TEKNISKA HÖGSKOLAN

HÖGSKOLAN I JÖNKÖPING

ARCHITECTURE & TECHNOLOGY
PROJECT REPORT

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Sammanfattning

Denna rapport redovisar ett förslag på en ny kontorsbyggnad i Huskvarna i Jönköpings kommun. Förslaget innefattar lösningar för bland annat ljud, ljus, interiör och exteriör utformning, möbler, planlösningar, konstruktionslösning med sektioner, lösningar för ventilation, värme, tillgänglighet, brandsäkerhet samt utrymning. Goda funktioner i byggnadens interiör, låg energiförbrukning samt hälsosamma och hållbara material är en viktig aspekt som tas hänsyn till i framtagandet av lösningar för byggnaden.

Två referensobjekt har granskats under projektets utformning. En grundläggande analys av det ena referensobjektet Horten Headquarters, har gjorts i enlighet med Andrew Charleson´s bok ”Structure as Architecture”.

På takvåningen finns en restaurang med tillhörande kök och takterrass på. Källaren inrymmer ett garage samt ventilationsutrymmen. Därutöver har byggnaden fyra våningar varav tre inrymmer kontorsutrymmen i en flexibel blandning av öppna kontorslandskap och cell-kontor.

Byggnadens bärande delar utgörs av pelare och HDF-bjälklag samt balkar av stål. Där HDF ej kan användas, platsgjuts betongen. Fasadmaterialen består dels av betong, dels av en dubbelglasad fasad med ett screen-tryck för att ge såväl estetiska kvaliteter som solavskärmning.

Installationer består av ett FTX-system för ventilation, med ett tillhörande VAV-system. Värmesystemet är anslutet till fjärrvärmenätet, och distribution sker med hjälp av konvektorer. Samtliga ventilationskanaler är gömda i innertaket med hjälp av akustiska innertakspaneler från Echophon. Dessa paneler står även för en god ljudkvalitet i byggnaden tillsammans med god isolering och ljudbarriärer i form av bl.a. glasdörrar.

Byggnadens huvudtrappa består av ett runt trapphus som är öppet från första våningen och upp till takvåningen. Ovanför finns ett runt takfönster med samma dimensioner som trapphuset. Utöver huvudtrappan finns det ytterligare ett trapphus i byggnaden samt en utvändig brandtrappa. Byggnaden inrymmer två allmänna hissar samt en servicehiss.

Byggnaden är även utrustad med ett sprinkler- och alarmsystem, och har projekterats i enlighet med brandklass Br1 enligt BBR. Inga utrymningsvägar överstiger 30 meters gångavstånd och utrymningsvägar finns i minst två riktningar.

Fönstrens speciella utformning med tillhörande screen-tryck sörjer för både bra dagsljusinsläpp samt tillgodoser behovet av tillräcklig solavskärmning. Ytterligare möjligheter till solavskärmning finns i byggnadens Silent Gliss Rollo system.

Byggnaden uppfyller BBRs krav på tillgänglighet med anpassade kommunikationsytor såsom ramper, dörrar, trösklar, och toaletter samt hjälpmedel såsom hörslinga i samlingslokal.

Byggnadens totala golvyta uppgår till 5 387,5 m^2 där källaren med garage utgör 1006 m^2. Det finns 149 st. kontorsarbetsplatser tillgängliga, 98 st. sittplatser i samlingslokalen samt 66 st. sittplatser i restaurangen med ytterligare 28 st. sittplatser på den tillhörande takterrassen. Byggnadens höjd uppgår till 19,1 m. Byggnaden inrymmer 22 st. toaletter varav 2 st. av dessa är handikappanpassade.

Abstract

This rapport presents a proposal for the new City Hall in Huskvarna in Jönköping's municipality. The proposal includes solutions for sound, light, interior and exterior design, furniture, floor plans, building technique and structure, solutions for ventilation, heating and cooling, accessibility and fire protection. Good interior functions, good daylight conditions, low energy consumption and healthy and sustainable materials are of great importance and have all been taken in consideration.

Two reference objects have been examined during the project. A basic analysis of one of the reference objects Horten Headquarters has been made in accordance with Andrew Charleson's book "Structure as Architecture".

A restaurant with an adjacent kitchen and roof terrace is situated on the roof floor. The basement houses a garage and several ventilation rooms. In addition, the building has four floors, three of which houses office spaces in a flexible mix of open floor plans and cell offices.

The structural components of the building consist of concrete columns, hollowcore slabs, and beams of steel. Where hollowcore cannot be used, concrete slabs are casted on site. The exterior materials consist of concrete and a double skin façade with a screen print to provide both aesthetic qualities as well as sun-protection.

The installations consist of an Energy Recovering Ventilation system, which works together with a VAV system. The heating system is connected to a district heating and distribution is done by convection. All ducts are hidden in the ceiling by the acoustic ceiling panels from Echophon. These panels, with the help of good insulation and sound barriers such as glass doors, provide a satisfying sound quality in the building.

The building's main stairwell has a circular shape and is open from the ground floor up to the top floor. Above the stairwell there is a round skylight with the same proportions as the stairwell. In addition to the main staircase there is one more staircase in the building as well as an external fire stairs. The building has two public elevators and one service elevator.

The building was carried out in fire class Br1, according to the building codes. No escape route exceeds a walking distance of 30 meters and there are at least two escape routes in different directions. The building is also equipped with a sprinkler and alarm system.

The windows design with its screen-print provides both good quality daylight and meets the need for adequate sun-protection. Additional shading is provided by the Silent Gliss Rollo system.

The building meets the building codes' requirements for accessibility with customized areas such as ramps, doors, thresholds, toilets and aids such as the induction loop in the assembly hall.

The building's total floor area is 5387.5 m^2, the basement with the garage represents 1006 m^2 of this area. There are 149 office spaces available, 98 seats in the assembly hall and 66 seats in the top floor restaurant with an additional 28 seats on the roof terrace. The height of the building equals to 19.1 meters. The building has 22 toilets whereof 2 of those are wheelchair accessible.

Table of Contents

1 Goal and objectives

The main goal for this rapport is to present a proposal for a new City Hall in Huskvarna and to show the client the strength of the proposal. Furthermore, the proposal ought to answer for a well executed design and solutions.

Different solutions will be studied and the result ought to answer to a modern sustainable office building for the client. Studies will be made for different aspect such as sound, light, interior and exterior design, furniture, floor plans, building technique and structure, ventilation, heating and cooling, accessibility and fire protection. These studies will later provide a basis for the final suggestions.

2 Results of empirical study

This chapter presents all the obtained results of the empirical study. The results are described in a body text along with pictures, renderings, drawings and charts for further clarification.

2.1 Concept

Several different reference objects have inspired the concept for the given project. The concept is based on a building with attractive aesthetic features along with good solutions for workspaces, technical solutions and above all the value of the tenants' well being.

The projects two main references have been Kuggen in Gothenburg and Horten Headquarters in Copenhagen. Kuggen is designed by Wingårdh Arkitektkontor and has an extremely energy efficient solution, partly due to its triangular windows, which also optimizes the radiation of daylight.

Illustration: Exterior concept, Kuggen

Illustration: Workspaces, Kuggen

Illustration: Sketchup concept drawing at an early stage

Horten Headqurters is designed by the Danish architects 3XN. It has been a source of inspiration when it comes to its spacious and interesting solution of the staircase and the area surrounding it, as well as its solutions for common areas and interior design.

Illustration: Interior design, Horten Headquarters

Illustration: Stairs, Horten Headquarters

One of the projects main focuses has revolved around the arrangement of the common areas along with the more private areas. A desire of a good integration of these two has been of great importance. The idea of this integration is based on the aspiration of turning the common areas into more than its obvious function. The common areas should also be a social meeting point and a place for gatherings. Thereby the social factor can be increased along with the wellbeing of the tenants in their work environment.

Another important aspect when discussing the concept is the circulation in the building. The location of all areas ought to have a logical placement, which helps create circulation and a natural flow throughout the building.

2.1.1 Analysis of Horten Headquarters

Horten Headquarters is designed by the Danish architects 3XN. The building houses the Danish law firm Horten.

The structure of the building consists of concrete slabs and pillars. These load-bearing structures are partially hidden, which gives a consonant touch to the architectural and structural form of the building. The façade actually covers large amounts of the structure, being only visible from the outside only in some areas of the façade. On the lower level of the building the reinforced concrete columns are shown either on the outside or through glass walls and windows.

Illustration: Exterior, Horten Headquarters

Illustration: Interior, Horten Headquarters

Horten has a quite unique façade, with its three-dimensional prefabricated windows, which are made of fiberglass and travertine. The façade itself therefore creates a lot of texture, depth and modulation to the exterior structure. The glazed area of the façade is supported by a steel construction. This is hardly noticeable from the outside, but plays a bigger role when looking at it from the inside, where you can see the steel members in front of the glass façade at the entrance. The exterior form is connected with the interior in most areas. The transparency of the ground floor windows and columns continues with columns and an open planed space on the inside, that lets the viewer see all the way from one end to the other. The recessed glass walls on each end of the building continue with interior atriums. The angled windows on the façade are used as interior windows in some areas as well.

The structural scale of the columns are kept on a human scale rather than massively monumental. The slightly slender columns feel somewhat under-scaled in comparison to the upper levels heavy looking façade. The heavy features of the main part of the building make it almost seem like it is too heavy for the entrance floor. Its heavy feeling derives from the stone used as the façade material and the blocky shape of the building. Also the thin nature of the pillars contributes to this. Although these upper levels are perceived as heavy when comparing it to the pillars it does not give a heavy overall impression of the building.

The entry for Horten Headquarters is of a neutral character. The entrance door is made of glass and it is a part of a bigger wall of glass. In that way the entrance gives a neutral perception. From another perspective the entrance feels expressed with its large glass wall and the interior ceiling height that is almost as high as the entire building.

Below one of the building's main wings the pillars are plain in view, showing of the load-bearing design. The structure as a whole is subtle and neutral, and does not give away much of its design from an outside view. From the interior in the atrium the columns and load bearing elements merge in a unified form of white finish. The openness and high roof gives it a pompous impression.

The angled slab edges in the atrium invites you to the middle and the central functions i.e. the staircase, which helps create circulation in the building. The structural columns help to create a subdivision of space, and section the different areas and into spatial spaces and corridors. Pillars reaching from the ground floor to the upper level separate the main walkway around the open area from the railing. This creates direction as well as integration and is finely integrated. In other instances the columns pronounces for example the reception desk on the ground floor. It is not used to a great extent as neutral load-bearing walls make up most of buildings layout, though the open areas still give room to some form of flexibility in its layout.

The building's circulation is mainly articulated by the structure's arcades and frames.
Various parts of the structure restrict and direct movement along to a single axis. The building's rounded stairwell with each flight of stairs going in different angles both restricts the movement and directs the circulation to around the stairwell. The structure is also expressing a sense of directionality. The reception area directly faces the stairs, which creates a straight line and direction in between these two areas. Open areas encourage circulation, which is perhaps most clearly expressed on the ground floor around the reception area with its big open spaces.

The building's surface structure is expressing and communicating the architect's different ideas, where the communication part is commonly seen as the more important and also more difficult part. The connectivity between the building and its foundation is an important aspect of the surface structure and this particular building communicates a sense of floating. The sense of floating is created by the surface structure where the ground floor, the part that connects the rest of the building to its foundation, is glazed whereas the rest of the floors are more enclosed. Because of this, the building can be seen as hovering above the ground. However, the structural pillars on the ground floor are still partly visible through the glazed facade, which provides a small amount of connectivity to the building. The surface's structure consists of both enclosure and openness. The previously mentioned glazed areas, as well as the main entrance part, communicate the openness and the rest of the building which is more enclosed in contrary to the fully glazed parts of the facade represent enclosure. The surface structure is both non-symmetrical as well as symmetrical. The shapes themselves are symmetrical but they are placed in a non-symmetrical manner.
The fact that the building's surface structure has parts that stick out from the building adds movement to the surface. The way that the windows' shapes are placed also creates a sense of movement.

The building inherits spatial qualities with its varying interior structural layouts. The ground floor with its big open spaces represent one layout and the rest of the floors with arcades and frames delimiting open areas and instead creating directionality, represent a different type of layout. These layouts combined create a third layout where possibilities are created for a large open vertical area reaching from the ground floor and up. Large areas are broken up and zones are created by color and structural layouts, i.e. pillars and stairwells. Because of this, sub-spaces are defined.

The structure does not illustrate any refined detailing. Stairs, columns and slabs are what they are and nothing more, and have primarily a utilitarian character. Although the detailing is not that refined, interesting solutions have been made for instance for the stair that plays in different directions, creating a pattern when looking at it from above. The detailing have been pared down to the bar minimum, and a "less is more"-approach complements the simple structure of columns and slabs. The heavy structural slabs are immediately toned done by light feeling of the columns. In

addition to the columns the glazed façade and the space between the slabs and the façade contributes to a somewhat lighter touch. The columns are unadorned slender and plain cylinders, and are placed in a non-remarkable order. There is almost evidence of detailing that does not seek attention.

Structural members screen direct sunlight but also provide surfaces of which it may reflect and then diffuse into its surrounding space. Light enters and screens through the glazed façade and windows and is reflected by the plain and white slabs and columns. By reflecting the light it can be spread into the surrounding area.

2.2 The site

The new City Hall is located in central Huskvarna. The site has a connection to a park avenue, which is situated in-between two main roads – Erik Dahlbergsgatan and Kungsgatan. Just outside the City Hall there is a traffic roundabout and a bus stop. The building has a fortunate location close to public tranports and other public services. This may reduce the need of car usage for the buildings' employees.

Illustration: Existing tree line, bus stop and traffic roundabout.

Illustration: Buildings in close surroundings, approximately 20-50 meters from the building.

Illustration: Park avenue

The total height of the building equals to 19,1 meters, with an additional top floor, which equals to a top height within the restriction of 45 degrees. This meets the requirement according to the program with a maximum height of 20 meters.

The solution presented to fit the height requirements consists of a building with five floors with the top floor excluded. In relation to the other buildings in the immediate surroundings, the height is notably higher and makes it the center of attention - a feature that is appropriate for the current object. At the same time, the building does not stand out too much given its height and on that account it does fit in very well in its surroundings. The highest building in the surroundings is 6 floors high and is located about 50 meters from the office building. The other buildings in the immediate surroundings, located approximately 20 meters from the office building, have no more than 4 floors.

Illustration: Site plan showing the placement of the building on the site

The outer line of trees outside the building is preserved which means that all of the trees are fully-grown and fairly high and therefore the tree line fits well in relationship to the building. The park behind the building is preserved and somewhat redone in terms of the design. It serves as a social meeting point and has a natural interaction with the building and its surroundings.

Illustration: Rendering of Exterior view, Kungsgatan

Illustration: Rendering of Exterior evening view

2.3 Tenant division

The division of tenants in the building can be made in several ways. The main proposal is to make a division floor wise. Due to the second floor being slightly smaller than the rest of the floors, it would be suitable to create a tenant division of the building in a way which the below picture illustrates.

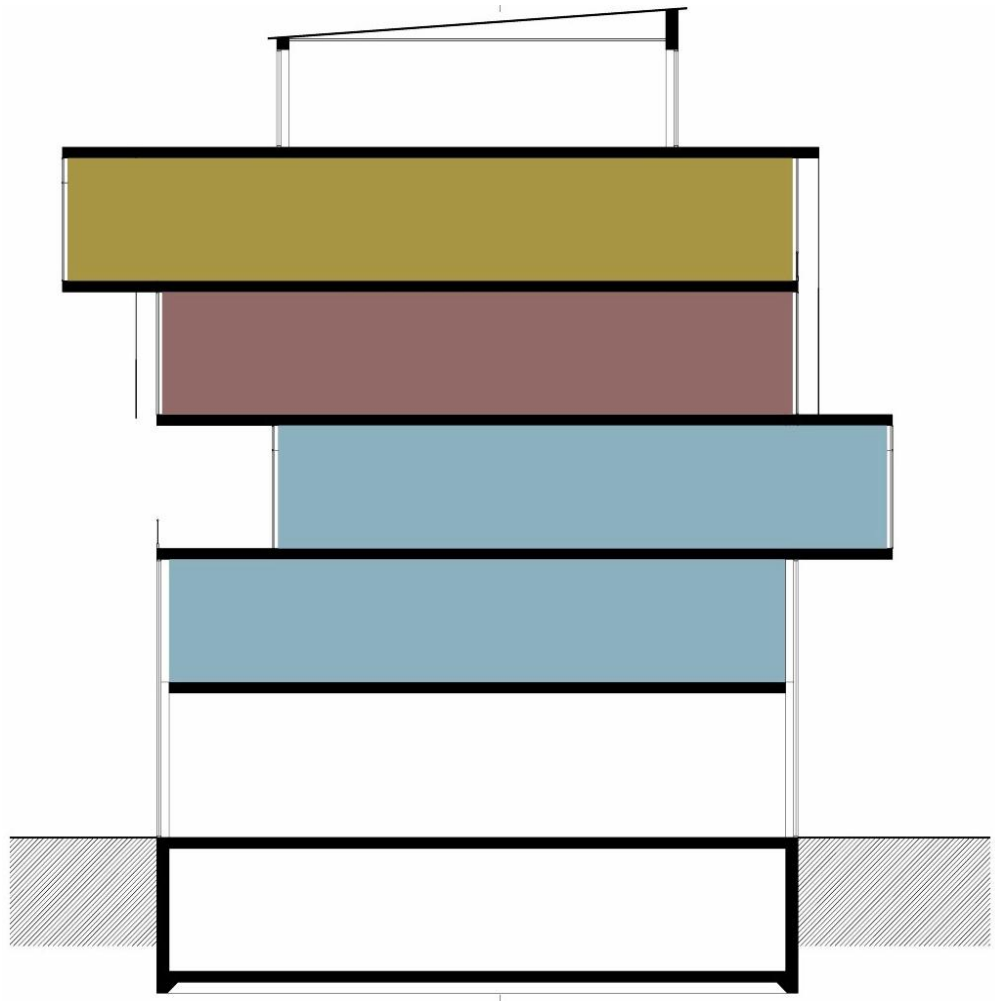


Illustration: Suggestion for tenant division of the building

The building's first and second floor would then be hosting one tenant, and the third and fourth floor would be hosting one tenant each. This creates the possibility for the hosting of three different tenants in the building.

Every floor has its own reference library and meeting rooms of different sizes, which also creates good possibilities for a division of the floors for several tenants. There are also storage spaces on the different floors. On the 1st floor there is a smaller rest room with a bed in case of sudden illness or other random conditions.

The layout of the building is divided into two sections on each side of the main stair, which also gives the possibility of dividing each floor into two different sections for tenants. The division is made by glass doors leading to the stairwell and common areas in the middle of the building, which makes it very suitable for hosting several tenants on every floor. This mentioned division of the building creates different areas in a natural way. At the same time, the division is flexible since the glass doors still allow flow and communication in between the different areas. If this division is

implemented, the common areas will be shared between two tenants, which will create additional social meeting points on each floor and thereby a enhanced integration of the employees.

2.4 Stairs and elevators

The main staircase has its location in the center of the building, allowing a natural flow and interaction in the entire building. The staircase has its starting point on the ground floor and goes all the way up to the roof floor. The staircase is connected to the common spaces of the building, such as the accommodation rooms, the entrance to the offices, the kitchen/dining areas and the balconies. The elevators are also placed around the main staircase.

The big and open staircase as well as the open space surrounding it intend for an airy and spacious feeling. Above the staircase there is a skylight of the same dimensions as the staircase, which benefits the transmission of light and enhances the airy feeling.

The stairs are designed in an overlapping arrangement meaning that none of the stairs are pointing in the same direction. The arrangement of the stairs gives a special effect when looking down at it from the floors above and creates movement in the building. It allows you to actually see all the stairs when looking down from the top floor so that the stair above it hides none of them. This contributes to an enhancement of the common space around the staircase and lets one experience the flow in the stairs and in between the different floors of the building.

Illustration: Overlapping arrangement of stairs

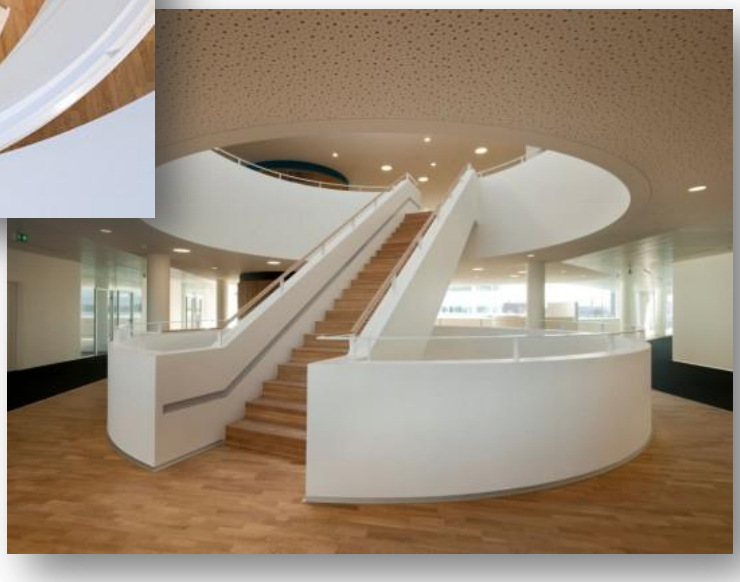


Illustration: Stair

A secondary stair has its location in the front of the building with its starting point on the ground floor and its end point on the top floor. On the ground floor it has a pompous appearance, and is easily overviewed as soon as you enter the building. On the 1st floor it converts into a stair of smaller proportions. An additional stair reaches from the garage and up to the ground floor, and connects with this bigger stair in the front area of the entrance. The addition of the secondary stair was made due to the non-optimal distance from the main stair to the office spaces on the left wing of the building. The secondary stair can therefore be used by those who work in the office spaces in its surrounding, without facing any difficulties regarding the distance to the main stair.

A stair for fire escape purposes is located in the back of the building. It goes along the exterior of the eastern façade and reaches from ground level all the way up to the roof floor. It has accessibility to emergency exits from the 2nd floor and up.

All the stairs have a width of 1200 mm and a minimum step depth of 250 mm. according to the requirements of the building codes. [BBR 8:232] The stairs' landings have the same width as the stairs, i.e. 1200 mm. The hand railing is 900 mm. high, which is considered suitable and meets the set requirements. [BBR 8:2321]. The fire escape stair located on the outside of the building has a width of 800 mm.

The stairs have all been calculated upon according to the calculation that follows below.

Calculation of the main staircase:
*The stair formula is: 2H + B = ((150*2)+250)- ((**190***2)+**250**) = 550 – **630** (600-**630**)*
H = Step height (raisers) = 150 – 190 mm
B = step depth (tread) = min. 250 mm
Maximum step height = 190 mm
The height between the levels is 3700 mm, which gives least amount of raisers:
3700/190 = 19.47 ➔ 20 raisers
The height of the raisers: 3700/20 = 185 ➔ H = 185 mm
*The staircase formula: 2*185 + 250 = 620 ok! (620<630) => B = 250 mm*
*20 raisers give us 19 treads, which gives us the perimeter of the staircase: 19 * 250 = 4750 mm*

Calculation of the staircase from the ground floor-2nd floor:
*The stair formula is: 2H + B = ((150*2)+250)- ((**190***2)+**250**) = 550 – **630** (600-**630**)*
H = Step height (raisers) = 150 – 190 mm
B = step depth (tread) =min. 250 mm
Maximum step height = 190 mm
The height between the levels is 8000 mm, which gives least amount of raisers:
8000/190 = 42.11 ➔ 43 raisers
The height of the raisers: 8000/43 = 186 ➔ H = 186 mm
*The staircase formula: 2*186 + 250 = 622 ok! (622<630) => B = 250 mm*
*43 raisers give us 42 treads, which gives us the length of the staircase: 42 * 250 = 10500 mm*

Calculation of the U-shaped staircase:
*The stair formula is: 2H + B = ((150*2)+250)- ((**190***2)+**250**) = 550 – **630** (600-**630**)*
H = Step height (raisers) = 150 – 190 mm
B = step depth (tread) = min. 250 mm

Maximum step height = 190 mm
The height between the levels is 3700 mm, which gives least amount of raisers:
3700/190 = 19.47 ➔ 20 raisers
The height of the raisers: 3700/20 = 185 ➔ H = 185 mm
*The staircase formula: 2*185 + 250 = 620 ok! (620<630) => B = 250 mm*
*20 raisers give us 19 treads, which gives us the perimeter of the staircase: 19 * 250 = 4750 mm*

Calculation of the staircase from the basement -ground floor:
*The stair formula is: 2H + B = ((150*2)+250)- ((**190***2)+**250**) = 550 – **630** (600-**630**)*
H = Step height (raisers) = 150 – 190 mm
B = step depth (tread) = min. 250 mm
Maximum step height = 190 mm
The height between the levels is 3700 mm, which gives least amount of raisers:
3700/190 = 19.47 ➔ 20 raisers
The height of the raisers: 3700/20 = 185 ➔ H = 185 mm
*The staircase formula: 2*185 + 250 = 620 ok! (620<630) => B = 250 mm*
*20 raisers give us 19 treads, which gives us the perimeter of the staircase: 19 * 250 = 4750 mm*

There are three elevators in the building. All of them are placed around the main staircase and thus connected to the common areas. Two of the elevators are public elevators while the third one is a service elevator. The latter serves as a garbage and delivery elevator, for instance used for food deliveries to the restaurant kitchen. This elevator will also serve for the cleaning trolley used by the cleaning staff. The service elevator runs from the basement to the top floor. Merely one of the public elevators goes from the basement to the top floor. The other one reaches from the ground floor to the top floor. All of the elevators and stairs that go down to the garage as are provided with a surface mounted firelock.

2.5 Ground floor

2.5.1 Entrance and exhibition area

The whole entrance has a double-floor height, giving an impressive touch along with the façade, which is entirely made out of large glass windows. The entrance region is therefore perceived as grand, spacious and airy. This approach was desirable for this zone due to its secondary function as an exhibition area. Space is given for potential exhibition screens and other displays.

Entering the building can be done through either one of the two spinning doors, or through a traditional double door, which is located in-between the two spinning doors.

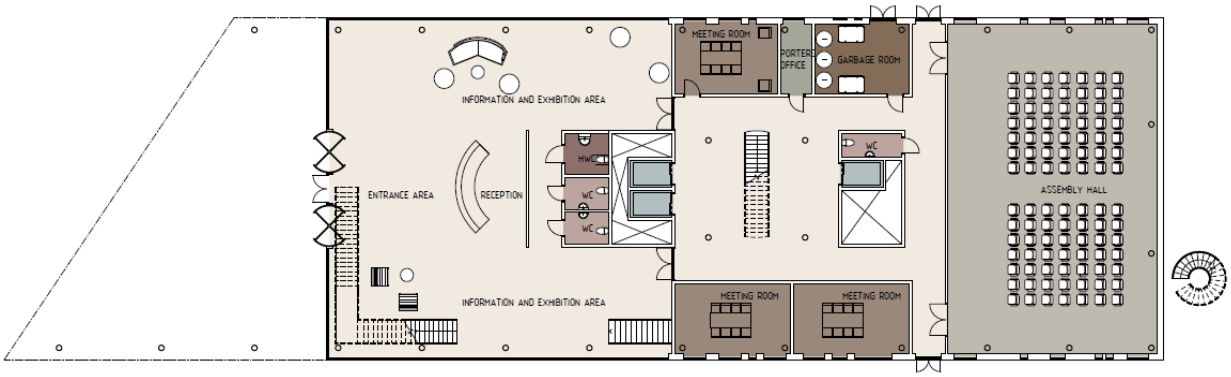


Illustration: Plan drawing of ground floor

Illustration: Rendering of reception and exhibition area

Illustration: Inspirational picture, entrance area

A grand stair is located next to the façade on the right hand side as entering, which also contributes to the grand appearance of the entrance. This stair reaches from the ground floor all the way to the 2nd floor, and covers the entire height of the entrance.

A reception is located in the front parts of the ground floor, and is easily spotted when entering the building. There are also couches and seating's for waiting or lounging in the entrance and exhibition area.

2.5.2 Meeting rooms

The ground floor has three meeting rooms located in the center of this floor, close to the main stair and the assembly hall. The meeting rooms can be used for different purposes such as for smaller conferences or regular meetings. A meeting-table with eight chairs is available in each of the three meeting rooms. If required there is space for a numerous amount of additional chairs.

2.5.3 Assembly hall

The assembly hall is located farthest away from the entrance on the ground floor. It has narrow windows that reach all the way from the floor to the ceiling. This provides a good amount of daylight, without having too many glazed sections, so that the risk of overheating the hall is reduced.

There are two double-doors for entering and exiting the assembly hall. These doors are located on each side of the hall to promote good circulation as well as for safety reasons.

The assembly hall has a sloped floor for assurance of a good view of the front area of the room, even from all the way in the back. The sloping floor is handicap accessible with two ramps on each side of the hall. A third ramp is located in between the two sections of seats.

The 98 seats of the assembly hall are organized into straight rows and columns, divided into two sections, facing the entrance of the hall. Alternative solutions consist of organizing the seats in a different pattern and to raise the floor in the front part of the room to create a stage for performance possibilities. Additional seats can be placed in the assembly hall if required.

Illustration: Rendering, assembly hall

2.5.4 Garbage room

A garbage room is located on the ground floor with a natural connection to Kungsgatan so that garbage collection can easily be made. It also has a close distance to the service elevator from where garbage transportation from other floors will be made. The garbage room has a separate entrance/exit to the street, which prevents passage through other areas.

Deliveries will be made mainly from the street on the northern side where a delivery entrance is located. This entrance also functions as an emergency exit, and its location has a rational relationship to the garbage room and the service elevator. Deliveries include deliveries to the restaurant kitchen on the top floor as well as handling of garbage.

2.6 Office floors

The office floors reach from the 1st floor to the 4th floor.

2.6.1 Common spaces

The common spaces on these floors consist of the kitchen/dining area, the area around the main stair, and recessed and projected boxes functioning as balconies and dining areas.

There is a kitchen and dining area on each of the office floors, which consists of a kitchenette with all the essential components, such as microwave, coffee maker, refrigerator, freezer, cabinets, sink, and a small hotplate.

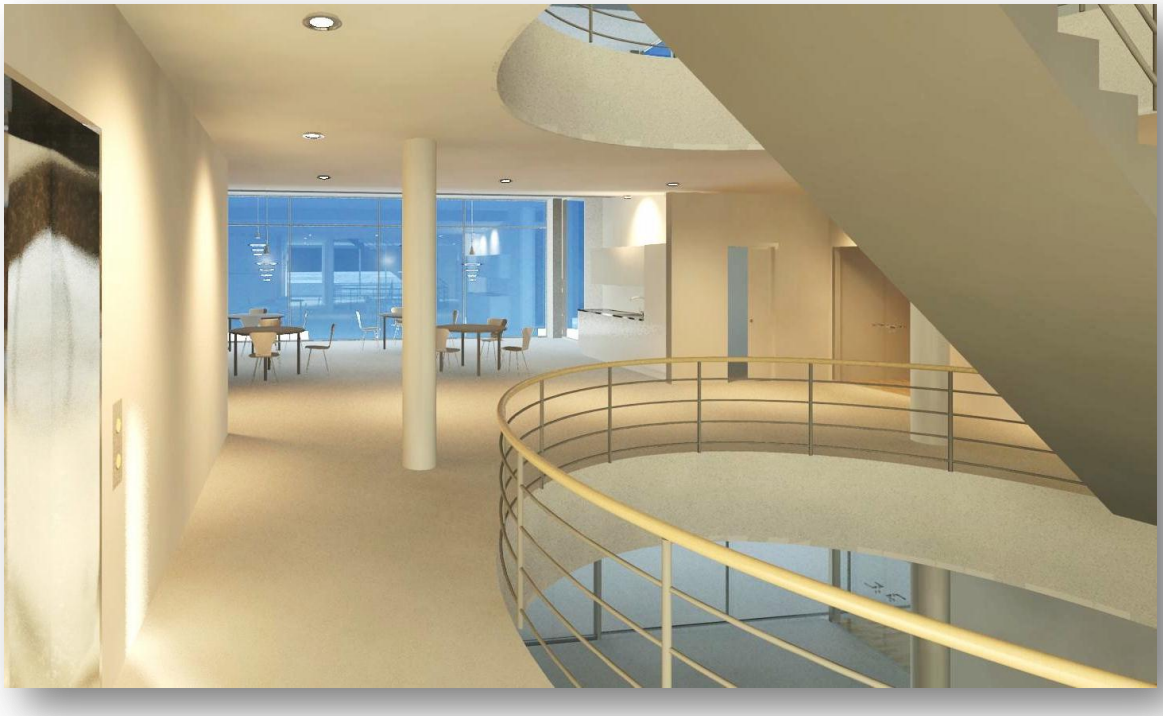


Illustration: Rendering of main stair and kitchen area on 3rd floor

The area with the dining tables is located in the region of a projected box, which allows a pleasant atmosphere for dining. On the other side of the stair a recessed box is located. This box serves as a

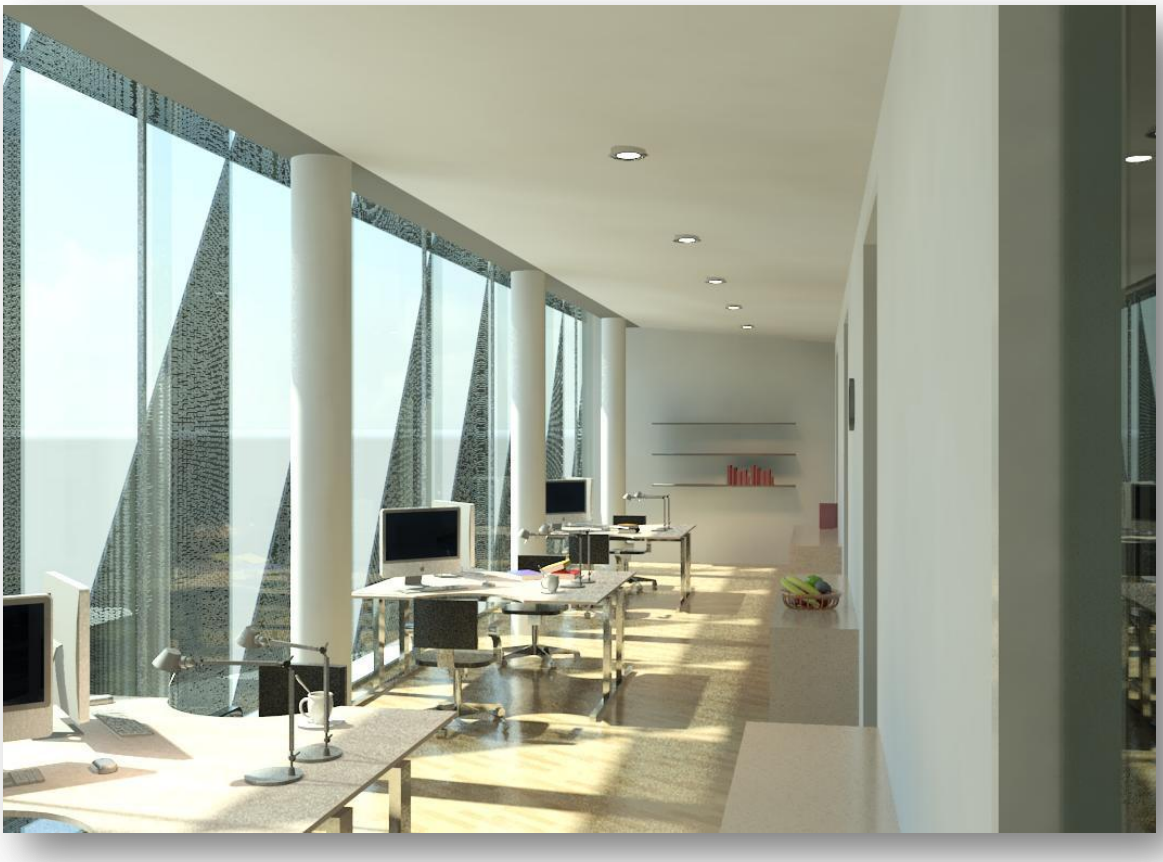
balcony – an additional place for social interactions. The location of the dining area with its relation to the common areas contributes to the continuous circulation that is created in these areas.

The implementation of the boxes where made for enhancement of the common areas, as well as for creating a unique structure and design to the façade.

2.6.2 Work spaces

The different types of rooms in the office building are a mix of cell offices and open landscapes in order to promote flexibility and communication in and between the workspaces. The open landscapes have possibilities to turn into more closed off workspaces with the use of barriers. This possible usage of barriers can create various formations and layouts when it comes to the room division of the offices. Barriers that are used consist of bookshelves, sliding glass doors and different types of screen walls. Screen walls can either be of a lighter type with a fairly large amount of permeability, or dense and go from floor to ceiling like a regular wall and create a more private setting.

The typical workspace has a work desk, filing/storage possibilities, a computer, an office chair and other standard office supplies available. The work spaces being a mix of both cell offices and open landscapes with a lot of transparency due to the glazed doors and walls, creates a sense of connection, belonging and social community. A social community itself tends to create feelings of security and loyalty, which in turn will create a good work environment for the employees in the building.



Illustrations: Rendering of workspaces on 3rd floor

The building's interior lighting in the workspaces is designed to comply with the SS-EN 12464-1, according to the given standards and building codes. [BBR 6:321] This ensures an excellent work

environment, which also answers to requirements from an ergonomic aspect. A well-designed lighting will also ensure a sense of security among the employees. [AV]

Having windows placed right next to or as close as possible to the individual work spaces creates not only good quality daylight but is also important for making accurate estimates and staying focused throughout the day. [AV] These things have been taken into consideration when designing both the interior lighting in the workspaces as well as designing the building's windows' and the workspaces themselves.

The different types of rooms are organized into individual workspaces of 16 m^2, larger meeting rooms ranging from 18,5 m^2 to close to 70 m^2. There are a total of 149 work places in the building.

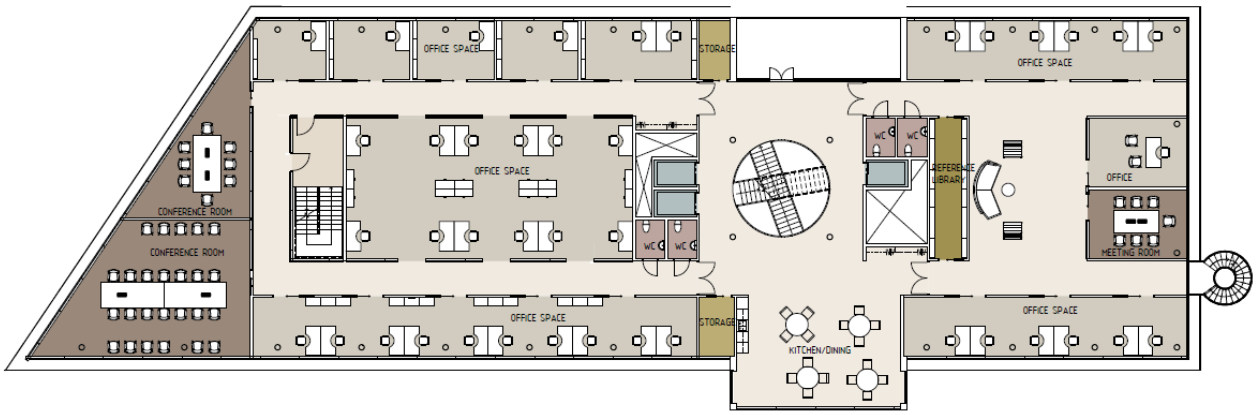


Illustration: Floor plan - Mix of different office types on 3rd floor

2.7 Roof floor

On top of the building there is a roof floor, which is recessed and therefore narrower than the rest of the floors. On the roof floor there is a large terrace, which serves as a balcony and outdoor dining

Illustration: Rendering of roof terrace

Illustration: Rendering of restaurant, roof floor

area for the building and connects to the whole outer surroundings.

The roof floor consists of a restaurant for the workers as well as for other guests. In addition to the restaurant functioning as a dining area and cafeteria for the building's employees and guests, it can also be used for office congregations and parties held after the building's opening hours. The dining space can in that case be transformed into a lounge area. The roof terrace, with its satisfying views of the Huskvarna surroundings can on special occasions function as an informal meeting space. The amount of seats in the restaurant is 66 with an extra 28 seats on the roof top terrace.

The restaurant kitchen is situated on the right wing of the building. It has its own service elevator, which provide access for food deliveries as well as carriage of garbage to the garbage room on the ground floor.

Situated on the roof floor, on the outside of the recessed restaurant and roof terrace areas is an outer line of sedum providing a vibrant green area to the roof floor. Due to the roof floor being recessed,

this solution utilizes the space on the sides and adds to the building's design. The sedum plants absorb rainwater and lessen the strain on the existing drainage solutions. The sedum also prolongs the life span of the roof due to its natural barrier against harmful UV-rays and provides extra insulation to the roof.

Outdoors furniture consist chairs and tables as well as couches for relaxed outdoors lounge purposes, fit to dine as well as just hanging out and enjoying the terrace. The terrace's barrier consists of a railing of an appropriate height of 1.1 m. according to the building code [BBR 8:2321], with a hand railing preventing accidents. The wall where the terrace connects to the indoor restaurant is made entirely out of glass to enhance the impression of connection between indoors and outdoors as well as making the most out of the terrace's qualities even for the enclosed part of the restaurant.

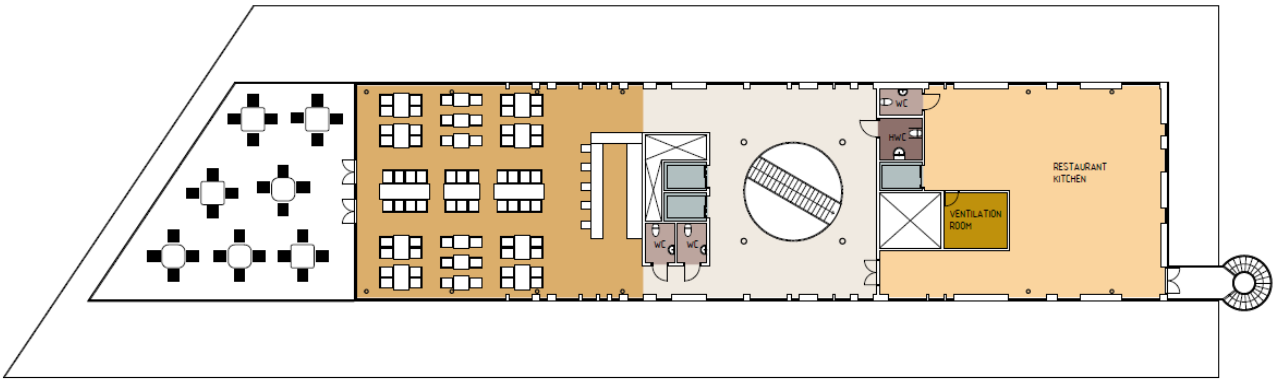


Illustration: Roof floor plan drawing

2.8 Garage

Accessibility to parking is solved from the northeast side of the building where the entrance to the underground garage is located. This is right beneath the assembly hall, which creates a natural slope for the ramp at the entrance to the garage.

There is one service elevator as well as one public elevator located in the garage along with a staircase. The service elevator runs through the whole building, which is why deliveries also can be made from the basement. On the top floor the service elevator goes all the way to the restaurant kitchen, why all food deliveries can be made without interfering with other zones of the building. All of the elevators and stairs that go down to the garage as are provided with a surface mounted firelock.

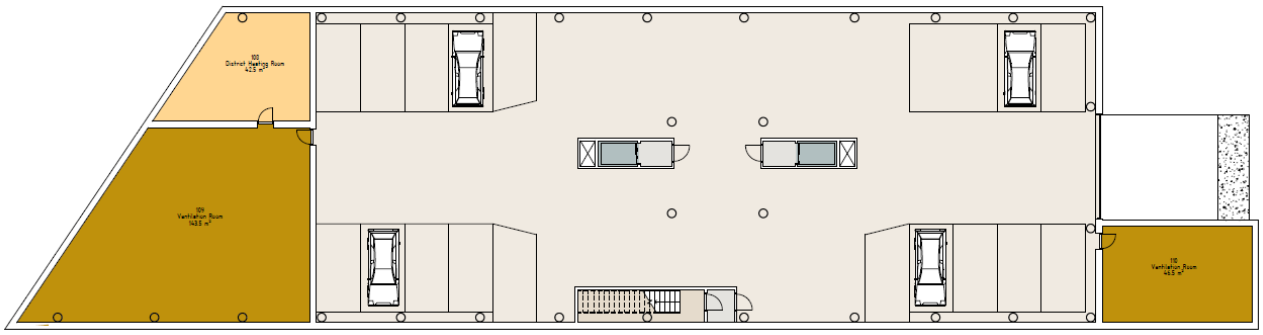


Illustration: Floor plan - parking and underground garage

There are 17 parking spaces available, as well as one handicapped parking space. The parking spaces located on the north and south side of the building, leaving the middle part of the garage open for circulation and transportation.

A ventilation room that serves the whole building is situated in the basement along with a separate ventilation room that is only for serving the garage. The building's district heating room is also placed in the basement.

2.9 Materials

Material for both the interior and exterior are presented in the chapters below. Natural and environmental friendly materials have been the focus of the material selection.

2.9.1 Interior materials

Bright colors and materials have been used throughout the building to keep the building light and airy.

The floors in the building consist of light oak parquet and a polished concrete floor. In general the parquet floors are used in the more private areas, such as the offices and meeting rooms, while the concrete floors are used in the public areas, such as the hallways, stairs and restaurant.

Where glass walls are not used, the walls are covered in wall panels from Ecophon, which helps reduce noise. White plaster covers all the walls that are not made of glass. All of the ceilings consist of a sound absorbing panels from Ecophon.

2.9.2 Interior room-description

	Floor	**Walls**	**Ceiling**	**Equipment**
Meeting rooms	Parquet	Ecophon wall panel	Ecophon Focus Lp	Outlets for electric office equipment
Work spaces	Parquet	Ecophon wall panel	Ecophon Focus Lp	Outlets for electric office equipment

Public areas/hallways and stairs	Concrete	Ecophon wall panel	Ecophon Focus Lp	
Assembly hall	Parquet	Ecophon wall panel	Ecophon Focus Lp	Inductive loop, outlets for electric office/communication equipment
Restaurant	Concrete	Ecophon wall panel	Ecophon Focus Lp	Bar equipment
Kitchen	Concrete	Ecophon wall panel	Ecophon Focus Lp	Kitchen equipment
WC	Concrete	Ecophon wall panel	Ecophon Focus Lp	Bathroom equipment

Illustrations: Parquet floor

Illustration: Concrete floor

Illustrations: Interior glass doors/walls

Illustrations: Ceiling panels

2.9.3 Exterior materials

The exterior material consists partly of a double skin façade, partly of a concrete construction. On the ground, first and roof floor the walls are entirely made out of concrete. However, these floors do not give the impression of large and heavy concrete walls due to the floor to ceiling windows, which cover big parts of the façade. The entrance consists entirely of large windows, which gives an open and inviting feeling. This contributes to the building being perceived as light and airy. The pillars can however be seen through the large windows, which makes the structure visible. This also contributes to a sense of stability and prohibits an impression of a floating building. It connects the rest of the building to its foundation. The fact that the same type of exterior materials is used on the roof floor as on the ground and first floor integrates the building and gives a continuous feeling to the building.

The rest of the building is made out of a double skin façade. This kind of solution is complex in its nature, and is further described in the following chapter.

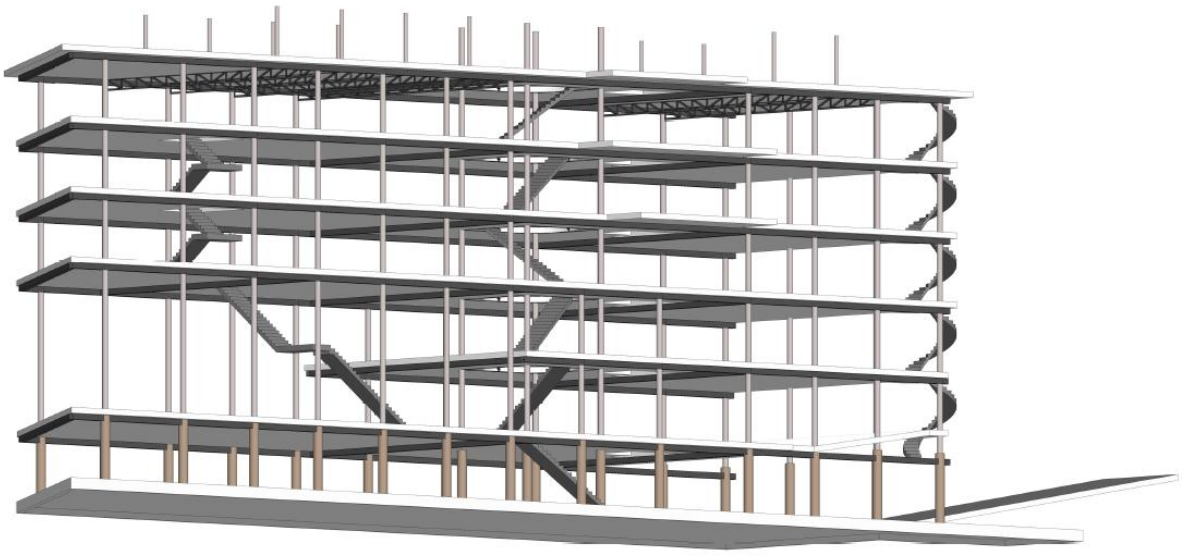
2.10 Building technique

This chapter describes the structural system of the building, its exterior materials, the critical points of the building along with all the installations.

2.10.1Structural system

The load-bearing and structural system consists of columns and slabs made of concrete. The pillars are resting on beams made of steel, which work together with the pillars and the slabs. The columns, beams and slabs all have a dimension of 300 mm. The pillars are placed along the façade, as well as around the main staircase where they function as extra support. The floor structure is made of prefabricated hollowcore slabs. A structure of this type is usually used for larger buildings and can cope with spans of larger dimensions such as in this specific case. The area around the main staircase is a critical point seen from a load-bearing perspective. Therefore the slab in this area is casted on site. The bearing capacity around this specific cutout can be ensured using this method.

On the recessed roof floor the columns are placed further into the building, which is why steal lattice beams hade to be used to ensure the stability of the building. These beams are 550 mm high – a dimension that fits in the cavity of the ceiling where the installations go. Due to the construction of the lattice beams, the installations can still be located in the ceiling without further interference with the beams.

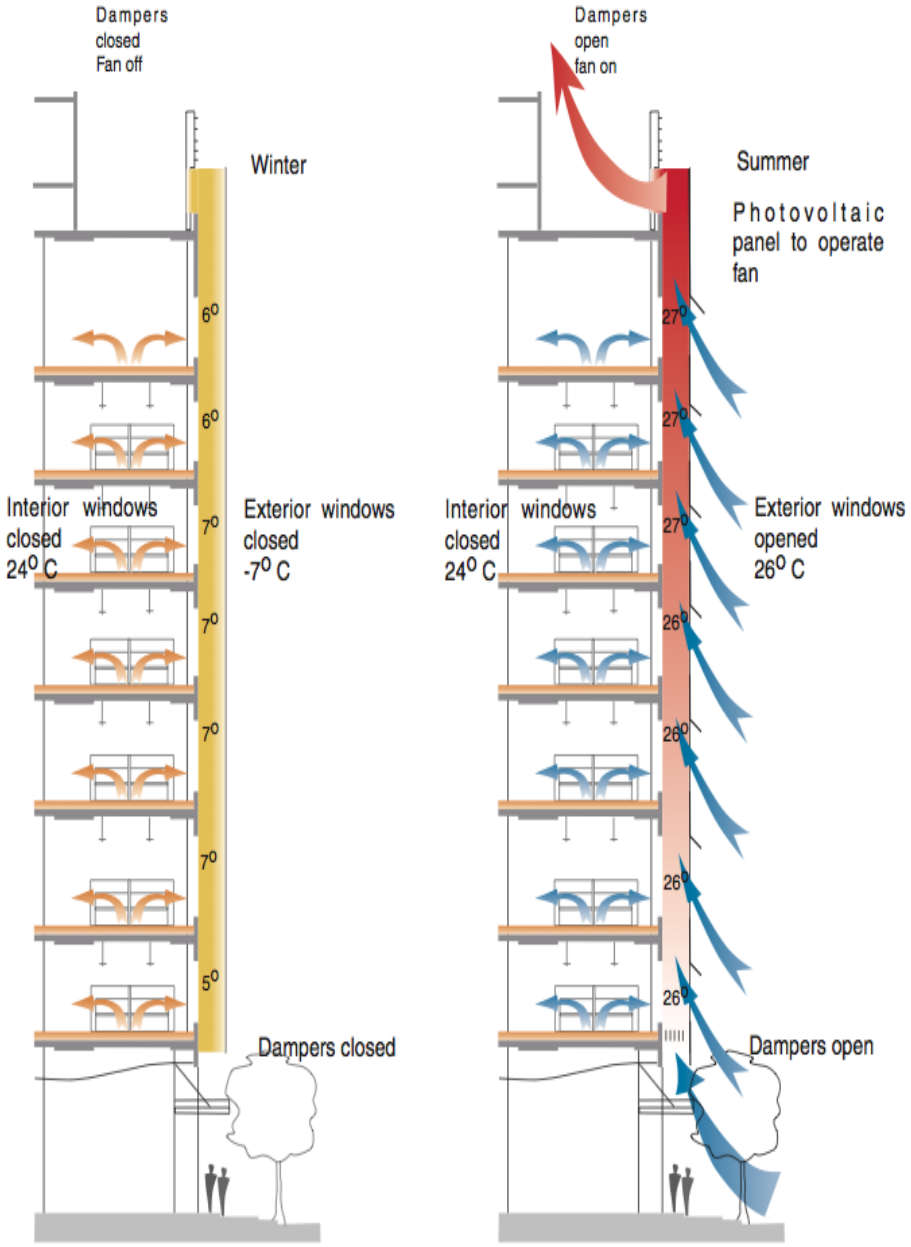


Illustrations: Structural system

2.10.2Double skin façade

A double skin façade [1] works in such way that it consists of two glass layers placed with a certain distance from each other so that air can flow in the intermediate cavity. In this cavity it is possible to place a potential sun-shading device. The cavity must be ventilated in some way, which can be solved by natural ventilation, fan supported or mechanical ventilation. In a cooler climate the double skin façade has the capacity to preserve the solar gain inside the cavity, while in a hot climate it can be ventilated and in that way prohibit unintentional heating of the building and thus reduce the need for cooling. Beneath is an illustration of the double skin façade and how it functions during summer time and wintertime.

Illustration: Double skin façade



Studies show that using a double skin façade allows you to achieve a higher insulation value than if using conventional methods. Using double skin facades carries many advantages. Some of them are listed below:

- **Protection** – the inner façade is protected from weather and wind.
- **Preheating** – fresh air is preheated in wintertime, which saves energy.
- **Overheating** – solar control is possible all year round, and overheating of the offices can be avoided.
- **Natural ventilation** – another way of saving energy is gained by choosing a natural ventilation system, which can be implemented by using the cavity for ventilation.
- **Lower energy losses** – wind cooling of the façade decreases due to the double skin.
- **Acoustic protection** – advantageous for buildings close to traffic or other noise sources.
- **Daylight and aeration** – the possibility of letting daylight into the building increases. Windows can be opened for ventilation in high-rise buildings.

- **Aesthetic** – enhances the architectural possibilities and permits transparency and fully glazed facades.
- **Sun shading** – the wind protection allows a cheaper shading alternative.
- **Thermal bridges** - results in a reduction of thermal bridges due to the developed outer skin of the façade.

The chosen solution for the double skin façade has a cavity gap of 600 mm, which gives enough space for cleaning purposes. Underneath the double skin façade there are dampers, which can be opened when ventilation is needed and closed for maintaining a desirable temperature inside the cavity.

Illustration: Double skin façade and its cavity

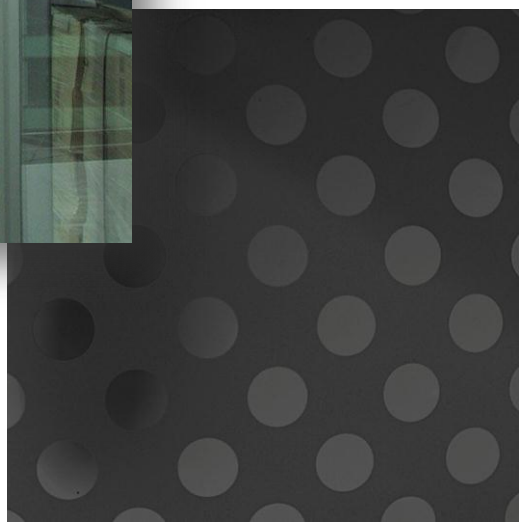


Illustration: Custom made screen print

A screen print has been used on the double skin façade for sun protection purposes, but it also functions as an aesthetic feature, which was an ambition for this particular building. The print has been custom designed for the building, and is printed on the lower triangles in each section of the exterior wall. It consist of a black finish with transparent outcuts, which allows a certain amount of radiation through and prevents the feeling of a completely solid surface.

2.10.3Critical points

The building critical points have been identified and solutions are described in the chapters below.

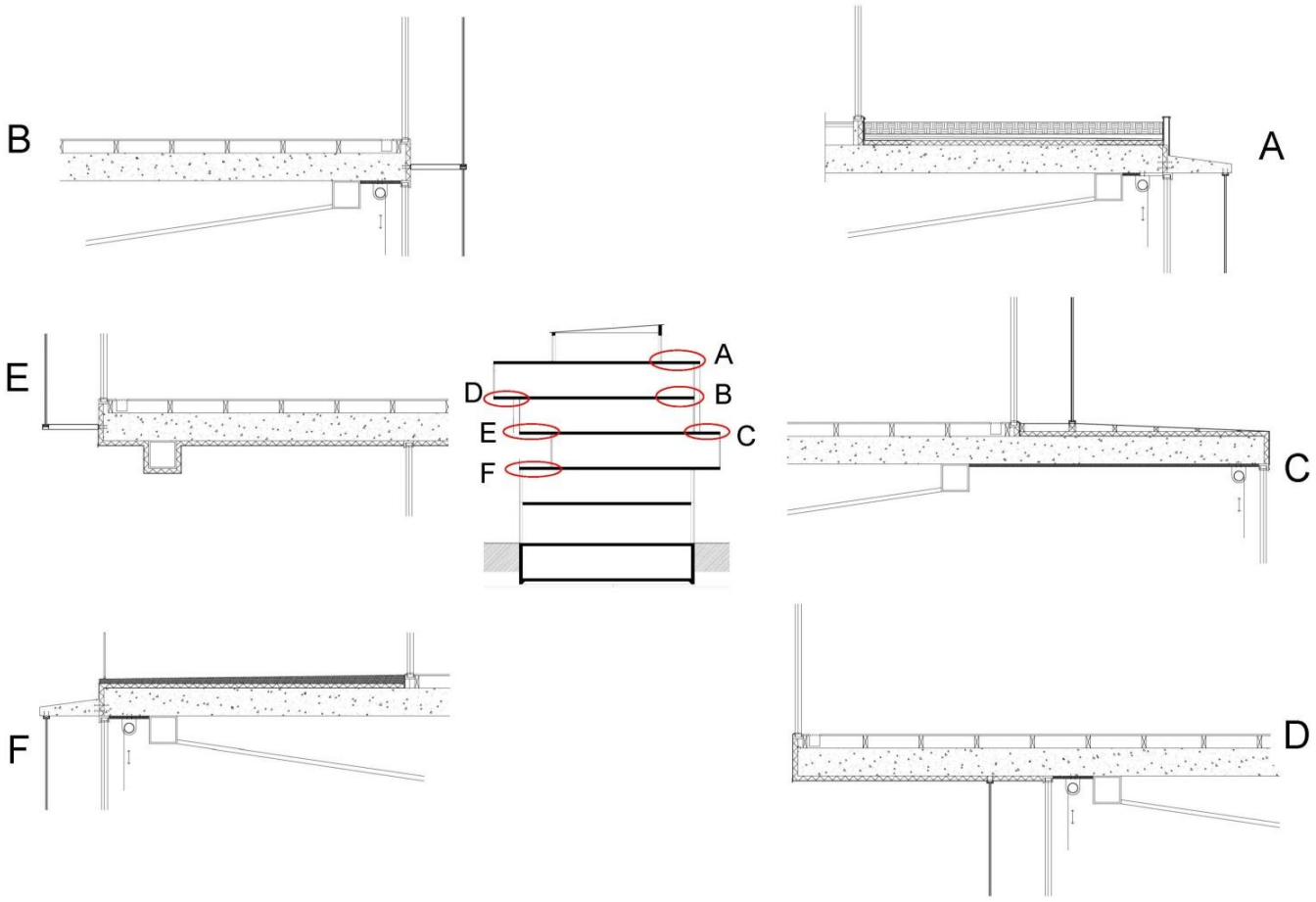


Illustration: Section description and overview

2.10.3.1 Drainage

The solution for roof drainage is based upon the building's roof angle, which is 4 degrees. The reason for this angle is to allow for proper roof drainage which no water filled dips but at the same time keep the roof looking fairly flat. The roof drainage is made up by gutters and downspouts distributed by Aurubis' Nordic Rainwater Systems [2], which can be used with all kinds of roofing materials. The downspouts run along the façade on the ground, 1st and roof floor. On the other floors with the double skin façade, the pipes run inside the cavity, between the two layers of glass.

The roof of the building provides a natural water runoff, which is absorbed by a gutter on the lower side of the roof, and then transported via downpipes with a maximal distance of 10 meters from each other. Where the downpipes meets the sedum roof, the water travels through a pipe that goes in-between the layers of the sedum.

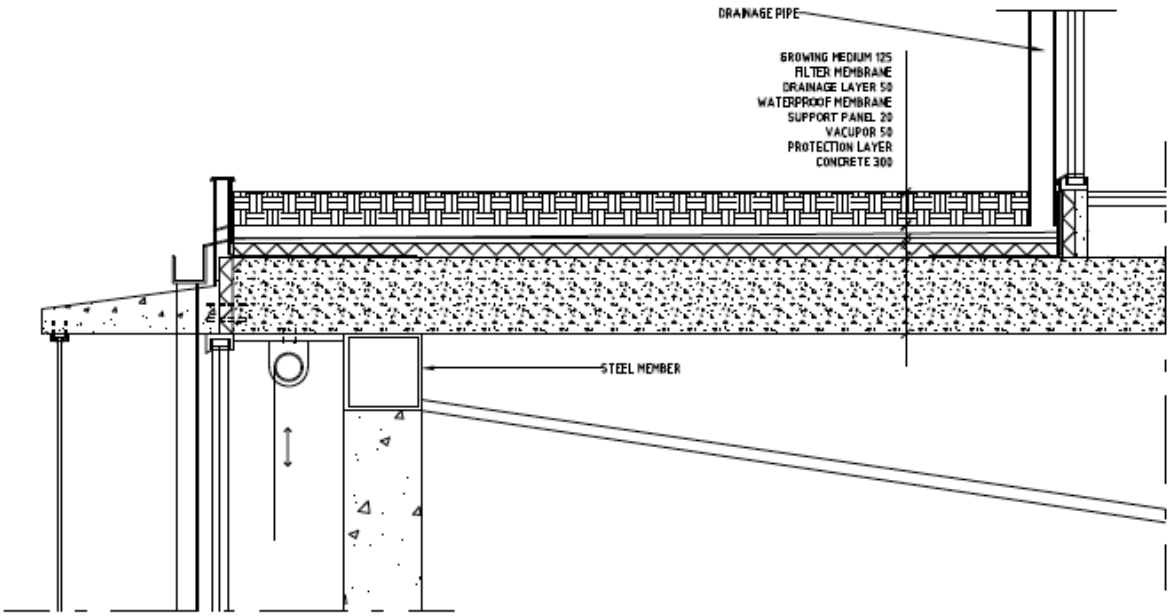


Illustration: Section - Drainage system

2.10.3.2 Roof terrace and sedum roof

The solution for the roof terrace is to use a vacuum insulation, called Vacupor. This type of insulation much thinner than a normal insulation but provides an insulation level that is seven times better. It is important to handle the vacuum insulation well. Therefore a protections layer is placed on top of the concrete, and above it a layer of 50 mm of Vacupor. On top of the Vacupor there is a fiber cover. Lastly, there is 20 mm. sand and 100 mm. stone slabs. These slabs have been chosen because they are more resistant than wood panels.

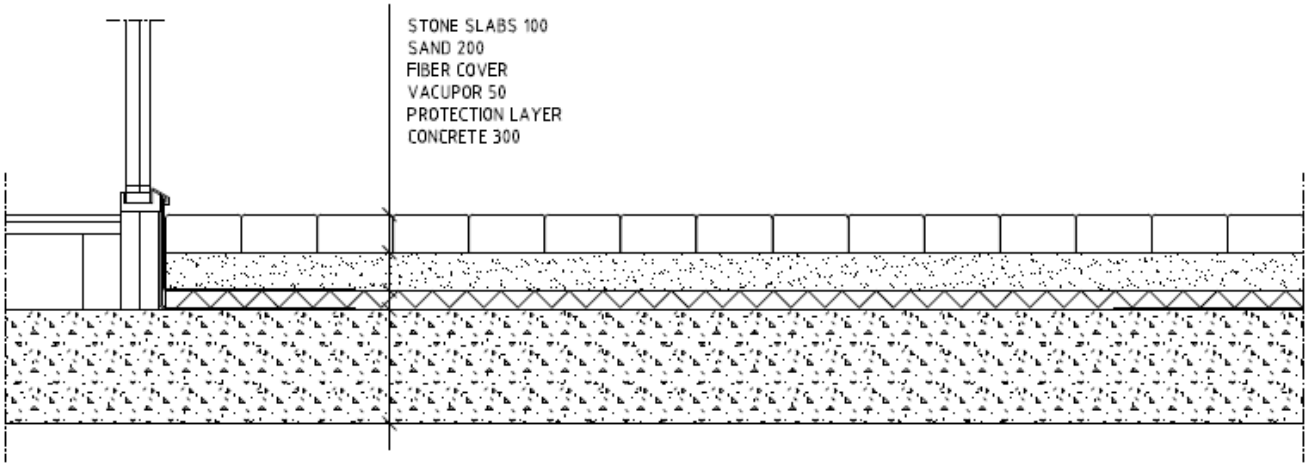


Illustration: Roof terrace section

The sedum roof area has also been designed with a Vacupor layer. This evens the levels between the roof terrace and the green area so that there is no step.

Underneath the insulation there is once again a protection layer. To support the different layers of the green roof, 20 mm. of support panels are placed on top of the 50 mm. of vacuum insulation. Thereafter a waterproof membrane is created with a drainage layer of 50 mm. and a filter membrane. The last layer is the actual growing medium of 125 mm.

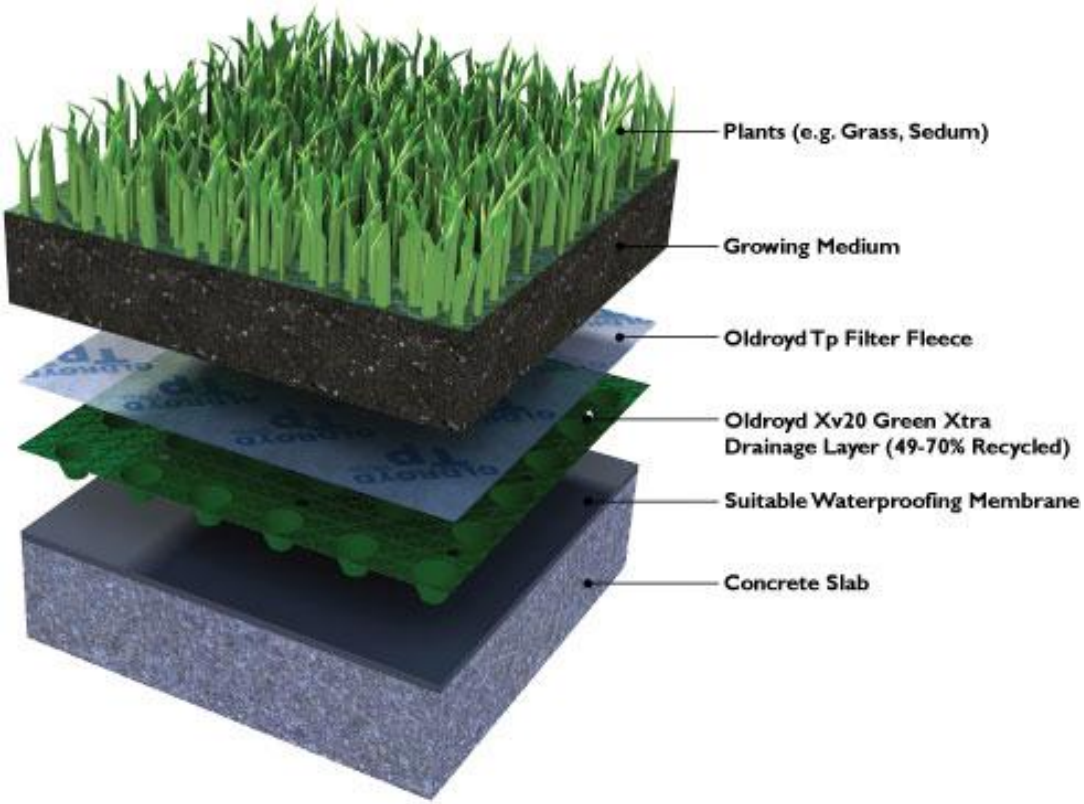


Illustration: Principal construction of a sedum roof

The section below also shows the solution for the attachment of the double skin façade, as well as the solution for the sun protection system, and the drainage solution.

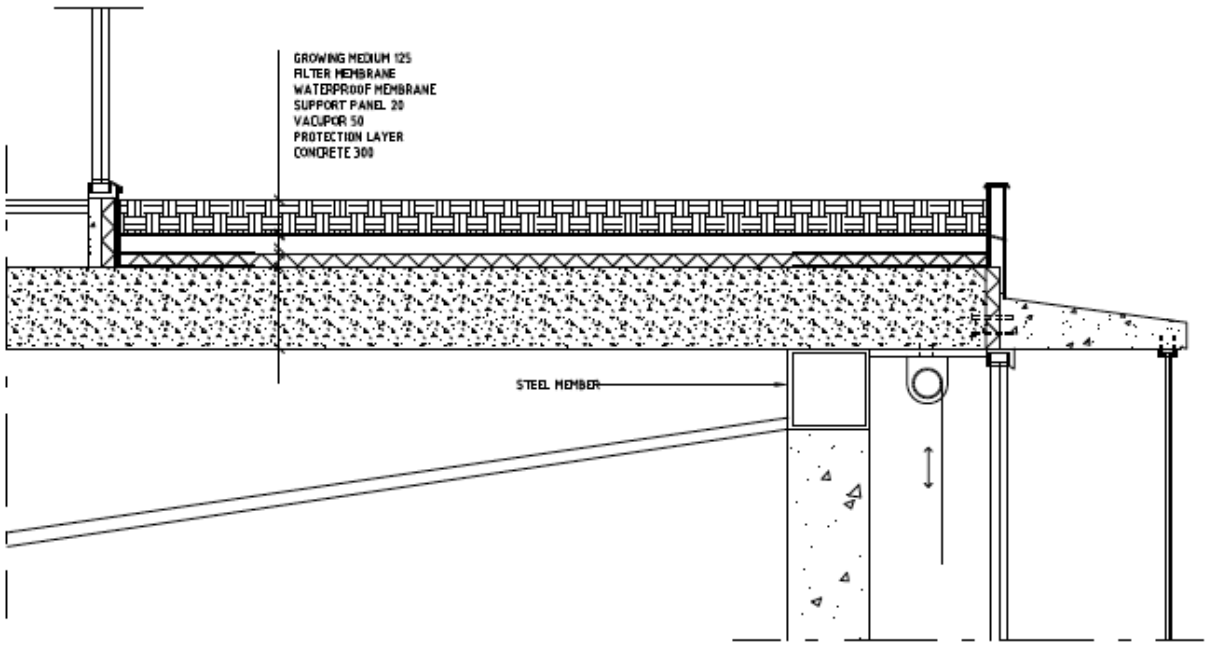


Illustration: Section A – Roof terrace with sedum roof

2.10.3.3 The boxes

The boxes are a critical point due to the risk of cold bridges. With enough insulation in the corners and the usage of vacuum insulation, a solution is presented. The floor of the recessed box balcony on top of the boxes roofs has the same roof system as the roof terrace on the roof floor. If the top of the box is not used as a balcony, the upper layer is made of steel plating.

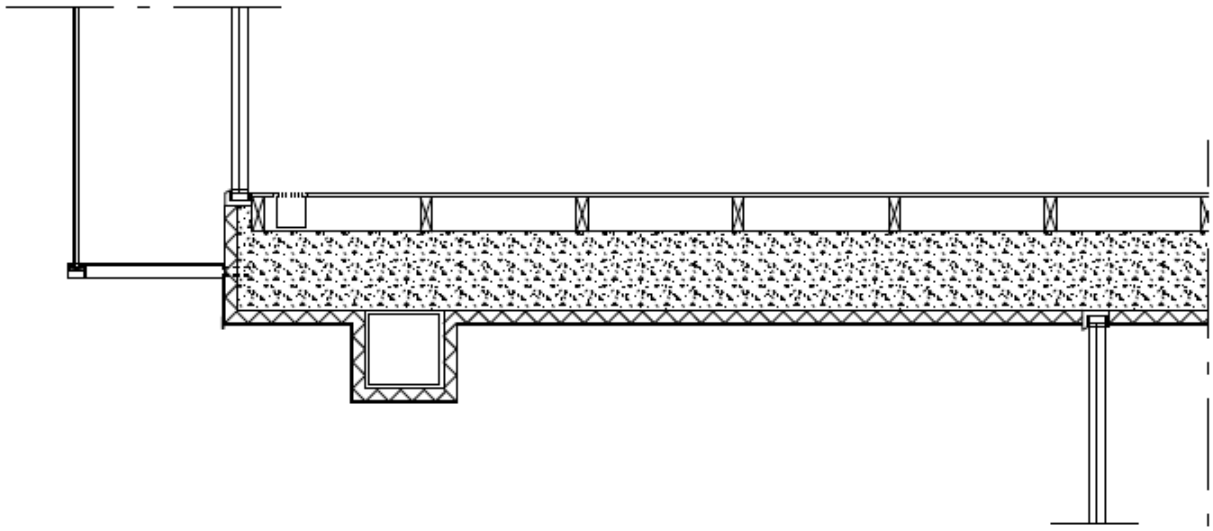


Illustration: Section E – Upper part of recessed box

The floor of the recessed balcony is slightly sloped, allowing natural water runoff when needed.

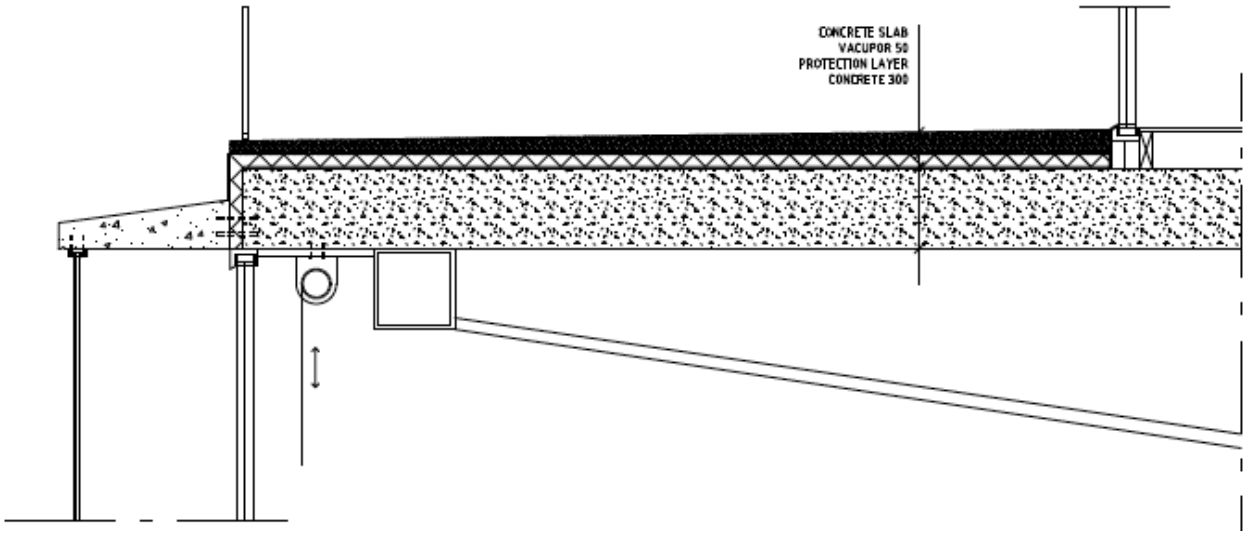


Illustration: Section F – Lower part of recessed box

The projecting boxes have a small slope on the roof to allow natural drainage.

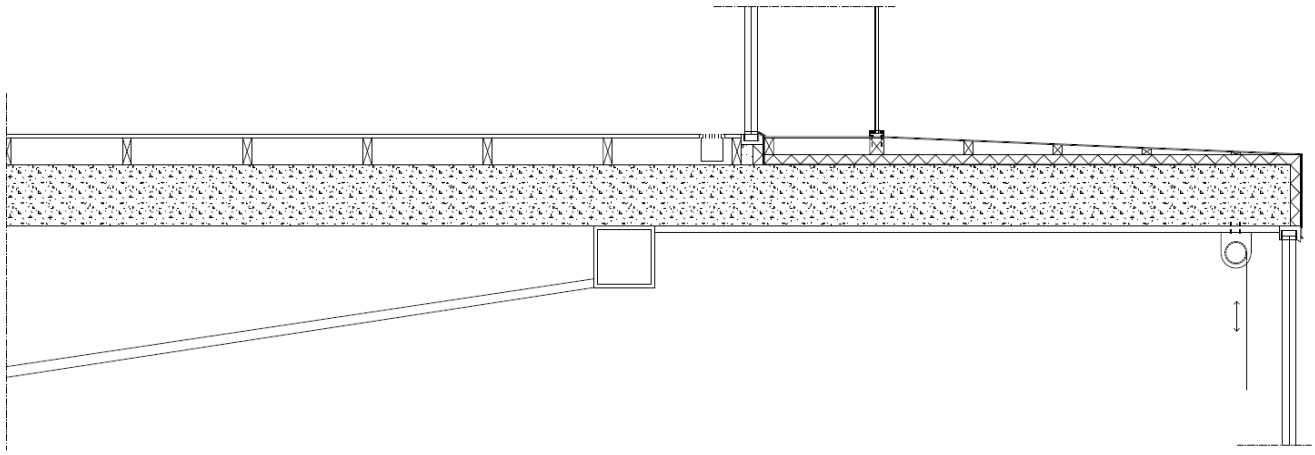


Illustration: Section C - Upper part of projecting box section

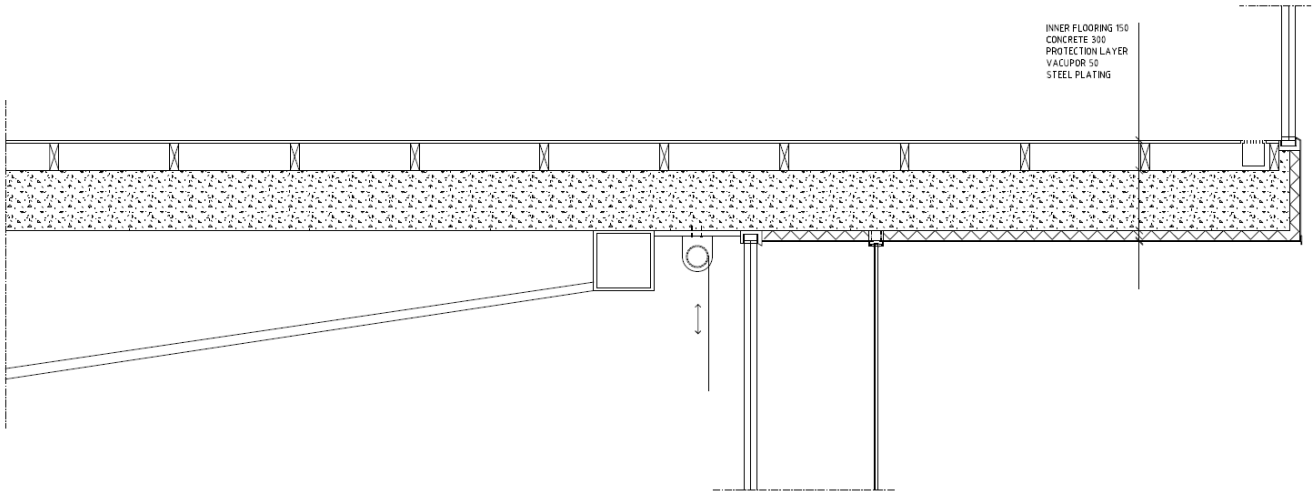


Illustration: Section D – lower part of projecting box

2.10.3.4 The ramp

The entrance for the garage is located on the east side of the building and starts 9 m. in front of the façade. To guarantee enough height for the slope, the ramp is located underneath the assembly hall. This way, the slope is used in a reasonable way, utilizing the existing slope in the assembly hall.

2.10.4 Installations

A room for ventilation equipment is placed in the basement with a total size of 143,5 m^2. The system chosen for the air distribution is an Energy Recovery Ventilation System. This system includes a heat exchanger, which can transform the heat from the warm and polluted air inside and include it into the fresh air supply. In this way, energy can be saved and costs can be reduced. Fresh air is brought in through outdoor air ducts located on the roof. The fresh air is then transported down through the building to the basement where it is heated and then distributed to the remaining floors of the building. Distribution is made air diffusers, with the duct for air supply being taken further into the rooms, while the duct for air outtake is put in the front parts of the rooms. All ducts are hidden in the ceiling by the acoustic ceiling panels from Echophon.

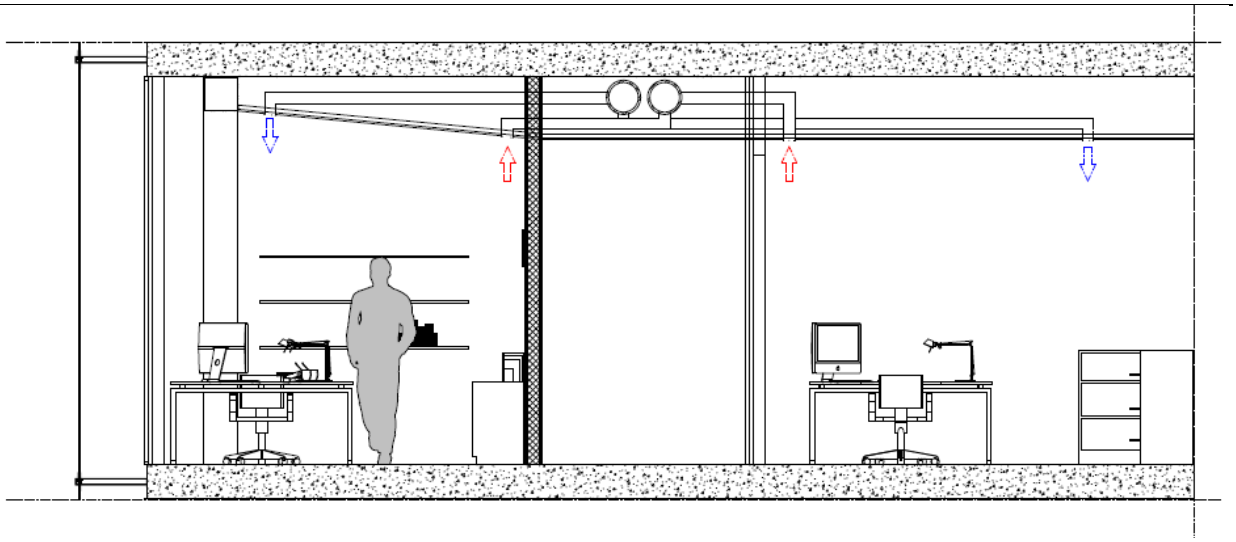


Illustration: Section of two office room, showing ventilation system

The building is equipped with a VAV-system (Variable Air Volume), which reduces the consumed energy by the fans. A VAV-system has a variable airflow, which adapts to the need of ventilation and is considered a good solution for the cooling of commercial buildings.

Vertical shafts run throughout the building in two separate shafts. These shafts have a natural connection to the elevators, restrooms and toilets. The shafts are larger on the ground and 1st floor and then reduced in size from the 2nd floor and up.

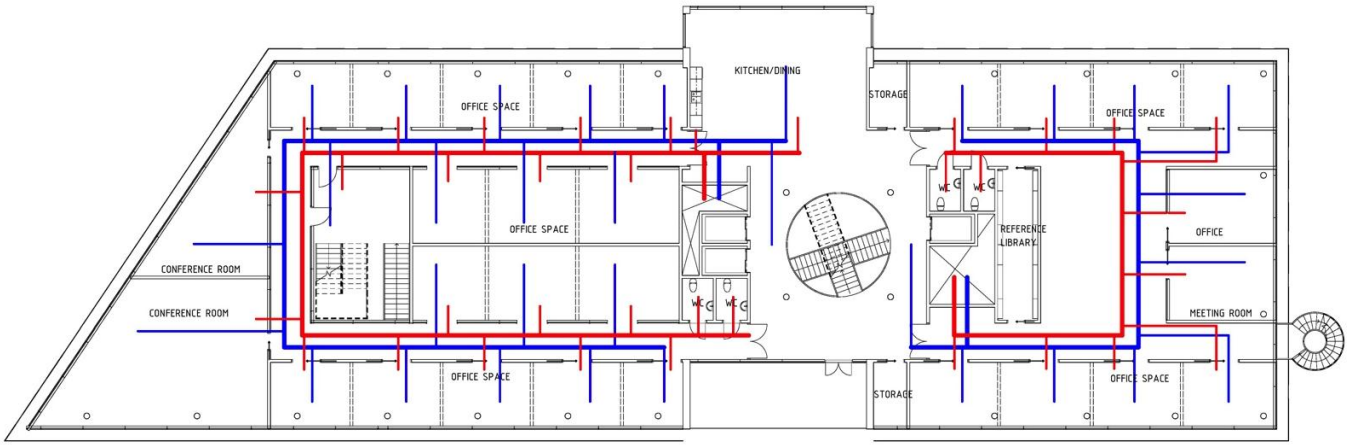


Illustration: 3rd floor plan – principal schema of ventilation ducts, showing air supply in blue color, and outtake in red.

There is also a separate ventilation room placed in the basement, serving the garage, with a total size of 46,5 m^2. The restaurant kitchen also has its own ventilation room, which is placed in the kitchen area. All of the installations are hidden behind acoustic ceiling panels.

A district heating system does distribution of heat. This heating system has a high reliability and is also flexible which suits the building well. It is also resource efficient and eco-friendly. Different types of fuel and heat sources can be utilized and adapted to fit the local conditions. Convectors are used for distributing heat. Hot water comes in from the heating plant to the building's convectors, and then the cooled off water is being led back to the heating plant. The building's district heating room is placed in the basement and has a total size of 42,5 m^2.

Other installations such as for sewage and electricity, all run through the shafts and ceiling with its generous dimensions.

2.11 Fire-protection and escapes

The building has an automated water sprinkler system installed on all floors, according to the Standards SS-EN 12259 and SS-EN 12845 [BBR 5:234]. This installation makes it possible to dispense a division of different fire compartments.

Escape routs are planned for although a fire cell division is not needed. These escape can be used for other emergencies and when evacuation is needed and they have nevertheless been designed according to the building codes for fire escape. The proposed emergency exits via the stairs does not make the stairwells itself into a fire compartment, which would otherwise have been necessary if the sprinkler system had not been installed.

Since the building has more than three floors it has been carried out in fire protection class Br1. [BBR 5:21] Every floor of the building has several escape routes. These escape routes consist of two different stairwells inside the building, which are unattached and located on separate sides of the building. There is also one fire stairwell for emergency exit purposes, located on the outside of the east side of the building. This emergency exit can be reached through a hallway from all floors except the ground floor, and also through the restaurant kitchen on the top floor. These emergency exits meet the set requirements according to the building code and demands. [BBR 5:311] The doors leading to the stairwell located in the west side of the building are conducted according to class EI60-C. The walking distance to any of the escape routes through the stairwells does not exceed 30 meters in any direction, which meets the requirements. [BBR 5:332] The width of the escape routes within the building is 1,8 meters at its narrowest point which well exceeds the minimum requirement of 0,9 m. [BBR 5:341] All doors that are part of an escape route open outwards to simplify evacuation.

There are two fire escapes located right outside the assembly hall doors, which allow a close escape to the outside sidewalk and street from this part of the building. Inside the assembly hall there is a sign stating the maximum amount of people allowed in it. The total floor space area in the assembly hall, designated for evacuation of the hall (not including the stage), is about 78 m^2. According to the building code for an assembly hall, the total floor space for evacuation purposes can be no less than 1,7 persons/m^2. [BBR 5:371] Considering the fact that the assembly hall has 98 seats, this would give a need for a minimum total floor space of about 58 m^2. The building's assembly hall with its floor space therefore meets this requirement.

Emergency lighting is also installed in the assembly hall and the stairwells. This emergency lighting provides intended sufficient light during at least 60 minutes. An automatic fire alarm is installed throughout the building. Detection is done using smoke detectors and a signal is sent out.

There are several guiding markings and signs on each floor pointing out the nearest emergency exits and escape routes. These markings are located by the doors leading to escape routes and also within an escape route. The signs are well lit green elucidated discs with distinct white symbols, according to the general standards. [BBR 5:351]

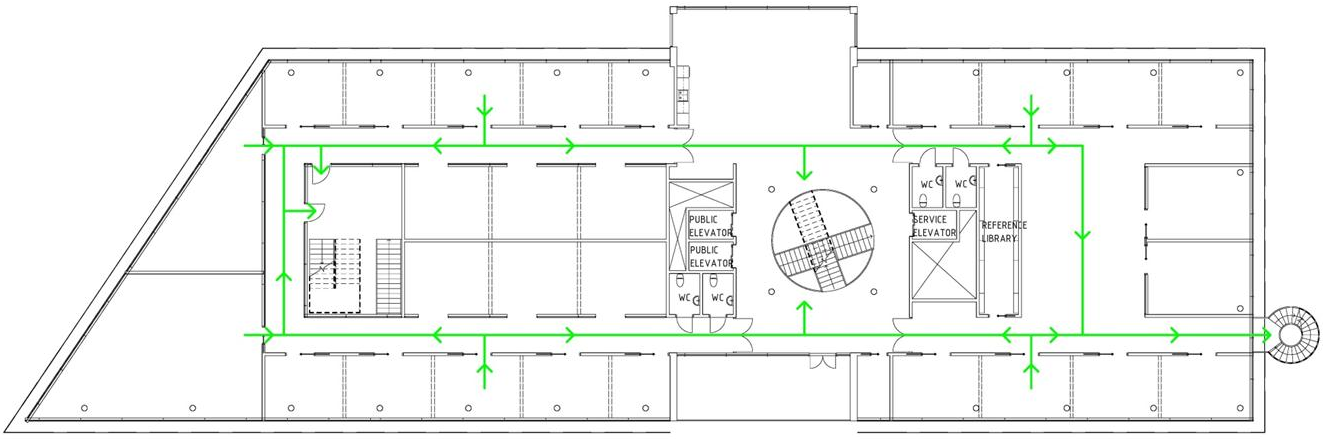


Illustration: Emergency escapes routes and emergency exits.

2.12 Sound

Noise reduction is solved by different types of barriers depending on the location of noise in the building. The staircases are enclosed from the office spaces in the building by glass doors and walls with automatic closing abilities. This provides noise reduction from the open stairwell in the middle. A thick single segment wall of concrete eliminates noise from the ventilation system in the garage. The installations leading out from the space and up through the shafts are insulated. Other noises from the garage such as from cars are prevented from transferring to the upper floors due to the usage of firelocks and dampening material.

The building's height itself, in relationship to the surroundings reduces the noise from the streets below so that the sound has less surface area to bounce on and reach up to the top. The sound from the installation space on each floor is dampened by acoustic ceiling material stretching through the whole building. The acoustic material from Echophon is chosen because it covers and reduces a wide range of frequencies and has a thickness of only 50 mm. It is also resistant to undesirable indoor climate as it maintains its functions at a humidity of 95 %.

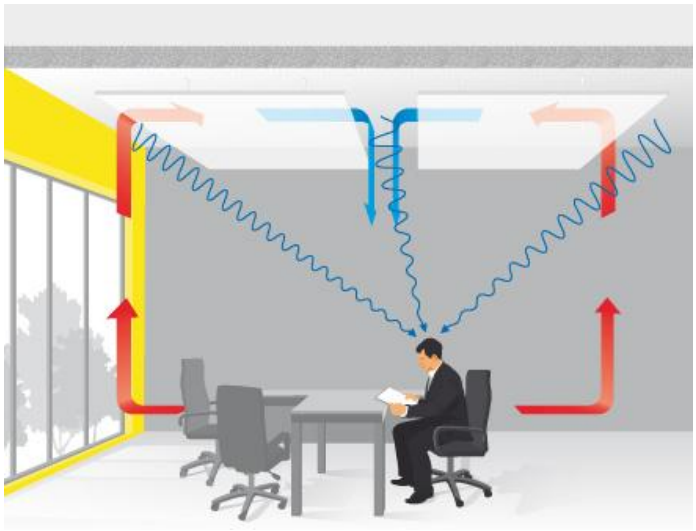


Illustration: Sound absorption thanks to the Echophon acoustic material

Regarding the sound climate in the offices, noise reducing wall panels can be placed in-between the office spaces if an additional noise reduction is needed.

2.13 Daylight

The position of the building makes the southeast façade fully covered in sunlight for the most part of the day. The buildings height and the amount of free space around it contribute to this. The northwest façade gets sunlight by the late afternoon hours.

The double skin façade is sectioned in separate windows, 2100 mm. wide. Each window is divided diagonally through the middle where the lower half of glass is covered by a sunshade, decreasing the intake of sunlight. The upper part is left transparent so that the light can reach further into the building. This makes it possible even for the office spaces in the center of the building to have access to sunlight. The walls to the central office spaces next to the corridor are made out of glass to further expand the sunlight's possibilities to reach the middle. The main staircase that is reaching from the ground floor to the top is kept open throughout the floors. The roof part of the stairwell is made of glass, letting the sunlight radiate through the building. This light will reflect itself and provide indirect sunlight and daylight to the middle parts of the building located around the stairwell.

2.14 Sun-protection

Solutions for sun-protection consist of non-solid shades in terms of screen prints placed on the lower triangles in each section of the exterior wall. These screen prints lets adequate light shine through but protect against bothersome sunlight and potential overheating during the summer. The material of which the layer of the print is made of contains reflective components that reduce the amount of sunlight that is let through.

According to the building code BBR, the total glazing area should give equivalent lighting that is achieved when the total glazing area is at least 10 % of the total floor space. [BBR 6:322] Another requirement is that those parts of a building where people stay for more than a very short period of time need access to direct sunlight as well as direct daylight. [BBR 6:322, 6:323] In these parts of the building, there also has to be opportunities to look outside. [AV 9§] To fulfill these previously mentioned requirements, large areas of the building are glazed but have access to sun-protection. The position and shape of the windows also contribute to this fact. This will ensure reasonable and satisfying access to both quality daylight and sunlight throughout the building.

The entire building has been equipped with Silent Gliss Rollo system. It is an interior system that is mounted in the roof between the loadbearing beams and the interior glass walls and therefore partially hidden. The system works in areas with dimensions up to five meters wide and 12 meters high. It has the possibility to either be operated manually with chains or automatically with engines. It can also be fitted with screen fabrics that reduce sunlight or fabrics that totally blocks the light. This gives the tenants in all areas of the building the opportunity to adapt the amount of sunlight transmitting into their own workspaces.

Illustration: Gliss Rollo System

2.15 Accessibility

The building code BBR has been taken in consideration when designing the building and meeting the demands for accessibility such as the possibility for wheelchair maneuvering in the building. The whole building is handicap accessible with elevators and ramps as an alternative to stairs and steps when needed, i.e. in the assembly hall located on the ground floor.

2.15.1 Assembly Hall

In the assembly hall there are no stairs, only ramps, placed on both sides of the room, as well as in the middle. The ramp has an inclination of 5 % (1:20), which makes the ramp even safer than the minimum requirement of 8 % (1:12) [BBR 3:1422]. The ramps' floor is plated with a non-slip material. The front part of the assembly hall functioning as a stage is easily accessible for wheel chairs and people with impaired mobility. The assembly hall is equipped with an inductive loop for people with impaired hearing.

2.15.2 Toilets

There is one HWC located on the ground floor and one on the roof floor, meets the requirements of a minimum size of 2,2 by 2,2 m. Both of the handicap toilets are equipped with a security alarm and other suitable equipment. [BBR 3:145] In addition to the 2 HWC's, there are 20 regular WC's in the building.

2.15.3 Common Areas

The building's main destination points such as the ground floor's entrance area with its information and exhibition area, the elevators and stairs, the restrooms, door entrances and emergency exists are all well-lit and easy to spot even for people with impaired orientation abilities. Continuous tactile and visual guidance routes with different material and shades of color as well as well-lit signs solve this. These signs are simple in their design to enable the comprehension of the content in the message, and are placed in a suitable height of 1,5 meters, making them convenient to read for both people standing up and for people in wheelchairs. Raised letters as well as clear, well known and easy to comprehend picture symbols, supplement all signs in the building. The minimum door width in the building is 0,9 m. which meet the requirements of a width of at least 0,8 m. [BBR 3:143] All doors are easily accessible and opened by people in wheelchairs or people with an impaired mobility. Heavier doors such as the ones to the assembly hall and the fireproof doors all have automatic door openers available. These door openers are placed with its center 0,8 m. from the floor and 1,0 m. from corners and the front of the door when it is opened.

The revolving doors to the building's main entrance on the first floor are supplemented by a traditional door, which can be used by people in wheelchairs or by people with impaired mobility or orientation abilities. All of the thresholds in the building are suited for wheelchairs.
The public elevators' measurements are 2,3 m. by 1,5 m., which allows for a person in a wheelchair along with an aid to comfortably fit inside of it. [BBR 3:144] The elevator also fits a stretcher, in case of accidents that needs medical attendance. The elevators are designed to be independently operated by people with impaired mobility or orientation abilities. When the elevator has stopped for exiting and entering, it alerts the passengers of this. The minimum hallway width in the building is 1,8 m. This allows for easy and comfortable maneuvering of a wheelchair and meets the set requirements. The minimum requirements according to the building code are an unobstructed width of 1,3 m. and 0,8 m. for pillars and such limited obstacles.

All hallways in the building or areas functioning as hallways are lit for their purpose and are therefore distinguished from other areas, as recommended. [BBR 3:142] The roof top terrace and

restaurant are also accessible for wheel chairs and people with impairments. The doors, hallways and circulation areas all meet the minimum requirements of width etc. in accordance with the rest of the building.

2.16 Basic facts

Total floor space	5387,5 m^2
Floor space excluding the basement	4381,5 m^2
Floor space of the basement	1006 m^2
Amount of work spaces	149
Amount of parking spaces	17 + 1 handicap accessible
Amount of elevators	2 public + 1 service
Amount of main stairs	2 + 1 fire escape stair
Amount of toilets	20 + 2 handicap accessible
Height of the building	19,1 m
Amount of seats in assembly hall	98
Amount of seats in restaurant	66 + 28 terrace seats

3 Reference list

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[14] http://www.av.se/dokument/Teman/kontor/verifiering_belysning.pdf 2011-11-28
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4 Appendices

A101 – Site plan	**1:500**
A102 – Basement	**1:100**
A103 – Ground floor	**1:100**
A104 – 1st floor	**1:100**
A105 – 2nd floor	**1:100**
A106 – 3rd floor	**1:100**
A107 – 4th floor	**1:100**
A108 – Roof floor	**1:100**
A109 – Section 1	**1:100**
A110 – Section 2	**1:100**
A111 – Office Section	**1:20**
A112 – Assembly hall, furnished plan	**1:50**
A113 – 3rd floor, furnished plan	**1:50**
A114 – Section description	**1:50**
K-27.0-101 - Construction drawing – Section A, Section B	**1:10**
K-27.0-102 - Construction drawing – Section C, Section D	**1:10**
K-27.0-103 - Construction drawing – Section E, Section F	**1:10**
K-27.0-104 – Construction drawing – Roof terrace, Drainage system	**1:10**

N

PRELIMINÄRHANDLING

BET	ANT	ÄNDRINGEN AVSER	DATUM	SIGN

Husqvarna City Hall

Fastighetsbeteckning

UPPDRAG.NR	RITAD/KONSTR. AV	HANDLÄGGARE
	Group B14	G. Hellborg
DATUM	ANSVARIG	
12/01/11	G. Hellborg	

New Development
Site plan

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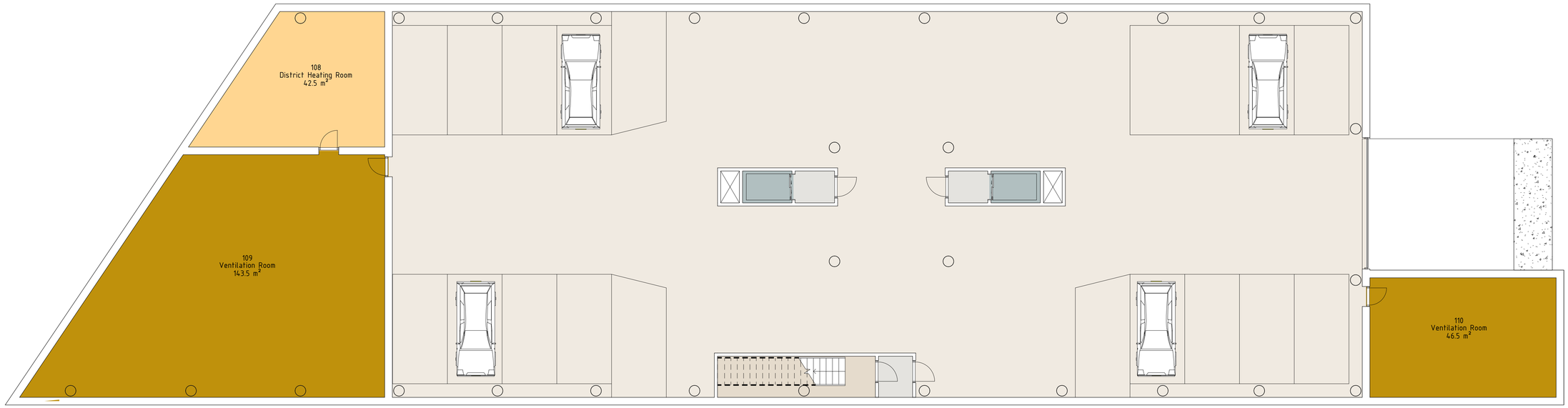

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BET	ANT	ÄNDRINGEN AVSER	DATUM	SIGN

Husqvarna City Hall

Fastighetsbeteckning

UPPDRAG NR	RITAD/KONSTR. AV	HANDLAGGARE
	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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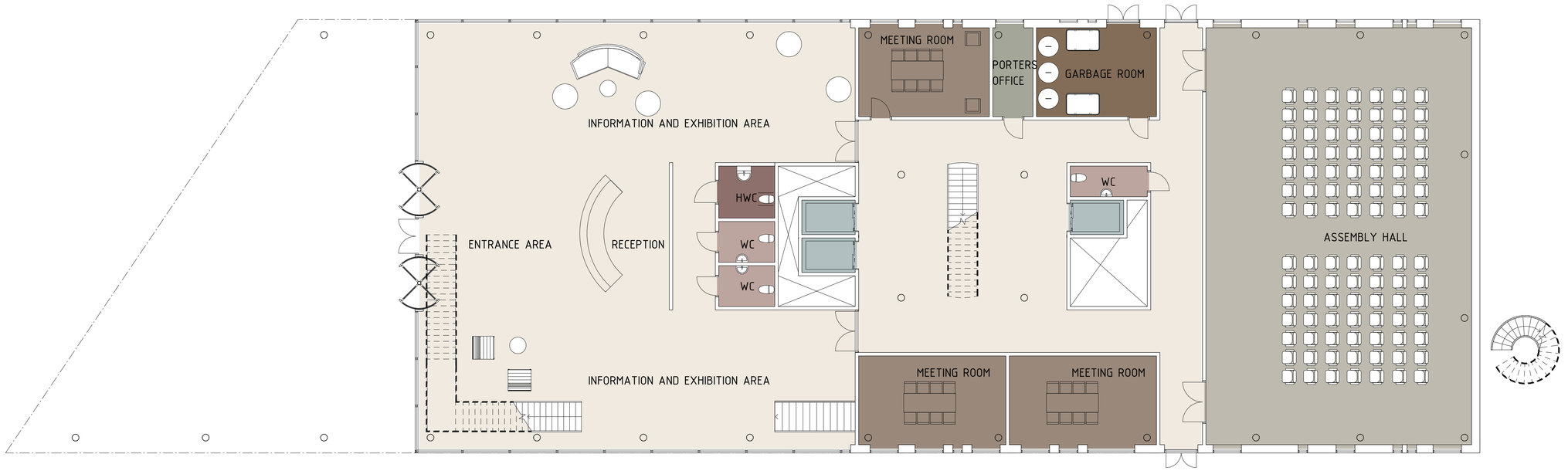

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Husqvarna City Hall

Fastighetsbeteckning

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	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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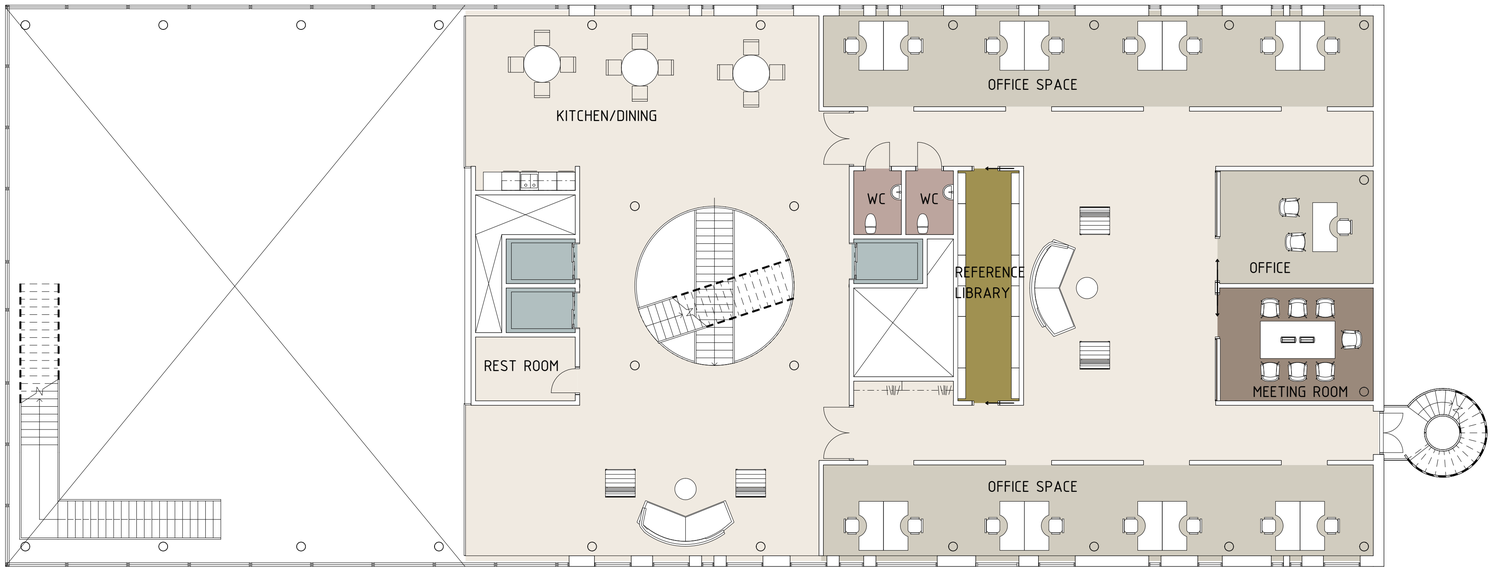

PRELIMINÄRHANDLING

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Husqvarna City Hall

Fastighetsbeteckning

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	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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1st floor

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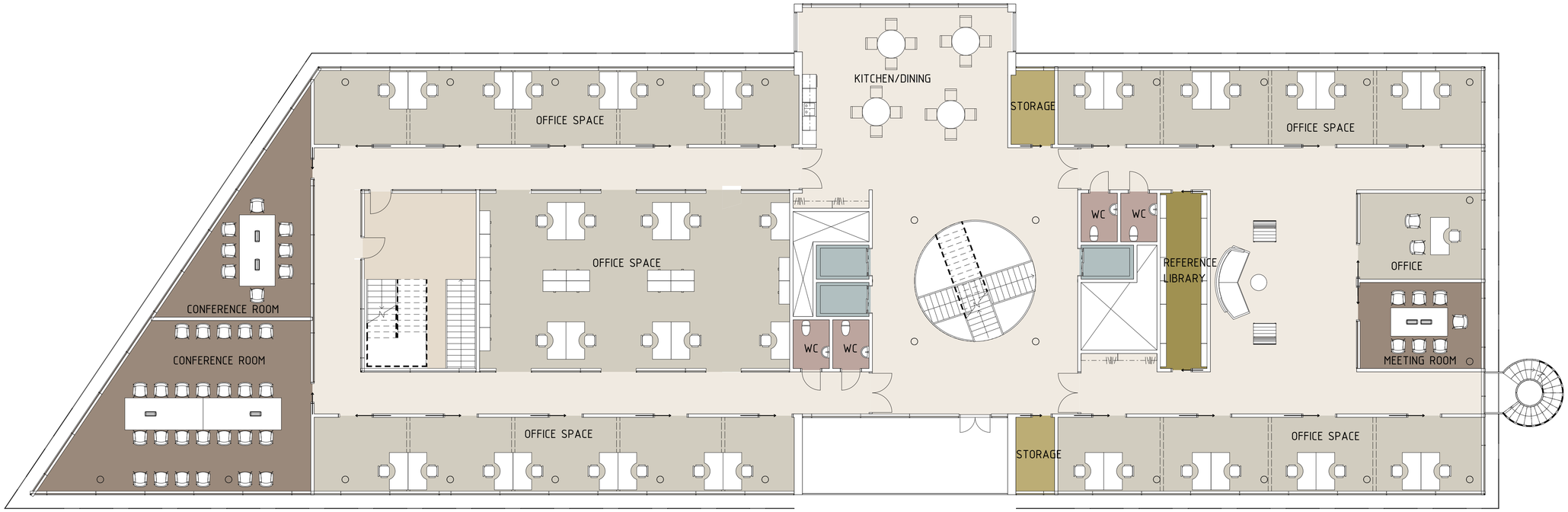

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Husqvarna City Hall

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DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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2nd floor

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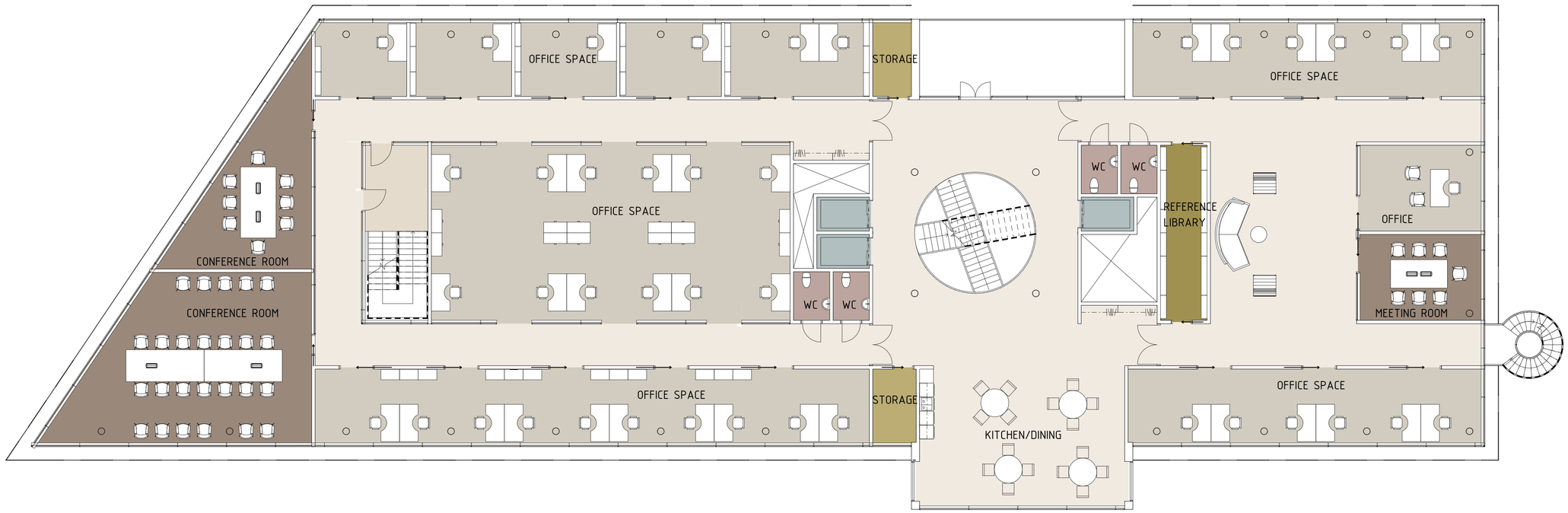

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Husqvarna City Hall

Fastighetsbeteckning

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	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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3rd floor

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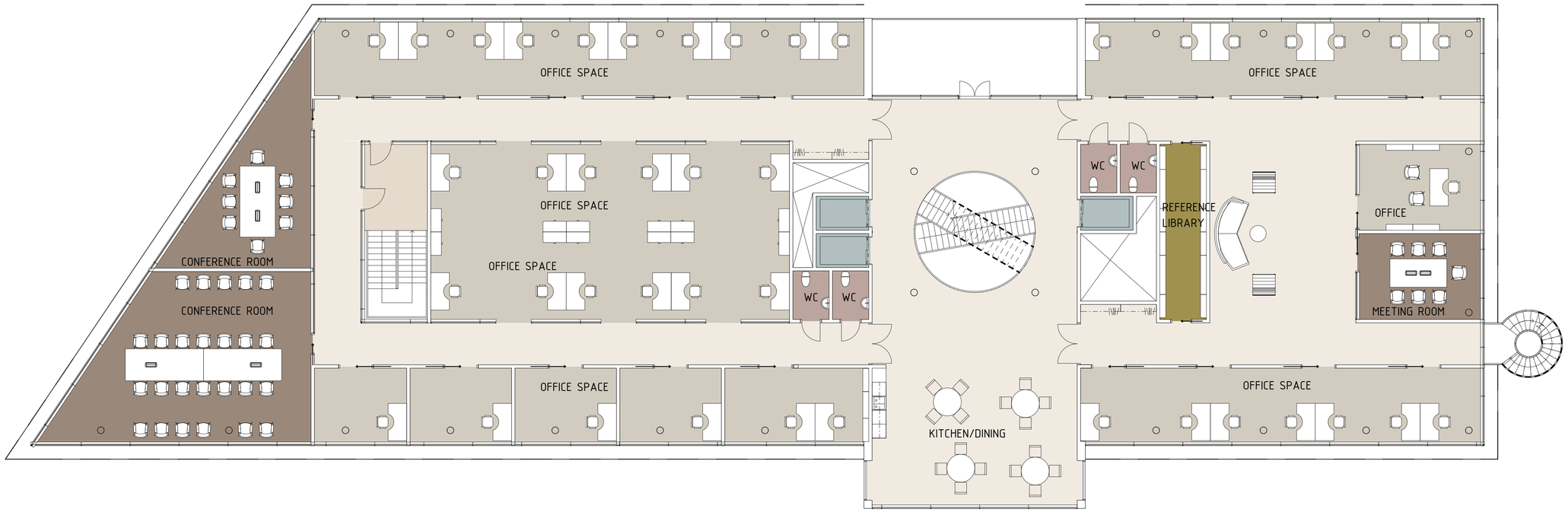

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Husqvarna City Hall

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	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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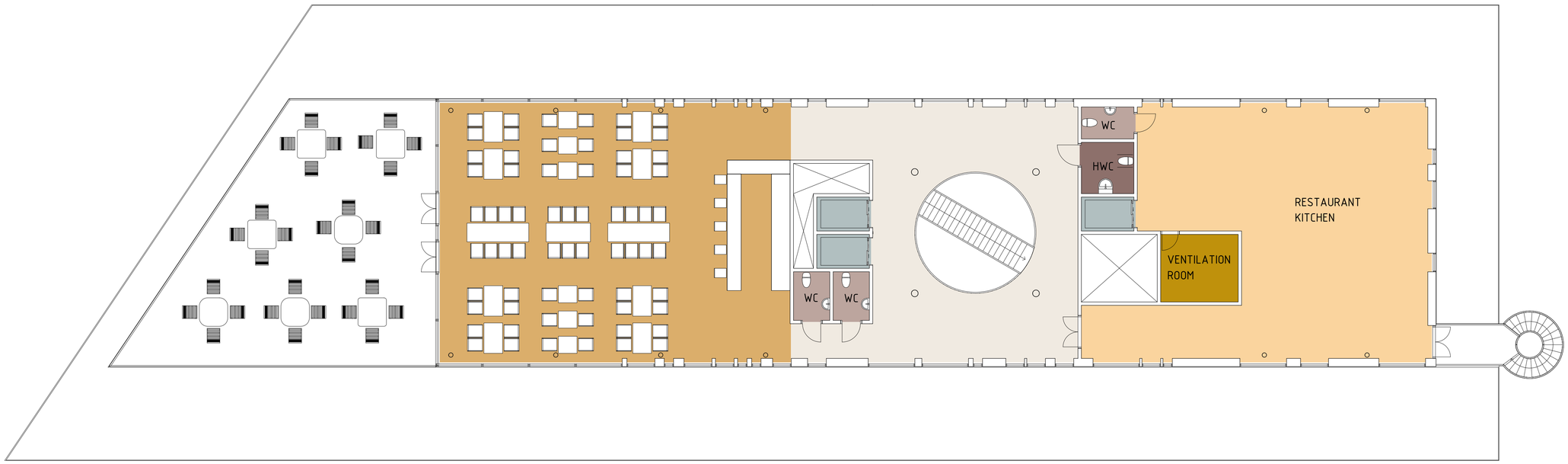

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Husqvarna City Hall

Fastighetsbeteckning

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	Group B14	G. Hellborg
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11/08/11	G. Hellborg	

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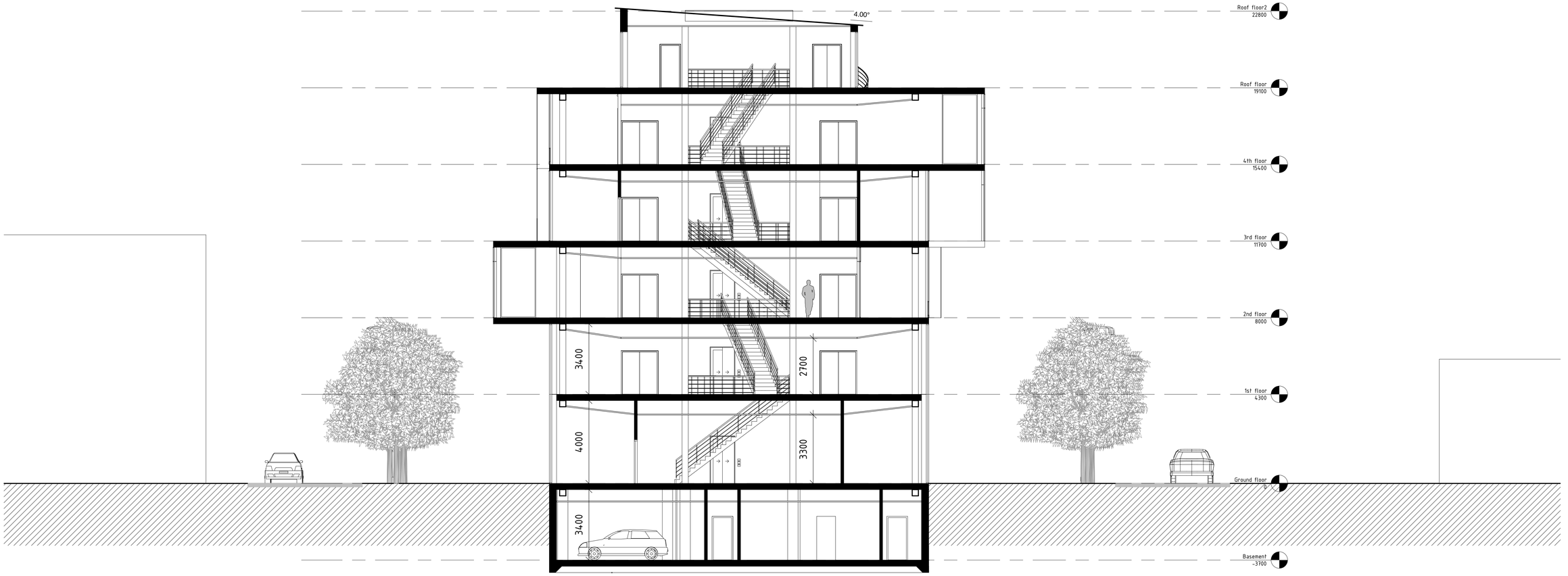

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Husqvarna City Hall

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UPPDRAG.NR	RITAD/KONSTR. AV	HANDLAGGARE
	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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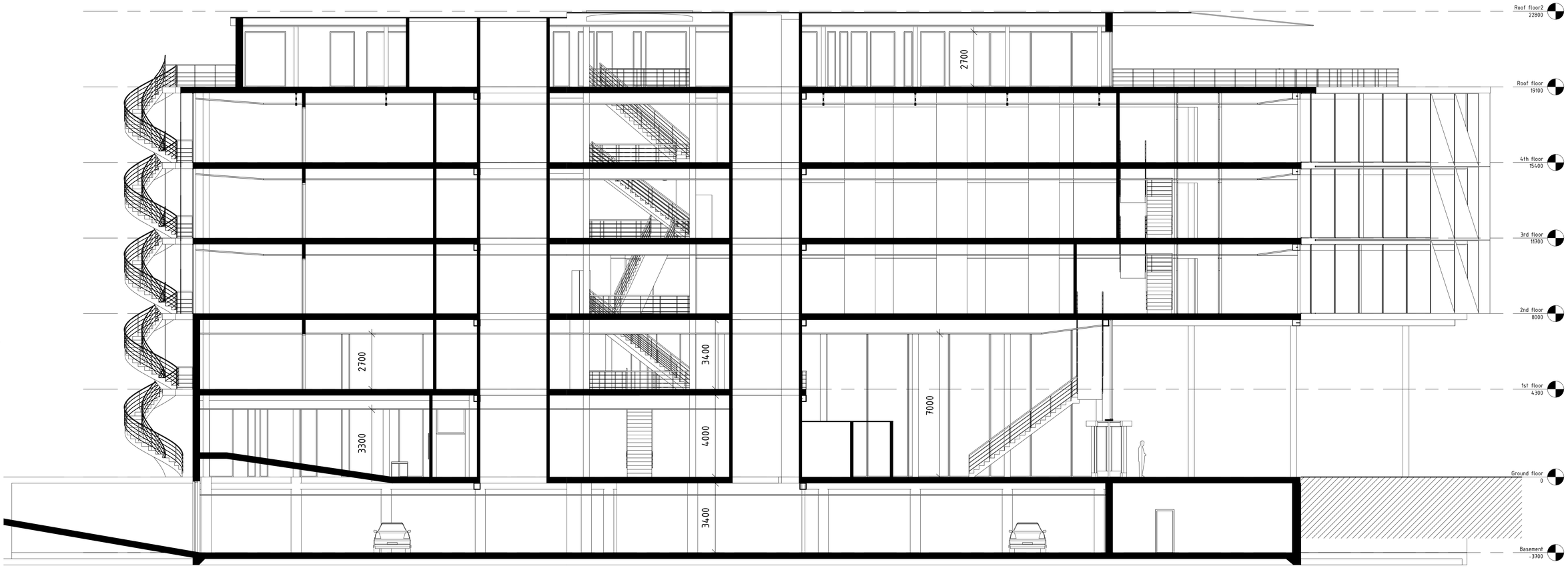

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Husqvarna City Hall

Fastighetsbeteckning

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11/08/11	G. Hellborg	

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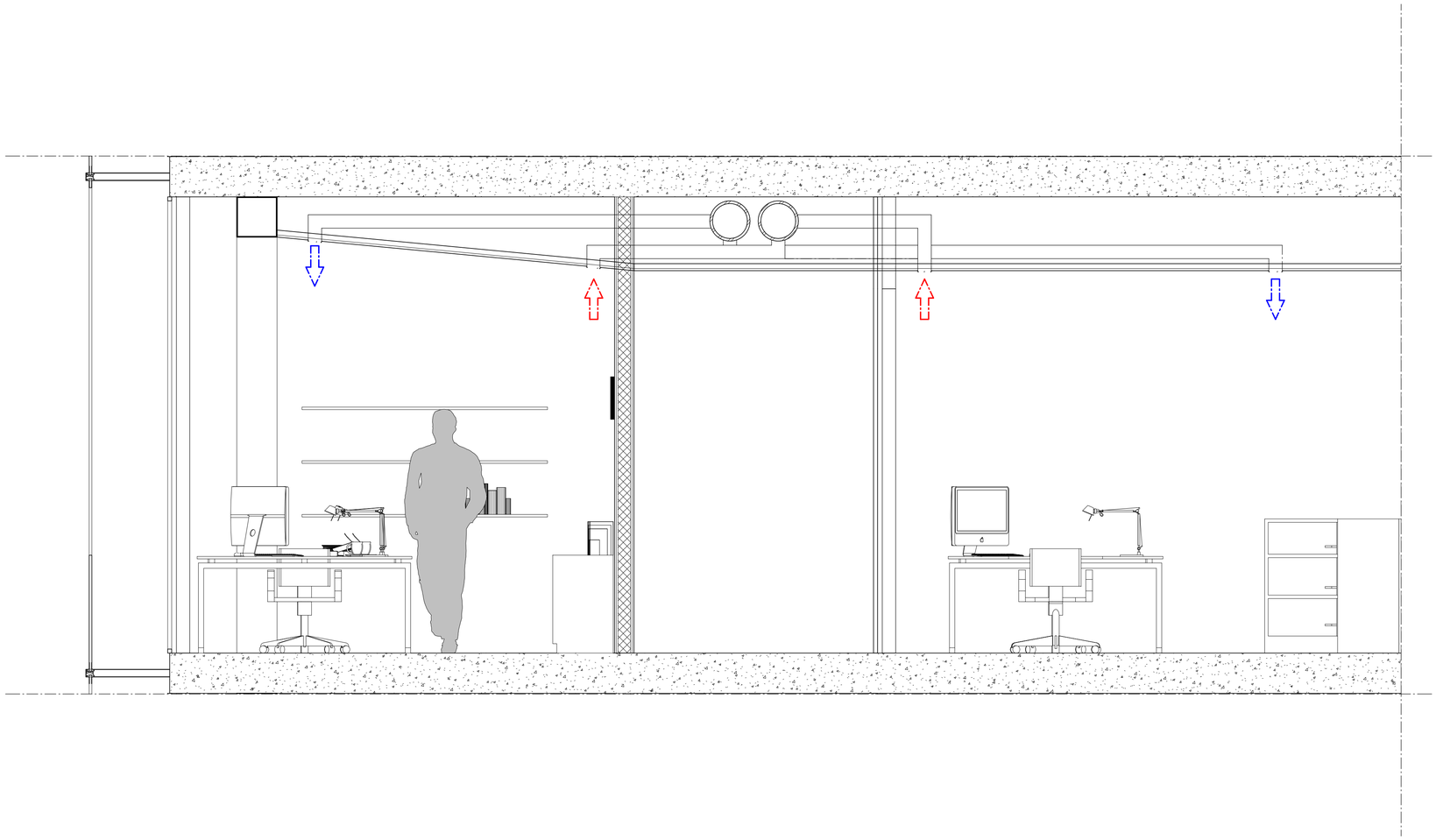

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Husqvarna City Hall

Fastighetsbeteckning

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	Group B14	G. Hellborg
DATUM	ANSVARIG	
12/06/11	G. Hellborg	

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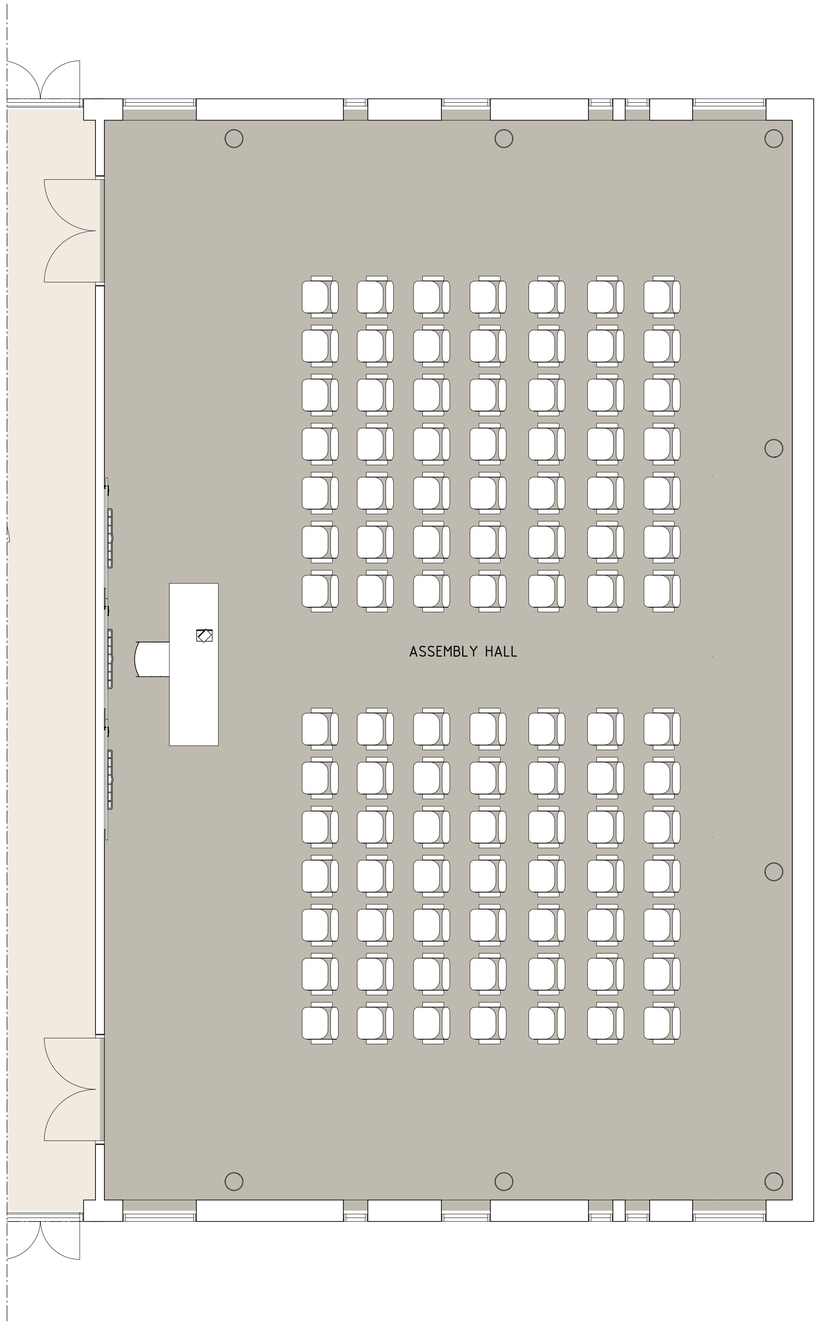

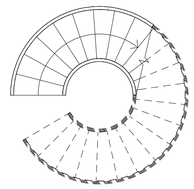

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Husqvarna City Hall

Fastighetsbeteckning

UPPDRAG NR	RITAD/KONSTR. AV	HANDLÄGGARE
	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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Assembly hall furnished plan

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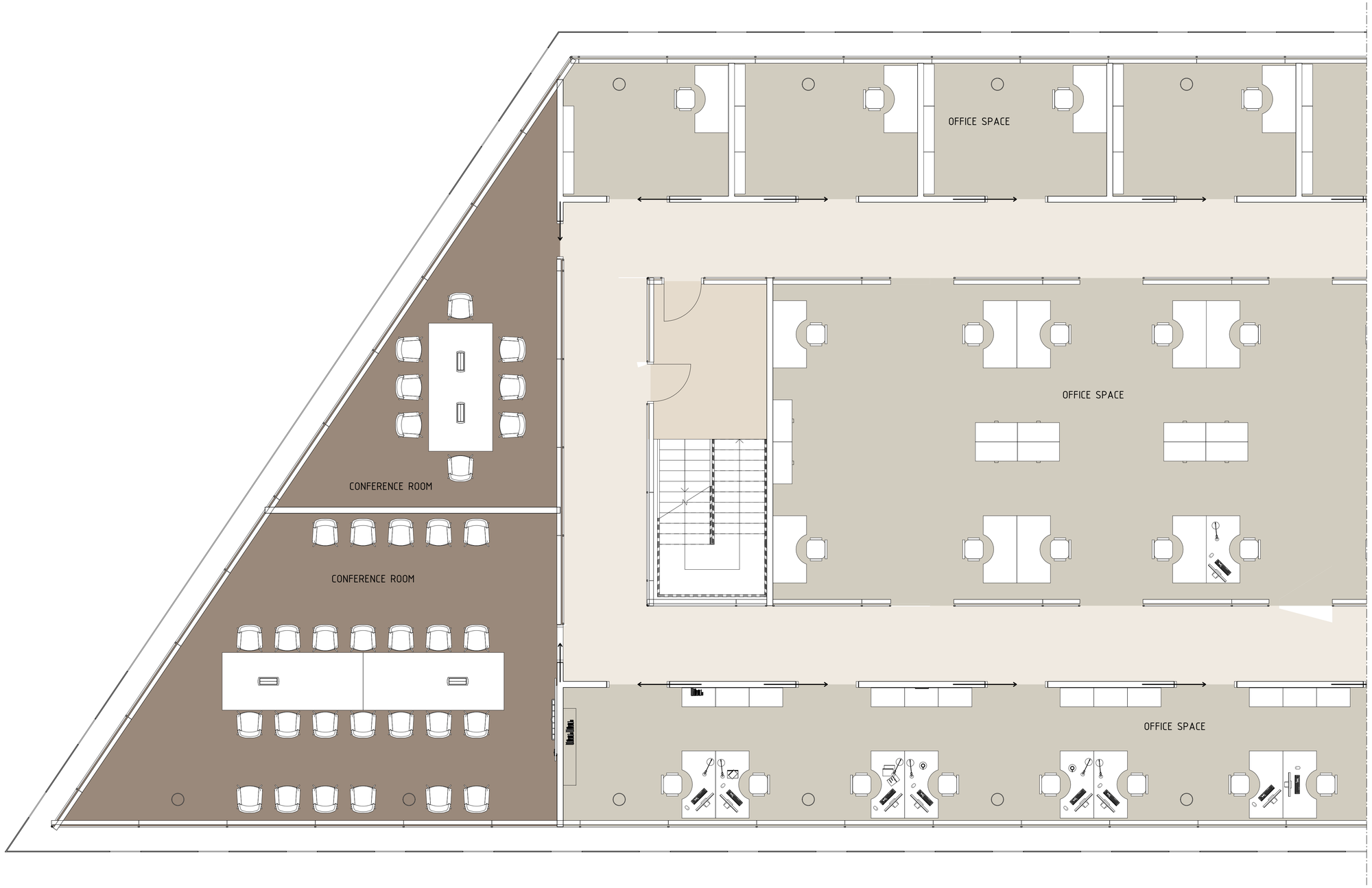

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Husqvarna City Hall

Fastighetsbeteckning

UPPDRAG NR	RITAD/KONSTR. AV	HANDLÄGGARE
	Group B14	G. Hellborg
DATUM	ANSVARIG	
11/08/11	G. Hellborg	

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3rd floor furnished plan

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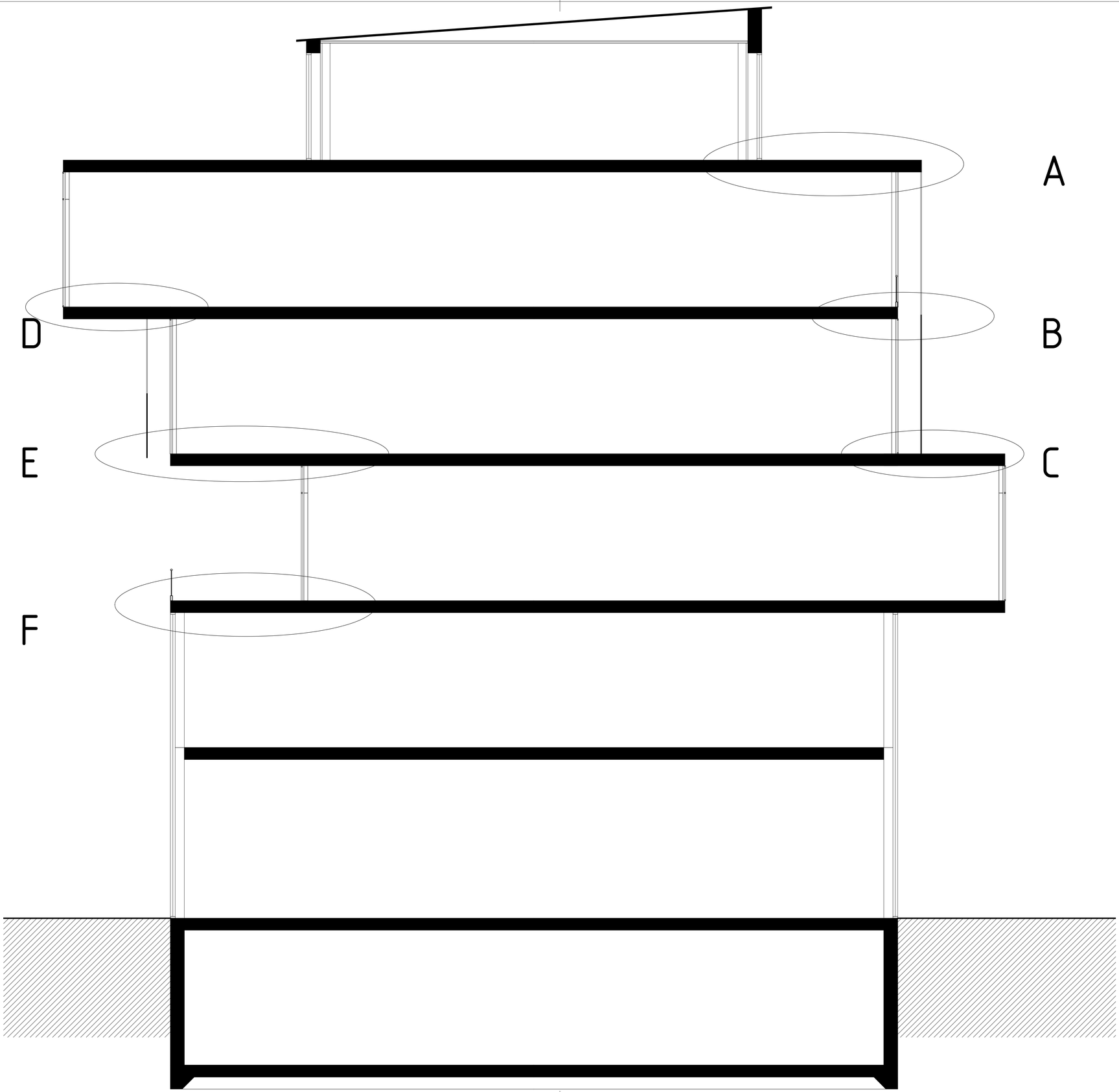

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Husqvarna City Hall

Fastighetsbeteckning

UPPDRAG.NR	RITAD/KONSTR. AV	HANDLAGGARE
	Group B14	G. Hellborg
DATUM	ANSVARIG	
12/08/11	G. Hellborg	

New Development
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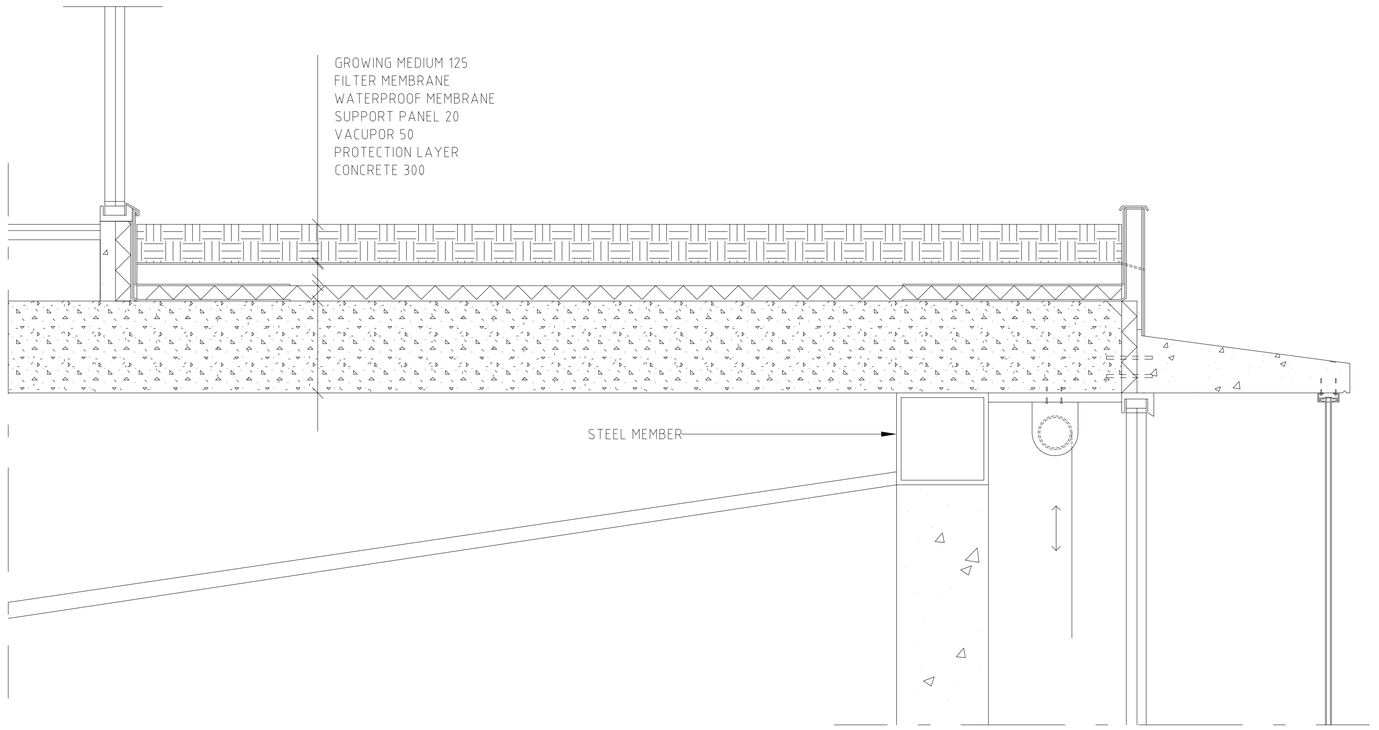
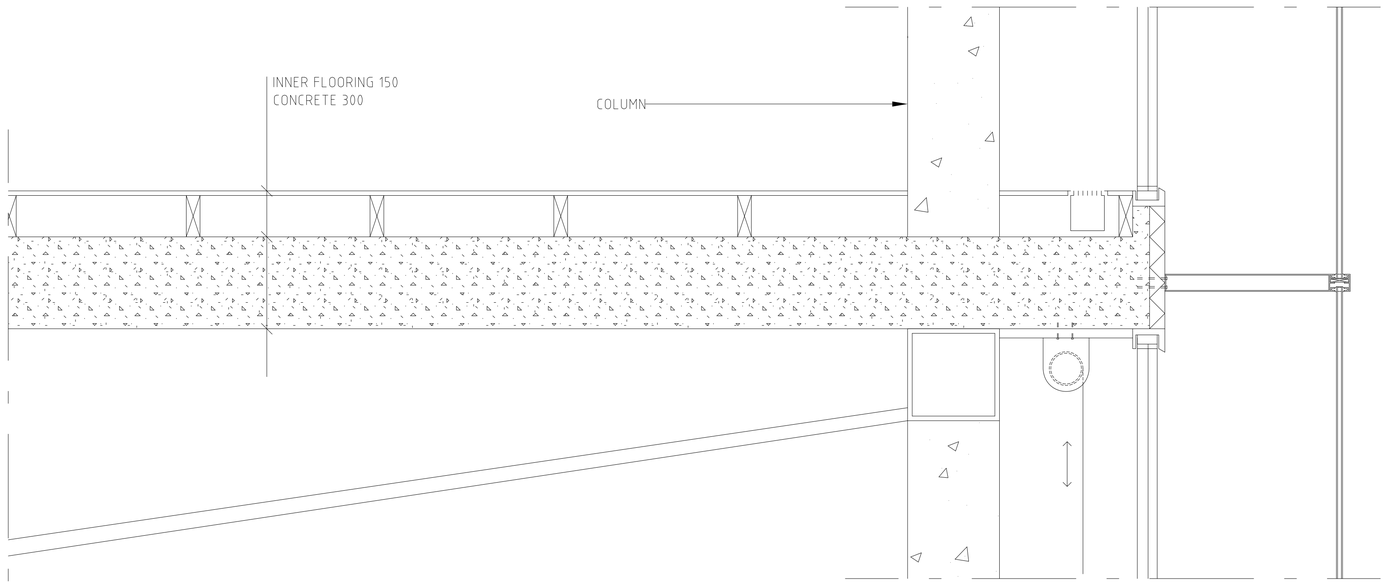


SECTION A



SECTION B

BET	ANT	ÄNDRINGEN AVSER	DATUM	SIGN

CONSTRUCTION DOCUMENT

OFFICE BUILDING
HUSKVARNA

UPPDRAG NR	RITAD/KONSTR AV	HANDLÄGGARE
	GROUP B14	GÖRAN H.

DATUM
2011-12-16

ANSVARIG

CONSTRUCTION DETAILS
FACADE SECTION A-B

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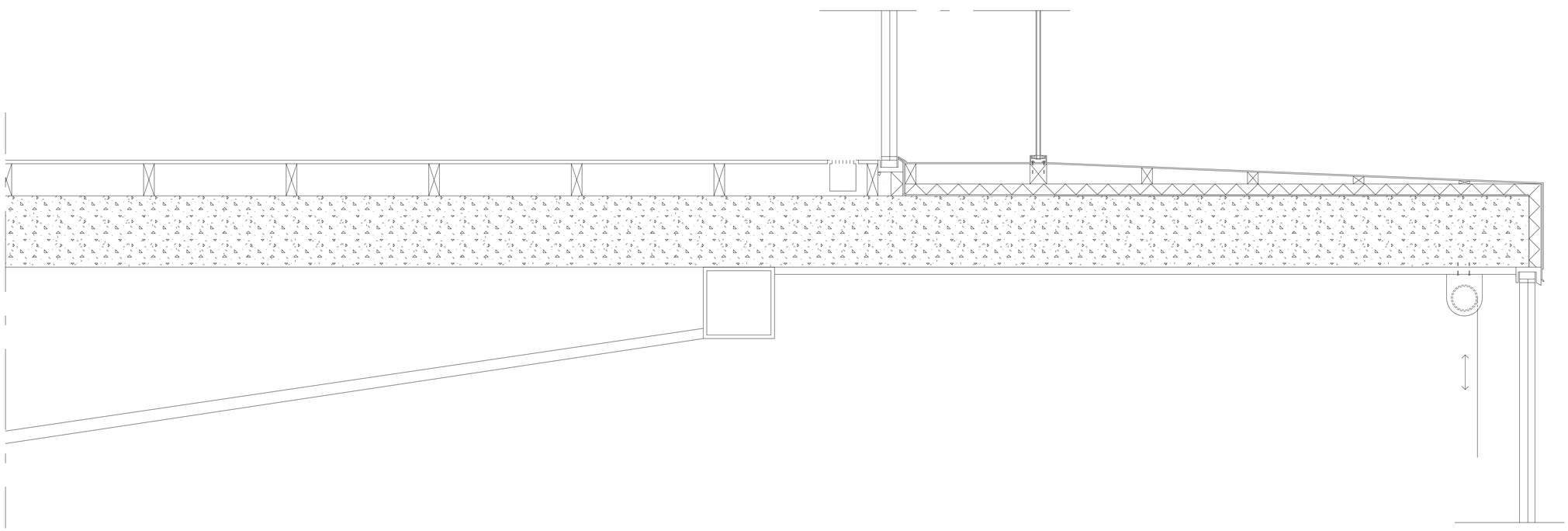
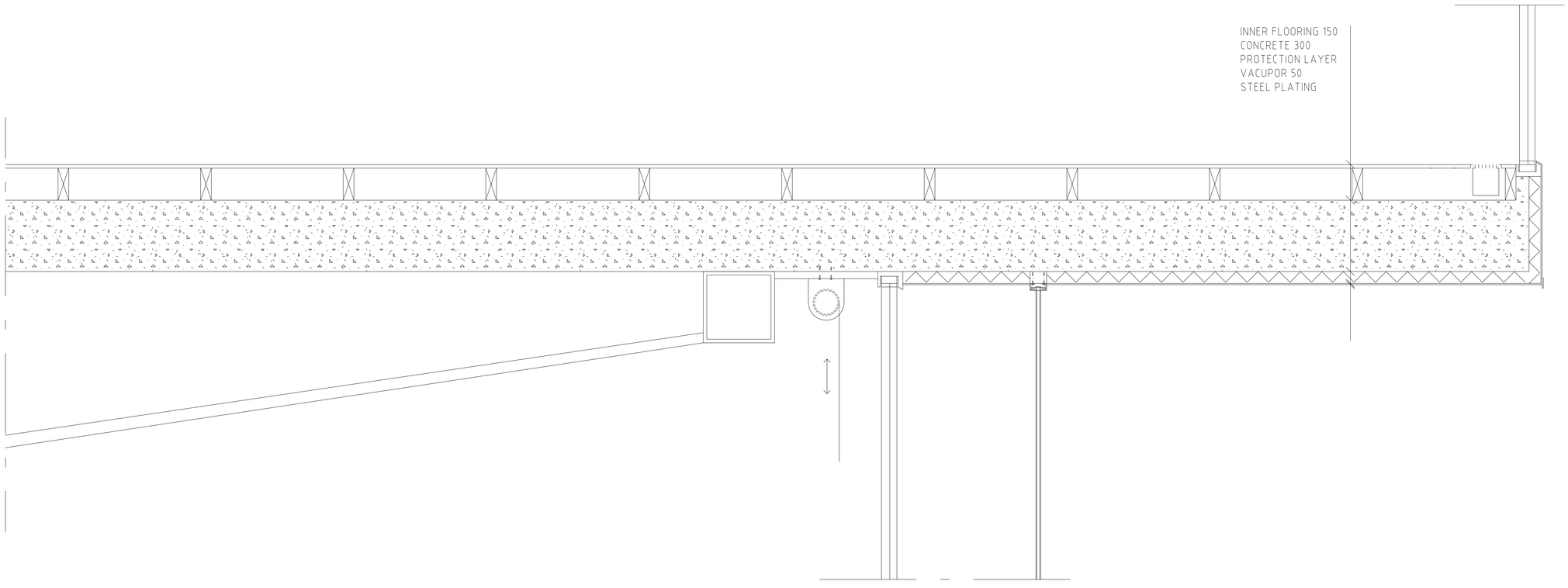


SECTION C

INNER FLOORING 150
CONCRETE 300
PROTECTION LAYER
VACUPOR 50
STEEL PLATING



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BET	ANT	ÄNDRINGEN AVSER	DATUM	SIGN

CONSTRUCTION DOCUMENT

OFFICE BUILDING
HUSKVARNA

UPPDRAG NR	RITAD/KONSTR AV	HANDLÄGGARE
	GROUP B14	GÖRAN H.
DATUM	ANSVARIG	
2011-12-16		

CONSTRUCTION DETAILS
FACADE SECTION C-D

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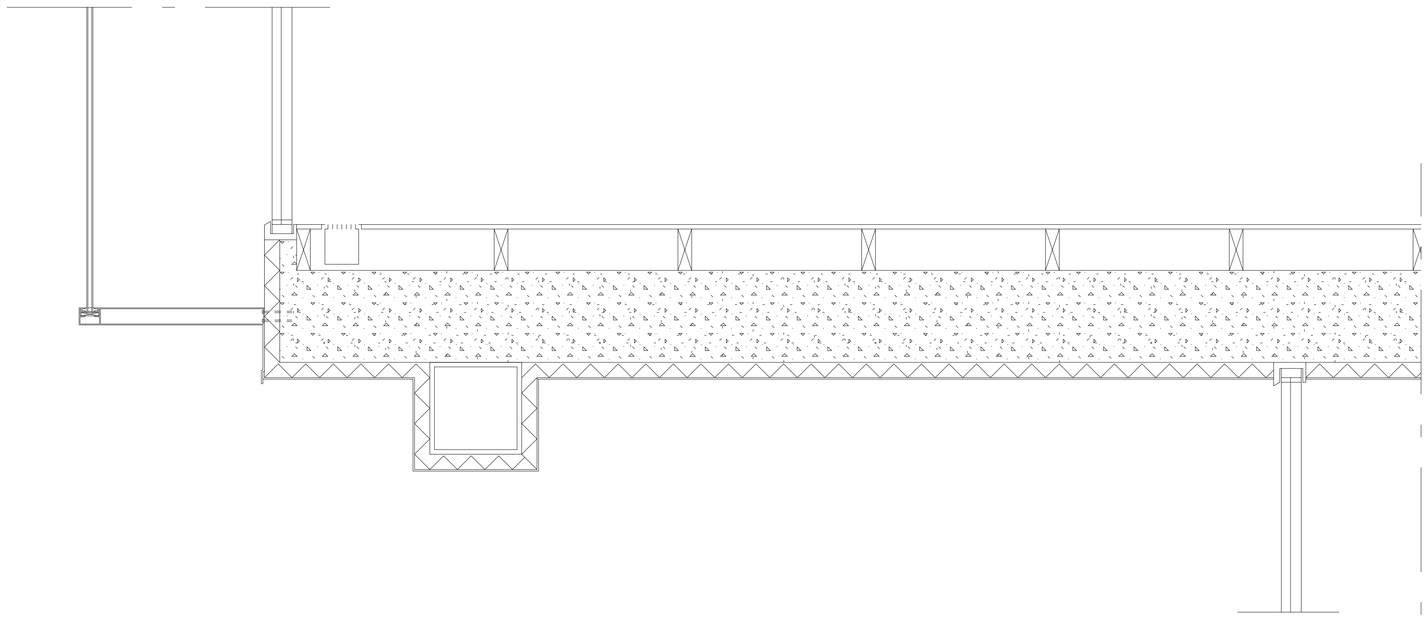

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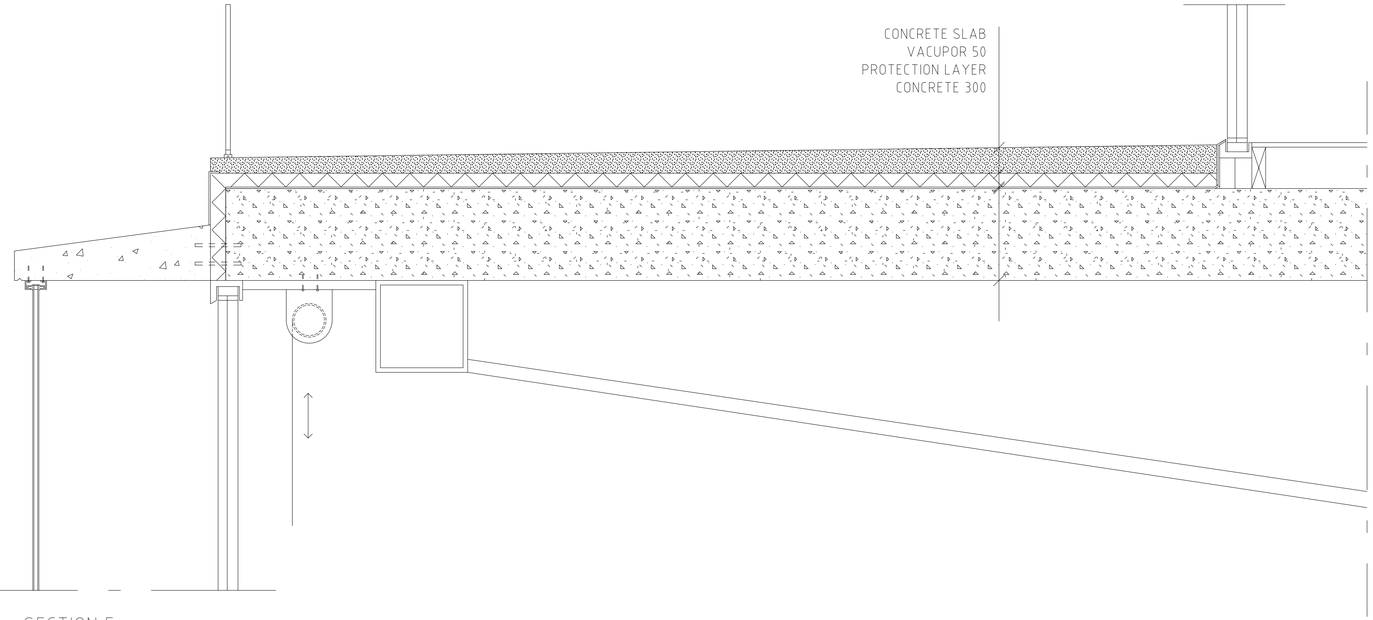

SECTION F

BET	ANT	ÄNDRINGEN AVSER	DATUM	SIGN

CONSTRUCTION DOCUMENT

OFFICE BUILDING
HUSKVARNA

UPPDRAG NR	RITAD/KONSTR AV	HANDLÄGGARE
	GROUP B14	GÖRAN H.
DATUM	ANSVARIG	
2011-12-16		

CONSTRUCTION DETAILS
FACADE SECTION E-F

SKALA	NUMMER	BET
1:10	K-27.0-103	

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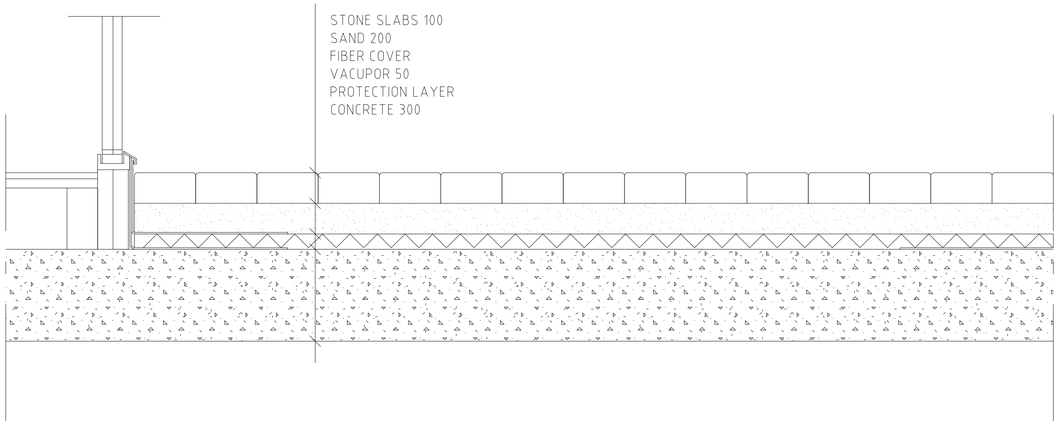
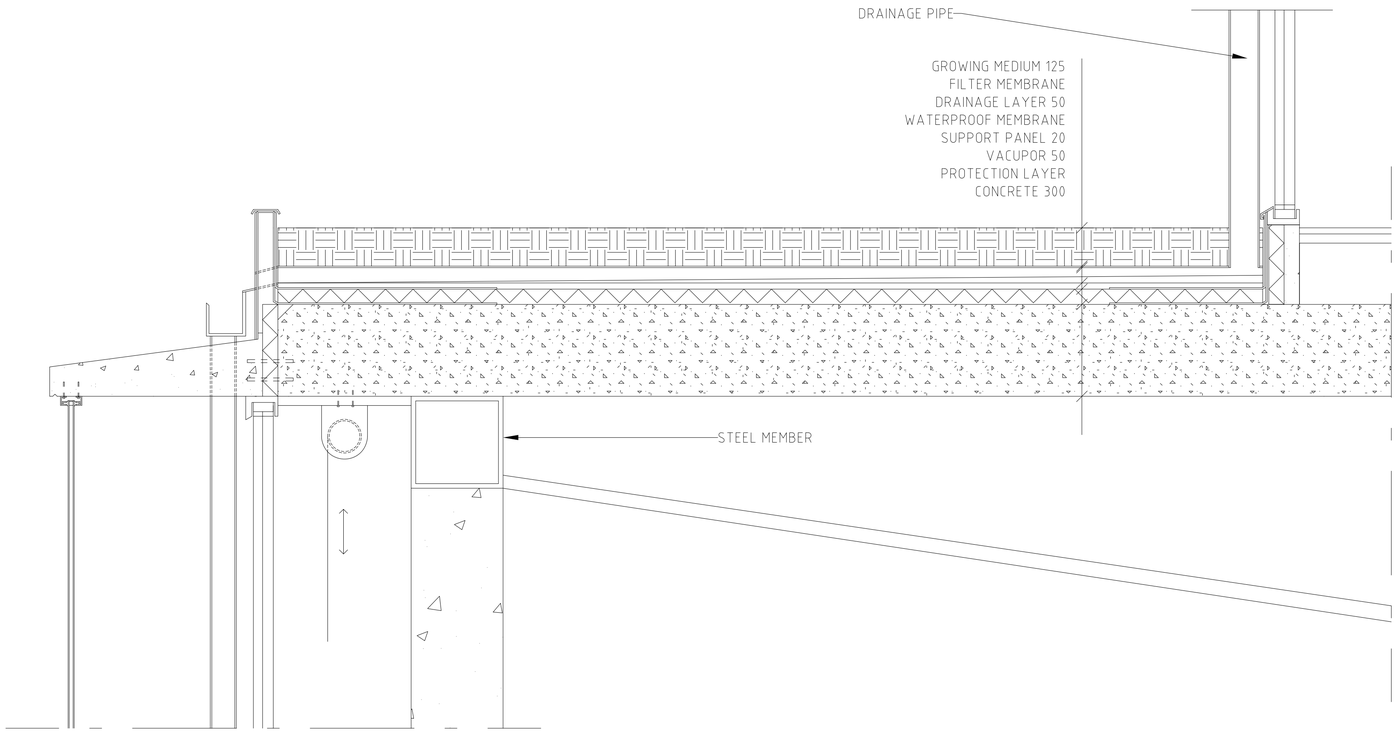
XREF RText (RText)

LAGER: SB11



ROOF TERRACE



SECTION A WITH DRAINAGE SYSTEM

BET	ANT	ÄNDRINGEN AVSER	DATUM	SIGN

CONSTRUCTION DOCUMENT

OFFICE BUILDING
HUSKVARNA

UPPDRAG NR	RITAD/KONSTR AV	HANDLÄGGARE
	GROUP B14	GÖRAN H.
DATUM	ANSVARIG	
2011-12-16		

CONSTRUCTION DETAILS
ROOF TERRACE

SKALA	NUMMER	BET
1:10	K-27.0-104	

XREF 20 Text (RText)

LAGER: SB11

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