ARCHITECTURE PORTFOLIO

MARC CASAJAUNA

ARCHITECTURE AND SYSTEMS

In order to have a good coordination between architecture and systems, the design of systems has to be taken into account in parallel with the architectural design process.
This portfolio is showing the coordination between this two modalities inside the architecture. To achieve this it is shown two projects where it is projected a thermal improvement with architecture and systems and two projects where the architecture is given and it is necessary to obtain a thermal comfort by means of the best systems for adequate coordination without being modify the architecture.

SELECTED WORKS

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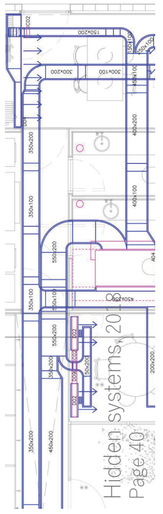

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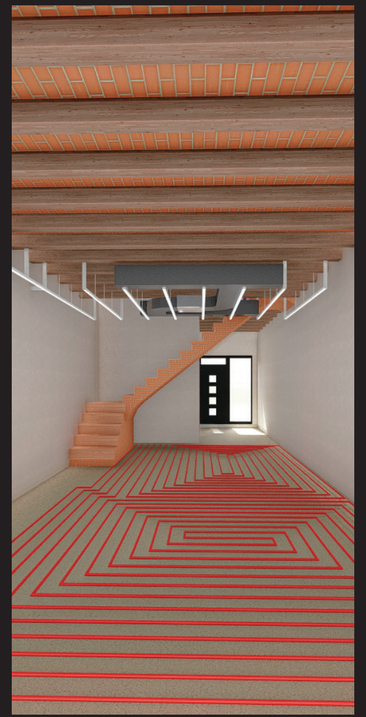
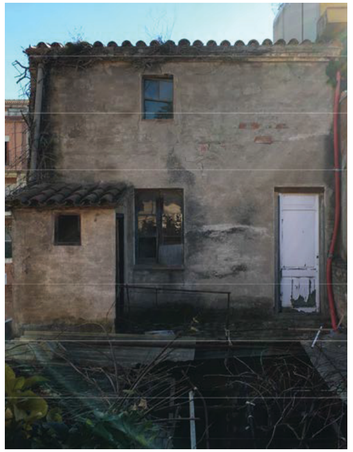
Between walls, 2019

Between architecture and systems

This project is addressed to the refurbishment of a single family townhouse. The house has 3 floors: the ground floor as a warehouse, the first floor fit for habitation and the attic. At the back of the house there is a garden attached which is a little higher than the ground floor and at the end of this garden it is found a small building used as a warehouse with two floors that gives access to the back street.

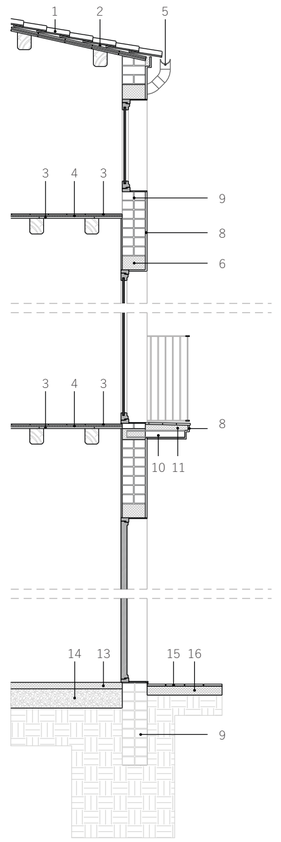


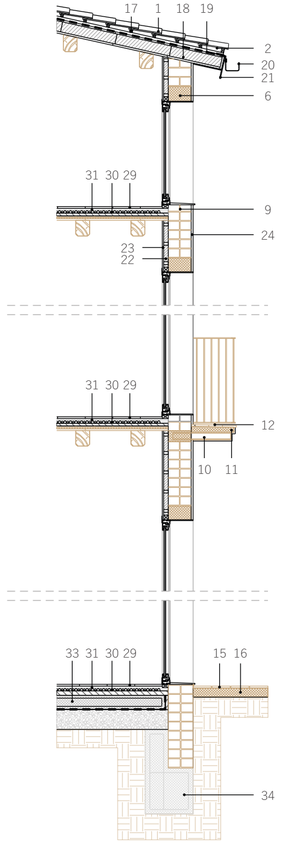


On account of the poor maintenance, the project includes a comprehensive reform of the building set which contains the main house, a garden and the construction on the other side of the plot.
To improve the space in front of the living room and create a terrace, several meters are removed from the garden into the garden. In all the exterior paraments it is made a thermal improvement; the roof is refurbished using thermochip panels, the main facade is improved with thermal insulation in the inside such as the separate walls, on the rear facade it is made a ETICS and the concrete slab is replaced by a new one. In the other building, it is designed the space to make a garage in the ground floor and a small office in the first floor.

Detail legend

1. Teja de arcilla cocida de color rojizo. Reaprovechamiento de la existente.
2. Cámara de aire ventilada.
3. Rasilla cerámica de espesor 2,5cm.
4. Rejuntado de ladrillo con mortero de cal.
5. Canal de desagüe, de PVC.
6. Dintel de hormigón en masa.
7. Ladrillo hueco doble.
8. Enlucido exterior de mortero de cal.
9. Ladrillo perforado con aparejo gótico.
10. Viga metálica IPN100, laminada en frío.
11. Rellene de hormigón en masa con restos de piezas cerámicas.
12. Pavimento de atoba cerámica de medidas 1x12x14cm.
13. Losa de hormigón en masa.
14. Grava de granulometria media.
15. Pavimento de losetas de hormigón.
16. Tierra compactada.
17. Rastrel de madera, de medidas 4x4cm.
18. Tablero de aglomerado hidrófugo de abeto con núcleo de poliestireno extruido con juntas selladas. Modelo TAH-Friso de abeto de Thermochip.
19. Lámina de EPDM de densidad 1,4kg/m2 con espesor de 1,5mm, colocado mediante fijación mecánica. Modelo Danofelt PY 150 de Danosa.
20. Canal de desagüe semicircular de acero galvanizado.
21. Pieza de protección de alero de madera de abeto tratada para clase de riesgo IV.
22. Aislamiento de lana mineral de espesor 60mm Rockwool Rocksol 501 de densidad 90kg/m3 y conductividad térmica de 0,035W/mK.
23. Placa de yeso laminado de espesor 150mm y densidad 630kg/m3, modelo Knauf Standard A.
24. Enlucido de mortero de cal hidráulica natural de base arenosa, cal blanca, con densidad de 1,2kg/m2mm de categoría CS II. Modelo Kleim NHL-Fino.
25. Mortero ligero de cal de muy baja densidad formulado a base de aglomerantes hidráulicos y aridos, con una conductividad térmica de 0,05W/mK, reforzado con malla de fibra de vidrio. Modelo Propam term 50.
26. Anclaje tipo taco-espiga de polipropileno para la fijación de aislamiento rígido en fachadas.
27. Plancha rígida de XPS de espesor de 30mm con una conductividad térmica de 0,034W/mK y densidad de 32kg/m3. Modelo Danopren TR 60 de Danosa.
28. Vierteaguas metálico hecho a medida, con corta-aguas.
29. Pavimento de gres porcelánico con acabado de imitación a madera, medida de las piezas 25x150cm. Modelo Starwood de Porcelanosa. Adherido con adhesivo cementoso para la colocación de piezas cerámicas modelo VAT flex de Propamsa.
30. Tubo de polibutileno de espeso 16mm model HEP20 de SaunierDuval. Colocado en panel aislante termo de Baxi.
31. Mortero autonivelante sin retracción de alta transmisión, reforzado con fibras, con una conductividad térmica de 1,7W/mK. Marca Ingremic.
32. Apeo mediante perfil metálico IPE200 laminado en caliente.
33. Solera de hormigón armado con barras corrugadas.
34. Recalce de muro para creación de zapatas de hormigón armado.





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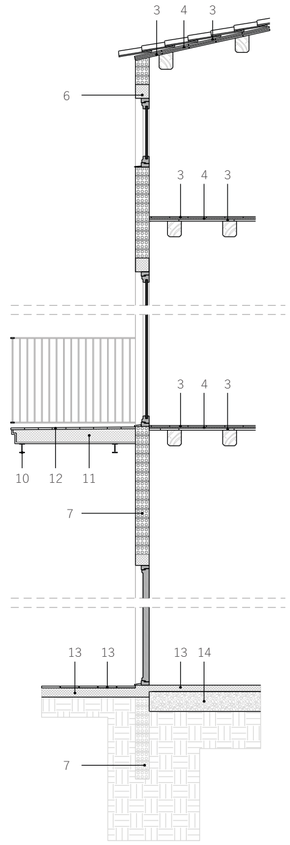
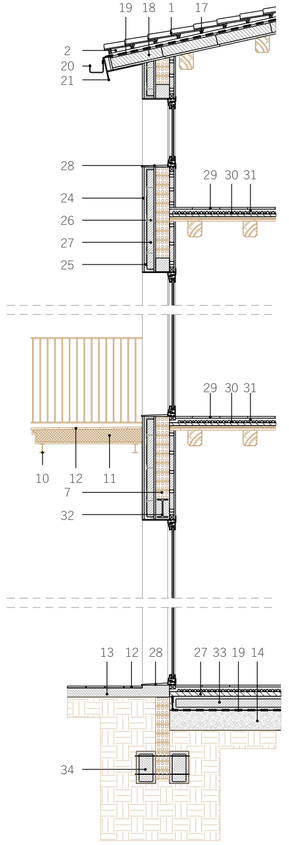
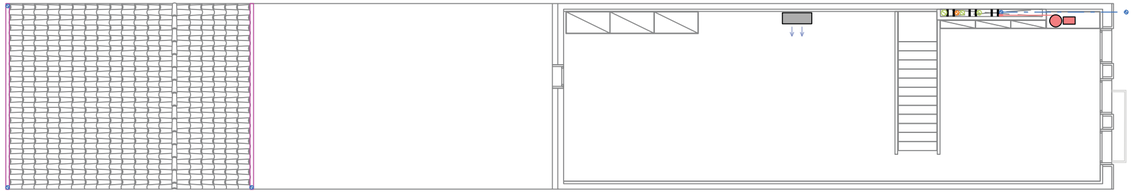
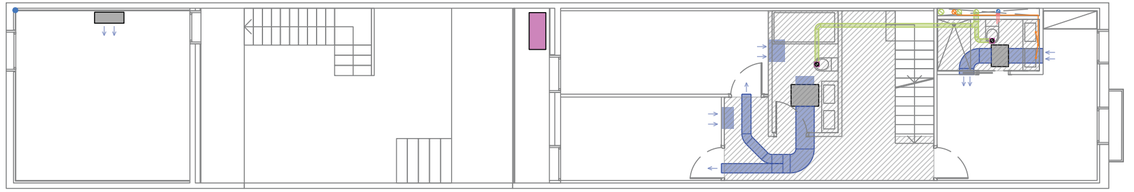
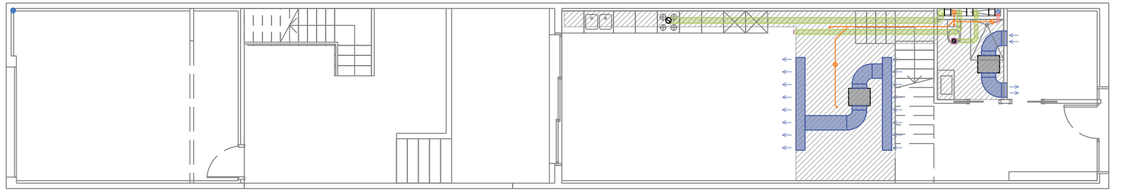




In this project it is designed a aerothermia system which can cool using interior units. It can generate heat with an underfloor heating system. As well as this it can also generate SHW by a hydrokit and a deposit. In order to maintain the appearance of the existing traditional architecture, which is projected in the architectonic design, the cool system design is projected online with the necessary false ceiling for a good function of the systems and at the same time it maintains the architectural concept as much as possible.

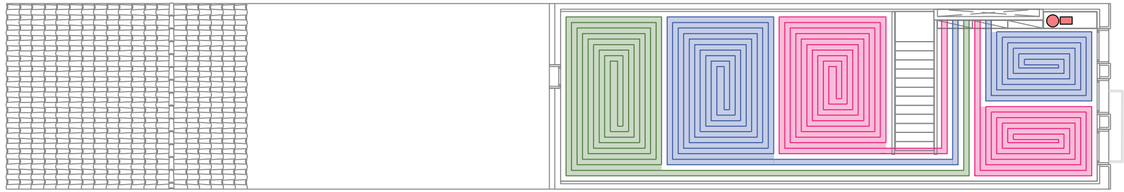


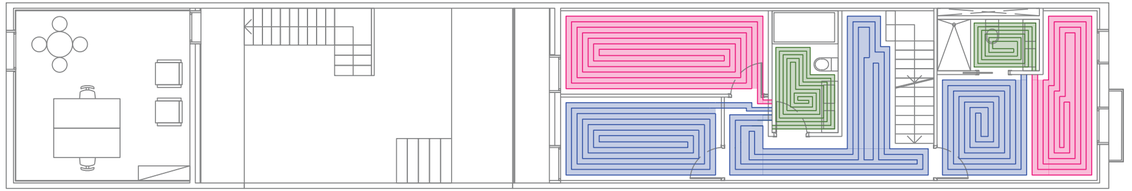


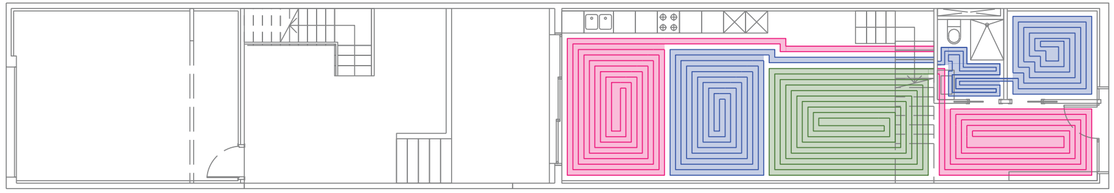


Between walls

The underfloor heating system has several benefits such as a correct and better distribution of the heat, because it works with low temperatures closer to the ones of the air in the rooms. also it is also advantageous for a house that have a high occupancy level, because of the system, which can work continuously for many hours as well as there is the possibility of having an individual treatment for each room.







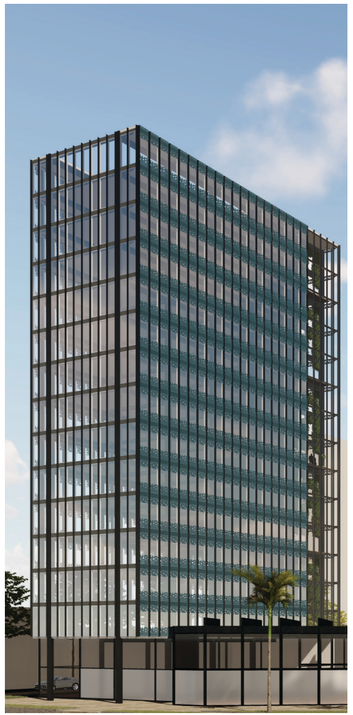
Between walls

Under beams, 2019

Between architecture and systems

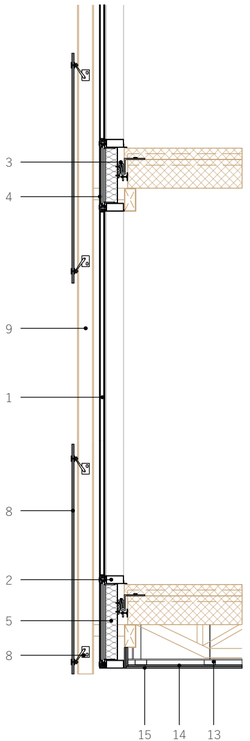
In 1950, SEAT opened one of its headquarters in Barcelona, placed in Plaça Cerdà where a combination of three innovative buildings were made. At that time SEAT created a automotive symbol at the Barcelona's old gate using the architecture that Mies had been promoting in USA.
Between 1990 and 2000, because of the opening of a new headquarters out of the city, the use of the buildings was changed to apartments.
Promoting the electric and sustainable mobility who fights to beat the climate change, the project considered the need to transform the buildings to become a new tecnologic symbol of the city, introducing the new company Waymo, a Google delegation.

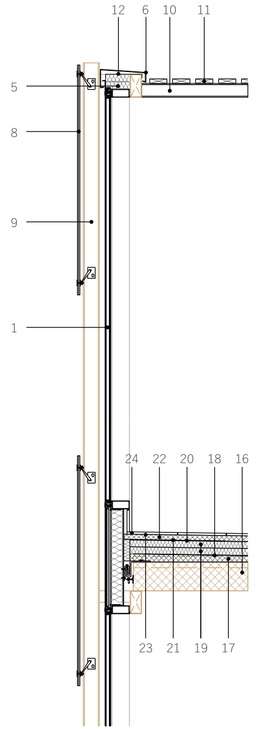
As the project wants to create a new tecnologic headquarters, with the refurbishment of the skyscraper it is tried to improve the thermal conditions introducing a new curtain wall system, which has better thermal qualities. In front of the curtain wall to create a sun protection it is used photovoltaic panels in horizontal stripes that can generate enough electric energy to charge the vehicles and to supply the corporation buildings. The compositional form from this stripes is given by the old facade module and its made to preserve the visual patrimony of the previous facade.



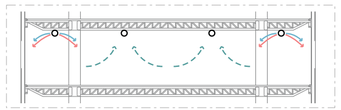
Detail legend

1. Ventana Schüco modelo AWS 102 de cristal 6T+3.2+6T/12Argón/6T low-e estructural sellado con silicona, con una transmitancia térmica de 1,2W/m2K.
2. Sistema de fachada Schüco modelo FW 50+SG con perfilería de aluminio oculta >12cm con rotura de puente térmico. Transmitancia térmica de 3,2W/m2K.
3. Mecanismo de ajuste tridimensional para sistema de fachada Schüco modelo FW 50+SG.
4. Cristal fotovoltaico opaco de silicio amorfo de 3.2+4 con transmitancia térmica de 5.7W/m2K i reflectancia de 7.6%. Marca Onyxsolar.
5. Aislamiento de lana mineral de espesor 60mm RockWool Wocksol 501 de densidad 90kg/m3 i conductividad térmica de 0,035W/mK.
6. Chapa de remate de acero galvanizado de espesor 3mm con goterón.
7. Sistema araña de fijación de acero inoxidable para muro cortina.
8. Cristal de protección solar fotovoltaico de silicio de alta densidad de células fotovoltaicas de 6T+6T con una transmitancia térmica de 5.5W/m2K y transparencia de 15%. Marca Onyxsolar.
9. Perfil IPN laminado en frío existente.
10. Perfil IPE 120 laminado en caliente.
11. Listón de madera maciza de Cedro con tratamiento antihumedad.
12. Lámina EPDM de densidad 1.4kg/m2 con espesor 1.5mm, colocación mediante fijación mecánica. Modelo Danofelt PY 150 de Danosa.
13. Perfilería de soporte Knauf.
14. Panel de fibrocemento de 150mm de espesor y densidad de 1.150kg/m3 con una conductividad térmica de 0,35W/mK. Modelo Acuapanel Skylite de Knauf.
15. Placa de yeso laminado hidrófugo de 150mm de espesor y densidad 720kg/m3. Modelo Impregnada H1 de Knauf.
16. Soporte estructural.
17. Hormigón en masa para la formación de pendientes. Espesor de 10cm en el punto más alto, inclinación del 2%.
18. Lámina de polietileno transparente de baja densidad (LDPE) de 0,2mm de espesor con una densidad de 180g/m2 sin fijación i con solapamiento de al menos 10cm. Modelo Danapol 250 de Danosa.
19. Plancha rígida de XPS de espesor 60mm con una conductividad térmica de 0,034W/mK i una densidad de 32kg/m3. Modelo Danopren TR60 de Danosa
20. Lamina de EPDM de densidad 1.4kg/m2 con espesor de 1.5mm, colocación mediante fijación mecánica. Modelo Danfelt PY 150 de Danosa.
21. Lamina geotextil de poliéster de espesor 1.9mm i densidad 150g/m2. colocación mediante fijación mecánica. Modelo Danofelt PY 150 de Danosa.
22. Capa de compresión de hormigón en masa de 50mm.
23. Adhesivo cementoso para la colocación de piezas cerámicas. Modelo VAT flex de Propamsa.
24. Pavimento cerámico con acabado mate y relieve de aspecto cementoso, grosor 1.1cm, formato 80x80cm. Modelo Newport de Porcelanosa.

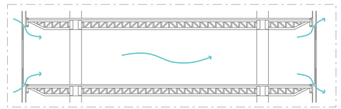




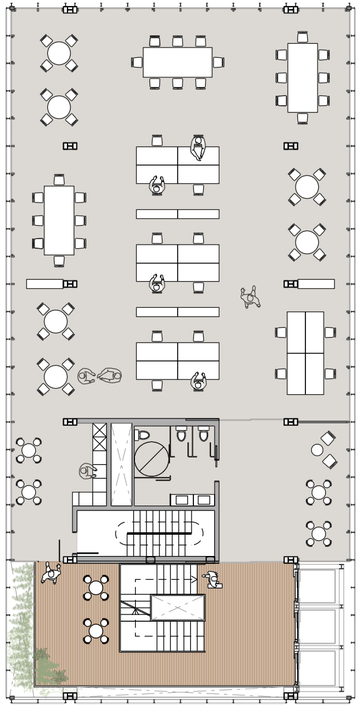
The climate control of the offices is made by means of two methods; the first method is made by using a AHU, Air Handling Unit, placed on the top floor which spreads out the climatized air for all the floors using galvanized steel pipes, this system creates an industrial visual game inside the offices along with the lattice girder.

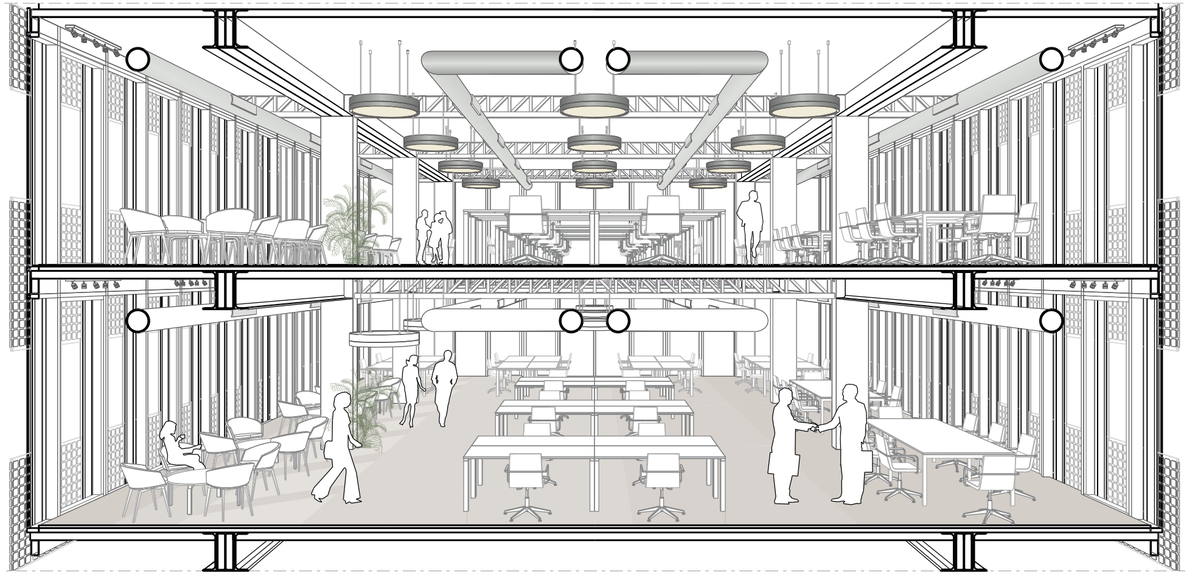


Air condition system



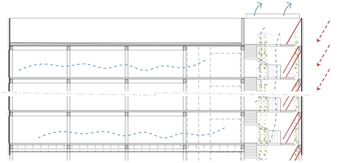
Natural air flow

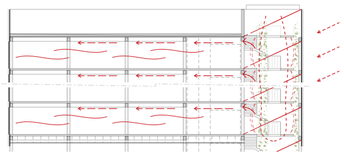


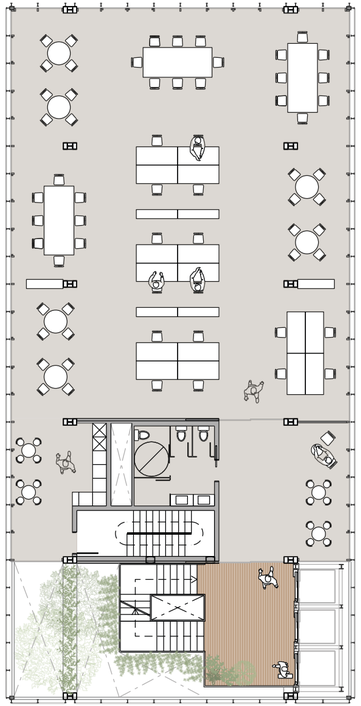


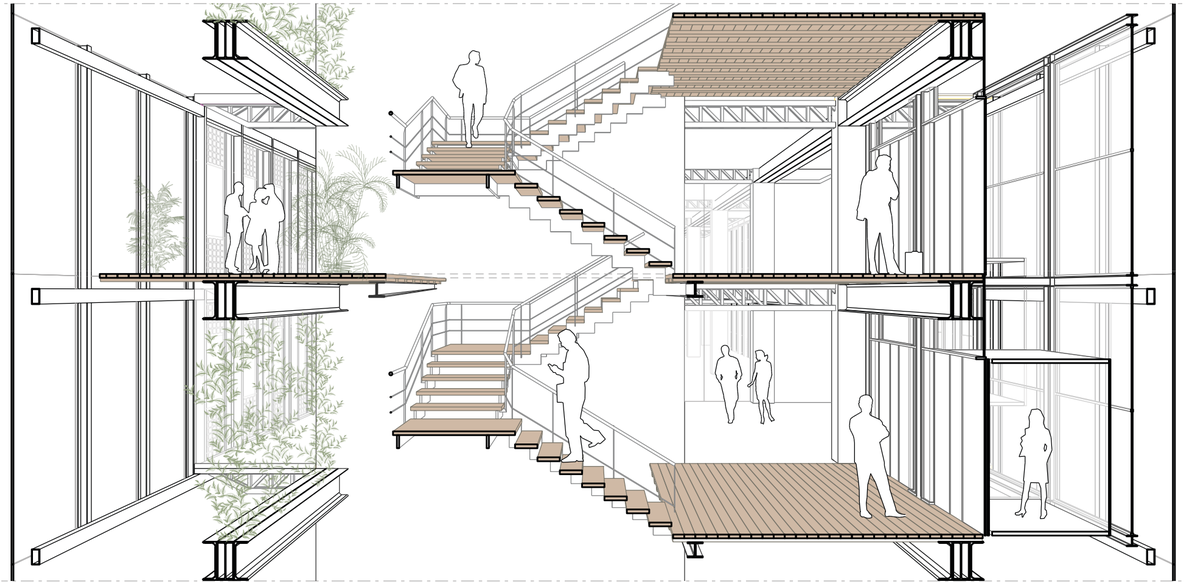
Under beams

The second method of climate control is achieved in a passive way by making use of the big hall, which has a hothouse function, where its own microclimate generates heat in winter and cold in summer, it is also important to mention that this method works along with a cross ventilation, which can be generated with the office's windows, obtaining a passive air conditioning supported by the mechanic method.









Under beams

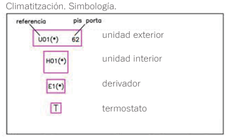
Exposed systems, 2019

Systems into architecture

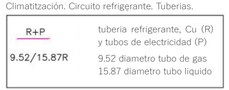
The present project is placed in Barcelona in a building built in 1989, in this case the architecture is given and it is the installation design what has to be considered. The building has 5 floors and the refurbishment takes place on the 4th and 5th floors. An industrial design with exposed installations is suggested because the architecture takes into account its high open spaces.

In this diagram it can seen how the lower floor is divided into four different zones which can be acclimated with independent interior units and in the upper floor, initially it is decided to split it into eight zones but later became six.

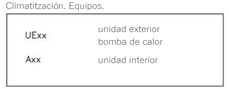
Climatització. Simbologia.

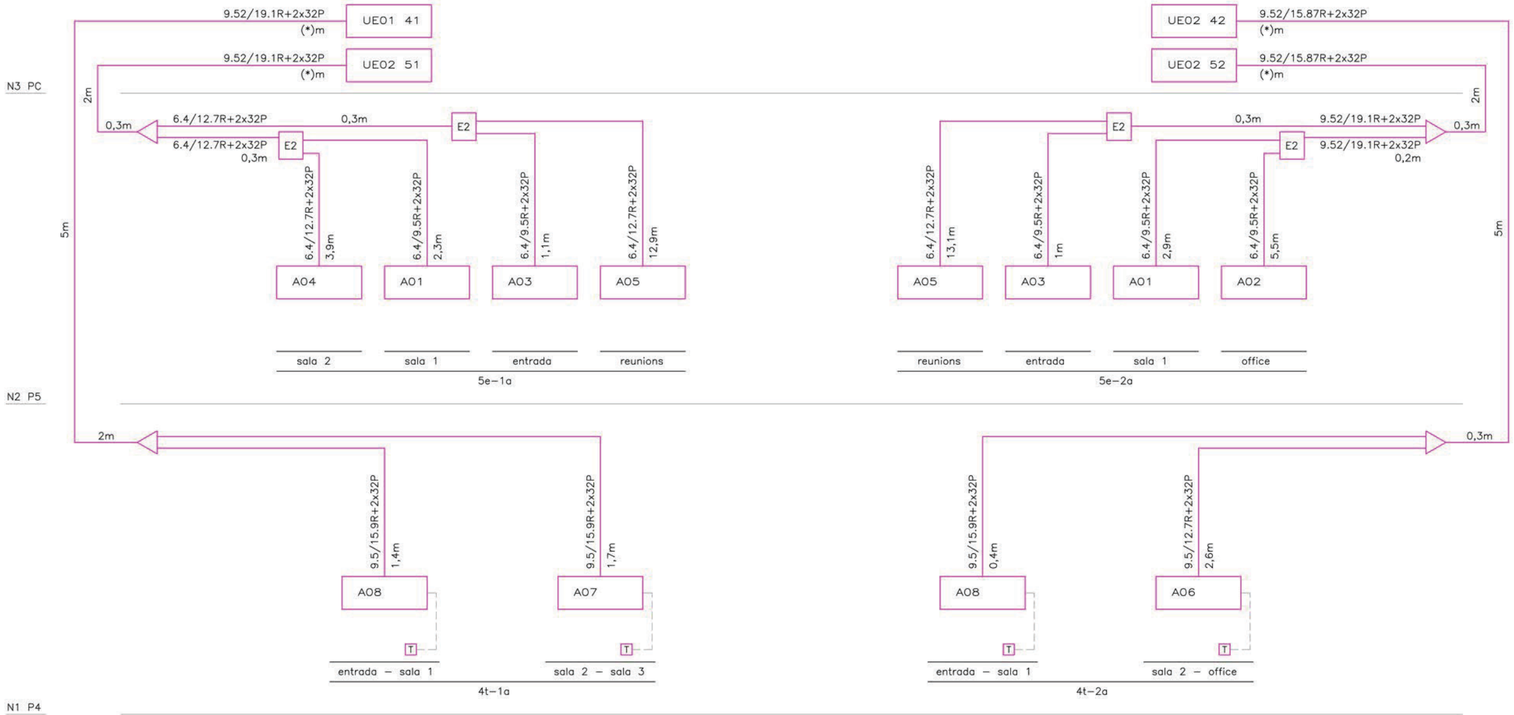


Climatització. Circuito refrigerante. Tuberias.



Climatització. Equipos.





(*) distancia a cubierta en función de la posición de la màquina exterior en la misma.

The systems in this level are exposed and are designed with circular ducts of galvanized steel, all the interior units are placed in the bathrooms which are the only places with false ceiling and is from there where the air is spreaded out.

Acondicionamiento de aire. Simbología.

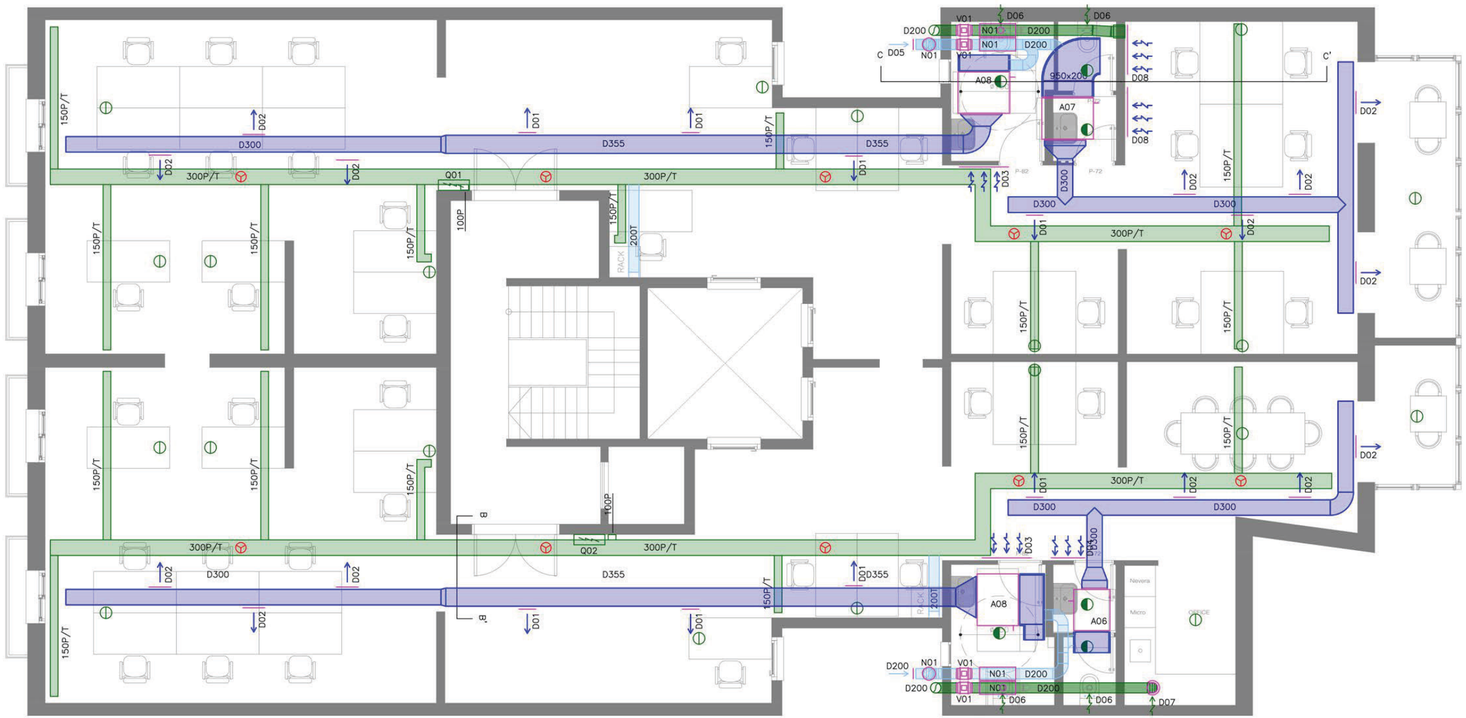
D01(*)	salida de aire por reja de impulsión
D01(*)	entrada de aire por reja de retorn

Acondicionamiento de aire. Conductos.

	conducto climatización, fibra oculta, planxa vista
	conducto ventilación impulsión, circular plancha galvanizada
	conducto ventilación extracción, circular plancha galvanizada

Ventilación y acondicionamiento de aire. Equipos.

V0x	ventilador
D0x	reja
N0x	atenuador
A0x	unidad interior acondicionamiento de aire



In this floor it is seen during the construction that the clear height is less than the permissible one and it is decided to use hidden systems that take up less height and use fiber ducts and low edge slot diffusers.

Acondicionamiento de aire. Simbología.

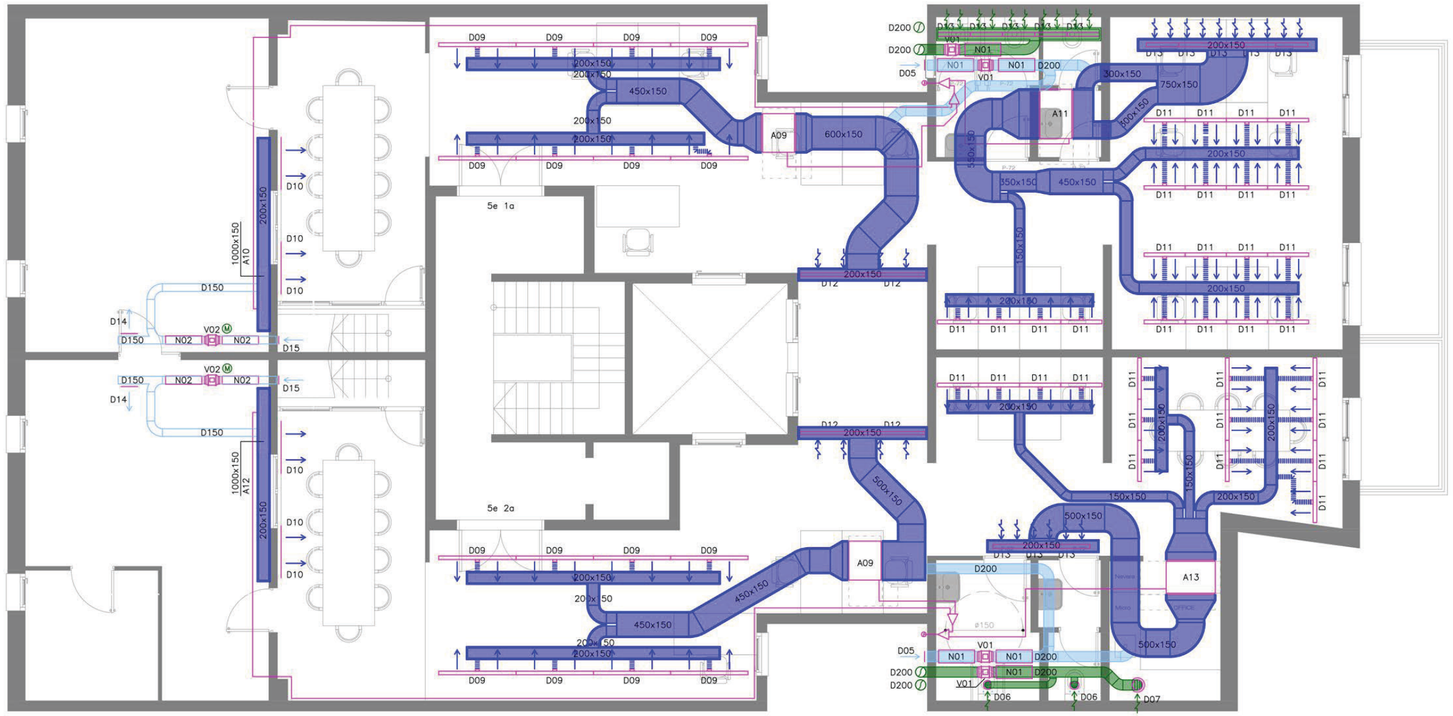
D01(*)	salida de aire por reja de impulsión
D01(*)	entrada de aire por reja de retorn

Acondicionamiento de aire. Conductos.

	conducto climatización, fibra oculta, planxa vista
	conducto ventilación impulsión, circular plancha galvanizada
	conducto ventilación extracción, circular plancha galvanizada

Ventilación y acondicionamiento de aire. Equipos.

V0x	ventilador
D0x	reja
N0x	atenuador
A0x	unidad interior acondicionamiento de aire



Acondicionamiento de aire. Simbología.

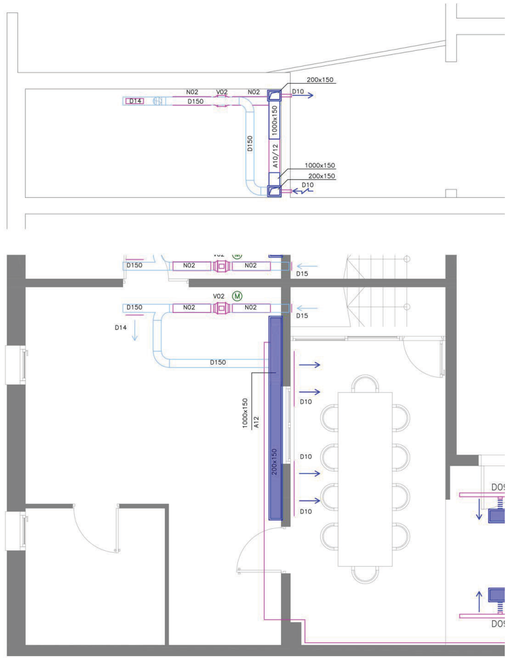
D01(*)	salida de aire por reja de impulsión
D01(*)	entrada de aire por reja de retorn

Acondicionamiento de aire. Conductos.

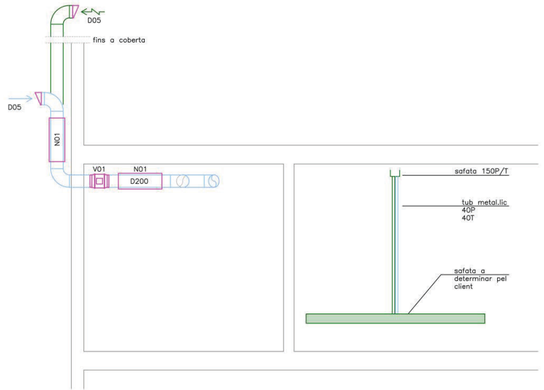
	conducto climatización, fibra oculta, planxa vista
	conducto ventilación impulsión, circular plancha galvanizada
	conducto ventilación extracción, circular plancha galvanizada

Ventilación y acondicionamiento de aire. Equipos.

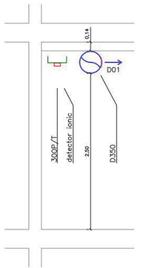
V0x	ventilador
D0x	reja
N0x	atenuador
A0x	unidad interior acondicionamiento de aire



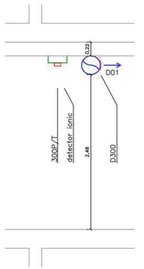
Detalle climatització sala de reuniones.



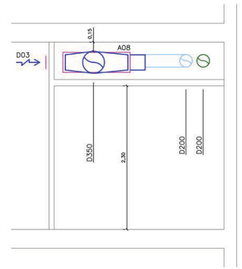
Sección AA'
Detalle aportación aire exterior y canalizaciones



Sección BB'
Detalle distribución elementos vistos



Sección CC'
Detalle distribución elements vistos

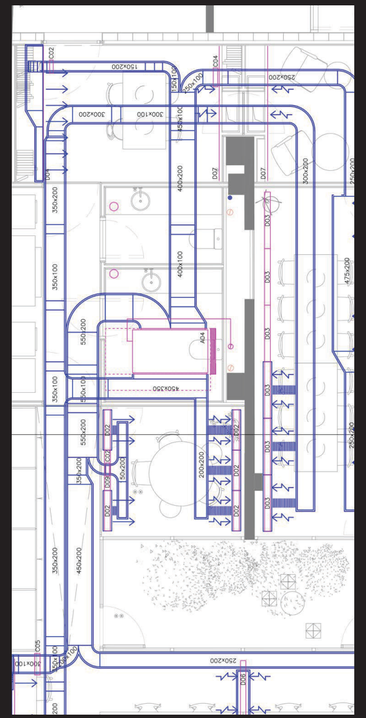


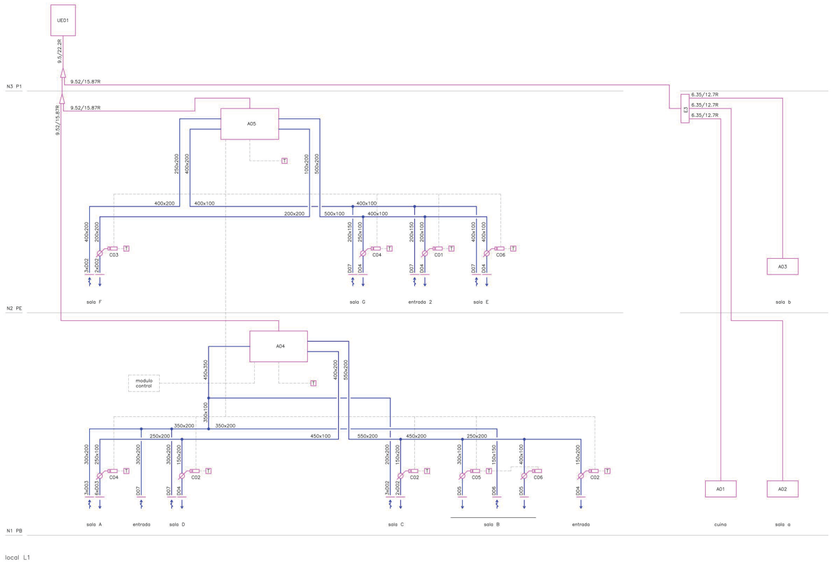
Sección DD'
Detalle retorno por el frontal de la pared

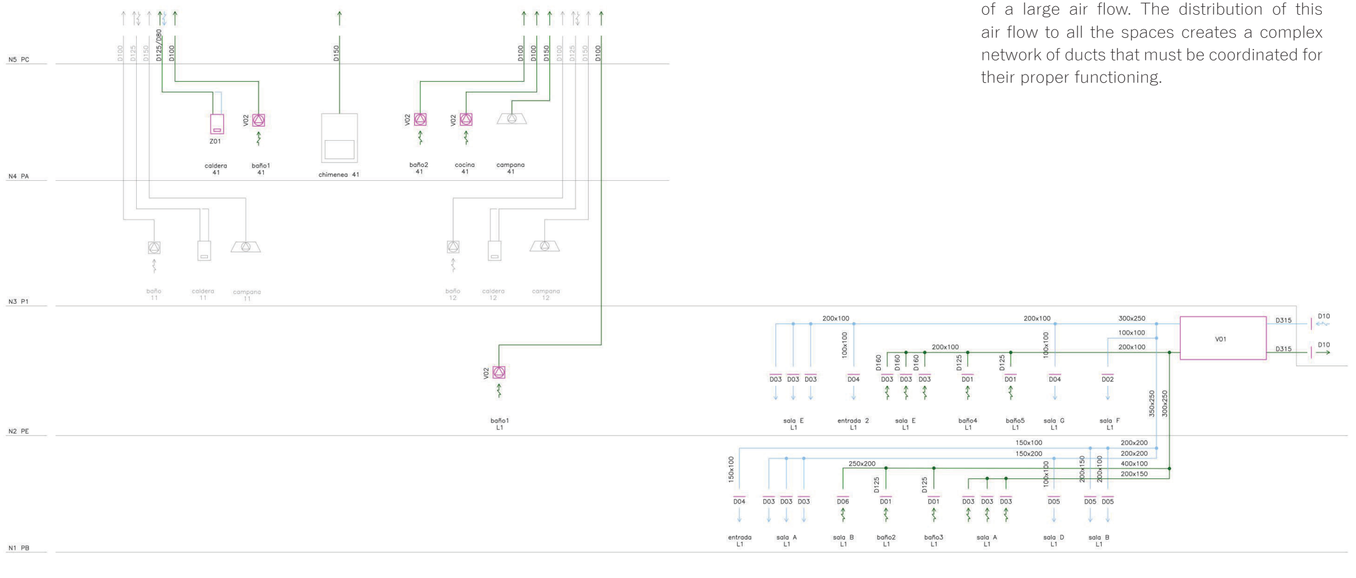
Hidden systems, 2018

Systems into architecture

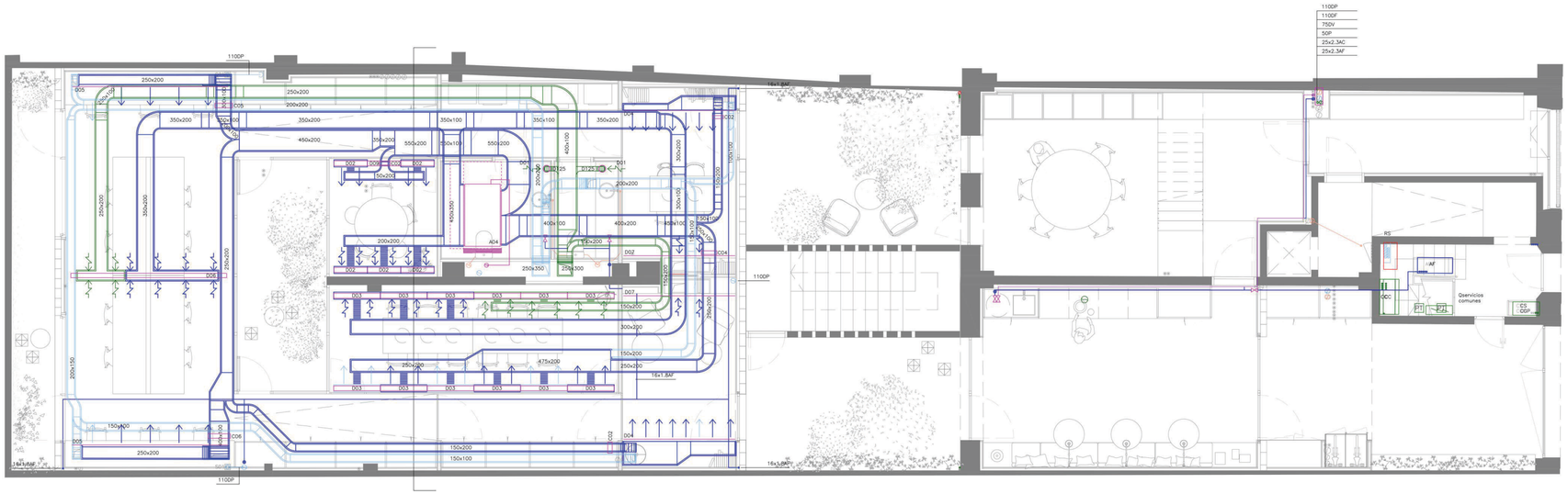
The following project is placed in a building built in 1878 in Barcelona, the architecture is given and what has to be designed is the systems for a good thermal comfort. The architecture contains two floors, the ground floor and the mezzanine, where the distribution of the spaces is very marked by an old structure which is maintained and adapted to it.







For this project, being a coworking space, it is necessary the renovation and conditioning of a large air flow. The distribution of this air flow to all the spaces creates a complex network of ducts that must be coordinated for their proper functioning.



On this level, placed in the bathroom, it is installed one of the two air conditioning interior units. From this point it is spread out the acclimatised air which is propelled with linear grates installed in the upper side of the cupboards placed in the building perimeter. At the interior rooms where there are not cupboards, it is used low edge slot diffusers placed in the false ceiling.

Acondicionamiento de aire. Simbología.

D01(*) salida de aire por reja de impulsión

D01(*) entrada de aire por reja de retorn

Acondicionamiento de aire. Conductos.

conducto climatización, fibra oculta, planxa vista

conducto ventilación impulsión, circular plancha galvanizada

conducto ventilación extracción, circular plancha galvanizada

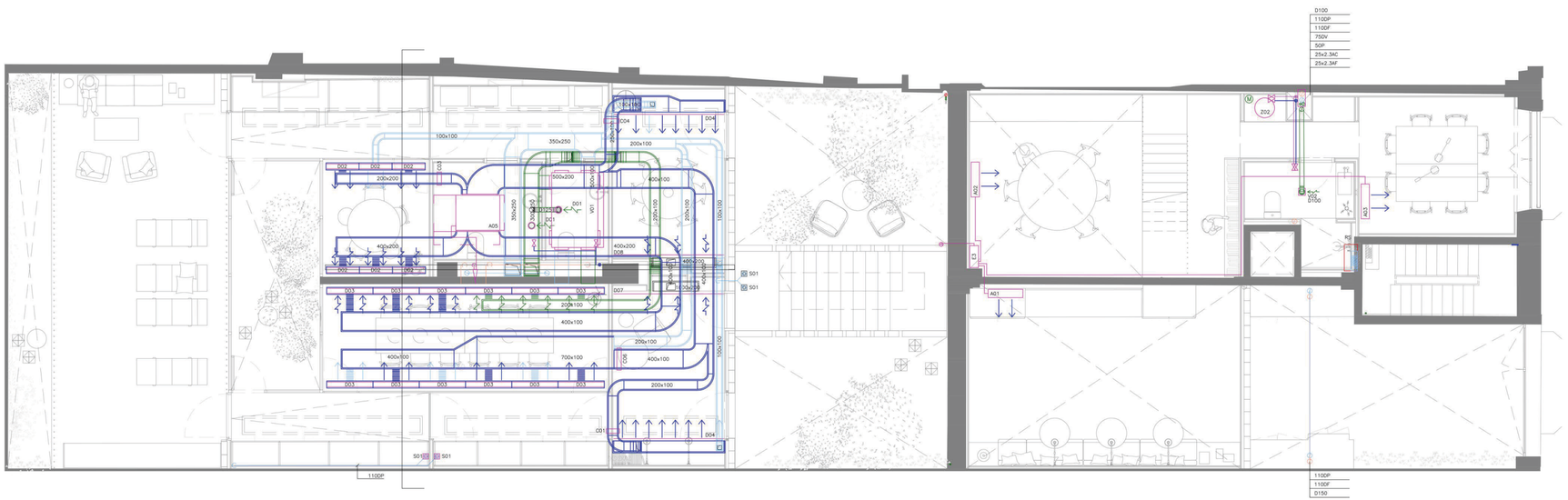
Ventilación y acondicionamiento de aire. Equipos.

V0x ventilador

D0x reja

N0x atenuador

A0x unidad interior acondicionamiento de aire



The first trouble from this floor is the location of the second air conditioning interior unit coordinated with the heat recovery unit as both have large dimensions. The other difficulty in tracing the distribution of the ducts is the coordination with the skylights that are on the side corridors.

Acondicionamiento de aire. Simbología.

D01(*) salida de aire por reja de impulsión

D01(*) entrada de aire por reja de retorn

Acondicionamiento de aire. Conductos.

conducto climatización, fibra oculta, planxa vista

conducto ventilación impulsión, circular plancha galvanizada

conducto ventilación extracción, circular plancha galvanizada

Ventilación y acondicionamiento de aire. Equipos.

V0x ventilador

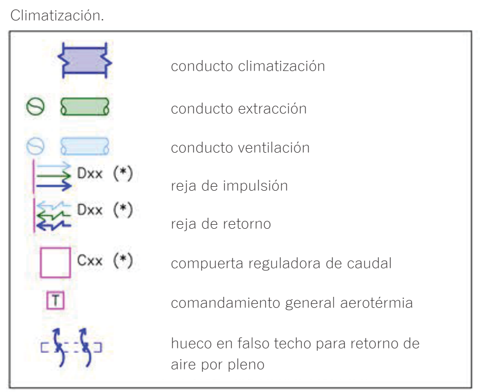
D0x reja

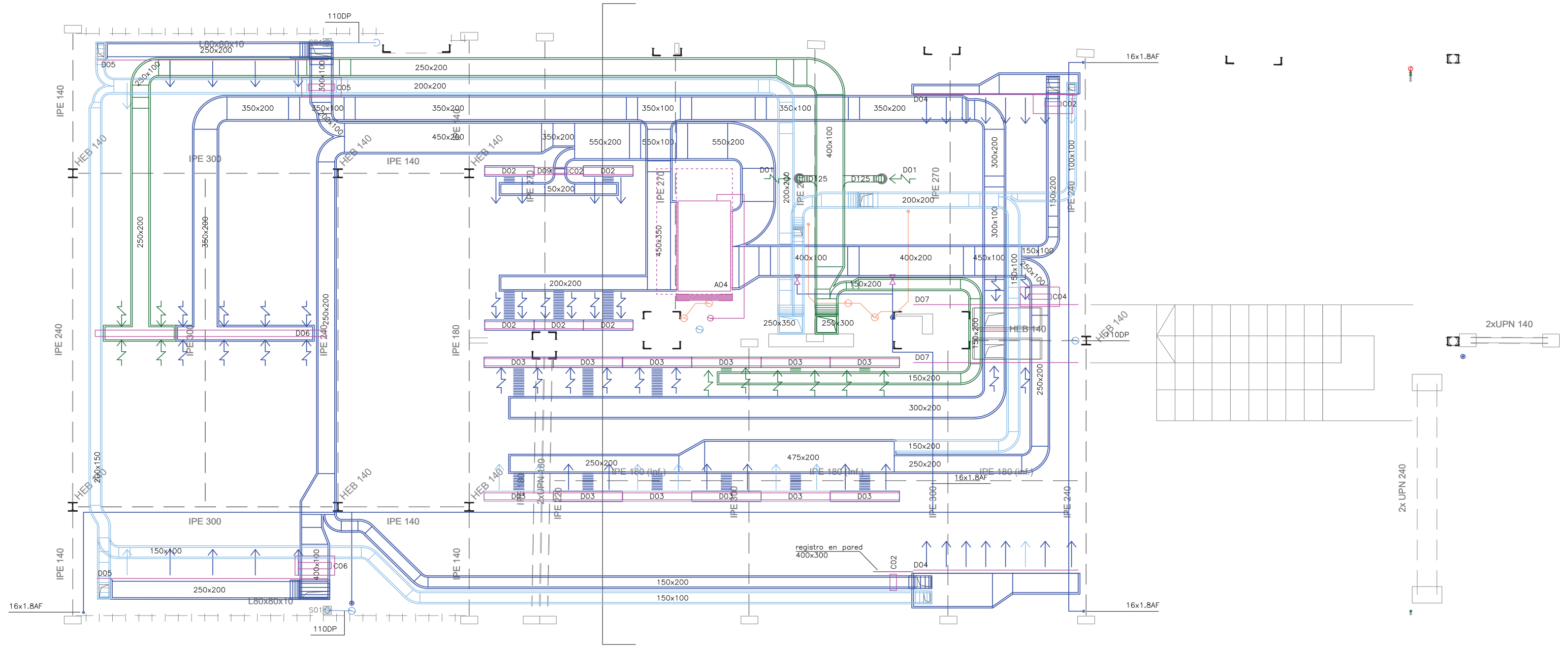
N0x atenuador

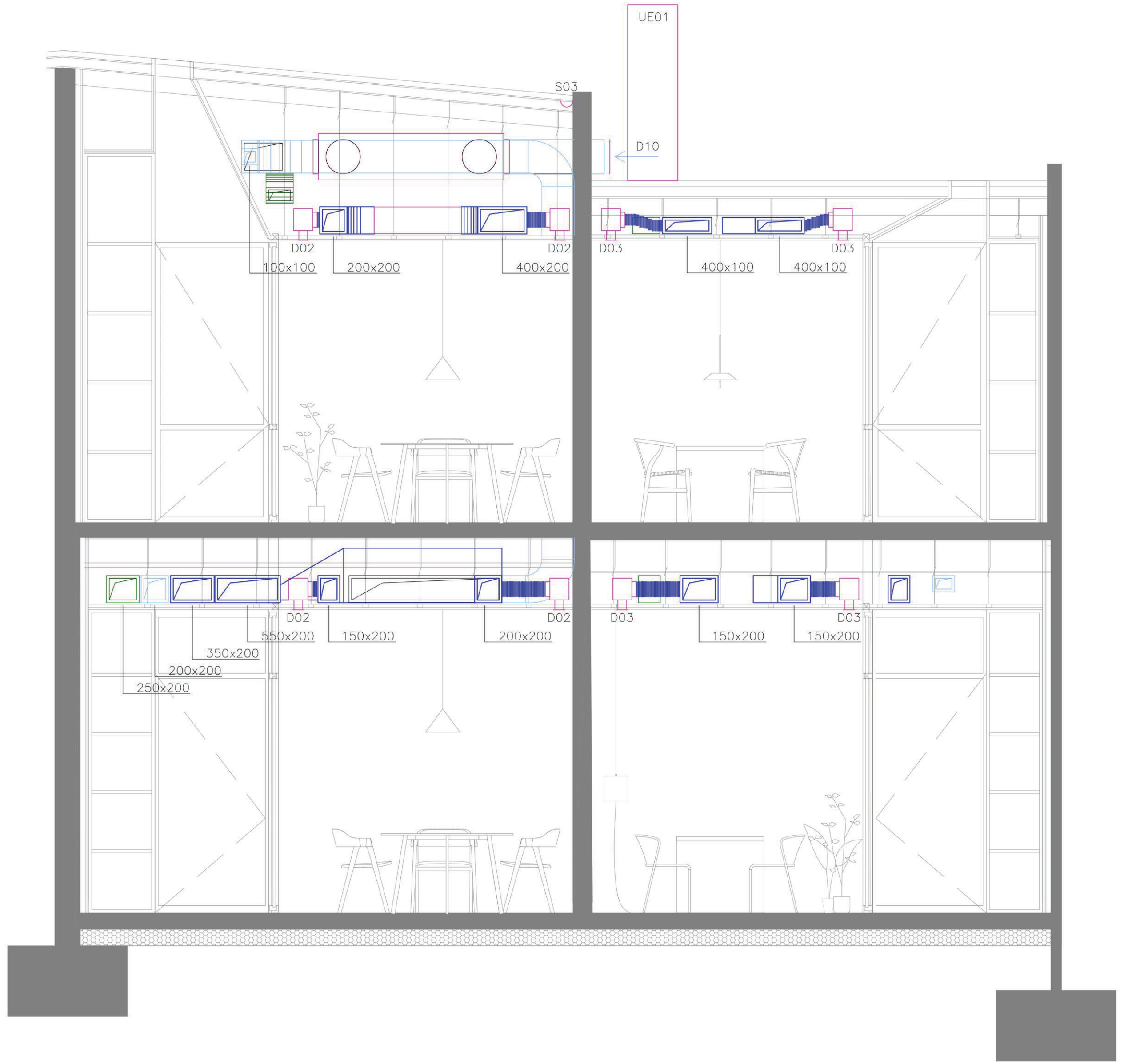
A0x unidad interior acondicionamiento de aire

Hidden systems

As it can be seen in the section, the height needed to be able to trace the ducts, between the false ceiling and the beams, is very low and that is why it was important a strong coordination between the structure office and the systems office to be able to obtain suitable constructive solutions and to be able to size ducts for a correct distribution of the air.







Hidden systems

COLLABORATION WITH

Between walls, 2019
Roger Camps
Judit Martí

Under beams, 2019
Felix Trallero
Judit Martí

Exposed systems, 2019
Quadrant
Architecture studio

Hidden systems, 2018
Quadrant
Architecture studio
Structure studio

MARC CASAJUANA DELGADO

Born: 13 February 1996

City: Ripollet, Barcelona

Email: marccasajoanadelgado@gmail.com

Phone: +

CURRICULUM VITAE

SOFTWARE SKILLS

MicroStation 2D

MicroStation 3D

Microstation Luxology

AutoCAD 2D

Lumion

Adobe Photoshop

Adobe Indesign

Presto V8

Creality Slicer - 3D printer

Microsoft Office - Word and Excel

LANGUAGES

Spanish	Native
Catalan	Native
English	B2

INTERESTS

Travels

Sports

Tecnologies

EDUCATION

2014 / 2020

Degree in Architectural Studies, ETSAV

(Escuela Tecnica Superior de Arquitectura del Vallès)

WORKSHOPS

2016 - Superilla pilot, Barcelona

Design of different spaces into the superblocks in Barcelona.

2018 - Esperienza Pepe, Venice

Worshop with artists for the study of the island of Lido and the use of abbey buildings.

PROFESSIONAL EXPERIENCE

2013 / 2015 - Tram Solucions

Operator work.

2016 / 2018 - Fotomaton Barcelona

Operator to help and assemble the photo booth album. Also to solve any doubt or problem that may arise and to assemble and transport the photo booth.

2018 / Currently - Quadrant

Collaboration and realization, of basic and executive projects of facilities, in design and calculation of solutions for housing, urbanism, offices and public buildings.

BIBLIOGRAPHY

Photos, page 8 / 9

Material of unknown origin provided by the teachers: Montserrat Cucurella and Manel Gonzalez, from the subject Intervenció en el parc edificat, ETSAV-UPC.

Photos, page 20 / 21

Material of unknown origin provided by the teachers: Pere Buil and Sergi Garriga, from the subject TAP PCG, ETSAV-UPC.