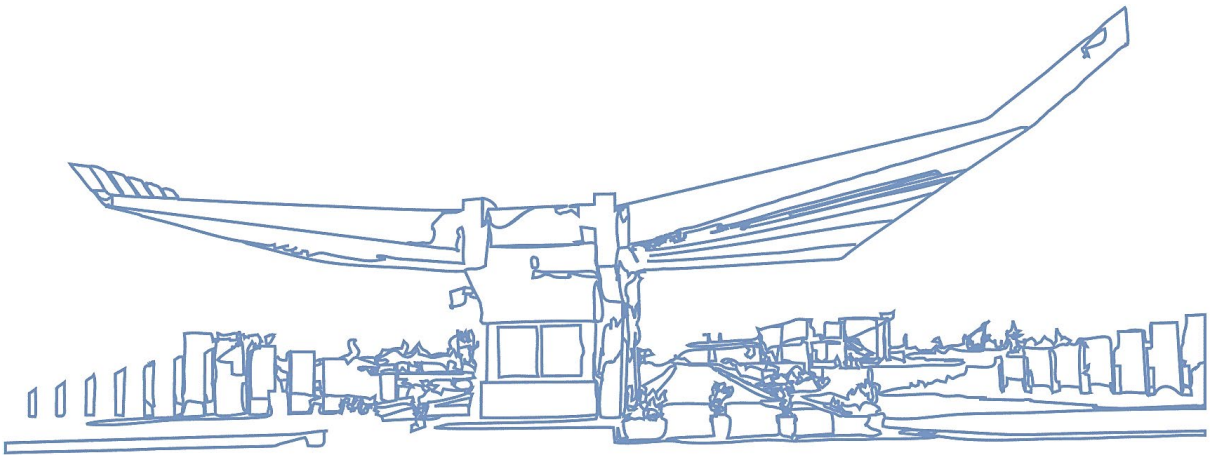
EPOKA UNIVERSITY

FACULTY OF ARCHITECTURE AND ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING

# PROFESSIONAL PRACTICE
# **JOURNAL**



Prepared by:

**Ilirian Ljuljduraj**

Submission date:

_____

## To be completed by the Student

Student Name: _____

Site Supervisor Name: _____

Company Name: _____

Field of Experience: _____

Signature of Student: _____

Date: _____

Signature/Stamp of Site Supervisor: _____

Date: _____

## Të plotësohet nga Studenti

Emri i Studentit: _____

Emri i Supervizorit në Praktikë: _____

Emri i Kompanisë: _____

Fusha e Ekspertizës: _____

Firma e Studentit: _____

Data: _____

Firma/Vula e Supervizorit në Praktikë: _____

Data: _____

Total Hours / Weeks: _____ / _____

Totali i Orëve / Javëve: _____ / _____

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To be completed by the respective EPOKA University Department

Course Instructor: _____

Grade: ☐ Satisfactory / ☐ Unsatisfactory

Signature: _____

Date: _____

Të plotësohet nga Departamenti përgjegjës i Universitetit "EPOKA"

Pedagogu i Lëndës: _____

Vlerësimi: ☐ I Kënaqshëm / ☐ I Pakënaqshëm

Firma: _____

Data: _____

# PROFESSIONAL PRACTICE APPROVAL FORM

To be completed by the Student and Institution/Company/Entity

Name / Surname : .....

Class / ID no. : ...../.....

Course-Title and Code : CE 301 Summer Practice I

Required Practice Duration : …… practice days

Professional Practice Period : ...../...../..... - ...../...../.....

Institution/Company/Entity : ….....

Address : .....

County : .....

City : .....

Country : .....

## APPROVAL OF THE PROFESSIONAL PRACTICE PLACE

We approve that the student named above will be engaged as an intern in our ……. office ..... days per week and between ...../...../..... - ...../...../..... under the supervision of ……...

Name / Surname : .....

Title / Position : .....

Seal / Signature : …….

……

To be completed by the respective EPOKA University Department

## APROVAL OF THE DEPARTMENT OF CIVIL ENGINEERING

The student named above is approved to be engaged as an intern in the stated …… office between ...../...../..... - ...../...../.....

Name / Surname :

Title / Position :

Seal / Signature :

---

*Please keep a copy for yourself and give a copy to the student to submit to the Department Professional Practice Supervisor.*

# FORMULARI I PRANIMIT PËR PRAKTIKË PROFESIONALE

Të plotësohet nga Studenti dhe Institucioni/Kompania/Entiteti

Emri/ Mbiemri : .....

Klasa / Nr. i Identifikimit : ...../.....

Kodi i Lëndës : CE 301 Praktika Verore I

Kohëzgjatja e Praktikës se Kërkuar : …… ditë në praktikë

Periudha e Praktikës Profesionale : ...../...../..... - ...../...../.....

Institucioni/Kompania/Entiteti : ….....

Adresa : .....

Qarku : .....

Qyteti : .....

Shteti : .....

## PRANIMI NGA VENDI I PRAKTIKËS PROFESIONALE

Ne pranojmë që studenti i lartpërmendur, të përfshihet si Praktikant pranë zyrës tonë …… për ..... ditë në javë, përgjatë ...../...../..... - ...../...../....., nën mbikëqyrjen e ……..

Emër / Mbiemër : .....

Titulli / Pozicioni : .....

Vula / Firma : ……

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Të plotësohet nga Departamenti përgjegjës i Universitetit "EPOKA"

## MIRATIMI NGA DEPARTAMENTI I INXHINIERISË SË NDËRTIMIT

Studenti i lartpërmendur pranohet të përfshihet si Praktikant në zyrën …… përgjatë ...../...../..... - ...../...../.....

Emër / Mbiemër :

Titulli / Pozicioni :

Vula / Firma :

---

*Lutemi të mbani një kopje për veten tuaj dhe një kopje t'ia jepni studentit për ta dorëzuar tek Mbikëqyrësi i Praktikës Profesionale pranë Departamentit përkatës.*

# PROFESSIONAL PRACTICE PERFORMANCE ASSESSMENT FORM
## CONFIDENTIAL[1]

To be completed by the Professional Practice Site Supervisor

Name and Surname of Student : …….

Class – Year : …….

Name of Organization : …….

Beginning and End of Practice : …….

Minimum Period of Practice : …….

Name of Compulsory Practice : CE 301 Summer Practice I

Evaluation of Professional Practice

| Department in the organization | Period of Practice (Weeks) | Interest in job | Attendance | Performance | Remarks |
|---|---|---|---|---|---|
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Evaluation:
(A) Excellent
(B) Good
(C) Fair
(D) Poor
(F) Unsatisfactory

Date : ……..…
Name of Supervisor : ……..…
Title of Supervisor : ……..…
Official Stamp and
Signature : ……..…

EPOKA University
Faculty of Architecture and Engineering
Department of Civil Engineering
Tirana, Albania

……

To be completed by the respective EPOKA University Department

Introduction : …….
Main Text Report : …….
Conclusion : …….
Overall Evaluation of Report : …….
Department of Civil Engineering

Department Professional Practice Supervisor who examined the Report
Name and Surname :

Date : …….

Signature : …….

[1]*Please submit this form in a sealed and signed envelope to the student after the professional practice period.*

# FORMULARI I VLERËSIMIT TË PRAKTIKËS PROFESIONALE
## KONFIDENCIALE[1]

Të plotësohet nga Mbikëqyrësi në Vendin e Praktikës Profesionale

Emri dhe Mbiemri i Studentit : …….

Klasa – Viti : …….

Emri i Organizatës : …….

Fillimi dhe Mbarimi i Praktikës : …….

Periudha Minimale e Praktikës : …….

Emri i Praktikës së Detyrueshme : CE 301 Praktika Verore I

Vlerësimi i Praktikës Profesionale

| Departamenti | Periudha e Praktikës (Javët) | Interesi i treguar në Punë | Pjesëmarrja | Performanca | Shënime |
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Vlerësimi: (A) Shkëlqyeshëm

(B) Mirë

(C) Pranueshëm

(D) Dobët

(F) Jo i Kënaqshëm

Data : ……

Emri i Mbikëqyrësit : ……

Titulli i Mbikëqyrësit : ……

Vula Zyrtare dhe

Firma : ……

Universiteti "EPOKA"
Fakulteti i Arkitekturës dhe Inxhinierisë
Departamenti i Inxhinierisë së Ndërtimit
Tirana, Shqipëri

……

Të plotësohet nga Departamenti përgjegjës i Universitetit "EPOKA"

Hyrja : ……
Raporti i Tekstit Kryesor : ……
Përfundime : ……
Vlerësimi i përgjithshëm i Raportit : ……
Departamenti i Inxhinierisë së Ndërtimit

Mbikëqyrësi i Praktikës Profesionale i caktuar nga Departamenti, i cili shqyrtoi këtë Raport

Emri dhe Mbiemri :

Data : …….

Firma :……

[1]*Lutemi që pas përfundimit të praktikës profesionale, ta dorëzoni këtë formular në një zarf të firmosur dhe të vulosur tek studenti në fjalë.*

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# INTRODUCTION

Civil engineering is a professional discipline that deals with the design, construction, and maintenance of the built environment. This includes buildings, airports, dams, roads, and bridge infrastructure. The environment around us is greatly influenced by civil engineers, who make sure that buildings are sturdy, strong, and safe. Their work solves difficult issues, enhances public areas, and improves community quality of life by merging technical expertise with creativity. Modern civilization is based on civil engineering, which makes it possible to create and maintain the vital systems that sustain daily existence.

I started my role as an Intern Civil Engineer at a company called BEMAX, which is located in Podgorica, Montenegro. BEMAX is one of the first private construction companies in Montenegro, which has become a regionally recognizable brand in the construction industry and has built a reputation in all construction works. Their approach involves the application of professional and ethical standards, the engagement of highly qualified personnel, the use of state-of-the-art equipment and machinery, and the application of innovations in technical and aesthetic aspects of construction. BEMAX is a synonym for, professionalism and respect for deadlines. It has the most modern machinery, team, and tunnel breaker equipment's, nine factories for the production of concrete, production of asphalt plant Benninghoven, and production of aggregates for concrete and asphalt mass.

The purpose of this report is to shed light on the remarkable progress achieved during my professional practice. Through this experience, I was able to get vital insight into the complexities of the building process, from project planning to its successful completion. Participating in the building operations of BEMAX d.o.o. turned out to be a very beneficial decision because it gave me the opportunity to see and take part in all of the phases that make up a construction project. I was able to get extensive information and a deep comprehension of the practical factors involved in bringing a project of this size to life through close observation and hands-on involvement.

# DAY 1: Construction Site Visit

2024-08-05

The first day was an introduction to the construction of the Business building showroom, whose investor was Glosarij d.o.o. *Figure 1* shows, the business building was located in Donja Gorica, Montenegro in a peripherical zone of the capital city Podgorica. *Figure 2* shows the front view of the building design.

In the construction site, I got to meet the site supervisor, Eng. Veljko Šuković, as well as the other staff. The site supervisor gave me a brief introduction to the project. He explained how the construction process goes, the costs of it, the steps, the involvements we had to do, etc. The business building consisted of a parking garage, a ground floor as well as 2 other floors. I got to see the building process start from the foundation to the first slab floor.

I went and investigated the foundation level, just to see how everything looks. There was 1 mobile crane to aid the workers, 11 carpenters, 11 ironworkers, 1 manager of the brigade of workers, and 1 warehouseman. There was difficulty with space for the construction equipment as it wasn't that big of a construction site, so a lot of time was lost only by moving the construction equipment to different areas.

*Figure 1 - Notice Board*

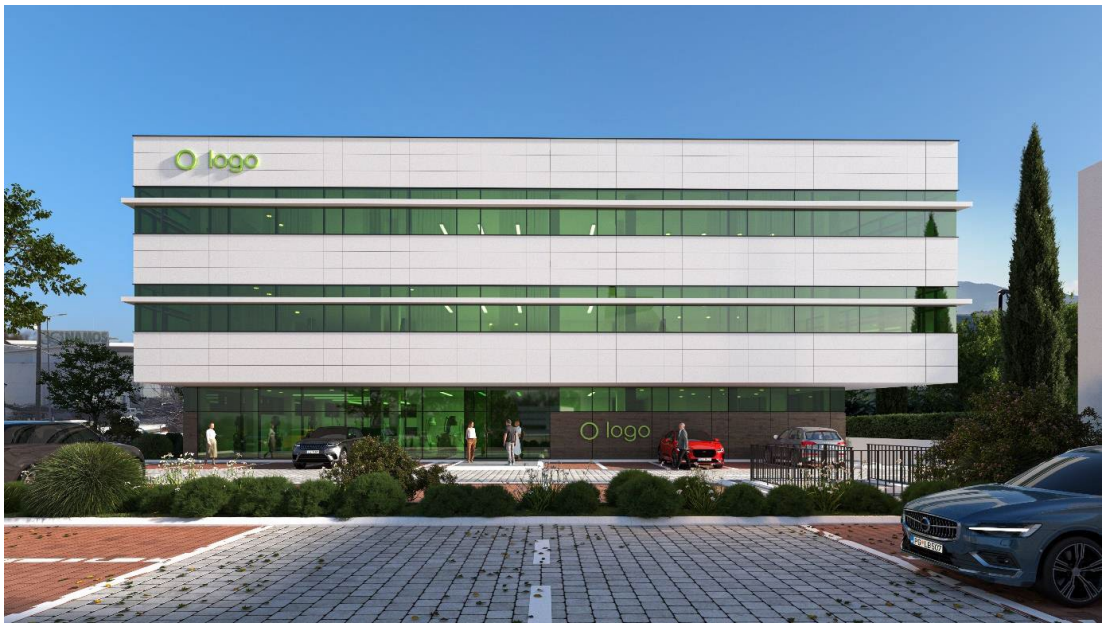


*Figure 2 - Business Building Showroom*

The works of the first day consisted of the installation of reinforcement of wall plates and columns, installation of wall formwork, and the installation of the horizontal hydro insulation. These were the works of my first day as an intern civil engineer. We had a strict system where we were all supposed to be at 07:00 am at the construction site, and only clock out at 05:00 pm.

## DAY 2: Concrete pouring of Elevator Foundation and Oil Separator

2024-08-06

The assembly of formwork and reinforcement involved setting up the necessary frameworks to shape and support concrete during the pouring and curing process. Formwork was installed meticulously to ensure the correct dimensions and alignment, while reinforcement bars were positioned according to the structural design requirements to enhance the strength and stability of the concrete elements.

According to the design specifications, as seen in *Figure 3,* reinforcement was constructed for the elevator foundation and oil separator. Steel bars were positioned and connected throughout this procedure to give both components the structural support they required. To support the upcoming concrete pour, proper alignment and anchoring were made sure of.

*Figure 3 - Elevator Foundation*

The wall plate reinforcement, which ran from the foundation to POS 100, was put together. In order to maintain structural integrity throughout the height of the building and support the vertical weight of the walls, reinforcement bars had to be positioned and secured within the formwork.

Before I started working here, they had already concreted some of the elements. When the concrete at POS Z-L was sufficiently cured, the formwork for the walls was carefully dismantled. In order to protect the freshly set concrete, the formwork panels had to be carefully removed during this procedure. The concrete surface quality had to then be checked. Once the concrete reached the necessary strength, the formwork for the columns at POS S-J2 and POS G1,2, which are seen in *Figure 4*, was removed. To ensure that there was no damage on the column structures and that the concrete columns were flawless, the disassembly was done carefully.

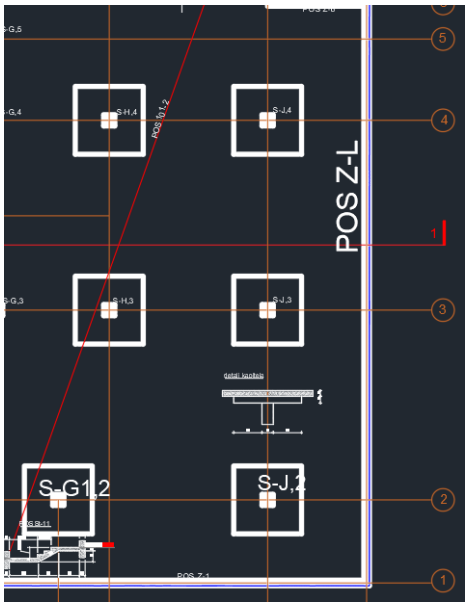


*Figure 4 - AutoCAD Plan Position of the Concreted Wall and Columns*

The process of backfilling included moving and compacting soil between the building foundations. To prepare the site for later construction stages and to offer stable support for the surrounding structures, the soil was carefully levelled and compacted.

Seen in *Figure 5,* concrete was poured into the prepared formwork for the elevator foundations and oil separator. The concrete was thoroughly mixed, transported, and placed to ensure uniformity and strength. The surface was finished to meet design specifications and allow for proper curing. A cross section of the elevator is shown in *Figure 6.*

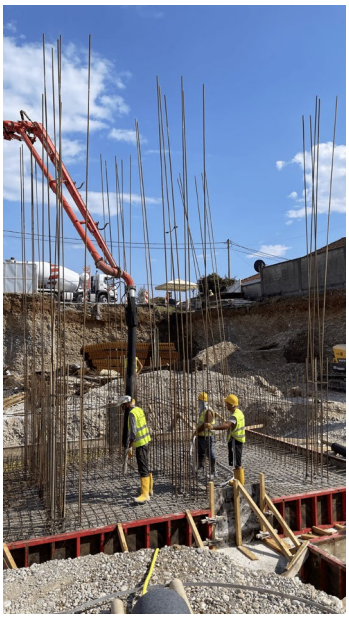

*Figure 5 - Concrete pouring for the Elevator Foundation*

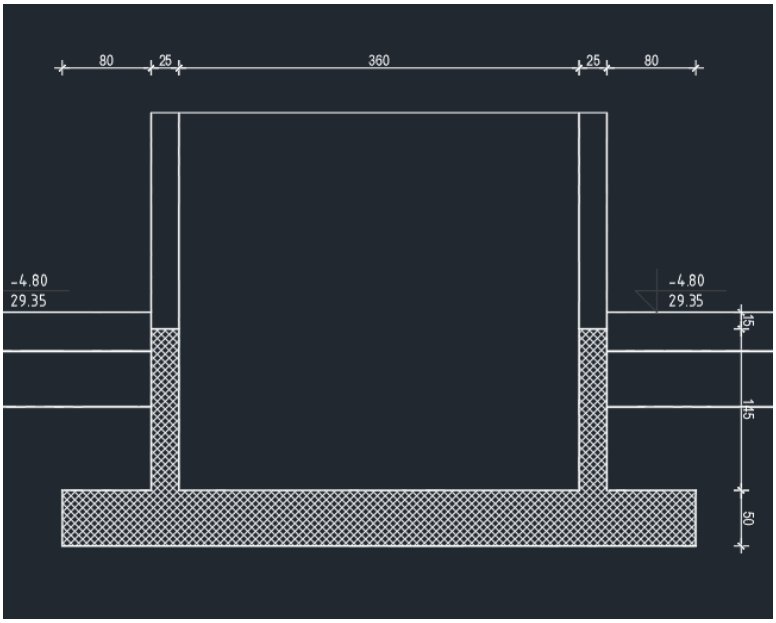


*Figure 6 - Elevator Foundation Section Cut*

The described activities were executed following standard construction practices and safety guidelines. Each phase of the work was completed with attention to detail and adherence to engineering specifications, contributing to the overall progress and structural integrity of the project.

## DAY 3: Concrete Pouring of Walls and Column H-3

2024-08-07

At the construction site, the carpentry brigade was focused on the formwork for the elevator and separator walls. During this procedure, reinforcement bars were installed in accordance with the structural design while the formwork was set up to define the shape and support the concrete. Precise measurements were taken during installation to guarantee that the structural elements fulfilled design specifications.

*Figure 7* shows the compaction and placement of soil material around the building foundations were part of the backfilling process. In order to obtain the right compaction and stability, the gravel layer was carefully laid out and rolled. This procedure guaranteed a sturdy foundation for the building and prepared the foundation area for subsequent construction stages.

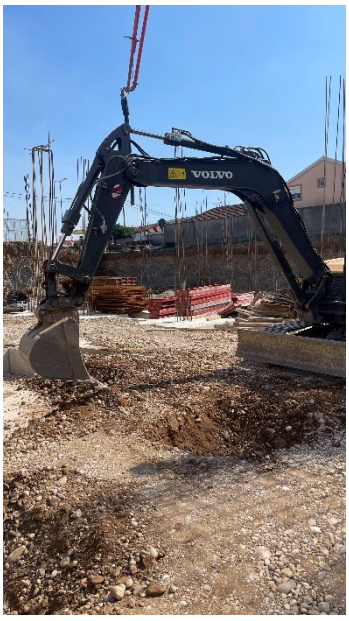


*Figure 7 - Compaction and placement of soil material*

Concrete was poured into the formwork for walls POS Z-J, POS Z-7-2, POS Z-6, and sections of walls POS Z-L and POS Z-K as seen in *Figure 8.* The concrete mix was prepared and transported to the site, then placed and finished to achieve the desired strength and surface finish. Proper curing procedures were followed to ensure optimal concrete properties.

*Figure 8 - Concrete Pouring for Specified Walls*

*Figure 9 - Concrete Pouring for Column H,3*

The oil separator's walls were constructed using the proper concrete mix and methods, as shown in *Figure 10*. The durability and functionality of the walls were ensured by pouring the concrete into the formwork and finishing it to the necessary specifications. To ensure the walls performed and had the appropriate strength, the curing process was watched closely.

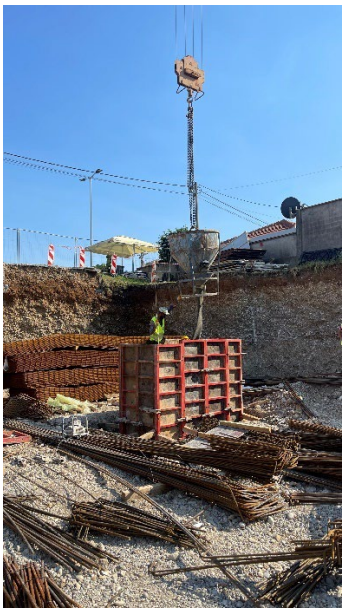

*Figure 10 - Concrete pouring for Oil Separator Walls*

The project specifications and engineering standards were followed in the completion of the construction operations mentioned. Every task was completed with rigorous attention to detail and quality control, which aided in the project's advancement and structural integrity.

## DAY 4: Formwork and Concrete Pouring of Elevator Walls

2024-08-08

We focused on a number of important jobs requiring formwork, reinforcing, and concreting for the building structure today at the construction site. First, the carpentry brigade had to install formwork and reinforce the columns and walls, particularly where the separator and elevator were located, illustrated in *Figure 11*. From the foundation to the POS100 slab, we installed the formwork and put together the wall and column reinforcements as seen in *Figure 12*. This arrangement guarantees that these crucial locations are both structurally strong and prepared for future development.

*Figure 11 - Formwork of Elevator Walls*

*Figure 12 - Reinforcement of Columns*

Furthermore, with particular attention to the elevator position from the foundation level to the floor slab, we concreted the walls at POS Z-D2, Z-D-2, POS Z-E-2, and POS Z-4*. Reinforcement of elevator walls are shown in *Figure 13*. To prevent cracks or weaknesses, we poured the concrete (Type – M30/35) progressively after the formwork was in place.

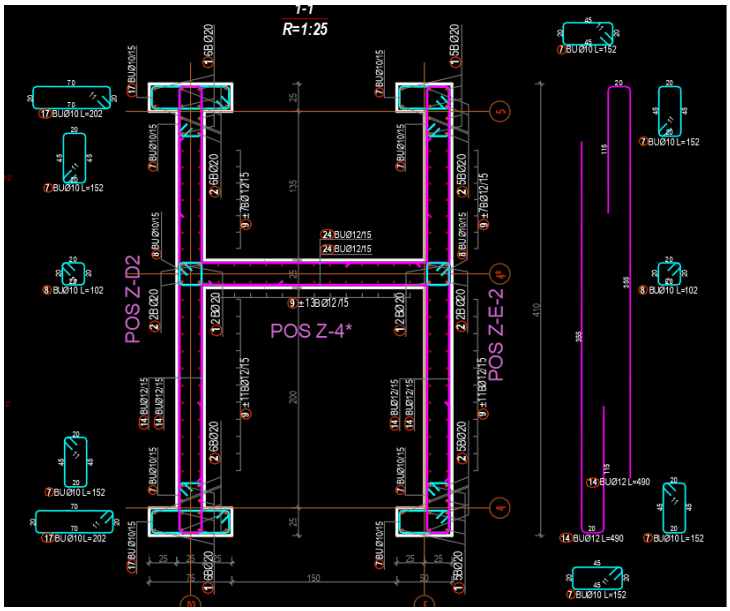


*Figure 13 - AutoCAD Reinforcement of Elevator Walls*

After pouring the Concrete, which had a total volume of 40m^3, curing was necessary to help develop the concrete's full strength and durability. This was usually the responsibility of the night guard that stayed there. The work for the day went according to schedule overall, with each stage making sure the structure complied with safety and design specifications.

## DAY 5: Supervision of Design Criteria

2024-08-09

At the construction site today, we completed a wide range of structural tasks aimed at concreting and reinforcing important building components. Our goals for the day included installing reinforcement and formwork in a variety of locations, including around the load-bearing columns, parapet walls, and elevator shafts.

We began with the installation of formwork and reinforcement for the parapet at the elevator location which can be seen in *Figure 14*. This parapet provides lateral stability surrounding the elevator area and serves as a crucial structural element. In order to make sure the structure could support the impending concrete pour, the carpentry team first established the reinforcement of the structure as per the design specifications, and then proceeded to add the formwork around it so concrete could be poured smoothly. To preserve structural strength and design criteria, every reinforcement bar was precisely positioned and secured in place as illustrated in *Figure 15*.

*Figure 14 - Parapet Wall*

*Figure 15 - Bar Reinforcement of Walls*

The reinforcement of the walls had to be done with the help of scaffolding so that the workers could achieve the needed height for the structure. Sometimes they would have trouble with this as there wasn't too much space due to the many structural elements being left on the floor.

The formwork of previously cast portions, particularly the POS Z-L wall and the walls surrounding the elevator, was then disassembled. By removing this formwork, we were able to make room and test the set concrete to make sure it had cured properly and without any problems. During this time, I was also responsible for checking if the reinforcement of the other structural components was put together as per design specifications as shown in *Figure 16.*

*Figure 16 - Checking for proper Design Specifications*

*Figure 17* clarifies that filling and levelling the area with a compacted base material was one of the day's main tasks. In order to provide a level and strong foundation for current and upcoming building projects, sub-base material had to be carefully spread out and compacted. This layer is crucial for ground stabilization and load distribution, particularly as the building's structural components are added.

*Figure 17 - Roller Compacting the Base Material*

Every step of the day's work was carried out in accordance with structural and safety regulations, and team members thoroughly examined every component before proceeding to the next stage. The building is now one step closer to having its intended structure after the jobs were finished on time.

## DAY 6: Horizontal and Vertical Waterproofing

2024-08-10

Our work at the construction site today was concentrated on completing the foundational components, applying waterproofing, and moving on with the concrete pours for the walls and columns in order to create stability in the structure.

*Figure 18* illustrates the waterproofing of the elevator and, *Figure 19* shows the waterproofing of the separator locations both horizontally and vertically. To prevent moisture intrusion, which may otherwise erode the structure or result in long-term damage, this waterproofing layer is essential. We made sure that these vulnerable areas surrounding the elevator and separator would be safe from groundwater by covering both horizontal and vertical surfaces.

The parapet formwork surrounding the elevator shafts was then disassembled, allowing us to examine the freshly set concrete and get the space ready for further work, as shown in *Figure 20*. Additionally, dismantling made room for the installation of vertical reinforcements in adjacent locations.

As seen in *Figure 21,* we then went ahead and concreted certain columns at POS G3, G4, G5, and G7 from the foundation to the POS100 slab. Concrete was carefully poured into each of these columns to preserve alignment and structural integrity, guaranteeing that each section cured with the appropriate load-bearing capability.

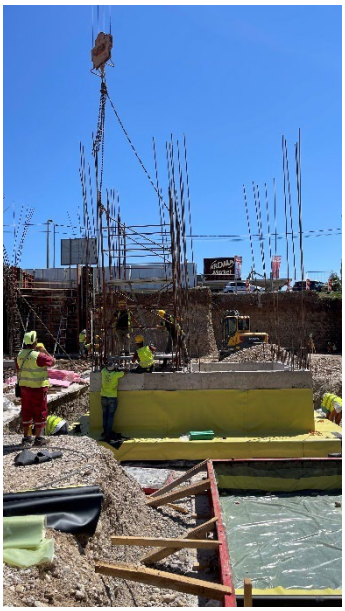

*Figure 18 - Waterproofing of the Elevator*

*Figure 19 - Waterproofing of Separator*

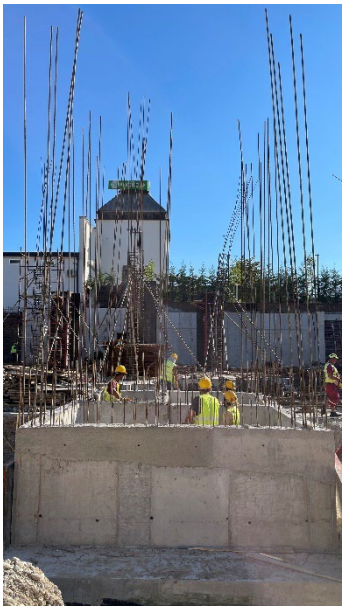

*Figure 20 - Parapet Walls after removing formwork*

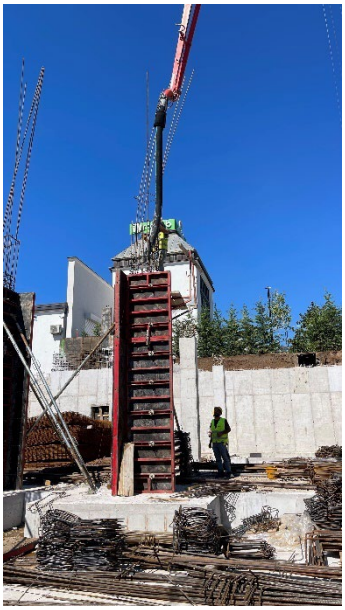

*Figure 21 - Concreting the Columns*

As the day went on, the POZ-2 wall was concreted from the foundation to the POS100 slab. The building's vertical stability in this area was strengthened by the cautious pouring and constant tracking of this wall, just as the columns. In addition, we covered about 300 square meters of the area we levelled with the compacted base material with a 5 cm layer of levelling concrete as illustrated in *Figure 22.* In order to prepare the surface for further structural layers or floor slabs, this thin layer serves to create a stable and level surface.

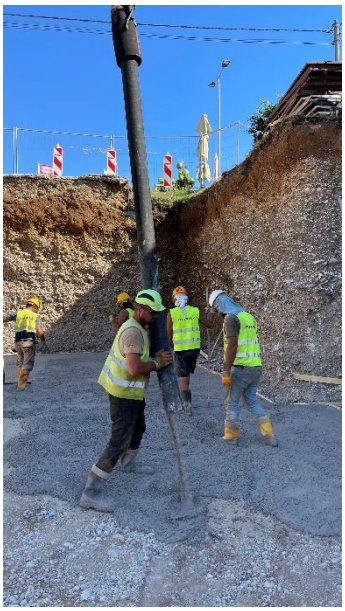

*Figure 22 - Applying 5cm of levelled concrete*

In the end, we covered the waterproofing on the foundation slab at POS Tp-3 with concrete protection. Since it protects the waterproofing membrane from harm during construction and offers an extra layer of protection against moisture, this protective concrete layer is crucial.

## DAY 7: Construction Activities

2024-08-12

The main tasks for Day 7 of my internship at **BEMAX d.o.o. Podgorica** were installing structural components that were essential to the building's development and laying the foundation. In order to prepare the surface for the next concrete layers, the day began with the levelling of the excavation for the lean concrete. The 5 cm thick layer of lean concrete, which is usually used to form a solid base, was poured. By ensuring that the foundation components will be supported by a stable, level surface, this layer avoids future settlement problems and creates a smooth transition for the following stages of construction.

Figure 23 shows the installation of formwork and reinforcement for the walls and columns from the foundation level up to the slab at POS100 and it received a lot of attention. The formwork, which acts as a mold for the concrete, was meticulously constructed to guarantee that all measurements and alignments matched the design requirements. The reinforcement, which is essential to the concrete structure's strength and stability, was positioned inside the formwork and connected to the steel bars in accordance with the planned arrangement. This procedure guarantees that the columns and walls will have the integrity of construction required to support the building's top stories.

*Figure 23 - Formwork of Walls*

Formwork and reinforcement for the elevator base were installed at POS Tp-3 in a similar procedure for the lift foundation as illustrated *Figure 24*. Because the elevator's foundation is crucial for supporting its machinery and structure, extra care was taken to make sure that all dimensions, including the exact alignment and reinforcement elements, complied with the design specifications.

*Figure 24 - Formwork and Reinforcement for Elevator POS Tp-3*

At last, seen in *Figure 25,* the lift foundation slab at POS Tp-3 had its concrete poured. This concrete slab helps distribute the lift's weight uniformly across the foundation and offers a strong base to support the lift shaft. Care was taken to prevent any disturbances that would have impacted the slab's final quality during the precise pour.

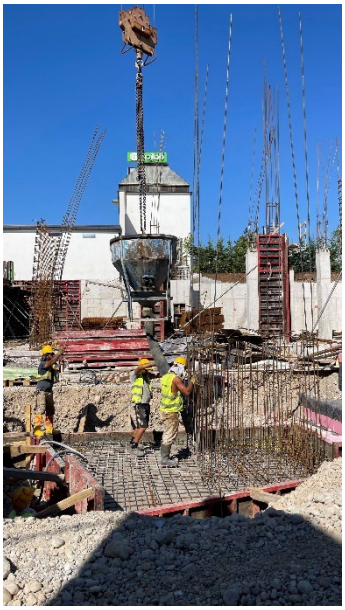

*Figure 25 - Concrete Pouring for Elevator Foundation*

I had the chance to watch how the teams responsible for excavation, formwork installation, reinforcement, and concrete application had to coordinate during these tasks. To guarantee that the structural components would be constructed in accordance with the project's technical criteria, each stage needed to be carefully planned and carried out.

## DAY 8: Foundation Protection and Structural Progress

2024-08-13

To start the day, horizontal waterproofing, which is essential for preventing moisture intrusion and guaranteeing the longevity of the building, was installed beneath the foundation. The waterproofing material, which was meticulously applied across the foundation area, offers a reliable fight against groundwater, which may otherwise jeopardize the foundation's and the structure's general stability. This is done by another sub-contractor company.

*Figure 26* illustrates the installation of formwork and reinforcement for the walls and columns from the foundation to POS100 as it was the next task. This work was similar to that done on Day 7, but it continued to focus on getting the structural components ready that will give the building vertical support.

Ultimately, a 5 cm thick covering of concrete was poured over 400 m² to complete the waterproofing protection. By serving as a protective covering for the waterproofing membrane, this layer guards against any physical harm that might result from later construction activities. Because it guarantees that the protective layer will stay in place for the duration of the building, this phase is crucial to preserving the waterproofing system's integrity.

*Figure 26 – Brigade Work*

Through my observation and assistance with these procedures throughout the day, I developed a deeper comprehension of how different construction jobs work together to guarantee the structural stability of the building. In order to preserve the building's structural and functional integrity, cautious planning and execution are crucial, as seen by the emphasis on waterproofing, concrete placement, and reinforcement.

## DAY 9: Vertical Waterproofing and Continued Structural Works

2024-08-14

The day began with the installation of the vertical waterproofing system of the elevator shaft, which plays a crucial role in preventing moisture from penetrating the buildings core and it can be seen *Figure 27*. This waterproofing layer was carefully applied along the elevator walls to ensure that no water can seep through, which is particularly important for maintaining the structural integrity and functionality of the elevator system.

*Figure 27 - Waterproofing System*

The next step, as shown in *Figure 28*, was to level the dirt surrounding the lift and perform earthfill. In order to stabilize and sustain the surrounding structure, soil material had to be placed and compacted around the lift shaft. In order to preserve adequate drainage away from the lift shaft and assist future building activities, the land was meticulously levelled to guarantee that the foundation and the surrounding ground remained flat.

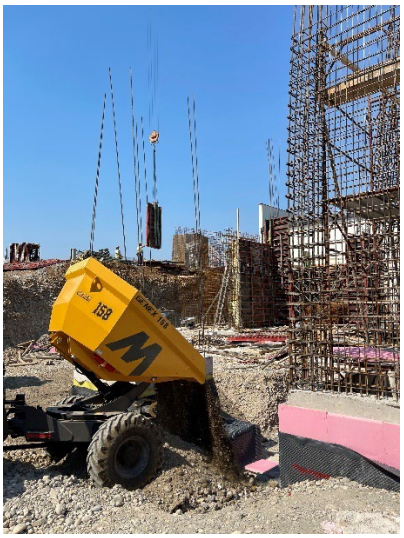

*Figure 28 - Earth fill and Soil Levelling*

The carpentry brigade also continued with the formwork of the necessary structural elements that needed to be reinforced and concreted at the end of the day. Throughout the day, I was able to observe the intricate coordination required between the waterproofing, earthwork, and structural activities.

## DAY 10: Foundation Preparation and Progress

2024-08-15

The day started with the gravel underneath the foundation's sub-base concrete being levelled by a compaction roller. This procedure entailed carefully levelling and compacting the gravel, which forms the base for the concrete slab, using a large gear. For a stable base that can sustain the weight of the entire construction, proper levelling is necessary.

The next step was to build reinforcement and formwork for the basement level walls. Because the basement walls are essential to the overall stability of the building, this technique required close attention to detail. The concrete walls were shaped using formwork, and the necessary structural strength was achieved by carefully placing reinforcement bars inside the formwork. To make sure the walls could support the weights from the surrounding earth and the floors above, the reinforcing pattern was carefully adhered to.

Formwork and reinforcement were also put in place for the connecting beams, isolated foundations, and strip foundations, illustrated in *Figure 29* and *Figure 30* once the basement walls were prepared. This phase of the foundation construction is essential since these components will support a large portion of the building's weight. The isolated foundations, connecting beams, and strip foundations were all meticulously built to guarantee that they held on to the design guidelines and offered sufficient support for the walls and columns.

Concrete was poured for some of the strip foundations, isolated foundations, and connecting beams once the formwork and reinforcing were in place. The formwork was ready, and 81 $m^3$ of concrete was poured into it. In order to ensure that the concrete was uniformly dispersed and empty of air pockets, it was carefully mixed, transported, and poured into the foundation elements. In order to ensure that the foundation construction would give the building the support it needed, this phase was essential.

Finally, 10 m³ of sub-base concrete—which was placed beneath the foundation—was poured. This sub-base layer ensures that the load from the structure is distributed equally over the foundation by giving the foundation elements more stability and support. The concrete was carefully poured to provide proper setting and a sturdy foundation for the building above.

*Figure 29 - Strip Foundation reinforcement*

*Figure 30 - Connecting Beams*

## DAY 11: Foundation and Basement Work

2024-08-16

The main goals of my internship at **BEMAX d.o.o. Podgorica** on this day was to continue building the basement and foundation as well as taking crucial waterproofing precautions. Formwork and reinforcement for the basement walls were installed to start the day. Because they must serve as a barrier between the building and the surrounding ground and offer strength and stability, these walls are an essential part of the building's structure. In order to guarantee that the concrete walls would have the structural strength required to support the building above, the formwork was meticulously positioned to guarantee that the walls would be precisely curved, and the reinforcement bars were positioned in accordance with the design specifications.

Installing the horizontal waterproofing beneath the foundation was the next step. This was done again by another sub-contractor firm. By acting as a moisture barrier, this layer keeps groundwater from leaking into the structure and jeopardizing the foundation's stability. In order to cover the entire foundation area and provide a continuous water barrier, the waterproofing material was carefully applied over the prepared surface.

The team worked on filling the access pathway to the construction site in addition to the on-site construction tasks. This required laying the material to form a level and sturdy working path, which is essential for the efficient movement of equipment and supplies to and from the building site. When the access path is properly planned, all actions can happen quickly and without interruption.

Concrete pouring for the basement walls took priority later in the day, with a total of 20 $m^3$ of concrete being poured. In order to guarantee equal distribution and the elimination of any air pockets, the concrete was carefully mixed before being poured into the formwork that had been built for the basement walls.

In order to protect the waterproofing underneath the foundation, 10 $m^3$ of concrete was finally poured. This layer serves as the waterproofing membrane's protective covering, keeping it whole and undamaged throughout the building process.

## DAY 12: Foundation and Wall Reinforcement

2024-08-17

The day began with the installation of formwork and reinforcement for the foundation strips and connecting beams, illustrated in *Figure 31* and *Figure 32*. These components are necessary to ensure that the loads from the superstructure are distributed uniformly across the foundation. In order to satisfy the design requirements, the formwork was meticulously assembled, and the reinforcement bars were positioned properly. For the foundation's components to be strong and stable, formwork and reinforcement must be installed correctly.

*Figure 31 - Strip Foundation work*

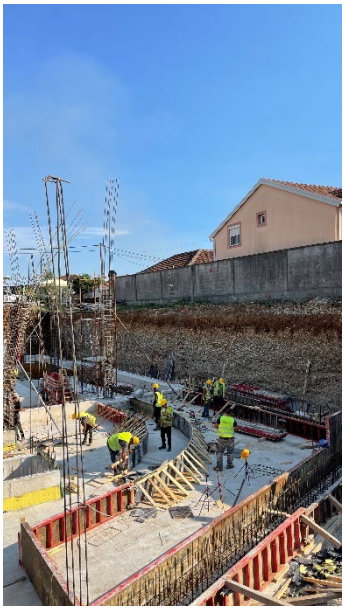

*Figure 32 - Framework of Strip Foundation*

The shipping and unloading of the necessary equipment and reinforcement also took up a large portion of the day, seen in *Figure* 33. This required cautious delivery of the required construction equipment and steel reinforcement to the location. In order to avoid delays in subsequent building phases, the team made sure that all items were appropriately unloaded and stored in a secure and orderly manner. Maintaining the building project's timeline depends on the timely delivery of materials.

I had the chance to see firsthand how each activity was carefully planned throughout the day to guarantee that the walls and foundation's structural components would be adequately strengthened and ready for the next stages of development. Additionally, I gained knowledge of material transportation logistics, which are essential to maintaining efficient operations at the building site.


*Figure 33 - Transportation of Materials*

## DAY 13: Foundation Pouring and Formwork Removal

2024-08-19

We started the day by taking down the formwork from the previously poured walls and columns. It was time to gently remove the formwork, which had been there long enough for the concrete to set. To prevent harming the freshly produced concrete components, this procedure needed to be done precisely. Formwork removal is a crucial stage in the building process since it shows the completed concrete structure and indicates the building's development.

Pouring concrete for the tie beams, slabs, and foundation strips was another significant duty for the day, which is shown in *Figure 34*. Concrete was mixed, moved, and poured into the formwork that had been prepared earlier in the day in considerable quantities. For the lower levels of the building to be completed, the concrete pouring for these foundation components was essential. To preserve the structure's integrity, the crew made sure that the concrete was spread out uniformly and that any air pockets were removed.

*Figure 34 - Strip Foundation Concrete Pouring*

## DAY 14: Formwork Dismantling and Wall Preparation

2024-08-20

The workers at **BEMAX d.o.o. Podgorica** focused on taking down the formwork from finished foundation components and continuing to get ready for the next stage of the wall construction on Day 14 of my internship. The day started with the formwork being taken down from the foundation. The following step was to carefully remove the formwork, which had been there long enough for the concrete to harden. To prevent any harm to the freshly cast foundation components, the formwork was carefully disassembled. The foundation pour was finished when the formwork was removed, exposing the concrete that would eventually serve as the building's structural base. A photo of how the structural elements look like afterwards can be seen in *Figure 35.*

*Figure 35 - Connecting Beams and Strip Foundation after being concreted*

I saw during the day that the construction process requires close attention to the timing and accuracy of every phase. I developed a better grasp of how each step builds on the one before it to guarantee the stability and longevity of the building, from the meticulous disassembly of the formwork to the accurate installation of new formwork and reinforcement for the basement walls.

## DAY 15: Advancing Wall Preparations and Foundation Stability

2024-08-21

On Day 15 of my internship, we did the disassembly, assembly, and foundational improvements, all of which were intended to forward the building process effectively and methodically.

The morning began with the formwork for the columns and wall panels that had already been cast being removed. To guarantee that the freshly hardened concrete stayed intact and unbroken, this work required accuracy and cautious handling. The smooth concrete surfaces were revealed during the removal procedure, and they were then examined for quality control.

In the meantime, work turned to constructing reinforcement and formwork for the upcoming wall panel segment, which would reach the POS100 floor slab. The reinforcement work is shown in *Figure 36*. To get the exact measurements called for in the design, the carpentry brigade carefully aligned the formwork. In order to provide the required structural strength to support the building's load in the next phases, steel reinforcing bars were inserted within the formwork. This phase is essential to guaranteeing the structure's stability and longevity.

*Figure 36 - Reinforcement work*

The day's work also included the delivery and unloading of necessary reinforcement materials. These supplies, which are necessary for the next phases of construction, were carefully moved and arranged on the job site. Maintaining continuous construction progress requires making sure reinforcement materials are available.

## DAY 16: Wall Construction Advancements

2024-08-22

We made significant progress on both structural and preparatory chores on my sixteenth day of my internship at **BEMAX d.o.o. Podgorica**. The tasks included everything from tearing down and reassembling formwork to pouring concrete for the building's essential components.

Reinforcement materials were delivered to the site, unloaded, and arranged for prompt use. These supplies are essential for preserving a consistent workflow, which allows the crew to get right into the assembly operation.

Additionally, the day's work involved pouring concrete for certain wall and column portions, such as the POS Z-D-1 and POS Z-2 walls, as shown in *Figure 37*, and column POS S-B,2. The concrete was carefully placed and compacted during the pours, which were completed up to the POS100 floor slab. Since these walls and columns are essential load-bearing components, this action represented a critical milestone in the building's structural evolution.

*Figure 37 - Concreting the Wall*

## DAY 17: Concrete Works

2024-08-23

The project's structural and foundational components were advanced on day 17 at **BEMAX d.o.o. Podgorica**, with a focus on formwork adjustments, foundation preparation, and heavy concrete pouring.

*Figure 38* illustrates the pouring of the garage floor slab. It was the first concrete task that took priority. This slab, which covered 650 m², needed to be precisely levelled and compacted in order to produce a smooth and long-lasting finish. An important step in getting the garage ready for future growth was the timely and effective completion of the concrete pour.

*Figure 38 - Concreting the Garage Slab*

The team also finished pouring concrete for wall panels, such as POS Z-D-2, POS Z-D2, POS Z-E-2, and POS Z-4*. These walls, which extend to the POS100 floor slab, are essential structural elements. To guarantee adequate concrete distribution and compaction, the pouring process was carried out under close supervision.

## DAY 18: Foundation and Slab Preparations

2024-08-24

On Day 18 of my internship at **BEMAX d.o.o. Podgorica**, the main priorities were getting ready for the POS100 floor slab installation and continuing to develop the subsurface levels, which included formwork and reinforcing activities.

The first significant task of the day was to install reinforcement and formwork for the basement level wall panels. Formwork and reinforcement bars were cautiously placed by the carpentry brigade, who made sure that everything lined up with the design specifications. Since these walls would support the weight of the entire tower, the technique needed meticulous attention to detail.

In parallel, the team started assembling the POS100 floor slab formwork which is shown in *Figure 39*. This work is necessary to provide a flat, sturdy surface that will act as the building's foundation for the subsequent phase of construction. In order to prepare for the concrete pour, the formwork for the slab was carefully measured, installed, and reinforced with bars.

*Figure 39 - POS100 Floor Slab Formwork*

## DAY 19: Concrete Pouring and Continued Formwork Setup

2024-08-26

Day 19 of my Internship at **BEMAX d.o.o.** wasn't too different from the previous days, as we only dealt with preparing the formwork of the POS100 Floor Slab, continuous reinforcement works and concreting one round column.

The day started with the carpentry brigade continuing to work with the formwork of the POS100 Floor, making further progress in the construction phase. Finishing this formwork would be a crucial step, as we could further proceed with the next level of the building.

*Figure 40 - Formwork of POS100 Slab*

The brigade continued with the reinforcement work of other structural elements, as well as concreting the round column S-7*, which is visible in *Figure 41*. This would sum up the works of day 18.

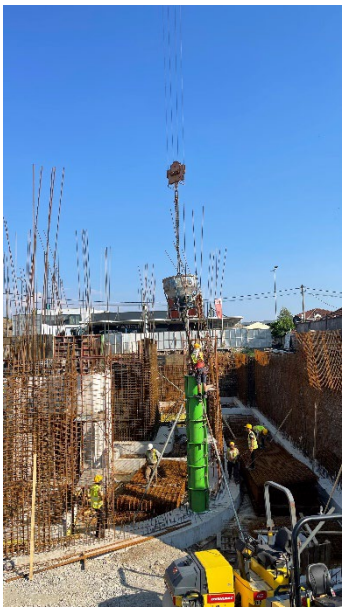

*Figure 41 - Concreting Column S-7**

## DAY 20: Advancing Wall and Slab Construction

2024-08-27

Day 20 of my internship at **BEMAX d.o.o. Podgorica** saw a major advancement in the building's structural components, with a focus on concrete work, assembly, and disassembly.

Formwork was removed from columns and wall panels to start the day. To prevent causing damage to the concrete surfaces, this work required accuracy and caution. After being demounted, the formwork was inspected, cleaned, and ready to be used again in later stages of construction. This process can be seen in *Figure 42*.

*Figure 42 - Disassembly of Formwork*

After disassembling, the team proceeded to assemble the reinforcement and formwork for the wall panels that extended to the POS100 floor slab. To ensure the correct alignment and compliance to the design criteria, this task required close coordination. Careful placement of the reinforcement bars guaranteed that the walls would adhere to structural requirements.

At the same time, the POS101-2 floor slab's formwork assembly got underway. As I oversaw the carpentry brigade, it was my responsibility to make sure the construction met the requirements. Seeing something like this being constructed was truly awesome.

The concrete pouring for several wall panels, including POS Z-3, POS Z-3*, POS Z-C, and POS Z-E-1, up to the POS100 floor slab, marked the end of the day's labour. During this phase, 24.5 m³ of concrete was poured. The structural elements can be seen in *Figure 43* in real life, and in *Figure 44* as AutoCAD drawings.

*Figure 43 - Concreting Walls*

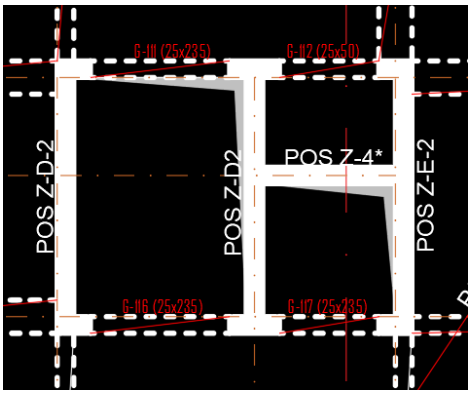


*Figure 44 - AutoCAD Drawings of Walls*

## DAY 21: Refining Wall and Slab Elements

2024-08-28

Day 21 of my Internship at **BEMAX d.o.o.** was similar to previous days I wrote about. It consisted of a lot of assembly and disassembly of formwork, as well as reinforcement and concrete works.

The carpentry brigade dealt with constructing the new formwork and reinforcement for the POS100 Floor Slab. It was built with careful attention to aligning it according to the structural design.

As all of the necessary formwork was completed, the brigade concreted the POS Z-E-3 wall panel, which extended up to the POS100 Slab. A total of 4.5 $m^3$ concrete was poured, with the process being closely watched. This process is illustrated in *Figure 45*.

*Figure 45 - Concreting Wall Panel POS Z-E-3*

## DAY 22: Advancing Stairwell and Structural Walls

2024-08-29

Day 22 at **BEMAX d.o.o. Podgorica** was marked by diverse activities, focusing on the stairwell and structural wall development.

The stairwell's subbase layer was prepared and levelled with great care, involving the compacting and grading of a 20 cm thick layer of material.

There were two main duties for the day's concrete work. In the first, concrete was poured up to the POS100 slab level for a number of wall sections, including POS Z-D-3, POS Z-D1-1, and POS Z-7-1. The lateral stability of the building depends on these walls, and their precise concrete application was necessary to satisfy design requirements.

The second step involved pouring and levelling a layer of concrete that was 12 cm thick on the stairs floor slab, as shown in *Figure 46*. This was a crucial stage in forming the vertical circulation components of the structure, guaranteeing their robustness and functionality.

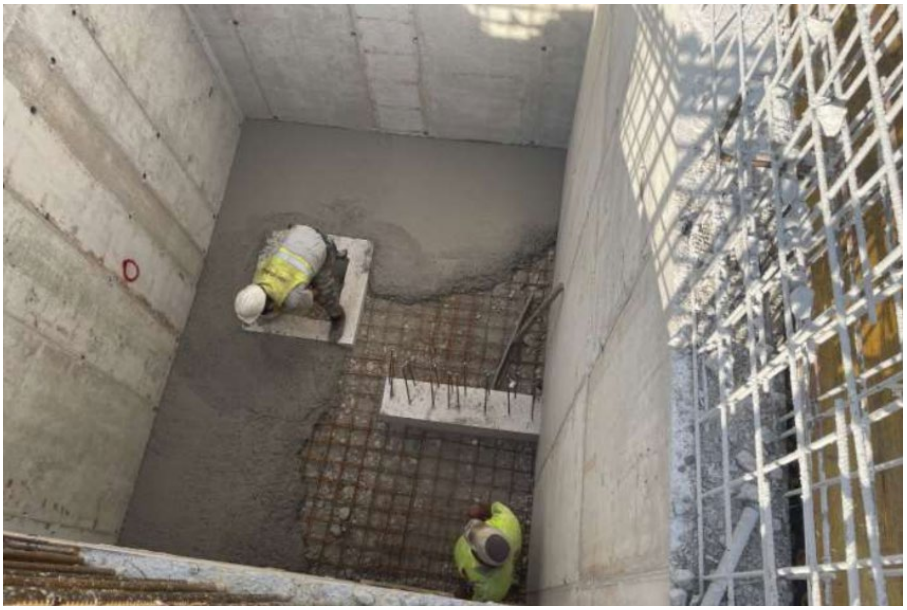

*Figure 46 - Concrete layer on the stairs floor slab*

## DAY 23: Reinforcement and Foundation Advancements

2024-08-30

On Day 23 at **BEMAX d.o.o. Podgorica**, the construction activities were focused on refining structural elements and preparing for critical concrete work within the basement level.

Formwork and reinforcement assembly for the POS101-2 slab and beams has advanced, illustrated in *Figure 47*. Because they equally distribute loads and sustain higher levels, these components are crucial to the building's structural stability.

As the day's work came to an end, 5.0 m³ of concrete was poured for the POS Z-8 wall on the basement level. This procedure was closely watched to guarantee correct placement, curing, and compaction.

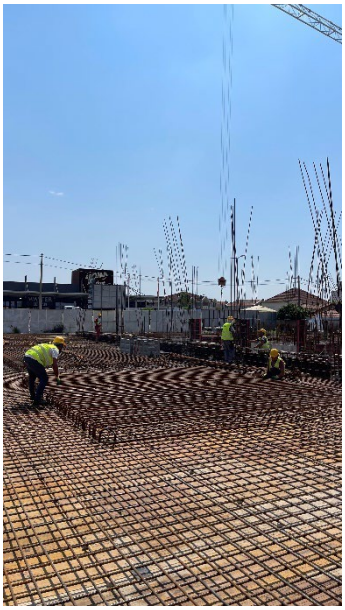

*Figure 47 - Formwork and Reinforcement for POS101-2 Slab*

## DAY 24: Reinforcing Basement Structures

2024-08-31

On day 24 we had similar works to the previous day. It involved the assembly and disassembly of many structural components, reinforcement works, and also on this day we concreted the POS Z-B-8.

The reinforcing assembly and formwork for the POS101-2 slab and beams have advanced. These components needed to be coordinated in order to give the structure above stability and load distribution.

The day concluded with the pouring of concrete for the POS Z-B-8 wall in the basement, using 5.0 m³ of concrete, and it is illustrated in *Figure 48*.

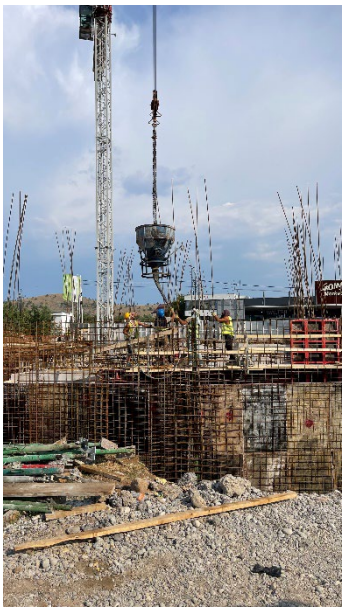

*Figure 48 - Concreting Wall Section POS Z-B-8*

## DAY 25: AutoCAD Works and Calculations

2024-09-02

On Day 25, the development of basement structural elements was the main focus of construction activities at BEMAX d.o.o. Podgorica.

The successful completion of earlier concrete work was marked by the disassembly of formwork from wall panels and columns at the start of the day.

This was a different day for me as I had a lot of calculations to do regarding the concreting of the wall sections on the side of the ramp. Due to the unsymmetric walls and different angles, it was a bit difficult to calculate the amount of concrete needed for this. This work is shown in *Figure 49*.

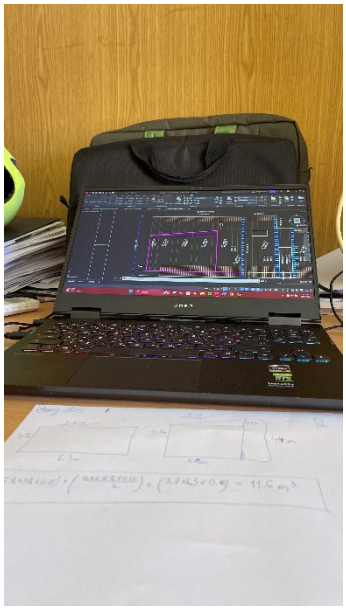

*Figure 49 - Calculations and AutoCAD work*

Concrete pouring for portions of the POS Z-9 and POS Z-A-9 walls, up to the ramp slab level, marked the end of the day. In order to provide the best strength and durability, the concrete was laid and compacted under careful supervision. The process can be seen in *Figure 50*.

*Figure 50 - Concreting Wall sections POS Z-9 and POS Z-A-9 on ramp side*

## DAY 26: Surveying and Concreting Slab POS101-2

2024-09-03

Day 26 at **BEMAX d.o.o. Podgorica** was a something new for me. Besides the dismantling, preparations, reinforcements etc. I also got to do some measurements with the surveyor, illustrated in *Figure 51*.

This was very interesting to me as I was prepared for this from my university course, Surveying, which we did in the 4th semester. We spent almost half a day conducting measurements for the slope of the ramp, as it had to be reinforced and concreted with high precision, as well as meeting the design specifications. We labelled these measurements with points, as shown in *Figure 52.* These measurements played a crucial role in maintaining the structural accuracy of ongoing and upcoming work.

*Figure 51 - Conducting Measurements*

*Figure 52 - Surveying Points*

The crew made progress on the formwork and reinforcement installation for the slab and beams of POS101-2 in parallel with these operations. Accurate component alignment was necessary in this crucial step to guarantee stability and appropriate load distribution.

During this day 176.5m$^3$ of concrete were poured for the slab POS101-2, which is 25cm thick. This process was highly supervised as it took half a day for all of the concrete to be poured and vibrated. All necessary engineers were gathered watching this process. It was monitored closely to ensure uniform placement and compaction of the concrete for the structural strength. *Figure 53* and *Figure 54*, shows the process before and after being concreted.

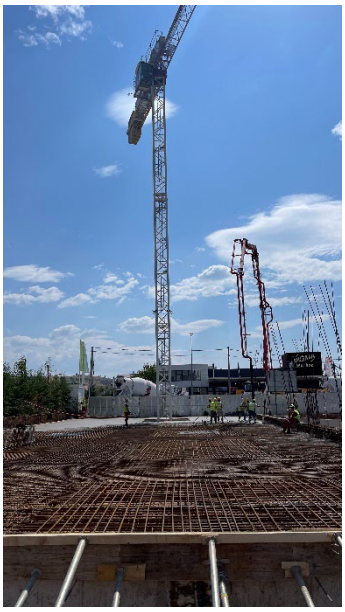

*Figure 53 - Before Concreting Slab POS101-2*

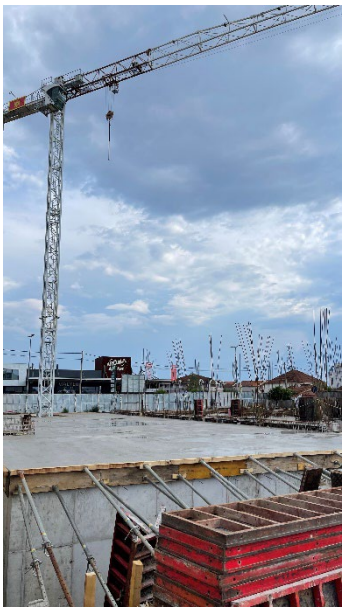

*Figure 54 - After Concreting Slab POS101-2*

This was an intense day at work for me as I experienced a lot of new activities at the job. I found it to be very interesting and fun to do these activities. I really enjoyed the teamwork we put into making this day possible.

## DAY 27: Advancing Basement Works with Precision and Efficiency

2024-09-04

Day 27 construction operations at **BEMAX d.o.o. Podgorica** focused on finishing the basement area's necessary structural elements while making sure that resources were employed effectively and that every detail was carefully considered.

The day started as usual, with the dismantling of previous formwork from wall panels and columns. The carpentry brigade then reused these formworks for further construction processes. They installed the formwork with precision. They also concentrated on the reinforcement for basement panels.

Additionally, there were three concrete pouring tasks during the day's operations. Using 10.0m³ of concrete to pour a floor slab that is 50m² in size and 20cm thick. This work was completed effectively to provide a strong foundation for the building above. The process is shown in *Figure 55.*

A basement wall that needed 5.0m³ of concrete has been poured. The crew took great care to guarantee that the wall was poured consistently, preserving alignment and structural soundness.

Pouring the staircase parapet, which consumed 2.5m³ of concrete. This step gave the basement staircase a more aesthetically pleasing and useful aspect.

*Figure 55 - Floor slab concrete pouring*

## DAY 28: Progress in Basement Construction

2024-09-05

On day 28, there was a notable improvement in the construction of the foundation and basement at the **BEMAX d.o.o. Podgorica** site. To make sure the structure was stable and prepared for future phases, the team concentrated on a number of related activities.

In order to reuse resources and keep the building schedule moving forward, the day started with the disassembly of formwork from wall panels and columns. To make sure that the project specifications were followed, care was taken to confirm the condition of the surfaces that were exposed following disassembly.

In parallel, natural filling material intended for backfilling around the foundations was delivered and unloaded at the location. To ensure a compact and sturdy platform for concrete work, this material was then used to fill and level the subgrade layer underneath the floor slab. *Figure 56* shows this procedure.


*Figure 56 - Fill material for subgrade layer*

In order to support the forthcoming concrete pour, the team assembled the steel reinforcement for slab POS 101-4 as part of additional reinforcement work.

During this day, a total of 26m$^3$ of concrete was poured. 12m$^3$ of concrete were used for a basement wall, reinforcing the structural framework, while 14m$^3$ of concrete was used for the slab POS101-4, which was the ramp slab, creating a sturdy floor level to support the superstructure above. The activity can be seen in *Figure 57* in real life, and in *Figure 58* as an AutoCAD Drawing.

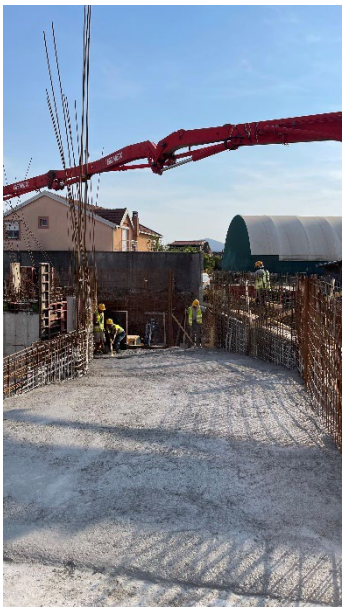

*Figure 57 - Concreting Slab POS101-4*

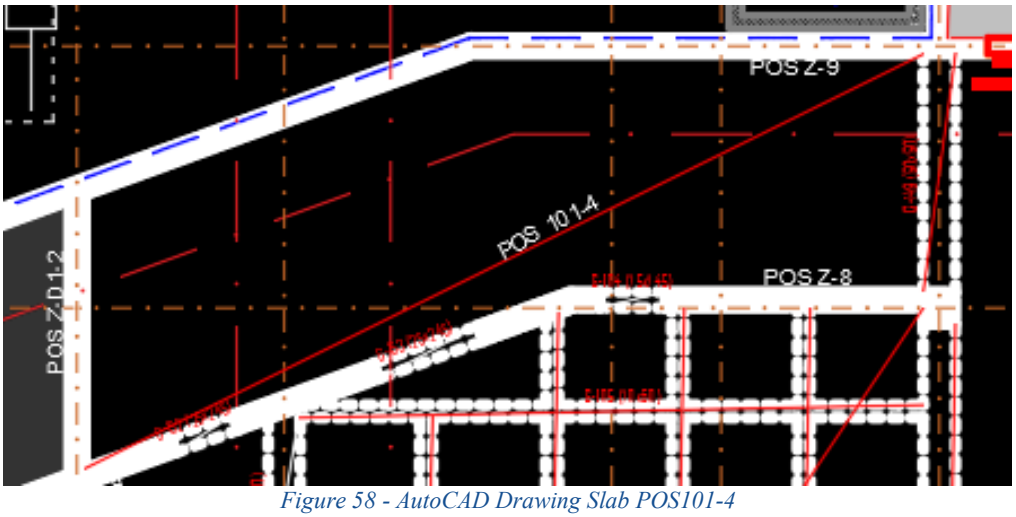


*Figure 58 - AutoCAD Drawing Slab POS101-4*

## DAY 29: Measurements, advancing Garage and Wall Construction

2024-09-06

On day 29 of my Internship at **BEMAX d.o.o. Podgorica**, I had some new activities for the day.

We started early in the morning with noting each point of where the tubes would pass, so the brigade team can work with high precision. This task is illustrated in *Figure 60.*

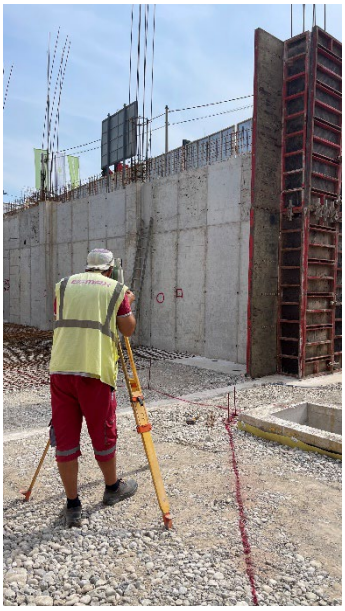

*Figure 59 - Measuring points*

*Figure 60 - Passing of tubes*

Besides the measurements for the tube passings, we also conducted some measurements so the carpentry team knew how high the garage floor should be concreted. We noted this points with red circles and they were 1.20m from the current floor, as shown in *Figure 59*. The carpentry brigade knew the thickness of the floor slab was 20cm, so they poured concrete until the height reached 1m from the noted red circles.

At the same time, workers prepared the garage floor slab's formwork and reinforcement, which are essential to the building's operation. Due to this high flow of work, it was difficult to conduct measurements.

The subgrade material was levelled and rolled both manually and mechanically to create a compact and even base for the upcoming concrete pours.

A total of 87m$^3$ of concrete was poured for the garage floor slab, concluding the floor slab for the basement level. This was supervised by all of the engineers in site as it had to be done according to design parameters. The activity is demonstrated in *Figure 61* and *Figure 62*.

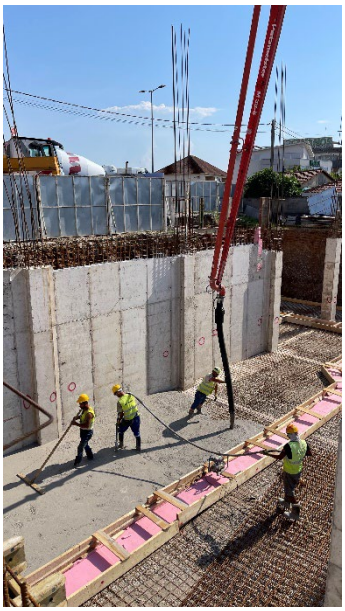

*Figure 61 - Concrete pouring for Garage floor slab*

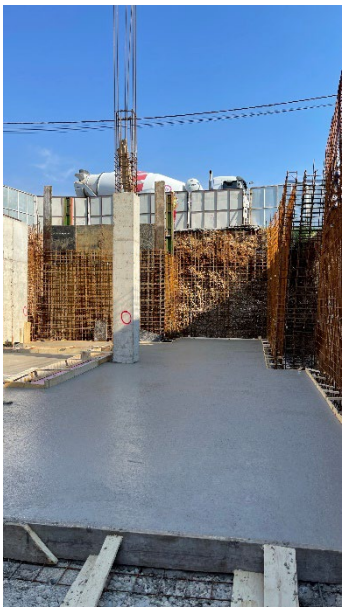

*Figure 62 - Levelled Garage floor slab*

## DAY 30: POS100 Construction Progress and Staircases

2024-09-07

On day 30, my last day as an Intern Civil Engineer at **BEMAX d.o.o. Podgorica,** was special to me as it meant I was able to finish my internship successfully. On the last day of my internship, I saw the beginning of the reinforcement works of the slab and beams of POS100.

The day began as any usual day, with the dismantling of previous framework. The carpentry brigade was careful as always with this process. Afterwards, we checked the quality of the surface of the structural elements.

During my last day, me and the surveyor did some more measurements, to make sure the works knew to properly align the structural elements.

I also learned something new on my last day, and that was learning how to read plans and cross-sections of staircases. I inspected the process of the carpentry team making these stairs possible. The staircase reinforcement work is demonstrated in *Figure 63*, as well as an AutoCAD drawing of it is shown in *Figure 64.*

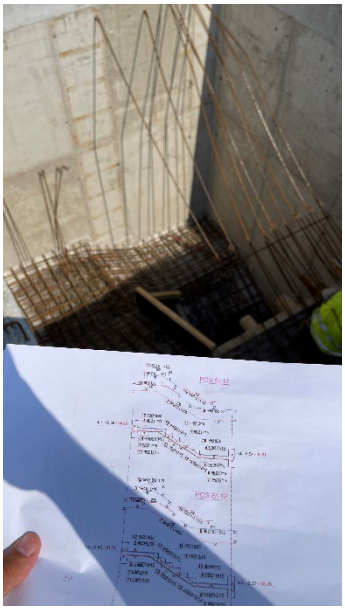

*Figure 63 - Staircase inspection*

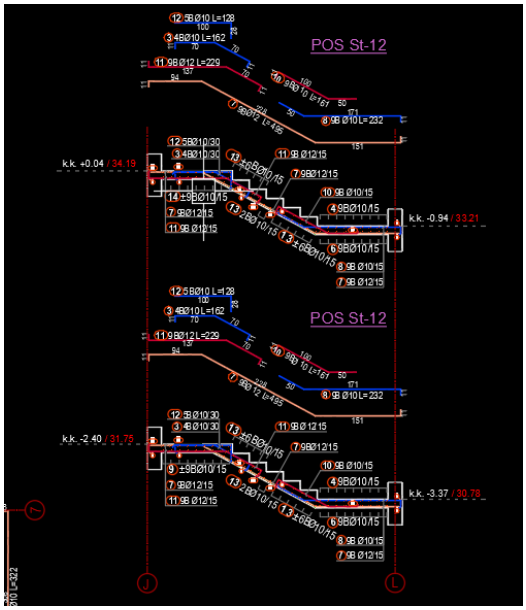


*Figure 64 - AutoCAD Staircase Cross Section*

Finally, I got to see the reinforcements and work for the POS100 level being made. It was very sophisticating to see how each element connects with the previous ones that were build. The process is visible in *Figure 65*.

*Figure 65 - Preparation works for POS100 floor level*

This concluded my last day on site at the Glosarij Business building showroom. I left the construction at the phase of the POS100 floor level. I said my goodbyes to the team, who were all respectful during my time here.

# CONCLUSIONS

I have gained significant experience from my internship at BEMAX d.o.o. Podgorica, which has allowed me to apply my theoretical knowledge to actual construction projects. I obtained practical expertise in a variety of civil engineering duties during my tenure with the company, ranging from simple formwork and reinforcement to the complexity of foundation work and concrete pouring as well as surveying measurements.

My technical abilities and comprehension of the building process were significantly improved by the hands-on experience I gained in areas like materials handling, equipment management, and wall and slab construction. I got the opportunity to collaborate with experienced engineers and labourers, benefiting from their knowledge and helping the project succeed. They help me improve my critical thinking and my ability to problem-solve.

During my time here, I learned more than the construction phase of the project. I learned how to be a team-player who helps to achieve common goals. I gained a deeper appreciation of the safety protocols, effective communication and teamwork on-site. I know that these lessons will follow me all through my career as a Civil Engineer.

Overall, this Internship has been an unforgettable experience for me and a huge motivation to my future self, in my academic as well as professional career. It has provided me with the necessary tools to excel in the field of civil engineering. I am grateful for the opportunity I had and look forward to applying my knowledge to future projects.