Technical Elaboration

Business Office with Storage Shed

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Module: Superstructure Constructions

FOREWORD

As a building consultant in training, I have been asked to make a technical elaboration of an office building with storage shed to be built. This was done on behalf of the company Metropolis Packaging. My name is Nadia Monsengo, I live in The Hague and I am currently studying at the NCOI. I also work as a freelancer in the construction industry. My activities consist of making construction drawings, such as 3D drawings, floor plans, elevations, sections, detail drawings, site plans and revision drawings. In addition, I am occasionally involved as an advisor in construction projects. For this project, I was asked to make a technical elaboration with a Program of Requirements, detail drawings and explanation regarding various construction aspects.

Given that I am still studying, I experience this assignment as a unique opportunity to prove myself and show what knowledge I possess. It is also important for me to continue to grow and therefore gain as much knowledge as possible with each new assignment.

I would like to thank the organization for giving me a unique opportunity.

- Nadia Monsengo The
Hague, April 4, 2022

SUMMARY

Metropolis Packaging, a company specializing in reselling raw products from abroad, has commissioned the construction of an office building and storage warehouse. The buildings must be similar to the structure in the photo below and in accordance with other requirements of the client.

The client expects a technical elaboration of the new building to be constructed. The technical elaboration consists of the Program of Requirements, explanations and detailed drawings.

The report was realized by, among other things, researching various construction methods and materials. The information for the research comes from various sources, such as books by Jellema, the Basic Book of Architecture and various internet websites. The list of references can be found on the 11th page of this report. In addition to these sources, Youtube videos were also viewed, showing how building components are put together.

The result of the technical elaboration indicates the following two options:

1. Option 1: An office building with a curtain wall, hollow core slab floor and a storage warehouse consisting of a cavity wall, finished with natural stone tiles and a warm flat roof.

2. Option 2: The entire office building consists of a cavity wall with sand-lime brick as the outer leaf tongue and groove blocks and cellular concrete blocks as the inner leaf. The ground floor of sand-lime brick is at the second option replaced by a ribbed cassette floor and the roof has as an alternative a wide slab floor as roof construction, with a vapor barrier layer, insulation and roofing on top.

From this technical elaboration we conclude that the chosen materials and the building design are well in line with the client's requirements and that the chosen materials have been carefully considered. A recommendation from my side to the client is to opt for the first option: A office building with a curtain wall and a storage warehouse with a cavity wall. This is closest to the client's requirements and has a shorter construction time than the second option.

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INTRODUCTION

The client, an international import and export packaging company, is located in Zoetermeer. They are active in importing raw products from various regions and selling them in new packaging. The company's name is Metropolis Packaging. Because they are an international company and are growing, they have decided to have a building constructed in a location that is easily accessible from areas all over the world, namely Rotterdam.

The building to be constructed is comparable to a company office with a storage warehouse. The director of Metropolis Packaging has requested a technical elaboration of the new building. This technical elaboration consists of the following components: Construction method, floors, facades, roofs and facade openings. Each component has a description plus detailed drawings. With each choice made of the type of construction method, floor, facade, roof and facade openings, the choice is argued.

The purpose of this report is to provide a clear picture of how the building will be constructed.

The first chapter establishes a Program of Requirements for the shell and building envelope. The Program of Requirements also takes into account the final usage function of the building.

The second chapter explains the relationship between the different aspects of the superstructure, such as materials, construction costs, requirements, design and other aspects.

In the third chapter "Choice + Substantiation Construction Method", a decision is made about the construction method, floors, facades, roofs and facade openings to be used. A rationale is included with each decision.

When choosing construction method, floors, facades, roofs and facade openings in chapter 3, materials and other components related to sustainability are also taken into account.
Sustainability is central to the fourth chapter. Among other things, it describes how the health of the users, the environment inside, the environment in the area and the sustainability of the building material are taken into account.

A technical elaboration is not complete without details and a construction sequence. These can be found in chapter 5, along with a brief explanation. The detailed drawings belonging to this chapter can be found in the appendix.

The last chapter contains a description of 5 alternative details. The description emphasizes the differences. As in chapter 5, the detailed drawings of this chapter are also included in the appendix.

ELABORATION

CHAPTER 1: (TECHNICAL) PROGRAM OF REQUIREMENTS

This chapter provides an explanation of the requirements necessary for building an office space with a storage warehouse.

To build an office with a storage warehouse and to make the right choice regarding the construction method and usage, various components are involved. One of these components is the Program of Requirements. The Program of Requirements contains all the wishes and requirements of all stakeholders, which must be taken into account. For this project, the stakeholders are the client (Metropolis Packaging), the government (regulations), the users, and the environment (local residents). The Program of Requirements consists of the following:

- General requirements office area plus storage warehouse
- General requirements storage warehouse
- General Technical functions and requirements
- Functional and performance requirements per building component

The above requirements and wishes are shown in the tables in appendix 1

To know what the general technical functions and requirements are of the supporting structure and building envelope, it is also important to know what the permanent and variable loads are and how these are transferred to the load-bearing soil. The permanent and variable loads are transferred to the load-bearing soil layer via the columns, floors and foundation and are also shown in the tables in appendix 1. The general technical functions and requirements that follow from this are also in the same appendix. This also applies to the functional and performance requirements per building component. Other requirements relating to construction can be found in the Eurocodes, Building Decree, NEN Standards and National Assessment Guideline (BRL)
.

[1] Jellema 3, 2019. Supporting structure 3. ThiemeMeulenhoff

[2] Window Frames of Wood, z.d. This is how wood meets the technical requirements for window frames Accessed on 06-03-2022 from https://kozijnenvanhout.nl/zo-voldoet-hout-aan-de-techn

[3] A.H.L.G. Bone, 2021. Basic Book of Architecture. ThiemeMeulenhoff

CHAPTER 2: EXPLANATION OF COHERENCE

This chapter explains the coherence between various construction aspects with regard to the superstructure.

As mentioned earlier, the construction of a new building involves various components, such as program requirements, materials, construction method and more. These parts are interconnected. For example, a final design cannot be made without choosing a construction method.

Construction method: The industrial construction method is used for this project. Concrete and steel skeleton construction are applied. The girders for the roof construction consist of steel and the columns and floors of prefabricated concrete elements. A column structure has been chosen in connection with freedom and flexibility of the spatial layout.

Coherence

Roofs: The roof construction transfers internal and external loads to the girders and columns on the first floor and, in the case of the storage shed, the girders and columns on the ground floor.

Columns: Concrete columns are located on the ground floor and first floor of the office area columns. The columns connect the ground floor to the first floor and the first floor to the roof construction. In the storage shed, the columns run from the ground floor to the roof construction of the storage shed.

Floors: Channel plate floors are used for all floors. The ground floor of both building sections is a free-bearing floor consisting of insulated channel plate floors. The first floor is also a channel plate floor without insulation. This supports the columns, its own weight and other overlying loads. The ground floors support their own weight, the columns and other loads from the above construction.

Facade cladding: Taking into account the client's requirements, the facade of the office area chosen for a curtain wall and for the storage shed a cavity wall with natural stone (marble) as the outer leaf and sand-lime brick masonry blocks as the inner leaf. The curtain wall is not part of the supporting structure. The internal and external forces of the curtain wall are transferred via anchoring to the supporting structure.

Frames: The door and window frames in the curtain wall are also not part of the supporting structure. This is not the case with the cavity wall at the storage shed. Here, the window frames are fixed in the facade as a setting frame and mounting frame.
[4][5]

[4]Professor Nico Hendriks Msc, 2016. Lecture notes materialisation of the building envelope. Publisher unknown
[5]A.H.L.G. Bone, 2021. Basic Book of Architecture. ThiemeMeulenhoff

CHAPTER 3: CHOICE + JUSTIFICATION

Chapter 3 describes the choice made for the construction method, floors, facades and cladding, roofs and facade openings based on the Program of Requirements.

Construction method: As mentioned in chapter 2, an industrial construction method has been chosen. The most parts are prefabricated and assembled on the construction site. All columns are made of prefabricated concrete. These are spread on the inside of the building and run from the ground floor to the roof construction. The surface area of the columns and the number of columns depend on the weight that the columns carry and pass on to the floors and foundation. The columns are also equipped with reinforcement.

Roofs and roofing: A warm flat roof with a slope has been chosen. A flat roof is easy feasible, has no spatter forces and wind forces have little effect on the roof. However, it can [7] Echter kan het roof material lose its quality due to water or snow and dirt can arise due to residual water. The roof can therefore bend. This must be taken into account. Channel slab floors are used in combination with sandwich panels. A channel slab floor is often used for large spans, it has a light weight and because the floor is prefabricated, the assembly time is short. In connection with weight, it was decided not to add a screed to the channel slab floor. Instead, the electricity cables come between the roof construction and the ceiling.

IPE beams are used for the roof of the office. To take into account the construction speed, sandwich panels are also used here. The advantage of this is that they have high insulation values, it is stiff, flexible, demountable, durable, there is plenty of choice of coating and it is energy-saving. Sandwich panels from Falk Bouwsystemen have a length of 25 meters, a width of 1.1 meters and a maximum height of 0.18m (R-value of 7.10m^{2}K/W). The bottom of the panel contains trapezoidal profile plates and the top a waterproof roofing.

Facade, cladding and facade openings: The choice has fallen on a combination of curtain wall and cavity wall. The office area consists of a curtain wall and the storage warehouse consists of a cavity wall with natural stone as cladding.

Curtain wall: A curtain wall requires little construction material, which reduces costs. It provides a lot of light and there is a lot of choice in the type of profiles and colors. The construction can consist of steel, wood or aluminum. A self-supporting steel curtain wall has been chosen, because steel is a has greater strength than aluminum, it is detailed slenderly and it has a higher fire resistance than wood and aluminum. Of the type of curtain walls (stick and rail, element facade and ladder facade), the preference has been given to a ladder facade. This combines stick-and-rail and element facade combined. The advantage of this is that the curtain wall has no double styles and rails and that the parts are prefabricated, which shortens the working time. Windows and doors are mounted in the factory in the ladder.

Cavity wall: The cavity wall consists of an inner leaf of sand-lime brick (75 mm), EPS insulation (140mm), cavity (30mm), cavity anchors and natural stone slabs (30mm). The following applies to the insulation material

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[7] A.H.L.G. Bone, 2021. Basic Book of Architecture. ThiemeMeulenhoff

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Gevelrenovatie-info.nl, n.d. Curtain wall: Info & Prices. Accessed on 24-03-2022 from https://www.gevelrenovatie-info.nl/gevelbekleding/vliesgevel

J. Reijmers, A.F. van den Hout, F.Th van Gessel, Jellema 4A & 4B & 4C, 2011, Enclosure Performance Requirements Roofs Facades Facade Openings, Thieme Meulenhoff

that it must be properly connected to the anchors in connection with thermal bridges. The anchors that can be used for this are stainless steel 316/316TI anchors

Facade cladding: This consists of natural stone slabs. This was chosen because of the low maintenance costs, the durability and appearance that the material offers. In addition, it is largely non-combustible, resistant to weather conditions and retains heat well. There are different types of natural stone: Granite, marble, limestone, slate, quartzite, syenite, diabase, hard stone and sandstone. The choice fell on marble. Disadvantage: Marble is not acid-resistant and can be affected by acid rain.

Facade openings: Adjustable frames and mounting frames are used for the facade openings of the storage shed. In contrast to a traditional frame, a mounting frame is easy to replace and is not easily damaged. The facade openings are filled with casement windows and double doors. As mentioned earlier, the facade openings in the curtain wall are mounted in the factory in the ladder of the curtain wall.

Floors: There are different types of floors available on the market: wide slab floor,

pipe plate floors, climate floors, steel-concrete floors and many others. In connection with large spans and high load-bearing capacity, a hollow core slab floor with a screed of at least 50 mm has been chosen for both the ground floor and the first floor of the office, in which part of the pipes are processed. The hollow core slab floor on the ground floor has insulation on the underside. The floor can carry high loads and is available in thicknesses from 135 to 500 mm, in widths from 0.6 to 1.2 m and in lengths from 5 to 18 m. Given the surface area of the building to be built, this is the ideal floor type.

CHAPTER 4: SUBSTANTIATION SUSTAINABILITY Chapter 4 describes the sustainability of the materials. Concrete:

Concrete is a sustainable material. It lasts a long time, is recyclable, has a high

insulation value and is resistant to external loads. Because concrete is workable (it can be made stronger by adding raw materials), it is also flexible. It is also

sustainable because it is checked by certification bodies on aspects of sustainability.
[16][17]

Steel: Steel is sustainable because it is long-lasting and has little construction waste. It is recyclable and

currently more than 80% of steel is made from metal waste. It is therefore reused. The material retains the same quality. Due to the strength of the material, it is not necessary to use it in large quantities.

Aluminum: Aluminum (which is found in sandwich panels) is a sustainable material because it is net

like concrete and steel, it also has a long lifespan, approximately 60 years. Because it is used in many different products, both large and small, it is also recyclable. It has a long life cycle and the quality does not decrease when reused.

Insulation material: There are various sustainable insulation materials such as cellulose, EPS, BioFoam,

Kooltherm boards and shells. EPS insulation boards have been chosen for this building. It has a long lifespan and is fully recyclable. In addition, EPS is a material with a high

J. Reijmers, A.F. van den Hout, F.Th van Gessel, Jellema 4A & 4B & 4C, 2011, Enclosure Performance Requirements Roofs Facades Facade Openings, Thieme Meulenhoff

[15] J oost de Vree, n.d. Hollow core slab floor. Retrieved on 25-03-2022 from https://www.joostdevree.nl/shtmls/kanaalplaatvloer.shtml

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insulation value, so not much of it needs to be used. 2021

CHAPTER 5: DETAIL DRAWINGS

This chapter describes and draws the details. The drawings are in the appendix. In addition to the drawings, the construction sequence is also indicated in the appendix.

Detail 1: Roof edge and top of frame connection office area

Detail 1 consists of the roof edge and the top of the frame in the curtain wall.

Detail 2: Bottom of frame connection

The second detail consists of the bottom frame connection. The construction consists of a self-supporting curtain wall and is made up of a combination of mullion and transom construction and element facade (ladder construction).

Detail 3: Horizontal frame connection

The third detail consists of a horizontal frame connection. This is the same frame as the frame in detail 2. The construction sequence is the same here.

Detail 4: Bottom of frame, ground floor, foundation

Detail 4 concerns the connection of the bottom of a frame to the ground floor to the foundation.

Detail 5: Bottom of facade, ground floor, foundation

Detail 5 is the connection of the bottom of the facade on the left side of the building to the ground floor to the foundation. The construction sequence is the same as in detail 4. The only difference is that the curtain wall on this side of the building does not have a built-in frame, because this side of the facade has no entrance.

Detail 6: Roof edge storage shed

Detail 6 consists of a detail of the roof edge of the storage shed. This is a similar detail to detail 1. The only difference is the structure of the facade. The facade of the storage shed is a cavity wall finished with natural stone panels and consists of stacked inner leaf, vapor-permeable HR insulation board, waterproof layer, air cavity and natural stone facade panels.

Detail 7: Bottom of facade, ground floor, foundation

Detail 7 is also a detail of the storage shed, consisting of the bottom of the facade, ground

ground floor and foundation. The construction sequence is the same as detail 4. Here too there is a difference in the facade. Instead of a curtain wall, this also consists of an inner leaf of sand-lime brick, insulation, cavity and natural stone facade finish.

Detail 8: Horizontal connection office – storage shed

Detail 8 is a horizontal connection between the curtain wall of the office area and the cavity wall of the storage shed. The curtain wall of the office is mounted against the cavity wall by means of adjusting and mounting frames. A curtain wall is attached to the inner leaf of the cavity wall as an inner wall. This inner wall provides the separation between the office and storage shed.

Detail 9: Vertical section connection flat roof office – facade storage shed

Detail 9 is a vertical detail of the connection between the flat roof of the office and the curtain wall

Insulation-Facts z.d. Sustainable insulation materials. Accessed on 02-04-2022 from https//www.isolatie-weetjes.nl/isolatiematerialen/duurzame-isolatiematerialen/

[21] Kingspan z.d. Insulation boards Accessed on 02-04-2022 from https://duckduckgo.com/?q=eps+isolatieplaten+duurzaam&atb=v319-1&ia=web

(inner wall/partition wall) that extends to the roof of the storage shed. [22]

CHAPTER 6: DETAIL; ALTERNATIVE ELABORATION

Detail - Alternative 1: Roof edge and top of frame connection office area

The curtain wall has been replaced by a cavity wall consisting of sand-lime brick cladding blocks (outer leaf), 40 mm air cavity, cell glass block insulation and an inner leaf of cellular concrete blocks. The roof is still a warm roof, but instead of a sandwich panel, a wide slab floor is used for the roof construction.

Detail - Alternative 2: Bottom of frame connection

As mentioned in detail 1, the curtain wall has been replaced by a cavity wall. The frame at the curtain wall has a top-hung window and the frame at this detail does not. In addition, this frame consists of a subframe and mounting frame, which means that the mounting frame is mounted after the structural phase. In contrast to a curtain wall where the frame and glass are incorporated as a facade element in a ladder.

Detail - Alternative 3: Horizontal frame connection

What is mentioned in Detail - Alternative 2 also applies to this detail.

Detail - Alternative 4: Bottom of frame, GF floor, foundation

This detail shows that the hollow core slab floor with insulation has been replaced by a ribbed cassette floor. In addition, a curtain wall with a built-in frame has been replaced by a door frame that opens inwards.

Detail - Alternative 5: Bottom of facade, GF floor, foundation

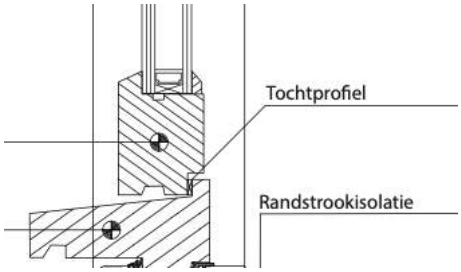
This detail shows a different view of the cavity wall and ground floor (ribbed cassette floor) discussed above. This detail shows that a floor ventilation duct runs from the outer leaf, through the cavity down to the bottom of the ground floor. The floor ventilation duct is necessary for ventilating the crawl space.

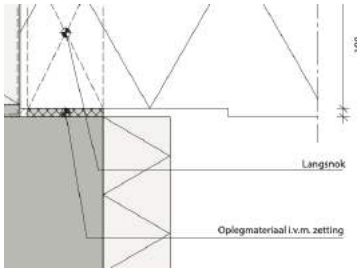
J. Reijmers, A.F. van den Hout, F.Th van Gessel, Jellema 4A & 4B & 4C, 2011, Performance Requirements Enclosure Roofs Facades Facade Openings, Thieme Meulenhoff

[23] A.H.L.G. Bone, 2021. Basic Book of Architecture. ThiemeMeulenhoff

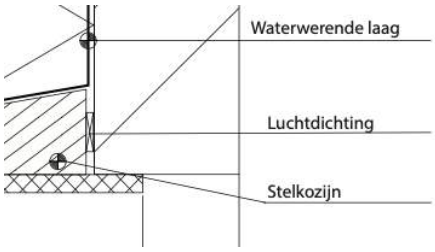
CHAPTER 7: DISPLAY POINTS FOR ATTENTION DETAILING

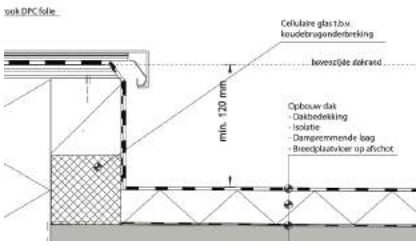
Below you will see a number of images that require extra attention:



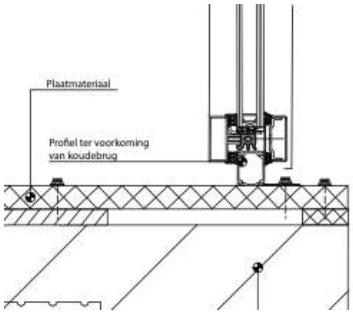


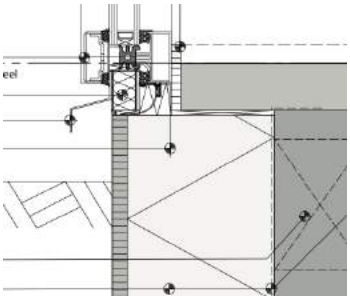
1. Draft profile in connection with sealing and insulating the frame. If this is not done correctly, drafts and possibly noise pollution can occur.
2. Support materials: There are different types of support materials such as rubber support, plastic supports and more. The correct support must be used in connection with shifts and deformations to be chosen. [24]





1. Air tightness: Extra attention must also be paid to this. Poor air tightness can namely prevent the following: More energy loss due to air leaks, drafts, unwanted noise, foul odors and fire propagation due to the presence of oxygen. [25]
2. Cellular glass: Extra attention must also be paid to cold bridges here.





1. Special profile for the attachment of the curtain wall (inner wall) to the inner leaf. This also requires special attention in connection with drafts, noise, etc. from the storage shed.
2. At the bottom of the curtain wall there is insulation between the curtain wall and the screed. This also requires attention to be paid. This can easily be overlooked.

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https://www.cementbouw.nl/divisie/betonmortel/duurzaam-beton/ https://www.betongoed.nl/blog/is-beton-duurzaam

https://www.joostdevree.nl/shtmls/kanaalplaatvloer.shtml https://www.gevelrenovatie-info.nl/gevelbekleding/vliesgevel

https://www.falkbouwsystemen.nl/nl/producten/dakpanelen/falk-1100-tr-3-platdak https://www.falkbouwsystemen.nl/nl/producten/dakplaten/geisoleerde-dakplaten

https://bcb-online.nl/?bouwdeel=beton%20c4555%7Ckolom%7Ccilinder%7Cvebo%7Ckl000400 https://kozijnenvanhout.nl/zo-voldoet-hout-aan-de-techn

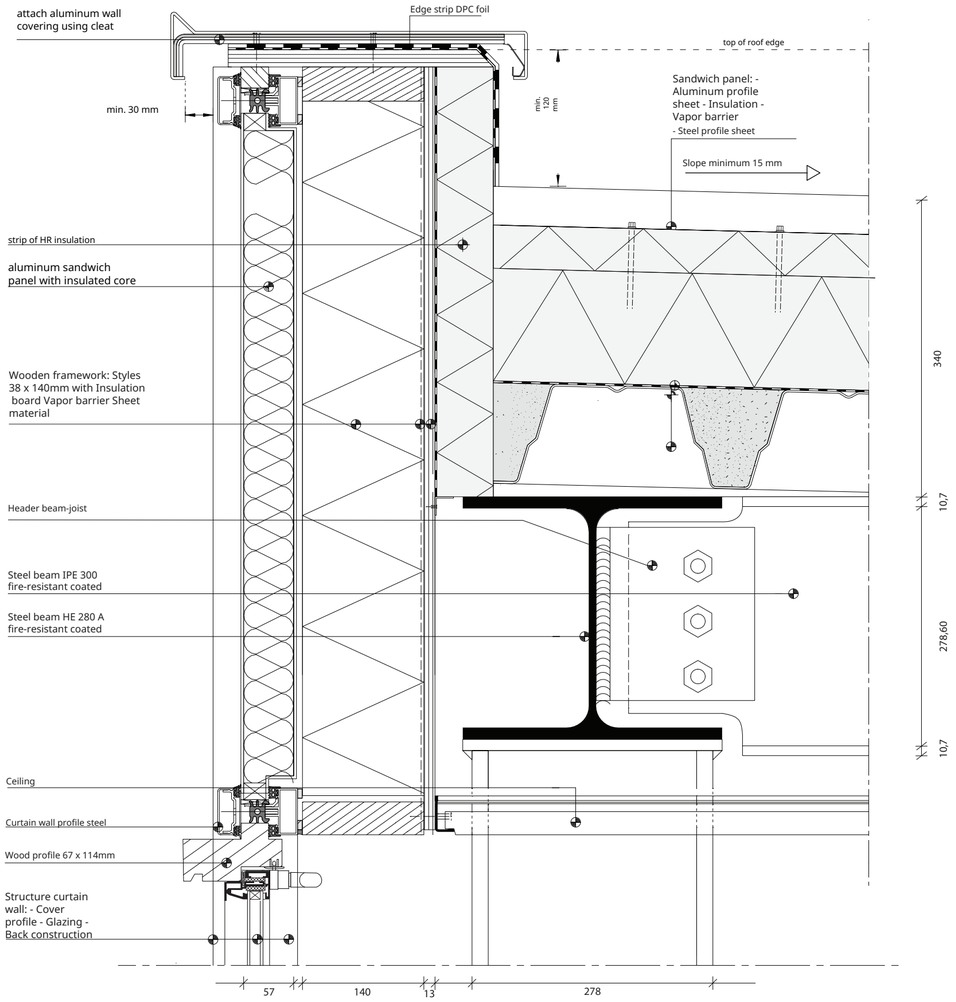
GENERAL REQUIREMENTS OFFICE AREA			
Ground floor: 16 x 16 m2		First floor: 16 x 16 m2	
Closed office room	2	Closed office space	1
Open office room	1	Open office space	1
Meeting room	2	Canteen + kitchen	1
Toilet	4	Presentation room	1
Meter cupboard	1	Light incidence	A lot
Archive space	1	Location	Rotterdam
Changing rooms/Locker room:	1		
Light incidence	A lot		
Location	Rotterdam		

PERMANENT LOAD	VARIABLE LOAD
Own weight construction	Personnel
Own weight non-load bearing	Machines
components and finishing materials	Appliances
Soil load	Goods
	Cars and vans
	Wind load
	Rain and snow

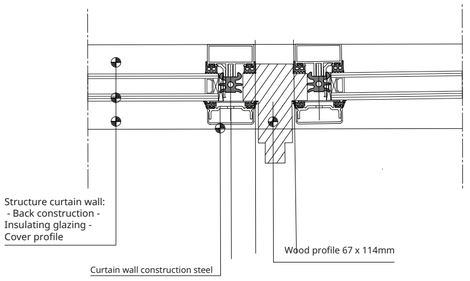
GENERAL REQUIREMENTS STORAGE WAREHOUSE			
Ground floor		Parking requirements according to NEN2443:2000 nl (perpendicular parking)	
Total area	25 x 25 m2	Width	minimum 2.4 m
Parking space area:	16 x 15 m2	Length	minimum 4.5/5 m
Storage space area:	9 x 10 m2	Total width parking area	minimum 16 m
		Street width for driving in	minimum 6 m wide
Light incidence: 50% less than light incidence in the office area			

GENERAL TECHNICAL FUNCTIONS AND REQUIREMENTS	
Moisture-resistant requirements	Construction must be watertight
	Construction must be resistant to moisture penetration (NEN 2778
	Construction must be vapor-tight.
	Construction (floor) must be airtight.
Heat insulating requirements	Construction must be energy efficient.
	Construction must meet the EPN (Energy Performance Standard)
	Thermal resistance must be at least 3.5 m2 K/W.
Fire resistance requirements	Construction must meet the requirements in the NEN standards
	Construction must be resistant to failure of its own weight.
	Fire resistance with regard to failure may be 30 minutes.
	Construction must be resistant to fire spread and flashover
	Fire resistance with regard to fire spread and flashover may be 30 minutes.
Sound insulating requirements	Sufficient mass with regard to airborne noise.
	No sound leaks
	Requirements according to the Building Decree Sound from outside may be max 40 dB(A).
Functional requirements	Building must be freely divisible.
	Load-bearing structure must have a lifespan of at least 50 years, according to the TGB 1990
	Building must meet the BENG requirements Casco must ensure stability and dimensional stability

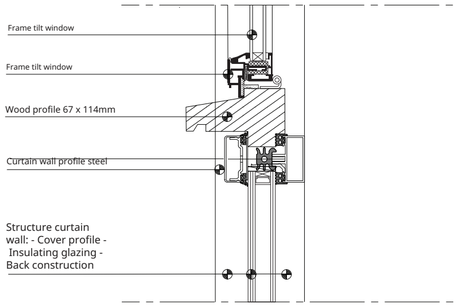
FUNCTIONAL AND PERFORMANCE REQUIREMENTS PER BUILDING	
COMPONENT Load-bearing structure	
Roof construction	- Transfer loads to columns on the first floor
Columns 1st floor	- Transfer the above loads to the first floor floor.
	- Transverse dimension must be equal to or greater than 350mm, with fire resistance of 120 min
	- Reinforcement distance must be greater than or equal to 57 mm
Floors 1st floor	- Transfer the above loads to columns on the ground floor
	- Function as a separation between the ground floor and first floor of the office area.
	- Maximum permissible stress for office = 2.5-3.5 kN/m2
	- Concentrated load for office = 3.0kN
Columns Ground floor	- Transfer the above loads to the ground floor floor
	- Transverse dimension must be equal to or greater than 350mm, with fire resistance of 120 min
	- Reinforcement distance must be greater than or equal to 57 mm
Floors ground floor	- Transfer the above loads to the foundation
	- Must be airtight
	- Resist deflection
	- Thermal resistance of at least 3.5 m2 K/W
	- According to Building Decree, Rc = minimum 2.5 m2
	- Crawl space height is at least 0.7m
	- Crawl hatch is at least 0.5x0.8 m.
	- Maximum permissible stress for office = 2.5-3.5 kN/m2
	- Concentrated load for office = 3.0kN
Foundation	- Transfer all the above loads to the load-bearing soil layer
	- Must be sufficiently stiff so that it is resistant to deformations.
	- Must be resistant to groundwater, soil from outside, animals and plants.
	- The load-bearing capacity of the building must not exceed the load-bearing capacity of the soil
	- No unequal or many large settlements may take place
	- The soil under the foundation must not be compressed too much. - Length of concrete piles must not be greater than 70 x shaft diameter.
Load-bearing structure	
Roof covering	- Must be able to be recycled.
	- Must be waterproof/rainproof
	- Must comply with NEN 6063:2019 nl Determination of the fire hazard of roofs.
Facades	- Function as a separation between the office area and storage warehouse
	- Must be ventilated.
	- Must be vapor-tight.
	- Must have a thermal resistance of at least 3.5 m2 K/W
	- Facades must be sound-insulating. Sound load from outside may be max 40 dB(A).
Frames	- Maximum 1.65 W/(m2xK) U-value
	- Fire resistance = 30 or 60 minutes
	- Burglar-proof
	- Sound load of maximum 35 dB
Exterior doors	- Maximum 1.65 W/(m2xK) U-value



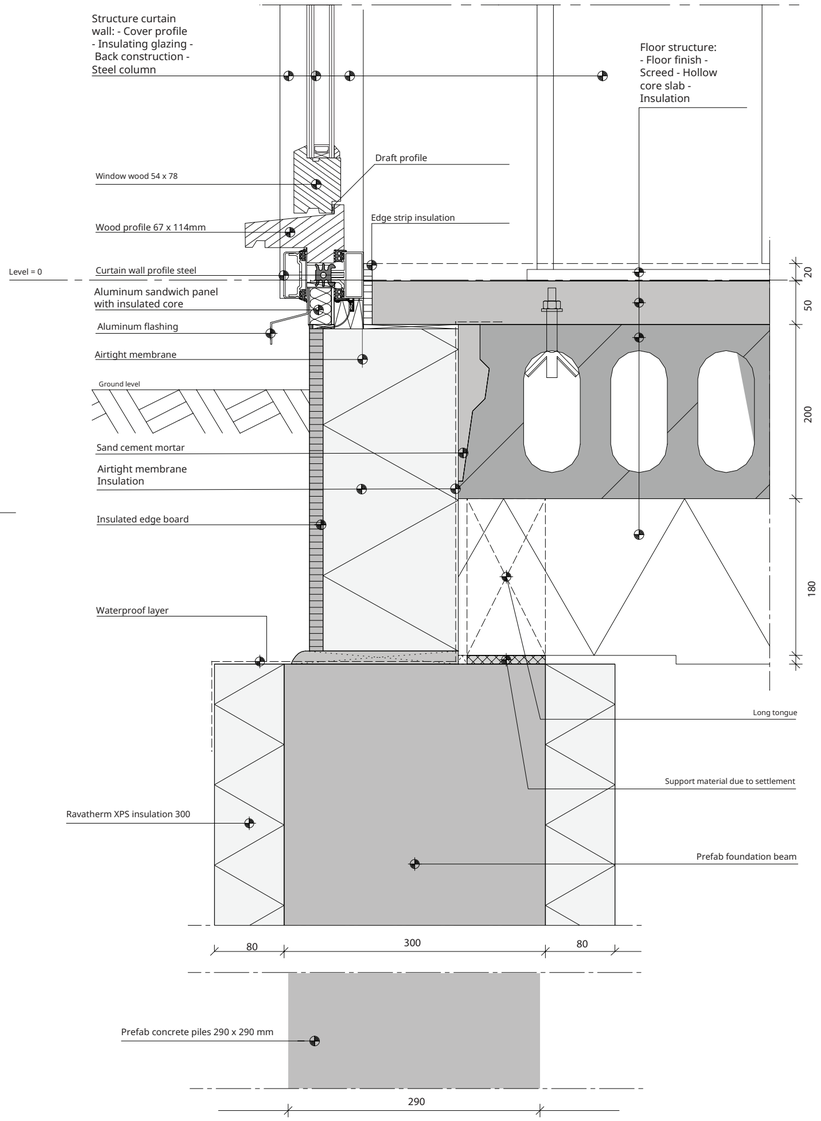
Detail 1: Roof edge and top frame connection office area



Detail 3: Horizontal frame connection



Detail 2: Bottom frame connection



Detail 4: Bottom frame, GF floor, foundation

Construction sequence Detail 1:

1. Curtain wall connects to the back construction, the floor.
2. Top of curtain wall is provided with wooden framework with insulation and vapor barrier covered with a sheet material.
3. Steel HE 280 A beam is mounted to the steel column
4. IPE 300 beam is then mounted to the

HE 280 beam by means of a header beam.

5. Insulation strip is applied against the sheet material.
6. Sandwich panels are applied to the beams.
7. A vapor barrier and an aluminum are placed on top of the curtain wall wall covering attached
8. Vapor barrier at the wall covering extends to the insulation strip
9. Finally, ceiling panels are mounted to the underside of the beams.

Construction sequence Detail 2:

1. The ladders of the curtain wall are with rule, frame and glass in a factory together put as element facade.
2. It is mounted on the construction site against the underlying construction.
3. Rules are applied between the ladders. brought.
4. In this, other glass and panels are then applied. These are with a clamping strip screwed into the profile.
5. Finally, the cover caps are on the clamping strips clicked.

Construction sequence detail 3 (same as detail 2):

1. The ladder work is with rule, frame and glass in a factory assembled.
2. It is fixed on the construction site against the underlying construction.
3. Rules are applied between the ladders.
4. In this, other insulating glass and panels are then applied and with a clamping strip in the profile screwed against the back construction.
5. Finally, the cover caps are on the clamping strips clicked.

Construction sequence detail 4:

1. Prefab concrete piles driven into the ground.
2. Place prefab foundation beams with insulation on piles.
3. Install pipes for sewerage and electricity in the crawl space.
4. Place long tongue
5. Place hollow core slab with insulation on the foundation beams.
6. Fill joints with sand cement mortar
7. Place waterproof layer against the floor and foundation
8. Mount insulated edge board against the floor.
9. Place curtain wall with a built-in frame on the insulated edge board.
10. Apply edge strip insulation against curtain wall.
11. Then apply screed and finish the floor.

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HOUSE OF GIZA

Architecture & Design

Project:	Office building with storage shed
Project number:	26052022
Drawing number:	1/5
Drawing name:	Detail drawing 1: Roof edge and top frame connection office area Detail drawing 2: Bottom frame connection Detail drawing 3: Horizontal frame connection Detail drawing 4: Bottom frame, GF floor, foundation
Scale:	1:5
Date:	26-05-2022
Format:	A3
Client:	Metropolis Packaging

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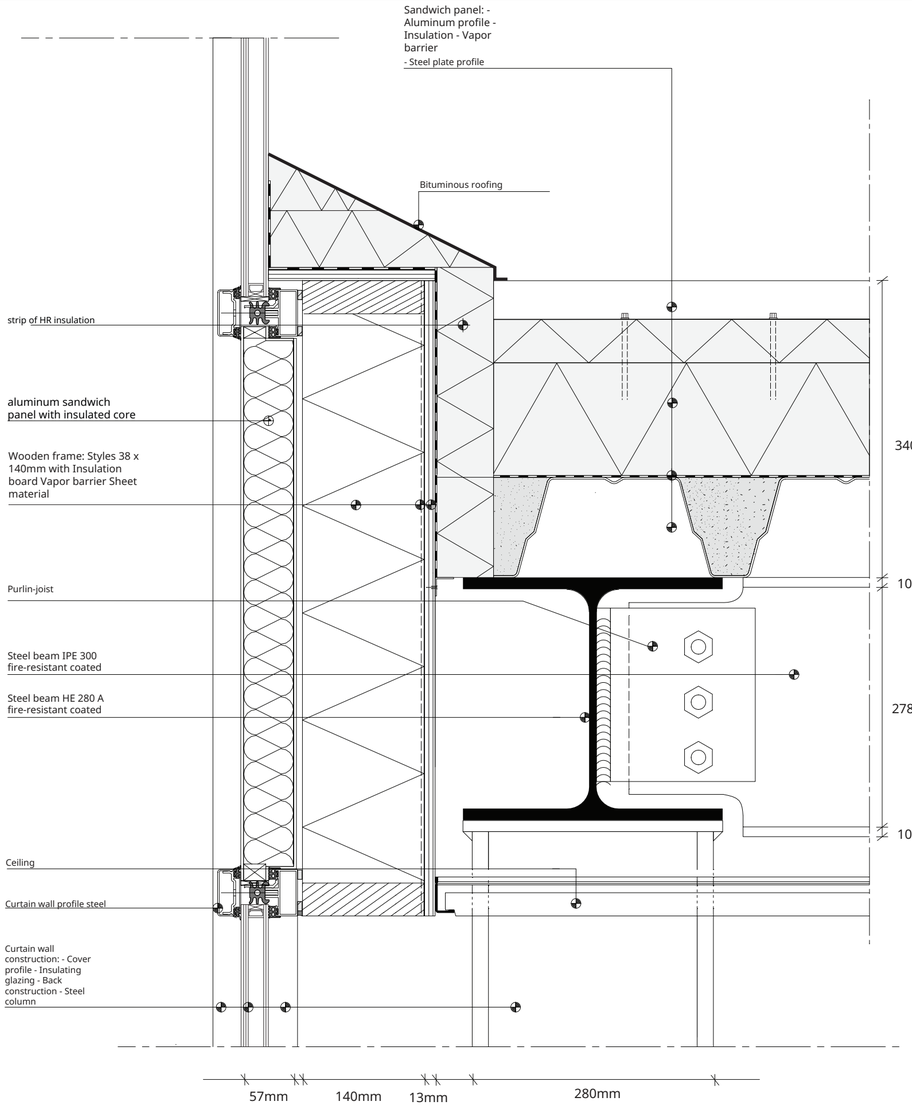
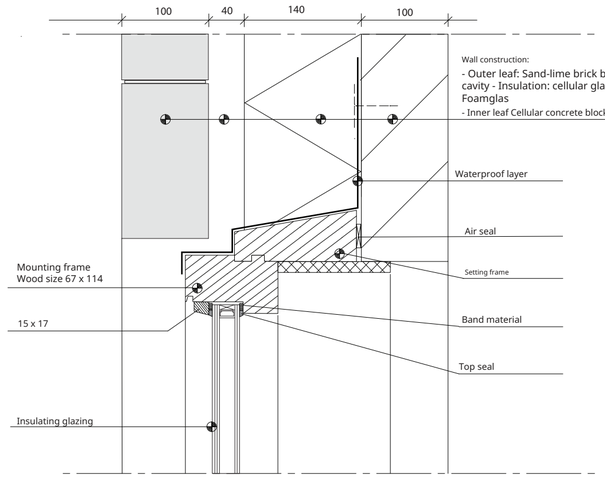
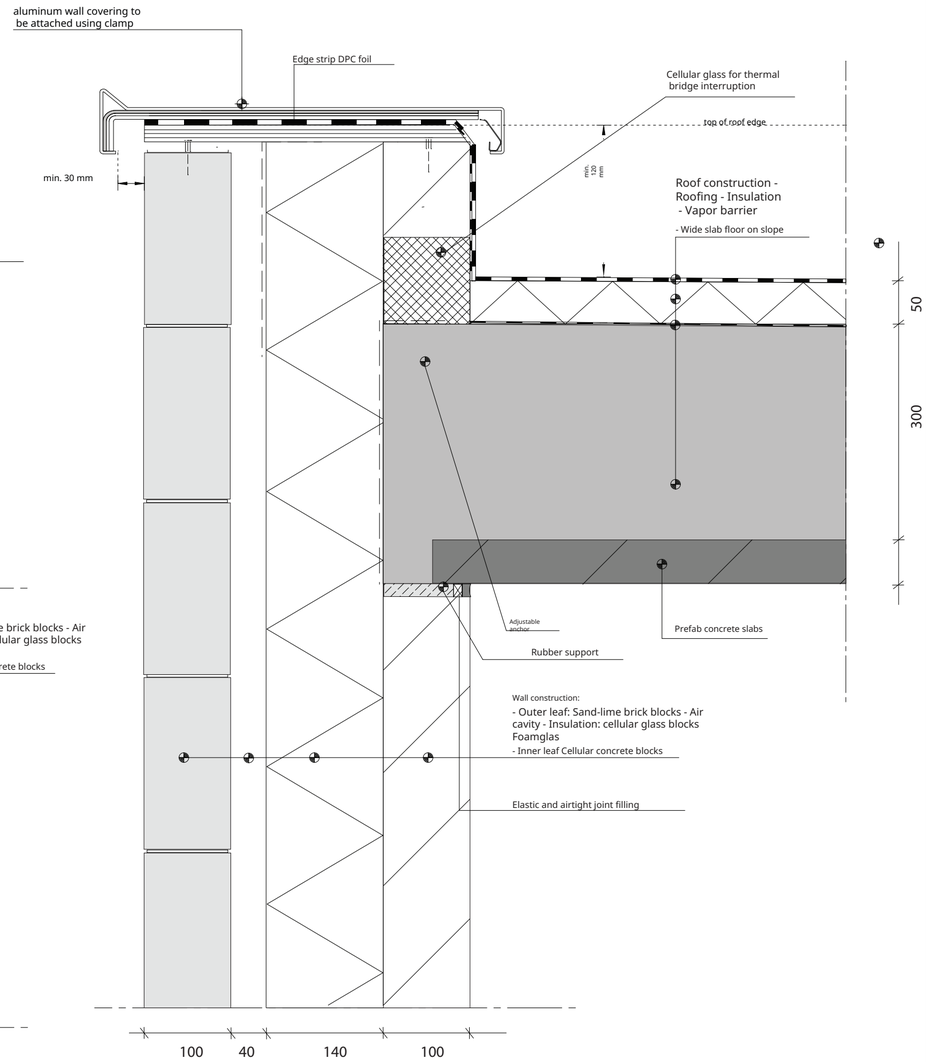


Detail 9: Vertical cross-section flat roof connection office – facade storage shed



Detail-Alternative 2: Bottom window connection



Detail-Alternative 1: Roof edge and top window connection office area

Construction sequence Detail 9:

1. This curtain wall (inner wall) also connects to the construction (the floor) and is higher in this part than the other curtain walls (rising wall).
2. Curtain wall extends to the roof of the storage shed. (Not visible in this detail)
3. The curtain wall, at roof height of the office area, is provided with a wooden frame with insulation and vapor barrier covered with a sheet material. The vapor barrier extends to the rising curtain wall.
3. Steel HE 280 A beam is mounted to the steel column
4. IPE 300 beam is then mounted to the HE 280 beam by means of a purlin.
5. Insulation strip is applied against the vapor barrier.
6. Sandwich panels are applied to the beams.
7. Additional insulation material is applied to the wooden frame and vapor barrier.
8. The bituminous roofing is glued to the insulation material with special glue.
9. Finally, ceiling panels are mounted to the underside of the beams.

Construction sequence Detail-Alternative 1:

1. Cellular concrete blocks (inner leaf) are bricked together.
2. A rubber support and wide slab floor are placed on the inner leaf: The prefab concrete slabs of 50 mm thick + lattice girders are made in the factory. A concrete layer is poured on the prefab concrete slabs on the construction site.
3. The wide slab floor is covered with a vapor barrier
4. The insulation is attached to the inner leaf and the wide slab floor. A vapor barrier is placed against it.
placed.
5. A cellular glass is placed on the wide slab floor to interrupt thermal bridging.
6. The inner leaf is finished on top of that.
7. Outer cavity wall consisting of sand-lime brick blocks is stacked on top of each other.
8. Then a vapor barrier, insulation and roofing are mounted on the wide slab floor.
9. The vapor barrier extends to the wall covering. An edge strip of DPC foil is placed on the wall covering.
placed.
10. Finally, an aluminum wall covering is attached with a clamp.

Construction sequence Detail-Alternative 2:

1. Cellular concrete blocks (inner leaf) on each other bricklaying.
2. The setting frame is placed against the inner leaf attached
3. Then the waterproof layer and insulation placed.
4. The outer leaf is further bricked and mounted via wall ties.
5. Finally, the mounting frame is attached after the structural phase.

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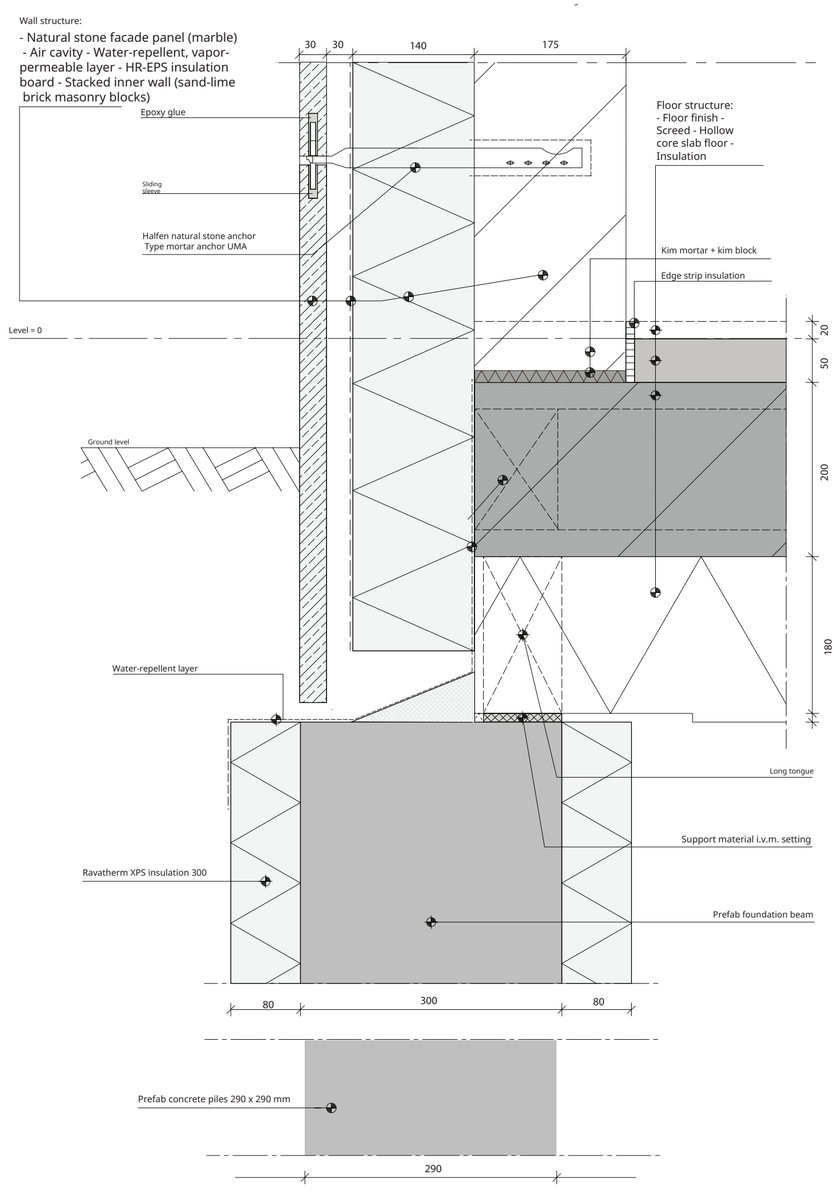
HOUSE OF GIZA

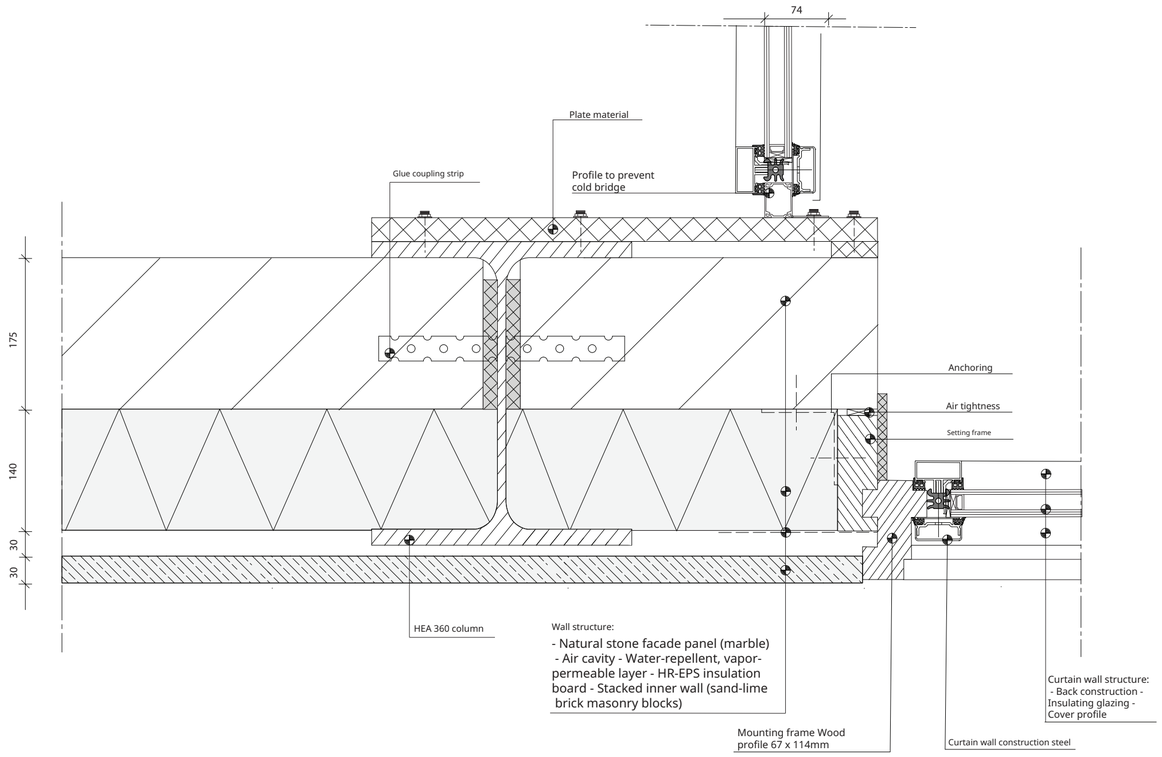
Architecture & Design

Project:	Office building with storage shed
Project number:	26052022
Drawing number:	4/5
Drawing name:	Detail drawing 9: Vertical cross-section flat roof connection office – facade storage shed Detail drawing-Alternative 1: Roof edge and top window connection Detail drawing-Alternative 2: Bottom window connection
Scale:	1:5
Date:	26-05-2022
Format:	A3
Client:	Metropolis Packaging

0 5 30



Detail 7: Bottom facade, GF floor, foundation



Detail 8: Horizontal connection office – storage shed

Construction sequence detail 7:

1. Drive prefab concrete piles into the ground.
2. Place prefab foundation beams with insulation on piles.
3. Install pipes for sewerage and electricity in the crawl space.
4. Place support material and long tongue
5. Place hollow core slab floor with insulation on the foundation beams.
6. Kim mortar and kim block are placed
7. Inner wall is bricked.
8. Water-repellent layer is attached against the foundation and the floor.
9. An edge strip insulation is placed on the inside against the inner wall, in connection with the expansion and/or contraction of the screed.
10. Then screed is poured. Once it is dry, the floor is finished.
11. In the meantime, insulation + water-repellent vapor-permeable layer is applied from the outside.
12. Finally, natural stone plates are mounted for the outer leaf by a natural stone anchor.

Construction sequence detail 8:

1. Build inner wall of sand-lime brick
2. Attach HEA columns between the sand-lime brick masonry blocks by means of glue coupling strips
2. Mount insulation by means of anchoring
3. Attach setting frame and air tightness
4. Apply water-repellent vapor-permeable layer against the insulation and setting frame
5. Mount natural stone panels with natural stone anchors (the natural stone anchors are not visible in this detail)
6. Mount curtain wall inner wall against inner leaf via special profile intended to prevent any cold bridge and plate material.
7. Attach mounting frame to setting frame.
8. Plate material is mounted against the setting frame and inner leaf.
9. And finally, the curtain wall is mounted in the mounting frame.

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HOUSE OF GIZA

Architecture & Design

Project:	Office building with storage shed
Project number:	26052022
Drawing number:	3/5
Drawing name:	Detail drawing 7: Bottom facade, GF floor, foundation Detail drawing 8: Horizontal connection office – storage shed
Scale:	1:5
Date:	26-05-2022
Format:	A3
Client:	Metropolis Packaging

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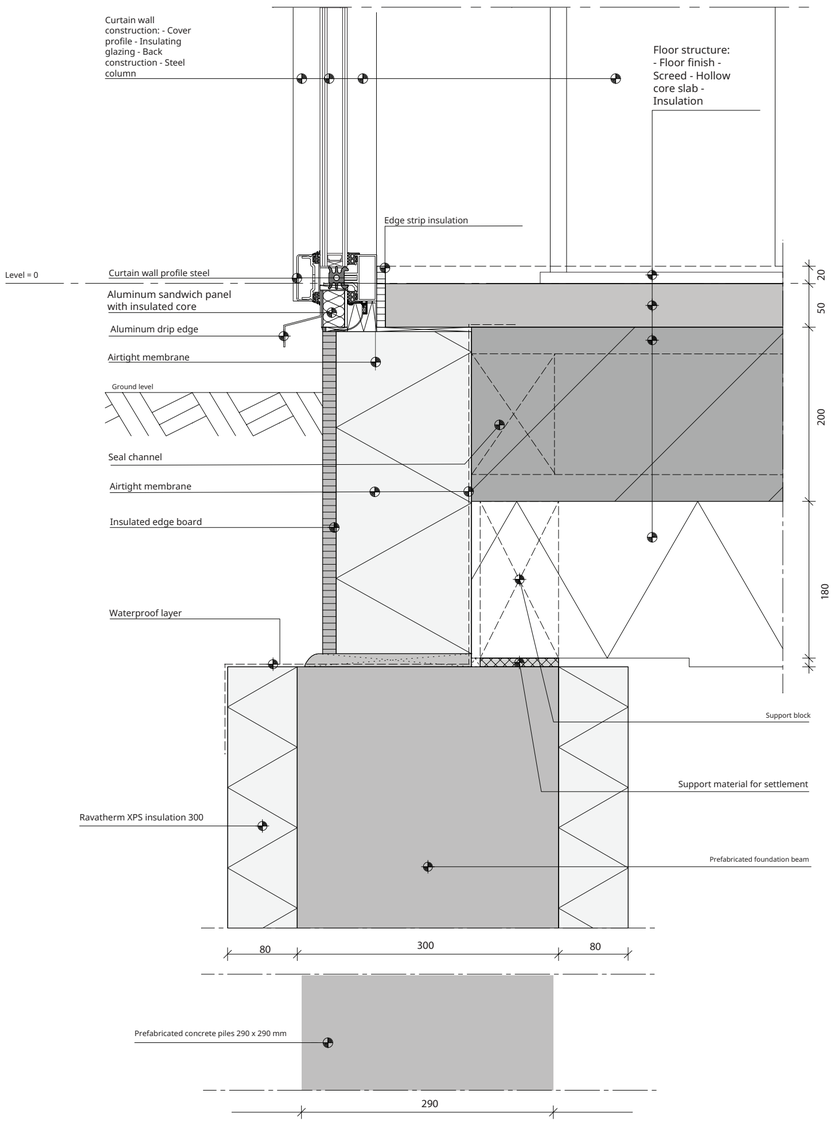
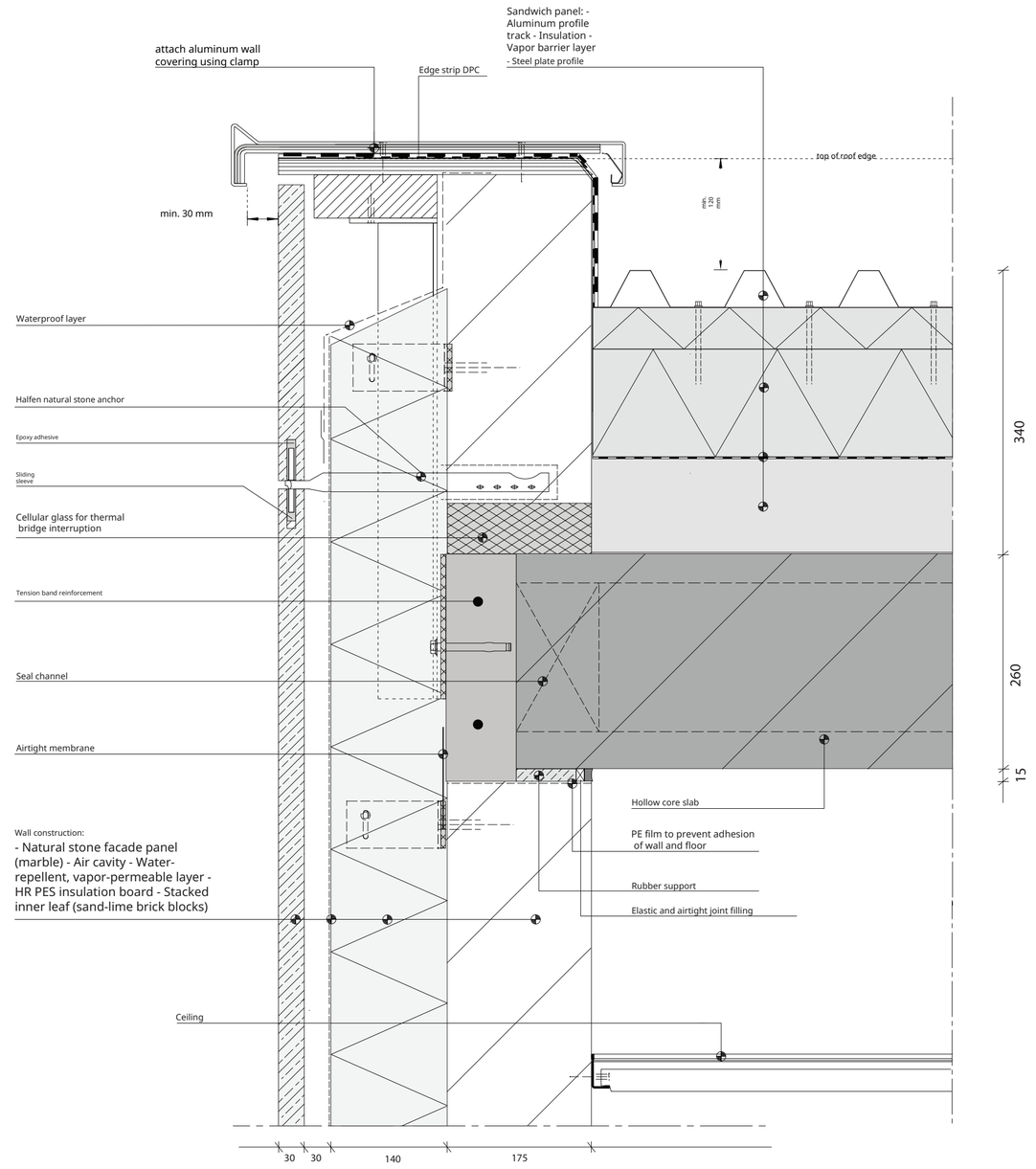


Detail 5: Bottom of facade, ground floor, foundation



Detail 6: Roof edge storage shed

Construction sequence detail 5:

1. Drive prefabricated concrete piles into the ground.
2. Place prefabricated foundation beams with insulation on piles.
3. Install pipes for sewerage and electricity in the crawl space.
4. Place support block
5. Place hollow core slab with insulation on the foundation beams.
6. Fill joints with sand cement mortar
7. Place waterproof layer against the floor and foundation
8. Mount insulated edge board against the floor.
9. Place curtain wall on the insulated edge board.
10. Apply edge strip insulation against the curtain wall.
11. Then apply screed and finish the floor.

Construction sequence detail 6:

1. Inner leaf is bricked.
2. A PE film is applied to the inner leaf to prevent adhesion of the wall and hollow core slab
3. A rubber support is placed on top of that.
4. The hollow core slab of 260 mm is placed on the support. The channels are sealed.
5. The slot at the hollow core slab is filled with sand-cement mortar and tension band reinforcement
6. Insulation (cellular glass) is placed on the floor for thermal bridge interruption
7. More sand-lime brick blocks are stacked on top of that.
8. When the floor and inner wall are finished, the insulation is mounted against the inner leaf and the floor.
9. The insulation is covered with a water-repellent, vapor-permeable layer.
10. A wooden framework is also attached to the floor and inner leaf to support the wall covering.
11. Then the outer leaf (a facade panel of natural stone, marble) is mounted with an anchor.
12. Finally, the sandwich panel is placed and the roof edge is covered with an edge strip, aluminum roof trim and cover strip

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HOUSE OF GIZA

Architecture & Design

Project:	Office building with storage shed
Project number:	26052022
Drawing number:	2/5
Drawing name:	Detail drawing 5: Bottom of facade, ground floor, foundation Detail drawing 6: Roof edge storage shed
Scale:	1:5
Date:	26-05-2022
Format:	A3
Client:	Metropolis Packaging

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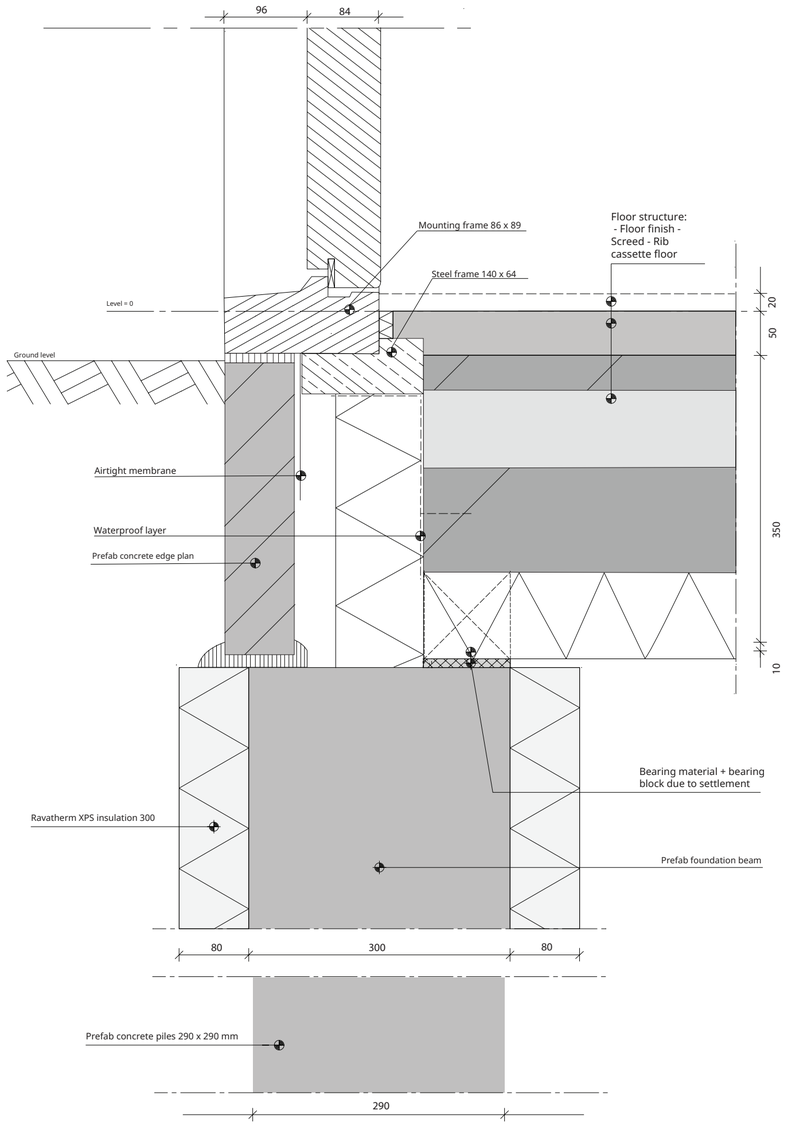
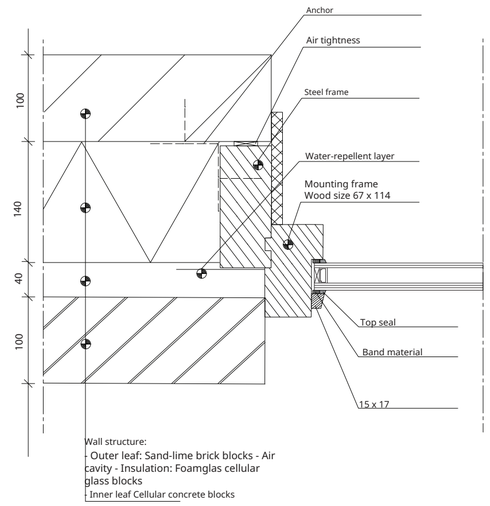
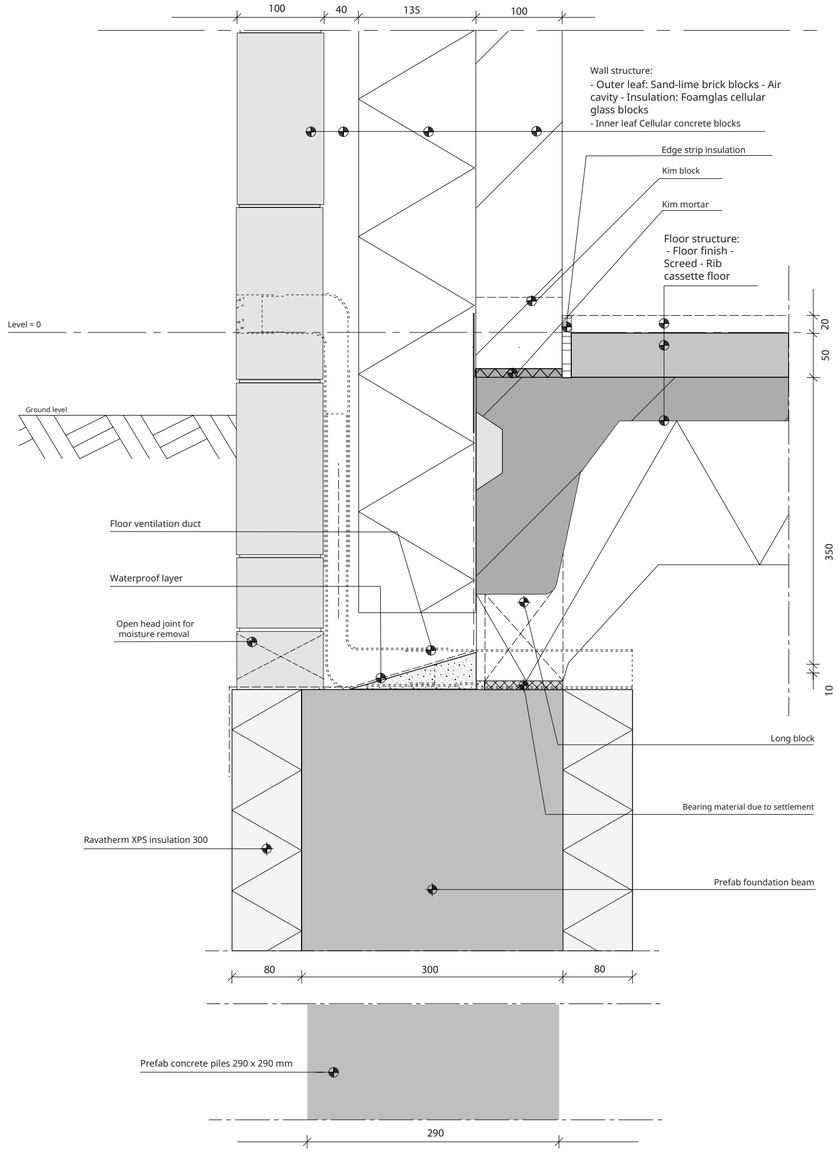


Detail-Alternative 4: Bottom of frame, ground floor, foundation



Detail-Alternative 3: Horizontal frame connection



Detail-Alternative 5: Bottom of facade, ground floor, foundation

Construction sequence detail 4:

1. Drive prefab concrete piles into the ground.
2. Place prefab foundation beams with insulation on piles.
3. Install pipes for sewerage and electricity in the crawl space.
4. Place bearing material + bearing block on the foundation beams.
5. Install rib cassette floor.
6. Place a waterproof layer against the floor with an insulation strip.
7. Mount a steel frame on the insulation strip and waterproof layer.
8. Place an airtight membrane against the steel frame.
9. A screed is poured on the rib cassette floor. Then the floor is finished.
10. A prefab is placed against the airtight membrane to support the mounting frame concrete edge board.
11. Finally, a mounting frame with a wooden door is attached above it.

Construction sequence Detail-Alternative 3:

1. Mortar cellular concrete blocks (inner leaf) together.
2. The steel frame is attached against the inner leaf
3. Then the water-repellent layer and insulation are placed.
4. The outer leaf is further bricked and mounted via cavity ties.
5. Finally, the mounting frame is attached after the structural phase.

Construction sequence detail 4:

1. Drive prefab concrete piles into the ground.
2. Place prefab foundation beams with insulation on piles.
3. Install pipes for sewerage and electricity in the crawl space.
4. Install floor ventilation duct on the foundation.
5. Place bearing material + bearing block on the foundation beams.
6. Install rib cassette floor.
7. Place a waterproof layer against the floor
8. Attach kim mortar and kim block to the floor.
9. Brick inner leaf
10. Attach edge strip insulation.
11. Pour screed and finish floor
12. Attach insulation against the inner leaf.
13. Finish and attach outer leaf to inner leaf via cavity ties.

FINAL DESIGN

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HOUSE OF GIZA

Architecture & Design

Project:	Company office with storage warehouse
Project number:	26052022
Drawing number:	5/5
Drawing name:	Detail drawing-Alternative 3: Horizontal frame connection Detail drawing-Alternative 4: Bottom of frame, ground floor, foundation Detail drawing-Alternative 5: Bottom of facade, ground floor, foundation
Scale:	1:5
Date:	26-05-2022
Format:	A3
Client:	Metropolis Packaging

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