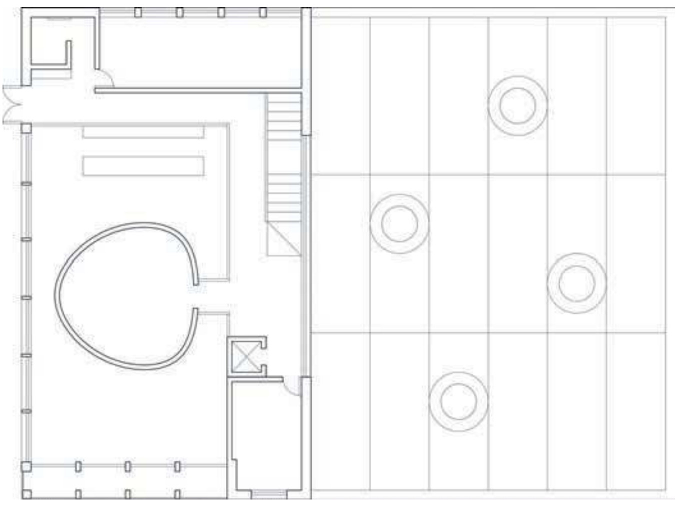
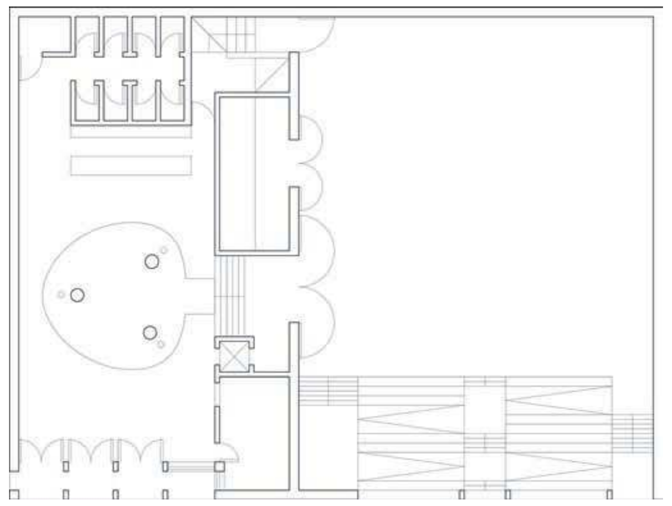
STRUCTURAL CONCEPT



First Floor Plan



Ground Floor Plan

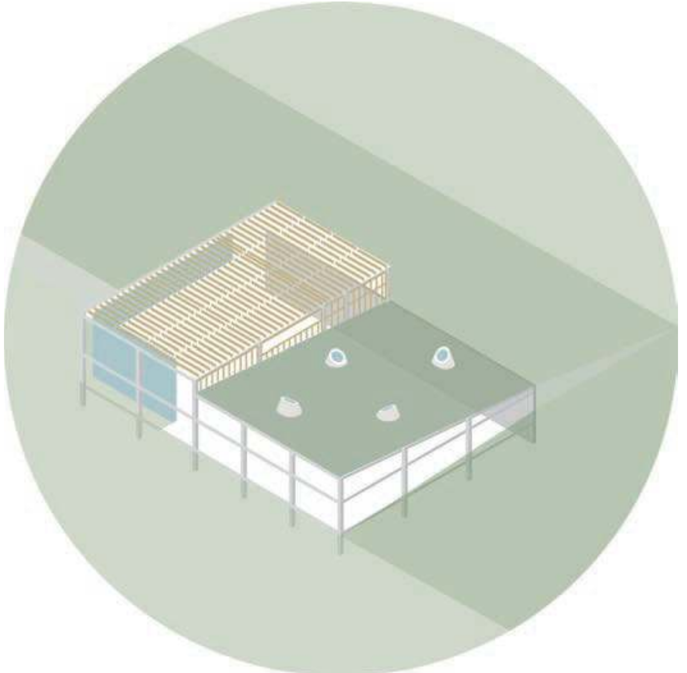
Perspective Section

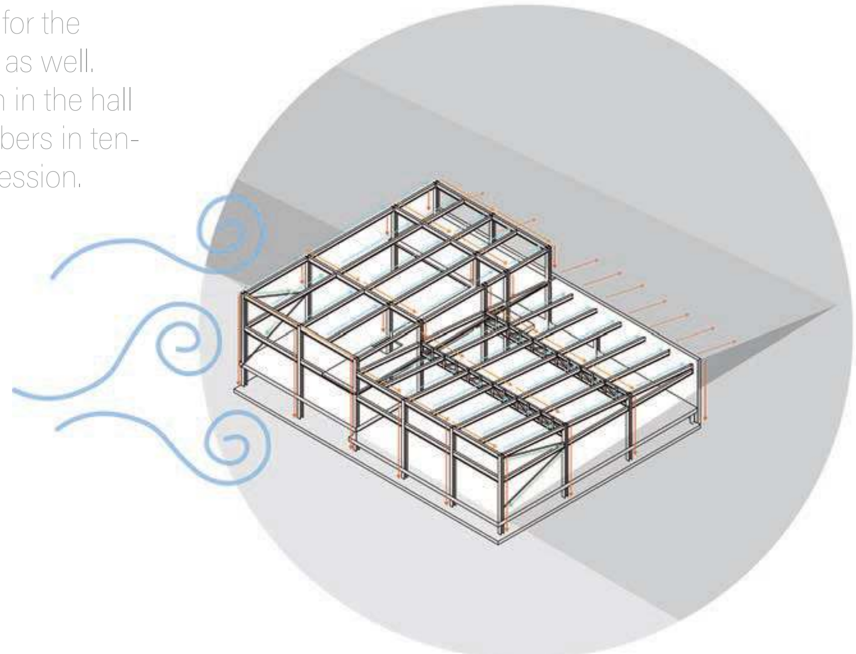
Due to the high loads imposed by the roof, a steel system had to be used. For cost effectiveness and speed of the build, the whole frame is homogenous. This building technique also allows for a more sympathetic approach to the site in terms of public access due to the speed and reduced heavy plant required.

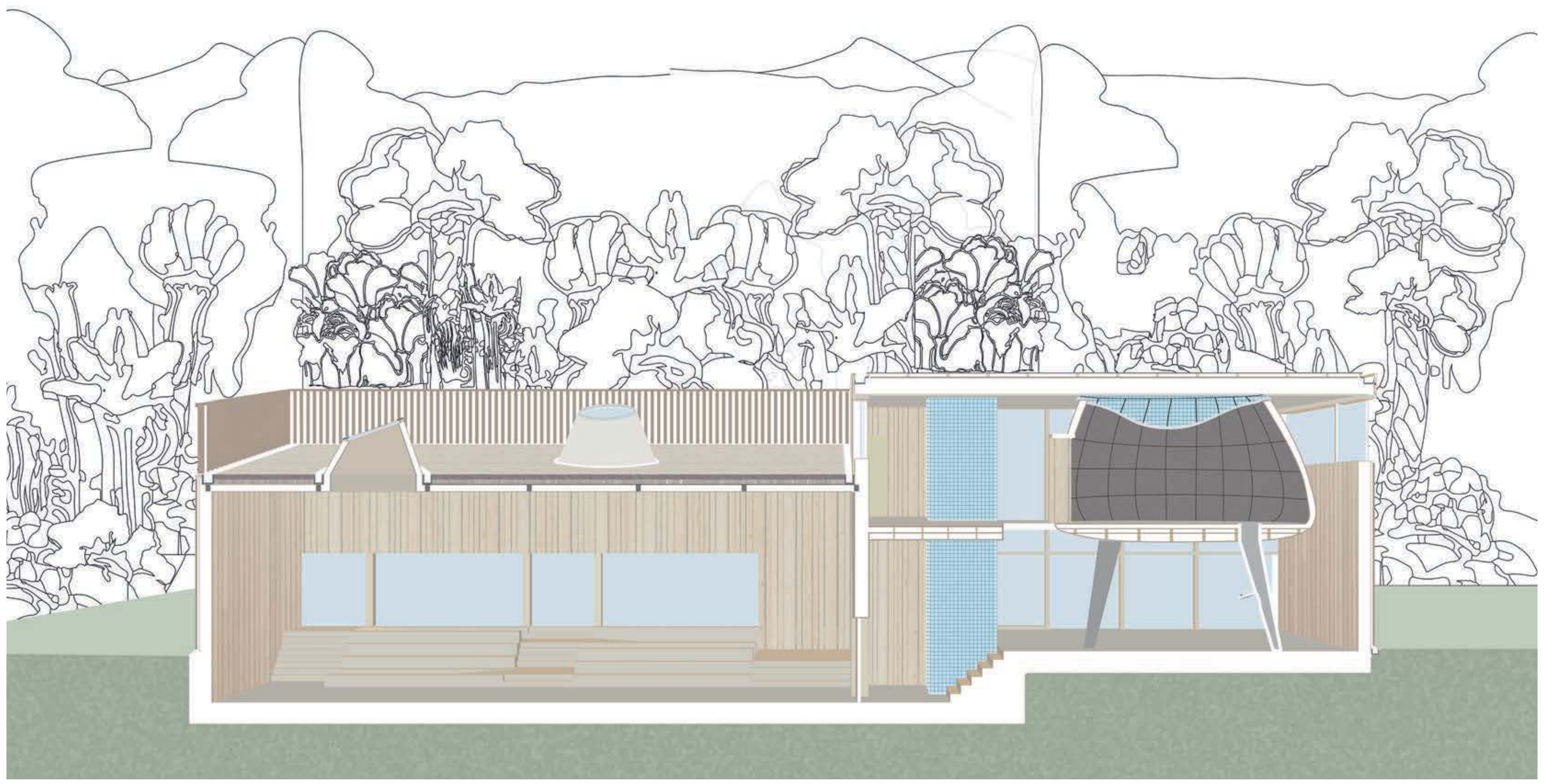
In line with the environmental goals, timber is used predominantly throughout the building to reduce the amount of steel required.
Cross bracing for the building is located on the corners this is because the retaining back wall prevents torsion in the frame thus reducing the need for bracing.

Slab foundation was chosen so that the toe of the retaining wall could be built into. A strip foundation could have been an option as well, but it seemed easier to just keep it simple and do a raft for the whole floor, its quicker to pour in one go as well.
The Pratt Truss chosen for the large span in the hall because it has the longer diagonal members in tension which is better for steel than compression.

When the structure experiences wind loads and other lateral forces, cross bracing, rigid (moment) connections and the retaining wall resist deformation and transfer the loads into the ground as shown.
The prevailing wind comes from the South West direction and so the building is strategically positioned against the rear earth berm.







CONCEPT EVOLUTION

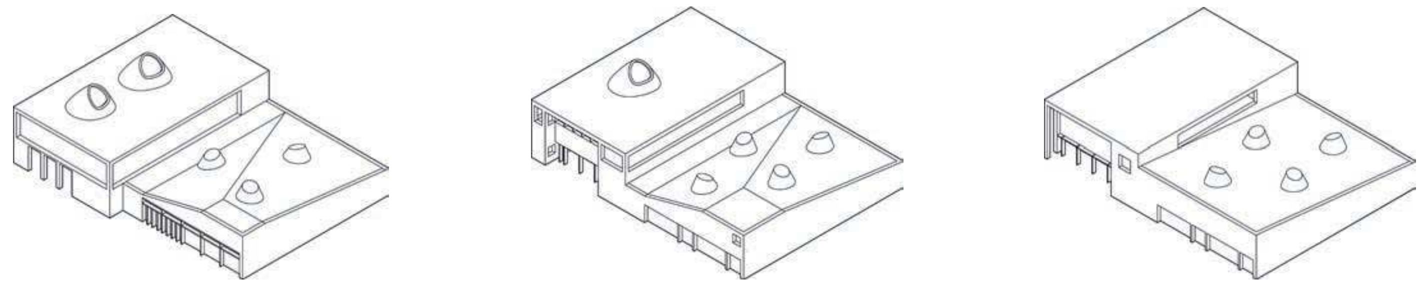
This project aimed to combine music experience with playground design which was explored ad finalised through engineered details. The main concept is the approach of encouraging exploration and play that leads to new experiences of the music within the building.

Reclaiming a carpark as public space the build attempts to tackle to different atmospheres of public space within a public park and tourist centre. This led to the design of a walkable grass roof with integrated skylights that dictated the structural system of the building.

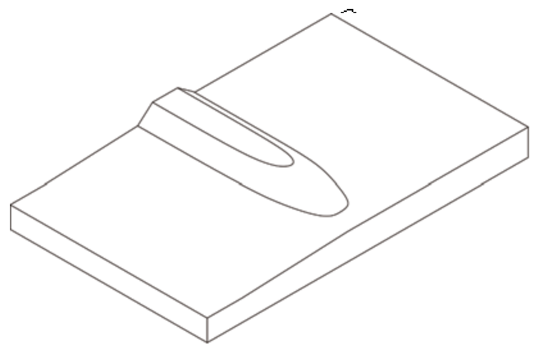
Due to cost reduction and ensured structural viability, the structual ambition of the project had to be simplified. This led to the condensing of the the key concepts. Cladding provides privacy and intrique to the private practice room of the first floor and the sigle fall of the roof provides a surprise for the user once they reach the park. The roof acts as a new public square, reinvigorating the original space through a spectater spot for the activities int the park.

1.
Amos Rex Cultural Centre in Helsinki
2.
Mecanoo
Delft Library

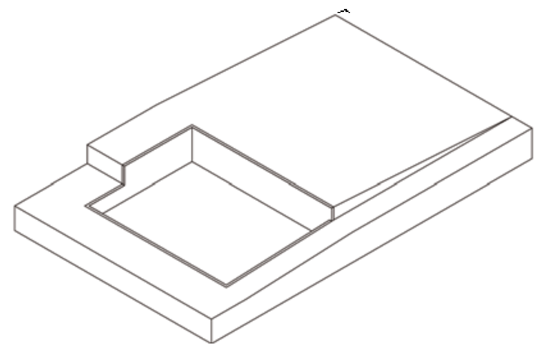
3.
Extension of the Maritime Museum on Texel
4.
Supermarket in Liège



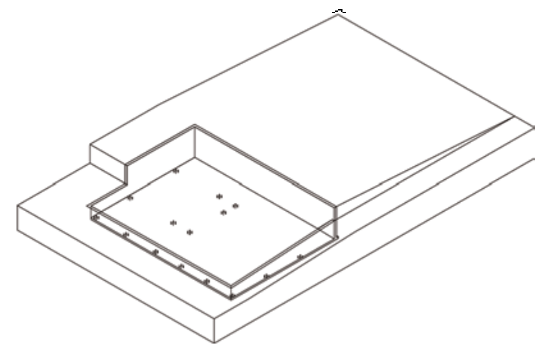
CONSTRUCTION SEQUENCE



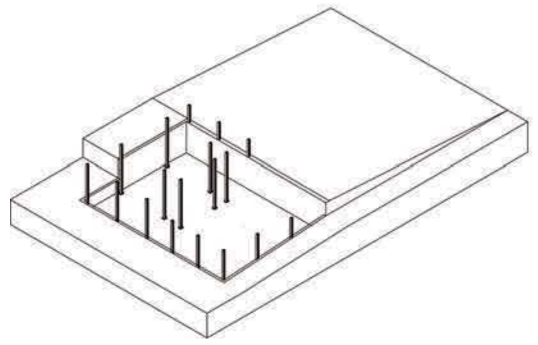
1.
Site is excavated using diggers with some soil removed to be placed on north side for roofs approach.



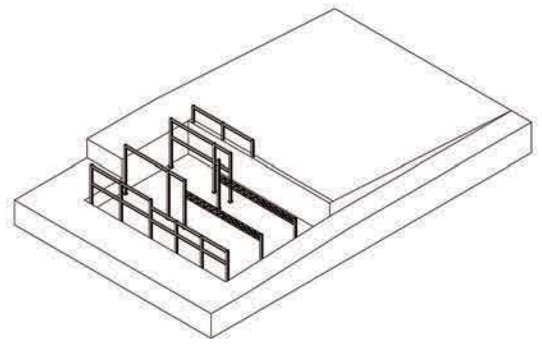
2.
Retaining wall constructed and earth sloped landscaped.



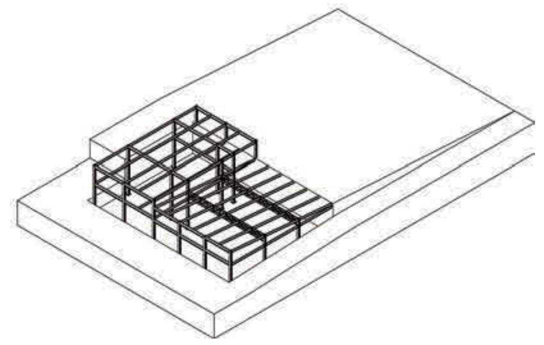
3.
Sab foundations poured, ancor bolts but in place for steel columns.



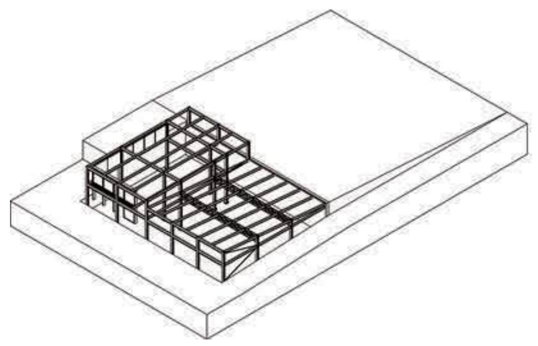
4.
Steel columns erected using a small crane, support scaffolding maybe used in case of strong winds.



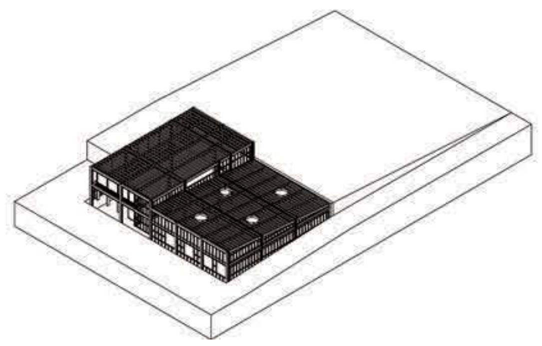
5.
Primary beams and truss lifted into place and bolted together using rigid connections



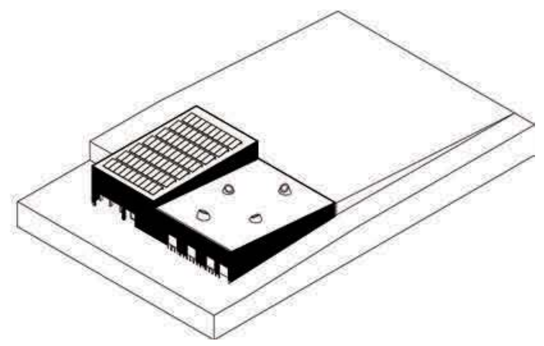
6.
Secondary beams lifted in place and bolted together.



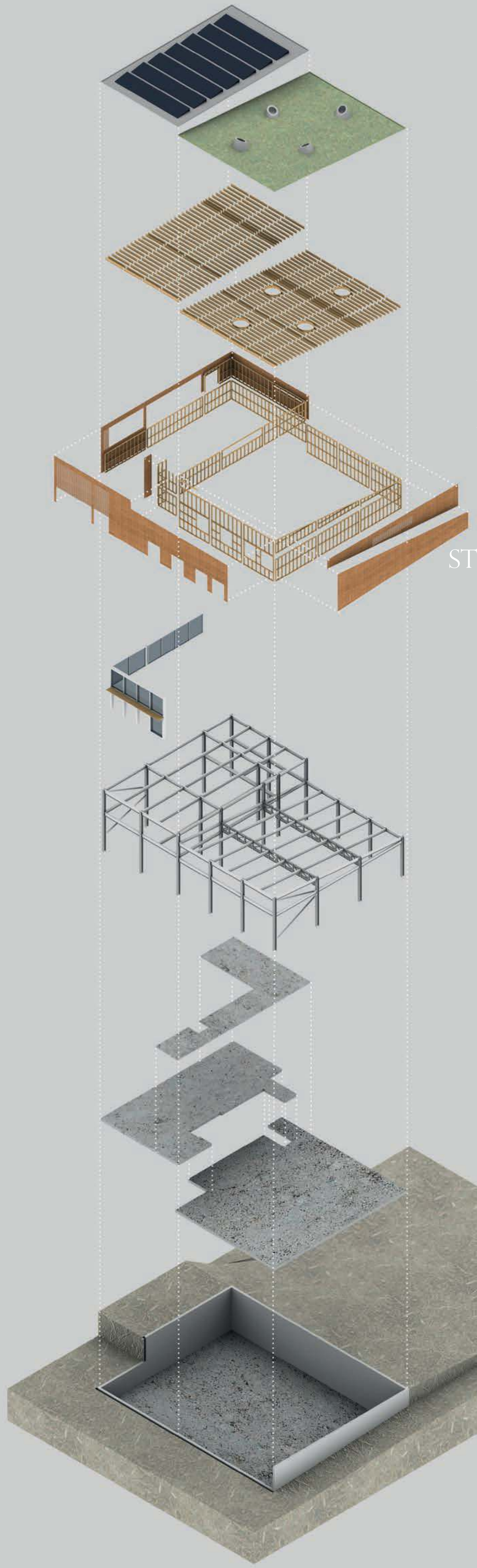
7.
Steel curtain wall system installed and cross bracing applied to weak corners. Composite floor slabs constructed.



8.
Timber infil constructed on each floor, progressing up through the building.



9.
Roof, cladding and finishes applied. Grass roof infilled wih beneficial location specific plant Solar panels installed.



Grass Roof
Skylights

Flat Roof
Solar PV Cells

Tertiary Structure
Local Larch Cladding
Timber Rafters
Standard Timber Kit Infill

EXPLODED STRUCTURAL AXO

Steel/Glass Curtain Wall

Steel Frame Compostion

Primary Structure:
Column - UC 305 x 305 x 118
Beam - UB 457 x 191 x 67

Secondary Structure:
Beam - UB 356 x 171 x 45
Bracing - CHS 193 x 12.5

Composite Steel Floor

Steel/Concrete Floor

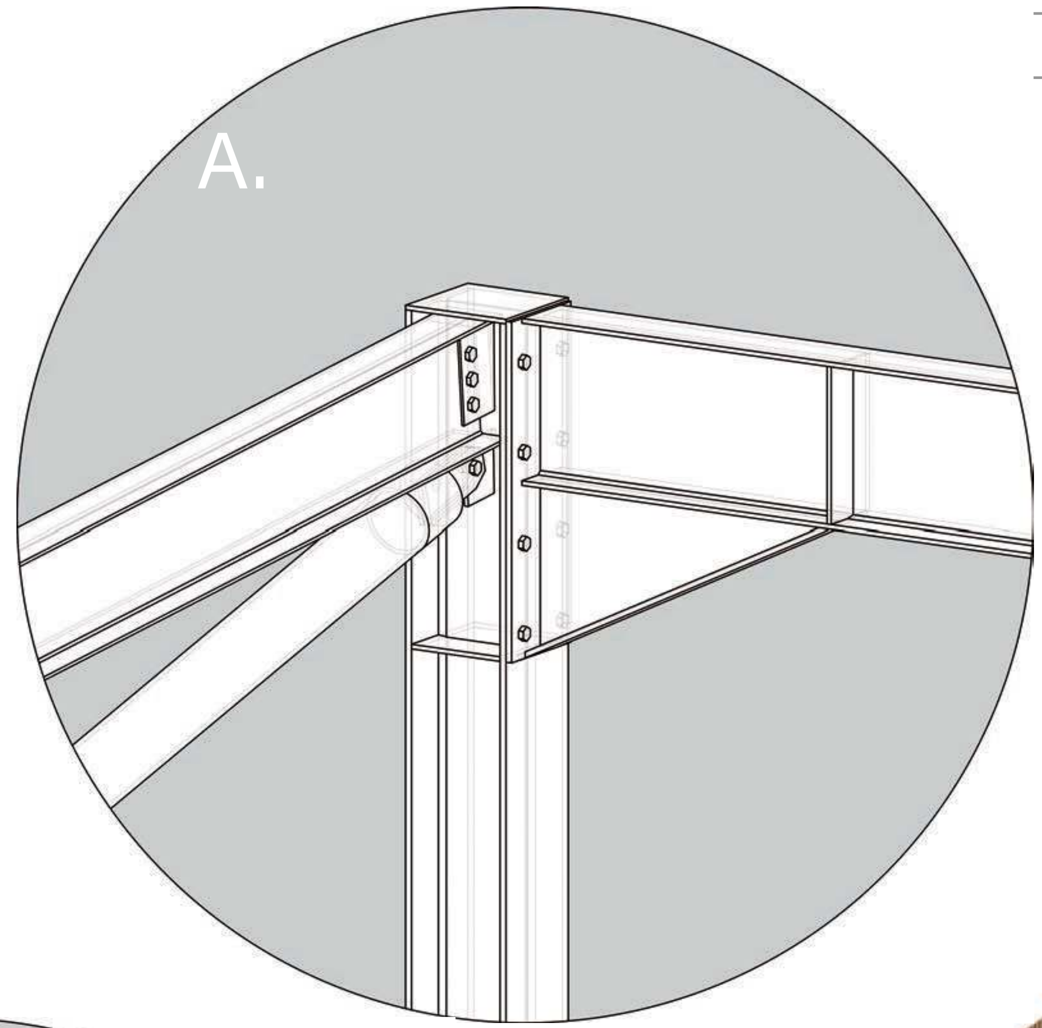
Foundations

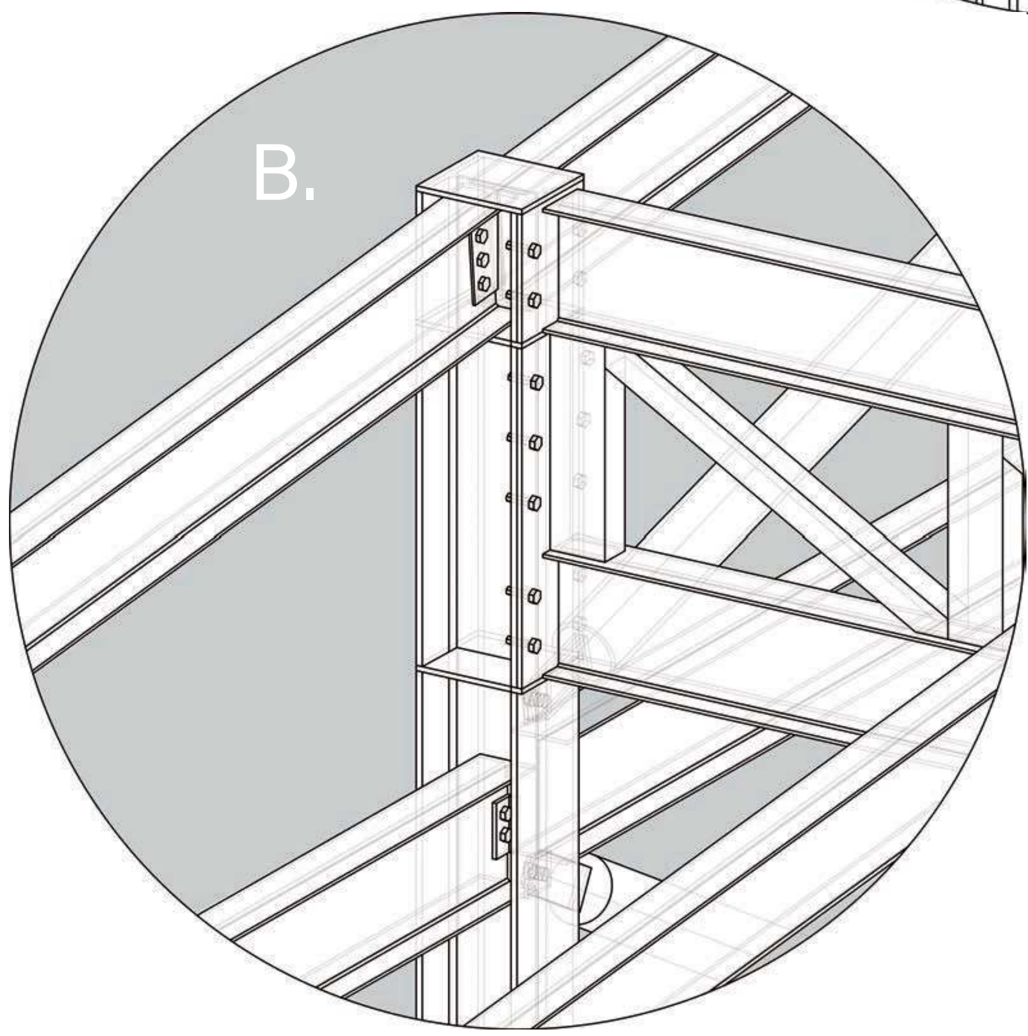
Slab Foundations
Retaning Wall

Bracing
Pinned Tubular connections:
Fin plates are welded to the bracing member and columns. These are bolted together on site.
As loading is purely axial only single bolt connections are used with the bolt located in the center line of the tube.

Single Plate
Angled connections:
Plate is welded to secondary section (beam).
Angle welded to primary section
Single shear plate welded to secondary beam and bolted to primary member.
This is a shear and tension connection due to the incline of the beam to the column.

Foundations
Construction:
A layer of grote is placed between the base plate and its support for the purpose of leveling.
Anchor bolts provide stability for the column-during erection or to prevent uplift.

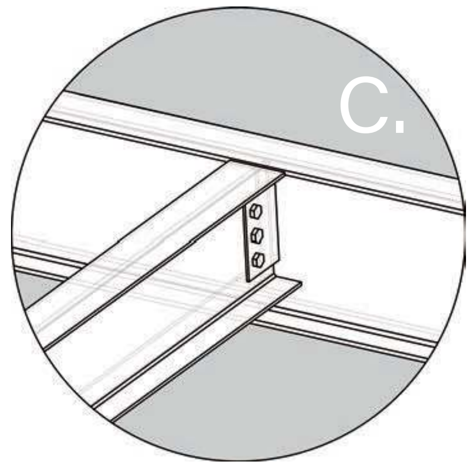


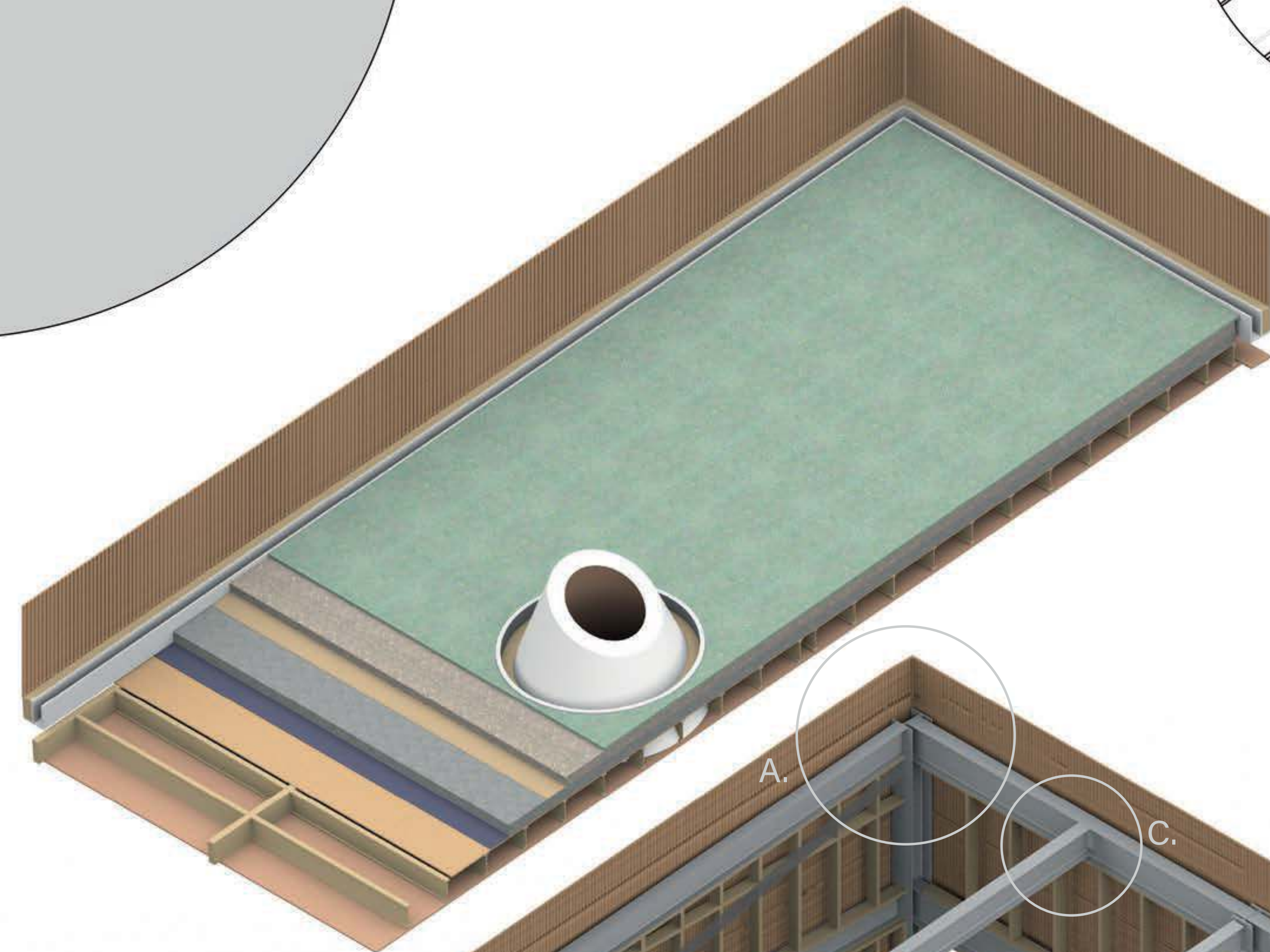


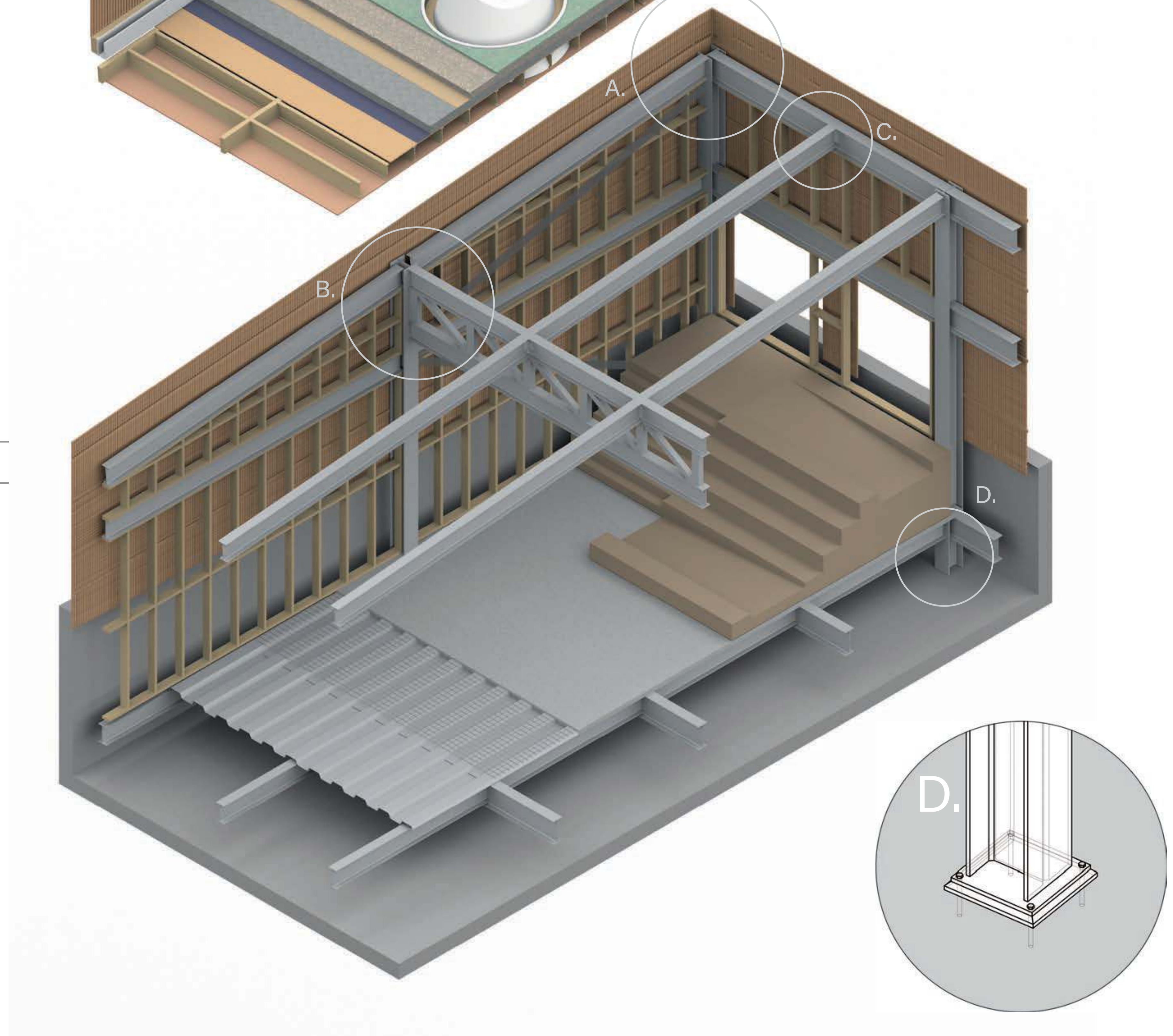
STEEL FRAME CONNECTIONS

Primary Connections
Rigid connections:
These connections are designed to resist both moment and shear forces. The connection is applied between the primary beams/truss and columns.
This is because the building has to resist the effect of latteral loads such as wind and the large loads imposed by the walkable green roof.

Beam to Beam
Fin plate connections:
Here the beam is connected on an angled slope where a notch is cutinto the top for the connection between the fin plate and the beam.







BUILDING FABRIC

Grass roof construction
40mm sedum grass layer
120mm Topsoil/turf
Filter fabric
150mm lightweight drainage aggregate
Waterproof membrane
19mm Protection board
Steel frame beams (tbc)
150mm timber frame with inserted insulation (150mm sheep's wool)
50/150 timber frame battens with inserted insulation (50mm sheep's wool)
Vapour barrier
19mm 3 layer fir laminated boarding

Composite Floor Construction
80mm Poured polished concrete
Steel Reinforcment
Steel corugated deck
Steel beams
Crawl space
Slab foundation

Solid Wall Construction
50mm larch cladding
25/50mm timber battens
25mm ventilated cavity
Breather membrane
19mm OSB boarding
Steel columns
Steel beams
150mm timber frame
150mm sheep's wool inserted insulation
50/150 timber frame battens
50mm sheep's wool inserted insulation
Vapour barrier
19mm 3 layer fir laminated boarding

Curtain wall construction (not shown)
50mm larch cladding (50mm spacing between strips)
25/50mm timber bearers
180mm steel I columns
maintenance walkway: 40 mm grating
wood and steel frame curtain-wall facade with double glazing