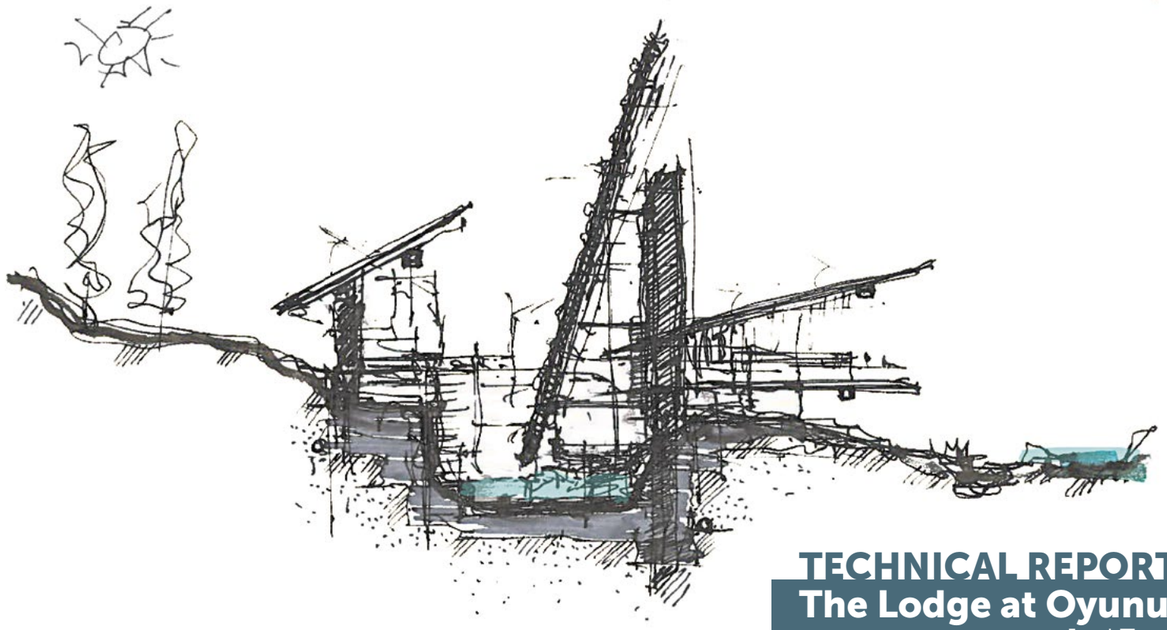
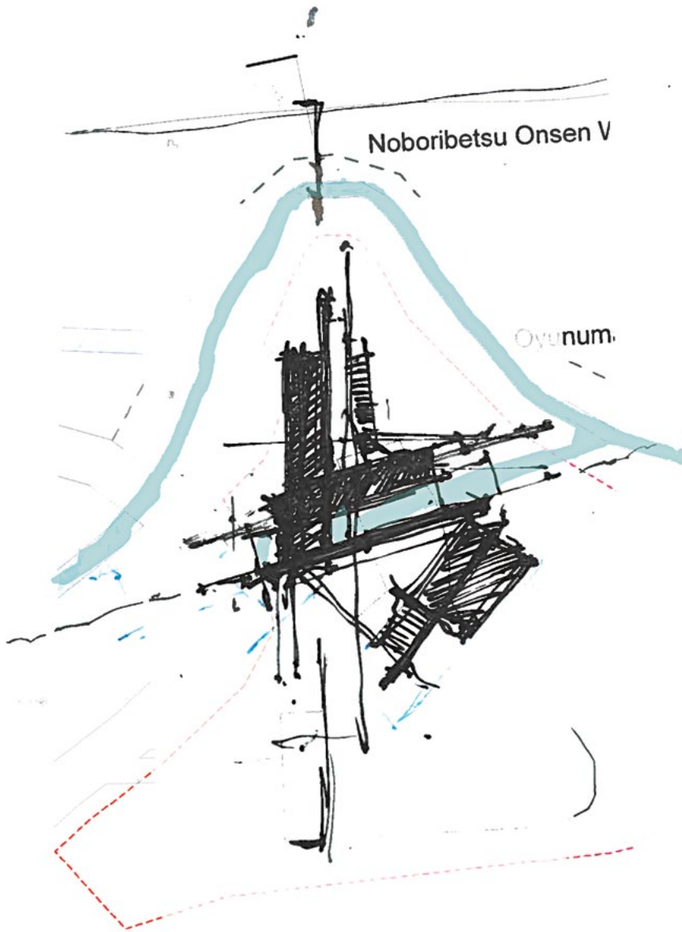


TECHNICAL REPORT
The Lodge at Oyunuma

Joel Tremblay

CONTENTS



ENERGY MANIFESTO

The goal of the project is to create opportunities for the user to engage with their space, allow them to operate devices which will increase their overall comfort and well-being. An underlying element of the project is to bring "invisible" energy in by carefully orientating the user to specific views and moments within the surrounding context. The Lodge is to act as a medium that makes sustainability fun and as a result, increase the well-being of the occupant.

Heating

A Hydronic subfloor heating system is used in conjunction with thermal mass elements to keep spaces conditioned. Heating is focused in the more private programmed areas such as the bedrooms, washrooms and changerooms. The lounge , kitchen and other larger public areas benefit from solar heat gains.

Cooling / Ventilation

ERV's provide active mechanical cooling and ventilation throughout the project. The ductwork is located in-between the drop ceiling of the lower level and structure of the floor above. Operable openings and skylights provide inlets and outlets for passive cooling and natural ventilation.

Water & Waste Management

The water source for the site is pumped up from the aquifer below. Being that the water is of a warm temperature it can be used directly for the thermal pools and foot bath. Grey water is treated on site via a living machine. There is no black water treatment as toilets are incinerating, waterless units. Storm and rain water is collected and used by the green house, green roofs and as irrigation for the wetlands.

Electricity

Photovoltaics are used to harness a minor source of electricity for the project. Being that the active solar radiation on site is limited, the project is also connected to the main grid. Low energy led lighting is used throughout the entire project to reduce energy loads.

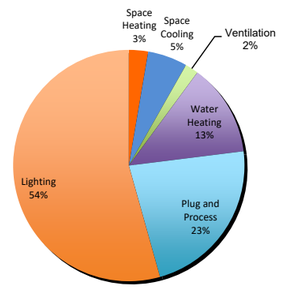
Annual Energy Use Estimate Report Summary

Project Designer Joel Tremblay

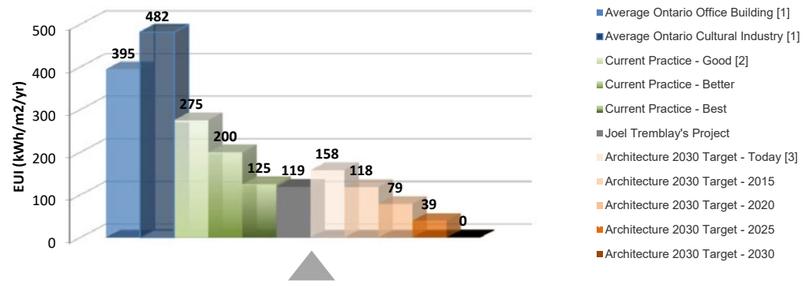
Total Net Floor Area	464 m^2	Window-to-Wall Ratio	0.45
Total Gross Floor Area	580 m^2	Floor Area to Enclosure Ratio	0.94
Site Area	2600 m^2	Window Spec: U-value = 0.19	SHGC = 0.5
		Daylight Fraction	0.28

Estimated Total Annual Energy Use	**57543 ekWh**
Energy Use by End-Use	
Space Heating	1858 kWh
Space Cooling	3828 kWh
Ventilation	1293 kWh
Water Heating	8925 kWh
Plug and Process	15628 kWh
Lighting	37541 kWh
Renewable Energy Generation	11530 kWh
Energy Use Intensity (EUI)	**119** **ekWh/m^2/year**
EUI with Renewable Energy	**99** **ekWh/m^2/year**
Estimated Global Warming Potential	
Nitrogen oxides (NOx)	14 kg
Sulphur dioxide (SO_2)	31 kg
Carbon dioxide (CO_2)	7376 kg
Equivalent to CO_2 emissions from	14.5 cars

Energy Use by End-Use Table



Energy Use Intensity Comparisons



Notes:

[1] EUI for Average Canadian Office Building is from Natural Resources Canada "Commercial and Institutional Building Energy Use Survey 2000"

[2] EUI for Good, Better and Best Current Practice is based on current experience for this building type

[3] More information about the Architecture 2030 Challenge can be found at http://architecture2030.org/

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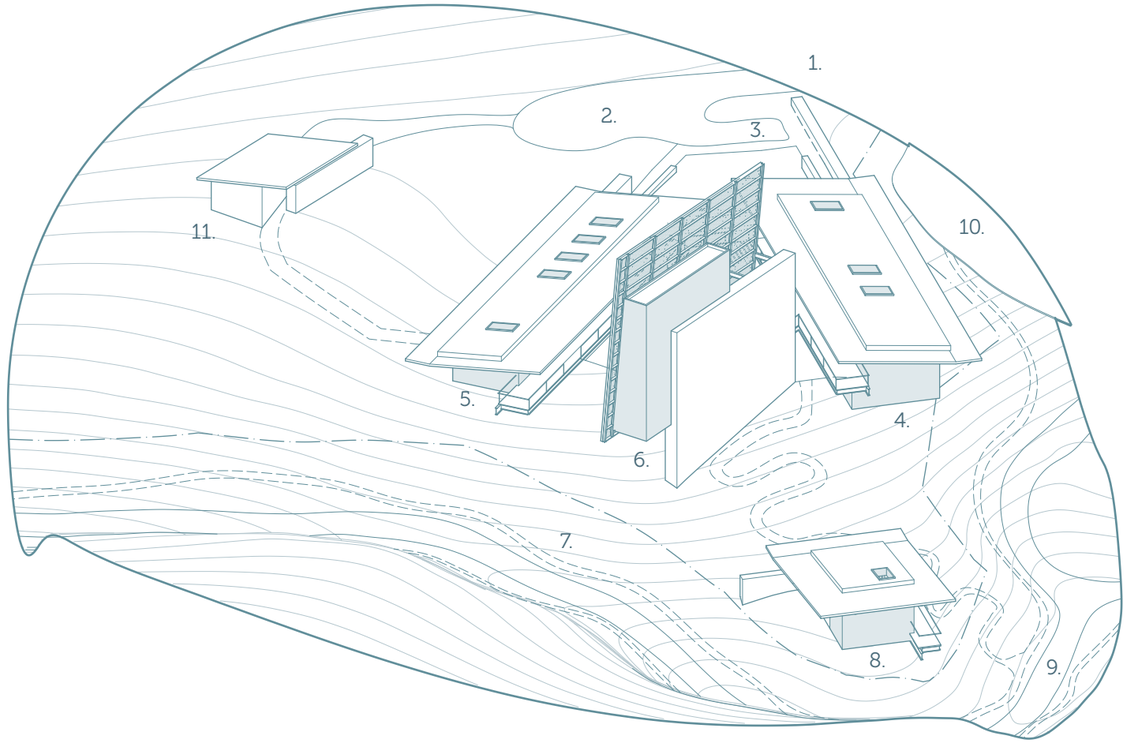
AXO SITE ORGANIZATION

1. Primary Site Entrance
2. Dropoff / Turn Around
3. B.F. Parking Spot
4. Community Wing
5. Accommodation Wing
6. Green House
7. Walking Path / Trail
8. Artist Residence
9. Foot Bath Pond / River
10. Road
11. Storage Shed / Garage

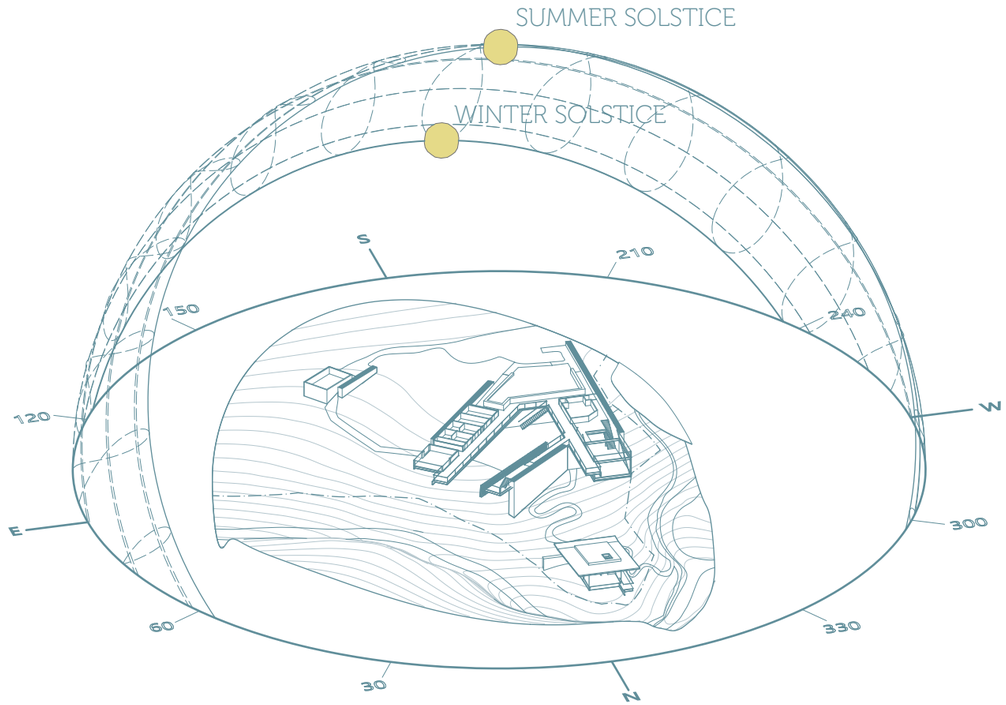


SITE SOLAR STRATEGY

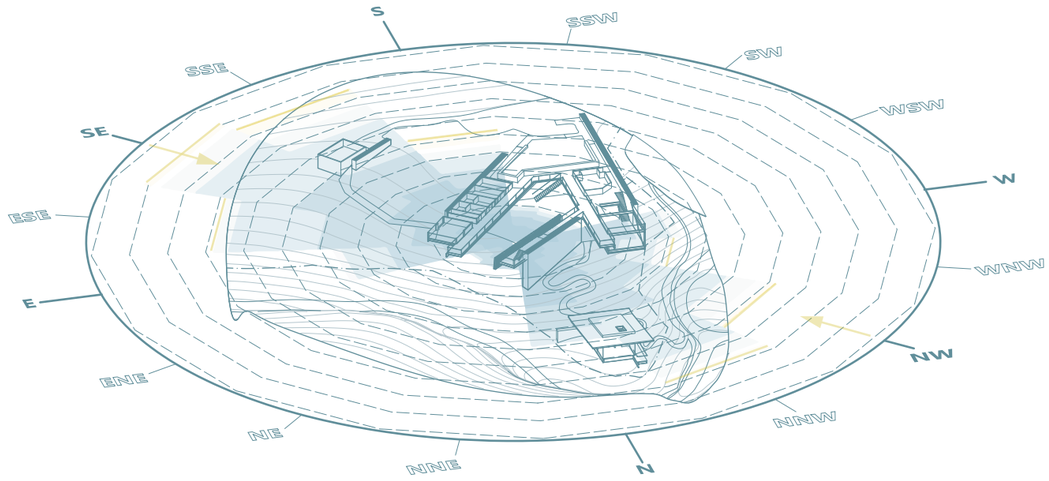
Each building wing is oriented so that every program will receive light in the mornings and evenings. The Accommodation wing contains a thermal mass element that stores thermal energy in the morning allowing it to disipate at night. The Green House orients itself to the south in order to maximise its exposure to the sun and potential for thermal gain. Large overhangs are used to shade selected programs throughout the project.

SITE WIND STRATEGY

The majority of the wind comes from the South-East and North-West. As a result the artist residence is located at the foot of the hill to allow for passive cooling. Each building is designed with the opportunity for an inlet and outlet ventilation path.



SITE SUN SOLTICES

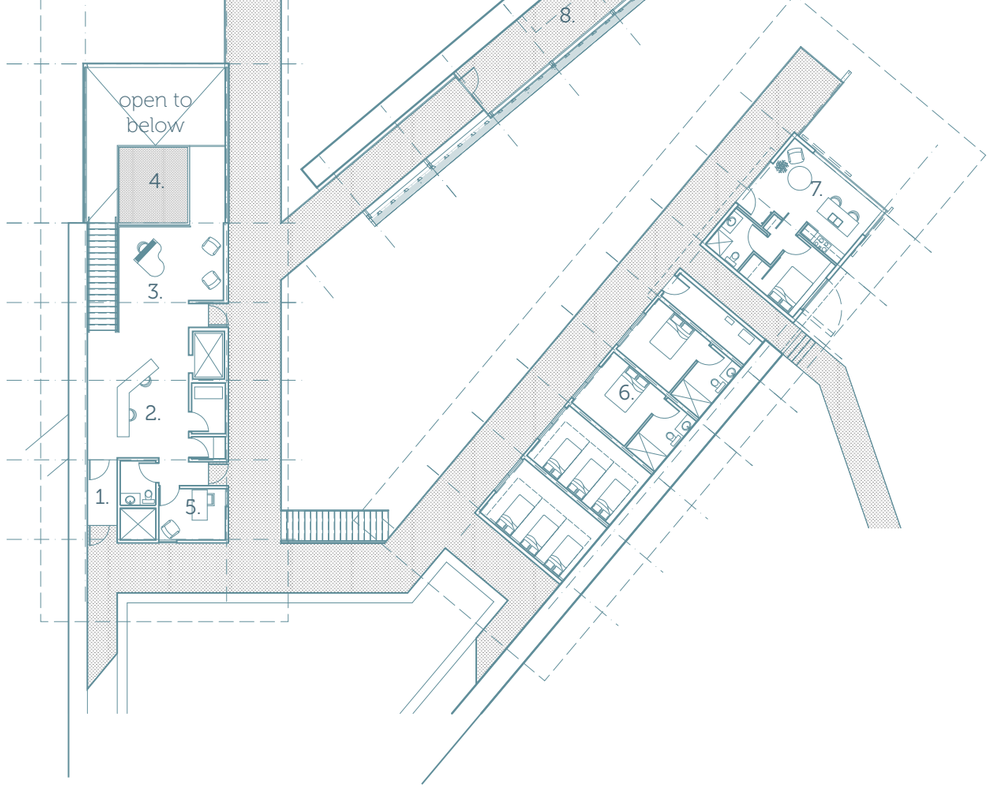


SITE WINDROSE DIRECTIONS

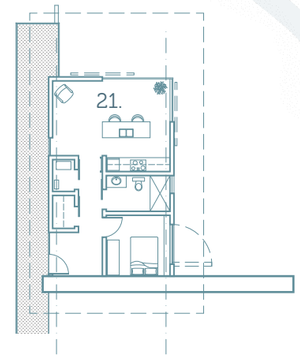
PROGRAM ORGANIZATION

1. Vestibule
2. Reception
3. Interior Vestibule
4. Waiting / Mesh
5. Office
6. Resident Accommodation
7. Lodge Manager Residence
8. Green House
9. Lounge
10. Dinning
11. Kitchen
12. Change Rooms
13. Mechanical / Boiler Room
14. Sauna
15. Thermal Bath
16. Washroom / Showers
17. Living Machine
18. Storage / Archive
19. Wetlands
20. Foot Bath
21. Artist Residence

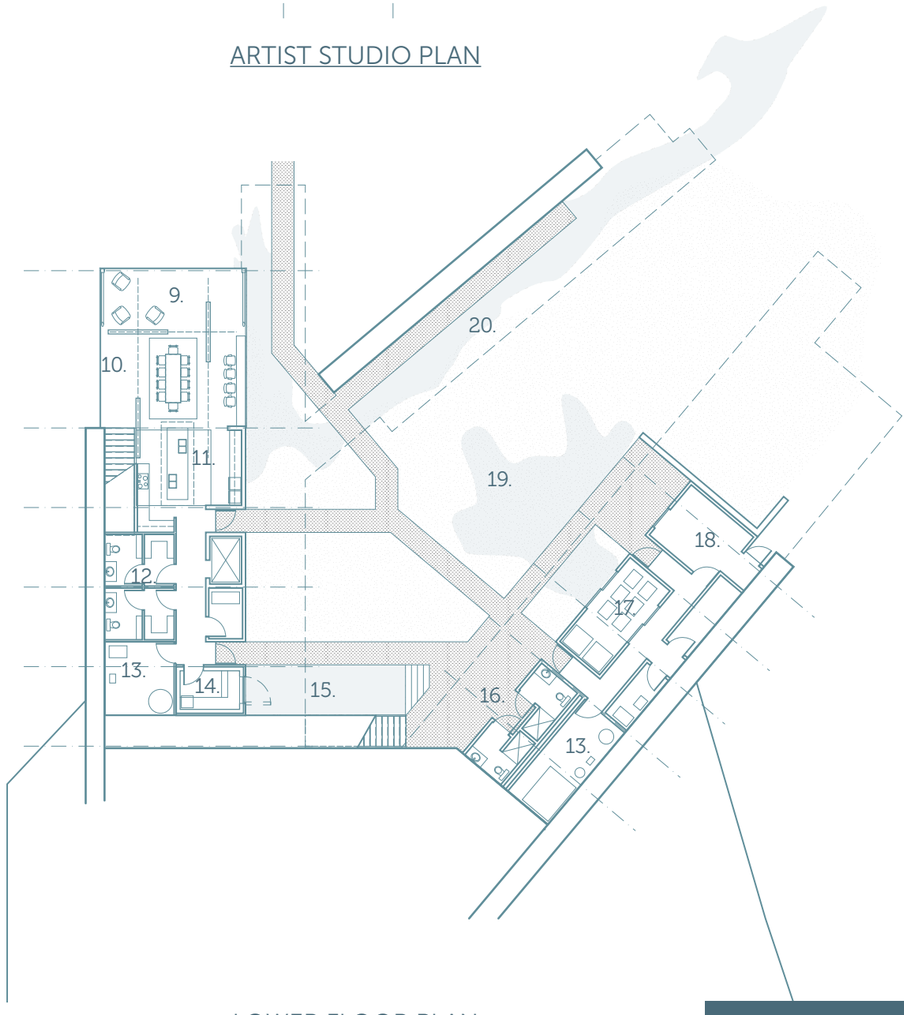
New guests will enter from the southern vestibule entrance and be greeted by reception. From that point on the rest of the project is a playground. The intention is to have users wander and interact with their space. Thermal elements act as a people attractor creating places for people to naturally gather around.



GROUND FLOOR PLAN PLAN



ARTIST STUDIO PLAN

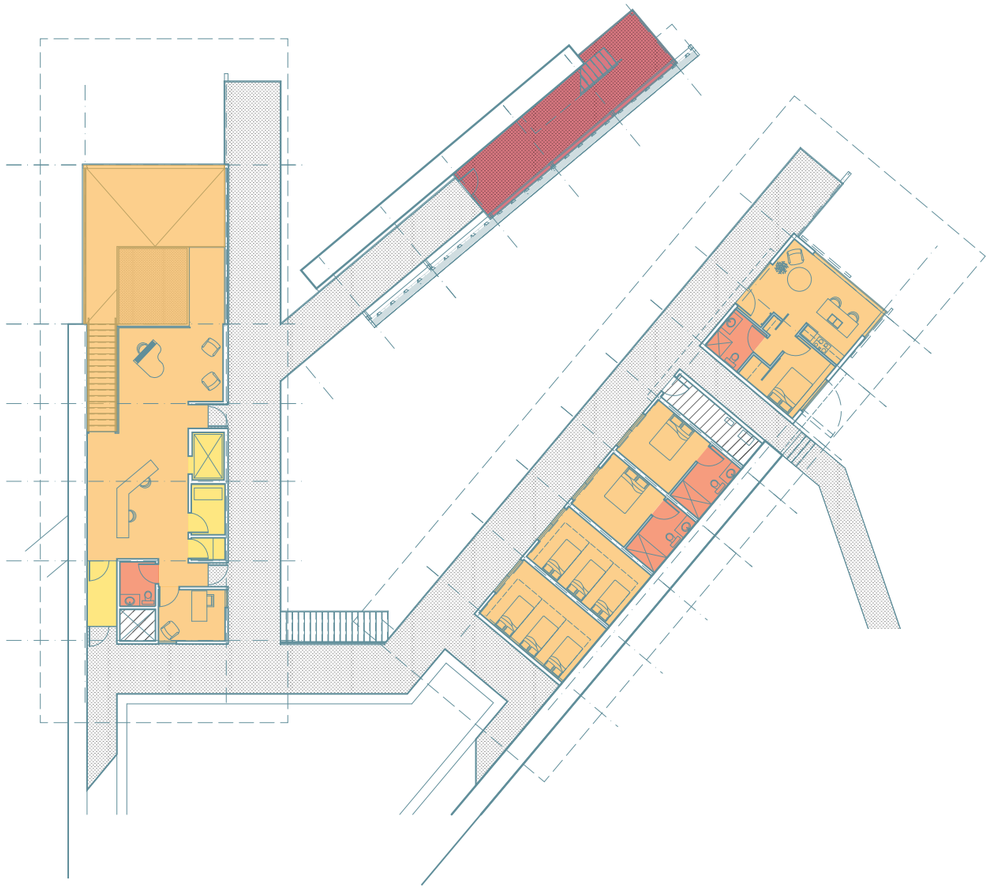


LOWER FLOOR PLAN

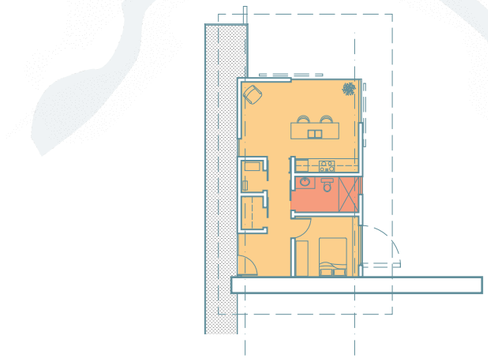
BUILDING CLIMATE CONDITIONS

- Hot / Humid
- Stable / Humid
- Moderate Humidity (40-60%)
- Stable / Dry
- Sheltered / Unconditioned

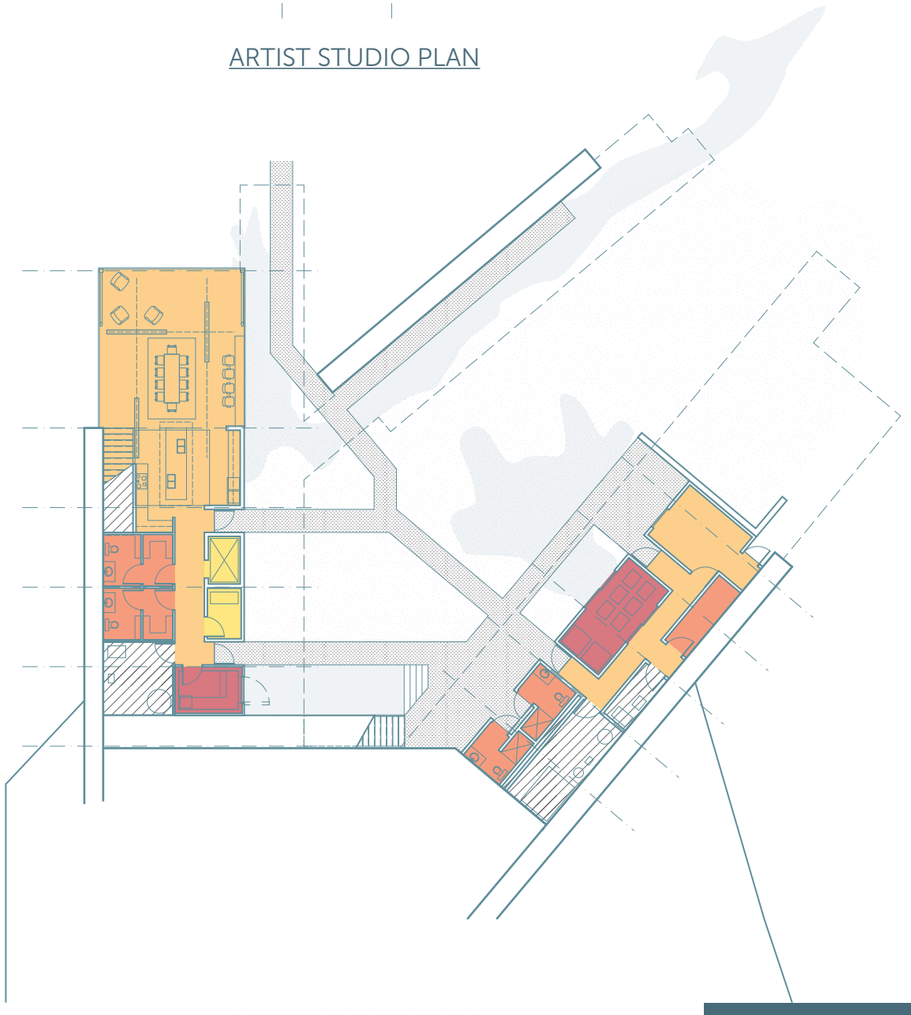
The overall lodge layout is broken up into seperate zones because the condition of each space will be tailored to its specific use. The residential sleeping and living zones are warm and intimate, the lounge and waiting areas are more lively and active. Circulation spaces are unconditioned. Users will travel between private and public areas allowing them to fully experience the difference between inside and outside conditions.



GROUND FLOOR PLAN PLAN

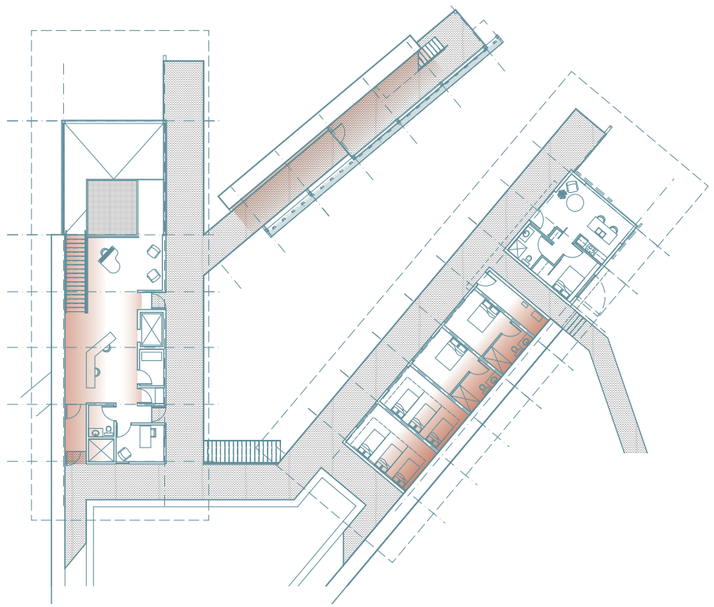


ARTIST STUDIO PLAN

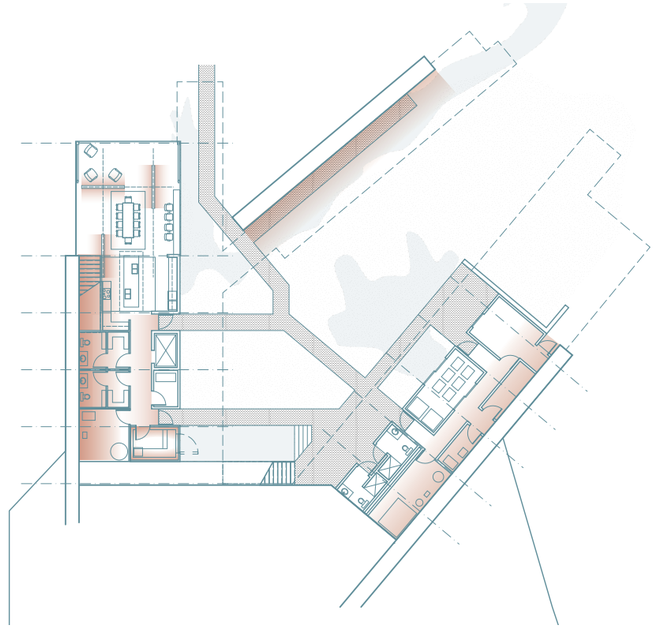


LOWER FLOOR PLAN

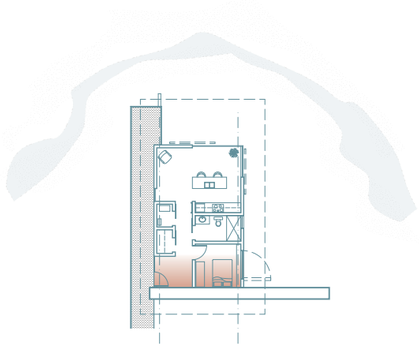
Lodge at Oyunuma



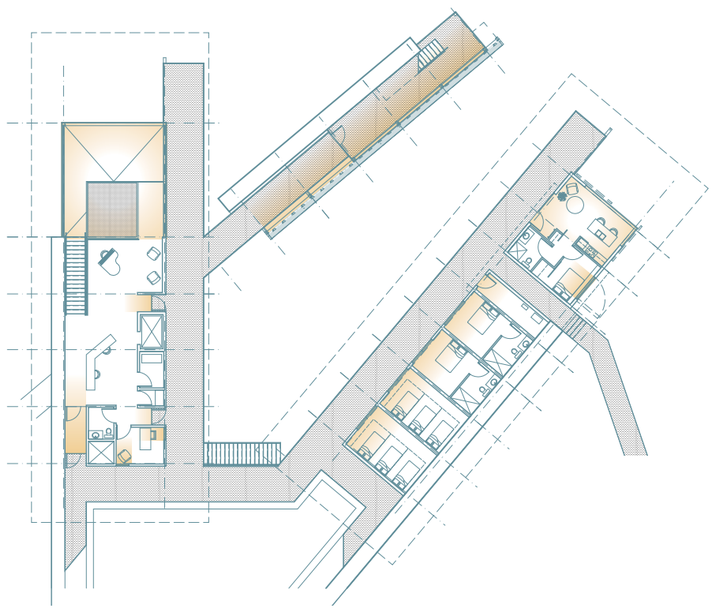
COMFORT NARRATIVE

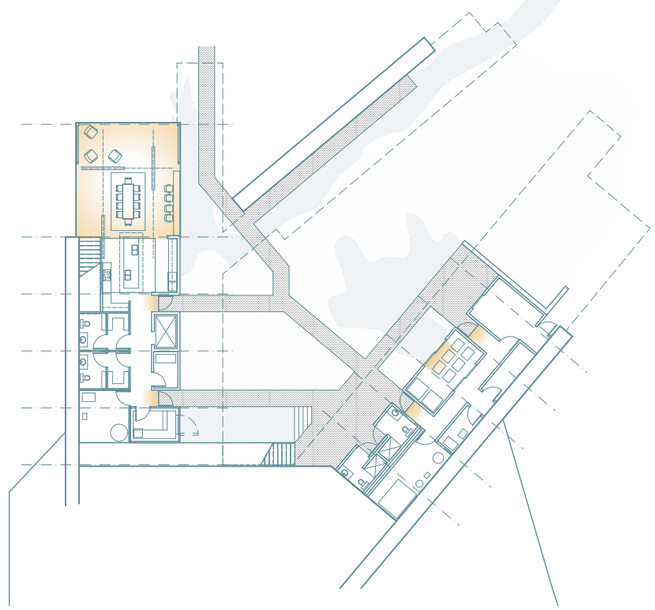


INTERNAL THERMAL RELEASE

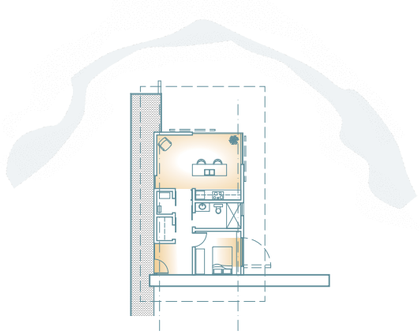


Thermal mass elements are commonly found adjacent program of the lodge. People will naturally gather around these elements because they will provide a sense of comfort. The idea is to have these thermal elements oriented differently so they provide different levels of comfort throughout the day.





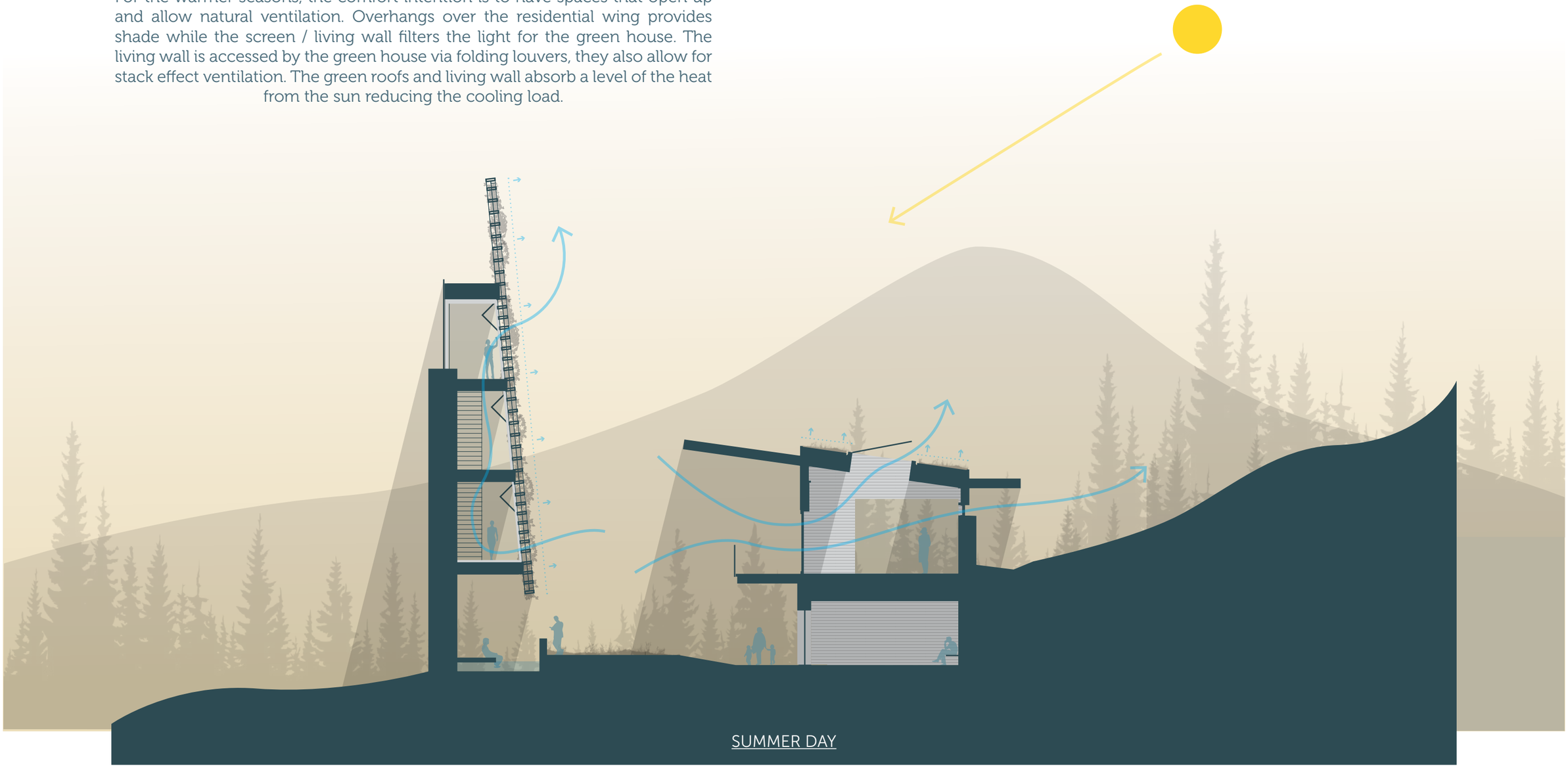
SOLAR HEAT GAIN



Windows facing West and East as well as South facing skylights allow for solar heat gain. The accommodation wing receives solar rays during the evening while the community wing in the morning.

COMFORT NARRATIVE

For the warmer seasons, the comfort intention is to have spaces that open up and allow natural ventilation. Overhangs over the residential wing provides shade while the screen / living wall filters the light for the green house. The living wall is accessed by the green house via folding louvers, they also allow for stack effect ventilation. The green roofs and living wall absorb a level of the heat from the sun reducing the cooling load.

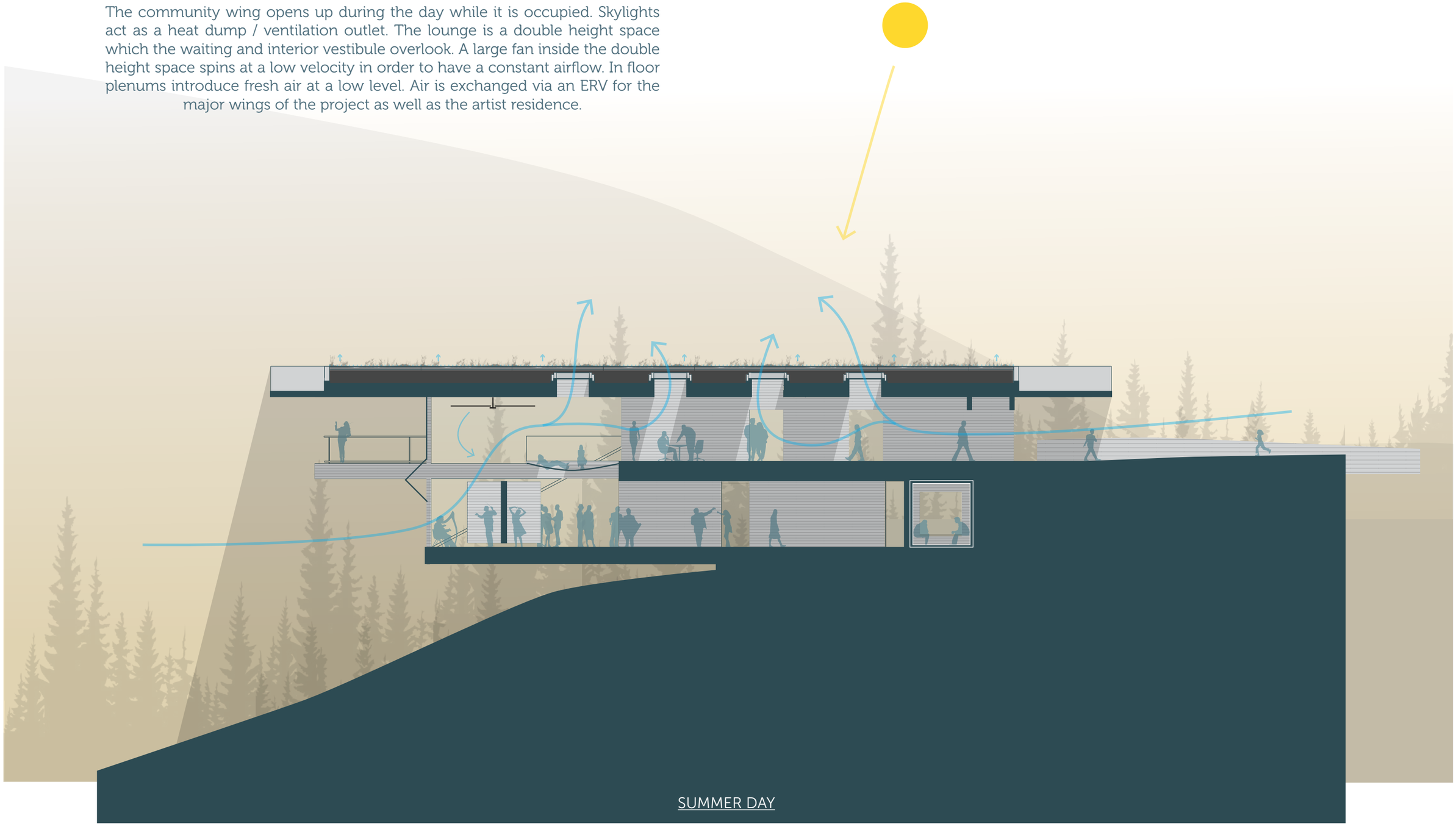


SUMMER DAY

During the colder months, thermal mass elements store the suns thermal energy during the day and release it back at night. To assist the heating of the conditioned spaces, infloor hydronic heating is used. The orientation of the roofs allow for as much sun as possible to enter the building during the day.

WINTER EVENING

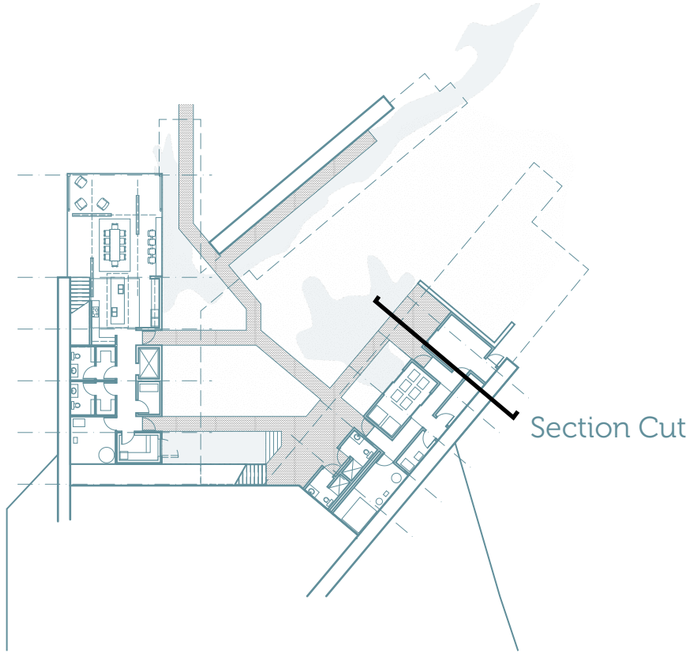
The community wing opens up during the day while it is occupied. Skylights act as a heat dump / ventilation outlet. The lounge is a double height space which the waiting and interior vestibule overlook. A large fan inside the double height space spins at a low velocity in order to have a constant airflow. In floor plenums introduce fresh air at a low level. Air is exchanged via an ERV for the major wings of the project as well as the artist residence.

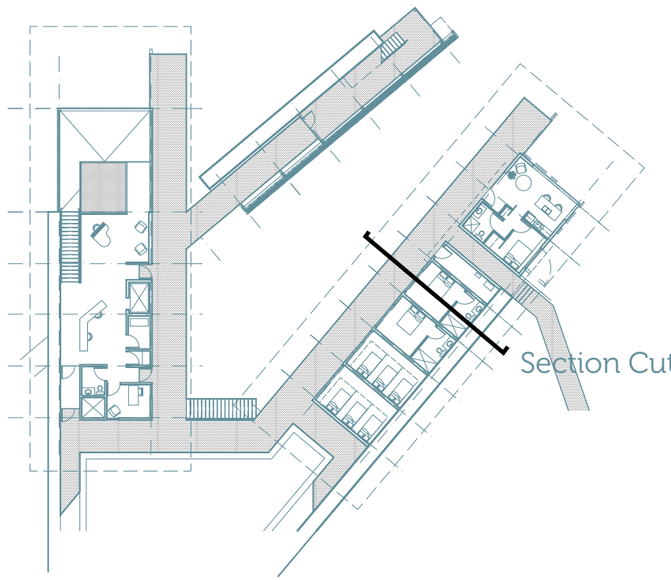


SUMMER DAY

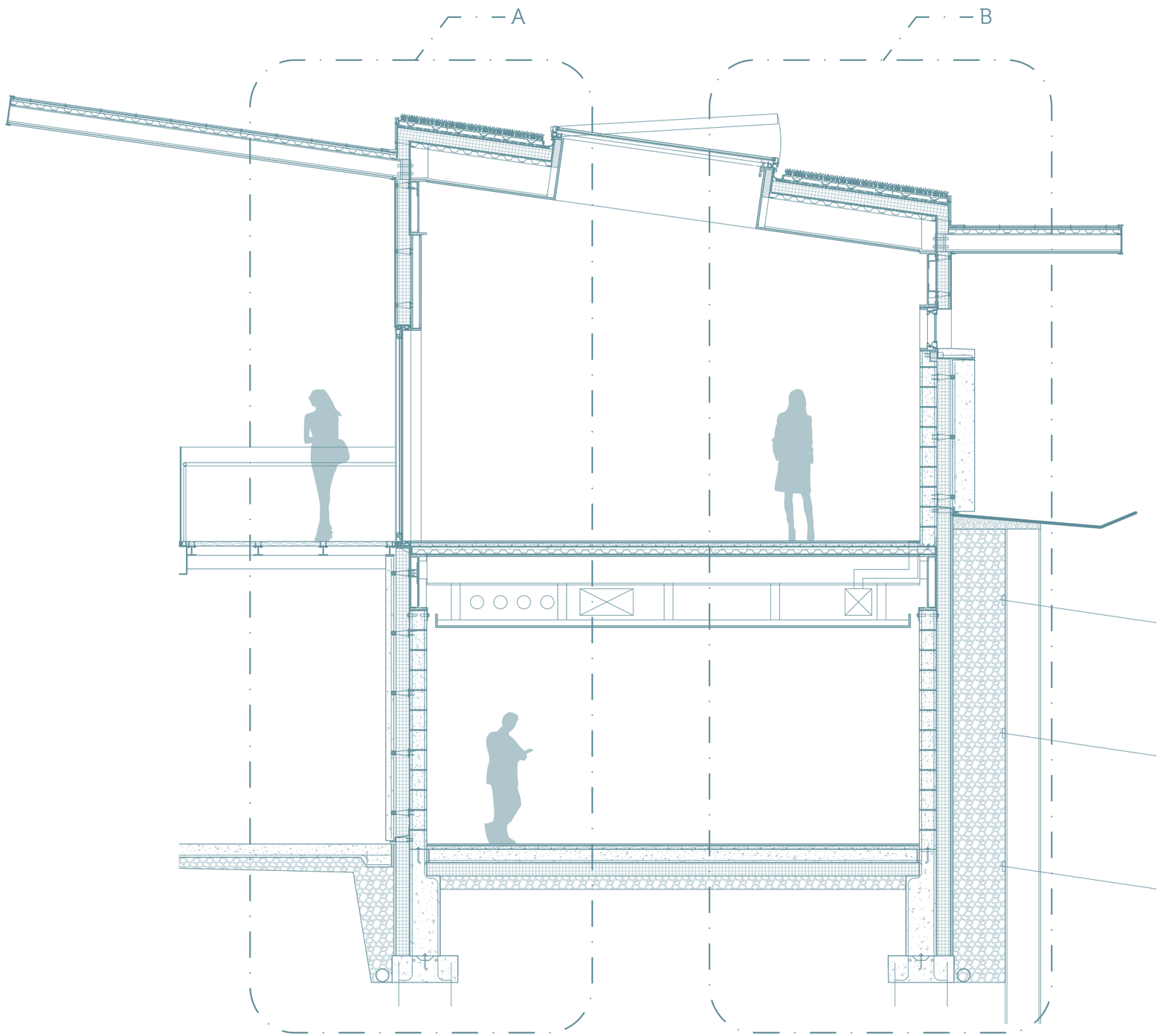
The community wing closes up at night, thermal mass elements keep the space warm. The lounge is comprised of mobile concrete (thermal) walls which can be positioned by the user to gain solar thermal energy during the day. The suana is insulated in order to reduce heating energy loads.

WINTER EVENING

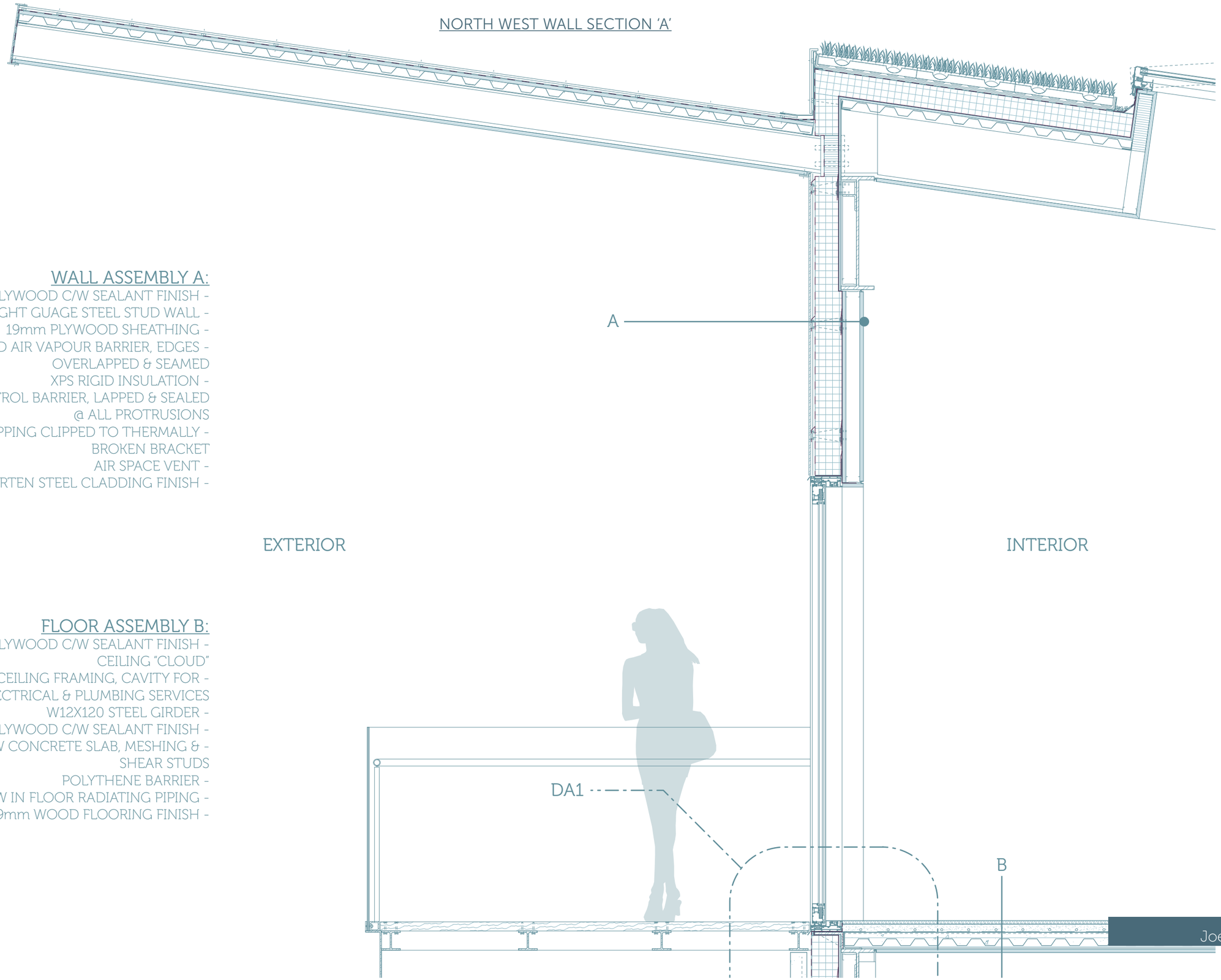




ENVELOPE



NORTH WEST WALL SECTION 'A'



WALL ASSEMBLY A:

19mm BIRCH PLYWOOD C/W SEALANT FINISH -
92mm LIGHT GUAGE STEEL STUD WALL -
19mm PLYWOOD SHEATHING -
FULLY ADHERED AIR VAPOUR BARRIER, EDGES -
OVERLAPPED & SEAMED
XPS RIGID INSULATION -
CONTINUOUS WATER CONTROL BARRIER, LAPPED & SEALED
@ ALL PROTRUSIONS
HORIZONTAL STRAPPING CLIPPED TO THERMALLY -
BROKEN BRACKET
AIR SPACE VENT -
CORTEN STEEL CLADDING FINISH -

FLOOR ASSEMBLY B:

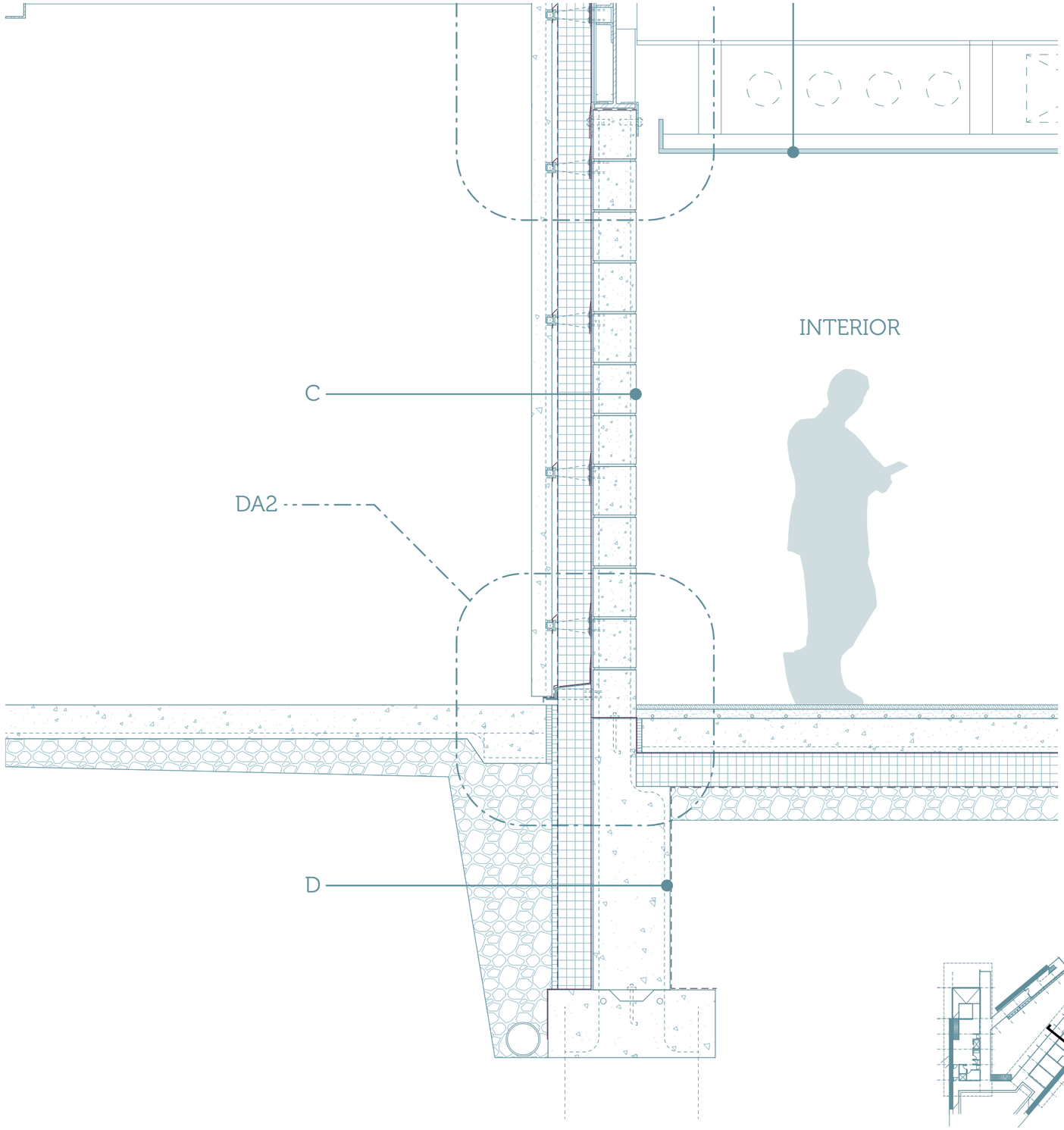
SUSPENDED 19mm BIRCH PLYWOOD C/W SEALANT FINISH -
CEILING "CLOUD"
FULLY SECURED SUSPENDED CEILING FRAMING, CAVITY FOR -
MECHANICAL, ELECTRICAL & PLUMBING SERVICES
W12X120 STEEL GIRDER -
19mm BIRCH PLYWOOD C/W SEALANT FINISH -
COMPOSITE STEEL DECK C/W CONCRETE SLAB, MESHING & -
SHEAR STUDS
POLYTHENE BARRIER -
SCREED TOPING LAYER C/W IN FLOOR RADIATING PIPING -
19mm WOOD FLOORING FINISH -

WALL ASSEMBLY C:

FINISH LOAD BEARING 190mm CMU BLOCK -
FULLY ADHERED AIR VAPOUR BARRIER, EDGES -
OVERLAPPED & SEAMED
XPS RIGID INSULATION -
CONTINUOUS WATER CONTROL BARRIER, LAPPED & SEALED
@ ALL PROTRUSIONS
HORIZONTAL CLADDING RAIL CLIPPED TO THERMALLY -
BROKEN BRACKET
AIR SPACE VENT-
90mm PRECAST CONCRETE PANEL WITH BOARD FORM -
FINISH, SEALED & PROTECTED

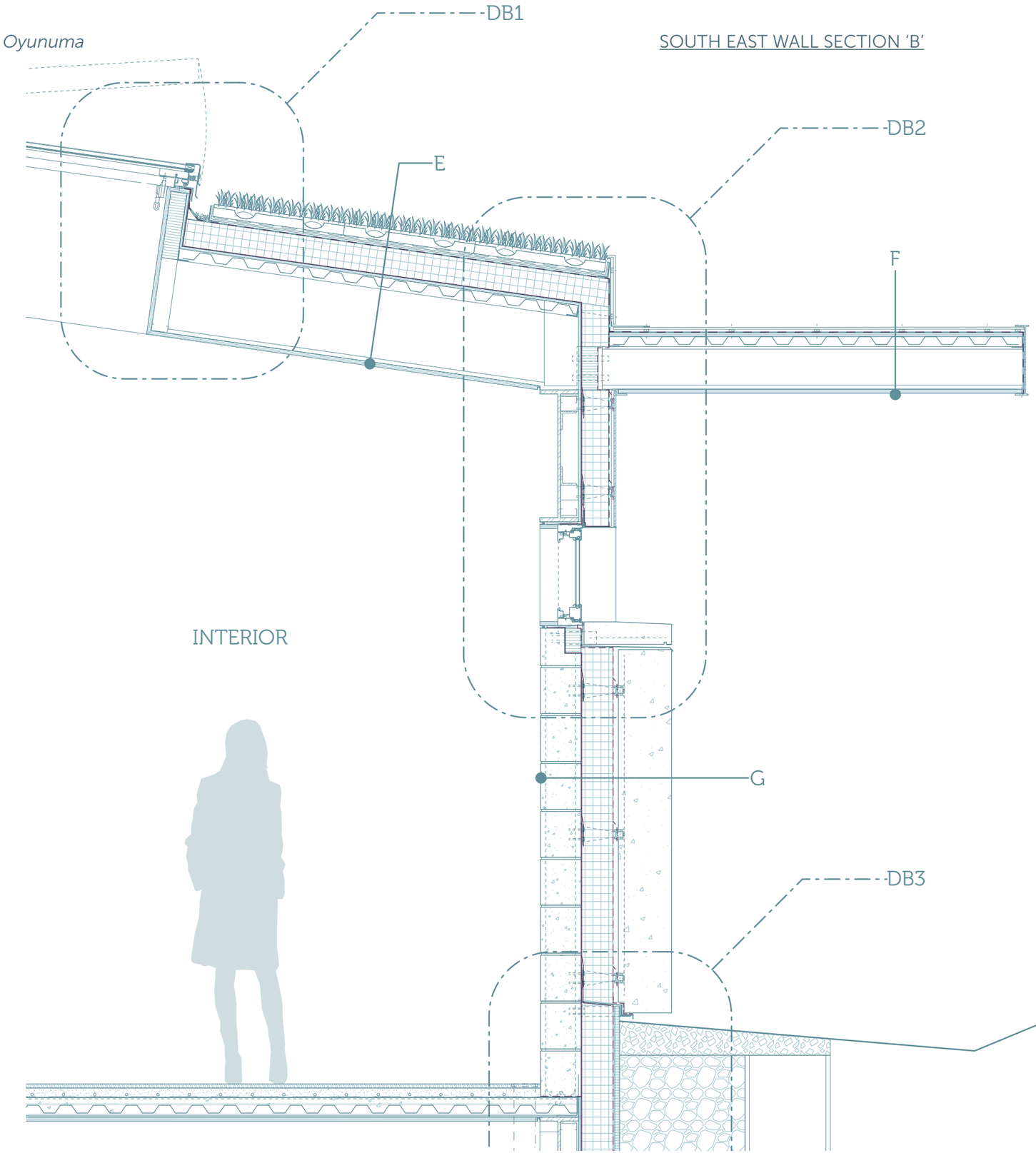
FOUNDATION ASSEMBLY D:

POURED CONCRETE FOUNDATION WALL -
FULLY ADHERED AIR VAPOUR BARRIER, EDGES -
OVERLAPPED & SEAMED
XPS RIGID INSULATION -
CONTINUOUS WATER CONTROL BARRIER -
DRAINAGE BOARD -
GRAVEL DRAINAGE LAYER FILL -



NORTH WEST WALL SECTION 'A'

SOUTH EAST WALL SECTION 'B'



ROOF ASSEMBLY E:

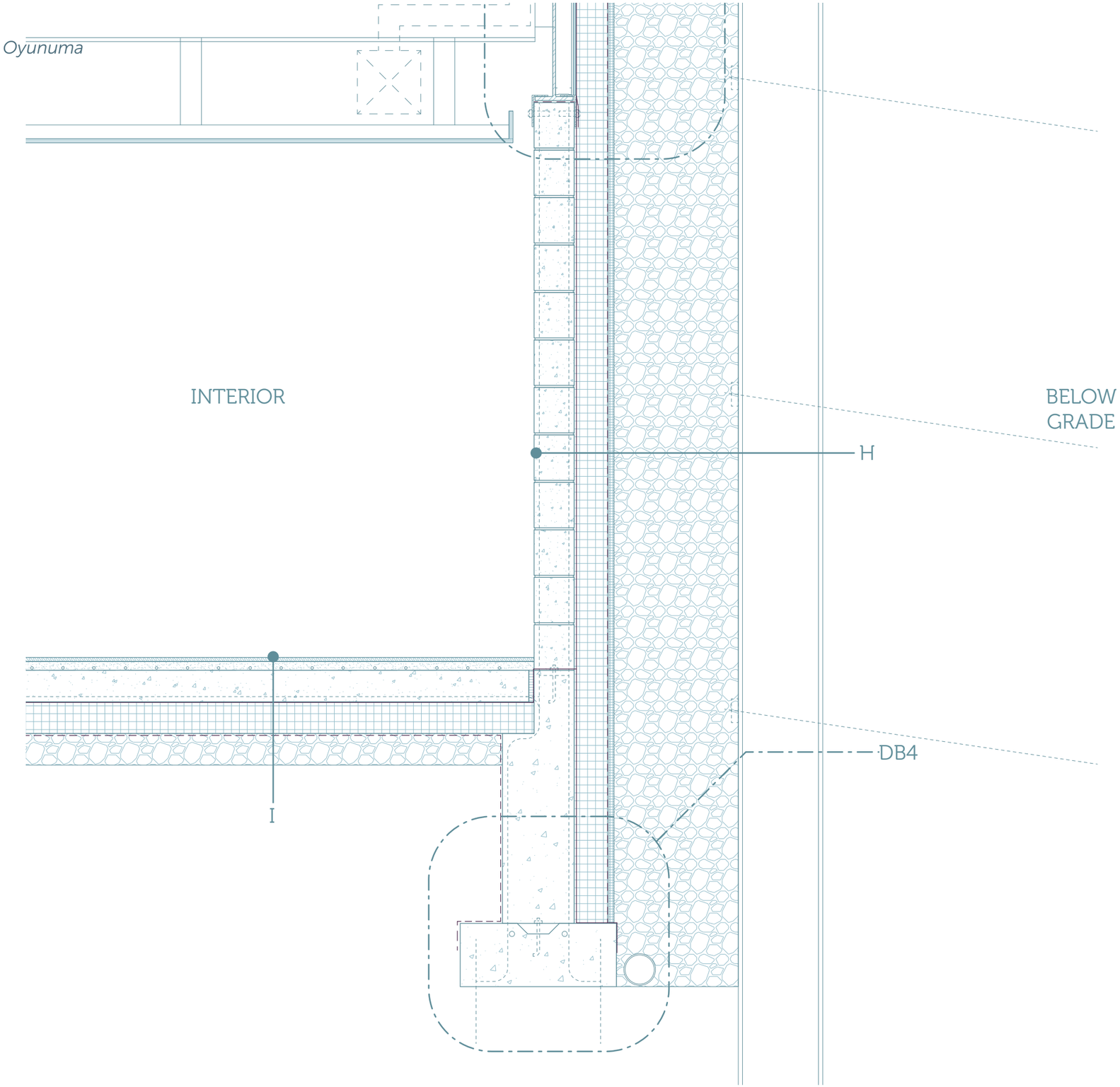
- FINISH 19mm BIRCH PLYWOOD C/W SEALANT
- W12X120 STEEL GIRDER
- STEEL DECKING
- 19mm PLYWOOD SHEATHING
- FULLY ADHERED AIR VAPOUR BARRIER, EDGES OVER-LAPPED & SEAMED
- XPS RIGID INSULATION
- FULLY ADHERED & WATER PROOF ROOFING MEMBRANE
- ROOFING EPDM SLIP SHEET, EDGES OVERLAPPED & SEAMED
- LIVEROOF GREEN ROOF SYSTEM

ROOF ASSEMBLY F:

- FINISH 19mm BIRCH PLYWOOD C/W WATERPROOF SEALANT
- W12X22 STEEL CANTILEVER SECTION
- STEEL DECKING
- 19mm PLYWOOD SHEATING
- FULLY ADHERED WATER PROOF ROOFING MEMBRANE
- ROOFING EPDM SLIP SHEET, EDGES OVERLAPPED & SEAMED
- METAL ROOF STRAPPING W/ AIR SPACE VENT
- FINISH METAL ROOF CLADDING

WALL ASSEMBLY G:

- FINISH LOAD BEARING 190mm CMU BLOCK
- FULLY ADHERED AIR VAPOUR BARRIER, EDGES OVERLAPPED & SEAMED
- XPS RIGID INSULATION
- CONTINUOUS WATER CONTROL BARRIER, LAPPED & SEALED @ ALL PROTRUSIONS
- HORIZONTAL STRAPPING CLIPPED TO THERMALLY BROKEN BRACKET
- AIR SPACE VENT
- 200mm PRECAST CONCRETE PANEL WITH BOARD FORM FINISH, SEALED & PROTECTED



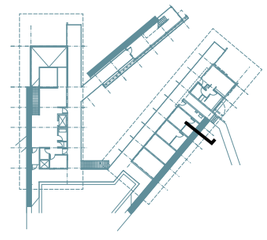
SOUTH EAST WALL SECTION 'B'

WALL ASSEMBLY H:

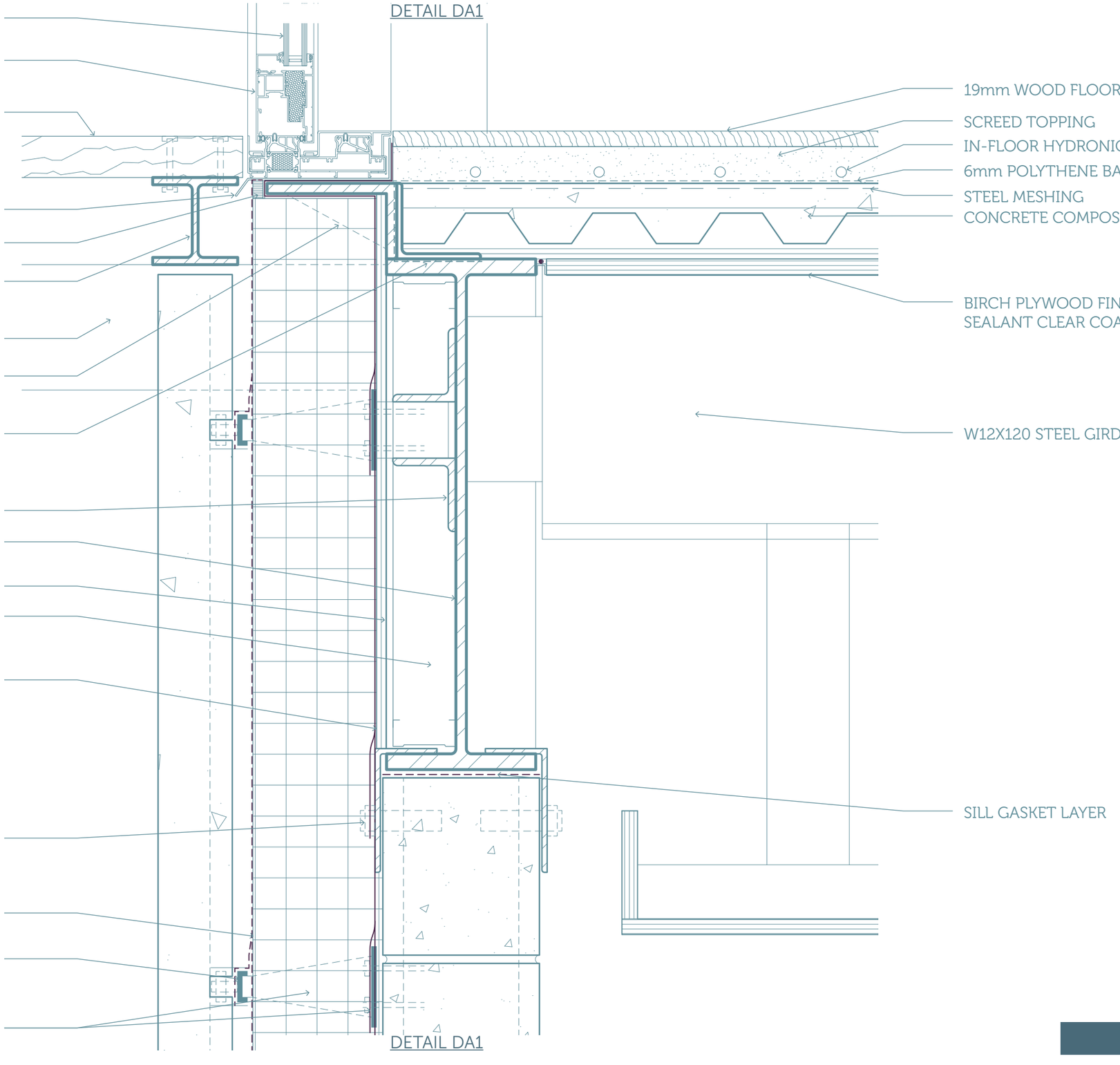
- FINISH LOAD BEARING 190mm CMU BLOCK
- FULLY ADHERED AIR VAPOUR BARRIER, EDGES OVERLAPPED & SEAMED
- XPS RIGID INSULATION
- CONTINUOUS WATER CONTROL BARRIER
- DRAINAGE BOARD
- GRAVEL DRAINAGE LAYER FILL
- STEEL DRIVEN PILE RETAINING WALL C/W TIE BACKS INTO BEDROCK

FLOOR ASSEMBLY I:

- FINISH 19mm WOOD FLOORING
- SCREED TOPPING LAYER C/W IN FLOOR RADIATING PIPING
- POLYTHENE BARRIER
- POURED CONCRETE FLOOR SLAB
- FULLY ADHERED AIR VAPOUR BARRIER, EDGES OVERLAPPED & SEAMED
- XPS RIGID INSULATION
- CONTINUOUS WATER CONTROL BARRIER
- GRADE 'A' COMPACTED GRANULAR FILL

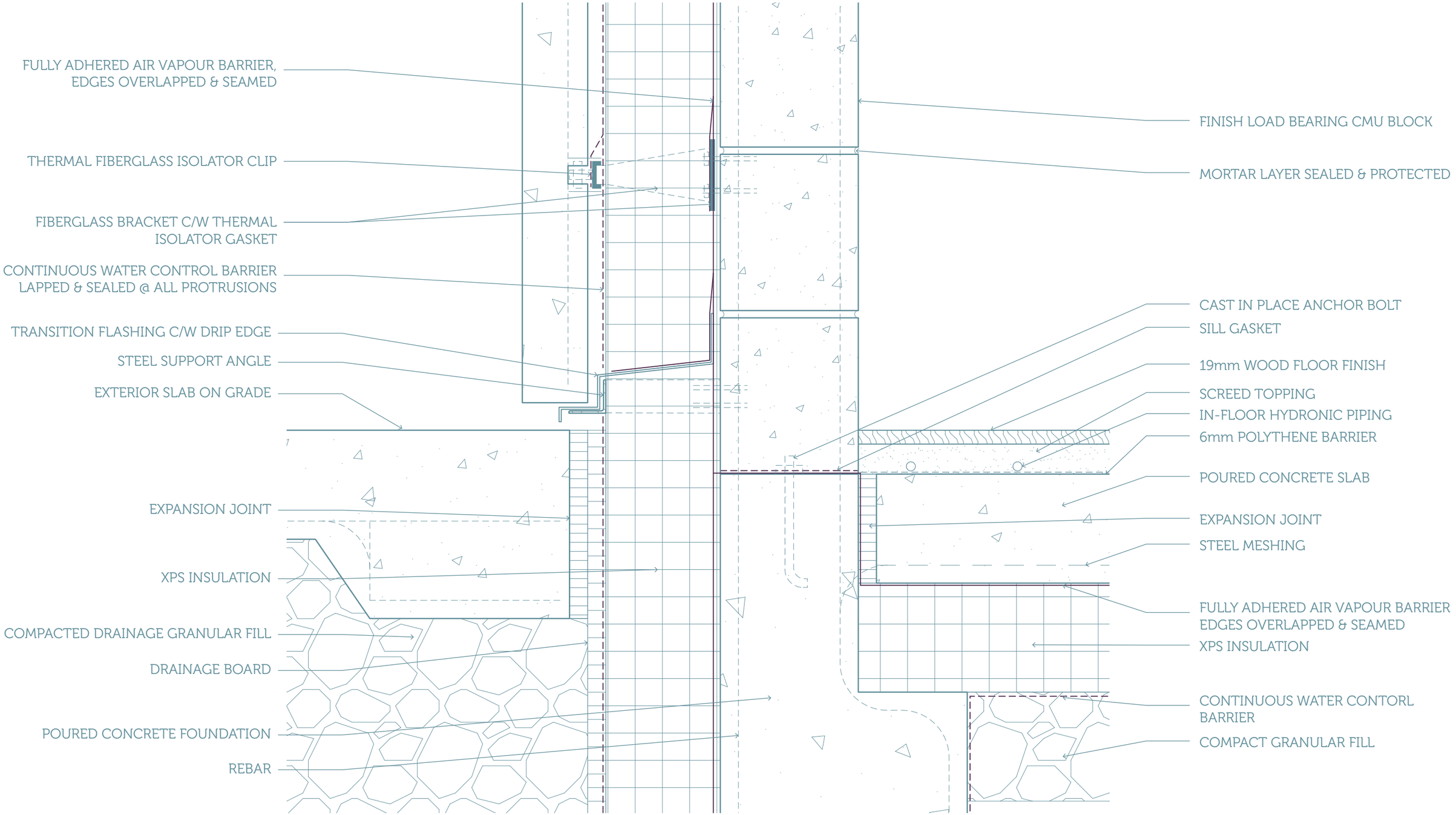


DETAIL DA1



DETAIL DA1

DETAIL DA2



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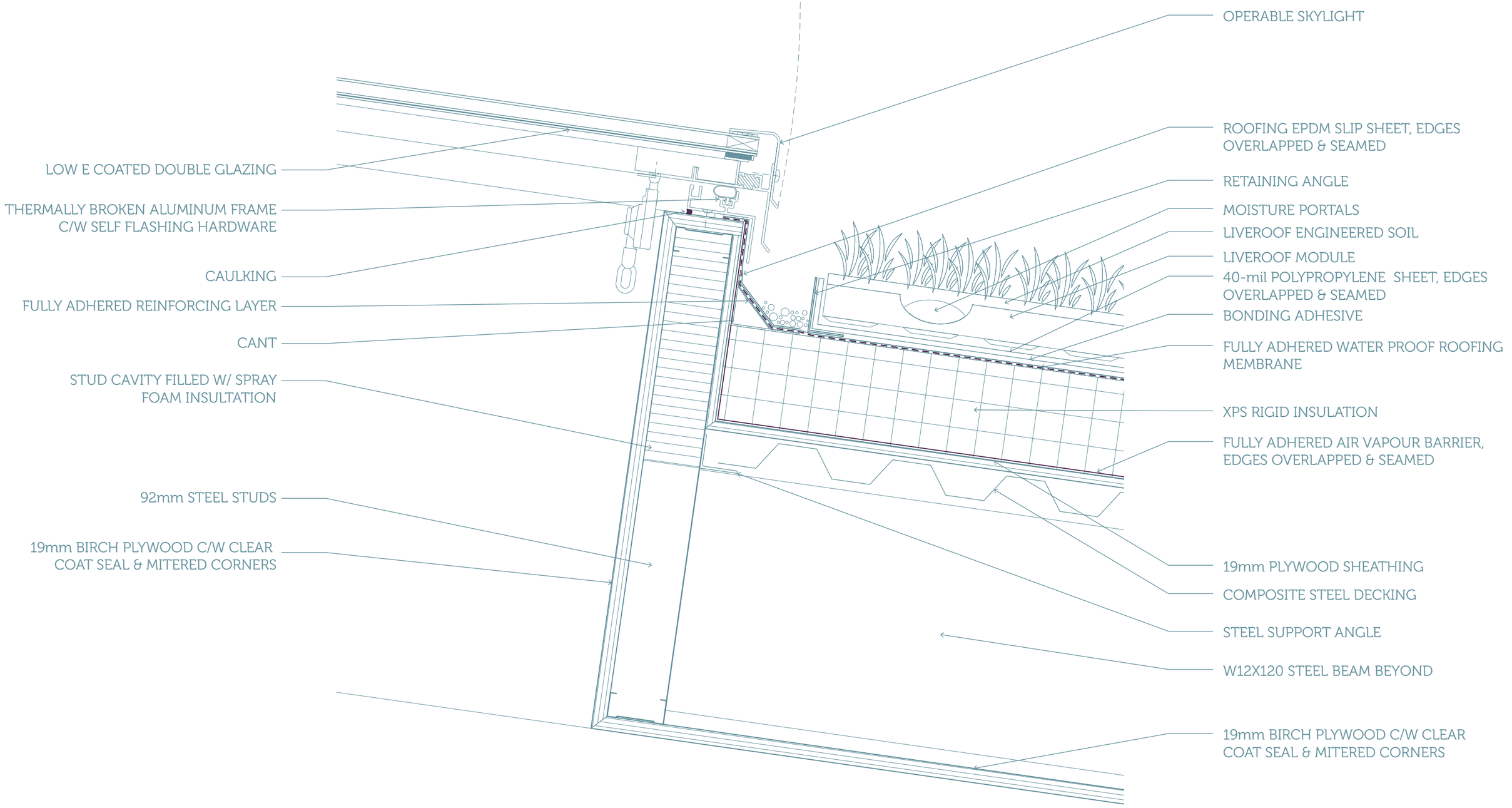
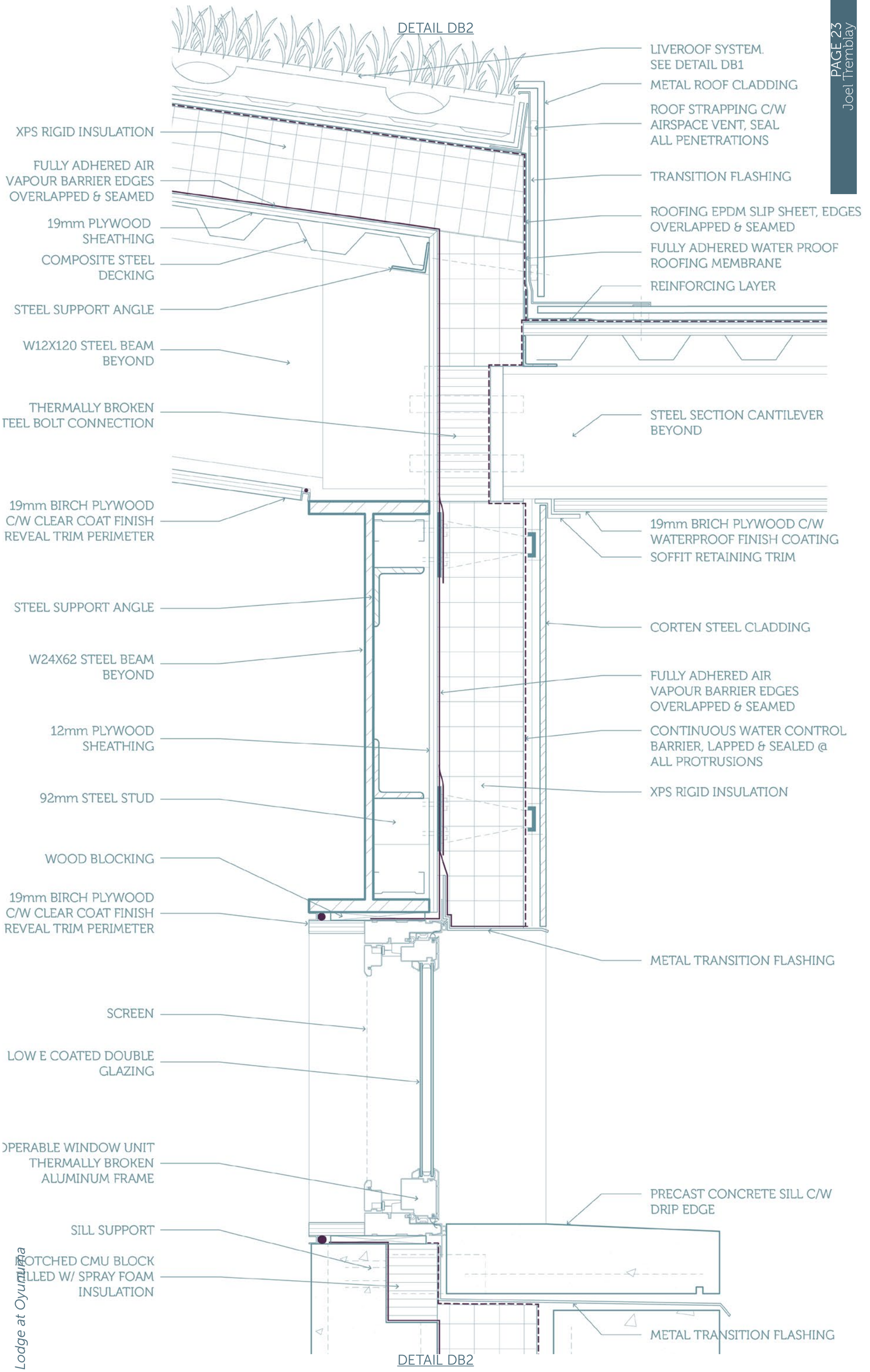


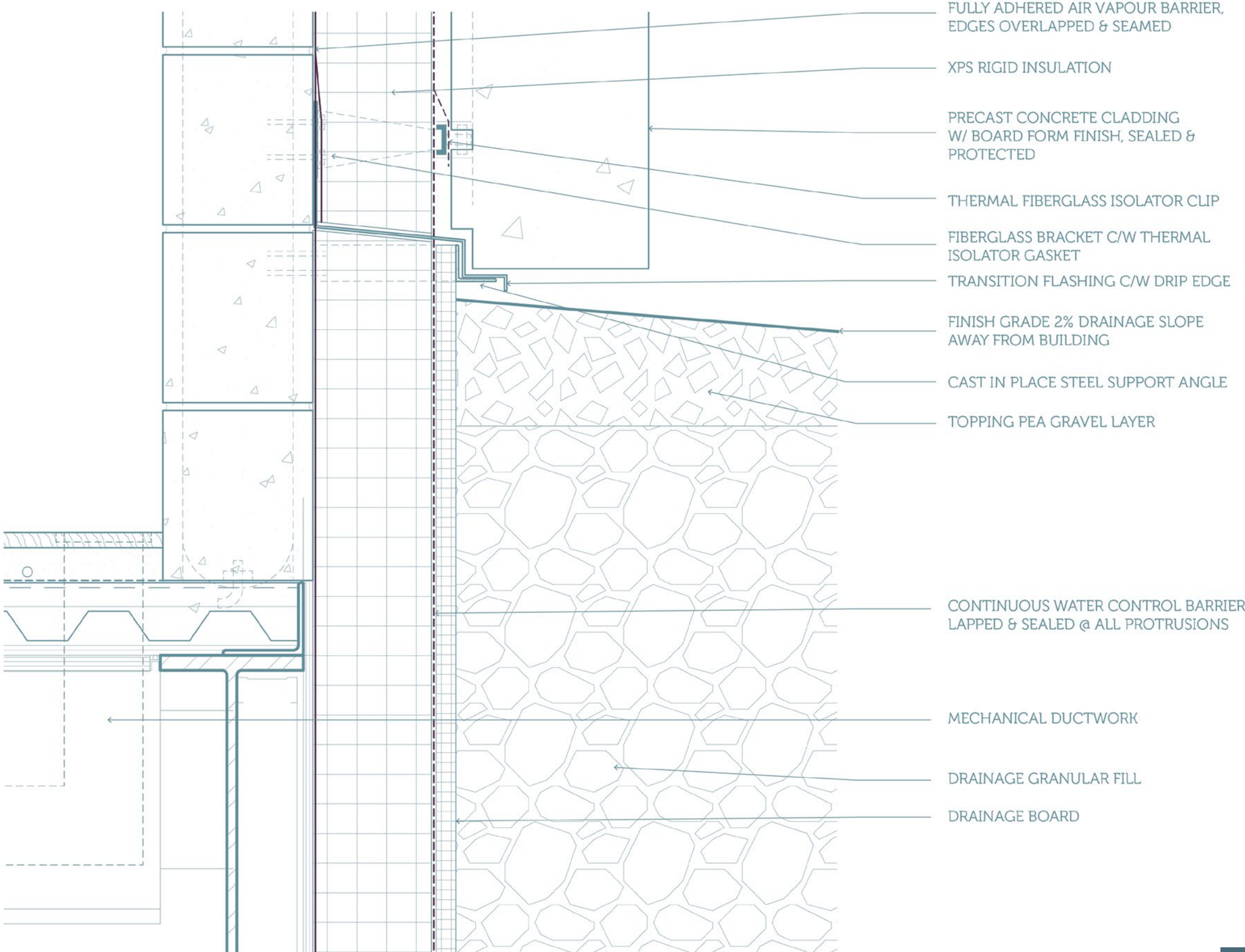
DETAIL DB1

DETAIL DB2



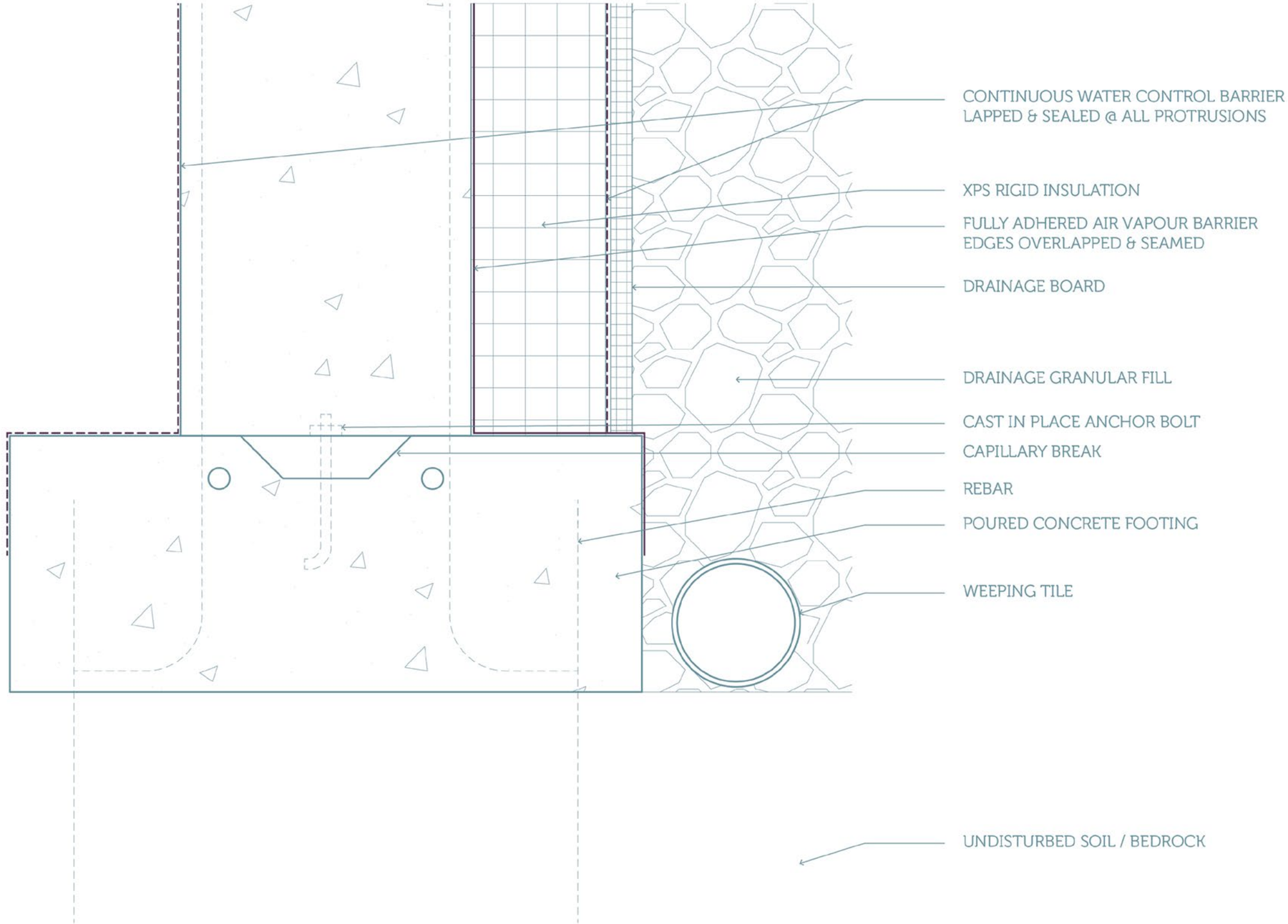
DETAIL DB2

DETAIL DB3



DETAIL DB3

DETAIL DB4

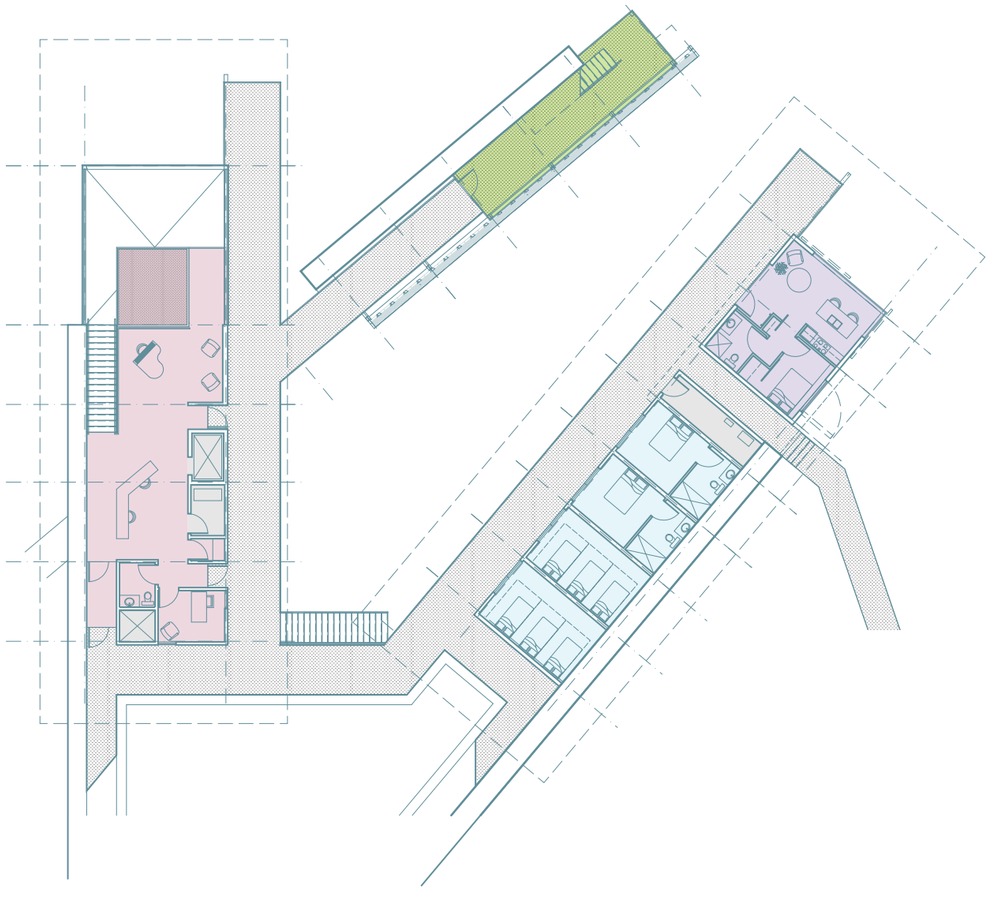


DETAIL DB4

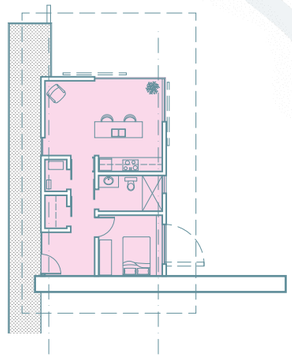
BUILDING ZONES

- Zone A | Vestibule, Reception, Office & Waiting
- Zone B | Accommodation Rooms
- Zone C | Lodge Manager
- Zone D | Green House
- Zone E | Kitchen, Dinning & Lounge
- Zone F | Change Rooms & Corridor
- Zone G | Washrooms & Showers
- Zone H | Living Machine, Corridor & Archive
- Zone I | Artist Residence
- Zone J | Sauna
- Zone K | Service

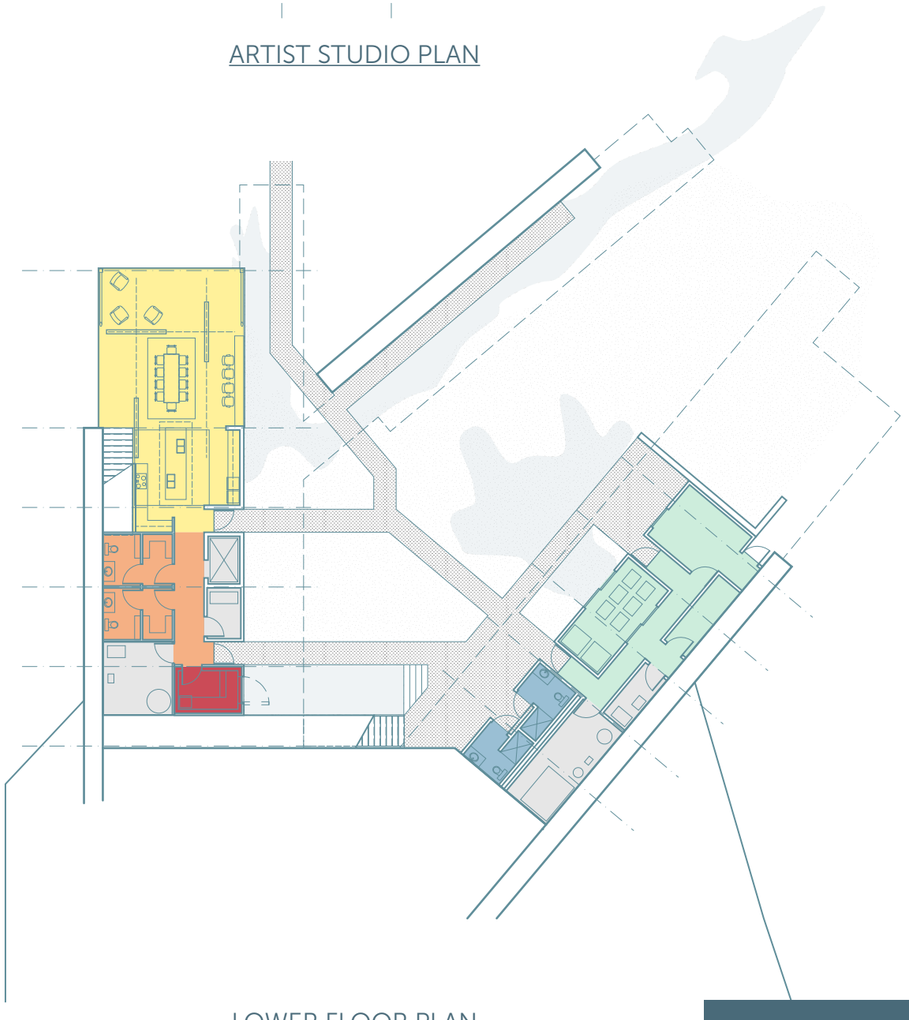
The overall lodge layout is broken up into seperate zones because the condition of each space will be tailored to its specific use. The residential sleeping and living zones are warm and intimate where as the public vestibule and waiting areas are more lively and active.



GROUND FLOOR PLAN PLAN



ARTIST STUDIO PLAN

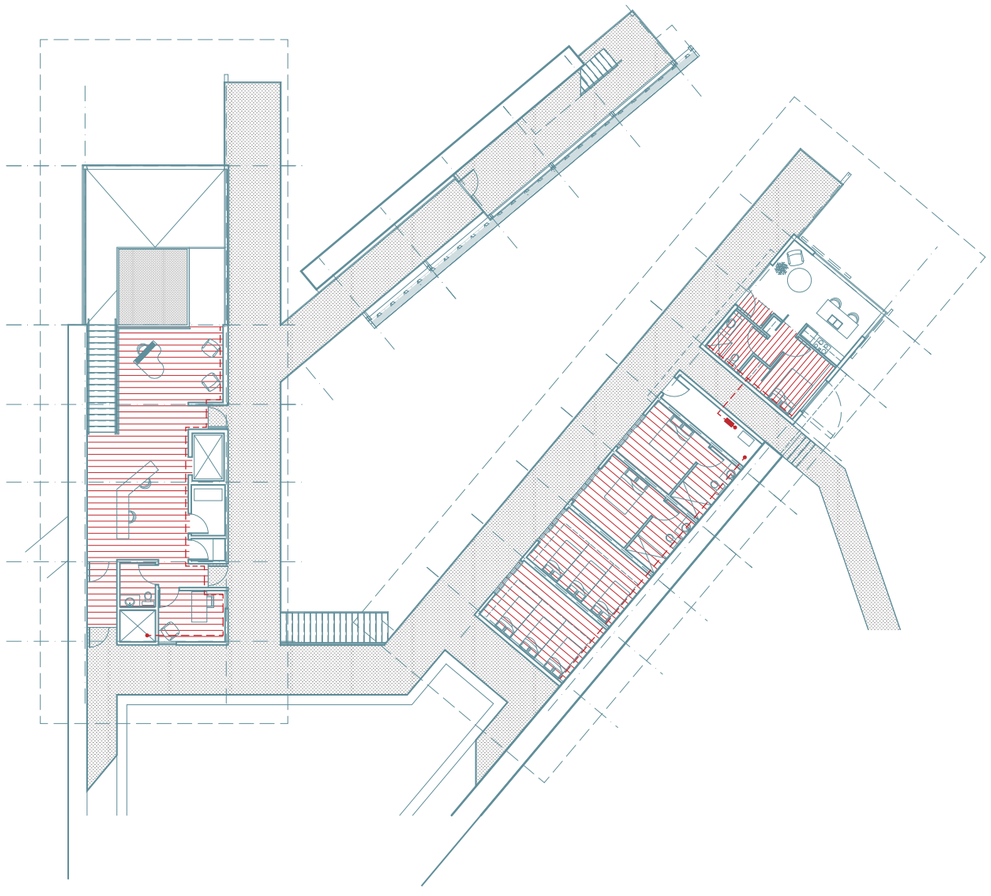


LOWER FLOOR PLAN

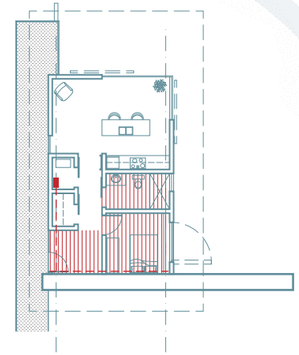
HEATING SYSTEMS

- Hot water storage tank
- On demand electric water heater
- Manifold
- Hydronic tubes
- Descending piping
- Ascending piping
- Sauna heater
- Geothermal Heatpump

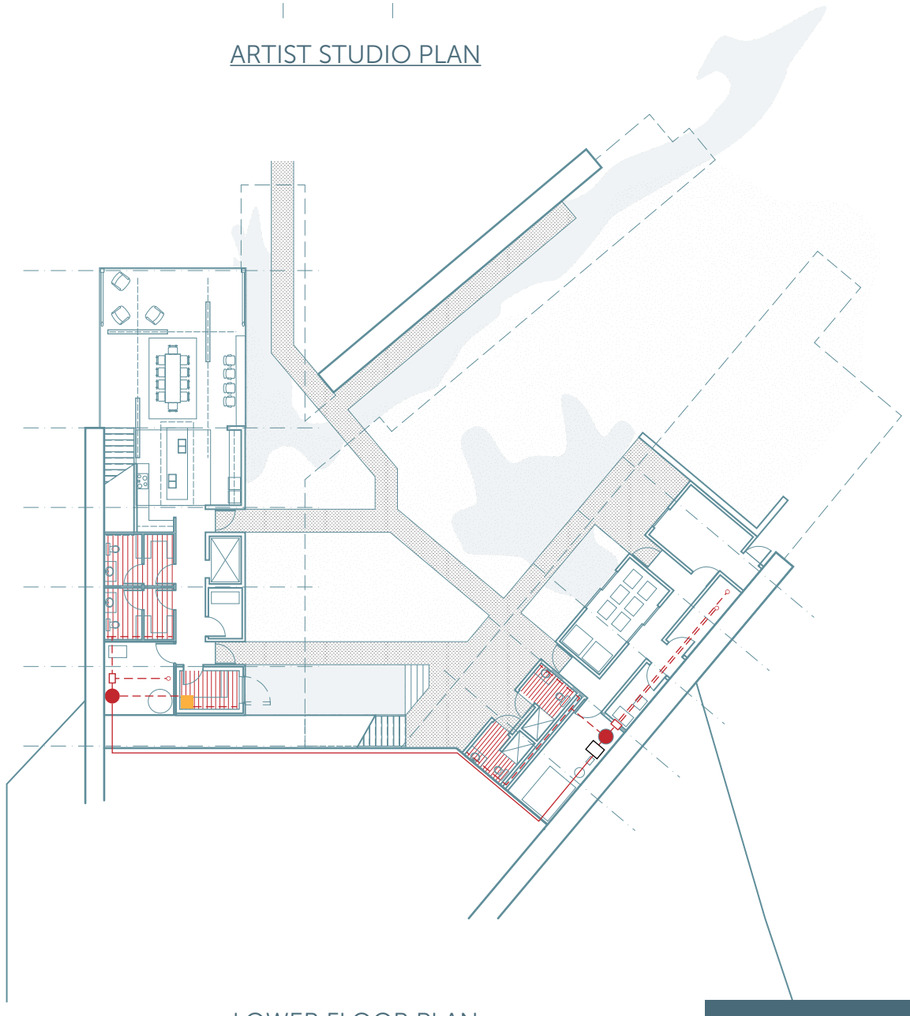
In-floor radiate heating is used to heat the building during the colder months. Thermal mass walls are used as a means for passive heating strategies. The artist residence and lodge manager have their own on demand heating system in order to give user control. The hydronic system is linked to a closed loop geothermal heatpump.



GROUND FLOOR PLAN PLAN



ARTIST STUDIO PLAN

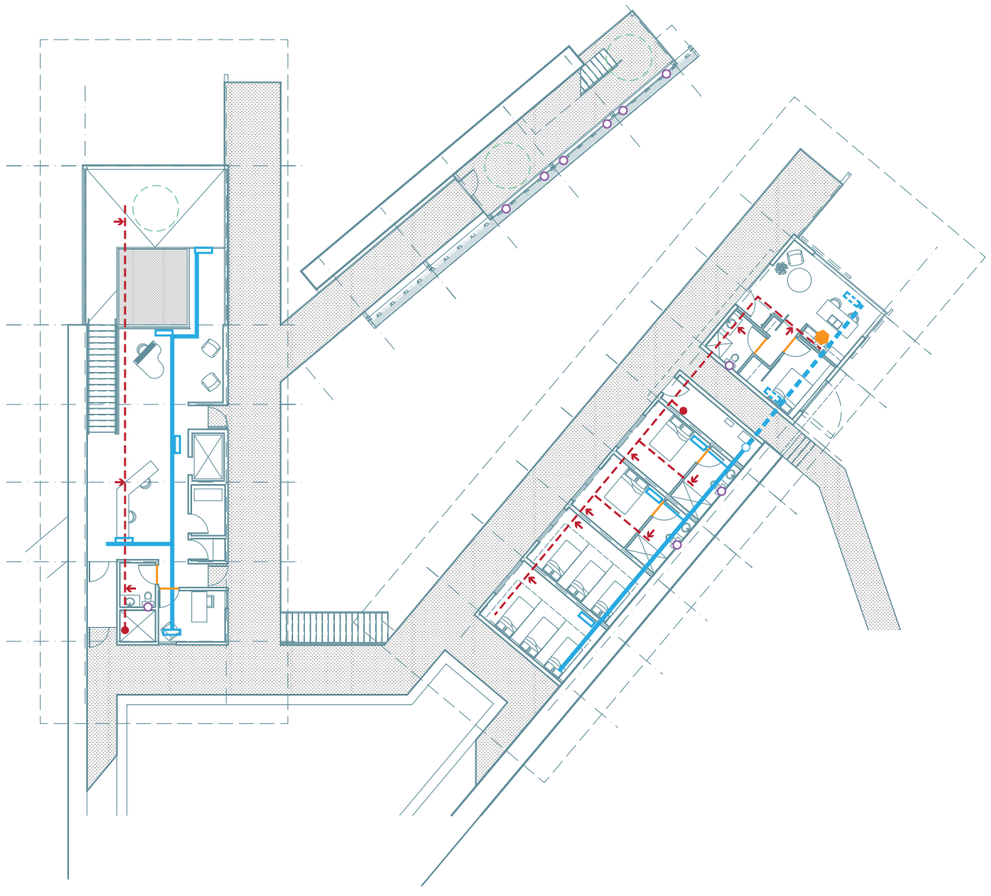


LOWER FLOOR PLAN

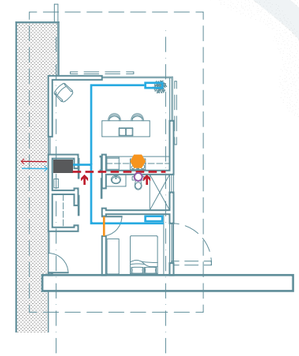
COOLING / VENTILATION SYSTEMS

- ERV System
- Infloor fresh air duct
- Ceiling fresh air duct
- Floor mounted fresh air diffuser
- Ceiling mounted fresh air diffuser
- Ascending ductwork
- Descending ductwork
- Ceiling return exhaust duct
- Ceiling return vent
- Door undercut
- Recirculation range hood
- Direct exhaust
- Ceiling mounted fan

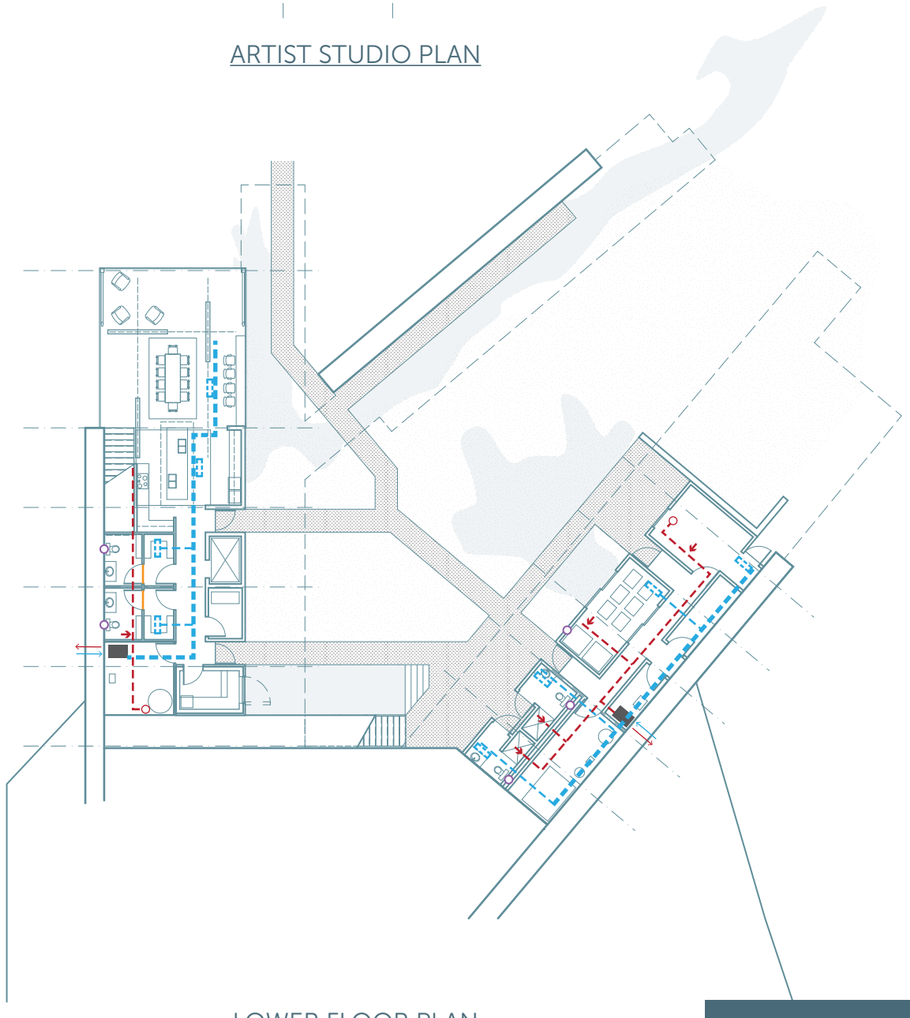
Active cooling for the project is provided by ERV's. The majority of the ductwork spans between the lower floor suspended ceiling and ground floor structure. Fans are utilized in spaces with greater ceiling heights in order to provide a constant airflow. Direct exhausts are required for the incinerating toilet units.



GROUND FLOOR PLAN PLAN



ARTIST STUDIO PLAN



LOWER FLOOR PLAN

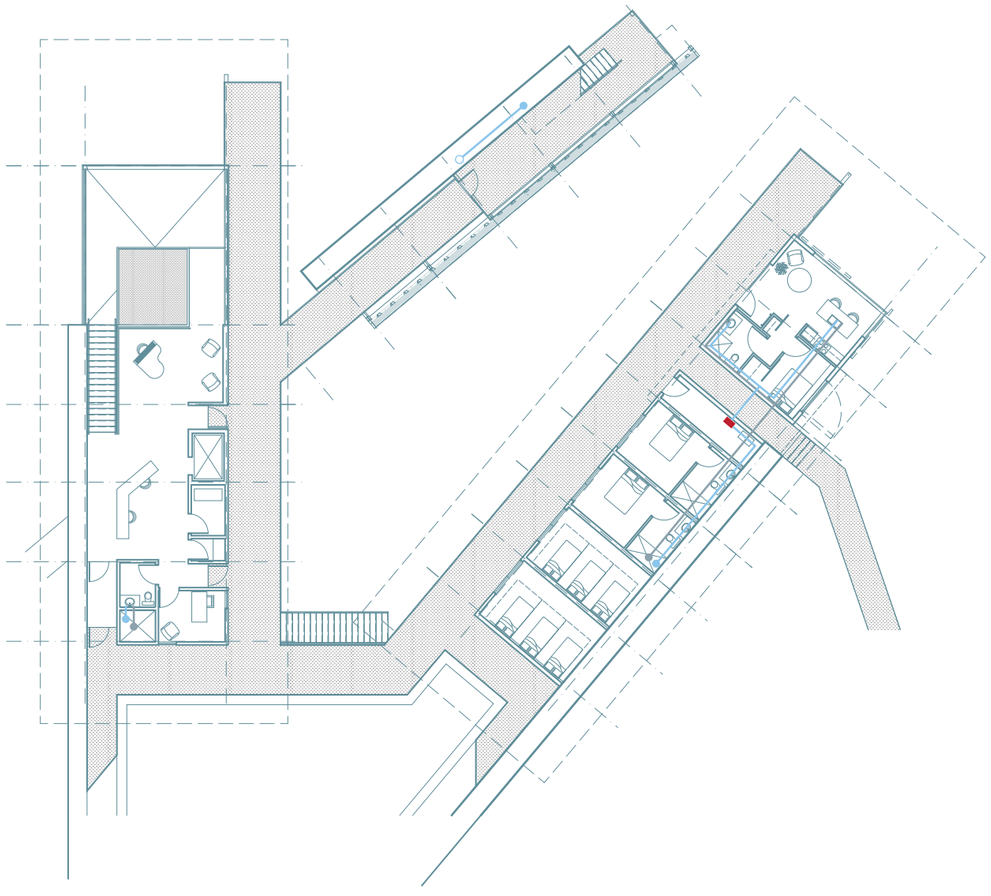
WATER / WASTE MANAGEMENT

- Cistern
- Well
- UV filter
- Fresh water piping
- Grey water piping

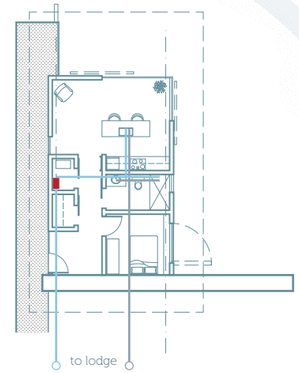
(Exterior water lines to be insulated)

- Ascending piping
- Descending piping
- Air source hot water tank
- On demand electric water heater
- Overflow

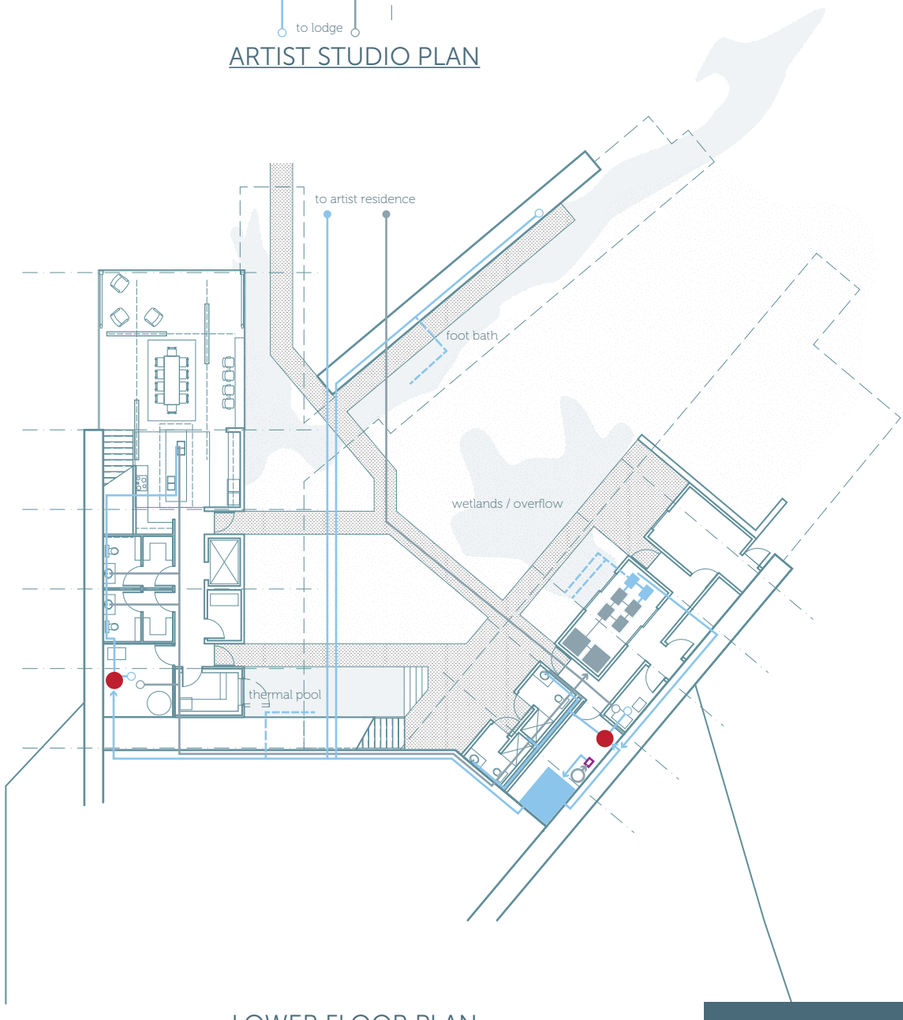
Water is pumped up from an aquifer through a well and treated with a UV filter. Fresh water is stored in a cistern and supplies domestic items throughout the project. Grey water is treated on-site with a living machine. There is no black water to be treated on site as the toilets are incinerating units. Rain & Storm water is collected on site in a storage tank to be used for irrigating wetlands as well as maintaining the green house and roofs.



GROUND FLOOR PLAN PLAN



ARTIST STUDIO PLAN

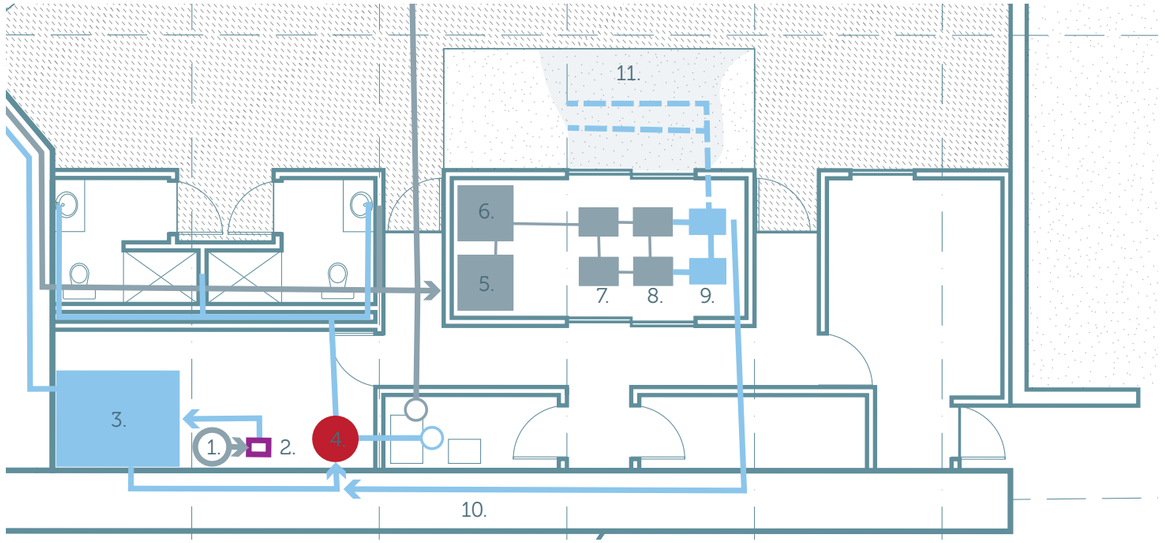


LOWER FLOOR PLAN

GREY WATER MANAGEMENT PROCESS

Living Machine

1. Water is pumped up from the aquifer via a well.
2. a UV filter eliminates any harmfull bacteria.
3. The water is stored inside a cistern collection tank.
4. Water that is used for domestic hot water is pumped through a hot water tank, being that the water from the aquifer is warm, the hot water tank is in minimal operation.
5. Water from showers and sinks are drained into a living machine setting aerobic reactor tank.
6. The pretreated water is pumped into a flow equalizer and recirculation tank, ready for the cleaning stages. (Exhausted)
7. Tidal flow cells provide the first official cleaning stage of grey water.
8. The vertical flow cells provides the second cleaning stage.
9. The final polishing stage incorporates a screen filter, catridge filter, clorine tablet feeder and UV filter in order to end up with safe, reusable water.
10. Water is pumped back into the cistern for reuse.
11. During summer months the living machine can expand / overflow to the outdoor wetlands.



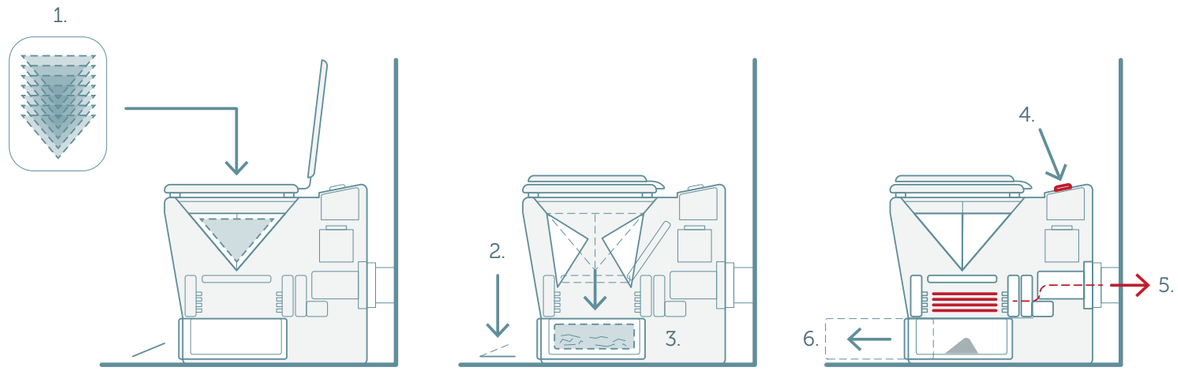
WASTE MANAGEMENT PROCESS

Incinerating Toilet Units

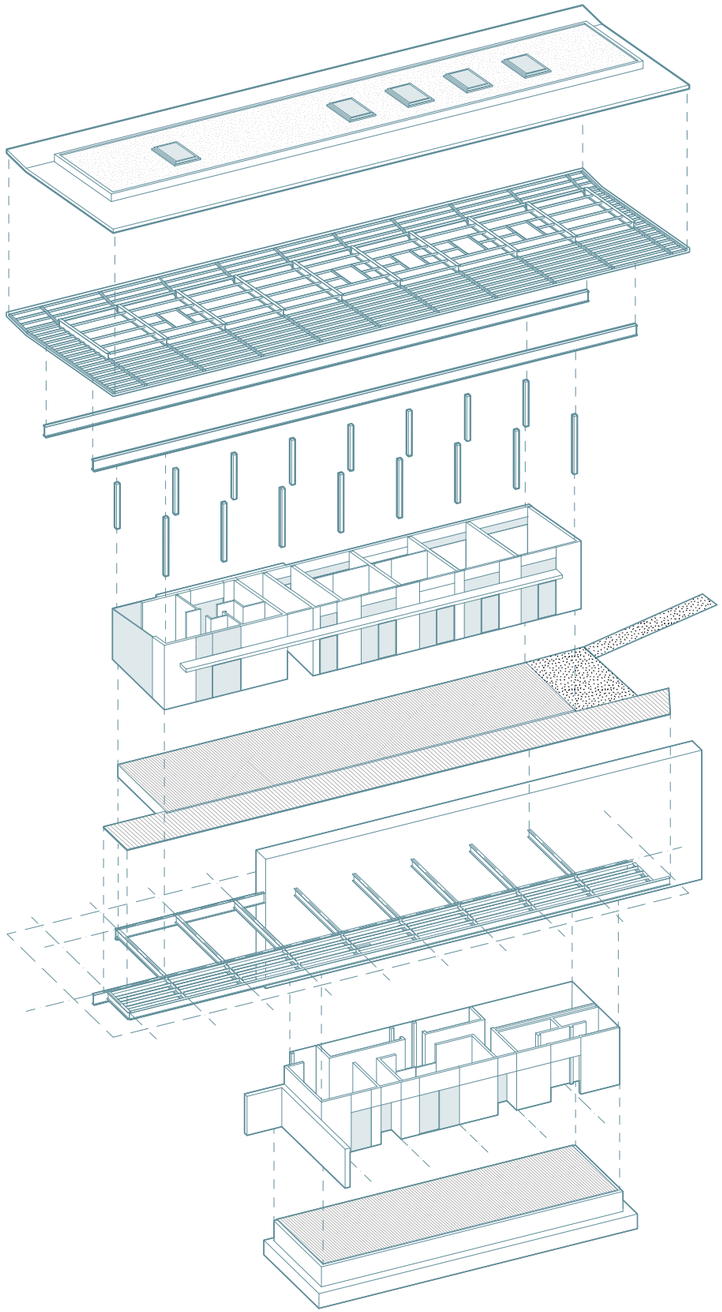
1. Paper bowl liner is inserted before every use.
2. Close lid and step on footpedal
3. Paper bowl and contents drop into the ashpan
4. Start cycle
5. Blower fan and incinerating process starts. Directly exhausted to outside
6. Ashpan is emptied weekly

Notes :
- Can be used at any time-even while it is in cycle
- No water required
- Uses 1.5 kilowatt hour of electricity per cycle
- Ash produced is germ-free. no restrictions on its disposal

Unit specified : INCINOLET - Electric Incinerating Toilet



TYPICAL STRUCTURE



finish roof envelope with green roof

roof girders and steel decking

primary roof beams

steel columns

light guage steel wall framing

Structural steel deck flooring with wood flooring finish

Steel floor beams & Girders cast into masonry wall

Load bearing masonry block walls

Poured conrete foundations and footings

ROOF

The steel roof structure is comprised of two large "primary" beams that span across the entire building supporting "secondary" roof girders and cantilevering overhangs. Composite steel decking provides lateral support across the entire roof. Putting the girders above the primary beams allows a seamless soffit aesthetic from inside to outside.

WALLS & COLUMNS

Steel columns are embeded into the light gauge steel wall framing and concrete masonry block where required. The walls provide lateral bracing between the roof beams and floor beams. The lower level load bearing concerete masonry block walls pick up the beam back span load and transfers it to the foundations.

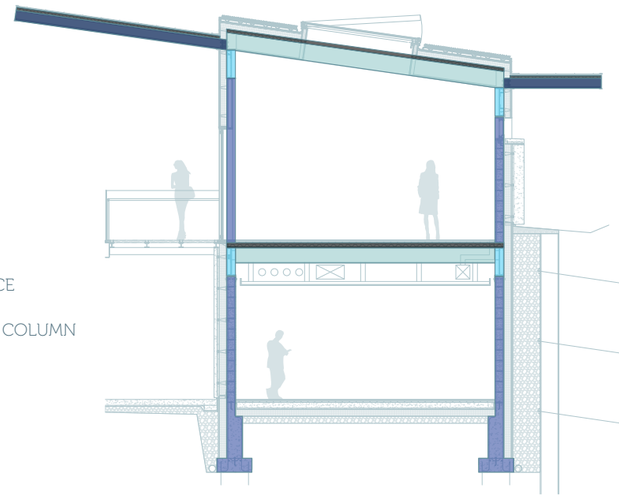
FLOORS

The steel floor structure is comprised of two large "primary" beams that span accross the entire building supporting "secondary" floor girders and cantilevering boardwalk overhang. The overall floor of the building is cantilvering a 1/3 ratio. Composite concrete steel decking provides the lateral bracing for the floor structure.

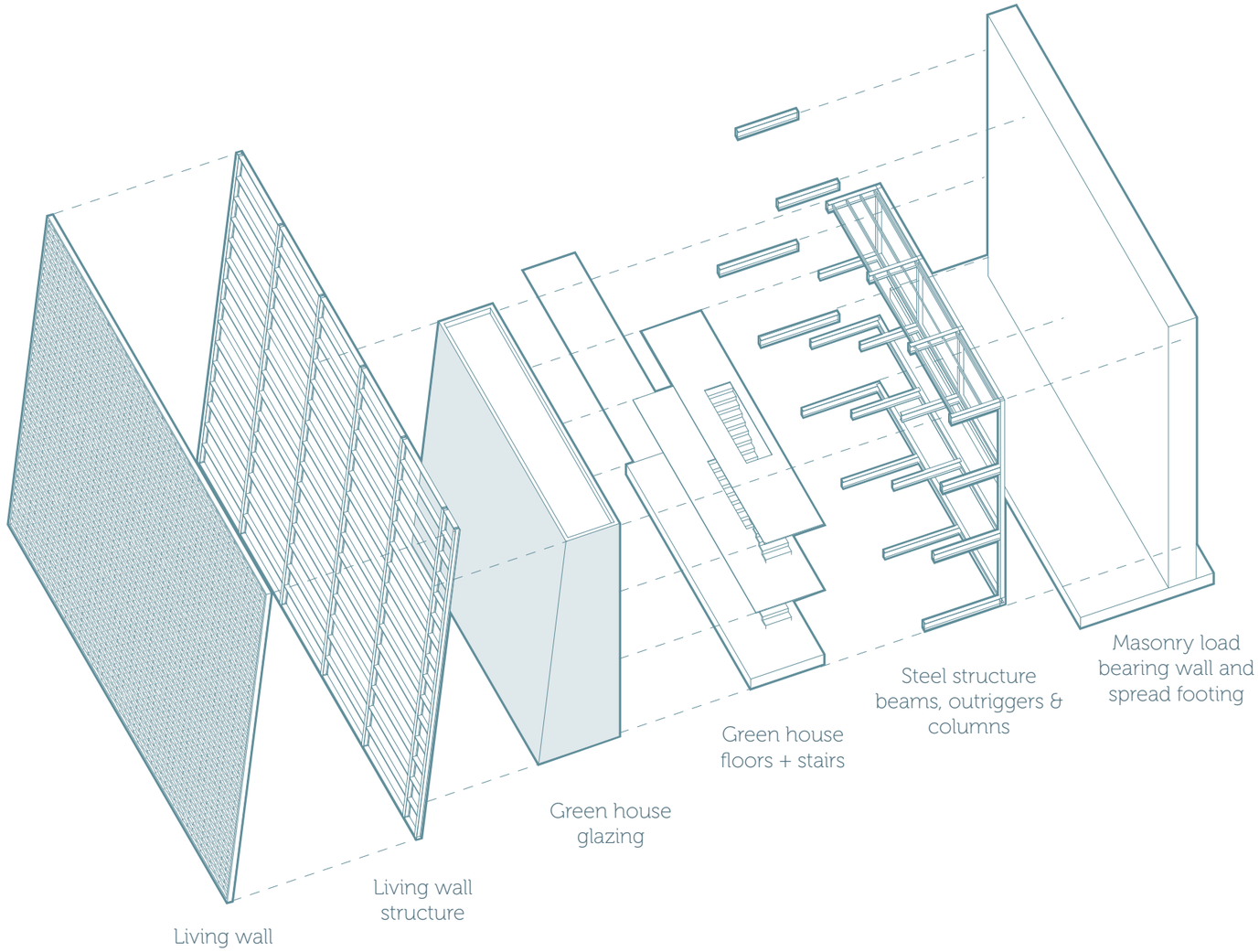
FOUNDATION

Poured concrete foundation walls and footings transfer the overall load of the building to the ground. Because one side of the lower level is essentially underground, the soil itself is held in place by a steel pile retaining wall.

- PRIMARY BEAM
- SECONDARY GIRDER
- CANTILEVER OVERHANG
- STEEL DECKING LATERAL BRACE
- LOAD TRANSFERING WALL OR COLUMN



GREEN HOUSE STRUCTURE



ROOF

The composite steel deck roof slopes towards the living wall allowing for rainwater collection / use in the green house. The roof structure itself is flat, rigid insulation is tapered in order to have a sloped drainage path. The living wall structure is composed of primary beams and secondary girders which are braced into the flooring structure.

WALLS & COLUMNS

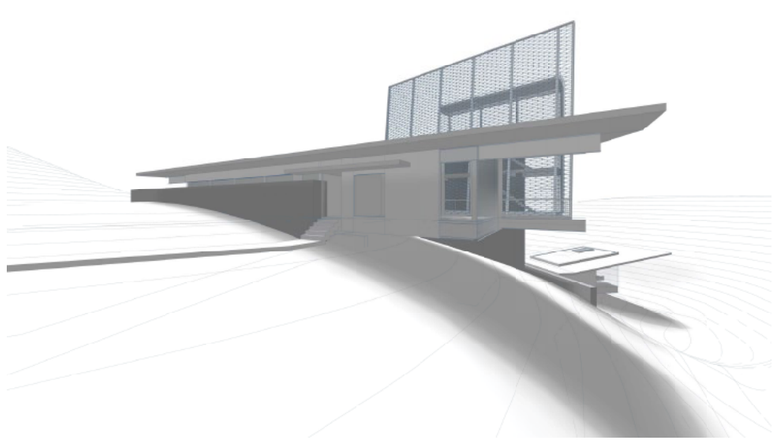
The overall green house is glazed using a curtain wall system. Steel beams and columns transfer the envelope loads to the load bearing masonry wall. This wall also acts as a thermal mass for the green house.

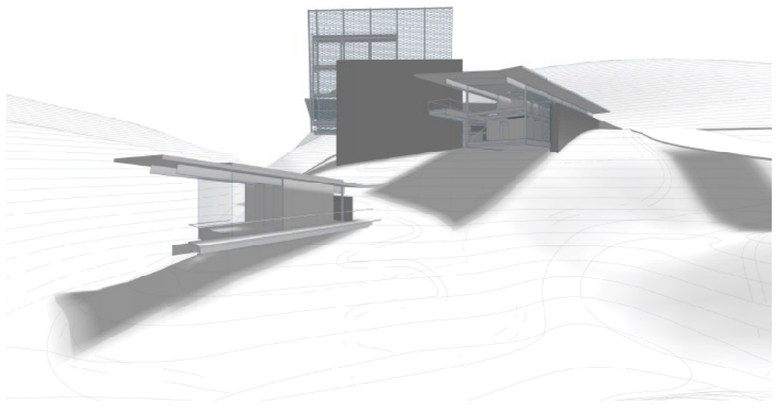
FLOORS / STAIRS

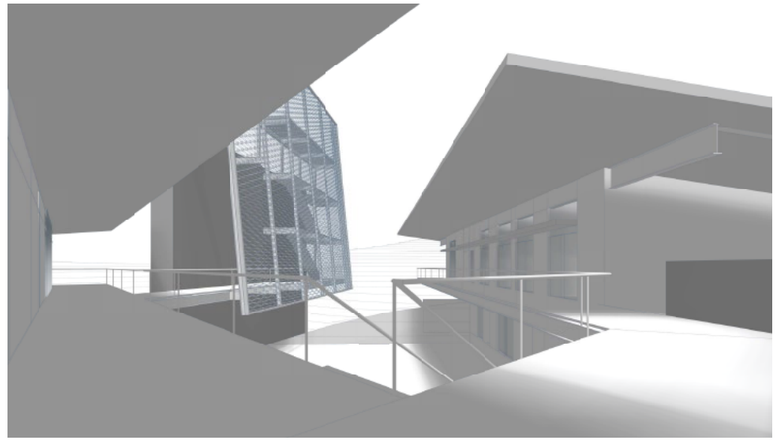
Floors of the greenhouse are relatively light in order to allow natural light to illuminate the space. The flooring itself is steel grate ontop of steel outriggers which are cast into the masonry wall. A series of steel stairs lead up to the top most floor of the green house which overlooks the landscape. The floors provides lateral support for the structure.

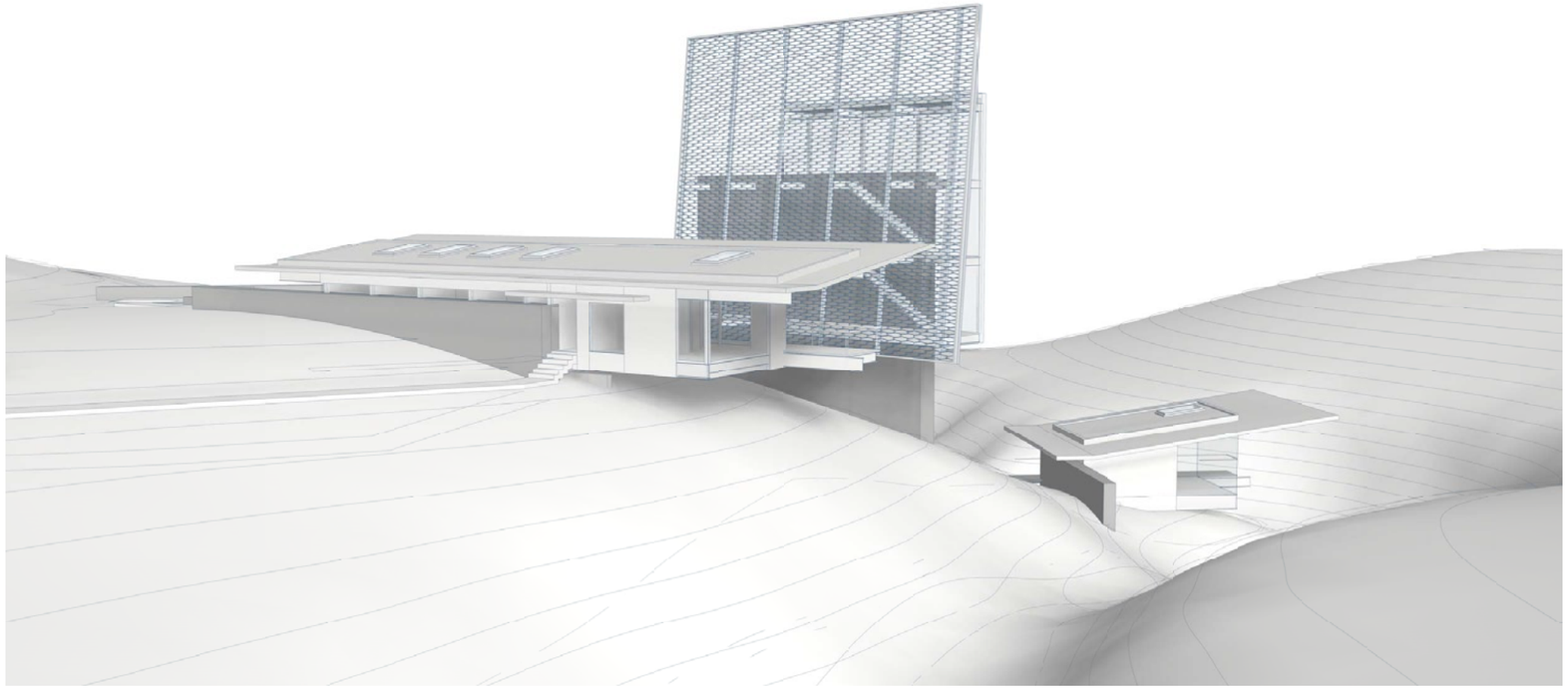
FOUNDATION

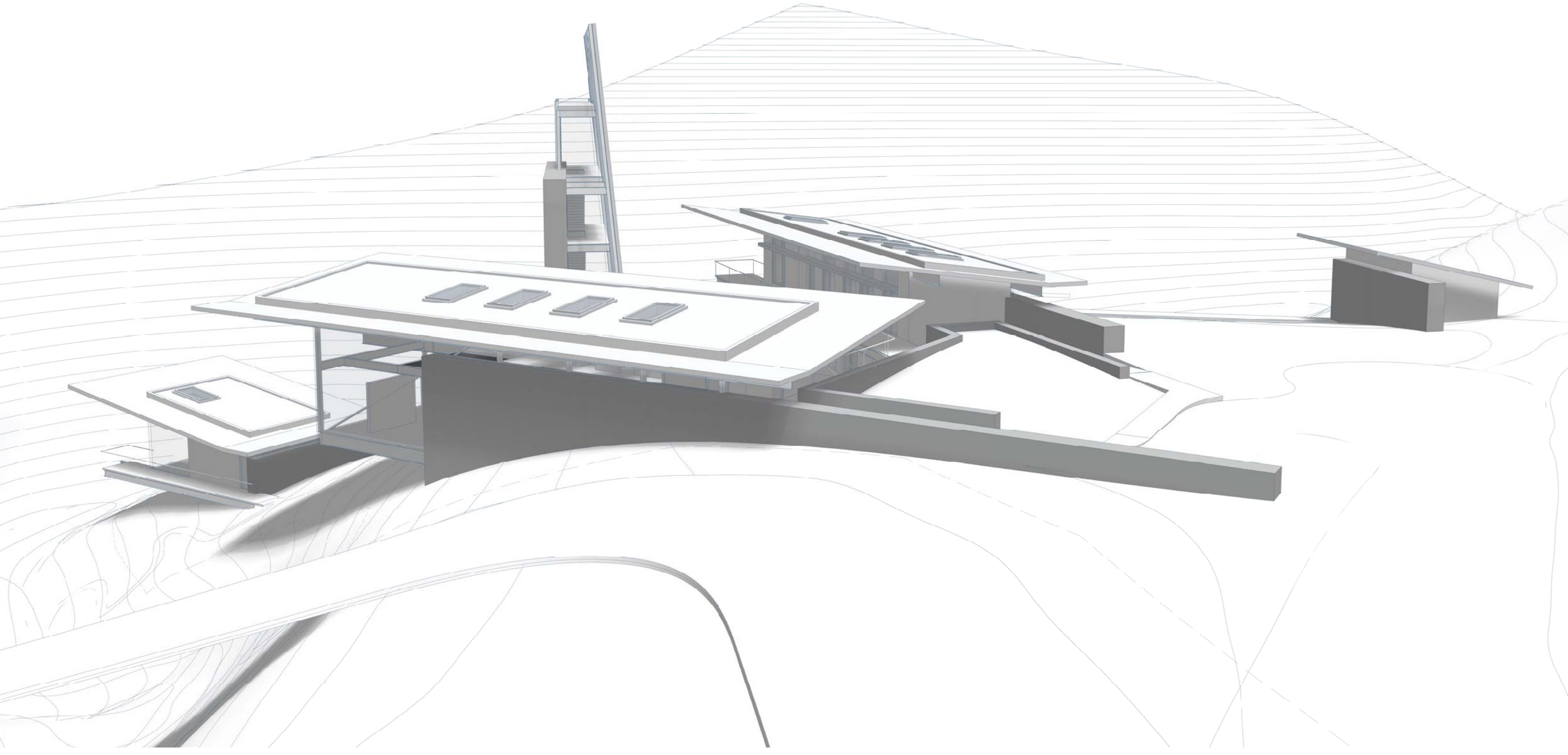
Because the entire structure is cantilevering, a large spread footing is required to transfer the moment load down to the ground. The footing is fully secured into bedrock using piles.











APPENDIX

The Lodge at Oyunuma

by : Joel Tremblay

e secret of happiness is in knowing this: that we live by the law of expenditure. find greatest joy, not in getting, but in expressing what we are. There are tides he ocean of life, and what comes in depends on what goes out. The currents v inward only where there is an outlet. Nature does not give to those who will spend; her gifts are loaned to those who will use them. Empty your lungs and athe. Run, climb, work, and laugh; the more you give out, the more you shall receive. Be exhausted, and you shall be fed."
–Raymond John Baughan, The Joy of Doing

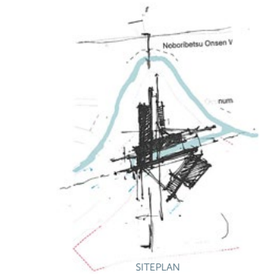
The project is inspired by the ideas of the cottage **(fun)**, location **entation)** and the importance of traditional **(healing)** methods. The idea is to ate architecture that is happy, sustainable and engaging. A place that does not nand anything from the occupant other than themselves. A place that the user isn't necessarily have to behave. The user can make the space their own, they open a wall to the outdoors, sit on a lookout that cantilevers out to infinity even climb onto the roof to have a beer. The intention is to design elements t make the user curious and aware of what they are doing. The design seeks to ate opportunities instead of obstructions. This means to design things that will spark curiousity and enable egagement.

top for a moment and be aware of what you are doing and where you are"
– Tom Kundig

Precedents

Wa_Sauna by Go_C_Studio (2.) Tigermoth Camper Trailer by Taxa tdoors (3.) Ceramic Studio by Fung + Blatt Architects (4.) Gulf Islands bin by Olson Kundig (5.) Berkshire Residence by Olson Kundig (6.) ilica of Water by Atelier House

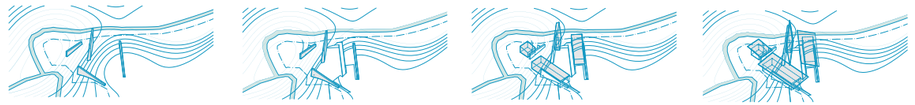
Sketches



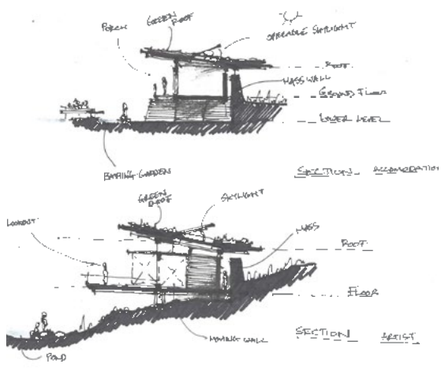
SITEPLAN

SECTION

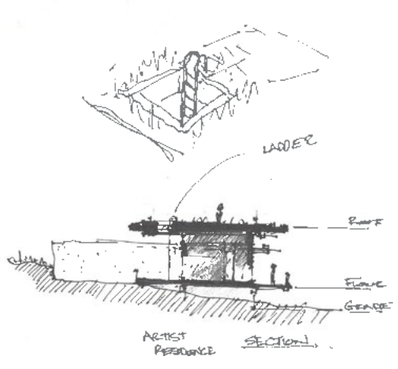
OVERALL SITEPLAN
1:500



MASSING DIAGRAM



SKETCH SECTIONS



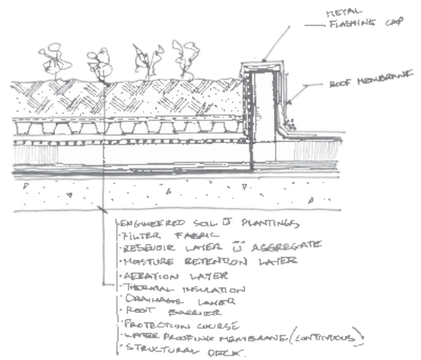
ACCESS TO ROOF ARTIST RESIDENCE

The Approach

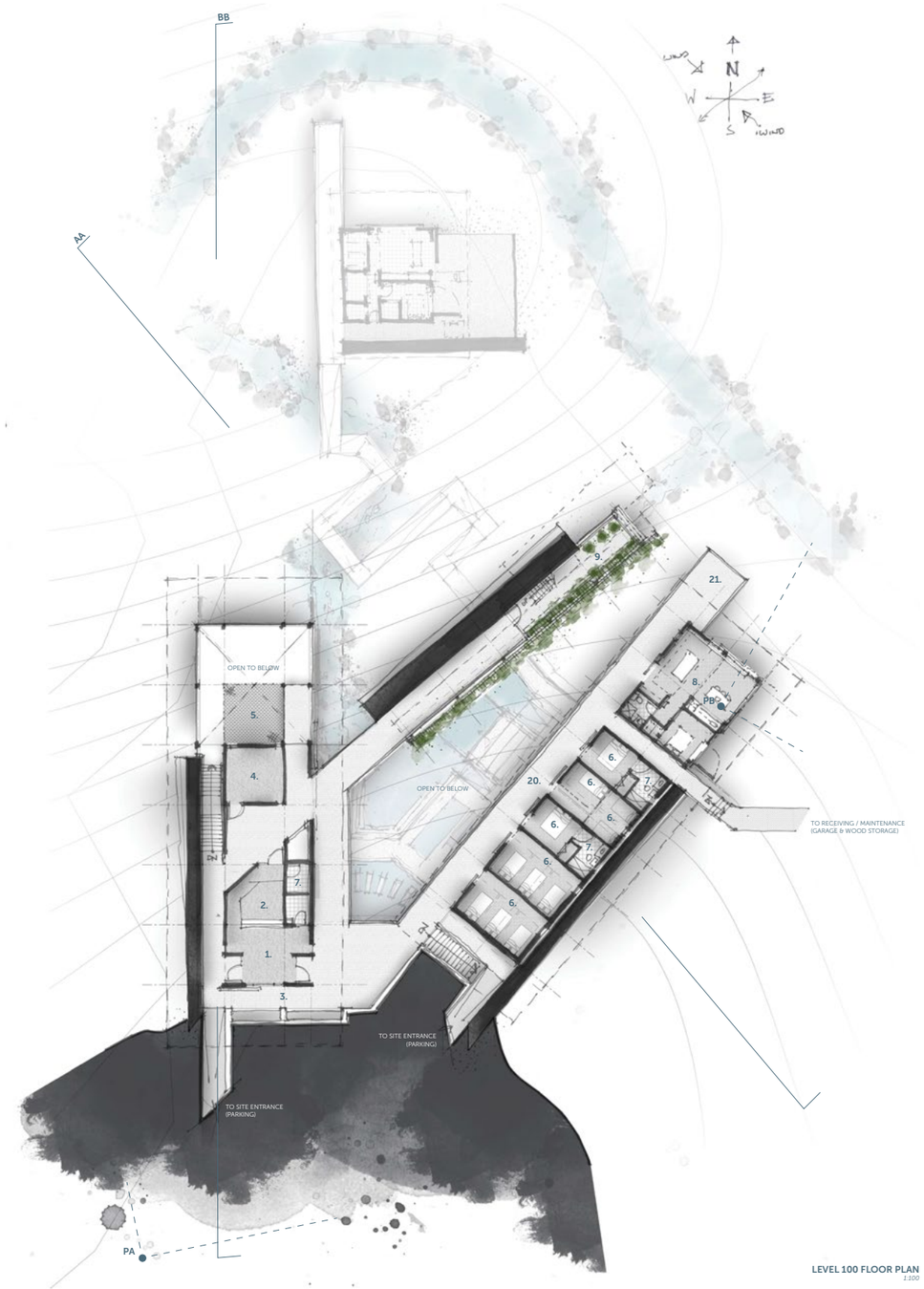
PERSPECTIVE VIEW PA

"Management"

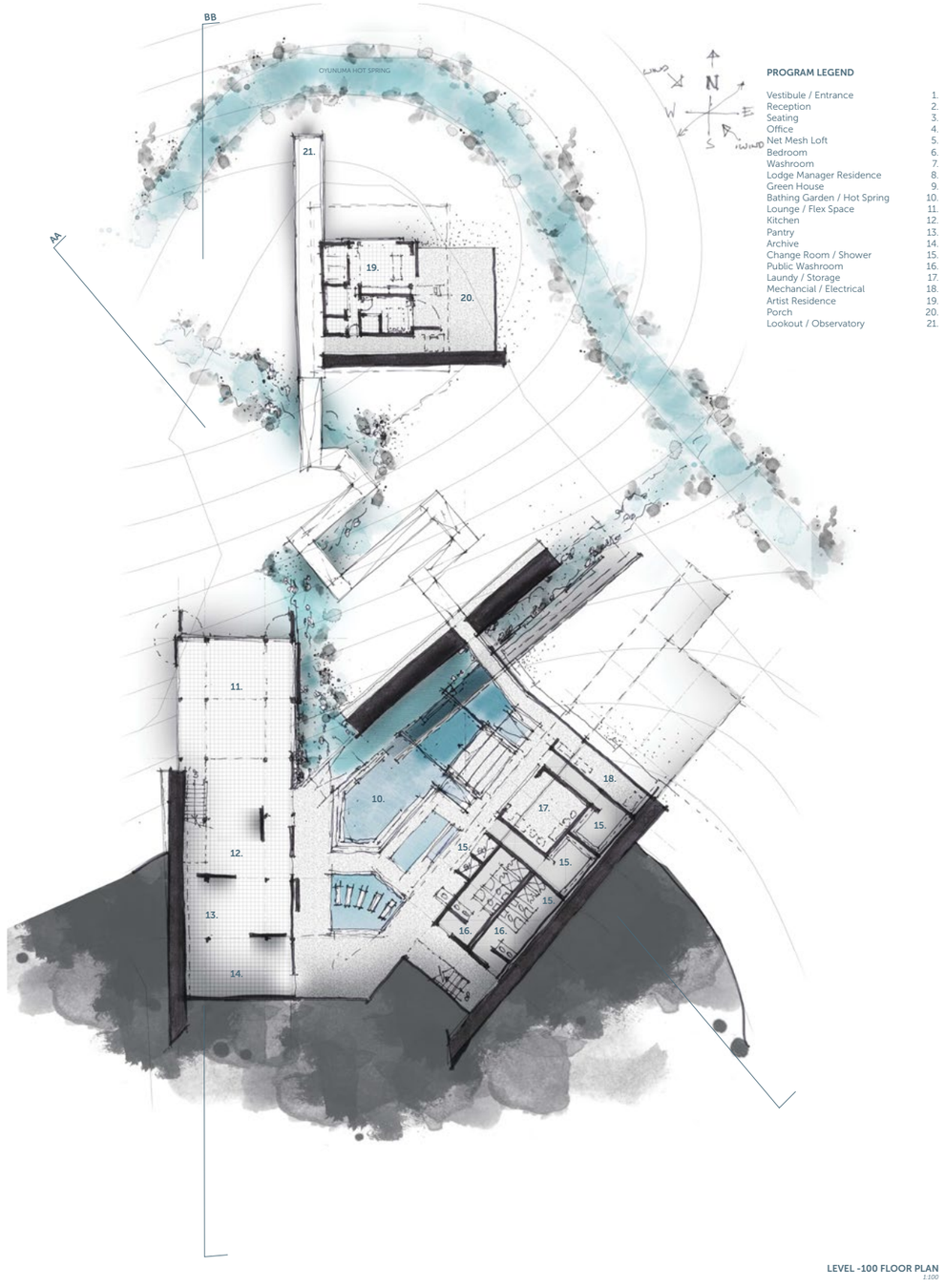
PERSPECTIVE VIEW PB



DETAIL : GREEN ROOF TRANSITION
1:10



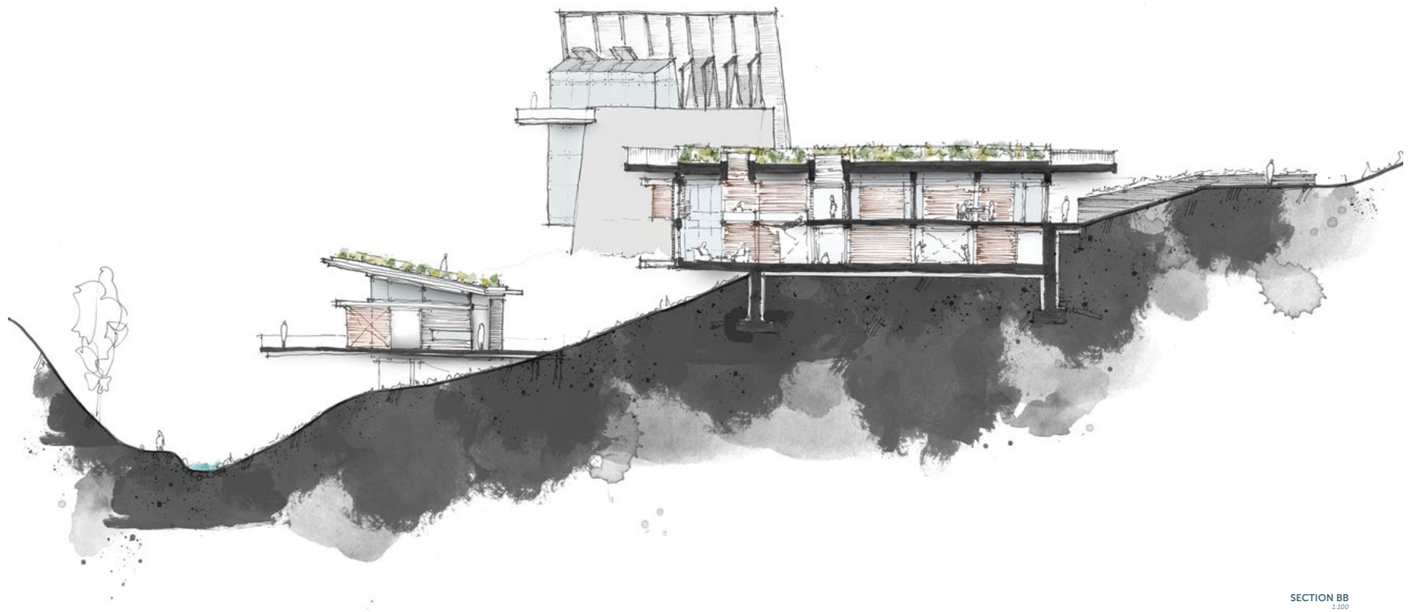
LEVEL 100 FLOOR PLAN
1:100



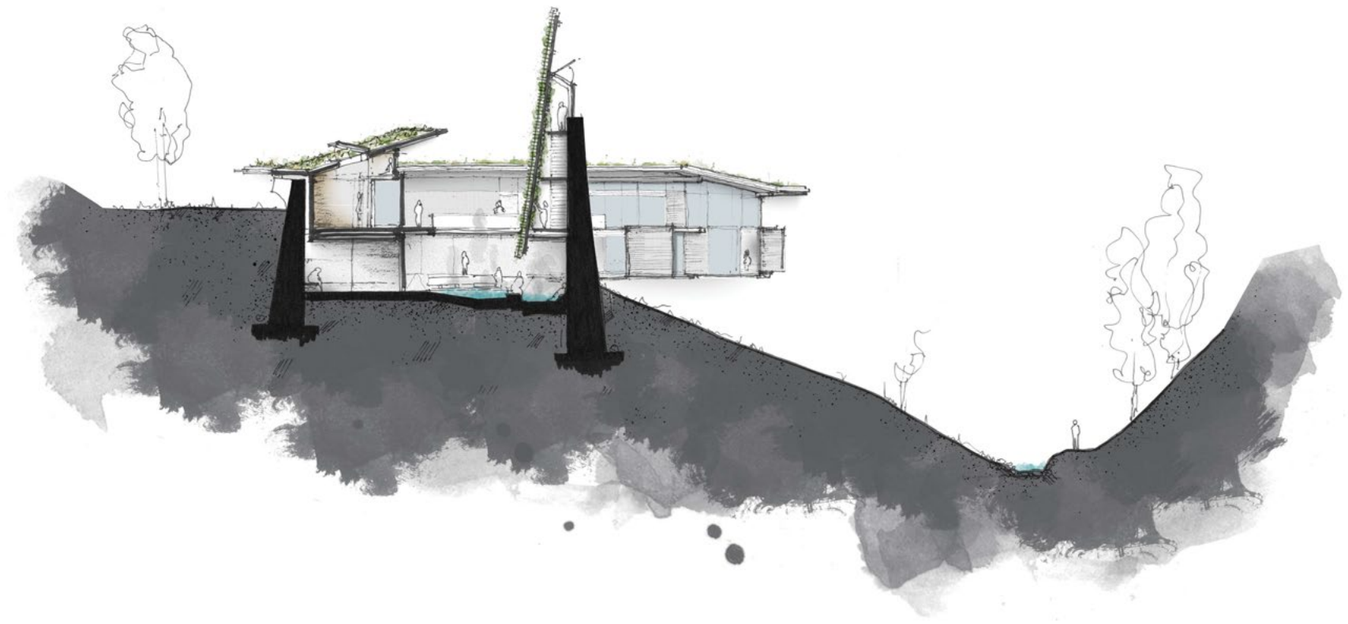
PROGRAM LEGEND

Vestibule / Entrance	1.
Reception	2.
Seating	3.
Office	4.
Net Mesh Loft	5.
Bedroom	6.
Washroom	7.
Lodge Manager Residence	8.
Green House	9.
Bathing Garden / Hot Spring	10.
Lounge / Flex Space	11.
Kitchen	12.
Pantry	13.
Archive	14.
Change Room / Shower	15.
Public Washroom	16.
Laundry / Storage	17.
Mechancial / Electrical	18.
Artist Residence	19.
Porch	20.
Lookout / Observatory	21.

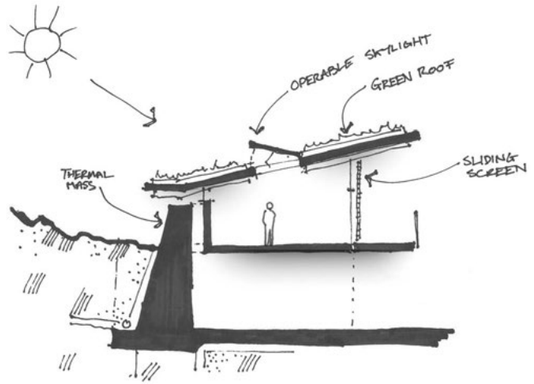
LEVEL -100 FLOOR PLAN
1:100



SECTION BB
1:100



SECTION AA
1:100



PASSIVE STRATEGY DIAGRAM
N.T.S.

Annual Energy Use Estimate Report Summary

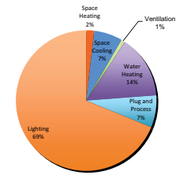
Project Designer	Joel Tremblay
Student ID Number	20510698

Total Net Floor Area	586 m^2	Window-to-Wall Ratio	0.78
Total Gross Floor Area	733 m^2	Floor Area to Enclosure Ratio	0.92
Site Area	8130 m^2	Window Spec: U-value = 1.31 SHGC = 0.5	
		Daylight Fraction	0.21

Estimated Total Annual Energy Use	**101182 ekWh**
Energy Use by End-Use	
Space Heating	2956 kWh
Space Cooling	10609 kWh
Ventilation	1463 kWh
Water Heating	23542 kWh
Plug and Process	11996 kWh
Lighting	111470 kWh
Renewable Energy Generation	60855 kWh

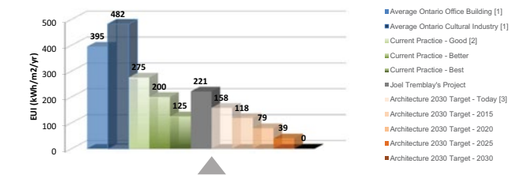
Energy Use Intensity (EUI)	**221** **ekWh/m^2/year**
EUI with Renewable Energy	**138** **ekWh/m^2/year**

Energy Use by End-Use Table



Estimated Global Warming Potential	
Nitrogen oxides (NOx)	12 kg
Sulphur dioxide (SO_2)	27 kg
Carbon dioxide (CO_2)	6465 kg
Equivalent to CO_2 emissions from	12.7 cars

Energy Use Intensity Comparisons



Notes:
[1] EUI for Average Canadian Office Building is from Natural Resources Canada "Commercial and Institutional Building Energy Use Survey 2000"
[2] EUI for Good, Better and Best Current Practice is based on current experience for this building type
[3] More information about the Architecture 2030 Challenge can be found at http://architecture2030.org/

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END