CONSTRUCTION OF AN ADMINISTRATIVE BUILDING IN KLUIZE N, BELGIUM

AUTHOR:

BARBARA COTANDA BRELL

ACADEMIC TUTOR:

Mª José Vidal Lucas. Universidad Politécnica de Valencia
Bart Craeye. HUB KAHO, KUL Association

ETS de Ingeniería de Edificación
Universitat Politècnica de València
Abstract

The following Bachelor Final Project is a technical assignment of an administrative building located in Nieuweweg 30 - 9940 Evergem - Kluizem (Belgium). Include a site installation plan, principal section, additional detailed drawings, a technical study, a comparative study and schedule, using MS Project. In order to monitor the progress of the works, several visits were made to the building site.

After studying the way buildings are made in Belgium, a comparative with the Spanish method is done. This is the main reason why I chose to do my final project abroad, so I could learn different ways of construction and maybe some new techniques.

Key words: comparative study, detailed drawing, principal section, schedule, site installation.
Acknowledgements

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Chapter 1.

Introduction

The following project is about the construction of an administrative building in Kluizen, Belgium.

The building site has no adjacent buildings, so there is as much room as needed for the equipment. Also the tower crane can be placed outside the building and they only need to consider the height of the own building when transferring materials. Vehicles can enter the building site and place the materials on the stockage area, near the entry and the tower crane.

The water table had to be lowered and stay at -5.55 m. The construction itself consists on a basement, ground floor and first floor with impassable roofs (see plan 2). Foundations are made by piles in the whole building. Wall foundations with beams, both made of in situ concrete, are used in the basement. The rest of the building is supported by in situ concrete beams. Stairs consist of 6 parts of prefabricated steps, going around the elevator, which is covered by concrete blocks walls. Floors are made by prefabricated slabs 15x120cm with a layer of in situ concrete and electrowelded mesh 150x150mm on top. All concrete used is C30/37 GB EE3 S3, both in situ and prefabricated. The steel used for the reinforcement is BE500S, while the electrowelded mesh type is BE500SD.
The slopes of the top roofs are made with prefabricated beams with different heights, which support the slabs and the rest of the layers. On the roofs of the first floor the slope is created by aerated concrete. All ledges are made by cellular concrete YTONG coated of insulation.

The façade is composed of brickwork of thermoblock 29cm, insulation, an air cavity and another brickwork on the outside. This building is meant to demand as no energy as possible so thick insulation (15-25 cm of cellular glass Uthermwall R 5.2) is used all over, as well as insulating materials, such as cellular concrete or thermoblock.

That is why well insulated joinery is also used. However, there is heating in the floors, in case it is needed. Ceilings are composed by suspended ceiling with 5cm of acoustic insulation. Walls are finished with plasterwork.
Chapter 2.

Site installation plan

Location of the construction crane on site, radius, lifting capacity and lift capacity at max. radius. The construction has no adjacent buildings, so the only restriction for the tower crane is the building itself.

Location for temporary storage of material and consumer goods.

Location of site offices and building supervisor’s offices.

Location of temporary site access roads and their construction.

Location of available utilities.

HSE measures.

See plan 1
Chapter 3.

Principal section

Broken longitudinal section of the building of study, to scale 1:50.

Plans of ground floor and first floor indicate where the section comes from.

On the section are also indicated the additional detailed drawings.

These are the main elements shown on the section:

- Pile foundations.
- Basement of in situ concrete beams and walls.
- Prefabricated stairs.
- Floors of prefabricated slabs with electrowelded mesh and a layer of concrete on top.
- Walls of concrete blocks, prefabricated concrete or thermoblock bricks. View leyend.
- Façade covered by 2 x 10 cm of insulation, 4 c of air cavity and ceramic bricks on the outside.

See plan 2
Chapter 4.

Detailed drawings

Ten detailed drawings to scale 1:10 of relevant constructive building joints from the principal section.

*See plans 3.1 to 3.10*
Chapter 5.

Technical study

The subject of the technical study is the elevator pit. It is made of in situ concrete C30/37 GB EE3 SE with reinforcement BE 500 S. It has pile foundations, like the whole building.

The lowest level the concrete will be is -4.4 m, so according to what the laboratory calculated, water table must stay at least 1 m under the slab.

*See plan 4*
Chapter 6. Comparative study

The comparative study is focused on the columns. It aims to prove which material -bricks, in situ concrete or prefabricated concrete- is the best option for these elements.

After studying the pros and cons of each material, the prefabricated concrete is the one that best suits, since its high price is offset by the short execution and good resistance of the material.

See plan 5
Chapter 7.

Schedule

Works were started on August 8th, 2014 and it is planned to finish the building by January 21st, 2015.

Main activities and their durations are included on the schedule.

See Gantt of the works.
Chapter 8.

Conclusion

The main difference I noticed between the way buildings are made in Spain and in Belgium is the structure.

Prefabricated elements are commonly used in Belgium, like in the construction assigned. As the drawings show, prefabricated slabs are the main element of the floors, which rest on the lower floor walls and columns. This means both floors and walls are part of the building structure.

In Spain the main kind of building has an in situ concrete structure, including columns, beams and stairs. First all the structure is done, followed by the roof. After this, brickworks can start, so they will not be a part of the structure.
Appendix

Class notes from Polytechnic University of Valencia

Class notes from Project Management 3, at KaHo Sint-Lieven

http://www.construmatica.com/construpedia/Ejecuci%C3%B3n_de_Pilares

http://www.construmatica.com/construpedia/Ventajas_y_Desventajas_de_la_Construcci%C3%B3n_Prefabricada

http://www.construmatica.com/construpedia/Tecnolog%C3%ADa_de_la_Construcci%C3%B3n_Estructuras,_Cerramientos_y_Materiales_de_Impermeabilizaci%C3%B3n:%C3%B3 Prefabricados_Utilizados_en_Sistemas_Estructurales

http://www.construmatica.com/construpedia/Ejecuci%C3%B3n_de_F%C3%A1brica_de_Ladrillo

http://www.construmatica.com/construpedia/Reglas_Generales_de_Ejecuci%C3%B3n_de_Muros_con_Bloque_Termoarcilla

https://www.youtube.com/watch?v=ha0_KGNu8gw
Annex

Plan 1. Site installation plan
Plan 2. Principal section
Plans 3.1-3.10. Additional detailed drawings
Plan 4. Technical study
Plan 5. Comparative study
Gantt of the works
Pictures of the construction
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>The methods refer to the strategies employed in the construction process.</td>
</tr>
<tr>
<td>Core Components</td>
<td>The core components are the primary structures and elements of the structure.</td>
</tr>
<tr>
<td>Materials</td>
<td>The materials used are the building blocks of the construction.</td>
</tr>
<tr>
<td>Design</td>
<td>The design is the blueprint for the construction.</td>
</tr>
<tr>
<td>Cost</td>
<td>The cost is the financial investment required for the project.</td>
</tr>
</tbody>
</table>

**Diagram:**
- A diagram illustrates the assembly of the core components, highlighting the placement and connection of materials.
- The diagram also shows the integration of the core components into the overall design.

**Conclusion:**
- The conclusion summarizes the findings and implications of the study.
- It emphasizes the importance of the chosen methods and the effectiveness of the design in achieving the intended outcomes.
<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
<th>Predecessors</th>
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<tbody>
<tr>
<td>1</td>
<td>START</td>
<td>646 days</td>
<td>Mon 12/08/13</td>
<td>Mon 01/02/16</td>
<td></td>
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<tr>
<td>2</td>
<td>Dewatering</td>
<td>130 days</td>
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<td>Fri 07/02/14</td>
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<td>3</td>
<td>Dig</td>
<td>11 days</td>
<td>Wed 21/08/13</td>
<td>Wed 04/09/13</td>
<td>132SS+7 days</td>
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<td>4</td>
<td>Pile foundations</td>
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<td>Fri 13/09/13</td>
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<tr>
<td>5</td>
<td>Lift pit</td>
<td>12 days</td>
<td>Mon 10/02/14</td>
<td>Tue 25/02/14</td>
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<tr>
<td>6</td>
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<td>30 days</td>
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<td>Tue 08/04/14</td>
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<td>7</td>
<td>Slab</td>
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<td>Wed 26/02/14</td>
<td>Mon 10/03/14</td>
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<td>Tue 08/04/14</td>
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<td>Wed 09/04/14</td>
<td>Tue 20/05/14</td>
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<td>Floor</td>
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<td>Wed 09/04/14</td>
<td>Tue 22/04/14</td>
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</tr>
<tr>
<td>11</td>
<td>Prefab staircase</td>
<td>1 day</td>
<td>Wed 23/04/14</td>
<td>Wed 23/04/14</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>Prefab elements</td>
<td>2 days</td>
<td>Thu 24/04/14</td>
<td>Fri 25/04/14</td>
<td>11</td>
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<tr>
<td>13</td>
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<td>Mon 28/04/14</td>
<td>Fri 16/05/14</td>
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<td>14</td>
<td>Prefab lintels</td>
<td>2 days</td>
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<td>Tue 20/05/14</td>
<td>13</td>
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<tr>
<td>15</td>
<td>First floor</td>
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<td>Tue 17/06/14</td>
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<td>Wed 21/05/14</td>
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<td>Wed 28/05/14</td>
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<tr>
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<td>Tue 17/06/14</td>
<td>19</td>
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<tr>
<td>21</td>
<td>Roof</td>
<td>20 days</td>
<td>Wed 18/06/14</td>
<td>Tue 15/07/14</td>
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<tr>
<td>22</td>
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<td>Wed 18/06/14</td>
<td>Tue 24/06/14</td>
<td>20</td>
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<tr>
<td>23</td>
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<td>Tue 08/07/14</td>
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<td>24</td>
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<td>5 days</td>
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<td>Tue 15/07/14</td>
<td>23</td>
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<td>25</td>
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<td>26</td>
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<td>External Joinery</td>
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</tr>
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<td>29</td>
<td>END</td>
<td>1 day</td>
<td>Mon 12/01/15</td>
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<td>1528;24</td>
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