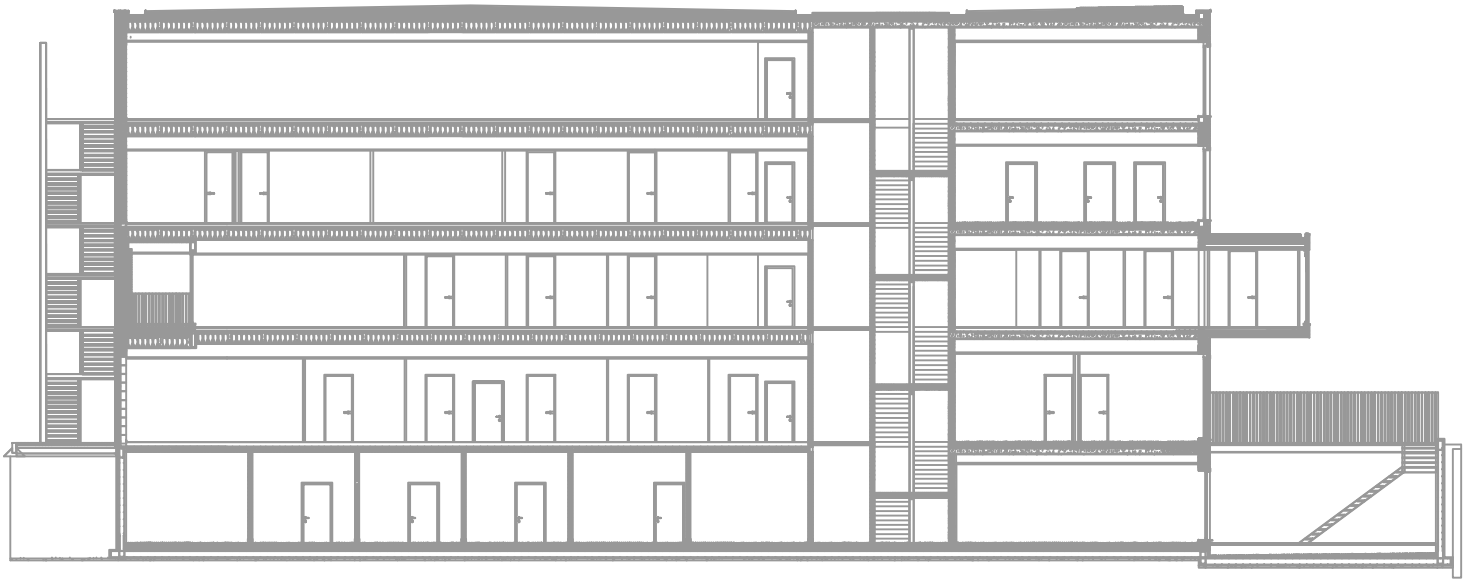
STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING



BACHELOR FINAL PROJECT

AUTOR: Paula Cort Azcárraga
ACADEMIC TUTOR: Frank Verplanken

Home University: Universidad Politécnica de Valencia (Spain)
Host University: Kaho Sint-Lieven (Belgium)

UNIVERSIDAD POLITECNICA DE VALENCIA

ACADEMIC YEAR
2013/2014

KAHO Sint-Lieven

Introduction

My name is Paula Cort Azcárraga and I am from Valencia, Spain. For the last four years I have been studying building-construction at the Universidad Politéctica, sited in Valencia. I chose to go with building construction because it is what I have a passion for. I grew up with my father as a construction worker, and I was always fascinated by it at a young age. Construction offers people the opportunity to see the fruits of their labor on a day to day basis. I also think of construction as a classical trade in that you constantly learn and improve your ability over time.

My school offered me the opportunity to study abroad through an Erasmus Exchange program and I didn't hesitate to accept it. I chose Belgium because of its gorgeous historic monuments, castles, cobblestone architecture and beautiful art work. I thought it is one of the best countries to learn about building construction. Moreover, the people here are very fluent in English and this could help me to improve this language. Belgium is widely known as the heart of Europe and a hub for international networking.

Studying in a different country has provided me a huge expertise and knowledge about a variety of subjects in more depth and from a different cultural perspective. The way of learning in Belgium varies considerably from the way I used to study in Spain. Here, practical learning is much

more emphasized than theoretical. I personally think that the way used here is more useful and provides more knowledge that I will need in my future.

Moreover, I have learnt several ways to built, specifically the prefabricated technique, which is very used in Belgium, in Spain most of construction is made is situ and not usual to move from a different place.

Appreciation

First of all, I would like to thank Frank and Steve for their time and dedication on my project. I would not have been able to do it without their help and patience, not only at class but also at the work. Their knowledge and expertise is very much appreciated.

I also wish to thank all the members of the Kaho Sint-Lieven for being always willing to help and for making things easier.

It was a pleasant experience and without their support it wouldn't have been possible.

Index

PART 4. Technical study.

- Precast stairs
- Stairs details PLANE 16
- Step by step. PLANE 17

PART 5. Comparative study

- Propos the comparative
- Comparative table
- Details PLANE 18, PLANE 19
- Step by step PLANE 20/21/22/24

PART 6. Scheduling and pricing

- Schedule work. GANTT

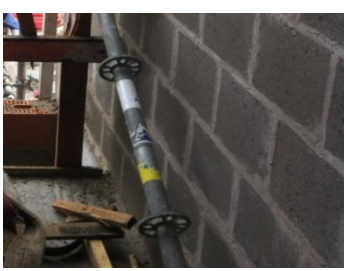
Part 1.

Site installation plan

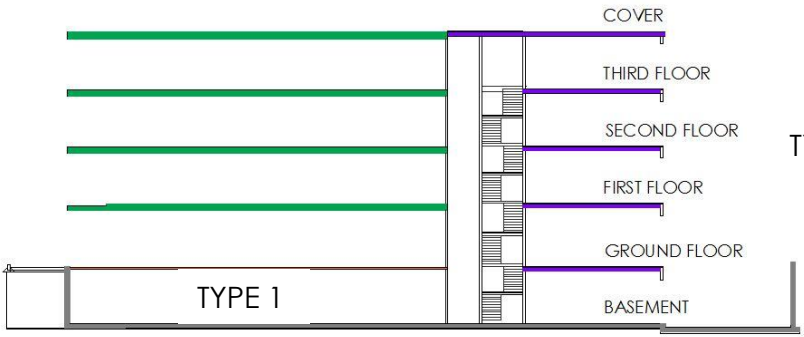
This is a building for office use, has 4 level + basement. The structure is with prefabricated concrete, excluding the basement slab, this is in situ.

BASEMENT GROUND, FIRST AND SECOND FLOOR

The use of ceramic brick and concrete brick is also combined.



Concrete block has more resistance than ceramic, but the last is cheaper.



TYPE 3

TYPE 2

When I arrive at work, hollow core slab was placed. There are two types.

1 type: Thickness 0.15 m + 0.05

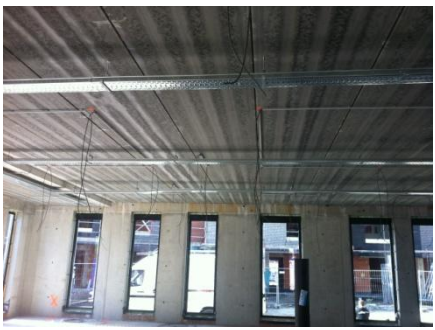
2 type: Thickness 0.24 m + 0.05

3 type: Thickness 0.40 m + 0.05

Rebar

0.05 m concrete

Hollow core slab



Insulation: recticel, polyurethane.

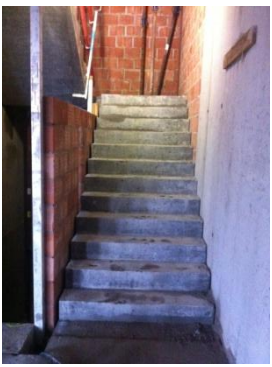
Brick facade

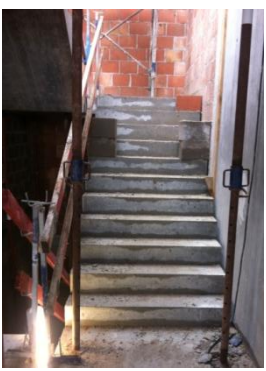
Facane brick: 5 x 9 x 12 cm

Insulation: polyurethane, 8 cm (depends on the site of placement)

Ceramic brick: 11 x 12 x 24 cm

Prefabricated stairs





Windows

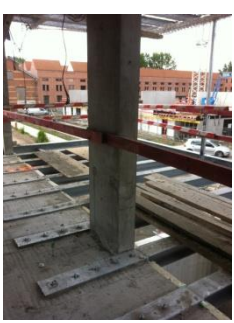




Cantilever



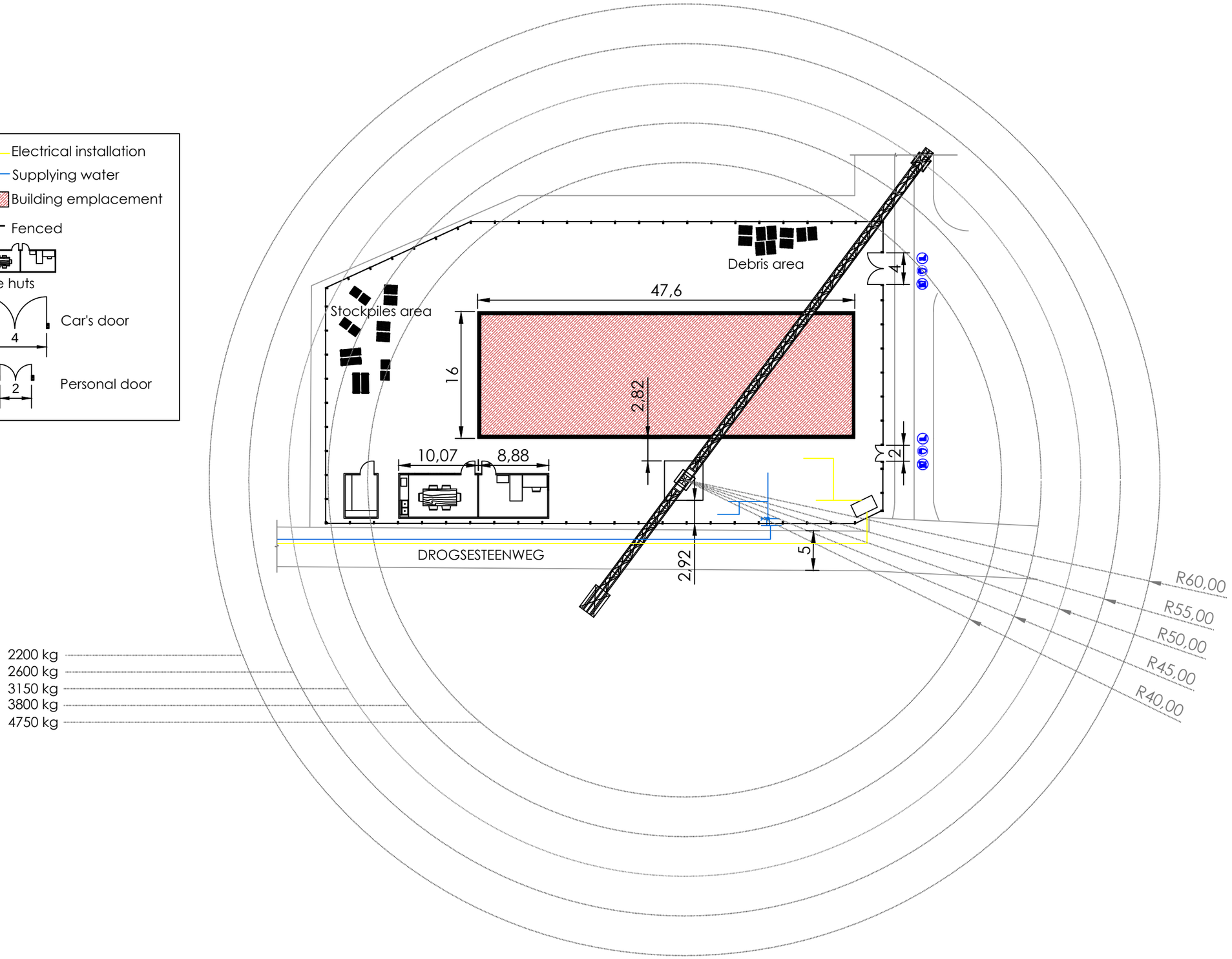


HEB 180 anchored floor using steel sheet.

When I get to the work they were completing the structure. I could see how the structure is finished, the facade was performed using a scaffold; placement of windows, electrical installation, sanitary and air conditioning. The cantilever construction and removal of the tower crane.

Electrical installation
Supplying water
Building emplacement
Fenced
Site huts
Car's door
4
Personal door
2



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 1
Site installation plan

IMPLANTATION

PLANE Nº :
1

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT
Paula Cort Azcárraga

SCALE
1 / 500

DATE
16 / JUNE / 2014

LOCATION OF THE CONSTRUCTION CRANE

The tower crane is placed outside the future building. Just in the middle in front the principal facade.

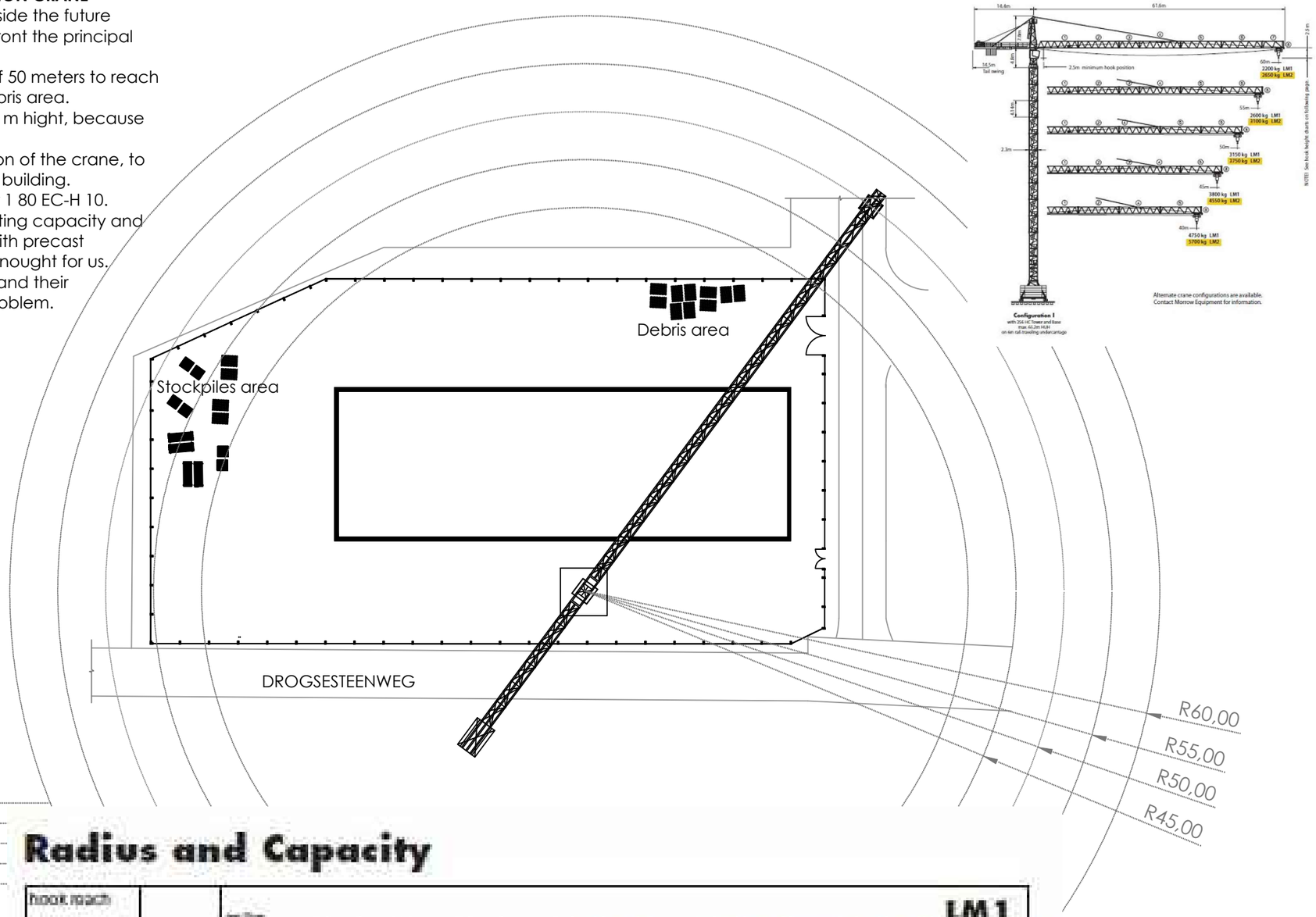
In this way we need a radius of 50 meters to reach the stockpile area and the debris area.

Secondly, we need at least 20 m hight, because our building
have 16 m. since the foundation of the crane, to the most elevated pont of the building.

We choise the model: Liebherr 1 80 EC-H 10.

Finaly, we need to know the lifting capacity and the lift capacity, as we work with precast elements. So LM1=3150 kg. is enought for us.

About the adjacent buildings and their protection, there aren't any problem.



2200 kg
2600 kg
3150 kg
3800 kg
4750 kg

Radius and Capacity

hook reach m	(r)	m/kg	m/kg 24	26	28	30	32	34	36	38	40	42	45	48	50	52	55	58	60
			LM1																
60	(61.6)	24 - 17.3 10000	6020	6310	5790	5340	4940	4600	4290	4010	3760	3540	3240	2980	2820	2680	2480	2300	2200
55	(56.6)	24 - 17.9 10000	7190	6560	6020	5550	5140	4790	4470	4180	3920	3690	3380	3110	2950	2800	2600		
50	(51.6)	24 - 18.8 10000	7600	6940	6370	5880	5450	5080	4740	4440	4170	3930	3600	3320	3150				
45	(46.6)	24 - 19.6 10000	7970	7280	6690	6180	5730	5340	4990	4670	4390	4140	3800						
40	(41.6)	24 - 20.9 10000	8570	7830	7200	6660	6180	5760	5390	5050	4750								

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 1

Site installation plan

TOWER CRANE

PLANE Nº :

2

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

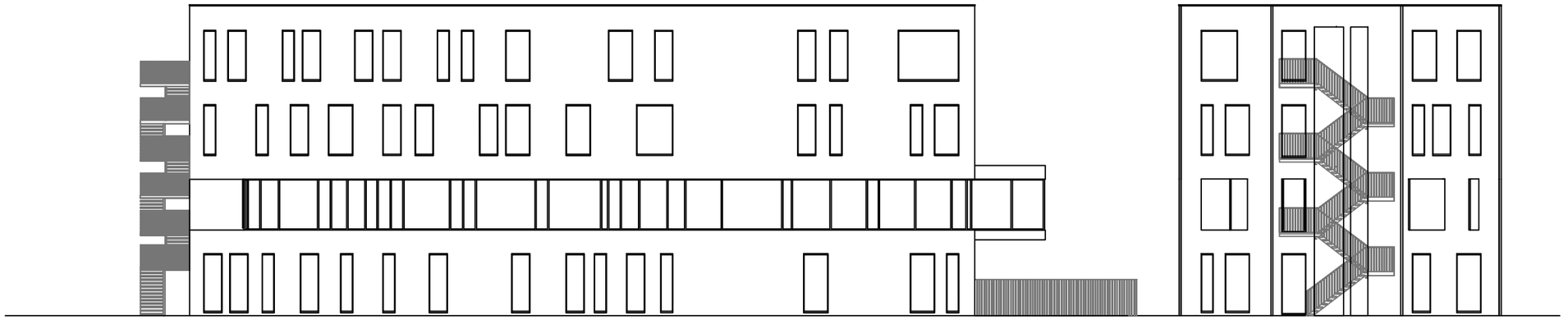
Paula Cort Azcárraga

SCALE

1 / 500

DATE

16 / JUNE / 2014



FACADE NORTH

FACADE WEST

FACADE SOUTH

FACADE EAST

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 1
Site installation plan

FACADES

PLANE Nº :

3

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

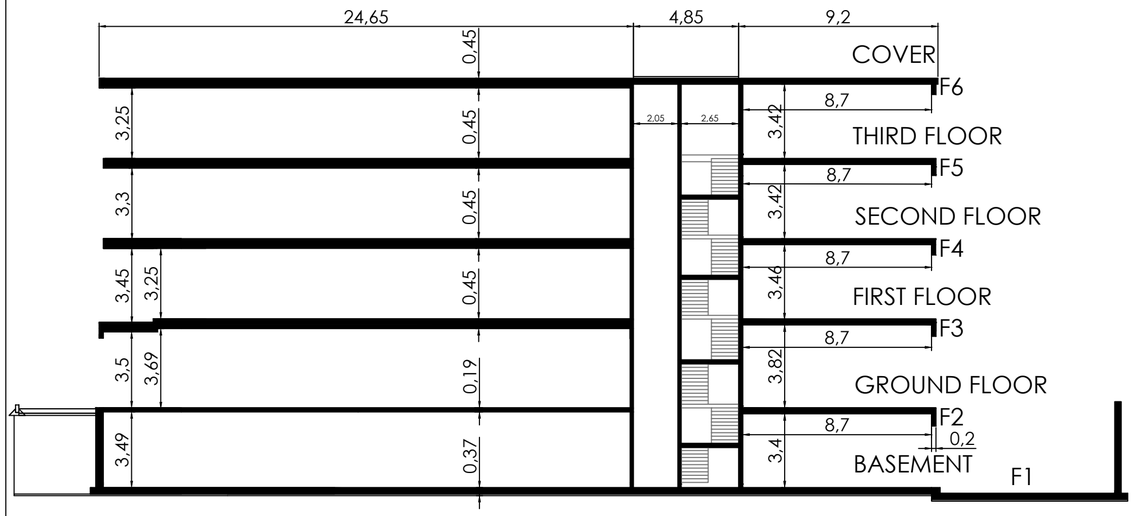
Paula Cort Azcárraga

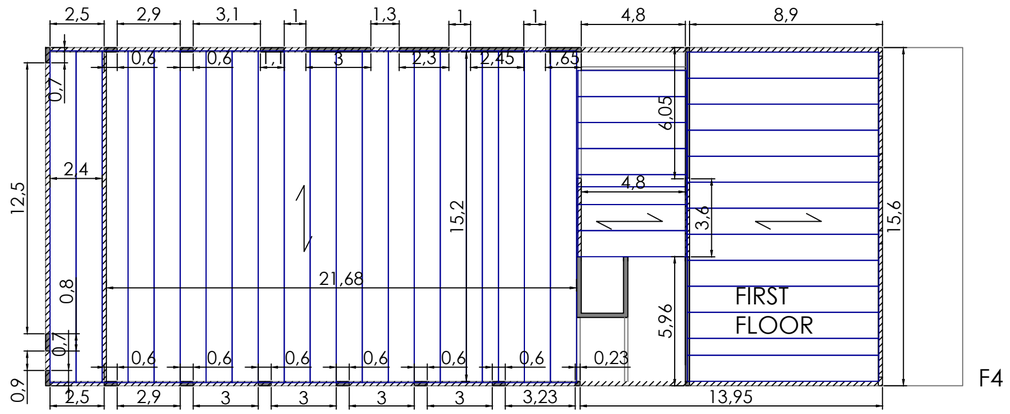
SCALE

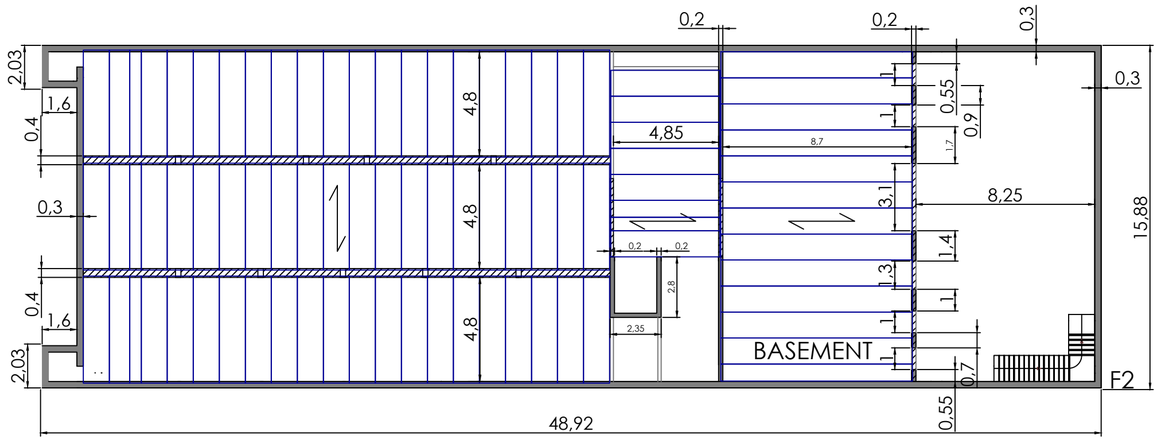
1 / 250

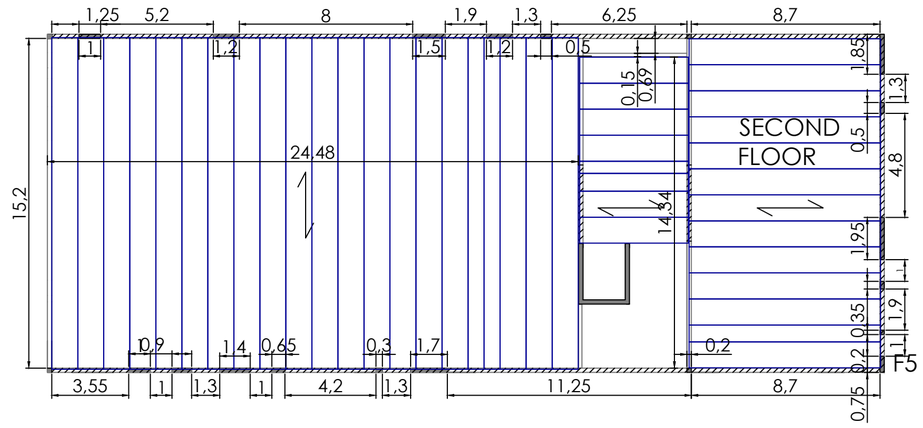
DATE

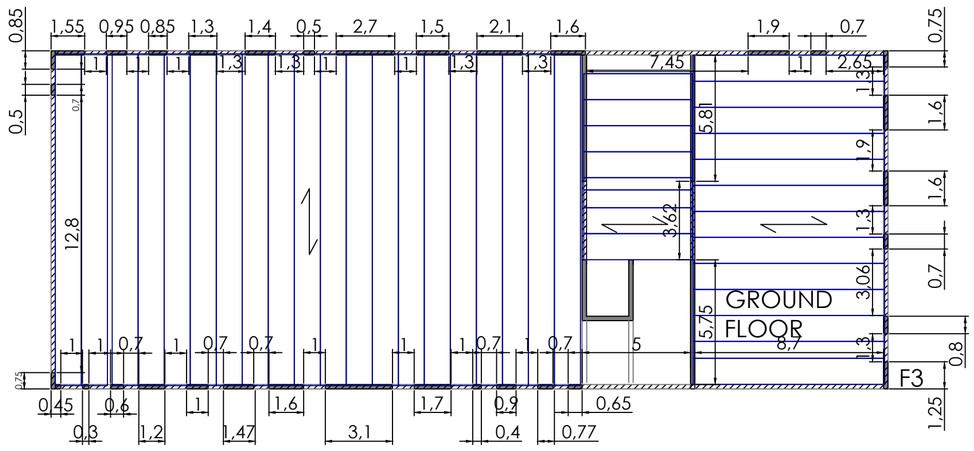
16 / JUNE / 2014

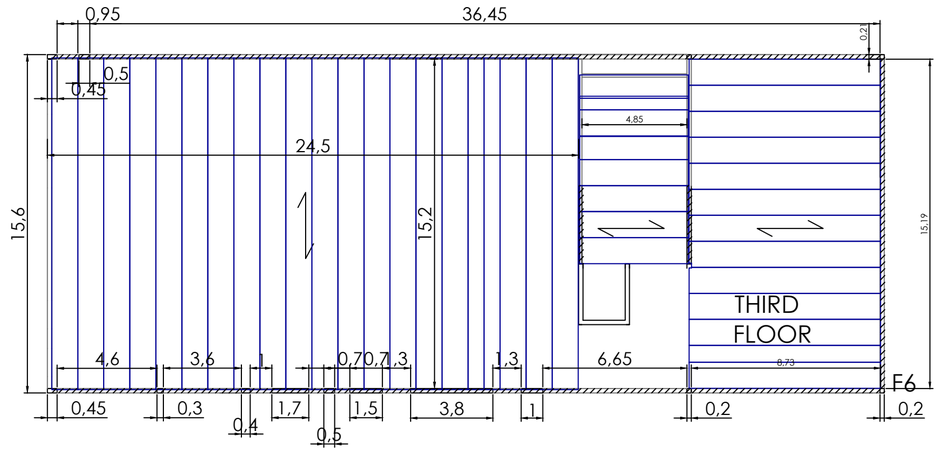












CONCRETE PILLAR
CONCRETE BEAM
CONCRETE WALL
BRICK WALL
HOLLOW CORE SLAB

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 1
Site installation plan

STRUCTURE

PLANE Nº :

4

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

SCALE

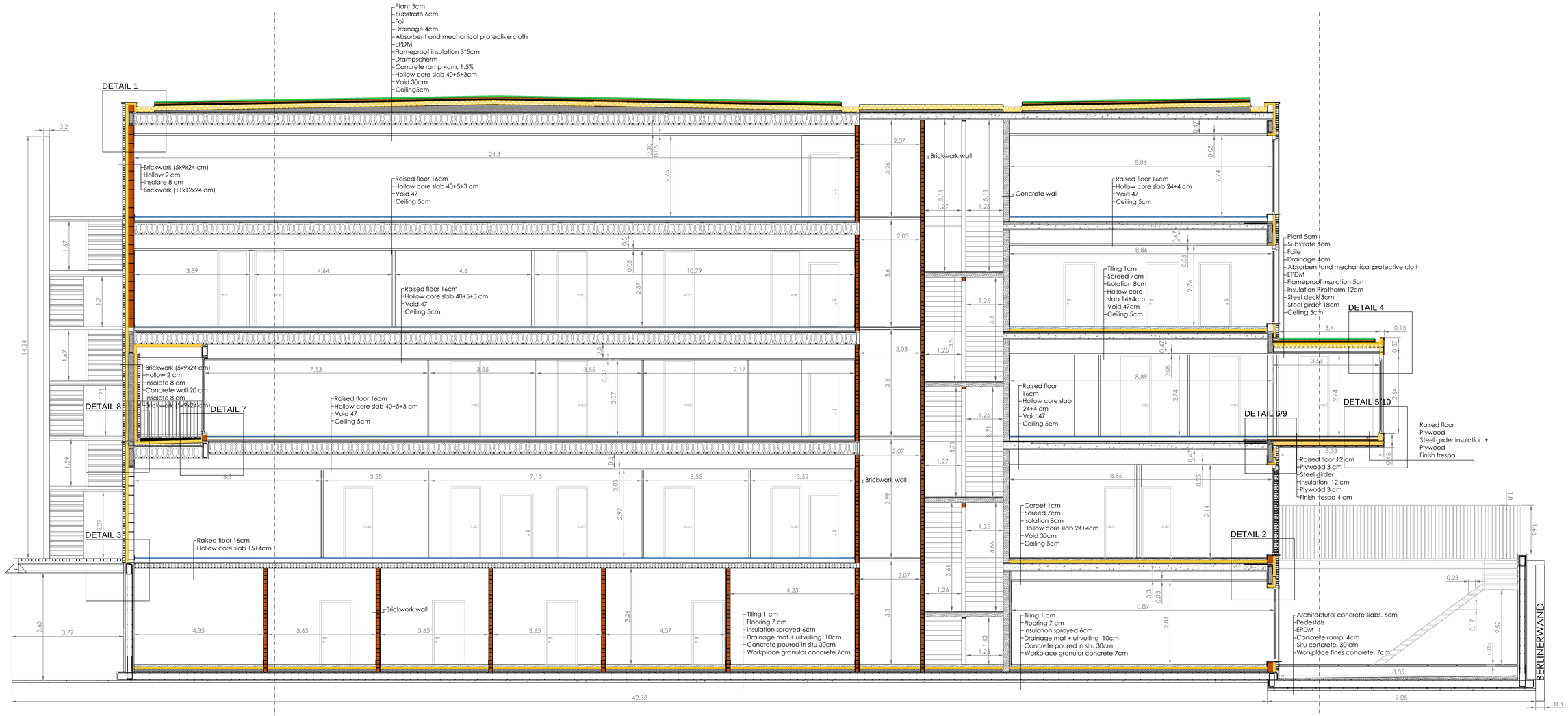
1 / 200

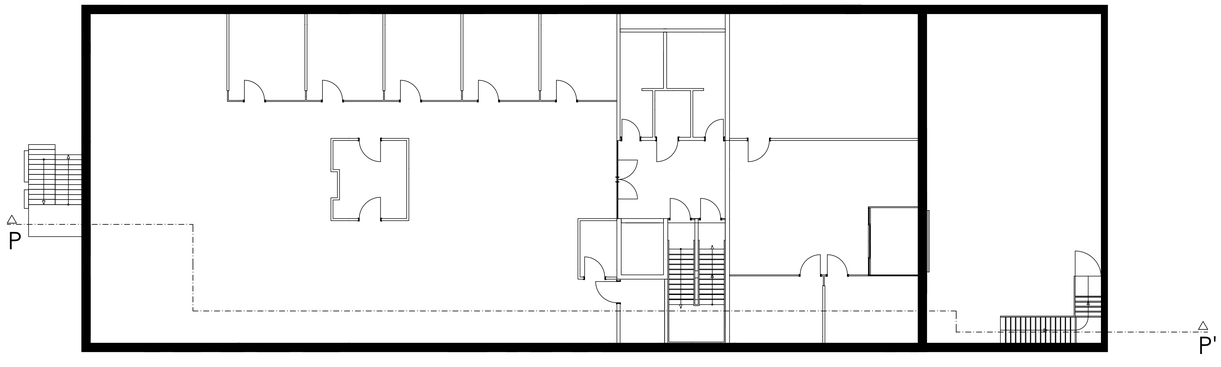
DATE

16 / JUNE / 2014

Part 2.

Principal section





Insolate
Plant
Concrete
Brickwok (11x12x24 cm)
Prefabricated concrete
Dranaige
Hollow core slab
Rebar
Gravel
EPDM
Brickwok (5x9x24 cm)
Carpet

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 2

PRINCIPAL SECTION P-P'

PLANE N° :

5

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

SCALE

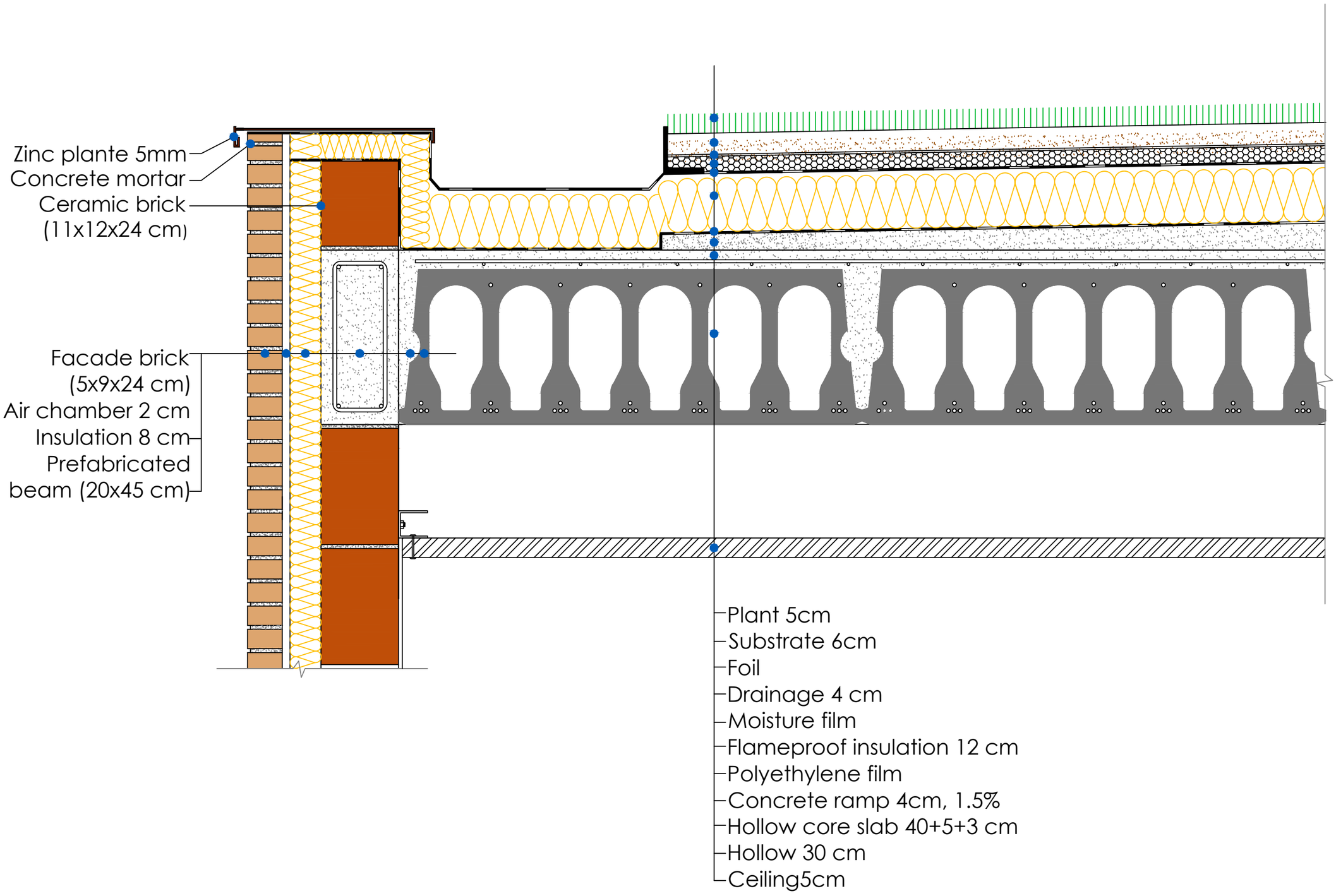
1 / 50

DATE

16 / JUNE / 2014

Part 3.

Details



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 1

PLANE Nº :

6

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

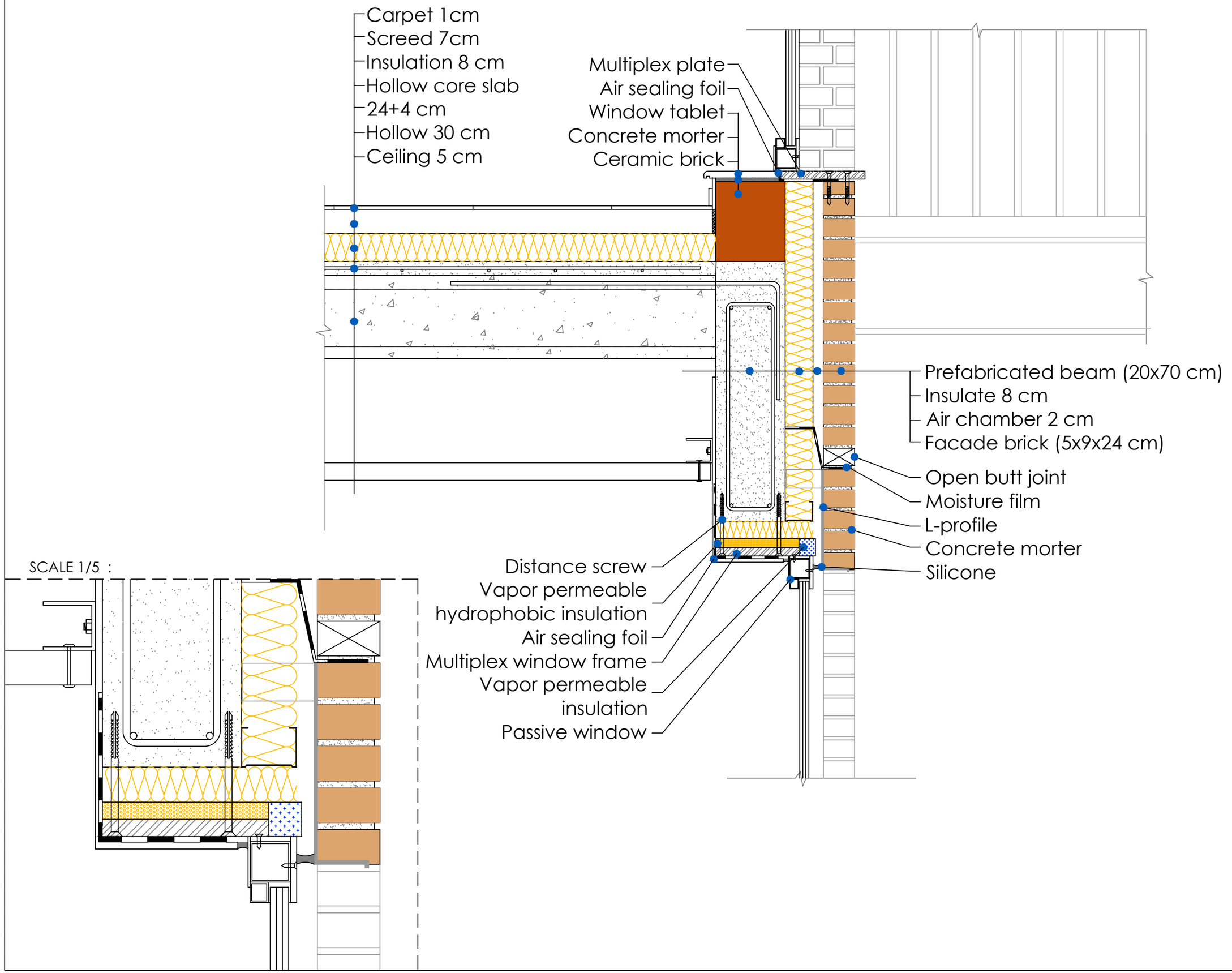
Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 2

PLANE Nº :

7

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

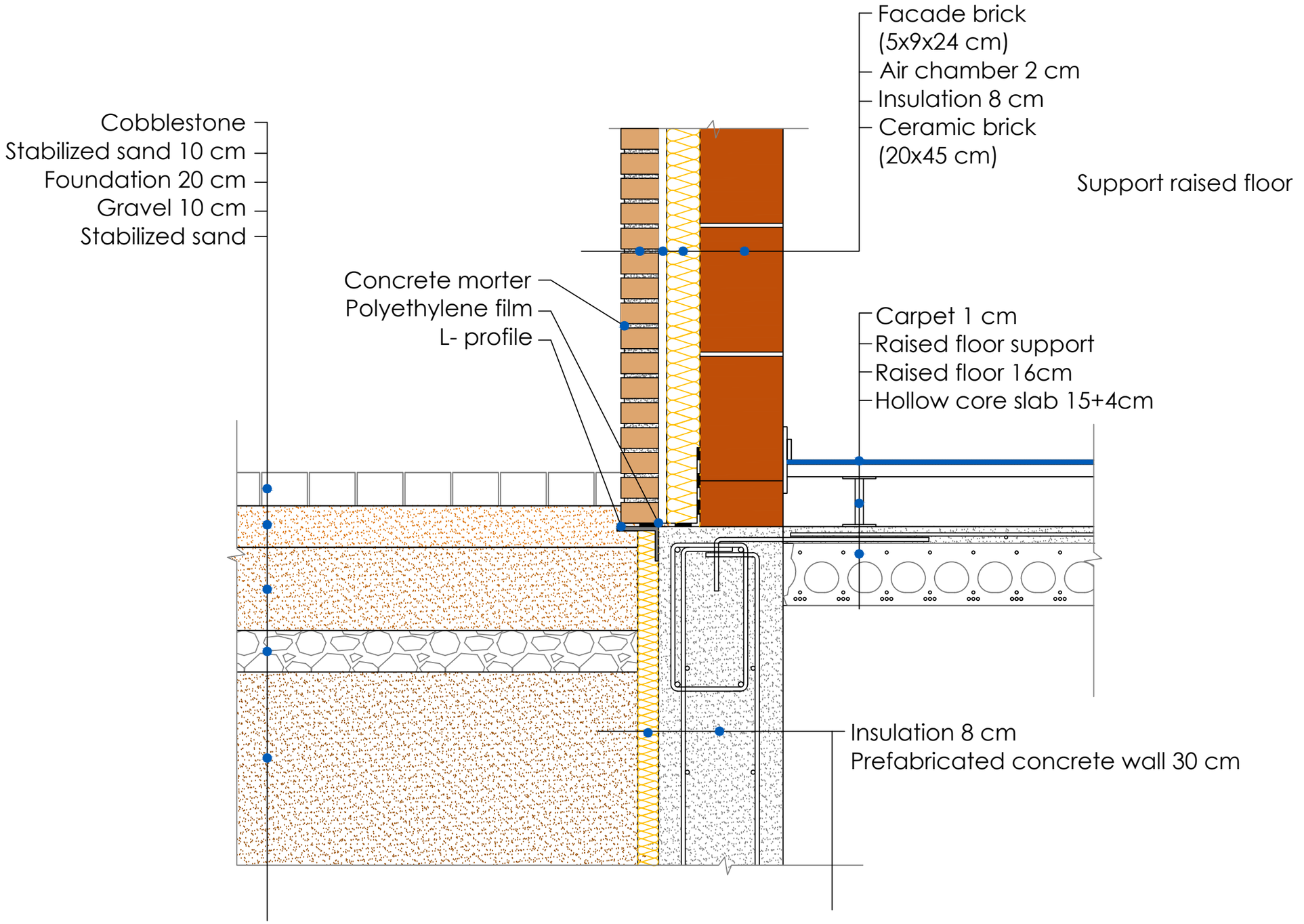
Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 3

PLANE Nº :

8

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

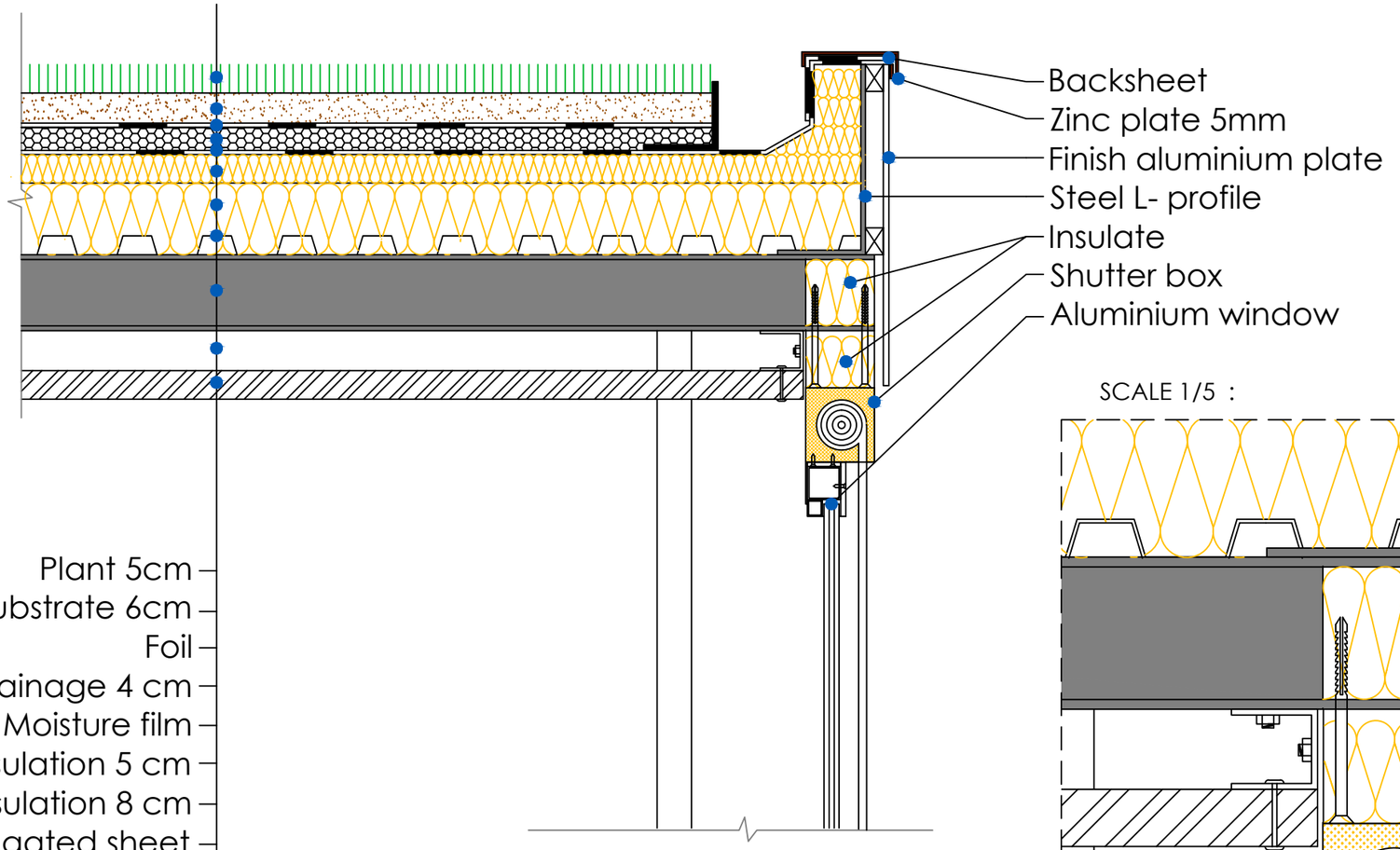
Paula Cort Azcárraga

SCALE

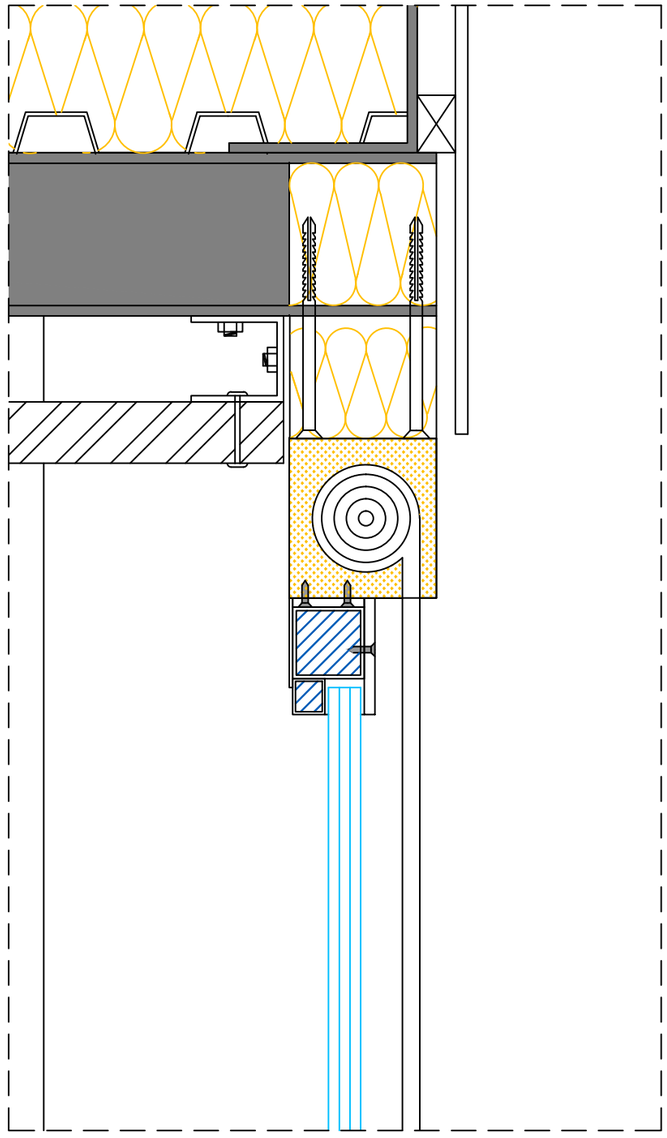
1 / 10

DATE

16 / JUNE / 2014



SCALE 1/5 :



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 4

PLANE Nº :

9

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

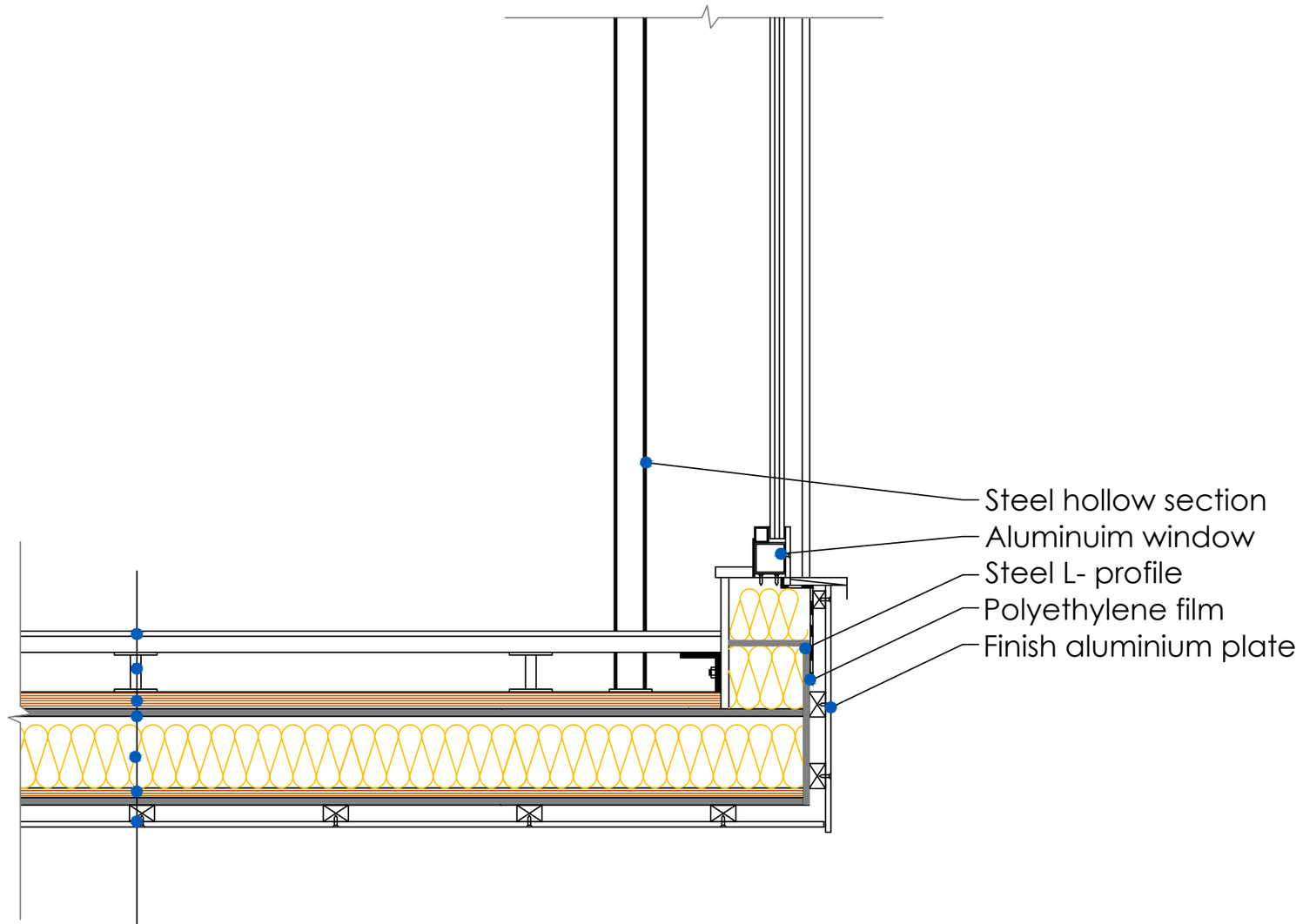
Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 5

PLANE Nº :

10

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

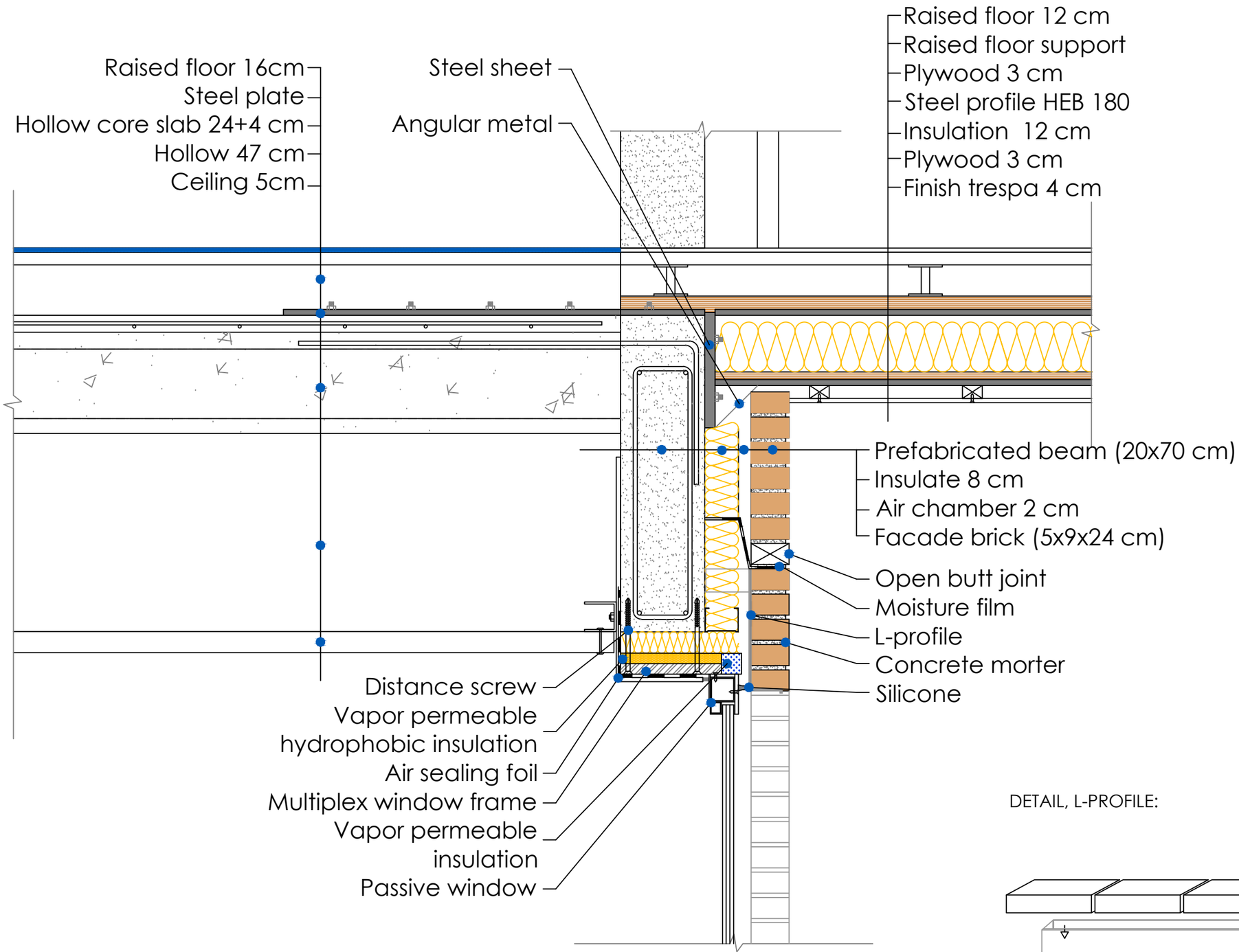
Paula Cort Azcárraga

SCALE

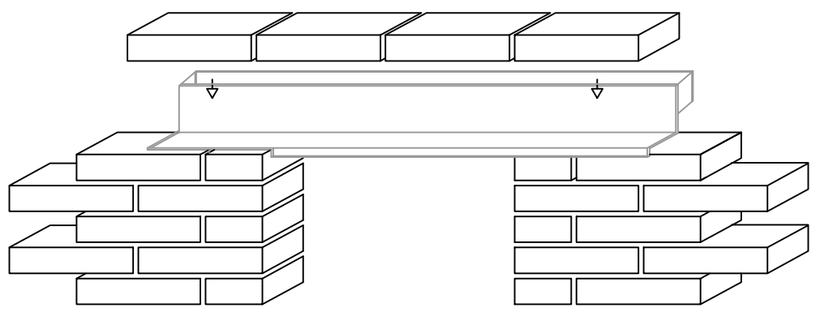
1 / 10

DATE

16 / JUNE / 2014



DETAIL, L-PROFILE:



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 6

PLANE Nº :

11

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

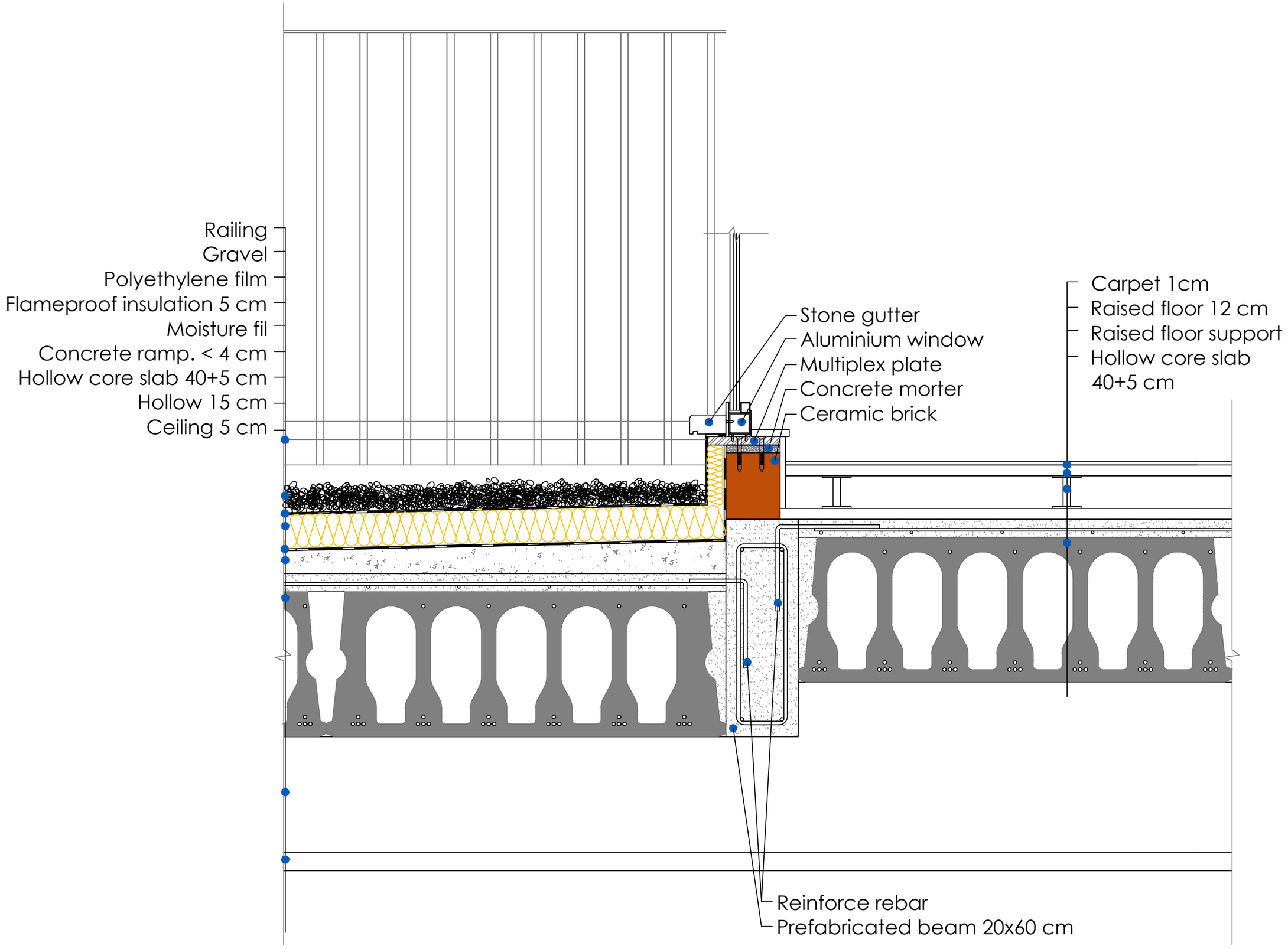
Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 7

PLANE Nº :

12

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

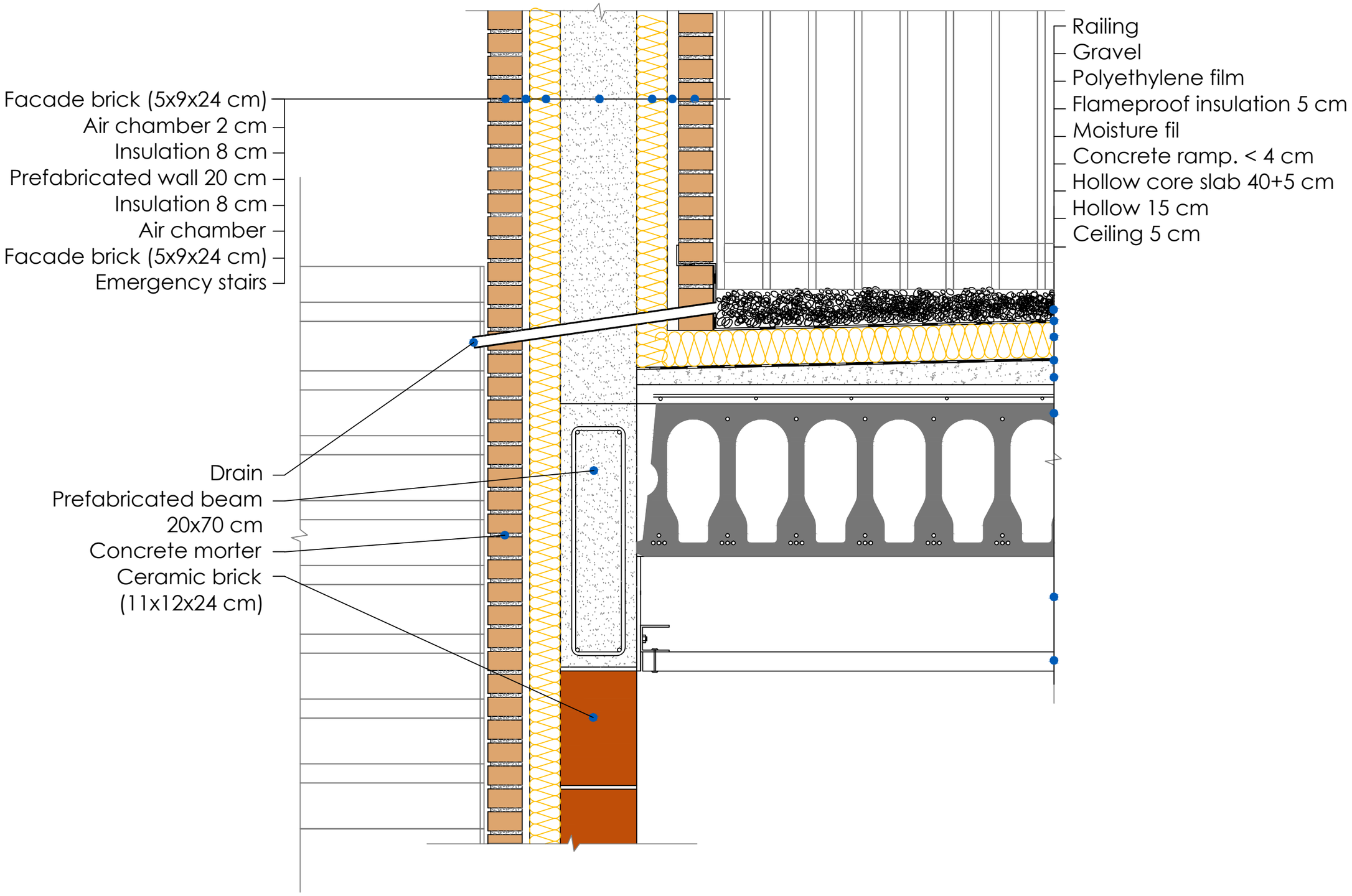
Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 8

PLANE Nº :

13

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

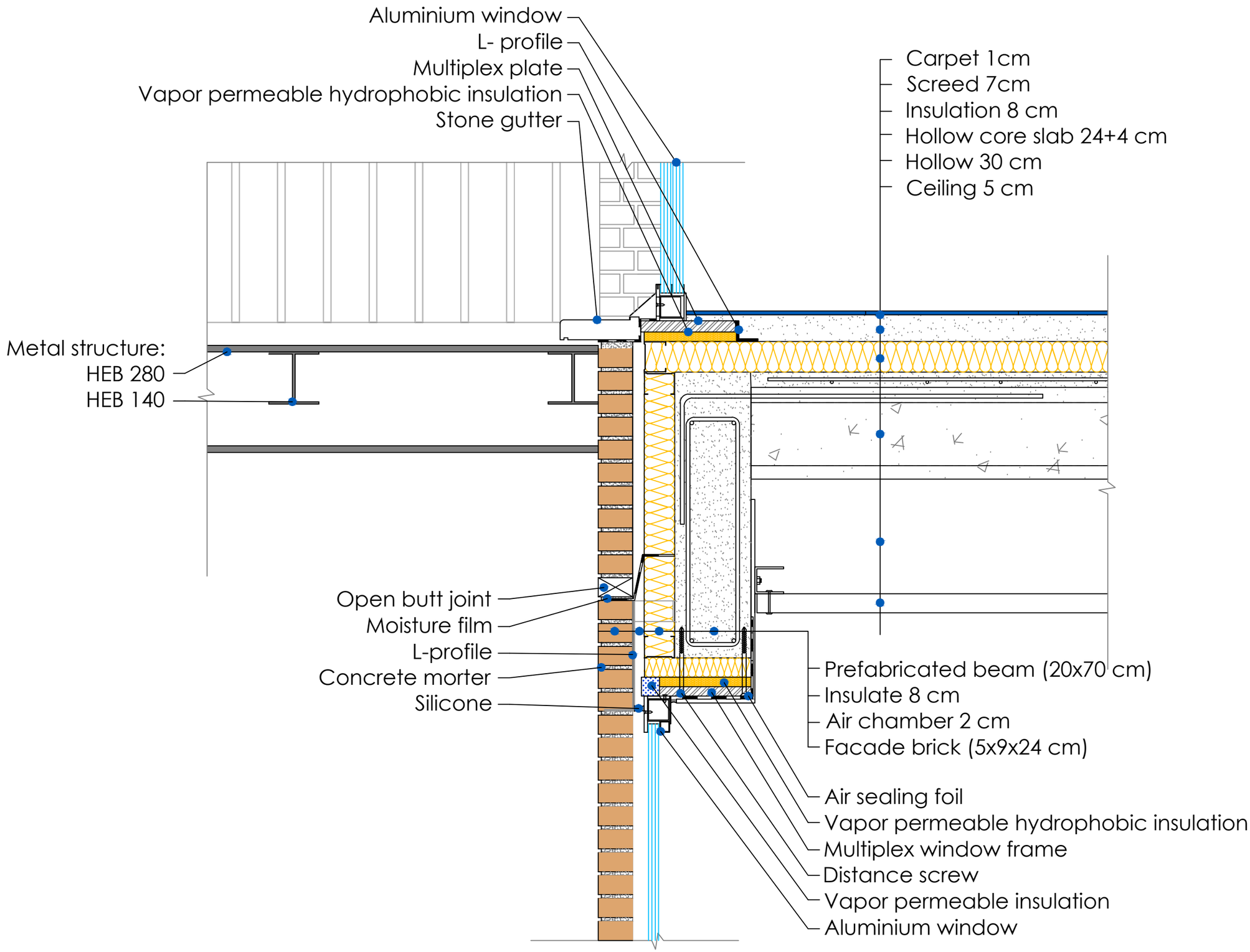
Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 9

PLANE Nº :

14

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

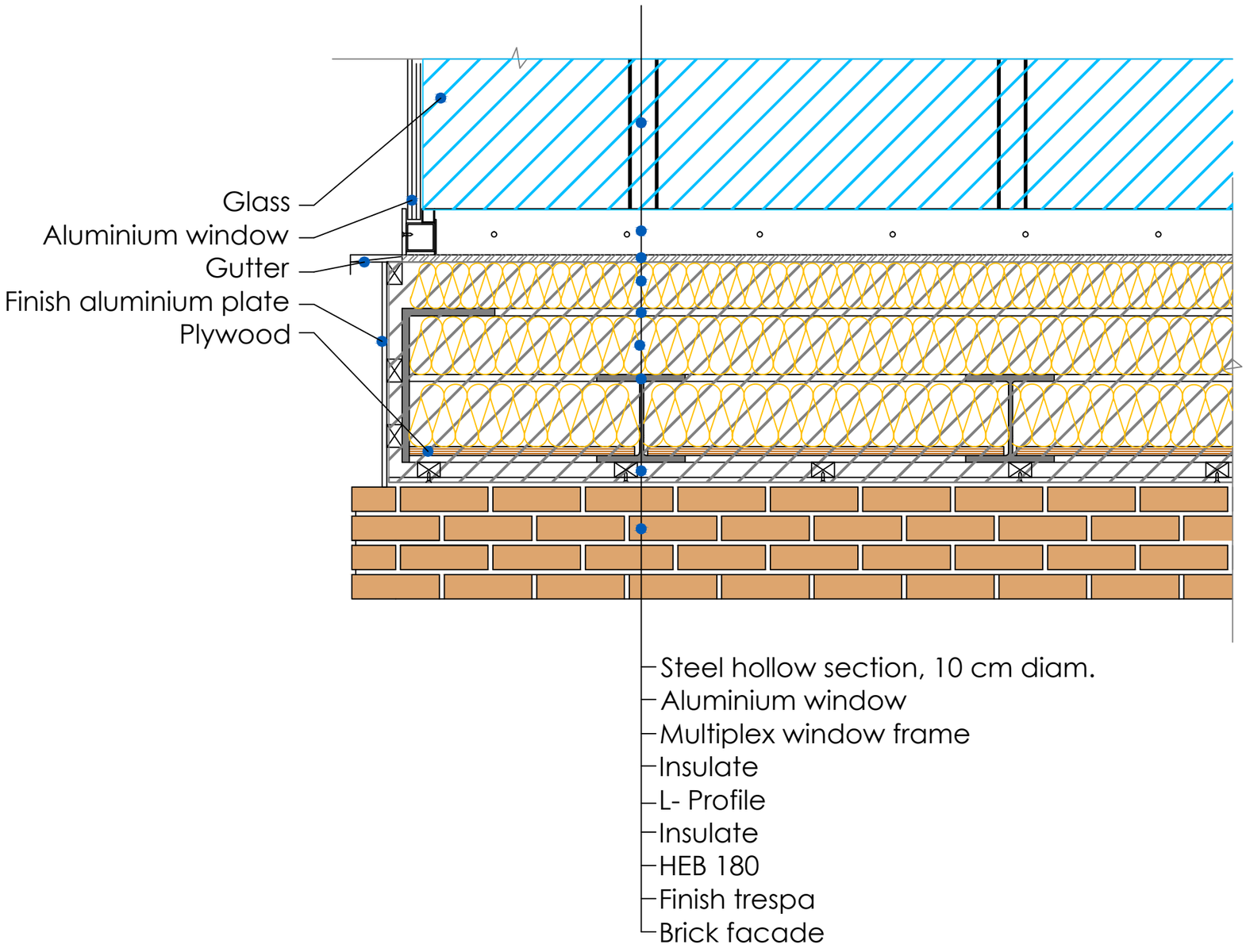
Paula Cort Azcárraga

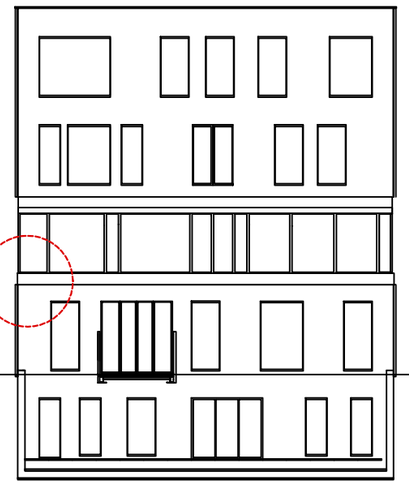
SCALE

1 / 10

DATE

16 / JUNE / 2014





FACADE EAST

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 3
Detailed drawings

DETAIL 10

PLANE Nº :

15

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

SCALE

1 / 10

DATE

16 / JUNE / 2014

Part 4.

Technical study

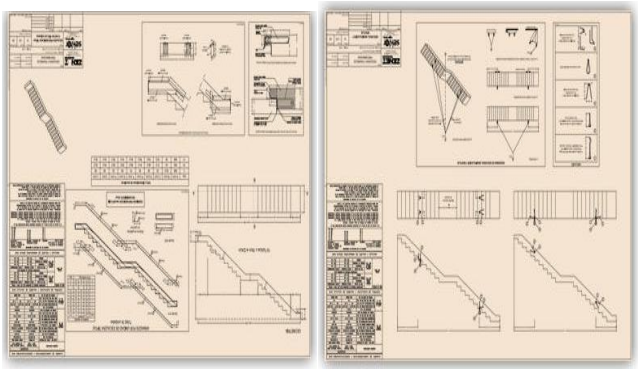
1 PRECAST STAIRS

The prefabricated concrete stairs are custom manufactured for each project.
Prefabricated stairs can be designed to adapt at the structural, dimensional and esthetics characteristics, for each type of building.
In this way, it possible to reduce the problems that affects with the time and the cost.

2 INSTALLATION AND NECESSARY EQUIPMENTS

Indications to install precast elements:

1. Location plan
2. Structural plan
3. Ground plan, sections and levels.
4. Relationship and specifications for precast



Also, must to know:

- To analyze the characteristics and peculiarities of work.
- To know all spaces and facilities available.
- Check the access, maneuvering areas and slopes.

Choose the correct crane and equipment, it's the most important thing, so it is decisive for the good ending work.

Should be analyzed, height, weight, dimensions, etc..
For this work will be use a Tower Crane: LIEBHERR, 180 E-CH-10. (More information in plane 2)

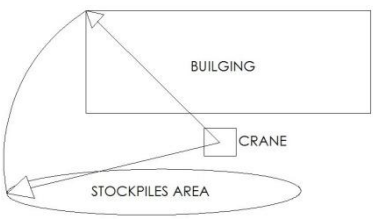
To transport:

In general, precast elements, small and slightly weighed, as the stairs, are move with very basic equipment: conventional truck, trailer...

Should be avoid restock the material at the work, so there are actions than increase the total cost and complicate the ejecution.

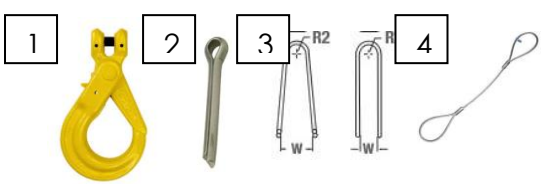
To acces:

Supply of the precast elements must be continuous and safe, for that reason, ways and access must be positioned parallel to the stock area.



The auxiliary resources more common in the lifting to mounting prefabricated elements, are:

1. Lifting hook
2. Pins
3. Stirrup
4. Brands and steel wire



To install:

Should not beginning to do the mounting without these conditions:

a) Concrete must have enough resistance.
b) Prepare all areas necessary for ease of assembly
c) Ensure a supply of items, continuous and completely to prevent the execution stops for lack of precast.
d) Check the features and suitability of auxiliary resources and equipment so as to ensure maximum safety of assembly.

2.1 Assembly sequence:

Assembly should be do, when be possible, for levels, avoiding crane movements.

Will be a good view between laborers at stockpiles and collocation area.
When the sight is not possible, a code will be established among laborers.

Stockpile prefabricated elements it is recommended to do inside the building, when the building only have one level, and outside the building, when this have more levels.
For this way is easier not disrupting at others activities.

3 ADVANTAGES AND DISADVANTAGES

Advantages

Easy to install: It is not necessary use formwork.

Stockpiles: Stairs normally come from the factory to truck and are placed directly from this.

Quick access: Instant access between levels, increasing efficiency and security.

Cost reduction: Because is faster to install, need less laborer and without formwork.

Maintenance: Low maintenance cost

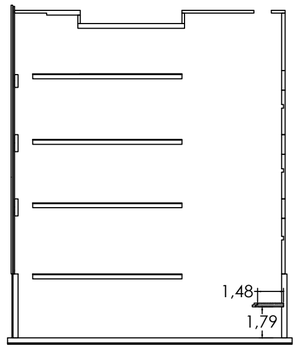
Quality: Stairs with industrial quality. The surfaces have a high quality finish.

Disadvantages

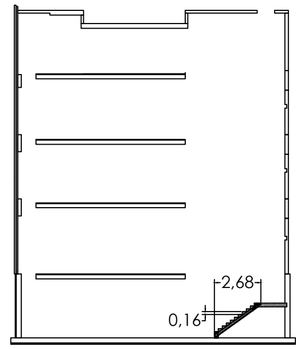
The only disadvantage is the cost. Prefabricated elements are designed specifically for this work and are industrial build so always is necessary to move them until the work. So these reasons can be increase the total cost, but in almost occasions, these costs are counteracted with others, and is better choose precast

4 CONSTRUCTION METHOD: STEP BY STEP

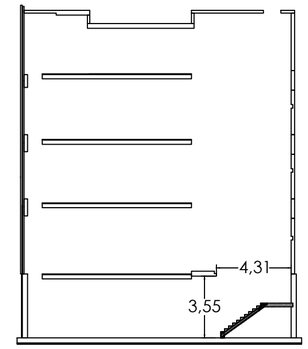
STEP 1



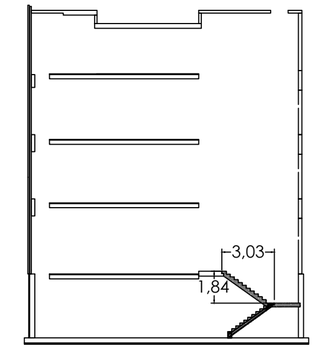
STEP 2



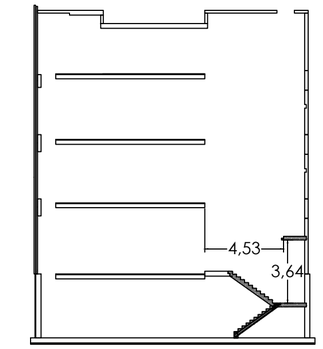
STEP 3



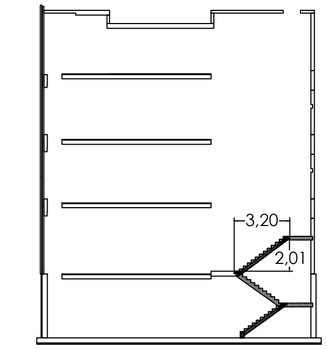
STEP 4



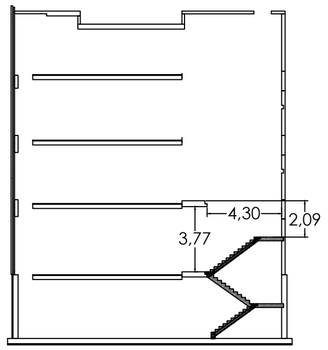
STEP 5



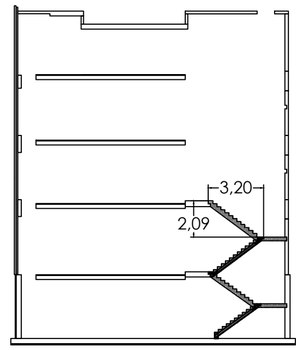
STEP 6



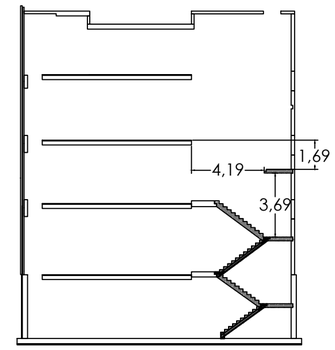
STEP 7



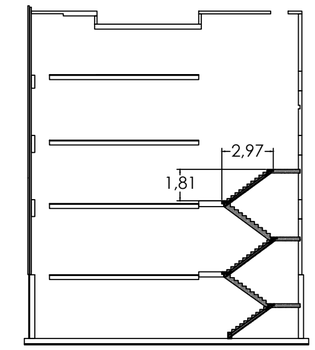
STEP 8



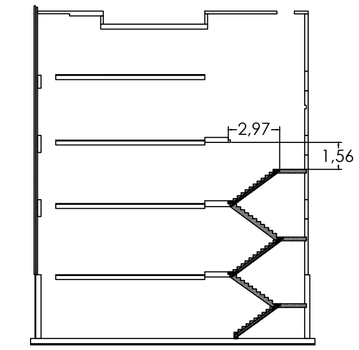
STEP 9



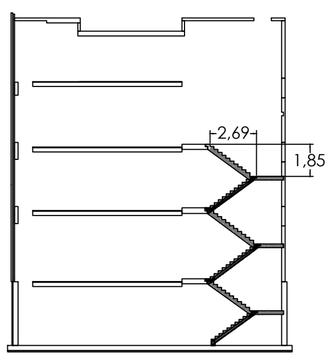
STEP 10



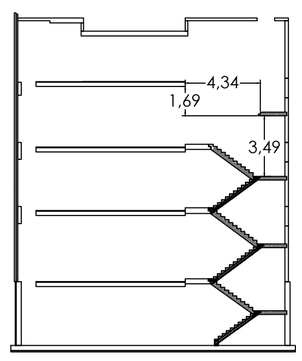
STEP 11



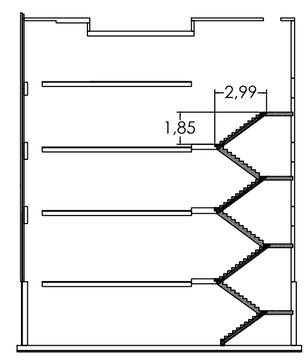
STEP 12



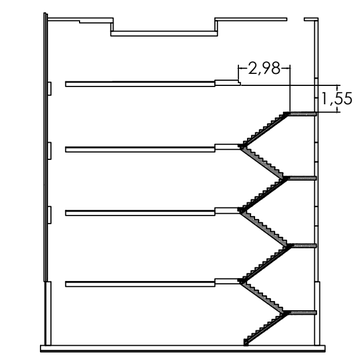
STEP 13



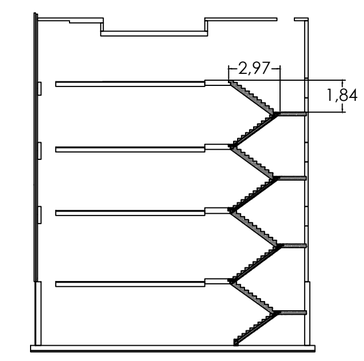
STEP 14



STEP 15



STEP 16



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 4
Technical study:
Prefabricated stairs.

STEP BY STEP

PLANE Nº :

17

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

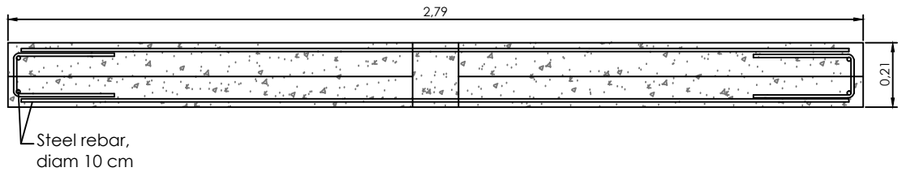
Paula Cort Azcárraga

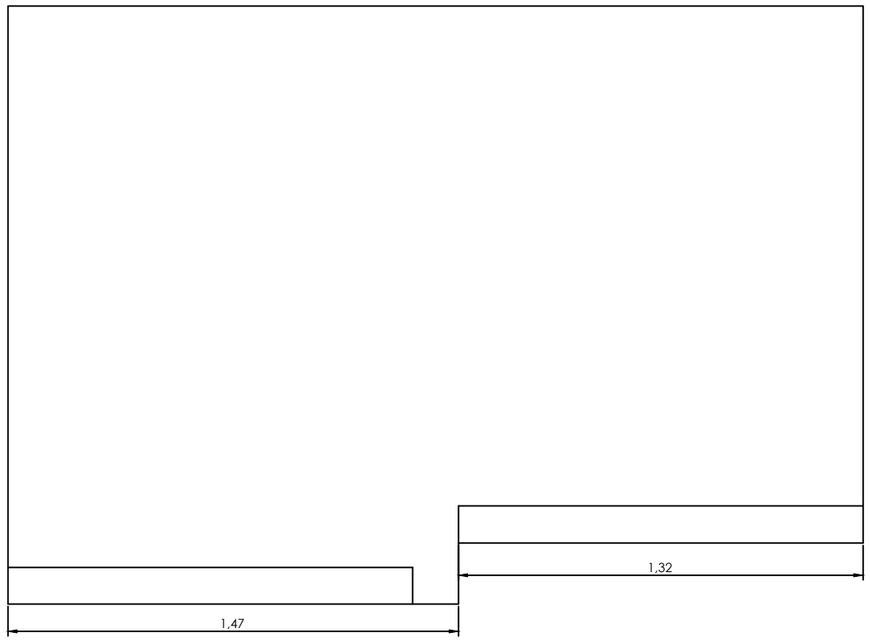
SCALE

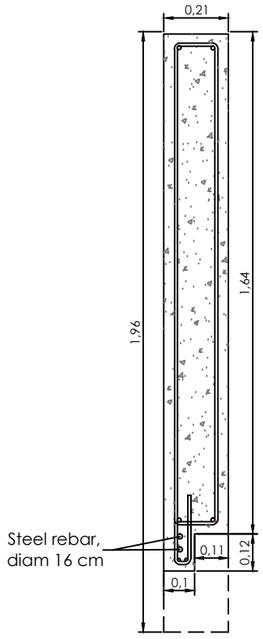
1 / 250

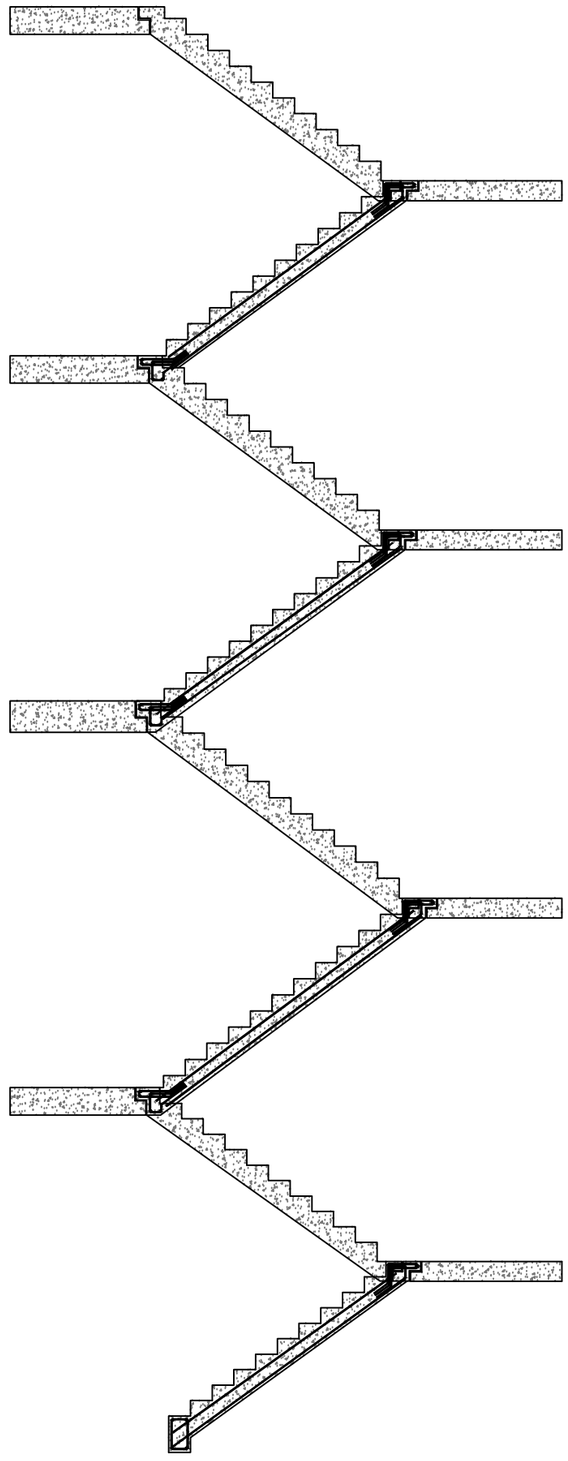
DATE

16 / JUNE / 2014









STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 4

Technical study.

Details about precast stairs

PLANE Nº :

18

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

SCALE

1 / 70

DATE

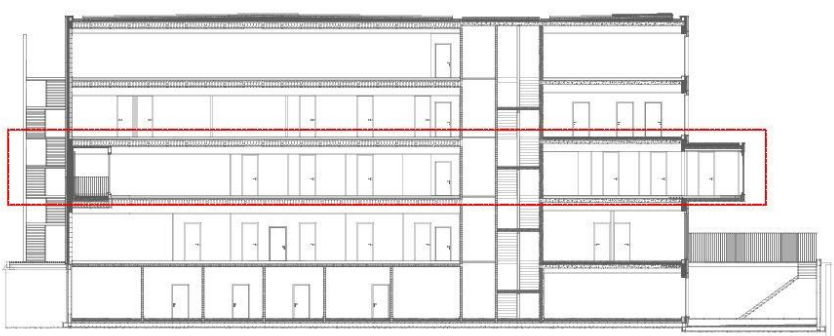
16 / JUNE / 2014

Part 5.

Comparative study

The topic chosen for comparative study is the different between two ways to build a very interesting element at the work: the cantilever.
It proposes a new way to build, comparing time, cost and performance.

When the architect designed this structure, he thought to move the first floor 5 metres to the right. And became these level a very diaphanous place, to get more light, space and, of course, beauty.



The purpose is to change the mechanical anchorage by a spatial structure. It work as a single structure, also reduced material and cost, increasing the strength and safety.

Now, beams are put with the floor through steel sheet. It are anchored with screw and the beams are welded at sheets. Thus, the welding is working perpendicular at the floor direction, a really dangerous situation. Because the direction about the welding must be the same at its work.

To improve this situation could add a metal plate over the existing ones. welding them to these, so that for welding this in the same direction as the work.

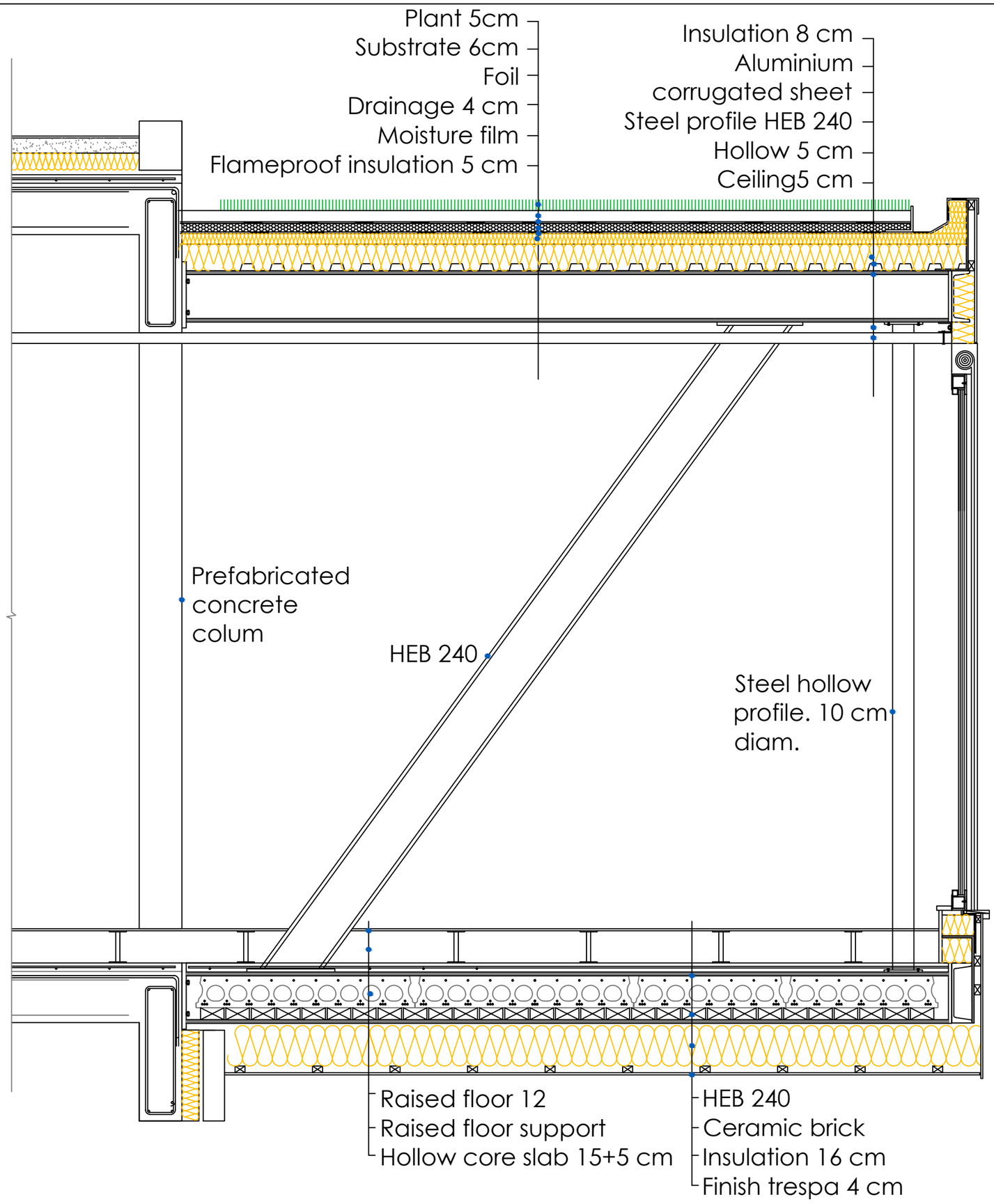
The new construction is to replace every HEB 180, place from 70 cm, by HEB 240.
Just 5 beams this time, combined with another diagonal beam, which will be anchored to the upper beam is placed. Created a work triangle.

COMPARATIVE STUDY

<table>
<tr><th></th><th>CANTILEVER PROJECT</th><th>SPATIAL STRUCTURE</th></tr>
<tr><td>MATERIAL AND EQUIPMENT</td><td>
<table>
<tr><th>MATERIAL</th><th>EQUIPMENT</th></tr>
<tr><td>21 HEB 180
4 IPE 180
21 HEA 140
2 HEA 140
6 Steel hollow profile</td><td>Crane
Lifting platform</td></tr>
</table>
</td><td>
<table>
<tr><th>MATERIAL</th><th>EQUIPMENT</th></tr>
<tr><td>Concrete (2.89 m3)
Rebar
Strut
Ceramic block
15 HEB 240
5 Steel hollow profile
8 Hollow core slab (1x0.15m)
8 Hollow core slab (0.7x0.15m)</td><td>Crane
Lifting platform
Truck mixer
Concrete cupola</td></tr>
</table>
</td></tr>
<tr><td>SCHEDULLING AND PRICING</td><td>
<table>
<tr><th>Nº</th><th>MATERIALS</th><th>QUANTITY</th><th>UNIT PRICE</th><th>TOTAL PRICE</th></tr>
<tr><td>1.01</td><td>HEB 180 (kg)</td><td>3978,24</td><td>1,67 €</td><td>6.643,66 €</td></tr>
<tr><td>1.02</td><td>IPE 180 (kg)</td><td>6,64</td><td>1,66</td><td>11,02 €</td></tr>
<tr><td>1.03</td><td>HEA 140 (kg)</td><td>2968,98</td><td>1,71</td><td>5.076,96 €</td></tr>
<tr><td>1.04</td><td>HEA 140 (kg)</td><td>49,4</td><td>1,71</td><td>84,47 €</td></tr>
<tr><td>1.05</td><td>Steel hollow profile (kg)</td><td>72</td><td>1,64</td><td>118,08 €</td></tr>
<tr><td></td><td></td><td></td><td></td><td>11.934,19 €</td></tr>
</table>
TOTAL = 11.934,19€
</td><td>
<table>
<tr><th>Nº</th><th>MATERIALS</th><th>QUANTITY</th><th>UNIT PRICE</th><th>TOTAL PRICE</th></tr>
<tr><td>2.01</td><td>HEB 240 (kg)</td><td>4534,4</td><td>1,67</td><td>7.572,45 €</td></tr>
<tr><td>2.02</td><td>Steel hollow profile (kg)</td><td>142,35</td><td>1,81</td><td>257,65 €</td></tr>
<tr><td>2.03</td><td>Ceramic block</td><td>200</td><td>0,1</td><td>20,00 €</td></tr>
<tr><td>2.04</td><td>Floor hollow core slab + concrete + rebar</td><td>57,72</td><td>62,35</td><td>3.598,84 €</td></tr>
<tr><td></td><td></td><td></td><td></td><td>11.448,94 €</td></tr>
</table>
TOTAL = 11.448,94€
</td></tr>
<tr><td>PROS AND CONS</td><td>PROS:
- Less time of ejecution

CONS:
- Dangerous structure
- Future repairs</td><td>PROS
- Save steel profiles
- Increased security
- The structure works better

CONS:
- More time of ejecution</td></tr>
<tr><td>CONCLUSION</td><td colspan="2">Keeping in mind all the information obtained before, there aren't a lot differences about the price or time to execute. But, studying the structure, how it works, and all the forces origin, the second option is better, so with more or less the same price, you attend a most security option.</td></tr>
</table>



STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 5

Comparative study.

New construction for the cantilever.
Spatial structure

PLANE Nº :

18

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

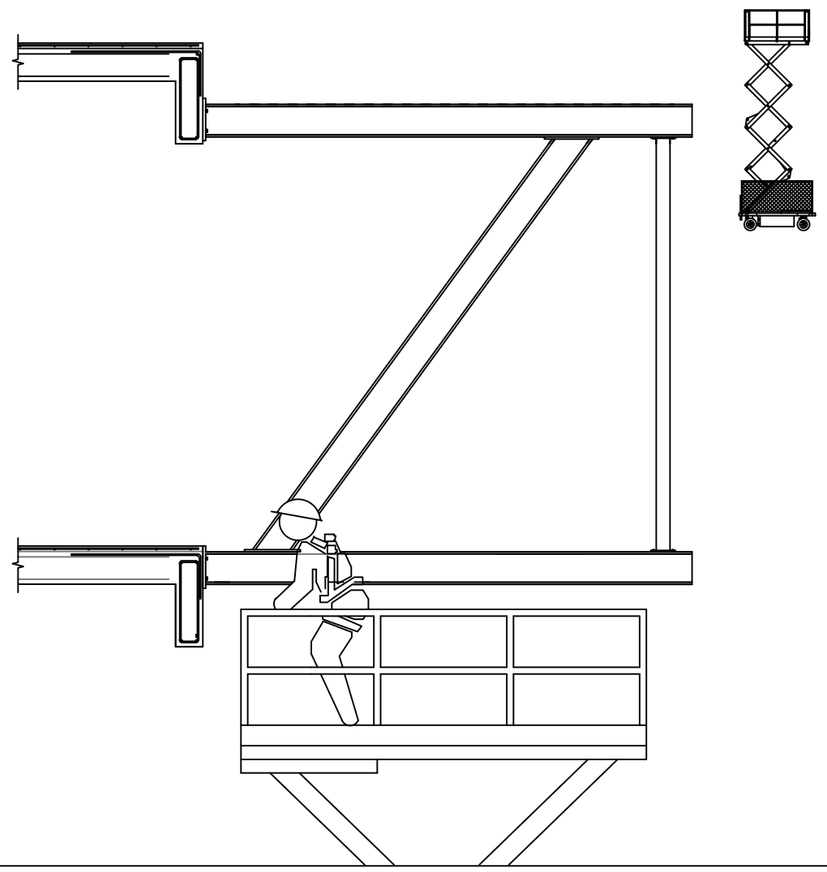
SCALE

1 / 20

DATE

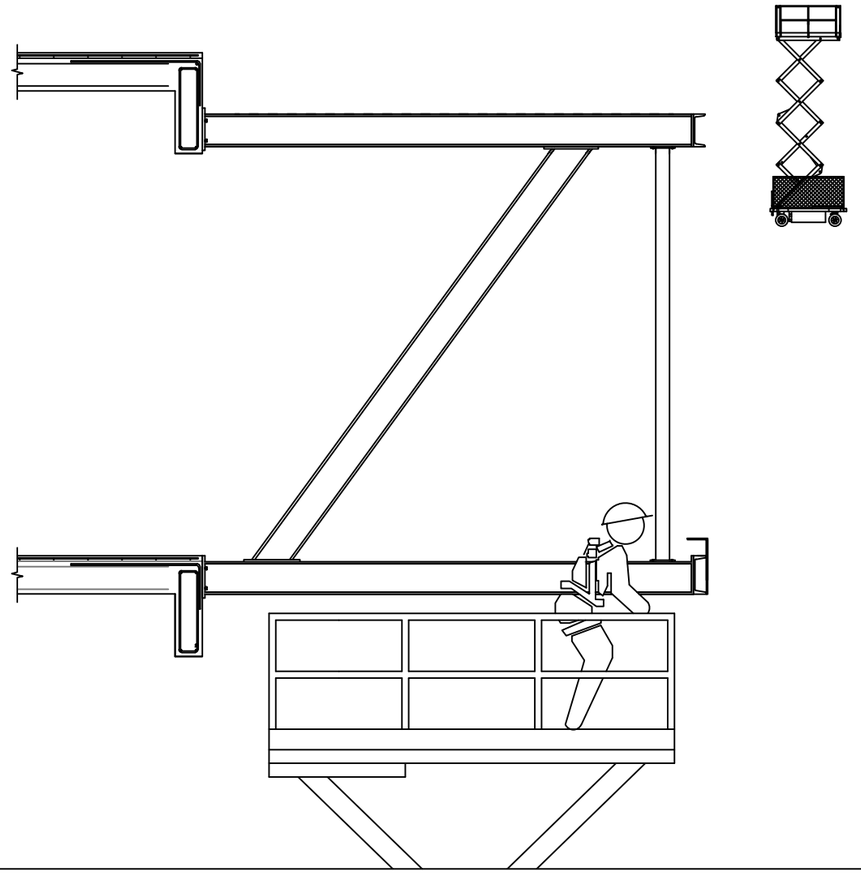
16 / JUNE / 2014

1



The metal structure soars with crane. Another laborer, placed on the lifting platform, guide the structure and fixed.

2



Then, still on the platform placed end profiles

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 5

Comparative study.

STEP BY STEP
Spatial structure

PLANE Nº :

19

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

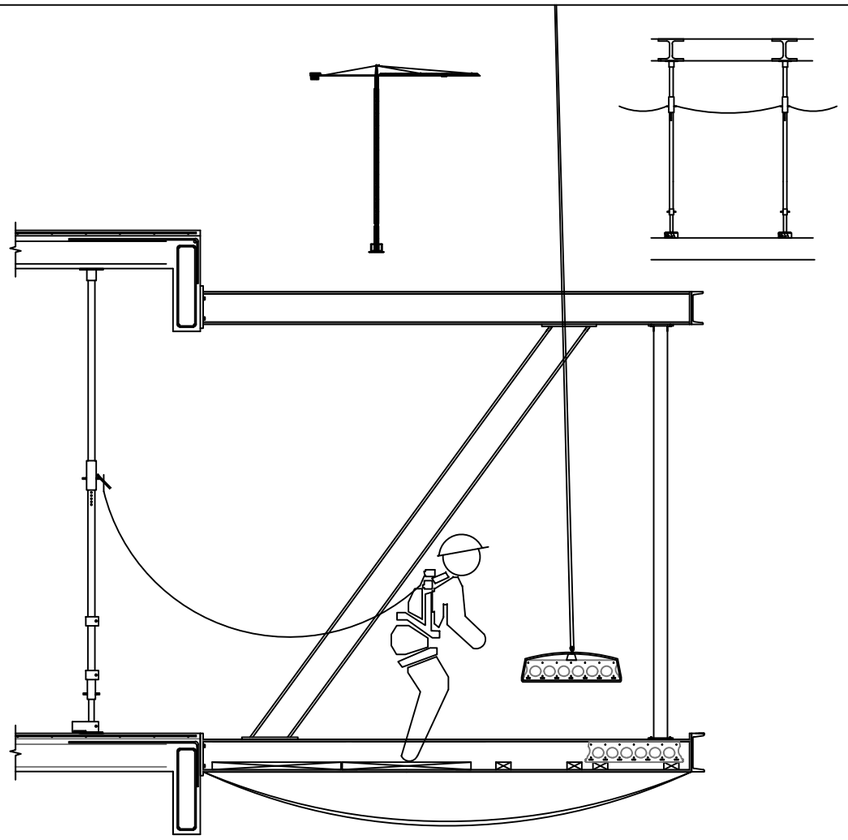
SCALE

1 / 50

DATE

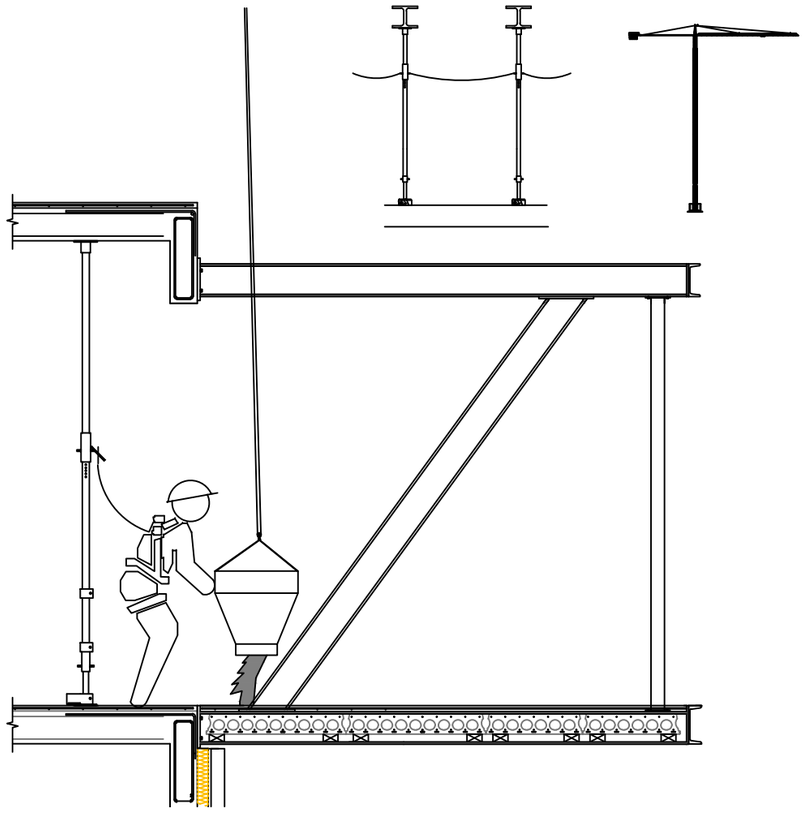
16 / JUNE / 2014

3



Put wooden boards on the steel profile, on them, the operator can move and place the hollow core. It shall be protected with a lifeline

4



When they are placed all hollow core slabs, the slab is concreted

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 5

Comparative study.

STEP BY STEP
Spatial structure

PLANE Nº :

20

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

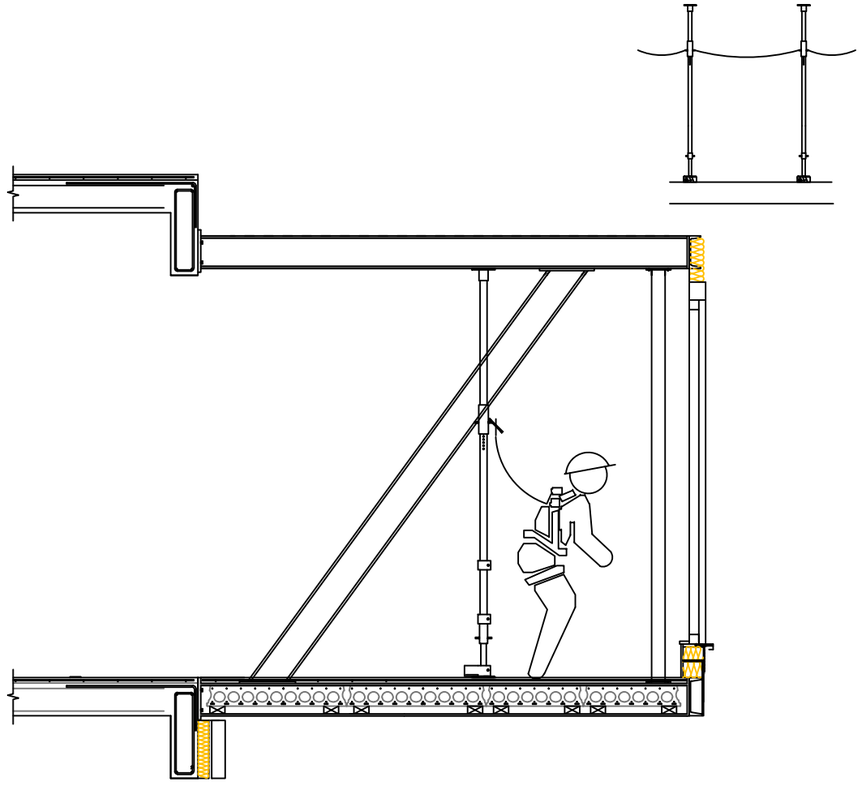
SCALE

1 / 50

DATE

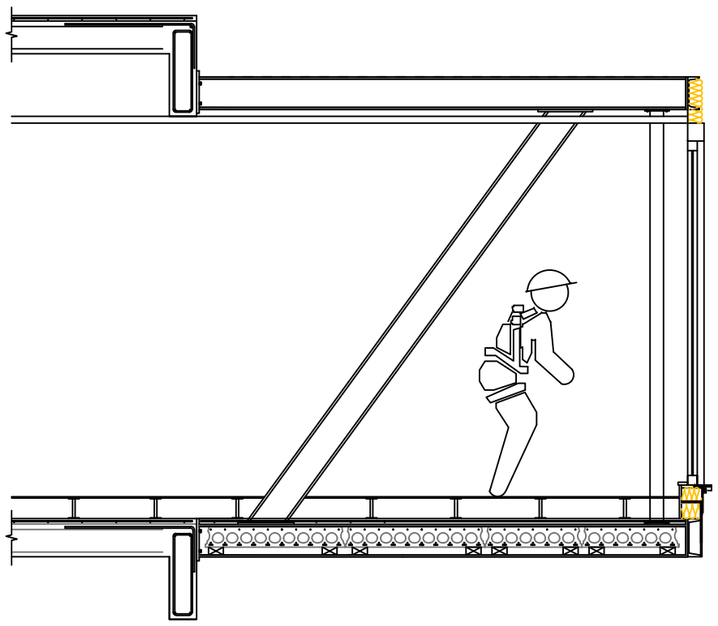
16 / JUNE / 2014

5



With the same procedure, the operator places the window

6



Raised floor, and ceilings.

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 5

Comparative study.

STEP BY STEP
Spatial structure

PLANE Nº :

21

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

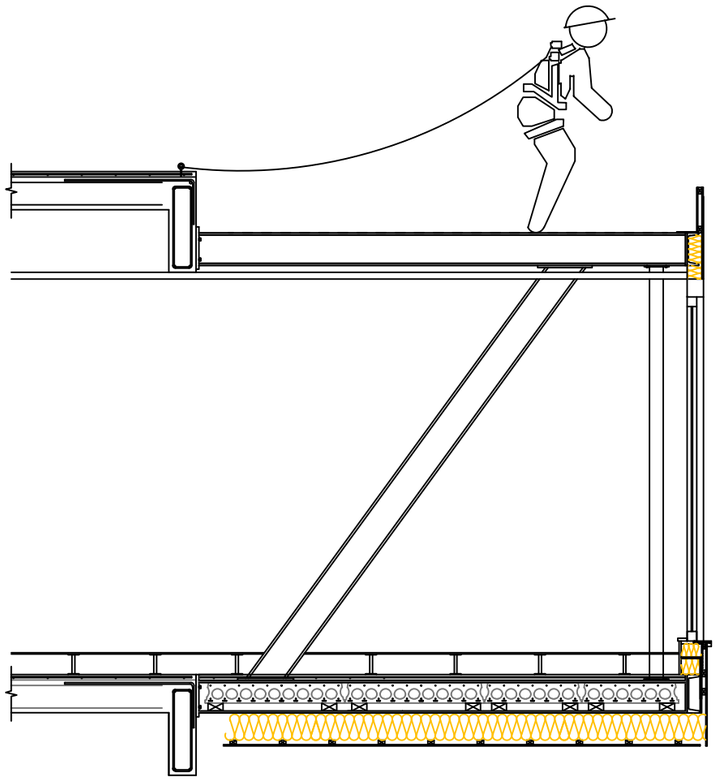
SCALE

1 / 50

DATE

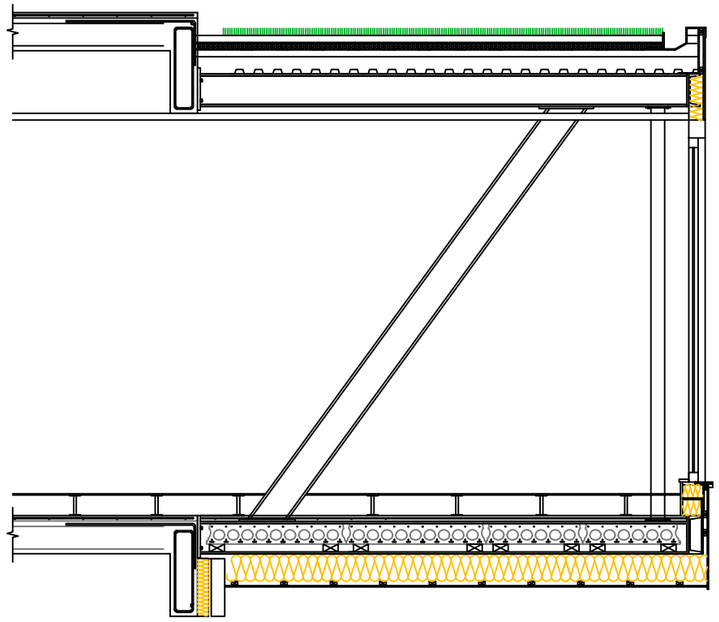
16 / JUNE / 2014

7



After, the laborer finish the roof.

8



All structure are finish

STUDY and CONSTRUCTIVE ANALYSIS of an OFFICE BUILDING located in Ghent

FINAL BACHELOR PROJECT

DESCRIPTION

PART 5
Comparative study

STEP BY STEP
Spatial structure

PLANE Nº :

22

UNIVERSIDAD POLITECNICA DE VALENCIA

KAHO Sint-Lieven

STUDENT

Paula Cort Azcárraga

SCALE

1 / 50

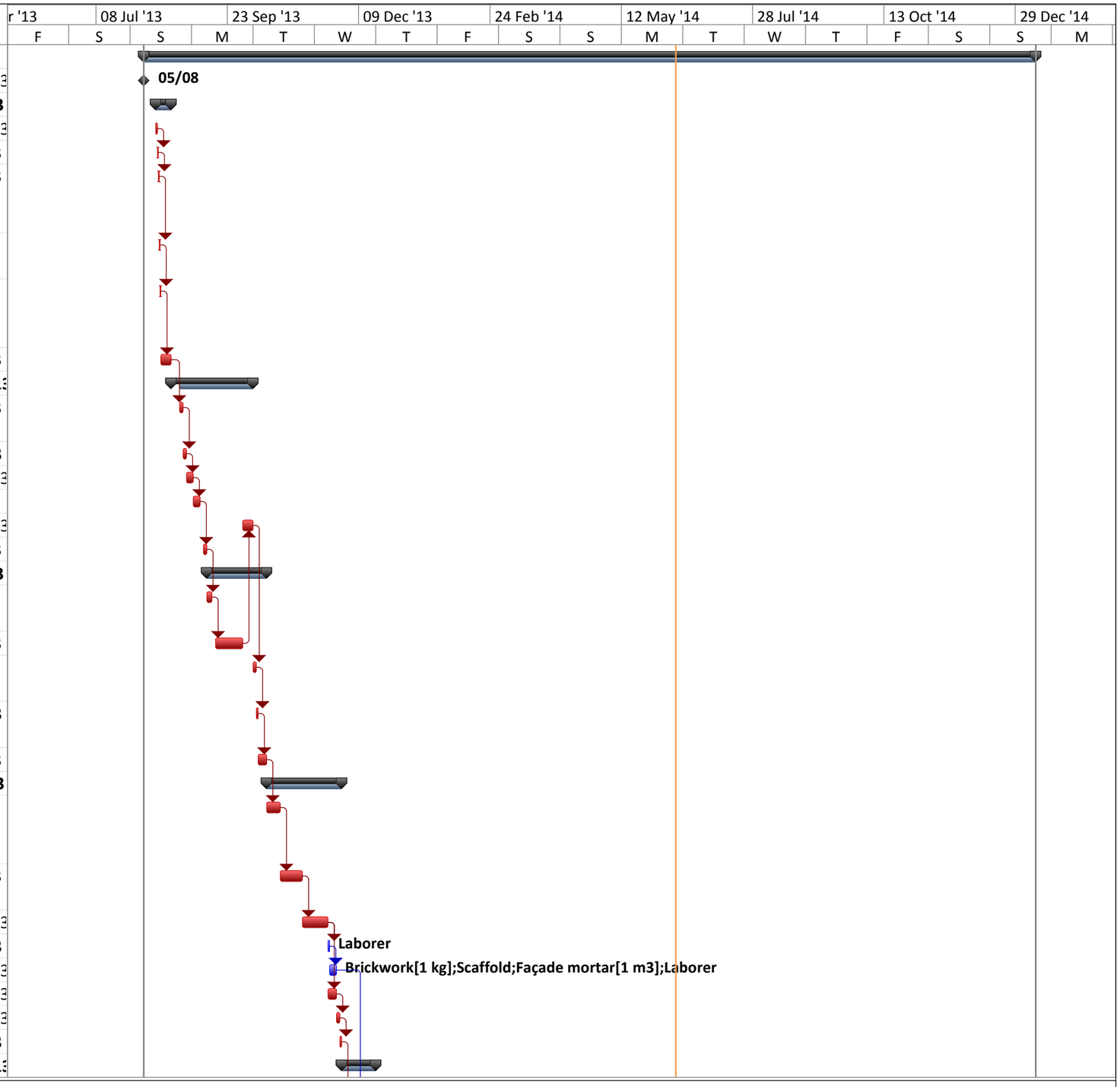
DATE

16 / JUNE / 2014

Part 6.

Scheduling and pricing

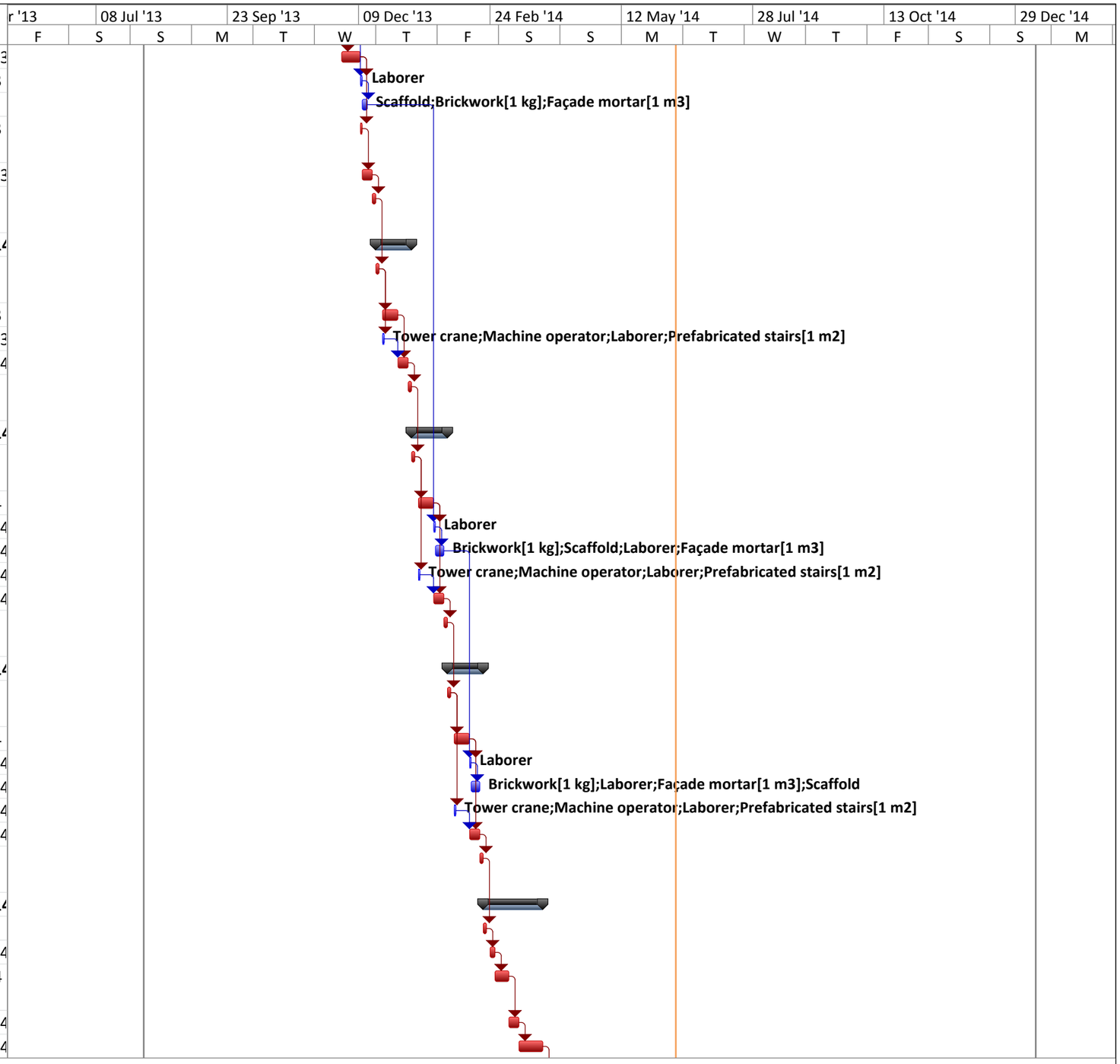
ID		Task Name	Duration	Start	Finish
1		**OFFICE BUILDING**	**375 days**	**Mon 05/08/13**	**Fri 09/01/15**
2		START	0 days	Mon 05/08/13	Mon 05/08/13
3		**1 Implanting**	**7 days**	**Mon 12/08/13**	**Tue 20/08/13**
4		1.1 Cleaning surface	1 day	Mon 12/08/13	Mon 12/08/13
5		1.2 Fenced and signaling	0,5 days	Tue 13/08/13	Tue 13/08/13
6		1.3 Electrical installation, plumbing and sanitation of temporary facilities	0,5 days	Tue 13/08/13	Tue 13/08/13
7		1.4 Placement of temporary facilities in site huts	0,5 days	Wed 14/08/13	Wed 14/08/13
8		1.5 Electrical, plumbling and sanitation installation of the site huts	0,5 days	Wed 14/08/13	Wed 14/08/13
9		1.6 Placement of the crane	4 days	Thu 15/08/13	Tue 20/08/13
10		**2 Earthwork**	**34 days**	**Wed 21/08/13**	**Mon 07/10/13**
11		2.1 Installation of temporary retaining wall	2 days	Mon 26/08/13	Tue 27/08/13
12		2.2 Dig to -2m	2 days	Wed 28/08/13	Thu 29/08/13
13		2.3 Drainage installation	2 days	Fri 30/08/13	Mon 02/09/13
14		2.4 Installing dewatering pumps	4 days	Tue 03/09/13	Fri 06/09/13
15		2.5 Dig to -4m	4 days	Wed 02/10/13	Mon 07/10/13
16		2.6 Dig elevator pit	2 days	Mon 09/09/13	Tue 10/09/13
17		**3 Framework**	**25 days**	**Wed 11/09/13**	**Tue 15/10/13**
18		3.1 Temporary foundation with rocks approx 50cm thickness	3 days	Wed 11/09/13	Fri 13/09/13
19		3.2 Installing 115 poles to -2m	12 days	Mon 16/09/13	Tue 01/10/13
20		3.3 Cut piles to break free the rebar that's inside. Sonar test	2 days	Tue 08/10/13	Wed 09/10/13
21		3.4 Ground leveling in the pits, foundation plate + walls	1 day	Thu 10/10/13	Thu 10/10/13
22		3.5 Foundation plate building	3 days	Fri 11/10/13	Tue 15/10/13
23		**4 Basement**	**32 days**	**Wed 16/10/13**	**Thu 28/11/13**
24		4.1 Formwork slab + rebar + sewage pipes + concrete found slab + formwork panels	6 days	Wed 16/10/13	Wed 23/10/13
25		4.2 Final plans basement walls, columns and cover	9 days	Thu 24/10/13	Tue 05/11/13
26		4.3 Foundation walls	11 days	Wed 06/11/13	Wed 20/11/13
27		4.4 Place the scaffold	1 day	Thu 21/11/13	Thu 21/11/13
28		4.5 Brickwork facade BASEMENT	2 days	Fri 22/11/13	Mon 25/11/13
29		4.6 Interior walls of concrete	3 days	Thu 21/11/13	Mon 25/11/13
30		4.7 Prefabricated beams	2 days	Tue 26/11/13	Wed 27/11/13
31		4.8 Prefabricated stairs	1 day	Thu 28/11/13	Thu 28/11/13
32		**5 Ground Floor**	**14 days**	**Fri 29/11/13**	**Wed 18/12/13**



Project: GANT OBRA
Date: Fri 13/06/14

Task	Group By Summary	External Milestone	Duration-only	Deadline			
Split	Rolled Up Task	Inactive Task	Manual Summary Rollup	Critical			
Milestone	Rolled Up Milestone	Inactive Milestone	Manual Summary	Critical Split			
Summary	Rolled Up Progress	Inactive Summary	Start-only	Progress			
Project Summary	External Tasks	Manual Task	Finish-only				

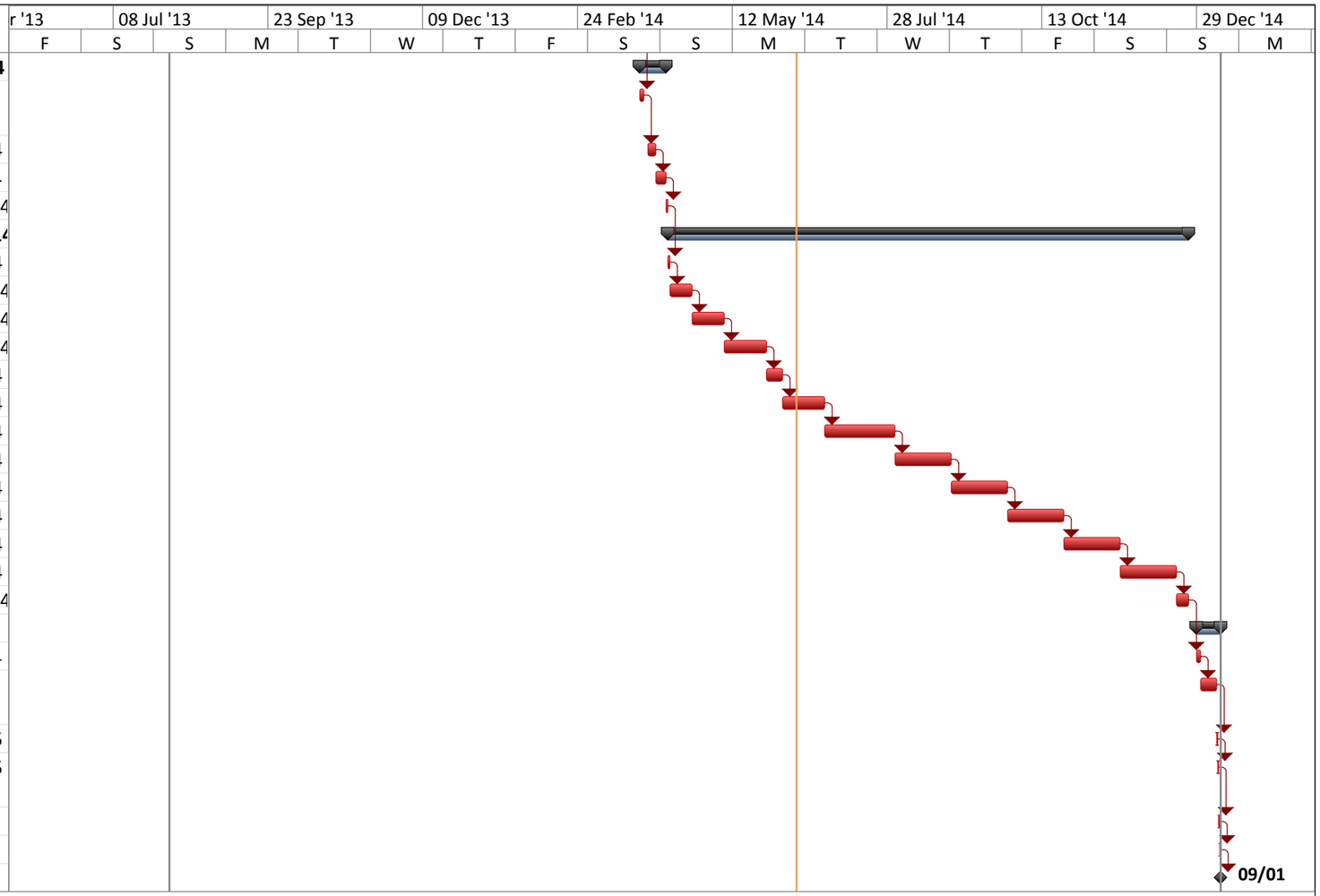
ID	Task Name	Duration	Start	Finish
33	5.1 Concrete and prefabricated walls	7 days	Fri 29/11/13	Mon 09/12/13
34	5.2 Place the scaffold	1 day	Tue 10/12/13	Tue 10/12/13
35	5.3 Brickwork facade GF	3 days	Wed 11/12/13	Fri 13/12/13
36	5.4 Prefabricated stairs + platforms stabbing	1 day	Tue 10/12/13	Tue 10/12/13
37	5.5 Cover GF	4 days	Wed 11/12/13	Mon 16/12/13
38	5.6 Electrical installation, plumbing and sanitation	2 days	Tue 17/12/13	Wed 18/12/13
39	**6 First Floor**	**15 days**	**Thu 19/12/13**	**Wed 08/01/14**
40	6.1 Final reinforcement plans and cover	2 days	Thu 19/12/13	Fri 20/12/13
41	6.2 Concrete and prefabricated walls	7 days	Mon 23/12/13	Tue 31/12/13
42	6.3 Prefabricated stairs + platforms st	1 day	Mon 23/12/13	Mon 23/12/13
43	6.4 Cover F1	4 days	Wed 01/01/14	Mon 06/01/14
44	6.5 Electrical installation, plumbing and sanitation	2 days	Tue 07/01/14	Wed 08/01/14
45	**7 Second Floor**	**15 days**	**Thu 09/01/14**	**Wed 29/01/14**
46	7.1 Final reinforcement plans and cover	2 days	Thu 09/01/14	Fri 10/01/14
47	7.2 Concrete and prefabricated walls	7 days	Mon 13/01/14	Tue 21/01/14
48	7.3 Place the scaffold	1 day	Wed 22/01/14	Wed 22/01/14
49	7.4 Brickwork facade 2F	3 days	Thu 23/01/14	Mon 27/01/14
50	7.5 Prefabricated stairs + platforms st	1 day	Mon 13/01/14	Mon 13/01/14
51	7.6 Cover F2	4 days	Wed 22/01/14	Mon 27/01/14
52	7.7 Electrical installation, plumbing and sanitation	2 days	Tue 28/01/14	Wed 29/01/14
53	**8 Third Floor**	**15 days**	**Thu 30/01/14**	**Wed 19/02/14**
54	8.1 Final reinforcement plans and cover	2 days	Thu 30/01/14	Fri 31/01/14
55	8.2 Concrete and prefabricated walls	7 days	Mon 03/02/14	Tue 11/02/14
56	8.3 Place the scaffold	1 day	Wed 12/02/14	Wed 12/02/14
57	8.4 Brickwork facade 3F	3 days	Thu 13/02/14	Mon 17/02/14
58	8.5 Prefabricated stairs + platforms st	1 day	Mon 03/02/14	Mon 03/02/14
59	8.6 Cover 3F	4 days	Wed 12/02/14	Mon 17/02/14
60	8.7 Electrical installation, plumbing and sanitation	2 days	Tue 18/02/14	Wed 19/02/14
61	**9. Roof**	**25 days**	**Thu 20/02/14**	**Wed 26/03/14**
62	9.1 Formwork cover	2 days	Thu 20/02/14	Fri 21/02/14
63	9.2 Eaves bricklaying	3 days	Mon 24/02/14	Wed 26/02/14
64	9.3 Prefabricated architectural concrete	6 days	Thu 27/02/14	Thu 06/03/14
65	9.4 Waterproofing and tests	4 days	Fri 07/03/14	Wed 12/03/14
66	9.5 Finishing cover	10 days	Thu 13/03/14	Wed 26/03/14



Project: GANT OBRA
Date: Fri 13/06/14

Task	Group By Summary	External Milestone	Duration-only	Deadline			
Split	Rolled Up Task	Inactive Task	Manual Summary Rollup	Critical			
Milestone	Rolled Up Milestone	Inactive Milestone	Manual Summary	Critical Split			
Summary	Rolled Up Progress	Inactive Summary	Start-only	Progress			
Project Summary	External Tasks	Manual Task	Finish-only				

ID	Task Name	Duration	Start	Finish
67	**10 Projection structure**	**9 days**	**Thu 27/03/14**	**Tue 08/04/14**
68	10.1 Support steel beams, anchoring to concrete	2 days	Thu 27/03/14	Fri 28/03/14
69	10.2 Envolvent glass	4 days	Mon 31/03/14	Thu 03/04/14
70	10.3 Installations	3 days	Fri 04/04/14	Tue 08/04/14
71	11 Remove Crane	1 day	Wed 09/04/14	Wed 09/04/14
72	**12 Interior finish**	**185 days**	**Thu 10/04/14**	**Wed 24/12/14**
73	12.1 Remove scaffol	1 day	Thu 10/04/14	Thu 10/04/14
74	12.2 Suspended ceilings	7 days	Fri 11/04/14	Mon 21/04/14
75	12.3 Raised floors	12 days	Tue 22/04/14	Wed 07/05/14
76	12.4 Installation of air conditioning	15 days	Thu 08/05/14	Wed 28/05/14
77	12.5 Air tightness test	6 days	Thu 29/05/14	Thu 05/06/14
78	12.6 Insulation	15 days	Fri 06/06/14	Thu 26/06/14
79	12.7 Carpentry	25 days	Fri 27/06/14	Thu 31/07/14
80	12.8 Fixed partitions	20 days	Fri 01/08/14	Thu 28/08/14
81	12.9 Pavement stairs and rug	20 days	Fri 29/08/14	Thu 25/09/14
82	12.10 Carpet	20 days	Fri 26/09/14	Thu 23/10/14
83	12.11 Paint	20 days	Fri 24/10/14	Thu 20/11/14
84	12.12 Furniture	20 days	Fri 21/11/14	Thu 18/12/14
85	12.13 Cleaning	4 days	Fri 19/12/14	Wed 24/12/14
86	**13 Environment construction**	**10 days**	**Mon 29/12/14**	**Fri 09/01/15**
87	13.1 Outdoor railings and mailboxes	2 days	Mon 29/12/14	Tue 30/12/14
88	13.2 Outdoor construction, outside pavement and street furniture	6 days	Wed 31/12/14	Wed 07/01/15
89	13.3 Remove site huts	0,5 days	Thu 08/01/15	Thu 08/01/15
90	13.4 Remove temporary installations	0,5 days	Thu 08/01/15	Thu 08/01/15
91	13.5 Remove fenced	0,5 days	Fri 09/01/15	Fri 09/01/15
92	13.6 Cleaning	0,5 days	Fri 09/01/15	Fri 09/01/15
93	END	0 days	Fri 09/01/15	Fri 09/01/15



Project: GANT OBRA
Date: Fri 13/06/14

Task	Group By Summary	External Milestone	Duration-only	Deadline
Split	Rolled Up Task	Inactive Task	Manual Summary Rollup	Critical
Milestone	Rolled Up Milestone	Inactive Milestone	Manual Summary	Critical Split
Summary	Rolled Up Progress	Inactive Summary	Start-only	Progress
Project Summary	External Tasks	Manual Task	Finish-only	

Some photos of the current state of the work: