Technology and Environment in Architecture-

Construction Tasks

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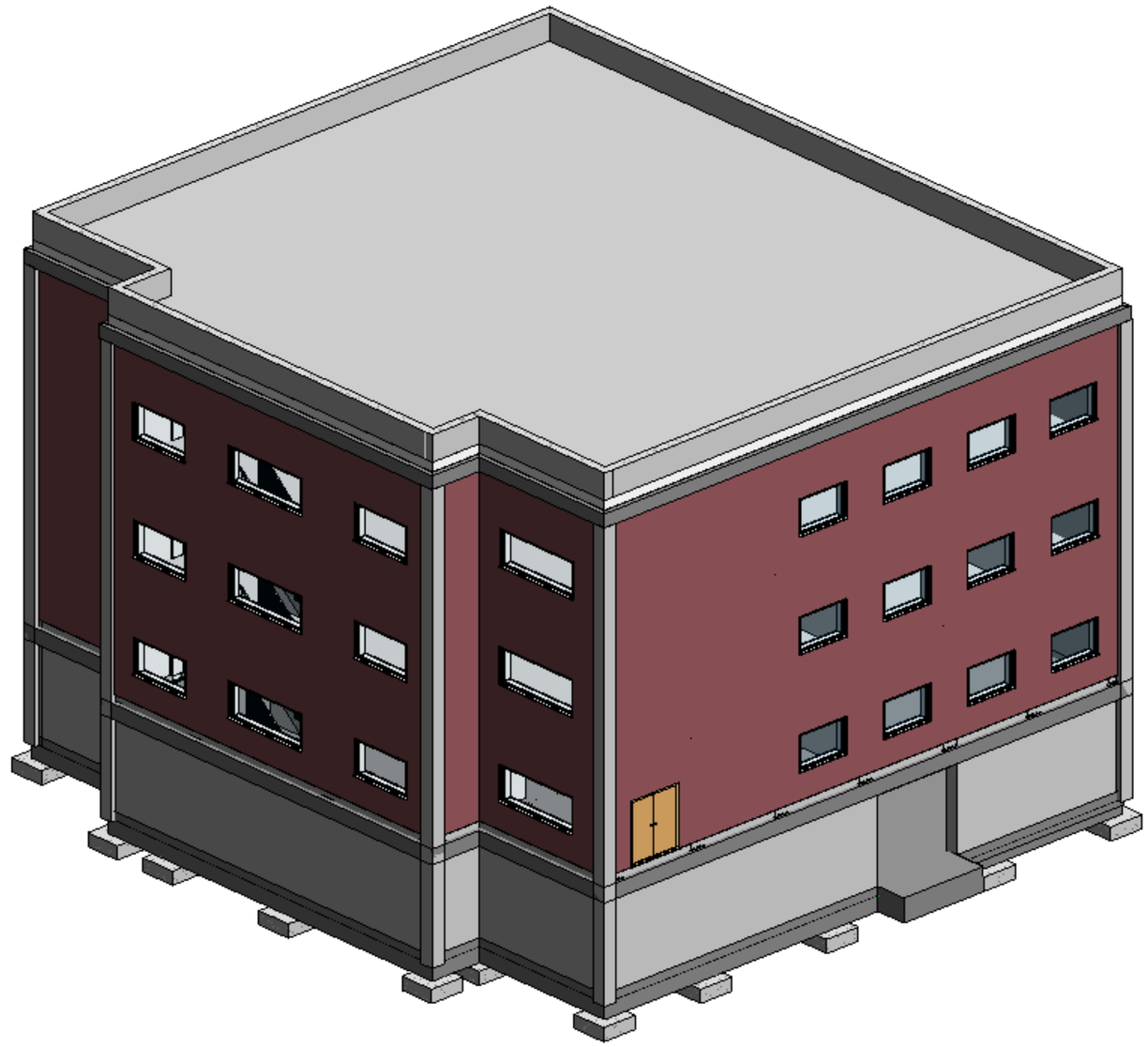

Construction Tasks 1-6

Technology and Environment in Architecture-
Construction Tasks
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Contents Page-

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

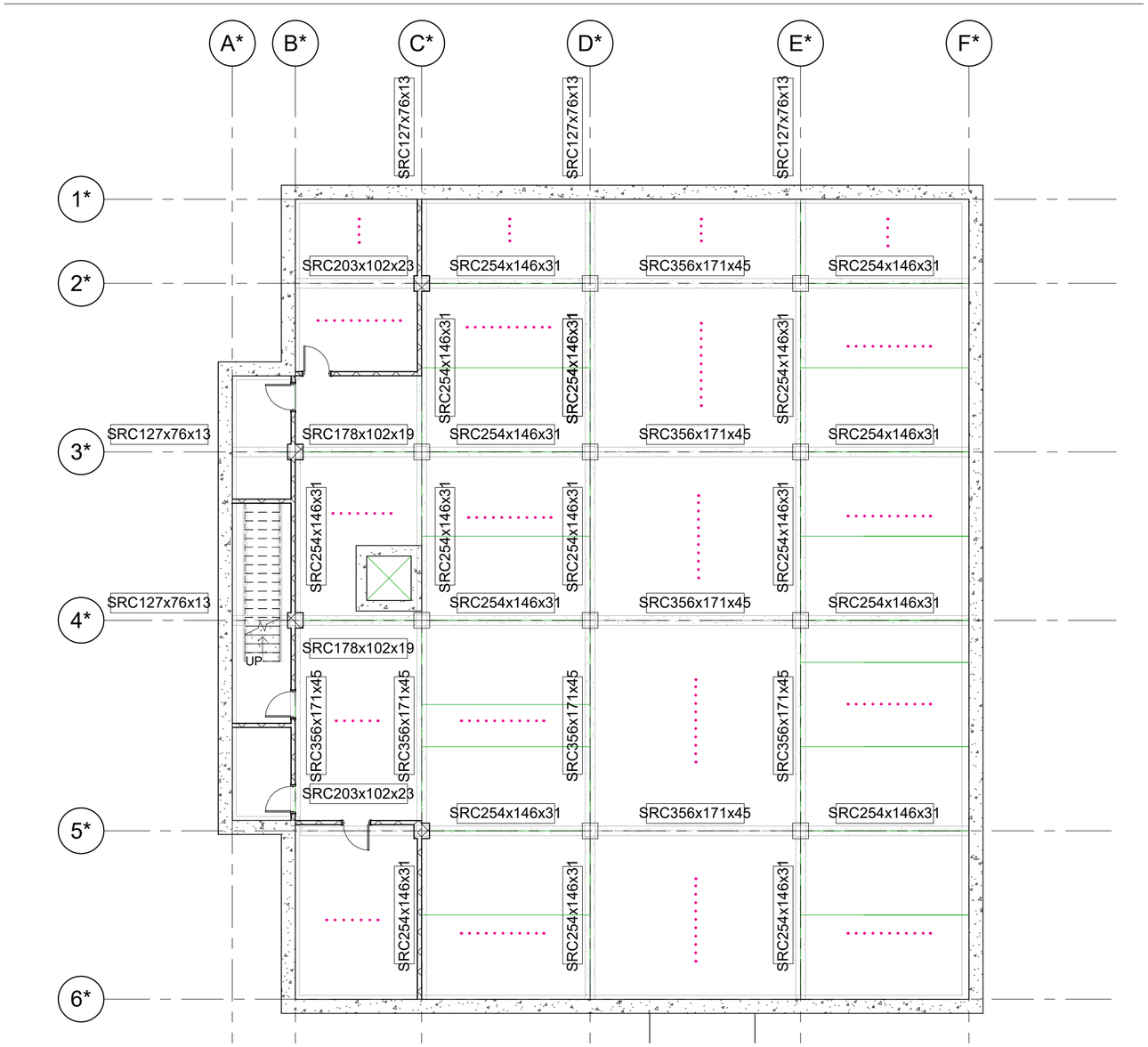
Task 1- Basement and Concrete Columns

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Span of the floor slabs

Task 1- Basement and Concrete Columns

Grid Ref.	Span (mm).	Depth (mm).	Width (mm).	Beam Required
B3-B4	4350.0	242	121	254x146
B4-B5	5548.0	308	154	356x171
B5-B6	4571.6	254	127	254x146
C1-C2	2175.0	121	60	127x76
C2-C3	4350.0	242	121	254x146
C3-C4	4350.0	242	121	254x146
C4-C5	5548.0	308	154	356x171
C5-C6	4571.6	254	127	254x146
B2-C2	3374.6	187	94	203x102
C2-D2	4350.0	242	121	254x146
D2-E2	5550.0	308	154	356x171
E2-F2	4573.2	254	127	254x146
A3-B3	1575.0	88	44	127x76
B3-C3	3150.0	175	88	178x102
C3-D3	4350.0	242	121	254x146
D3-E3	5550.0	308	154	356x171
E3-F3	4573.2	254	127	254x146



Basement Floor
1:100 @ A3

Fig 1.1: Basement Floor (Beeley, 2020).

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Construction Tasks

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Task 2- Floor Plans and Steel

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Construction Tasks
Joseph Beeley- N0810079

Primary Beams

Secondary Beams

Task 2- Ground Floor

Grid Ref.	Span (mm).	Depth (mm).	Width (mm).	Beam Required
C1-C2	4764.9	238	119	254x146
C2-C3	4456.9	223	111	254x146
C4-C5	5410.0	271	135	305x165
C5-C6	4830.0	242	121	254x146
D1-D2	4764.9	238	119	254x146
D5-D6	4830.0	242	121	254x146
E1-E2	4764.9	238	119	254x146
E5-E6	4830.0	242	121	254x146
G3-G4	1911.0	96	48	127x76
G4-G5	5410.0	271	135	305x165
G5-G6	4830.0	242	121	254x146
B2-C2	3080.0	154	77	178x102
B5-C5	3081.9	154	77	178x102
C2-D2	3200.0	160	80	178x102
C5-D5	3200.0	160	80	178x102
D2-F2	6394.8	320	160	356x171
D5-E5	3194.8	160	80	178x102

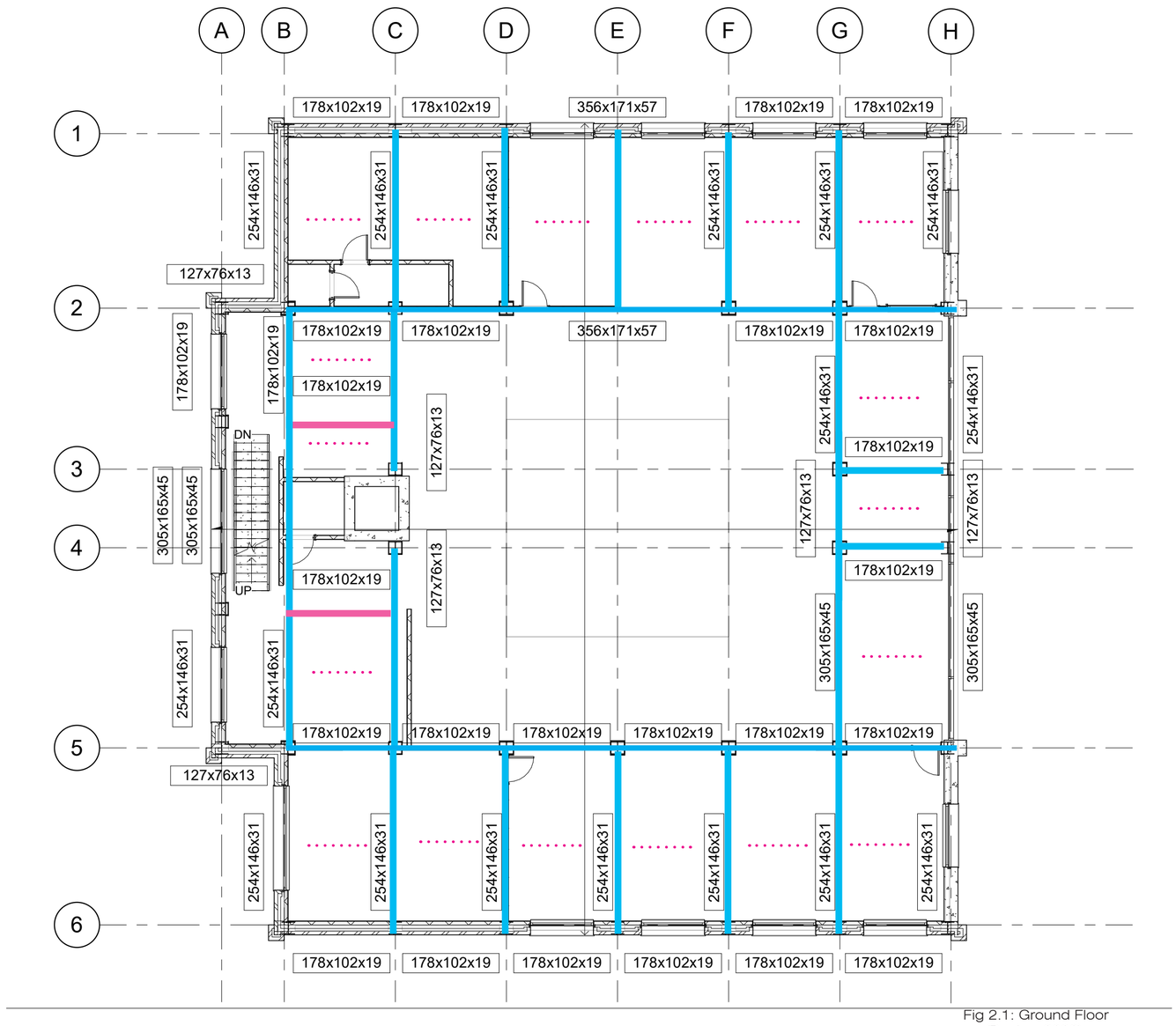


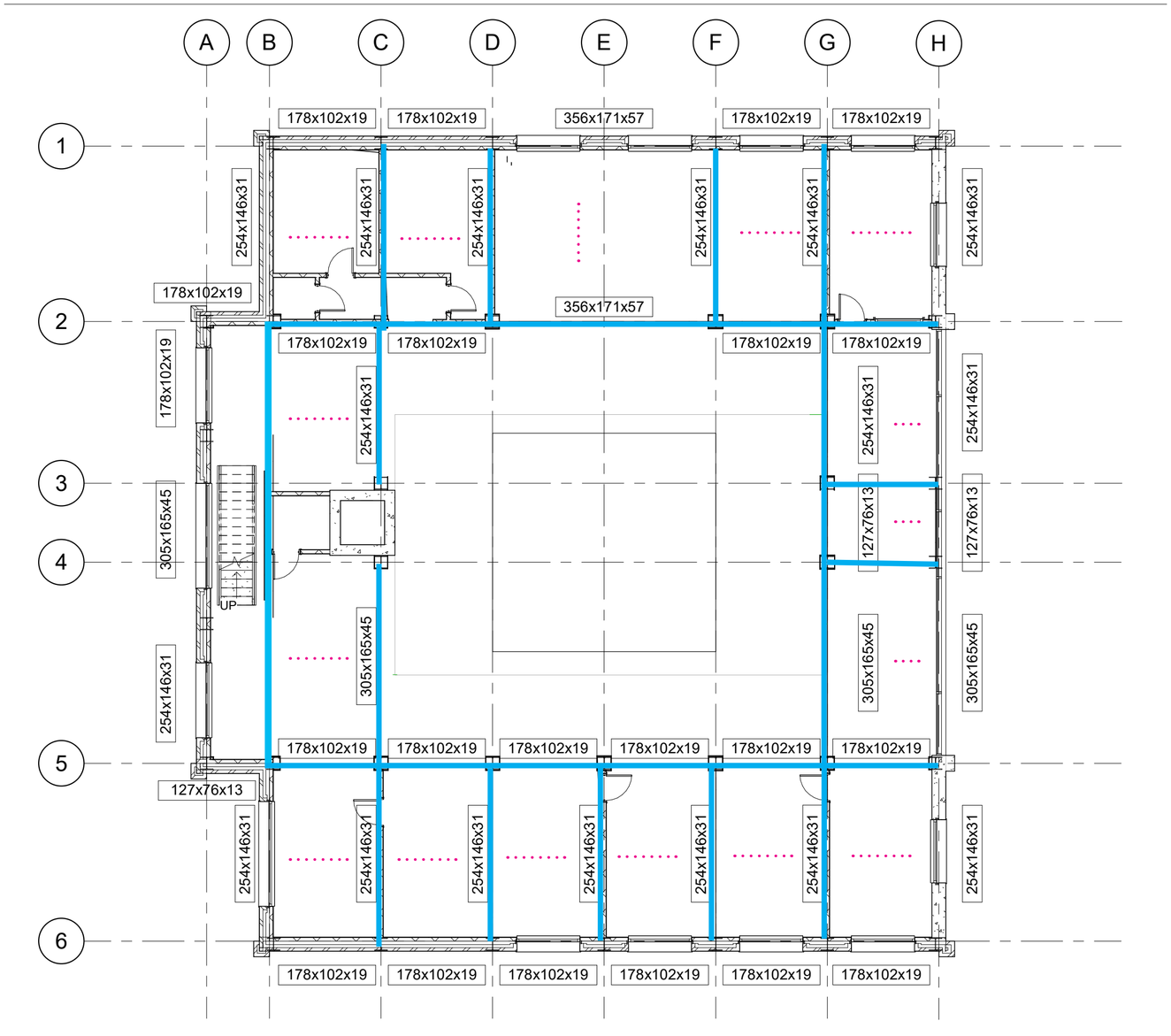
Fig 2.1: Ground Floor (Beeley, 2020).

Ground Floor
1:100 @ A3

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 2- First Floor

Grid Ref.	Span (mm).	Depth (mm).	Width (mm).	Beam Required
C1-C2	4764.9	238	119	254x146
C2-C3	4456.9	223	111	254x146
C4-C5	5410.0	271	135	305x165
F1-F2	4764.9	238	119	254x146
F5-F6	4830.0	242	121	254x146
G1-G2	4764.9	238	119	254x146
G2-G3	4456.9	223	111	254x146
G3-G4	1911.0	96	48	127x76
G4-G5	5410.0	271	135	305x165
G5-G6	4830.0	242	121	254x146
D2-F2	6394.8	320	160	356x171
D5-E5	3194.8	160	80	178x102
E5-F5	3194.8	160	80	178x102
F2-G2	3194.8	160	80	178x102
F5-G5	3194.8	160	80	178x102
G2-H2	3099.9	155	77	178x102
G5-H5	3089.6	154	77	178x102



First Floor
1:100 @ A3

Fig 2.2: First Floor (Beeley, 2020).

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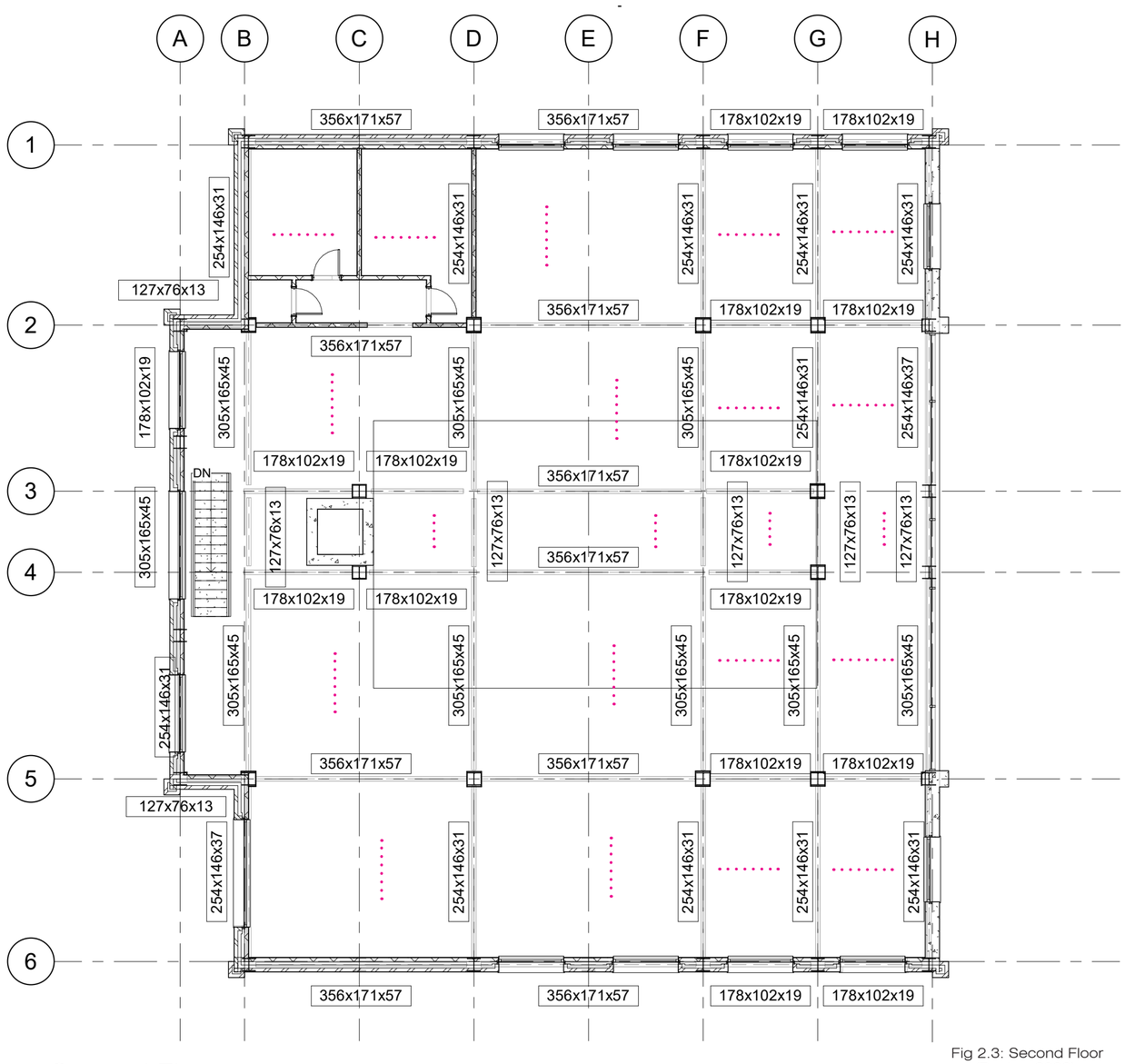
Construction Tasks
Joseph Beeley- N0810079

Task 2- Second Floor

Grid Ref.	Span (mm).	Depth (mm).	Width (mm).	Beam Required
B2-D2	6287.5	314	157	356x171
B5-D5	6287.5	314	157	356x171
D2-F2	6395.0	320	160	356x171
D5-F5	6395.0	320	160	356x171
F2-G2	3200.0	160	80	178x102
F5-G5	3200.0	160	80	178x102
G2-H2	3105.1	155	78	178x102
G5-H5	3105.1	155	78	178x102
D1-D2	4764.9	238	119	254x146
D5-D6	4830.0	242	121	254x146
F1-F2	4764.9	238	119	254x146
F5-F6	4830.0	242	121	254x146
G1-G2	4764.9	238	119	254x146
G2-G3	4456.9	223	111	254x146
G3-G4	1911.0	96	48	127x76
G4-G5	5410.0	271	135	305x165
G5-G6	4830.0	242	121	254x146



Second Floor
1:100 @ A3

Fig 2.3: Second Floor (Beeley, 2020).

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Construction Tasks
Joseph Beeley- N0810079

Task 3- Connections and Flooring

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Construction Tasks
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Task 3- Connections and Flooring

I determined that due to the structure of my beams and the fact there were a lot of grouping of three and four beams, that only platform plates and I-Beams were possible to connect them, through playing around with connection types in Revit.

Completed steel framing with connections

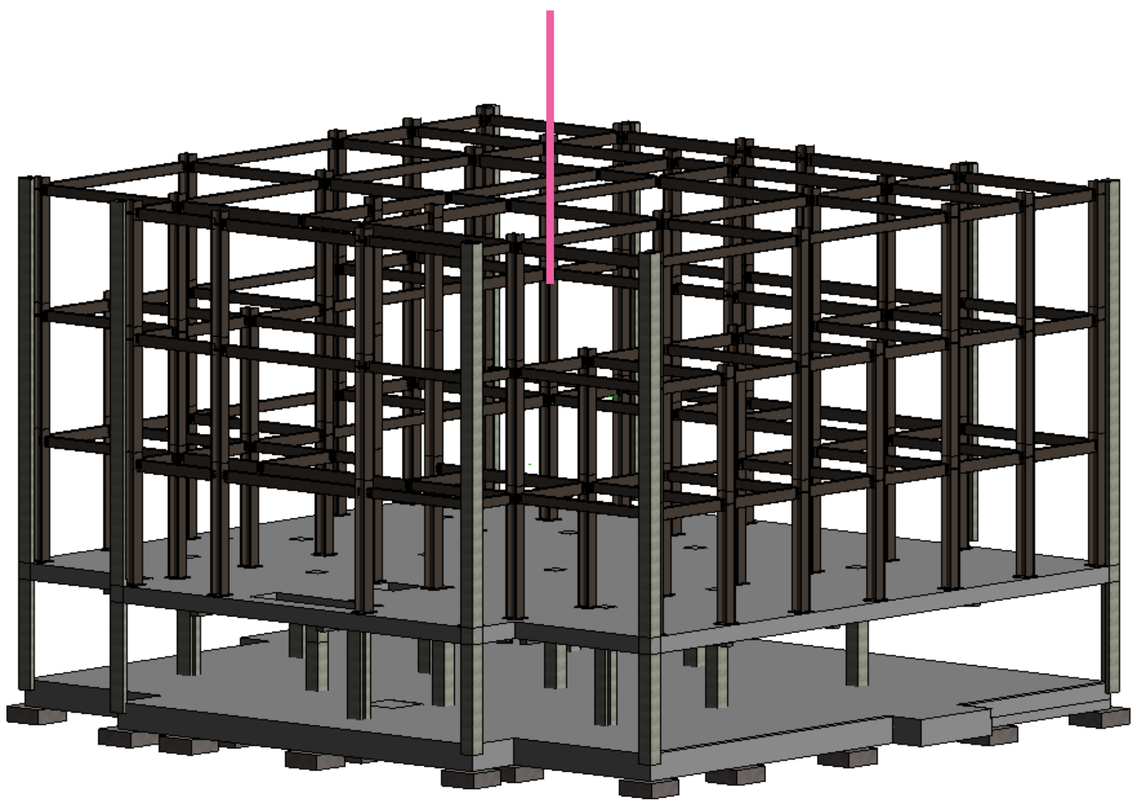


Fig 3.1: Structure and Foundation (Beeley, 2020).

An instance in which a platform plate would be better at connecting the four beams to the column.

Steel Column

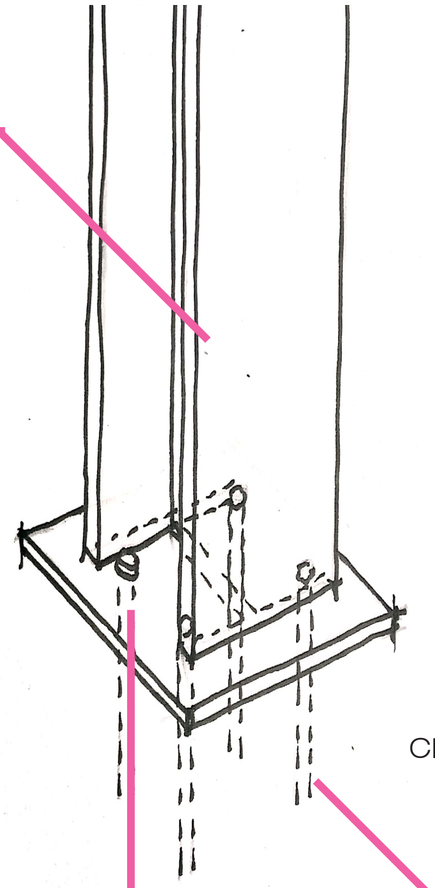


Fig 3.2: Base Plate Connection (Beeley, 2020).

Base plate and bolt

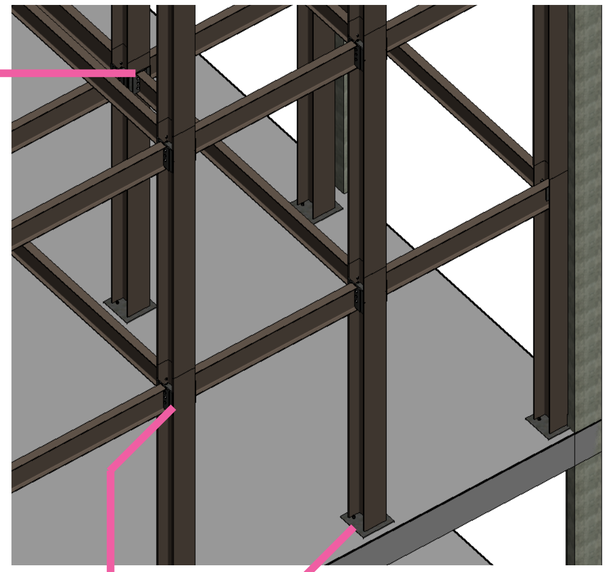


Fig 3.3: Finer Column Detail (Beeley, 2020).

Base plate

Clip angle connections

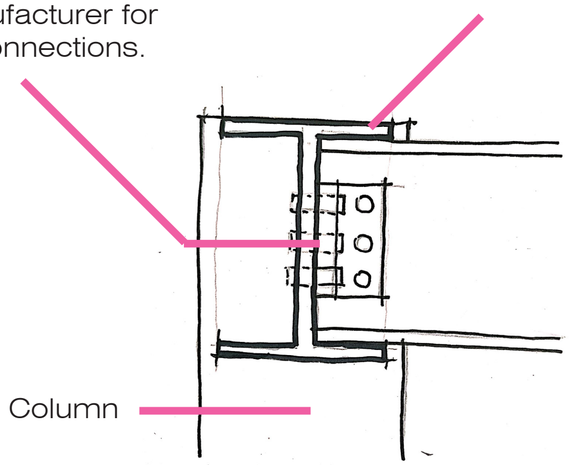
The bolts do in fact surpass the flooring screed and insulation and connect to the concrete slabs on the metal deck.

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 3- Connections and Flooring

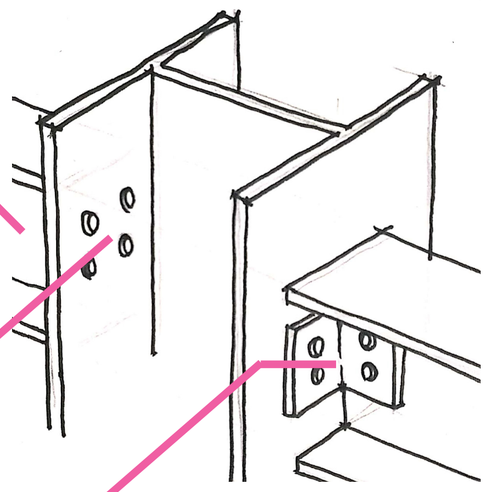
Bolts pass through holes in the I-Beam made by the manufacturer for these connections.

I-Beam sat within its perpendicular counterpart.



Steel Column

Additional I-Beams

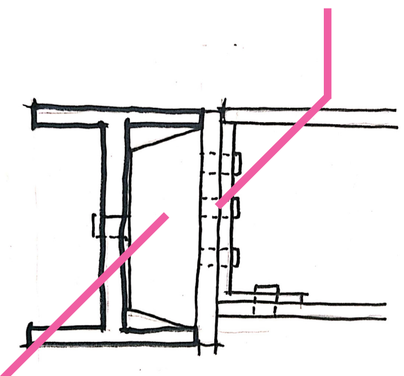


Bolts protrude through to the other side.

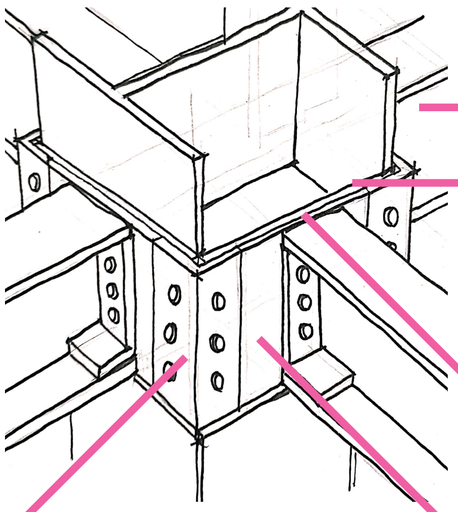
Bolts and bracket

Fig 3.4: Clip Angle Connection (Beeley, 2020).

Bolts and bracket



Back of platform plate protrudes into space.



Additional I-Beams

Primary plate

The platform plate spans the width of the column, is topped with a smaller second plate, allowing for corner plates to be added to the excess bolting the platform system together.

Corner connection

Secondary plate

Fig 3.5: Platform Plate Connection (Beeley, 2020).

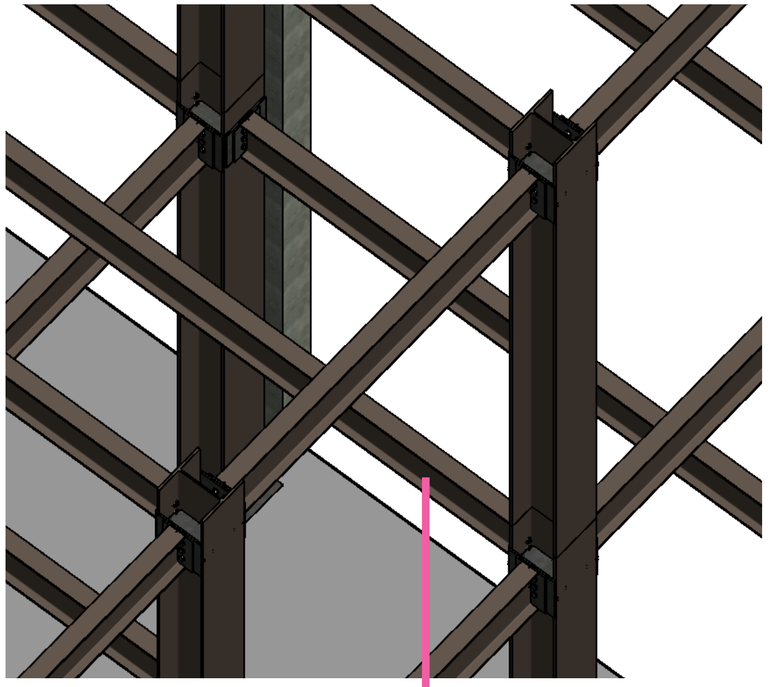


Fig 3.6: Connection Between Beams and Columns (Beeley, 2020).

A closer look at the connections used for my steel frame.

Task 3-Connections and Flooring

The voided mezzanines from each floor.

Structural columns and connections sit between the floor slab and suspended ceiling.

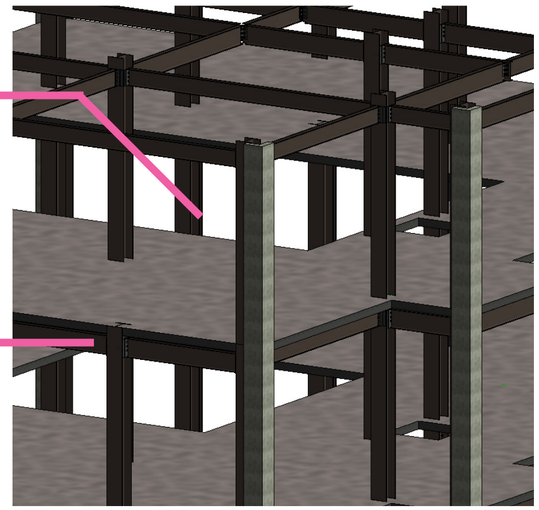
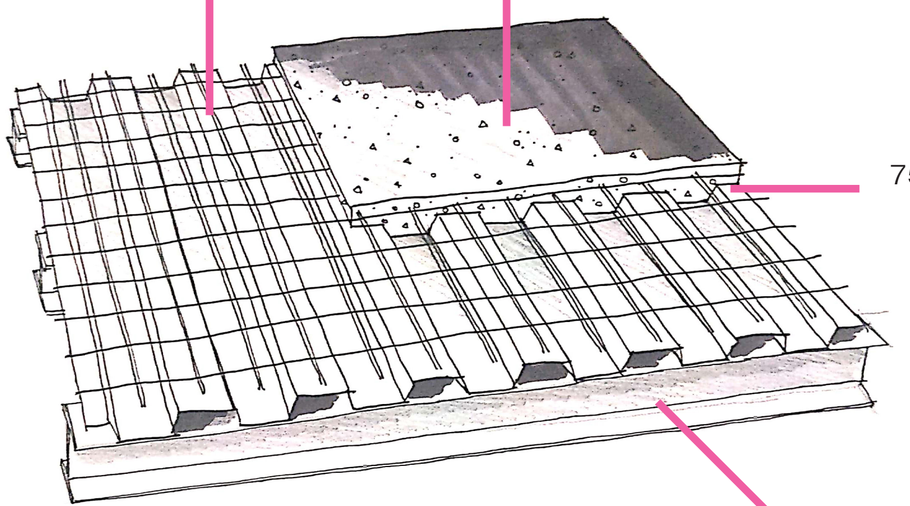


Fig 3.7: Floor Voids
(Beeley, 2020).

Reinforcement rebar grid all slabs set as a whole.

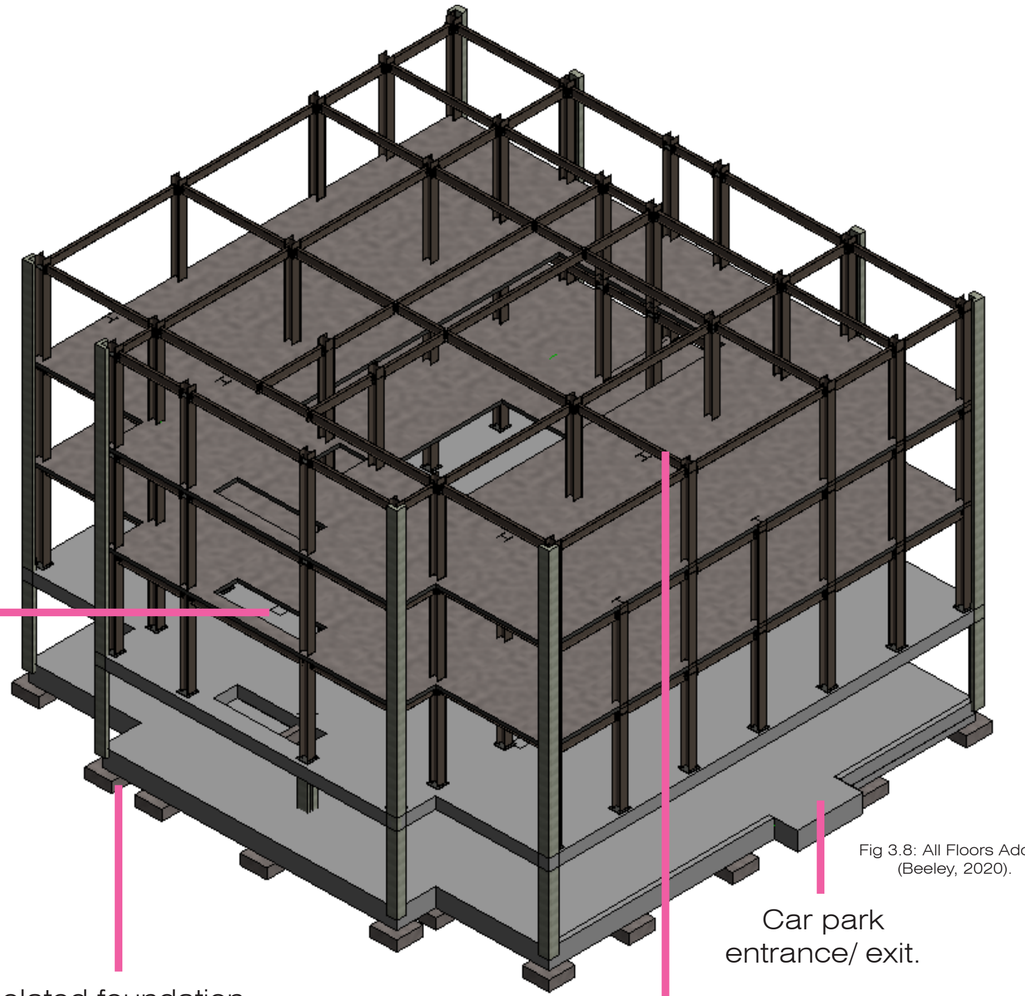
In-situ concrete slab



75mm Steel decking

Steel frame running perpendicular to the decking above.

Fig 3.6: Floor Decking
(Beeley, 2020).



Spaces for the staircases.

Isolated foundation mirroring the undulation of a slab.

Structure becomes more open plan as you go higher, which will relieve and structural tensions in the concrete work.

Car park entrance/ exit.

Fig 3.8: All Floors Added
(Beeley, 2020).

Task 4- Curtain Walling and MetSec

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 4- Curtain Walling and MetSec

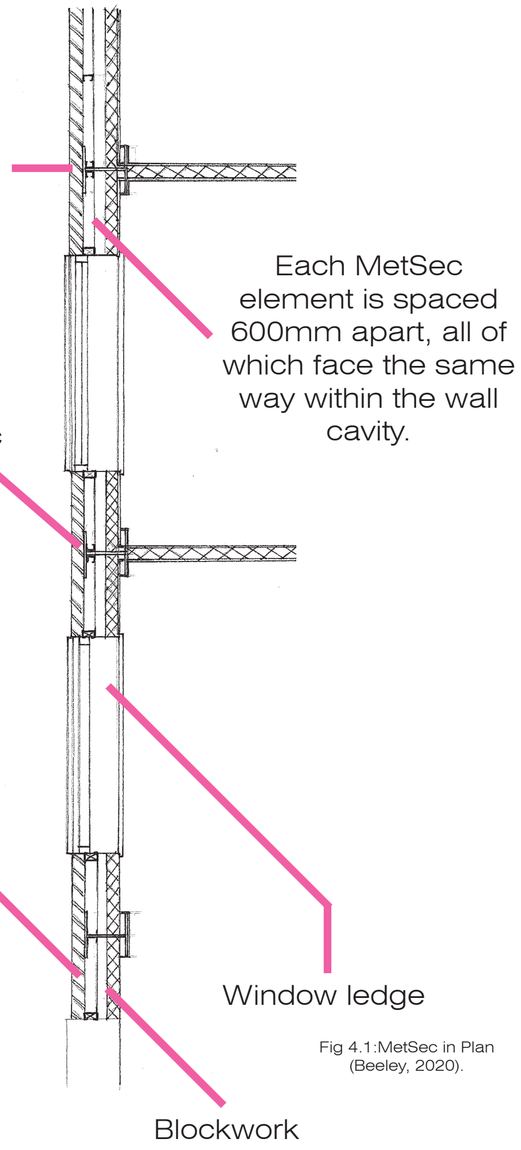


Fig 4.1:MetSec in Plan (Beeley, 2020).

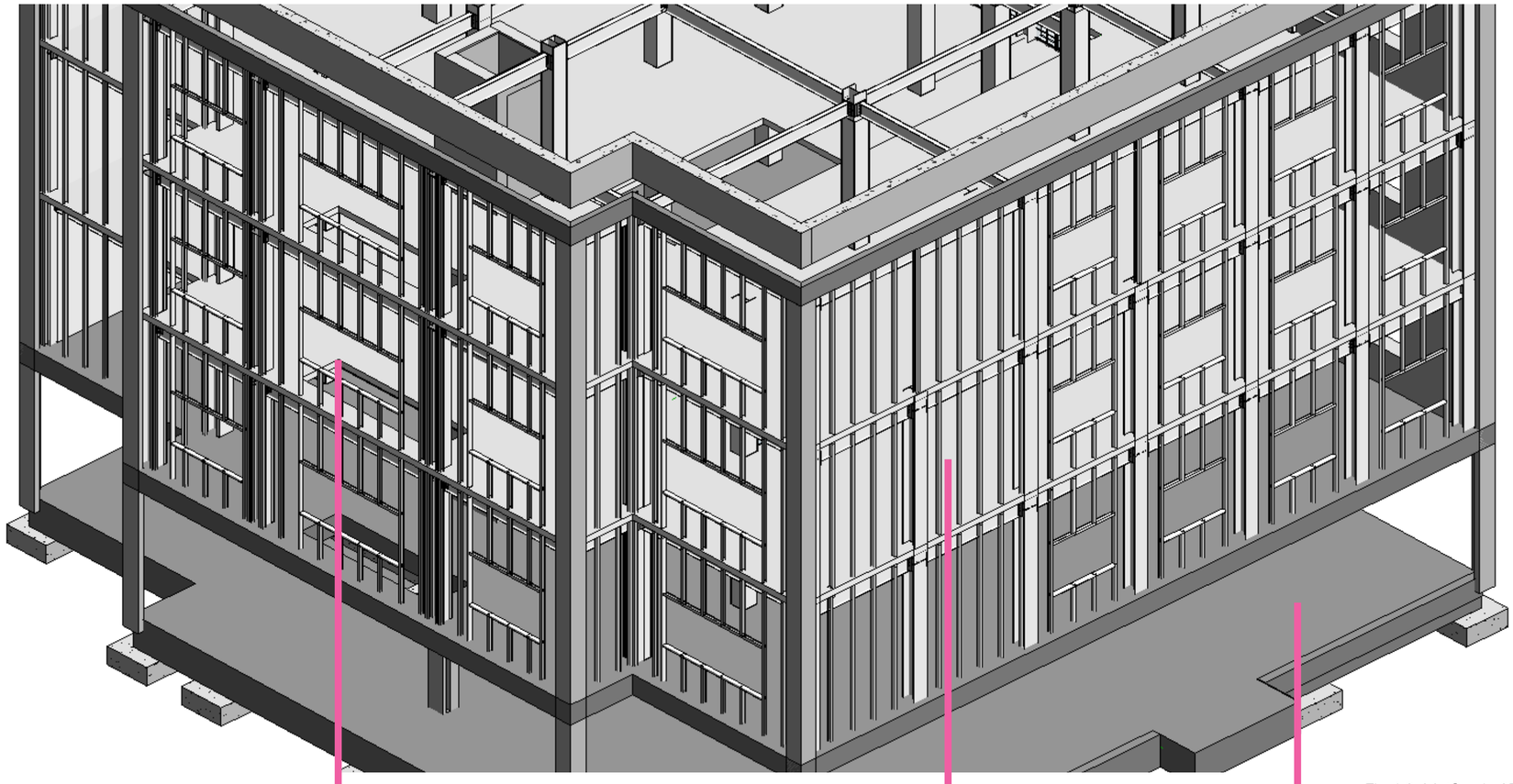


Fig 4.2: MetSec in 3D (Beeley, 2020).

These panels would have been bolted together to the desired dimensions based on acquired plans, then brought onto site pre-made. They are BIM complient, so are easily used and modified in the construction field, with a database of prelaoded designs on any size you could need.

A load bearing structure that can be inserted into most building schemes.

Below ground level thick retaining concrete will support the rest of the framework including the MetSec.

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Construction Tasks
Joseph Beeley- N0810079

Task 4- Curtain Walling and MetSec

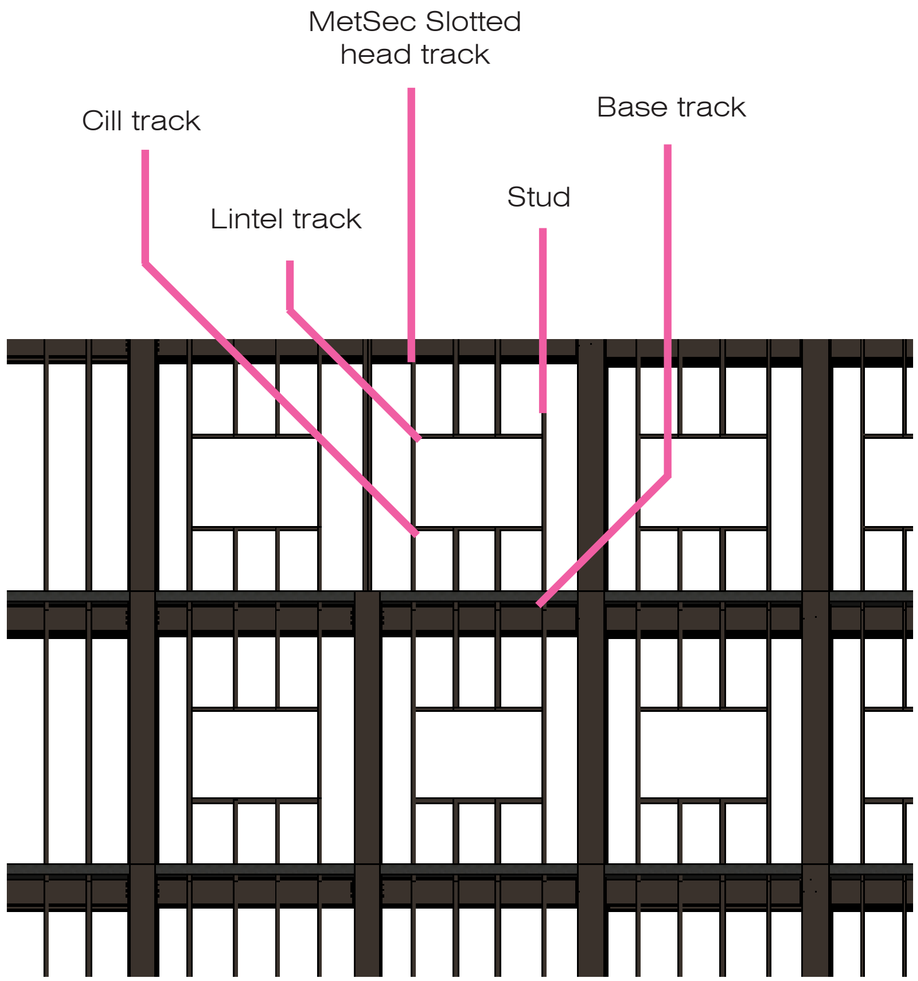


Fig 4.3: Elements of MetSec (Beeley, 2020).

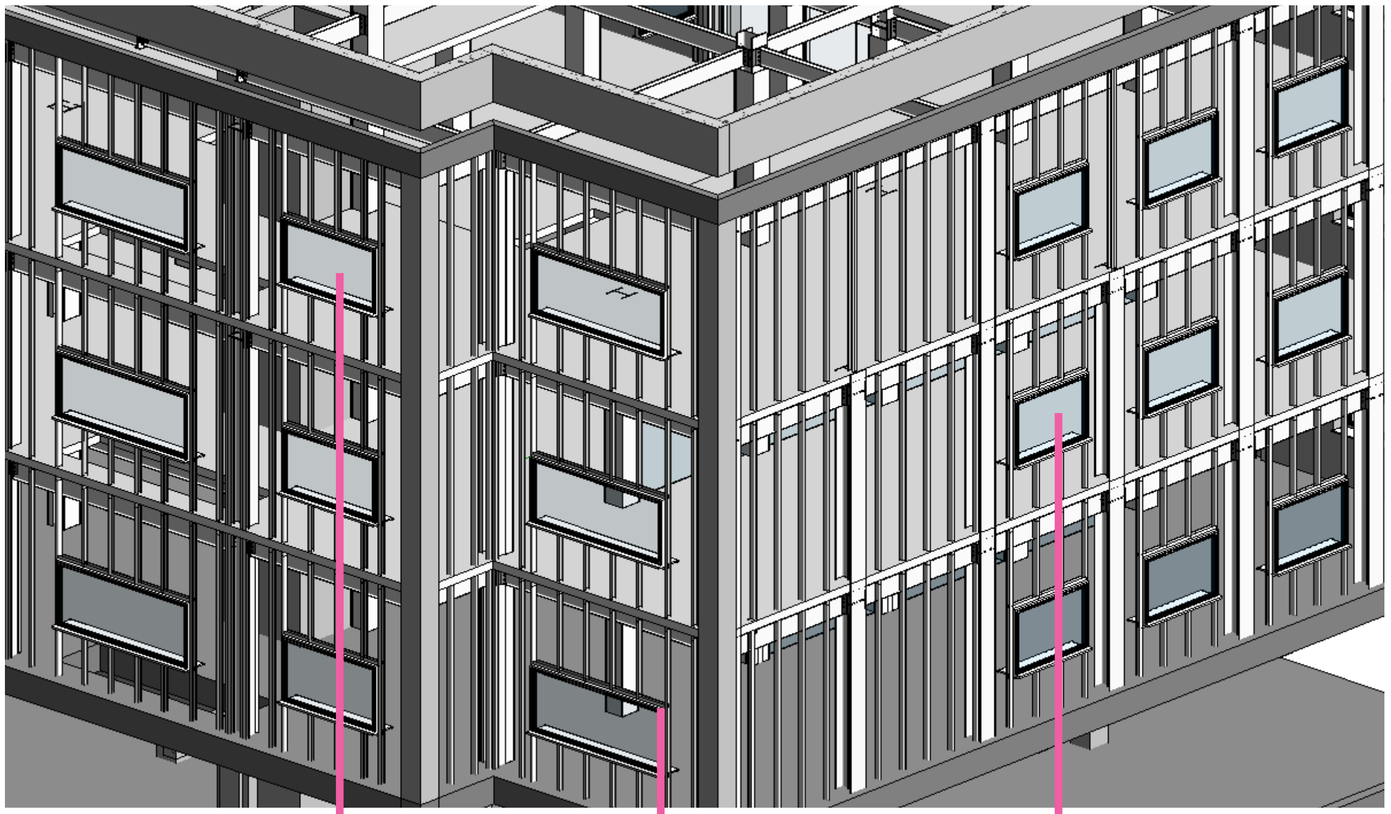


Fig 4.4: Adding Glazing (Beeley, 2020).

MetSec is premade to cater to other design knowns, such as the scaling of the windows, to allow it to sit comfortably within the lintel track and sill track.

Addition of glazing is quick, cost effective and non-labour intensive.

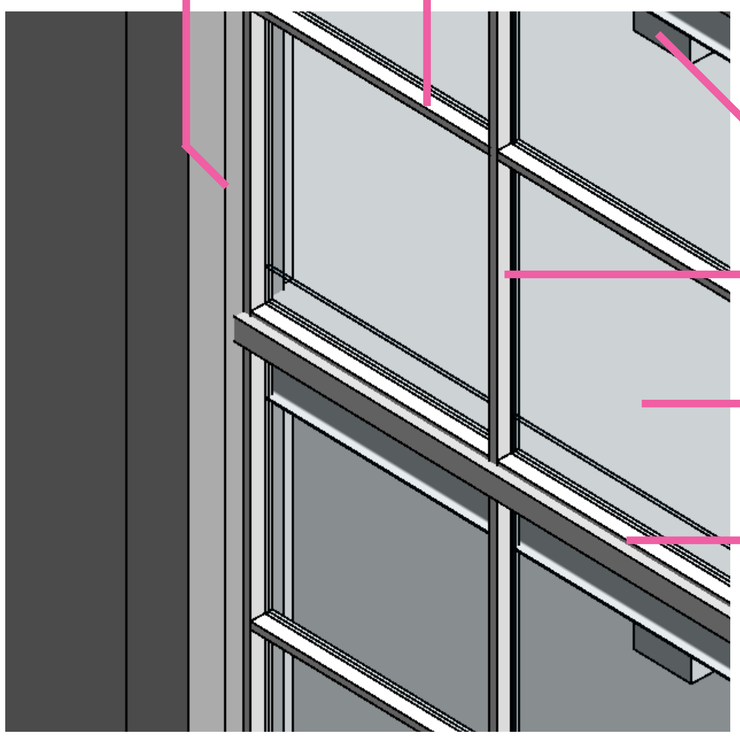
The thickness/depth will also be taken into acoount and varies through types of MedSec component to allow for a range of uses.

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 4- Curtain Walling and MetSec

Structural join covered with mullion. Anchored to the front of the slab.

Horizontal mullion with mullion cover



Interior column

Mullion with mullion cover

Office floor

Fixing to the slab's edge with a transom.

Fig 4.5: Curtain Wall Close-up (Beeley, 2020).

Steel encased in plasterboard to give the office space a cleaner feel, detailing and materiality can change atmosphere.

Steel grid system is flush against the curtain wall in two places, acting like a large set of mullions.

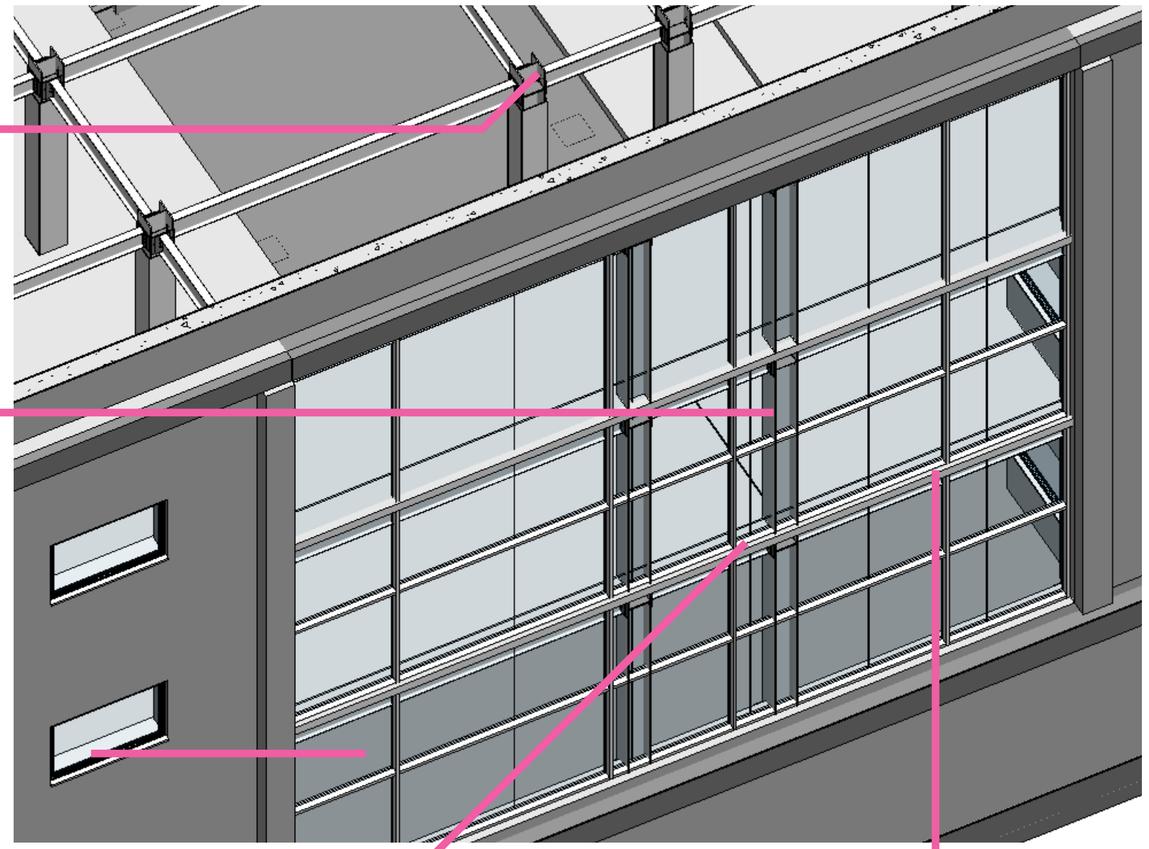


Fig 4.6: Wall Connections

The transom sits just above and below the floor, houses the glass within its grooves, and insulates behind and between it. With insulation between the joins in floor slabs.

The curtain wall is double glazed with a thermal spacer that runs through the cavity in the glass panes, like water in a radiator.

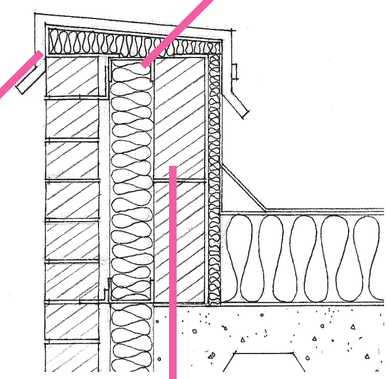
Task 5- The Roof

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 5- The Roof

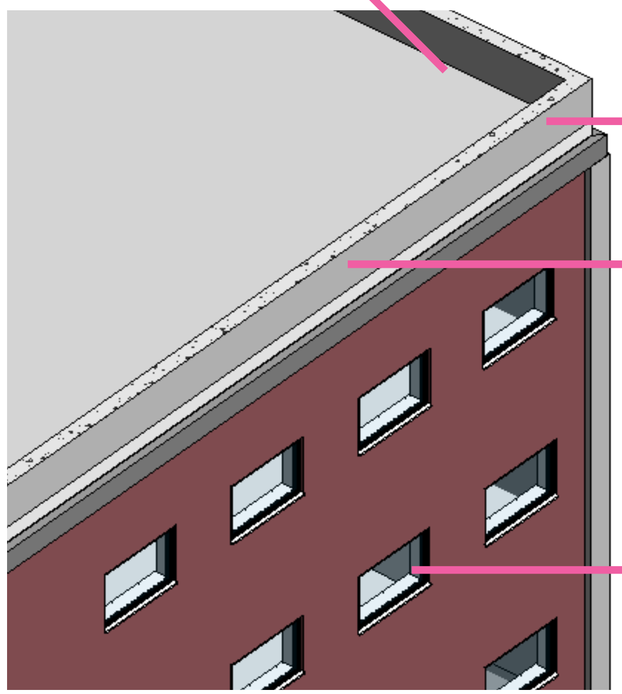
MetSec allows for the structure to exist at this level, keeps the structure strong. Retains continuity within the wall, ensuring there aren't weak spots.

Metal cap flashing



Blockwork is completely surrounded by membranes and insulation to prevent cold bridging.

Cant and flashing for interior protection.



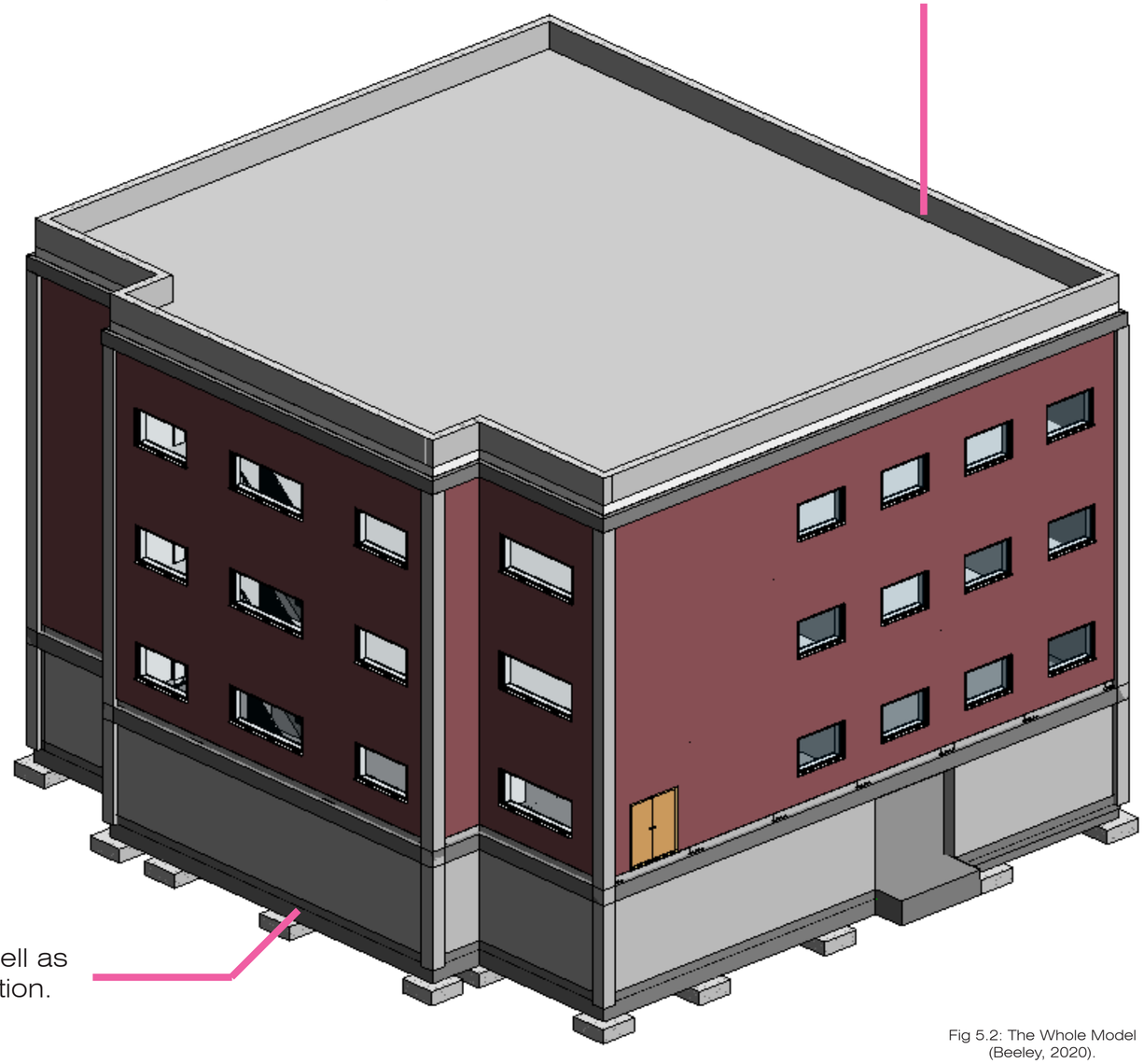
Follows the masonry of the walls below.

Blockwork, insulation and structural MetSec, followed by a blockwork interior.

Window

Fig 5.1: Roof Corner (Beeley, 2020).

There will naturally be drainage within the wall in the form of weep holes that would either let the water drain back out of the wall exterior, or through the inside via wall ties and drip trays to a point close to the ground.



Isolated as well as slab foundation.

Fig 5.2: The Whole Model (Beeley, 2020).

Task 6- Section and Detail

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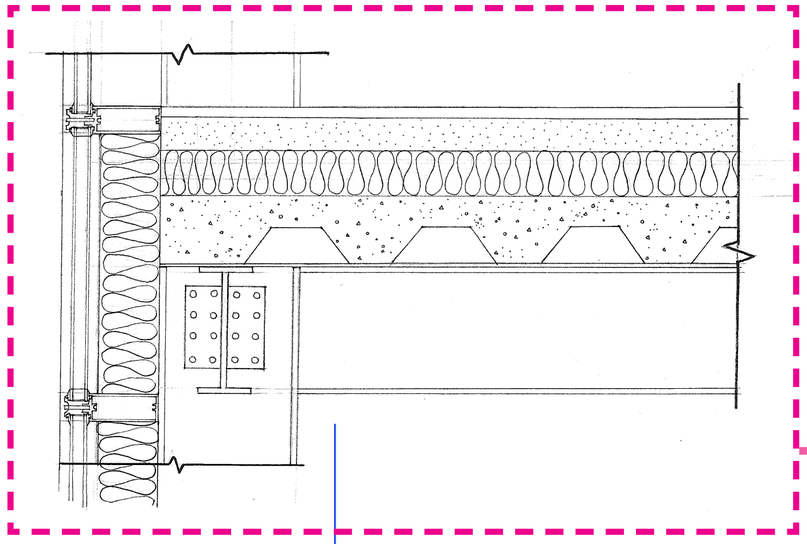
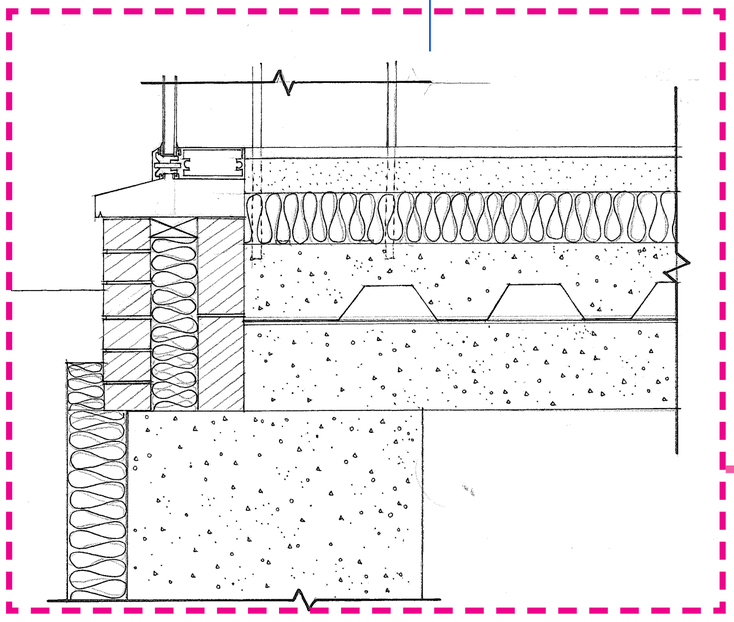
Construction Tasks
Joseph Beeley- N0810079

Task 6- Section and Detail



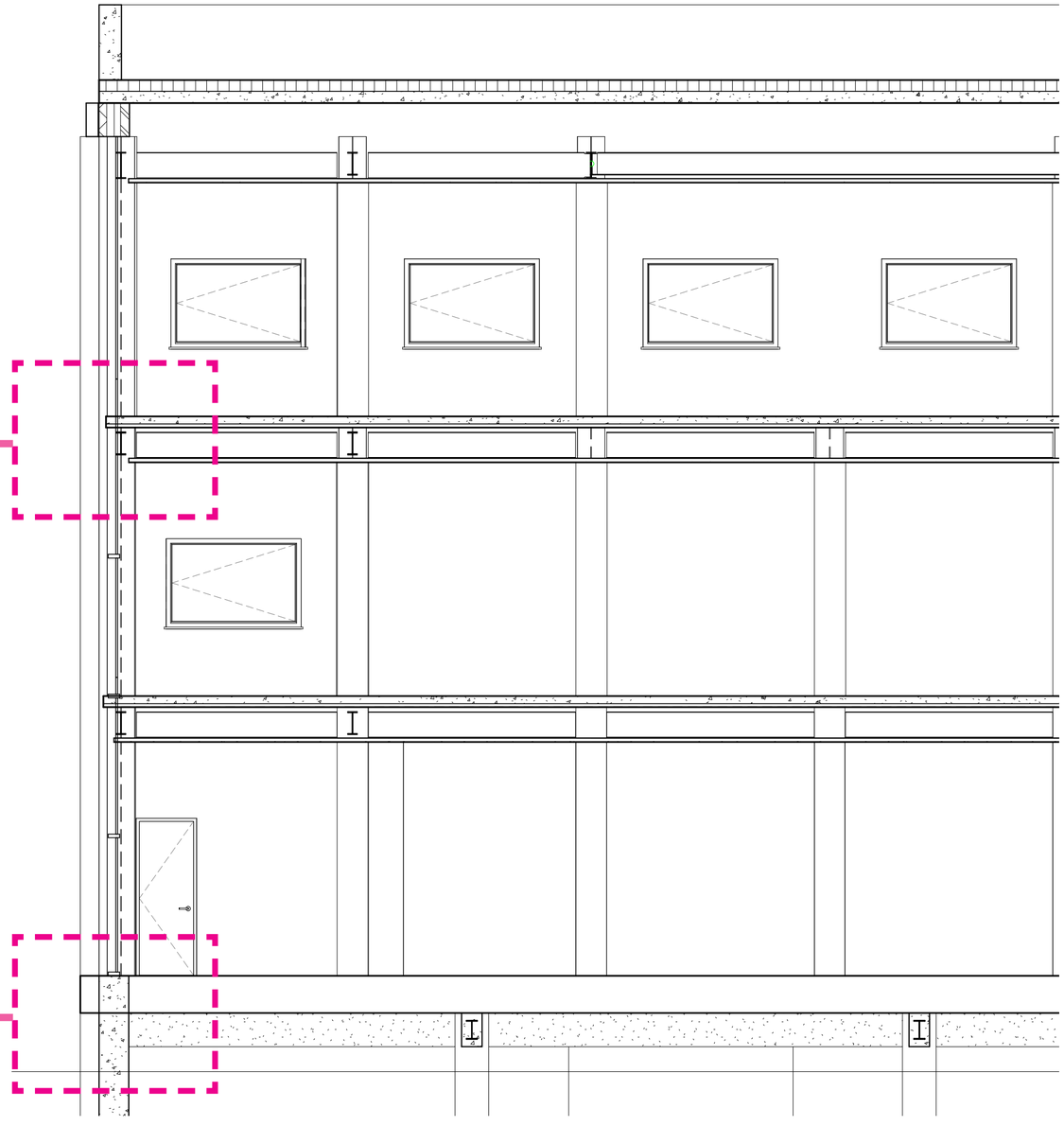
Upper Floor Detail
Curtain Wall Side
1:20 @ A3

Fig 6.1: Upper Floor Detail
(Beeley, 2020).



Ground Floor Detail
Curtain Wall Side
1:20 @ A3

Fig 6.2: Ground Floor Detail
(Beeley, 2020).



Long Section
Curtain Wall Side
1:50 @ A3

Fig 6.3: Long Section
(Beeley, 2020).

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 6- Section and Detail

Roof Detail
Masonry Side
1:20 @ A3

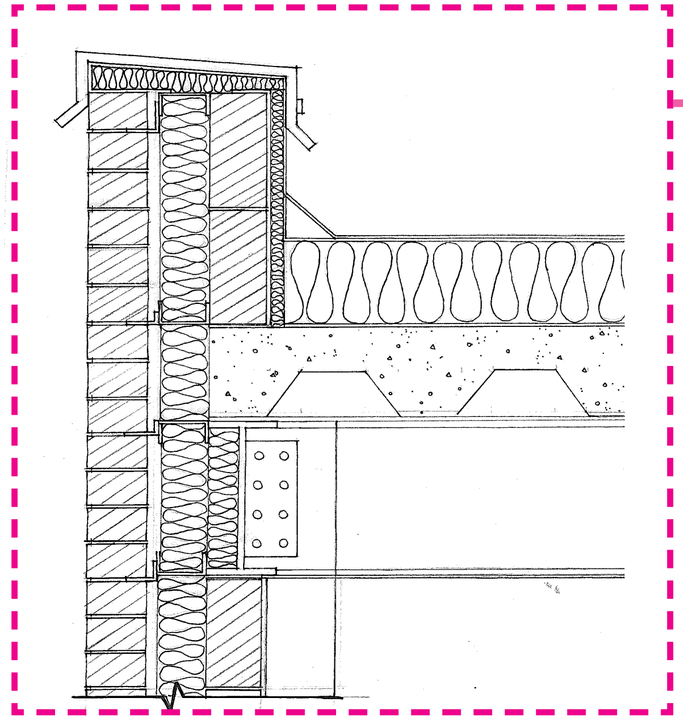


Fig 6.4: Roof Detail
(Beeley, 2020).

Foundation Detail
Masonry Side
1:20 @ A3

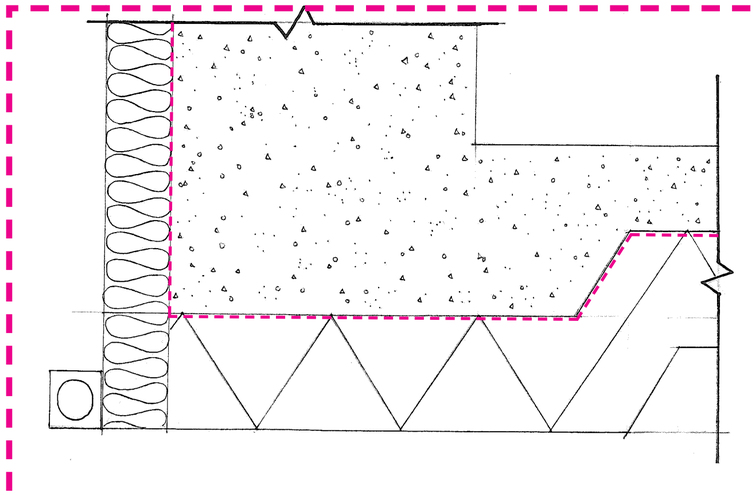
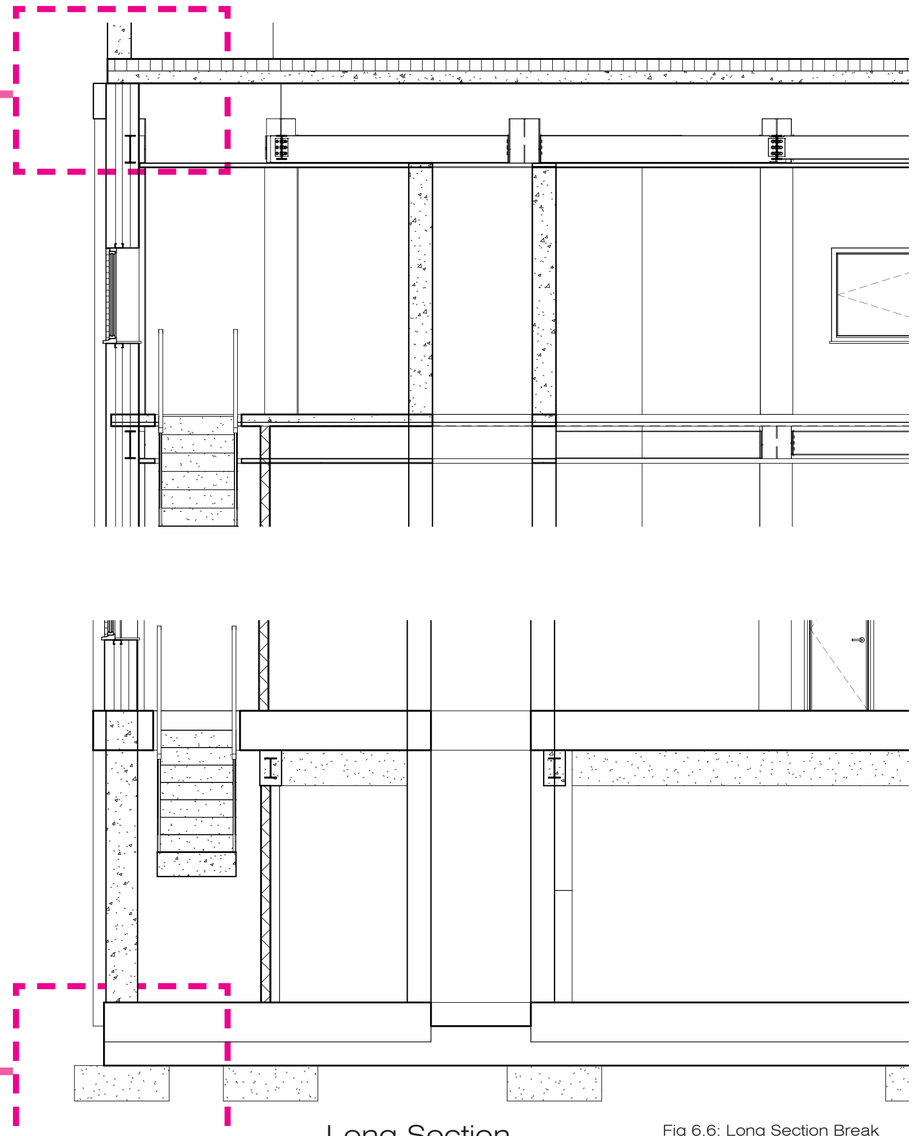


Fig 6.5: Foundation Detail
(Beeley, 2020).

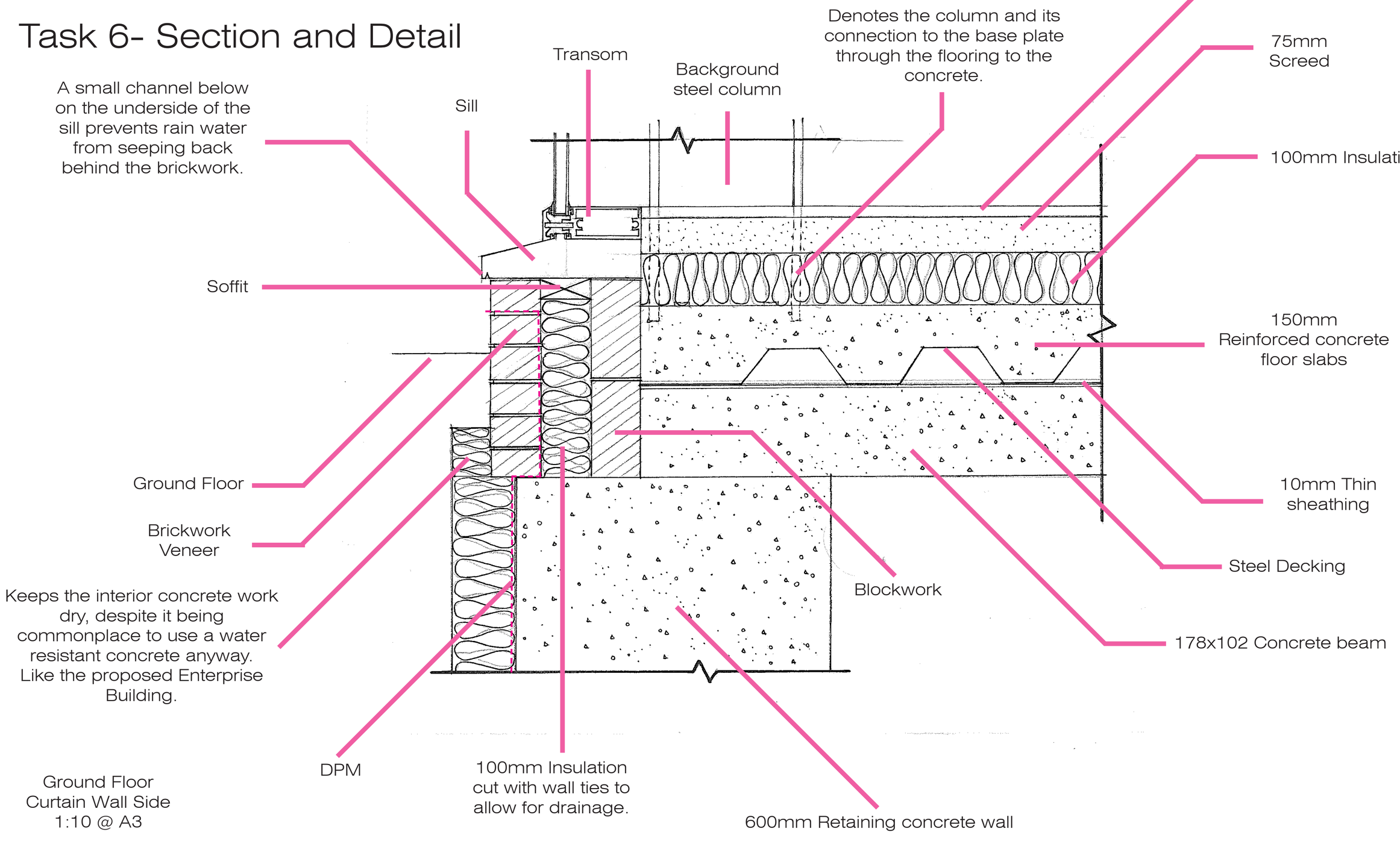


Long Section
Masonry Side
1:50 @ A3

Fig 6.6: Long Section Break
(Beeley, 2020).

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 6- Section and Detail



Ground Floor
Curtain Wall Side
1:10 @ A3

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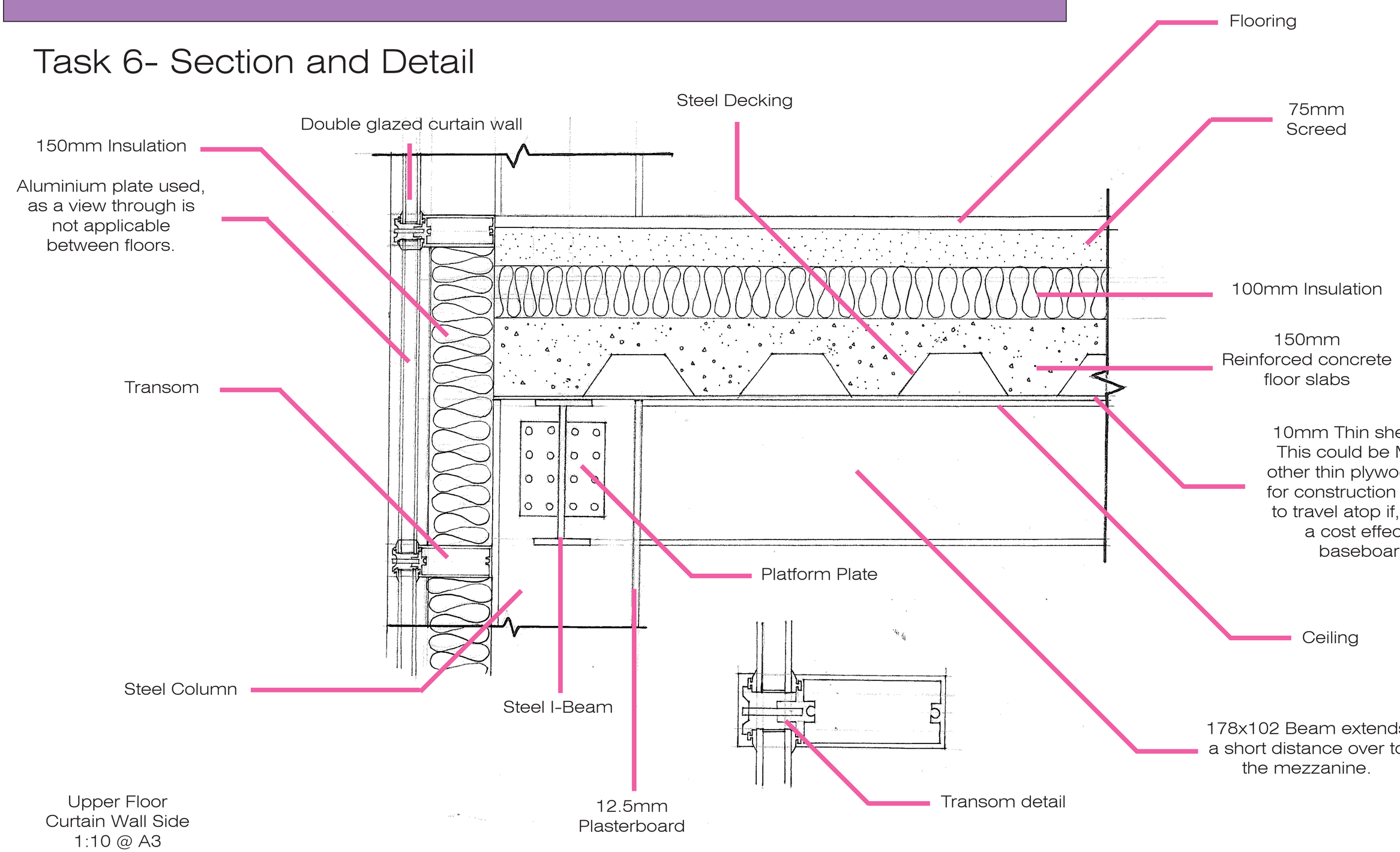
Construction Tasks
Joseph Beeley- N0810079

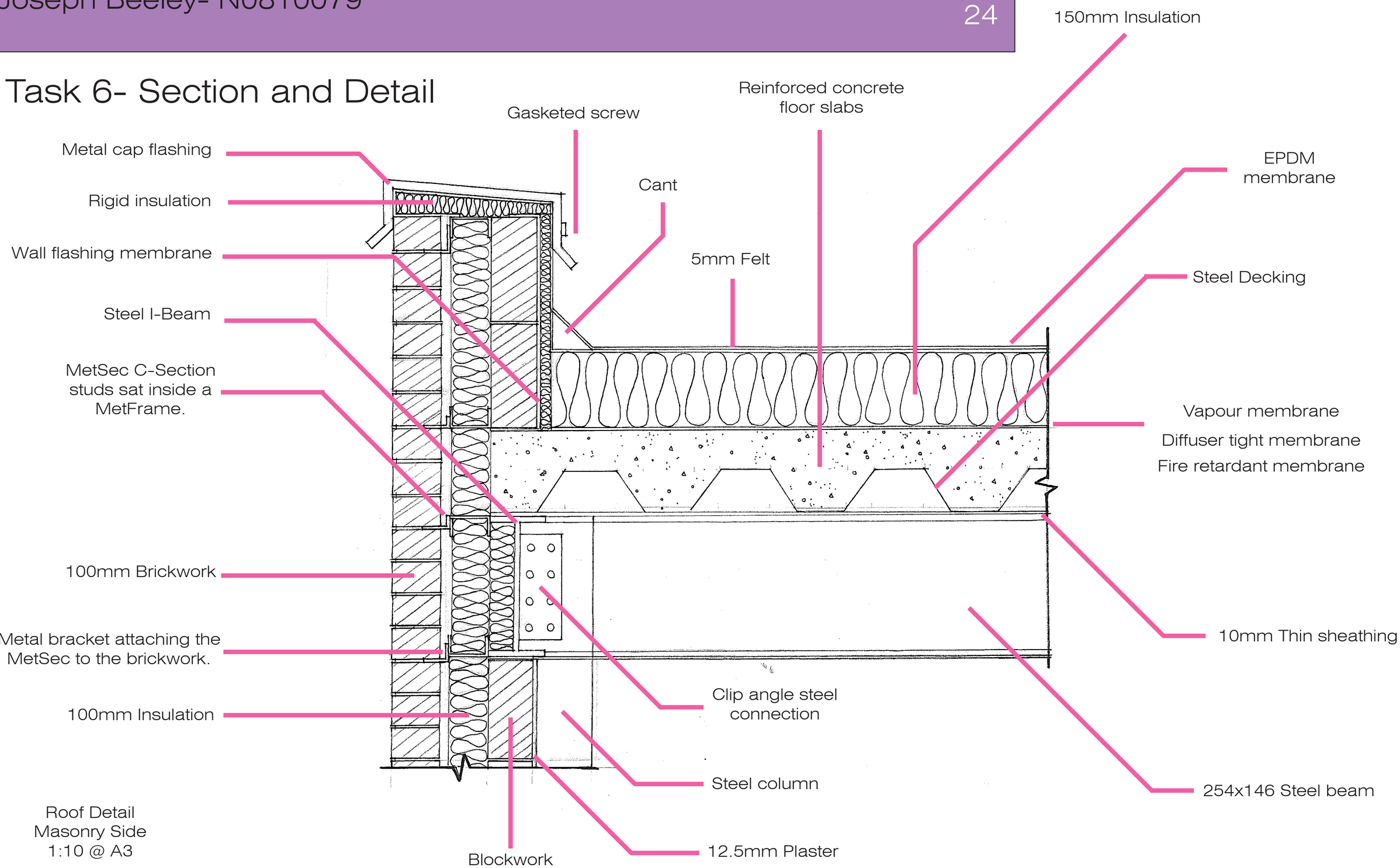
Task 6- Section and Detail



Upper Floor
Curtain Wall Side
1:10 @ A3

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 6- Section and Detail



Roof Detail
Masonry Side
1:10 @ A3

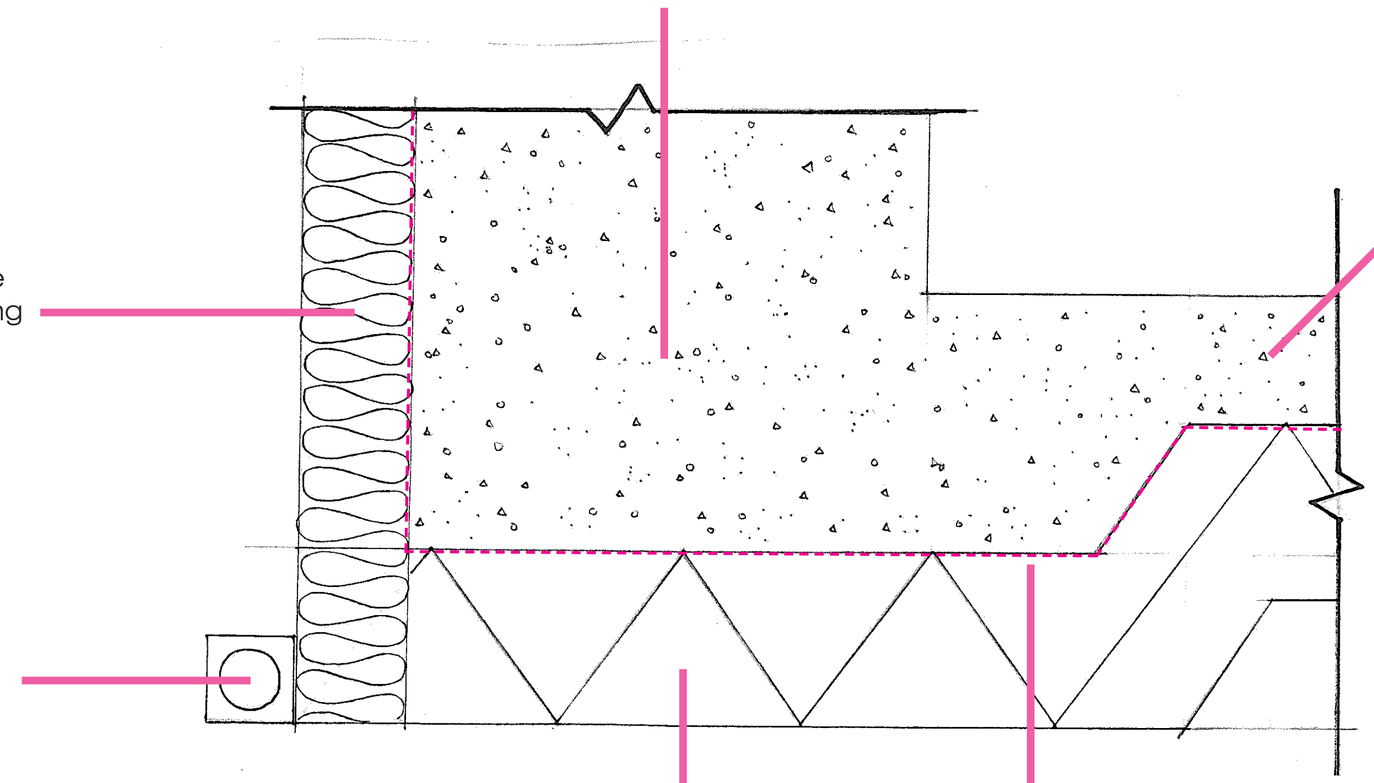
Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 6- Section and Detail

Retaining wall of thickness 600mm meets the foundation slab, varying from 300mm to 150mm at its thinnest points.

Foundation Slab

Insulation beside basement retaining wall



Hardcore

DPM

Foundation Detail
Masonry Side
1:10 @ A3

Land drainage using a similar system to the proposed Enterprise and Innovation Centre, in this case without a slope but an earth berm wall of proplbe similar soil composite.

Technology and Environment in Architecture-
Construction Tasks
Joseph Beeley- N0810079

Task 7- Referencing and Bibliography

Image Referencing:

Fig 1.1: Beeley, J., 2020, *Basement Floor* [diag].

Fig 2.1: Beeley, J., 2020, *Ground Floor* [diag].
Fig 2.2: Beeley, J., 2020, *First Floor* [diag].
Fig 2.3: Beeley, J., 2020, *Second Floor* [diag].

Fig 3.1: Beeley, J., 2020, *Structure and Foundation* [diag].
Fig 3.2: Beeley, J., 2020, *Base Plate Connection* [diag].
Fig 3.3: Beeley, J., 2020, *Finer Column Detail* [diag].
Fig 3.4: Beeley, J., 2020, *Clip Angle Section* [diag].
Fig 3.5: Beeley, J., 2020, *Platform Plate Section* [diag].
Fig 3.6: Beeley, J., 2020, *Connection Between Beams and Columns* [diag].
Fig 3.7: Beeley, J., 2020, *Floor Voids* [diag].
Fig 3.8: Beeley, J., 2020, *All Floors Added* [diag].

Fig 4.1: Beeley, J., 2020, *MetSec in Plan* [diag].
Fig 4.2: Beeley, J., 2020, *MetSec in 3D* [diag].
Fig 4.3: Beeley, J., 2020, *Elements of MetSec* [diag].
Fig 4.4: Beeley, J., 2020, *Adding Glazing* [diag].
Fig 4.5: Beeley, J., 2020, *Curtain Wall Close-up* [diag].
Fig 4.6: Beeley, J., 2020, *Wall Connections* [diag].

Fig 5.1: Beeley, J., 2020, *Roof Corner* [diag].
Fig 5.2: Beeley, J., 2020, *The Whole Model* [diag].

Fig 6.1: Beeley, J., 2020, *Upper Floor Detail* [diag].
Fig 6.2: Beeley, J., 2020, *Ground Floor Detail* [diag].
Fig 6.3: Beeley, J., 2020, *Long Section* [diag].
Fig 6.4: Beeley, J., 2020, *Roof Section* [diag].
Fig 6.5: Beeley, J., 2020, *Foundation Detail* [diag].
Fig 6.6: Beeley, J., 2020, *Long Section Break* [diag].

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