SELFICIENT

Sustainable and affordable home for everyman

AS-BUILT *DRAWINGS*

University of applied sciences Utrecht
Solar Decathlon 2017

UNIVERSITY OF APPLIED SCIENCES UTRECHT

SELFICIENT

TEAM NAME:	Selficient
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SHEET TITLE

COVER PAGE

G-001

G - GENERAL

L - LANDSCAPING

S - STRUCTURAL

A- ARCHITRECTURAL

I - INTERIOR

F- FIRE PROTECTION

P - PLUMBING

M - MECHANICAL

E- ELECTRICAL

O - OPERATIONS

AP - APPENDIXES

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ABBREVATON LEGEND

ADA	AMERICANS WITH DISABILITIES ACT
OSB	ORIENTED STRAND BOARD
iCEM	INTEGRATED CLIMATE AND ENERGY MODULE
SIPS	STRUCTURAL INSULATED PANEL
HEA	STRUCTURAL PROFILE
HDP	HIGH DENSITY PLATE
EPDM	ETHYLENE PROPYLENE DIENE MONOMER
CLT	CROSS LAMINATED TIMER

MATERIAL HATCHES LEGEND

HARD BOARD

STEEL

SOLID WOOD

PRE COMPRESSED SEAL

INSULATION

SOIL

PLYWOOD

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GENERAL NOTES, SYMBOLS AND ABBREVATIONS

G-003

SECTION R301 DESIGN CRITERIA
R301.2.1.1.1 SUNROOMS.
SUNROOMS SHALL COMPLY WITH AAMA/NPEA/NSA 2100. FOR THE PURPOSE OF APPLYING THE CRITERIA OF AAMA/NPEA/NSA 2100 BASED ON THE INTENDED USE, SUNROOMS SHALL BE IDENTIFIED AS ONE OF THE FOLLOWING CATEGORIES BY THE PERMIT APPLICANT, DESIGN PROFESSIONAL OR THE PROPERTY OWNER OR OWNER'S AGENT IN THE CONSTRUCTION DOCUMENTS. COMPONENT AND CLADDING PRESSURES SHALL BE USED FOR THE DESIGN OF ELEMENTS THAT DO NOT QUALIFY AS MAIN WINDFORCE-RESISTING SYSTEMS. MAIN WINDFORCE-RESISTING SYSTEM PRESSURES SHALL BE USED FOR THE DESIGN OF ELEMENTS ASSIGNED TO PROVIDE SUPPORT AND STABILITY FOR THE OVERALL SUNROOM.

SECTION R302 FIRE-RESISTANT CONSTRUCTION

R302.1 EXTERIOR WALLS.
CONSTRUCTION, PROJECTIONS, OPENINGS AND PENETRATIONS OF EXTERIOR WALLS OF DWELLINGS AND ACCESSORY BUILDINGS SHALL COMPLY WITH TABLE R302.1(1); OR DWELLINGS EQUIPPED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM INSTALLED IN ACCORDANCE WITH SECTION P2904 SHALL COMPLY WITH TABLE R302.1(2).
R302.11 FIREBLOCKING.
IN COMBUSTIBLE CONSTRUCTION, FIREBLOCKING SHALL BE PROVIDED TO CUT OFF BOTH VERTICAL AND HORIZONTAL CONCEALED DRAFT OPENINGS AND TO FORM AN EFFECTIVE FIRE BARRIER BETWEEN STORIES, AND BETWEEN A TOP STORYAND THE ROOF SPACE.

SECTION R303 LIGHT, VENTILATION AND HEATING

R303.1 HABITABLE ROOMS.
HABITABLE ROOMS SHALL HAVE AN AGGREGATE GLAZING AREA OF NOT LESS THAN 8 PERCENT OF THE FLOOR AREA OF SUCH ROOMS. NATURAL VENTILATION SHALL BE THROUGH WINDOWS, SKYLIGHTS, DOORS, LOUVERS OR OTHER APPROVEDOPENINGS TO THE OUTDOOR AIR. SUCH OPENINGS SHALL BE PROVIDED WITH READY ACCESS OR SHALL OTHERWISE BE READILY CONTROLLABLE BY THE BUILDING OCCUPANTS. THE OPENABLE AREA TO THE OUTDOORS SHALL BE NOT LESS THAN 4 PERCENT OF THE FLOOR AREA BEING VENTILATED.

EXCEPTIONS:

1. THE GLAZED AREAS NEED NOT BE OPENABLE WHERE THE OPENING IS NOT REQUIRED BY SECTION R310 AND A WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM IS INSTALLED IN ACCORDANCE WITH SECTION M1507.

2. THE GLAZED AREAS NEED NOT BE INSTALLED IN ROOMS WHERE EXCEPTION 1 IS SATISFIED AND ARTIFICIAL LIGHT IS PROVIDED THAT IS CAPABLE OF PRODUCING AN AVERAGE ILLUMINATION OF 6 FOOTCANDLES (65 LUX) OVER THE AREA OF THE ROOM AT A HEIGHT OF 30 INCHES (762 MM) ABOVE THE FLOOR LEVEL.
R303.3 BATHROOMS.
BATHROOMS, WATER CLOSET COMPARTMENTS AND OTHER SIMILAR ROOMS SHALL BE PROVIDED WITH AGGREGATE GLAZING AREA IN WINDOWS OF NOT LESS THAN 3 SQUARE FEET (0.3 M2), ONE-HALF OF WHICH MUST BE OPENABLE.

R303.5.2 EXHAUST OPENINGS.
EXHAUST AIR SHALL NOT BE DIRECTED ONTO WALKWAYS.

R303.9 REQUIRED GLAZED OPENINGS.
REQUIRED GLAZED OPENINGS SHALL OPEN DIRECTLY ONTO A STREET OR PUBLIC ALLEY, OR A YARD OR COURT LOCATED ON THE SAME LOT AS THE BUILDING.

EXCEPTIONS:

1. REQUIRED GLAZED OPENINGS THAT FACE INTO A ROOFED PORCH WHERE THE PORCH ABUTS A STREET, YARD OR COURT AND THE LONGER SIDE OF THE PORCH IS NOT LESS THAN 65 PERCENT UNOBSTRUCTED AND THE CEILING HEIGHT IS NOT LESS THAN 7 FEET (2134 MM).

2. EAVE PROJECTIONS SHALL NOT BE CONSIDERED AS OBSTRUCTING THE CLEAR OPEN SPACE OF A YARD OR COURT.

3. REQUIRED GLAZED OPENINGS THAT FACE INTO THE AREA UNDER A DECK, BALCONY, BAY OR FLOOR CANTILEVER WHERE A CLEAR VERTICAL SPACE NOT LESS THAN 36 INCHES (914 MM) IN HEIGHT IS PROVIDED.
SECTION R304 MINIMUM ROOM AREAS
R304.1 MINIMUM AREA.
HABITABLE ROOMS SHALL HAVE A FLOOR AREA OF NOT LESS THAN 70 SQUARE FEET (6.5 M2).

EXCEPTION: KITCHENS.

R304.2 MINIMUM DIMENSIONS.
HABITABLE ROOMS SHALL BE NOT LESS THAN 7 FEET (2134 MM) IN ANY HORIZONTAL DIMENSION.

EXCEPTION: KITCHENS.

R304.3 HEIGHT EFFECT ON ROOM AREA.
PORTIONS OF A ROOM WITH A SLOPING CEILING MEASURING LESS THAN 5 FEET (1524 MM) OR A FURRED CEILING MEASURING LESS THAN 7 FEET (2134 MM) FROM THE FINISHED FLOOR TO THE FINISHED CEILING SHALL NOT BE CONSIDERED AS CONTRIBUTING TO THE MINIMUM REQUIRED HABITABLE AREA FOR THAT ROOM.

SECTION R305 CEILING HEIGHT

R305.1 MINIMUM HEIGHT.
HABITABLE SPACE, HALLWAYS AND PORTIONS OF BASEMENTS CONTAINING THESE SPACES SHALL HAVE A CEILING HEIGHT OF NOT LESS THAN 7 FEET (2134 MM). BATHROOMS, TOILET ROOMS AND LAUNDRY ROOMS SHALL HAVE A CEILING HEIGHT OF NOT LESS THAN 6 FEET 8 INCHES (2032 MM).
EXCEPTIONS:

1. FOR ROOMS WITH SLOPED CEILINGS, THE REQUIRED FLOOR AREA OF THE ROOM SHALL HAVE A CEILING HEIGHT OF NOT LESS THAN 5 FEET (1524 MM) AND NOT LESS THAN 50 PERCENT OF THE REQUIRED FLOOR AREA SHALL HAVE A CEILING HEIGHT OF NOT LESS THAN 7 FEET (2134 MM).

2. THE CEILING HEIGHT ABOVE BATHROOM AND TOILET ROOM FIXTURES SHALL BE SUCH THAT THE FIXTURE IS CAPABLE OF BEING USED FOR ITS INTENDED PURPOSE. A SHOWER OR TUB EQUIPPED WITH A SHOWERHEAD SHALL HAVE A CEILING HEIGHT OF NOT LESS THAN 6 FEET 8 INCHES (2032 MM) ABOVE AN AREA OF NOT LESS THAN 30 INCHES (762 MM) BY 30 INCHES (762 MM) AT THE SHOWERHEAD.
3. BEAMS, GIRDERS, DUCTS OR OTHER OBSTRUCTIONS IN BASEMENTS CONTAINING HABITABLE SPACE SHALL BE PERMITTED TO PROJECT TO WITHIN 6 FEET 4 INCHES (1931 MM) OF THE FINISHED FLOOR.
SECTION R306 SANITATION

R306.1 TOILET FACILITIES.
EVERY DWELLING UNIT SHALL BE PROVIDED WITH A WATER CLOSET, LAVATORY, AND A BATHTUB OR SHOWER.

R306.2 KITCHEN.
EACH DWELLING UNIT SHALL BE PROVIDED WITH A KITCHEN AREA AND EVERY KITCHEN AREA SHALL BE PROVIDED WITH A SINK.

R306.3 SEWAGE DISPOSAL.
PLUMBING FIXTURES SHALL BE CONNECTED TO A SANITARY SEWER OR TO AN APPROVED PRIVATE SEWAGE DISPOSAL SYSTEM.

R306.4 WATER SUPPLY TO FIXTURES.
PLUMBING FIXTURES SHALL BE CONNECTED TO AN APPROVED WATER SUPPLY. KITCHEN SINKS, LAVATORIES, BATHTUBS, SHOWERS, BIDETS, LAUNDRY TUBS AND WASHING MACHINE OUTLETS SHALL BE PROVIDED WITH HOT AND COLD WATER.
SECTION R308 GLAZING
R308.1 IDENTIFICATION.
EXCEPT AS INDICATED IN SECTION R308.1.1 EACH PANE OF GLAZING INSTALLED IN HAZARDOUS LOCATIONS AS DEFINED IN SECTION R308.4 SHALL BE PROVIDED WITH A MANUFACTURER'S DESIGNATION SPECIFYING WHO APPLIED THE DESIGNATION, DESIGNATING THE TYPE OF GLASS AND THE SAFETY GLAZING STANDARD WITH WHICH IT COMPLIES, WHICH IS VISIBLE IN THE FINAL INSTALLATION. THE DESIGNATION SHALL BE ACID ETCHED, SANDBLASTED, CERAMIC-FIRED, LASER ETCHED, EMBOSSED, OR BE OF A TYPE THAT ONCE APPLIED CANNOT BE REMOVED WITHOUT BEING DESTROYED. A LABEL SHALL BE PERMITTED IN LIEU OF THE MANUFACTURER'S DESIGNATION.

EXCEPTIONS:

1. FOR OTHER THAN TEMPERED GLASS, MANUFACTURER'S DESIGNATIONS ARE NOT REQUIRED PROVIDED THAT THE BUILDING OFFICIAL APPROVES THE USE OF A CERTIFICATE, AFFIDAVIT OR OTHER EVIDENCE CONFIRMING COMPLIANCE WITH THIS CODE.

2. TEMPERED SPANDREL GLASS IS PERMITTED TO BE IDENTIFIED BY THE MANUFACTURER WITH A REMOVABLE PAPER DESIGNATION.
R308.1.1 IDENTIFICATION OF MULTIPLE ASSEMBLIES. MULTIPANE ASSEMBLIES HAVING INDIVIDUAL PANES NOT EXCEEDING 1 SQUARE FOOT (0.09 M2) IN EXPOSED AREA SHALL HAVE NOT LESS THAN ONE PANE IN THE ASSEMBLY IDENTIFIED IN ACCORDANCE WITH SECTION R308.1. OTHER PANES IN THE ASSEMBLY SHALL BE LABELED "CPSC 16 CFR 1201" OR "ANSI Z97.1" AS APPROPRIATE.
R309.3.1 IMPACT TEST.
WHERE REQUIRED BY OTHER SECTIONS OF THE CODE, GLAZING SHALL BE TESTED IN ACCORDANCE WITH CPSC 16 CFR 1201. GLAZING SHALL COMPLY WITH THE TEST CRITERIA FOR CATEGORY II UNLESS OTHERWISE INDICATED IN TABLE R308.3.1(1).

EXCEPTION: GLAZING NOT IN DOORS OR ENCLOSURES FOR HOT TUBS, WHIRLPOOLS, SAUNAS, STEAM ROOMS, BATHTUBS AND SHOWERS SHALL BE PERMITTED TO BE TESTED IN ACCORDANCE WITH ANSI Z97.1. GLAZING SHALL COMPLY WITH THE TEST CRITERIA FOR CLASS A UNLESS INDICATED IN TABLE R308.3.1(2).
R308.4.3 GLAZING IN WINDOWS.
GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL THAT MEETS ALL OF THE FOLLOWING CONDITIONS SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION:

1. THE EXPOSED AREA OF AN INDIVIDUAL PANE IS LARGER THAN 9 SQUARE FEET (0.836 M2),

2. THE BOTTOM EDGE OF THE GLAZING IS LESS THAN 18 INCHES (457 MM) ABOVE THE FLOOR,

3. THE TOP EDGE OF THE GLAZING IS MORE THAN 36 INCHES (914 MM) ABOVE THE FLOOR; AND

4. ONE OR MORE WALKING SURFACES ARE WITHIN 36 INCHES (914 MM), MEASURED HORIZONTALLY AND IN A STRAIGHT LINE, OF THE GLAZING.

EXCEPTIONS:

1. DECORATIVE GLAZING.

2. WHERE A HORIZONTAL RAIL IS INSTALLED ON THE ACCESSIBLE SIDE(S) OF THE GLAZING 34 TO 38 INCHES (864 TO 965 MM) ABOVE THE WALKING SURFACE. THE RAIL SHALL BE CAPABLE OF WITHSTANDING A HORIZONTAL LOAD OF 50 POUNDS PER LINEAR FOOT (730 N/M) WITHOUT CONTACTING THE GLASS AND HAVE A CROSS-SECTIONAL HEIGHT OF NOT LESS THAN 11/2 INCHES (38 MM).

3. OUTBOARD PANES IN INSULATING GLASS UNITS AND OTHER MULTIPLE GLAZED PANELS WHERE THE BOTTOM EDGE OF THE GLASS IS 25 FEET (7620 MM) OR MORE ABOVE GRADE, A ROOF, WALKING SURFACES OR OTHER HORIZONTAL [WITHIN 45 DEGREES (0.79 RAD) OF HORIZONTAL] SURFACE ADJACENT TO THE GLASS EXTERIOR.
R308.4.5 GLAZING AND WET SURFACES.
GLAZING IN WALLS, ENCLOSURES OR FENCES CONTAINING OR FACING HOT TUBS, SPAS, WHIRLPOOLS, SAUNAS, STEAM ROOMS, BATHTUBS, SHOWERS AND INDOOR OR OUTDOOR SWIMMING POOLS WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60 INCHES (1524 MM) MEASURED VERTICALLY ABOVE ANY STANDING OR WALKING SURFACE SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION. THIS SHALL APPLY TO SINGLE GLAZING AND EACH PANE IN MULTIPLE GLAZING.

EXCEPTION: GLAZING THAT IS MORE THAN 60 INCHES (1524 MM), MEASURED HORIZONTALLY AND IN A STRAIGHT LINE, FROM THE WATER'S EDGE OF A BATHTUB, HOT TUB, SPA, WHIRLPOOL OR SWIMMING POOL OR FROM THE EDGE OF A SHOWER, SAUNA OR STEAM ROOM.

R309.2 CARPORTS.
CARPORTS SHALL BE OPEN ON NOT LESS THAN TWO SIDES. CARPORT FLOOR SURFACES SHALL BE OF APPROVEDNONCOMBUSTIBLE MATERIAL. CARPORTS NOT OPEN ON TWO OR MORE SIDES SHALL BE CONSIDERED TO BE A GARAGE AND SHALL COMPLY WITH THE PROVISIONS OF THIS SECTION FOR GARAGES. EXCEPTION: ASPHALT SURFACES SHALL BE PERMITTED AT GROUND LEVEL IN CARPORTS.

THE AREA OF FLOOR USED FOR PARKING OF AUTOMOBILES OR OTHER VEHICLES SHALL BE SLOPED TO FACILITATE THE MOVEMENT OF LIQUIDS TO A DRAIN OR TOWARD THE MAIN VEHICLE ENTRY DOORWAY.
SECTION R310 EMERGENCY ESCAPE AND RESCUE OPENINGS
R310.1 EMERGENCY ESCAPE AND RESCUE OPENING REQUIRED.
BASEMENTS, HABITABLE ATTICS AND EVERY SLEEPING ROOM SHALL HAVE NOT LESS THAN ONE OPERABLE EMERGENCY ESCAPE AND RESCUE OPENING.
WHERE BASEMENTS CONTAIN ONE OR MORE SLEEPING ROOMS, AN EMERGENCY ESCAPE AND RESCUE OPENING SHALL BE REQUIRED IN EACH SLEEPING ROOM. EMERGENCY ESCAPE AND RESCUE OPENINGS SHALL OPEN DIRECTLY INTO A PUBLIC WAY, OR TO A YARD OR COURT THAT OPENS TO A PUBLIC WAY.

EXCEPTION: STORM SHELTERS AND BASEMENTS USED ONLY TO HOUSE MECHANICAL EQUIPMENT NOT EXCEEDING A TOTAL FLOOR AREA OF 200 SQUARE FEET (18.58 M2).
R310.1.1 OPERATIONAL CONSTRAINTS AND OPENING CONTROL DEVICES.
EMERGENCY ESCAPE AND RESCUE OPENINGS SHALL BE OPERATIONAL FROM THE INSIDE OF THE ROOM WITHOUT THE USE OF KEYS, TOOLS OR SPECIAL KNOWLEDGE. WINDOW OPENING CONTROL DEVICES COMPLYING WITH ASTM F 2090 SHALL BE PERMITTED FOR USE ON WINDOWS SERVING AS A REQUIRED EMERGENCY ESCAPE AND RESCUE OPENING.

R310.2 EMERGENCY ESCAPE AND RESCUE OPENINGS.
EMERGENCY ESCAPE AND RESCUE OPENINGS SHALL HAVE MINIMUM DIMENSIONS AS SPECIFIED IN THIS SECTION.

R310.2.1 MINIMUM OPENING AREA.
EMERGENCY AND ESCAPE RESCUE OPENINGS SHALL HAVE A NET CLEAR OPENING OF NOT LESS THAN 5.7 SQUARE FEET (0.530 M2). THE NET CLEAR OPENING DIMENSIONS REQUIRED BY THIS SECTION SHALL BE OBTAINED BY THE NORMAL OPERATION OF THE EMERGENCY ESCAPE AND RESCUE OPENING FROM THE INSIDE. THE NET CLEAR HEIGHT OPENING SHALL BE NOT LESS THAN 24 INCHES (610 MM) AND THE NET CLEAR WIDTH SHALL BE NOT LESS THAN 20 INCHES (508 MM).

EXCEPTION: GRADE FLOOR OR BELOW GRADE OPENINGS SHALL HAVE A NET CLEAR OPENING OF NOT LESS THAN 5 SQUARE FEET (0.465 M2).
R310.3 EMERGENCY ESCAPE AND RESCUE DOORS.
WHERE A DOOR IS PROVIDED AS THE REQUIRED EMERGENCY ESCAPE AND RESCUE OPENING, IT SHALL BE PERMITTED TO BE A SIDE-HINGED DOOR OR A SLIDER. WHERE THE OPENING IS BELOW THE ADJACENT GROUND ELEVATION, IT SHALL BE PROVIDED WITH A BULKHEAD ENCLOSURE.

R310.3.1 MINIMUM DOOR OPENING SIZE.
THE MINIMUM NET CLEAR HEIGHT OPENING FOR ANY DOOR THAT SERVES AS AN EMERGENCY AND ESCAPE RESCUE OPENING SHALL BE IN ACCORDANCE WITH SECTION R310.2.1.

R310.3.2 BULKHEAD ENCLOSURES.
BULKHEAD ENCLOSURES SHALL PROVIDE DIRECT ACCESS FROM THE BASEMENT. THE BULKHEAD ENCLOSURE SHALL PROVIDE THE MINIMUM NET CLEAR OPENING EQUAL TO THE DOOR IN THE FULLY OPEN POSITION.
R310.4 BARS, GRILLES, COVERS AND SCREENS.
BARS, GRILLES, COVERS, SCREENS OR SIMILAR DEVICES ARE PERMITTED TO BE PLACED OVER EMERGENCY ESCAPE AND RESCUE OPENINGS, BULKHEAD ENCLOSURES, OR WINDOW WELLS THAT SERVE SUCH OPENINGS, PROVIDED THAT THE MINIMUM NET CLEAR OPENING SIZE COMPLIES WITH SECTIONS R310.1.1 TO R310.2.3, AND SUCH DEVICES SHALL BE RELEASABLE OR REMOVABLE FROM THE INSIDE WITHOUT THE USE OF A KEY, TOOL, SPECIAL KNOWLEDGE OR FORCE GREATER THAN THAT REQUIRED FOR THE NORMAL OPERATION OF THE ESCAPE AND RESCUE OPENING.
R310.5 DWELLING ADDITIONS.
WHERE DWELLING ADDITIONS OCCUR THAT CONTAIN SLEEPING ROOMS, AN EMERGENCY ESCAPE AND RESCUE OPENING SHALL BE PROVIDED IN EACH NEW SLEEPING ROOM. WHERE DWELLING ADDITIONS OCCUR THAT HAVE BASEMENTS, AN EMERGENCY ESCAPE AND RESCUE OPENING SHALL BE PROVIDED IN THE NEW BASEMENT.

EXCEPTIONS:

1. AN EMERGENCY ESCAPE AND RESCUE OPENING IS NOT REQUIRED IN A NEW BASEMENT THAT CONTAINS A SLEEPING ROOM WITH AN EMERGENCY ESCAPE AND RESCUE OPENING.

2. AN EMERGENCY ESCAPE AND RESCUE OPENING IS NOT REQUIRED IN A NEW BASEMENT WHERE THERE IS AN EMERGENCY ESCAPE AND RESCUE OPENING IN AN EXISTING BASEMENT THAT IS ACCESSIBLE FROM THE NEW BASEMENT.

SECTION R311 MEANS OF EGRESS

R311.1 MEANS OF EGRESS.
DWELLINGS SHALL BE PROVIDED WITH A MEANS OF EGRESS IN ACCORDANCE WITH THIS SECTION. THE MEANS OF EGRESS SHALL PROVIDE A CONTINUOUS AND UNOBSTRUCTED PATH OF VERTICAL AND HORIZONTAL EGRESS TRAVEL FROM ALL PORTIONS OF THE DWELLING TO THE REQUIRED EGRESS DOOR WITHOUT REQUIRING TRAVEL THROUGH A GARAGE. THE REQUIRED EGRESS DOOR SHALL OPEN DIRECTLY INTO A PUBLIC WAY OR TO A YARD OR COURT THAT OPENS TO A PUBLIC WAY.

R311.2 EGRESS DOOR.
NOT LESS THAN ONE EGRESS DOOR SHALL BE PROVIDED FOR EACH DWELLING UNIT. THE EGRESS DOOR SHALL BE SIDE-HINGED, AND SHALL PROVIDE A CLEAR WIDTH OF NOT LESS THAN 32 INCHES (813 MM) WHERE MEASURED BETWEEN THE FACE OF THE DOOR AND THE STOP, WITH THE DOOR OPEN 90 DEGREES (1.57 RAD). THE CLEAR HEIGHT OF THE DOOR OPENING SHALL BE NOT LESS THAN 78 INCHES (1981 MM) IN HEIGHT MEASURED FROM THE TOP OF THE THRESHOLD TO THE BOTTOM OF THE STOP. OTHER DOORS SHALL NOT BE REQUIRED TO COMPLY WITH THESE MINIMUM DIMENSIONS. EGRESS DOORS SHALL BE READILY OPENABLE FROM INSIDE THE DWELLING WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT.

R311.3 FLOORS AND LANDINGS AT EXTERIOR DOORS.
THERE SHALL BE A LANDING OR FLOOR ON EACH SIDE OF EACH EXTERIOR DOOR. THE WIDTH OF EACH LANDING SHALL BE NOT LESS THAN THE DOOR SERVED. EVERY LANDING SHALL HAVE A DIMENSION OF NOT LESS THAN 36 INCHES (914 MM) MEASURED IN THE DIRECTION OF TRAVEL. THE SLOPE AT EXTERIOR LANDINGS SHALL NOT EXCEED 1/4 UNIT VERTICAL IN 12 UNITS HORIZONTAL (2 PERCENT).
R311.6 HALLWAYS.
THE WIDTH OF A HALLWAY SHALL BE NOT LESS THAN 3 FEET (914 MM).

SECTION R317 PROTECTION OF WOOD AND WOOD-BASED PRODUCTS AGAINST DECAY
R317.1.4 WOOD COLUMNS.
WOOD COLUMNS SHALL BE APPROVED WOOD OF NATURAL DECAY RESISTANCE OR APPROVED PRESSURE-PRESERVATIVE-TREATED WOOD.
SECTION 324 SOLAR ENERGY SYSTEMS
R324.4 ROOFTOP-MOUNTED PHOTOVOLTAIC SYSTEMS.
ROOFTOP-MOUNTED PHOTOVOLTAIC PANEL SYSTEMS INSTALLED ON OR ABOVE THE ROOF COVERING SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH SECTION R907.

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BUILDING CODES

G-004

25743

1609 | 10416 | 61st Ave (70' R.O.W.) | 1501 | 11392

DIA Land

Private Land

3048 EXISTING BERM

OVERFLOW PARKING AS REQUIRED

OVERFLOW PARKING AS REQUIRED

3421 EXISTING BERM

EXHIBIT HOUSE 101 Missouri S&T

HOUSE 103 Maryland

EXHIBIT HOUSE 105 UC Berkeley U of Denver

EXHIBIT HOUSE 107 Wash State

60x120 EDUCATION TENT

EXHIBIT HOUSE 109 Northwestern

EXHIBIT HOUSE 111 Wash U STL

ELECTRIC VEHICLE DEMONSTRATION AREA (WEEKEND ONLY)

EXHIBIT HOUSE 113 Las Vegas

5325 5326 5327 5328 5329 5326 5327 5328 5329 5330 5331 5332

1270 WELCOME TENT

EXHIBIT

Road Base

464

1524

EXHIBIT HOUSE 102 UC Davis

20x20 FIRST AID TENT

SOLAR ENVELOPE

EXHIBIT HOUSE 106 Netherlands

EXHIBIT HOUSE 108 Swiss Team

60'x120' EXHIBIT

40'x60' FOOD SERVICE TENT

EXHIBIT HOUSE 112 Team Alabama

EXHIBIT HOUSE 114 Team Daytona Beach

RESTROOM & SANITATION 110

5325 5326 5327 5328 5329 5330

3734 EXISTING BERM

3048

(3) - 8'x30' PRODUCTION TRAILERS

120'-0"

OVERFLOW PARKING AS REQUIRED

464'-9"

120'-0"

OVERFLOW PARKING AS REQUIRED

449'-6"

4731 | 900 | 508 | 1048 | 1981

60th Ave (78' R.O.W.)

North

SITE PLAN

1 : 500

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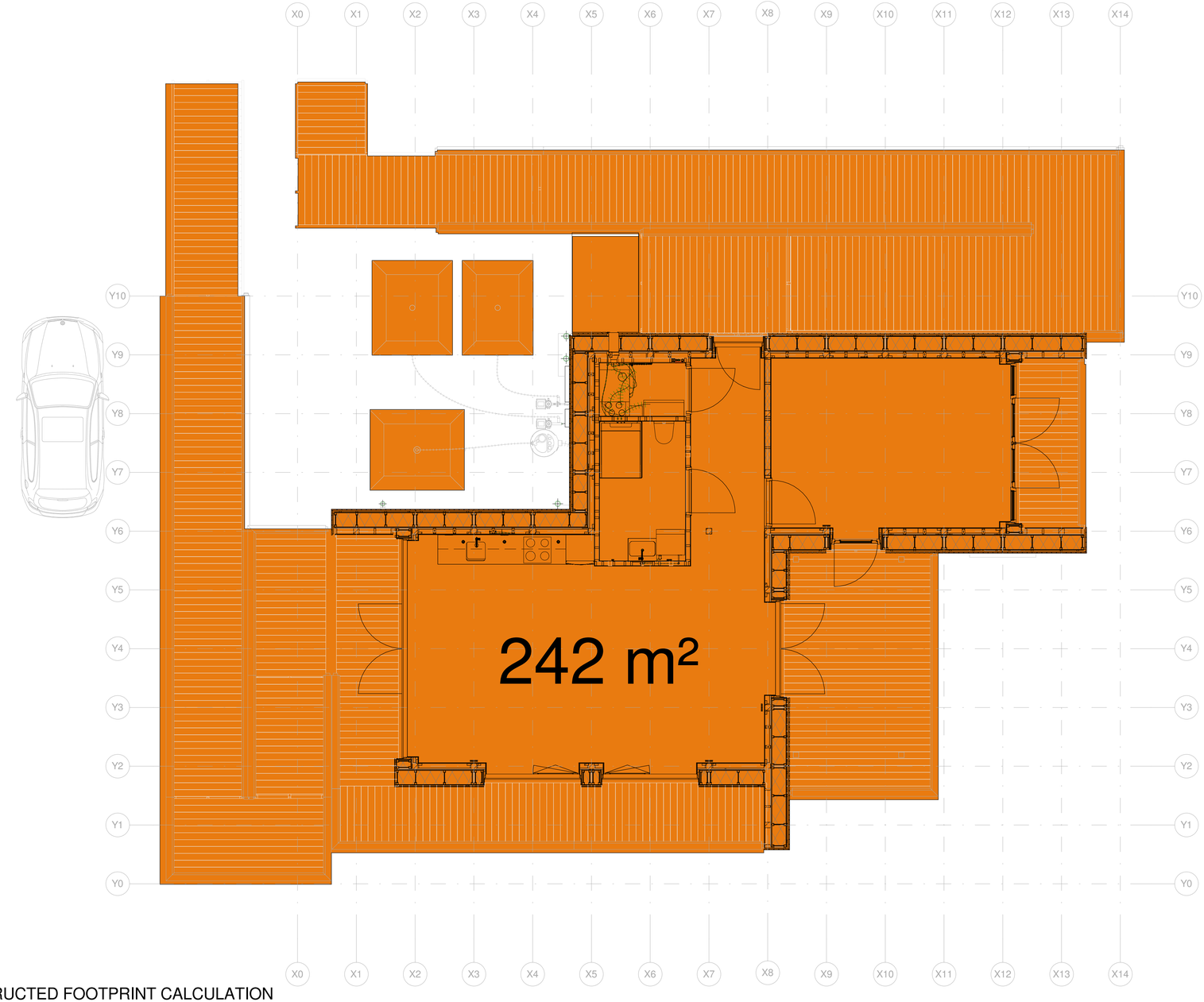
SITE PLAN

G-100



CONSTRUCTED FOOTPRINT CALCULATION

1 : 50

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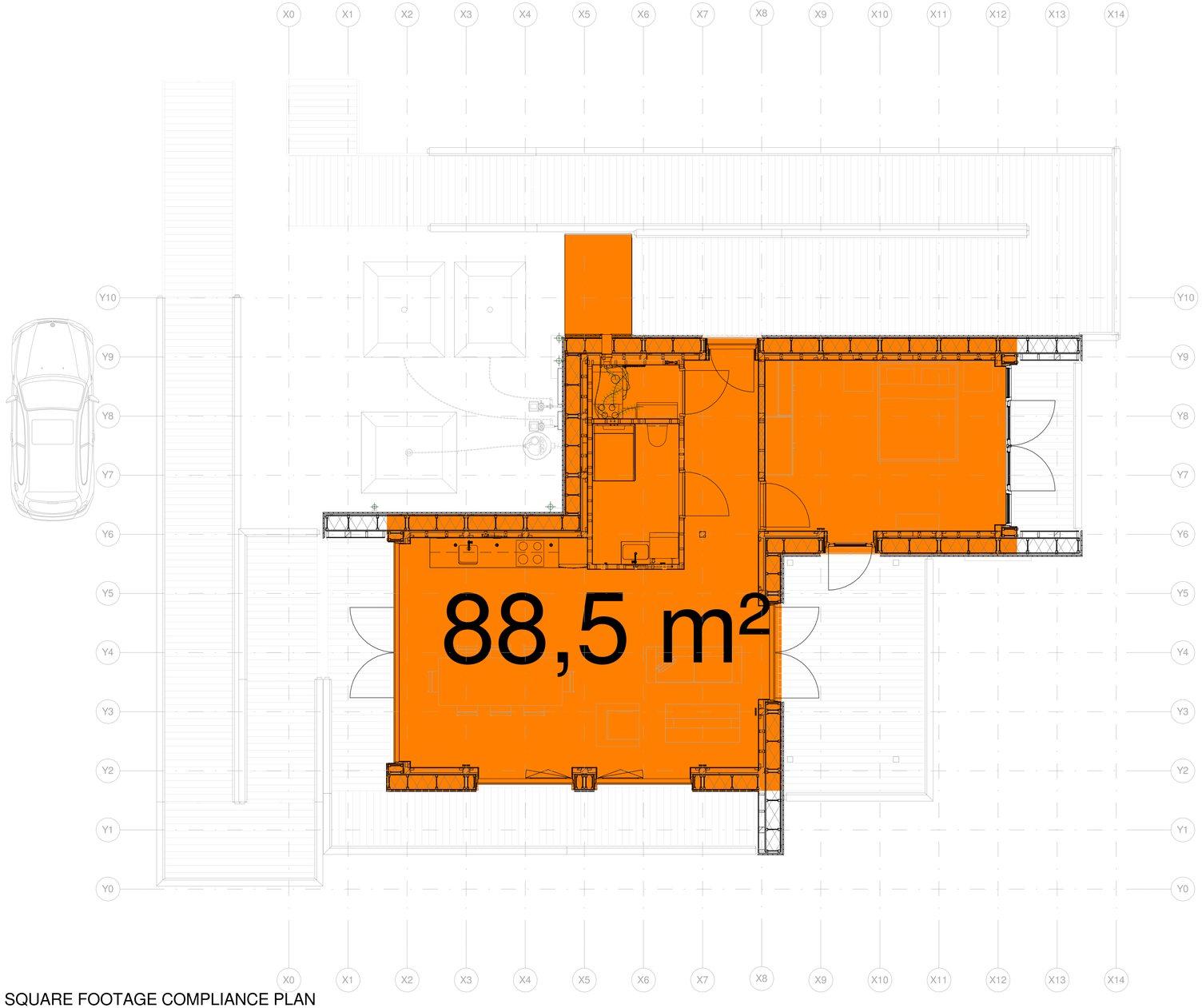
CONSTRUCTED FOOTPRINT CALCULATION

G-101



FINISHED SQUARE FOOTAGE COMPLIANCE PLAN

1 : 50

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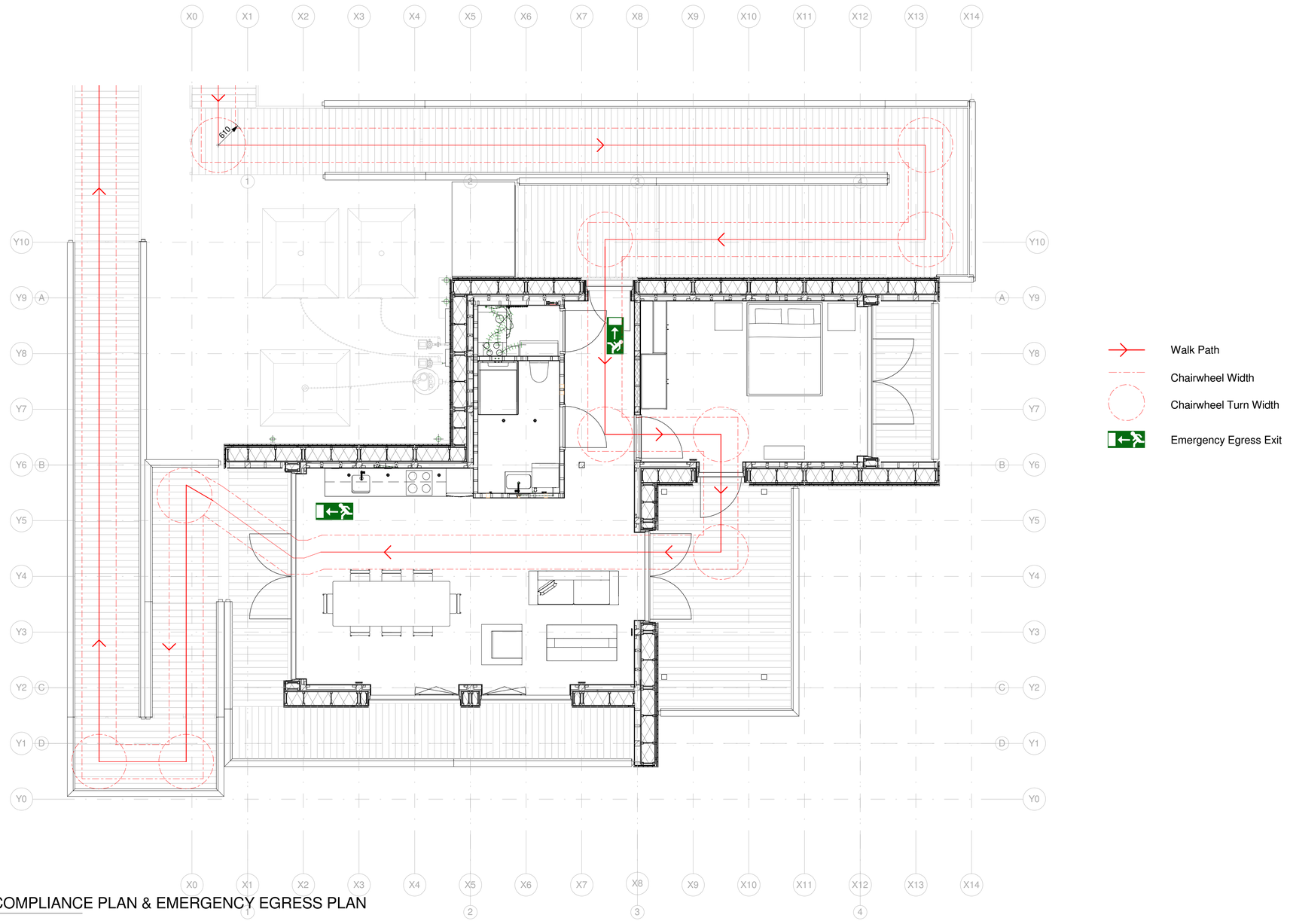
SHEET TITLE

FINISHED SQUARE FOOTAGE COMPLIANCE PLAN

G-102



ADA TOUR ROUTE COMPLIANCE PLAN & EMERGENCY EGRESS PLAN

1 : 50

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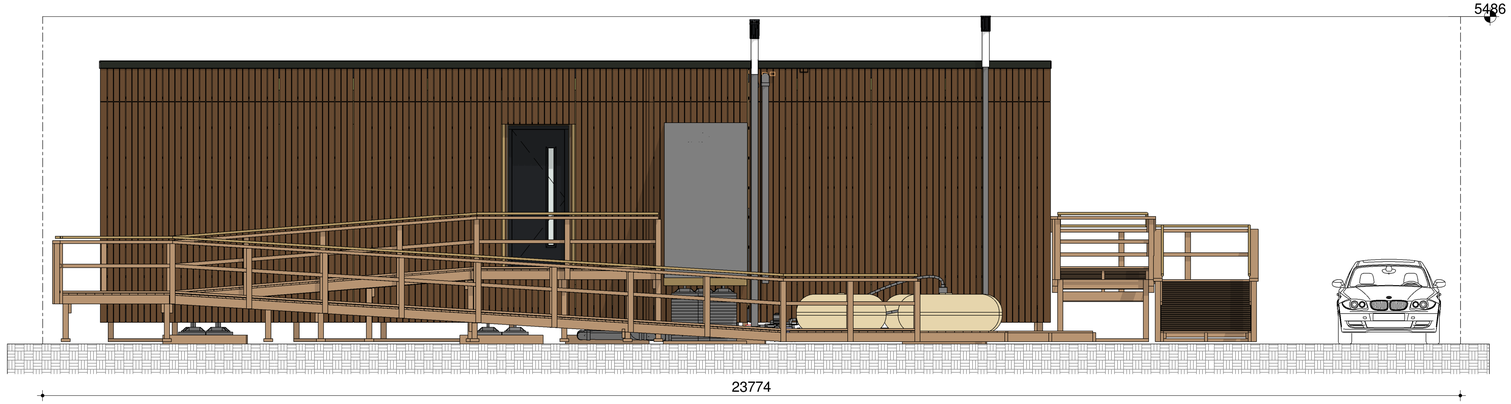
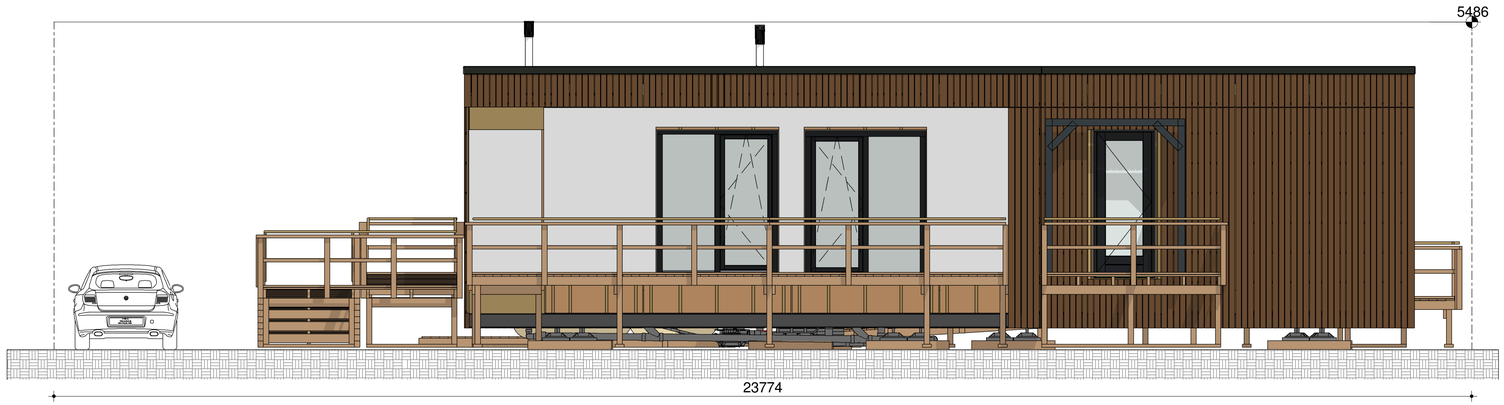
ADA TOUR ROUTE COMPLIANCE PLAN & EMERGENCY EGRESS PLAN

G-103



SOLAR ENVELOPE COMPLIANCE NORTH ELEVATION

1 : 50



SOLAR ENVELOPE COMPLIANCE SOUTH ELEVATION

1 : 50

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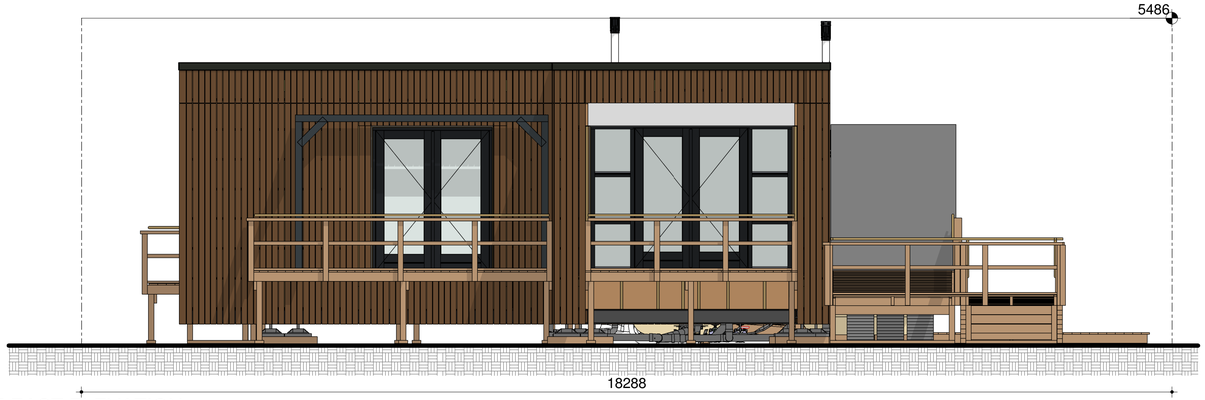
SHEET TITLE

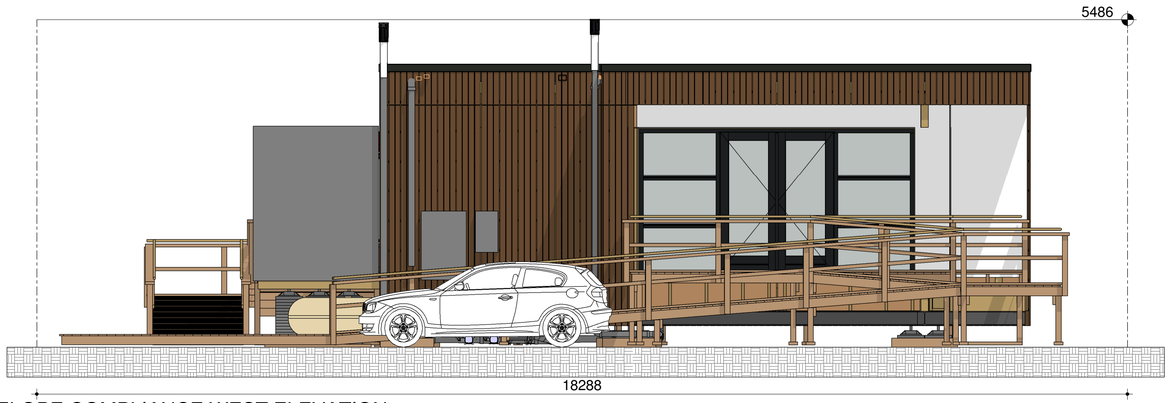
SOLAR ENVELOPE COMPLIANCE ELEVATIONS

G-200



SOLAR ENVELOPE COMPLIANCE EAST ELEVATION

1 : 50



SOLAR ENVELOPE COMPLIANCE WEST ELEVATION

1 : 50

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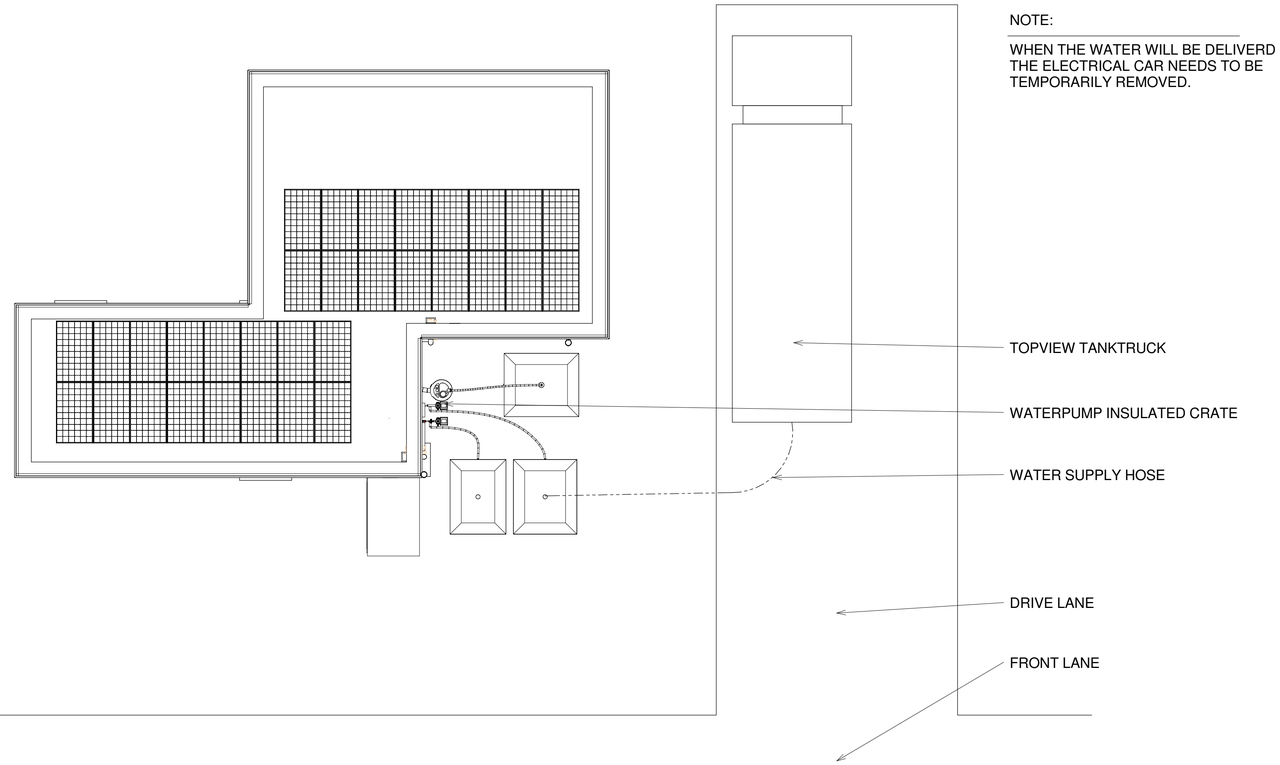
SOLAR ENVELOPE COMPLIANCE ELEVATIONS

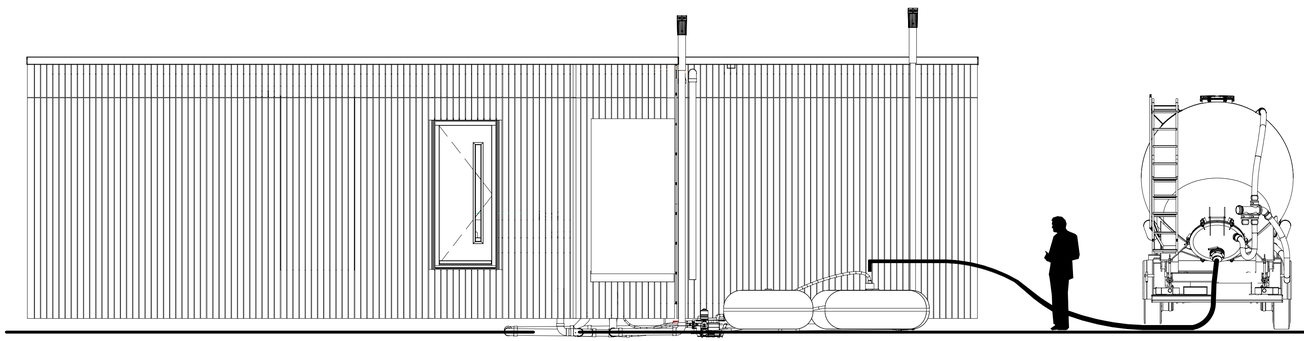
G-201



NOTE:

WHEN THE WATER WILL BE DELIVERD THE ELECTRICAL CAR NEEDS TO BE TEMPORARILY REMOVED.

Topview



WATER DELIVERY AND REMOVAL

Scale 1:80 & 50

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Rev.00	02-24-2017	ADD. WATER DELIVERY

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DRAWN BY:	Kars Slagter
CHECKED BY:	Remco Polle
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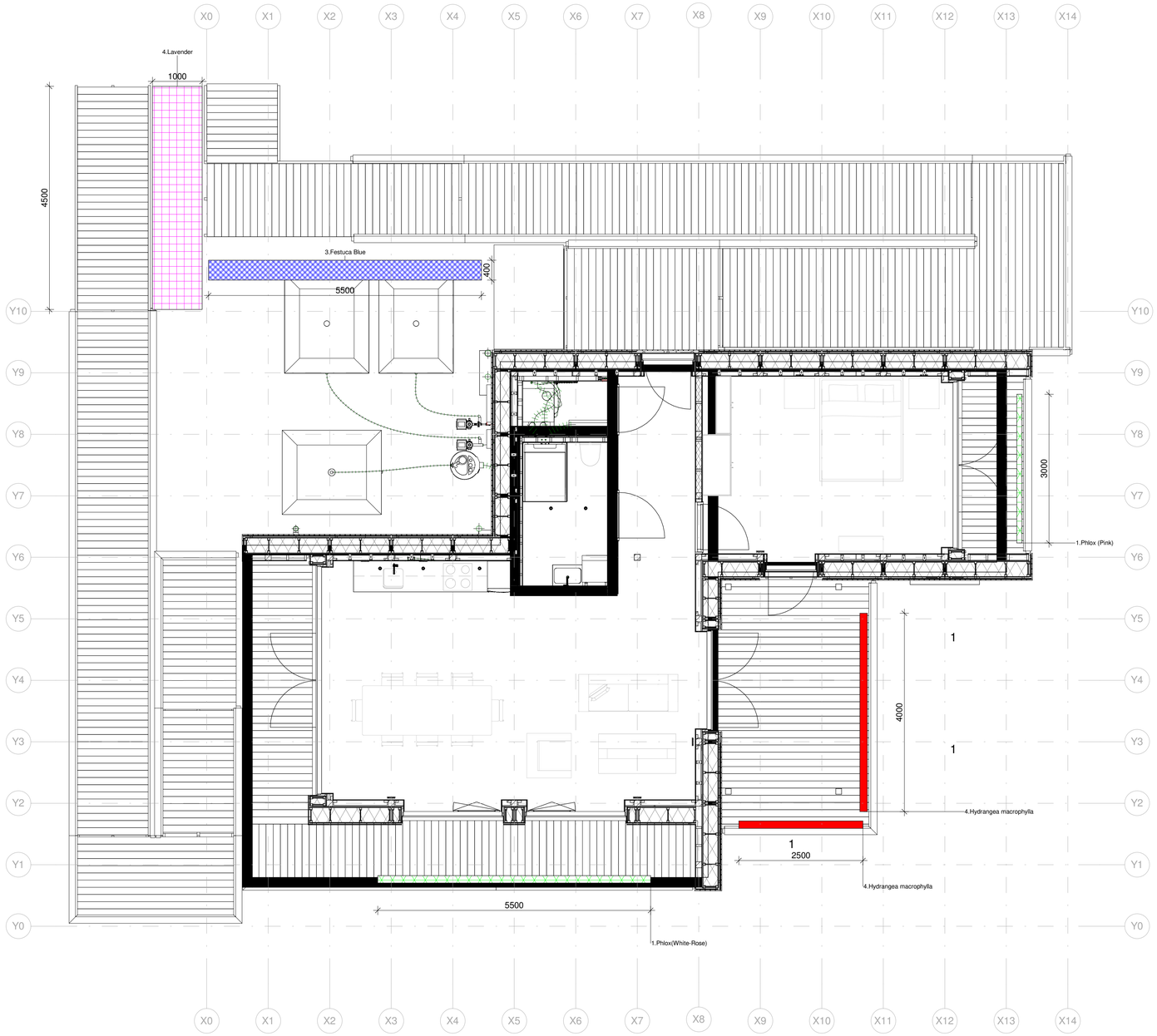
WATER DELIVERY AND REMOVAL

G-202

10-8-2017 14:38:12



LANDSCAPE PLAN

1 : 50

Hatching	Picture	Description
		**NUMBER 1: Phlox(White-Rose); Phlox (Pink)** • **FLOWER COLOR:** Pink with small darker pink eye **GROWTH HABIT:** height: 1.00 to 1.50, feet spread: 0.75 to 1.00 feet, bloom time: july to september • **EXTRA:** Attracts: Birds, Hummingbirds, Butterflies
		**NUMBER 2: Lavender** • **FLOWER COLOR:** VIOLET FLOWER WITH A GREEN STALK. • **GROWTH HABIT:** NO SPECIAL TREATMENT • **EXTRA:** GIVES A NICE SMELL.
		**NUMBER 3: Festuca Blue** • **FLOWER COLOR:** BRIGHT BLUE FLOWER WITH A DARK BLUE STALKS. • **GROWTH HABIT:** SPRINKLE THE SEEDS THINLY ON THE GROUND AND COVER THEM WITH A THIN LAYER OF SOIL (NO MORE THAN A FEW MILLIMETERS). • **EXTRA:** CAN BE USED FOR COOKING.
		**NUMBER 4: Hydrangea macrophylla** • **FLOWER COLOR:** BRIGHT BLUE FLOWER WITH A DARK BLUE STALK • **GROWTH HABIT:** Flowering period June - October, Plant Height 130 cm - 150 cm • **EXTRA:** KEEPS WELL IN DRY SUMMERS.
		WATER METHODOLOGY • ALL PLANTS ARE GOING TO BE WATERED BY HAND

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LANDSCAPE PLAN

L-200

GENERAL

ALL MATERIALS , WORKMANSHIP, DESIGN AND CONSTRUCTION SHALL CONFORM TO THE DRAWINGS, SPECIFICATIONS, THE DENVER BUILDING CODE (DBC, 2016 EDITION), OR EUROCODE CRITERIA, PER STRUCTURAL CALCULATIONS DOCUMENT.

DESIGN LOADING CRITERIA:

ROOF LIVE LOAD.....1.46 kPA
FLOOR LIVE LOAD.....CLASS C5:5
FLOOR LIVE LOAD (RESIDENTIAL DEKCS).....5.50 kPA
PARTITIAN LOADING (RESIDENTIAL).....0.5 kPA
GROUND SNOW LOAD.....0.56 kPA
BASIC WIND SPEED PRESSURE.....0.6 kPA

DRAWINGS INDICATE GENERAL AND TYPCIAL DETAILS OF CONSTRUCTION. WHERE CONDITIONS ARE NOT SPECIFICALLY INDICATED BUT ARE OF SIMILAR CHARACTER TO DETAISL SHOWN.
SIMILAR DETAILS OF CONSTRUCTION SHALL BE USED, SUBJECT TO REVIEW AND APPROVAL BY THE UNIVERSITY REPRESENTATIVE.

STRUCTURAL PLANS SHALL INCLUDE DESIGN DETAILS FOR ANY
EXTERIOR APPURTENANCES SUCH AS DECKS, STARIS, RAMPS, AWNINGS, CANPOIES, AND ROOF PROJECTIONS (IRC, SEC. R301.1).
DECK STRUCTURAL FRAMING SHALL INCLUDE FULL DETAILS FOR
HOUSE LEDGER CONNECTIONS, JOIST-TO-BEAM CONNECTIONS, AND
BEAM-TO COLUMN/FOOTING CONNECTIONS. SPECIAL DESING ATTENTION SHALL BE PAID TO LOAD PATH FOR DECK FOUNDATION
SYSTEMS FOR CONCEALED FOOTING SYSTEMS.

FOUNDATION

PROVIDE A FOUNDATION PLAN FOR TEMPORARY SETUP ON THE COMPETITION SITE. THE DESIGN MUST ACCOMMODATE ALL DESIGN LOADS, INCLUDING GRAVITY AND LATERAL DERIVED FROM WIND AND SEISMIC. PLANS SHALL INCLUDE LOCATION AND SIZE OF ALL TEMPORARY FOOTINGS AND REQUIRED TIE-DOWN ANCHORS (E.G., TYPE, NUMER, AND INSTALLATION CONFIGURATION) TO PREVENT WIND UPLIFT OR OVERTURING (IRC SEC. R401.1 AND R401.2) AND TO PROVIDE ADEQUATE LATERAL LOAD TRANSFERENCE FOR SDC B DESIGN SEISMIC FORCES. PLEASE PROVIDE CONSIDERATION FOR SLOPING OR VARIABLE SITE CONDITIONS.

JACKPADS

AS ADJUSTABLE FOOTINGS SELFICIENT WILL USE JACKPADS. THE GROUND UNDERNEATH THE JACKPADS HAS TO BE LEVELLED WITH A DENSITY OF 90%. THE POSITIONS OF THE JACKPADS CAN BE EXTRACTED FROM THE CONSTRUCTION DRAWINGS.
THE TOP OF ALL THE JACKPADS HAVE TO BE LEVELLE EQUALLY, TO MAINTAIN THAT THE HOUSE WILL BE LEVELLED HORIZONTALLY, BEFORE THE SILLS CAN BE PLACED.

STEEL

PROVIDE STRUCTURAL DETAILS FOR LOAD-CARRYING STRUCTRUAL STEEL ASSEMBLIES. ON TOP OF THE JACKPADS A STEEL BEAM WILL BE PLACED, TO MAKE IT EASIER TO BUILD-UP, TO ENDURE WIND FORCES AND TO CONNECT THE SUTEKI FRAME.

TYPE	ASTM SPECIFICATION
BEAM	ASTM-HE240A

SILLS

THE SILLS WILL BE PLACED ON TOP OF THE SEEL BEAMS WHICH ARE LAYING ON THE JACKPADS.

WOOD

THE POSTS AND BEAMS ARE MADE OUT OF THE SUTEKI WOOD SYSTEM. THERE ARE THREE MAIN TYPES OF CONNECTORS USED; S-3A IS USED WHE A COLUMN IS STANDING BETWEEN TWO OR MORE BEAMS. CONNECTION S-3B IS USED WHEN A BEAM IS CONNECTED TO ANOTHER BEAM. CONNECTION HD-H6 IS USED WHEN A COLUMN IS STANDING BETWEEN TWO BEAMS.

SUTEKI BEAMS	120X270mm
	120X390mm
SUTEKI POSTS	120X120mm

THE FLOOR CONSITS CONSISTS OF CLT (CROSS LAMINATED TIMBER)-PANELS. THIS IS CONNECTED WITH THE SUTEKI BEAMS WITH M10X280mm LAG SCREWS. THE ROOF ALSO CONSISTS OF CLT-PANELS.

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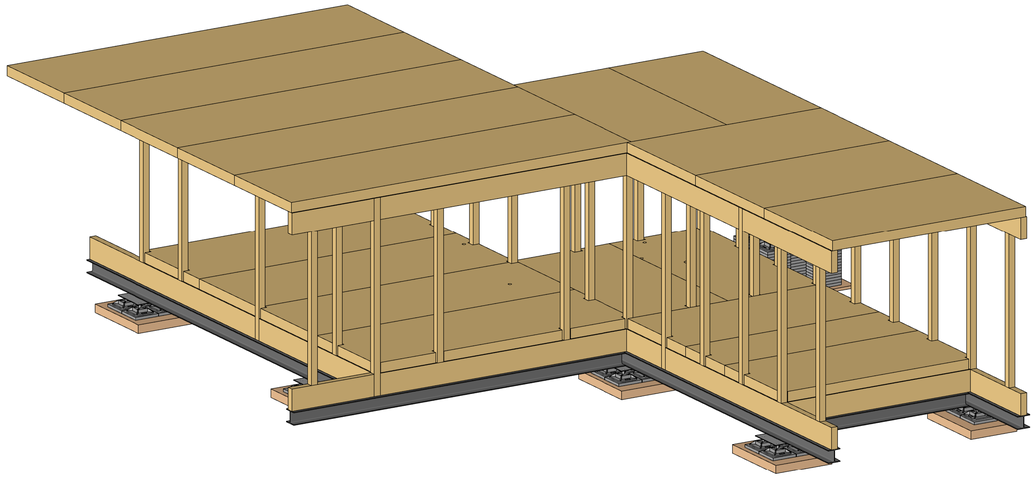
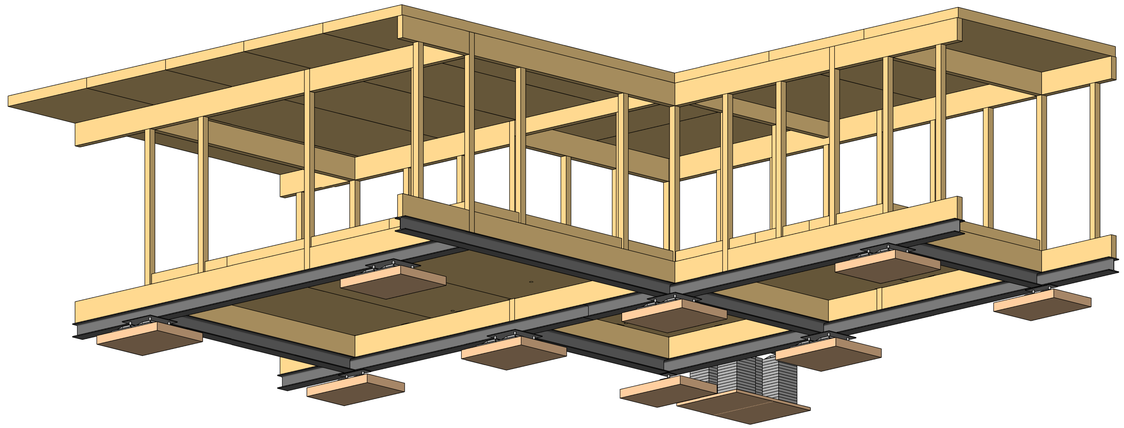
GENERAL NOTES AND SYMBOLS

S-001



3D STRUCTURAL ISOMETRIC NORTH VIEW



3D STRUCTURAL ISOMETRC SOUTH VIEW

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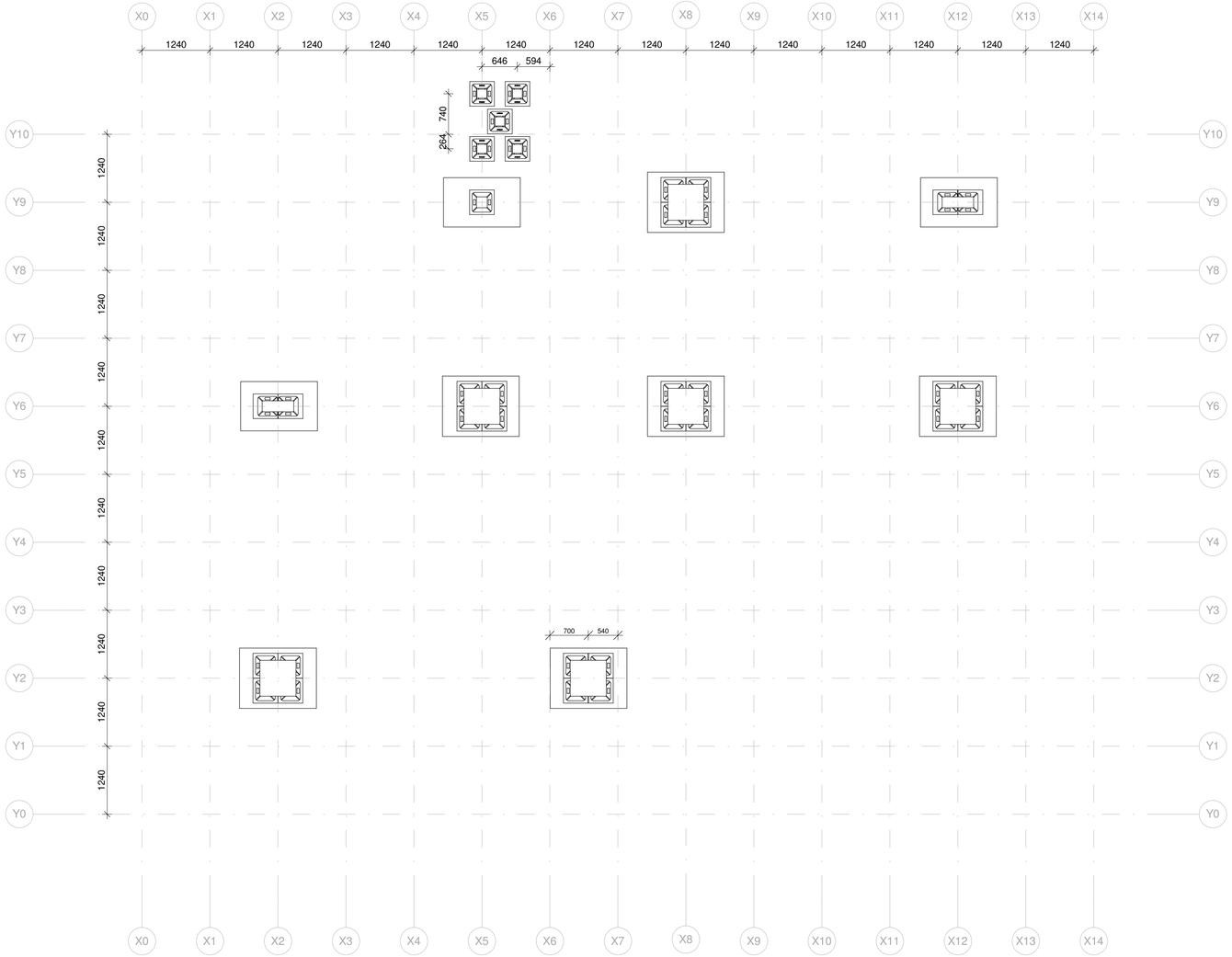
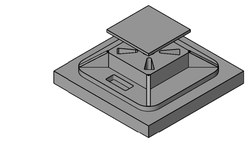
STRUCTURAL ISOMETRIC VIEW

S-100

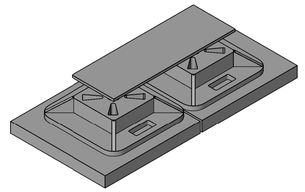


STEEL SUBSTRUCTURE FRAME

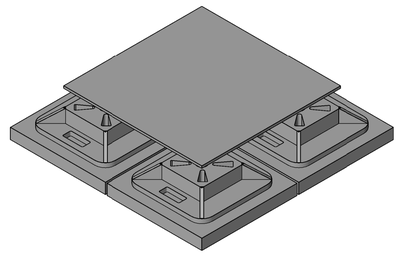
1 : 50



JackPad type 1 Single



JackPad type 2 Double



JackPad type 3 Quadruple

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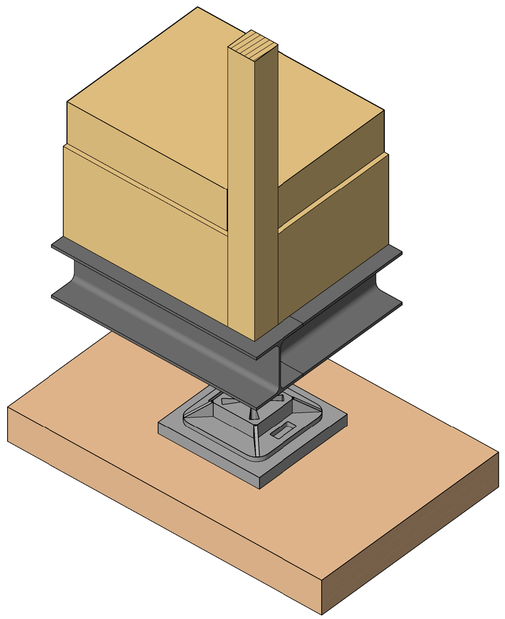
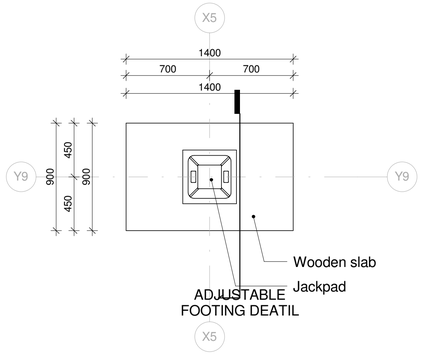
SHEET TITLE

STRUCTURAL FOUNDATION PLAN

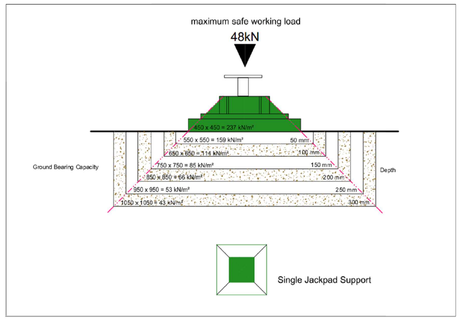
S-200



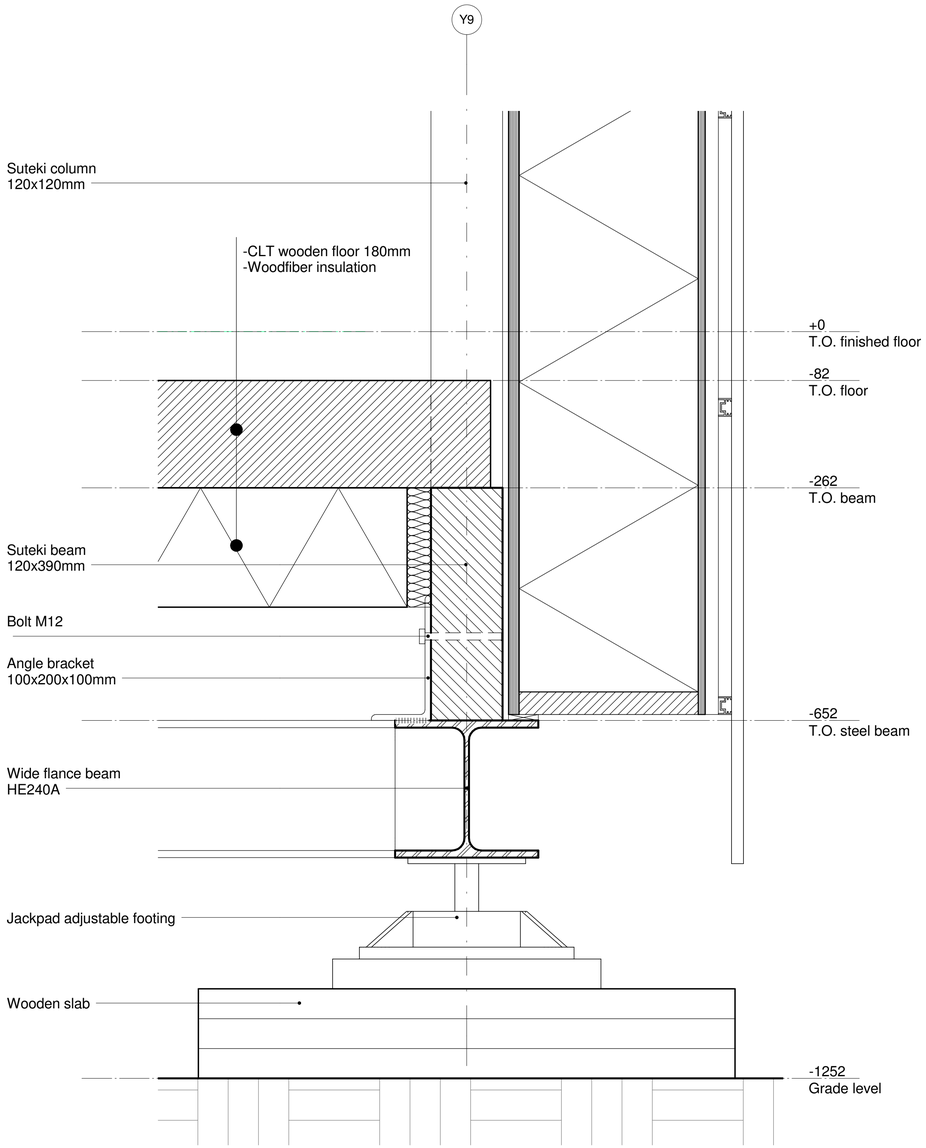
Jackpad adjustable footing can be adjusted in height by using the large tiles for large adjustments and the threaded spigot for smaller adjustments.



Overview of a single jackpad



Maximum working load of a single jackpad



TECHNICAL INFORMATION ADJUSTABLE FOOTING

ADJUSTABLE FOOTING DEATIL

1 : 5

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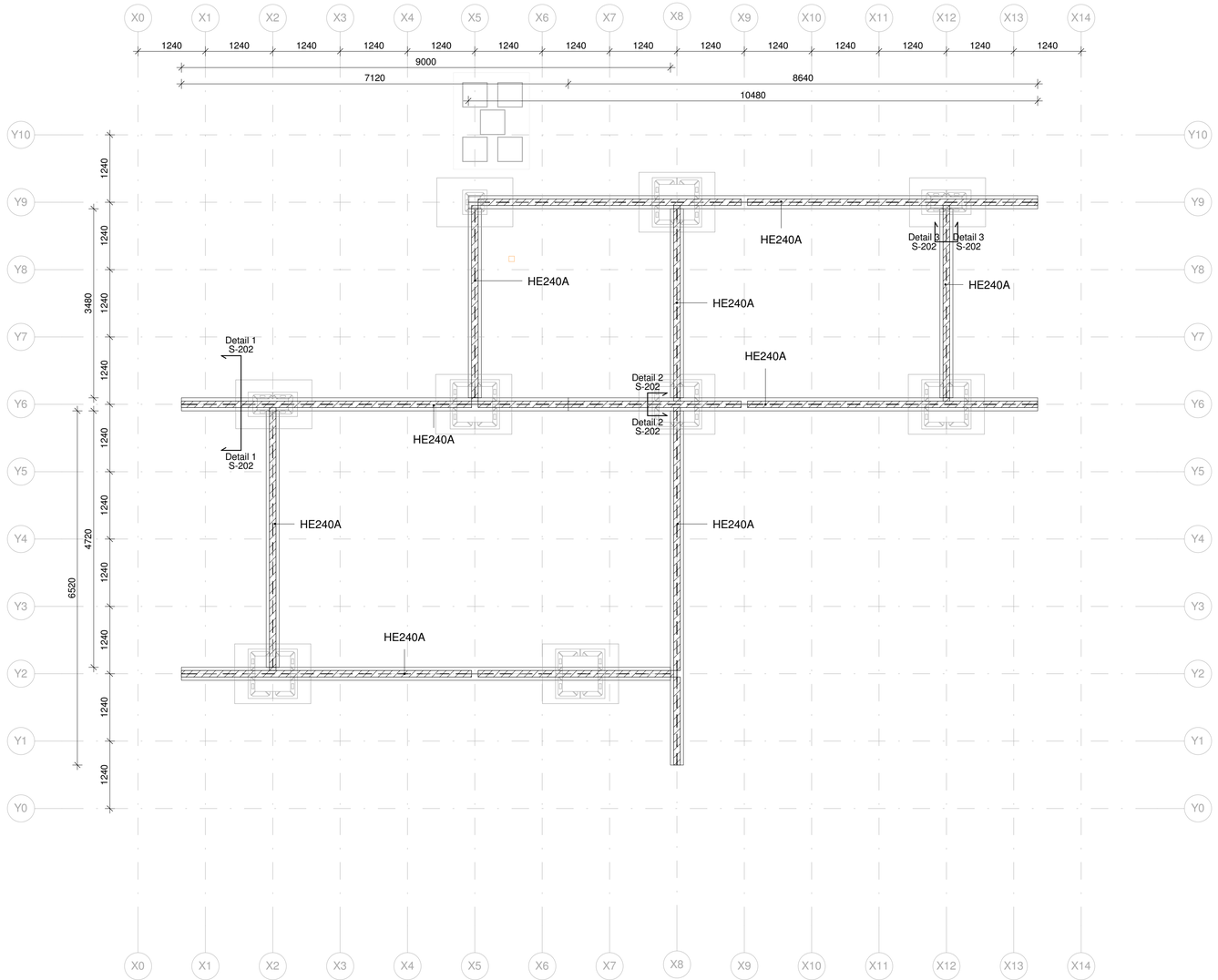
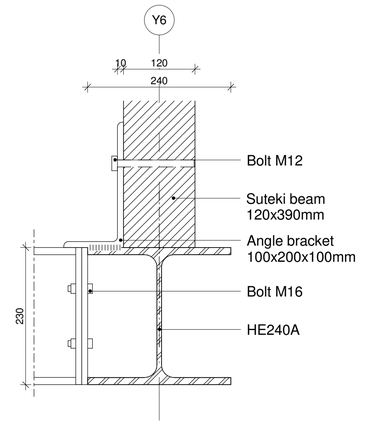
ADJUSTABLE FOOTING DETAIL

S-201



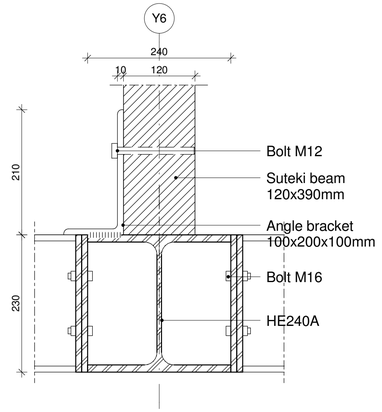
STEEL SUBSTUCTURE FRAME

1 : 50



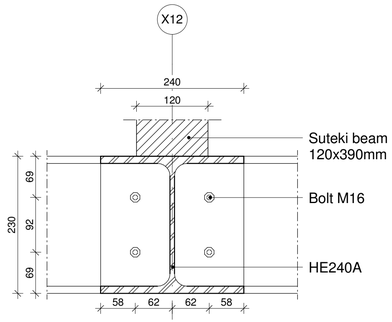
STRUCTURAL DETAIL V01

1 : 5



STRUCTURAL DETAIL V02

1 : 5



STRUCTURAL DETAIL V03

1 : 5

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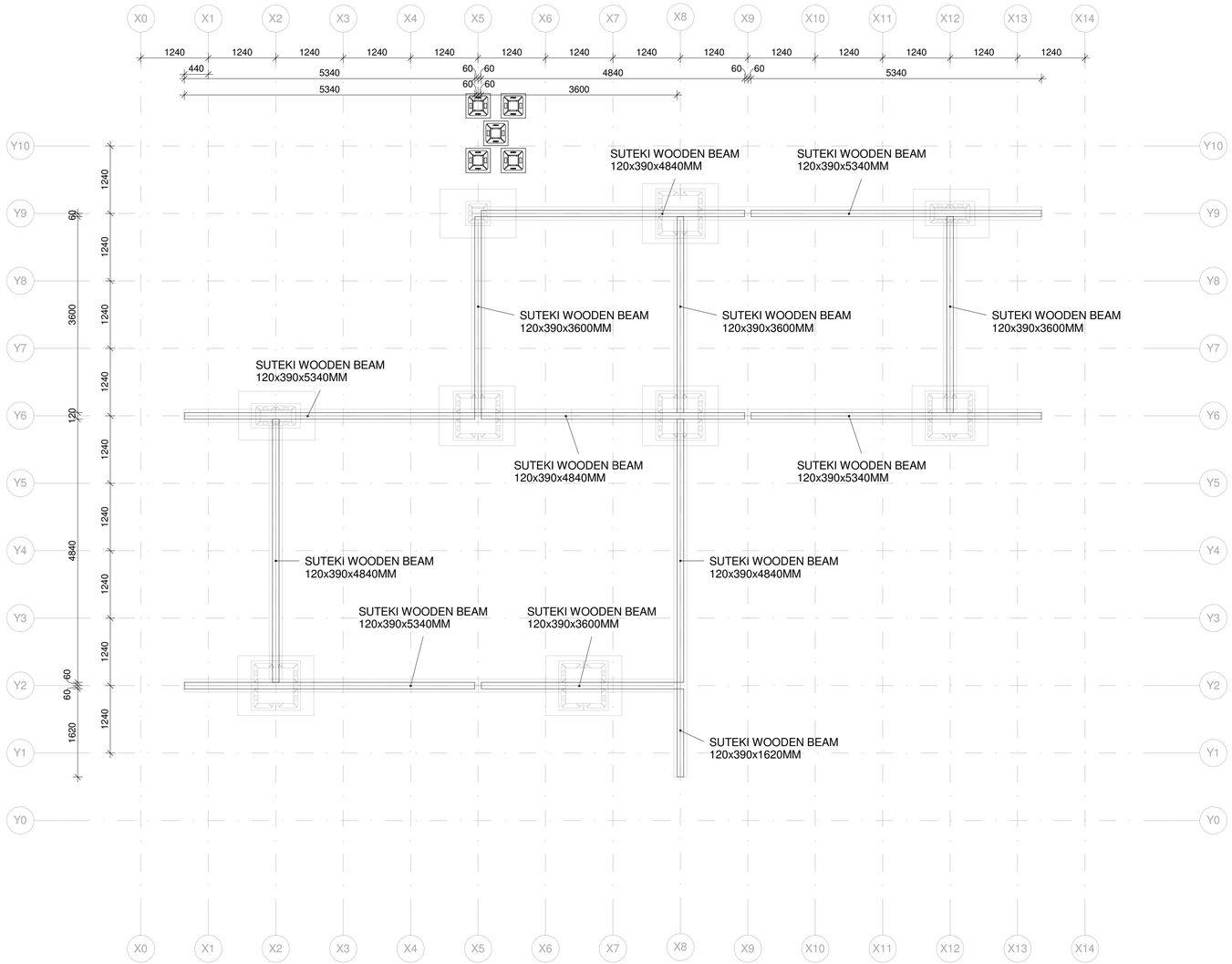
STEEL SUBSTUCTURE FRAMING PLAN

S-202



FLOOR FRAMING PLAN

1 : 50

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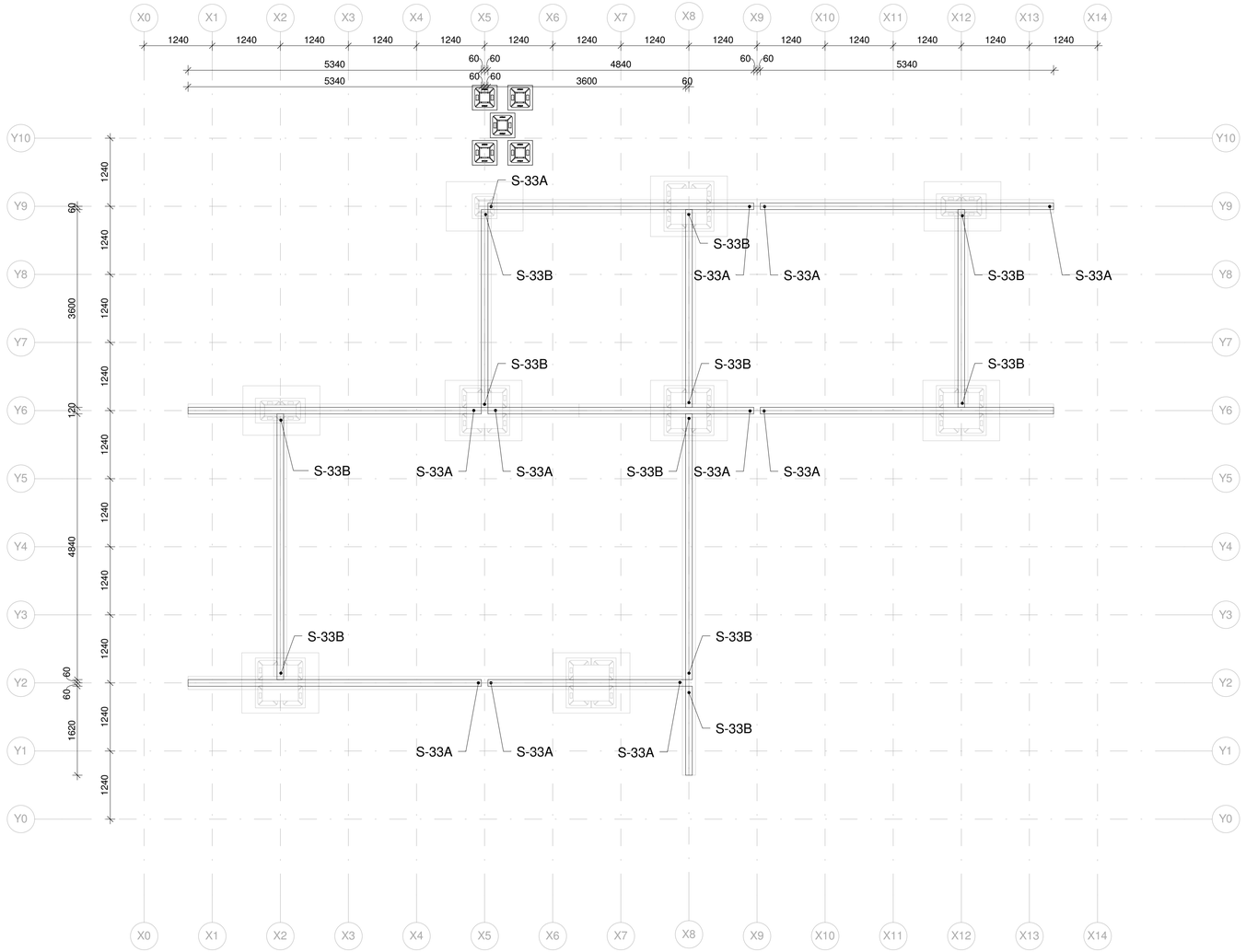
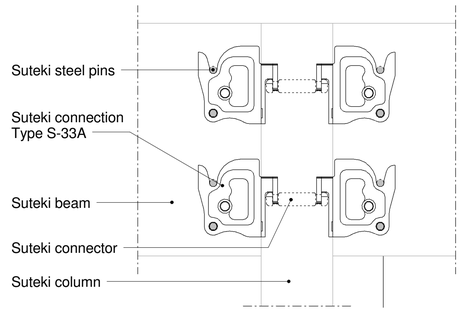
FLOOR FRAMING PLAN

S-203



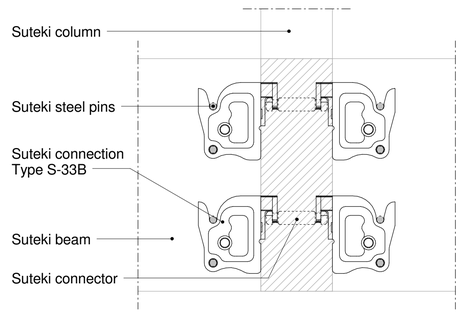
SUTEKI CONNECTION BEAMS

1 : 50



SUTEKI CONNECTOR TYPE S-33A

1 : 5



SUTEKI CONNECTOR TYPE S-33B

1 : 5

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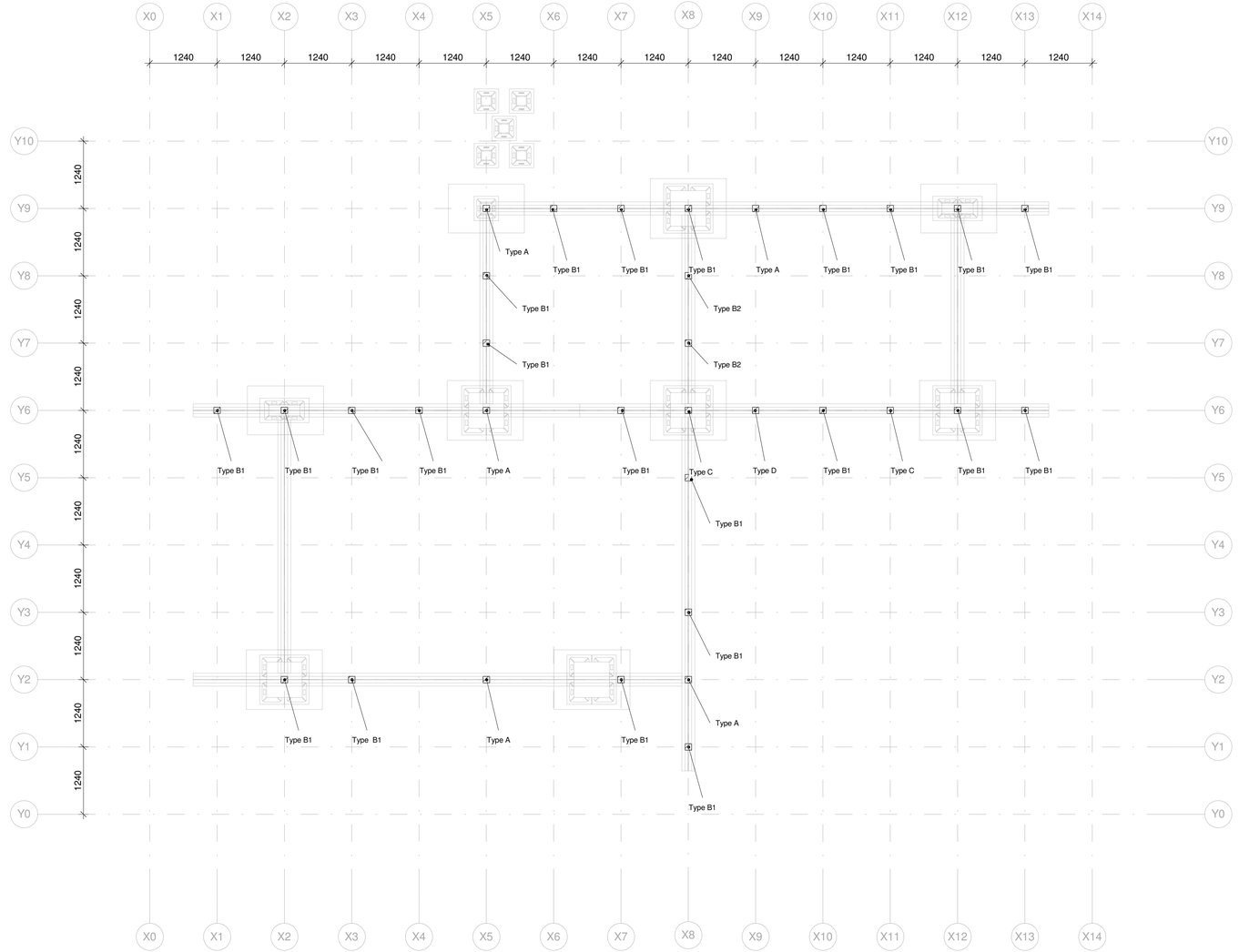
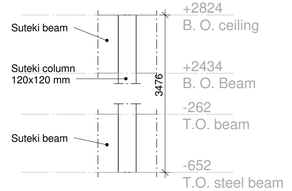
FLOOR FRAMING SUTEKI CONNECTIONS PLAN

S-204



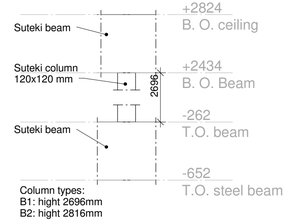
SUTEKI COLUMNS PLAN

1 : 50



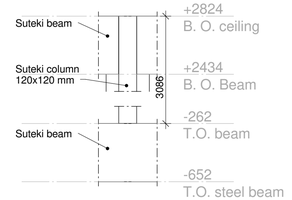
TYPE A DETAIL

1 : 20



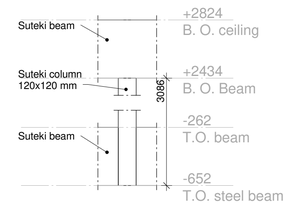
TYPE B1 & B2 DETAIL

1 : 20



TYPE C DETAIL

1 : 20



TYPE D DETAIL

1 : 20

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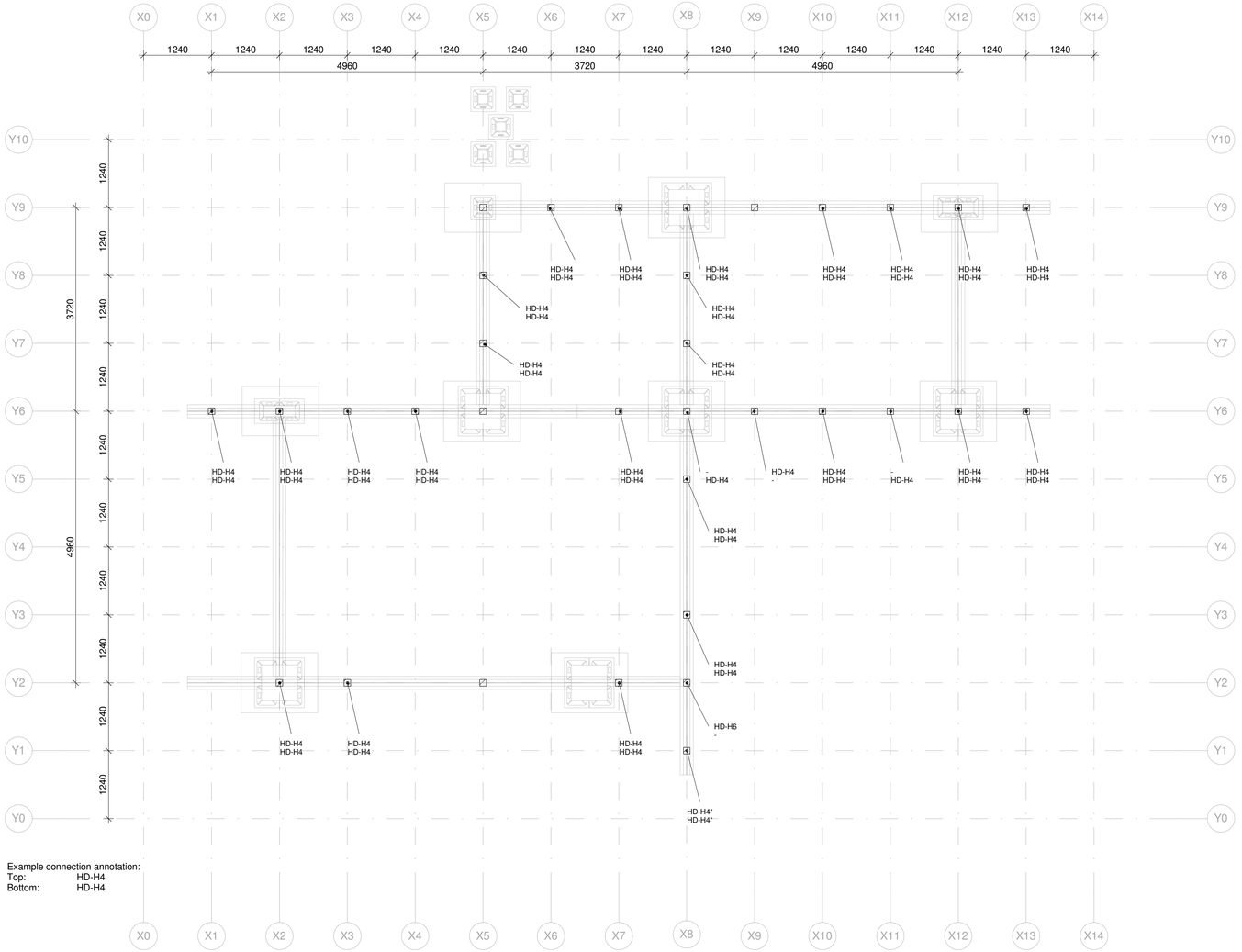
SUTEKI COLUMNS PLAN

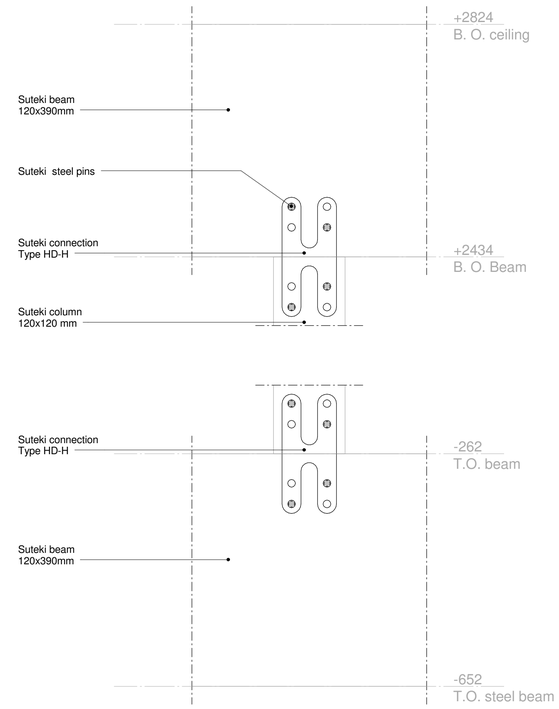
S-205



Example connection annotation:
Top: HD-H4
Bottom: HD-H4

SUTEKI COLUMNS CONNECTION

1 : 50



HD-H CONNECTION DETAIL

1 : 5

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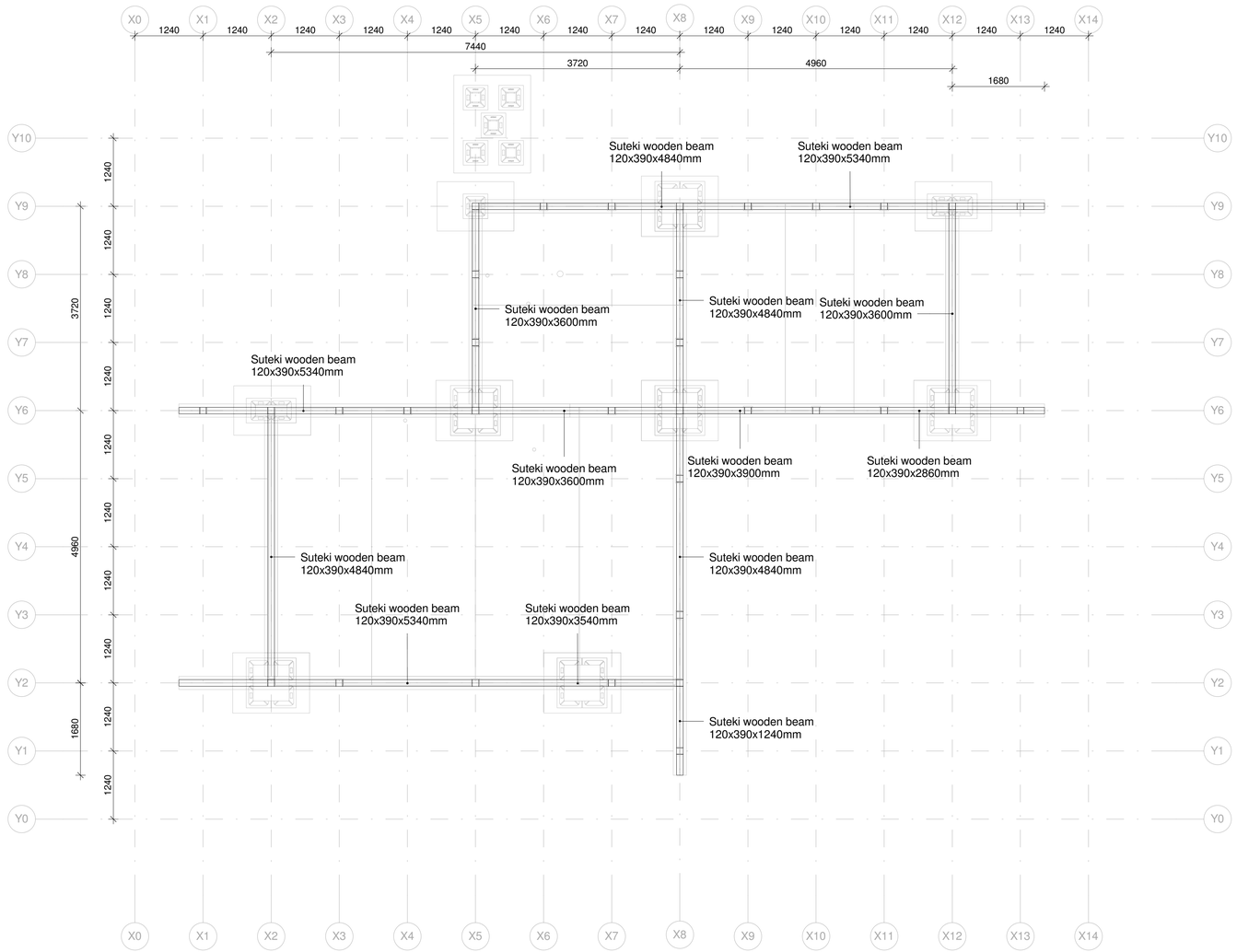
SUTEKI COLUMNS CONNECTIONS

S-206



ROOF FRAMING PLAN

1 : 50

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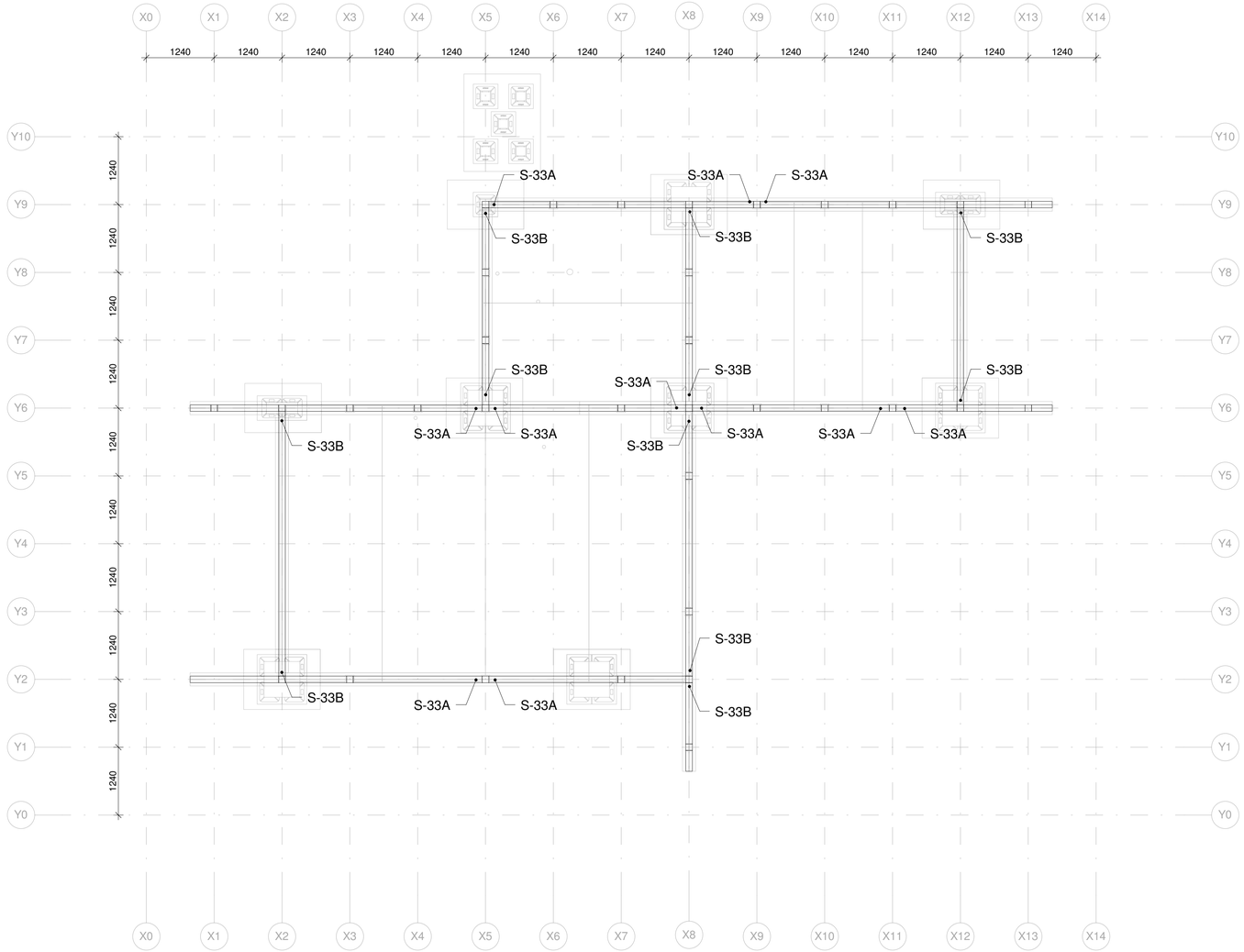
SHEET TITLE

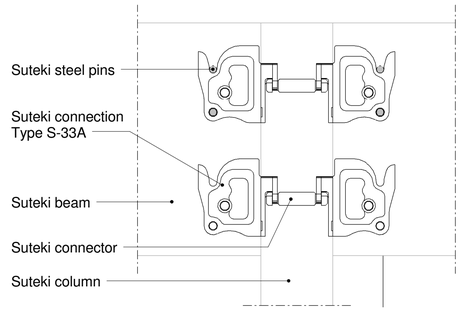
ROOF FRAMING PLAN

S-207



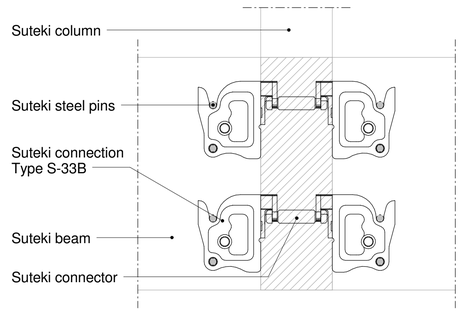
SUTEKI CONNECTION BEAMS

1 : 50



SUTEKI CONNECTOR TYPE S-33A

1 : 5



SUTEKI CONNECTOR TYPE S-33B

1 : 5

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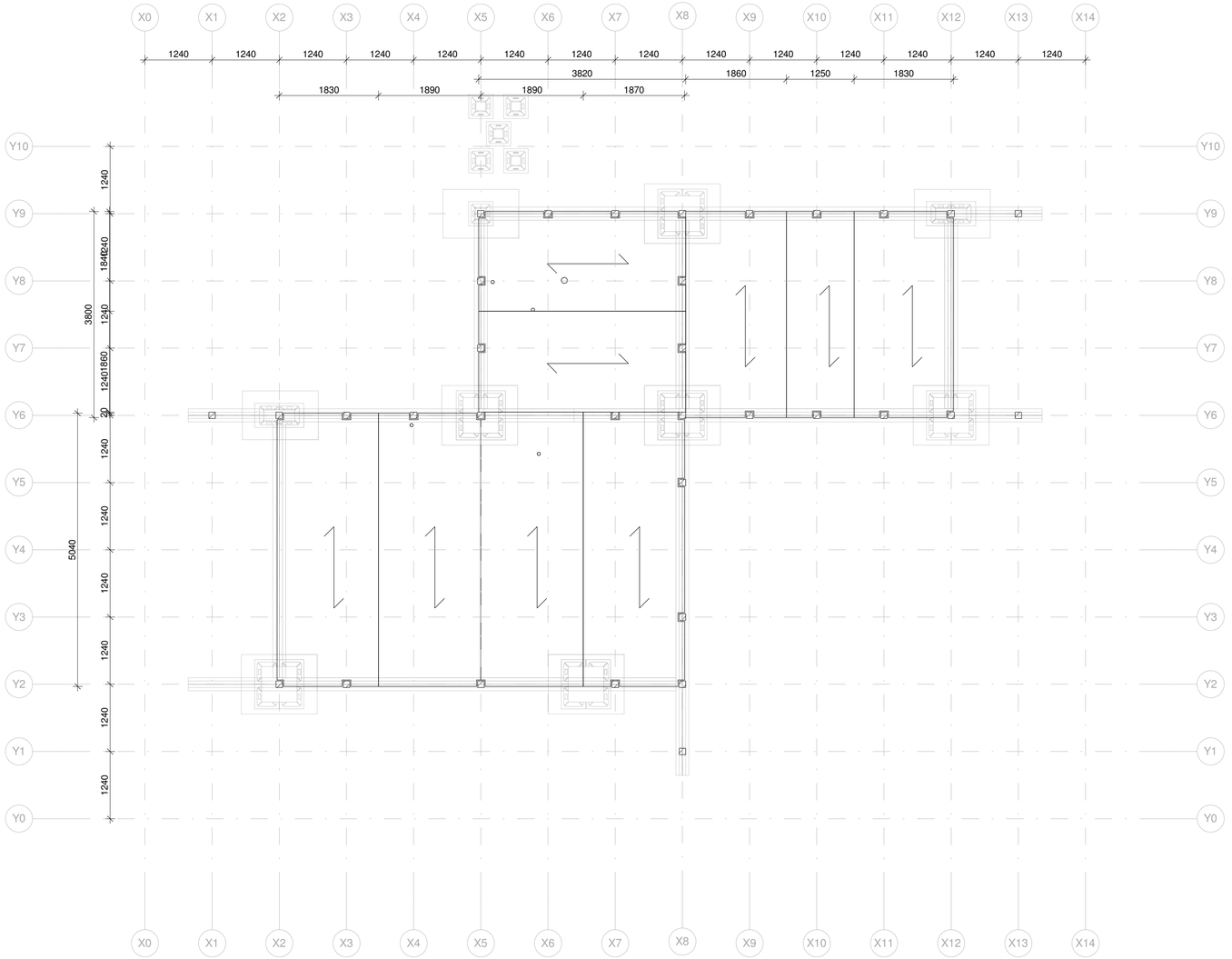
ROOF FRAMING SUTEKI CONNECTIONS PLAN

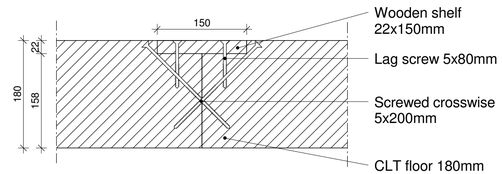
S-208



Floors screwed crosswise 5x200

GROUND FLOOR PLAN

1 : 50



STRUCTURAL FLOOR DETAIL V01

1 : 5

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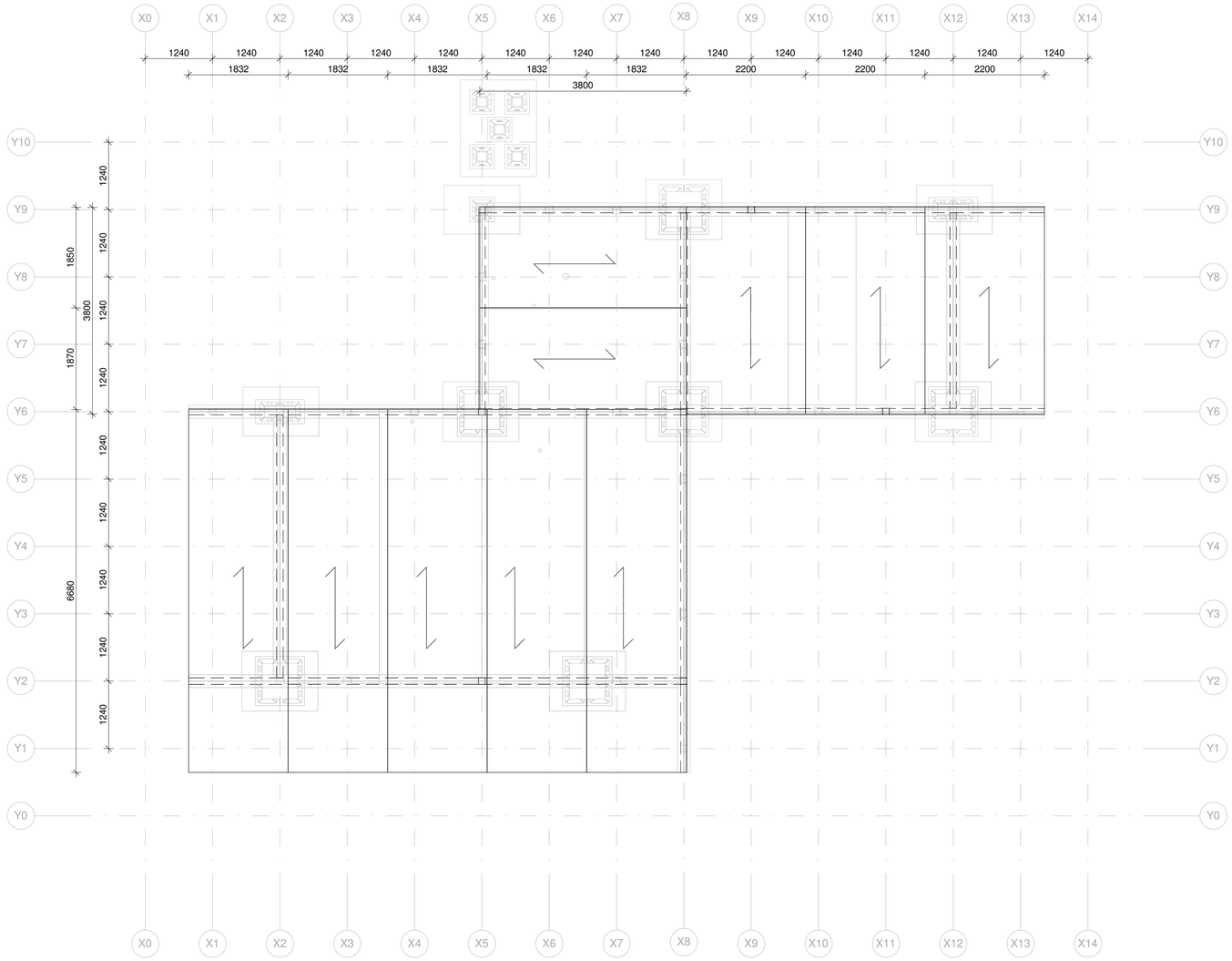
SHEET TITLE

GROUND FLOOR PLAN

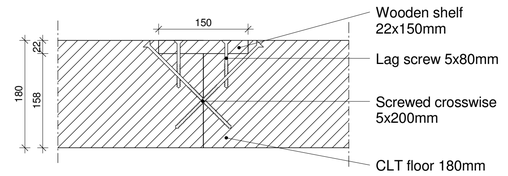
S-209



Floors screwed crosswise 5x200

ROOF FLOOR PLAN

1 : 50



STRUCTURAL ROOF DETAIL V01

1 : 5

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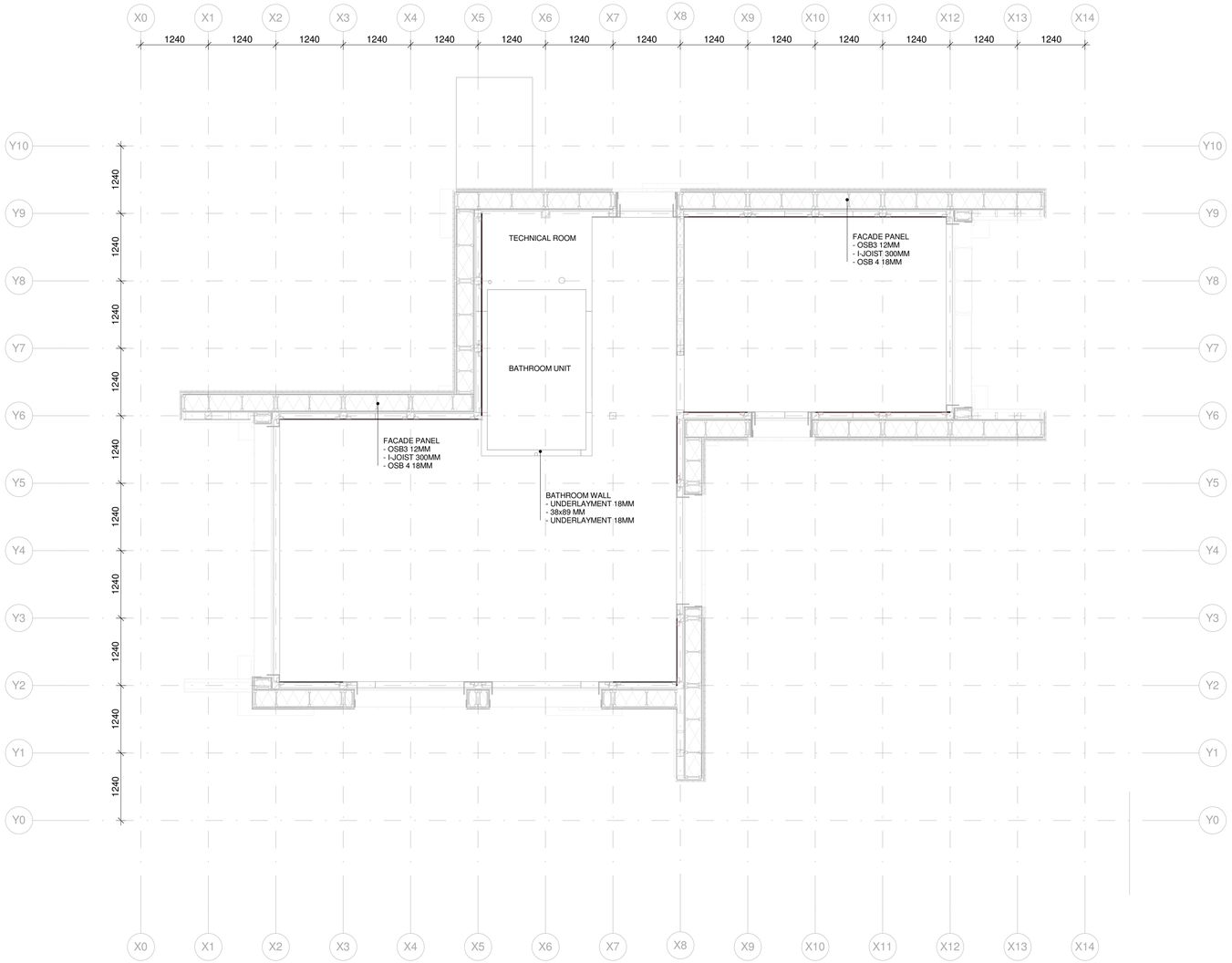
ROOF FLOOR PLAN

S-210



With the plywood (12 mm) inner walls the stability of the structure is maintained. These walls provide the connection between the Suteki columns.

WALL FRAMING PLAN

1 : 50

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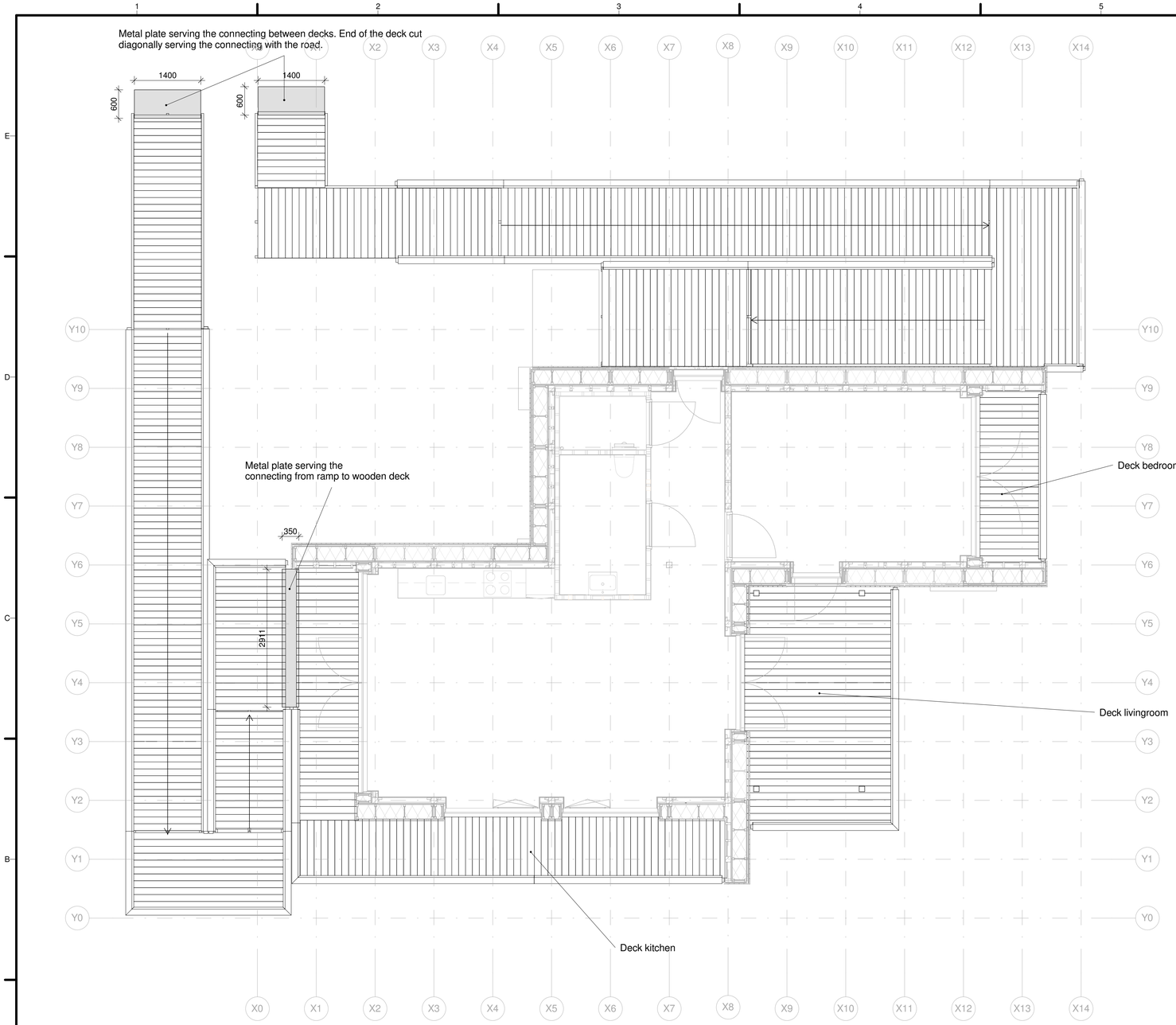
SHEET TITLE

WALL FRAMING PLAN

S-211



STRUCTUAL RAMP PLAN

1 : 50

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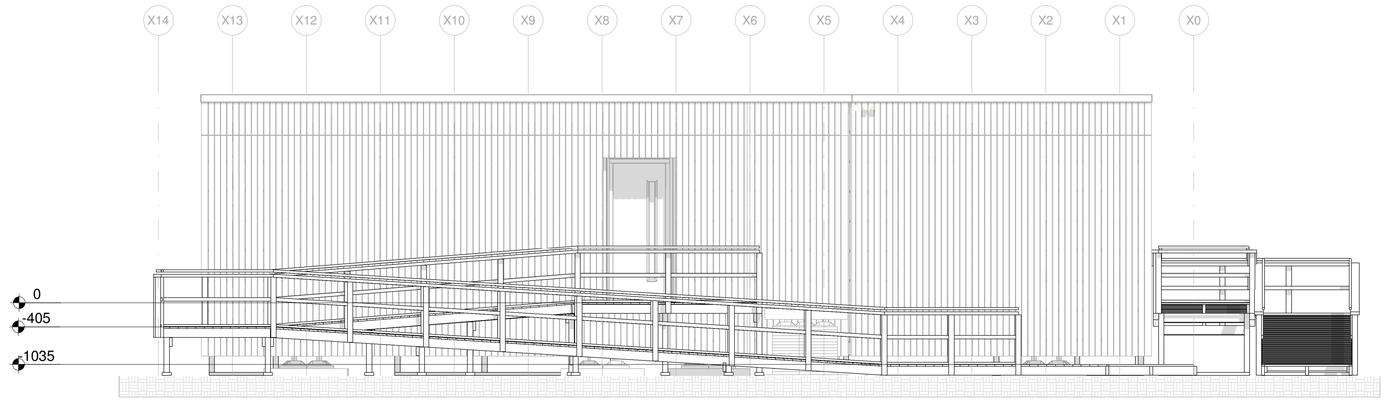
SHEET TITLE

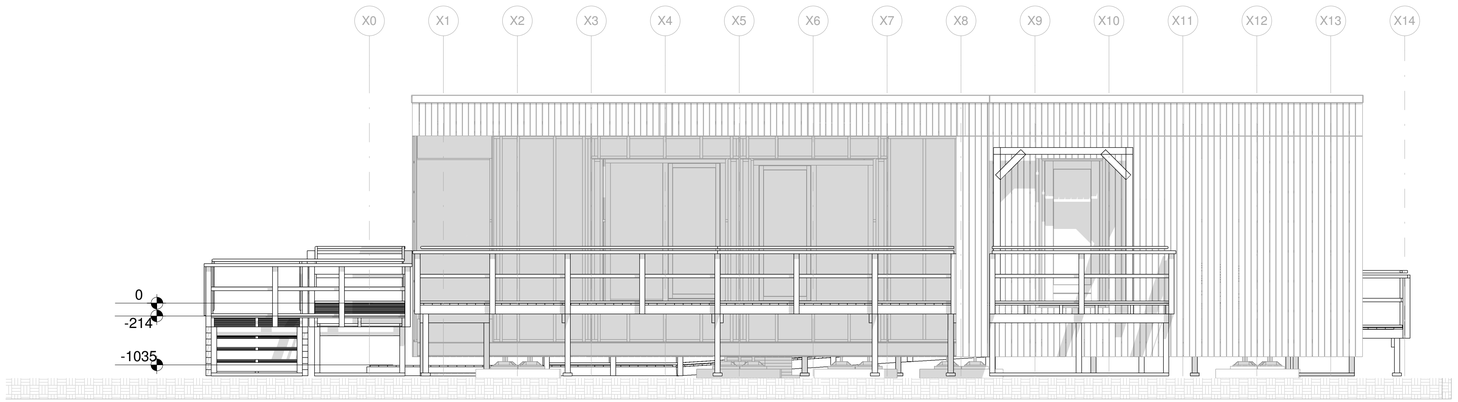
STRUCTUAL RAMP PLAN

S-212



NORTH ELEVATION RAMP

1 : 50



SOUTH ELEVATION RAMP

1 : 50

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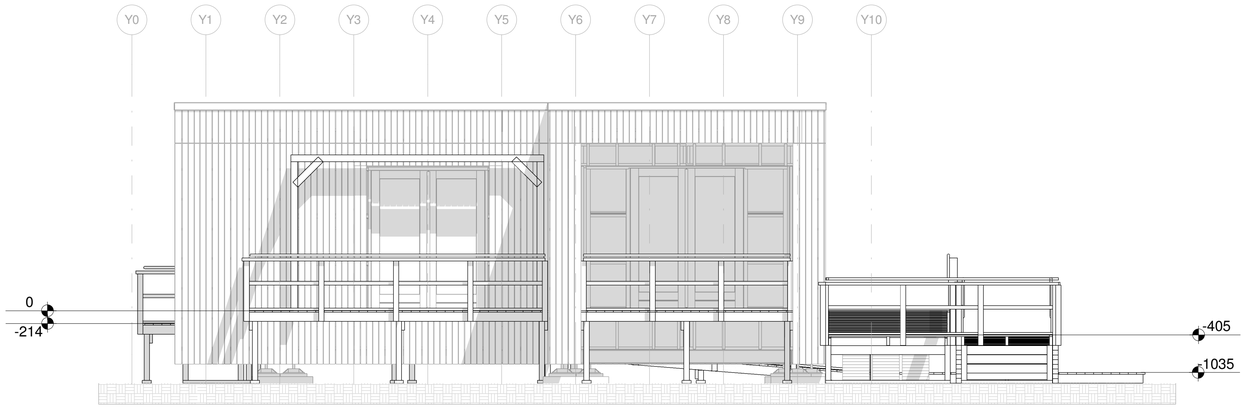
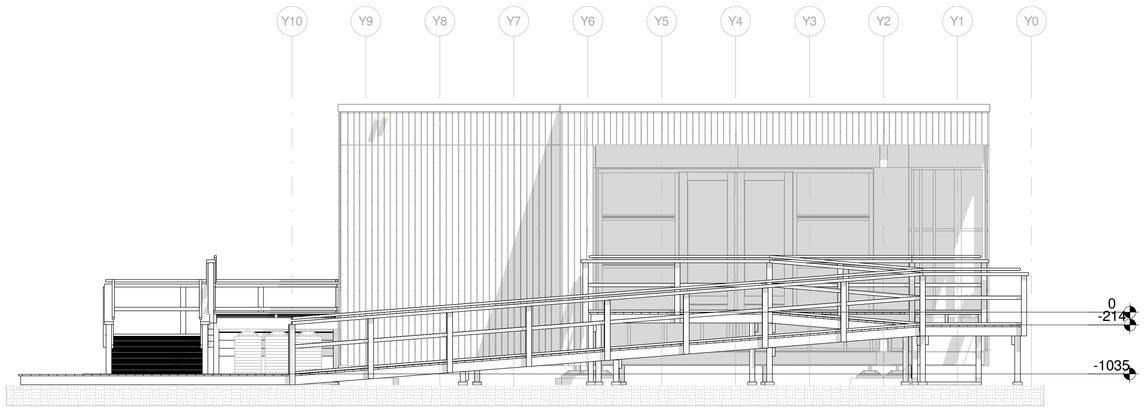
RAMP ELEVATIONS

S-300



ELEVATION EAST RAMP

1 : 50



ELEVATION WEST RAMP

1 : 50

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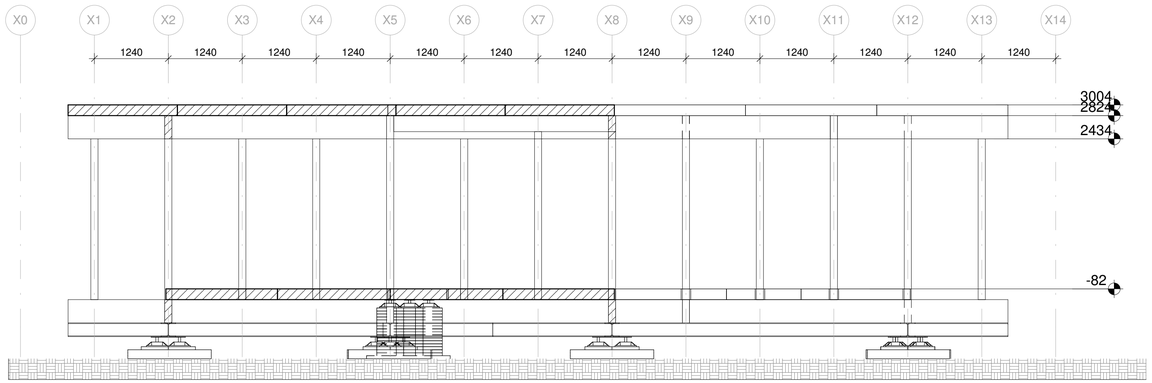
SHEET TITLE

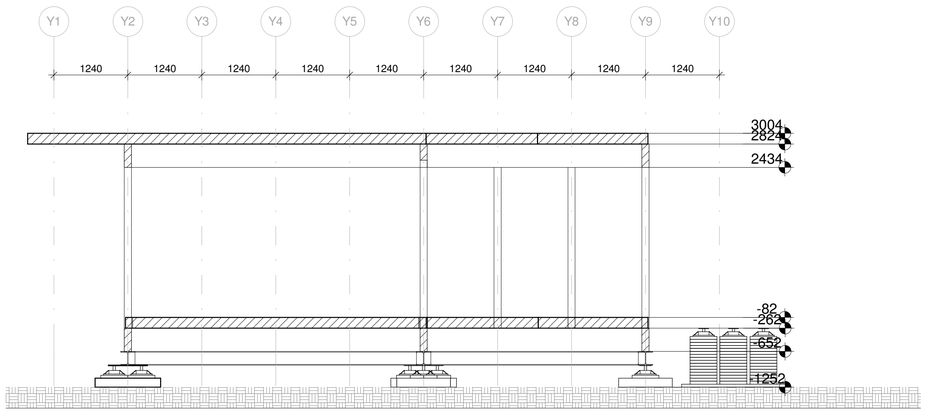
RAMP ELEVATIONS

S-301



STRUCTUAL SECTION A

1 : 50



STRUCTUAL SECTION B

1 : 50

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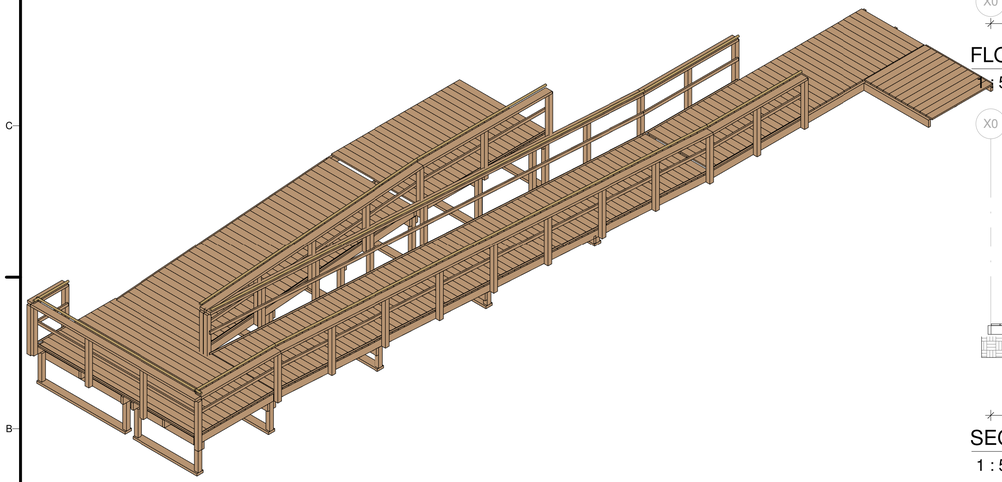
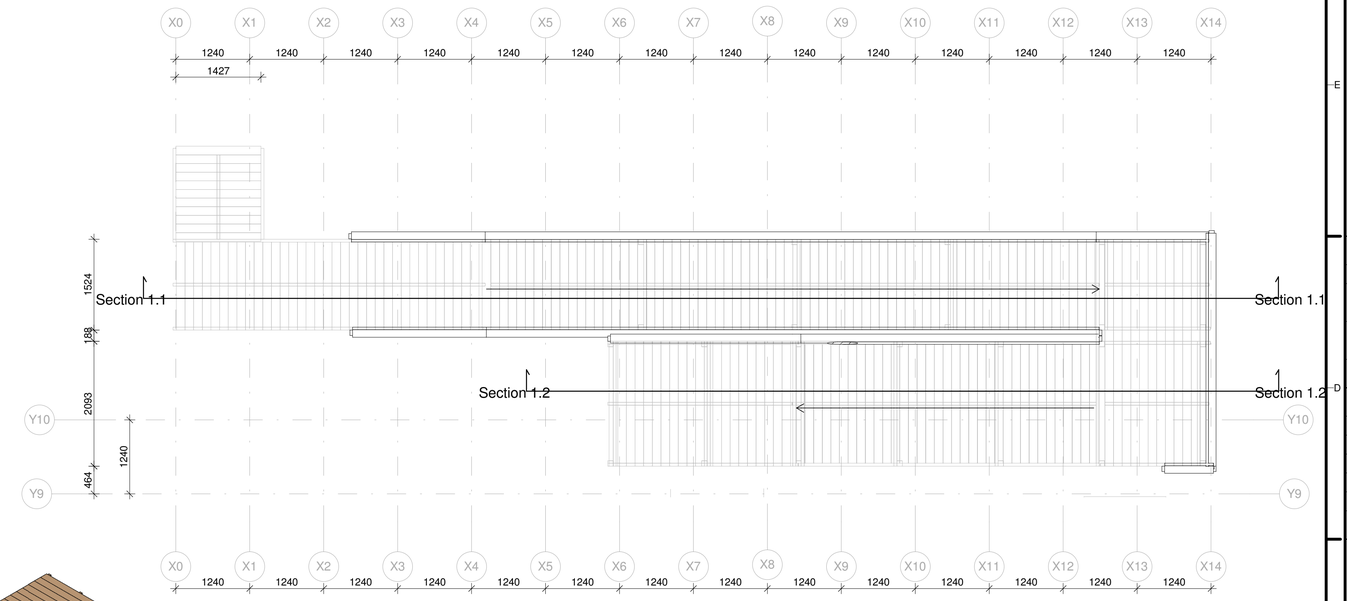
SHEET TITLE

STRUCTUAL SECTIONS

S-350

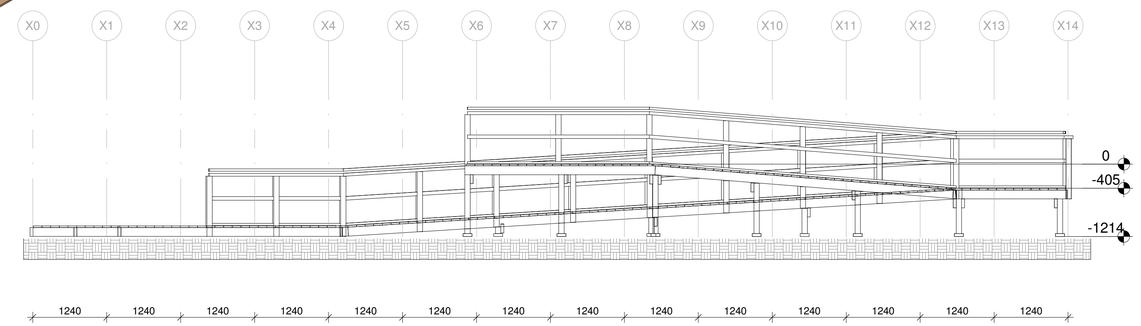


3D ISOMETRIC



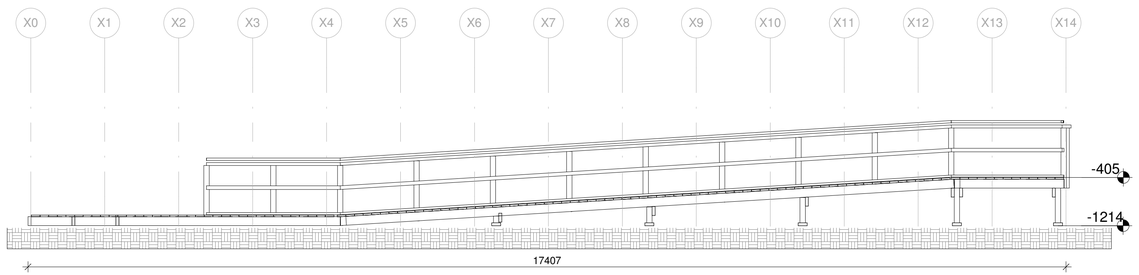
FLOORPLAN RAMP ENTRANCE

1 : 50



SECTION 1.2

1 : 50



SECTION 1.1

1 : 50

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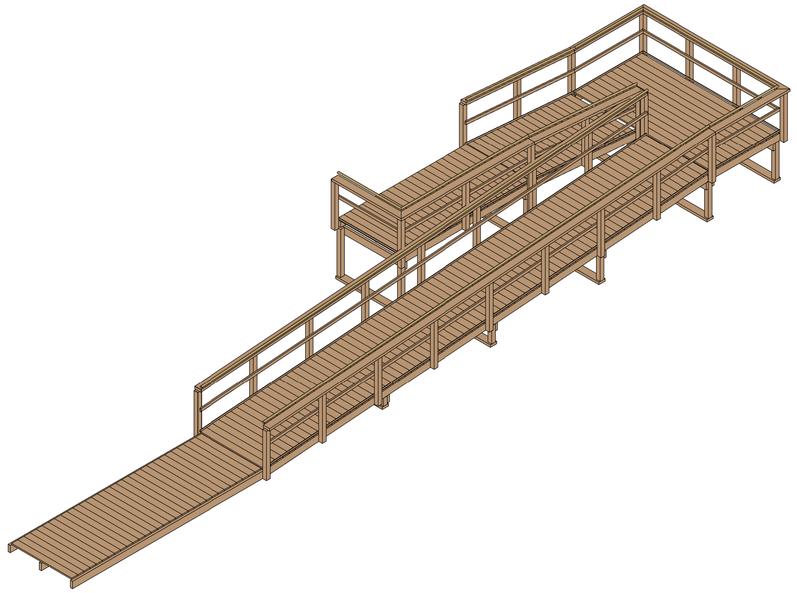
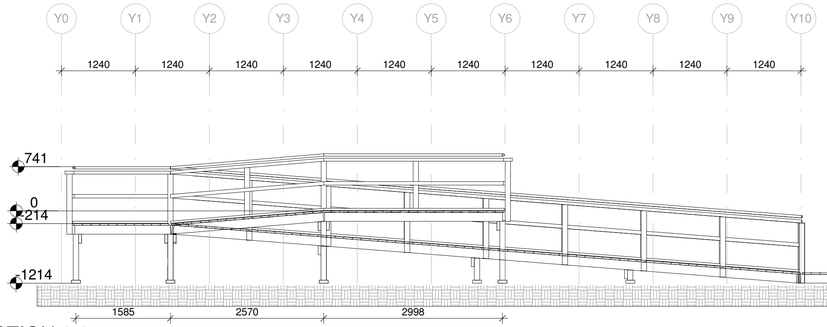
STRUCTUAL RAMP OVERVIEW ENTRANCE

S-360

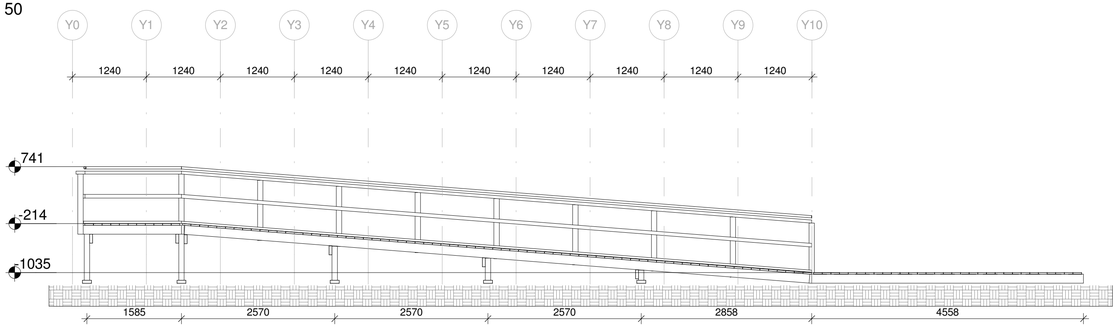


RAMP EXIT



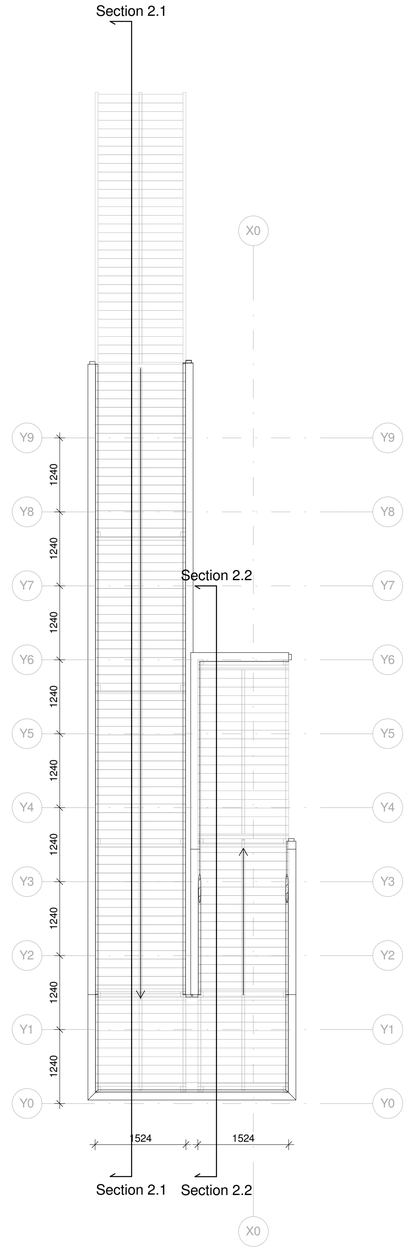
SECTION 2.2

1 : 50



SECTION 2.1

1 : 50



FLOORPLAN RAMP EXIT

1 : 50

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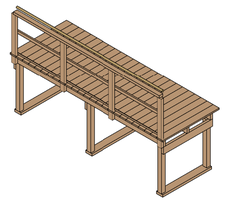
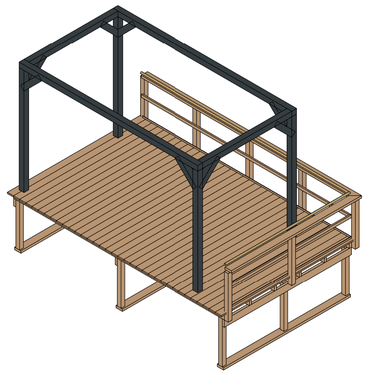
SHEET TITLE

STRUCTUAL RAMP OVERVIEW EXIT

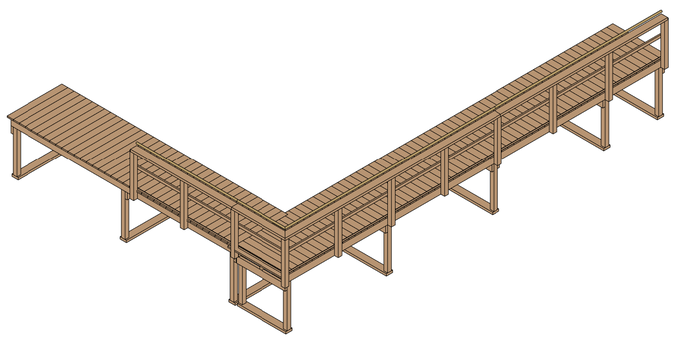
S-361



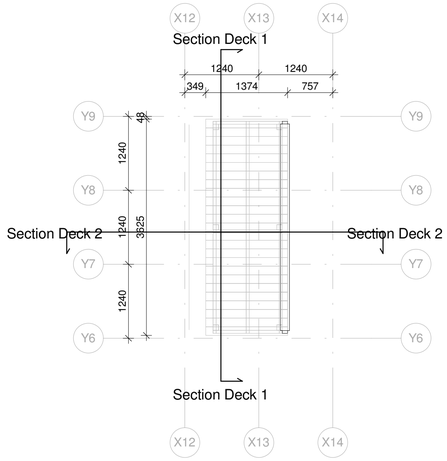
DECK BEDROOM



DECK LIVINGROOM

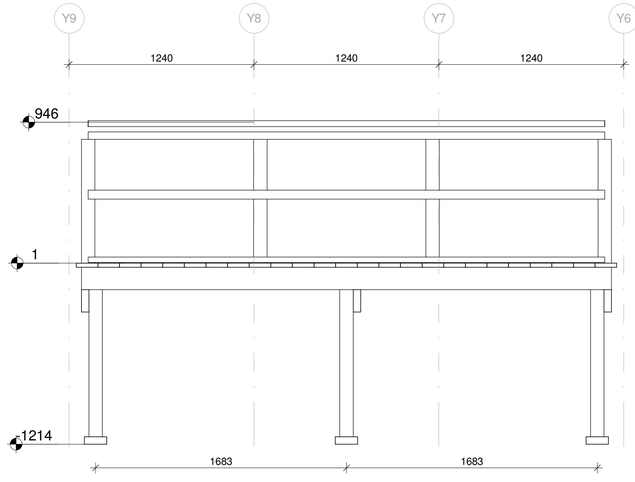


DECK KITCHEN



FLOORPLAN DECK BEDROOM

1 : 50



SECTION DECK BEDROOM

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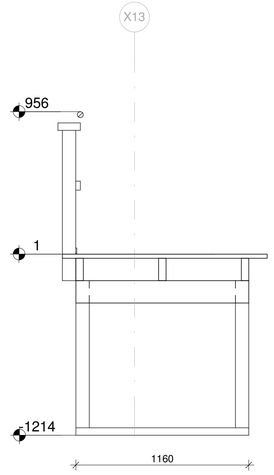
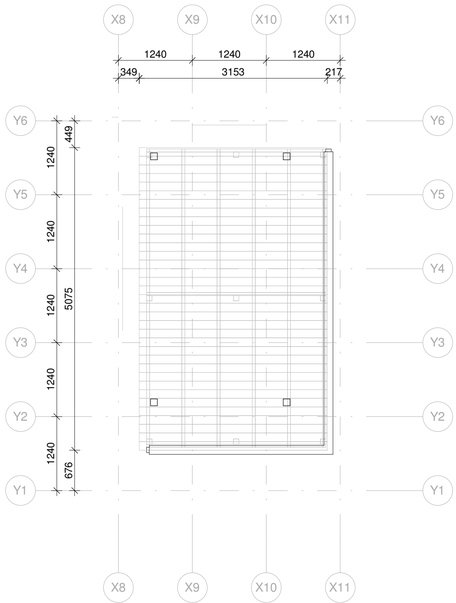


SECTION DECK BEDROOM

1 : 20



FLOORPLAN DECK LIVINGROOM

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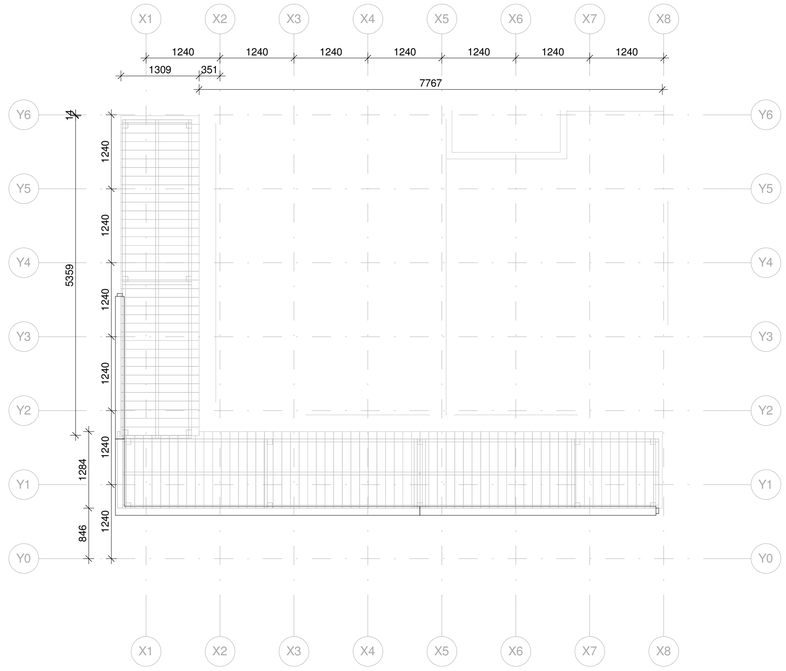

FLOORPLAN DECK KITCHEN

1 : 50

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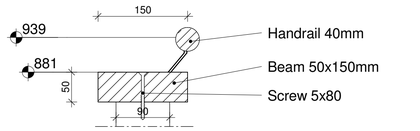
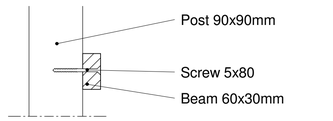
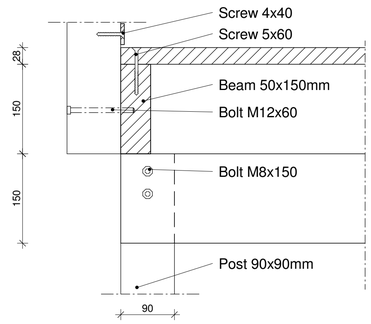
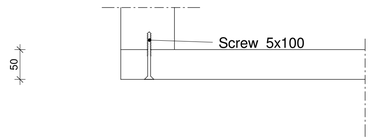
STRUCTUAL DECK OVERVIEW

S-362



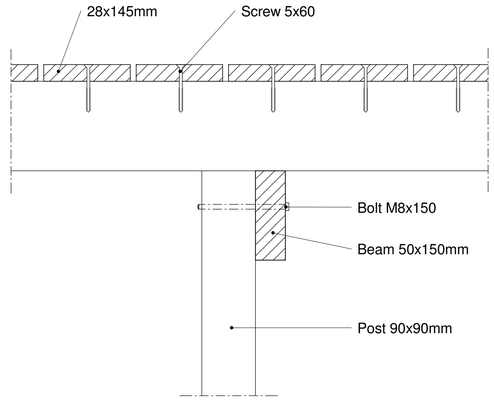


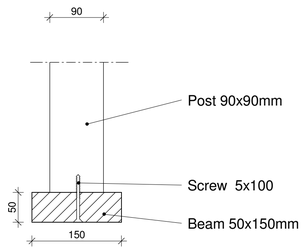




RAMP DETAIL 1

1 : 5





RAMP DETAIL 2

1 : 5

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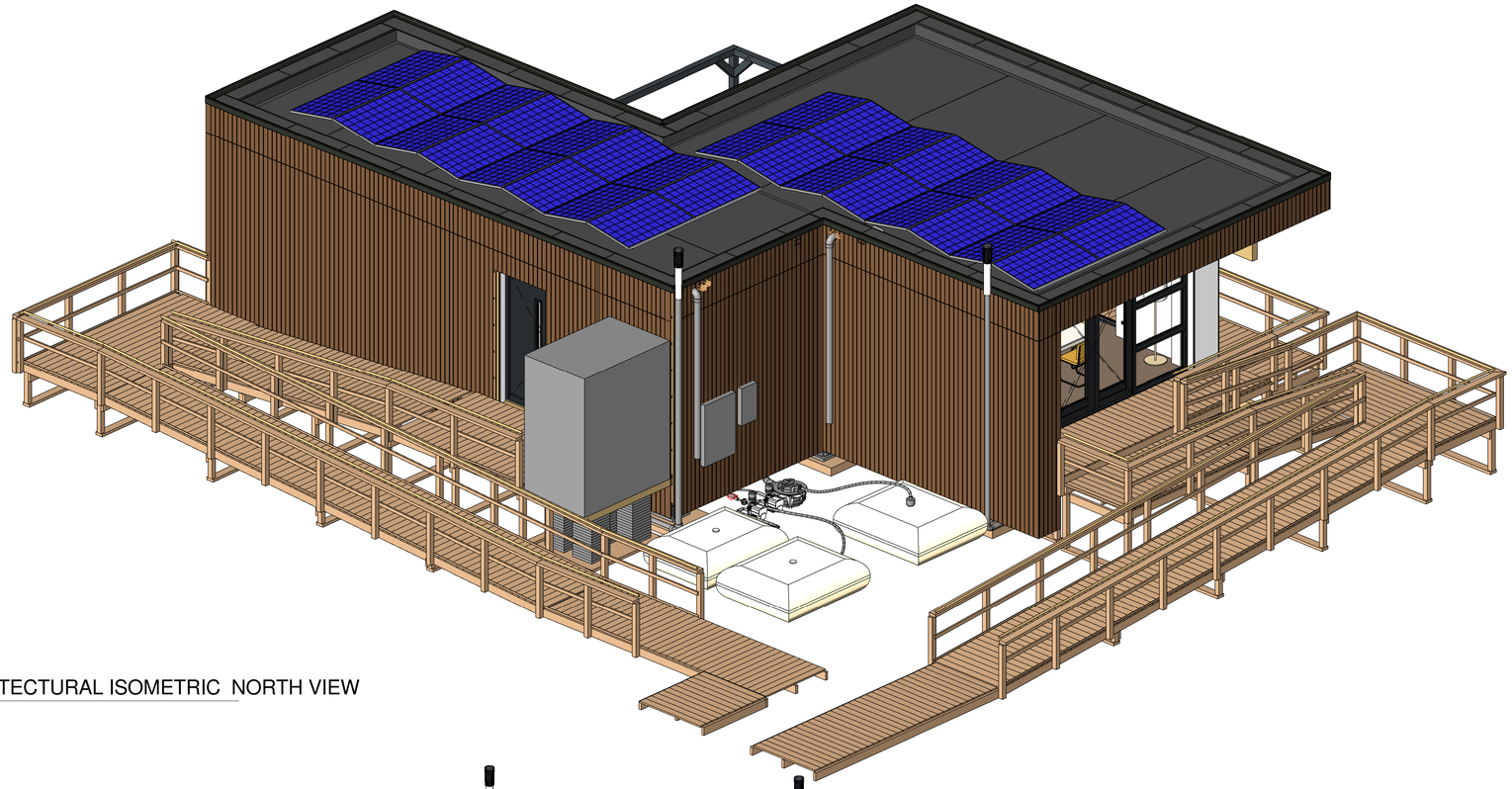
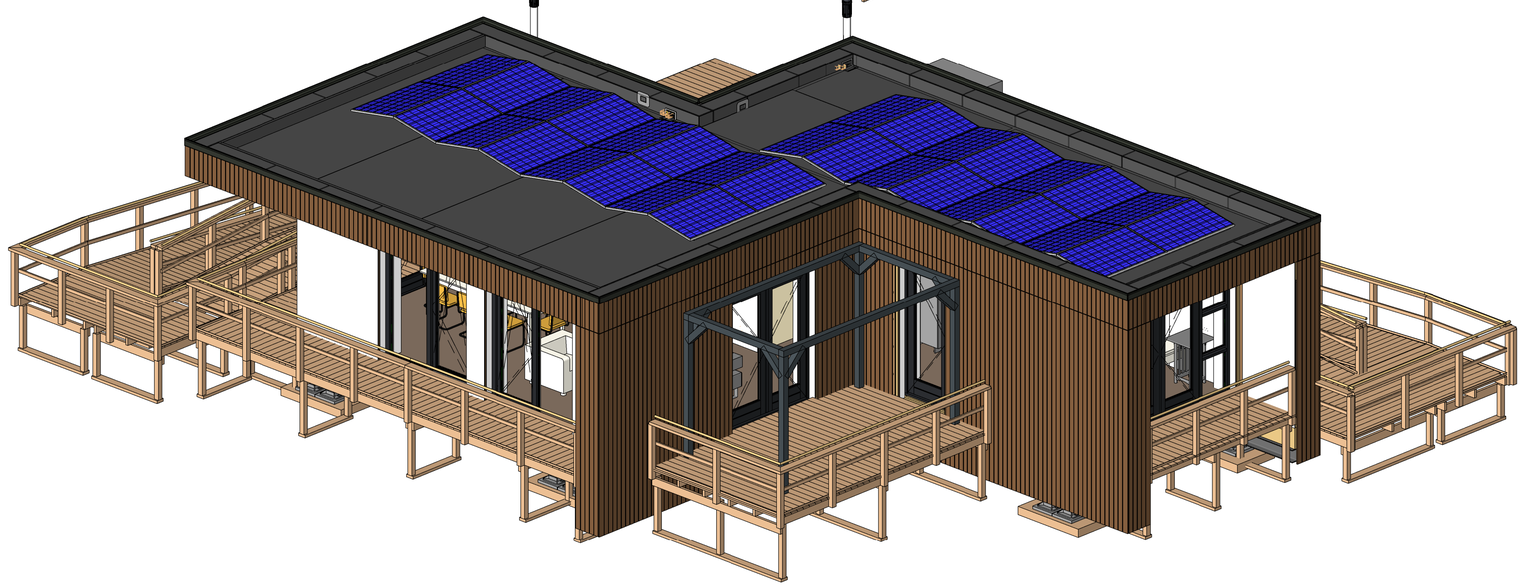
SHEET TITLE

RAMP PLAN DETAIL

S-400



ARCHITECTURAL ISOMETRIC NORTH VIEW



ARCHITECTURAL ISOMETRIC SOUTH VIEW

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ARCHITECTURAL ISOMETRIC

A-100

FLOOR PLAN GROUND FLOOR

1 : 50

N

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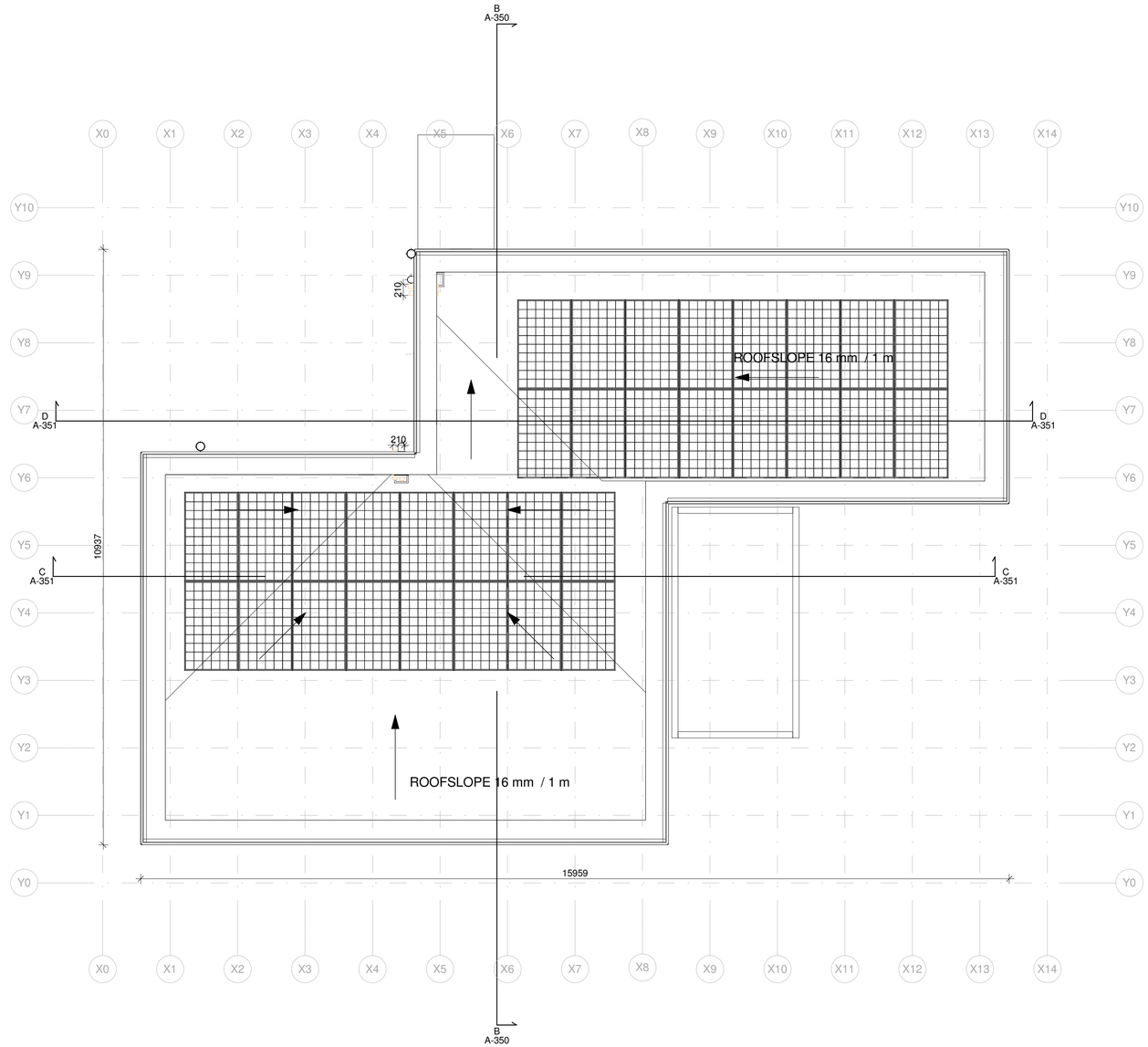
SHEET TITLE

FLOOR PLAN GROUND FLOOR

A-200



ROOF PLAN

1 : 50

N

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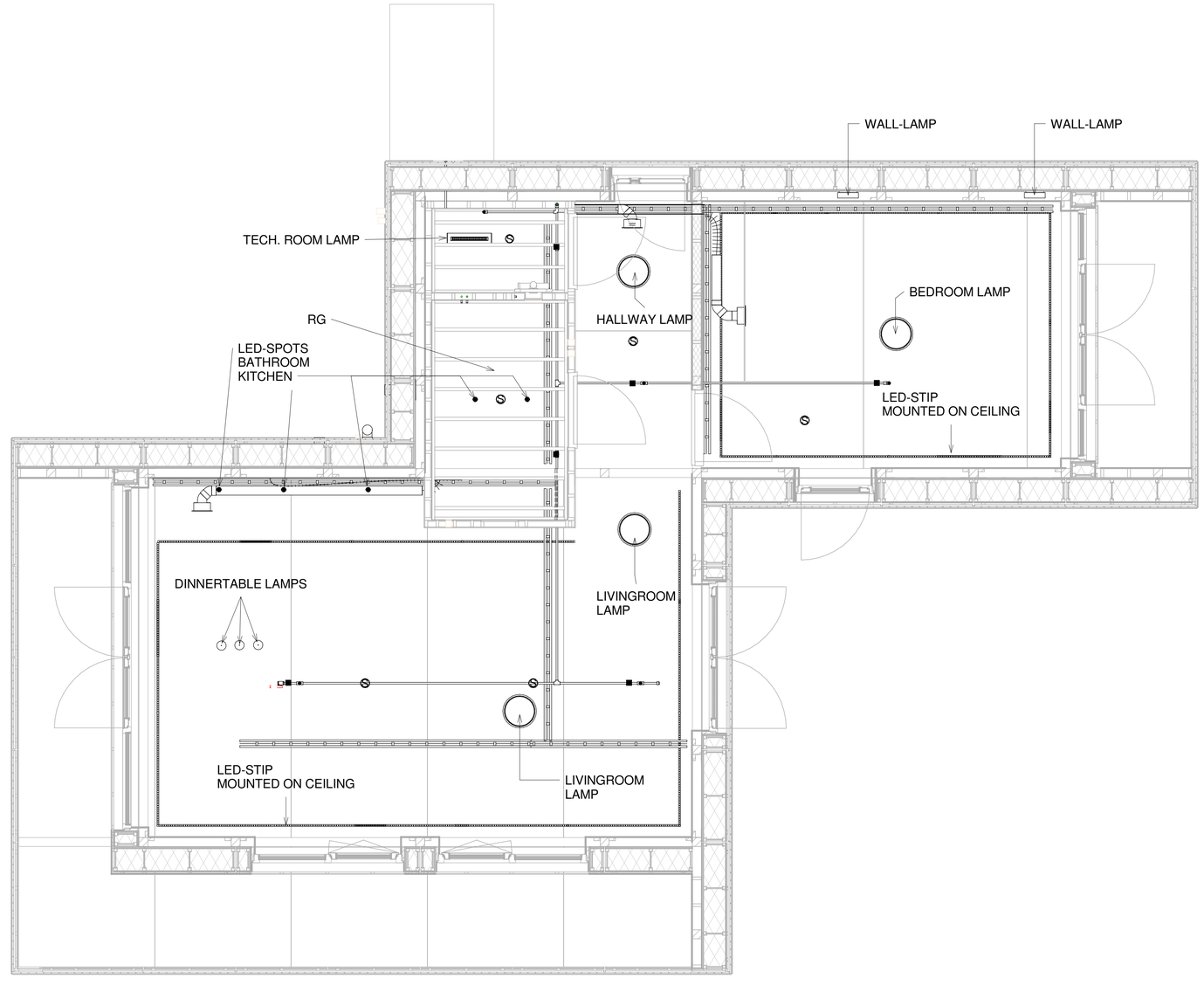
SHEET TITLE

ROOF PLAN

A-201



REFLECTED CEILING PLAN

Scale 1:35

REFLECTED CEILING DRAWING KEY

- FLANGE
- VALVE
- SMOKE DETECTOR
- CEILING SPRINKLER HEAD
- HYDROFOOR PUMP
- PRESSURE GAUGE
- FLOW SWITCH
- CEILING-LAMP
- CEILING-LAMP
- CEILING LAMP
- LED-SPOTS
- WALL LAMP
- LED-STIP

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MARK	DATE	DESCRIPTION
Rev.00	02-24-2017	ADD. CEILING PLAN
Rev.01	08-08-2017	UPDATED CEILING PLAN

LOT NUMBER:	106
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CHECKED BY:	Remco Polle
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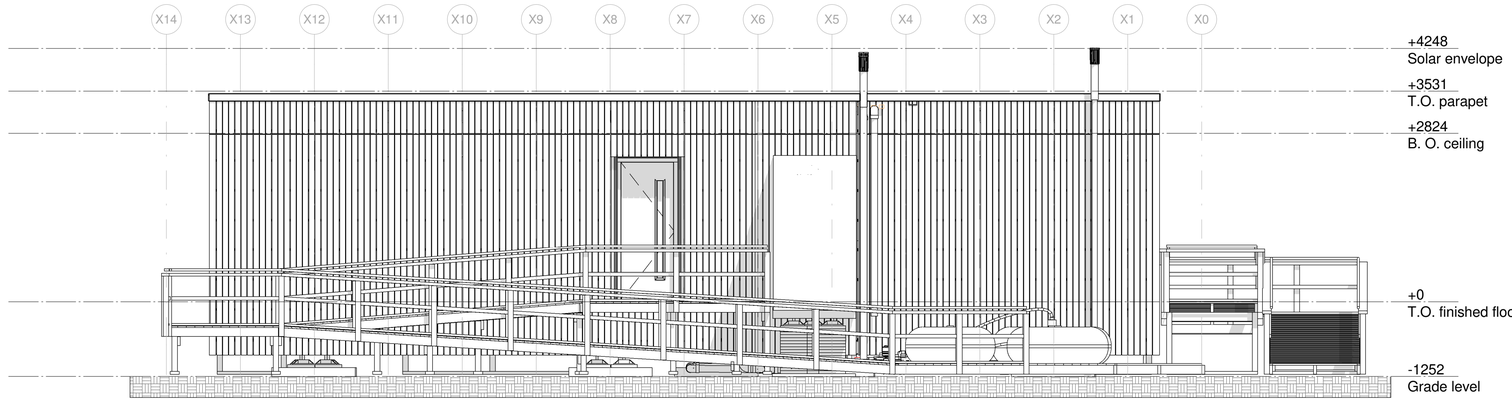
REFLECTED CEILING PLAN

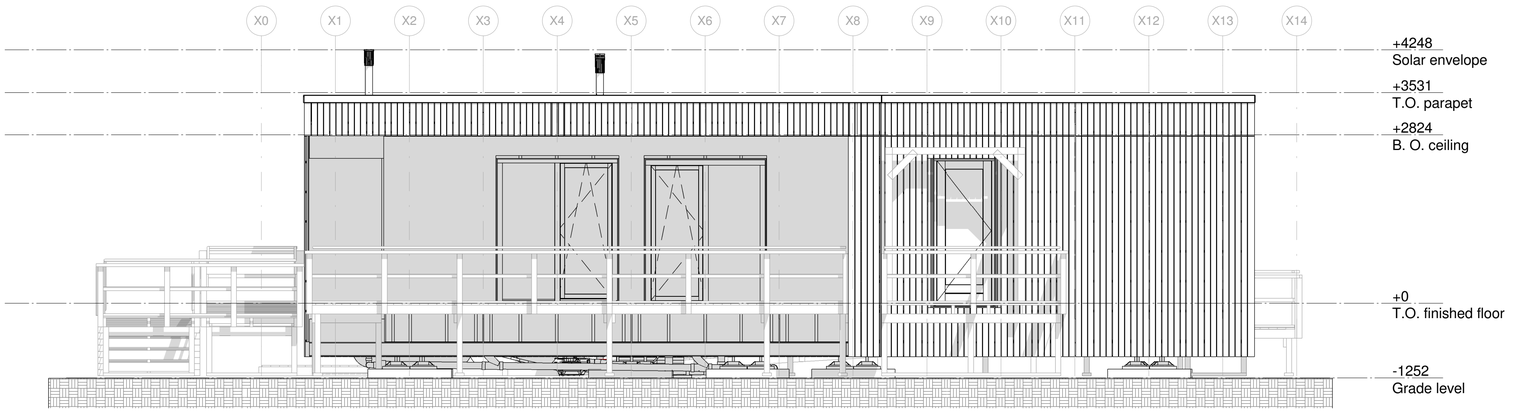
A-202

10-8-2017 14:37:16



NORTH ELEVATION

1 : 50



SOUTH ELEVATION

1 : 50

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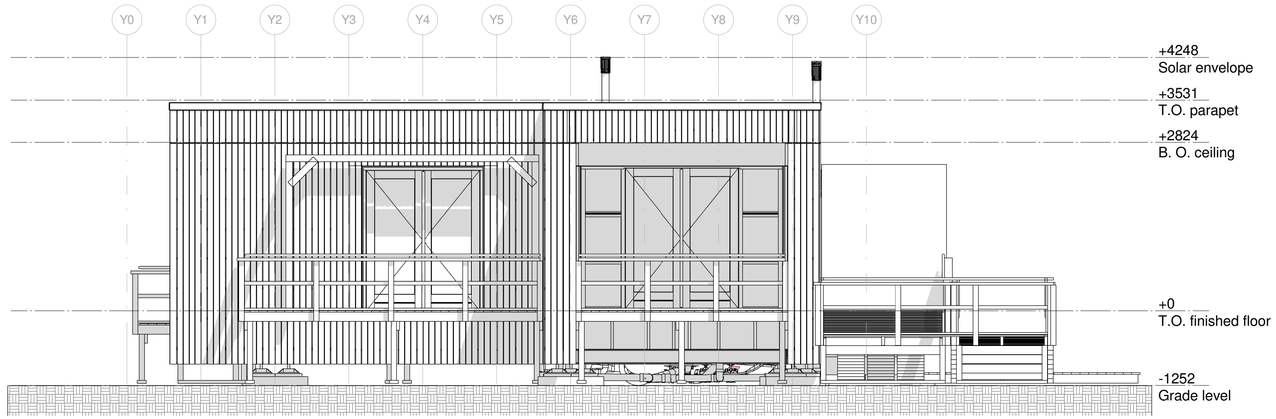
SHEET TITLE

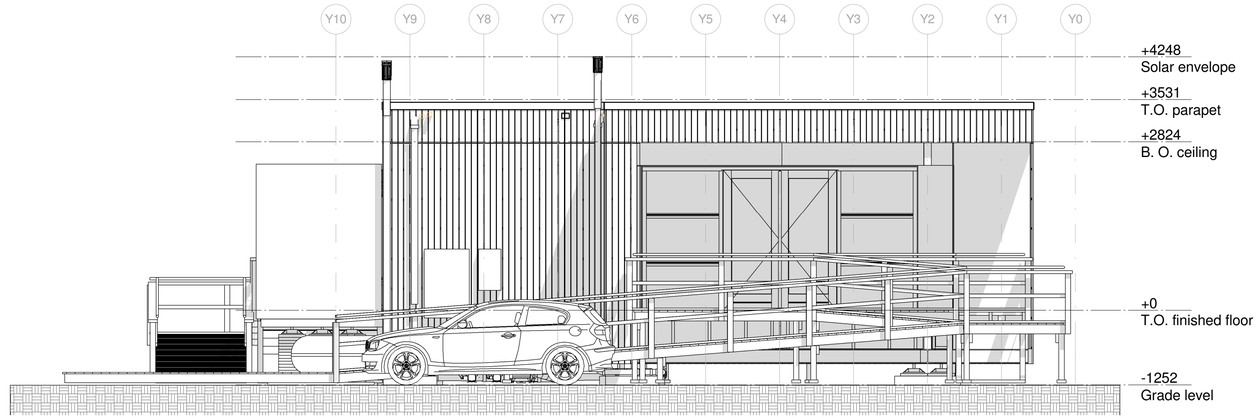
ELEVATIONS

A-300



EAST ELEVATION

1 : 50



WEST ELEVATION

1 : 50

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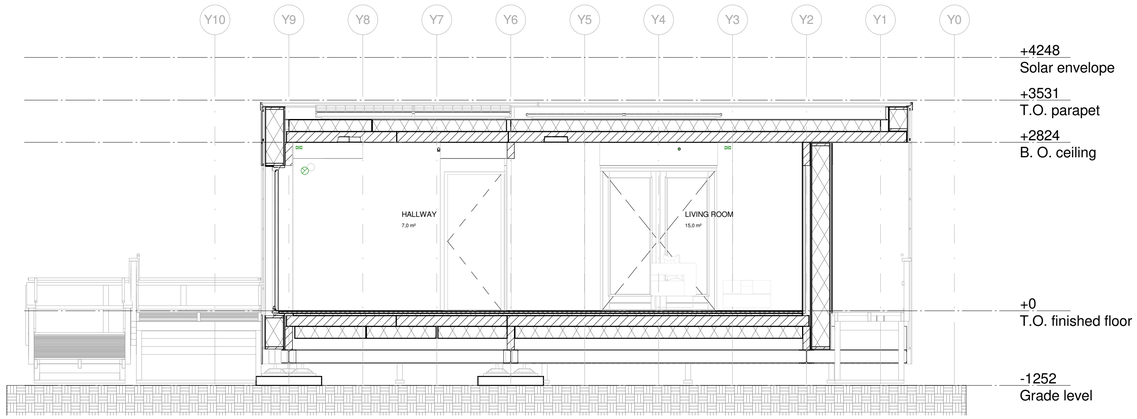
SHEET TITLE

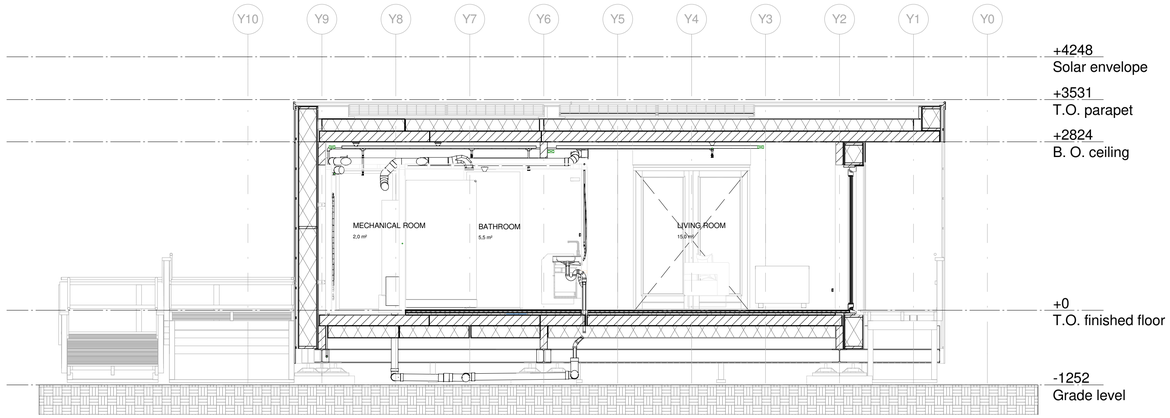
ELEVATIONS

A-301



SECTION A-A

1 : 50



SECTION B-B

1 : 50

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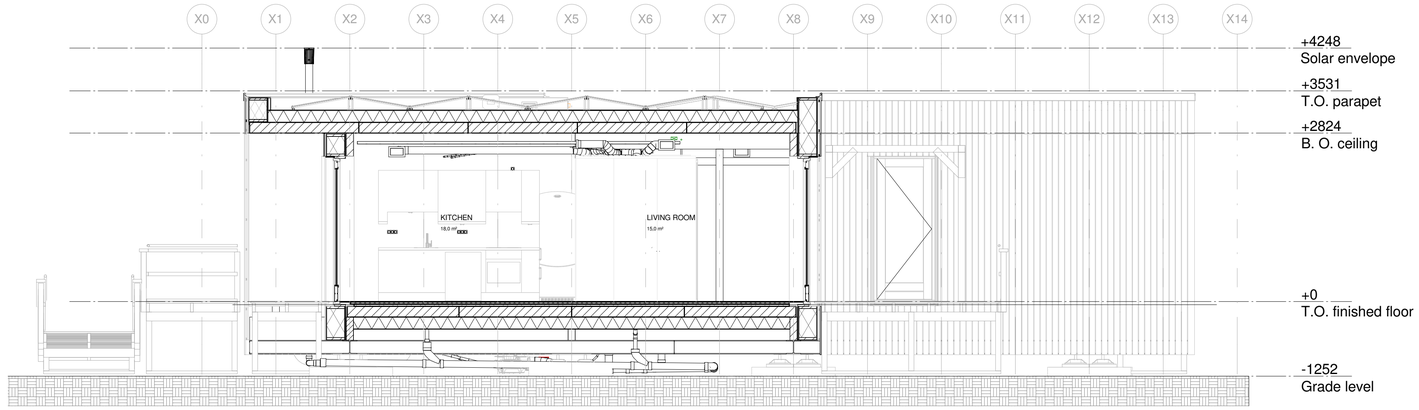
SCALE:	1 : 50

SHEET TITLE

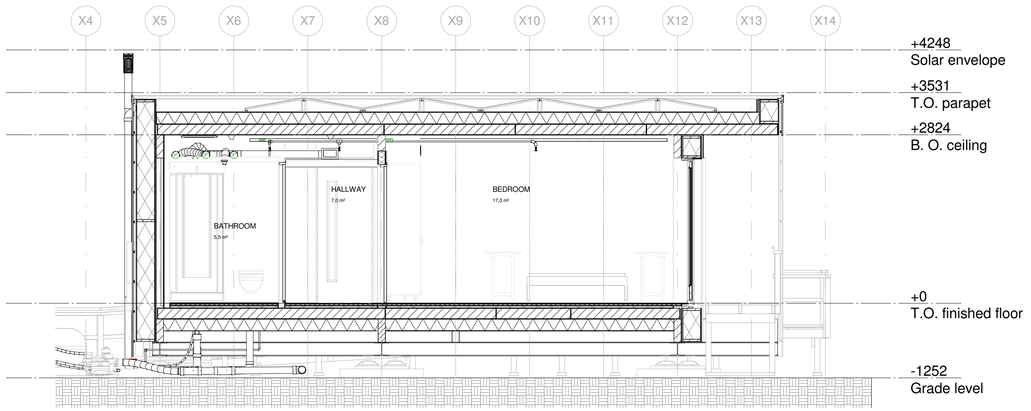
SECTION VIEW A & B

A-350



SECTION C-C

1 : 50



SECTION D-D

1 : 50

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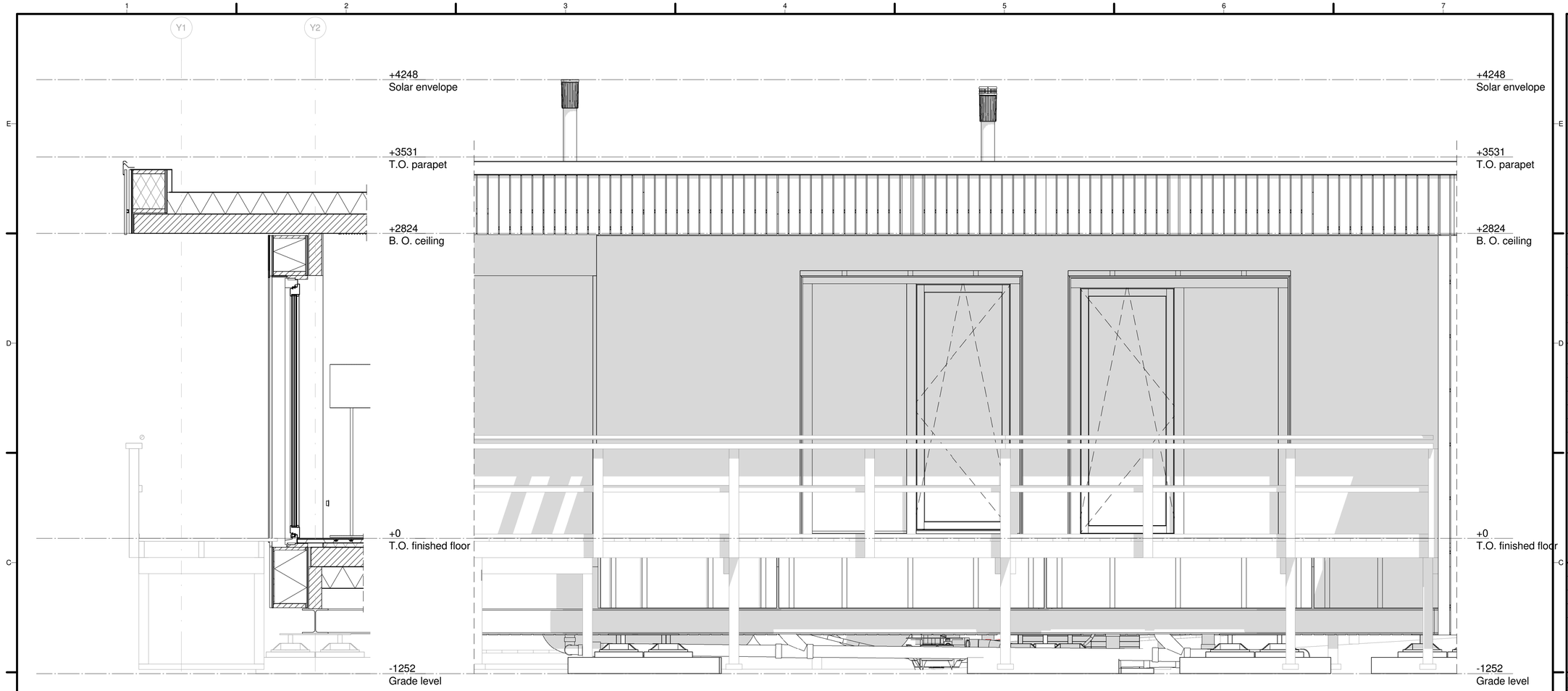
SHEET TITLE

SECTION VIEW C & D

A-351

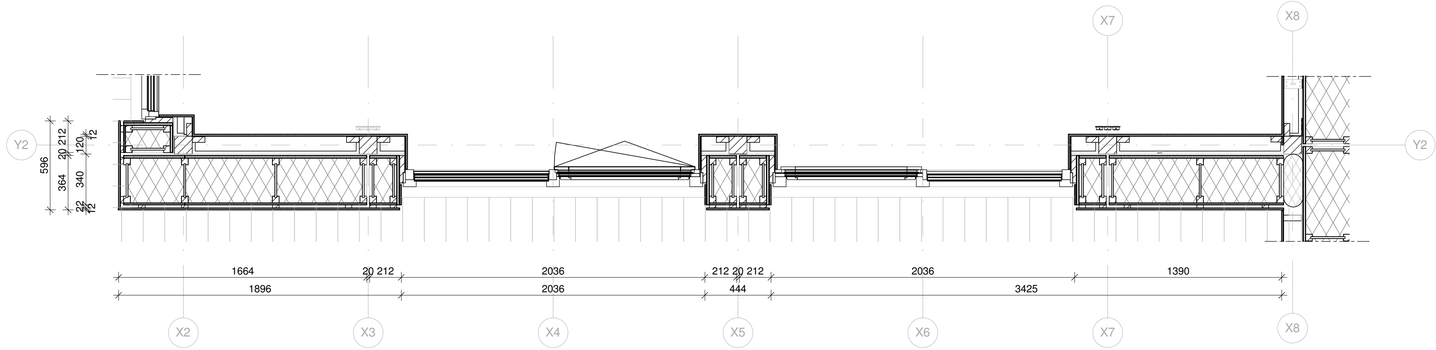


SECTION FRAGMENT 01

1 : 20

ELEVATION FRAGMENT 01

1 : 20



FLOOR PLAN ELEVATION 01

1 : 20

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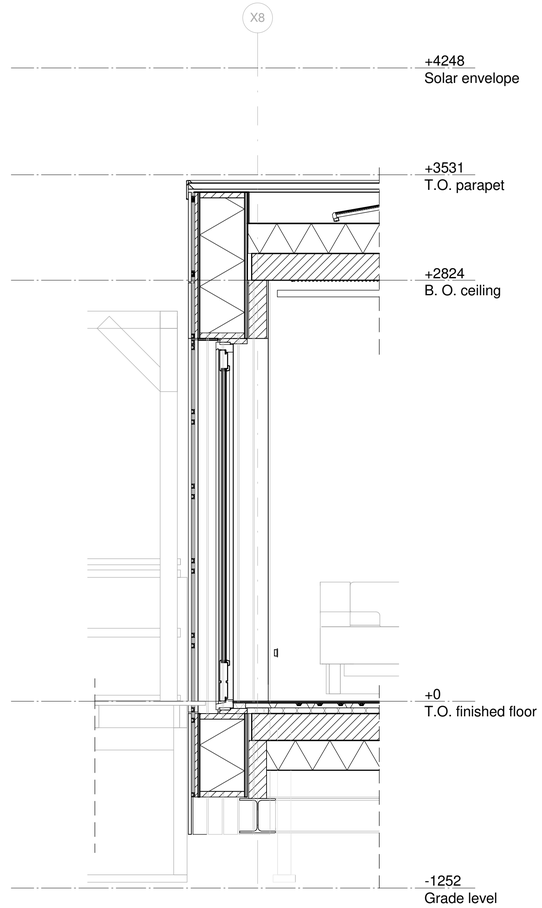
SHEET TITLE

FACADE FRAGMENT 01

A-360



SECTION FRAGMENT 02

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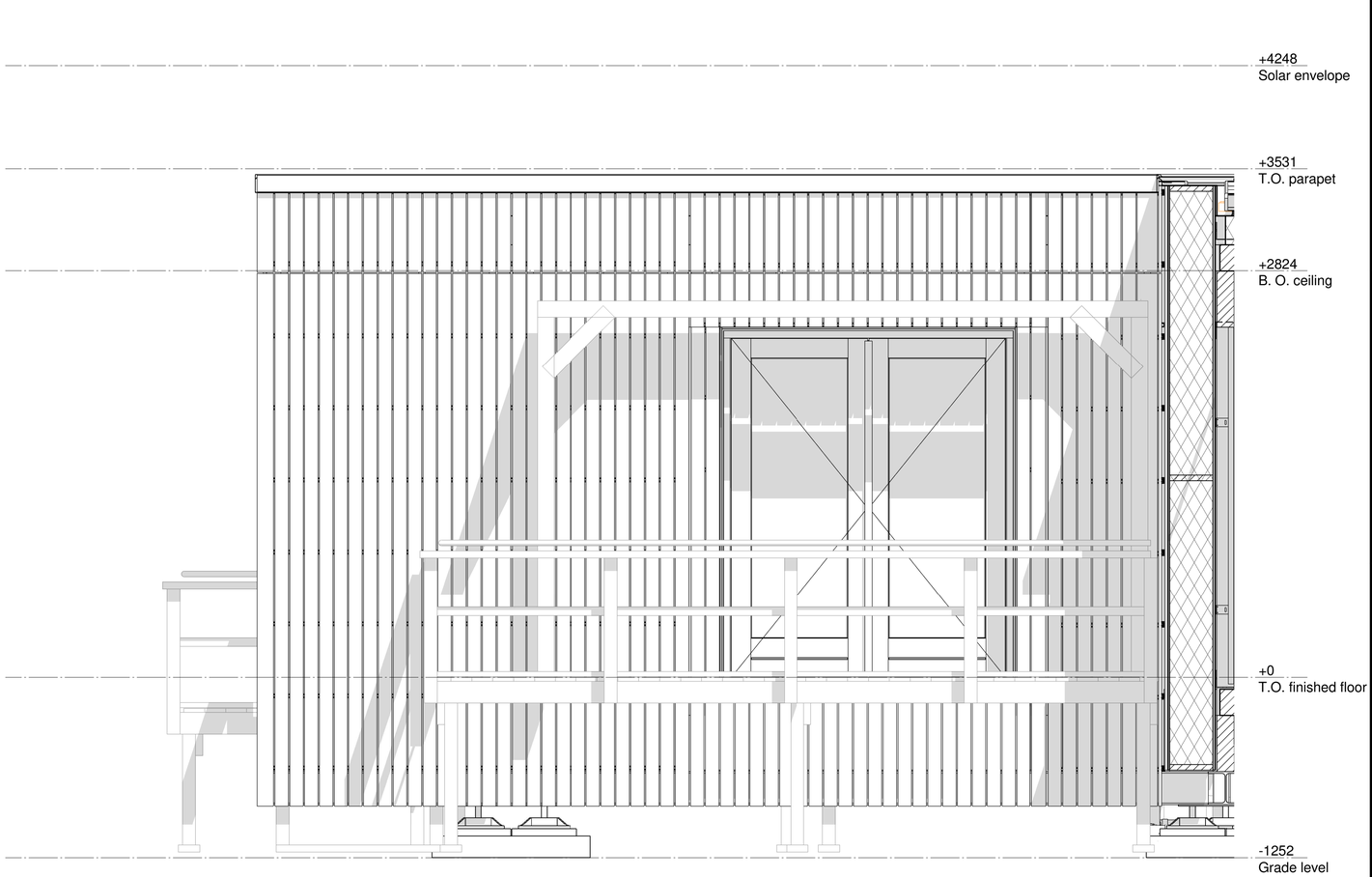
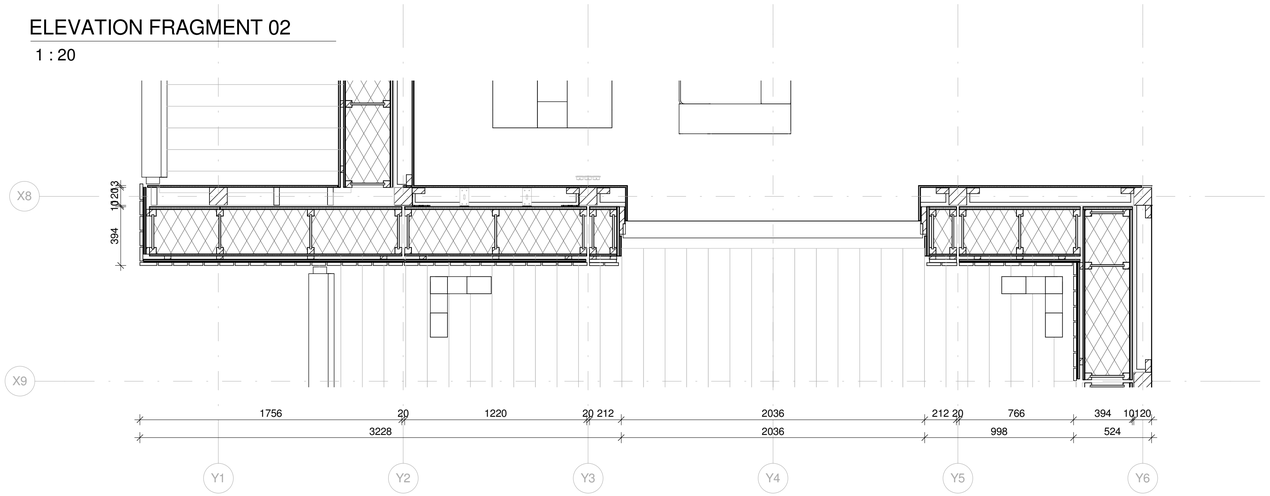


ELEVATION FRAGMENT 02

1 : 20



FLOOR PLAN FRAGMENT 02

1 : 20

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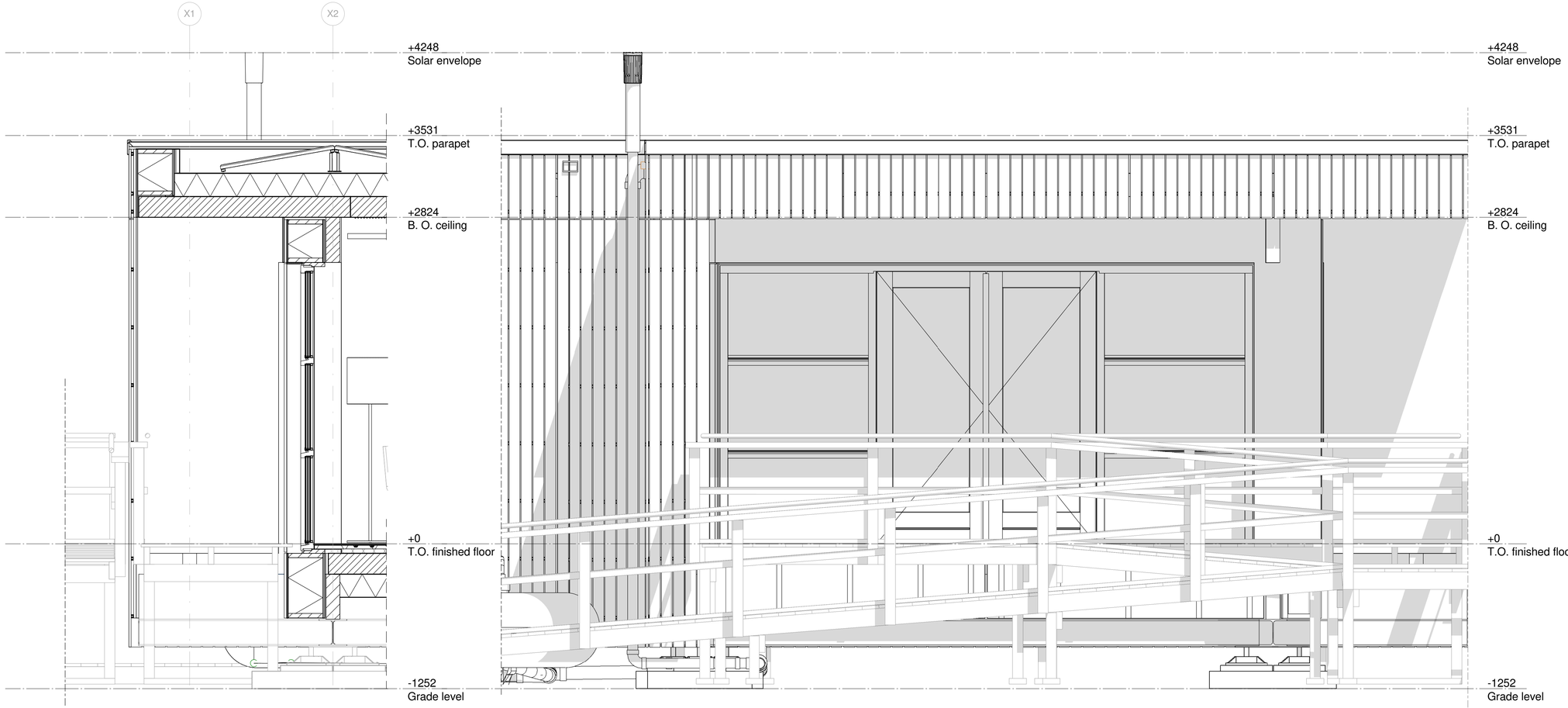
SHEET TITLE

FACADE FRAGMENT 02

A-361

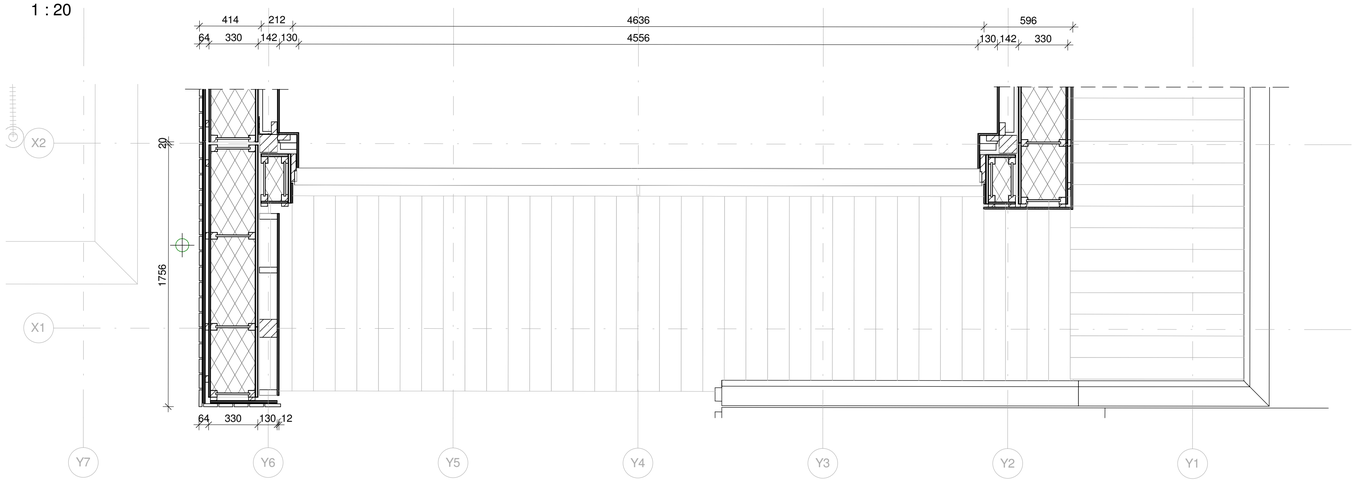


SECTION FRAGMENT 03

1 : 20

ELEVATION FRAGMENT 03

1 : 20



FLOOR PLAN FRAGMENT 03

1 : 20

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FACADE FRAGMENT 03

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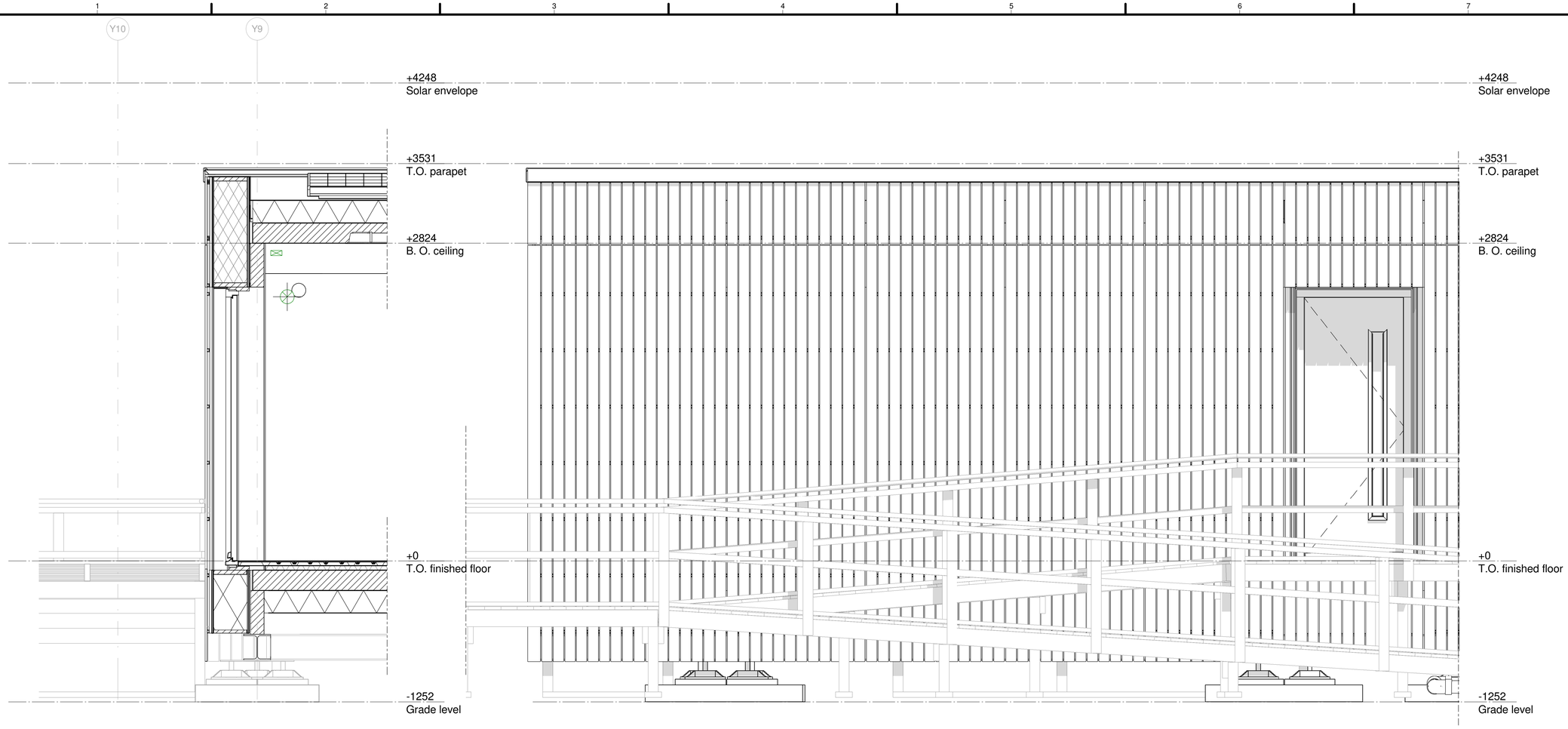
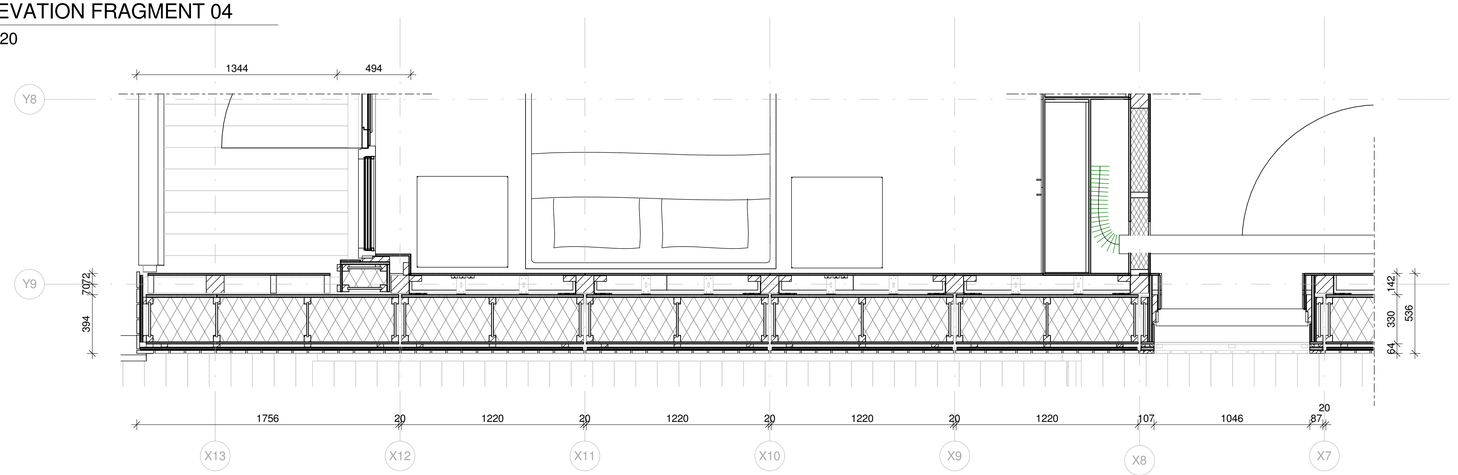


SECTION FRAGMENT 04

1 : 20

ELEVATION FRAGMENT 04

1 : 20



FLOOR PLAN FRAGMENT 04

1 : 20

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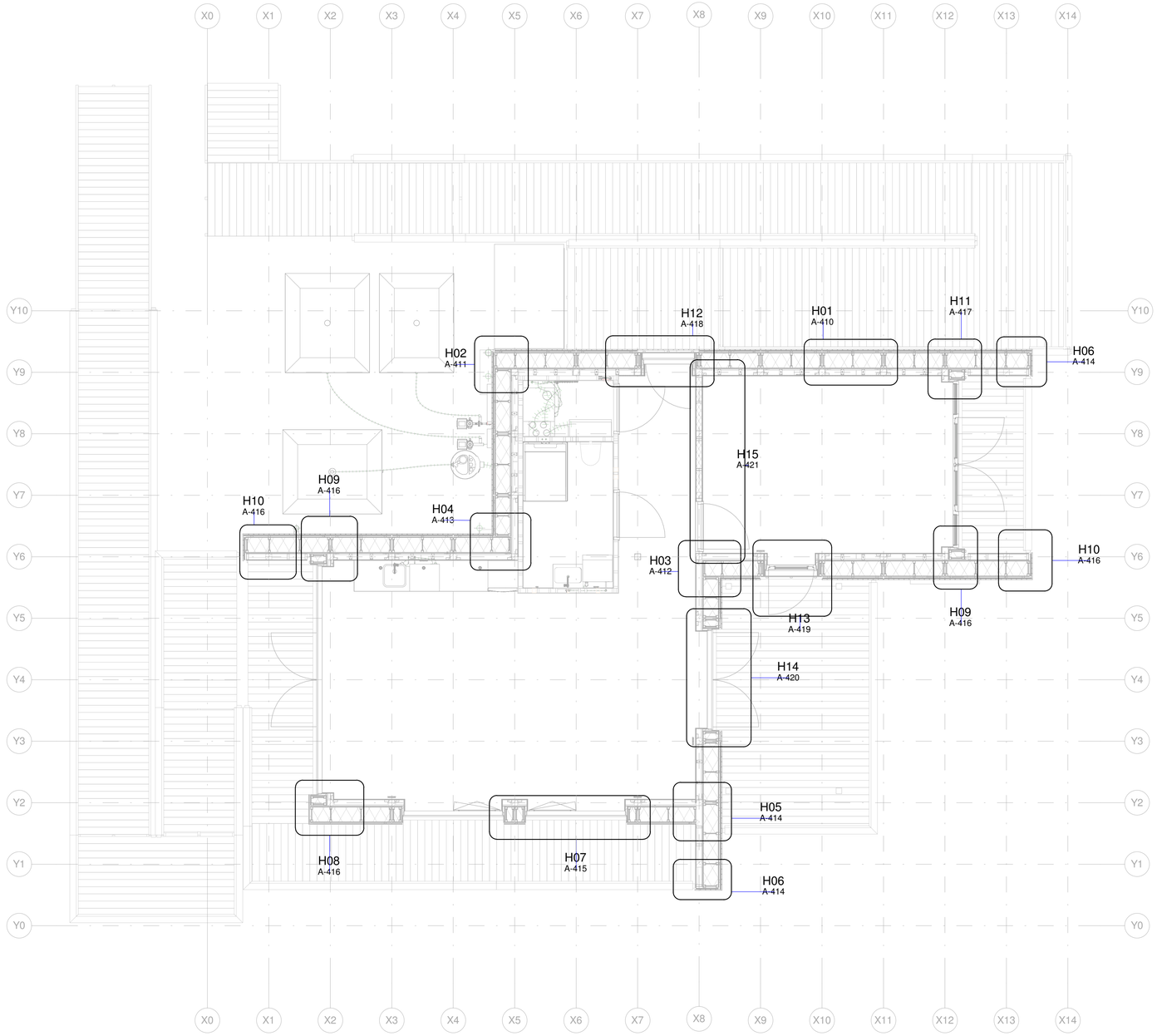
FACADE FRAGMENT 04

A-363



DETAIL OVERVIEW FLOOR PLAN

1 : 50

N

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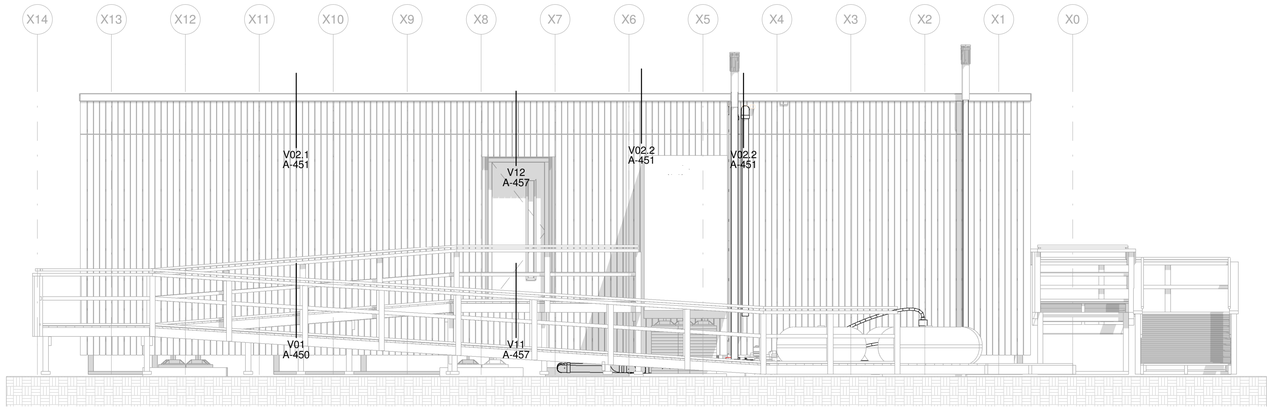
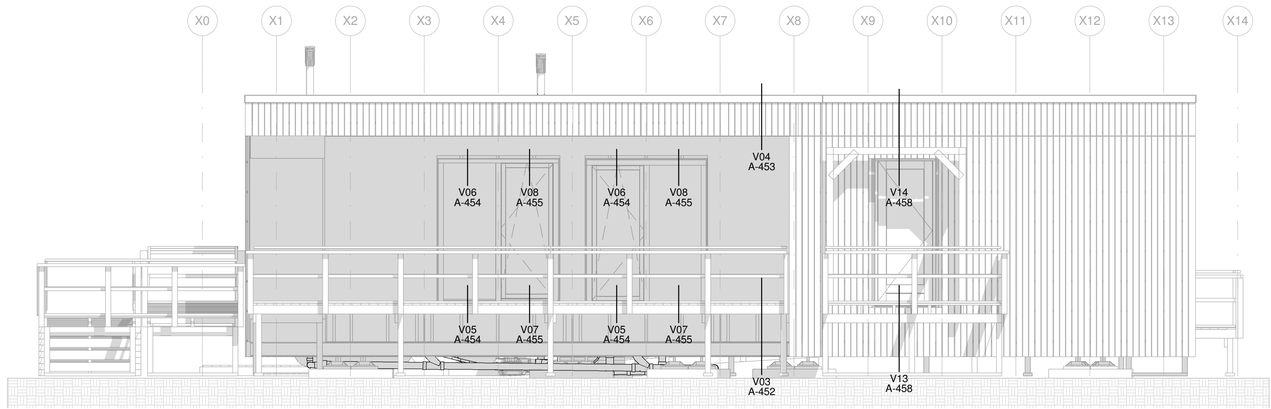
DETAIL OVERVIEW FLOOR PLAN

A-400



NORTH ELEVATION

1 : 50



SOUTH ELEVATION

1 : 50

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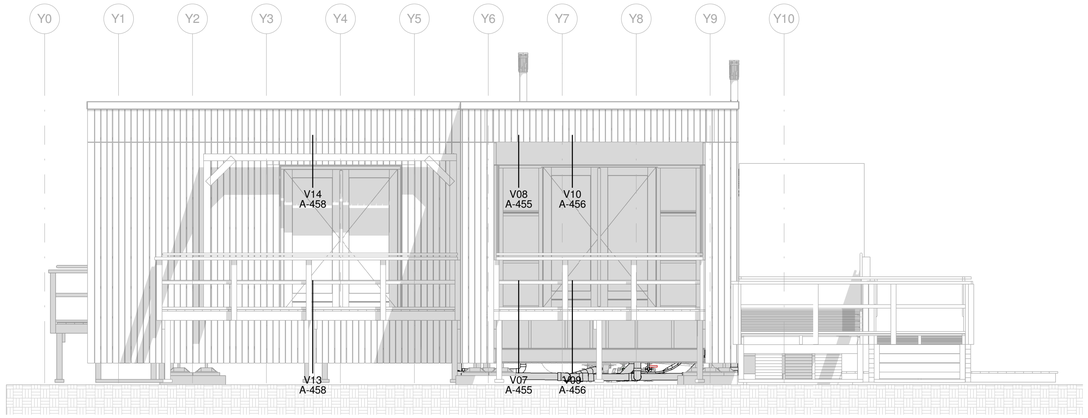
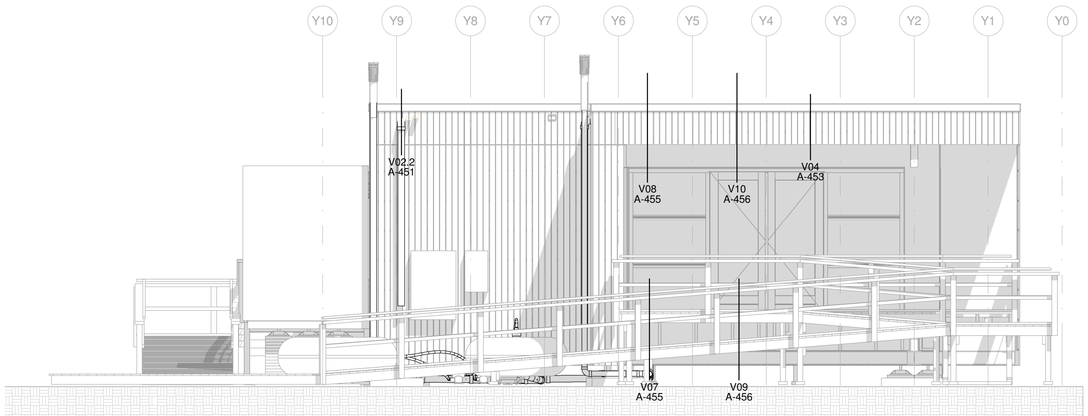
DETAIL OVERVIEW ELEVATIONS

A-401



EAST ELEVATION

1 : 50



WEST ELEVATION

1 : 50

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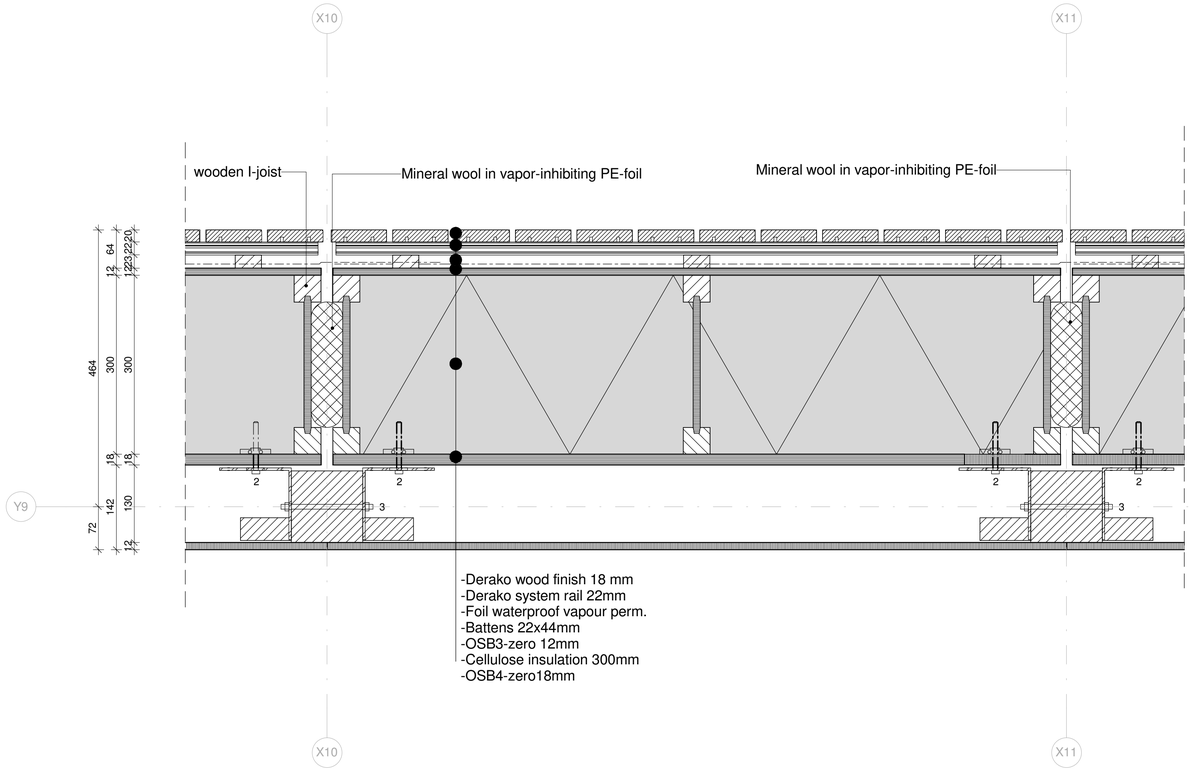
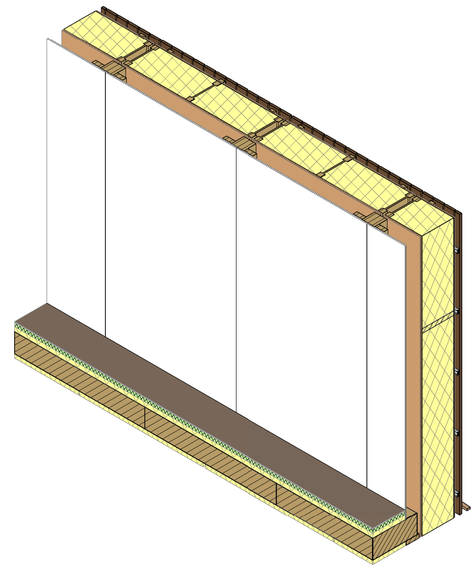
SHEET TITLE

DETAIL OVERVIEW ELEVATIONS

A-402





DETAIL H01

1 : 5

Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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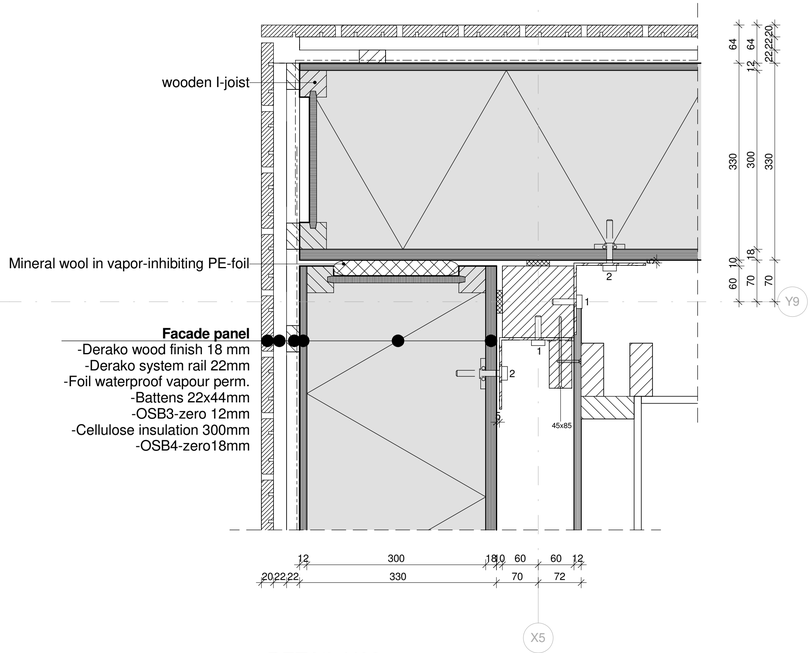
SHEET TITLE

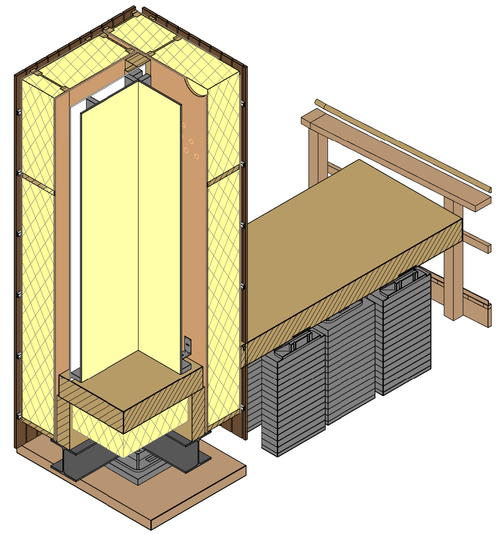
DETAIL H01 - CONNECTION FACADE PANELS

A-410



DETAIL H02

1 : 5



Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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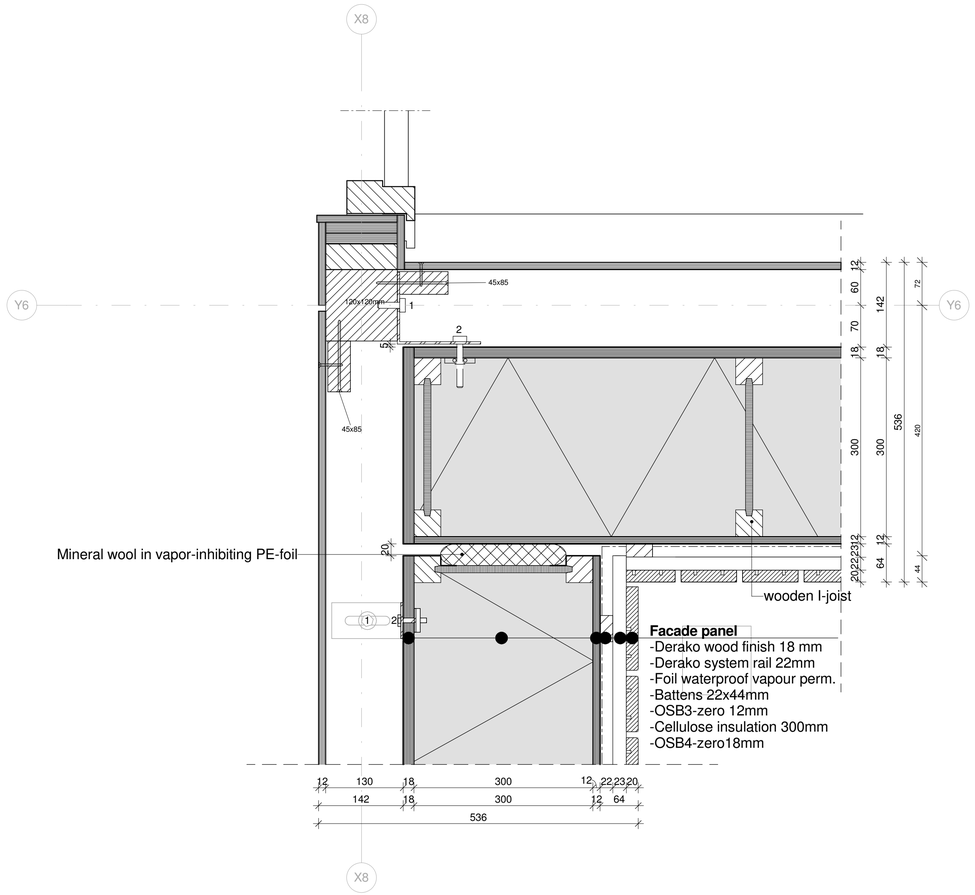
SHEET TITLE

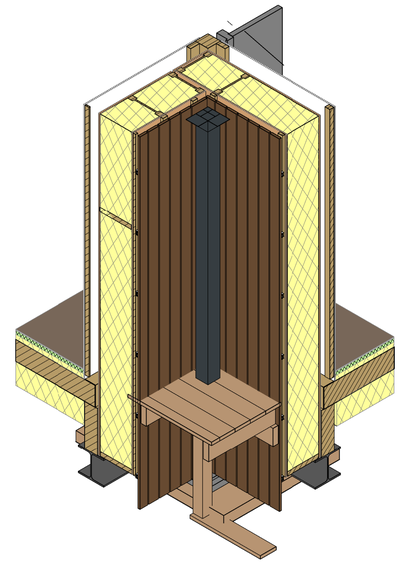
DETAIL H02 - CONNECTION OUTSIDE CORNER FACADE PANELS

A-411



DETAIL H03

1 : 5



Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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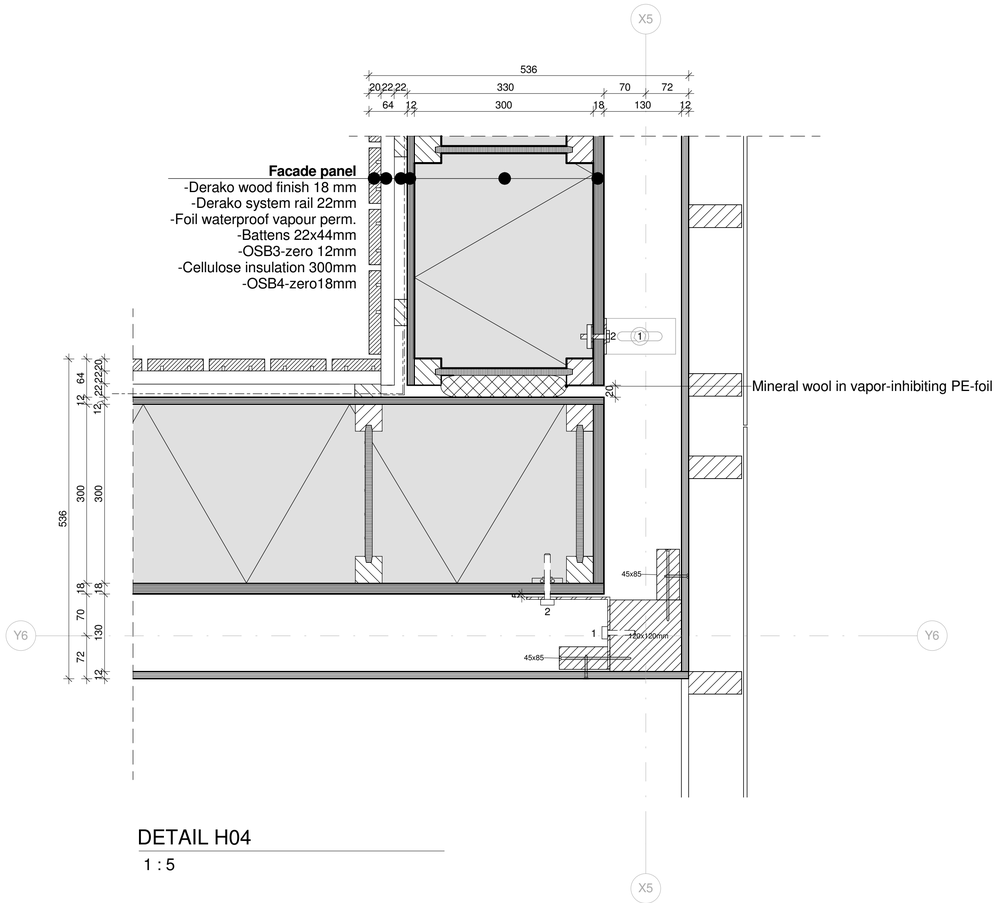
SHEET TITLE

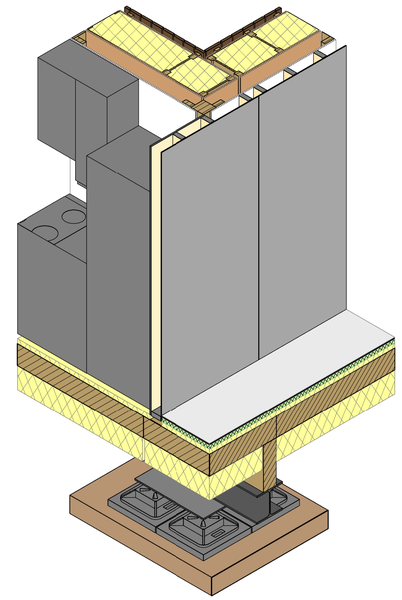
DETAIL H03 - CONNECTION INSIDE CORNER FACADE PANELS

A-412



DETAIL H04

1 : 5



Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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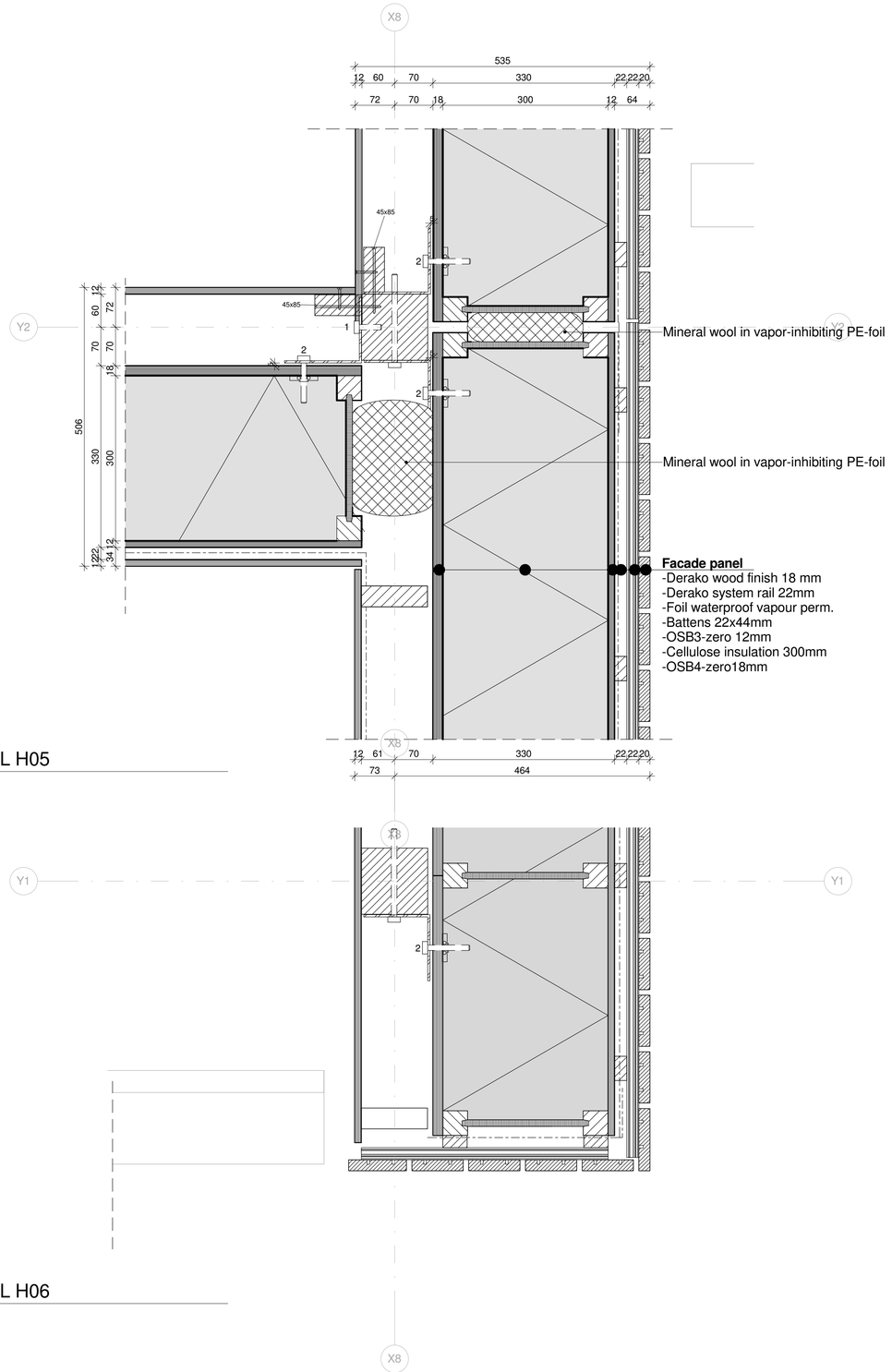
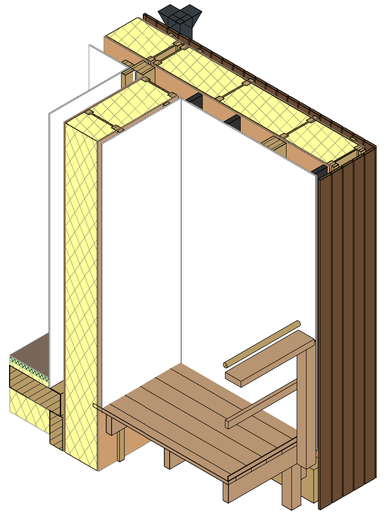
DETAIL H04 - CONNECTION INSIDE CORNER FACADE PANELS

A-413



DETAIL H05

1 : 5



Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL H06

1 : 5

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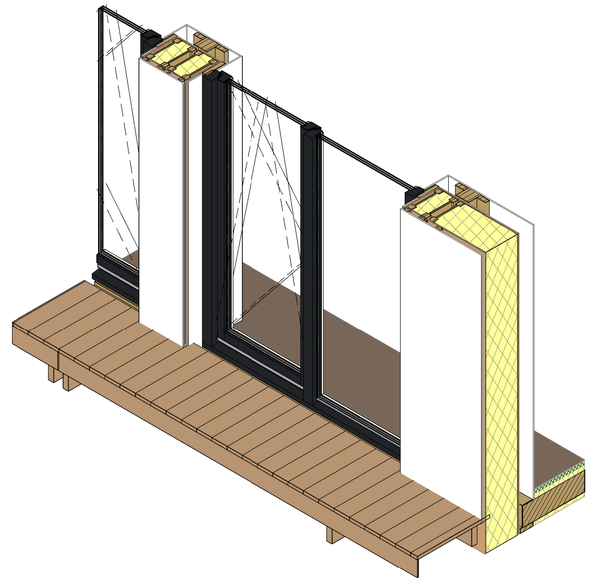
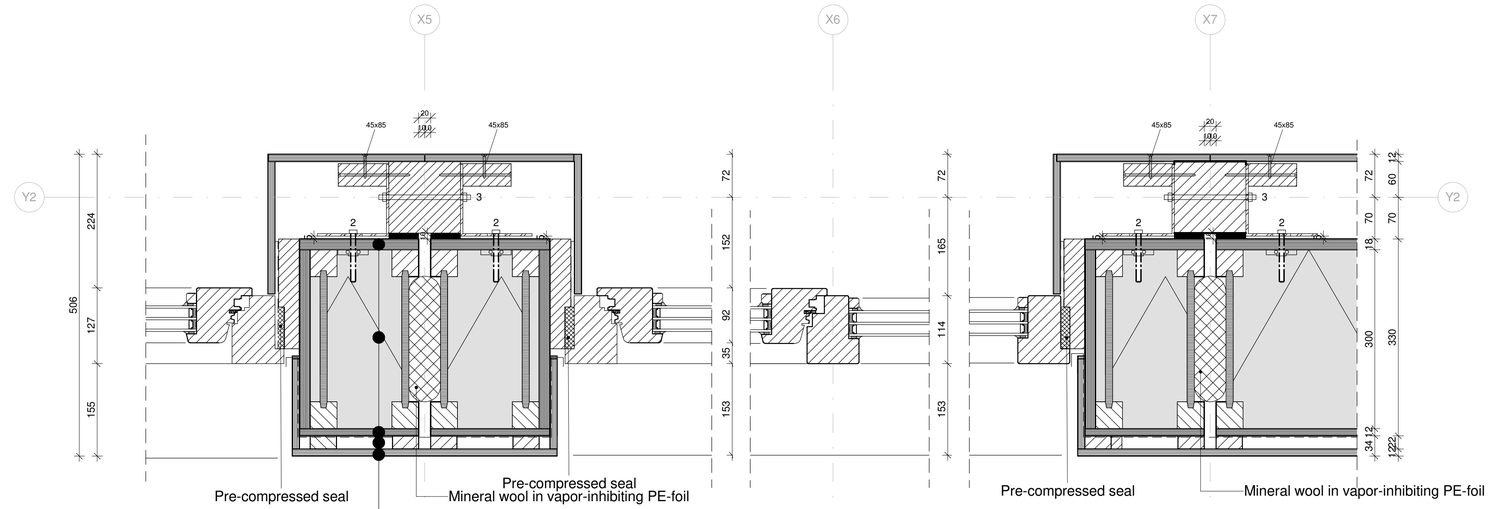
DETAIL H05-H06 - CONNECTION FACADE PANELS AT OVERHANG

A-414





FACADE PANEL
-Plywood Okoume 12mm
-Battens 22x44mm
-Foil waterproof vapour perm.
-OSB3-zero 12mm
-Cellulose insulation I-JOISTS steicowall SW45ISO 300mm
-OSB4-zero18mm

DETAIL H07

1 : 5

Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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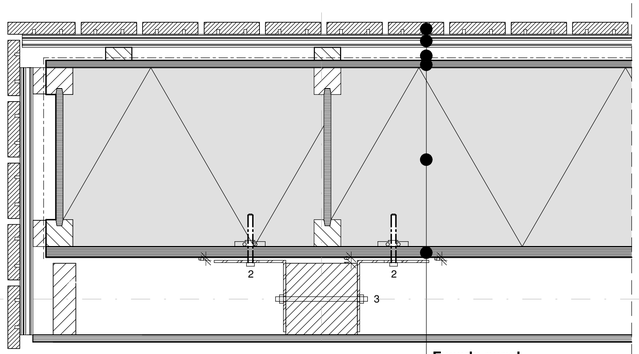
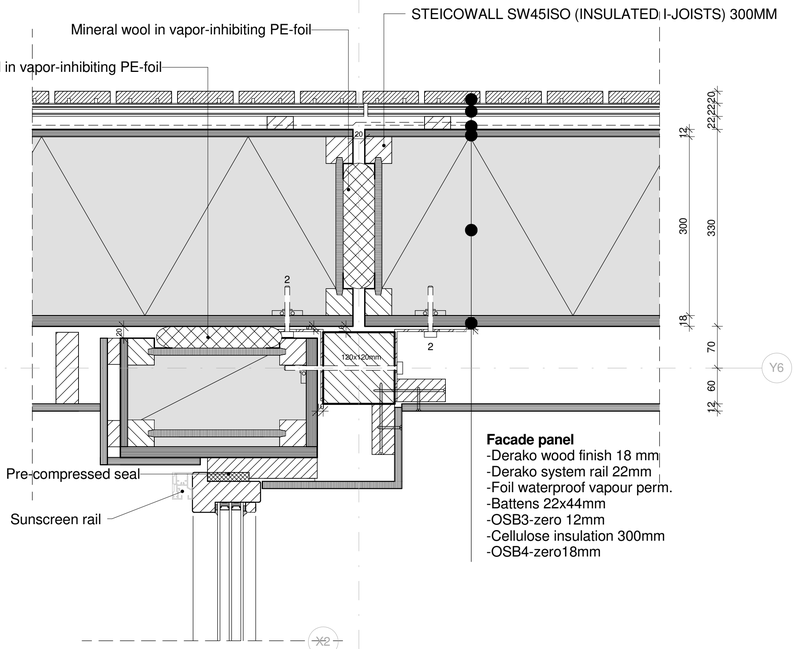
DETAIL H07 - CONNECTION TILT-TURN WINDOW

A-415



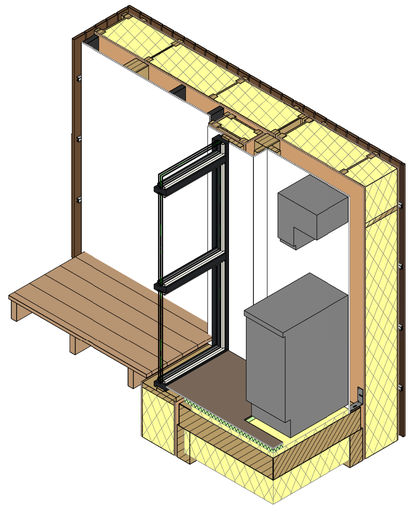
Facade panel
-Derako wood finish 18 mm
-Derako system rail 22mm
-Foil waterproof vapour perm.
-Battens 22x44mm
-OSB3-zero 12mm
-Cellulose insulation 300mm
-OSB4-zero18mm

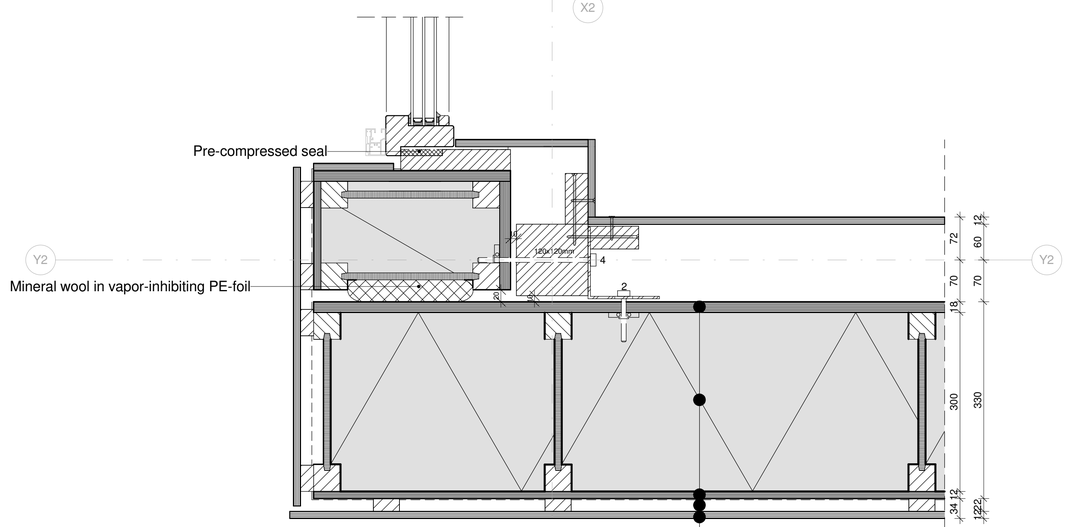
DETAIL H10
1 : 5



Facade panel
-Derako wood finish 18 mm
-Derako system rail 22mm
-Foil waterproof vapour perm.
-Battens 22x44mm
-OSB3-zero 12mm
-Cellulose insulation 300mm
-OSB4-zero18mm

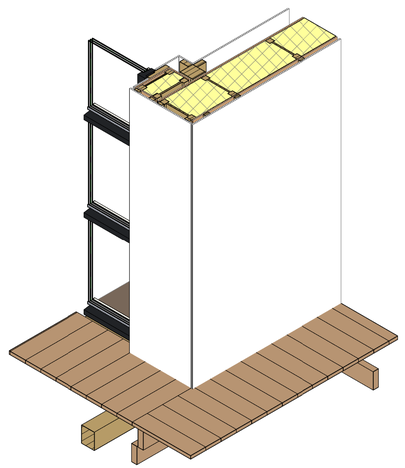
DETAIL H09
1 : 5





FACADE PANEL
-Plywood Okoume 12mm
-Battens 22x44mm
-Foil waterproof vapour perm.
-OSB3-zero 12mm
-Cellulose insulation I-JOISTS steicowall SW45ISO 300mm
-OSB4-zero18mm

DETAIL H08
1 : 5



Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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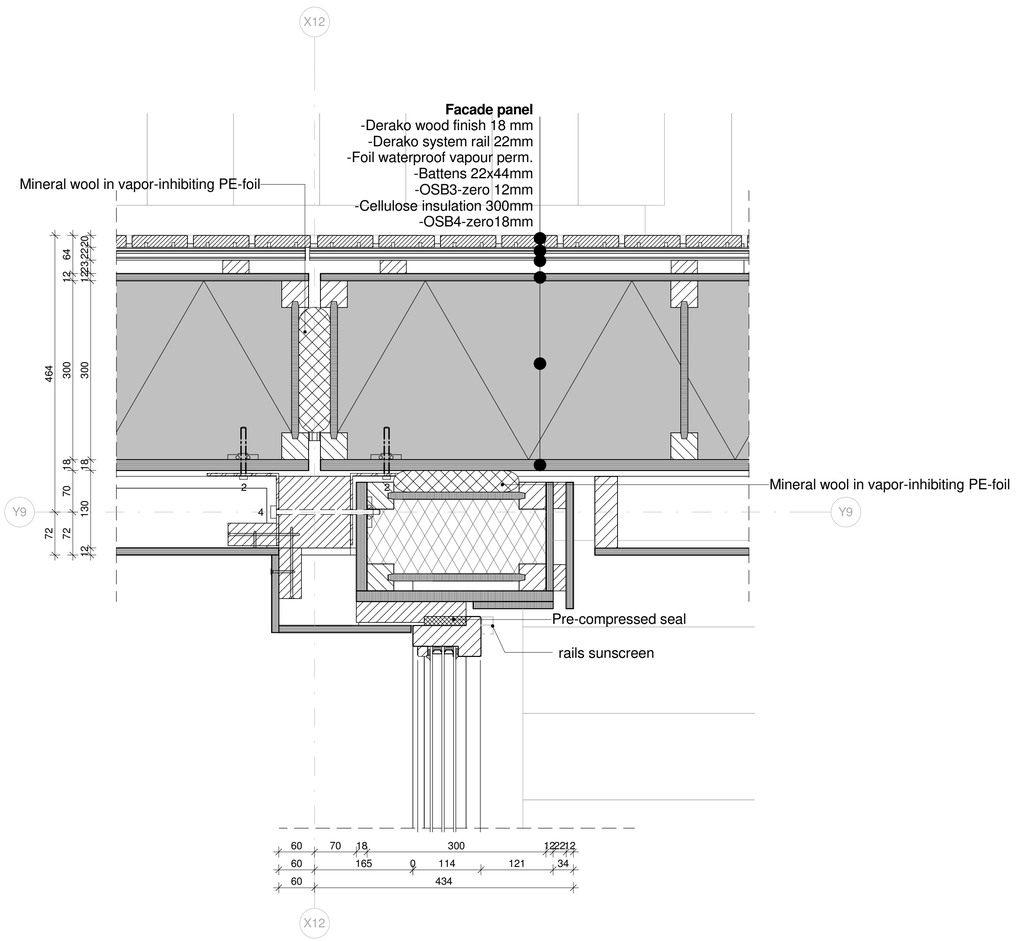
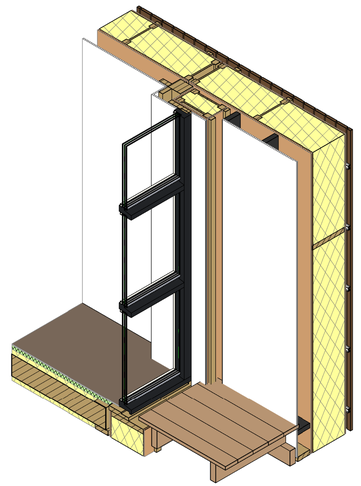
DETAIL H08-H09-H10 - CONNECTION DINING/BED ROOM WINDOW/DOOR

A-416





Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL H11

1 : 5

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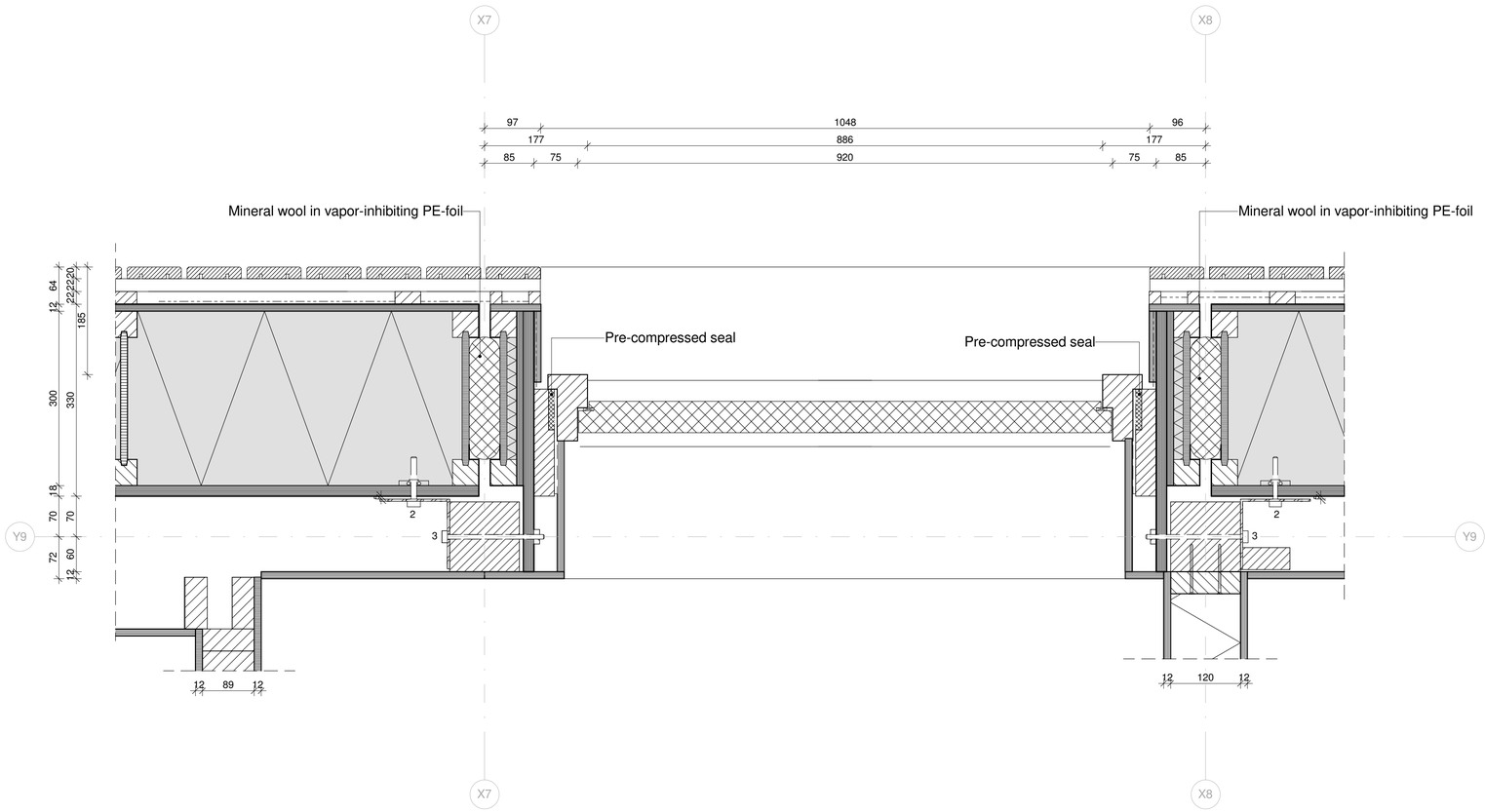
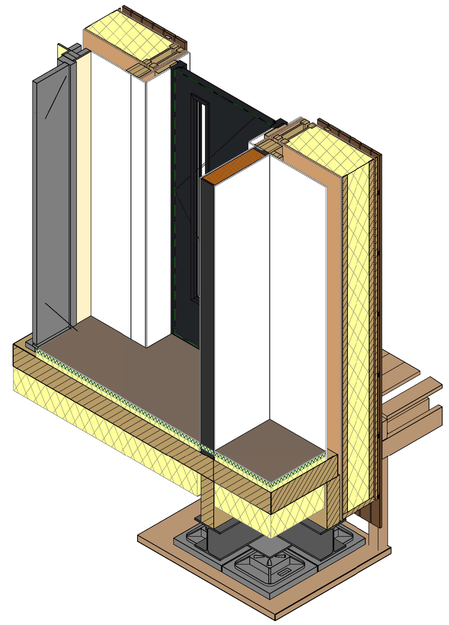
DETAIL H11 - CONNECTION BEDROOM WINDOW

A-417





DETAIL H12

1 : 5

Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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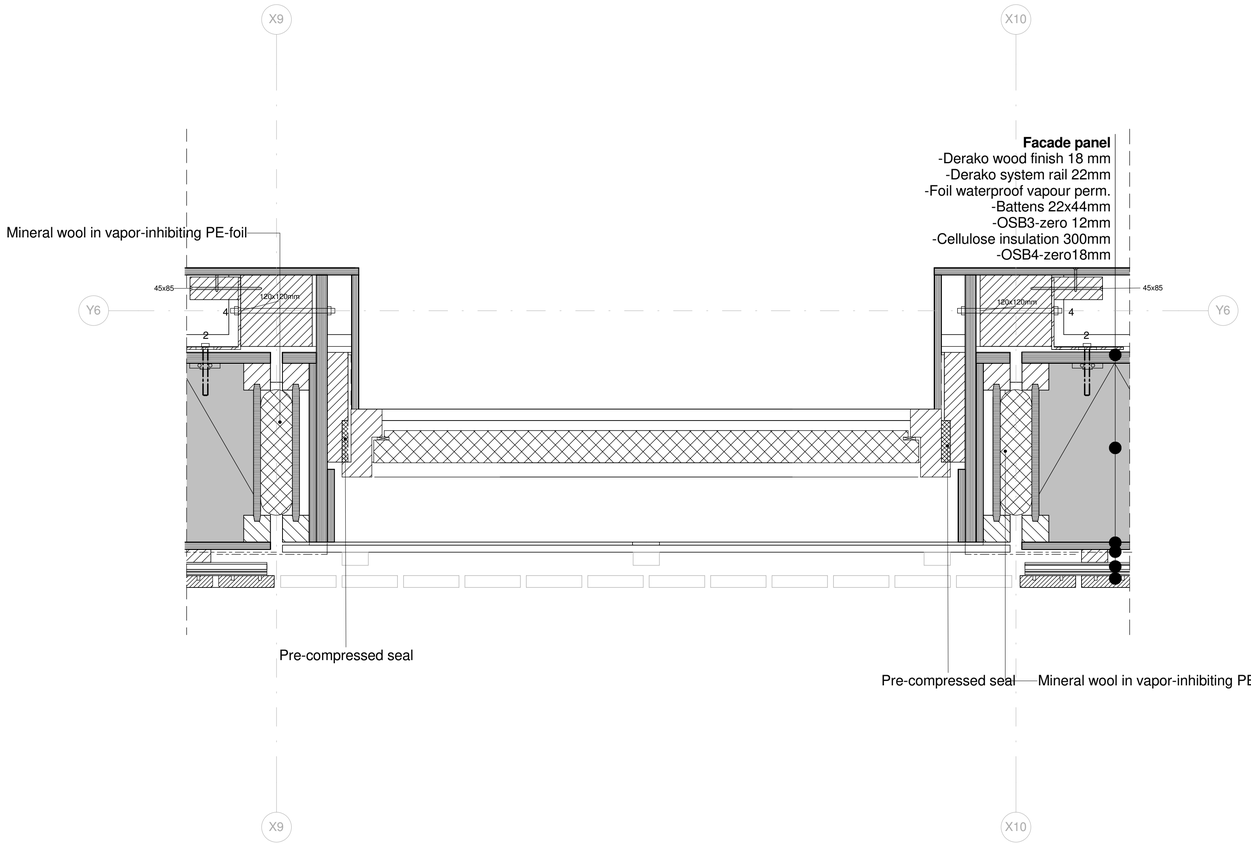
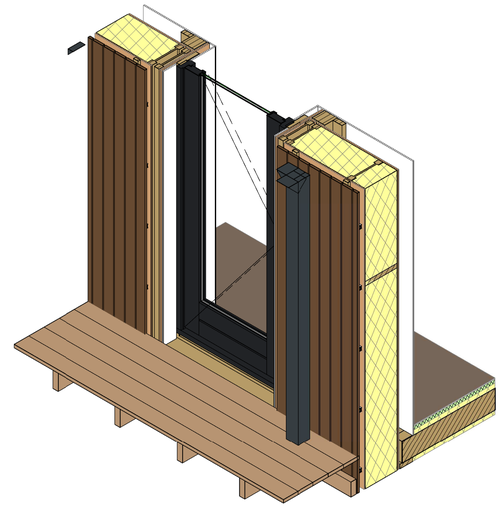
DETAIL H12 - CONNECTION FRONT DOOR

A-418



DETAIL H13

1 : 5



Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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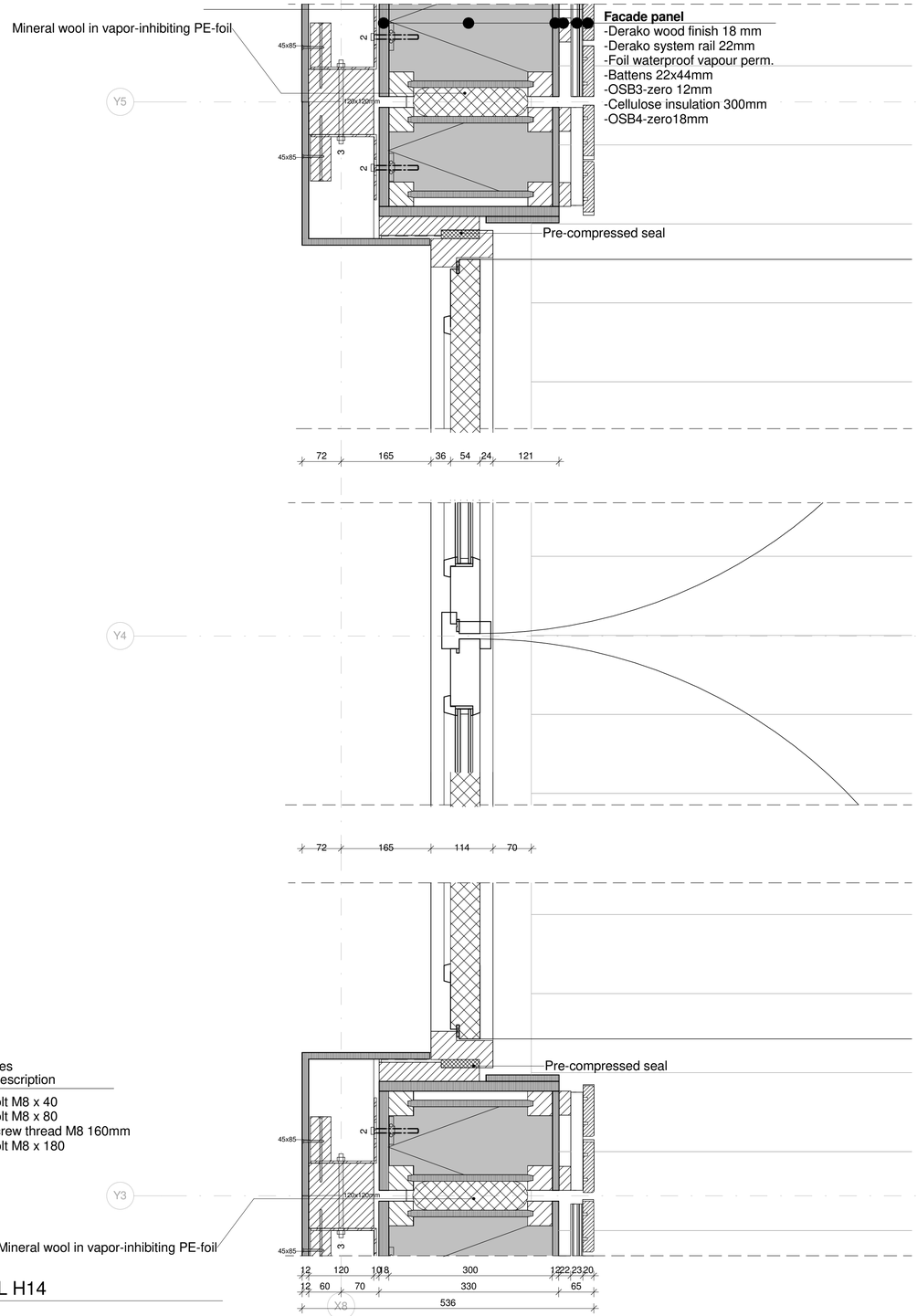
SHEET TITLE

DETAIL H13 - CONNECTION BEDROOM DOOR

A-419

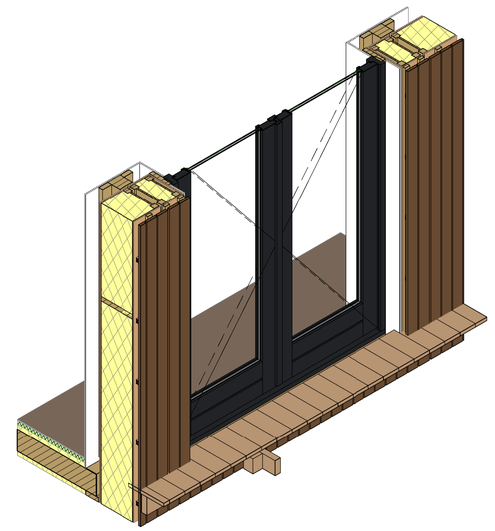


Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL H14

1 : 5



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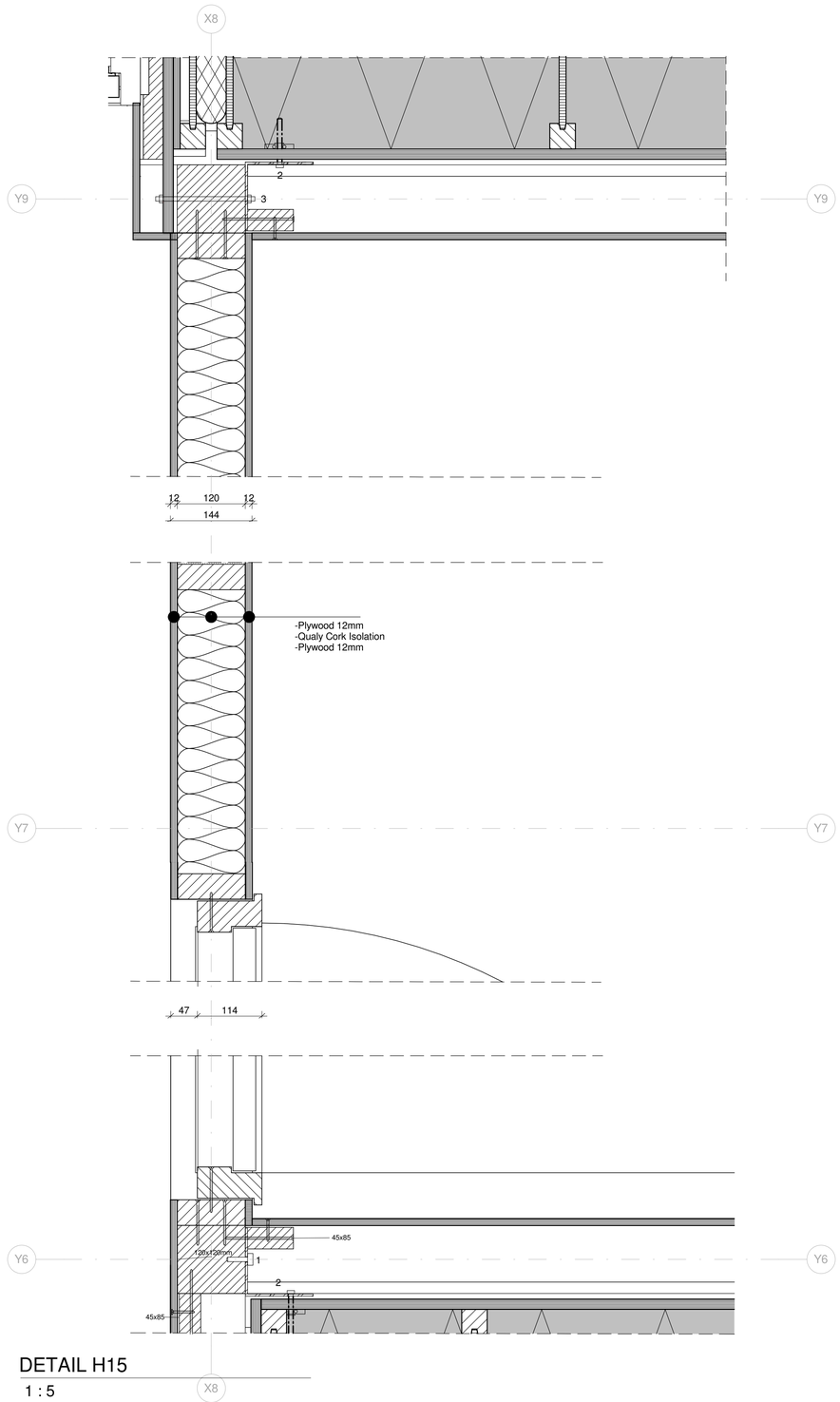
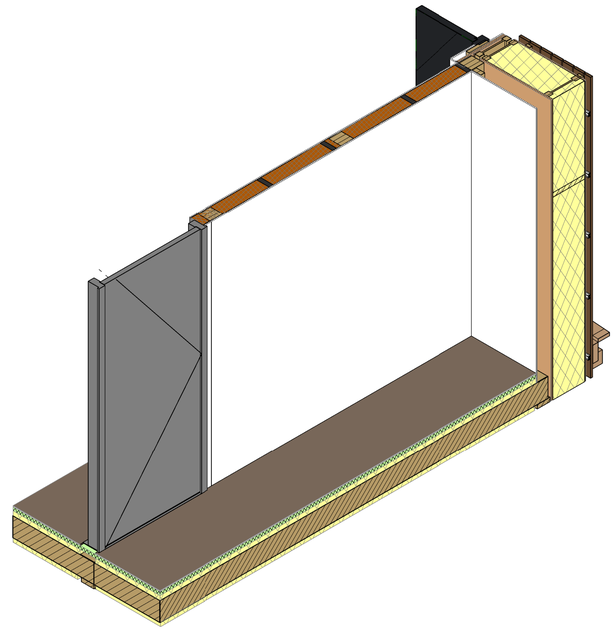
SHEET TITLE

DETAIL H14 - CONNECTION LIVINGROOM DOOR

A-420





Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL H15

1 : 5

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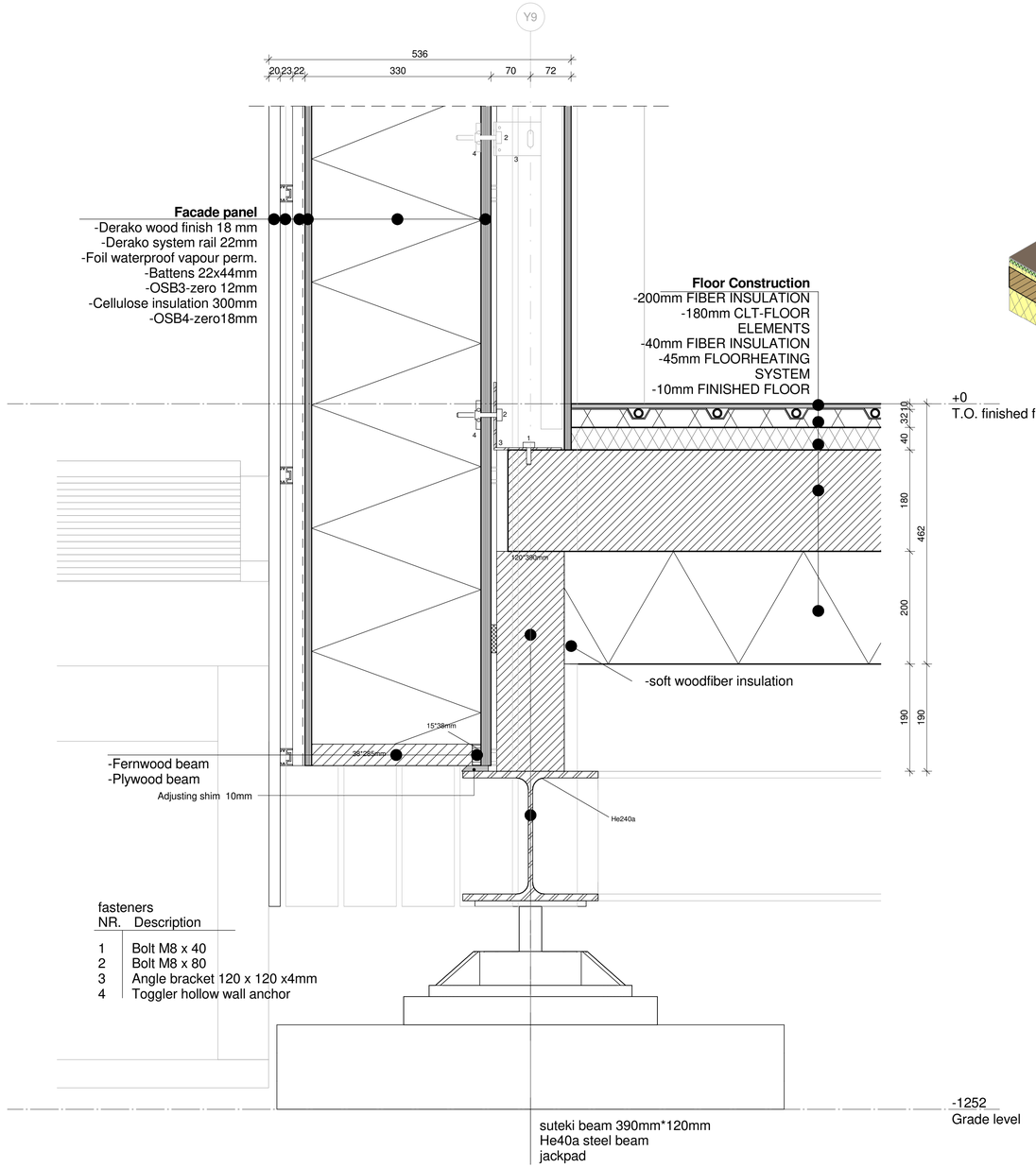
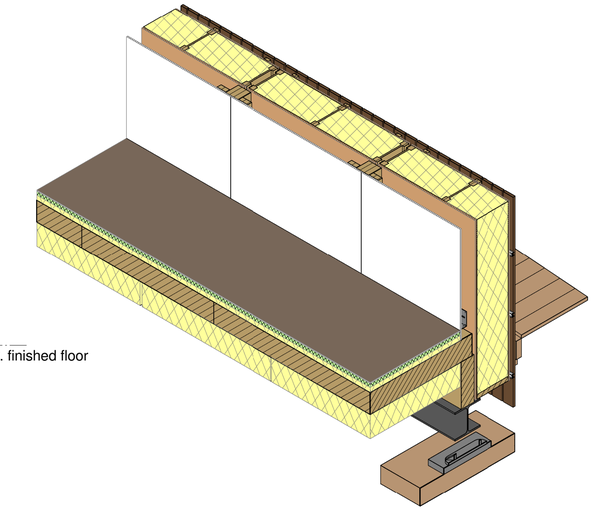
SHEET TITLE

DETAIL H15 - INTERIOR WALL/DOOR

A-421





DETAIL V01

1 : 5

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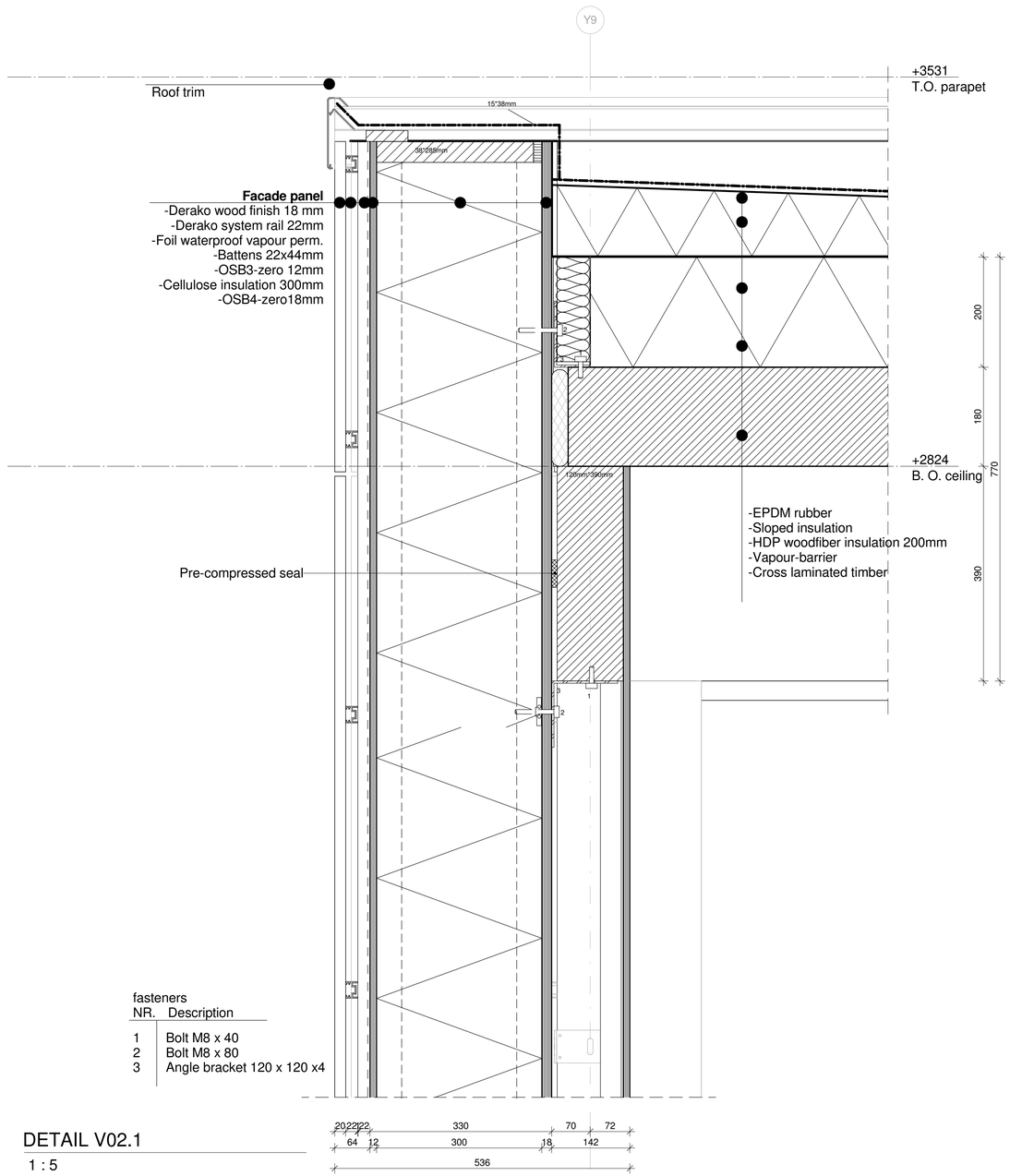
SHEET TITLE

DETAIL V01 - CONNECTION FOUNDATION CONSTRUCTION

A-450

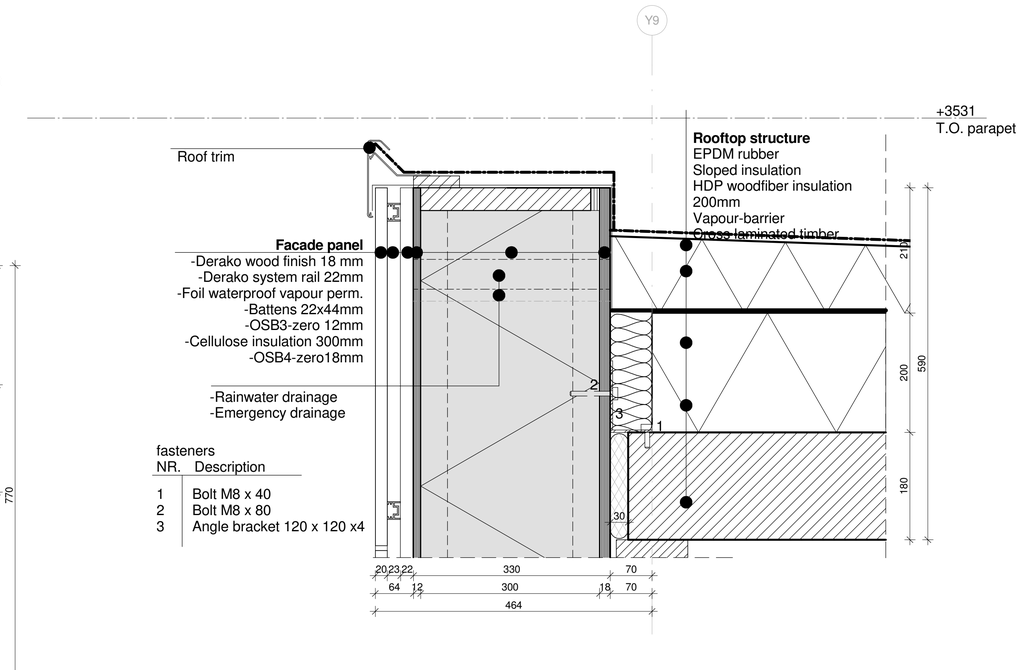


fasteners

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Angle bracket 120 x 120 x4

DETAIL V02.1

1 : 5

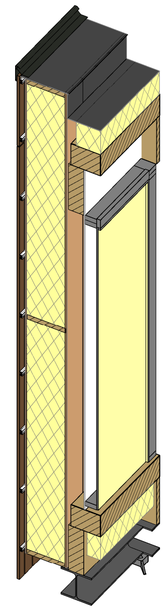


fasteners

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Angle bracket 120 x 120 x4

DETAIL V02.2

1 : 5



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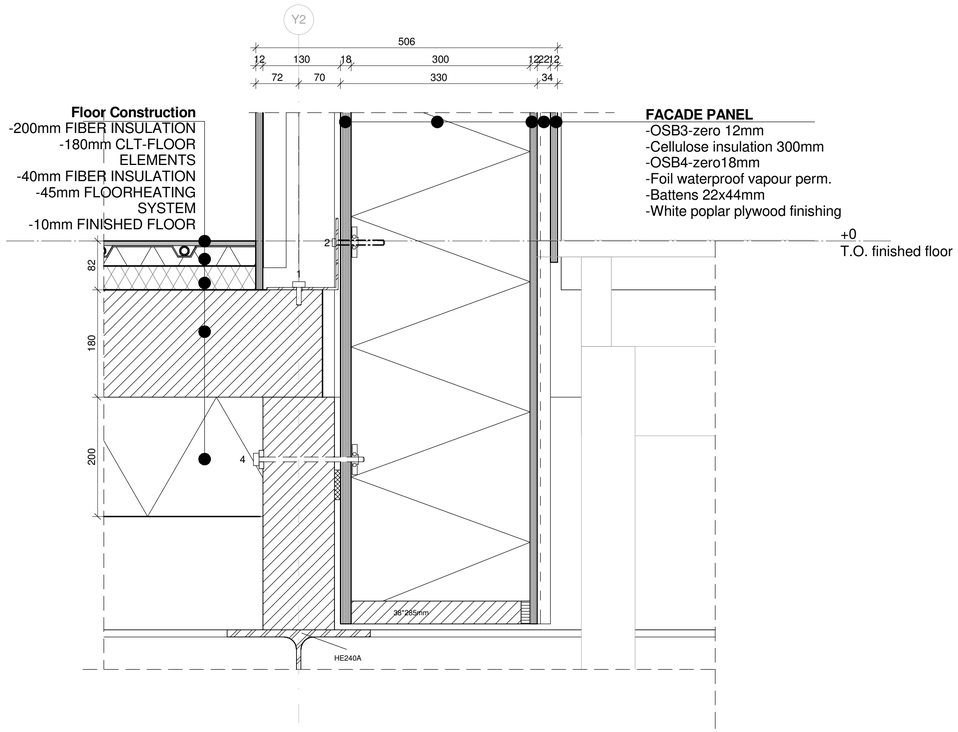
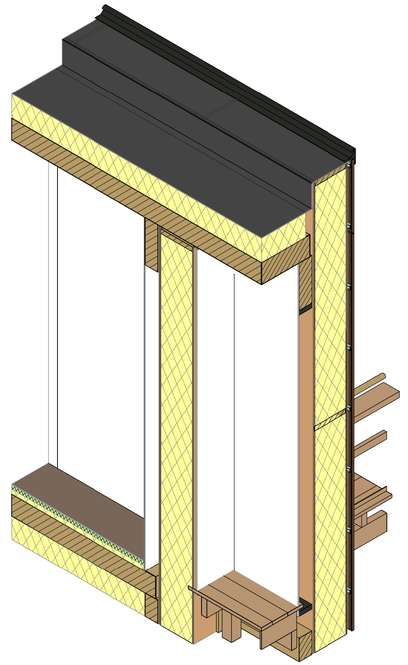
SHEET TITLE

DETAIL V02 - CONNECTION ROOF EAVES

A-451





DETAIL V03

1 : 5

Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

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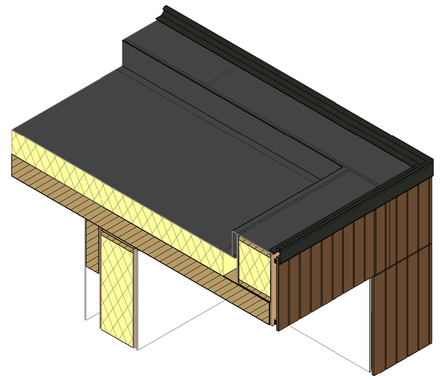
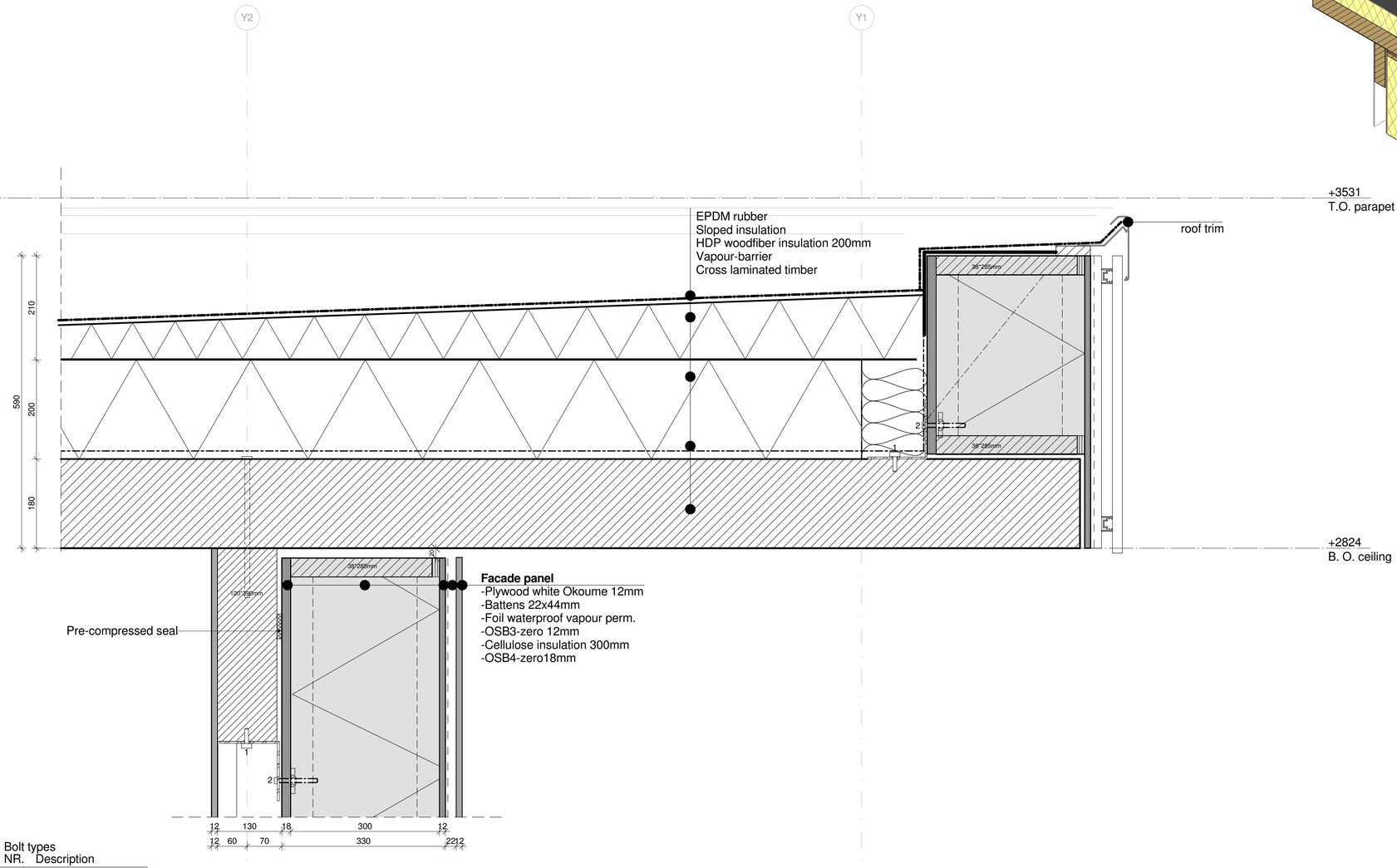
SHEET TITLE

DETAIL V03 - CONNECTION FOUNDATION AT OVERHANG

A-452





Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL V04

1 : 5

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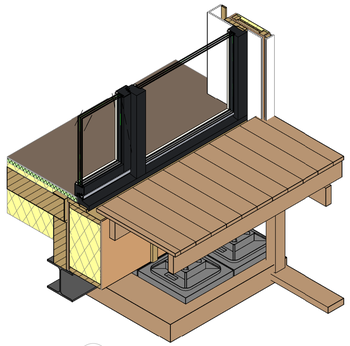
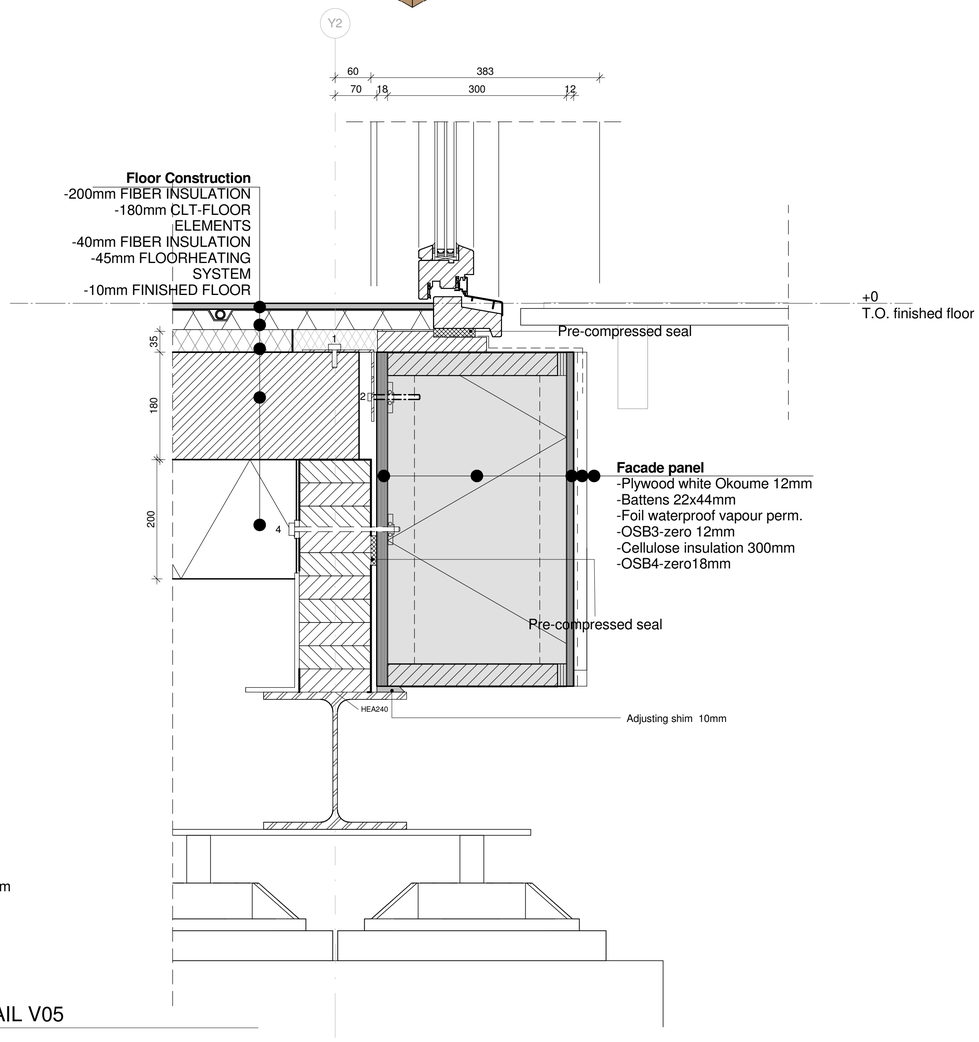
DETAIL V04 - CONNECTION EAVES AT OVERHANG

A-453



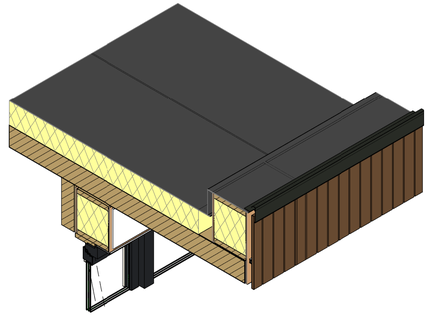


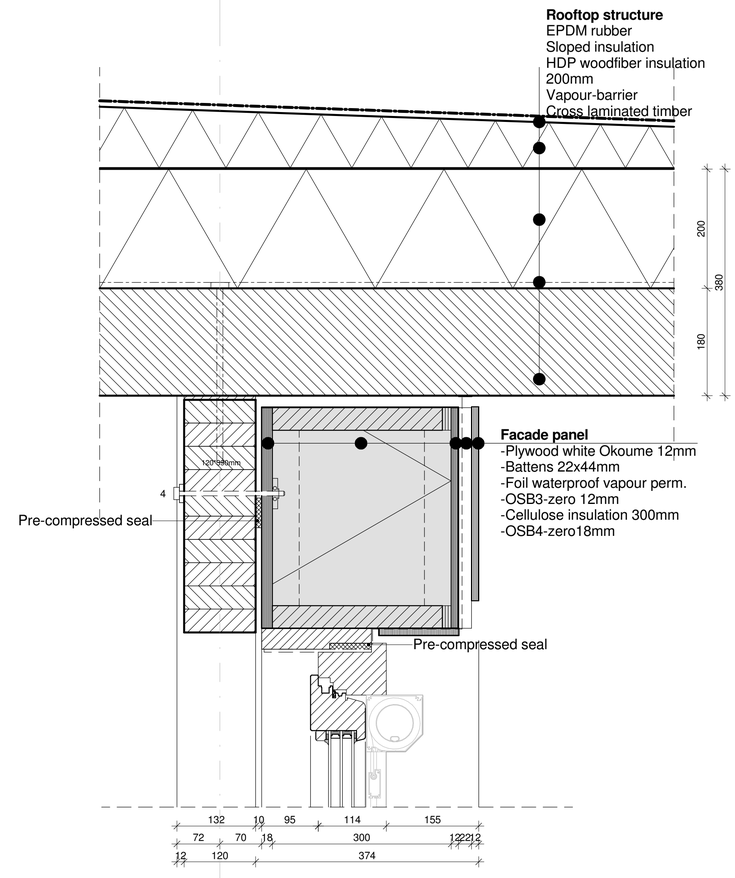
Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL V05

1 : 5





DETAIL V06

1 : 5

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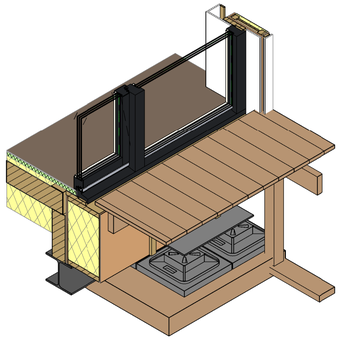
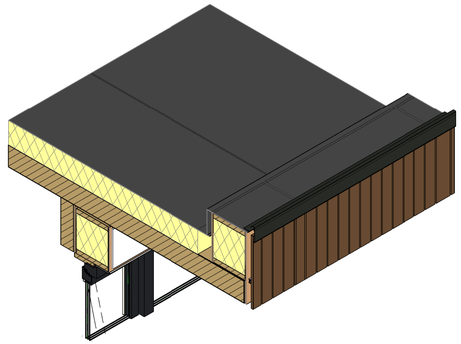
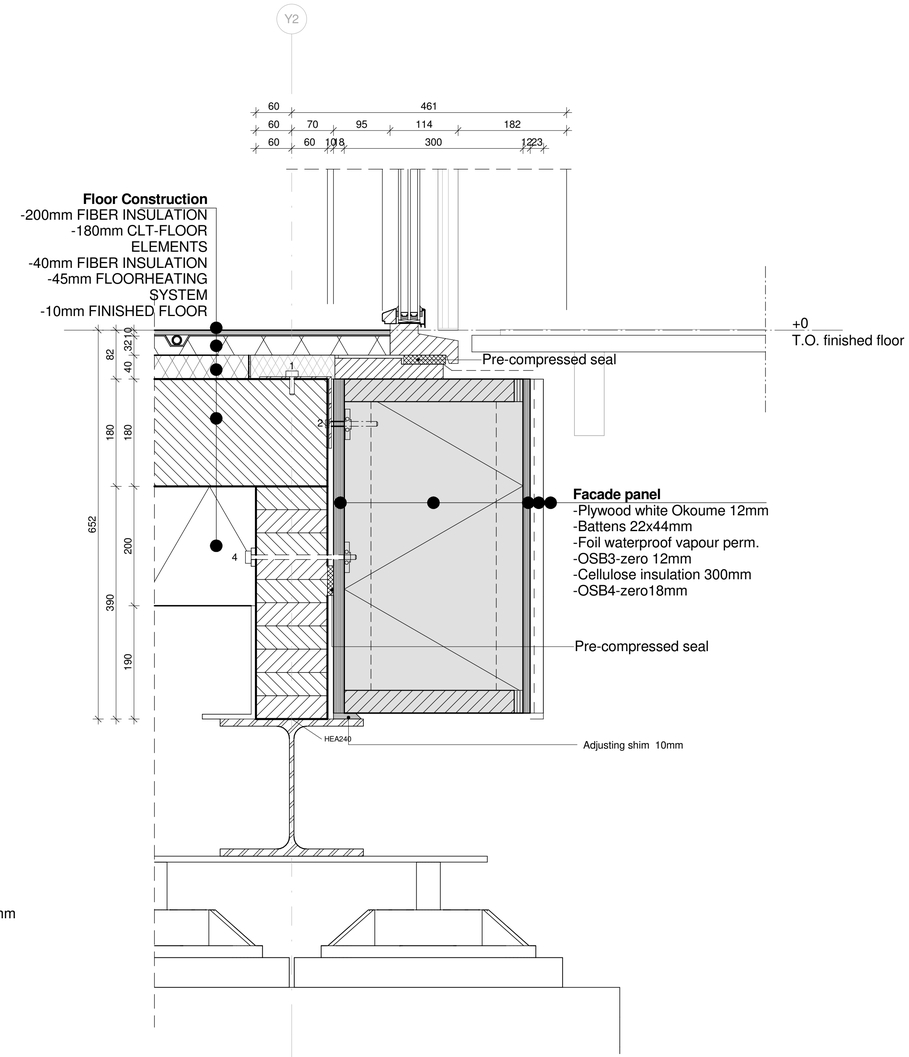
SHEET TITLE

DETAIL V05-V06 - CONNECTION TILT-TURN WINDOW

A-454





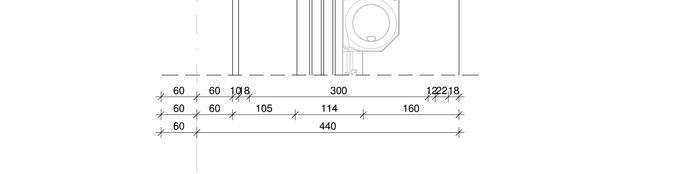


Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL V07

1 : 5



DETAIL V08

1 : 5

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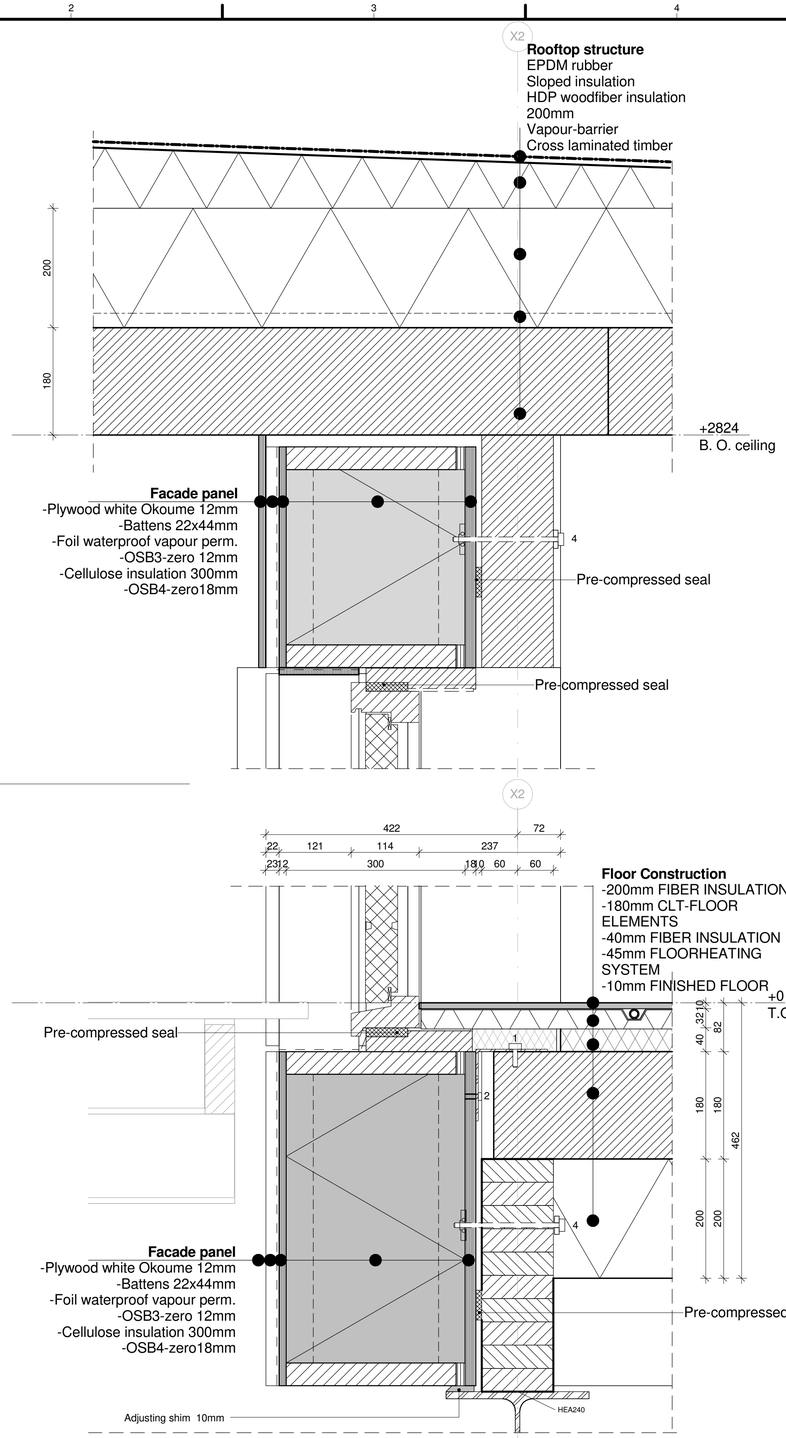
SHEET TITLE

DETAIL V07-V08 - CONNECTION WINDOW

A-455



DETAIL V10

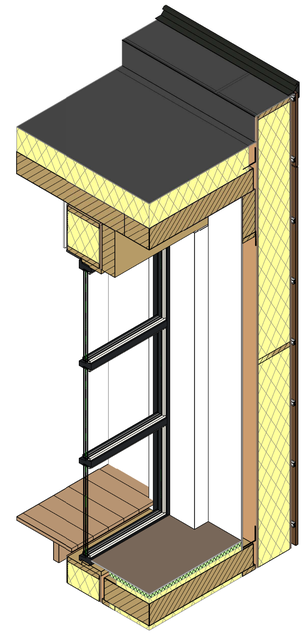
1 : 5

DETAIL V09

1 : 5

Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180



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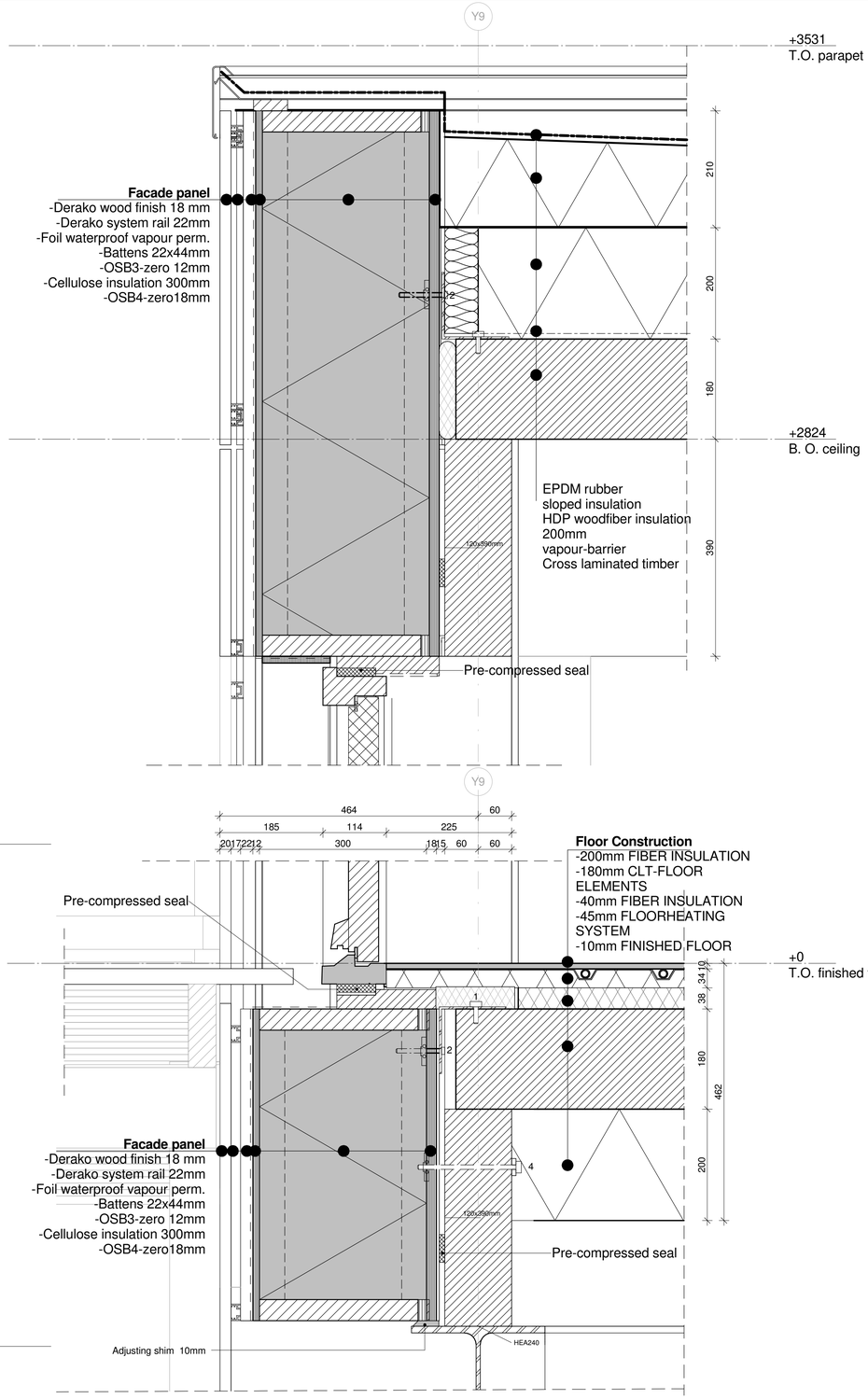
SHEET TITLE

DETAIL V09-V10 - CONNECTION DINING/BEDROOM WINDOW/DOOR

A-456



DETAIL V12

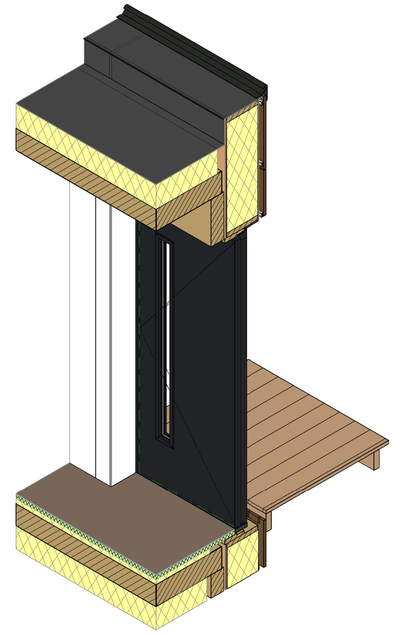
1 : 5

DETAIL V11

1 : 5

Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180



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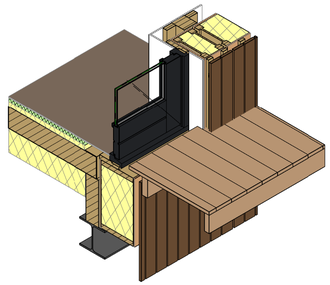
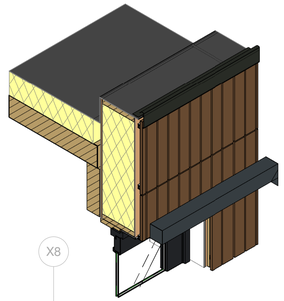
SHEET TITLE

DETAIL V11-V12 - CONNECTION FRONT DOOR

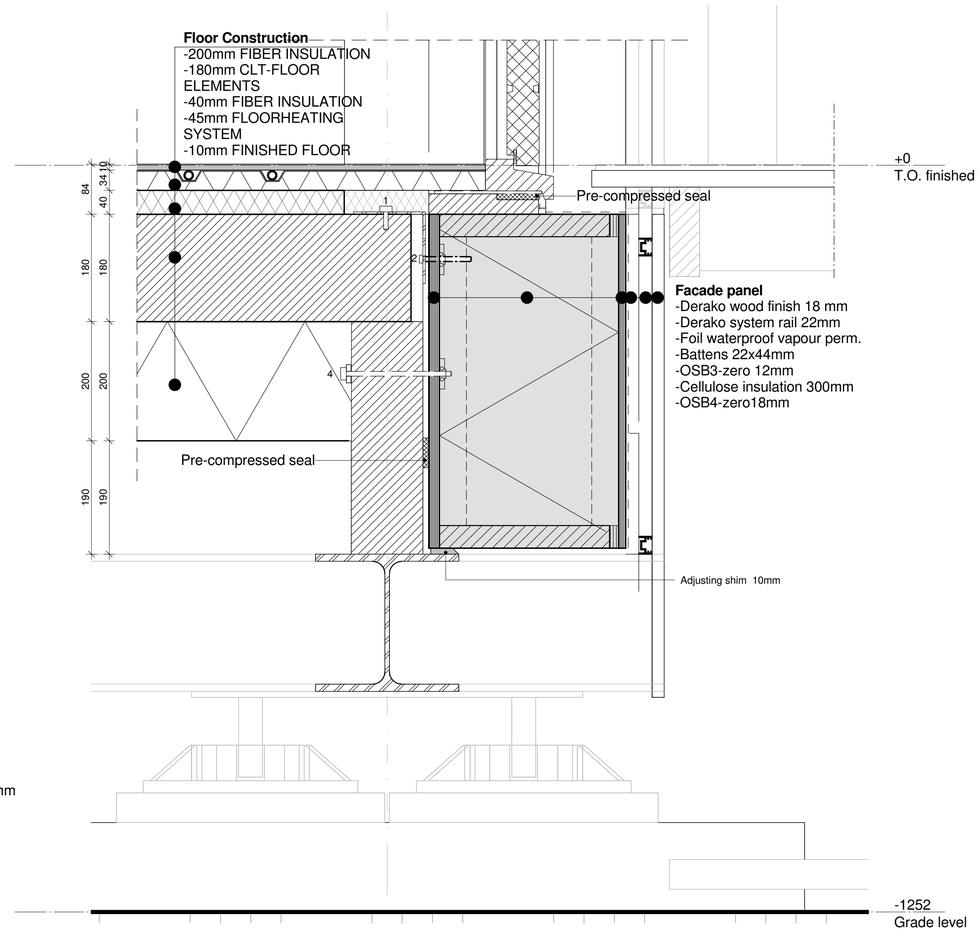
A-457





X8

X8

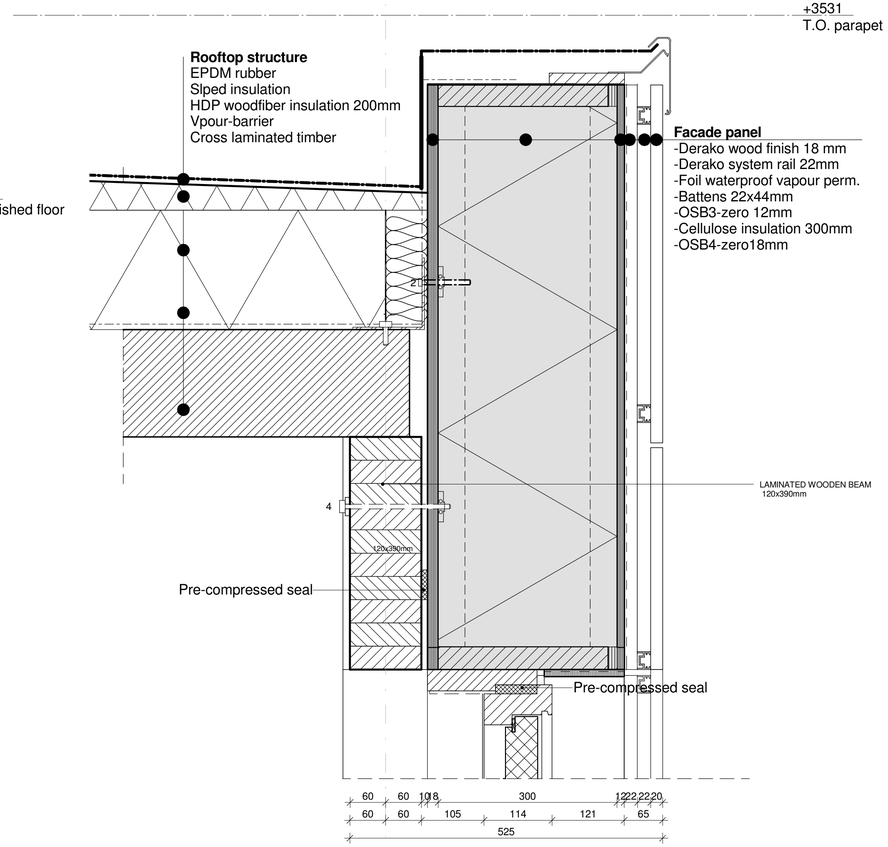


Bolt types

NR.	Description
1	Bolt M8 x 40
2	Bolt M8 x 80
3	Screw thread M8 160mm
4	Bolt M8 x 180

DETAIL V13

1 : 5



DETAIL V14

1 : 5

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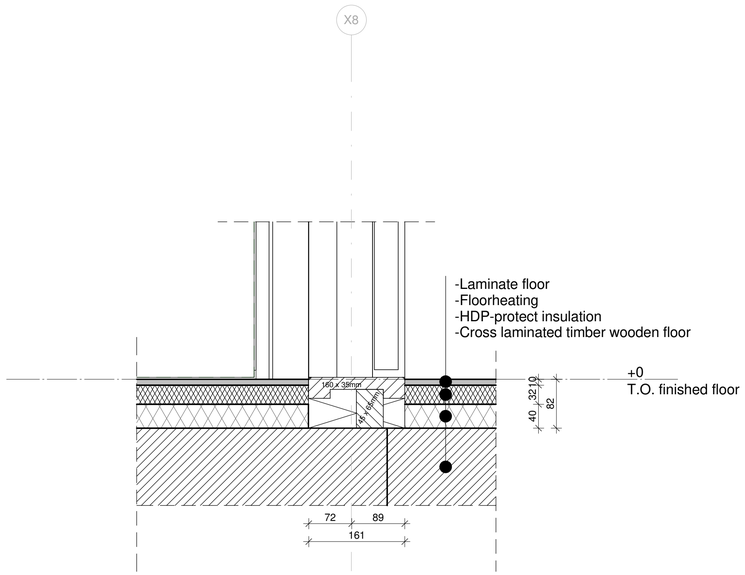
SHEET TITLE

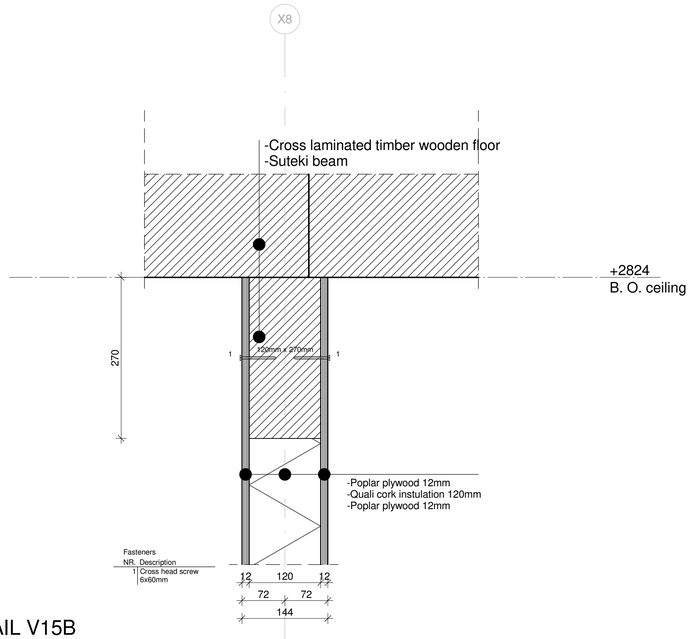
DETAIL V13-V14 - CONNECTION BEDROOM DOOR SOUTH

A-458



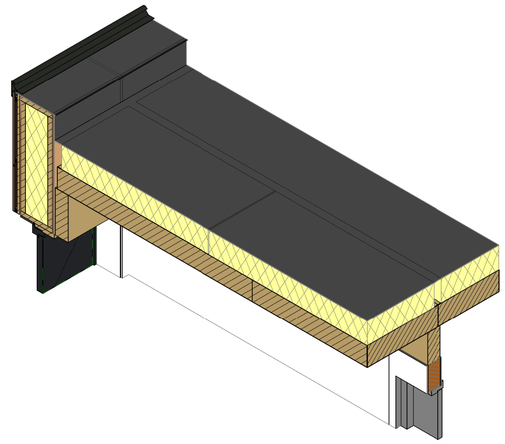
DETAIL V15A

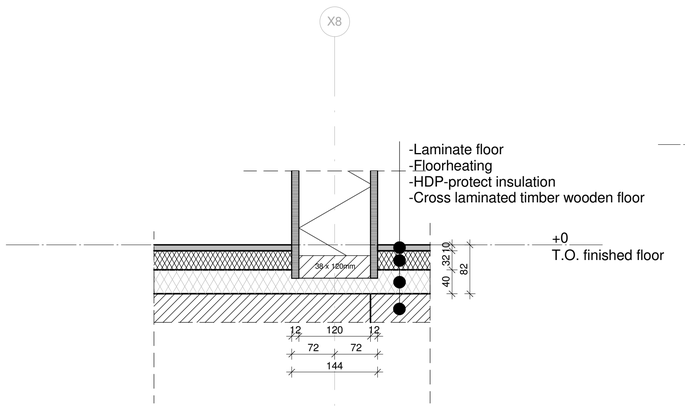
1 : 5



DETAIL V15B

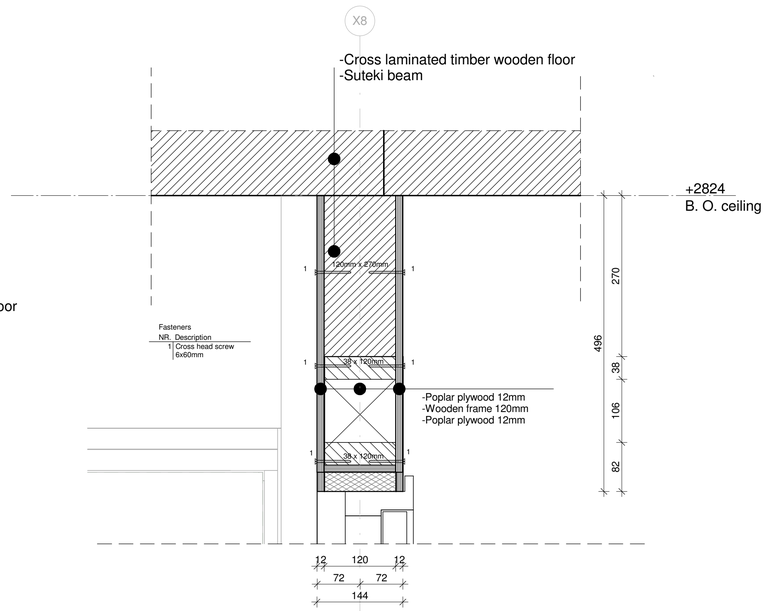
1 : 5





DETAIL V15C

1 : 5



DETAIL V15D

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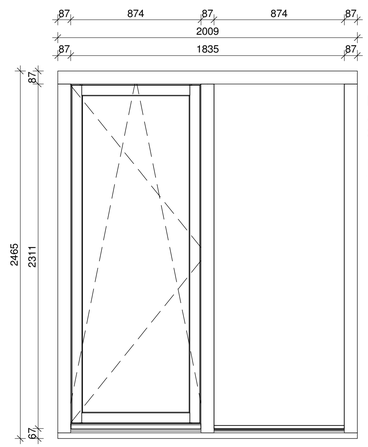
DETAIL V15 - CONNECTION INTERIOR WALL/DOOR

A-459

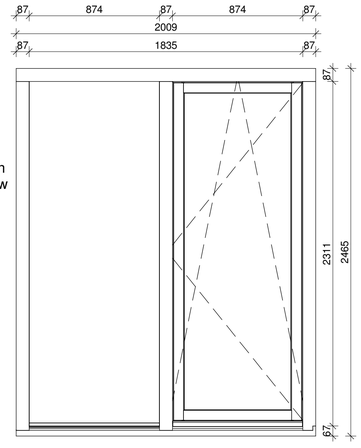


Materials
Accoya wood
Spruce pinewood

Direction of rotation
Tilt and turn window

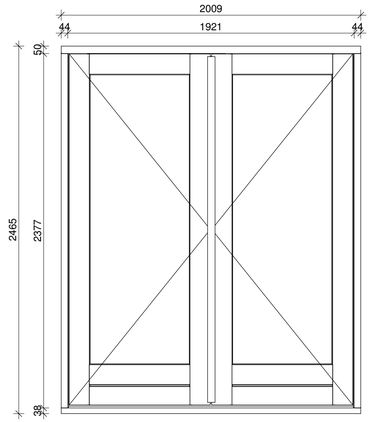
MARK A

1 : 20



MARK A mirrored

1 : 20

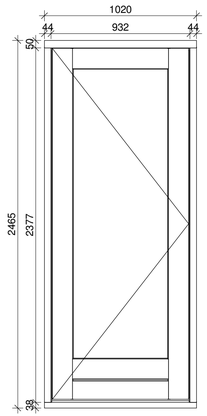


Materials
Accoya wood
Spruce pinewood

Direction of rotation
Double turn door

MARK B

1 : 20

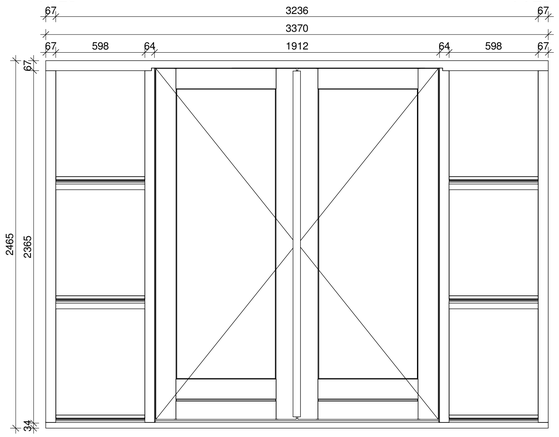


Materials
Accoya wood
Spruce pinewood

Direction of rotation
Inverting door

MARK C

1 : 20

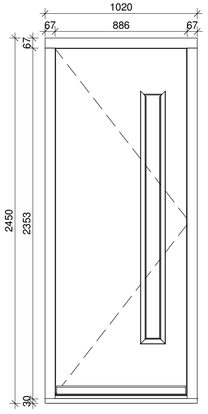


Materials
Accoya wood
Spruce pinewood

Direction of rotation
Double window

MARK D

1 : 20

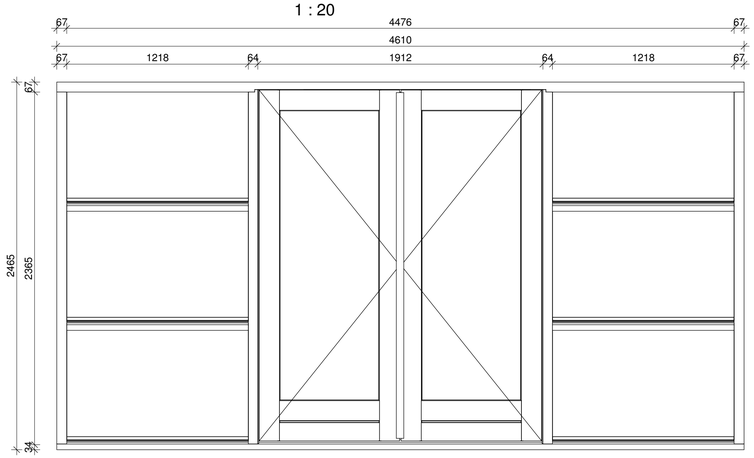


Materials
Accoya wood
Spruce pinewood

Direction of rotation
turning door

MARK E

1 : 20

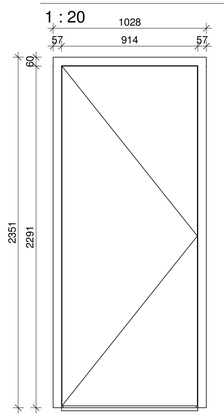


Materials
Accoya wood
Spruce pinewood

Direction of rotation
Double inverting window

MARK G

1 : 20



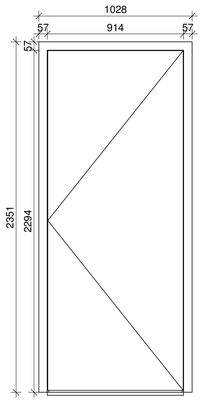
Materials
Accoya wood
Spruce pinewood

Direction of rotation
Inverting door

Noise resistance interior doors up to ca. 32 dB

INTERIOR 01

1 : 20



Materials
Accoya wood
Spruce pinewood

Direction of rotation
Inverting door

Noise resistance interior doors up to ca. 32 dB

INTERIOR 02

1 : 20

All doors, windows and window frames comply with burglar resistance class 2, in accordance to NEN 5096

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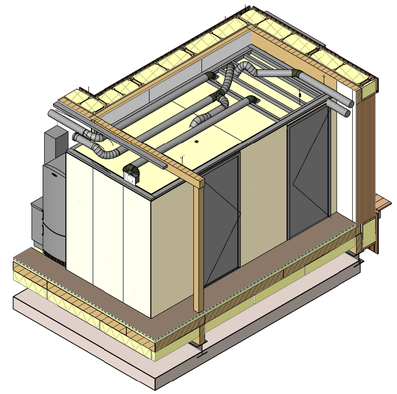
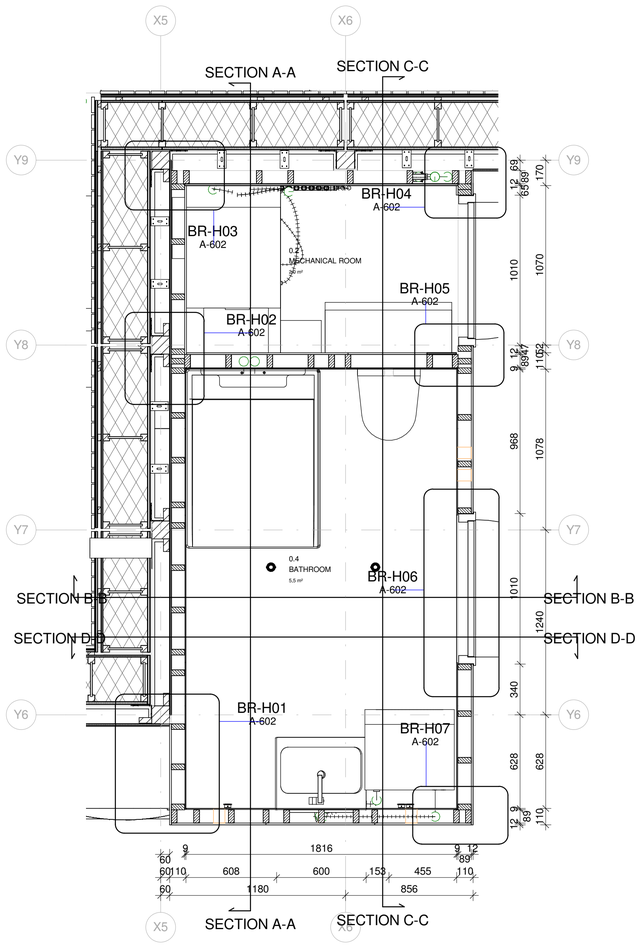
SHEET TITLE

WINDOW & DOOR SCHEDULE

A-500

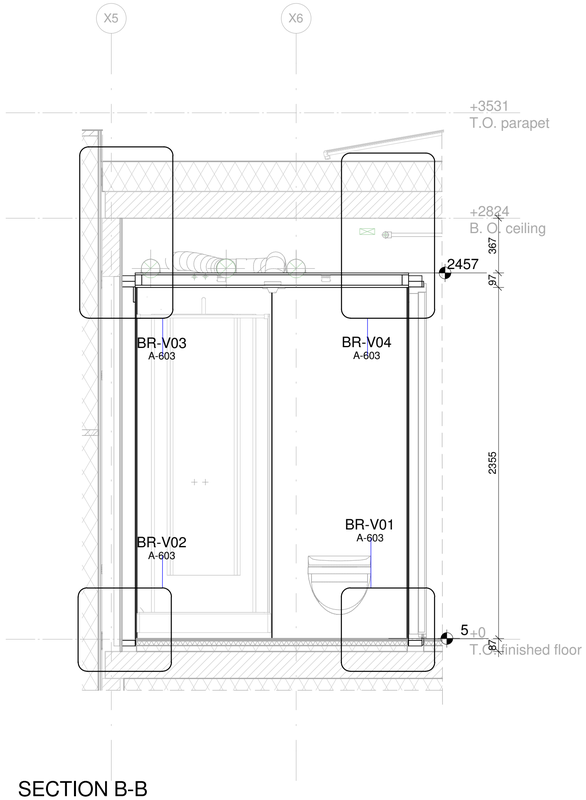


BATHROOM 3D ISOMETRIC



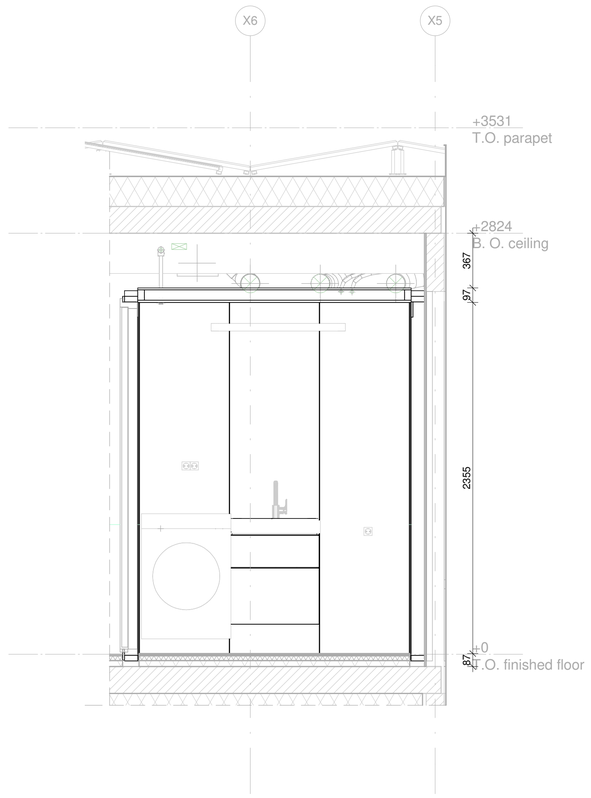
BATHROOM FLOOR PLAN

1 : 20



SECTION B-B

1 : 20



SECTION D-D

1 : 20

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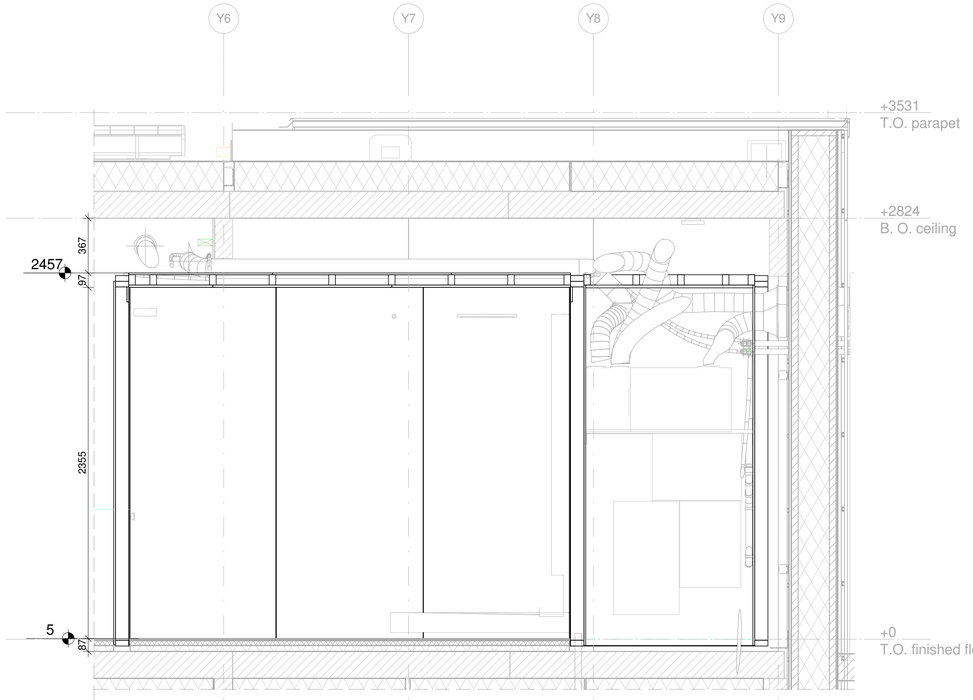
SHEET TITLE

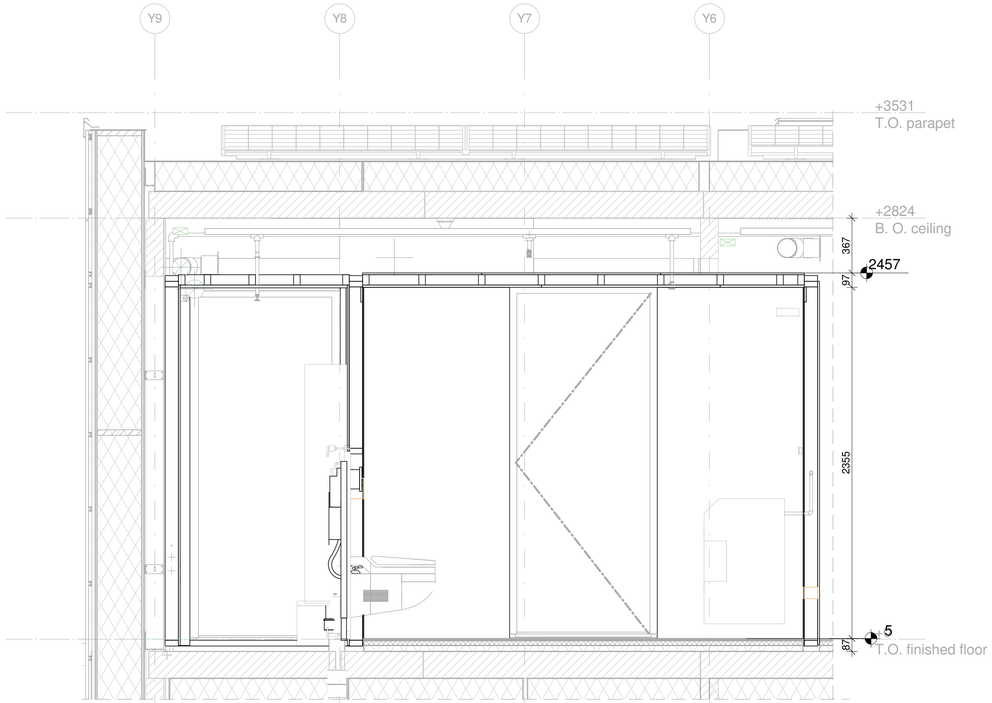
BATHROOM-MODULE PLAN & ELEVATIONS

A-600



SECTION A-A

1 : 20



SECTION C-C

1 : 20

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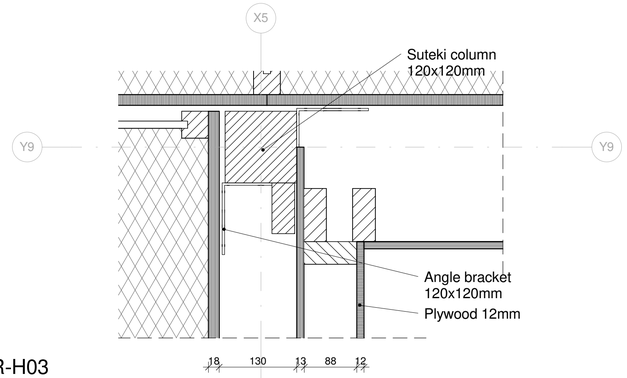
SHEET TITLE

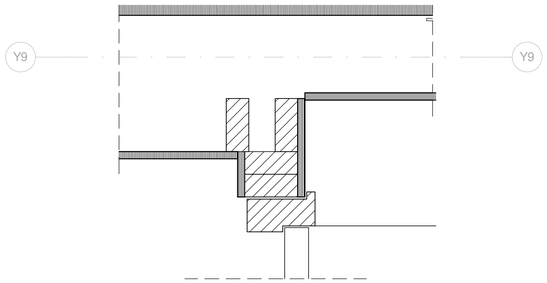
BATHROOM ELEVATIONS

A-601



DETAIL BR-H03

1 : 5



DETAIL BR-H04

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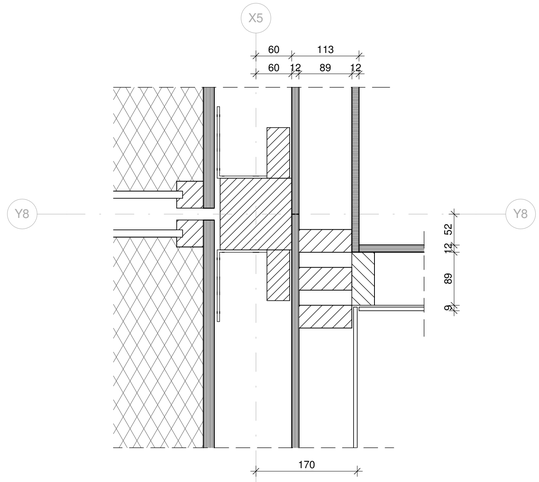

DETAIL BR-H02

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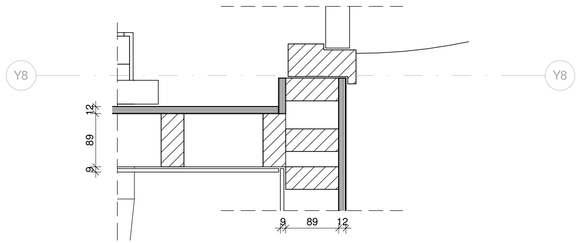

DETAIL BR-H05

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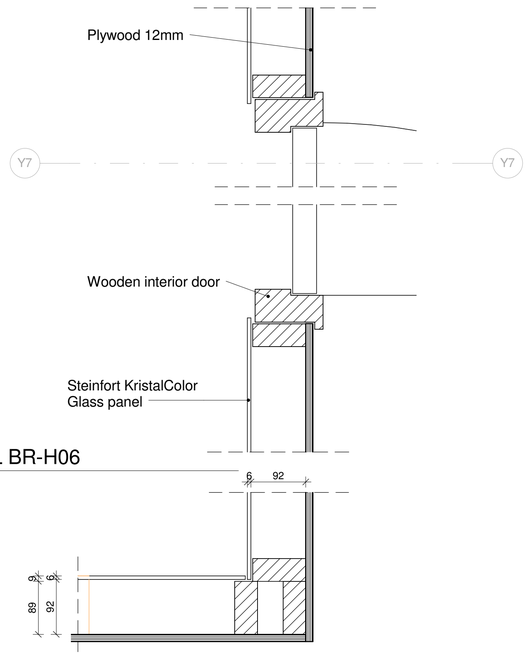

DETAIL BR-H06

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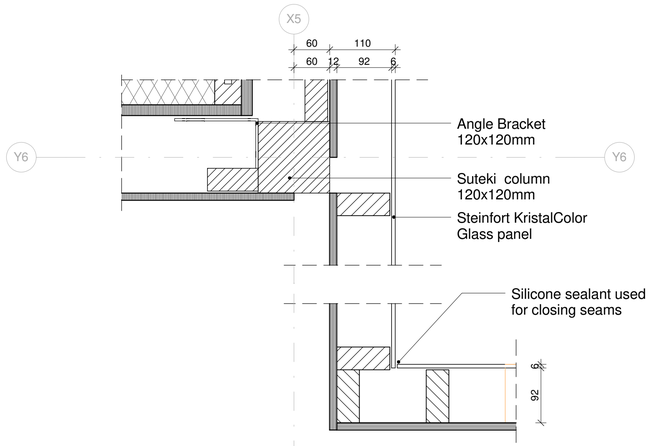
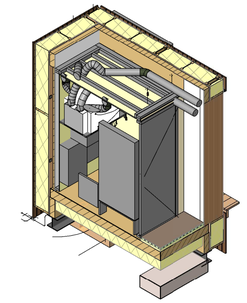


DETAIL BR-H01

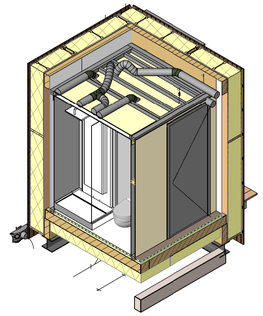
1 : 5

DETAIL BR-H07

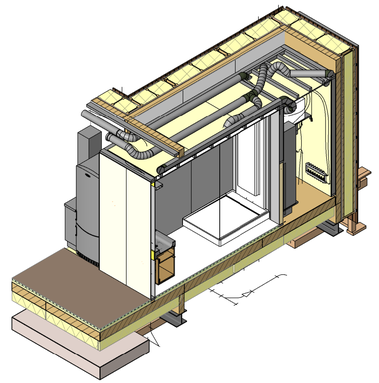
1 : 5



TECHINCAL ROOM 3D SECTION



BATHROOM 3D SECION A-A



BATHROOM AND TECHNICAL ROOM 3D SECTION B-B

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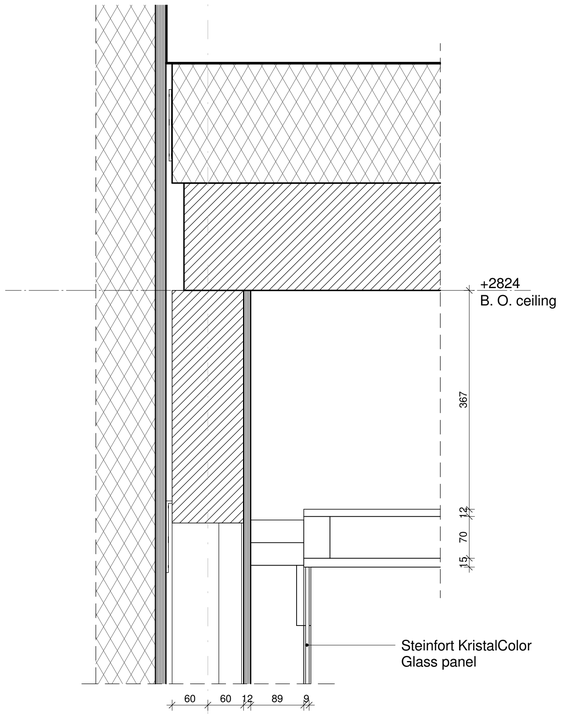
SHEET TITLE

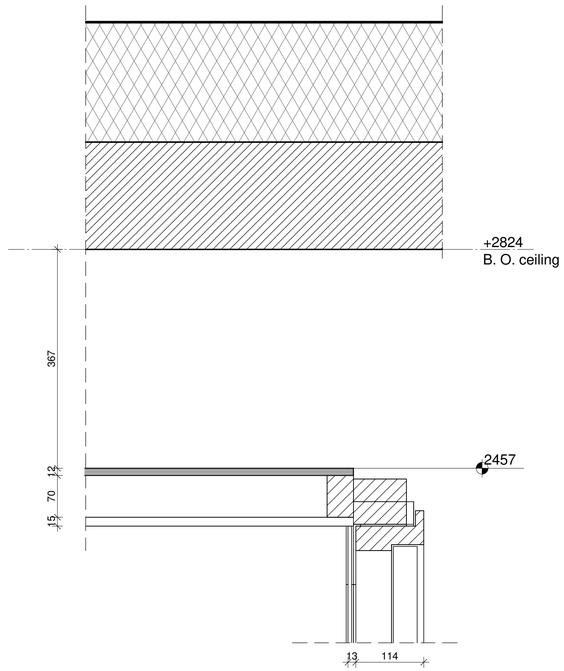
BATHROOM-MODULE
DETAILS HORIZONTAL

A-602



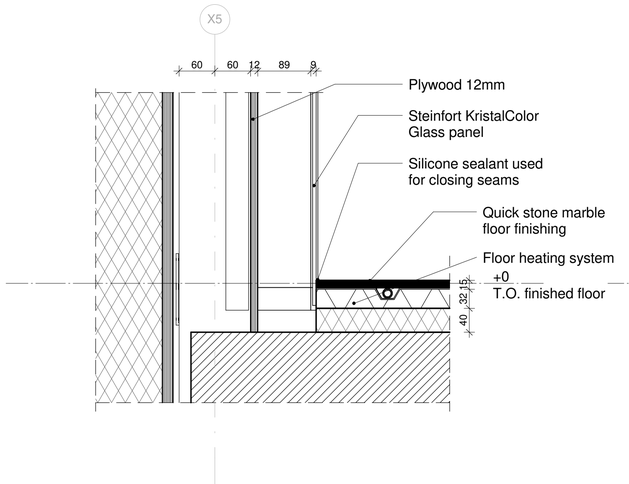
DETBAIL BR-V03

1 : 5



DETAIL BR-V04

1 : 5



DETAIL BR-V02

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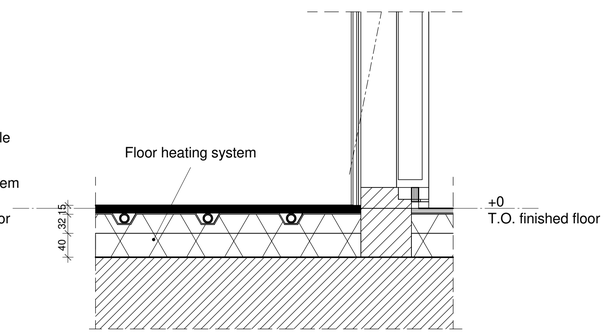

DETAIL BR-V01

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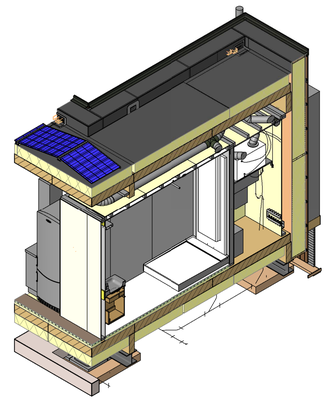

BATHROOMD 3D SECTION C-C

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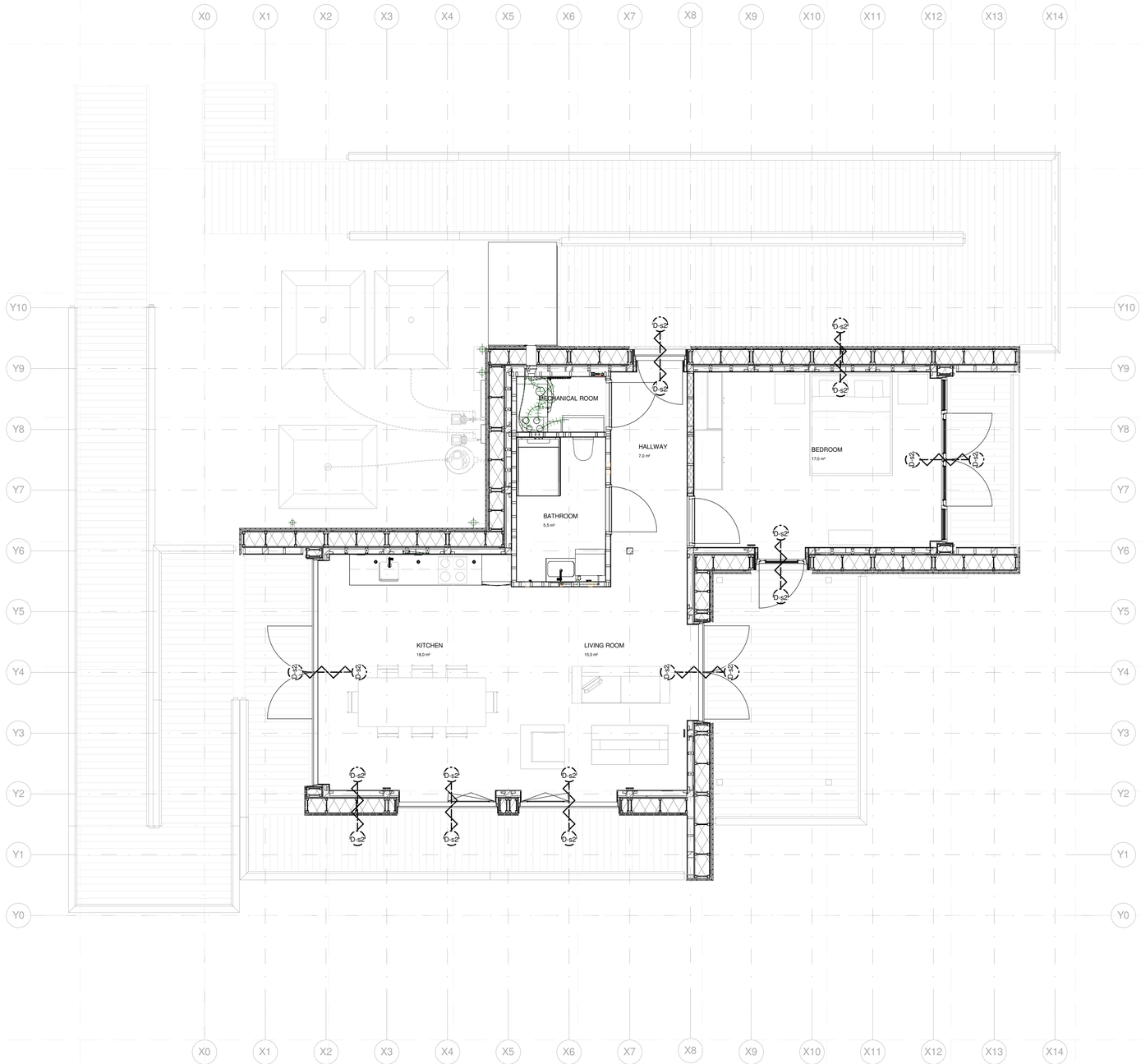
SHEET TITLE

BATHROOM-MODULE DETAILS VERTICAL

A-603



INTERIOR FINISHES

1 : 50

Fire Resistance rating

- Plywood Interprime 12mm; Fire Resistance Data (EN 13501): D-s2
- OSB-4-zero 18mm; Fire Resistance Data (EN 13501): D-s2
- Suteki Beam 120x390mm; Fire Resistance Data (EN 13501): D-s2
- Suteki Beam 120x270mm; Fire Resistance Data (EN 13501): D-s2
- Suteki Column 120x120; Fire Resistance Data (EN 13501): D-s2
- Baseboard MDF 12x90mm; Fire Resistance Data (EN 13501): D-s2
- Interior Doors; Fire Resistance Data (EN 13501): D-s2
- Cross Laminated Timber (CLT) Floor 180mm; Fire Resistance Data (EN 13501): D-s2
- Laminate; Fire Resistance Data (EN 13501): Cfl-s1fl
- Window Frame Exterior (Accoya): Fire Resistance Data (EN 14915): D-s2
- Window Frame Interior (European Pine): Fire Resistance Data (EN 13501): D-s2
- Exterior Doors (Accoya): Fire Resistance Data (EN 14915): D-s2
- Steinfort KristalColor (Glass): No Known Fire Resistance Data (deemed Non-Flammable)
- Quick Stone Tiles (Marble): No Known Fire Resistance Data (Deemed Non-Flammable)
- Plywood Okoumé 12mm; Fire Resistance Data (EN 13501): D-s2
- Derako Façade Finish; Fire Resistance Data (EN 13501): D-s2

10-8-2017 17:47:16

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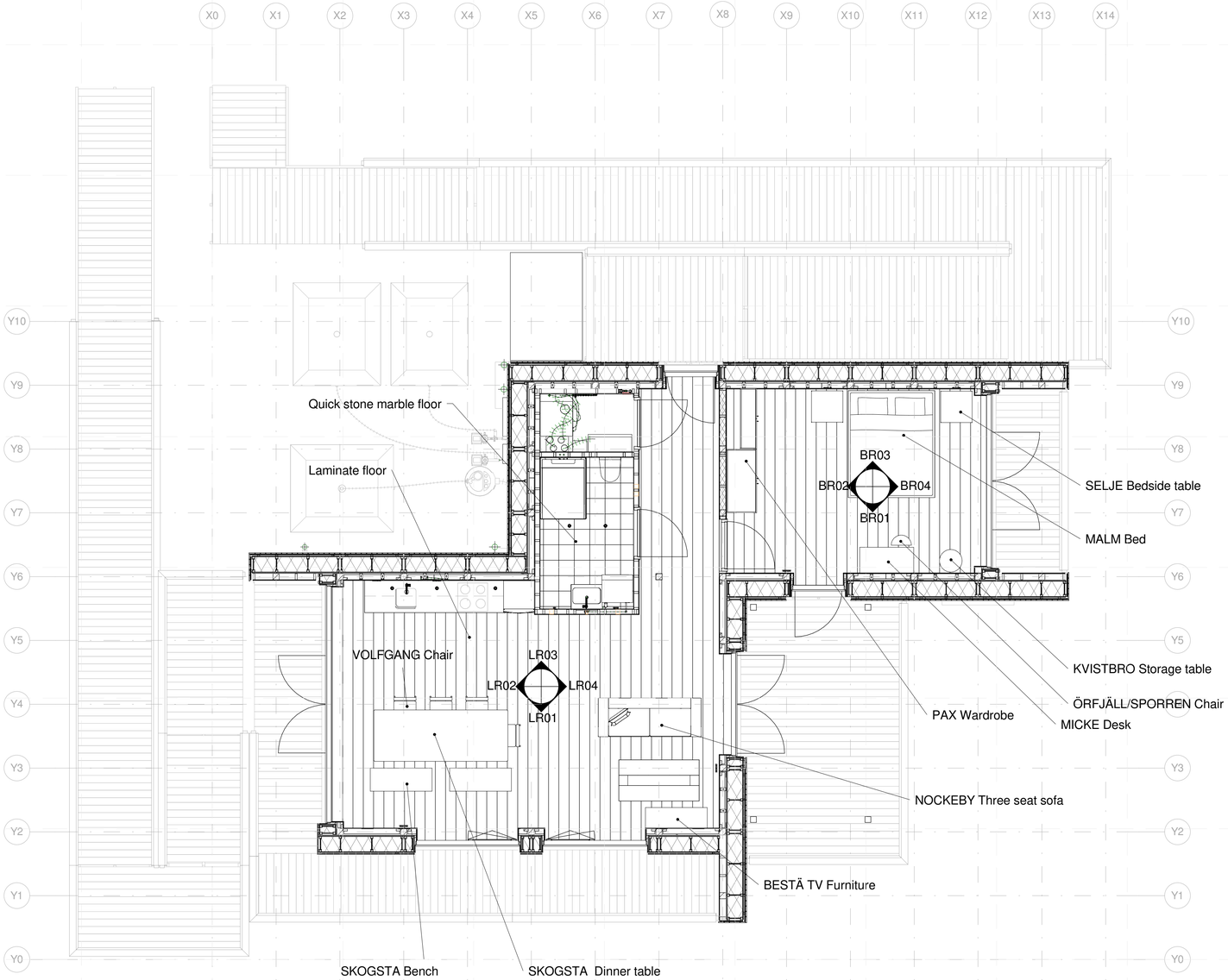
INTERIOR FINISHES

I-200



INTERIOR FURNITURE LAYOUT

1 : 50

10-8-2017 17:47:19

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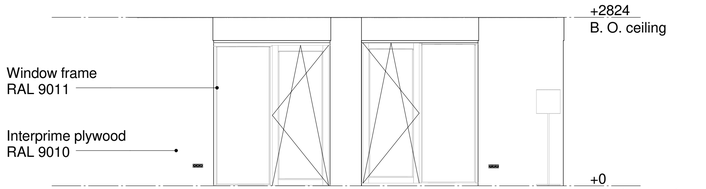
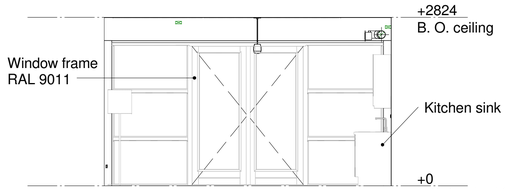
INTERIOR FURNITURE LAYOUT

I-201



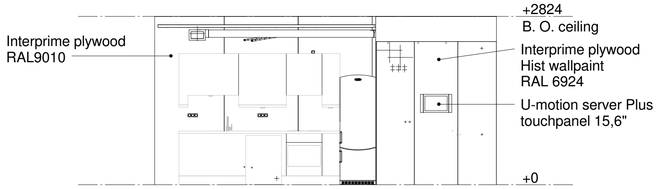
LR01 Livingroom

1 : 50



LR02 Livingroom

1 : 50



LR03 Livingroom

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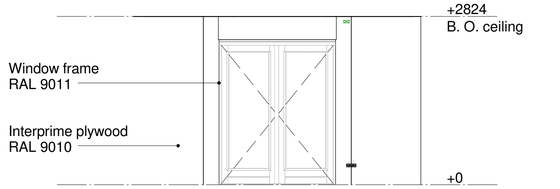
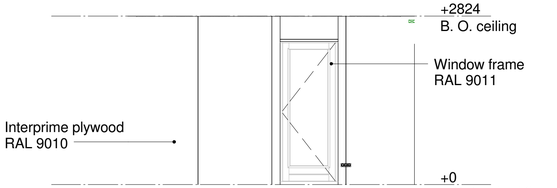


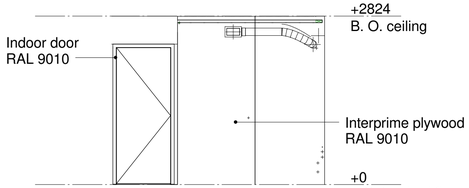
LR04 Livingroom

1 : 50



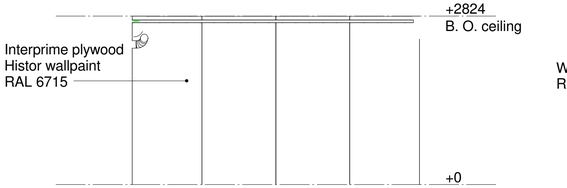
BE01 Bedroom

1 : 50



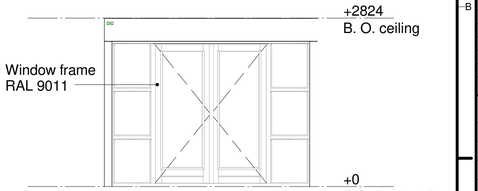
BE02 Bedroom

1 : 50



BE03 Bedroom

1 : 50



BE04 Bedroom

1 : 50

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INTERIOR ELEVATIONS

I-300

Building Code & Mechanical notes

SD 2017 Buildingcode 11-02-2016
Building Planning and Construction
Section 3.0

3-1 Fire protection and Prevention.
a. Fire Protection Plan
Each team shall provide a fire protection plan. This plan shall indicate the location of fire extinguishers, how egress will be made from the unit, and who will be responsible (i.e., the team's health and safety officer) for public-tour life safety during the event. A written operations plan for team-facilitated orderly and quick evacuation and fire mitigation shall be included. Successful demonstration of the plan shall be required before any public tour of the building will be permitted.
b. Each house shall be required to have smoke alarms per IRC requirements and a fire extinguisher with a minimum Underwriters Laboratory (UL) rating of 2A-10BC. Smoke alarms shall be connected to the AC voltage side of the inverter and provided with independent power, i.e., battery backup integral with the alarm. All alarms shall be interconnected and all shall sound when one is activated (IRC, Sec. R314).
c. Carbon monoxide alarms are required for houses provided with fuel burning appliances or having attached garages. Fuel burning appliances are prohibited per Solar Decathlon rules. Carbon monoxide alarms shall be required per IRC Section R315 for any attached garage, even those used exclusively for an electrical vehicle.

3-11 Fire Sprinkler System.
2015 IRC Section R313 requires fire-suppression sprinkler systems in all single-family dwellings. All buildings shall be provided with fire sprinklers designed in accordance with IRC Section P2904 or NFPA 13D. Such systems shall be fully operational during the public exhibit and competition. Each dwelling shall be individually required to provide site-stored fire water for sprinkler operations based on the sprinkler system design demand plus any residual volume necessary to keep the pump primed. Each dwelling's sprinkler shall be required to be provided with a pump capable of the pressure and volume required for the fire sprinkler design. The pump shall be mounted on a portable skid and shall be pretested and demonstrated to be functional at the minimum required fire sprinkler design pressure prior to arriving at the event site. Pumps used for fire sprinklers may be dedicated to the fire sprinkler system or may be used for both domestic and fire system purposes. All valves provided between the fire water supply source and each individual fire sprinkler shall be of a type that can be locked in the open (on) position. Teams shall provide the means to ensure that the valves are locked open during the duration of the public exhibit.
A test and drain valve shall be placed in an accessible location at the most remote point of the sprinkler system. This valve will be used to assist in charging the system with water, and will be operated by the team during the inspection period to demonstrate that the sprinkler system is charged and that the pump used for sprinkler pressurization is operating correctly.

SD 2017 DD Guidance 2016-09-09
Fire Protection

The International Residential Code ensures the safety of students and the general public through a combination of active and passive fire protection features.

Surface Spread of Flame and Accelerated Combustion Potential
IRC Section R302.9 regulates flame spread and smoke development. All wall and ceiling finishes must meet a minimum flame spread of 200 and SD of 450 using the ASTM E84 test methodology. Plywood and other wood finishes (other than window, door, baseboard, and chair rail trim) must comply with these requirements. If an outer plywood veneer is less than 1/28" (0.91mm) (common for most hardwood surfaced plywood materials), then the core materials will be regulated. Fabrics and other adhered wall coverings must also be demonstrated to pass the ASTM E84 test if they exceed 1/28" (0.91mm) thickness.

Active Fire Protection
- FIRE SPRINKLER SYSTEM: Provide FULL details on the MANDATORY fire sprinkler system. This should be provided in accordance with IRC Section P2904 or NFPA 13-D. Indicate source of team provided water supply for operation of the system while placed on temporary display. Provide diagram from water supply tank, to the pump, to the riser, and to the branch piping. The diagram should state pipe diameters and materials used. Provide a cut sheet for the sprinkler head(s) selected. Indicate the minimum pump pressure setting necessary for minimum operation pressure. Provide a reflected ceiling plan with all sprinkler heads indicated in relation to below ceiling level mounted luminaires, ceiling fans, beams, soffits or other potential obstructions. Indicate any heat producing sources such as HVAC heating vents, ranges and ovens. Indicate head offset distances to be provided.
- SMOKE ALARM LOCATIONS: Smoke alarms are required in all sleeping areas and at a point immediately outside the sleeping area(s). IRC Section R313/4 requires the alarms to be installed in accordance with NFPA 72. Nearly all US produced smoke alarms contain instructions based on NFPA 72 criteria. Pay particular attention to placement of the detectors relative to the intersection between the wall and the ceiling.
- SMOKE ALARM POWER REQUIREMENTS: Smoke alarms shall have their primary power source from the AC side of the inverters. Internal battery back-up shall be provided internal to the detection device. Combination household fire alarm systems shall be specifically approved prior to installation. Please provide full details on any system proposed OTHER THAN interconnected single station smoke alarms.

2015 International Residential Code
Chapter 29 Water supply and distribution

P2904.1 General.
The design and installation of residential fire sprinkler systems shall be in accordance with NFPA 13D or Section P2904, which shall be considered equivalent to NFPA 13D. Partial residential sprinkler systems shall be permitted to be installed only in buildings not required to be equipped with a residential sprinkler system. Section P2904 shall apply to stand-alone and multipurpose wet-pipe sprinkler systems that do not include the use of antifreeze. A multipurpose fire sprinkler system shall provide domestic water to both fire sprinklers and plumbing fixtures. A stand-alone sprinkler system shall be separate and independent from the water distribution system. A backflow preventer shall not be required to separate a stand-alone sprinkler system from the water distribution system. ment of
the detectors relative to the intersection between the wall and the ceiling.
- SMOKE ALARM POWER REQUIREMENTS: Smoke alarms shall have their primary power source from the AC side of the invertors. Internal battery back-up shall be provided internal to the detection device. Combination household fire alarm systems shall be specifically approved prior to installation. Please provide full details on any system proposed OTHER THAN interconnected single station smoke alarms.

P2904.1.1 Required sprinkler locations.
Sprinklers shall be installed to protect all areas of a dwelling unit.
Exceptions:
1. Attics, crawl spaces and normally unoccupied concealed spaces that do not contain fuel-fired appliances do not require sprinklers. In attics, crawl spaces and normally unoccupied concealed spaces that contain fuel-fired equipment, a sprinkler shall be installed above the equipment; however, sprinklers shall not be required in the remainder of the space.
2. Clothes closets, linen closets and pantries not exceeding 24 square feet (2.2 m2) in area, with the smallest dimension not greater than 3 feet (915 mm) and having wall and ceiling surfaces of gypsum board.
3. Bathrooms not more than 55 square feet (5.1 m2) in area.
4. Garages; carports; exterior porches; unheated entry areas, such as mud rooms, that are adjacent to an exterior door; and similar areas.

P2904.2 Sprinklers.
Sprinklers shall be new listed residential sprinklers and shall be installed in accordance with the sprinkler manufacturer's instructions.

P2904.2.1 Temperature rating and separation from heat sources.
Except as provided for in Section P2904.2.2, sprinklers shall have a temperature rating of not less than 135°F (57°C) and not more than 170°F (77°C). Sprinklers shall be separated from heat sources as required by the sprinkler manufacturer's installation instructions.

P2904.2.2 Intermediate temperature sprinklers.
Sprinklers shall have an intermediate temperature rating not less than 175°F (79°C) and not more than 225°F (107°C) where installed in the following locations:
1. Directly under skylights, where the sprinkler is exposed to direct sunlight.
2. In attics.
3. In concealed spaces located directly beneath a roof.
4. Within the distance to a heat source as specified in Table P2904.2.2.

TABLE P2904.2.2 LOCATIONS WHERE INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED

HEAT SOURCE	RANGE OF DISTANCE FROM HEAT SOURCE WITHIN WHICH INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIREDa, b (inches)
Fireplace, side of open or recessed fireplace	12 to 36
Fireplace, front of recessed fireplace	36 to 60
Coal and wood burning stove	12 to 42
Kitchen range top	9 to 18
Oven	9 to 18
Vent connector or chimney connector	9 to 18
Heating duct, not insulated	9 to 18
Hot water pipe, not insulated	6 to 12
Side of ceiling or wall warm air register	12 to 24
Front of wall mounted warm air register	18 to 36
Water heater, furnace or boiler	3 to 6
Luminaire up to 250 watts	3 to 6
Luminaire 250 watts up to 499 watts	6 to 12

P2904.2.3 Freezing areas.
Piping shall be protected from freezing as required by Section P2603.6. Where sprinklers are required in areas that are subject to freezing, dry-sidewall or dry-pendent sprinklers extending from a nonfreezing area into a freezing area shall be installed.

P2904.2.4 Sprinkler coverage.
Sprinkler coverage requirements and sprinkler obstruction requirements shall be in accordance with Sections P2904.2.4.1 and P2904.2.4.2.

P2904.2.4.1 Coverage area limit.
The area of coverage of a single sprinkler shall not exceed 400 square feet (37 m2) and shall be based on the sprinkler listing and the sprinkler manufacturer's installation instructions.

P2904.4.1 Determining required flow rate for each sprinkler.
The minimum required flow for each sprinkler shall be determined using the sprinkler manufacturer's published data for the specific sprinkler model based on all of the following:
1. The area of coverage.
2. The ceiling configuration.
3. The temperature rating.
4. Any additional conditions specified by the sprinkler manufacturer.

P2904.4.2 System design flow rate.
The design flow rate for the system shall be based on the following:

1. The design flow rate for a room having only one sprinkler shall be the flow rate required for that sprinkler, as determined by Section P2904.4.1.
2. The design flow rate for a room having two or more sprinklers a shall be determined by identifying the sprinkler in that room with the highest required flow rate, based on Section P2904.4.1, and multiplying that flow rate by 2.
3. Where the sprinkler manufacturer specifies different criteria for ceiling configurations that are not smooth, flat and horizontal, the required flow rate for that room shall comply with the sprinkler manufacturer's instructions.
4. The design flow rate for the sprinkler system shall be the flow required by the room with the largest flow rate, based on Items 1, 2 and 3.
5. For the purpose of this section, it shall be permissible to reduce the design flow rate for a room by subdividing the space into two or more rooms, where each room is evaluated separately with respect to the required design flow rate. Each room shall be bounded by walls and a ceiling. Openings in walls shall have a lintel not less than 8 inches (203 mm) in depth and each lintel shall form a solid barrier between the ceiling and the top of the opening.

P2904.5 Water supply.
The water supply shall provide not less than the required design flow rate for sprinklers in accordance with Section P2904.4.2 at a pressure not less than that used to comply with Section P2904.6.

P2904.5.1 Water supply from individual sources.
Where a dwelling unit water supply is from a tank system, a private well system or a combination of these, the available water supply shall be based on the minimum pressure control setting for the pump.

P2904.5.2 Required capacity.
The water supply shall have the capacity to provide the required design flow rate for sprinklers for a period of time as follows:

1. Seven minutes for dwelling units one story in height and less than 2,000 square feet (186 m2) in area.
2. Ten minutes for dwelling units two or more stories in height or equal to or greater than 2,000 square feet (186 m2) in area.
Where a well system, a water supply tank system or a combination thereof is used, any combination of well capacity and tank storage shall be permitted to meet the capacity requirement.

Water need for 10min of sprinkling.
Waterneed = 10min * (number of sprinklers * Flow of one sprinkler)
Waterneed = 10min * (2 * 13GPM)
Waterneed = 260G (984.2L)

Waterneed = 260G (984.2L) * safety
Waterneed = 260G (984.2L) * 20%
Waterneed = 312G (1180.8L)

Min flow pump
Min flow pump = number of sprinklers * flow one sprinkler
Min flow pump = 2 * 13 GPM (49.2 L/min)
Min flow pump = 26GPM (98.42 L/min)

P2904.6.1 Method of sizing pipe.
Piping supplying sprinklers shall be sized using the prescriptive method in Section P2904.6.2 or by hydraulic calculation in accordance with NFPA 13D. The minimum pipe size from the water supply source to any sprinkler shall be 3/4 inch (19 mm) nominal. Threaded adapter fittings at the point where sprinklers are attached to the piping shall be not less than 1/2 inch (13 mm) nominal.

P2904.6.2 Prescriptive pipe sizing method.
Pipe shall be sized by determining the available pressure to offset friction loss in piping and identifying a piping material, diameter and length using the equation in Section P2904.6.2.1 and the procedure in Section P2904.6.2.2.

TABLE P2904.6.2(1) WATER SERVICE PRESSURE LOSS (PLsvc)a, b Pipe shall be sized

FLOW RATE	3/4-INCH WATER SERVICE PRESSURE LOSS				1-INCH WATER SERVICE PRESSURE LOSS				1¼ -INCH WATER SERVICE PRESSURE			
(gpm)	(psi)				(psi)				LOSS (psi)			
	Length of water service pipe (feet)				Length of water service pipe (feet)				Length of water service pipe (feet)			
	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150
8	5.1	8.7	11.8	17.4	1.5	2.5	3.4	5.1	0.6	1.0	1.3	1.9
10	7.7	13.1	17.8	26.3	2.3	3.8	5.2	7.7	0.8	1.4	2.0	2.9
12	10.8	18.4	24.9	NP	3.2	5.4	7.3	10.7	1.2	2.0	2.7	4.0
14	14.4	24.5	NP	NP	4.2	7.1	9.6	14.3	1.6	2.7	3.6	5.4
16	18.4	NP	NP	NP	5.4	9.1	12.4	18.3	2.0	3.4	4.7	6.9
18	22.9	NP	NP	NP	6.7	11.4	15.4	22.7	2.5	4.3	5.8	8.6
20	27.8	NP	NP	NP	8.1	13.8	18.7	27.6	3.1	5.2	7.0	10.4
22	NP	NP	NP	NP	9.7	16.5	22.3	NP	3.7	6.2	8.4	12.4
24	NP	NP	NP	NP	11.4	19.3	26.2	NP	4.3	7.3	9.9	14.6
26	NP	NP	NP	NP	13.2	22.4	NP	NP	5.0	8.5	11.4	16.9
28	NP	NP	NP	NP	15.1	25.7	NP	NP	5.7	9.7	13.1	19.4
30	NP	NP	NP	NP	17.2	NP	NP	NP	6.5	11.0	14.9	22.0
32	NP	NP	NP	NP	19.4	NP	NP	NP	7.3	12.4	16.8	24.8
34	NP	NP	NP	NP	21.7	NP	NP	NP	8.2	13.9	18.8	NP
36	NP	NP	NP	NP	24.1	NP	NP	NP	9.1	15.4	20.9	NP

TABLE P2904.6.2(2) MINIMUM WATER METER PRESSURE LOSS (PLm)a

FLOW RATE	5/8-INCH METER PRESSURE LOSS	3/4-INCH METER PRESSURE	1 -INCH METER PRESSURE LOSS
(gallons per minute, gpm)b	(pounds per square inch, psi)	LESS (pounds per square inch, psi)	(pounds per square inch, psi)
8	2	1	1
10	3	1	1
12	4	1	1
14	5	2	1
16	7	3	1
18	9	4	1
20	11	4	2
22	NP	5	2
24	NP	5	2
26	NP	6	2
28	NP	6	2
30	NP	7	2
32	NP	7	3
34	NP	8	3
36	NP	8	3

TABLE P2904.6.2(5) ALLOWABLE PIPE LENGTH FOR 1-INCH TYPE M COPPER WATER TUBING

SPRINKLER	WATER	AVAILABLE PRESSURE—Pt (psi)								
FLOW RATE	DISTRIBUTION	15	20	25	30	35	40	45	50	55	60
(gpm)	SIZE (inch)	Allowable length of pipe from service valve to farthest sprinkler (feet)									
8	1	806	1075	1343	1612	1881	2149	2418	2687	2955	3224
9	1	648	864	1080	1296	1512	1728	1945	2161	2377	2593
10	1	533	711	889	1067	1245	1422	1600	1778	1956	2134
11	1	447	586	745	894	1043	1192	1341	1491	1640	1789
12	1	381	508	634	761	888	1015	1142	1269	1396	1523
13	1	328	438	547	657	766	875	985	1094	1204	1313
14	1	286	382	477	572	668	763	859	954	1049	1145
15	1	252	336	420	504	588	672	756	840	924	1008
16	1	224	298	373	447	522	596	671	745	820	894
17	1	200	266	333	400	466	533	600	666	733	799
18	1	180	240	300	360	420	479	539	599	659	719
19	1	163	217	271	325	380	434	488	542	597	651
20	1	148	197	247	296	345	395	444	493	543	592

P2904.6.2.1 Available pressure equation.
The pressure available to offset friction loss in the interior piping system (Pt) shall be determined in accordance with the Equation 29-1.

Pt = Psub * PLsvc * PLm * PLd * PLe * Psp (29-1)

Pt = 7.1 * 1 * 4.4 * 9.1 = 284.28
According to Table P2904.6.2.(5) Pt will be less than 15 psi.

where:
Pt = Pressure used in applying Tables P2904.6.2(4) through P2904.6.2(9).
Psup = Pressure available from the water supply source.
PLsvc = Pressure loss in the water-service pipe.
PLm = Pressure loss in the water meter.
PLd = Pressure loss from devices other than the water meter.
PLe = Pressure loss associated with changes in elevation.
Psp = Maximum pressure required by a sprinkler.

P2904.6.2.2 Calculation procedure.
Determination of the required size for water distribution piping shall be in accordance with the following procedure:

Step 1—Determine Psup
Obtain the static supply pressure that will be available from the water main from the water purveyor, or for an individual source, the available supply pressure shall be in accordance with Section P2904.5.1.

Psub will be 0 psi according to the pump (Grundfos CMBE 10-27)

Step 2—Determine PLsvc
Use Table P2904.6.2(1) to determine the pressure loss in the water service pipe based on the selected size of the water service.

According to Table P2904.6.2(1) the psi will be 7.1.

Step 3—Determine PLm
Use Table P2904.6.2(2) to determine the pressure loss from the water meter, based on the selected water meter size.

According to table P2904.6.2.(2) the pressure loss will be 1 psi.

Step 4—Determine PLd
Determine the pressure loss from devices other than the water meter installed in the piping system supplying sprinklers, such as pressure-reducing valves, backflow preventers, water softeners or water filters. Device pressure losses shall be based on the device manufacturer's specifications. The flow rate used to determine pressure loss shall be the rate from Section P2904.4.2, except that 5 gpm (0.3 L/s) shall be added where the device is installed in a water-service pipe that supplies more than one dwelling. As an alternative to deducting pressure loss for a device, an automatic bypass valve shall be installed to divert flow around the device when a sprinkler activates.

There won't be filters installed.

Step 5—Determine PLe
Use Table P2904.6.2(3) to determine the pressure loss associated with changes in elevation. The elevation used in applying the table shall be the difference between the elevation where the water source pressure was measured and the elevation of the highest sprinkler.

The elevation loss in the system will be 4.4 psi.

Step 6—Determine Psp
Determine the maximum pressure required by any individual sprinkler based on the flow rate from Section P2904.4.1. The required pressure is provided in the sprinkler manufacturer's published data for the specific sprinkler model based on the selected flow rate.

The sprinkler that will be used needs a minimum of 9.1psi.

Step 7—Calculate Pt
Using Equation 29-1, calculate the pressure available to offset friction loss in water-distribution piping between the service valve and the sprinklers.

Using the equitation 29-1 the answer will be 284.28. The outcome of this equation will be put in 2904.6.2(5). Now you can see that the available pressure that will be needed for the sprinkler will be less than 15 Psi (1.03 bar).

Step 8—Determine the maximum allowable pipe length
Use Tables P2904.6.2(4) through P2904.6.2(9) to select a material and size for water distribution piping. The piping material and size shall be acceptable if the developed length of pipe between the service valve and the most remote sprinkler does not exceed the maximum allowable length specified by the applicable table. Interpolation of Pt between the tabular values shall be permitted.

The maximum allowable length of piping in Tables P2904.6.2(4) through P2904.6.2(9) incorporates an adjustment for pipe fittings. Additional consideration of friction losses associated with pipe fittings shall not be required.

TABLE P2904.6.2(3) ELEVATION LOSS (PLe)

ELEVATION (feet)	PRESSURE LOSS (psi)
5	2.2
10	4.4
15	6.5
20	8.7
25	10.9
30	13
35	15.2
40	17.4

P2904.7 Instructions and signs.
An owner's manual for the fire sprinkler system shall be provided to the owner. A sign or valve tag shall be installed at the main shutoff valve to the water distribution system stating the following: "Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign.".

P2904.8 Inspections.
The water distribution system shall be inspected in accordance with Sections P2904.8.1 and P2904.8.2.

P2904.8.1 Preconcealment inspection.
The following items shall be verified prior to the concealment of any sprinkler system piping:

1. Sprinklers are installed in all areas as required by Section P2904.1.1.
2. Where sprinkler water spray patterns are obstructed by construction features, luminaires or ceiling fans, additional sprinklers are installed as required by Section P2904.2.4.2.
3. Sprinklers are the correct temperature rating and are installed at or beyond the required separation distances from heat sources as required by Sections P2904.2.1 and P2904.2.2.
4. The pipe size equals or exceeds the size used in applying Tables P2904.6.2(4) through P2904.6.2(9) or, if the piping system was hydraulically calculated in accordance with Section P2904.6.1, the size used in the hydraulic calculation.
5. The pipe length does not exceed the length permitted by Tables P2904.6.2(4) through P2904.6.2(9) or, if the piping system was hydraulically calculated in accordance with Section P2904.6.1, pipe lengths and fittings do not exceed those used in the hydraulic calculation.
6. Nonmetallic piping that conveys water to sprinklers is listed for use with fire sprinklers.
7. Piping is supported in accordance with the pipe manufacturer's and sprinkler manufacturer's installation instructions.
8. The piping system is tested in accordance with Section P2503.7.

P2904.8.2 Final inspection.
The following items shall be verified upon completion of the system:

1. Sprinkler are not painted, damaged or otherwise hindered from operation.
2. Where a pump is required to provide water to the system, the pump starts automatically upon system water demand.
3. Pressure-reducing valves, water softeners, water filters or other impairments to water flow that were not part of the original design have not been installed.
4. The sign or valve tag required by Section P2904.7 is installed and the owner's manual for the system is present.

SPRINKLER DRAWING KEY

- FLANGE
- VALVE
- SMOKE DETECTOR
- CEILING SPRINKLER HEAD
- HYDROFOOR PUMP
- PRESSURE GAUGE
- FLOW SWITCH

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MARK	DATE	DESCRIPTION
Rev.00	02-24-2017	ADD. NOTES AND SYMBOLS

LOT NUMBER: 106
DRAWN BY: Huib Snijder
CHECKED BY: Remco Polle

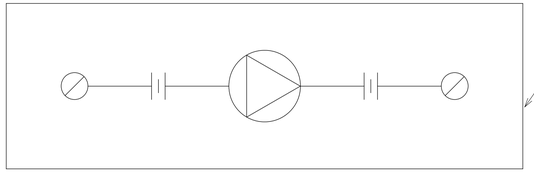
SHEET TITLE
FIRE PROTECTION NOTES AND SYMBOLS

F-001

10-8-2017 14:37:34

MANI VALVE TAG

PUMP SITUATION FOR TESTING WITH ORGANISATION



TESTING HOSE

RESIDENTAL RISER ASSEMBLY

SPRINKLER SCHEMATICS

Legenda:

- Verloopstuk XXX
- GEKA Coupling
- Vent valve
- (1) Sprinkler Viking VK102 K5.6 175 °F (93°C)
- (2) Sprinkler Viking VK457 K4.9 165 °F (74°C)
- (3) Sprinkler Viking VK430 K4.3 155 °F (68°C)
- (M) Main Valve with tag
- Valve
- Pump Grundfos CMBE 10-27
- Flange connection witch gasket
- Switch for domotic
- Testing hose
- (M) Manometer
- (S) Sprinkler

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MARK	DATE	DESCRIPTION
Rev.00	11-17-2016	90% REVISION
Rev.01	02-24-2017	SECOND DESIGN
Rev.02	08-08-2017	FINAL DESIGN

LOT NUMBER:	106
DRAWN BY:	Huib Snijder
CHECKED BY:	Remco Polle
COPYRIGHT:	NONE: PROJECT IS PUBLIC DOMAIN

SHEET TITLE

SPRINKLER SCHEMATICS

F-100

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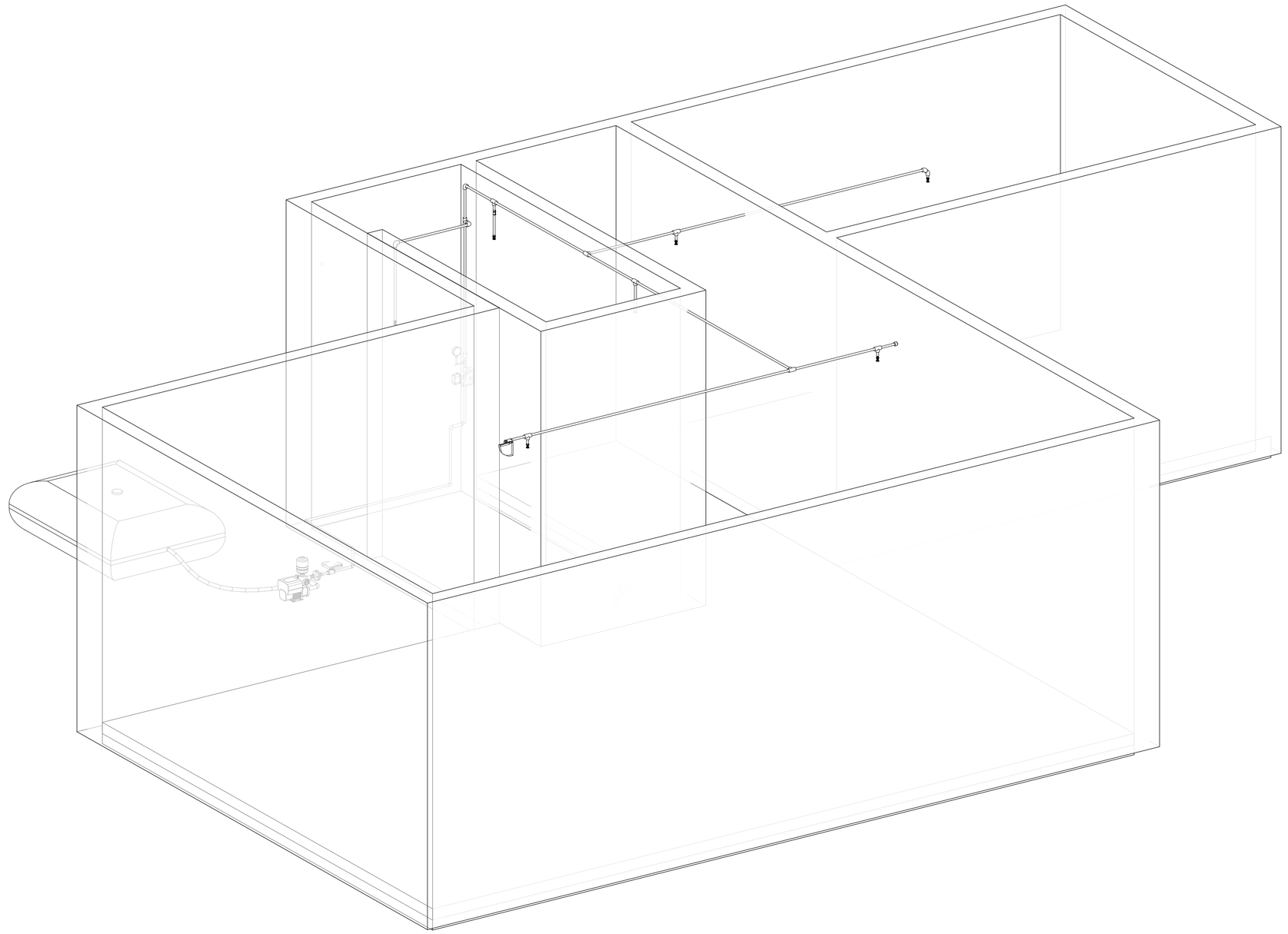

SPRINKLER ISOMETRIC

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MARK	DATE	DESCRIPTION
Rev.00	11-17-2016	90% REVISION
Rev.01	02-24-2017	SECOND DESIGN
Rev.02	08-08-2017	FINAL DESIGN

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SHEET TITLE

SPRINKLER ISOMETRIC

F-101

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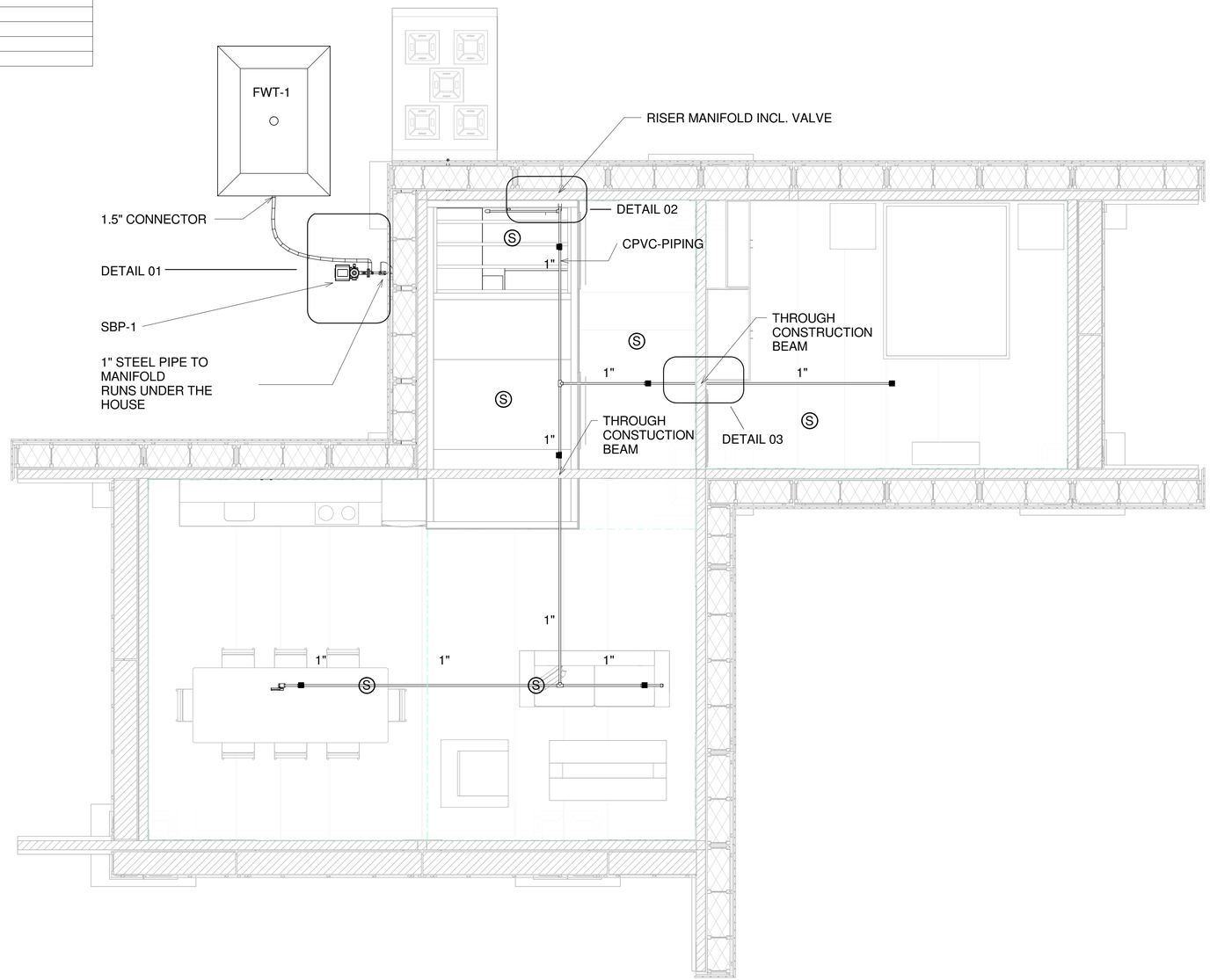
Sprinkler Schedule		
Description	Amount	Lenght
Sprinkler Head	6	
1" Tubing (25,4mm)		660" (16780mm)
1" 37/64" Tubing (40mm)		106" (2695mm)
90 deg Bends (CPVC)	8	
90 deg Bends (STEEL)	12	
T-junction	5	
Smokedetectors	6	
Raiser Manifold	1	
HydrofoorPump	1	



FIRE DETECTION AND ALARM

1:35

SPRINKLER DRAWING KEY

- FLANGE
- VALVE
- SMOKE DETECTOR
- CEILING SPRINKLER HEAD
- HYDROFOOR PUMP
- PRESSURE GAUGE
- FLOW SWITCH

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MARK	DATE	DESCRIPTION
Rev.00	11-17-2016	90% REVISION
Rev.01	02-24-2017	SECOND DESIGN
Rev.02	08-08-2017	ADD. SPRINKLER

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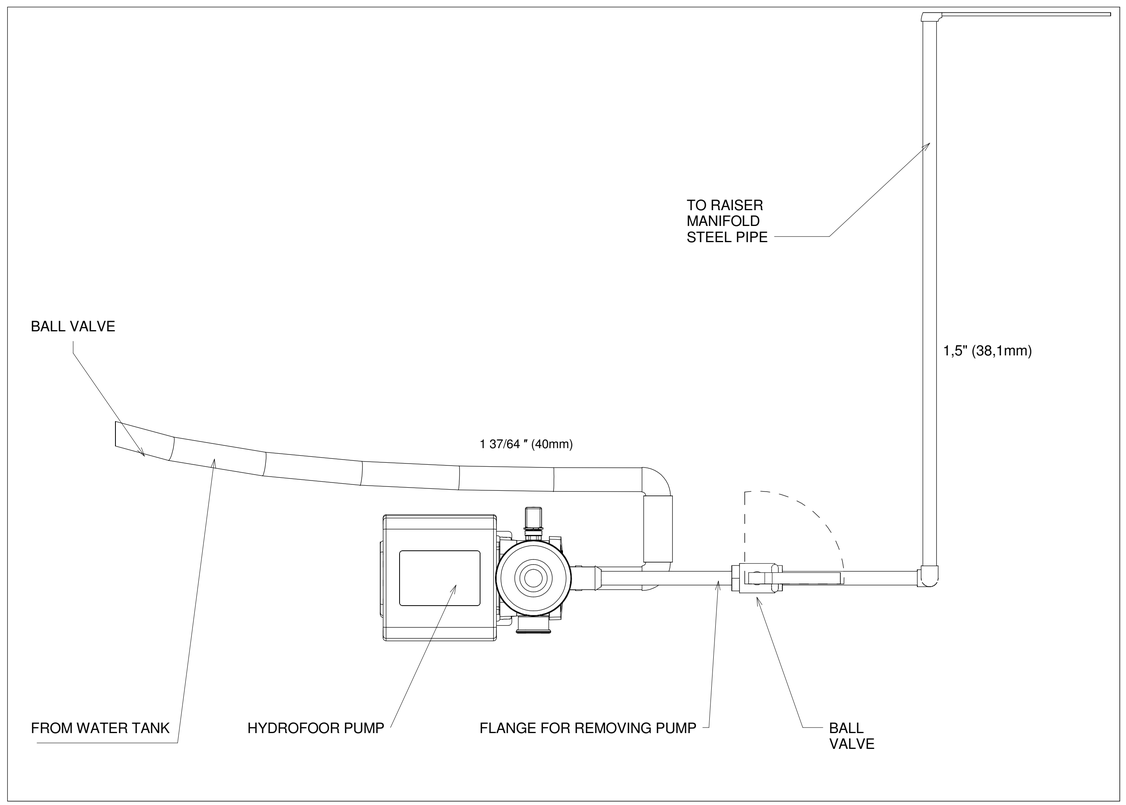
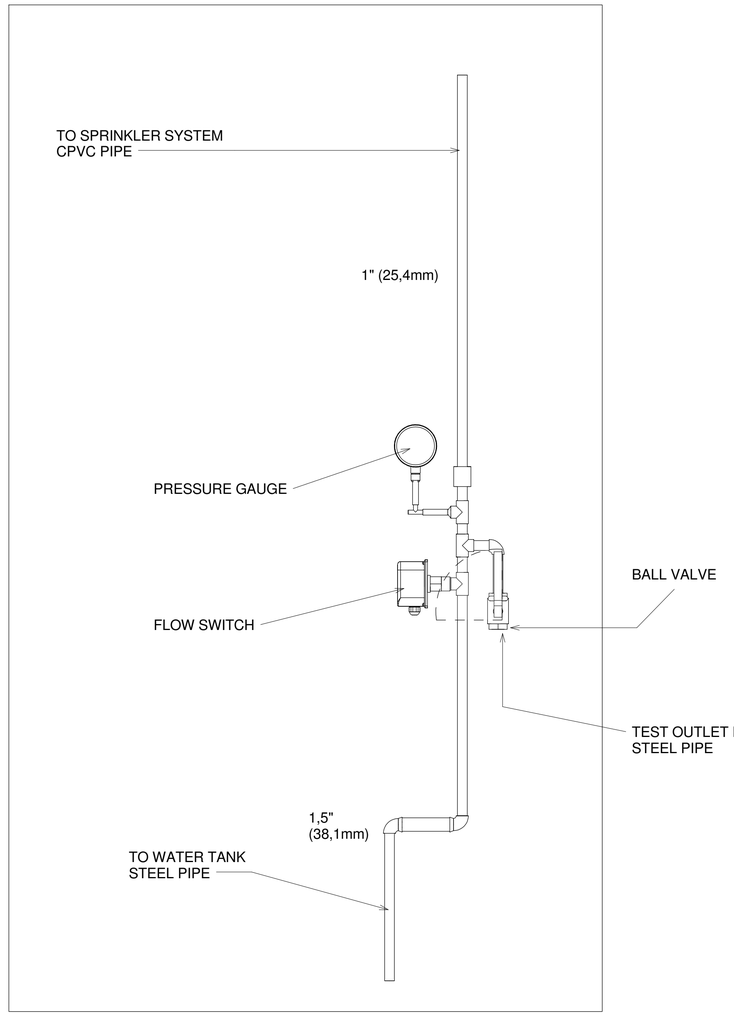
FIRE DETECTION AND ALARM

F-200

10-8-2017 14:37:46



DETAIL 01 - HYDROFOOR PUMP CLOSE-UP



DETAIL 02 - RISER MANIFOLD CLOSE-UP

SPRINKLER DETAILS

1:5

SPRINKLER DRAWING KEY

- FLANGE
- VALVE
- SMOKE DETECTOR
- CEILING SPRINKLER HEAD
- HYDROFOOR PUMP
- PRESSURE GAUGE
- FLOW SWITCH

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SPRINKLER DETAILS

F-400

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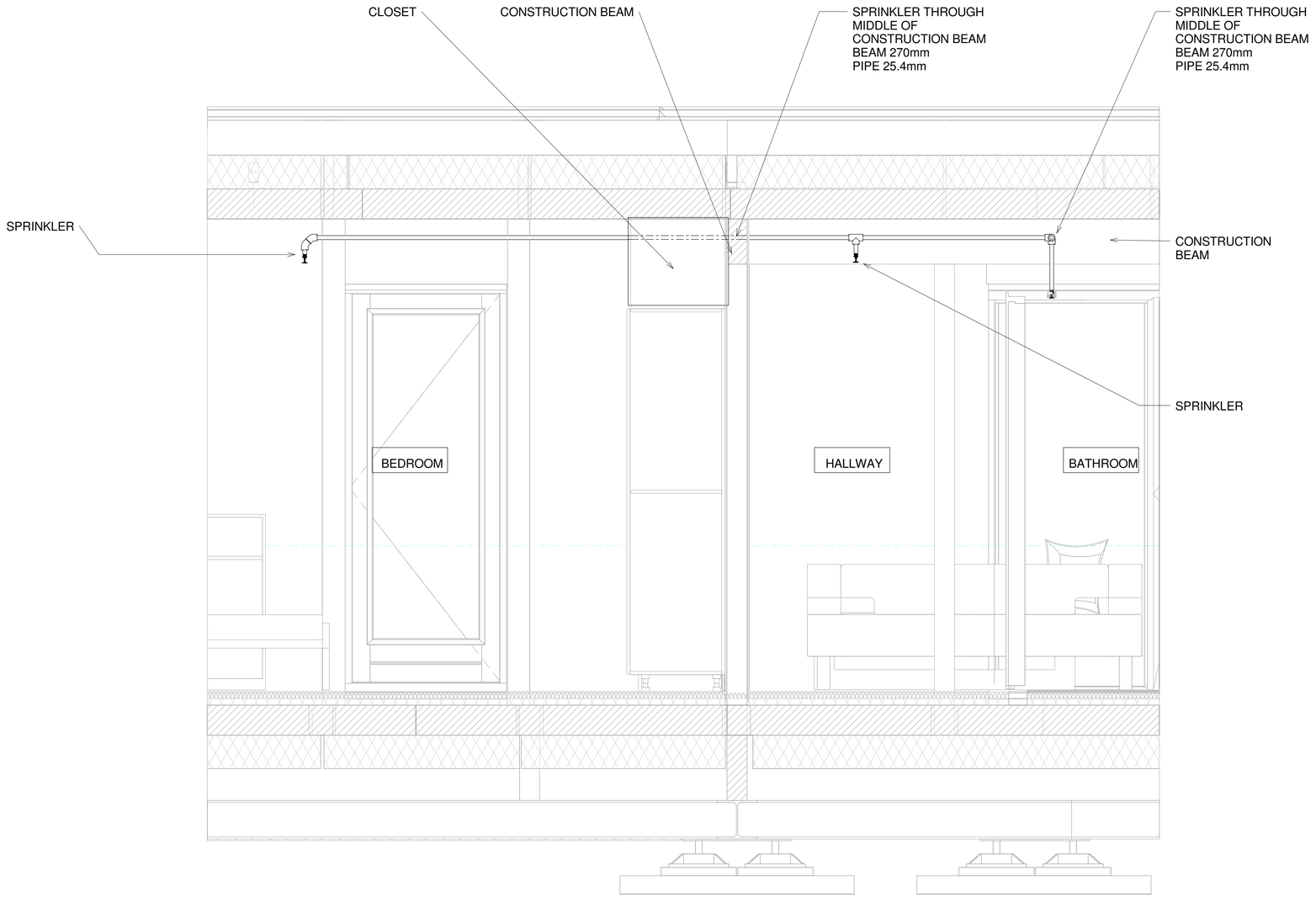

DETAIL 03 - SPRINKLER PIPING THROUGH CONSTRUCTION BEAM

SPRINKLER DETAIL CONST. BEAM

1:15

10-8-2017 14:37:53

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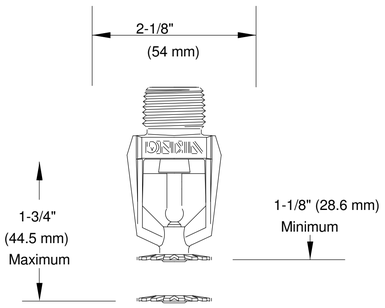
SPRINKLER DETAIL CONST. BEAM

F-401

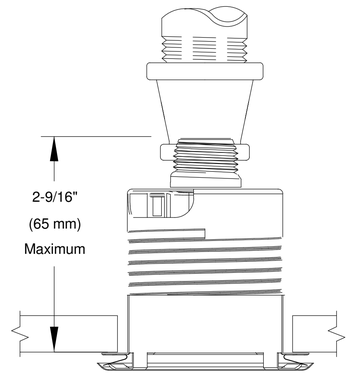
VK102
SPRINKLER HEAD TECHNICAL ROOM



INSTALLED WITH A MICROMATI
MODEL E - 1 RECESSED ESCUTCHEON

VIKING STANDARD RESPONSE PENDENT SPRINKLER 10139 (VK102)

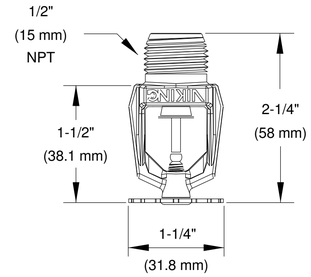
VK457
SPRINKLER HEAD BATHROOM



NOTE: UPON SPRINKLER ACTIVATION, THE DEFLECTOR DESCENDS TO APPROXIMATELY 13/16" (20.6MM) BELOW THE SPRINKLER BODY

VIKING RESIDENTIAL CONCEALED PENDENT SPRINKLER VK457

VK430
SPRINKLER HEAD LIVING AND BEDROOM



INSTALLED WITH A MICROMATIC
MODEL E-1 RECESSED ESCUTCHEON

VIKING RESIDENTIAL PENDENT K4.3 SPRINKLER 09530 (VK430)

SPRINKLER CLOSE-UPS

10-8-2017 14:37:58

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SPRINKLERS CLOSE-UPS

F-402

Fire Suppression Schedule

Type Mark	Room: name	Description	Manufacturer	Model	Count	Dimensions (DxWxH) (mm)	URL
VK102	Tech Room	Sprinkler Head	VIKING	VK102	2	SEE F-402	http://www.vikingcorp.com/vk102-micromatic-standard-response-pendent-sprinkler-k56
VK457	Bathroom	Sprinkler Head	VIKING	VK457	1	SEE F-402	http://www.vikingcorp.com/vk457-residential-concealed-fusible-element-pendent-sprinkler-k49
VK430	Living and Bedroom	Sprinkler Head	VIKING	VK430	4	SEE F-402	http://www.vikingcorp.com/vk430-residential-pendent-sprinkler-k43
FWT-1	Outiside	Fire Suppression Water Tank	DAMME Kunststoffen	CUSTOM	1	1500x2000x650	http://www.dammekunststoffen.nl/index.php
SBP-1	Outside	Sprinkler Booster Pump	WILO	MHI 405-1/E/1/230/50/2	1	377x232x506	http://productfinder.wilo.com/nl/nl/c0000001100009aa900020023/product.html#tab=range_description
CPVC	Inside	Fire Suppression Piping	Blazemaster	1''		1''	https://www.lubrizol.com/CPVC/Blazemaster/
CPVC	Inside	Tee, Elbows Piping	Blazemaster	1''			https://www.lubrizol.com/CPVC/Blazemaster/
S	Inside	Smoke Detector	First Alert	230V	6		https://www.brandbeveiligingshop.nl/first-alert-first-alert-rookmelder-230-volt-met-10.html
DETAIL 01	Outside	Detail SBP-1	Various		1		
DETAIL 01	Outside	Ball Valve	VIKING	Various	3	25,4mm and 40mm (diameter)	
DETAIL 01	Outside	Flange	VIKING	Various	2	25,4mm and 40mm (diameter)	
DETAIL 02	Tech Room	Detail Riser Manifold	Various				
DETAIL 02	Tech Room	Pressure Gauge	VIKING	DN25	1		http://www.vikingcorp.com/sites/default/files/databook/wetsystems/102407.pdf
DETAIL 02	Tech Room	Ball Valve	VIKING	DN25	1	1''	http://www.vikingcorp.com/sites/default/files/databook/wetsystems/102407.pdf
DETAIL 02	Tech Room	Flow Switch	VIKING	VSR-S Flow Switch	1		http://www.vikingcorp.com/sites/default/files/databook/wetsystems/102407.pdf

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CHECKED BY: Remco Polle

SHEET TITLE

FIRE SUPPRESSION SCHEDULE

F-500

10-8-2017 14:38:00

Plumbing code notes

Symbols

GATE VALVE

PUMP

3-WAY VALVE

Plumbing Abbreviations

DST	DOMESTIC SUPPLY TANK
DRT	DOMESTIC RETURN TANK
WWP	WASTE WATER PUMP
EPP	ELECTRONIC PRESSURE PUMP
WC	WATER CLOSET
SK	SINK
DW	DISH WASHER
WM	CLOTHES WASHING MACHINE
RWT	RAIN WATER TANK
DST	DOMESTIC SUPPLY TANK
AV	AIR VENT
RWI	RAINWATER INLET
DFU	DRAIN FIXTURE UNIT
WSFU	WATER SUPPLY FIXTURE UNIT
EO	EMERGENCY OVERFLOW

Section R106.11
Information on construction documents

R106.1.1 Information on construction documents.
Construction documents shall be drawn upon suitable material. Electronic media documents are permitted to be submitted where approved bij the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it wil conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.

Section N1103 (R403)
Systems

N1103.5.1 (R403.5.1.) Heated water circulation and temprature maintenance systems (Mandatory)
Heated water circulation systems shall be in accordance with Section R1103.5.1.1. Heat trace temprature maintenance systems shall be in accordance with Section R1103.5.1.2. Automatic controls, temprature sensors and pumps shall be accesible. Manual controls shall be readily accessible.

N1103.5.1.1 (R403.5.1.1) Circulation systems.
Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when te water in the circulation loop is at the desired temprature and when there is no demand for hot water.

N1103.5.3 (R403.5.3) Hot water pipe insulation (Prescriptive).
Insulation for hot water pipe with a minimum thermal resistance (R-value) of R-3 shall be applied to the following:

1. Piping 3/4 inch (19 mm) and larger in nominal diameter.

2. Piping serving more than one dwelling unit.

3. Piping located outside the conditioned space.

4. Piping from the water heater to a distribution manifold.

5. Piping located under a floor slab.

6. Burried piping.

7. Supply and return piping in recirculation systems other than demand recirculation systems.

Section P2501
General

P2501.1 Scope.
The provisions of this chapter shall establish the general administrative requirements applicable to plumbing systems and inspection requirements of this code.

Section P2503
Inspection and Tests.

P2503.2 Concealment.
A plumbing or drainage system, or part thereof, shall not be covered, concealed or put into use until it has been tested, inspected and approved by the building official.

P2503.5 Drain, waste and vent systems testing.
Rough-in and finished plumbing installations of drain, waste and vent systems shall be tested in accordance with Sections P2503.5.1 and P2503.5.2.

P2503.5.1 Rough plumbing.
DWV systems shall be tested on completion of the rough piping installation by water or, for pipig systems other than plastic, by air, without evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough-in piping has been installed, as follows:

1. Water test. Each section shall be filled with water to a point not less than 5 feet (1524 mm) above the highest fitting connection in that section, or to the highest point in the completed system. Water shall be held in the sections under test for a period of 15 minutes. The system shall prove leak free by visual inspection.

2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This pressure shall be held without introduction of additional air for period of 15 minutes.

P2503.5.2 Finished plumbing.
After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas tight or water tight as follows:

1. Water tightness. Each fixture shall be filled and then drained. Traps and fixture connections shall be proven water tight by visual insection.

2. Gas tightness. Where required by the local administrative authority, a final test for gas tightness of the DWV system shall be made by the smoke or peppermint test as follows:

2.1 Smoke test. Introduce a pungent, thick smoke into the system. When the smoke appears at vent terminals, such terminals shall be sealed and a pressure equivalent to a 1-inch water column (249 Pa) shall be applied and maintained for a test period of not less than 15 minutes.

2.2 Peppermint test. Introduce 2 ounces (59 mL) of oil of peppermint into the system. add 10 quarts (9464 mL) of hot water and seal the vent terminals. The odor of peppermint shall not be detected at any trap or other point in the system.

P2503.6 Shower liner test.
Where shower floors and receptors are made water tight by the application of materials required by Section P2709.2, the completed liner installation shall be tested. The pipe from the shower drain shall be plugged water tight for the test. The floor and receptor area shall be filled with potable water to a depth of not less than 2 inches (51 mm) measured at the threshold. Where a threshold of not less than 2 inches (51 mm) in height does not exist, a temporary threshold shall be constructed to retain the test water in the lined floor or receptor area to a level not less than 2 inches (51 mm) in depth measured at the threshold. The water shall be retained for a test period of not less than 15 minutes and there shall not be evidence of leakage.

P2503.7 Water-supply system testing.
Upon completion of the water-supply system or a section of it, the system or portion completed shall be tested and proved tight under a water pressure of not less than the working pressure of the system or, for piping systems other than plastic, by an air test of not less than 50 psi (345 kPa). This pressure shall be held for not less than 15 minutes. The water used for tests shall be obtained from a potable water source.

P2503.8 Inspection and testing of backflow prevention devices.
Inspection and testing of backflow prevention devices shall comply with Sections P2503.8.1 and P2503.8.2.

P2503.8.1 Inspections
Inspections shall be made of backflow prevention assemblies to determine whether they are operable.

P2503.8.2 Testing
Reduced pressure principle, double check, double check detector and pressure vacuum breaker backflow preventer assemblies shall be tested at the time of installation, immediately after repairs or relocation and every year thereafter.

Section P2603
Structural and Pipping protection

P2603.2 Drilling and notching.
Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R802.7 and R802.7.1. Holes in load-bearing members of cold-formed steel light-frame constructions shall be permitted only in accordance with Sections R505.2.6, R603.2.6 and R804.2.6. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.3, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame constructions shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Sections R610.7.

Section P2701
Fixtures, Faucets and Fixture fittings

P2701.1 Quality of fixtures.
Plumbing fixtures, faucets and fixture fittings shall have smooth impervious surfaces, shall be free from defects, shall not have concealed fouling surfaces, and shall conform to the standaards indicated in Table P2701.1 and elsewhere in this code.

Section P2702
Fixture Accessories

P2702.1 Plumbing fixtures.
Plumbing fixtures, other than water closets, shall be provided with approved strainers.

Exception: Hub drains receiving only clear water waste and standpipes shall not require strainers.

P2702.2 Waste fittings.
Waste fittings shall conform to ASME A112.18.2/CSA B125.2, ASTM F 409 or shall be made from pipe and pipe fittings complying with any of the standards indicated in Tables P3002.1(1) and P3002.3.

Section P2703
Tail Pieces

P2703.1 Minimum size.
Fixture tail pieces shall be not less than 1.5 inches (38 mm) in diameter for sinks, dishwashers, laundry tubs, bathtubs and similar fixtures, and not less than 1.25 inches (32 mm) in diameter for bidets, lavatories and similar fixtures.

Section P2704
Acces to Connections

P2704.1 General.
Slip joints shall be made with an approved elastomeric gasket and shall be installed only on the trap outlet, trap inlet and within the trap seal. Fixtures with concealed slip-joint connections shall be provided with an acces panel or utility space not les than 12 inches (305 mm) in its smallest dimension or other approved arrangement so as to provide acces to the slip connections for inspection and repair.

Section P2704
Acces to Connections

P2704.1 General.
Slip joints shall be made with an approved elastomeric gasket and shall be installed only on the trap outlet, trap inlet and within the trap seal. Fixtures with concealed slip-joint connections shall be provided with an acces panel or utility space not les than 12 inches (305 mm) in its smallest dimension or other approved arrangement so as to provide acces to the slip connections for inspection and repair.

Section M1403
Heat pump equipment

M1403.1 Heat Pumps.
Electric heat pumps shall be listed and labeled in accordance with UL 1995 or UL/CSA/ANCE 60335-2-40.

Section P2705
Installation

P2705.1 General
The installation of fixture shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, copper alloy or other corrosion-resistant material.

2.Wall-hung fixtures shall be rigidly supported so that strain is not transmitted to the plumbing system.

3. Where fixtures come in contact with walls and floors, the contact area shall be water tight.

4. Plumbing fixtures shall be usable.

5. Water closets, lavatories and bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.

6. The location of piping, fixtures or equipment shall not interfere with the operation of window or doors.

7. In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.6.

8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumping fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.4.

Section P2706
Waste Receptors

P2706.1 General
For other than hub drains that reveive only clear-water waste and standpipes, a removable strainer or basket shall cover the waste outlet of waste receptors. Waste receptors shall not be installed in concealed spaces. Waste receptors shall not be installed in plenums, attics, crawl spaces or interstitial spaces above ceilings and below floors. Waste receptors shall be readily accesible.

P2706.1.1 Hub drains
Hub drains shall be in the form of a hub or a pipe that extends not less than 1 inch (25 mm) above a water-impervious floor.

P2706.1.2 Standpipes
Standpipes shall extend not less than 18 inches (457 mm) and not greater than 42 inches (1067 mm) above the trap weir.

P2706.1.2.1 Laundry tray connection to standpipe.
Where a laundry tray waste line connects into a standpipe for an automatic clothes washer drain, the standpipe shall extend not less than 30 inches (762 mm) above the standpipe trap weir and shall extend above the fleed rim of the laundry tray. The outlet of the laundry tray shall not be greater than 30 inches (762 mm) horizontally from the standpipe trap.

Section P2707
Directional Fittings

P2707.1 Directional fitting required.
Approved directional-type branch fittings shall be installed in fixture tailpieces receiving the discharge from food-waste disposer units or dishwashers.

Section P2708
Showers

P2708.1 General
Shower compartments shall have not less than 900 square inches (0.6 m2) of interior cross-sectional area. Shower compartments shall not be less than 30 inches (762 mm) in minimum dimension measured from the finished interior dimension of the shower compartment, exclusive of fixture valves, shower heads, soap dishes, and safety grab bars or rails. The minimum required area and dimension at a heigt equal to the top of the threshold and at a point tangent to its centerline and shall be continued to a height of not less than 70 inches (1778 mm) above the shower drain outlet. Hinged shower doors shall open outward. The wall area above built-in tubs having installed shower heads and in shower compartments shall be constructed in accordance with Section R702.4. Such walls shal form a water-tight joint with each other and with either the tub, receptor or shower floor.

Exception:

1. Shower compartments having not less than 25 inches (635 mm) in minimum dimension measured from the finished interior dimension of the compartment provided that the shower compartment has a cross-sectional area of not less than 1,300 square inches (0.838 m2).

P2708.1.1 Acces.
The shower comparment acces and egress opening shall have a clear and unobstructed finished width of not less than 22 inches (559 mm).

P2708.2 Shower drain.
Shower drains shall have an outlet size of not less than 1.5 inches (38 mm) in diameter.

P2708.3 Water supply riser.
Water supply risers from the shower valve to the shower head outlet, whether exposed or concealed, shall be attached to the structure using support devices designed for use with the specific piping material or fittings anchored with screws.

P2708.4 Shower control valves
Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016/ASME A112.1016/CSA B125.16. The high limit stop shall be set to limit the water temprature to not greater than 120°F (49°C). In-line thermostatic valves shall not be used for compliance with this section.

Section P2711
Lavatories

P2711.1 Approval
Lavatories shall conform to ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4 or CSA B45.5/IAPMO Z124.

P2711.3 Lavatory was outlets.
Lavatories shall have waste outlets not less than 1.25 inch (32 mm) in diameter. A strainer, pop-up stopper, crossbar or other device shall be provided to restrict the clear opening of the waste outlet.

Section P2712
Water Closets

P2712.1 Approval
Water closets shall conform to the water consumption requirements of Section P2903.2 and shall conform to ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4 or CSA B45.5/IAPMO Z124. Water closets shall conform to the hydraulic performance requirements of ASME A112.19.2/CSA B45.1. Water closet tanks shall conform to ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4 or CSA B45.5/IAPMO Z124. Water closets that have an invisible seal and unventilated space or walls that er not thoroughly washed at each discharge shall be prohibited. Water closets that allow backflow of the contents of the bowl into the flush tank shall be prohibited. Water closets equipped with a dual flushing device shall comply with ASME A112.19.14.

P2712.2 Flushing devices required.
Water closets shall be provided with a flush tank , flushometer tank or flushometer valve designed and installed to supply water in sufficient quantity and flow to flush the contents of the fixture, to cleanse the fixture and refill the fixture trap in accordance with ASME A112.19.2/CSA B45.1.

Section P2714
Sinks

P2714.1 Sink waste outlets.
Sinks shall be provided with waste outlets not less than 1.5 inches (38 mm) in diameter. A strainer, crossbar or other device shall be provided to restrict the clear opening of the wase outlet.

Section P2717
Dishwashing Machines

P2717.1 Protection of water supply.
The water supply to a dishwasher shall be protected against backflow by an air gap complying with ASME A112.1.3 or A112.1.2 that is installed integrally within the machine or a backflow preventer in accordance with Section P2902.

P2717.2 Sinks and dishwasher.
The combined discharge from a dishwasher and a one- or two-compartment sink, with or without a food-waste disposer, shall be served by a trap of not less than 1.5 inches (38 mm) in outside diameter. The dishwasher discharge pipe or tubing shall ris to the underside of the counter and be fastened or otherwise held in that position before connecting to the head of the food-waste disposer or to a wye fitting in the sink tailpiece.

Section P2718
Clothes Washing Machine

P2718.1 Waste connection
The discharge from a clothes washin machine shall be through an air break.

Section P2722
Fixture Fitting

P2722.1 General
Fixture supply valves and faucets shall comply with AME A112.18.1/CSA B125.1 as indicated in Table P2701.1. Faucets and fixture fittings that supply drinking water for human ingestion shall conform to the requirements of NSF 61, Section 9. Flexible water connectors shall conform to the requirements of Section P2905.7.

P2722.2 Hot water
Fixture fittings supplied with both hot and cold water shall be installed and adjusted so that the left-hand side of the water temprature control represent the flow of hot water when facing the outlet.

Exception: Shower and tub/shower mixing valves conforming to ASSE 1016/ASME A112.1016/CSA B125.16, where the water temprature control corresponds to the markings on the device.

P2722.3 Hose-connected outlets
Faucets and fixture fittings with hose-connected outlets shall conform to ASME A112.18.3 or ASME A112.18.1/CSA B125.1.

Section P2901
General

P2722.1 Potable water required
Potable water shall be supplied to plumbing fixtures and plumbing appliances except where treated rainwater, treated gray water or municipal reclaimed water is supplied to water closets, urinals and trap primers. The requirements of this section shall not be construed to require signage for water closets and urinals.

Section P2902
Protection of Potable Water Supply

P2722.1 General.
A potable water supply system shall e designed and installed as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply. Connections shall not be made to a potable water supply or provide a cros-connection between the supply and a source of contamination except where approved backflow prevention assemblies, backflow prevention devices or other means or methods are installed to protect the potable water supply. Cros-connections between an individual water supply and a potable pubic water supply shall be prohibited.

P2722.2 Hot water
The supply lines and fittings for every plumbing fixture shall be installed so as to prevent backflow. Plumbing fixture fittings shall provide backflow protection in accordance with ASME A112.18.1/CSA B125.1.

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Rev. 00	02-24-2017	ADD. NOTES & SYMBOLS
MARK	DATE	DESCRIPTION

LOT NUMBER:	106
DRAWN BY:	Mads de Kock
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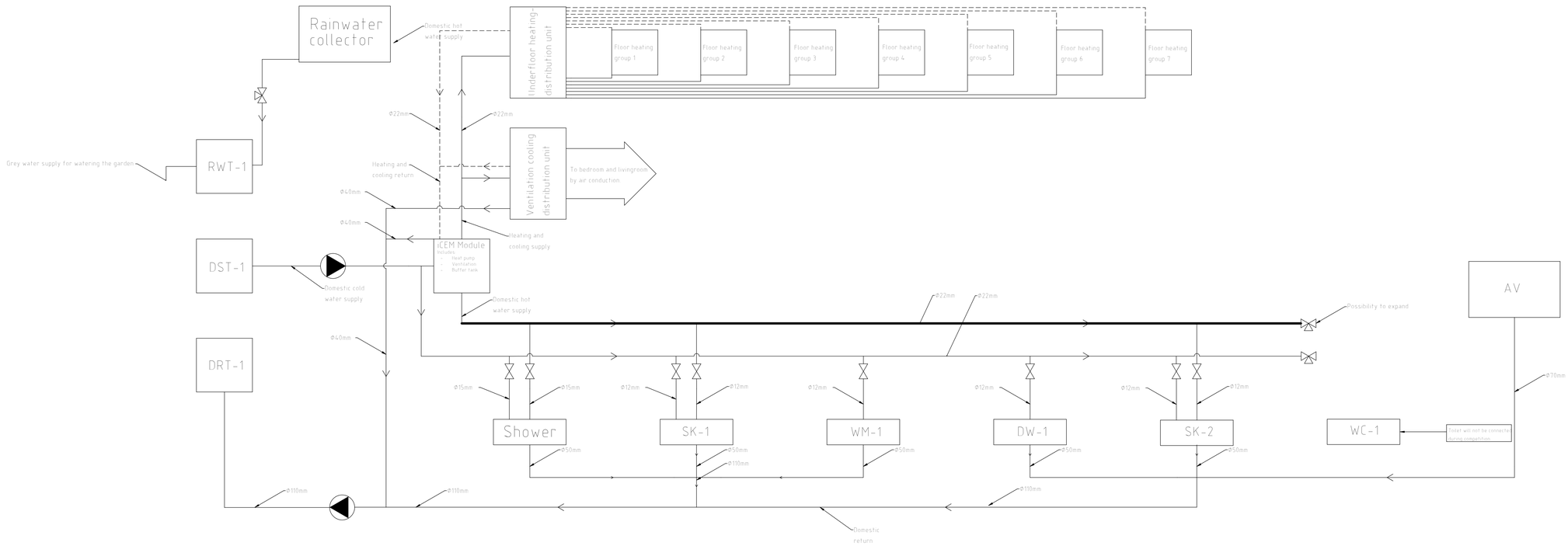
PLUMBING NOTES AND SYMBOLS

P-001

10-8-2017 14:38:38



DOMESTIC SUPPLY AND RETURN SCHEMATICS

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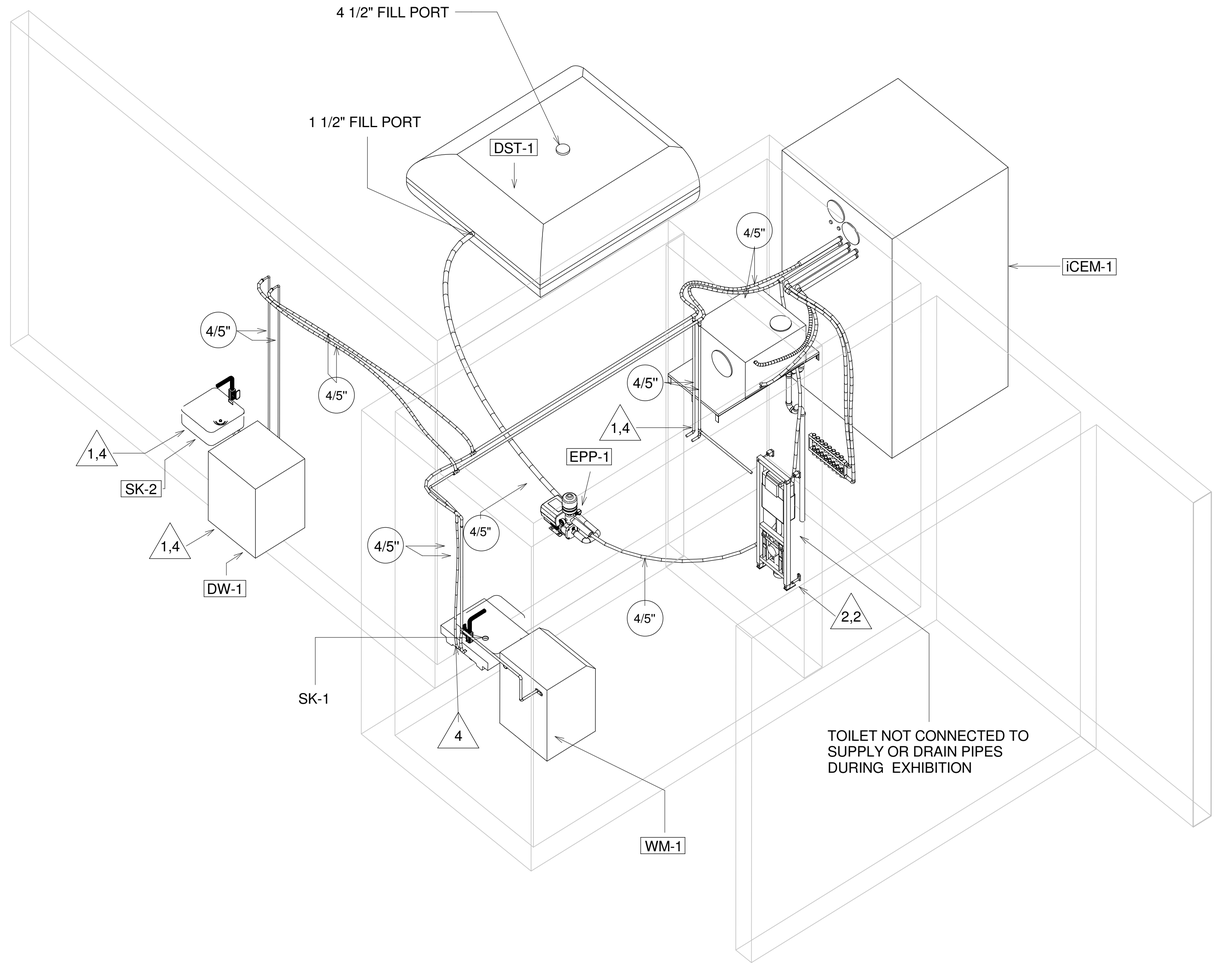
DOMESTIC SUPPLY AND RETURN SCHEMATICS

P-100



DOMESTIC SUPPLY ISOMETRIC

1:25

LEGEND

(#) SIZE (IN.)

<#> DFU

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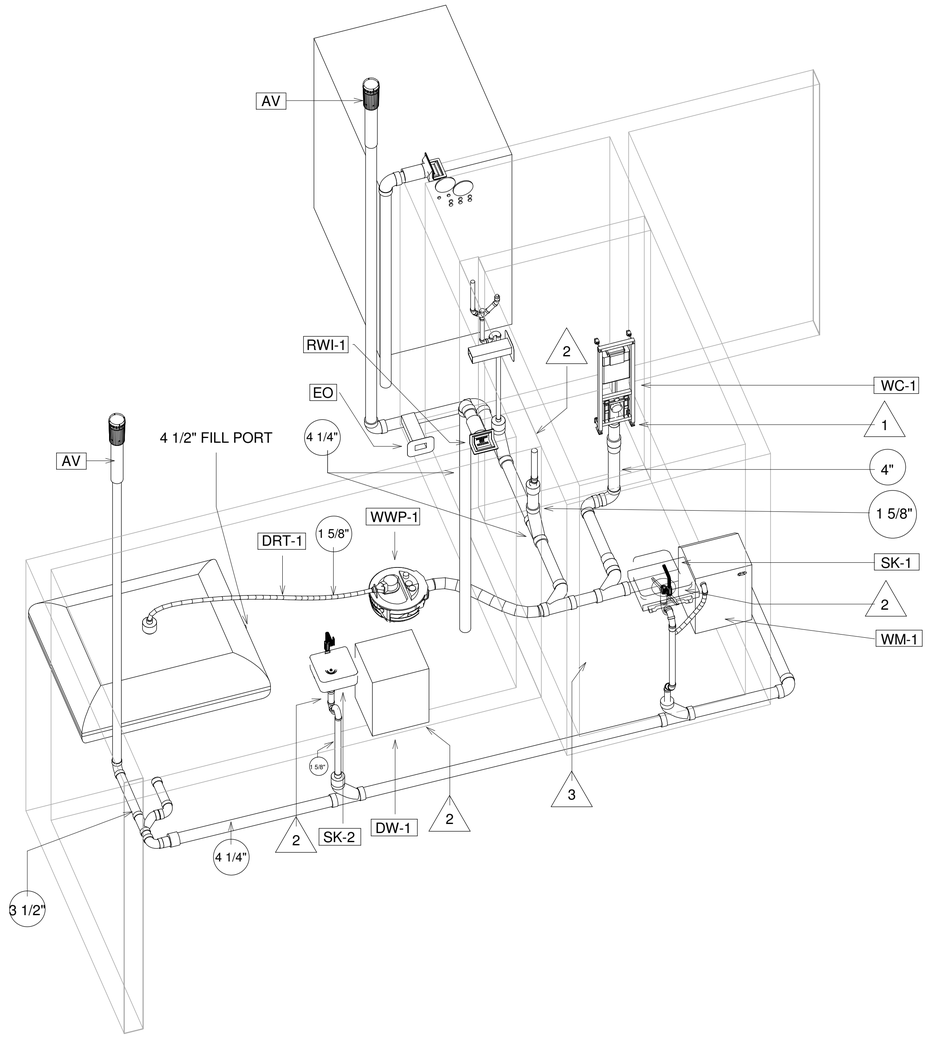
DOMESTIC SUPPLY ISOMETRIC

P-101



DOMESTIC RETURN ISOMETRIC

1:30

LEGEND

SIZE (IN.)

DFU

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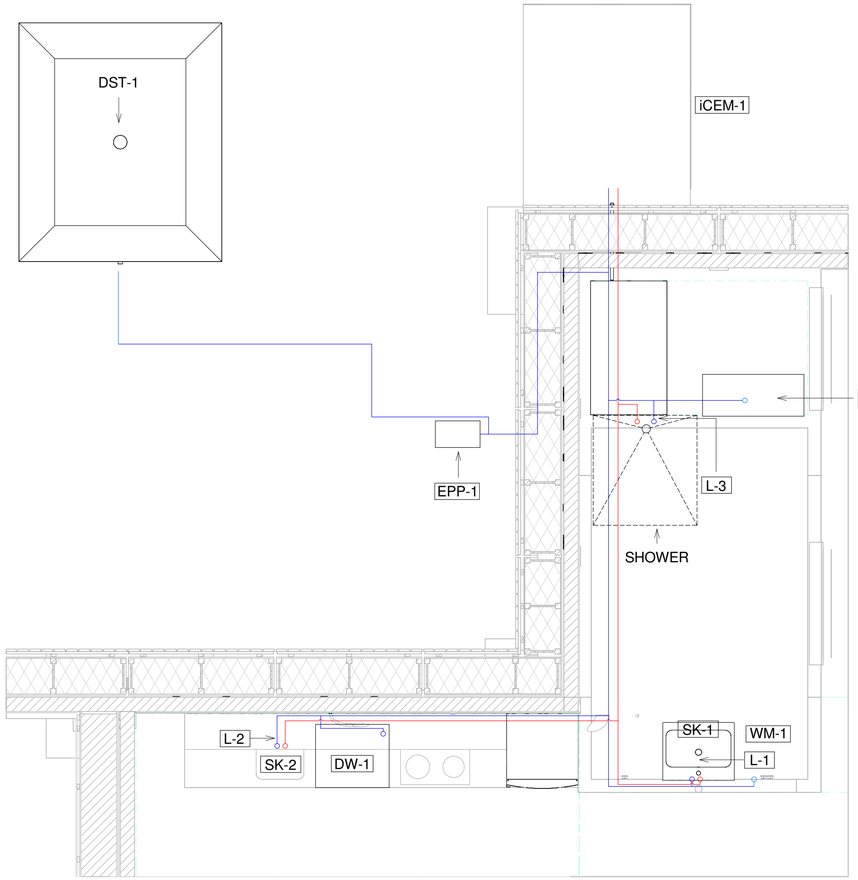
DOMESTIC RETURN ISOMETRIC

P-102

LEGEND

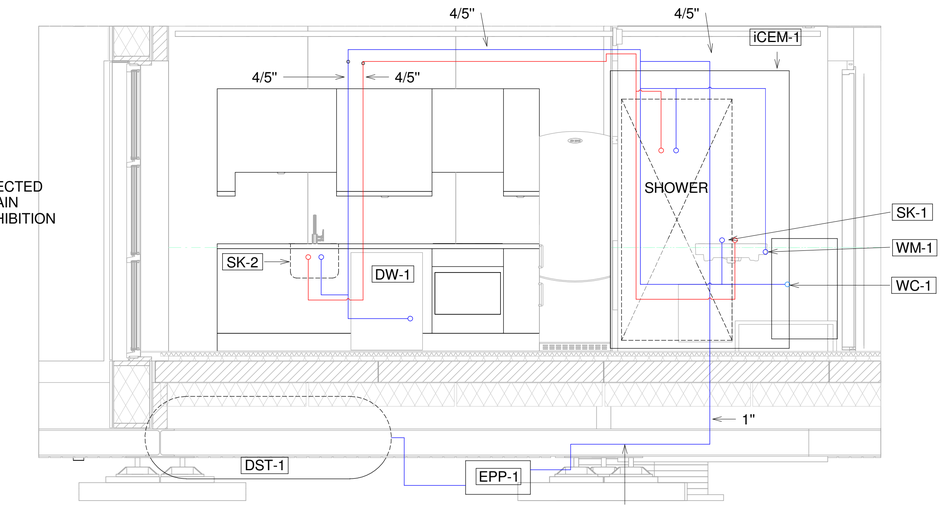
HOT WATER SUPPLY

COLD WATER SUPPLY



DOMESTIC SUPPLY TOP VIEW

TOILET NOT CONNECTED
TO SUPPLY OR DRAIN
PIPES DURING EXHIBITION



DOMESTIC SUPPLY SIDE VIEW

SUPPLY FROM
TANK OUTSIDE
THE HOUSE

SUPPLY TOP AND SIDE VIEW

1:25

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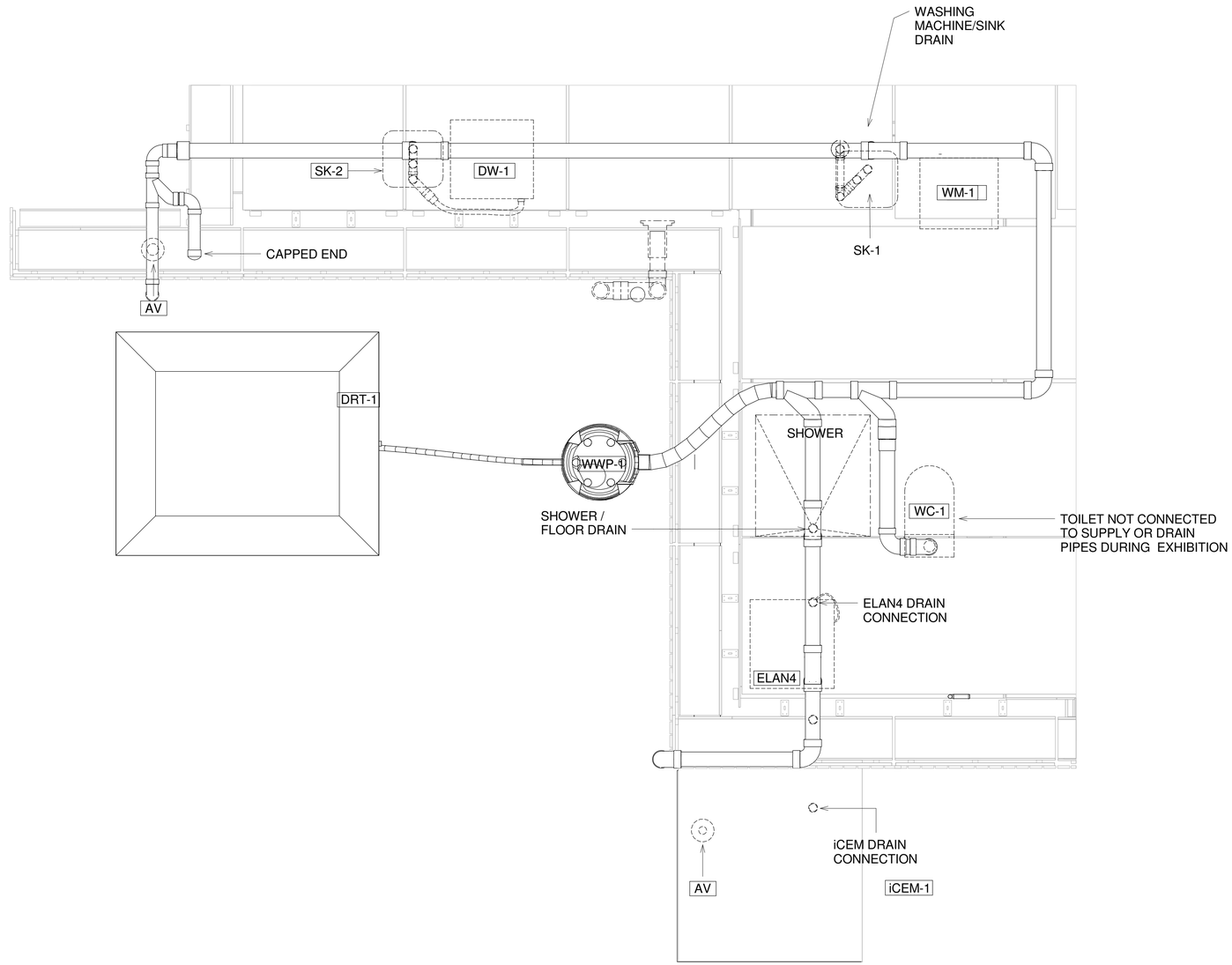
DOMESTIC SUPPLY
TOP AND SIDE

P-200



DOMESTIC RETURN BOTTEM VIEW

1:20

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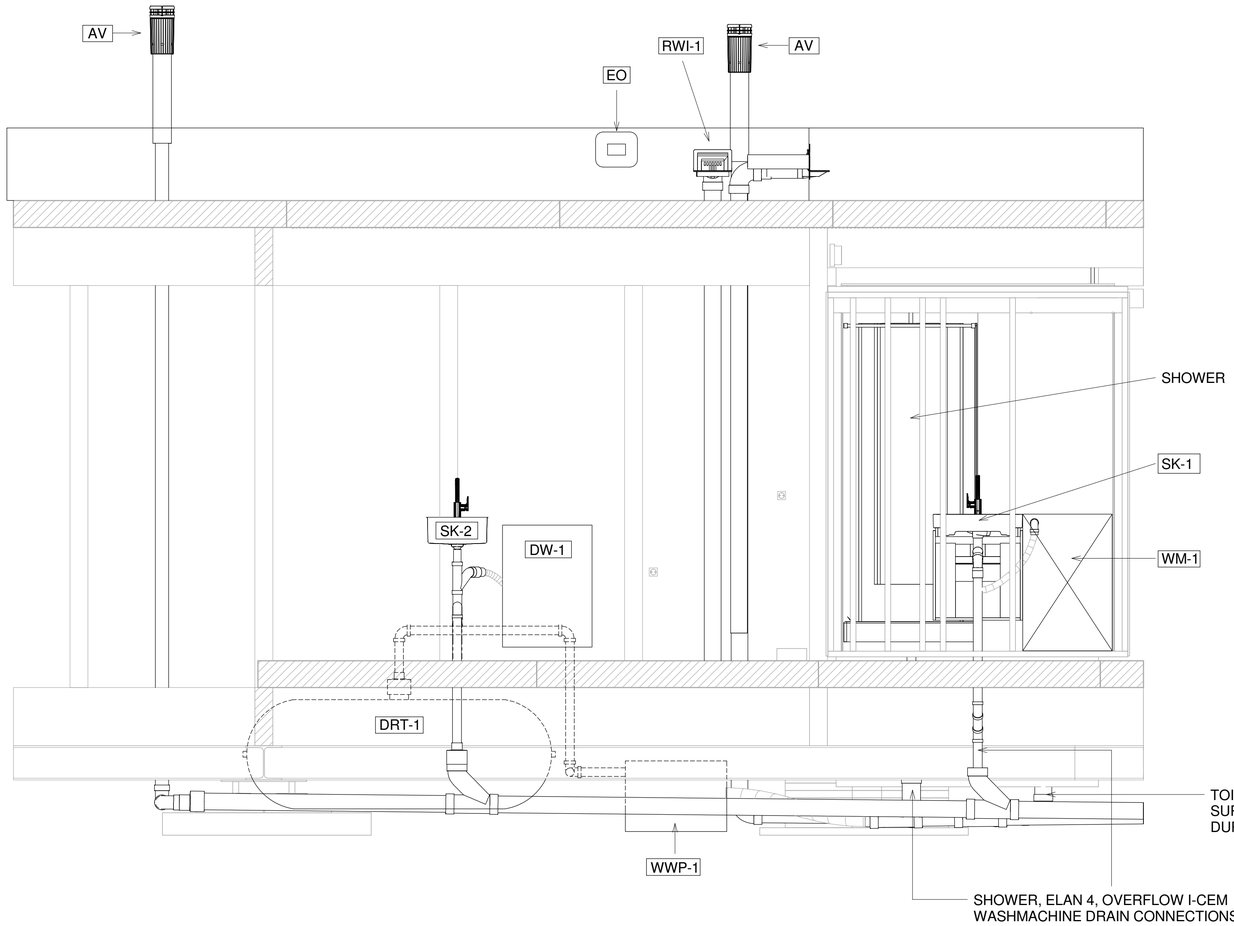
DOMESTIC RETURN BOTTOM VIEW

P-201



DOMESTIC RETURN SIDE VIEW

1:20

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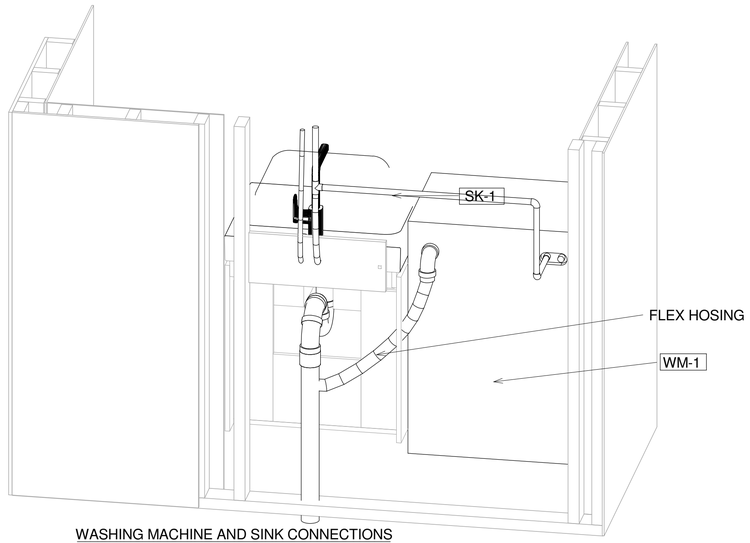
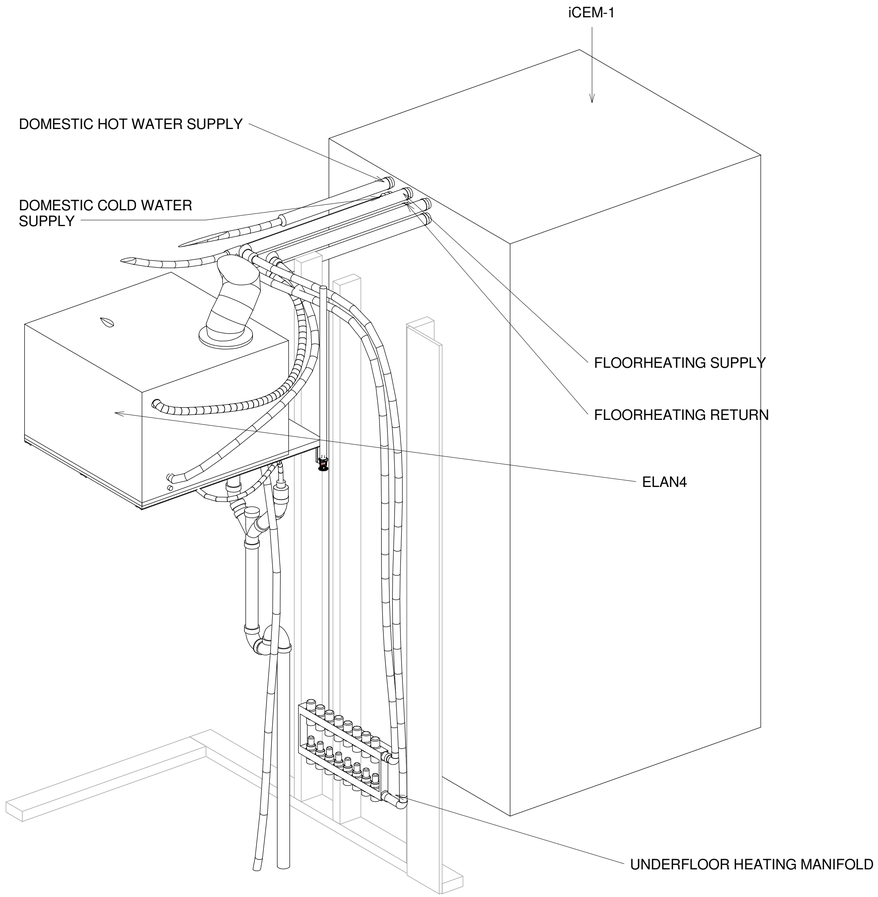
DOMESTIC RETURN SIDE VIEW

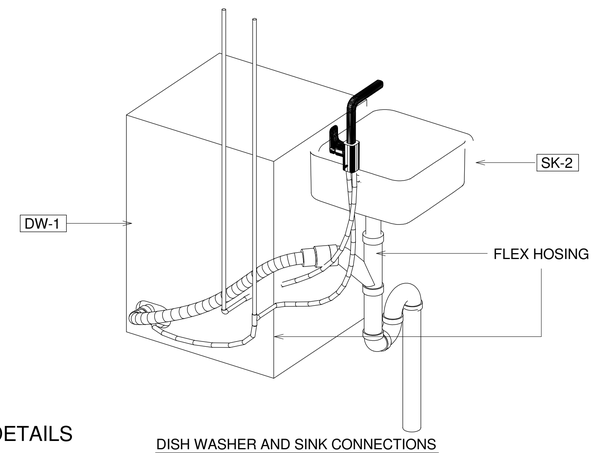
P-300



WASHING MACHINE AND SINK CONNECTIONS
Scale 1:10



MECHANICAL ROOM (ELAN4, UNDERFLOOR HEATING MANIFOLD & iCEM CONNECTIONS AND PIPING



DISH WASHER AND SINK CONNECTIONS

PLUMBING DETAILS

1:10

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PLUMBING DETAILS

P-400

Plumbing Fixture Schedule

Type Mark	Room: name	Description	Manufacturer	Model	Count	Dimensions (DxWxH) (mm)	URL
DST-1	Outside	Domestic Supply Tank	DAMME Kunststoffen	CUSTOM MADE	1	1700x2000x650	http://www.dammekunststoffen.nl/index.php
DRT-1	Outside	Domestic Return Tank	DAMME Kunststoffen	CUSTOM MADE	1	1700x2000x650	http://www.dammekunststoffen.nl/index.php
WWP-1	Outside	Waste Water Pump	WILO	DRAINLIFT	1	580x395	
EPP-1	Outside	Electronic Pressure Pump	WILO	FMC	1	377x232x506	
iCEM-1	Mech Room	iCEM module	LG	iCEM	1	1500x980x2410	
WC-1	Bathroom	Water Closet	GEBERIT	MERA COMFORT	1	205x470x1135	
WM-1	Bathroom	Wash Machine	SAMSUNG	WD80J6400AW	1	550x598x818	
SK-2	Bathroom	Sink	SPHINX	T09C0LLU06GDS	1	445x393x160	
Shower	Bathroom	Shower	XENZ BV	UPFALL SHOWER	1	900x1200x2130	http://www.upfallshower.com/wp-content/uploads/2015/04/Upfall-Brochure-januari-2017.pdf
SK-1	Kitchen	Sink	IKEA	O.novo	1	500x400x170	
DW-1	Kitchen	Dish Washer	IKEA	DIN29330	1	540x600x840	
RWI-1	Roof	Rainwater Inlet	Marley Alutec	DR450	1	217x148x193	http://www.marleyalutec.co.uk/products/roof-outlet-systems/roof-outlets/?ProductIds=13927
EO	Roof	Emergency overflow	Fleck-dach	FLECK-FRN	1	235x280x500	http://www.fleck-dach.de/cms2/images/pdf/Notueberlauf_BIG_04-11.pdf

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SHEET TITLE

PLUMBING FIXTURE SCHEDULE

P-500

10-8-2017 14:39:00

Flow Rate Schedule

FLOW RATE	3/4-INCH WATER SERVICE PRESSURE LOSS				1-INCH WATER SERVICE PRESSURE LOSS				11/4 -INCH WATER SERVICE PRESSURE			
(gpm)	(psi)				(psi)				LOSS (psi)			
	Length of water service pipe (feet)				Length of water service pipe (feet)				Length of water service pipe (feet)			
	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150
8	5.1	8.7	11.8	17.4	1.5	2.5	3.4	5.1	0.6	1.0	1.3	1.9
10	7.7	13.1	17.8	26.3	2.3	3.8	5.2	7.7	0.8	1.4	2.0	2.9
12	10.8	18.4	24.9	NP	3.2	5.4	7.3	10.7	1.2	2.0	2.7	4.0
14	14.4	24.5	NP	NP	4.2	7.1	9.6	14.3	1.6	2.7	3.6	5.4
16	18.4	NP	NP	NP	5.4	9.1	12.4	18.3	2.0	3.4	4.7	6.9
18	22.9	NP	NP	NP	6.7	11.4	15.4	22.7	2.5	4.3	5.8	8.6
20	27.8	NP	NP	NP	8.1	13.8	18.7	27.6	3.1	5.2	7.0	10.4
22	NP	NP	NP	NP	9.7	16.5	22.3	NP	3.7	6.2	8.4	12.4
24	NP	NP	NP	NP	11.4	19.3	26.2	NP	4.3	7.3	9.9	14.6
26	NP	NP	NP	NP	13.2	22.4	NP	NP	5.0	8.5	11.4	16.9
28	NP	NP	NP	NP	15.1	25.7	NP	NP	5.7	9.7	13.1	19.4
30	NP	NP	NP	NP	17.2	NP	NP	NP	6.5	11.0	14.9	22.0
32	NP	NP	NP	NP	19.4	NP	NP	NP	7.3	12.4	16.8	24.8
34	NP	NP	NP	NP	21.7	NP	NP	NP	8.2	13.9	18.8	NP
36	NP	NP	NP	NP	24.1	NP	NP	NP	9.1	15.4	20.9	NP

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FLOW RATE SCHEDULE

P-501

10-9-2017 14:39:02

HVAC notes and symbols

Mech Symbols

Ductwork

Grille

Mech Abbreviations

EG	Exhaust grille
RG	Return grille
VU	Distribution unit floor heating

Section R106.11
Information on construction documents

R106.1.1 Information on construction documents.
Construction documents shall be drawn upon suitable material. Electronic media documents are permitted to be submitted where approved bij the building official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it wil conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.

Section M1307
Appliance installation

M1307.1 General.
Installation of appliances shall conform to the conditions of their listing and label and the manufacturer's instructions. The manufacturer's operating and installation instructions shall remain attached to the appliance.

M1307.2 Anchorage of appliances.
Appliances designed to be fixed in position shall be fastened or anchored in an approved manner. In Seismic Design Categories D0, D1 and D2, and in townhouses in Seismic Design Category C, water heaters and thermal storage units shall be anchored or strapped to resist horizontal displacement caused by earthquake motion in accordance with one of the following:

1. Anchorage and strapping shall be designed to resist a horizontal force equal to one-third of the operating weight of the water heater storage tank, acting in any horizontal direction. Strapping shall be at points within the upper one-third and lower one-third of the appliance's vertical dimensions. At the lower point, the strapping shall maintain a minimum distance of 4 inches (102 mm) above the controls.

2. The anchorage strapping shall be in accordance with the appliance manufacturer's recommendations.

Section M1308
Mechanical systems installation

M1308.1 Drilling and notching.
Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load-bearing members of cold-formed steel light-frame constructions shall be permitted only in accordance with Sections R505.2.6, R603.2.6 and R804.2.6. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.3, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame constructions shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Sections R610.7.

Section M1401
General

M1401.1 Installation.
Heating and cooling equipment and appliances shall be installed in accordance with the manufacturer's instructions and the requirements of this code.

M1401.2 Access.
Heating and cooling equipment and appliances shall be located with respect to building construction and other equipment and appliances to permit maintenance, servicing and replacement. Clearances shall be maintained to permit cleaning of heating and cooling surfaces; replacement of filters, blowers, motor, controls and vent connections; lubrication of moving parts; and adjustments.

Exception: Acces shall not be required for ducts, piping, or other components approved for concealment.

M1401.3 Equipment and appliances sizing.
Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S or other approve sizing methodologies based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

M1401.4 Exterior installations.
Equipment and appliances installed outdoors shall be listed and labeled for outdoor installation. Supports and foundations shall prevent excessive vibration, setllement or movement of the equipment. Support and foundations shall be in accordance with Section M1305.1.4.1.

Section M1403
Heat pump equipment

M1403.1 Heat Pumps.
Electric heat pumps shall be listed and labeled in accordance with UL 1995 or UL/CSA/ANCE 60335-2-40.

Section M1501
General

M1501.1 Outdoor discharge.
The air removed bij every mechanical exhaust system shall be discharged to the outdoors in accordance with Section M1506.3. Air shall not be exhausted into an attic, soffit, ridge vent or crawl space.

Exception: Whole-house ventilation-type attic fans that discharge into the attic space of dwelling units having private attics shal be permitted.

Section M1506
Exhaust ducts and exhaust openings

M1506.1 Duct construction.
Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

M1506.3 Exhaust openings.
Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet 9914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechnical air intakes except whre the opening is located 3 feet (914 mm) above air intake. Openings shall comply with Sections R303.5.2 and R303.6.

Section M1507
Mechanical ventilation

M1507.1 General.
Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

M1507.2 Recirculation of air.
Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an attic, crawl space or other areas inside the building.

M1507.3 Whole-house mechanical ventilation system.
Whole-house mechanical ventilation systems shall be designed in accordance with Sections M1507.3.1 through M1507.3.3.

M1507.3.1 System design.
The whole-house ventilation system shall consist f one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered as providing supply ventilation.

M1507.3.2 System controls.
The whole-house mechanical ventilation system shall be provided with controls that enable manual override.

Section M1601
Duct construction

M1601.1 Duct design.
Duct systems serving heating, cooling and ventilation equipment shall be installed in accordance with the provisions of this section and ACCA Manual D, the appliance manufacturer's installation instructions or other approved methods.

M1601.1.1 Above-ground duct systems.
Above-ground duct systems shall conform to the following.

1. Equipment connected to duct systems shall be designed to limit discharge air temprature to not greater than 250°F (121°C).

2. Factory-made ducts shall be listed and labeled in accordance with UL 181 and installed in accordance with the manufacturer's instructions.

3.Fibrous glass duct construction shall conform to the SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards.

4. Field-fabricated and shop-fabricated metal and flexible duct constructions shall conform to the SMACNA HVAC Duct Construction Standards - Metal and FLexible except as allowed by Table M1601.1.1 Galvanized steel shall conform to ASTM A 653.

5. The use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temprature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.

6. Duct systems shall be constructed of materials having a flame spread index of not greater than 200.

7. Stud wall cavities and the spaces between solid floor joist to be used as air plenums shall comply with the following conditions:

7.1 These cavities or spaces shall not be used as a plenum for supply air.

7.2 These cavities or spaces shall not be part of a required fire-resistance-rated assembly.

7.3 Stud wall cavities shall not convey air from more than one floor level.

7.4 Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fireblocking in accordance with Section R602.8.

7.5 Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

M1601.4 Installation.
Duct installation shall comply with Sections M1601.4.1 through M1601.4.10.

Section M1602
Return air

M1602.1 Outdoor air openings.
Outdoor intake openings shall be located in accordance with Section R303.5.1. Opening protection shall be in accordance with Section R303.6.

M1602.2 Return air openings.
Return air openings for heating, ventilation and air conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or dragt hood of another appliance located in the same room or space.

2. The amount of return air taken from any room or space shall be not graeater than the flow rate of supply air delivered to such room or space.

3. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturer's installation instructions, Manual D or the design of the registered desgin professional.

4. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage mechanical room boiler room furnace room or unconditioned attic.

Exceptions:

1. Taking return air from kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet (3048 mm) from the cooking appliances.

2. Dedictated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

3. Taking return air from an unconditioned crawl space shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.

4. Return air from one dwelling unit shall not be discharged into another dwelling unit.

L1
iCEM module

L1.1 Explenation iCEM module.
In the ICEM module, is the ventilation unit located. The ventilation unit is a Renovent Excellent 400.

B1
Special installation specifications:

B1.1 General installation Elan 4.
The unit is supplied fully wired. When installing the Elan 4, the water connections and the system air ducts must be at the air outlet side. If the Elan 4 in combination with a heat recovery unit is used, there should also be a condensate drain
installed. Then, the unit can be connected to the power grid.

See installation Manual Elan 4 for details and installation instructions.

B1.2 General installation Renovent Excellent 400.
See installation instructions Renovent Excellent 400 for details and installation manual

B1.3 Explenation and installation distributor unit.
The distrubitor unit divides the hot water in to the different underfloor heating systems(7 heating circuits). The distributor unit is installed against the bathroom module.

Fresh Air Ventilation Calculations -...

Room	Square	Airflow	Vent. rate
Bathroom and toilet	5.3 m2	50.4 m3/h	4.13 1/h
Bedroom	18 m2	45.36 m3/h	1.03 1/h
Living room, Kitchen and Hall	41.5 m2	134,36 m3/h	1.25 1/h
Mechanical room	2.5 m2	18 m3/h	2.77 1/h

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MARK	DATE	DESCRIPTION
Rev. 00	02-24-2017	ADD. NOTES AND SYMBOLS

LOT NUMBER:	106
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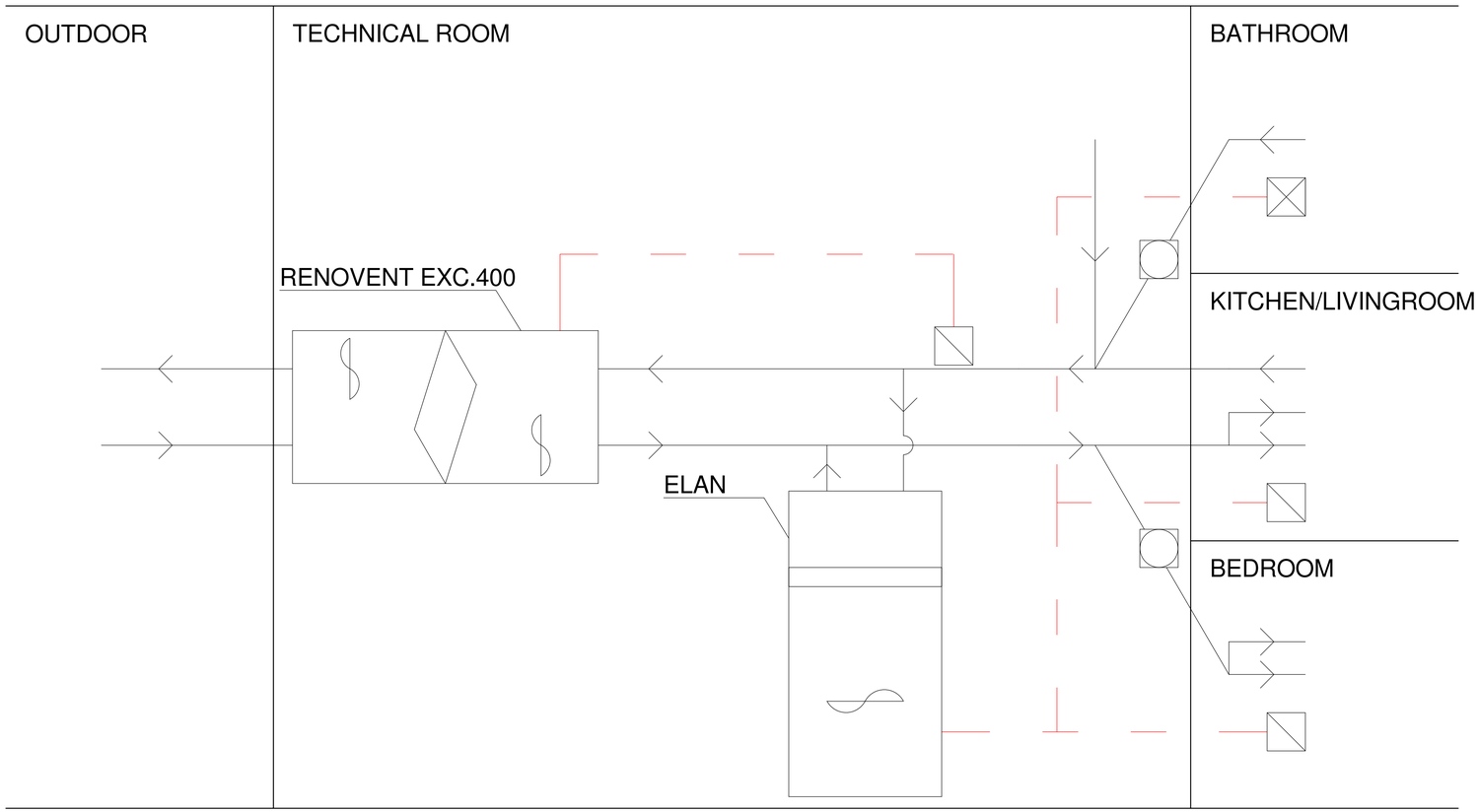
SHEET TITLE

HVAC NOTES AND SYMBOLS

M-001

10-8-2017 14:38:15



LEGEND:

- CO2 SENSOR
- HUMIDITY SENSOR
- SENSOR CONNECTION
- PIPING
- CAV-VALVE

VENTILATION SCHEMATIC

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VENTILATION SCHEMATICS

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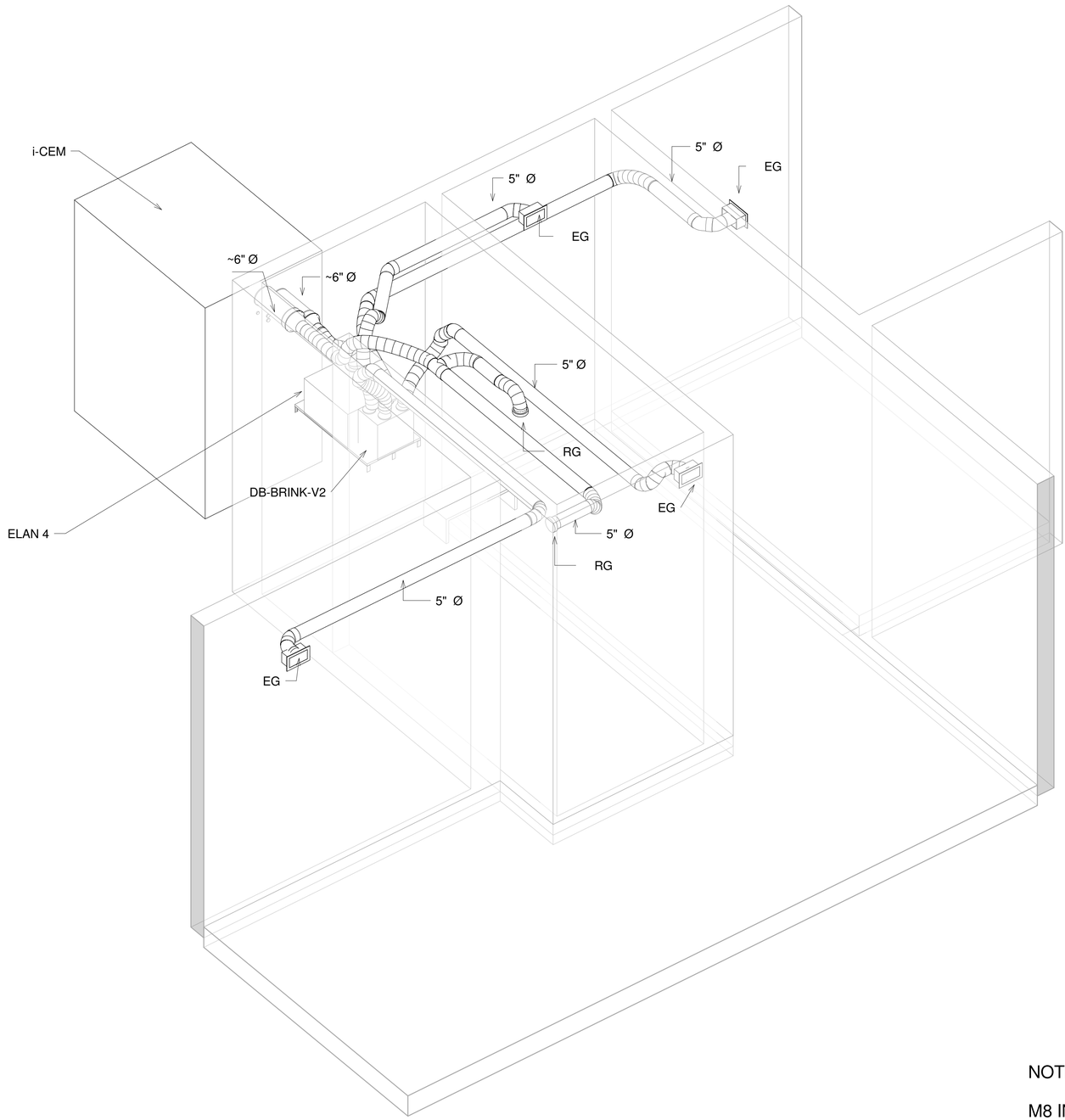

HVAC ISOMETRIC

NOTE

M8 INSERT 20MM
M8 THREAD-END
125MM BRACE, M8 ATTECHMENT

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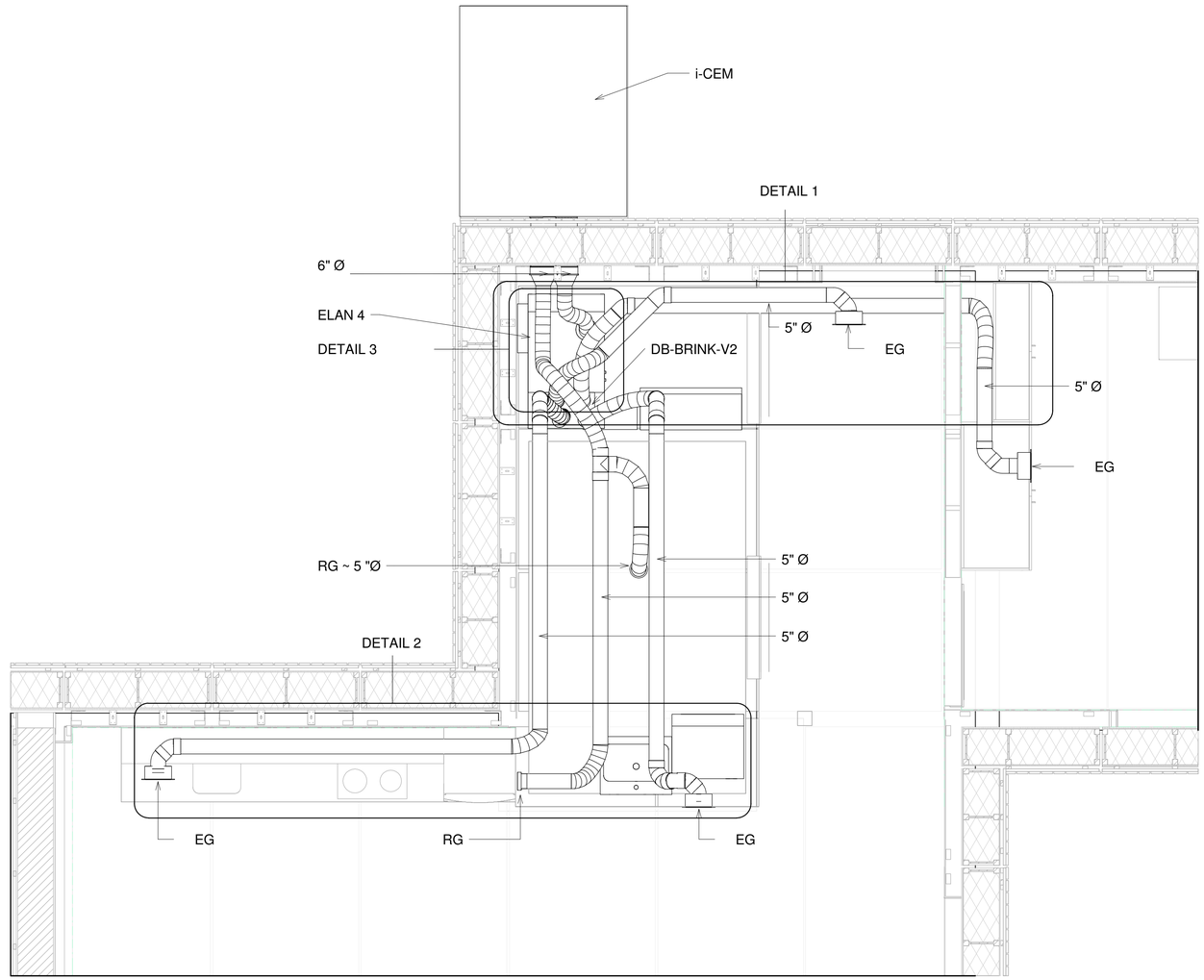
HVAC ISOMETRIC

M-101



HVAC EQUIPMENT AND DISTRIBUTION

1:24

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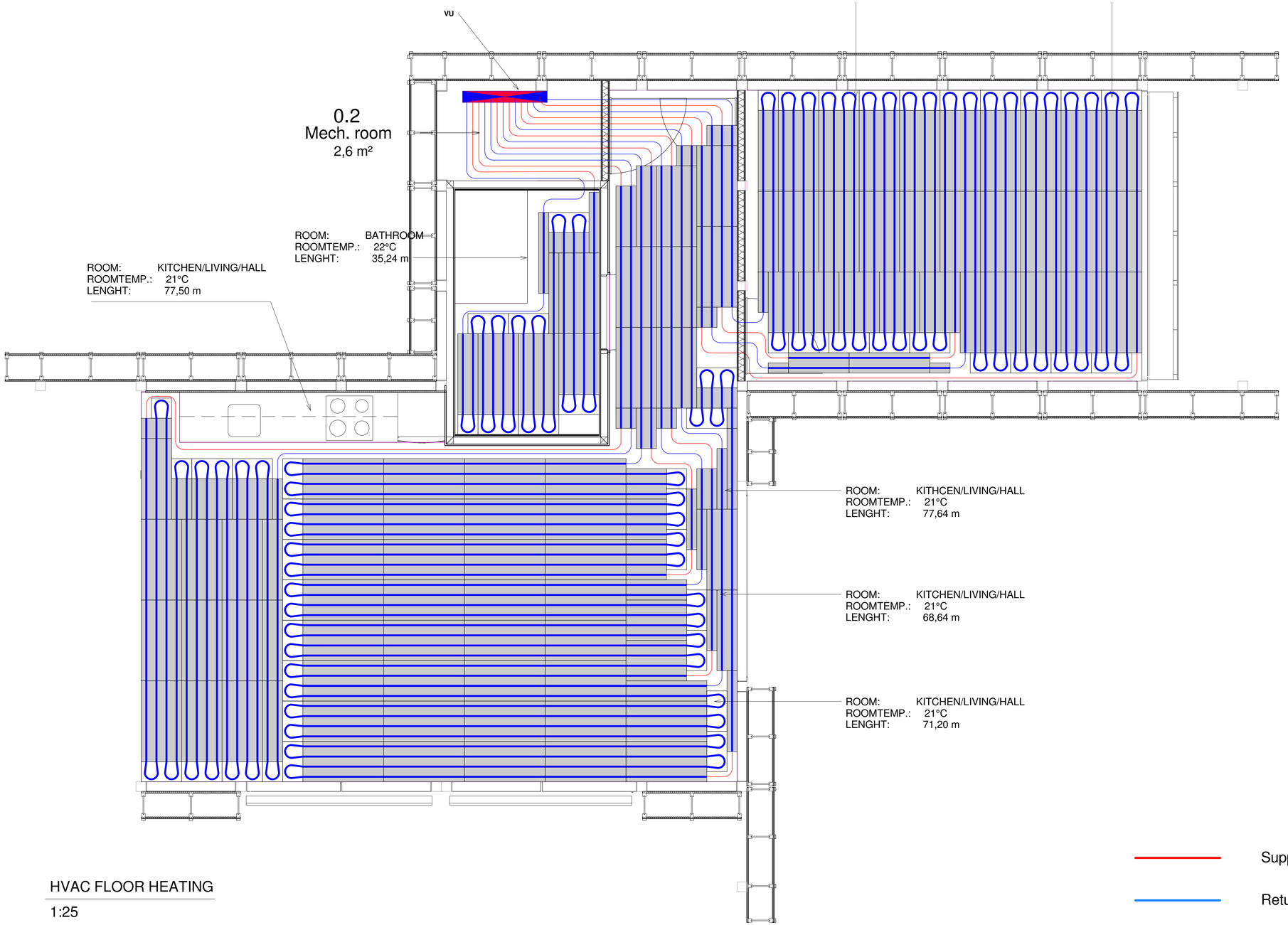
HVAC EQUIPMENT AND DISTRIBUTION

M-200



HVAC FLOOR HEATING

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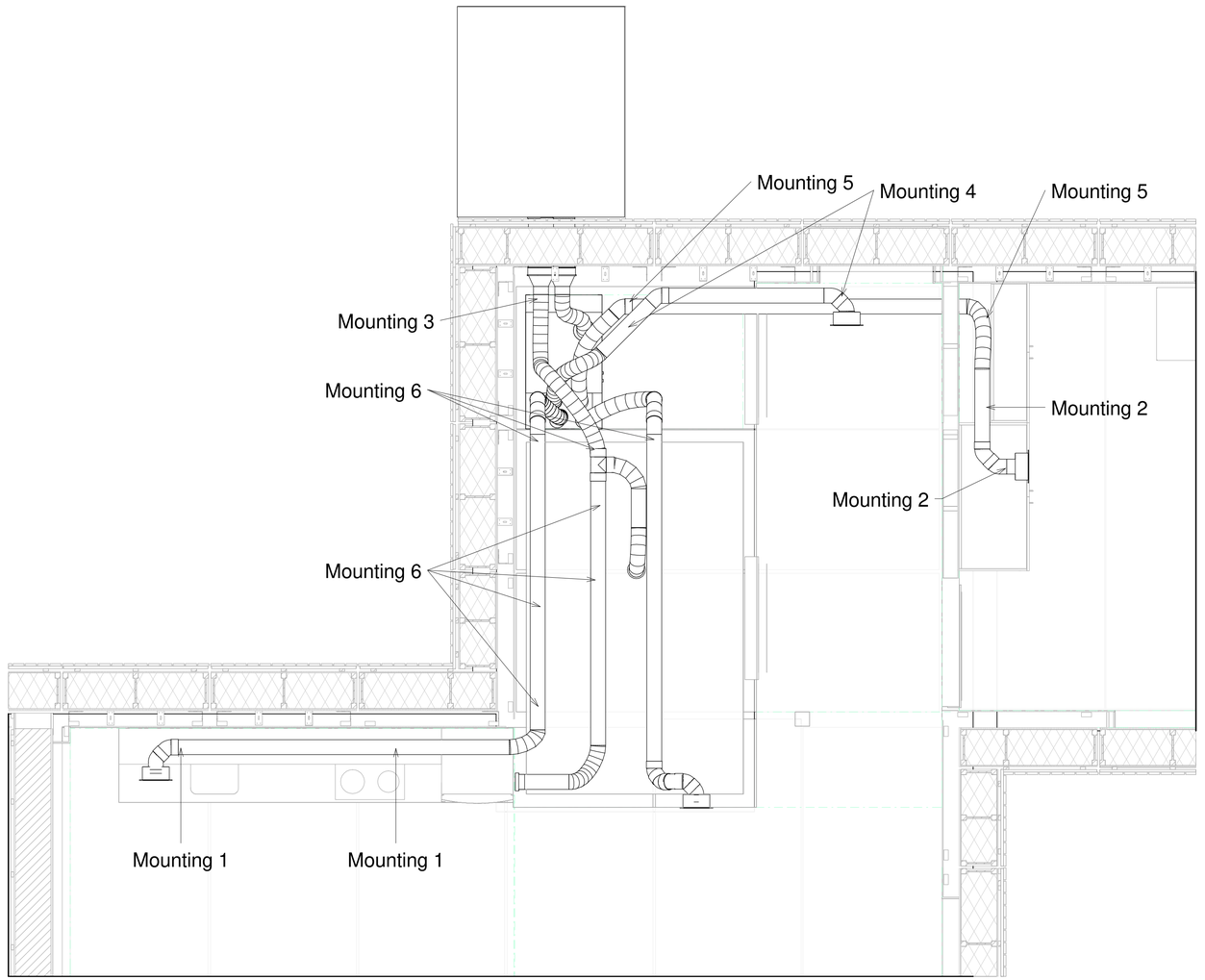
HVAC FLOOR HEATING

M-201



HVAC VENTILATION MOUNTING

1:24

Legend	
Mounting	Quantity
1	2
2	2
3	1
4	2
5	2
6	7

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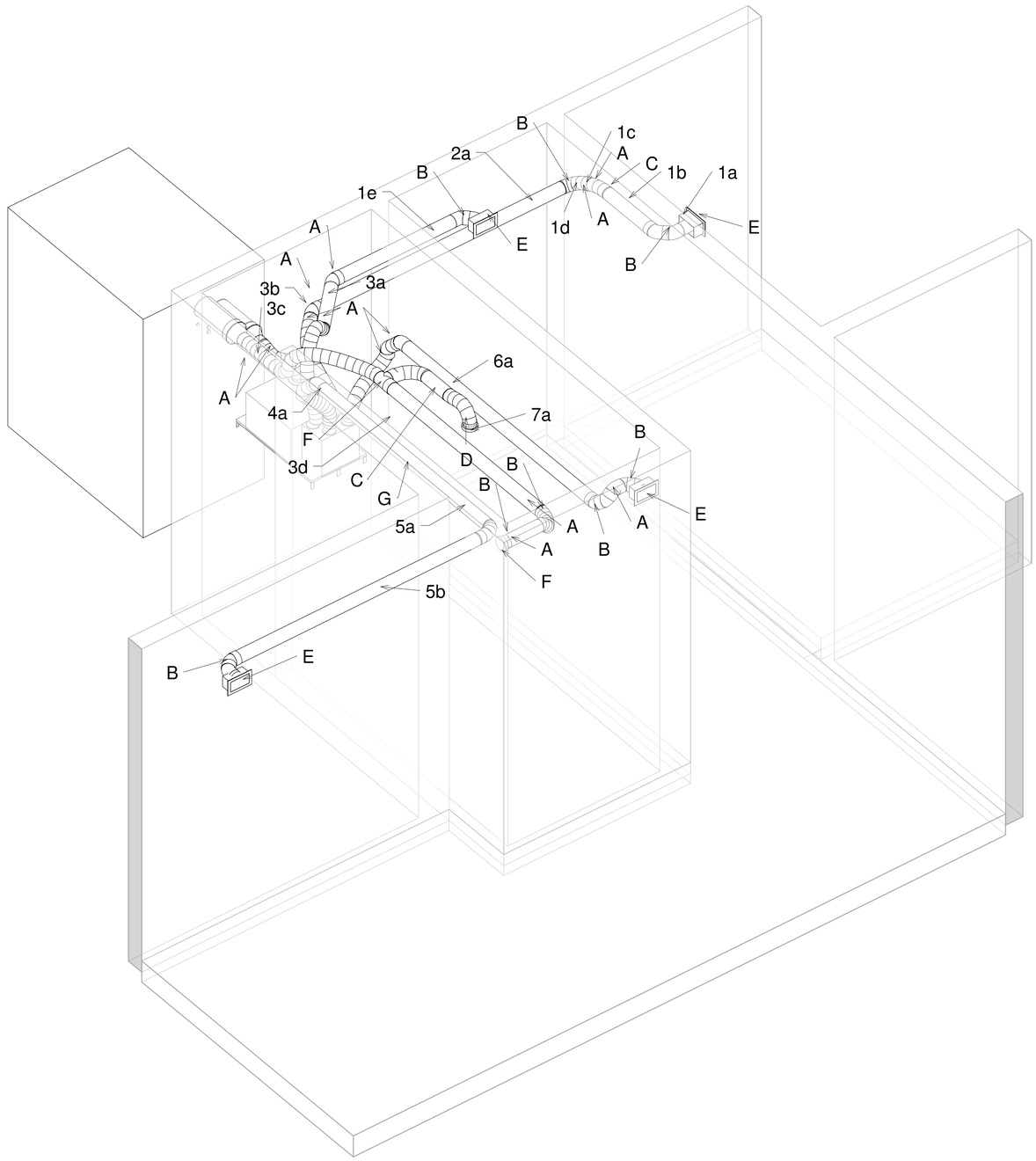
HVAC-VENTILATION MOUNTING

M-202



HVAC -VENTILATION INSTALLATION

Material legend	
Sign	Part
A	45° Bend
B	90° Bend
C	Volume controller
D	Flexible tube
E	Supply valve
F	Return valve
G	T-piece
Number + letter	See cut drawing (SN-01)

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SHEET TITLE

HVAC-VENTILATION INSTALLATION

M-203

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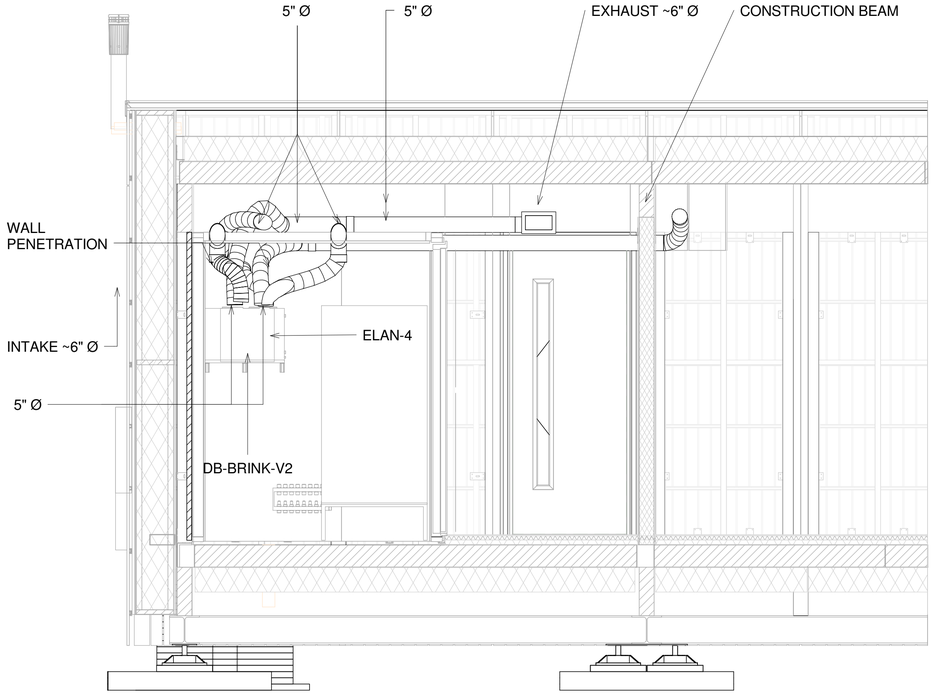
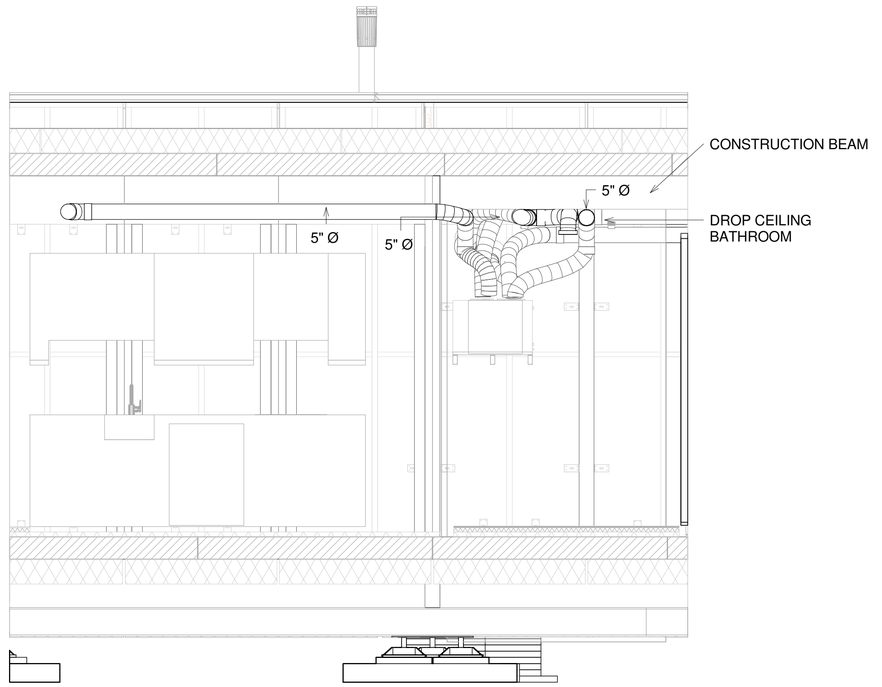


HVAC DETAIL 1



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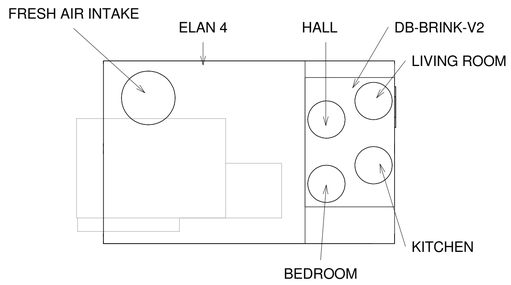

ELAN 4 AND BRINK-V2
TOP VIEW - DETAIL 3
1:12

HVAC DETAILS
1:24

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SHEET TITLE
HVAC DETAILS

M-400

Mechanical Schedule

Type Mark	Room: name	Description	Manufacturer	Model	Count	Dimensions (DxWxH) (mm)	URL
i-CEM	Tech Room	i-CEM	Centercon	Energy Module	1	1400x2100x2600	
EG	Hallway, Livingroom, Kitchen and Bedroom	Exhaust Grill	Velu	125mm	4	125mm (diameter)	
RG	Bathroom and Kitchen	Return Grill	Velu	125mm	2	125mm (diameter)	
ELAN 4	Tech Room	ELAN 4	Brink	ELAN 4	1	500x500x500	https://www.brinkclimatesystems.nl/nl-nl/professionals/producten/luchtverwarming/elan-4-(1)
DB-Brink-V2	Tech Room	DB-Brink-V2	Brink	Ventilation Distribution Box	1		
Ducts	Inside	Ducts and Bends	Velu	125mm		125mm (diameter)	
Floor Heating	Floor	System Element	Jupiter		93		http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php
	Floor	Connection Element	Jupiter		17		http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php
	Floor	Side Element	Jupiter		18		http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php
	Floor	System Piping	Jupiter		485		http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php
	Floor	Side Isolation	Jupiter		62		http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php
	Floor	Rahmenholz	Jupiter		62	1000x45x30	http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php
	Floor	Ideaal OKO	Jupiter		89		http://www.jupiter-vloerverwarming.nl/droogbouw-techniek/wat-is-droogbouw/index.php

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SHEET TITLE

MECHANICAL SCHEDULE

M-500

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MECH ABBRIVIATIONS AND SYMBOLS

	SINGLE WALL SOCKET WATERPROOF
	SINGLE WALL SOCKET
	DUAL WALL SOCKET
	PERILEX
	BIPOLAR SWITCH
	PULSE SWITCH KNX
	TOUCH SCREEN KNX
	FIXED CONNECTION
	FIXED 230V CONNECTION
	DATA POINT
	MOTION DETECTOR
	JUNCTION BOX
	CEILING FIXTURE
	LED SPOT
	SMOKE DETECTOR
	MAGNET CONTACT
	INTERCOM WATERPROOF
	TWILIGHT SWITCH WATERPROOF

KT	COOKING APPLIANCE
OV	OVEN
AFZ	EXTRACTOR
VW	DISHWASHER
WM	WASHING MACHINE
DR	TUMBLE DRYER
RV	MOISTURE SENSOR
KK	FRIDGE
VR	FREEZER
NOTE:	LED STRIP CABLE TO HKL

GENERAL ELECTRICAL NOTES

1. GENERAL NOTES .

1.1 National Electrical Code
The provisions of the 2014 NEC supersede the limited prescriptive electrical requirements contained in Chapters 33-42 of the IRC.

1.2 Installation
Installation of electrical conductors, raceways, and devices shall conform to the 2014 NEC and the 2017 solar decathlon building code.

1.3 Equipment
All electrical equipment shall carry an approved testing agency listing in accordance with IRC section 140.11 and section 110.2 of the NEC , or shall have been approved by the Solar Decathlon building official and Solar Decathlon electrical inspectors for temporary use during the solar decathlon 2017 event.

1.4 Grounding
The grounding electrode conductor from the main service equipment to the Solar Decathlon 2017 organizer utility panel shall be a minimum size of 4 awg copper and shall be bonded by qualified electrical personnel to the organizer grounding electrode system at the organizer utility panel location.

1.4 Equipment Grounding
The equipment grounding electrode conductor shall be the first to be connected and last to be disconnected during installation, de-installation, or servicing of photovoltaic modules and inverters.

1.5 Branch Circuit
Branch circuit conductors shall have an ampacity not less than the maximum load to be served. Conductors shall be sized to carry not less than the larger of NEC 210.19 (A)(1)(a or (b).

1.6 Conductors
Conductors specified in the electrical plan shall be sized in compliance with NEC table 310.15(B)(16). Minimum AC conductors size shall be 14 AWG. Minimum DC conductors size shall be 12 AWG.

1.6 Insultation of Conductors
Except where otherwise noted, conductors shall be copper with 600 Volt insulation.

1.7 Panelboards
All panelboards shall be provided with a factory installed ground bus for connecting to ground the green or bare ground wire in all branch circuits.

1.8 Electric Vehicle Charging
An outlet installed for the purpose of charging electric vehicles shall be supplied by a seperate branch circuit having no other outlets per NEC 210.17.

1.9 Installation route
Team shall provide a clear installation route for organizer ethernet and power cables from the organizer utility panel to the organizer enclosure.

1.10 Branch Circuit Breaker
Team shall supply a dedicated 15A 2P branch circuit breaker and adequate ground and neutral bus bar terminals in the team panel board for voltage sense circuitry connections to the organizer pv monitoring meter to be connected by organizer's qualified electrical personnel.

1.11 Organizer Enclosure
Team shall provide an organizer enclosure of required specifications per Solar Decathlon 2017 team interconnection checklist with adequate conduit fill and pull box acces for entrance of organizer sensor wires.

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ELECTRICAL SYMBOLS AND NOTES

E-001

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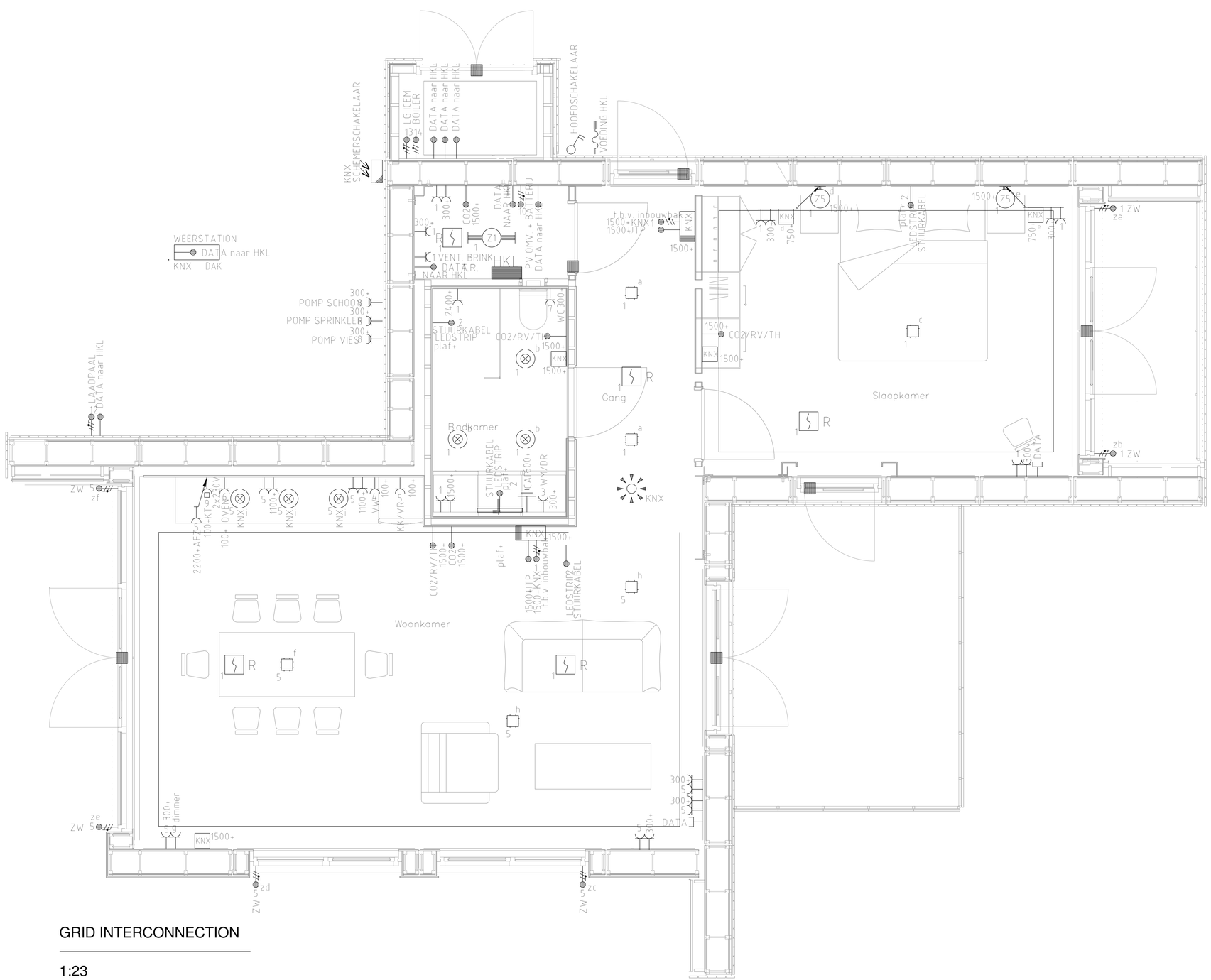

GRID INTERCONNECTION

1:23

	SINGLE WALL SOCKET WATERPROOF
	SINGLE WALL SOCKET
	DUAL WALL SOCKET
	PERILEX
	BIPOLAR SWITCH
	PULSE SWITCH KNX
	TOUCH SCREEN KNX
	FIXED CONNECTION
	FIXED 230V CONNECTION
	DATA POINT
	MOTION DETECTOR
	JUNCTION BOX
	CEILING FIXTURE
	LED SPOT
	SMOKE DETECTOR
	MAGNET CONTACT
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	TWILIGHT SWITCH WATERPROOF

KT	COOKING APPLIANCE
OV	OVEN
AFZ	EXTRACTOR
VW	DISHWASHER
WM	WASHING MACHINE
DR	TUMBLE DRYER
RV	MOISTURE SENSOR
KK	FRIDGE
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NOTE:	LED STRIP CABLE TO HKL

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GRID INTERCONNECTION

E-100

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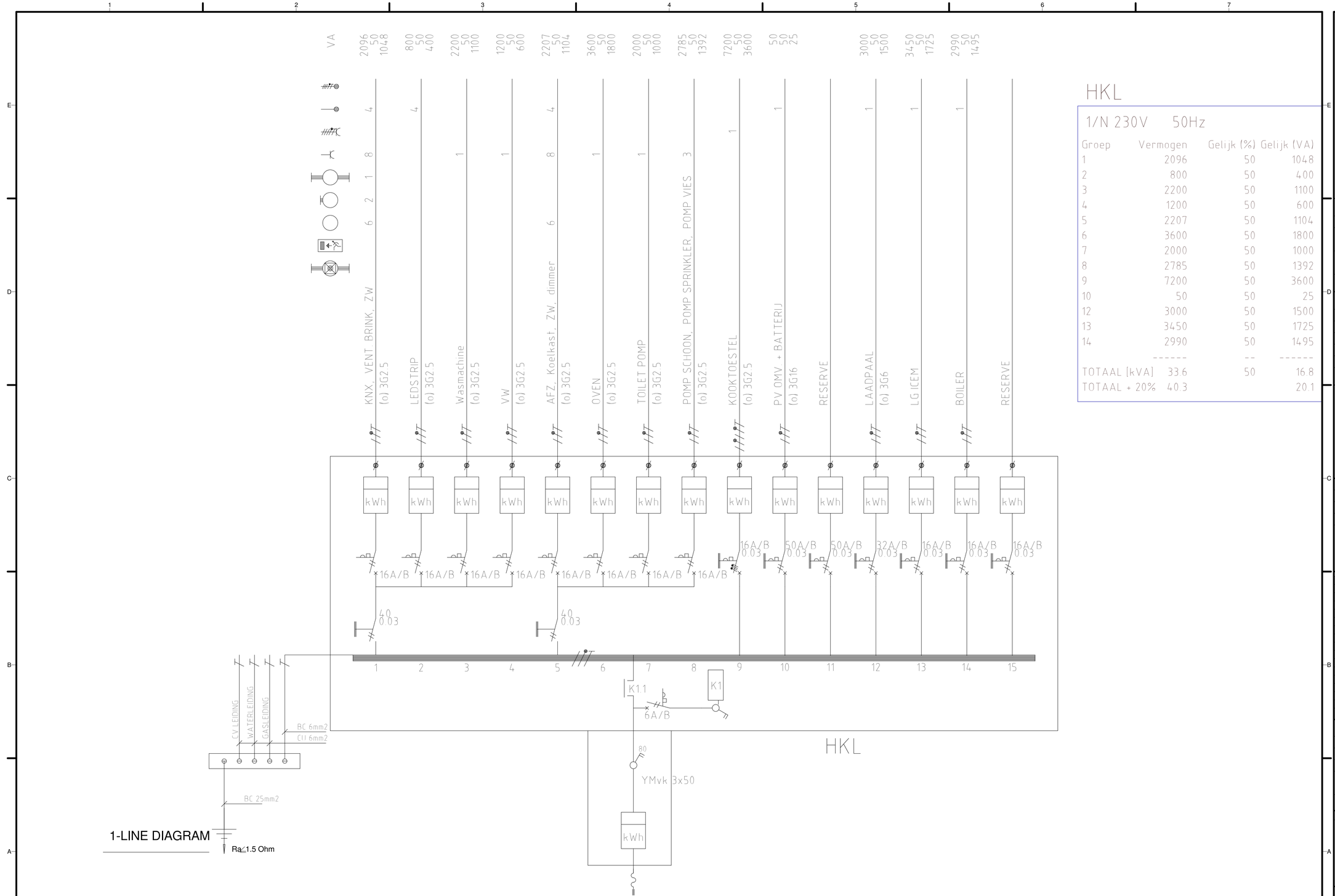

HKL

1/N 230V 50Hz

Groep	Vermogen	Gelijk (%)	Gelijk (VA)
1	2096	50	1048
2	800	50	400
3	2200	50	1100
4	1200	50	600
5	2207	50	1104
6	3600	50	1800
7	2000	50	1000
8	2785	50	1392
9	7200	50	3600
10	50	50	25
12	3000	50	1500
13	3450	50	1725
14	2990	50	1495
TOTAAL [kVA]	33.6	50	16.8
TOTAAL + 20%	40.3		20.1

1-LINE DIAGRAM

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1-LINE DIAGRAM

E-200

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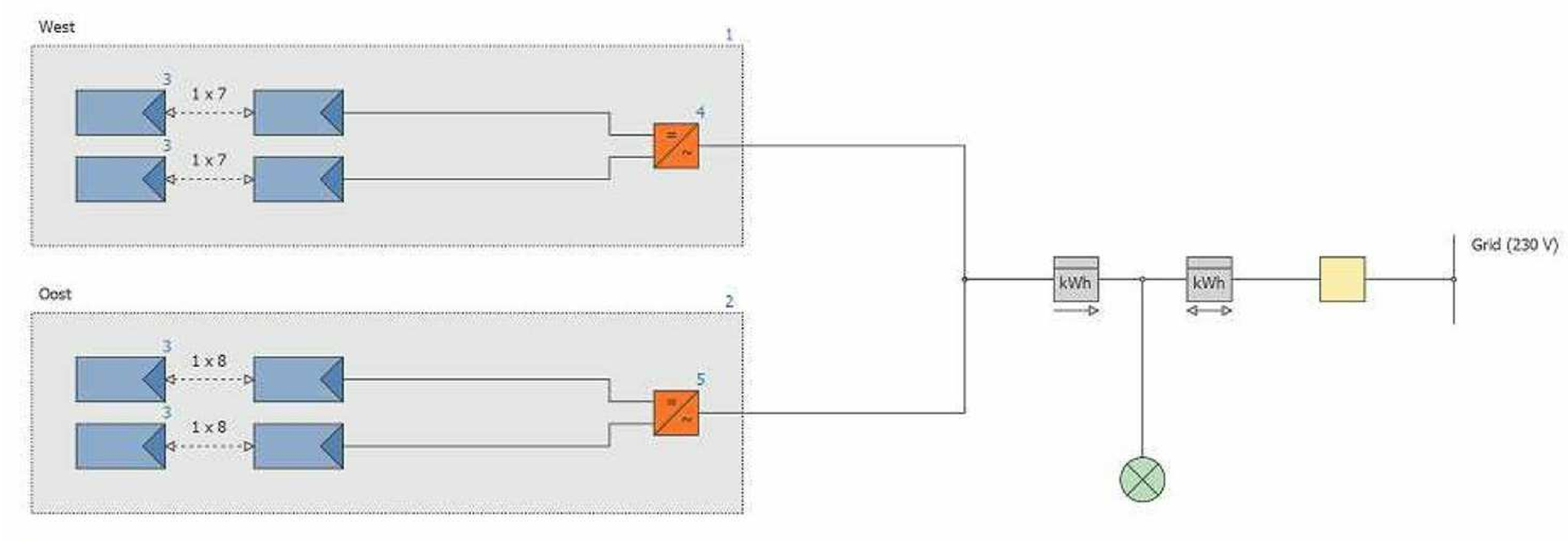

Module Area
1. 23,0 m², ∠10°, ∠90°, 4,48 kWp, 14 PV Modules
2. 26,2 m², ∠10°, ∠90°, 5,12 kWp, 16 PV Modules

PV Module
3. LG320N1C-G4, LG Electronics Inc., 320 W

Inverter
4. Conext-mppt 80 600, 4,8 kW, Max AC Power:4,8 kW
5. Conext-mppt 80 600, 4,8 kW, Max AC Power: 4,8 kW

3-LINE DIAGRAM SEE APPENDIX E-201

10-8-2017 14:37:23

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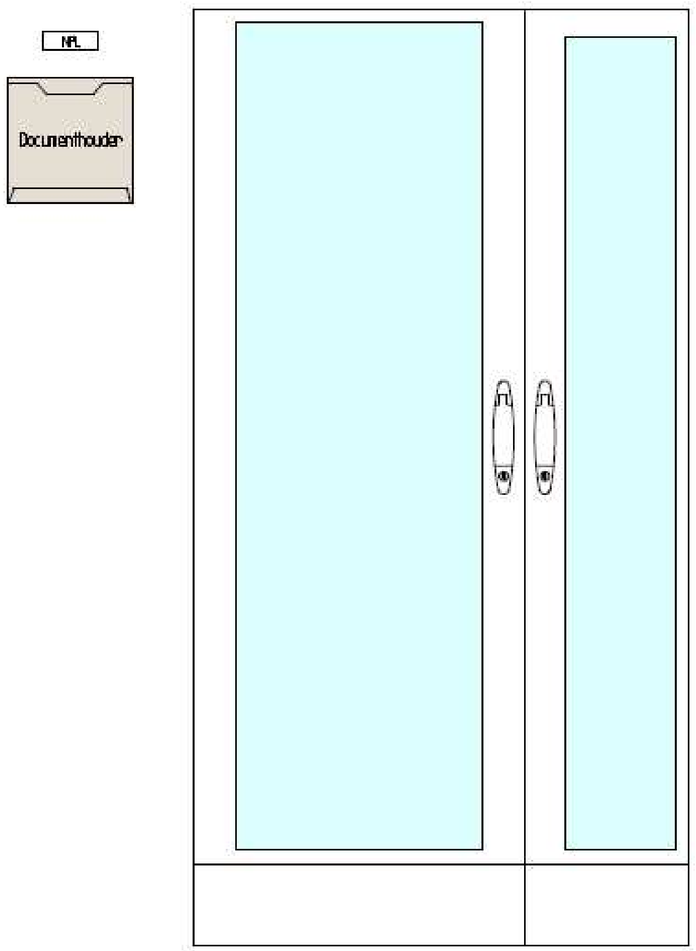
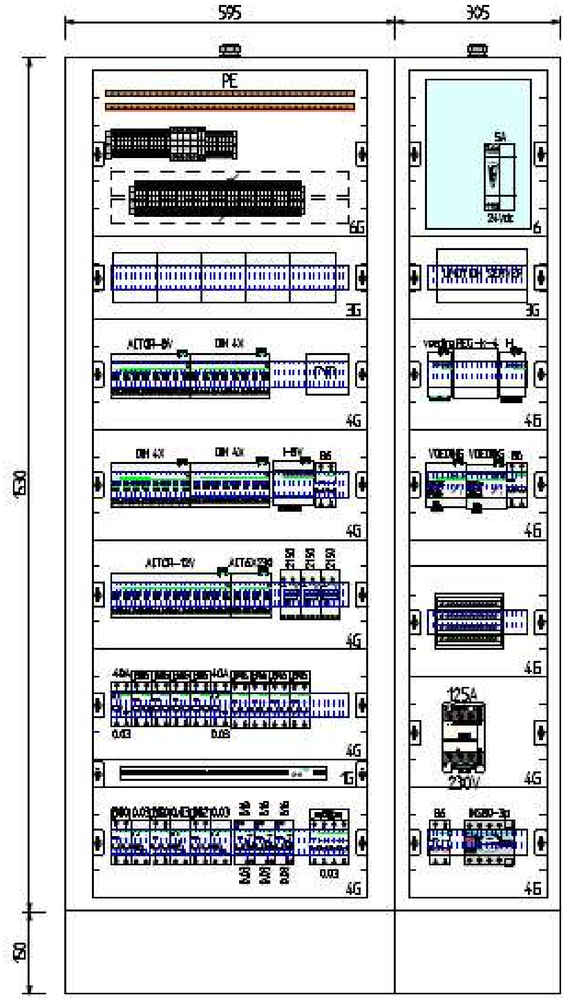
3-LINE DIAGRAM

E-201





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FUSEBOX

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E-300

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ACTION LIST

E-500

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Electrical Schedule

Type Mark	Room: name	Description	Manufacturer	Model (Artikelnummer)	Count	Dimensions (DxWxH) (mm)	URL
KT	Kitchen	Cooking appliance	IKEA	403.039.34	1	510x580x56	http://www.ikea.com/be/nl/catalog/products/40303934/
OV	Kitchen	Oven	IKEA	803.009.57	1	567x594x455	http://www.ikea.com/nl/nl/catalog/products/80300957/
AFZ	Kitchen	Extractor	IKEA	903.046.10	1	355x561x358	http://www.ikea.com/nl/nl/catalog/products/90304610/
VW	Kitchen	Dish washer	IKEA	803.520.36	1	550x596x818	http://www.ikea.com/nl/nl/catalog/products/80352036/
WM	Bathroom	Washing machine	Samsung	572799	1	600x600x850	https://www.wasmachinestore.nl/product/572799/samsung-wd80j6400aw.html
DR	Bathroom	Dryer	Samsung	572799	1	600x600x850	https://www.wasmachinestore.nl/product/572799/samsung-wd80j6400aw.html
RV	Every room	Space moisture sensor	Schneider Electric/Brink	MTN6005-0001	3	74x74x31	http://www.schneider-electric.com/en/product/MTN6005-0001/knx-co2%2C-humidity-and-temperature-sensor-ap -
KK	Kitchen	Refrigerator	IKEA	203.127.60	1	677x595x1845	http://www.ikea.com/nl/nl/catalog/products/20312760/
VR	Kitchen	Freezer	IKEA	203.127.60	1	677x595x1845	http://www.ikea.com/nl/nl/catalog/products/20312760/
							-
Lightning							-
a	Hallway	Ceiling light	Lechlade	-	1	-	https://lampgigant.nl/lamp/lechlade-plafondlamp-modern-design-wit/
b	Bathroom	Led spot	YPHIX	50258907	3	7x75x22	https://www.ledlampendirect.nl/led-inbouwspot-argenta-aluminium-rond-ip65-
c	Bedroom	Ceiling light	Lechlade	-	1	-	https://lampgigant.nl/lamp/lechlade-plafondlamp-modern-design-wit/ -
d	Bedroom	Wall light	YPHIX	50228056	1	197x76x111	https://www.ledlampendirect.nl/wandlamp-nalo-spot-230v-gu10-rvs-854.html
e	Bedroom	Wall light	YPHIX	50228056	1	197x76x111	https://www.ledlampendirect.nl/wandlamp-nalo-spot-230v-gu10-rvs-854.html
f	Living room	Ceiling light	Lampgigant	-	1	730x200x1100	https://lampgigant.nl/lamp/landelijke-eettafellamp-milicia-zwart/
g	Living room	Standing light	Lampgigant	-	1	-	https://lampgigant.nl/lamp/landelijke-houten-bruine-vloerlamp-joleen-stoffen-
h	Living room	Ceiling light	Lampgigant	-	1	-	https://lampgigant.nl/lamp/industrie-hanglamp-flow-greige-grijs-taupe/
i	Kitchen	Led spot	123Ledspots	11882299	1	7x75x22	https://www.123ledspots.nl/inbouw-en-opbouw-led-spot-monaco-4w-dimbaar.html
							-
Shading							-
za	Bedroom	Shading	Smits	-	1	7x732x2465	http://www.wonninkprojectzonwering.nl/ -
zb	Bedroom	Shading	Smits	-	1	7x732x2465	http://www.wonninkprojectzonwering.nl/ -
zc	Living room	Shading	Smits	-	1	7x1352x2465	http://www.wonninkprojectzonwering.nl/ -
zd	Living room	Shading	Smits	-	1	7x1352x2465	http://www.wonninkprojectzonwering.nl/ -
ze	Living room	Shading	Smits	-	1	7x2009x2465	http://www.wonninkprojectzonwering.nl/ -
zf	Living room	Shading	Smits	-	1	7x2009x2465	http://www.wonninkprojectzonwering.nl/ -
							-
HKL							-
KNX Power Supply 0,4A	Technical room	KNX Power Supply 0,4A	Schneider Electric	MTN693003	1	92x17.5x68.1	http://www.schneider-electric.com/en/product/MTN693003/power-supply-reg%2C-24-v-dc---0.4-a%2C-light-grey -
KNX Power Supply AC 24V	Technical room	KNX Power Supply AC 24V	Schneider Electric	MTN684064	1	90x72x65	http://www.schneider-electric.com/en/product/MTN684064/knx-power-supply-reg-k-640-ma%2C-light-grey -
HomeLynk	Technical room	HomeLynk	Schneider Electric	LSS100100	1	58x52x90	http://www.schneider-electric.com/en/product/LSS100100/homelynk-logic-controller/
U.Motion KNX Server Plus	Technical room	U.Motion KNX Server Plus	Schneider Electric	MTN6501-0002	1	63x162x95	http://www.schneider-electric.com/en/product/MTN6501-0002/u.motion---knx-server-plus/ -
KNX Weather Station	Technical room	KNX Weather Station	Schneider Electric	MTN682991	1	-	http://www.schneider-electric.com/en/product/MTN682991/weather-station-reg-k-4-gang%2C-light-grey -
KNX Heating actor	Technical room	KNX Heating actor	Schneider Electric	MTN6730-0001	1	-	http://www.schneider-electric.com/en/product/MTN6730-0001/heating-actuator-reg-k-6x230-0.16-a-%2C-light-grey -
KNX Shading actor	Technical room	KNX Shading actor	Schneider Electric	MTN649808	1	-	http://www.schneider-electric.com/en/product/MTN649808/blind-actuator-reg-k-8x-10-with-manual-mode%2C-light-grey

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ELECTRICAL SCHEDULE

E-501A

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Electrical Schedule

Binary Input	Technical room	Binary Input	Schneider Electric	MTN644592	1	65x72x90	http://www.schneider-electric.com/en/product/MTN644592/binary-input-reg-k-8x10%2C-light-grey -
Smoke Detector Link	Technical room	Smoke Detector Link	Schneider Electric	MTN548001	1	34x50x44	http://www.schneider-electric.com/en/product/MTN548001/flush-mounted-system-relay-for-argus-smoke-detector/
KNX Universal dimmer actor	Technical room	KNX Universal dimmer actor	Schneider Electric	MTN6710-0004	3	-	http://www.schneider-electric.com/en/product/MTN6710-0004/knx-universal-dimming-actuator-ll-reg-k-4x230-250w/
12-fold Switch actor	Technical room	12-fold Switch actor	Schneider Electric	MTN648493	3	-	http://www.schneider-electric.co.uk/en/product/MTN648493/switch-actuator-reg-k-12x230-16-with-manual-mode%2C-light-grey
Zennio Lumentio DX4	Technical room	Zennio Lumentio DX4	Schneider Electric	10241798	5	67x90x79	http://zennio.com/products/lighting/lumento-dx4
Smartlink	Technical room	Smartlink	Schneider Electric	A9XMZA08	1	40x359x23	http://www.schneider-electric.com/en/product/A9XMZA08/acti9-smartlink-si-b---modbus-tcp-ip-and-wireless-communication-module/
ACTI9 Powertag	Technical room	ACTI9 Powertag	Schneider Electric	A9MEM1521	9	42.7x35.4x16.5	http://www.schneider-electric.com/en/product/A9MEM1521/acti-9---powertag---1p%2Bn---up-position---maximum--63a---energy-sensor
IEM-21	Technical room	IEM-21	Schneider Electric	A9MEM2155	3	64x90x36	http://www.schneider-electric.com/en/product/A9MEM2155/modular-single-phase-power-meter-iem2155---230v---63a-with-comm-modbus---mid/
Legend							-
Single wall socket waterproof	Outside	Single wall socket waterproof	Schneider Electric	MTN2300-8019	3	61x73x83	https://www.elektrobode.nl/products/merten-opb-wcd-ra-klapdeksel-kindbev-pw-aquastar-mtn2300-8019 -
Single wall socket	Bathroom, technical room and kitchen	Single wall socket	Schneider Electric	MTN2300-6034	7	71x71x40	http://www.schneider-electric.com/en/product/MTN2300-6034/schuko-socket-outlet%2C-shutter%2C-screwless-terminals%2C-antbracite%2C-system-design
Dual wall socket	Bedroom, technical room, bathroom, living room and kitchen	Dual wall socket	Schneider Electric	MTN2300-6034	11	71x71x40	http://www.schneider-electric.com/en/product/MTN2300-6034/schuko-socket-outlet%2C-shutter%2C-screwless-terminals%2C-antbracite%2C-system-design
Perilex	Kitchen	Perilex	ABL	540534	1	-	https://www.technischeunie.nl/product/prd1999974773
Bipolar switch	Outside	Bipolar switch	Schneider Electric	VCFN25GE	1	106x82.5x131	http://www.schneider-electric.com/en/product/VCFN25GE/tesys-mini-vario---enclosed-emergency-stop-switch-disconnector---20-a/
Pulse switch KNX	Bedroom, bathroom and living room	Pulse switch KNX	Schneider Electric	MTN6215-5910	5	30x71x71	http://www.schneider-electric.com/en/product/MTN6215-5910/knx-multitouch-pro%2C-system-design -
Touchscreen KNX	Hallway and living room	Touchscreen KNX	Schneider Electric	MTN6260-0315	2	92x306x525	http://www.schneider-electric.com/en/product/MTN6260-0315/u.motion-client-touch-15/
Fixed connection	Every room	Fixed connection	-	-	18	-	- -
Fixed 230V connection	Every room	Fixed 230V connection	-	-	12	-	
Data point	Bedroom and living room	Data point	Schneider Electric	MTN4564-6034	2	71x71x23	http://www.schneider-electric.com/en/product/MTN4564-6034/cen.pl.-t.-2-gng-modular-jack-w.-label-fld-%26-dust-slide%2C-anthracite%2C-sys.-design -
Motion detector	Hallway	Motion detector	Schneider Electric	MTN630919	1	-	http://www.schneider-electric.com/en/product/MTN630919/knx-argus-presence-with-light-control-and-ir-receiver%2C-polar-white
Junction box	Bedroom, living room and hallway	Junction box	Attema	1598762	6	45x95x45	https://www.technischeunie.nl/product/prd1999983007?_requestid=1875427&q=1598762 -
Ceiling fixture	Technical room	Ceiling fixture	Philips	531765	1	155x630x65	https://www.karwei.nl/assortiment/massive-victory-line-tl-armatuur-2x-10w-led/p/B531765 -
Led spot	Bathroom and kitchen	Led spot	YPHIX and 123Ledspots	50258907 and 118822996		?x90x50 and ?x75x22	https://www.ledlampendirect.nl/led-inbouwspot-argenta-aluminium-rond-ip65-straalwaterdicht-dimbaar-en-kantelbaar-7w-vervangt-60w.html
Smoke detector	Bedroom, technical room, living room and hallway	Smoke detector	Schneider Electric	MTN5480-1119	5	?x?x49	http://www.schneider-electric.com/en/product/MTN5480-1119/argus-smoke-detector---rf-duo---polar-white/ -
Magnet contact	Bedroom, technical room, living room and hallway	Magnet contact	ENOcean	LSS10020032	9	?x78x25	http://www.schneider-electric.com/en/product/LSS10020032/ecostruxure-building-expert-enocean-room-occupancy-sensor/ -
Intercom waterproof	Outside	Intercom waterproof	Schneider Electric	MTN6910-0033	1	52x331x130	http://www.schneider-electric.com/en/product/MTN6910-0033/u.motion-door-station-set%2C-1-unit
Twilight switch waterproof	Roof	Twilight switch waterproof	Schneider Electric	MTN663991	1	-	http://www.schneider-electric.com/en/product/MTN663991/knx-brightness-and-temperature-sensor%2C-light-grey

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SHEET TITLE

ELECTRICAL SCHEDULE

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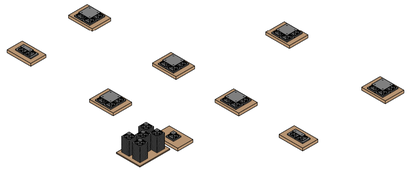

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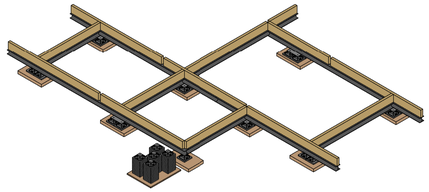

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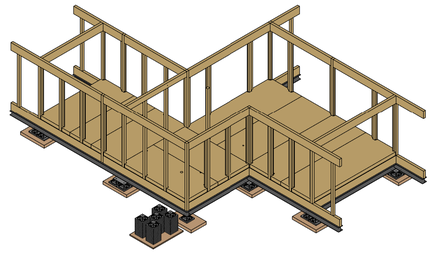

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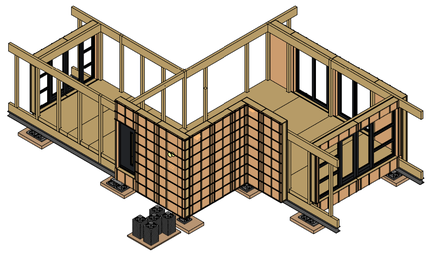

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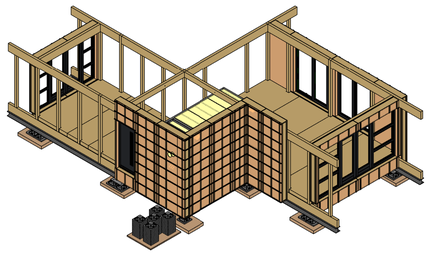

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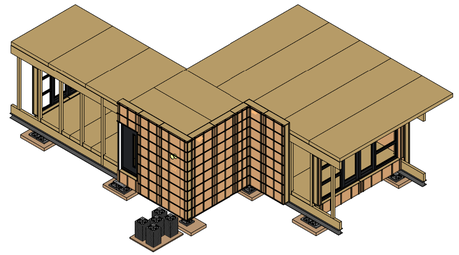

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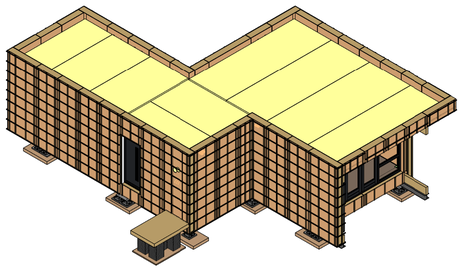

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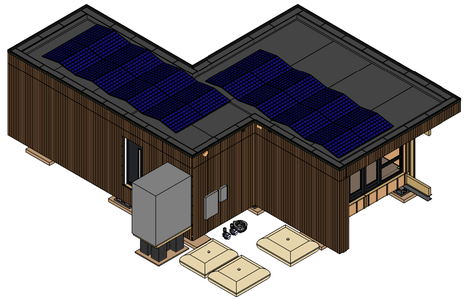

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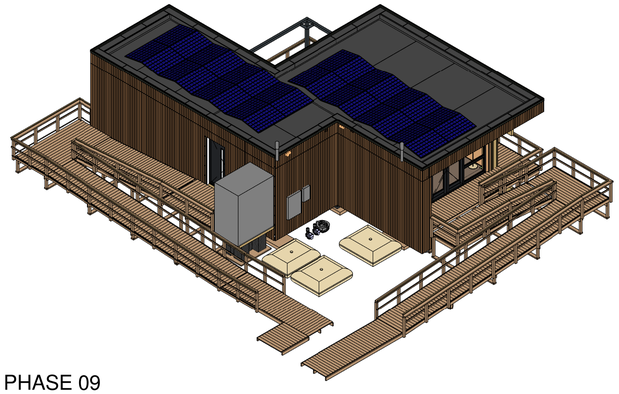

PHASE 09

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OPERATIONS

O-100

APPENDIX E-201

Company

Solar Comfort

Tielerweg 19c
4191 NE
Nederland

Contact Person:
Aart van Driel

Phone: 0623516175
E-Mail: Avandriel@solarcomfort.nl

Client

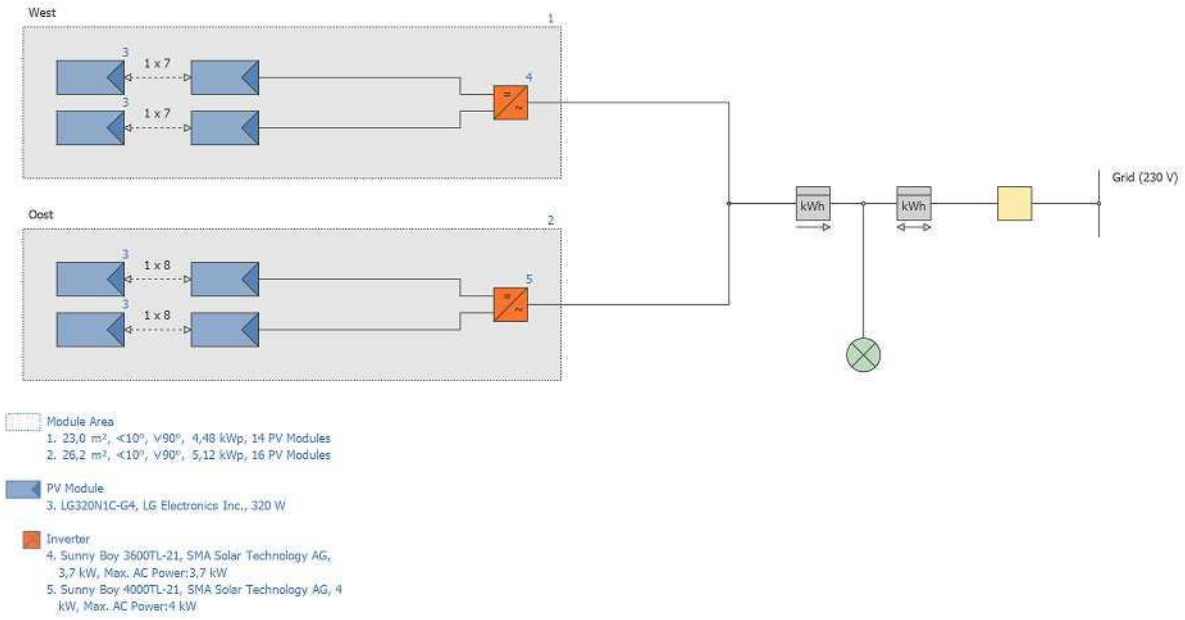
Hogeschool Utrecht

Contact Person:
Thijs Morel

Project

Address:
Denver, Colorado
Start of Operation Date: 12-10-2016
Project Description:

Grid connected PV System with Electrical Appliances		
Climate Data	DENVER INTL AP (1991 - 2005)	
PV Generator Output	9,6	kWp
PV Generator Surface	49,2	m²
Number of PV Modules	30	
Number of Inverters	2	



The yield		
PV Generator Energy (AC grid)	14.185	kWh
Own Consumption (Average)	5.183	kWh
Grid Feed-in	9.002	kWh
Spec. Annual Yield	1.477,64	kWh/kWp
Performance Ratio (PR)	85,7	%
Own Power Consumption	36,5	%
CO_2 Emissions avoided	8.511	kg / year

Your Gain		
Total investment costs	0,00	€
Return on Assets	267,18	%
Amortization Period	0,0	Years
Electricity Production Costs	0	€/kWh

Set-up of the system

Climate Data	DENVER INTL AP	
Type of System	Grid connected PV System with Electrical Appliances	

Consumption

Total Consumption	12636	kWh
Load Peak	1,4	kW

PV Generator 1. Module Area

Name	West	
PV Modules*	14 x LG320N1C-G4	
Manufacturer	LG Electronics Inc.	
Inclination	10	°
Orientation	East 90	°
Installation Type	Mounted - Roof	
PV Generator Surface	23,0	m²
Shading	0	%

PV Generator 2. Module Area

Name	Oost	
PV Modules*	16 x LG320N1C-G4	
Manufacturer	LG Electronics Inc.	
Inclination	10	°
Orientation	East 90	°
Installation Type	Roof parallel	
PV Generator Surface	26,2	m²
Shading	0	%

Inverter

1. Module Area	**West**
Inverter 1*	1 x Sunny Boy 3600TL-21
Manufacturer	SMA Solar Technology AG
Configuration	MPP 1: 1 x 7 | MPP 2: 1 x 7

2. Module Area	**Oost**
Inverter 1*	1 x Sunny Boy 4000TL-21
Manufacturer	SMA Solar Technology AG
Configuration	MPP 1: 1 x 8 | MPP 2: 1 x 8

AC Mains

Number of Phases	1	
Mains Voltage (1-phase)	230	V
Displacement Power Factor (cos phi)	+/- 1	

Simulation Results

PV System

PV Generator Output	9,6	kWp
Spec. Annual Yield	1.477,64	kWh/kWp
Performance Ratio (PR)	85,7	%
PV Generator Energy (AC grid)	14.185	kWh/year
Own Consumption	5.183	kWh/year
Grid Feed-in	9.002	kWh/year
Regulation at Feed-in Point	0	kWh/year
Own Power Consumption (Average)	36,5	%
CO_2 Emissions avoided	8.511	kg / year

Appliances

Appliances	12.636	kWh/year
Stand-by Consumption	24	kWh/year
Total Consumption	12.660	kWh/year
covered by PV power	5.183	kWh/year
covered by grid	7.476	kWh/year
Solar Fraction	40,9	%

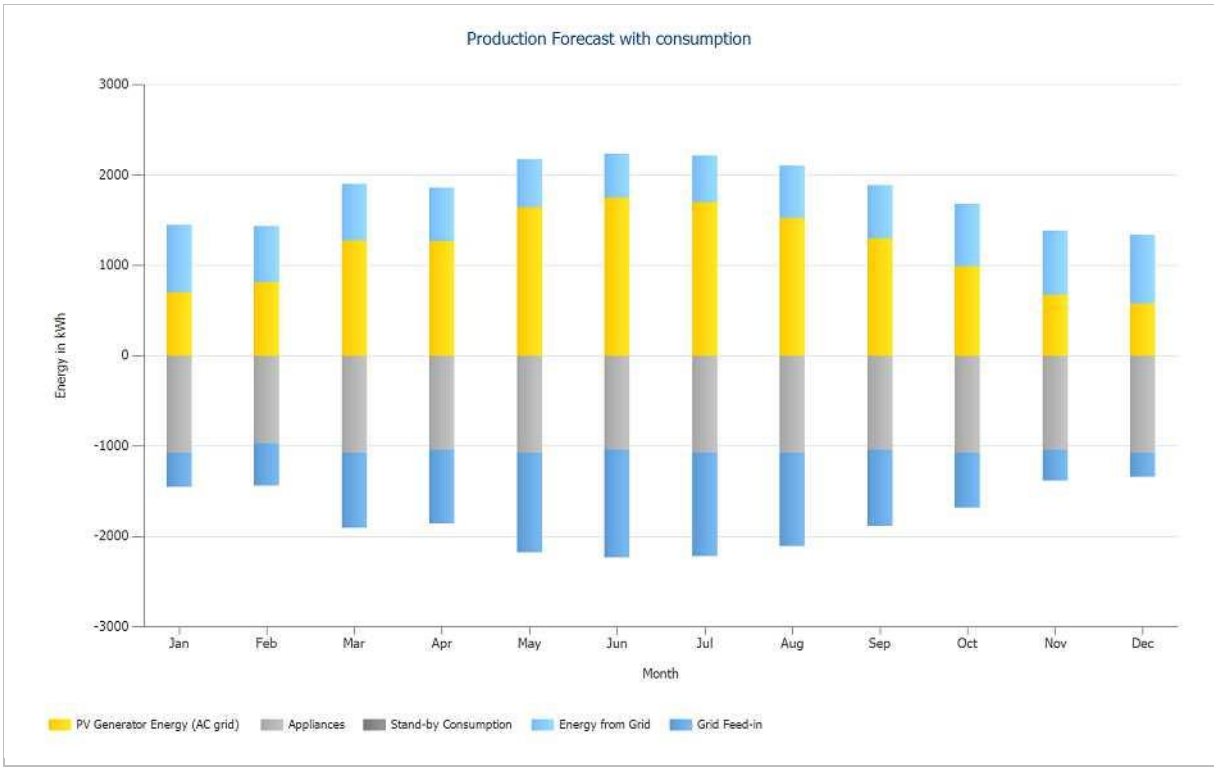


Figure: Production Forecast with consumption

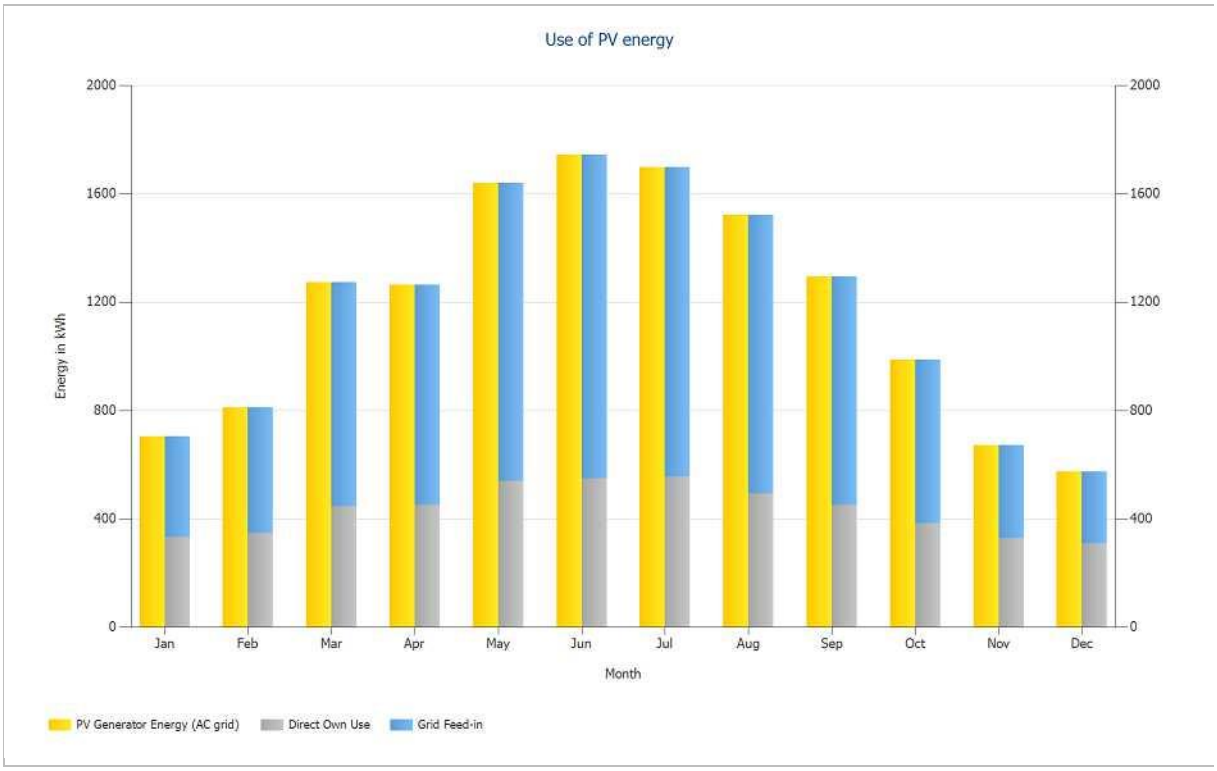


Figure: Use of PV energy

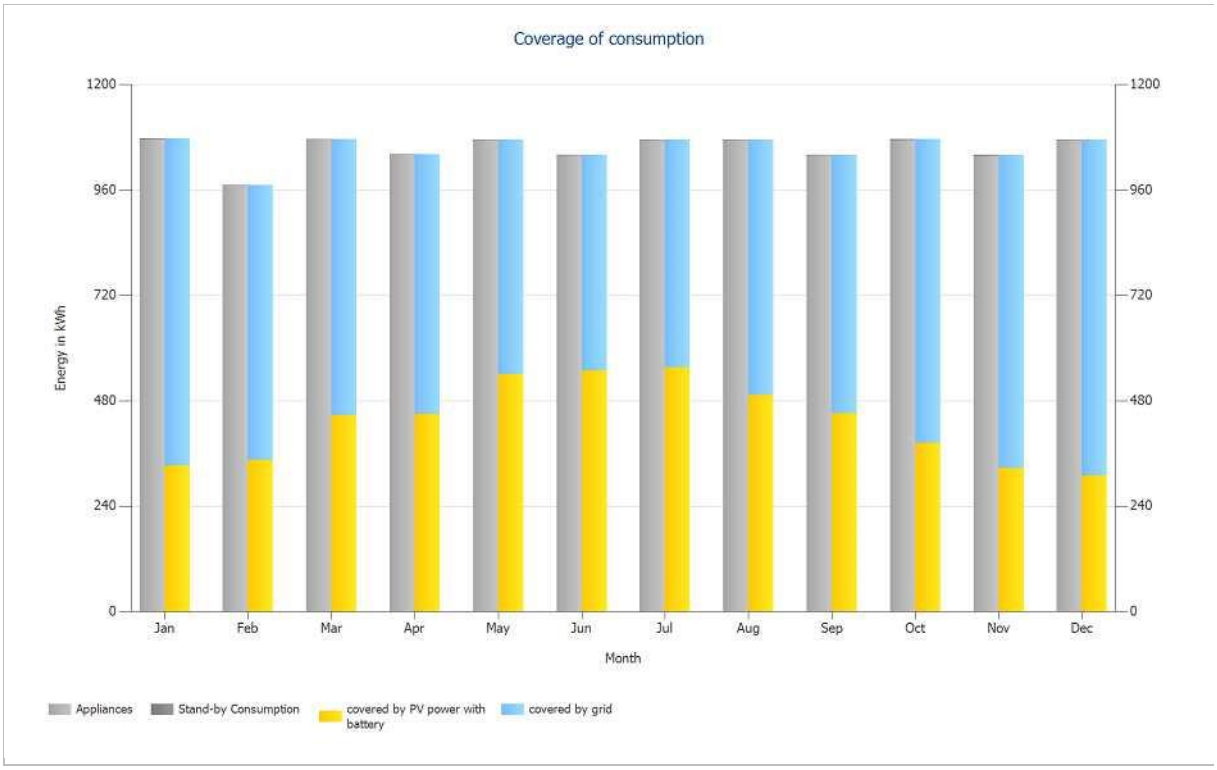


Figure: Coverage of consumption (in a normal situation)

Results per Module Area

West

PV Generator Output	4,48	kWp
PV Generator Surface	23,0	m²
Global Radiation at the Module	1722,6	kWh/m²
PV Generator Energy (AC grid)	6628,2	kWh/year
Spec. Annual Yield	1479,5	kWh/kWp
Performance Ratio (PR)	85,8	%

Oost

PV Generator Output	5,12	kWp
PV Generator Surface	26,2	m²
Global Radiation at the Module	1722,6	kWh/m²
PV Generator Energy (AC grid)	7557,4	kWh/year
Spec. Annual Yield	1476,1	kWh/kWp
Performance Ratio (PR)	85,6	%

PV System Energy Balance

Global radiation - horizontal	**1.670,2**	**kWh/m²**	
Deviation from standard spectrum	50,11	kWh/m²	3,00 %
Ground Reflection (Albedo)	2,61	kWh/m²	0,15 %
Orientation and inclination of the module surface	-0,34	kWh/m²	-0,02 %
Shading	0,00	kWh/m²	0,00 %
Reflection on the Module Interface	0,00	kWh/m²	0,00 %
Global Radiation at the Module	**1.722,6**	**kWh/m²**	
	1.722,6	kWh/m²	
	x 49,2	m²	
	= 84.752,0	kWh	
Global PV Radiation	**84.752,0**	**kWh**	
Soiling	0,00	kWh	0,00 %
STC Conversion (Rated Efficiency of Module 19,52 %)	-68.204,27	kWh	-80,48 %
Rated PV Energy	**16.547,7**	**kWh**	
Low-light performance	-164,73	kWh	-1,00 %
Deviation from the nominal module temperature	-659,36	kWh	-4,02 %
Diodes	-78,62	kWh	-0,50 %
Mismatch (Manufacturer Information)	-312,90	kWh	-2,00 %
Mismatch (Configuration/Shading)	0,00	kWh	0,00 %
PV Energy (DC) without inverter regulation	**15.332,1**	**kWh**	
Regulation on account of the MPP Voltage Range	0,00	kWh	0,00 %
Regulation on account of the max. DC Current	0,00	kWh	0,00 %
Regulation on account of the max. DC Power	0,00	kWh	0,00 %
Regulation on account of the max. AC Power/cos phi	-52,37	kWh	-0,34 %
MPP Matching	-180,45	kWh	-1,18 %
PV energy (DC)	**15.099,3**	**kWh**	
Energy at the Inverter Input	**15.099,3**	**kWh**	
Input voltage deviates from rated voltage	-237,10	kWh	-1,57 %
DC/AC Conversion	-533,56	kWh	-3,59 %
Stand-by Consumption	-23,60	kWh	-0,16 %
Total Cable Losses	-143,05	kWh	-1,00 %
PV energy (AC) minus standby use	**14.162,0**	**kWh**	
PV Generator Energy (AC grid)	**14.185,3**	**kWh**	

Cashflow Table

	year 1	year 2	year 3	year 4	year 5
Electricity Savings	€ 532,48	€ 512,22	€ 494,54	€ 479,03	€ 465,36
Annual Cash Flow	**€ 532,48**	**€ 512,22**	**€ 494,54**	**€ 479,03**	**€ 465,36**
Accrued Cash Flow (Cash Balance)	€ 532,48	€ 1.044,70	€ 1.539,25	€ 2.018,28	€ 2.483,64

	year 6	year 7	year 8	year 9	year 10
Electricity Savings	€ 453,24	€ 442,42	€ 432,72	€ 423,95	€ 415,99
Annual Cash Flow	**€ 453,24**	**€ 442,42**	**€ 432,72**	**€ 423,95**	**€ 415,99**
Accrued Cash Flow (Cash Balance)	€ 2.936,87	€ 3.379,30	€ 3.812,02	€ 4.235,97	€ 4.651,96

	year 11	year 12	year 13	year 14	year 15
Electricity Savings	€ 408,69	€ 401,98	€ 395,75	€ 389,94	€ 384,49
Annual Cash Flow	**€ 408,69**	**€ 401,98**	**€ 395,75**	**€ 389,94**	**€ 384,49**
Accrued Cash Flow (Cash Balance)	€ 5.060,65	€ 5.462,63	€ 5.858,38	€ 6.248,32	€ 6.632,81

	year 16	year 17	year 18	year 19	year 20
Electricity Savings	€ 379,34	€ 374,46	€ 369,80	€ 365,34	€ 361,05
Annual Cash Flow	**€ 379,34**	**€ 374,46**	**€ 369,80**	**€ 365,34**	**€ 361,05**
Accrued Cash Flow (Cash Balance)	€ 7.012,15	€ 7.386,61	€ 7.756,41	€ 8.121,75	€ 8.482,80

	year 21
Electricity Savings	€ 356,91
Annual Cash Flow	**€ 356,91**
Accrued Cash Flow (Cash Balance)	€ 8.839,72

Degradation and inflation rates are applied on a monthly basis over the entire observation period.
This is done in the first year.

PV Module: LG320N1C-G4

Manufacturer	LG Electronics Inc.	
Available	Yes	

Electrical Data

Cell Type	Si monocrystalline	
Only Transformer Inverters suitable	No	
Number of Cells	60	
Number of Bypass Diodes	3	

Mechanical Data

Width	1000	mm
Height	1640	mm
Depth	40	mm
Frame Width	10	mm
Weight	17	kg
Framed	No	

I/V Characteristics at STC

MPP Voltage	33,6	V
MPP Current	9,53	A
Nominal output	320	W
Open Circuit Voltage	40,9	V
Short-Circuit Current	10,05	A
Increase open circuit voltage before stabilisation	0	%

I/V Part Load Characteristics

Values source	Manufacturer/user-created	
Irradiance	200	W/m²
Voltage in MPP at Part Load	32,5	V
Current in MPP at Part Load	1,94	A
Open Circuit Voltage (Part Load)	37,9	V
Short Circuit Current at Part Load	2,05	A

Further

Voltage Coefficient	-114,52	mV/K
Electricity Coefficient	3,02	mA/K
Output Coefficient	-0,37	%/K
Incident Angle Modifier	100	%
Maximum System Voltage	1000	V
Spec. Heat Capacity	920	J/(kg*K)
Absorption Coefficient	70	%
Emissions Coefficient	85	%

Inverter: Sunny Boy 3600TL-21 (Conext MPPT 80 600)

Manufacturer	SMA Solar Technology AG	
Available	Yes	

Electrical Data		
DC Power Rating	3,88	kW
AC Power Rating	3,68	kW
Max. DC Power	3,88	kW
Max. AC Power	3,68	kW
Stand-by Consumption	10	W
Night Consumption	1	W
Feed-in from	32	W
Max. Input Current	30	A
Max. Input Voltage	750	V
Nom. DC Voltage	400	V
Number of Feed-in Phases	1	
Number of DC Inlets	4	
With Transformer	No	
Change in Efficiency when Input Voltage deviates from Rated Voltage	0,99	%/100V

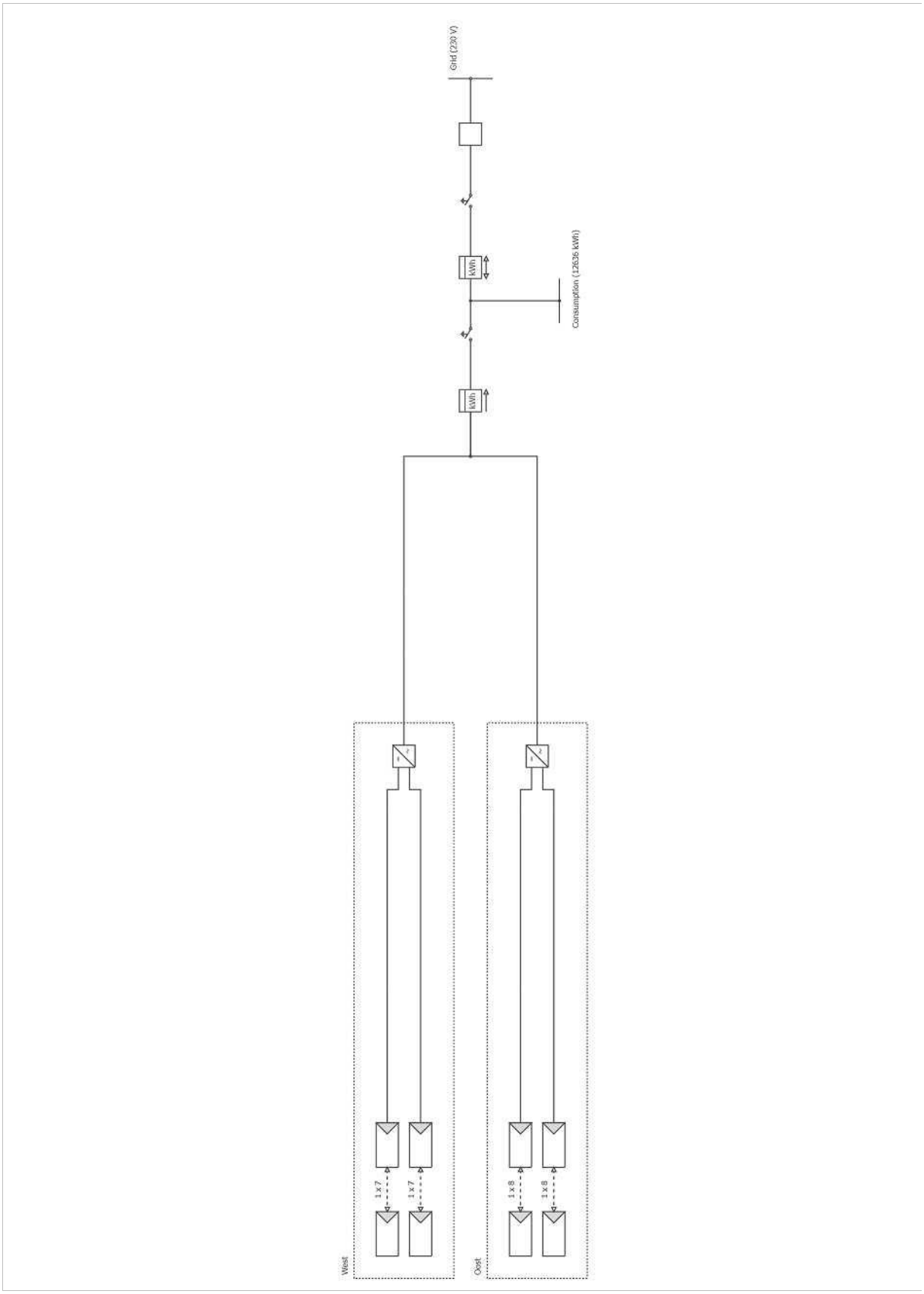
MPP Tracker		
Output Range < 20% of Power Rating	97	%
Output Range > 20% of Power Rating	98,9	%
No. of MPP Trackers	2	
Max. Input Current per MPP Tracker	15	A
Max. Input Power per MPP Tracker	3,68	kW
Min. MPP Voltage	125	V
Max. MPP Voltage	500	V

Inverter: Sunny Boy 4000TL-21 (Conext MPPT 80 600)

Manufacturer	SMA Solar Technology AG	
Available	Yes	

Electrical Data		
DC Power Rating	4,2	kW
AC Power Rating	4	kW
Max. DC Power	4,2	kW
Max. AC Power	4	kW
Stand-by Consumption	10	W
Night Consumption	1	W
Feed-in from	32	W
Max. Input Current	30	A
Max. Input Voltage	750	V
Nom. DC Voltage	400	V
Number of Feed-in Phases	1	
Number of DC Inlets	4	
With Transformer	No	
Change in Efficiency when Input Voltage deviates from Rated Voltage	0,99	%/100V

MPP Tracker		
Output Range < 20% of Power Rating	97	%
Output Range > 20% of Power Rating	98,9	%
No. of MPP Trackers	2	
Max. Input Current per MPP Tracker	15	A
Max. Input Power per MPP Tracker	4,2	kW
Min. MPP Voltage	125	V
Max. MPP Voltage	500	V


Grid (230 V)
kWh
Consumption (12636 kWh)
kWh
1 x 7
1 x 7
1 x 8
1 x 8
West
Oost

APPENDIX E-500

RF Action list

						Dimming actor				
						Z04	Z07	Z05	Z06	Z02
						Switch 01	**Switch 02**	**Switch 03**	**Switch 04**	**Switch 05**
	Description	**Groupaddress switch/movement**	**Groupaddress dim/step**	**Groupaddress val/height**	**Logic Adress**	1.1.20 channel 1	1.1.20 channel 2	1.1.20 channel 3	1.1.20 channel 4	1.1.21 channel 1
1	Multi touch pro 1.1.1 (Scenes)	7/0/2			1.1.62					
2	Multi touch pro 1.1.2 (Scenes)	7/0/3			1.1.62					
3	Multi touch pro 1.1.3 (Scenes)	7/0/4			1.1.62					
4	Multi touch pro 1.1.4 (Scenes)	7/0/5			1.1.62					
5	Multi touch pro 1.2.1 (Ceiling light)	0/0/7		0/3/6	1.1.62		Switch on/off			
6	Multi touch pro 1.3.1 (LED strip)	4/0/1	4/2/1	4/4/1	1.1.62					
7	Multi touch pro 1.4.1 (Blinds)		3/1/0	3/2/0	1.1.62					
8	Multi touch pro 1.5.1 (Heating/cooling)				1.1.62					
9	Multi touch pro 1.6.1 (Bed left)			0/3/4	1.1.62			Switch on/off		
10	Multi touch pro 1.6.2 (Bed right)			0/3/5	1.1.62				Switch on/off	
11	Multi touch pro 1.7.1 (Energy usage)			4/6/0	1.1.62					
12	Multi touch pro 1.7.2 (CO2 value)			6/1/0	1.1.62					
13	Multi touch pro 1.8.1 (Settings)				1.1.62					
14	Multi touch pro 2.1.1 (Scenes)	7/1/0			1.1.63					
15	Multi touch pro 2.1.2 (Scenes)	7/1/1			1.1.63					
16	Multi touch pro 2.1.3 (Scenes)	7/1/2			1.1.63					
17	Multi touch pro 2.1.4 (Scenes)	7/1/2			1.1.63					
18	Multi touch pro 2.2.1 (Lamp corner SW)			0/3/10	1.1.63					
19	Multi touch pro 2.2.2 (Lamp dinner table)			0/3/11	1.1.63					
20	Multi touch pro 2.3.1 (Ceiling light)			0/3/8	1.1.63					
21	Multi touch pro 2.3.2 (Kitchen spots)			0/3/12	1.1.63					
22	Multi touch pro 2.4.1 (LED strip)	4/0/2		4/2/2	1.1.63					
23	Multi touch pro 2.5.1 (blinds)		3/1/2	3/2/2	1.1.63					
24	Multi touch pro 2.5.2 (blinds)		3/1/4	3/2/4	1.1.63					
25	Multi touch pro 2.6.1 (Heating/cooling)				1.1.63					
26	Multi touch pro 2.7.1 (Settings)				1.1.63					
27	Multi touch pro 3.1.1 (Scenes)	7/2/0			1.1.64					
28	Multi touch pro 3.1.2 (Scenes)	7/2/1			1.1.64					
29	Multi touch pro 3.1.3 (Scenes)	7/2/2			1.1.64					
30	Multi touch pro 3.1.4 (Scenes)	7/2/3			1.1.64					
31	Multi touch pro 3.2.1 (Spots)	0/0/2		0/3/1	1.1.64					Switch on/off
32	Multi touch pro 3.3.1 (LED strip)	4/0/0		4/2/0	1.1.64					
33	Mulit touch pro 3.4.1 (Settings)				1.1.64					
34	Push button pro 1.1 (Scene wake up)	7/0/0			1.1.60		Switch on			
35	Push button pro 1.2 (Blind down/up)	7/0/6			1.1.60		Switch off			
36	Push button pro 1.3 (Lamp bed left)	0/0/5	0/2/4		1.1.60			Switch on		
37	Push button pro 1.4 (Lamp bed left)	0/0/5	0/2/4		1.1.60			Switch off		
38	Push button pro 2.1 (Lamp bed right)	0/0/6	0/2/5		1.1.61				Switch on	
39	Push button pro 2.2 (Lamp bed right))	0/0/6	0/2/5		1.1.61				Switch off	
40	Push button pro 2.3 (Scene wake up)	7/0/1			1.1.61		Switch on			
41	Push button pro 2.4 (Blind down/up))	7/0/7			1.1.61		Switch off			
42	PIR Hallway	0/0/4			1.1.1	Switch on				
43	Combisensor (wind)				1.1.44					
44	Combisensor (rain)				1.1.44					
45	Combisensor (twilight)				1.1.44					
46	Combisensor (sun east)				1.1.44					
47	Combisensor (sun south)				1.1.44					
48	Combisensor (sun west)				1.1.44					
49	Combisensor (all up)				1.1.44					

-	-	-	Z12	Z13	Z9	Z11	Z04	Z07	Z05	Z06	Z02	-	-	-	Z12	Z13
Switch 06	**Switch 07**	**Switch 08**	**Switch 09**	**Switch 10**	**Switch 11**	**Switch 12**	**Dim 01**	**Dim 02**	**Dim 03**	**Dim 04**	**Dim 05**	**Dim 06**	**Dim 07**	**Dim 08**	**Dim 09**	**Dim 10**
1.1.21 channel 2	1.1.21 channel 3	1.1.21 channel 4	1.1.22 channel 1	1.1.22 channel 2	1.1.22 channel 3	1.1.22 channel 4	1.1.12 channel 1	1.1.20 channel 2	1.1.20 channel 3	1.1.20 channel 4	1.1.21 channel 1	1.1.21 channel 2	1.1.21 channel 3	1.1.21 channel 4	1.1.22 channel 1	1.1.22 channel 2
								Dim on/off								
									Dim on/off							
										Dim on/off						
						Switch on/off										
			Switch on/off													
					Switch on/off											
				Switch on/off												
									Dim on/off							
									Dim on/off							
										Dim on/off						
										Dim on/off						
							-									

														Zennio Lumento DX4		
Z9	Z11	Z04	Z07	Z05	Z06	Z02	-	-	-	Z12	Z13	Z9	Z11	Z03	Z08	Z08
Dim 11	**Dim 12**	**Val 01**	**Val 02**	**Val 03**	**Val 04**	**Val 05**	**Val 06**	**Val 07**	**Val 08**	**Val 09**	**Val 10**	**Val 11**	**Val 12**	**Switch**	**Switch**	**Switch**
1.1.22 channel 3	1.1.22 channel 4	1.1.12 channel 1	1.1.20 channel 2	1.1.20 channel 3	1.1.20 channel 4	1.1.21 channel 1	1.1.21 channel 2	1.1.21 channel 3	1.1.21 channel 4	1.1.22 channel 1	1.1.22 channel 2	1.1.22 channel 3	1.1.22 channel 4	1.1.23	1.1.24	1.1.25
			Value													
															Switch on/off	Switch on/off
				Value												
					Value											
													Value			
										Value						
												Value				
											Value					
						Value										
														Switch on/off		
															Switch on	Switch on
															Switch off	Switch off
															Switch on	Switch on
															Switch off	Switch off

												Blind actor			
Z10	Z10	Z03	Z08	Z08	Z10	Z10	Z03	Z08	Z08	Z10	Z10	za	zb	zc	zd
Switch	**Switch**	**Dim**	**Dim**	**Dim**	**Dim**	**Dim**	**Led color**	**Led color**	**Led color**	**Led color**	**Led color**	**Blind stop/step**	**Blind stop/step**	**Blind stop/step**	**Blind stop/step**
1.1.26	1.1.27	1.1.23	1.1.24	1.1.25	1.1.26	1.1.27	1.1.23	1.1.24	1.1.25	1.1.26	1.1.27	1.1.42 channel 1	1.1.42 channel 2	1.1.42 channel 3	1.1.42 channel 4
			Dim on/off	Dim on/off				Set color	Set color						
												Stop/step	Stop/step		
Switch on/off	Switch on/off				Dim on/off	Dim on/off				Set color	Set color				
														Stop/step	Stop/step
		Dim on/off					Set color								
								White	White						
								White	White						

ze	zf	-	-	za	zb	zc	zd	ze	zf	-	-	za-zf
Blind stop/step	**Blind stop/step**	**Blind stop/step**	**Blind stop/step**	**Blind height**	**Blind height**	**Blind height**	**Blind height**	**Blind height**	**Blind height**	**Blind height**	**Blind height**	**Blind all channels**
1.1.42 channel 5	1.1.42 channel 6	1.1.42 channel 7	1.1.42 channel 8	1.1.42 channel 1	1.1.42 channel 2	1.1.42 channel 3	1.1.42 channel 4	1.1.42 channel 5	1.1.42 channel 6	1.1.42 channel 7	1.1.42 channel 8	
				Height position	Height position							
						Height position	Height position					
Stop/step	Stop/step							Height position	Height position			
												Up
												Up
												Up

12-fold switch actor												Heating actor							
Elan 1	Elan 2	Elan 3	Z01	Elan 4	Cooling	Heating	Pump Elan	Pump u.f.h.				Bedroom	Livingroom	Bathroom					
Switch 1	**Switch 2**	**Switch 3**	**Switch 4**	**Switch 5**	**Switch 6**	**Switch 7**	**Switch 8**	**Switch 9**	**Switch 10**	**Switch 11**	**Switch 12**	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**	**Zone 7**	
					Cooling	Heating						On/off							
					Cooling	Heating							On/off						

		Alarm syst	Ventilator	Ventilator	Brandalarn	Status Aan	Status Lan	Status Nac	PANIC
		-	5/0/71	5/0/72	-	5/0/17	5/0/15	5/0/16	-