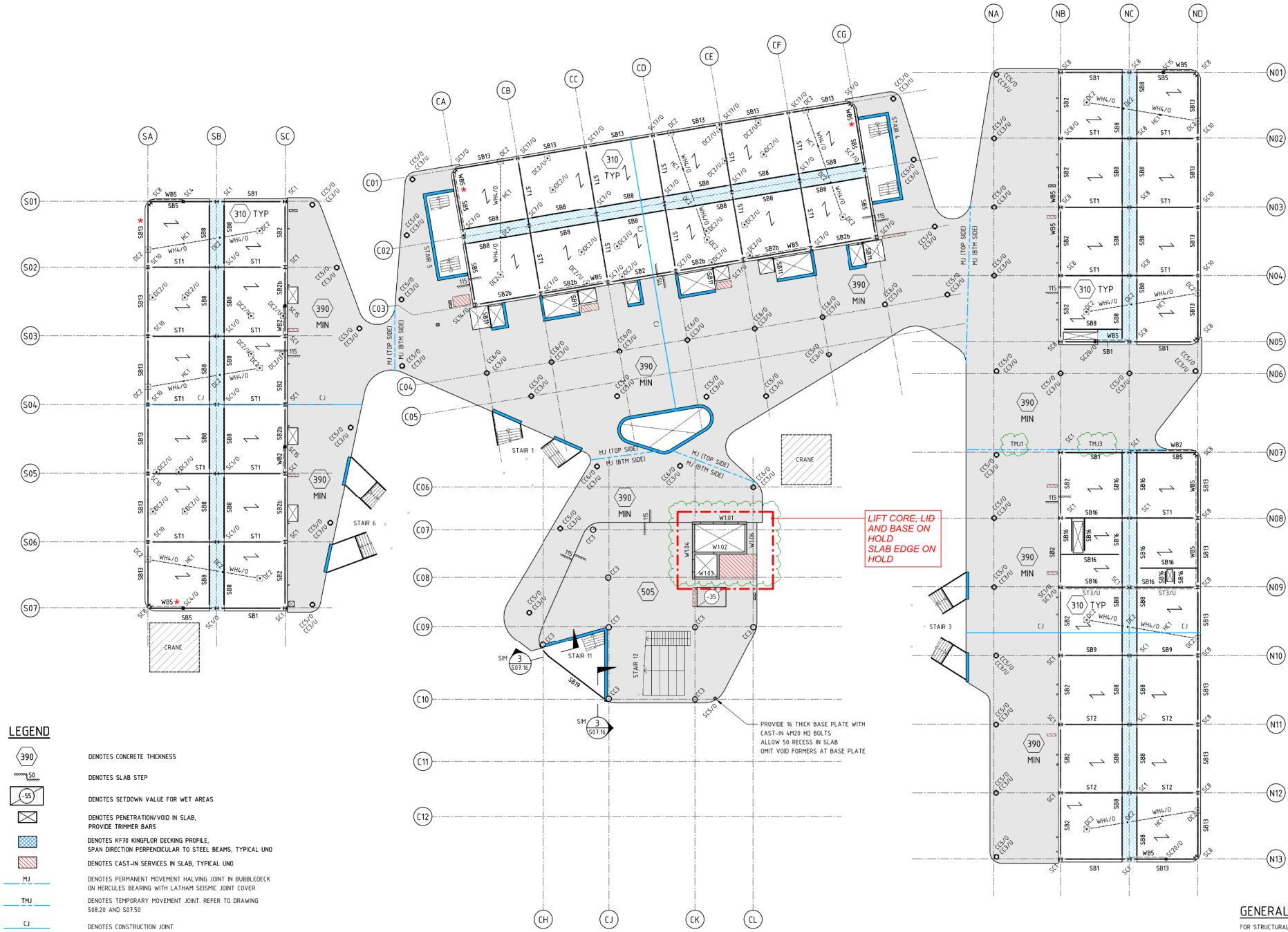
LEVEL 01 - 3D VIEW



LEVEL 02 AND 03 - 3D VIEW



LEVEL 03, 04 AND 05 - 3D VIEW



CONCRE	
MARK	SIZE
COLUMN	
CC1	600 DIA
CC2	550 x 550
CC3	600 DIA
CC4	750 DIA
CC5	450 DIA
CC6	450 DIA
CC7	500 DIA
CC8	350 x 350

LEGEND

- 390 — DENOTES CONCRETE THICKNESS
- 50 — DENOTES SLAB STEP
- -55 — DENOTES SETDOWN VALUE FOR WET AREAS
- DENOTES PENETRATION/VOID IN SLAB, PROVIDE TRIMMER BARS
- DENOTES KF70 KINGFLOR DECKING PROFILE, SPAN DIRECTION PERPENDICULAR TO STEEL BEAMS, TYPICAL UNO
- DENOTES CAST-IN SERVICES IN SLAB, TYPICAL UNO
- MJ — DENOTES PERMANENT MOVEMENT HALVING JOINT IN BUBBLEDECK ON HERCULES BEARING WITH LATHAM SEISMIC JOINT COVER
- TMJ — DENOTES TEMPORARY MOVEMENT JOINT. REFER TO DRAWING S08.20 AND S07.50
- CJ — DENOTES CONSTRUCTION JOINT
- CC1/0 — DENOTES REINFORCED CONCRETE COLUMN OVER
- CC1/U — DENOTES REINFORCED CONCRETE COLUMN UNDER

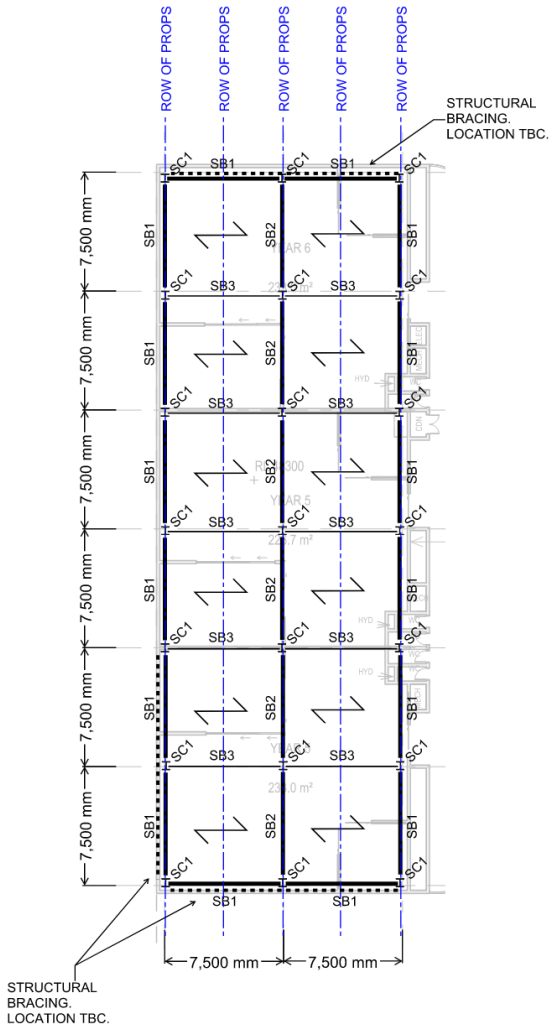
LEVEL 03 - OVERALL SLAB PLAN

GENERAL NOTES

FOR STRUCTURAL SPECIFICATIONS REFER

SLABS TO BE 390 THICK. SLABS CAST AC
DESIGNED BY BUBBLEDECK CONTRACTOR (

ALL BUBBLEDECK SLABS TO BE TEMPORA

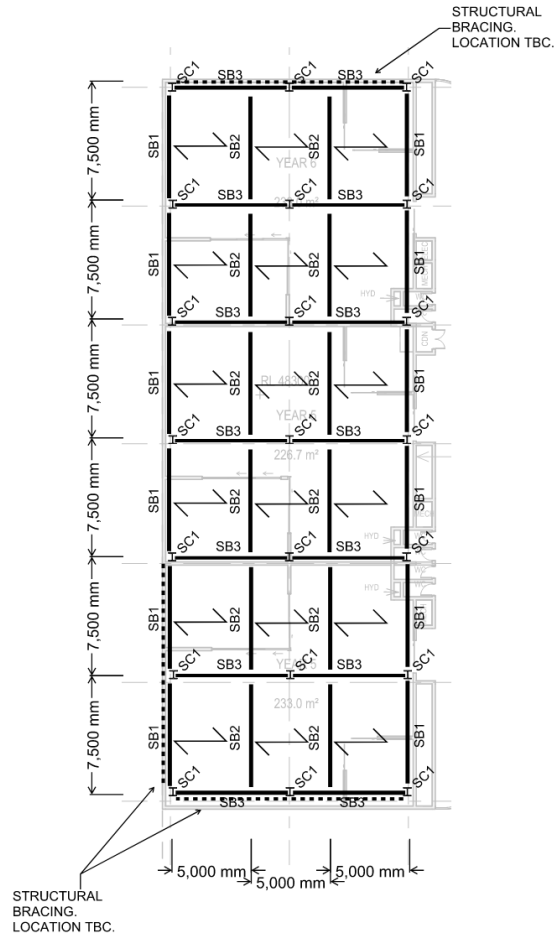


OPTION A1 & A2
7.5x7.5m GRID - PROPS

FLOORING:
KINGFLOR 'SLIMFLOR 210' METAL DECKING OR SIMILAR. 310MM THICK.

BEAMS:
SB1 - 530UB92
SB2 - 530UB92 (OPTION A1)
SB2 - 310UC118+15x510 PLATE+2/50x5SHS (OPTION A2)
SB3 - 90x5 SHS

PROPPING:
1 ROW OF PROPS MID-SPAN OF EACH SLAB
1 ROW OF PROPS UNDER BEAMS SB1 & SB2

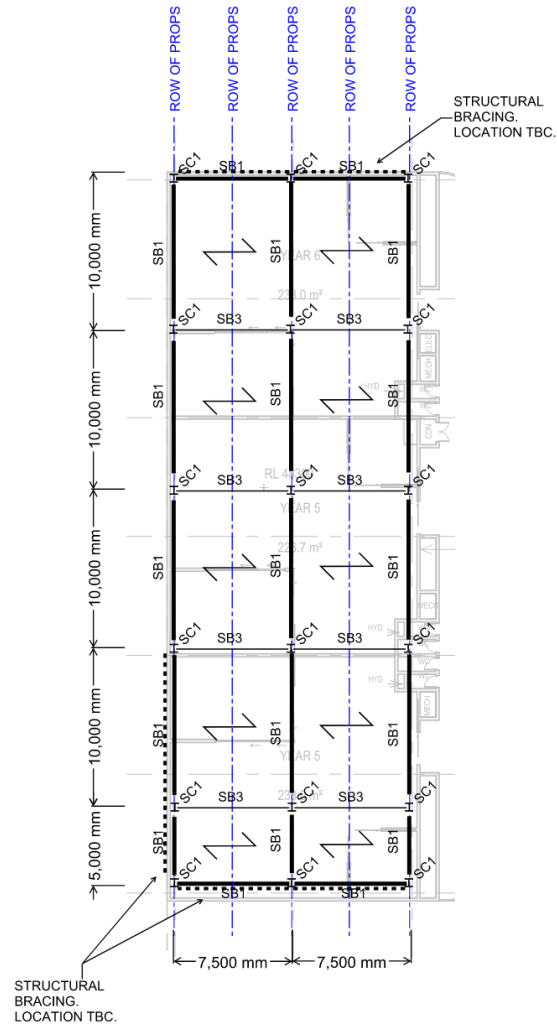


OPTION B1 & B2
7.5x5m GRID - NO PROPS

FLOORING:
KINGFLOR 'SLIMFLOR 210' METAL DECKING OR SIMILAR. 310MM THICK.

BEAMS:
SB1 - 530UB82
SB2 - 530UB82 (OPTION B1)
SB2 - 250UC89.5+16x460 PLATE (OPTION B2)
SB3 - 610UB113

PROPPING:
NO PROPPING REQUIRMENTS

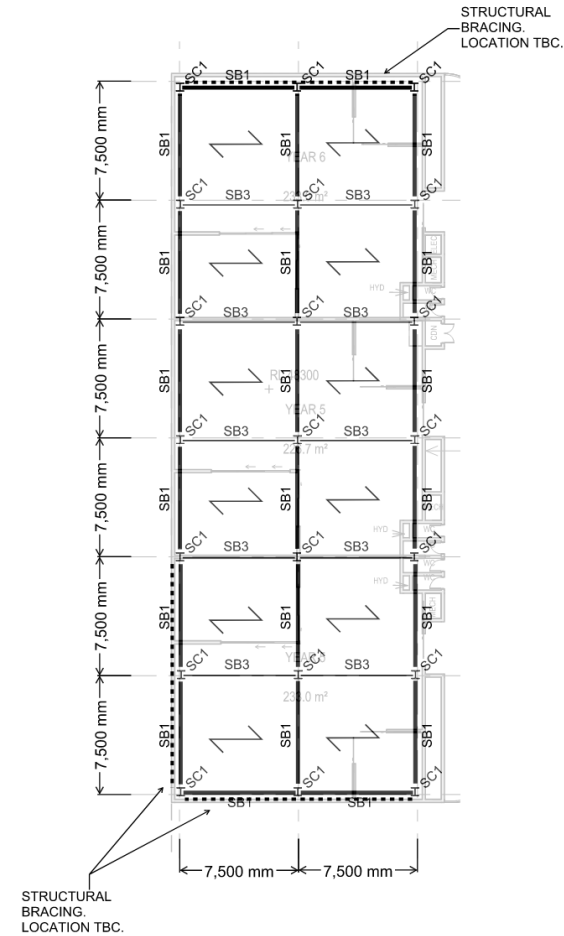


OPTION C
10x7.5m GRID - PROPS

FLOORING:
KINGFLOR 'SLIMFLOR 210' METAL DECKING OR SIMILAR. 310MM THICK.

BEAMS:
SB1 - 610UB125
SB3 - 90x5 SHS

PROPPING:
1 ROW OF PROPS MID-SPAN OF EACH SLAB
1 ROW OF PROPS UNDER BEAMS SB1 & SB2



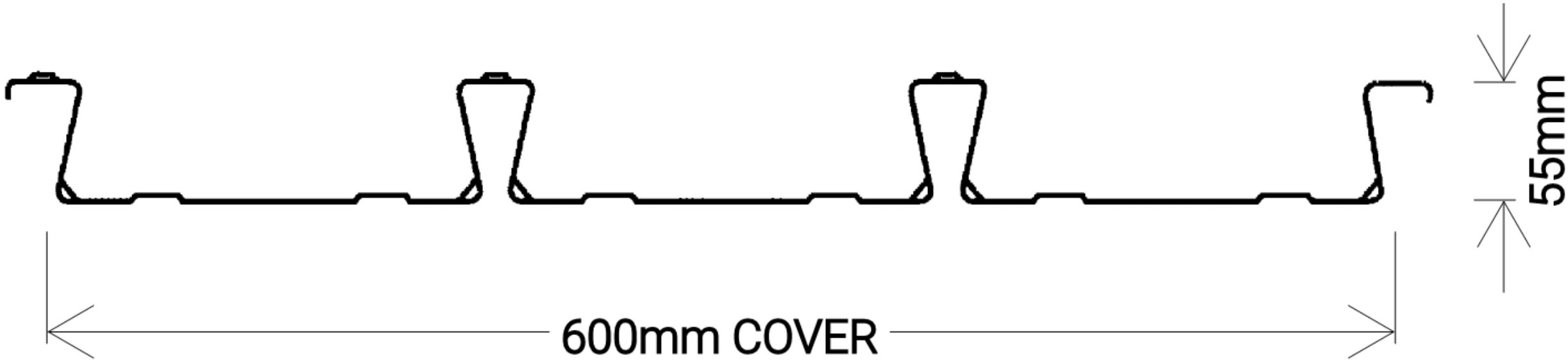
OPTION D
7.5x7.5m GRID - TIMBER

FLOORING:
XLAM CL7/295 CLT FLOORING WITH 50mm CONCRETE TOPPING LAYER

BEAMS:
SB1 - 310UC137+15x510 PLATE
SB3 - 90x5 SHS

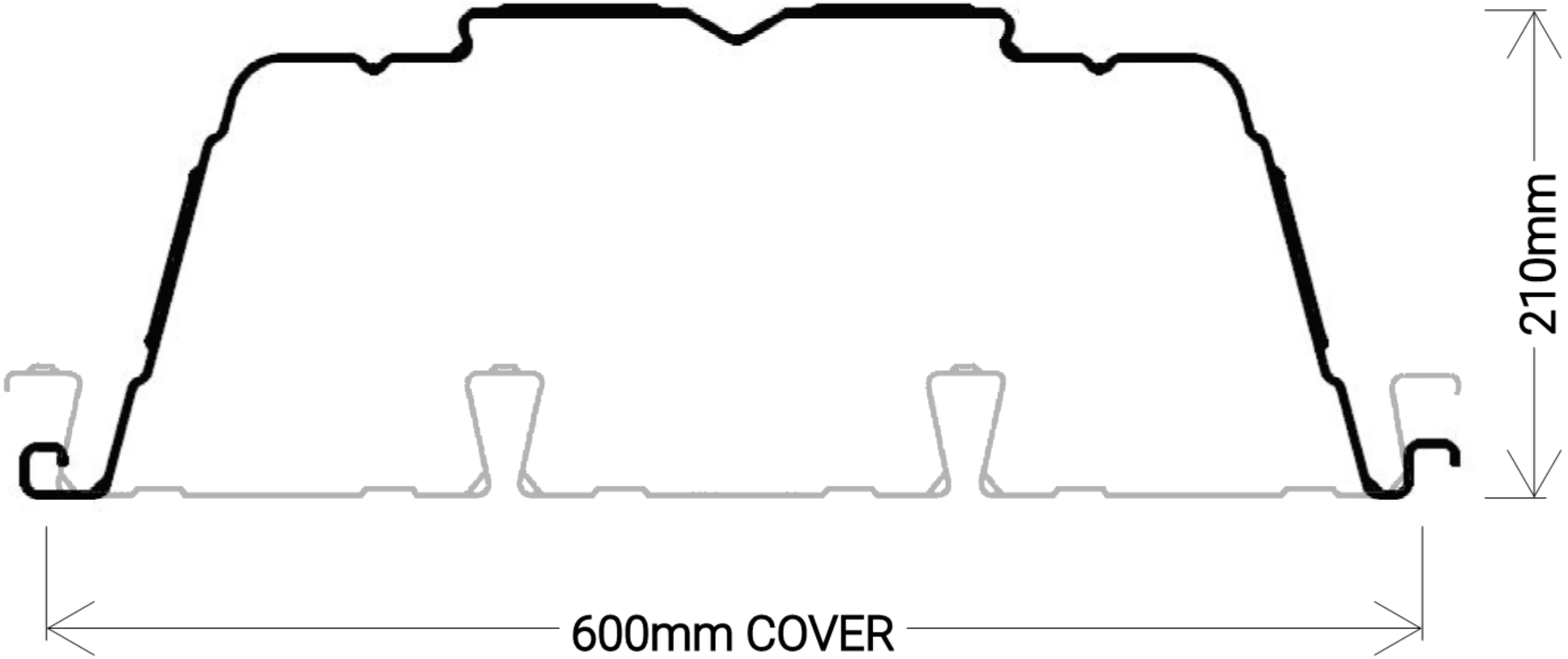
PROPPING:
1 ROW OF PROPS MID-SPAN OF EACH SLAB
1 ROW OF PROPS UNDER BEAMS SB1 & SB2

“Traditional” Composite Decking – e.g. RF55/Bondek



KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

SlimDek 210® is a composite metal deck formwork with deep ribs, allowing unpropped spans **up to 7m to be achieved**



FIELDERS

SlimDek 210® in SlimFlor vs “Traditional” Composite

SlimFlor® - Primary ASB + SlimDek 210®
no secondary beams

Vs.

Conventional Primary-secondary steel framing +
structural decking

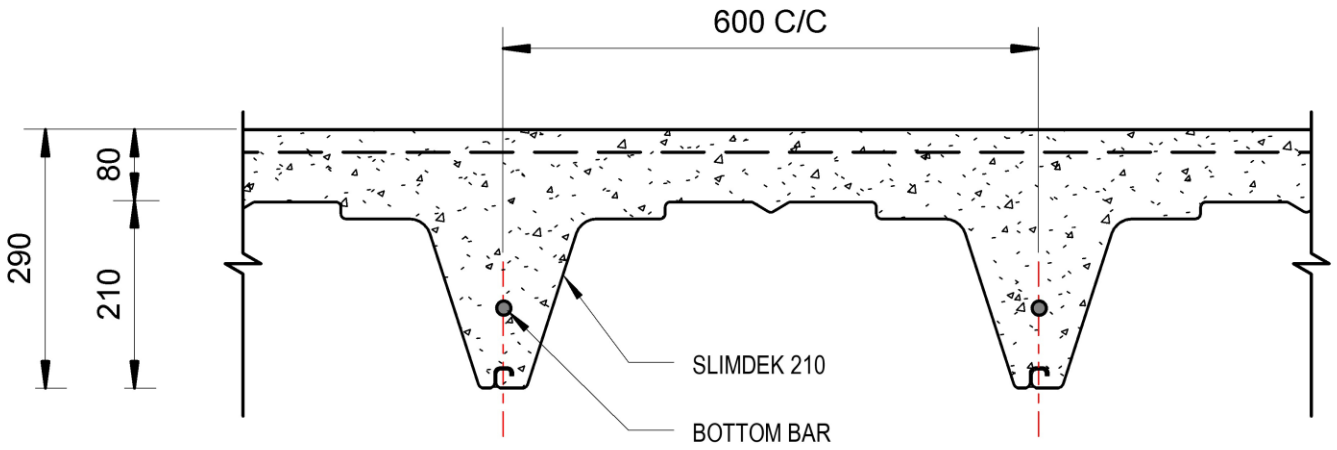
SlimDek 210® in SlimFlor vs “Traditional” Composite

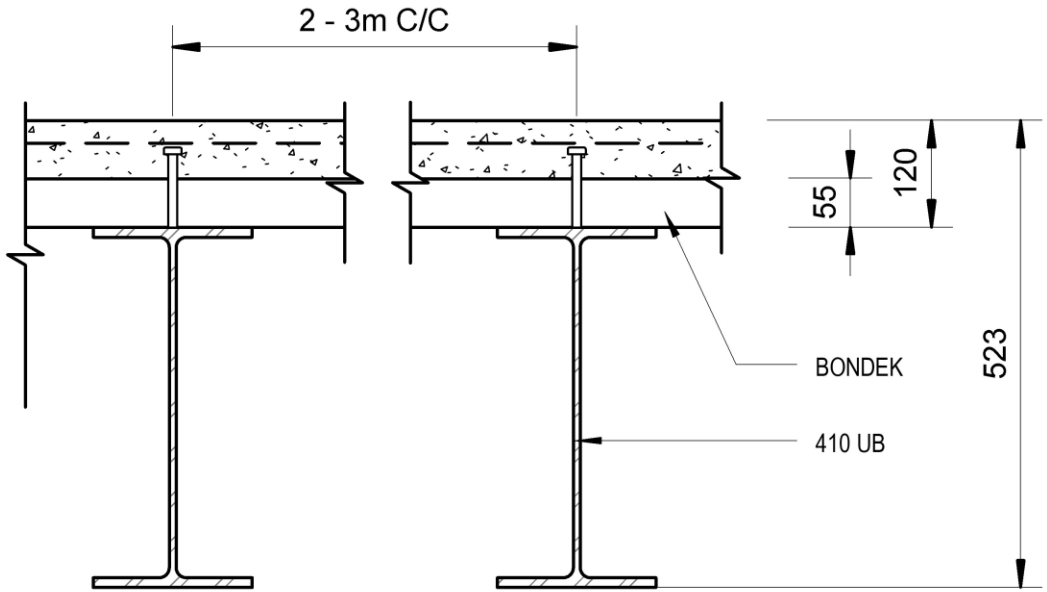
KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

SlimFlor® - Primary ASB + SlimDek 210®
no secondary beams

Vs.

Conventional Primary-secondary steel framing + structural decking





290mm SLIMDEK 210 SLAB

AVERAGE CONCRETE VOLUME ≈ 290-170+15 =135mm

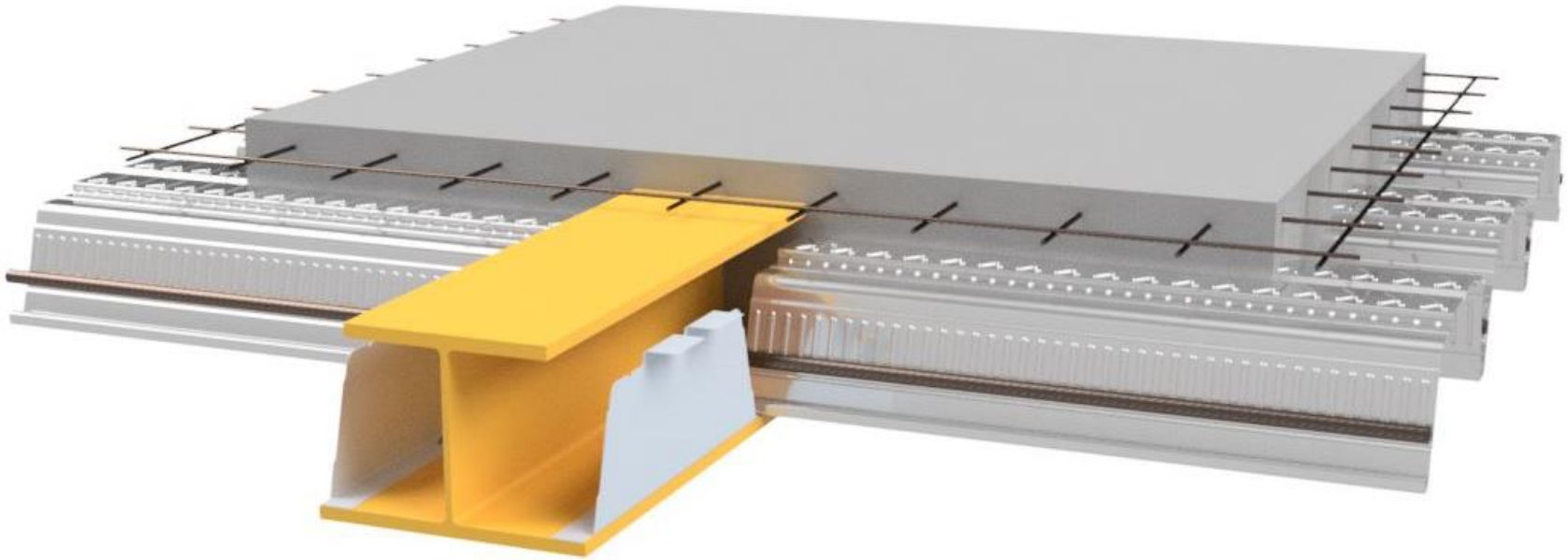
60FRL – 280mm	90FRL – 290mm
120FRL – 305mm	180/240FRL – 330/350mm

120mm BONDEK SLAB

AVERAGE CONCRETE VOLUME ≈ 120+5 =125mm

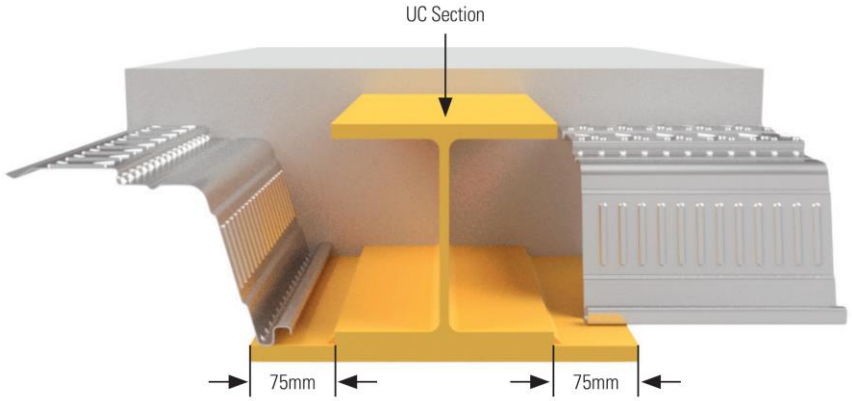
FIELDERS | STEEL SUPPLIED BY BLUESCOPE STEEL

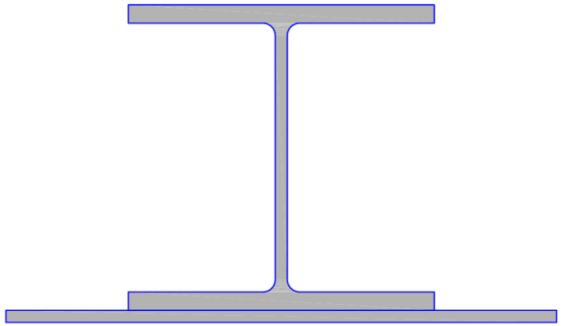
SlimDek 210® in SlimFlor® arrangement (Internal Beams at SSCC)



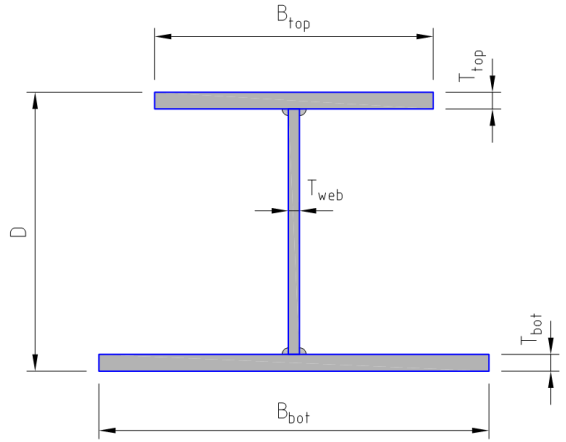
Asymmetric Steel Beams – ASB

- ASB(UC) – Standard UC section with welded bottom plate (hit-miss)

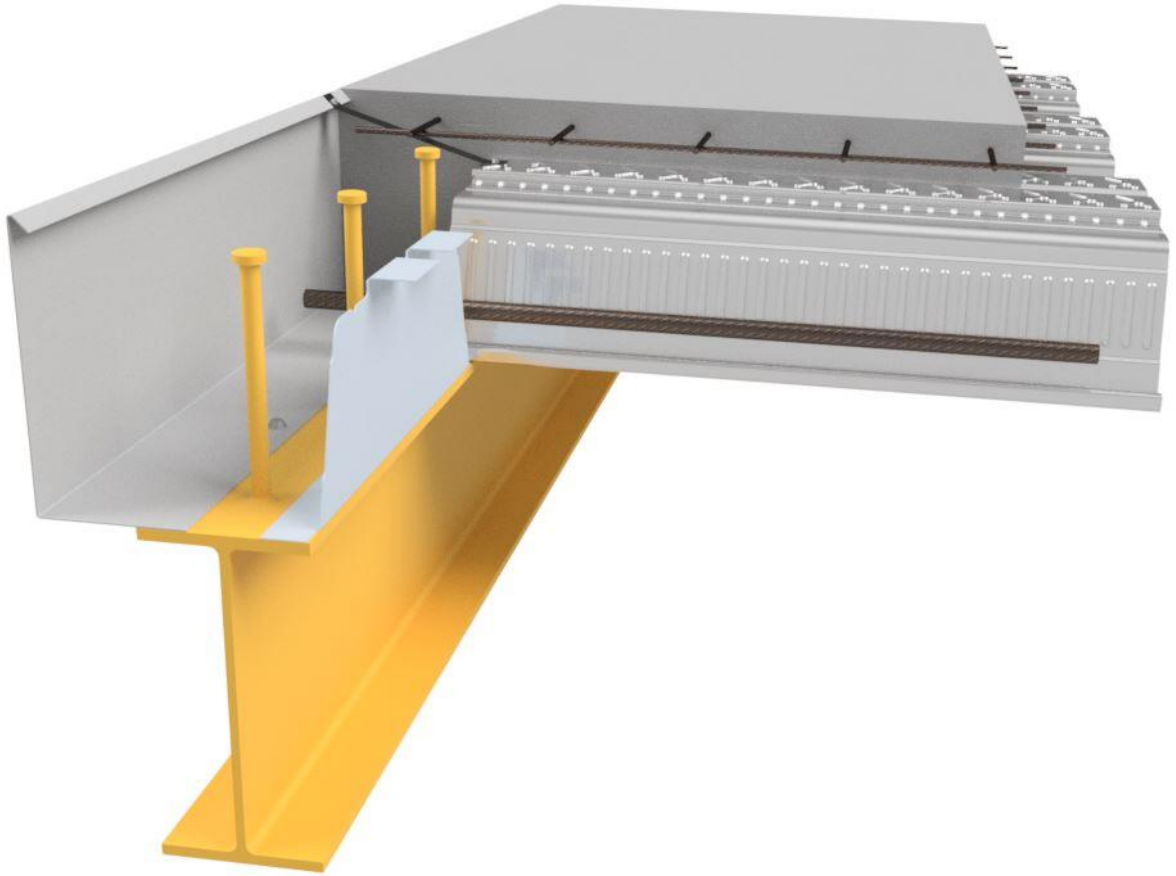




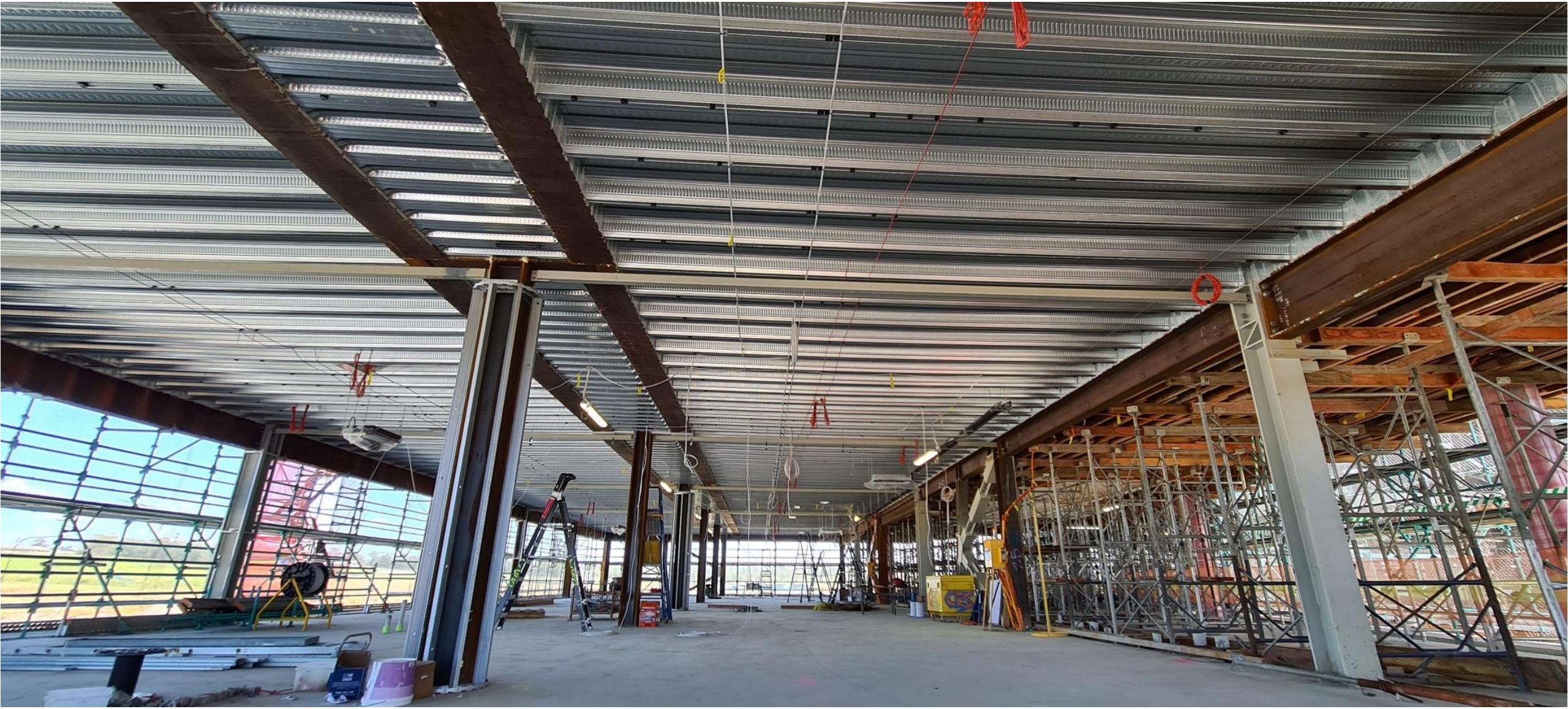
- CUSTOM ASB – 3 plate welded ASB with bottom flange wider than top flange



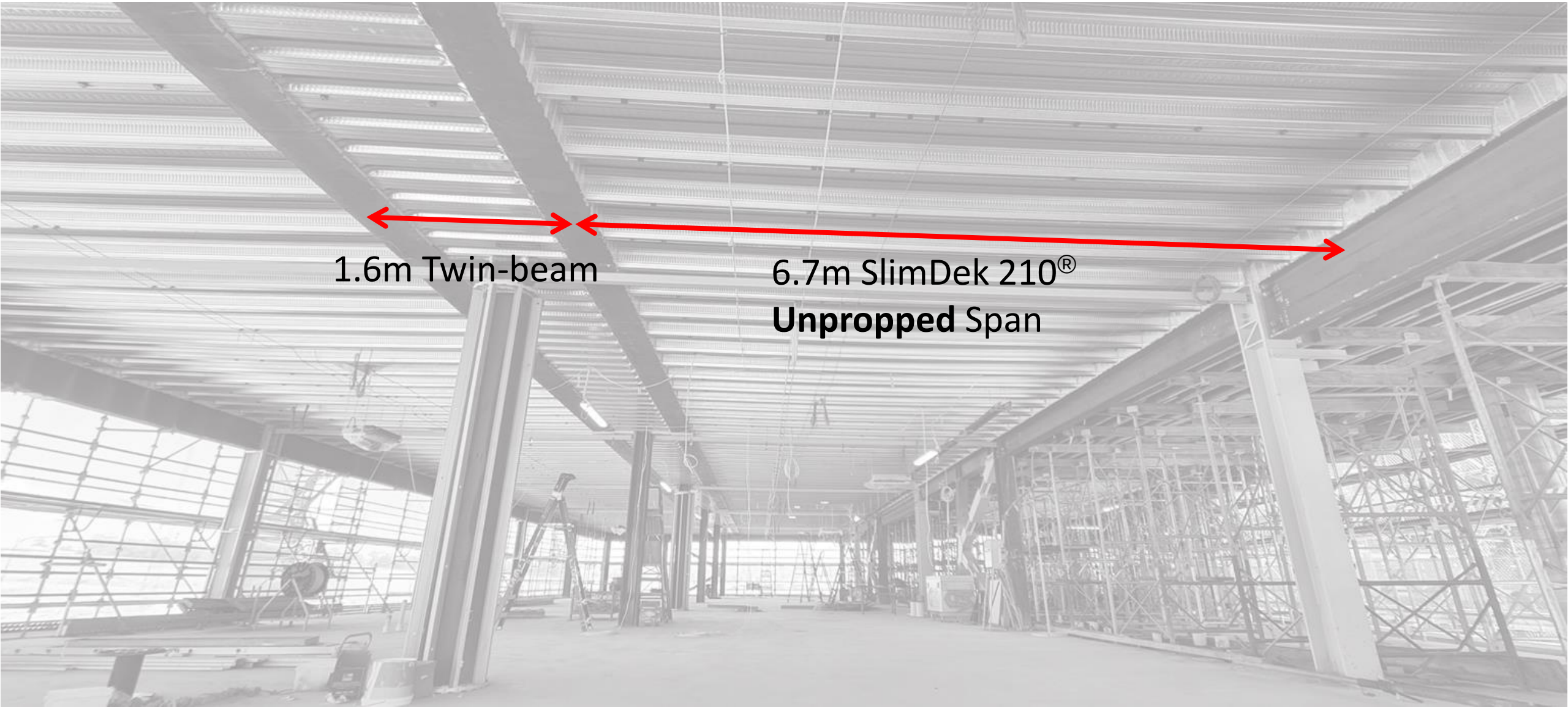
SlimDek 210® in down-stand arrangement (Edge beams at SSCC)



KINGFLOR
COMPOSITE STEEL FORMWORK RANGE



FIELDERS
STEEL SUPPLIED BY BLUESCOPE STEEL


1.6m Twin-beam
6.7m SlimDek 210®
Unpropped Span
7.5m COLUMN GRID

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

FIELDERS
STEEL SUPPLIED BY BLUESCOPE STEEL


DANGER
KEEP CLEAR

The Design Process – SlimFlor® Beams

Beam Design

- Fully encased asymmetric steel beams are designed as **fully composite for SLS** and steel only for ULS **without shear studs**
  - This has been validated by testing, showing full composite capacity is achieved all the way up to yield (CTBUH paper, SCI-P-248, etc.) & significant reserve capacity present at ULS
- **KingBeam 2** software can be used for design of SlimFlor® beams
  - ASB's are checked for construction stage torsion and local flexure of the bottom flange (crane beam effect)
  - ASB's are checked for SLS and ULS as per above assumptions
  - All checks undertaken in accordance with AS2327
  - KingBeam 3 currently under development for continuous composite (watch this space!)
- Superior Hp/A Ratio of encased SlimFlor® beams reduces the passive fire protection requirements

The Design Process – SlimFlor® Beams

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

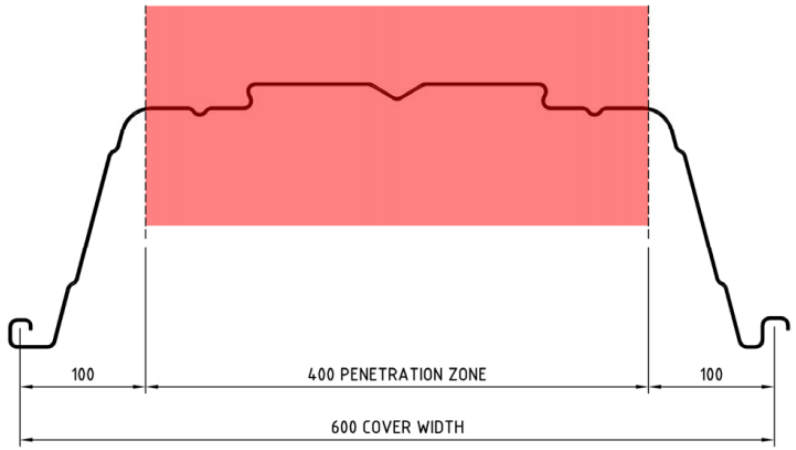
Beam Design

- Fully encased asymmetric steel beams are designed as **fully composite for SLS** and **partially** for ULS **without shear studs**
  - This has been validated by testing, showing full composite capacity is achieved all the way up to yield (CTBUH paper, SCI-P-248, etc.) & significant reserve capacity present at ULS
- **KingBeam 2** software can be used for design of SlimFlor® beams
  - ASB's are checked for construction stage loads and local flexure of the bottom flange (crane beam effect)
  - ASB's are checked for SLS and ULS as per above assumptions
  - All checks undertaken in accordance with AS2327
  - KingBeam 3 currently under development for continuous composite (watch this space!)
- Superior Hp/A Ratio of encased SlimFlor® beams reduces the passive fire protection requirements

Reach out, we'll do it for you and save your project budget!

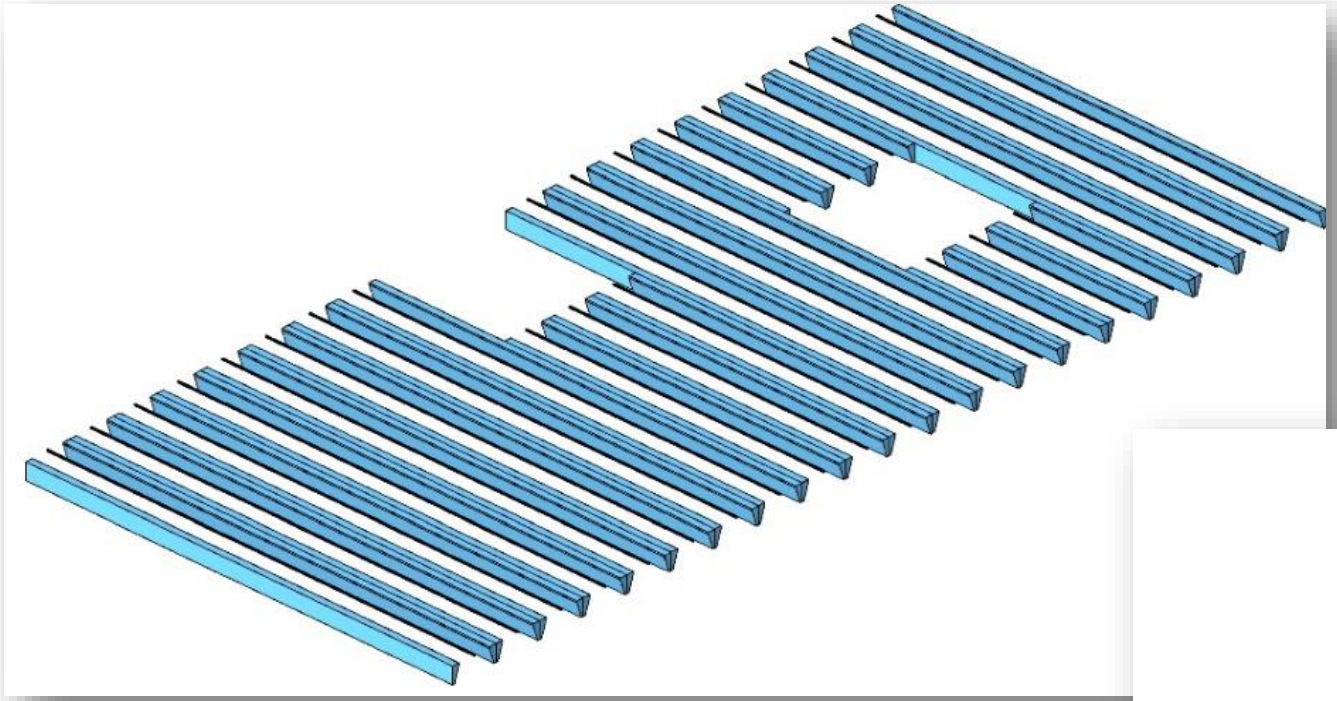
Service Penetrations & Coordination

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

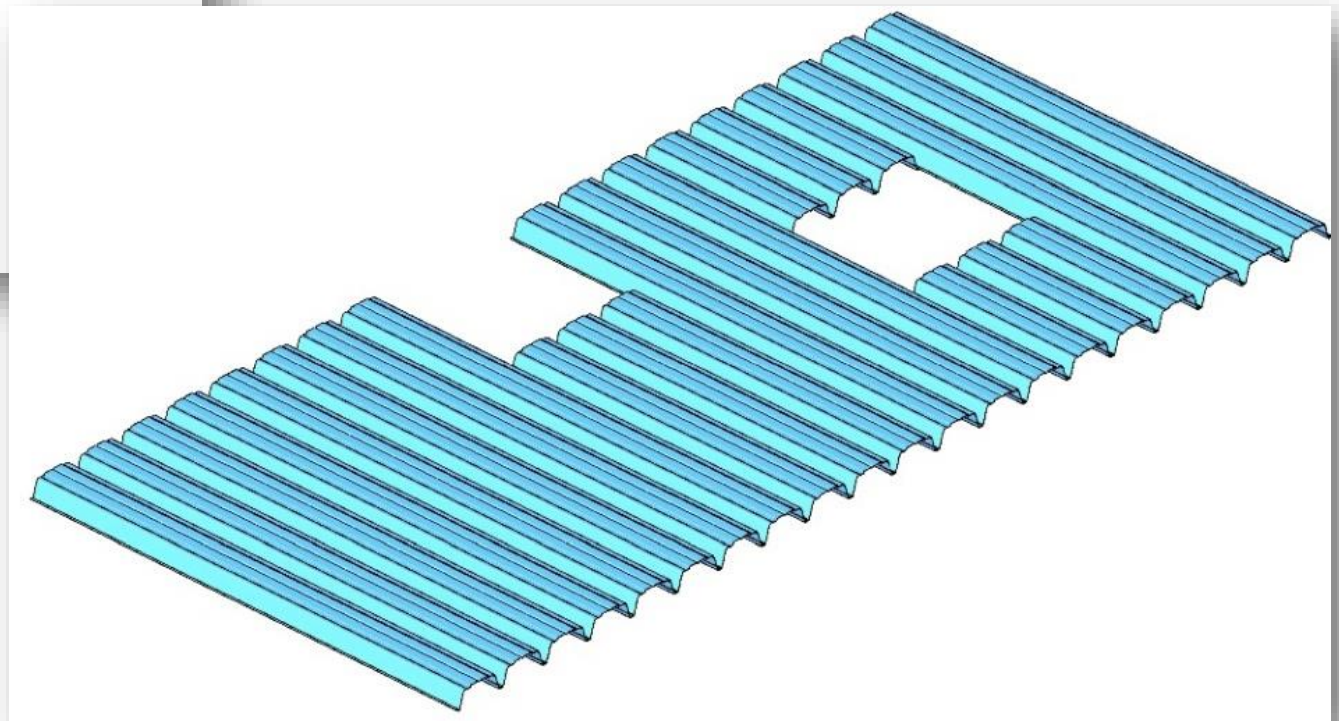


FIELDERS

SlimDek 210® Support



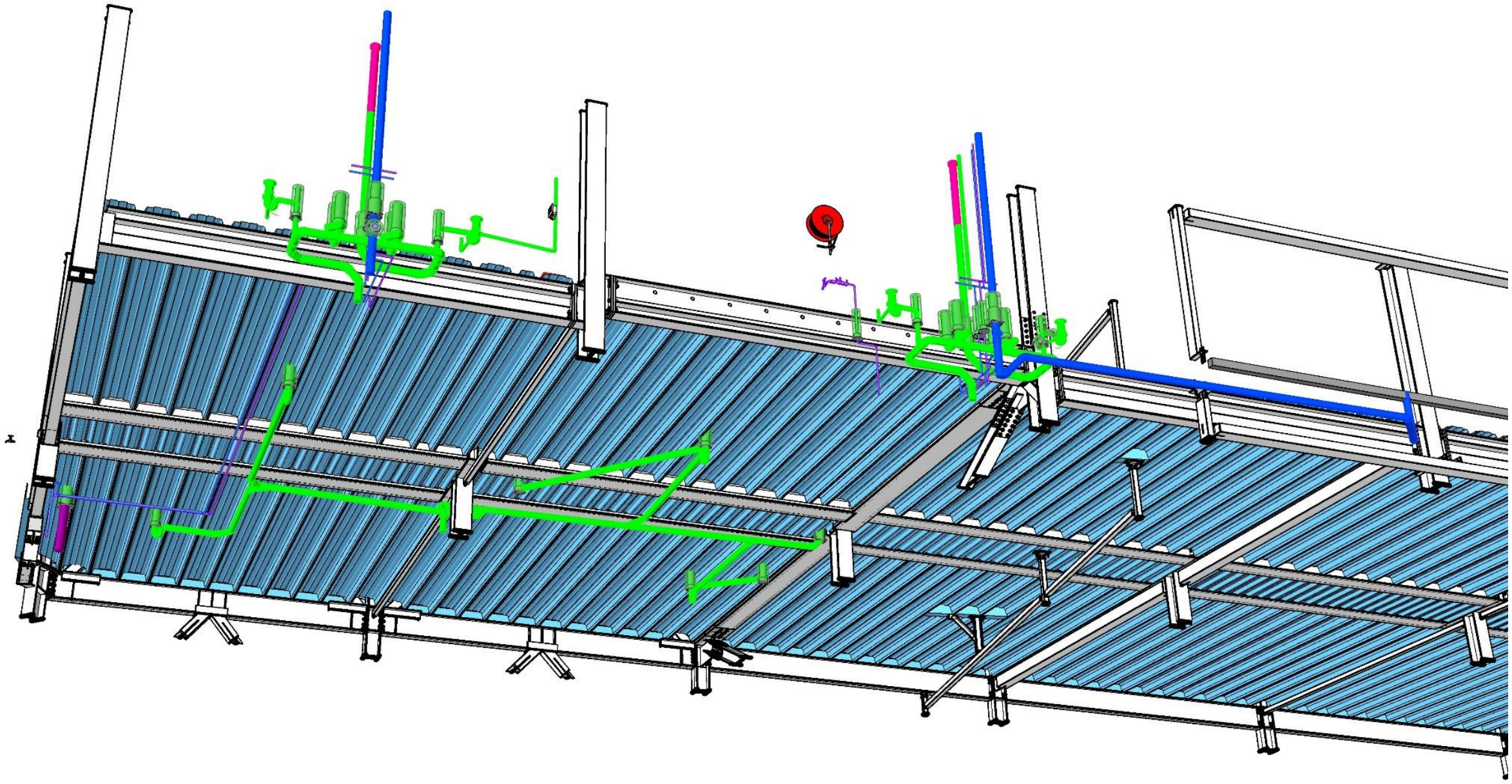
Coarse Level of Detail



Fine Level of Detail

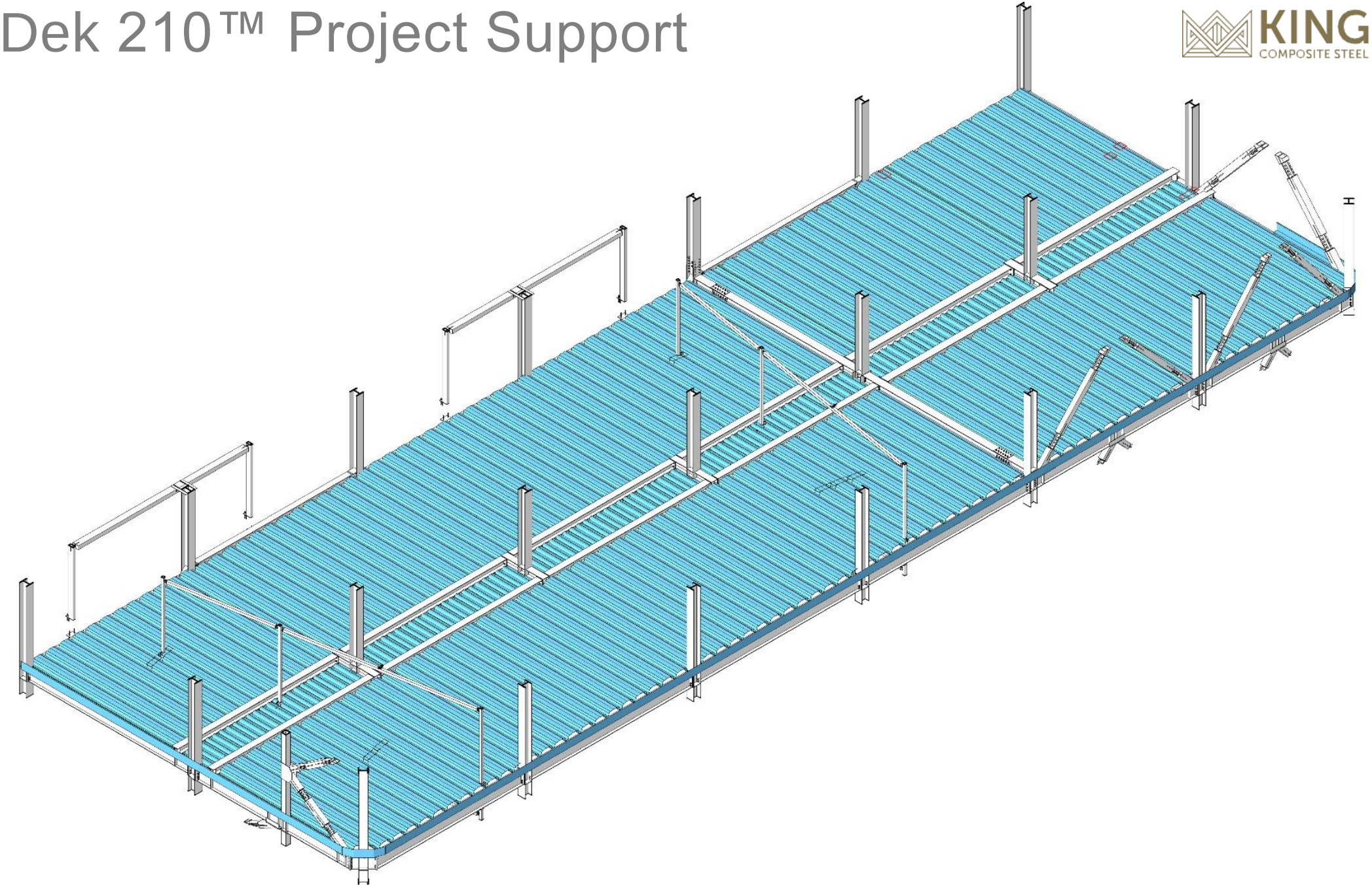
SlimDek 210™ Project Support

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE



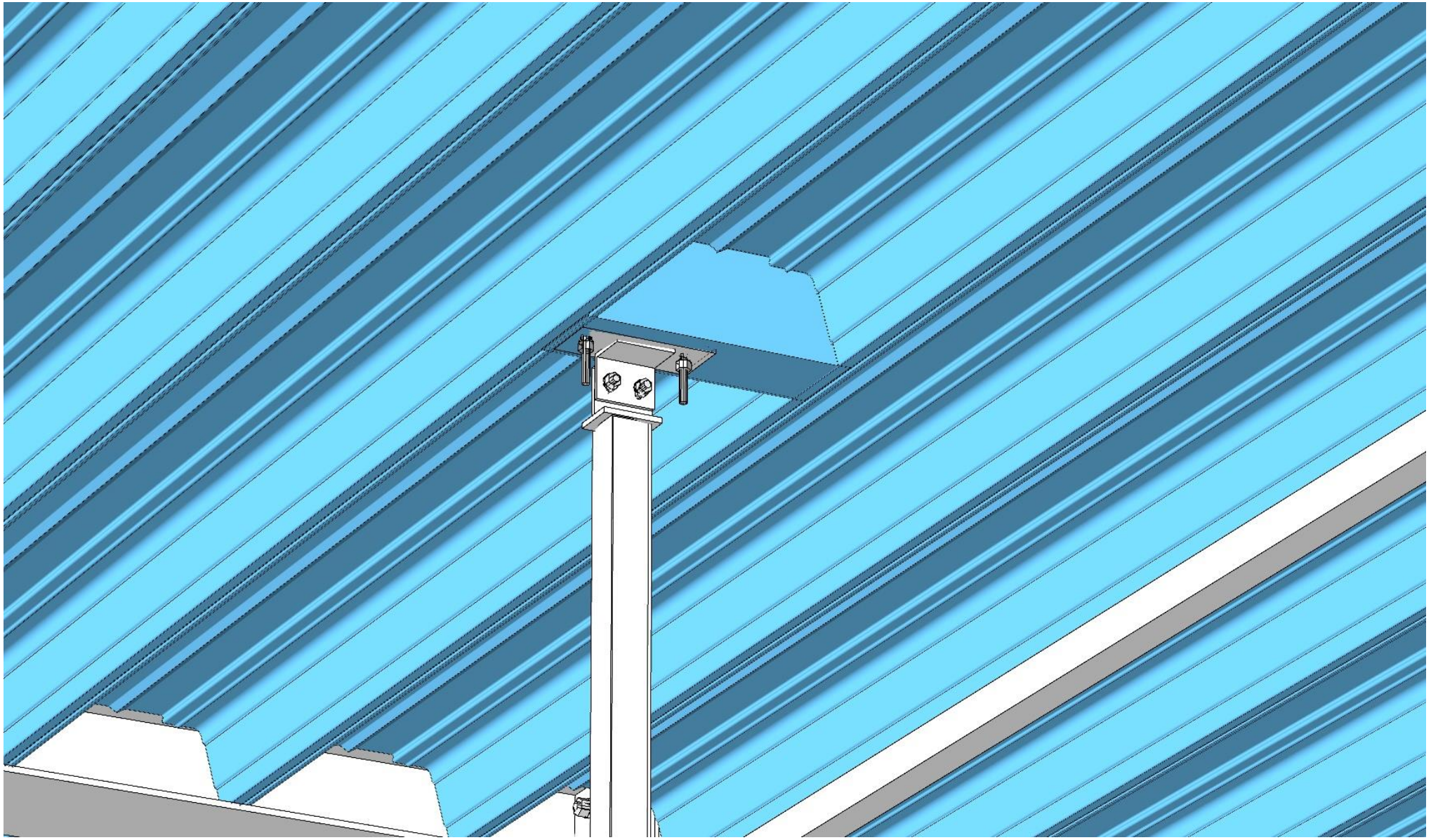
SlimDek 210™ Project Support

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

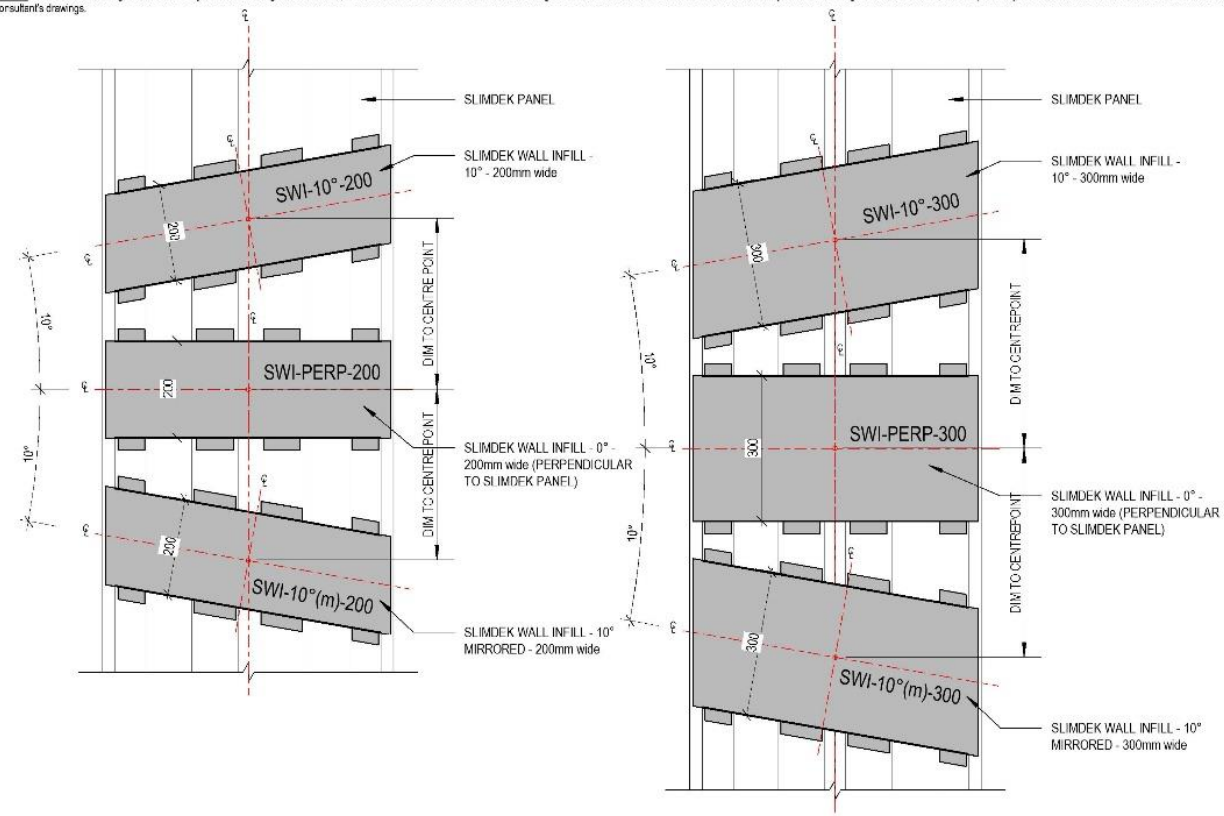


SlimDek 210® Infill Pieces/Accessories

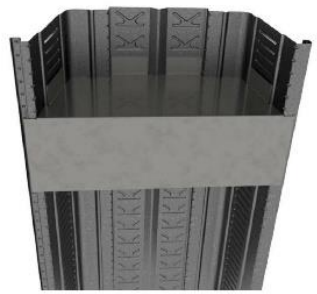
KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

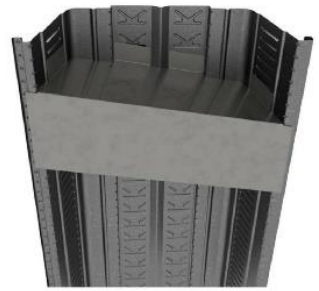


DO NOT SCALE - DIMENSIONS IN MILLIMETRES UNLESS STATED OTHERWISE



1 SLIMDEK WALL INFILL DETAIL (SWI) - PLAN VIEW
1 : 10


SWI - PERPENDICULAR


SWI - 10deg

SLIMDEK WALL INFILL SCHEDULE

Level	Zone	Type Mark	Count
LEVEL 01		SWI-Perp-200	9
LEVEL 01	ZONE 1	SWI-Perp-200	3
LEVEL 01	ZONE 2	SWI-Perp-200	9
LEVEL 01	ZONE 2	SWI-Perp-300	1
LEVEL 01	ZONE 3	SWI-Perp-200	14
LEVEL 01	ZONE 3	SWI-Perp-300	5
LEVEL 01: 40			40
LEVEL 02	ZONE 1	SWI-10°(m)-200	1
LEVEL 02	ZONE 1	SWI-10°-200	1
LEVEL 02	ZONE 1	SWI-Perp-200	1
LEVEL 02	ZONE 1	SWI-Perp-300	1
LEVEL 02	ZONE 2	SWI-10°(m)-200	1
LEVEL 02	ZONE 2	SWI-Perp-200	8
LEVEL 02	ZONE 3	SWI-Perp-200	16
LEVEL 02	ZONE 3	SWI-Perp-300	3
LEVEL 02	ZONE 5	SWI-Perp-200	11
LEVEL 02: 41			41
LEVEL 03	ZONE 1	SWI-10°(m)-200	3
LEVEL 03	ZONE 1	SWI-10°-200	4
LEVEL 03	ZONE 2	SWI-10°(m)-200	4
LEVEL 03	ZONE 2	SWI-10°-200	4
LEVEL 03	ZONE 3	SWI-10°(m)-200	1
LEVEL 03	ZONE 3	SWI-10°-200	2
LEVEL 03	ZONE 3	SWI-Perp-200	4
LEVEL 03	ZONE 3	SWI-Perp-300	10
LEVEL 03	ZONE 5	SWI-10°(m)-200	1
LEVEL 03	ZONE 5	SWI-10°-200	2
LEVEL 03	ZONE 5	SWI-Perp-200	5
LEVEL 03	ZONE 5	SWI-Perp-300	5
LEVEL 03: 45			45
LEVEL 04	ZONE 3	SWI-10°(m)-200	3
LEVEL 04	ZONE 3	SWI-10°(m)-300	1
LEVEL 04	ZONE 3	SWI-10°-200	4
LEVEL 04	ZONE 3	SWI-10°-300	2
LEVEL 04	ZONE 3	SWI-Perp-200	5
LEVEL 04	ZONE 5	SWI-10°(m)-200	3
LEVEL 04	ZONE 5	SWI-10°-200	6
LEVEL 04: 24			24
LEVEL 05	ZONE 3	SWI-10°(m)-200	2
LEVEL 05	ZONE 3	SWI-10°(m)-300	1
LEVEL 05	ZONE 3	SWI-10°-200	4
LEVEL 05	ZONE 3	SWI-10°-300	2
LEVEL 05	ZONE 3	SWI-Perp-200	7
LEVEL 05	ZONE 5	SWI-10°(m)-200	4
LEVEL 05	ZONE 5	SWI-10°-200	8
LEVEL 05	ZONE 5	SWI-Perp-200	9
LEVEL 05: 35			35

ISSUE	REVISION DESCRIPTION	DATE	BY
3	DRAWING AMENDMENTS	17.06.20	RP
2	DRAWING AMENDMENTS	11.06.20	RP
1	FOR CONSTRUCTION	07.05.20	RP

FIELDERS
FINISH ON TOP WITH FIELDERS
27 STERLING ROAD
MINCHINBURY
NSW 2770
Ph: 02 9426 5000
Fax: 02 9603 1666
ABN 16 000 011 058

DRAWN	RP
DATE	31.03.20
CHECKED	RP
APPROVED	NJ

PROJECT IDENTIFICATION
SANTA SOPHIA CATHOLIC COLLEGE
THE GABLES TOWN CENTRE

Concept - Design - Solution

DRAWING TITLE
SLIMDEK FLASHING DETAILS - MANUF 4

SCALE @ A3: 1 : 10
PROJECT NO: F-200325
SHEET PREFIX: STR-BSL
SHEET No: M004

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

A3 SHEET
200mm 100mm 50mm 25mm 0mm

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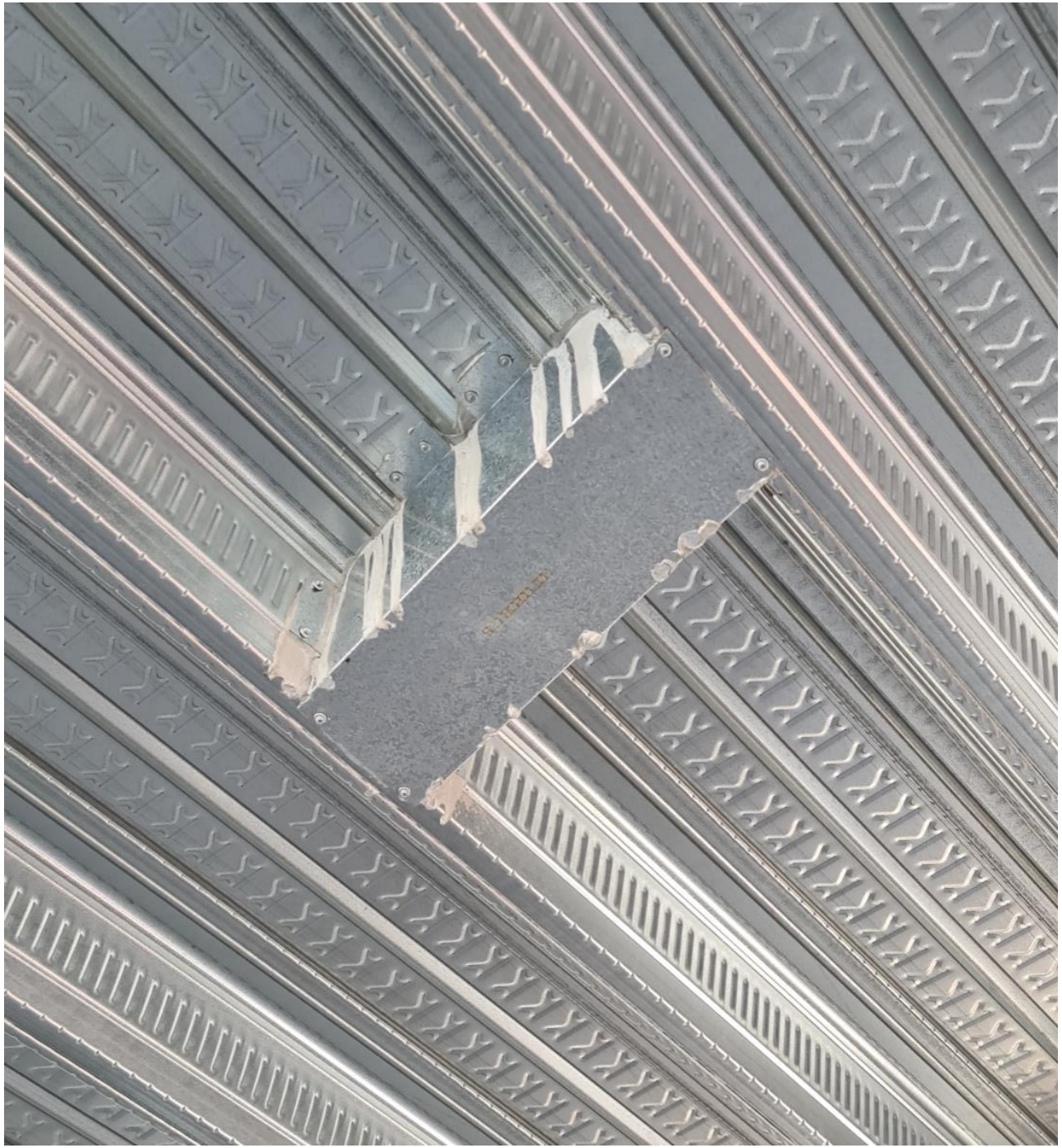
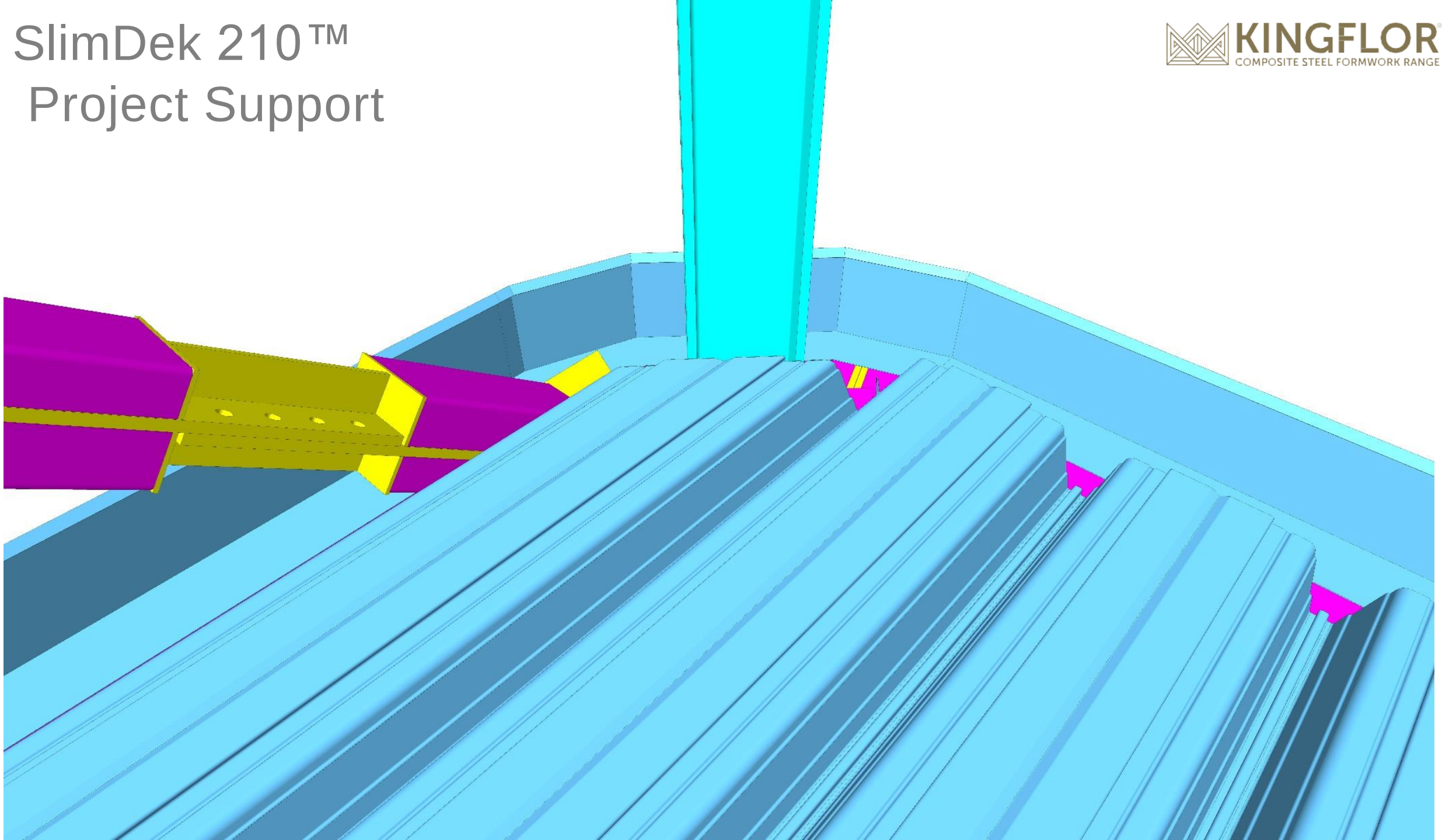
KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

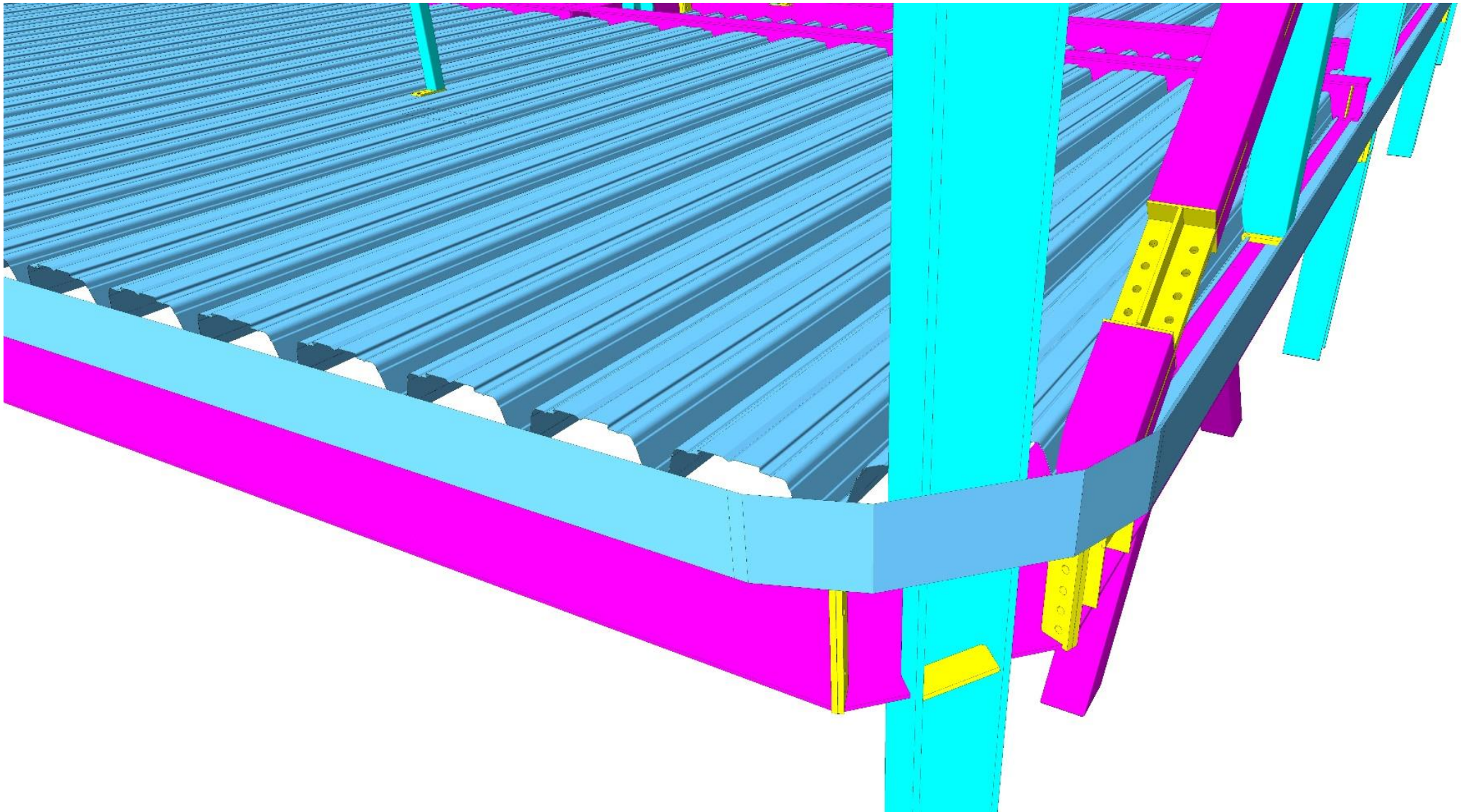


SlimDek 210™
Project Support

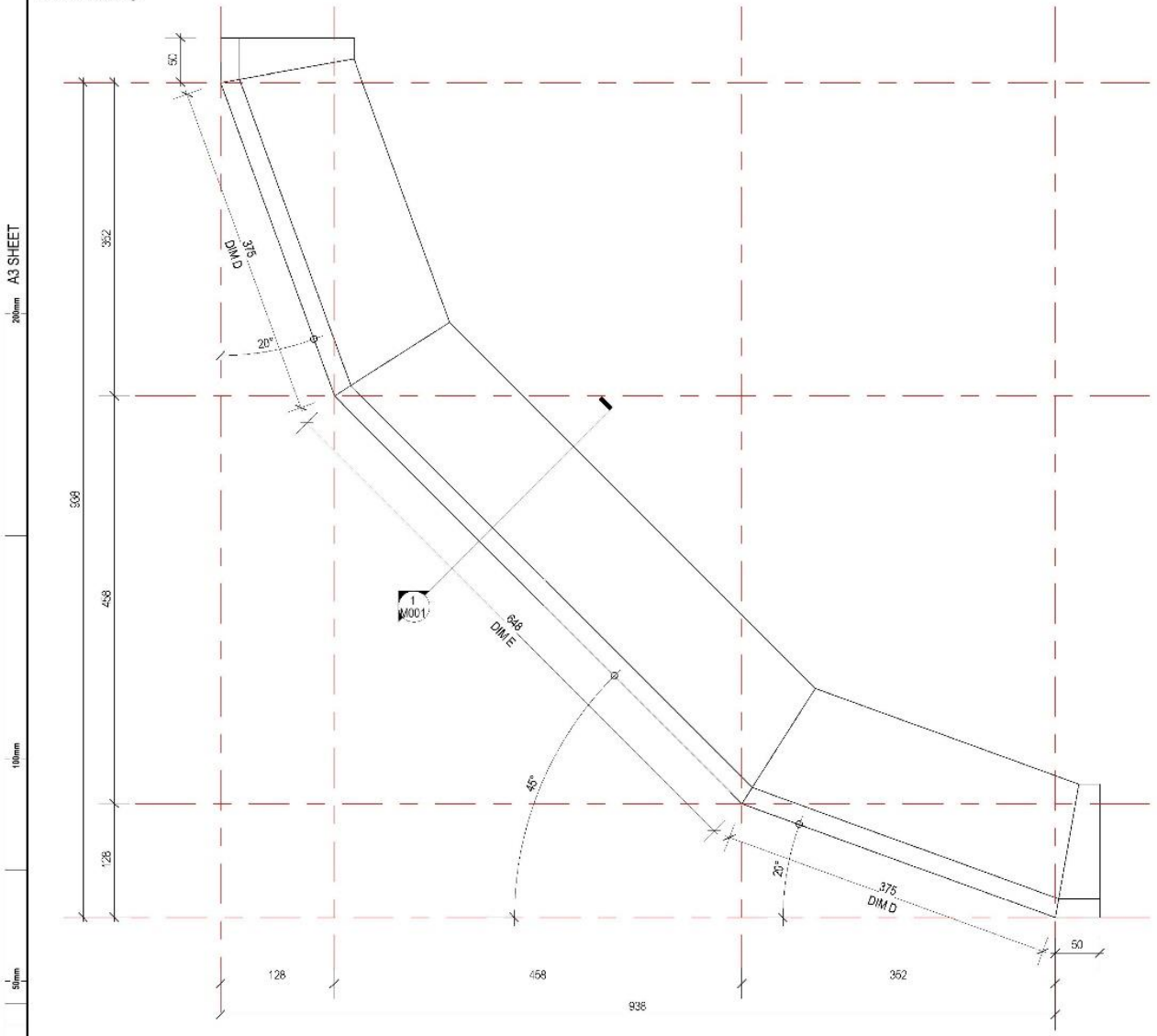
KINGFLOR
COMPOSITE STEEL FORMWORK RANGE



SlimDek 210™
Project Support



DO NOT SCALE - DIMENSIONS IN MILLIMETRES UNLESS STATED OTHERWISE



1 EDGEFORM CORNER DETAIL (EF-SPECIAL)
1 : 5

EDGEFORM CORNER (EF-SPECIAL) CUTTING LIST

Zone	Level	BMT	Count	Dimension A	Dimension B	Dimension C	Dimension D	Dimension E	Flashing Length
ZONE 1	LEVEL 01	2.4	2	310	150	30	374	648	1496
ZONE 1	LEVEL 02	2.4	1	310	150	30	374	648	1496
ZONE 1	LEVEL 03	2.4	1	310	150	30	374	648	1496
ZONE 2	LEVEL 02	2.4	1	280	178	30	374	648	1496
ZONE 2	LEVEL 02	2.4	1	310	150	30	374	648	1496
ZONE 2	LEVEL 03	2.4	2	310	150	30	374	648	1496
ZONE 5	LEVEL 02	2.4	2	310	150	30	374	648	1496
ZONE 5	LEVEL 03	2.4	2	310	150	30	374	648	1496
ZONE 5	LEVEL 04	2.4	2	310	150	30	374	648	1496
ZONE 5	LEVEL 05	2.4	2	310	150	30	374	648	1496
Grand total: 16			16						

ISSUE	REVISION DESCRIPTION	DATE	BY
1	FOR CONSTRUCTION	07.05.20	RP

FIELDERS
FINISH ON TOP WITH FIELDERS
27 STERLING ROAD
MINCHINBURY
NSW 2770
Ph: 02 9426 5000
Fax: 02 9603 1666
ABN 16 000 011 058

DRAWN	RP
DATE	31.03.20
CHECKED	RP
APPROVED	NJ

PROJECT IDENTIFICATION
SANTA SOPHIA CATHOLIC COLLEGE
THE GABLES TOWN CENTRE

Concept - Design - Solution

DRAWING TITLE
SLIMDEK FLASHING DETAILS - MANUF 3

SCALE @ A3: 1 : 5
PROJECT NO: F-200325
SHEET PREFIX: STR-BSL
SHEET No: M003

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

A3 SHEET

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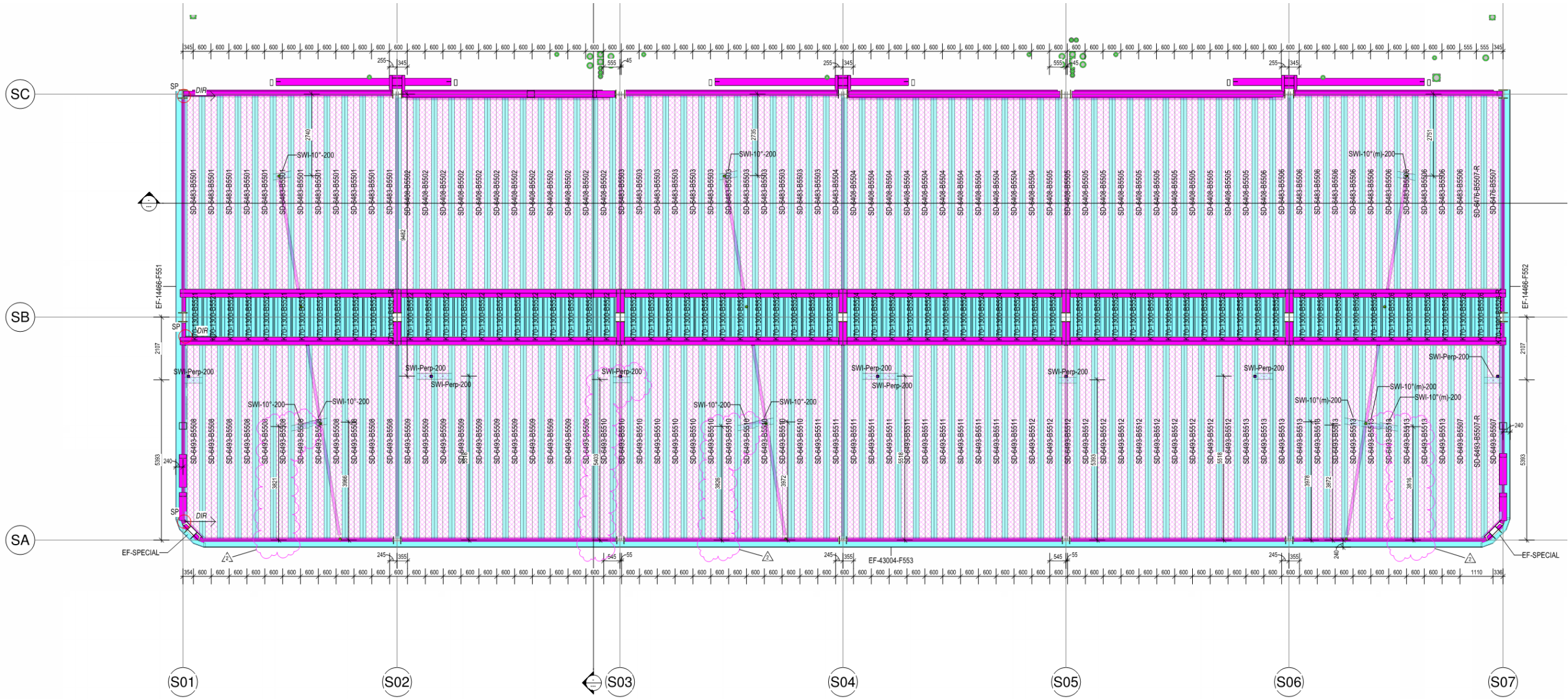
KINGFLOR
COMPOSITE STEEL FORMWORK RANGE



1 MARKING PLAN - LEVEL 05 - ZONE 5
1 : 75

SlimDek 210™ Project Support

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

SLIMDEK CUTTING LIST

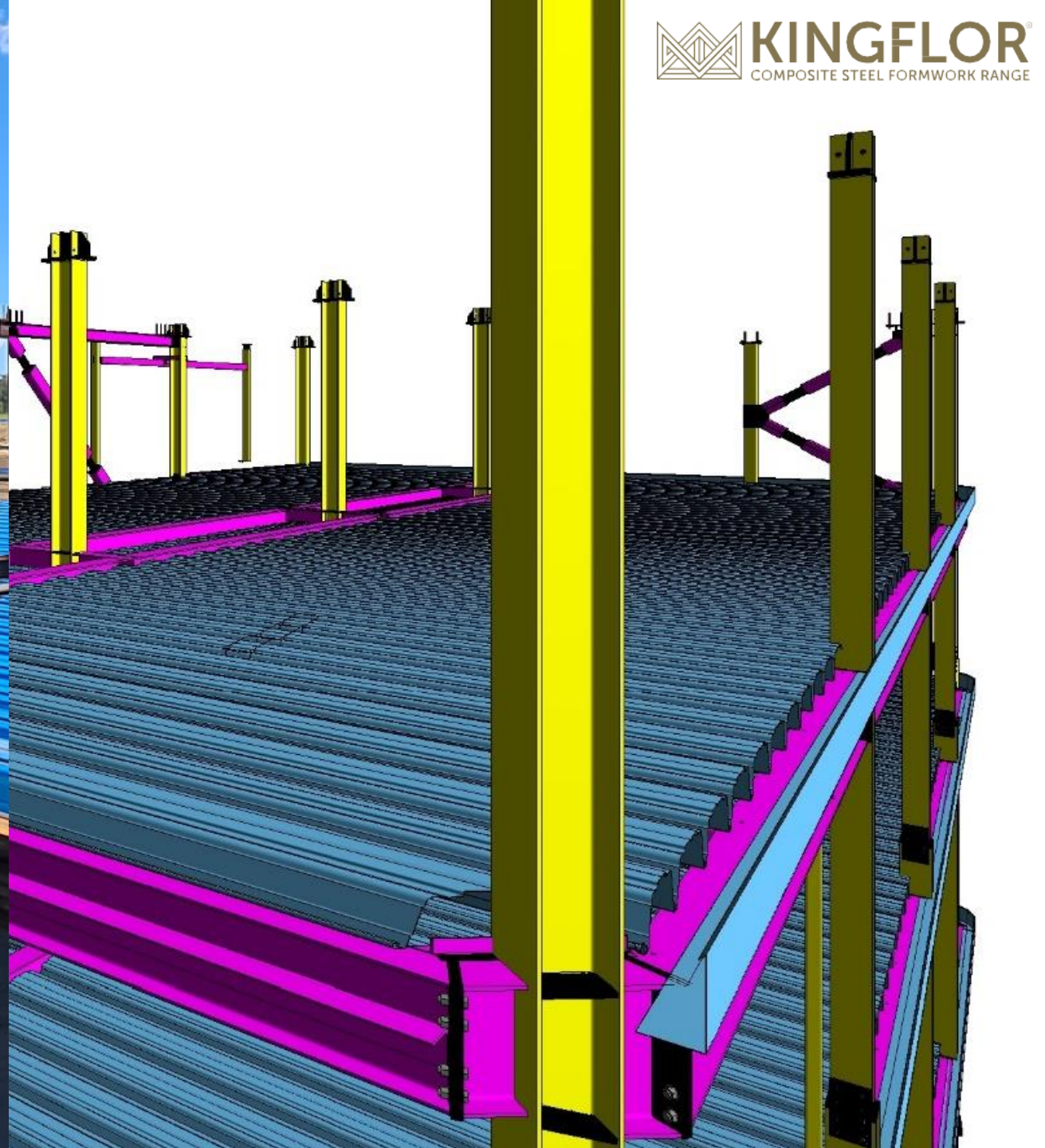
Bundle Number	BMT (mm)	Count	Cut Length (mm)	Total Length (m)	Total Mass (Kg)	Member Ripped
01	1.2	13	5209	67.717	663.627	No
		13		67.717	663.627	
02	1.2	11	5209	57.299	561.530	No
02	1.2	1	5209	5.209	51.048	Yes
		12		62.508	612.578	
03	1.2	13	4251	55.257	541.521	No
		13		55.257	541.521	
04	1.2	11	4251	46.756	458.210	No
04	1.2	1	4251	4.251	41.655	Yes
		12		51.007	499.865	
05	1.2	13	4009	52.123	510.802	No
		13		52.123	510.802	
06	1.2	10	4009	40.094	392.924	No
06	1.2	3	4009	12.028	117.877	Yes
		13		52.123	510.802	
07	1.2	1	2008	2.008	19.678	No
07	1.2	4	2088	8.352	81.850	No
07	1.2	1	5816	5.816	56.997	No
07	1.2	7	5896	41.272	404.466	No
		13		57.448	562.991	
08	1.2	11	5896	64.856	635.590	No
08	1.2	1	5896	5.896	57.781	Yes
		12		70.752	693.371	
09	1.2	3	3505	10.515	103.047	No
09	1.2	10	5595	55.950	548.310	No
		13		66.465	651.357	
10	1.2	11	5595	61.545	603.141	No
10	1.2	1	5595	5.595	54.831	Yes
		12		67.140	657.972	
Grand total		126		602.539	5904.886	

FLASHINGS CUTTING LIST

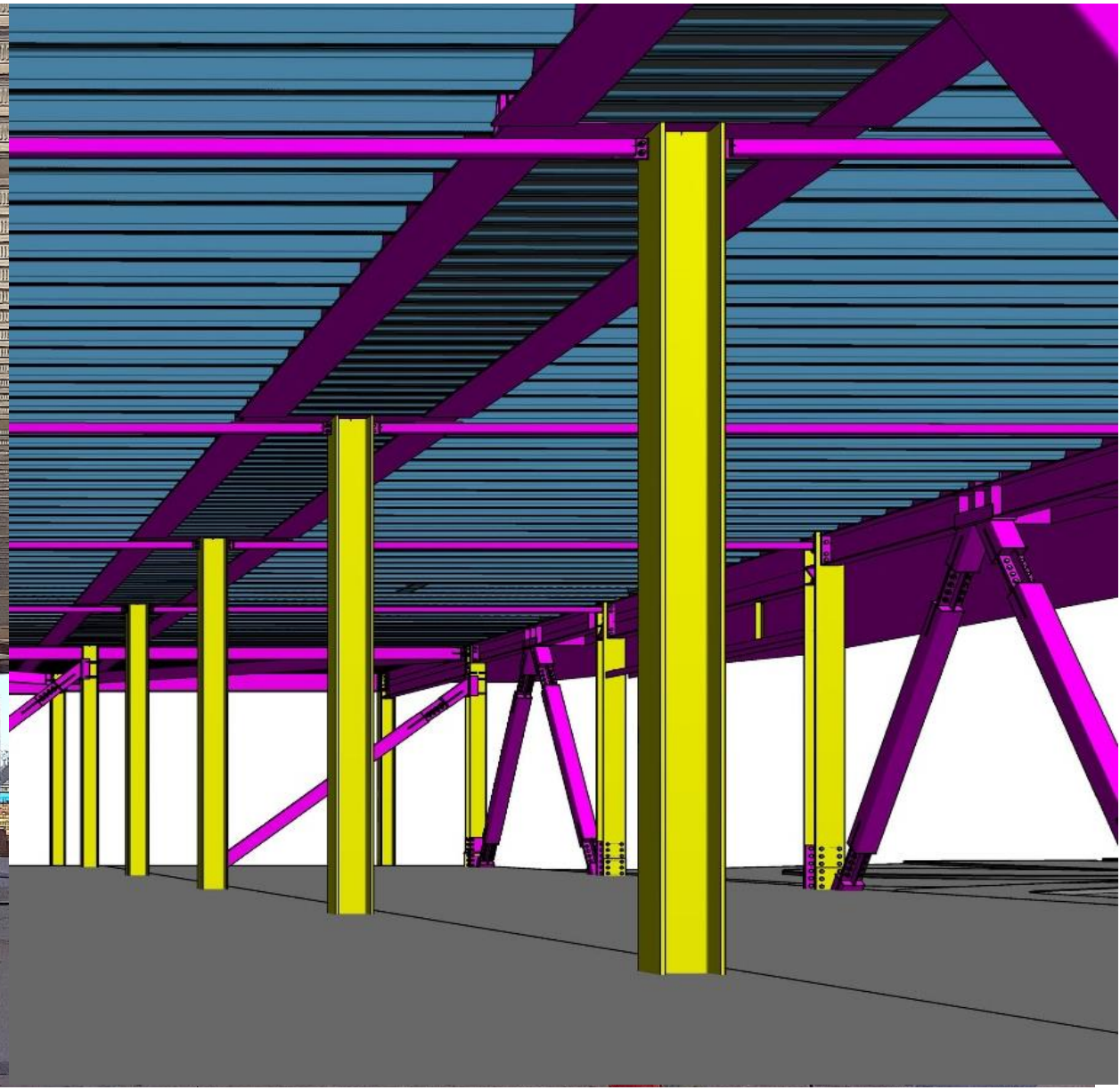
Mark	Type Mark	Count	Length (mm)	Total Length (m)	Dim A (mm)	Dim B (mm)	Dim C (mm)	BMT (mm)
F01	CP	1	2140	2.140	100	50		1.9
F02	EF	1	3135	3.135	125	280	30	2.4
F03	EF	1	3848	3.848	125	280	30	2.4
F10	EF	1	3135	3.135	125	280	30	2.4
F04	EFC	1	2140	2.140	50	210	50	1.9
F05	EFC	1	4009	4.009	50	190	50	1.9
F06	EFC	1	4251	4.251	50	210	50	1.9
F07	EFC	1	5209	5.209	50	210	50	1.9
F08	EFC	1	5660	5.660	50	210	50	1.9
F09	EFC	1	5896	5.896	50	210	50	1.9
Grand total: 10		10		39.424				

NOTES:
1. REFER FLASHING DETAILS ON M00_ SERIES PAGES
2. 'MARK' AND 'LENGTH' TO BE CLEARLY LABELLED ON ALL FLASHINGS - REFER DETAILS ON M00_ SERIES PAGES FOR LABEL POSITIONS
3. IF LENGTH IS TOO LONG FOR PRESS/FOLDER, DIVIDE THE FLASHING IN 2, AND ALLOW FOR 100mm OVERLAP

KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

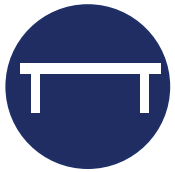


KINGFLOR
COMPOSITE STEEL FORMWORK RANGE



Benefits – SlimDek 210®

KINGFLOR COMPOSITE STEEL FORMWORK RANGE



- ✓ **Large unpropped spans** – made possible with SlimDek 210®
- ✓ **Program advantages** – Immediate fit-out of floor below the day after pour

- ✓ **Simple structure –** Less beams, less connections, less lifts, less fabrication
- ✓ **SlimFlor®** structure enables ease of service reticulation & reduction in PFP
- ✓ **Safety** – Twin beam cassette provides safe working platform

- ✓ **Lighter overall structure** – reduced demand on foundation & lateral system
- ✓ Concrete core eliminated – cost & program advantage.

- ✓ **Holistically cost competitive** – Selected over other solutions considered
- ✓ **Fully coordinated & shop-drawn bespoke project solutions**

“It’s like assembling IKEA furniture on site!”

FIELDERS | STEEL SUPPLIED BY BLUESCOPE STEEL

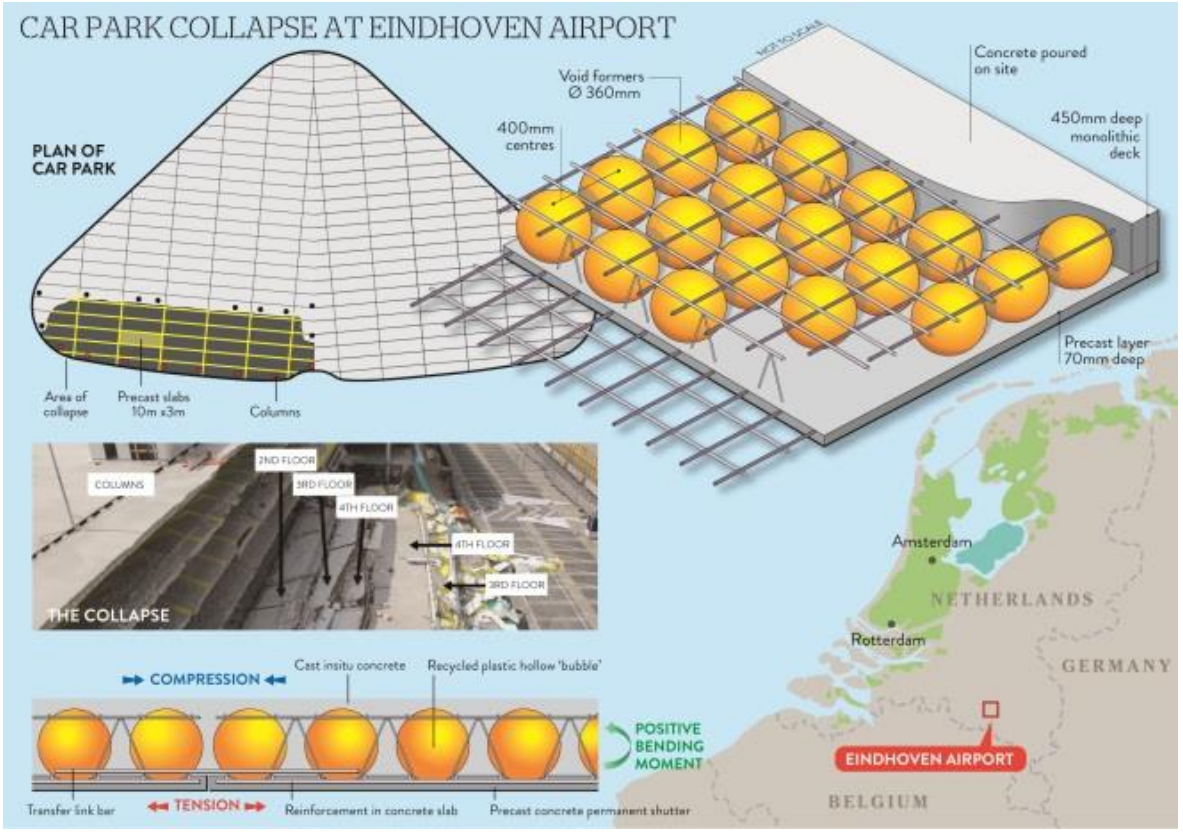
KINGFLOR
COMPOSITE STEEL FORMWORK RANGE

FIELDERS

STEEL SUPPLIED BY BLUESCOPE STEEL

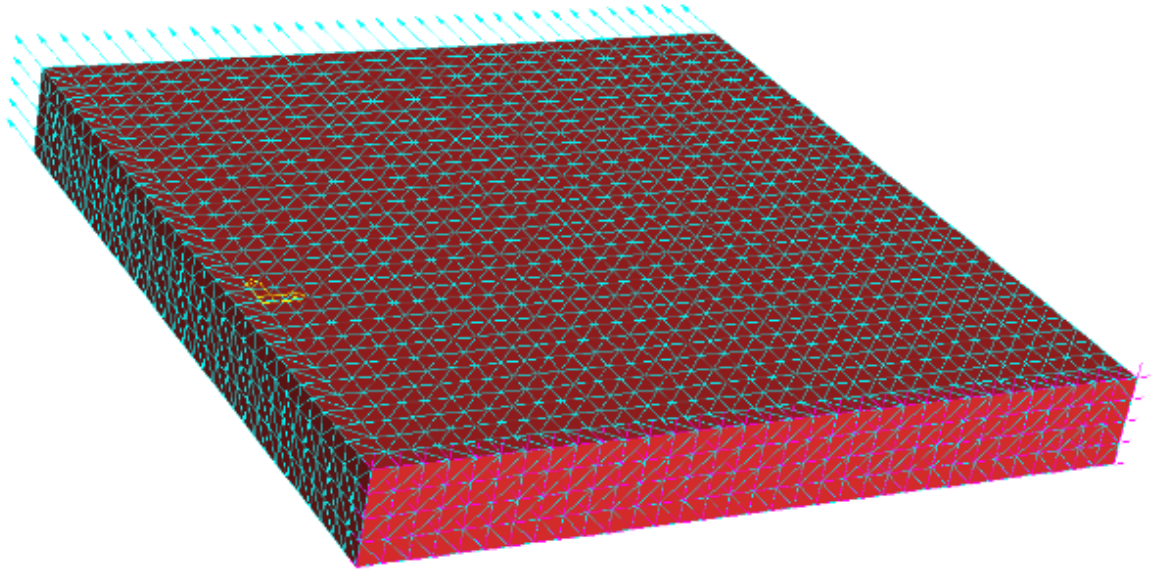
Bubbledeck

Bubbledeck – The Eindhoven Airport Car Park Collapse

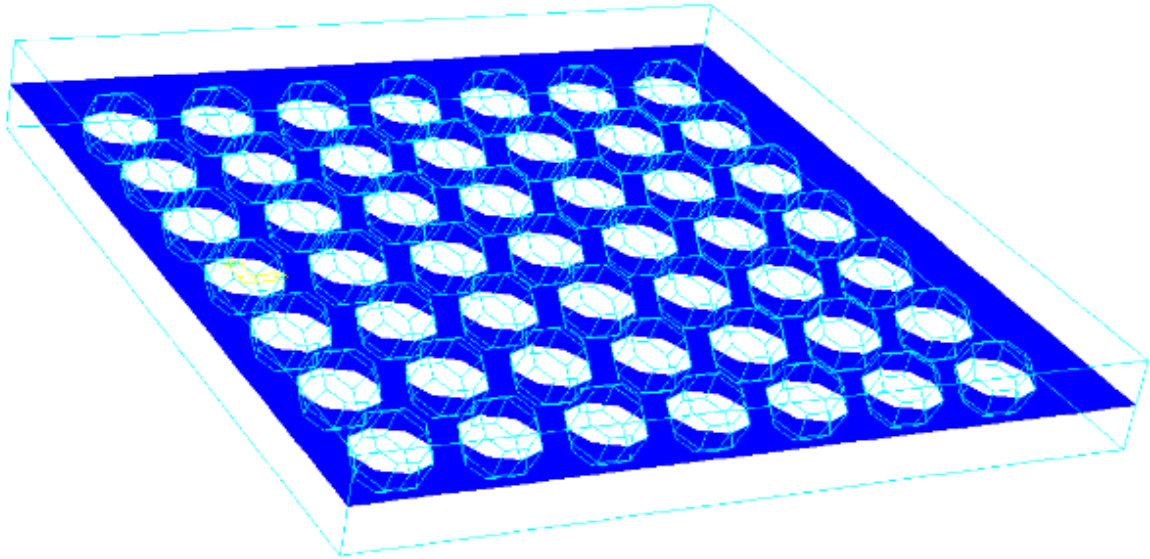


Bubbledeck – Client Concerns

Slab Diaphragm Actions



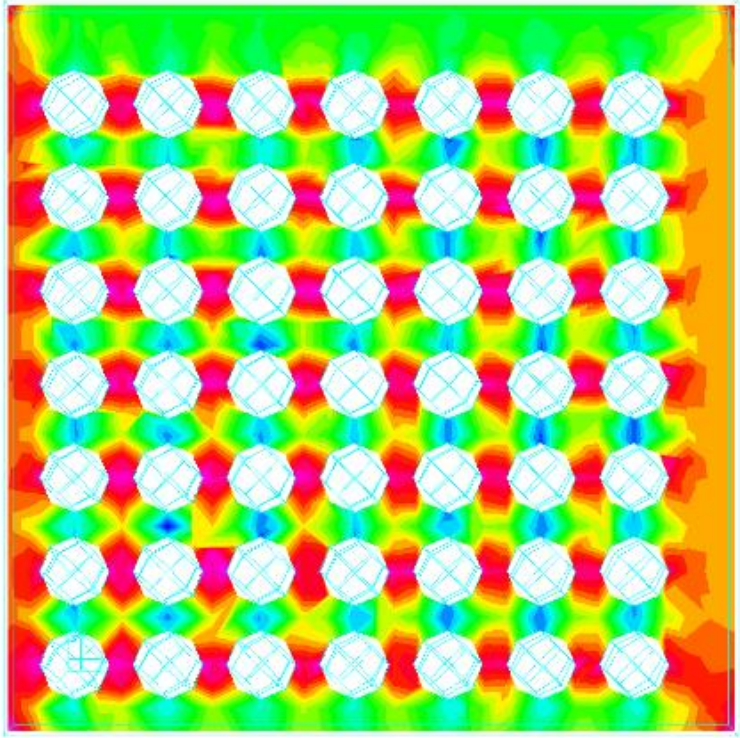
3D Brick FEA model of a section of 390 BubbleDeck slab. Forces are applied at one face of the model (blue arrows). XYZ pin restraints are applied at the opposite end of the model to all nodes (pink lines).



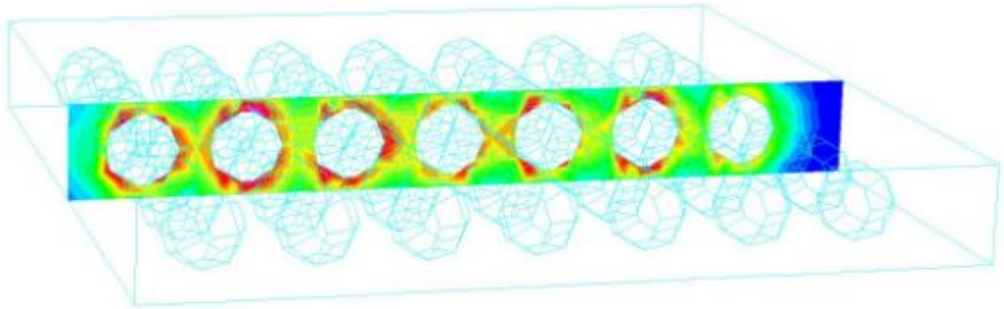
Cross section through the model showing void formers.

Bubbledeck – Client Concerns

Slab Diaphragm Actions



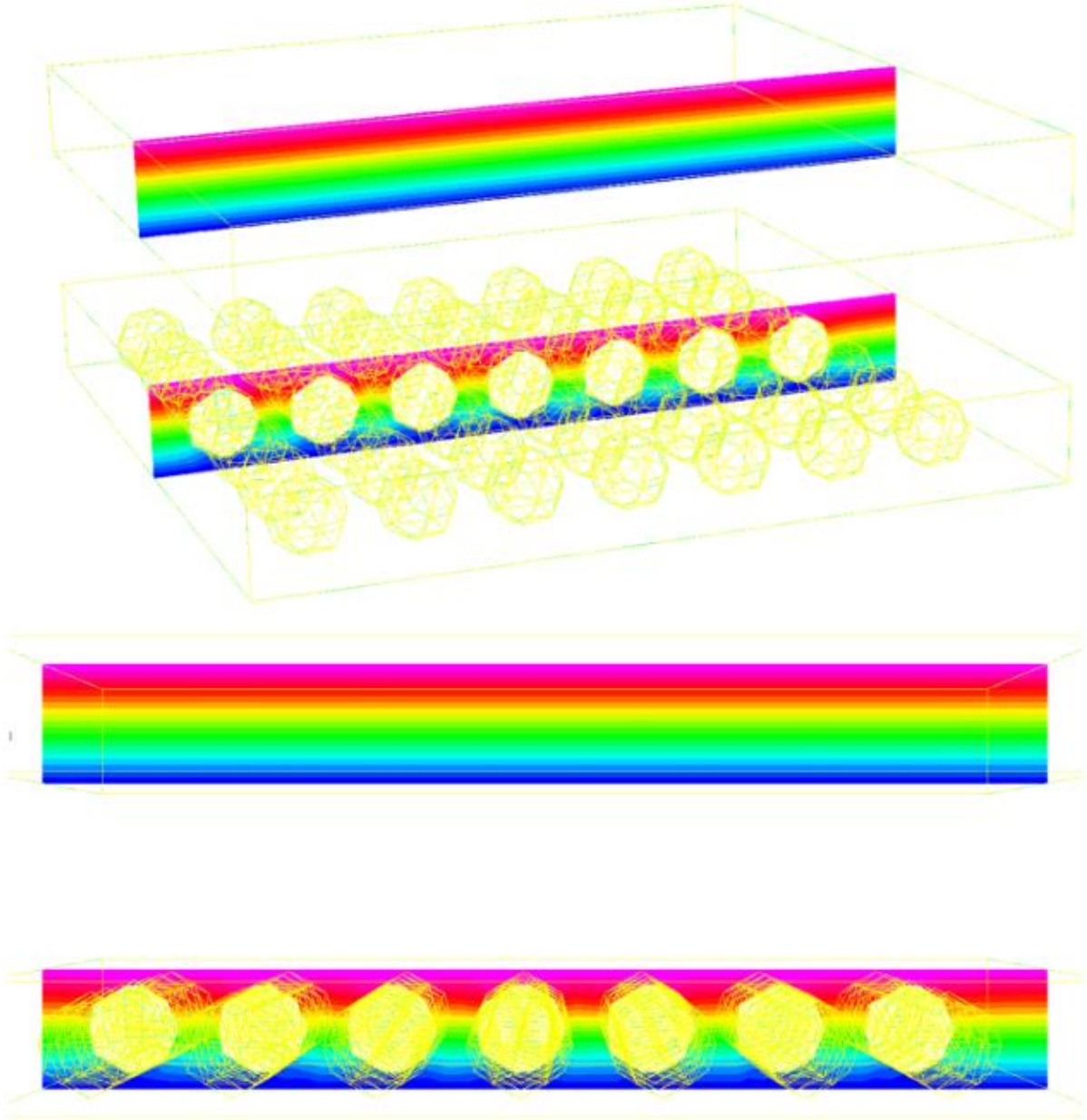
XY axial stress plot of BD390 subjected to uniform axial stress Section through slab at mid-level. The slab is subjected to the highest stress at neck regions where concrete volumes are lowest



XZ axial stress plot of BD390 subjected to uniform axial stress. Section lengthways through slab. The slab is subjected to the highest stress at neck regions where concrete volumes are lowest

Bubbledeck – Client Concerns

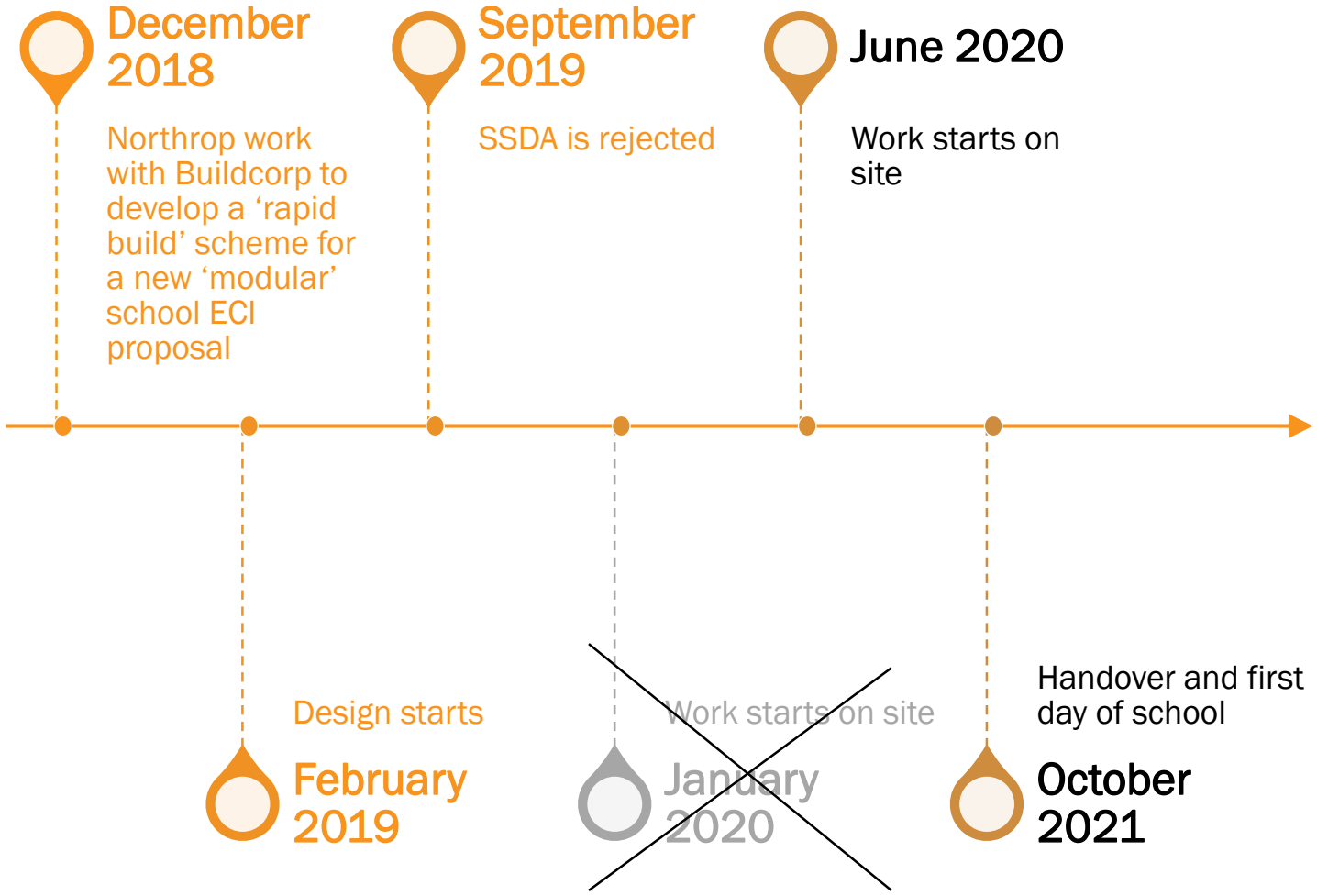
Thermal effects



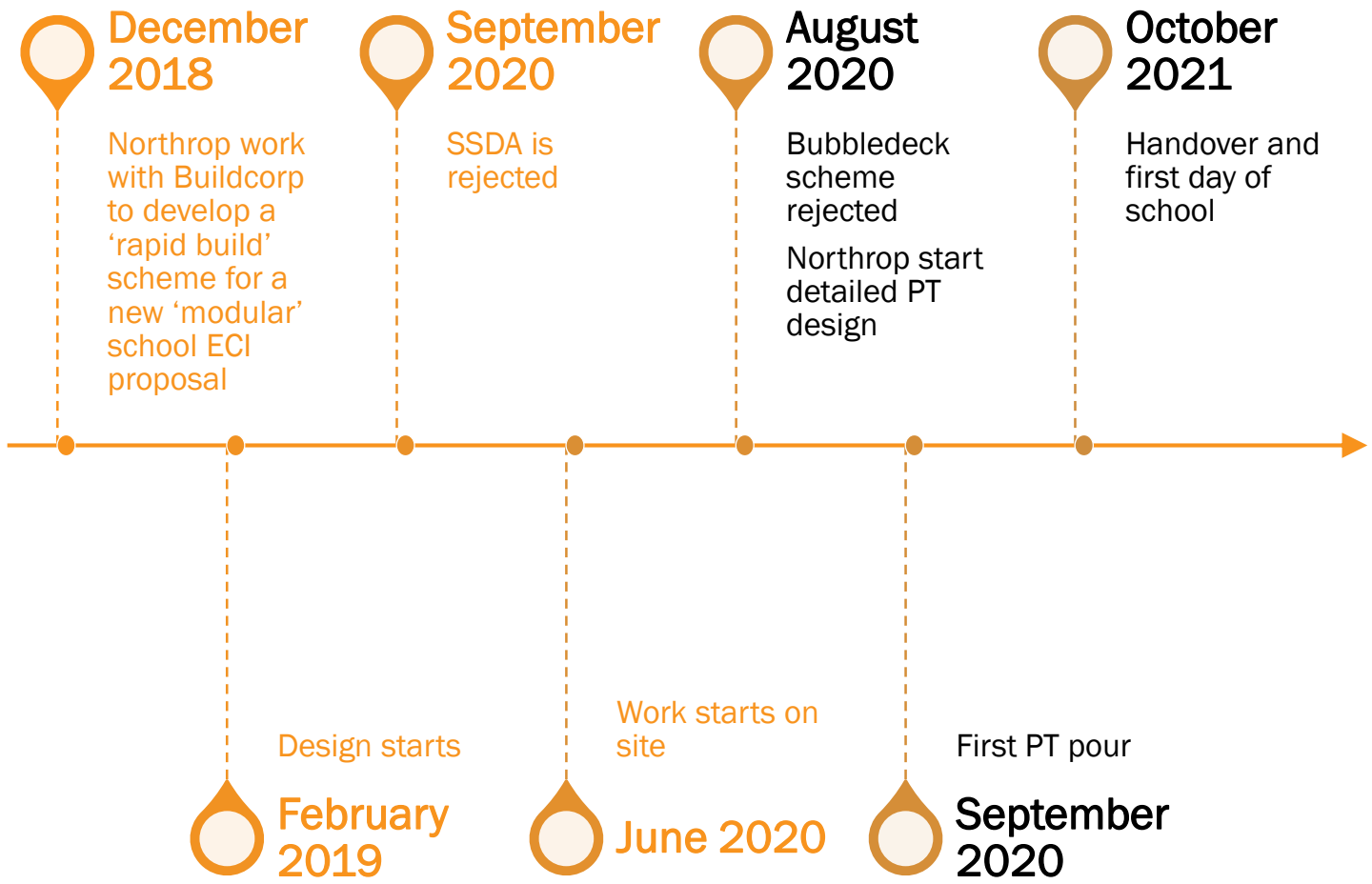
Steady state thermal analysis temperature plot of 390 solid slab (top) and BD390 slab (bottom).

The temperature variation of the solid slab is linear. The BubbleDeck is approximately linear

The Design Journey: A small road-block



The Design Journey

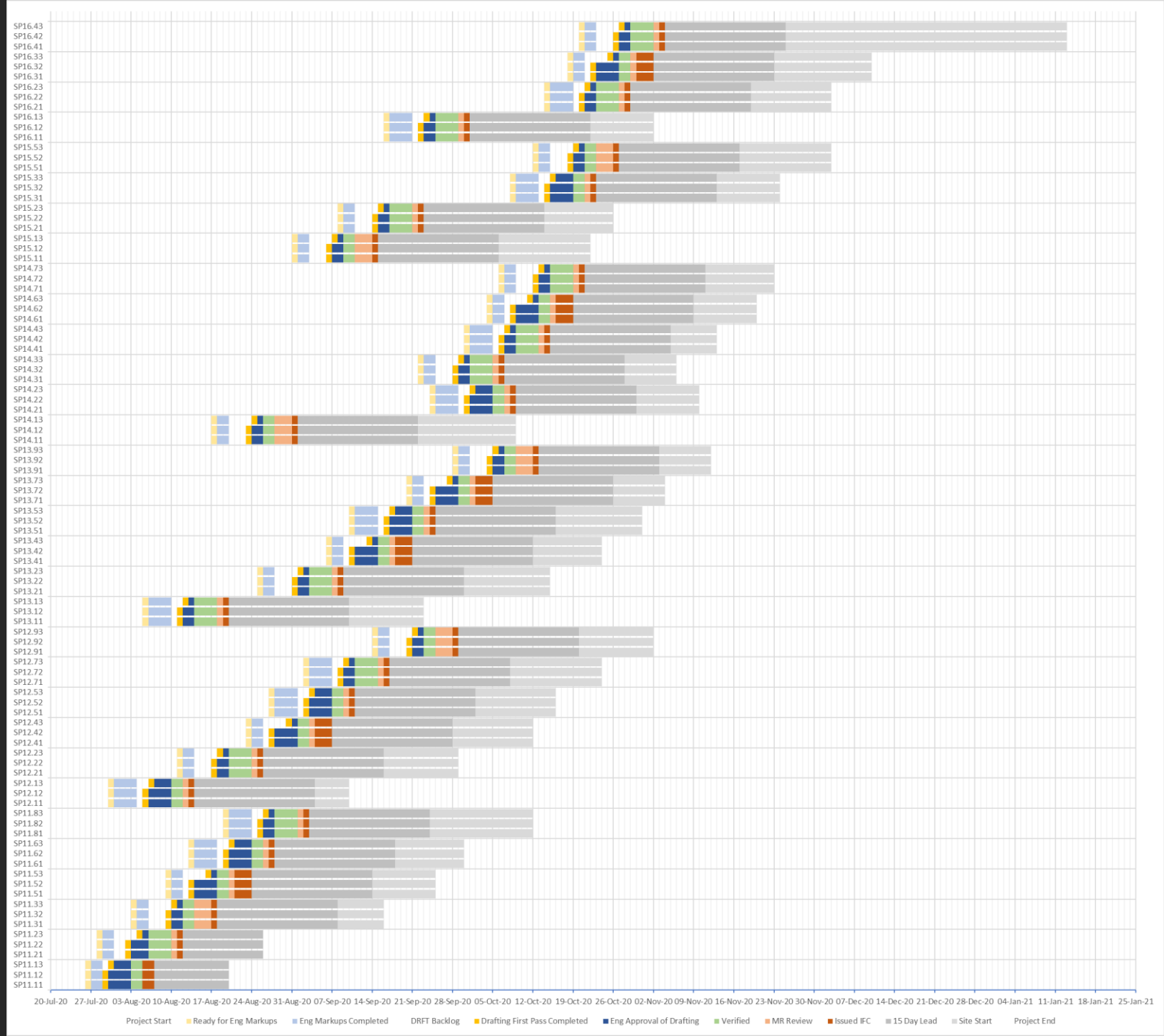


PT Documentation

32 PT Slab Pours

30 Unique PT Slab Pours (only 3 could be ‘typicalised’

1x PT Slab pour issued for construction every 2 days

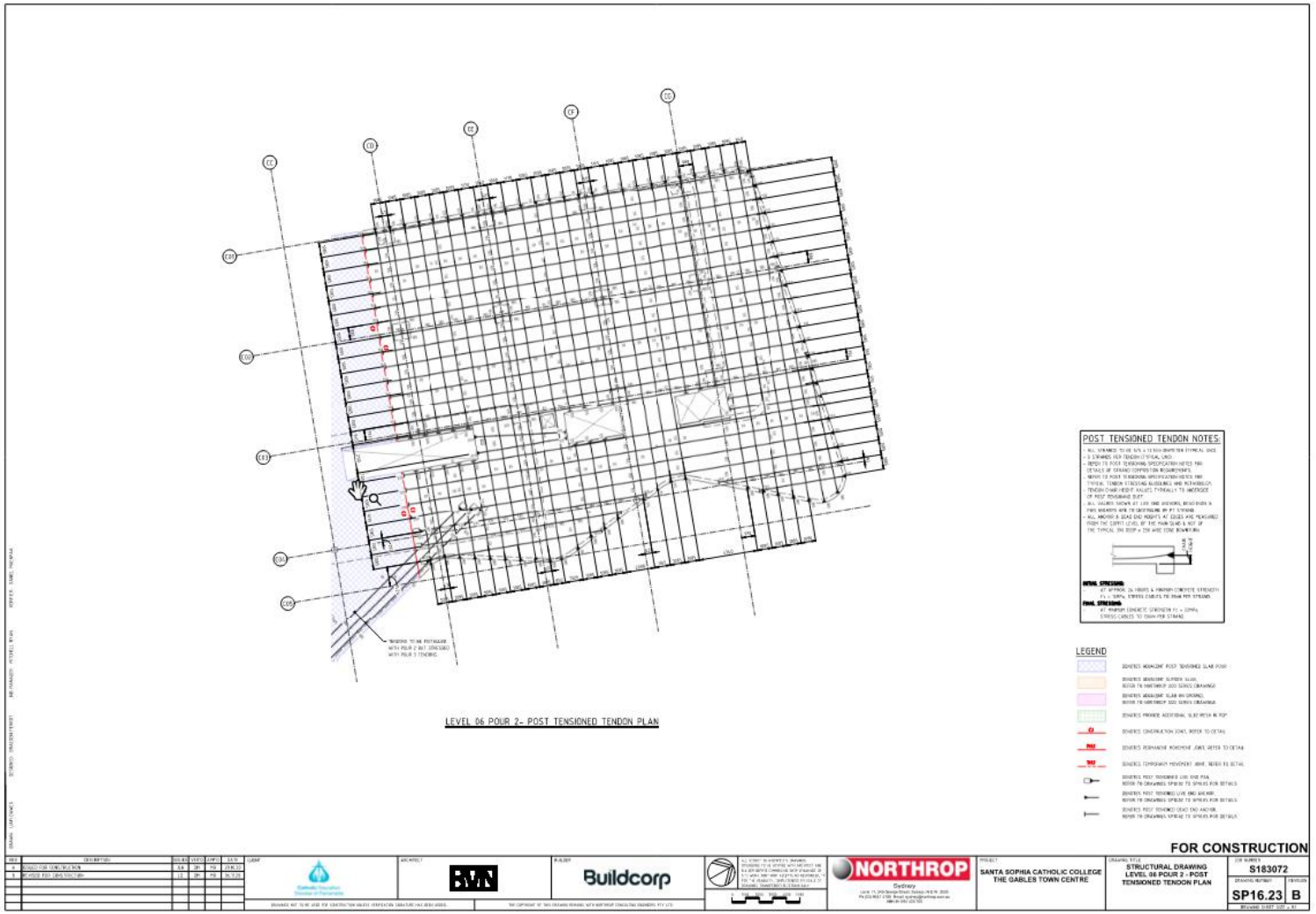


Automation

- Export Cad file from RAM
- Import Cad File Into Revit
- Run Dynamo Script.
- Then start Documentation process.

Post Tensioning Documentation

- Clean up Tendons and chair heights from Dynamo Script
- Show distance between tendons.
- Show correct end.

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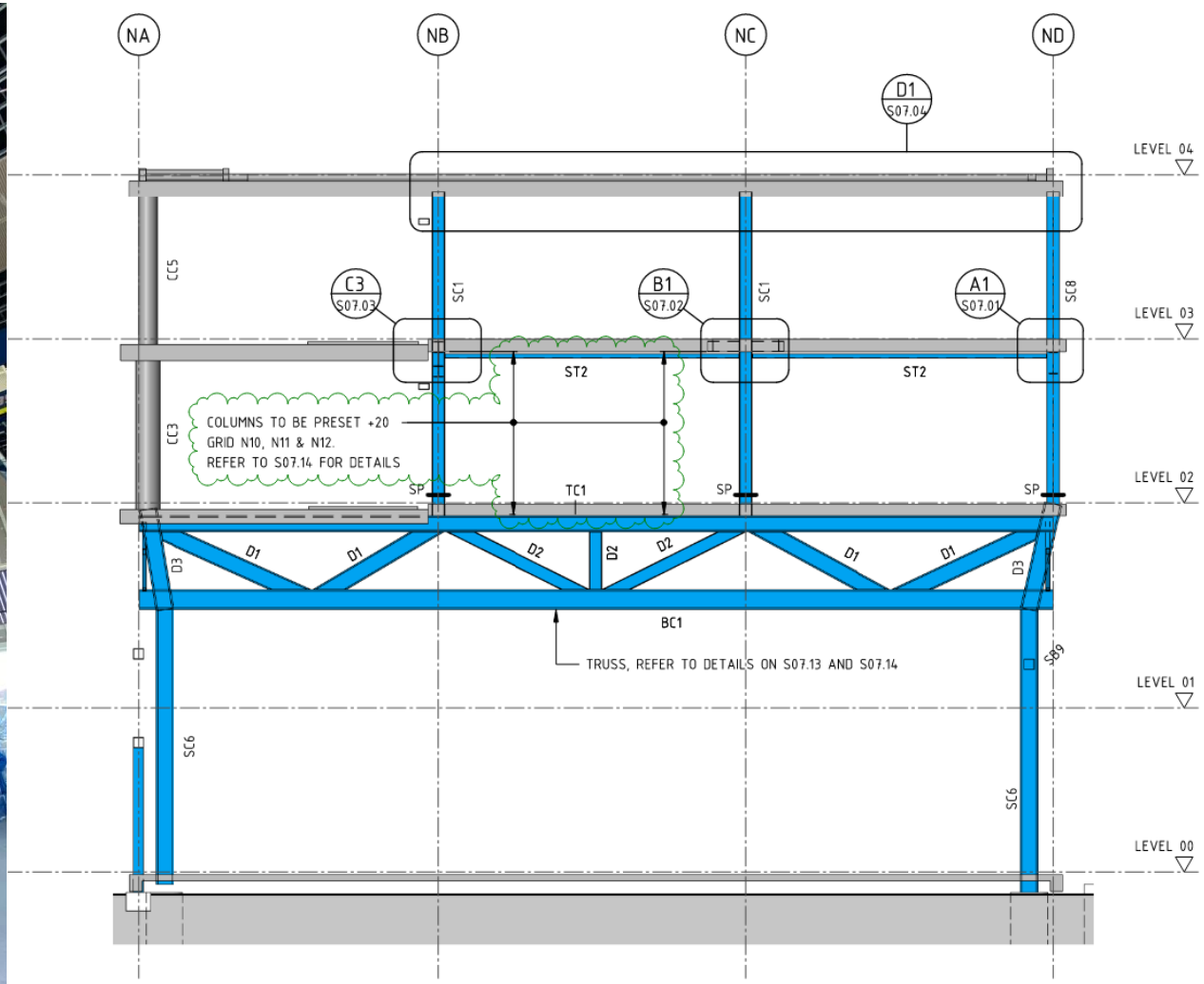
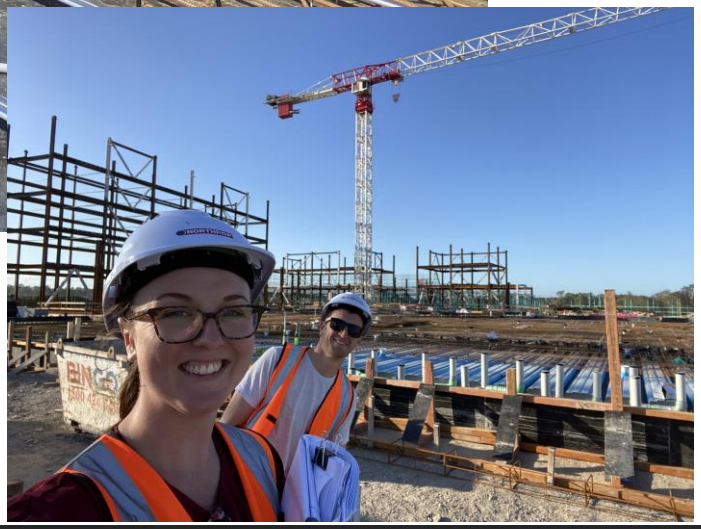


NORTH CLASSROOM 2 - EAST ELEVATION (GRID N11)

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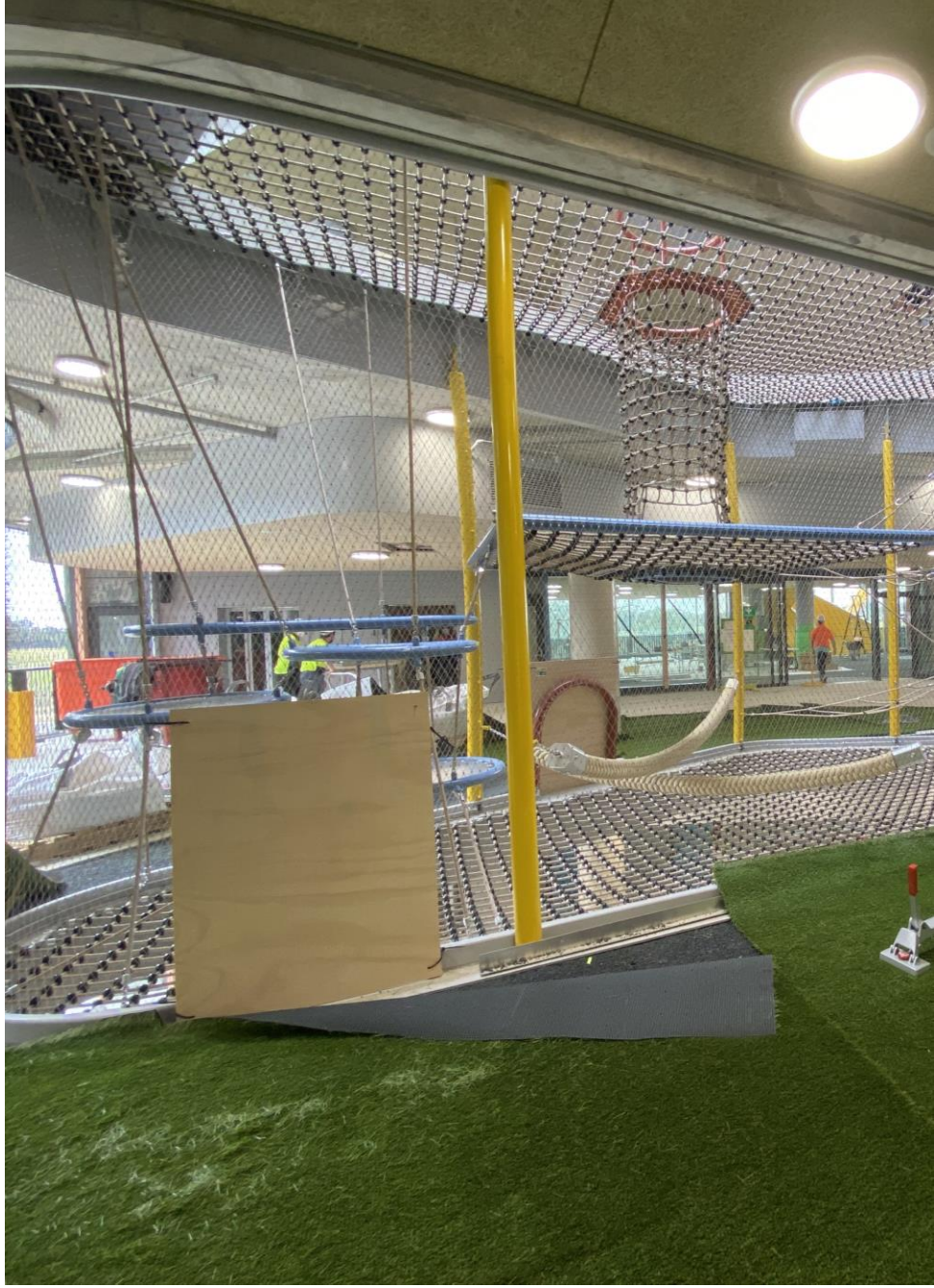

Questions