



University of Mohammed Kheider- Biskra  
Faculty of architecture, urbanism, civil engineering and hydraulic  
Department of Architecture

# MASTER'S DISSERTATION

Domain: **Architecture, urbanism and city professions**

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Specialization: **Construction Project Management**

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**Theme: Deadline planning and operational monitoring of a project: Case study of a school facility.**

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## Dedication

In the name of God, the Most Gracious, the Most Merciful,  
By His grace, I took each step,  
And by His mercy, I reached this end.

To the hearts that held me when I faltered,  
To the hands that lifted me when I fell,  
To the prayers whispered in silence,  
And the love that spoke without words.

To my father — a shelter in storms,  
A steady voice when the world turned cold.  
To my mother — the light in my darkest hours,  
A soul whose prayers guarded my every breath.

To my brother, my strength, my shield,  
To my sister, whose laughter lit my path.  
To my sister-in-law, a heart of quiet kindness,  
And to the silent friend whose presence healed without asking.

To my little stars, Rinad and Iyad,  
You are the promise of brighter days,  
The laughter I carry in weary nights.

And to my friends —  
For every moment you colored with joy,  
And every memory you carved in time.

This work is a reflection of your grace,  
A tribute to your unseen kindness,  
And a humble offering to the One  
Who beautifies every ending with mercy.

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**All praise is due to Allah, without whom none of this would have been possible.**

## Abstract:

This dissertation is entitled "Deadline Planning and Operational Monitoring of a Project: Case Study of a School Facility." It addresses the following research question: *How do deadline planning and operational monitoring influence the performance of educational construction projects, and what strategies can be implemented to improve their effectiveness?* The topic was selected due to the strategic importance of the education sector in Algeria and the recurring difficulties faced in meeting project deadlines because of poor planning and insufficient operational monitoring mechanisms.

The study relied on a methodology combining theoretical research, field investigations, and content analysis of organizational and technical documents related to the selected project.

The findings revealed that delays in educational construction projects are mainly caused by poor scheduling and the lack of precise, daily operational monitoring. The research demonstrated that accurate deadline planning combined with continuous site monitoring greatly enhances project performance. It also confirmed the effectiveness of integrating modern digital tools such as Microsoft Project and ClickUp to track project schedules and manage critical-path activities. The study recommends the adoption of periodic rescheduling based on actual site progress, the preparation of detailed, regular reports, and the structured use of digital tools to improve deadline management and ensure execution quality.

## Keywords:

Deadline Planning, Project Management, Operational Monitoring, Educational Sector, Planning.

## المخلص:

تحمل هذه المذكرة عنوان "تخطيط الأجل والمتابعة التنفيذية لمشروع: دراسة حالة منشأة تربوية". وتعالج الإشكالية التالية: كيف يؤثر تخطيط الأجل والمتابعة التنفيذية على أداء مشاريع البناء المدرسية، وما هي الآليات التي يمكن اعتمادها لتحسين فعاليتها؟ وقد تم اختيار هذا الموضوع بالنظر إلى الأهمية الاستراتيجية التي يحظى بها قطاع التربية في الجزائر، والصعوبات المتكررة التي تعرفها المشاريع في احترام الأجل، نتيجة سوء التخطيط وغياب آليات دقيقة ومنتظمة للمتابعة التنفيذية.

اعتمدت الدراسة على منهجية جمعت بين البحث النظري، التحقيقات الميدانية، وتحليل مضمون الوثائق التنظيمية والتقنية المتعلقة بالمشروع المدروس.

وأظهرت النتائج أن تجاوزات الأجل في مشاريع البناء المدرسية تعود أساساً إلى ضعف في إعداد البرامج الزمنية وغياب المتابعة اليومية الدقيقة لتقدم الأشغال. كما بينت الدراسة أن التخطيط المحكم للأجل مقروناً بمتابعة ميدانية مستمرة يسمح بتحسين أداء المشروع بشكل ملحوظ. وأكدت فعالية إدماج أدوات رقمية حديثة مثل Microsoft Project و ClickUp في متابعة البرامج الزمنية وضبط النشاطات الحرجة. وأوصت الدراسة باعتماد إعادة جدولة دورية وفق تقدم الأشغال الفعلي، إعداد تقارير تفصيلية منتظمة، واستعمال منظم للأدوات الرقمية من أجل تحسين التحكم في الأجل وضمان جودة التنفيذ.

## الكلمات المفتاحية:

تخطيط الأجل، تسيير المشاريع، المتابعة التنفيذية، قطاع التربية، التخطيط.

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## List of abbreviations:

- **PMBOK** : Project Management Body of Knowledge
- **CCPM** : Critical Chain Project Management
- **PERT** : Program Evaluation and Review Technique
- **BIM** : Building Information Modeling
- **ODS** : Ordre de Service
- **VRD** : Voirie et Réseaux Divers
- **MOA** : Maître d’Ouvrage
- **MOE** : Maître d’Œuvre
- **BET** : Bureau d’Études Techniques
- **Gantt** : Diagramme de Gantt
- **DD**: Start to Start — The start of the first activity triggers the start of the second activity.
- **DF**: Start to Finish — The start of the first activity determines the end of the second activity.
- **FD**: Finish to Start — The end of the first activity allows the start of the second activity.
- **FF**: Finish to Finish — Both activities finish together or the second one finishes after the first.
- **T.E.R** : Time Extension Request (Demande de prolongation de délai)
- **BET** : Bureau d’Études Techniques
- **ENT** : Entreprise de Travaux
- **CT** : Contrôle Technique
- **TER** : Temps d’Exécution Réel

## **Introductory chapter**

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### **General Introduction:**

The implementation of construction projects represents a crucial phase in the overall management of the production process. In Algeria, the majority of projects experience significant delays, particularly public infrastructure projects. Among these, educational facilities such as school buildings hold a special place, as they are designed to meet the urgent educational needs of the community while adhering to strict deadlines. These projects are considered among the most sensitive in terms of execution deadlines compared to other types of projects, due to their immediate social impact and their role in achieving national development objectives.

Project management in the construction sector, especially for educational infrastructure, is a fundamental pillar for ensuring the success of projects and achieving the defined objectives. The success of these projects largely depends on the various stakeholders involved, whether internal or external, each playing a decisive role at every stage of the process. It is essential to integrate the different perspectives of the involved parties — including the project owner, the construction company, the design office, and the control bureau — to make coherent and balanced decisions.

It should also be noted that the majority of public works companies in Algeria do not systematically use modern digital tools for planning and monitoring, such as MS Project or Primavera, which negatively affects their ability to anticipate and efficiently manage delays.

Moreover, it is commonly observed in educational facility projects that contractors tend to accelerate the completion of the administrative and pedagogical wings as the school year approaches, in order to hand them over for provisional use, while other works continue after classes have resumed. This situation results in the partial operation of a school still under construction, which can disrupt the educational process and pose safety risks to students and staff.

For this reason, precise planning and rigorous operational monitoring are essential to ensure that delays do not compromise the quality, deadline, or cost of the project. This study therefore aims to analyze deadline management and operational monitoring in the construction of educational facilities, through the example of a school building project. Focus will be placed on challenges related to deadline compliance, resource management, and possible solutions to optimize the workflow and ensure project delivery within the scheduled deadlines.

### **Problem Statement:**

Construction projects for educational institutions face a number of difficulties, especially when it comes to setting deadlines and monitoring the execution of the work. Failure to adhere to the schedule or the wrong monitoring mechanisms can lead to delays, increased costs, or negatively impact the quality of the project.

Time management requires the preparation of an accurate schedule that defines the execution periods for each phase of the project, while operational monitoring aims to continuously check the progress of the work and detect any deviations from the agreed program, so that the necessary measures can be taken in a timely manner. If these two aspects are not coordinated and integrated, the project may suffer from workflow disruptions, as well as misuse of available resources.

In the context of educational infrastructure projects in Algeria, these difficulties often translate into delays in project delivery, excessive costs, and operational inefficiencies. These recurrent issues reflect limitations in current project management practices, raising questions about their ability to

## **Introductory chapter**

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effectively plan and monitor project execution within the expected deadlines and required quality standards

### **Problem Question:**

Based on these observations and the ensuing reflections, it becomes essential to formulate a research question to clarify the underlying issue.

The main research question is:

**“How do deadline planning and operational monitoring influence the performance of educational construction projects, and what strategies can be implemented to improve their coordination and effectiveness?”**

This primary research question is supplemented by the following secondary questions:

- What are the effective tools for managing time and operational monitoring in educational construction projects?
- How can operational monitoring be organized to ensure the project progresses according to the planned schedule and required quality?
- What are the most common challenges facing educational construction projects in terms of scheduling and operational monitoring, and how can they be overcome?

### **Objectives of the study:**

1. Analyze the effect of operational monitoring in resolving delay problems.
2. Analyze the impact of time planning on resource management.
3. Propose solutions for improving processes in future projects.

### **Research methodology:**

To achieve the objectives of this research, a methodology combining both traditional and modern tools was adopted, structured around two complementary axes:

The first axis involved a comprehensive theoretical study including general definitions and key concepts related to deadline planning and operational monitoring in educational construction projects. It also addressed programming, the project life cycle, stakeholders, and reviewed more than ten techniques used in project planning, both traditional and modern, through an in-depth review of national and international literature to identify best practices and established standards.

The second axis consisted of a field study of a high school construction project. It began with a complete architectural and urban analysis of the studied site, alongside the preparation of a synoptic table summarizing the project's functional program.

In the final analytical chapter, the actual workflow process was examined. Data was collected through:

- Site visits to the project location.
- Analysis of monthly reports issued by the delegated project owner (maître d'ouvrage délégué).
- Daily reports recorded in the site logbook.

## **Introductory chapter**

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- Informal discussions and interviews with key project stakeholders.

These documents enabled us to precisely identify the deviations between theoretical planning and actual execution, accurately tracking delays and their causes — such as resource shortages, supply disruptions, or poor coordination between involved parties. This made it possible to assess the project’s compliance with its set deadlines and to pinpoint reasons behind delays and deviations.

Modern tools were also utilized to analyze the project’s actual work progress and scheduling, with results compared against national standards.

As a practical application, a new work schedule reflecting the actual progress on site was developed using two different techniques (one traditional and one modern), and their results were compared to identify appropriate improvement solutions.

This combination of traditional and modern methods, alongside detailed benchmarking against standards, enabled the presentation of a comprehensive and reliable analysis of planning and operational monitoring effectiveness, while proposing practical solutions to enhance the management of future projects and ensure their objectives are achieved within the required timeframe

### **Dissertation Structure:**

This dissertation is structured into three main chapters, organized as follows:

#### **Chapter One: Theoretical Framework**

This chapter presents the conceptual foundations of the study by introducing key definitions related to the education sector in Algeria, the programming of educational construction projects, and the spatial program requirements for a high school. It also explains essential project management concepts, including the project life cycle and stakeholder roles. The chapter concludes with a review of various traditional and modern tools and techniques for deadline planning and operational monitoring, establishing the theoretical basis for the fieldwork.

#### **Chapter Two: Case Study Presentation**

This chapter introduces the case study of a high school construction project in Biskra Province. It includes an architectural and urban analysis of the site and presents a synoptic table illustrating the project’s historical timeline and key phases prior to the start of execution (project life cycle).

#### **Chapter Three: Fieldwork, Analysis, and Results**

The final chapter focuses on the practical field investigation, presenting the workflow process and monitoring methods applied during the project execution. It begins by introducing the construction company responsible for the project, outlining its role and responsibilities. The chapter then compares the progress of this project to a reference project to identify the causes behind delays and deviations. Additionally, it evaluates the project’s compliance with national regulatory standards. The major on-site problems are also addressed, followed by an analysis of the use of modern digital scheduling tools — namely **Microsoft Project** and **ClickUp** — for the planning and operational monitoring of actual site work. Their results are compared, and based on the findings, practical solutions and corrective measures are proposed to improve deadline management and workflow coordination in future educational construction projects.

## Chapter I: Thematic and managerial study

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### Introduction:

Education is one of the fundamental pillars of societal development, playing a key role in shaping individuals and preparing them to face future challenges. For this reason, governments place great emphasis on the education sector and strive to develop its infrastructure by establishing modern educational institutions that meet pedagogical standards and address the growing needs of the population. However, the implementation of these projects faces several challenges, primarily **time planning, resource management, and operational control**, making it essential to adopt **precise project management methodologies**.

In this context, the **Ministry of National Education** plays a crucial role in organizing the educational process by setting policies and strategies to enhance the quality of education and provide a suitable learning environment. At the local level, **Directorates of Education** oversee the implementation of these policies, including the **planning and execution of educational projects**, such as schools and high institutions, to ensure a fair distribution of educational facilities and balance supply and demand.

**Time management and operational monitoring** are among the key factors that ensure the success of school construction projects. Effective planning helps **reduce delays, optimize resource utilization, and ensure quality execution** in accordance with required standards. In this regard, projects rely on **modern techniques** such as **scheduling charts (Gantt, PERT, CPM), visual management systems (Kanban), and Building Information Modeling (BIM)** to control workflow and achieve desired objectives.

This study focuses on **deadline planning and operational monitoring** in the construction of educational institutions, with a particular emphasis on the **construction of a high school** as a case study. It will analyze the various stages of the project, from planning to execution, while evaluating the tools and techniques used to manage scheduling and ensure the project progresses according to its defined objectives. Additionally, a comparison between **traditional and modern time management methods** will be presented to propose practical solutions for improving the efficiency of educational projects.

### I.1. Presentation of the Study Sector:

**I. 1.1. The education sector:** is a vital pillar in shaping future generations and has been given special attention by public authorities through various infrastructure programs implemented in the region. Today, this sector benefits from a well-structured and coordinated infrastructure base, designed to meet the growing demands of students. (Direction de l'Éducation de la Wilaya d'El Tarf, 2022)

**I. 1.2. Education:** is the process by which a teacher transfers knowledge and facts, works on shaping concepts, and brings about cognitive, emotional, and behavioral changes. (S.Bellil, 2023)

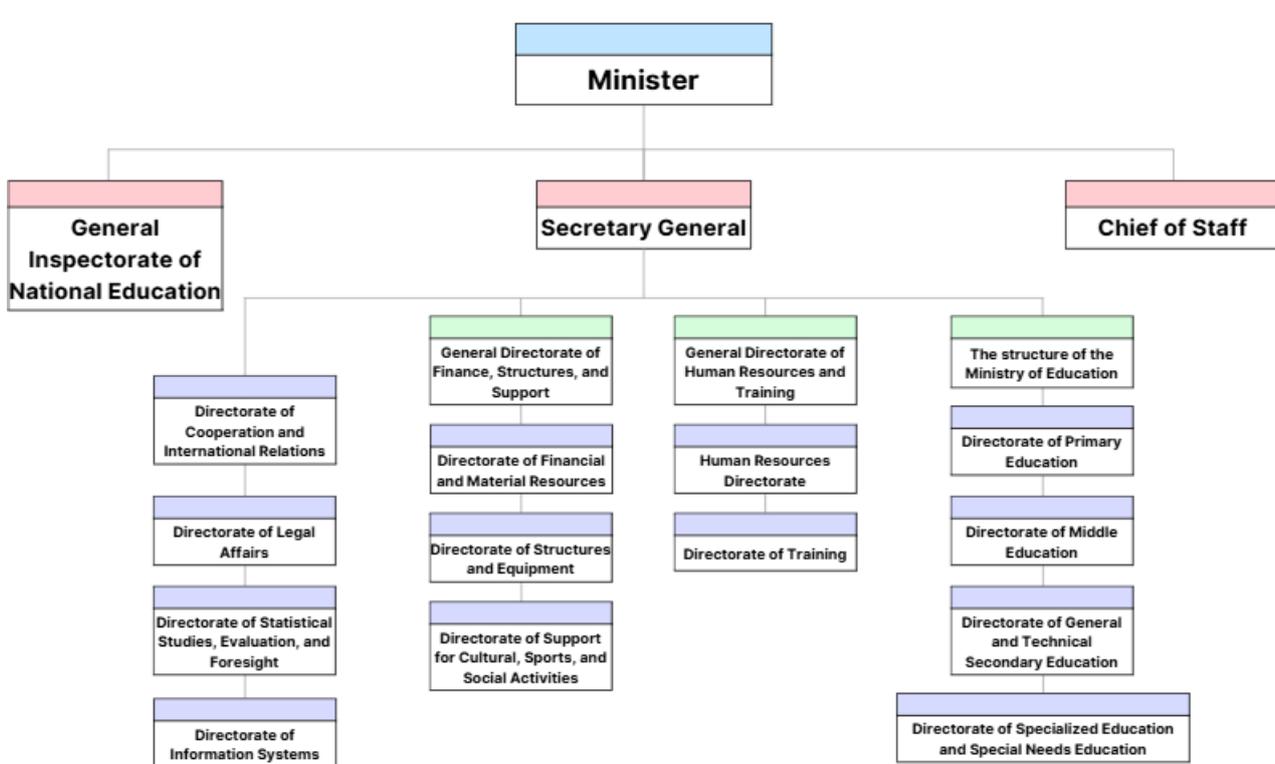
**I. 1.3. Learning:** is the actual and genuine outcome of the education process. (S.Bellil, 2023)

**I. 1.4. The educational process:** is a pedagogical act composed of a set of integrated elements that must function in harmony to achieve its objectives. Its key elements include the teacher, the learner, and the curriculum. (S.Bellil, 2023)

**I. 1.5. Definition of the Ministry of Education in Algeria:** The Ministry of Education is a governmental body responsible for the education and teaching of citizens by establishing educational institutions and defining the major educational goals that represent society, which are the

## Chapter I: Thematic and managerial study

result of a specific educational philosophy. The Ministry has several tasks, including overseeing the proper functioning of educational institutions, gathering educational interests at the level of each state in the form of a Directorate of Education, and preparing the school map for the various stages of education. (wikipedia, 2024)



**Figure 1 :**The structure of the Ministry of Education (Ministère de l'Éducation Nationale, 2024)

**I.1.6. Definition of the Directorate of Education:** The Directorate of Education is a branch of the Ministry of Education and is considered one of the executive directorates present at the state level across the country. According to Article 4 of Executive Decree 90-174, which regulates the organization and functioning of educational services at the state level, this directorate consists of 3 to 6 departments. A new department, the "Finance and Resources Department," was added in accordance with the regulatory texts issued in the form of a joint ministerial decision dated June 2, 2002. (Directorate of Education of Batna Province, 2024) Education in Algeria is divided into three educational stages: Primary Education, middle, and High Education.

The Structure of the Directorate of Education:

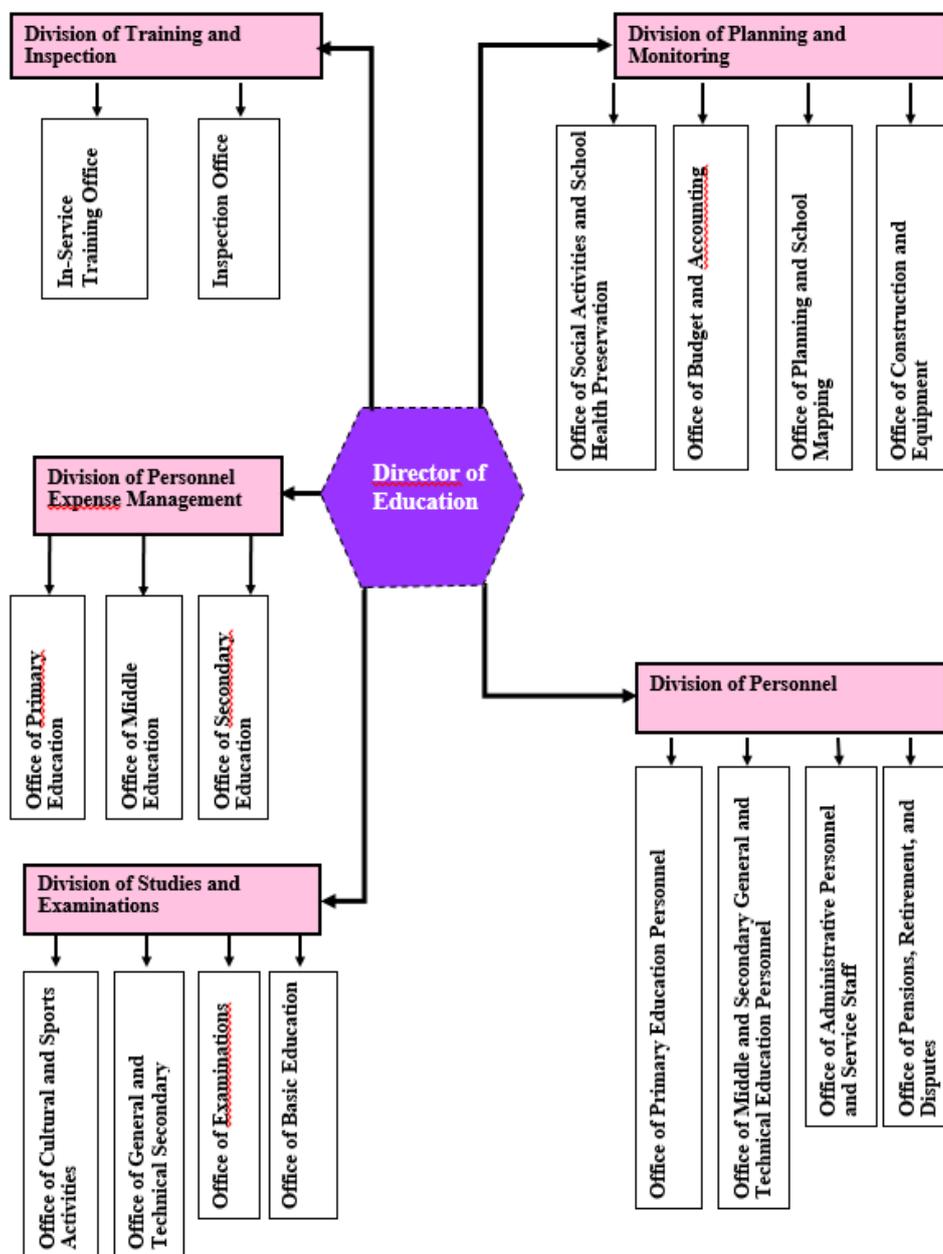


Figure 2: Structure of the Directorate of Education (ecoledz, 2024)

**I. 1.7. The high school** is a public institution with an administrative character, possessing legal personality and financial autonomy. It is dedicated to education and teaching, with general and technological high education forming the academic pathway that follows compulsory basic education. In addition to continuing the general objectives of basic education, high education aims to enhance acquired knowledge and facilitate gradual specialization in various fields according to students' abilities and interests. A high school is equipped with: Laboratories for practical work, Computer rooms, A library and a documentation and school information center, Sports facilities and equipment, Cultural and scientific clubs, A multipurpose hall, Educational tools and technical teaching equipment. (Forum Djelfa, 2014)

## Chapter I: Thematic and managerial study

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**I. 1.8. Classroom:** A form of school organization in which learners are divided into groups that share a set of common characteristics, as defined by official authorities, and these groups are referred to as classrooms. (B.Mezghich, 2025)

**I. 1.9. The school canteen:** is a equipped facility where meals are provided to all or some school students at midday.

### I.2. Identification of the Case Study

**I.2.1. Categories of Education Projects:** According to (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

**Tableau 1:** Representation of Educational and Training Project Categories.

Category A	Category B	Category C
School classrooms.	Middle school.	High school.
Primary school.	Semi-boarding school.	National institute.
School canteens.	Vocational training and apprenticeship center.	Semi-boarding school.

#### I.2.2. Planning Standards for Educational Facilities:

Planning standards for educational facilities are regulatory frameworks that establish the spatial, functional, and organizational criteria necessary for the design and implementation of educational establishments. These standards ensure that the physical environment supports pedagogical objectives and provides suitable conditions for learning and teaching activities. They differ according to the educational level and type of establishment. (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

##### I.2.2.1. Primary Schools:

Primary schools are divided into five categories (A-1-2-3-4), differing in the number of classrooms, student capacity, and land area. A single primary school serves the 6-12 age group as the core facility for a neighborhood unit. The distance between the school and the child's residence should not exceed 300 meters. The population required for programming a primary school is estimated at 2,000 inhabitants. (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

##### I.2.2.2. Middle Schools:

Middle schools are categorized based on the number of classrooms, varying in student capacity and spatial requirements. A middle school serves as a center for the residential neighborhood, with the distance from the farthest housing unit to the school ranging between 400 to 1,000 meters. It caters to the age group of 12 to 16 years. The population required for programming a middle school is estimated at 4,200 inhabitants. (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

##### I.2.2.3. High Schools:

High schools serve the largest number of residential neighborhoods, with the standard distance from the farthest housing unit ranging between 1,200 and 1,500 meters.

## Chapter I: Thematic and managerial study

- Two high schools are constructed for every population size of 33,000 inhabitants, with each school covering an area of 44,000 m<sup>2</sup>, ensuring a per capita space allocation of 0.60 m<sup>2</sup> per person. - One technical school (lycée technique) is established for every population size of 100,000 inhabitants, with an area of 25,000 m<sup>2</sup>, providing a per capita space of 0.25m<sup>2</sup> per person. The population required for programming a high school is estimated at 16,500 inhabitants. (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

### I.2.3. Calculating Educational Needs Across All Levels: (S.Houari, 2022/2023)

- **Classroom Occupancy Rate:** This is calculated by dividing the total number of students by the number of occupied classrooms, then comparing the result with the ideal classroom occupancy rate, which is set at **30 students per classroom** (in Algeria).
- **Estimating the Current Number of Classrooms:** This is determined through field research.
- **Estimating the Classroom Deficit:**
  - **Theoretical number of classrooms** = Current number of students / Ideal classroom occupancy rate.
  - **Deficit** = Theoretical number of classrooms - Current number of classrooms (If positive, there is a deficit; if zero or negative, there is no deficit).
- **Number of Schools:** This is determined based on the number of classrooms planned

### I.3. Identification of the Programs of the Study Sector

Educational sector planning is carried out based on statistics regarding the population and the number of enrolled children in each area according to age groups. This is followed by a needs assessment, leading to the programming of educational projects based on the region's requirements.

#### I.3.1.For Primary Schools:

CATEGORIE	EQUIPEMENTS	BASE DE CALCUL		SURFACE UNITAIRE	LOCALISATION			REMARQUES
		POPULATION CONCERNEE	RATIO		CENTREMENT D'HABITATION	UNITE DE VOISINAGE	QUARTIER	
	Agence F.T.T.		0,03m <sup>2</sup> /hab	1000 m <sup>2</sup>			x	
	Agence de Banque Assurance etc.							Inclus dans le commerce tertiaire
	Antenne Administrative avec Poste de Police		0,03m <sup>2</sup> /hab	1000 m <sup>2</sup>			x	Hors Programme
	Commissariat			2500 m <sup>2</sup>			x	H.P.
	Protection Civile						x	
	Organisation de masse		0,015m <sup>2</sup> / hab	500 m <sup>2</sup>			x	
	Crèche	1% de la population	20m <sup>2</sup> /enf. 0,2m <sup>2</sup> /hab	750 m <sup>2</sup>			x	
	Ecole maternelle	2% de la population	20m <sup>2</sup> /enf. 0,4m <sup>2</sup> /hab	1600 m <sup>2</sup>			x	
	E P E (Ecole Fondamen- tale Elémentaire)	20% de la population	7m <sup>2</sup> /élève 1,4m <sup>2</sup> /hab	5000 m <sup>2</sup>			x	
	E P S (Ecole Fondamen- tale Supérieure)	5% de la population	7,5m <sup>2</sup> /élè 0,35m <sup>2</sup> /hab	5400 m <sup>2</sup>			x	
	Enseignement Général	1,4% de la	10m <sup>2</sup> /élève	3000 m <sup>2</sup>				H.P.
	Technicum		15m <sup>2</sup> /élève					H.P.

Figure 3: The theoretical equipment grid according to CADAT (S.Makhloufi, 2024)

## Chapter I: Thematic and managerial study

The percentage of primary school students represents 2% of the total population,

$$\text{So: } \begin{array}{l} a \longrightarrow 100\% \\ x \longrightarrow 2\% \end{array}$$

Such that:  $a$  is total population  $x$  is high school students

Using the rule of three, we find that:  $x = \frac{100 \times a}{2}$

**Calculating the Area of a primary school:** According to KADAT standards, the allocated space per student is **20 square meters**. So: the Area of a prim School =  $x \times 20$

Primary schools are classified into different categories (**A, 1, 2, 3, 4**), with **Category 4** being the highest, used in areas with a large number of students. **Category A** is the smallest, used in areas with a low number of students or for expansion purposes. (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

**Tableau 2 :**Primary School Programming in the Education Sector

type	Number of Classrooms	Number of Students	Land Area (m <sup>2</sup> )	Future Expansion Area (m <sup>2</sup> )	Construction Site Area (m <sup>2</sup> )
A	3	90	2000	437	1563
1	6	180	2600	470	2130
2	12	360	4000	438	3562
3	18	540	5150	454	4696
4	24	720	6000	/	5953

### I.3.2. For Middle Schools:

CATEGORIE	EQUIPEMENTS	BASE DE CALCUL		SURFACE UNITAIRE	LOCALISATION			REMARQUES
		POPULATION CONCERNEE	RATIO		GROUPEMENT D'INSTALLATION	UNITE DE VOISINAGE	QUARTIER	
	Agence F.T.T.		0,03m <sup>2</sup> /hab	1000 m <sup>2</sup>			x	
	Agence de Banque Assurance etc.							Inclus dans le commerce tertiaire
	Antenne Administrative avec Poste de Police		0,03m <sup>2</sup> /hab	1000 m <sup>2</sup>			x	Hors Programme
	Commissariat			2500 m <sup>2</sup>			x	H.P.
	Protection Civile							
	Organisation de manne		0,015m <sup>2</sup> /hab	500 m <sup>2</sup>			x	
	Crèche	1% de la population	20m <sup>2</sup> /enf. 0,2m <sup>2</sup> /hab	750 m <sup>2</sup>			x	
	Ecole maternelle	2% de la population	20m <sup>2</sup> /enf. 0,4m <sup>2</sup> /hab	1600 m <sup>2</sup>			x	
	E F E (Ecole Fondamen- tale Elémentaire)	20% de la population	7m <sup>2</sup> /élève	5000 m <sup>2</sup>			x	
	E F S (Ecole Fondamen- tale Supérieure)	5% de la population	7,5m <sup>2</sup> /élb	5400 m <sup>2</sup>			x	
	Enseignement Général	1,4% de la population	10m <sup>2</sup> /élève	3000 m <sup>2</sup>				H.P.
	Technicum		15m <sup>2</sup> /élève					H.P.

**Figure 4 :**The theoretical equipment grid according to CADAT (S.Makhloufi, 2024)

## Chapter I: Thematic and managerial study

The percentage of middle school students represents 5% of the total population, so:

$$a \longrightarrow 100\%$$

$$x \longrightarrow 20\%$$

Such that:  $a$  is total population       $x$  is high school students

Using the rule of three, we find that:  $x = \frac{100 \times a}{20}$

**Calculating the Area of a middle School:** According to KADAT standards, the allocated space per student is seven square meters. So: the Area of a High School =  $x \times 7$

Middle schools are classified into different types (3, 4, 5, 6, 7), with **Type 7** being the largest, used in areas with a high number of students. **Type 3** is the smallest, used in areas with a lower number of students or for expansion purpose (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

**Tableau 3:** Middle School Programming in the Education Sector

Type	Number of Classrooms	Number of Students	Total Land Area (m <sup>2</sup> )
3	12	360	6000
4	16	480	6800
5	20	600	7700
6	24	720	8500
7	28	840	9300

### I.3.3. For high Schools:

CATEGORIE	EQUIPEMENTS	BASE DE CALCUL			LOCALISATION			REMARQUES
		POPULATION CONCERNEE	RATIO	SURFACE UNITAIRE	GROUPEMENT D'HABITATION	UNITE DE VOISINAGE	QUARTIER	
	Agence F.T.T.		0,03m <sup>2</sup> /hab	1000 m <sup>2</sup>			x	Inclus dans le commerce tertiaire
	Agence de Banque Assurance etc.							
	Antenne Administrative avec Poste de Police		0,03m <sup>2</sup> /hab	1000 m <sup>2</sup>			x	Hors Programme
	Commissariat			2500 m <sup>2</sup>			x	H.P.
	Protection Civile							
	Organisation de masse		0,015m <sup>2</sup> /hab	500 m <sup>2</sup>			x	
	Crèche	1% de la population	20m <sup>2</sup> /enf. 0,2m <sup>2</sup> /hab	750 m <sup>2</sup>			x	
	Ecole maternelle	2% de la population	20m <sup>2</sup> /enf. 0,4m <sup>2</sup> /hab	1600 m <sup>2</sup>			x	
	E F E (Ecole Fondamentale Elementaire)	20% de la population	7m <sup>2</sup> /élève	5000 m <sup>2</sup>			x	
	E F S (Ecole Fondamentale Supérieure)	5% de la population	7,5m <sup>2</sup> /élève	5400 m <sup>2</sup>			x	
	Enseignement Général	1,4% de la population	10m <sup>2</sup> /élève	3000 m <sup>2</sup>				H.P.
	Technicien		15m <sup>2</sup> /élève					H.P.

**Figure 5 :** The theoretical equipment grid according to CADAT (S.Makhloufi, 2024)

The percentage of high school students represents 5% of the total population,

## Chapter I: Thematic and managerial study

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So:  $a \longrightarrow 100\%$   
 $x \longrightarrow 5\%$

Such that:  $a$  is total population       $x$  is high school students

Using the rule of three, we find that:  $x = \frac{100 \times a}{5}$

**Calculating the Area of a High School:** According to KADAT standards, the allocated space per student is **7.5 square meters**. So: the Area of a High School =  $x \times 7.5$

High schools are classified into different types (**600, 800, 1000**), with **Type 1000** being the largest, used in areas with a high number of students. **Type 600** is the smallest, used in areas with a lower number of students or for expansion purposes.

**Tableau 4** :high School Programming in the Education Sector

Type	Number of Classrooms	Number of Students	Total Land Area (m <sup>2</sup> )
600	20	600	9000
800	27	800	10400
1000	34	1000	11250

### I.3.4. School Planning Standards

- 1- The school site must face two streets to ensure easy access, with the main street being at least 10 meters wide, where the entrance for teachers and visitors is located.
- 2- It is preferable for the site to be on secondary streets with a minimum width of 6 meters, where the students' entrance should be placed.
- 3- The sidewalk leading to the students' entrance should be at least 4 meters wide.
- 4- Parking areas for visitors, administration, and students should be clearly separated.
- 5- Sites located on streets with service lanes on both sides are preferred, with each lane being no less than 3 meters wide.
- 6- The school location should be on private or secondary streets, ensuring that the walking distance for students does not exceed 500 meters.
- 7- The site should be far from sources of noise, industrial areas, and entertainment facilities that may negatively affect young and older students.
- 8- The school should be centrally located near essential services such as hospitals and fire stations, and the surrounding environment should be healthy and free from visual pollution.
- 9- The minimum distance between the school and adjacent buildings should be 3 meters to prevent noise disturbances, and the school fence should be at least 2 meters high.
- 10- Roads leading to the school must be planned carefully, taking into account daily traffic flow and peak hours to ensure smooth mobility and student safety.
- 11- The site should preferably have a square shape. If rectangular, the length-to-width ratio should not exceed
- 12- If a highway is located near the site, it is preferable for the school to be either 4 meters lower or higher than the road level, with an embankment and a protective fence for safety.
- 13- In cases where the school is near a high-speed road, the site should be positioned at a safe distance with necessary protective measures to reduce noise and enhance security. (السعود, 2020)

## Chapter I: Thematic and managerial study

### I.3.5. Spatial Program: (Official Gazette of the People's Democratic Republic of Algeria, 2021)

The spatial program represents a crucial reference for determining the functional and spatial needs of educational establishments. It defines the different facilities, their capacities, and their areas in accordance with regulatory and pedagogical standards. In the case of a high school, it serves as a guide for the planning and organization of the spaces required for the smooth running of educational and administrative activities.

#### I.3.5.1. High School Construction Program (Official Gazette of the People's Democratic Republic of Algeria, 2021)

The high school construction program defines the various essential facilities that make up the institution, organizing them according to the needs of students, educational staff, and administrative personnel, while complying with the technical and pedagogical standards established by the relevant authorities. This program varies according to the type of high school and the number of students it is designed to accommodate.

##### I.3.5.1. high school type 1000:

This category of high school is designed to accommodate 1000 students, with facilities distributed according to regulatory requirements and functional needs. The program is divided into several main components, including pedagogical, administrative, and service wings, each with specific functions and dedicated spaces.

**Table 5 :** High School Construction Program typ 1000 (Official Gazette, 2021)

1.Pedagogical Wing:	Facility	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )
	Standard Classrooms	34	62	2108
	Applied Sciences Lab (Natural Sciences & Physics)	6	64	384
	Preparation Room	3	30	90
	Technology Labs	3	48	144
	Computer Lab	2	72	144
	Visual Arts Workshop with Storage	1	80	80
	Music Workshop with Storage	1	80	80
	Multipurpose Activity Hall	1	80	80
	Library & Reading Room	1	120	120
	Lecture Hall	1	160	160
	Educational Supervisor's Office (Pedagogical Monitoring on Each Floor)	3	16	48
	Student Restrooms	2	75	150
	<b>Total</b>			<b>3588</b>
	Circulation Area	20%		718
<b>Total General 1</b>			<b>4306</b>	

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2. Administrative Wing	Facility	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )
	Principal's Office	1	30	30
	Secretariat	1	16	16
	Secondary Supervisor's Office and Secretariat	1	30	30
	Educational Advisor's Office	2	16	32
	Financial Administrator's Office	1	16	16
	Accounting Office	1	16	16
	Storage Room	1	20	20
	School and Career Guidance Counselor's Office	1	16	16
	Documentation and School Information Room	1	40	40
	Teachers' Lounge with IT Area	1	80	80
	Meeting Room	1	80	80
	Archive Room	1	40	40
	Storage Room	1	15	15
	Medical and Monitoring Unit, including a doctor's clinic, a dentist's clinic, a changing room, a paramedical treatment room, a waiting area, and a restroom	1	98	98
	Waiting Room	1	16	16
	Reception Desk	1	6	6
	Restrooms for Teachers and Administrative Staff	2	12	24
	<b>Total</b>			<b>575</b>
	Circulation Area	10%		58
<b>Total General 2</b>			<b>633</b>	
3. Services (Annexed Facilities)	Facility	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )
	Workshop and storage for professional workers	1	60	60
	Boiler room	1	30	30
	Electric transformer with generator room	1	40	40
	Shelter for renewable energy equipment	1	12	12
	Water tank with machine room	1	24	24
	<b>Total General 3</b>			<b>166</b>

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<b>4. Sports Hall</b>	Facility	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	
	Playground (30 m × 20 m)	1	600	600	
	Entrance	1	16	16	
	Changing room for students	2	32	64	
	Teacher's office with a changing room	2	12	24	
	Equipment storage	1	16	16	
	Courtyard	1	16	16	
	Shoe cleaning mat	1	8	8	
	Boiler room	1	16	16	
	<b>Total General 4</b>				<b>760</b>
<b>5. Staff Housing</b>	Facility	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	
	5-Room Housing	1	100	100	
	4-Room Housing	2	85	170	
	3-Room Housing	4	70	280	
	<b>Total general 5</b>				<b>550</b>
	<b>Total Built-up Area (total1+2+3+4+5)</b>				<b>6414</b>
<b>6. Outdoor Areas</b>	Facility	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )	
	Rest Area (3 m <sup>2</sup> per student)	1	3000	3000	
	Multipurpose Sports Field	1	1280	1280	
	Green Space and Gardening Area (20 m <sup>2</sup> per classroom)	1	500	500	
	Total General 6				4780
	<b>Total Land Area (Total 1 + Total 2 + Total 3 + Total 4 + Total 5 + Total 6)</b>				<b>11194</b>
	Future Expansion Area (Classrooms, Semi-boarding, Boarding, etc.)				556
	<b>Overall Total Land Area</b>				<b>11750</b>

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### I.3.5.2. Semi-Boarding (300 Beneficiarys): (Official Gazette of the People's Democratic Republic of Algeria, 2021)

**Table 6** : Semi-Boarding Construction Program (Official Gazette, 2021)

Designated Spaces	Units	Area per Unit (m <sup>2</sup> )	Total Area (m <sup>2</sup> )
<b>Dining Hall:</b>			
Dining Hall (Multipurpose space for 200 students × 0.9 m <sup>2</sup> )	1	270	270
total 1			270
<b>Kitchen and Its Annexes:</b>			
<b>1. Entrance</b>			
Goods Reception Area	1	20	20
Changing Room for Workers	1	7	7
Waste Container	1	10	10
<b>2. Storage Rooms</b>			
Refrigeration Room (with air compressor)	1	10	10
Daily Refrigeration Room	1	5	5
Cold and Dry Storage	1	25	25
Liquid Storage	1	15	15
<b>3. Preparation Area</b>			
Meat Preparation Area (with table 2.4m × 1.2m)	1	4	4
Fish and Vegetable Preparation Table (3.6m × 1.4m)	1	6	6
Bread Preparation Table (3.5m × 1.2m)	1	6	6
Cooking Area (with table 6.0m × 2.4m)	1	25	25
Distribution Area (with table 6.0m × 1.2m)	1	10	10
<b>4. Washing Area</b>			
Washing Sink for Dining Hall (with table 3.6m × 1.8m)	1	10	10
Service Washing Sink (with table 4.0m × 1.2m)	1	7	7
<b>Partial Total</b>			<b>160</b>
Circulation Space	10%		16
<b>Total 2</b>			<b>176</b>
<b>Overall Total</b>			<b>446</b>

A semi-boarding facility is implemented for 300 beneficiaries in middle schools of Type (6), Type (7), and in high schools of Type (1000).

### I.4. Definition of project

#### I.4.1. Project

According to ISO 10006: ‘a project is a single process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective that conforms to specific requirements, including time, cost and resource constraints’ (Afitop 2010).

According to APM BOK (2012) ‘a project is a single, transitory undertaking, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes and benefits. A project is generally considered successful if it achieves the objectives in accordance with their acceptance criteria within an agreed timeframe and budget’ (Bronte-Stewart 2018). For the PMI (Project Management Institute): ‘a project is a temporary undertaking decided with the aim of creating a unique product, service or outcome’ (PMBOK 2017).

According to the AFNOR X50-105 standard, a project is defined as ‘a specific approach that methodically structures a future reality and involves an objective to be achieved with given resources’ (AFITEP-AFNOR 1991). For his part, Moine (2012) defined a project as ‘a complex and impalpable work; it is an abstract object. It corresponds to a unique and innovative result, a pull over time, a transformation that leads to the final work, something quite concrete this time (a final tangible or intangible product)’.

To summarise, a project can be defined as the set of activities and actions to be undertaken in order to meet a defined need, subject to time, cost and quality constraints. It is dependent on resources (human, material and logistical), it often represents a unique and singular character and it includes a dose of uncertainty (student, 2025)



**Figure 6:** Definition of project (ELHUSSEIN & AL HASSAN M.AMIN)

#### I.4.2. Project characteristics: (PMBOK 2017).

- It aims to achieve a specific objective,
- It is unique (the same project is never carried out exactly the same way twice),
- It is temporary (with a defined start and end date),
- It involves coordinating a set of activities contributing to the desired objective, leading to specific issues in managing uncertainty.

#### I.4.3. Project constraints

Project constraints are the obligations and requirements to which the project is subject and by which its success is measured.

PRINCE 2 states that ‘there are six variables that should be taken into account throughout a project and therefore six aspects of project performance to manage. These are time, cost, scope, risk, benefits and quality’ (Bronte-Stewart 2018).

According to PMBOK (2017), project success is measured by product and project quality, on-time and on-budget delivery, and level of customer satisfaction.

The IPMA (International Project Management Association) stresses that project success is strictly related to project management success, such as the ability to deliver the project product within scope, time, cost and quality.

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The Project Management Institute's PMI PMBOK states that project management typically includes: identifying requirements, meeting the various needs and expectations of stakeholders during project execution and balancing competing project constraints, including: time, cost, scope, resources, quality and risk.

The APM BOK explains that success factors are management practices such as defining clear goals and objectives, maintaining a focus on business value, implementing an appropriate governance structure, ensuring senior management commitment and providing timely and clear communication. Key areas include schedule, finance, scope, resources, quality and risk.

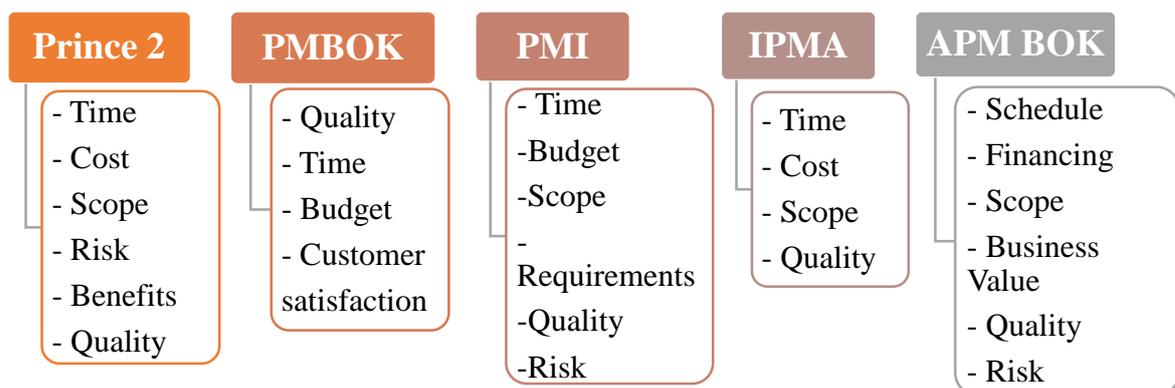


Figure 7 :Project constraints (Chan & Chan,2004)

### I.4.4. The Project Triptych

*The Project Triptych or the iron triangle, also known as the triple constraint triangle, the performance triangle or the golden triangle, is 'a representation of the most basic criteria for measuring project success: whether the project is delivered on time, within budget and at a certain level of quality, performance or scope' (Pinto, 2010).*

**I.4.4.1. Cost:** The project budget is set by the client during the early stages. It can be adjusted under certain conditions, but it must remain within a fixed limit. Exceeding the budget may result in the project losing its economic viability or facing administrative obstacles. The cost covers study expenses, implementation, operation, and closure.

**I.4.4.2. Time:** Every project has a specific duration that must be respected, even if estimating it is difficult from the outset. Missing deadlines negatively affects the project and may render it useless, even if it was not urgent. A final completion date is established, with continuous progress tracking throughout execution.

**I.4.4.3. Quality:** Quality reflects the project's ability to meet the technical and functional requirements defined at the start. A successful project fulfills these needs while remaining flexible to deal with inevitable changes. Avoiding design shortcuts and ensuring consistent performance is essential, alongside clear, comprehensive documentation.

A project is considered successful only if it respects the planned cost, meets the scheduled deadlines, and achieves the required quality agreed upon from the beginning.



Figure 8 :The Golden Triangle (We are ProjectSmart, 2025)

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### **I.5. Project life cycle**

According to the PMBoK Guide, project management can be structured into five distinct process groups:

- Pre-project and initiation
- Planning
- Execution
- Monitoring and controlling
- Closing

Each phase consists of a series of tasks that contribute to achieving a common project goal. Each phase is characterized by several project deliverables. These deliverables represent intermediate results that contribute to achieving the desired project outcome. (Gestion de Projet, 2025)

#### **I.5.1. The project initiation phase (Pre-Project)**

This project management phase occurs before the actual project initiation. It is characterized by the collection of necessary and relevant information to help make the decision of whether to "start or not" the project. It aims to define the scope and objectives of the project, analyse needs, clarify demand, and study the feasibility and appropriateness of the project. (Gestion de Projet, 2025)

During this phase, which marks the project start, it is essential to:

- Define the project objectives
- Specify the expected deliverables, desired timelines, and allocated budget
- Identify project stakeholders
- Conduct an initial risk analysis
- Set up project governance (committees, decision-makers, etc.)

The main deliverables of this phase are:

- Project Charter
- Macro Planning
- Risk Register
- Kick-off Meeting

#### **I.5.2. The planning phase**

This is the preparation and detailed development phase of the project. At this stage, the project content is defined in more detail, and a comprehensive project plan is created for timelines, budgets, and human resources. The objective of this phase is to define how the project will be executed, monitored, controlled, and eventually closed. (Gestion de Projet, 2025)

The main deliverables of this phase are:

- Project Management Plan (PMP)
- Expression of Needs
- Specifications Document
- Gantt Project Schedule
- RACI Matrix
- Communication Plan

#### **I.5.3. The execution or the implementation phase**

This phase involves implementing the project plan. It comprises the process of carrying out the tasks using the resources identified in the project plan, and according to the criteria of cost, deadline and

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quality. The objective of this phase is to achieve the project deliverables by implementing the project plan created in the previous phase. (Gestion de Projet, 2025)

The main deliverables of this phase are:

- Deliverable Tracking
- Meeting Minutes
- Change Request Register
- Acceptance Strategy

### I.5.4. The monitoring and control phase

This phase takes place regularly in parallel with the execution phase. It consists of monitoring the progress of the work on an ongoing basis and comparing it with the planned schedule in order to measure the performance of the activities and identify any corrective measures required.

The objective of this phase is to ensure the project objectives are achieved by regularly monitoring and measuring progress to identify any deviations from the project plan, allowing corrective actions to be taken if necessary. (Gestion de Projet, 2025)

The main deliverables of this phase are:

- Budget Tracking
- Dashboard

### I.5.5. The project closure phase

This consists of delivering the final deliverables to the customer, releasing the resources and closing the project. At this stage, the deliverables are completed, and the product or service is handed over to the internal or external client.

The deliverable of this phase is the project report, which analyzes the gaps between the initial objectives and the results achieved and documents the lessons learned. (Gestion de Projet, 2025)

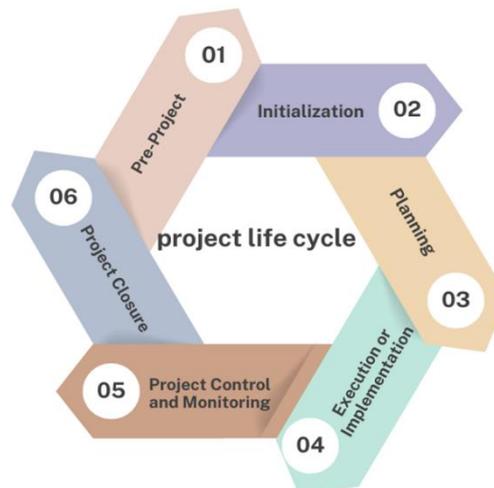


Figure 9 :project life cycle (student, 2025)

## I.6. Stakeholders :

### I.6.1. The Project Owner (Maître d'ouvrage):

Also known as "Project Ownership" or MOA, the project owner is a natural or legal person for whom a project is implemented and executed.

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### I.6.1.1. Role of the Project Owner:

- As the project sponsor, they define the project specifications, including requirements, budget, timeline, and objectives to be achieved.
- To execute the project, the project owner hires a project manager (Maître d'œuvre) and may also involve a delegated project owner (Maîtrise d'ouvrage déléguée) for better management.
- The project owner oversees the entire execution process and is the final decision-maker during the handover, being both the pilot and the owner of the project.
- This term is commonly used in construction but is also extending to other domains. (F.Alouane, 2020/2021)

### I.6.2. The Project Manager (Maître d'œuvre):

The project manager is a natural or legal person responsible for study and follow-up primarily in the construction field. They can be an engaged company, a professional, or an organization.

#### I.6.2.1. Role of the Project Manager:

- The project manager designs plans, organizes, supervises, and coordinates various stakeholders working on the project.
- They are selected by the project owner for whom the project is being executed. (F.Alouane, 2020/2021)

**I.6.3. The Contractor (L'entrepreneur):** The contractor is the person responsible for carrying out work under a business contract, providing materials, equipment, and labor. The profession of a contractor is regulated by laws specific to each country.

#### I.6.3.1. Responsibilities of the Contractor:

##### 1. Legal Responsibilities:

- They are subject to ten-year and two-year liabilities under civil code and public market regulations, just like architects.
- They must comply with labor law regulations.
- They are accountable for delays in delivering the work. (F.Alouane, 2020/2021)

##### 2. Contractor's Employees:

Contractor employees fall into three main categories:

- **I.A.C (Engineers and Executives):** Service heads, site managers, senior technicians, quantity surveyors, chief accountants, etc.
- **E.T.A.M (Employees, Technicians, and Supervisors):** Site foremen, surveyors, middle-level technical staff, and administrative officers.
- **Manual Labor Workers:**
  - **Laborers:** Perform simple auxiliary tasks without responsibility, requiring no specialization, such as cleaning, manual handling, and guarding.
  - **Specialized Workers:** Carry out simple tasks requiring prior adaptation or training, such as operating basic mixers for concrete or mortar.

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- **Qualified Workers:** Execute tasks requiring initiative and skills gained through professional training or equivalent experience, like masonry, tiling, or reinforcing steel assembly.
- **Team Leaders:** Skilled workers proficient in their trade and responsible for leading a team under supervision directives. (F.Alouane, 2020/2021)

### I.7. Project management:

#### I.7.1. Defenition of project management:

According to **PMBOK Guide, 6th Edition**: "*Project management is the application of knowledge, skills, tools, and techniques to project activities to meet its requirements. This is achieved by appropriately applying and integrating the project management processes identified for the project. Furthermore, it enables organizations to execute projects efficiently*". **Similarly, ISO 10006 emphasises that "Project management involves planning, organizing, monitoring progress, and controlling all aspects of the project in a continuous process to achieve its objectives."**

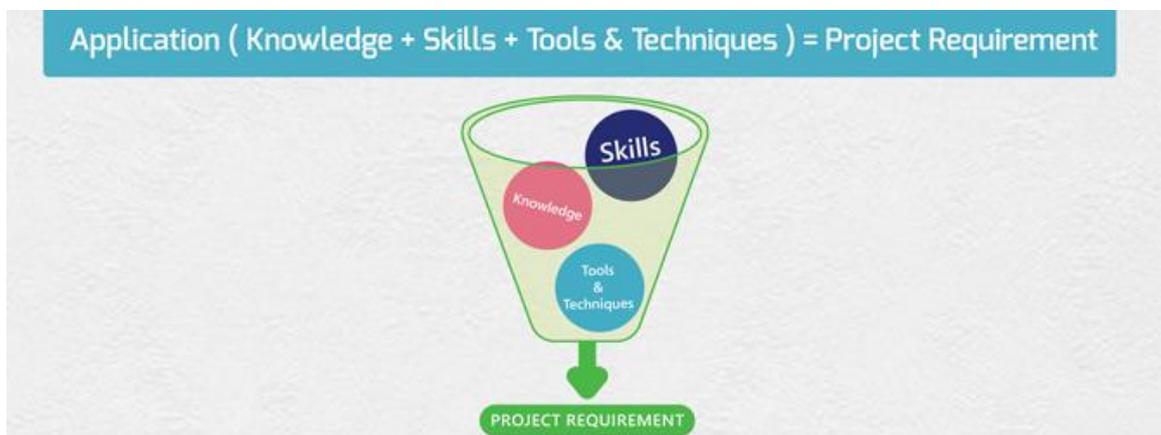


Figure 10: Project management (ELHUSSEIN & AL HASSAN M.AMIN)

#### I.7.2. Project management process groups:

The project management process is generally divided into five groups of processes, each playing a crucial role in the life cycle of a project. These groups are:

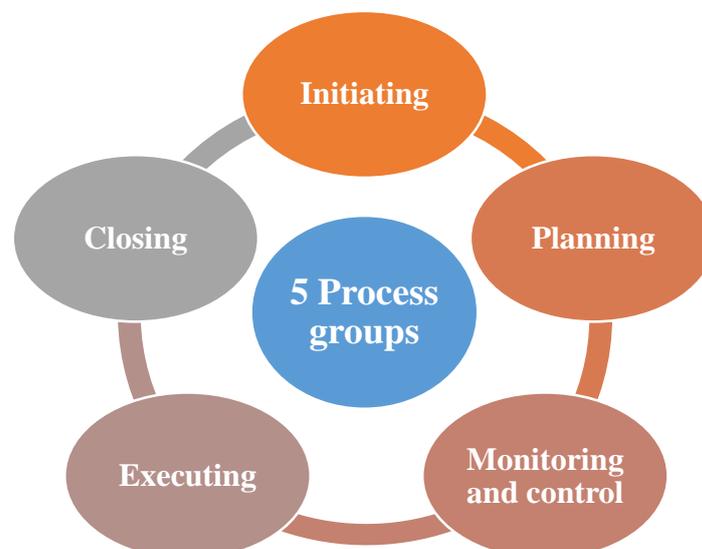


Figure 11 :The five groups of project management processes (student, 2025)

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### **I.7.2.1. Initiating**

This includes the processes by which a new project or a new phase of an existing project is defined and authorised to start (PMBOK 2017).

### **I.7.2.2. Planning**

It includes the processes for establishing the total content of the effort, defining and refining the objectives and specifying the sequence of actions required to achieve the objectives (PMBOK 2017).

### **I.7.2.3. Executing**

Includes the processes for carrying out the work defined in the project management plan to meet the project specifications. This group of processes involves the coordination of people and resources, and the integration and conduct of project activities in accordance with the project management plan (PMBOK 2017).

### **I.7.2.4. Monitoring and control**

Includes the processes for monitoring, reviewing and regulating the progress and performance of the project, identifying areas where changes to the plan are required, and undertaking the corresponding changes. The main benefit of this process group is that project performance is observed and measured periodically and consistently, so that deviations from the project management plan can be identified (PMBOK 2017).

### **I.7.2.5. Closing**

Includes the processes for finalising all activities for all project management process groups, in order to formally close the project, phases or contractual obligations. Once completed, this process group verifies that the defined processes have been completed for all process groups in order to close the project or a project phase, as appropriate, and formally establish the end of the project or phase (PMBOK 2017).

## **I.8. Project deadline management**

### **I.8.1. Defenition of Project deadline management**

Project deadline management includes the processes for planning the various project activities and managing their timely completion (PMBOK 2017). According to Afitep (2010), deadline management is the set of activities that make it possible, throughout the duration of a project, to anticipate, optimise and even re-plan tasks and resources in order to complete it on time.

### **I.8.2. Deadline management process**

The deadline management process encompasses a set of organized stages aimed at ensuring the project is executed within the contractual timeframe. This is achieved through precise schedule planning, identifying and sequencing activities, estimating the required resources, determining activity durations, developing the final schedule, and ultimately controlling adherence to the agreed deadlines during implementation while addressing any potential deviations.

#### **I.8.2.1. Schedule planning**

This process consists of establishing internal policies, procedures and documentation for the planning, development, management, execution and control of the project schedule (PMBOK 2017).

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### **I.8.2.2. Defining activities**

This involves identifying the specific actions to be undertaken to produce the project deliverables (PMBOK 2017).

### **I.8.2.3. Organise the activities in sequence**

Consists of identifying and documenting the relationships between project activities (PMBOK 2017).

### **I.8.2.4. Estimate the resources required for the activities**

This involves defining the profile of the people and estimating the number, type and quantity of materials, equipment or supplies needed to carry out each activity (PMBOK 2017).

### **I.8.2.5. Estimating the duration of activities**

This involves estimating the number of work periods required to complete each activity with the estimated resources (PMBOK 2017).

### **I.8.2.6. Develop the schedule**

This involves developing the project 's schedule model based on an analysis of activity sequences, durations, resource requirements and schedule constraints (PMBOK 2017).

### **I.8.2.7. Controlling the schedule**

This involves monitoring the status of the project in order to update progress and manage changes affecting the schedule baseline (PMBOK 2017).

## **I.8.3. Time control and monitoring**

Project time management generally consists of two main functions: the planning function, which includes project scheduling, and the project control function, which focuses on project monitoring (Chin and Abdul Hamid 2015; Khamooshi and Abdi 2017; Pellerin and Perrier 2019).

### **I.8.3.1. Planning and scheduling**

Planning and scheduling are among the most critical tasks in project management and control (Paz et al. 2018; Pellerin and Perrier 2019), because they determine the project objectives and the activities needed to achieve those objectives, and they provide the guidelines and direction for managing the project schedule throughout the project lifecycle (Olawale and Sun 2015; PMBOK 2017).

#### **I.8.3.1.1. Planning**

According to the PMBOK Guide (2017), planning is the process of establishing internal policies, procedures and documentation for the planning, development, management, execution and control of the project schedule.

According to Pierce (2013), planning can be defined as deciding what tasks need to be done to achieve the project objectives, this means setting realistic timetables and budgets, coordinating resources to get the job done, and above all making sure that everyone knows the plan of action. For Bjarnason (2017), planning is the establishment of project activities and events, their logical relationships and interdependencies, and the sequences in which they are to be carried out.

#### **I.8.3.1.2. Types of Planning :**

Project managers use four main types of planning:

**I.8.3.1.2.1. Strategic Planning** This type of planning is internal to the organization, originating from the thoughts and vision of senior management and key stakeholders. It defines the **mission** of

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the organization and outlines long-term objectives, typically spanning three, five, or even ten years. (ELHUSSEIN & AL HASSAN M.AMIN)

**I.8.3.1.2.2. Tactical Planning:** Tactical planning supports strategic planning by translating high-level strategies into **specific, structured plans**. It is executed by lower-level departments and operational teams, ensuring that each unit contributes to achieving the broader strategic goals. (ELHUSSEIN & AL HASSAN M.AMIN)

**I.8.3.1.2.3. Operational Planning:** This type of planning is detailed and action-oriented, primarily used by project managers. It focuses on specific **processes, workflows, and routine tasks** required for daily operations. The goal is to clearly define responsibilities and outline all necessary steps in great detail.

Contingency Planning

**I.8.3.1.2.4. Contingency planning:** is designed to help organizations **proactively respond** to potential future events or crises. It serves as a backup plan to mitigate risks, ensuring that the organization remains adaptable and can maintain workflow continuity if unexpected challenges arise.

### I.8.3.2. Scheduling

Scheduling is an important part of the planning process; it involves the networking of sequences and durations of activities, as well as the trade-offs and control of resources that have been temporarily fixed in the early stages of the planning process (Pellerin and Perrier 2019).

According to the Project Management Institute (PMI 2013), scheduling is the process of analyzing the sequences of activities, the durations of activities, resource requirements, and activity constraints to create the project schedule (Planning) (Bjarnason 2017).

The objective of scheduling is to provide a roadmap for the delivery of the project within the timeframe defined by the project team (PMI 2013). According to Mubarak (2010) (cited in Bjarnason 2017), three pillars are necessary for a good scheduling system:

- **The Human Factor:** A competent planner or planning team that understands the concepts, definitions, and applications of project scheduling.
- **Technology:** A good scheduling information system (software and hardware) along with competent IT support.
- **Management:** A dynamic, responsive, and supportive leadership that believes in the use of scheduling as part of the management effort.

### I.8.3.3. Comparison Between Planning and Scheduling (ELHUSSEIN & AL HASSAN M.AMIN)

Planning and scheduling are interrelated processes, but they differ in their definition, components, and purpose. The table below simplifies their relationship and highlights the key differences:

**Tableau 7:** Comparison Between Planning and Scheduling (ELHUSSEIN & AL HASSAN M.AMIN)

Comparison Aspect	Planning	Scheduling
Definition	The process of selecting the best strategy or approach to achieve the organization's strategic objectives and	The process of estimating time, sequencing activities, and allocating necessary resources to ensure the project is delivered on schedule.

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	successfully deliver the project according to client requirements.	
<b>Key Components</b>	<ol style="list-style-type: none"> <li>1. Defining Requirements, Scope, Purpose, and Objectives – Identifying deliverables (What &amp; Why).</li> <li>2. Defining the Methodologies (How).</li> <li>3. Identifying Risks and Response Strategies.</li> <li>4. Defining Finances / Cost Plan (How much?).</li> <li>5. Identifying Stakeholders and Organizing the Team (Who?).</li> <li>6. Designing the Project Schedule.</li> </ol>	<ol style="list-style-type: none"> <li>1. Work Breakdown Structure (WBS).</li> <li>2. Identifying Required Resources (RBS).</li> <li>3. Defining Activities List &amp; Milestones.</li> <li>4. Establishing Logical Relationships Between Tasks.</li> <li>5. Using Scheduling Tools &amp; Calendars.</li> <li>6. Determining Critical Path.</li> <li>7. Setting Start &amp; Finish Dates and linking activities with constraints and deadlines.</li> </ol>

### I.8.3.4. Control

Control is an implicit part of project management, closely related to planning, and their functions cannot be separated. In fact, without objectives and plans, control is not possible, as performance measures must be made against established criteria (Bjarnason 2017). According to the PMI (2013), control involves comparing actual and planned performance, analyzing variances, assessing trends for process improvement, considering possible alternatives, and taking appropriate corrective actions when necessary.

For APM (2010), project control is the application of processes to measure the project's performance against the project plan, in order to identify and correct variances to ensure that project objectives are met (Olawale and Sun 2015). This typically occurs in three steps: defining performance standards, comparing actual performance with these standards, and taking necessary corrective actions (Olawale and Sun 2015).

Time control or project schedule performance involves making measurements as the project progresses and comparing these measurements with the planned values (the baseline schedule) to determine the status of the project timeline (schedule), identify whether changes or variances have occurred or will occur, and manage these changes.

#### I.8.3.4.1. Planning

Planning involves determining the project's objectives and the activities necessary to achieve those objectives, sequencing these activities, and identifying the resources required for their execution. Finally, it includes the visual representation (graphical) of these activities in the form of a baseline schedule. (projectmanagement, 2025)

#### I.8.3.4.2. Monitoring

Monitoring is a continuous process of controlling the progress of the project. It ensures that the activities defined in the project management plan have been carried out as intended, in accordance with the predefined measurements of cost and time. It also helps to identify variances from the defined plans and establishes the necessary reports for subsequent action.

#### I.8.3.4.3. Analysis

After collecting data and information regarding the progress and status of the project, an analysis of this data must be performed to determine whether the project is performing as expected. If it is not, the analysis should evaluate and calculate the variances and their causes, in order to take the necessary actions.

### I.8.3.4.4. Action

Action is the final step in the time control process. It involves taking necessary preventive and corrective actions for any identified variances and potential changes.

### I.9.1. Time control during the project life cycle: tools and techniques

The time required to complete a construction project is generally of major importance to all stakeholders. As a result, several methods and techniques have been employed to effectively control and manage the project's timing. These methods and techniques are influenced by the various stages of the project life cycle (Attalla 1996) and are classified according to their nature into traditional and modern methods.

#### I.9.1.1. Traditional Methods

The early (traditional) methods are primarily used to visualize and optimize project durations, focusing on the aspects of project planning and management (Pellerin and Perrier 2019).

They are widely used in construction projects, among these methods:

- Gantt Chart
- PERT Network (Program Evaluation and Review Technique)
- Critical Path Method (CPM)
- Critical Chain Project Management (CCPM)
- Line of Balance (LOB)
- S-Curves
- Earned Value Management (EVM)
- Earned Schedule Management (ESM)
- Earned Duration Management (EDM)
- Analogy Estimating
- Bottom-Up Estimating
- Three-Point Estimation
- Precedence Diagram Method (PDM)
- Milestone Charts
- Matrix Method

#### I.9.1.2. Modern Methods

With the incredible advancement of information technologies, there has been a gradual introduction of more integrated methods and techniques over the past few decades. These methods include Agile and Lean practices, as well as other modern practices, which offer the advantage of managing uncertainties and potential risks while assisting project managers throughout the entire project life cycle.

Among these methods:

- Agile Methods
- Lean Methods
- 4D Visualization
- Monte Carlo Simulation Model
- Forecasting and Modeling
- Combination of PERT and Fuzzy Logic

### I.9.2. Techniques and Tools for Control According to Their Phases of Use

The techniques and tools used in time control have been categorized based on their type, usage, and phase of application into visualization, estimation, and planning tools:

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**Table 8 :**Techniques and Tools for Control According to Their Phases of Use

Method	Type	Usage	Phase
GANTT	Traditional	Visualization	Planning
PERT	Traditional	Visualization	Planning
Critical Path	Traditional	Visualization	Planning
Critical Chain	Traditional	Visualization	Planning
Line of Balance (LOB)	Traditional	Visualization	Planning
Analogous Estimating	Traditional	Estimation	Planning
Parametric Estimation	Traditional	Estimation	Planning
Bottom-Up Estimation	Traditional	Estimation	Planning
Three-Point Estimation	Traditional	Estimation	Planning
Milestone Chart	Traditional	Visualization	Planning
Precedence Diagram Method	Traditional	Planning	Planning
Matrix Method	Traditional	Planning	Planning
Burndown Chart	Modern	Visualization	Control and Monitoring
Rolling Wave Planning	Modern	Planning	Planning
Iterative Planning	Modern	Planning	Planning
IPD	Modern	Planning	Planning, Execution, Control
Kanban	Modern	Planning	Planning
BIM	Modern	Visualization	Initiation, Planning, Execution, and Control
TIA	Modern	Planning	Planning and Control
Takt Time	Modern	Planning	Planning
Push System	Modern	Planning	Planning
Pull System	Modern	Planning	Planning
LPS	Modern	Planning	Planning
4D Visualization	Modern	Visualization + Planning	Planning, Execution, and Control
Simulation	Modern	Planning	Planning and Control
Fuzzy Logic	Modern	Estimation	Planning
PERT + Fuzzy Logic	Modern	Estimation	Planning

### I.9.3. Definition of methods :

Methods are tools and techniques adopted in project management, aiming to organize, monitor, and control the various operations related to project implementation. These methods vary according to the project's nature, size, and complexity.

**I.9.3.1. The Gantt chart:** commonly used in project management, is one of the most effective tools for visually representing the progress of various activities (tasks) that make up a project. The left column of the chart lists all the tasks to be completed, while the header row represents the time units most suitable for the project (days, weeks, months, etc.). Each task is represented by a horizontal bar, whose position and length indicate the start date, duration, and end date. This chart allows for an instant overview of:

- The different tasks to be considered
- The start and end dates of each task
- The expected duration of each task
- The possible overlap of tasks and the duration of this overlap

## Chapter I: Thematic and managerial study

- The start and end dates of the project as a whole

In summary, a Gantt chart lists all the tasks that need to be completed to successfully carry out the project and indicates the dates when these tasks should be performed (the schedule). (gant.com, n.d.)

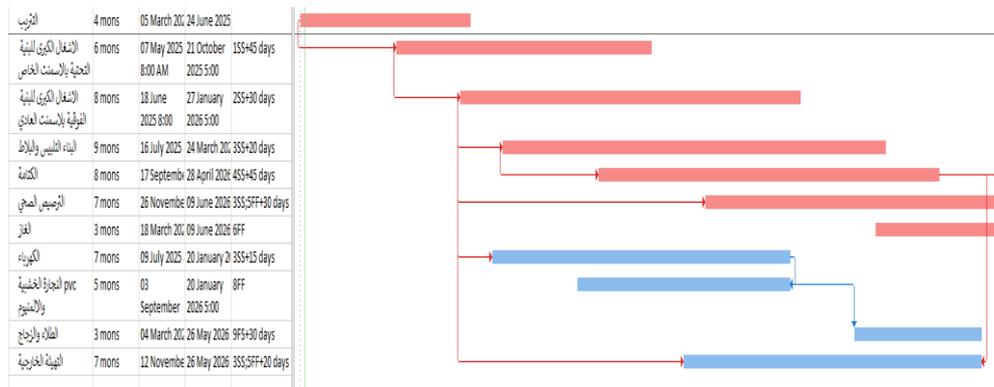


Figure 12 :the structure of gantt diagram (student, 2025)

**I.9.3.2. PERT:** It is a program evaluation and review technique It is a chart or graph used as a project management tool to visually represent the project schedule. It is a network diagram that defines the entire project schedule, including key tasks and milestones . (miro, 2025)

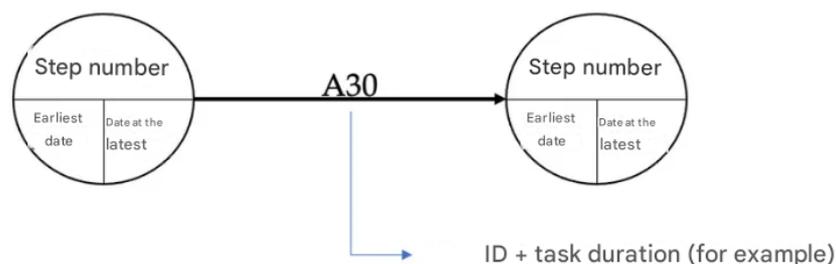


Figure 13:the structure of a PERT diagram. (blog gestion de projet, 2025)

### I.9.3.3. What is the Critical Path Method (CPM)?

The Critical Path Method (CPM) is a technique used by project managers to create a project schedule and estimate the total duration of a project. It is included in the PMBOK project management framework. It is highly useful for breaking down a complex project into distinct tasks and understanding the level of flexibility within the project. (asana, 2025)

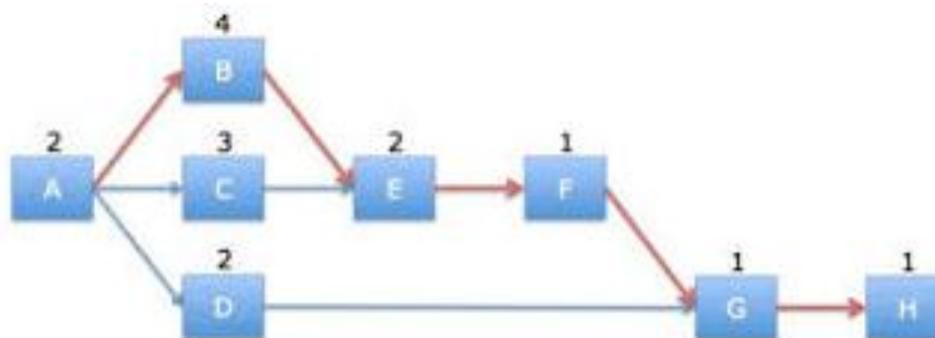


Figure 14: Critical Path Method (teamly, 2025.)

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**I.9.3.4. Critical Chain:** As a project management methodology, Critical Chain Project Management (CCPM) helps you manage essential resources and prioritize project dependencies to implement it as efficiently as possible. Does your team want to keep an eye on resource usage? Opt for the Critical Chain Method! This strategy should enable you to effectively monitor and track progress. (asana, 2025)



Figure 15 : Critical Chain (6IGMAS, 2025.)

### I.9.3.4.1. Critical Chain Method vs. Critical Path Method

Although similar, these two project management approaches differ on a key point.

**The Critical Path Method (CPM)** focuses exclusively on the sequence of simultaneous tasks required to complete a project. While other tasks may need to be completed, CPM highlights only those that are absolutely essential to the project's completion. This approach helps teams determine the optimal process for developing a relevant project schedule. Any tasks excluded from the critical path are considered lower priority. The project's health is assessed by monitoring whether critical tasks are completed on time. (asana, 2025)

**The Critical Chain Project Management (CCPM) Method**, while also considering task dependencies, does not overlook the resources required to complete the project. Resources are subject to constraints that may be affected by various uncertainties or risks. For this reason, CCPM incorporates buffer resources (additional resources to account for potential uncertainties) into the project schedule. Unlike CPM, which primarily focuses on task completion deadlines, CCPM evaluates a project's success based on how quickly buffer resources are consumed. If your team has not used any allocated buffer resources, that's a great sign—your project is progressing smoothly (asana, 2025)

**I.9.3.5. Line of Balance:** (LOB) is a project management technique that visually represents the repetitive and sequential nature of work within a project by plotting it as a single line on a graph. This method helps in scheduling and tracking tasks that follow a consistent pattern, facilitating efficient resource allocation and project planning. (AcqNotes, 2025)

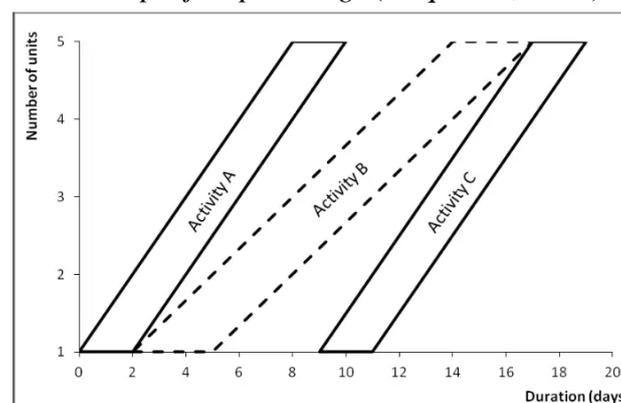


Figure 16: Line of Balance (AcqNotes, 2025.)

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**I.9.3.6. Analogous estimation:** It is an estimation method based on information derived from previous projects with similar tasks or results. The more historical information an organization has, the easier it is to find comparable results. Historical data must be adjusted to fit the current result so that it reflects differences in complexity, team members, etc. It provides a rough order of magnitude (ROM) estimate. (projectmanagement.com, s.d.)

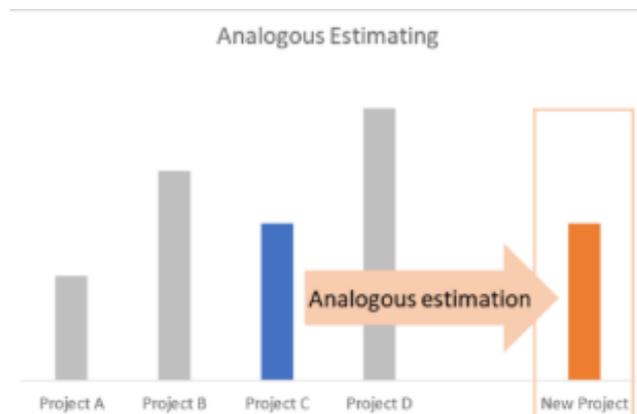


Figure 17 :Analogous estimation (projectmanagement.com, 2025.)

**I.9.3.7. Parametric estimating** It is a precise statistical technique for calculating the time, cost, and resources needed for a project to succeed. Parametric estimates combine historical and statistical data and use the relationship between variables to provide accurate estimates (What is parametric estimating?, s.d.)

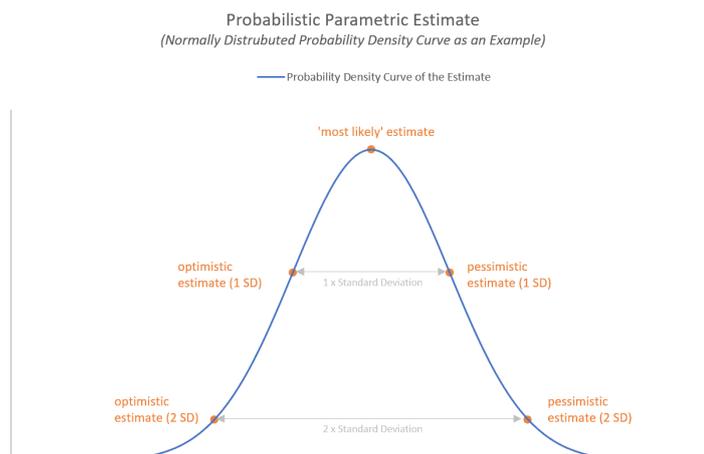


Figure 18: Parametric estimating (Parametric Estimating | Definition, Examples, Uses, 2025.)

**I.9.3.8. Bottom-up estimating:** is a method where project costs and timelines are calculated starting from the smallest, most detailed tasks. Each component is estimated individually and aggregated to form the total project effort (wrike, 2025)

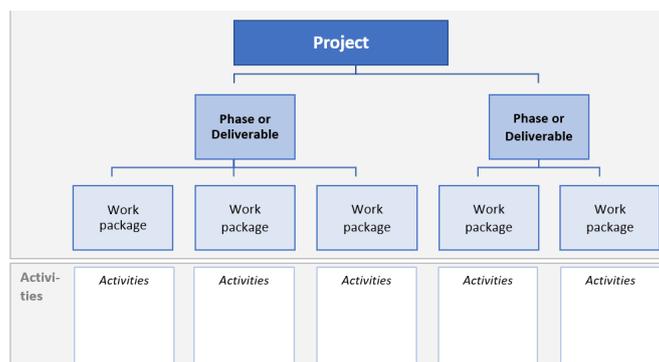
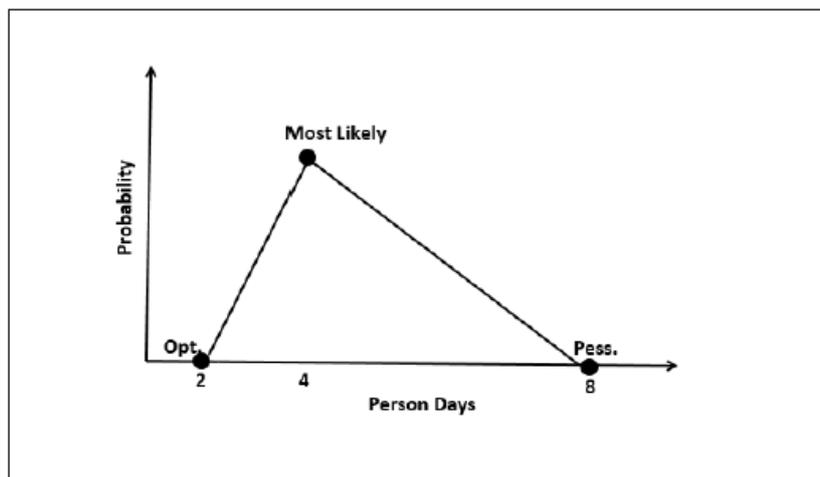


Figure 19: bottom-up estimating (wrike, 2025)

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**I.9.3.9. Three-Point Estimation** : is a technique used by professionals in estimating. This technique use the three figures that are produced initially for every distribution that is required, based on prior experience or best-guesses: The first is a most likely (M)/best guess (BG) which is the average amount of work the task might take if the team member performed it 100 times. The second estimate is the pessimistic (P) estimate which is the amount of work the task might take if the negative factors they identified do occur. The third estimate is the optimistic (O) estimate which is the amount of work the task might take if the positive risks they identified do occur. (Project-Management.info, 2025)



**Figure 20:**Three-Point Estimation (tutorialspoint, 2025.)

**Tableau 9:**comparison between Analogous Estimating, Parametric Estimating, Bottom-Up Estimating, and Three-Point Estimation (stuedent, 2025)

Method	Description	Accuracy	Data Dependency	When to Use?
<b>Analogous Estimating</b>	Uses historical data from previous similar projects, with slight adjustments to fit the current project.	Low to Medium	Relies on historical project data	When information is limited or in the early stages of a project.
<b>Parametric Estimating</b>	Uses mathematical and statistical relationships between variables (e.g., unit cost $\times$ number of units) to calculate time or cost with greater accuracy.	Medium to High	Relies on historical data and mathematical models	When sufficient data is available to create accurate mathematical relationships.
<b>Bottom-Up Estimating</b>	Estimates each subtask individually, then aggregates them to get the total project estimate.	Very High	Relies on a detailed analysis of every project component	When high accuracy is required, and full project details are available.
<b>Three-Point Estimation</b>	Uses three scenarios (Optimistic, Pessimistic, and Most Likely) to calculate an average estimate, reducing uncertainty impact.	Medium to High	Relies on expert judgment and previous experience	When there is uncertainty in estimates, and risk reduction is needed.

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**I.9.3.10. Milestone chart:** visually represents critical points along a timeline using distinct markers or symbols on a horizontal line that illustrates the project's progression. Each milestone sits at a specific interval, signifying when essential events, accomplishments, or deliverables should occur. (atlassian, 2025)

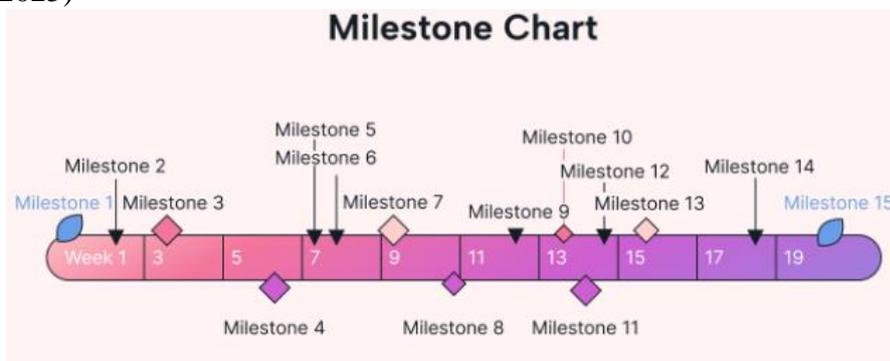


Figure 21: milestone chart (motion, 2025.)

**I.9.3.11. Precedence Diagram Method :** Precedence Diagram Method (PDM) is a visual representation technique that depicts the activities involved in a project. It is a method of constructing a project schedule network diagram that uses boxes/nodes to represent activities and connects them with arrows that show the dependencies. It's also sometimes called the activity-on-node (AON) method. (acqnotes, 2025)

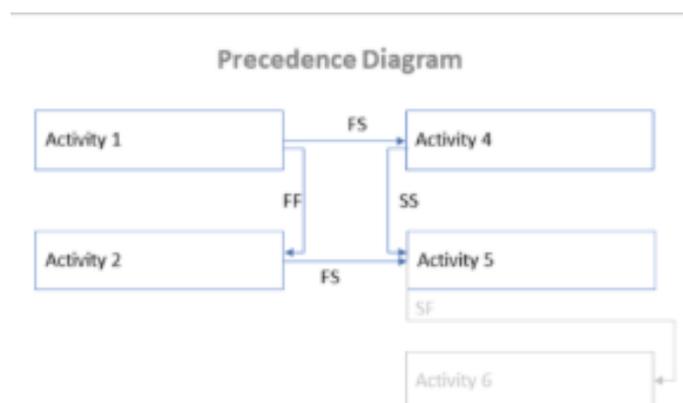


Figure 22: Precedence Diagram Method (projectmanagment.com, 2025)

**I.9.3.12. Burndown Chart:** is a graph that represents the work left to do versus the time it takes to complete it (asana, 2025)

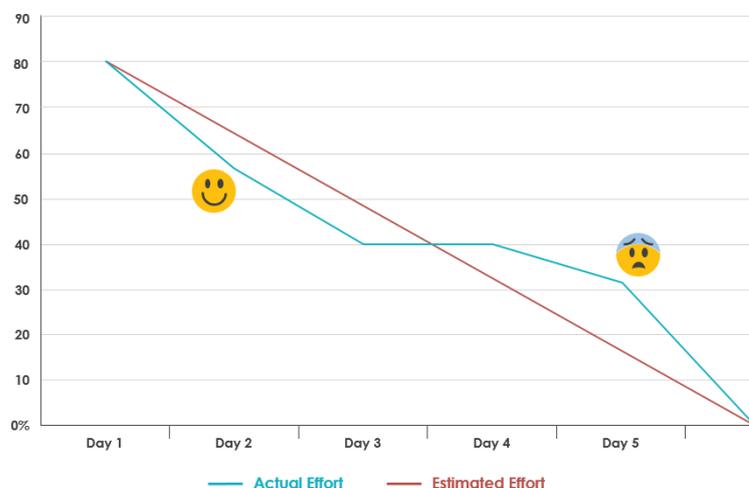


Figure 23: Burndown Chart (visual paradigm, 2025)

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**I.9.3.13. Rolling Wave Planning:** is a planning method based on successive waves. Unlike traditional planning methods that attempt to define the entire project from the outset, RWP focuses on detailed short-term planning and broad long-term planning. Thus, short-term activities are planned with precision, while long-term activities are defined more generally and refined as the project progresses. (offolio, 2025)

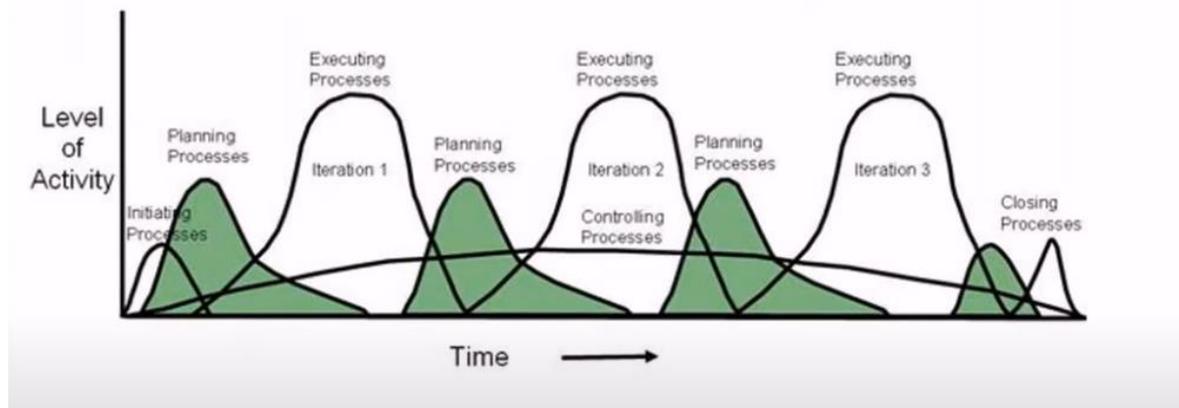


Figure 24: Rolling Wave Planning (offolio, 2025)

**I.9.3.14. Iterative Planning :** Iterative Planning is the process to adapt as the project unfolds by changing the plans. Plans are changed based on feedback from the monitoring process, changes in the project assumptions, risks and changes in scope, budget or schedule. (projectmanagement, 2025)

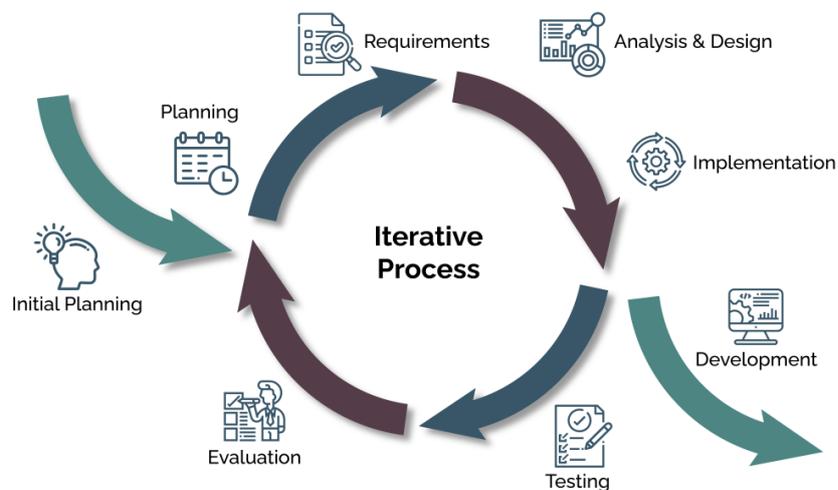


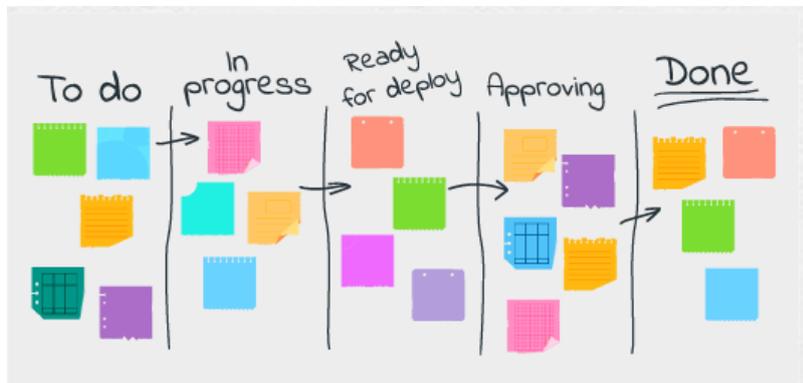
Figure 25: Iterative Planning (radiant, 2025)

**I.9.3.15. kanban :** is much more than just a visual management method. It provides a flexible framework for tracking task progress, identifying bottlenecks, and promoting continuous improvement. Marketing teams use it to plan campaigns, HR departments to track recruitment processes, and event planning teams to coordinate each phase of a project. Regardless of the team, Kanban helps manage complex projects without disrupting existing workflows, introducing changes gradually and adaptively.

**Kanban** is a method, while **ClickUp** is a tool that integrates the **Kanban** method alongside other options for managing and organizing workflows. It allows teams to plan, organize, and track tasks flexibly, with the ability to progressively adjust and structure workflows without disrupting ongoing

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operations. Additionally, it offers multiple project management views, including **Kanban boards**, **task lists**, **Gantt charts**, and **calendars**.



**Figure 26:**Kanban (ELHUSSEIN & AL HASSAN M.AMIN)

**I.9.3.16. BIM:** *BIM, or "Building Information Modeling," is a new method for managing construction projects, based on a 3D digital model that contains reliable and structured data. (siniat, s.d.)*



**Figure 27:**BIM (siniat, 2025)

## Conclusion

At the conclusion of this chapter, a detailed theoretical framework was presented, forming the essential foundation for understanding the subject of this study, which focuses on deadline planning and operational monitoring in the construction of educational institutions. The chapter highlighted the importance of the education sector as a vital pillar in building societies and preparing individuals capable of facing future challenges. In this context, the organizational structures supervising the sector were introduced, starting with the Ministry of National Education and the local Directorates of Education, with an explanation of their respective roles in project planning, execution, and oversight.

The chapter also addressed the classification of educational institutions according to the different stages of education, shedding light on the adopted planning standards regarding space allocation and capacity, in accordance with national and regulatory frameworks. It detailed the methodology for

## **Chapter I: Thematic and managerial study**

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calculating educational needs across various levels and explained how to estimate the areas and number of facilities required, based on the number of enrolled students in each region.

Furthermore, this chapter is significant for its presentation of the core concepts of project management and the stages of the project life cycle, with a particular emphasis on the key constraints that influence project success, notably time, cost, and quality. The theoretical framework for project deadline management was also discussed, detailing the fundamental processes from scheduling to monitoring and controlling deadlines. To enrich this section, various traditional and modern techniques used for scheduling and project control were reviewed, offering a comparative analysis of available estimation and scheduling tools based on their relevance to different project types.

This chapter has made it clear that the construction of educational institutions, particularly high schools, is not a simple technical operation but a comprehensive and integrated project requiring precise organization, effective scheduling, and rigorous coordination of resources and stakeholders. This theoretical foundation serves as a critical reference for the upcoming chapters, which will move on to a practical case study of a high school construction project. The next sections will analyze its planning processes, scheduling mechanisms, and operational monitoring systems to assess project time performance and propose strategies for enhancement.

## Chapter II: Analytical study

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### Introduction:

A school building is not merely a structure of walls and a roof; it plays a critical role as the environment where educational elements interact. Planning and designing schools are essential in providing an effective and suitable learning environment for students and teachers. This Part of research aims to analyze the architectural plans for a 1000/300 capacity high school project in the municipality of Biskra (western region, Amouri city), with a focus on urban and architectural analysis.

This study will review the architectural plans, including the site plan, block plan, and layouts for the ground and first floors, providing a comprehensive analysis of the floor plan. It will ensure that the layout meets the requirements of classrooms, administrative areas, and other essential facilities, emphasizing efficiency in planning, design, and sustainability.

### II.1. case study presentation

#### II.1.1. Technical Data Sheet:

**Project Title:** Construction and Equipment of a high School (1000/300 capacity) in Biskra Municipality (Western Area, Amouri District)

**Project Owner:** Directorate of Public Equipment for Biskra Province

**Design Office:** Architectural and Urban Planning Consortium - Zahzah Abdelghani & Berhail Redouane

**Contractor:** Public Works and Construction Company - Berhail Mohamed

**Project description:** The project involves the construction and equipping of a high school with a capacity of 1000 students and a semi-residential facility for 300 meals in the Amouri city of Biskra's western area.

**Scope of Work:** Includes the administrative wing, educational wing, auditorium, semi-residential facility for 300 meals, and VRD (Roads and Miscellaneous Networks).

**Project Start Date:** April 13, 2023

**Project Duration :** 14 months

**Total Project Cost:** 484 608 301 .10 DZ

**Project Code:** NE.5.622.1.262.107.22.02

**Location:** Amouri District, Western Biskra Province

**Land Area:** 6109.06 m<sup>2</sup>

**Built-Up Area:** 3184.33 m<sup>2</sup>

**Project Specifications:** The facility is a two-story structure (ground floor + first floor), utilizing traditional construction systems with reinforced concrete columns and beams.



## Chapter II: Analytical study

### II.1.2. Urban reading

As part of understanding the spatial and functional integration of the project within its urban environment, this section focuses on analyzing the project's site context and its interaction with the surrounding urban fabric. It examines various spatial, functional, and morphological aspects that influence the positioning and design of the educational facility.

#### II.1.2.1. Floor Analysis

To thoroughly understand the project's physical context and its integration within the surrounding environment, this section focuses on analyzing the location, characteristics, and constraints of the project site. It assesses factors such as geographical position, site shape, area, environmental context, and the strategic advantages and challenges presented by the site.

##### II.1.2.1.1. Location of Biskra Province: (موقع ولاية بسكرة، 2024)

Biskra Province is located in southeastern Algeria, nestled beneath the Aurès Mountains, which form a natural boundary with the northern regions. Covering an area of approximately 50,980.21 square kilometers, Biskra includes 33 municipalities and 12 districts. It is bordered by the following provinces:

To the North Batna

To the Northwest M'Sila

To the Northeast Khenchela

To the Southwest Ouled djellal

To the Southeast El Oued

To the South Ouargla



Figure 28: Biskra Province

##### II.1.2.1.2. Location of Biskra Municipality

(موقع ولاية بسكرة، 2024)

Biskra Municipality is located in the northern part of Biskra Province in southeastern Algeria. It is bordered by:

To the North: Lotayeh and Chetma municipalities

To the South: Sidi Okba municipality

To the East: El Hadjeb municipality

To the West: Oued Arak municipality

The area of Biskra Municipality is approximately 39,225 hectares (392.25 square kilometers).



Figure 29: Biskra Municipality

## Chapter II: Analytical study

### II.1.2.1.3. Location of the Project Site:

The project is located in the southeastern zone of the western area of Biskra Municipality, adjacent to the side road that connects the urban neighborhood to the provincial road cw07.

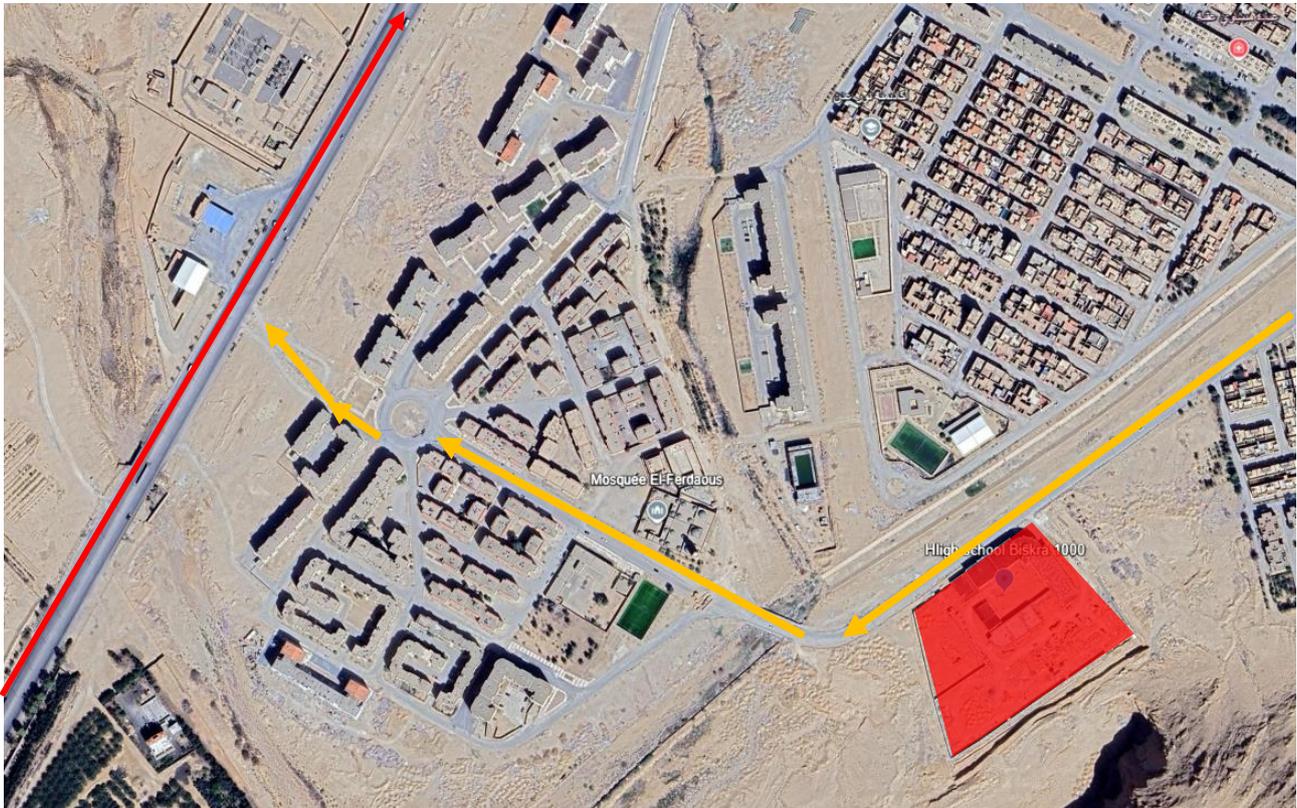
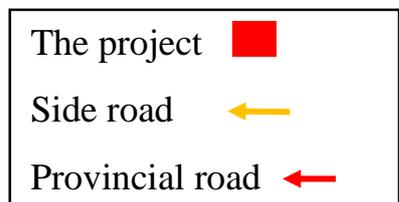


Figure 30: Location of the Project Site (google earth, 2025)



### II.1.2.1.4. Shape and Area of the Landm:

The shape of the land is geometrically regular, covering an area of 22686.96m<sup>2</sup>



Figure 31: Shape and Area of the Landm (google earth, 2025)

Chapter II: Analytical study

II.1.2.1.5. Surrounding Environment:

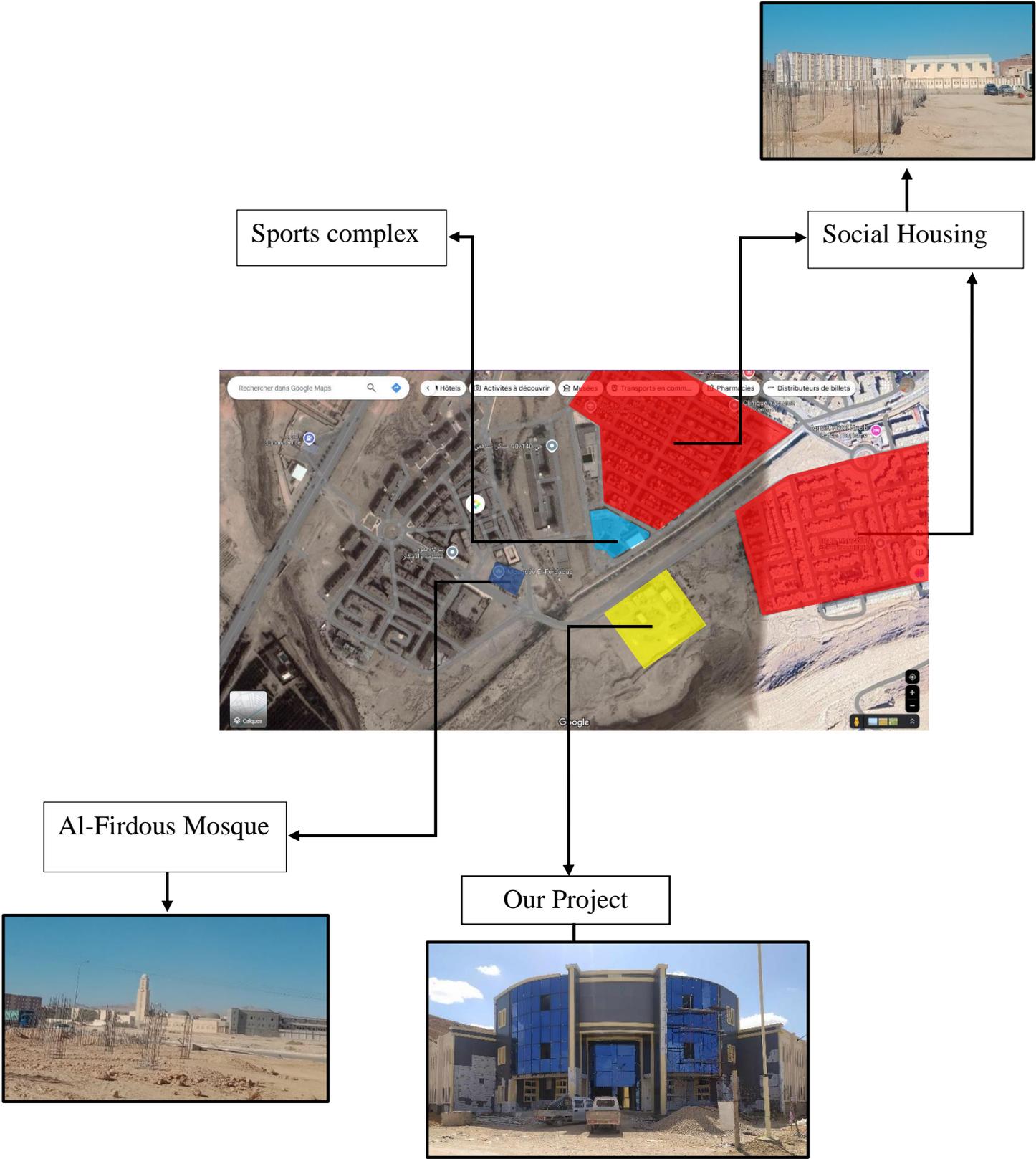


Figure 32: A diagram showing the project's surrounding environment (student, 2025)

## **Chapter II: Analytical study**

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### **II.1.2.1.8. Strengths and Weaknesses Summary:**

#### **II.1.2.1.8.1. Strengths:**

1. **Strategic Location:** The project is situated near the CW07 provincial road, providing easy access to the area and connecting it to surrounding regions.
2. **Surrounding Environment:** The proximity of the project to key community facilities such as Al-Firdous Mosque, social housing, and a youth center enhances its social character and offers a lively and service-rich environment.
3. **Adequate Land Area:** The land provides ample space for flexible and versatile project planning and design. (student, 2025)

#### **II.1.2.1.8.1. Weaknesses:**

1. **Heat Exposure:** The direct sunlight from the east may cause heat buildup during the day, requiring careful façade design to mitigate heat impact.
3. **Challenges with Surrounding Area:** While the surrounding environment is socially active, the high population density could put pressure on infrastructure and services, requiring careful planning for facilities and utilities. (student, 2025)

## Chapter II: Analytical study

### II.1.3. architectural reading

This section focuses on the architectural interpretation of the project, analyzing the spatial organization and design logic adopted for the educational facility. It examines the composition and interrelation of different functions and how architectural choices reflect both pedagogical requirements and site constraints.

#### II.1.3.1. Functional composition



Figure 33:site plan (zahzah, 2025)

The design of the high school is characterized by its practical and coordinated layout, where the educational sector provides the necessary space for classrooms and laboratories, while keeping the administrative sector close by to ensure easy access for both students and staff. The cafeteria is

## Chapter II: Analytical study

designed in a comfortable and inviting style to meet the needs of dining and recreation, while the restrooms and sanitary facilities ensure comfort and cleanliness. The gymnasium is designated for sports activities and physical exercises, with a play area that promotes vitality and social interaction among students. These facilities are integrated into an interior design that encourages learning and positive interaction within the school community.

### II.1.3.2. Functional Structure

This section explores the functional structure of the educational facility by analyzing how different activities and spaces are distributed within the building, both horizontally and vertically. It focuses on how spatial organization contributes to operational efficiency, safety, and user comfort within the project.

#### II.1.3.2.1. Analysis of Areas:

To understand the practical implementation of the functional concept, this part analyzes the distribution and relationship of various spaces according to the different floor plans. It assesses how functions are distributed within each level, the connections between them, and how movement is organized across floors.

##### II.1.3.2.1.1. According to the Ground Floor Plan:

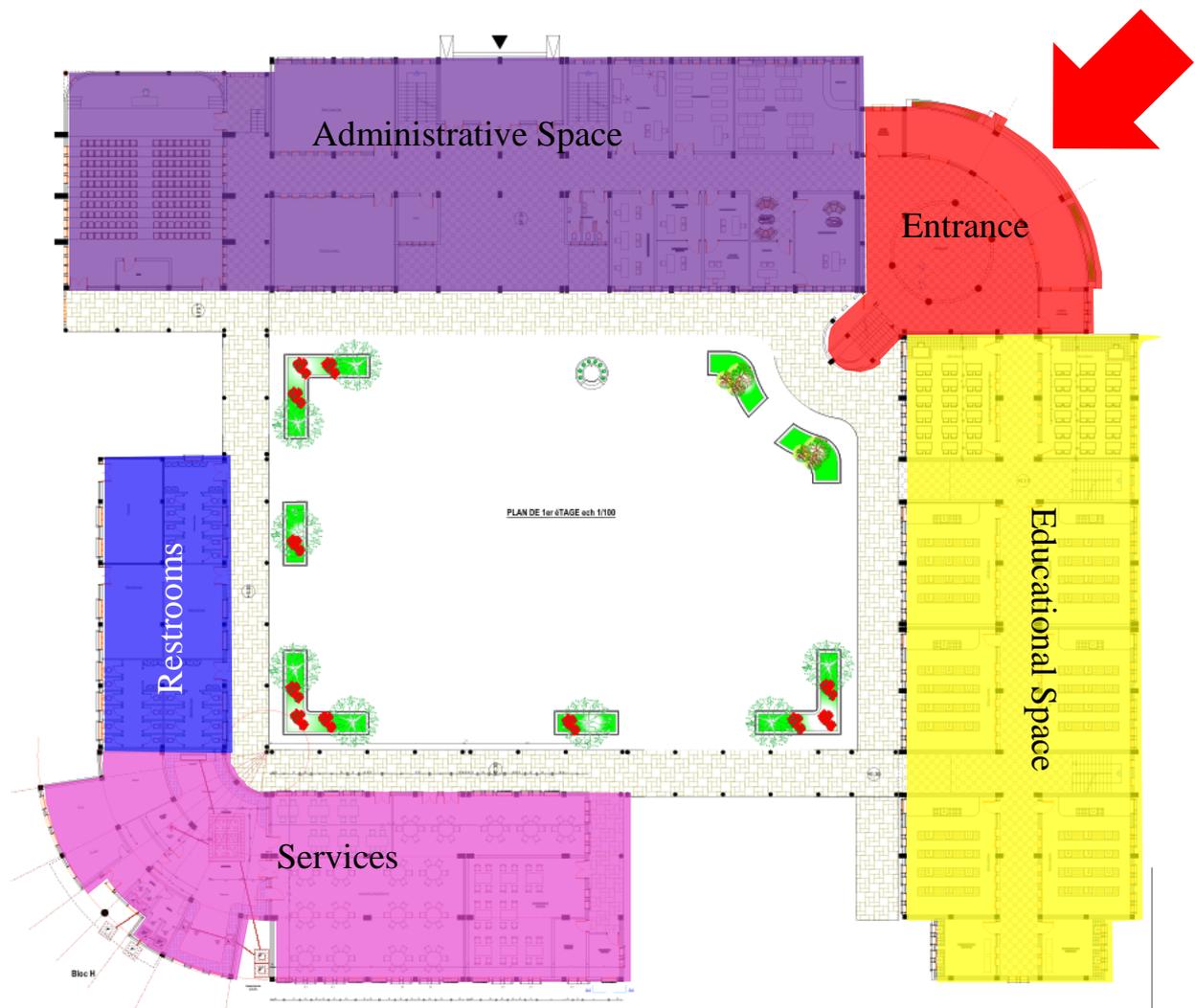
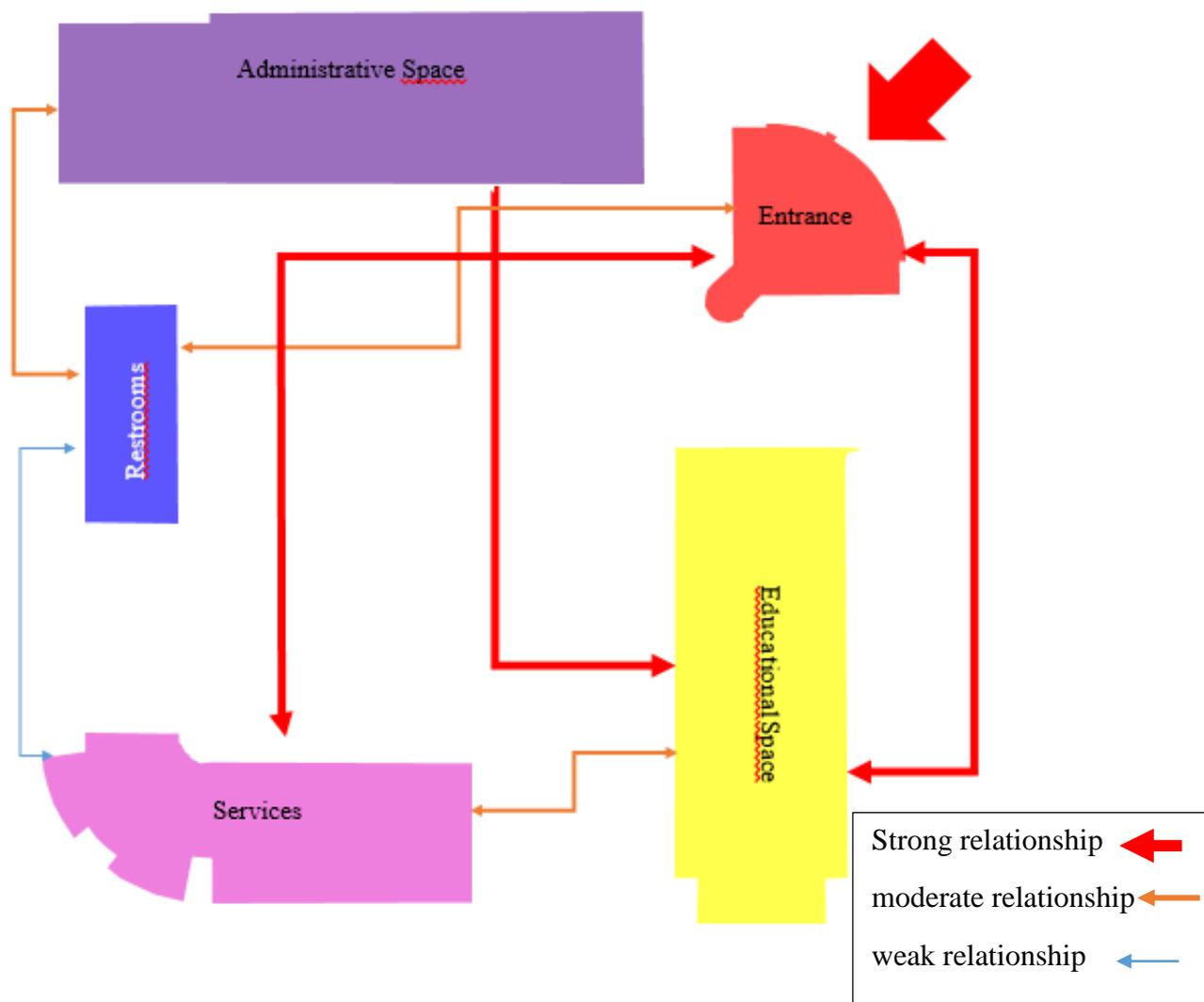


Figure 34: Ground Floor Plan (zahzah, 2025)

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The ground floor plan of the project is based on a traditional yet contemporary architectural concept that relies on a **central courtyard (patio)**. This design strategy allows for the functional and balanced distribution of various spaces around an open central area. The courtyard acts as a recreational and ventilating space while providing natural lighting for the surrounding facilities. It also serves as a circulation hub, facilitating the movement of students and staff throughout the institution. The different wings and services are organized around this central space in a radial layout that ensures clear functional separation and smooth flow. The **administrative wing** is positioned in a location that enables efficient supervision and management of the establishment, housing the director's office, deputy office, administrative secretary, and finance manager. Its proximity to the main entrance allows for easy reception of visitors and monitoring of daily entries and exits. On the other side, the **pedagogical wing** is composed of classrooms arranged to maintain a calm, focused environment while remaining easily accessible from the central courtyard. The **services area**, which includes restrooms and sanitary facilities, is placed in a dedicated zone that ensures convenience without disrupting educational activities, while also providing adequate privacy. This overall spatial arrangement around a central courtyard creates a healthy, interactive, and harmonious educational environment that promotes the physical comfort and social well-being of its users.

### II.1.3.2.1.1.1. spatial relationship

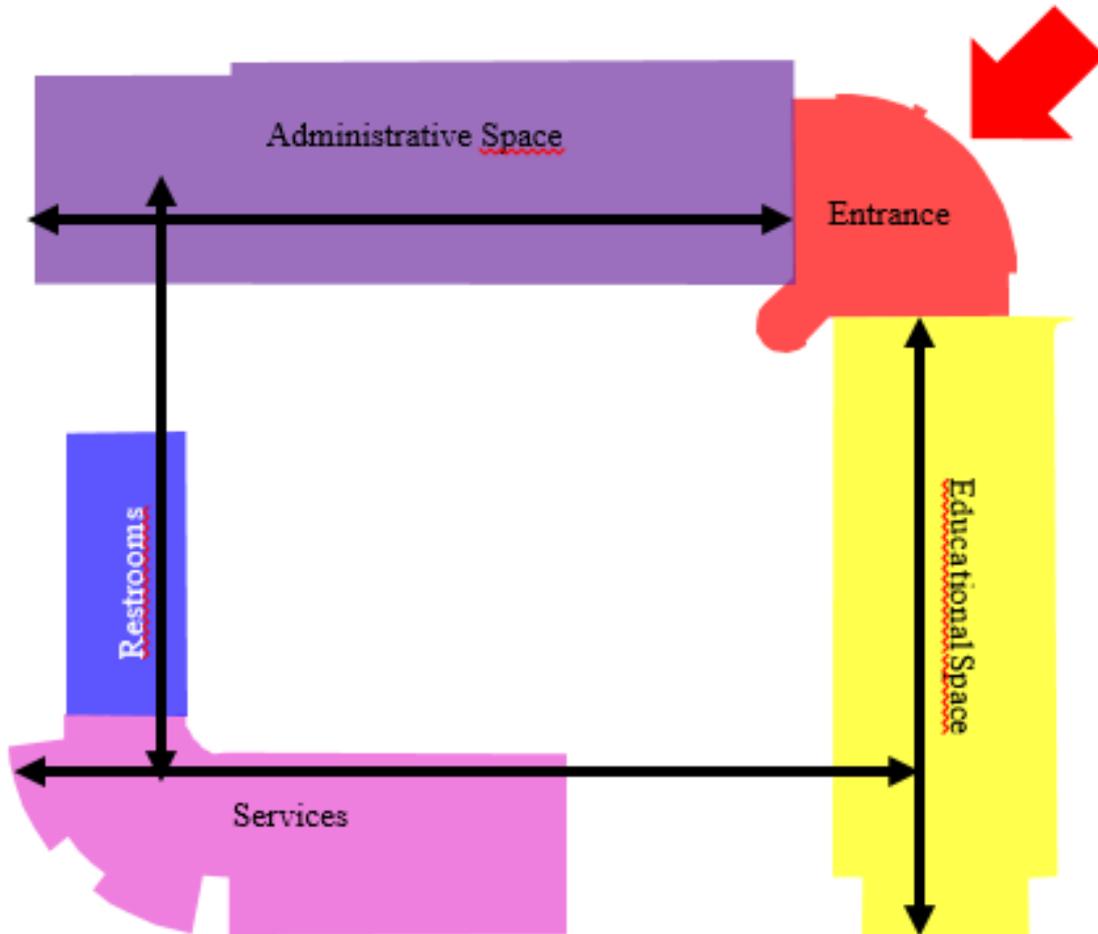


**Figure 35:** Diagram showing spatial relationship in the Ground Floor Plan (student, 2025)

## Chapter II: Analytical study

The conclusion from these relationships indicates that the building design effectively prioritizes easy access from the entrance to both the educational and service sectors, promoting smooth user flow. The moderate relationship between the entrance and the restrooms suggests accessible restroom facilities without complexity. The moderate connection between the educational sector and services shows that access to administrative areas is possible but requires a moderate distance. The weak relationship between restrooms and services suggests the need to improve the integration of these facilities to ensure user comfort and easy accessibility.

### II.1.3.2.1.1.2. Movement:



**Figure 36:** Diagram showing Movement in the Ground Floor Plan (student, 2025)

The linear flow in the design of the high school reflects its smoothness and coherence, offering wide, open corridors that facilitate the movement of students and staff within the building. The design naturally directs movement toward key areas such as classrooms, the cafeteria, and restrooms, making it easy for everyone to access these spaces and promoting interaction and communication between individuals.

### II.1.3.2.1.2. According to the first floor plan:



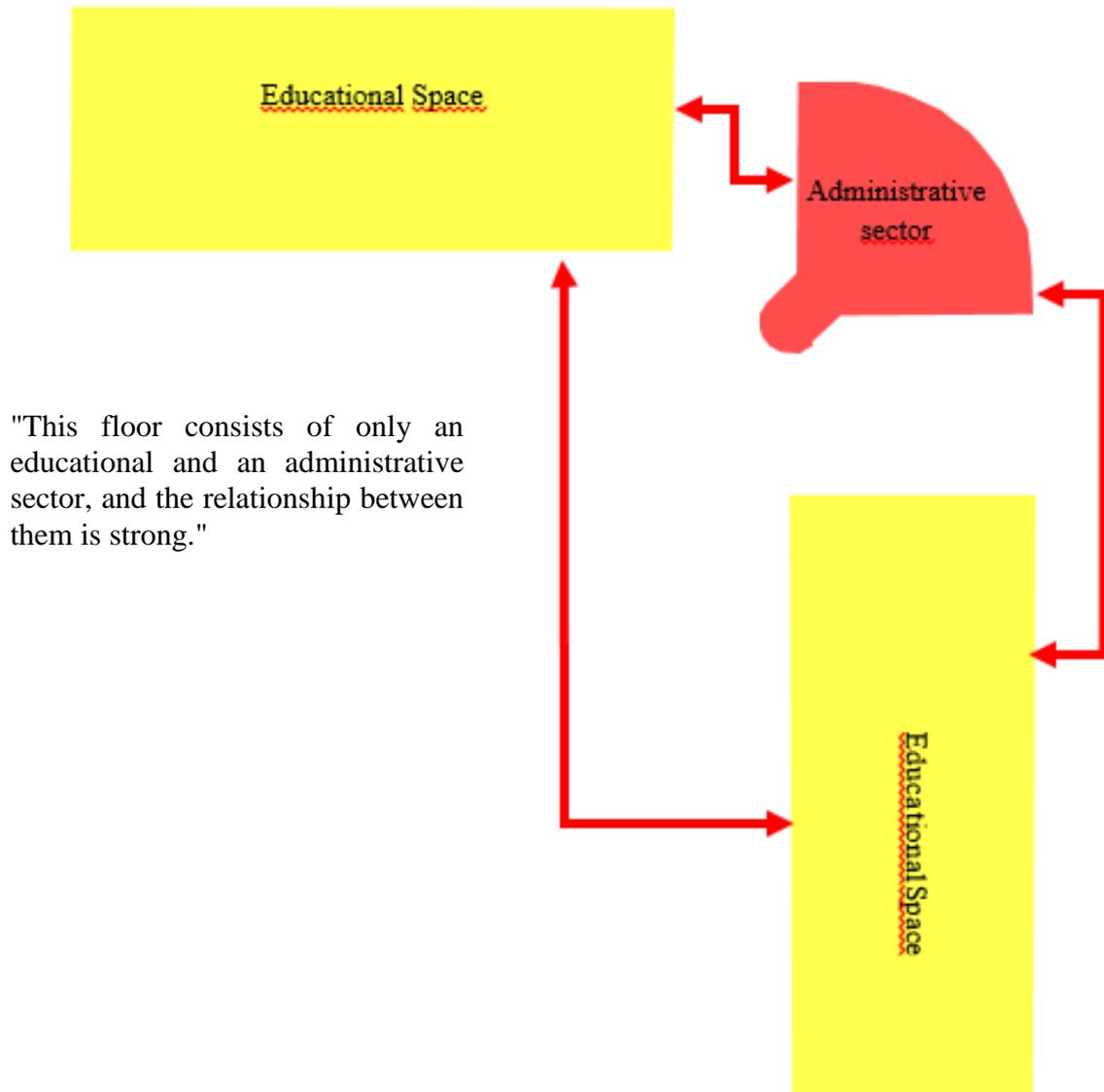
**Figure 37:**first floor plan (zahzah, 2025)

The first floor of this project is characterized by a clear and flexible functional layout, marked by the strategic and selective use of upper-level spaces. A compact administrative unit has been positioned directly above the main entrance, providing administrative staff with a vantage point for monitoring both the entrance area and the central courtyard. The remainder of the first floor is entirely dedicated to the pedagogical wing, which houses classrooms and specialized teaching spaces. This configuration ensures an effective vertical separation of administrative and educational functions, contributing to a quieter, more focused learning environment. Circulation within the floor is organized through corridors arranged radially around the central courtyard, promoting fluid movement and natural ventilation. Notably, the decision to limit upper-floor construction to areas above the entrance and the pedagogical wing — while leaving the spaces above the auditorium and service areas unbuilt — reflects a deliberate architectural choice aimed at preserving visual openness, optimizing natural lighting and ventilation, and maintaining a balanced structural load distribution. This spatial organization demonstrates a flexible, rational approach to vertical functional zoning, precisely tailored to meet operational requirements, environmental comfort, and the spatial dynamics of an educational facility.

## Chapter II: Analytical study

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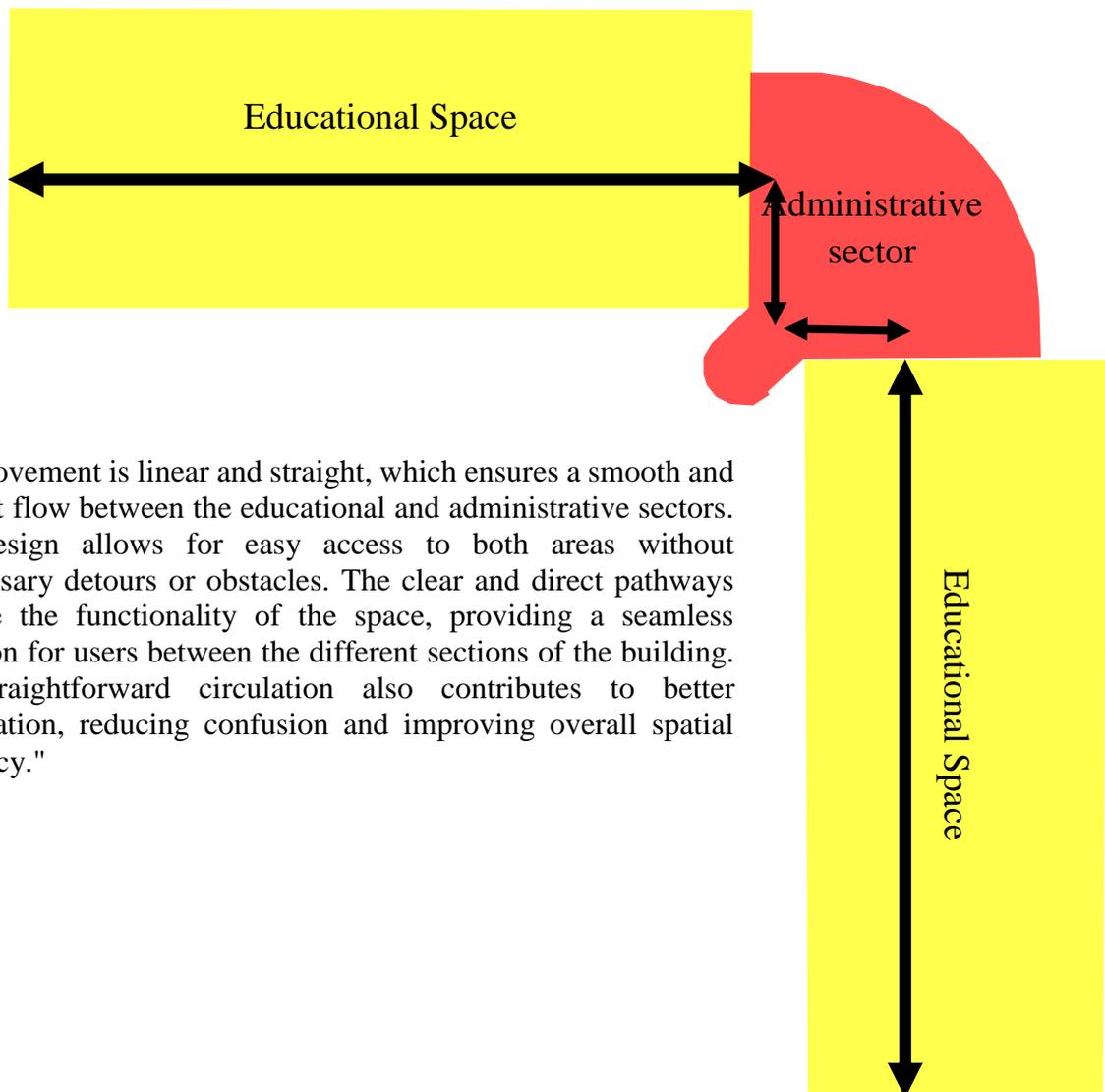
### II.1.3.2.1.2.1.spatial relationship



**Figure 38:**Diagram showing spatial relationship in the first floor plan (student, 2025)

The relationship between the first and second floors of the building is strong and effective

### II.1.3.2.1.2.2. Movement:



"The movement is linear and straight, which ensures a smooth and efficient flow between the educational and administrative sectors. This design allows for easy access to both areas without unnecessary detours or obstacles. The clear and direct pathways enhance the functionality of the space, providing a seamless transition for users between the different sections of the building. The straightforward circulation also contributes to better organization, reducing confusion and improving overall spatial efficiency."

**Figure 39:** Diagram showing Movement in the first floor plan (student, 2025)

The movement from one floor to another in this building, thanks to the strategically placed stairs and their design that suits the number of users, enhances smooth and efficient circulation between floors. This design allows users to move easily from one floor to another without feeling congested or confused, thus improving the overall experience of movement within the building. Additionally, it ensures that the stairs do not obstruct daily operations and enhances comfort and safety throughout the different spaces.

### II.1.3.2.1.3. According to the second floor plan:



**Figure 40:** Second floor plan (zahzah, 2025)

The library's placement alone on the second floor can be interpreted as an intentional design to create a quiet, independent environment away from the noise and other activities in the building. This separation enhances a conducive atmosphere for focused reading and study, offering privacy for users, which in turn optimizes the use of the educational resources available in the library.

Through our analysis of the floors, the relationships between the sectors, and the movement between floors and sectors, we observe that the design features a well-thought-out functional layout. The first floor is dedicated to educational activities, while the second floor is designated for administrative activities, contributing to a separation of functions that enhances focus and comfort in each sector. The strategically placed stairs between the floors provide easy access, promoting efficient circulation between sections and enhancing organization. The strong relationships between sectors on each floor facilitate natural movement, fostering interaction and communication among users. Overall, the design demonstrates high efficiency in space utilization and ensures functional comfort for all parties.

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### II.1.3.2.1.4. Positioning of stairs



**Figure 41:**Positioning of stairs (zahzah, 2025)

When analyzing the functional layout of the educational facility, it is observed that the overall organization is structured around a central open courtyard, which serves as a horizontal distribution hub for the surrounding functional spaces. The educational wings are distributed along the northern and eastern sides, while the administrative area is concentrated in the northeastern corner, partially isolated from the other spaces yet maintaining direct functional access to the courtyard.

Regarding the vertical circulation between floors, the plan features main staircases positioned along the vertical axes of the educational wings, ensuring a balanced coverage of distances between the points of ascent and descent, in accordance with recommended maximum travel distances in educational facilities. This placement ensures a rational distribution of student flow between floors and prevents congestion at a single point.

Additionally, a semi-circular staircase dedicated to the administrative wing connects the ground floor to the first floor, providing exclusive access for administrative staff. This functional solution embodies the principle of functional separation, which is essential for effective pedagogical management by allocating independent circulation paths for different user categories (students, staff, and visitors).

## Chapter II: Analytical study

The distribution of staircases also follows a balanced distribution approach, while respecting the principle of functional proximity for the educational wings, placing vertical circulation points near classroom clusters to minimize internal travel distances within and between floors.

As for the evacuation routes, the plan includes several exits that lead directly to the courtyard, supported by secondary staircases, thus enhancing safety conditions and ensuring the protection of students in emergency situations.

Consequently, the plan reflects the adoption of a centralized distribution model with integrated horizontal and vertical circulation, meeting the requirements of functional fluidity and differentiated circulation paths according to activity and user profiles.

### II.1.3.2.2. Spatial Analysis:

This section presents a comprehensive spatial analysis of the project's architectural composition. It focuses on how the distribution of spaces across different floor levels contributes to functional efficiency, operational comfort, and spatial harmony. The analysis is organized progressively according to each floor's plan, ensuring a clear understanding of spatial relationships, circulation, and functional zoning.

#### II.1.3.2.2.1. According to the Ground Floor Plan:

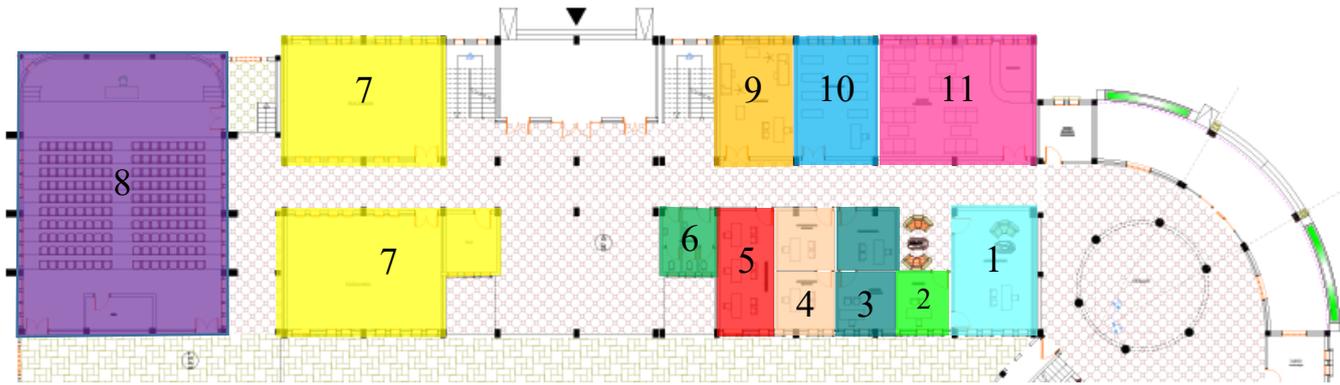
This subsection analyzes the spatial configuration of the ground floor by examining its various functional zones and their relationship to each other. It evaluates the arrangement of spaces, their accessibility, and how effectively they support the project's intended use.

##### II.1.3.2.2.1.1. Administrative Space



Figure 42: Ground Floor Plan (zahzah, 2025)

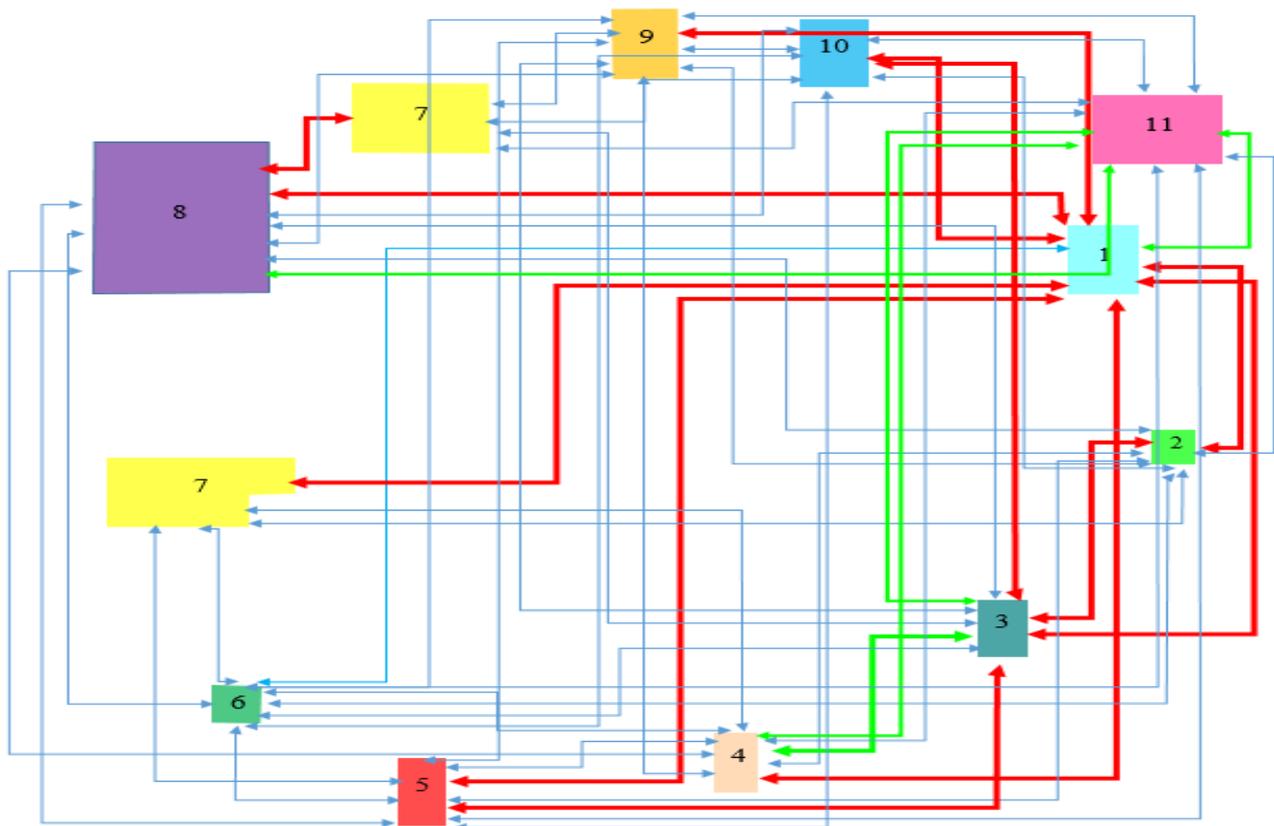
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**Figure 43:**Administrative Space according Ground Floor Plan (zahzah, 2025)

1 Director's Office	6 w.c
2 Waiting Room	7 Activity Room
3 School Treasurer	8 Amphitheater
4 Guidance and Counseling Office.	9 Testing Room
5 Meeting Room	10 Archive
	11 Buffet

### II.1.3.2.2.1.1.1. spatial relationship

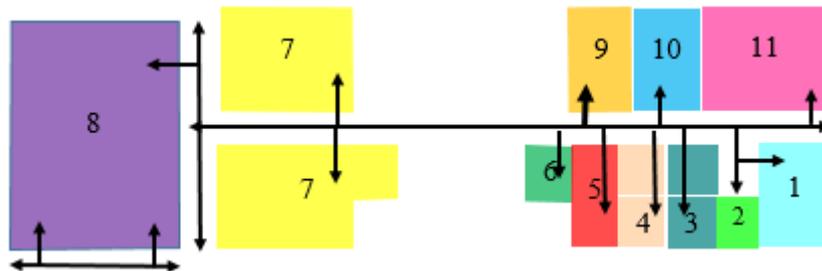


**Figure 44:**spatial relationship in the Administrative Space according Ground Floor Plan (student, 2025)

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The administrative sector includes a range of facilities that enhance organizational and administrative functions. The strong connection between the principal's office and other facilities allows for efficient school management and smooth communication across departments. The close link between the bursar's office and the waiting area facilitates easy handling of resources and administrative inquiries. Additionally, the connection between the auditorium and activity room creates a cohesive environment for hosting group activities and lectures, fostering active learning and student engagement.

### II. 1.3.2.2.1.1. Movement



**Figure 45:** Movement in the Administrative Space according Ground Floor Plan (student, 2025)

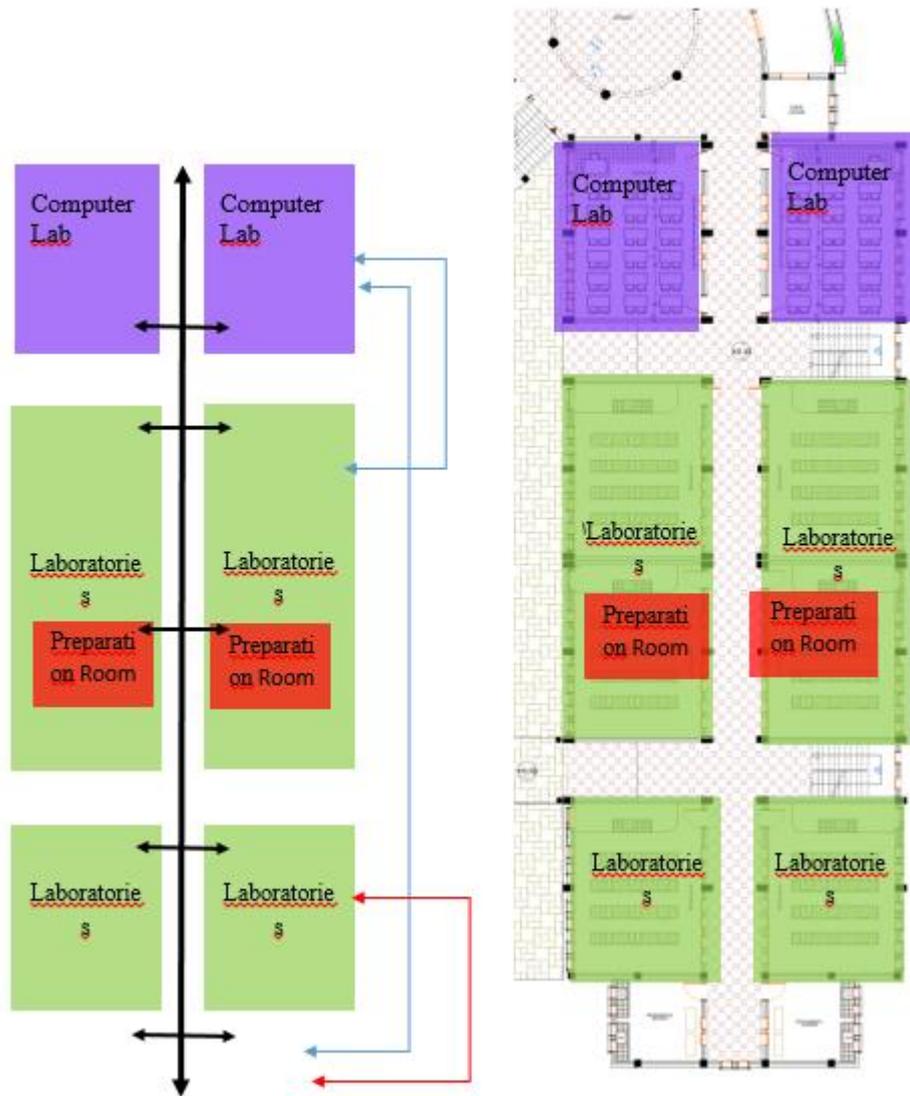
Linear circulation in the design enhances fluidity and logical sequencing between different spaces, making it easy to access various facilities within the building with clarity and simplicity. This linear movement strengthens spatial organization and reduces congestion, allowing users to navigate easily and without complication, resulting in a comfortable and efficient experience inside the building.

### II.1.3.2.2.1.2. Educational Space



**Figure 46:** Ground Floor Plan (zahzah, 2025)

#### II.1.3.2.2.1.2.1. spatial relationship and movement in the educational Space



**Figure 47:**spatial relationship and movement in the educational Space according Ground Floor Plan (student, 2025)

The educational wing, comprising computer rooms, laboratories, and preparation rooms, is designed with a linear flow that enhances straightforward movement between spaces. The strong connection between the laboratories and preparation room facilitates efficient use and accessibility for experiments and setups, ensuring streamlined workflow for educational activities. However, the weak relationship between the computer rooms and laboratories, as well as between the computer rooms and preparation rooms, might limit integrated use, suggesting that these areas function independently without significant overlap in activities. This separation could be beneficial for reducing disruptions but may also indicate limited cross-functional interactions between these spaces.

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### II.1.3.2.2.1.3. Services



Figure 49:Ground Floor Plan (zahzah, 2025)

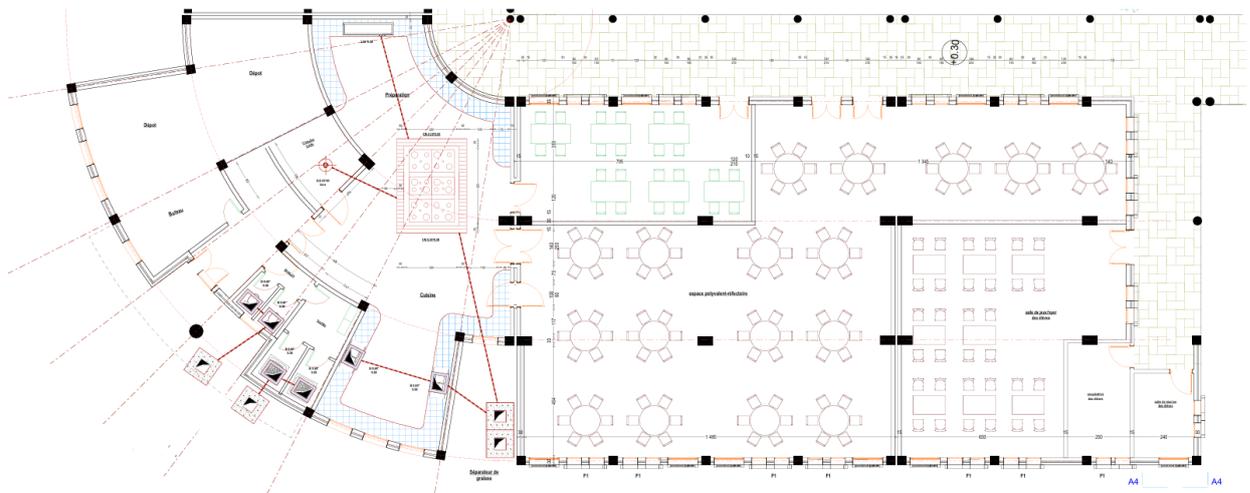


Figure 48:services Space according Ground Floor Plan (zahzah, 2025)

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### II.1.3.2.2.1.3.1. spatial relationship

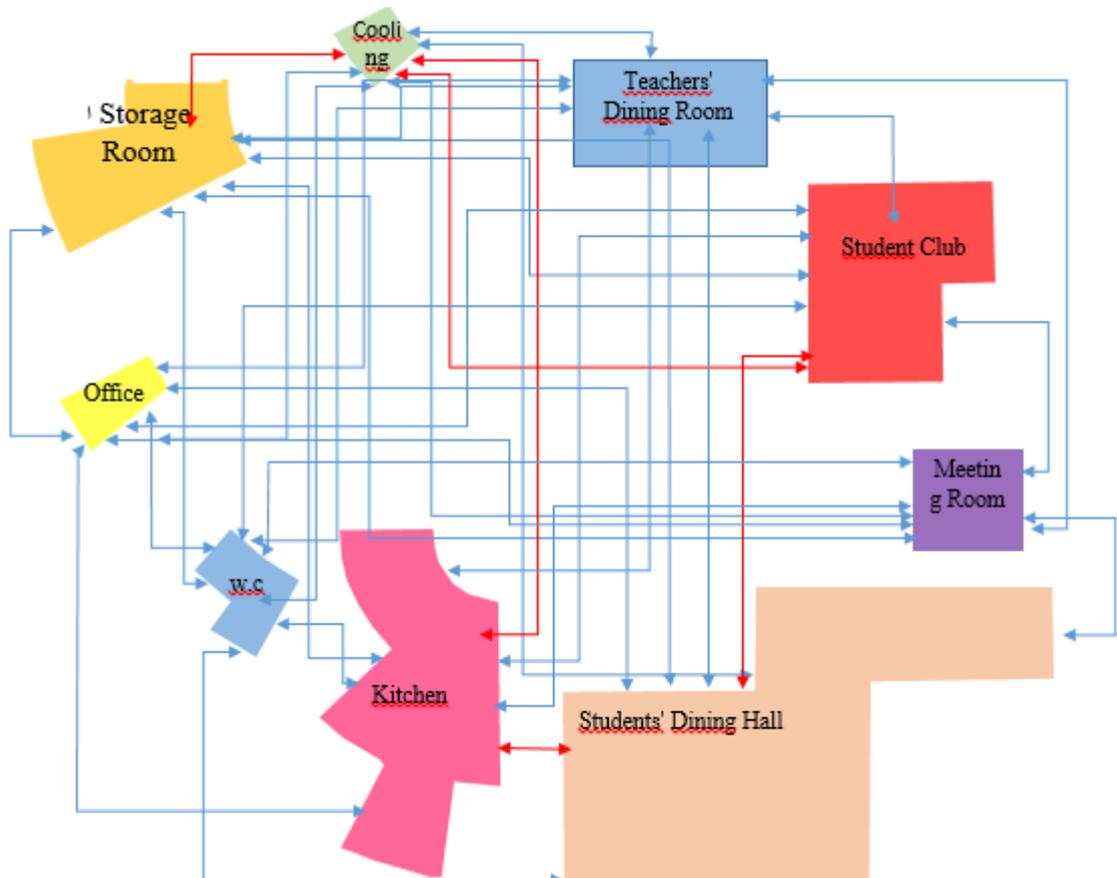


Figure 50:spatial relationship in the services Space (student, 2025)

The strong connection between the kitchen and the dining areas for teachers and students, as well as between the kitchen, storage room, and cold room, is explained by the need for these facilities to work seamlessly together to ensure fast and efficient food preparation and service. The kitchen's direct link to the dining areas minimizes the distance for transporting food, preserving its quality and temperature at serving time. Additionally, the storage room and cold room are located close to the kitchen, facilitating easy access to stored and refrigerated ingredients necessary for cooking, thus enhancing the efficiency of operations in the service wing.

Similarly, the strong connection between the storage and cold rooms is essential to ensure the easy transfer of items that require cooling before use or distribution. This arrangement allows for smoother and more effective management of food supplies within this sector.

### II.1.3.2.2.1.3.2. Movement

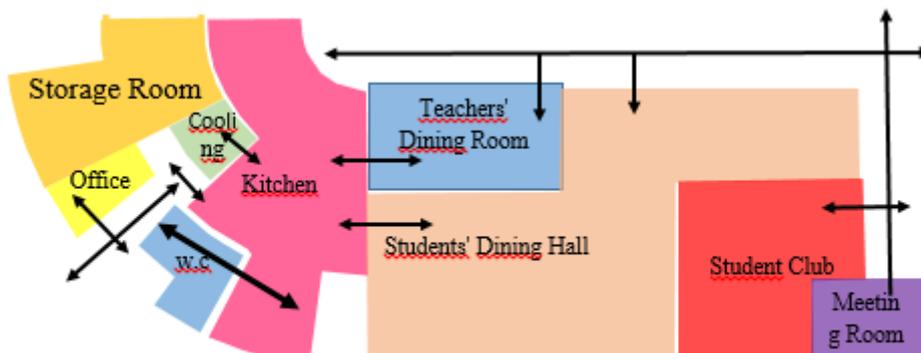


Figure51 :Movement in the services Space (student, 2025)

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The service wing of the high school is thoughtfully organized, featuring essential facilities such as a kitchen, dining halls for both teachers and students, a student club, and a meeting room. The linear flow between these areas promotes a natural and efficient movement, ensuring easy access and convenience for all users. This setup facilitates clear paths, reduces congestion, and allows staff and students to navigate the space seamlessly. The overall design supports the function of each space, creating a practical and cohesive environment within the school's service sector.

The analysis of the ground floor sectors reflects a practical design that promotes ease of movement and flow between different sections. The main sectors are strategically placed to allow easy access from the entrance to the educational and service areas. Classrooms are located near administrative facilities, facilitating the management of educational activities and providing essential support to both students and staff.

Additionally, the connection between the kitchen, cold storage, pantry, and dining halls highlights a focus on service efficiency, making food preparation and serving easier. The wide corridors reduce movement congestion and encourage seamless interaction among different areas. Overall, the layout of the ground floor sectors supports an integrated environment that achieves efficiency and ease of use, enhancing a comfortable and cohesive experience within the school.

### II.1.3.2.2.2. According to the first floor plan:



Figure 52: The first floor plan (zahzah, 2025)

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### II.1.3.2.2.1. spatial relationship and movement in the educational Space



**Figure 53 :**spatial relationship and movement in the educational Space according Ground Floor Plan (student, 2025)

The distribution of facilities between the ground floor and the first floor is based on safety and accessibility considerations. Placing the laboratories and computer labs on the ground floor facilitates evacuation in emergencies and avoids the need to transport heavy equipment across floors, which helps maintain the building's structural integrity. This arrangement also allows easy access to ground-level electrical and network connections, simplifying the setup and maintenance of computer labs. Classrooms are located on the first floor to provide a quieter environment, away from technical activities, which helps students maintain focus. This layout enables flexible movement within the

## Chapter II: Analytical study

building and allows for smooth transitions between the technical facilities on the ground floor and the academic classrooms on the first floor.

### II.1.3.3. Construction system

The architect relied on a traditional structural system known as “column-beam” (poteau-poutre), which is based on a network of columns (poteaux) and beams (poutres) made of reinforced concrete. In this system, the columns transfer the vertical loads from the floors and ceilings to the foundations, while the beams distribute the horizontal loads and transfer them to the columns.

The column-beam system is one of the most widely used systems in construction projects, especially educational and administrative buildings, as it provides excellent structural rigidity with flexibility in the distribution of interior spaces, allowing them to be adapted to the requirements of use. It is also easy to implement and its materials are readily available locally, in addition to its ability to withstand various loads, including seismic loads, in accordance with the technical regulations for construction in Algeria.

The choice of the column-beam system for this project was not arbitrary, but rather a response to the nature and size of the facility, seeking to achieve a balance between structural safety, quality of execution, and economic cost, while ensuring flexibility in the functional distribution of spaces.

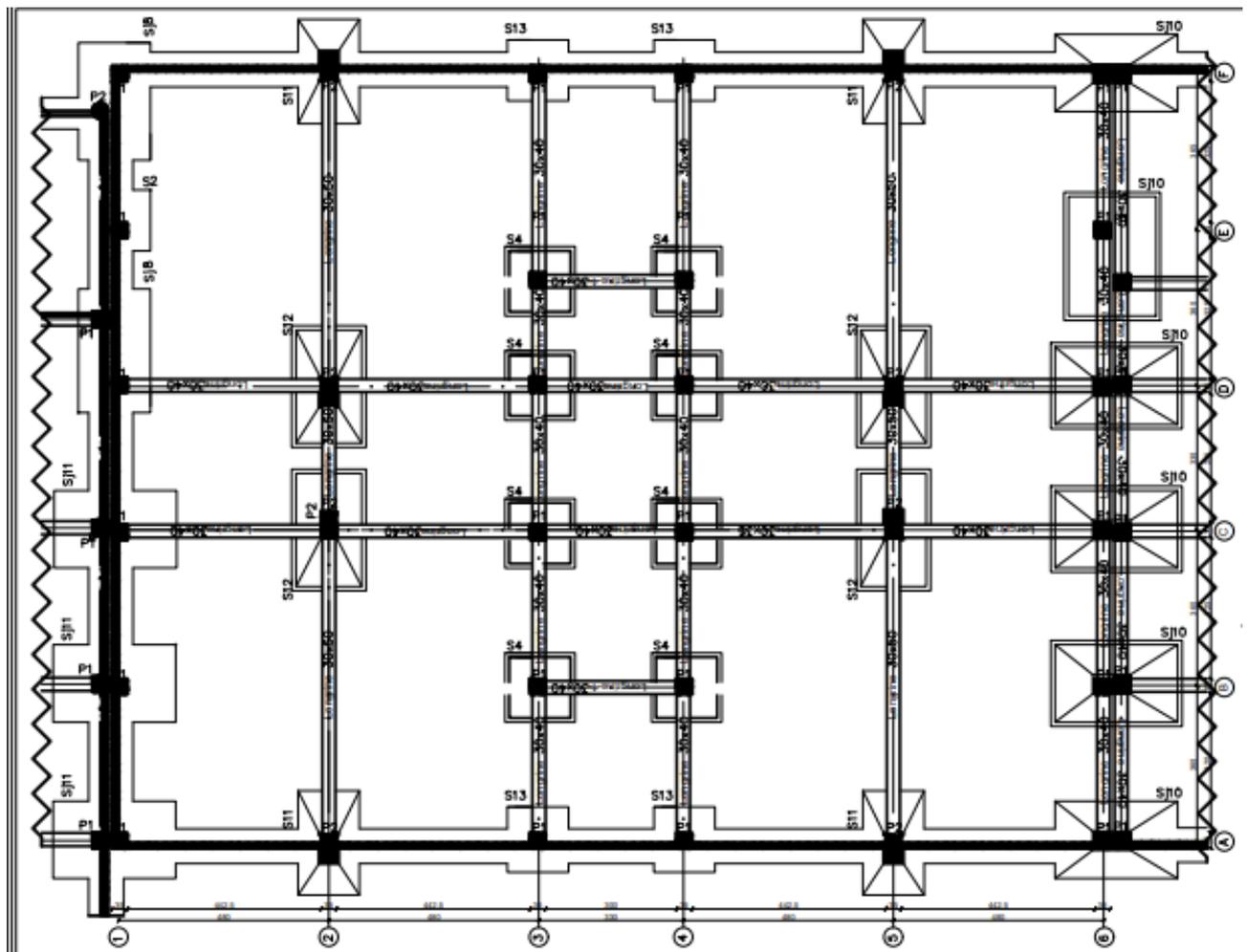


Figure 54: Construction system plan The Wing E (zahzah, 2025)

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### II.1.4. Analysis of the Project Schedule:

After reviewing the project schedule, the total duration of 14 months seems reasonable given the nature and scope of the work. However, an in-depth analysis of the relationships between tasks reveals several opportunities to improve the schedule without compromising the quality of execution.

One of the strengths of this schedule is the logical sequence of activities. Infrastructure work began one and a half months after site preparation began (DD + 1.5 months), followed by superstructure work, which began one month after infrastructure work began (DD + 1 month). This sequence is well aligned with the technical requirements and site readiness.

It is worth noting that the plan wisely overlapped some technical works to maximize time efficiency. For example, construction, painting, and tiling works started one month after the start of superstructure works, in conjunction with waterproofing works (DD). In addition, plumbing and electrical work began in parallel with the superstructure phase for two months (DD), paused for four months, and then resumed for completion one month after the completion of waterproofing (FD + one month) — a scheduling strategy aimed at reducing site congestion during heavy work while ensuring smooth technical integration. It should be noted that the gas installation work was timed to end at the same time as the completion of the plumbing work (FF relationship).

With regard to secondary works, carpentry, plastic, aluminum, and iron works were scheduled to begin with the second phase of electrical work (DD) and were carried out simultaneously, ending on the same day (FF). As for painting and glazing, they were logically scheduled to begin one month after the completion of all other works (FD + one month), ensuring that the finishes were protected from any potential damage on site.

The exterior works (VRD) were planned in two phases: The first began concurrently with the construction, painting, and tiling (DD) and lasted for three months, followed by a three-month hiatus, then resumed for an additional four months. This phased approach helped manage logistics and site access during the most intense periods of construction while ensuring the timely completion of the



Figure 55: Project Schedule (student, 2024)

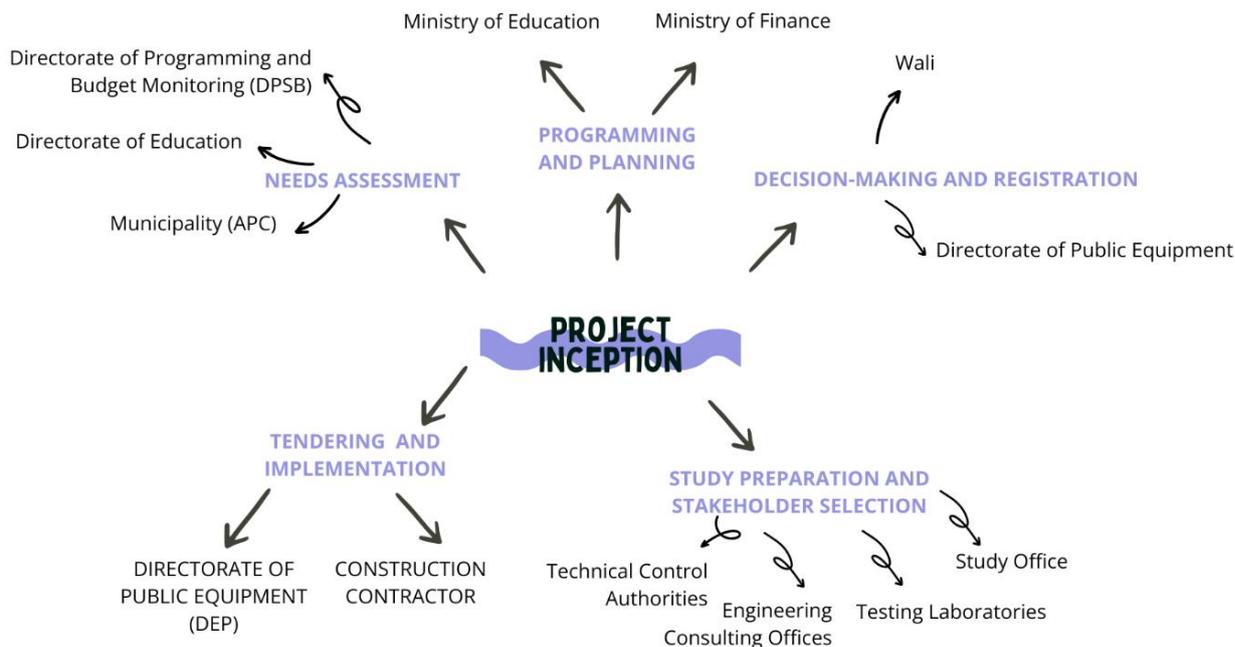
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**II.2. Synoptic table :** According to (Personal interview with an executive at the Directorate of Education of Biskra, 2024)

**Table 10 :**Project inception

Project Phase	Step	Actor	Date	Observation
<b>Operation program</b>			2021	
<b>Study Phase</b>	Tendering process	Directorate of Public Equipment of the Wilaya of Biskra/ Tender Committee	08/07/2021	This is the first step, which includes preparing the specifications and launching the tender to select the appropriate study office.
	Awarding	Directorate of Public Equipment , Zahzah Abdelghani Study Office	15/12/2021	The study office is selected after analyzing the submitted bids, usually based on technical and financial evaluation criteria.
	Study deadline	Zahzah Abdelghani Study Office, Directorate of Public Equipment	2 months	There should be close monitoring to ensure adherence to the set deadlines to avoid delays in subsequent phases.
	Monitoring deadline	Directorate of Public Equipment, Zahzah Abdelghani Study Office	30 months	This point is not entirely clear—does it refer to the time allowed for the study office to monitor the project after completing the study? Or is it related to the quality control of the study itself?
	Notice to proceed with the study	Directorate of Public Equipment, Zahzah Abdelghani Study Office	18/04/2022	After awarding, this notice is issued to the study office to officially begin work according to the signed contract.
<b>Implementation phase</b>	Tendering process	Directorate of Public Equipment, Competing Contractors	06/02/2022	The specifications for project execution are prepared, and the tender is launched to select the construction company.
	Awarding	Directorate of Public Equipment, Committee, Mohamed Berhail Construction Company	11/01/2023	The construction company ( <b>Berhail Mohamed</b> ) is selected based on technical and financial evaluation. At this stage, it is crucial to ensure the company's capability to complete the project within the specified deadlines.

**II.3. Project inception :**



**Figure 56:**project inception (Employees of the Directorate of Education for Biskra Province, 2024)

**Conclusion:**

Through architectural and urban analysis of the high school project, it is clear that the building's design reflects a well-considered response to the site's requirements and functional needs. The functional design ensures a balanced distribution of spaces across the different floors, facilitating user movement within the building and seamlessly integrating educational and service areas. In addition, climatic considerations, such as the orientation of the building and the use of natural shading, enhance user comfort and energy efficiency.

Furthermore, analysis of the project schedule highlights the consistent and systematic sequencing of construction phases, taking into account the technical interdependencies between different trades. The program reveals a deliberate effort to optimize execution time through the overlapping of compatible activities. The lengthy duration of construction works is a critical phase affecting the overall schedule, while the integration of parallel tasks—such as plumbing, electrical installations, and carpentry—demonstrates a proactive management approach aimed at minimizing downtime and ensuring continuity of work.

As for the poteau-poutre (column-beam) structural system, it not only provides functional flexibility by allowing for adaptable spatial configurations, but also facilitates the phased scheduling of work. This system simplifies coordination between different trades and accelerates the pace of secondary works once the main structural framework is complete, contributing positively to improving project duration.

In conclusion, the combined architectural, urban, and temporal analysis confirms that the project achieves an effective balance between functional quality, environmental responsiveness, and rational management of deadlines. The strategic integration between the poteau-poutre system and the well-organized project schedule enhances the project's ability to provide a high-performance, sustainable, and operationally efficient learning environment.

## Chapter III: Management study in the case study

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### Introduction

This chapter provides a detailed study of the management of the contracting company within the framework of project execution, focusing on the analysis of available material and human resources and monitoring the progress of work according to the specified timeline. A comparison was made between the actual progress of the work and the adopted schedule (planning), taking into account the deadlines outlined in the Algerian Official Gazette. Through this comparison, gaps in the progress of the work were identified, and the work methods used were reviewed. Using "Microsoft Project" and ClickUp, and comparing both tools, the actual project timeline was rebuilt based on the real data available, providing a comprehensive commentary on the potential deviations. At the end of the analysis, practical solutions were proposed to address delays and resolve issues that could affect the project's progress, aiming to improve coordination among all stakeholders and ensure the achievement of goals within the specified timeframe.

### III.1. Presentation of the executing company (human resources + material resources): (Enterprise, 2025)

Brahail Mohamed Construction Enterprise is one of the prominent local companies operating in the construction and public works sector in Biskra. The company specializes in the execution of a wide range of public and private projects, demonstrating strong capabilities in overseeing various phases of project implementation. It stands out for its commitment to quality standards and strict adherence to contractual deadlines. The company relies on a skilled and experienced technical and administrative team, supported by a fleet of modern equipment and machinery that ensures efficient and effective project delivery.

- **Company Name:** Brahail Mohamed Construction Enterprise
- **Sector of Activity:** Building and Public Works
- **Legal Status:** Private Sole Proprietorship
- **Year of Establishment:** 1995/03/01
- **Head Office:** ARRIS
- **Geographical Scope of Activity:** Biskra and Batna
- **Experience:** 30 years of experience in the construction field, during which it has completed numerous residential, educational, and administrative projects for both public and private institutions.
- **Human Resources:** Public Works Site Manager, Driver, Surveying Technician, Accountant, General Service Workers, Masonry Workers, Reinforcement Workers, Formwork Workers, Plumbing Technician, Carpenters, Tilers
- **Material Resources:** 2 cranes, 2 backhoe loaders, 3 trucks (15 tons), 1 trailer truck, 2 mechanical mixers

## Chapter III: Management study in the case study

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### III.2.1. Progress of the project execution work: (Daily reports, 2023/2024)

On 12/02/2023, the project site was installed and the land was cleared in the presence of both the design office Zahzah Abdelghani and the construction contractor Berhail Mohamed.



**Figure 57:**Preparing for the workshop installation process with the help of a topographical engineer and a topographical camera. (Monthly reports, 2023/2024)

On 05/03/2023, the land clearing was completed, and the major leveling works began, in the presence of the design office and the contractor.



**Figure 58:**Preparing the ground and removing the plant crust 10 to 20 cm thick on different types of soil, and transferring the soil to the designated public waste disposal site (Monthly reports, 2023/2024).

On 16/04/2023, excavation works began for wings A, B, C, D, E, F, G, and H.



**Figure 59:**Excavation works (Monthly reports, 2023/2024)

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On 20/04/2023, reinforcement works for foundations, substructure columns, and load-bearing walls started in wings A and B.



**Figure 60** ::reinforcement works for foundations (Monthly reports, 2023/2024)

On 04/05/2023, The technical building inspection report confirmed that excavation had reached a depth of 4 meters in all wings.

On 07/05/2023, excavation resumed in all wings, in accordance with the recommendations of the Technical Building Inspection Authority of Biskra.

On 14/05/2023, excavation works were completed as per the authority's recommendations.



**Figure 61**:excavation works (Monthly reports, 2023/2024)

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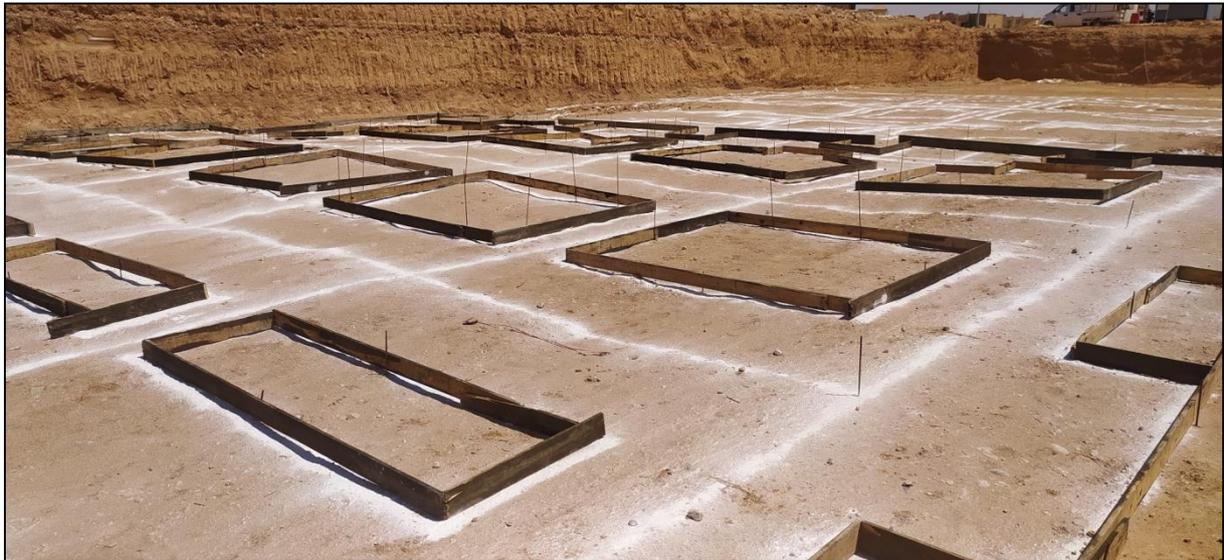
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On 16/05/2023, the setting out of foundation axes began. The reinforcement works for wings A and B were completed, and blinding concrete works (lean concrete) under the foundations were initiated.



**Figure 62:** setting out of foundation axes (Monthly reports, 2023/2024)

On 24/05/2023, blinding concrete works began in wing G, along with formwork activities, including formwork for the blinding concrete in wings A, B, D, and E.



**Figure 63:**Formwork for cleanliness concrete (Monthly reports, 2023/2024)



**Figure 64:**pouring concrete (Monthly reports, 2023/2024)

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On 25/05/2023, the blinding concrete pouring in wing G was completed.



**Figure 65:**pouring concrete (Monthly reports, 2023/2024)

On 30/05/2023, formwork for foundations and ground beams was completed. Foundation and ground beam installation and concrete pouring were carried out and completed on the same day for wings A and B.



**Figure 66:**formwork for foundations and ground beams (Monthly reports, 2023/2024)

On 04/06/2023, blinding concrete was poured under wing I.

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On 07/06/2023, the installation of reinforcement for foundations, ground beams, and load-bearing walls was completed 100%, and the blinding concrete pouring was completed for wings I and H.



**Figure 67:**installation of reinforcement  
(Monthly reports, 2023/2024)



**Figure 68:**the blinding concrete pouring  
(Monthly reports, 2023/2024)

June 8, 2023: The work on pouring concrete for the foundations, underground columns, and ground beams began, ensuring the concrete mix had a concentration of 350 kg/m<sup>3</sup>.



**Figure 69:**The work on pouring concrete for the foundations (Monthly reports, 2023/2024)

June 11, 2023: The formwork for the foundations and ground beams was removed, and the formwork for the underground columns was started. After removing the formwork, the architect noticed some segregation in the concrete of the foundations. He instructed the contractor to address this issue using the necessary methods, including the use of SIKA cement.

June 12, 2023: The pouring of concrete for the underground columns of wing G began. The architect noticed that the underground columns and foundations for wings E and D did not match the engineering plans (35x35 cm). He instructed the contractor to remove and correct them.

### Chapter III: Management study in the case study

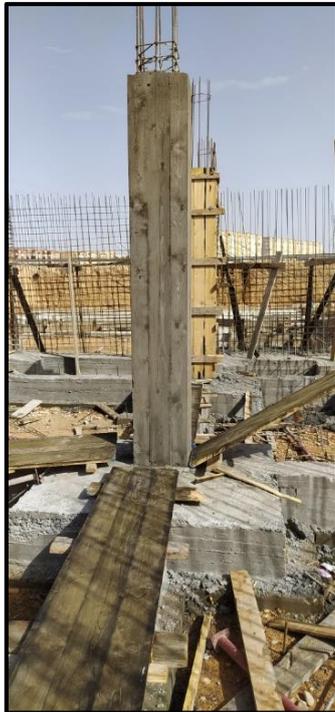
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June 13, 2023: The formwork for the foundations and ground beams was completed, and the reinforcement work for wing G started.



**Figure 70:**The work on pouring concrete for the foundations (Monthly reports, 2023/2024)

June 14, 2023: The pouring of concrete for the columns of wing G took place, with the contractor being instructed to speed up the work pace.



**Figure 71:**The pouring of concrete for the columns (Monthly reports, 2023/2024)

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June 18, 2023: The pouring of concrete for the load-bearing walls in wing G began, and the correction of the reinforcement for the underground columns in wings D and E was also initiated.



**Figure 72:**The pouring of concrete for the load-bearing (Monthly reports, 2023/2024)

June 21, 2023: The formwork for the foundations and ground beams of wing A started.



**Figure 73:**The formwork for the foundations and ground beams (Monthly reports, 2023/2024)

June 22, 2023: The pouring of concrete for the foundations and ground beams of wing E began and was completed on the same day.

June 25, 2023: The pouring of concrete for the foundations and ground beams in wing I began, along with the start of concrete pouring for the underground columns in wing B. However, the pouring work in wing I was halted due to a shortage of cement. The contractor was instructed to ensure the supply of all necessary construction materials to avoid work stoppages in the middle of any wing. It was also emphasized that work should begin in wings C, F, and H.

July 9, 2023: The formwork for the foundations and ground beams in wing A was completed.

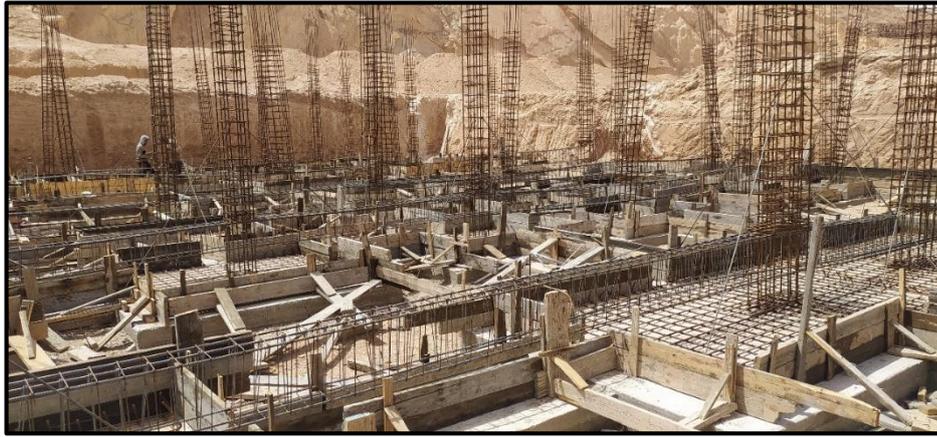


**Figure 74:**The formwork for the foundations and ground beams (Monthly reports, 2023/2024)

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July 10, 2023: The work on placing the foundations and underground columns in wing A began.



**Figure 75:** The pouring of concrete for the foundations and ground beams (Monthly reports, 2023/2024)

July 11, 2023: The pouring of concrete for the foundations and ground beams in wing D began, along with the pouring of concrete for the load-bearing walls in wing G.



**Figure 76:** The pouring of concrete for the foundations and ground beams (Monthly reports, 2023/2024)

July 13, 2023: The reinforcement work for the foundations and underground columns was completed, and the pouring of concrete for the foundations was finished on the same day for wings I, E, and D. The pouring of concrete for the foundations, underground columns, and the load-bearing wall in wing G was also completed.



**Figure 77:** The pouring of concrete for the foundations (Monthly reports, 2023/2024)

### Chapter III: Management study in the case study

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July 16, 2023: Completion of foundation and underground column works in wing A. Formwork removal for the load-bearing walls in wing G was also completed.



**Figure 78:** foundation and underground column (Monthly reports, 2023/2024)

July 24, 2023: Formwork activities for the load-bearing walls in wing I are currently halted.



**Figure 79:** Formwork activities for the load-bearing walls (Monthly reports, 2023/2024)

August 9, 2023: Painting of the load-bearing walls in wing G began using the product FLANT KOOT.



**Figure 80:** Painting load-bearing walls in wing G using FLANT KOOT. (Monthly reports, 2023/2024)

August 10, 2023: Concrete was poured for part of the load-bearing walls in wing D. Work remains halted in wing I.

### Chapter III: Management study in the case study

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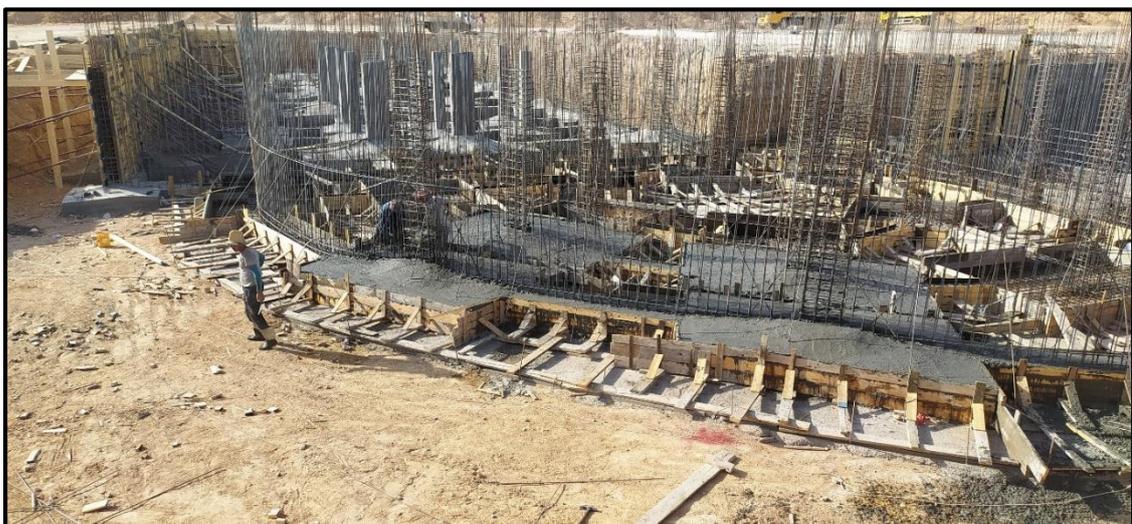
August 13, 2023: Construction activities are halted in wings F, H, and I.

August 14, 2023: Concrete was poured for the load-bearing walls in wings A and B. Work is still halted in wings I and H.



**Figure 81:** Concrete was poured for the load-bearing walls (Monthly reports, 2023/2024)

August 16, 2023: Concrete pouring for the foundations and ground beams in wing C took place.



**Figure 82:** Pouring concrete for foundations and floor beams (Monthly reports, 2023/2024)

August 19, 2023: Concrete was poured for part of the load-bearing walls in wing E.

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August 21, 2023: Completion of reinforcement work for the ground floor columns in wings A, B, and I. Work remains suspended in the remaining wings.

August 23, 2023: Concrete was poured for part of the load-bearing walls in wing A. Work continues to be halted in wings H and I.

August 29, 2023: Completion of reinforcement for the retaining walls in wing C. Concrete was poured for part of the load-bearing walls in wing D. Work remains halted in the other wings.



**Figure 83:**Reinforcing retaining walls(Monthly reports, 2023/2024)

August 31, 2023: Formwork began for the retaining walls in wing C, along with the start of concrete pouring.

On 06/09/2023, the concrete for the load-bearing walls of the f and c wing was poured



**Figure 84:**Reinforcing retaining walls(Monthly reports, 2023/2024)

On 11/09/2023, concrete was poured for part of the protective walls in Wing A



**Figure 85:**Concrete for load-bearing walls(Monthly reports, 2023/2024)

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26/09/2023 The concrete pouring of the load-bearing walls in Wings F and C was completed, as well as the concrete pouring of the sub-pillar of Wing A.

27/09/2023 Pouring the concrete for the load-bearing walls of Wings F and D was completed on the same day, as was pouring the concrete for the underpinning columns of Wing F.

01/10/2023 Molding of the foundations of the H wing



**Figure 86:** Molding of the foundations (Monthly reports, 2023/2024)

On October 2nd, 2023, the concrete for the substructure columns of Wing C was poured. On the same day, the formwork for the foundations and ground beams of Wing H was also completed.



**Figure 87:** the concrete for the substructure columns (Monthly reports, 2023/2024)

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By October 3rd, 2023, part of the load-bearing walls of Wing I had been cast, and work began on reinforcing the ground beams of Wing H.



**Figure 88:** Pouring of the load-bearing walls of the first wing (Monthly reports, 2023/2024)



**Figure 89:** reinforcement of the floor beams (Monthly reports, 2023/2024)

On October 5th, 2023, the concrete was poured for the retaining walls and substructure columns of Wing F, and these works were fully completed on the same day.

On October 7th, 2023, the concrete for the substructure columns of Wings A, B, C, D, E, and F was poured and completed on the same day. Additionally, the foundations and ground beams of Wing H were



**Figure 90:** concrete for the substructure columns (Monthly reports, 2023/2024)

On October 10th, 2023, the concrete was poured for the retaining walls of Wings I and C.

On October 15th, 2023, painting works using the protective product “Flintcoat” were completed in Wings A, B, D, and E, along with the completion of reinforcement works for the retaining walls of Wing H.



**Figure 91:** painting works using the protective product “Flintcoat” (Monthly reports, 2023/2024)

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On October 25th, 2023, formwork removal was completed for the retaining walls, foundations, and ground beams of Wing H, followed by the start of Flintcoat application works in the same wing.

By October 30th, 2023, the reinforcement of the ground floor columns for Wings I and H was completed.

On October 31, 2023, backfilling works commenced using the appropriate machinery



**Figure 92:**backfilling works (Monthly reports, 2023/2024)

On November 2nd, 2023, reinforcement works began for the columns of Wings A, B, C, D, and E.

On November 13th, 2023, reinforcement works started for the first-floor columns of Wings A and B, while reinforcement works for the ground floor columns of Wings A, B, C, D, and E were completed.

On November 14th, 2023, reinforcement works for the ground floor columns of all wings — A, B, C, D, E, F, G, H, and I — were finalized.

On November 23rd, 2023, backfilling works were completed for all wings, with thorough soil compaction and water saturation to prevent future settlement issues.



**Figure 93:** backfilling works (Monthly reports, 2023/2024)

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On November 27th, 2023, reinforcement works for the ground beams of Wings A, B, C, D, and E began.



**Figure 94:** reinforcement works (Monthly reports, 2023/2024)

On December 5th, 2023, formwork works for the blinding concrete and ground beams of Wings D and E commenced.



**Figure 95:** formwork works (Monthly reports, 2023/2024)

On December 7th, 2023, formwork installation was completed, and concreting works for the blinding concrete and supporting forms for the ground beams of Wing B started.



**Figure 96:**Concrete pouring work for concrete covering (Monthly reports, 2023/2024)

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On December 13th, 2023, concreting works for the blinding concrete and supporting formwork of the ground beams for Wing A began, along with reinforcement works for the ground beams of Wing B.



**Figure 97:** concreting works for the blinding concrete (Monthly reports, 2023/2024)

On December 14th, 2023, reinforcement works for the ground beams of Wing D were completed, and the blinding concrete for the ground beams of Wing G was poured.

On December 16th, 2023, concreting works for the ground beams of Wing D were carried out.

**On December 18th, 2023:** Completion of reinforcement works for the ground beams of wings A, B, E, and G. Completion of blinding concrete works for the ground beams of wing C. Completion of formwork removal for the ground beams of wing D. Start of formwork installation for the ground beams of wing E.



**Figure 98:** formwork removal for the ground beams (Monthly reports, 2023/2024)



**Figure 98:**reinforcement works for the ground beams (Monthly reports, 2023/2024)

**On December 20th, 2023:** Completion of formwork removal in wings B and E. Start of reinforcement works for the ground beams of wing C. Start of application of flintkote protective material on the ground beams of wing D.



**Figure 99:**formwork removal (Monthly reports, 2023/2024)



**Figure 100 :**reinforcement works for the ground beams (Monthly reports, 2023/2024)

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**Figure 101:** application of flintkote protective material on the ground beams (Monthly reports, 2023/2024)

**On December 21st, 2023:** Concrete pouring for the ground beams of wing E.



**Figure 102 :** Concrete pouring for the ground beams (Monthly reports, 2023/2024)

**On December 24th, 2023:** Start of formwork installation for the ground beams of wing A.



**Figure 103 :** reinforcement works for the ground beams (Monthly reports, 2023/2024)

**On December 25th, 2023:** Concrete pouring for the ground beams of wing A. Start of applying flintkot material on the ground beams of wing E. Pouring of blinding concrete for the ground beams of wing H.



**Figure 104:** Concrete pouring for the ground beams (Monthly reports, 2023/2024)

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**On December 27th, 2023:** Start of reinforcement works for the ground beams of wing F and H  
Completion of formwork removal for the ground beams of wing G.



**Figure 105:** reinforcement works for the ground beams (Monthly reports, 2023/2024)



**Figure106:** formwork removal for the ground beams (Monthly reports, 2023/2024)

**On December 28th, 2023:** Concrete pouring for the ground beams of wing A.



**Figure107:** Concrete pouring for the ground beams (Monthly reports, 2023/2024)

**On January 3rd, 2024:** Concrete pouring for some of the ground floor columns of wing D.



**Figure108:** Concrete pouring for some of the ground floor columns (Monthly reports, 2023/2024)

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**On January 7th, 2024:** Completion of concrete works for all ground floor columns in wing D.



**Figure109:** concrete works for all ground floor columns (Monthly reports, 2023/2024)

**On January 11th, 2024:** Concrete pouring for the ground slab after removing loose stones and unsuitable mesh, placing medium-sized gravel, and installing mesh reinforcement type No. 6.



**Figure110:**the ground slab (Monthly reports, 2023/2024)

**On January 13th, 2024:** Concrete pouring for the ground floor columns of wing B.



**Figure111:** Concrete pouring for the ground floor columns (Monthly reports, 2023/2024)

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**On January 14th, 2024:** Concrete pouring for the ground slab of wing B.



**Figure112:** Concrete pouring for the ground slab (Monthly reports, 2023/2024)

**On January 15th, 2024:** Start of formwork installation for the roof slab of wing B.



**Figure113:** formwork installation for the roof slab (Monthly reports, 2023/2024)

**On January 17th, 2024:** Start of reinforcement works for the ground floor columns of wing A. Completion of concrete pouring for the ground floor columns of wing B. Concrete pouring for the ground slab of wing E.



**Figure114 :**Concrete pouring for the ground slab

**On January 21st, 2024:** Concrete pouring for some columns in wing A.. Completion of concrete works for the ground slab of wing E. Concrete pouring for connection boxes and sewer ducts in wing G.

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**On January 23rd, 2024:** Completion of formwork installation for the ground floor roof slab of wing D and start of reinforcement works for the upper beams and girders. Concrete pouring for some columns in wing G.



**Figure115:**Concrete pouring for some columns (Monthly reports, 2023/2024)



**Figure116:**formwork installation for the ground floor roof slab (Monthly reports, 2023/2024)

**On January 25th, 2024:** Concrete pouring for the ground floor columns of wings A and G. Start of formwork works for the ground floor columns of wing E.

**On January 28th, 2024:** Completion of formwork works for the ground floor roof slab and staircases of wing B, followed by the start of reinforcement for the upper beams and girders.

**On January 29th, 2024:** Concrete pouring for the ground floor columns of wing A. Completion of installation for hollow block elements of the ground floor roof slab in wing D, and start of steel mesh placement. Completion of stair reinforcement works and start of formwork works in wing D. Start of formwork works for the roof slab of wing G. Concrete pouring for the ground slab of wing G.



**Figure117:**installation for hollow block elements of the ground floor roof slab (Monthly reports, 2023/2024)



**Figure118:** stair reinforcement works (Monthly reports, 2023/2024)

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**Figure119:** Concrete pouring for the ground slab (Monthly reports, 2023/2024)

**On January 31st, 2024:** Concrete pouring for the roof slab and staircases in wing G.



**Figure 120:**Concrete pouring for the roof slab and staircases (Monthly reports, 2023/2024)

**On February 4th, 2024:** Concrete pouring for ground floor columns in wing A. Concrete pouring for the ground slab of the corridor in the same wing.W

**On February 6th, 2024:** Concrete pouring for the ground floor roof slab of wing B.

**On February 11th, 2024:** Completion of reinforcement works for the ground floor columns of wing C. Completion of formwork for the roof slab of wing G. Start of reinforcement works for the upper beams and girders in wing G.

**On February 14th, 2024:** Start of laying medium stones (stone bedding) for the ground slab of wing F.



**Figure121:**laying medium stones (stone bedding) for the ground slab (Monthly reports, 2023/2024)

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**On February 18th, 2024:** Start of reinforcement works for the upper beams and girders of wing A.

**On February 19th, 2024:** Concrete pouring for the roof slab of wing G.



**Figure122:**Concrete pouring for the roof slab (Monthly reports, 2023/2024)

**On February 21st, 2024:** Completion of formwork for the roof slab and start of reinforcement works for the upper beams and girders of wing E.

**On February 22nd, 2024:** Concrete pouring for the staircase of the lecture hall. Completion of concrete works for the first-floor columns in wing B. Start of formwork installation for the first-floor roof slab of wing B. Concrete pouring for the first-floor columns of wing D.



**Figure123:**Concrete pouring for the first-floor columns (Monthly reports, 2023/2024)

**On February 25th, 2024:** Completion of reinforcement works for upper beams and girders, hollow block installation, and start of mesh placement for wing A. Concrete pouring for upper first-floor columns of wing D.

**On February 26th, 2024:** Concrete pouring for some first-floor columns of wing D.

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**On February 27th, 2024:** Concrete pouring for the roof slab of wing A.



**Figure124:**Concrete pouring for the roof slab (Monthly reports, 2023/2024)

**On March 3rd, 2024:** Concrete pouring for the roof slab of wing E.



**Figure 125:**Concrete pouring for the roof slab (Monthly reports, 2023/2024)

**On March 5th, 2024:** Concrete pouring for the parapet wall of the roof slab of wing G. Start of masonry works for the ground floor of wing B.



**Figure126:**Concrete pouring for the roof slab (Monthly reports, 2023/2024)



**Figure 127:**Concrete pouring for the parapet wall of the roof slab (Monthly reports, 2023/2024)

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**On March 10th, 2024:** Start of reinforcement works for the first-floor beams and girders of wing B.

**On March 16th, 2024:** Completion of concrete pouring for the first-floor columns of wing A. Completion of formwork and hollow block installation for the first-floor roof slab of wing B. Concrete pouring for blinding concrete of the ground beams in wing I.



**Figure128:**formwork and hollow block installation for the first-floor roof slab (Monthly reports, 2023/2024)



**Figure129:** Concrete pouring for blinding concrete of the ground beams (Monthly reports, 2023/2024)

**On March 18th, 2024:** Start of formwork for the first-floor columns of wing E. Start of reinforcement works for the beams of this floor and wing.



**Figure 130:**formwork for the first-floor columns (Monthly reports, 2023/2024)

**On March 20th, 2024:** Concrete pouring for the first-floor roof slab of wing B. Concrete pouring for the parapet wall of the ground floor in wing A.

**On March 21st, 2024:** Installation of hollow block elements for the first-floor roof slab of wing D.



**Figure 131:**Installation of hollow block elements for the first-floor roof slab (Monthly reports, 2023/2024)

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**On March 24th, 2024:** Start of formwork works for the first-floor roof slab of wing A.

**On March 28th, 2024:** Concrete pouring for the first-floor roof slab of wing D.



**Figure 132:** Concrete pouring for the first-floor roof slab (Monthly reports, 2023/2024)

**On March 31st, 2024:** Start of dismantling formwork from the ground floor roof slab of wing A.

**On April 14th, 2024:** Resumption of site works after the Eid al-Fitr holiday break.

**On April 21st, 2024:** Start of formwork for the roof slab of wing E. Start of masonry works in wing



**Figure133** ::formwork for the roof slab  
(Monthly reports, 2023/2024)



**Figure134:**masonry works (Monthly reports, 2023/2024)

**On April 23rd, 2024:** Completion of formwork for the first-floor roof slab of wing A and start of reinforcement works for the upper beams and girders. Start of electrical installation works on the ground floor of wing B.



**Figure135:** electrical installation works on the ground floor (Monthly reports, 2023/2024)

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**On April 25th, 2024:** Concrete pouring for the parapet wall of the roof slab in wing B.

**On may 1<sup>st</sup> 2024:** Concrete pouring for the first-floor roof slab of wing A



**Figure136:**Concrete pouring for the first-floor roof slab (Monthly reports, 2023/2024)

**On May 2nd, 2024:** Concrete pouring for the first-floor roof slab of wing A. Start of alignment and reinforcement works for the outer boundary fence. Concrete pouring for the parapet wall of the roof slab in wing D. Completion of concrete pouring for the ground floor columns of wing C and start of formwork works for the roof slab.



**Figure137:**alignment and reinforcement works for the outer boundary fence (Monthly reports, 2023/2024)



**Figure138:**Concrete pouring for the parapet wall of the roof slab (Monthly reports, 2023/2024)

**On May 8th, 2024:** Concrete pouring for the upper beams of wing I.



**Figure139:**Concrete pouring for the upper beams (Monthly reports, 2023/2024)



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**On May 12th, 2024:** Concrete pouring for the first-floor roof slab of wing E.



**Figure140:**Concrete pouring for the first-floor roof slab (Monthly reports, 2023/2024)

**On May 20th, 2024:** Start of internal plastering works for walls and ceilings.



**Figure141:**internal plastering works for walls and ceilings (Monthly reports, 2023/2024)

**On May 22nd, 2024:** Concrete pouring for the ground floor roof slab of wing C. Completion of masonry works for the ground floor of wing A. Completion of dismantling formwork from the first-floor roof slab of wing A.



**Figure142:** pouring for the ground floor roof slab (Monthly reports, 2023/2024)

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**On May 27th, 2024:** Start of masonry works for the first floor of wing A.



**Figure143:**masonry works for the first floor (Monthly reports, 2023/2024)

**On May 28th, 2024:** Completion of internal plastering for classrooms in wing A. Concrete pouring for the first-floor columns of wing C.

**On May 30th, 2024:** Start of internal wall plastering works on the ground floor of wing D.

**On June 6th, 2024:** Completion of internal plastering works on the ground floor of wing D.

**On June 10th, 2024:** Completion of formwork for the first-floor roof slab and start of reinforcement works for girders and beams in wing C. Concrete pouring for the roof slab of wing F. Concrete pouring for the foundations of the remaining section of wing I.



**Figure144:**formwork for the first-floor roof slab (Monthly reports, 2023/2024)

**On June 11th, 2024:** Concrete pouring for beams in wing H.



**Figure 145:** Concrete pouring for beams (Monthly reports, 2023/2024)

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**On June 24th, 2024:** Completion of beam formwork dismantling in wing H. Removal of formwork for the ground floor roof slab in wing C. Start of formwork works for the parapet walls in wing I.



**Figure146:**beam formwork dismantling (Monthly reports, 2023/2024)



**Figure147:**formwork works for the parapet walls (Monthly reports, 2023/2024)

**On June 30th, 2024:** Concrete pouring for the first-floor roof slab of wing C. Concrete pouring for the parapet walls in wing I.



**Figure148:**pouring for the first-floor roof slab (Monthly reports, 2023/2024)



**On July 2nd, 2024:** Concrete pouring for the ground floor slab in wing D.

**On July 7th, 2024:** Start of dismantling formwork from the roof slab in wing F.

**On July 14th, 2024:** Concrete pouring for the parapet wall of the roof slab in wing F. Completion of roof formwork removal in wing F.

**On August 8th, 2024:** Concrete pouring for the second-floor roof slab of wing C.



**Figure149:**Concrete pouring for the second-floor roof slab (Monthly reports, 2023/2024)

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**On August 12th, 2024:** Completion of internal plastering and ceiling works on the ground and first floors, as well as floor tiling works on both levels in wings A, B, and D.



**Figure150:**internal plastering and ceiling works on the ground and first floors (Monthly reports, 2023/2024)



**Figure 151:** floor tiling works (Monthly reports, 2023/2024)

**On August 18th, 2024:** Concrete pouring for the metal gate columns at the secondary entrance.

**On August 19th, 2024:** Start of ceramic tile installation works inside the laboratories.



**Figure152 :**ceramic tile installation works (Monthly reports, 2023/2024)

**On August 20th, 2024:** Concrete pouring for the dome structure.



**Figure153 :** Concrete pouring for the dome structure (Monthly reports, 2023/2024)

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**On August 21st, 2024:** Completion of floor tiling works for the first floor of wing C.

**On August 28th, 2024:** Completion of ceramic tile installation works inside the laboratories of wing A.

**On August 29th, 2024:** Start of ceramic tile works on the ground floor of wing B. Completion of the dome decorative finishes.



**Figure154:**Completion of the dome decorative (Monthly reports, 2023/2024)

**17/09/2024:** The concrete for the ground floor slab of Wing H was poured on this day.

**19/09/2024:** Work was completed on covering the internal window sills of the ground floor with granito tiles in Wings A and B. Additionally, the marble cladding of the staircases in Wing B was finished. In Wing E, floor tiling with monocouche was completed, and the external wall cladding work was finalized in Wing F.

**29/09/2024** The marble cladding of the staircases in Wings A and B was completed, along with the ceramic wall covering in the stairwell areas. Marble cladding of the staircases in Wing C commenced, while in Wing D, this task was finalized. The concrete for the stairs leading to the teachers' private entrance in Wing F was poured. Meanwhile, ceramic wall covering work began in Wing G, and concrete works for the columns in Wing I were completed.

**02/10/2024:** Completion of masonry works for the second floor. Start of covering works for the main façade with ALUCOBOND panels in wing C. Completion of internal wall plastering in wing F.



**Figure155:**covering works for the main façade with ALUCOBOND panels (Monthly reports, 2023/2024)

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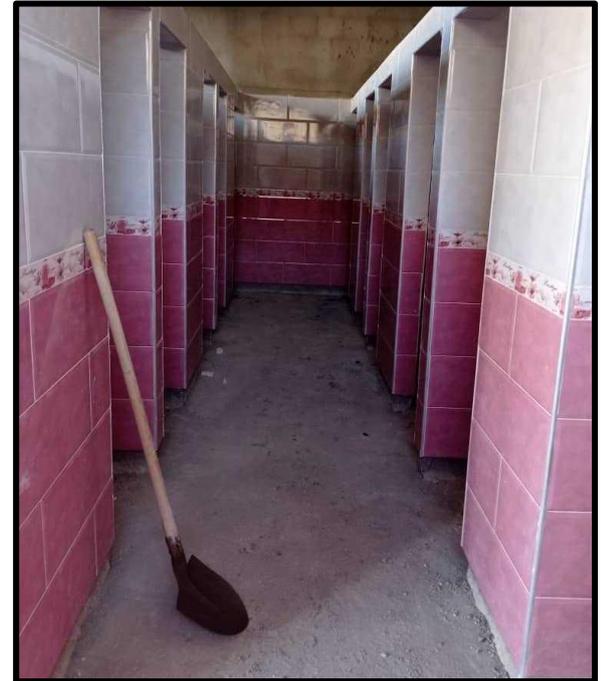
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**03/10/2024:** Completion of internal wall plastering works in wing I.

**17/10/2024:** Completion of covering the ground floor window ledges with granito tiles in wing A.  
Completion of ceramic tile wall covering in wing G.



**Figure156:** covering the ground floor window ledges with granito tiles (Monthly reports, 2023/2024)



**Figure157:**ceramic tile wall covering (Monthly reports, 2023/2024)

**27/10/2024:** Completion of slope-shaped concrete casting in wing A. Completion of beam concrete casting in wing I.

**30/10/2024:**Completion of slab formwork removal and start of reinforcement works in wing I.

**10/11/2024:** Completion of covering the main entrance columns with mosaic tiles.



**Figure158 :**covering the main entrance columns with mosaic tiles (Monthly reports, 2023/2024)

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13/11/2024: Start of waterproofing works.



**Figure159** :waterproofing works (Monthly reports, 2023/2024)

21/11/2024: Completion of ground floor door installation in wings E and D.



**Figure160**: ground floor door installation in wings (Monthly reports, 2023/2024)

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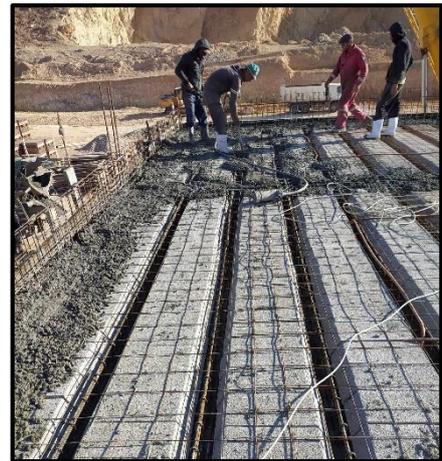
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**05/12/2024:** Completion of window installation works for the first and second floors in wings A, B, E, and D.



**Figure161:** window installation works (Monthly reports, 2023/2024)

**11/12/2024:** Concrete casting for the roof slab in wing I.01



**Figure162:**Concrete casting for the roof slab (Monthly reports, 2023/2024)

**19/12/2024:** Start of laboratory table installation in wings A and B. Completion of waterproofing works in wing C.



**Figure163:** laboratory table installation (Monthly reports, 2023/2024)

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**24/12/2024:** Completion of laboratory table installation. Completion of secondary entrance covering with ALUCOBOND panels. Start of waterproofing works for the roof of wing F.



**Figure164:** secondary entrance covering with ALUCOBOND panels (Monthly reports, 2023/2024)

**12/01/2025:** Completion of ceiling covering works with Placo-Plâtre boards in ground and first floors of wings C, D, and E. Start of installation of water and group washing pipes in wing G.

**14/01/2025:** Completion of installation works for sockets, circuit breakers, and long lamps. Start of PVC door installation. Start of window installation in wing G.



**Figure165:** installation works for sockets, circuit breakers, and long lamps (Monthly reports, 2023/2024)

**16/01/2025:** Start of laboratory water pipe installations in wings A and B. Start of varnish (laque) painting for doors. Completion of masonry works in wing I.



**Figure 166:** varnish (laque) painting for doors (Monthly reports, 2023/2024)

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**Figure167:** of masonry works (Monthly reports, 2023/2024)

**19/01/2025:** Completion of waterproofing works in wing F. Completion of roof slab formwork in wing I.

**23/01/2025:** Completion of rainwater drainage pipe installation in wings A and B.

**26/01/2025:** Completion of inox-glass partition installation in wing C.



**Figure 168:** inox-glass partition installation (Monthly reports, 2023/2024)

**27/01/2025:** The electrical connections for the laboratory tables were completed. Concrete was poured for the sloped roof structure and the teachers' room in the laboratory, and rainwater drainage pipes were installed on the roofs of Wings A and B. Cladding of the stairwell with Alucobond panels was finalized, as well as the installation of Placo-Plâtre ceiling tiles in Wing C. Additionally, the concrete slab for the corridor linking Wings I and H was poured successfully under suitable conditions.



**Figure169:** The electrical connections for the laboratory tables (Monthly reports, 2023/2024)

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**03/02/2025:** Electrical works for the laboratory tables in Wings A and B were completed. Interior wall cladding and the installation of decorative elements on the inner façade of Wing I were also finalized.

**05/02/2025:** Reinforcement and installation of hollow-core elements for the roof slab in Wing H were completed.

**10/02/2025:** Gas pipe installations on the ground and first floors were completed, along with the water and electrical connections for the laboratory tables in Wings A and B. Gas pipe installation in Wing C and in Wing F (both ground and first floors) was also finalized.



**Figure170:**Gas pipe installations (Monthly reports, 2023/2024)

**11/02/2025:** Lacquer paint works for the doors and vinyl paint finishes for internal walls and ceilings were completed in Wings A and B. Similar vinyl paint works were finalized in Wings C, D, and E. PVC doors for the sanitary block in the administration building were also installed.

**16/02/2025:** Waterproofing works for the roofs of Wings D and E were completed. Plumbing works and the installation of steel storage room doors in Wing G were finalized. Reinforcement of beams and overhead girders in Wing I was also finished.

**17/02/2025:** Waterproofing works for the ground floors of Wings A and B were completed.

**19/02/2025:** Steel storage room doors were installed, and vinyl paint works for both external and internal walls were completed.

**25/02/2025:** Marble flooring of the main entrance was completed, along with the concrete pouring for the sloped roof structure in Wing G.

**09/03/2025:** Interior gypsum wall cladding works were completed in Wing I.

**16/03/2025:** Construction works officially started in Wing H.

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18/03/2025: Wall cladding works using MDF panels were completed in Wing F.



**Figure 171:** Wall cladding works using MDF panels (Monthly reports, 2023/2024)

07/04/2025: Tiling of the courtyard floor was completed.



**Figure172:**Tiling of the courtyard floor (Monthly reports, 2023/2024)

21/04/2025: Concrete was poured for the sloped roof structure in Wing I on this date.

### III.2.2. Work Progress as of 29-04-2025

**Table 11 :** Work Progress (Monthly reports, 2023/2024)

Work Item	Current Progress
Earthworks	100% (Completed)
Major Structural Works (HTS Concrete)	100% (Completed)
Major Structural Works (CPA Concrete)	100% (Completed)
Masonry — Concrete Works	Between 98% and 100%, some form slope casting works ongoing in blocks A, B, C, F, H, I
Waterproofing	Ongoing in block F, completed in other areas
Sanitary Plumbing	Between 98% and 100%, with gas pipe installation ongoing in A, B, D, E

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Central Heating	Not yet launched (mentioned in planning, absent in work progress report)
Electricity	Mostly completed (100%), longitudinal light fixtures installation ongoing in A, B, D, E
Joinery (PVC and Metal)	Mostly completed (98%-100%), Alycobond façade cladding in C completed, secondary entrance in D, E pending
Painting (Internal Finishing)	Vinyl wall and ceiling paint in A, B, D, E ongoing, other areas 100% completed
VRD (External Networks and Site Works)	Progress between 60% and 98%, with some works (like Cunette 5%) halted

Although the contractual delivery date for the project was set for 20/06/2024, the work progress status as of 29/04/2025 shows that the completion rate has not exceeded 88%, with a significant number of works still in progress and others halted, particularly in the finishing and external development phases. This notable delay reflects a clear non-compliance with contractual deadlines and directly affects the timely commissioning of the facility, especially since a portion of the essential and complementary works is still underway, resulting in a considerable overrun of the scheduled handover date.

### III.3.1. Comparative study with a project:

#### III.3.1.1. Technical sheet of the project: (OMAD Group, 2022)

Project name: Medium school, class 06 base

Location: Western region of Biskra province,  
at the level of 1,460 public rental housing units (LPL)

Area: 8,000.00 m

Project owner: Directorate of Public Equipment

Study office: OMAD Group

Implementation company: Aba Abdellah Company

Start date: May 28, 2022

Completion period: 10 months



#### III.3.1.2. Project Schedule

TRAVAUX	MOIS	MOIS 01	MOIS 02	MOIS 03	MOIS 04	MOIS 05	MOIS 06	MOIS 07	MOIS 08	MOIS 09	MOIS 10
1- TERRASSEMENT		■									
2- Gros Oeuvre en Infrastructure en (HTS)		■	■								
3- Gros Oeuvre en superstructure en (CPA)			■	■	■						
4- MACONNERIE				■	■	■					
5- ETANCHEITE									■	■	
6- PLOMBERIE sanitaire GAZ										■	■
7- MENUISERIE											■
8- ELECTRICITE											■
9- PEINTURE - VITRERIE											■

Figure173:Project Schedule (OMAD Group, 2022)

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**Table12:** Comparison table between the case study and a reference example (student ‘2025)

Work Item	Case study Planning	Reference Project in Planning	Case study on Site	Reference Project on Site	Interpretation
<b>Site Preparation (Terracing)</b>	4 months	1 month	4 months (started before official ODS and completed 1 month ahead)	3 months (started before ODS from March to April)	Terracing works commenced before the issuance of the <b>Order to Start (ODS)</b> , a clear administrative and technical violation. A <b>justification report</b> should have been issued for this early progress along with a request for a <b>Planning Adjustment Addendum (Avenant)</b> . The reference project had a similar early start but for a shorter period and made use of the wait to prepare the site. The absence of <b>site installation PV</b> and <b>implantation PV</b> at this stage later disrupted infrastructure work coordination.
<b>Major Infrastructure Works</b>	5.5 months	2.5 months	5.5 months (started in April, 1 month delay due to soil issues)	7 months (April to August with soil problems)	Delays caused by poor soil bearing capacity and additional fill operations. However, no <b>ODS for additional works</b> nor <b>Avenant N°1 for deadline extension</b> was issued. Works progressed randomly (“ <b>Bligwa</b> ” method) without coordination with other trades (VRD, water supply). The contractor deviated from the <b>initial planning</b> , which negatively impacted subsequent trades. In the reference project, the issue was handled through <b>technical observation PV</b> and an updated planning.
<b>Major Superstructure Works</b>	8 months	5.5 months	8 months (ongoing, Bligwa method)	5.5 months (June to April, Bligwa method)	Project suffered delays due to non-compliance with a logical work sequence and absence of a <b>detailed task-by-task schedule</b> . The contractor worked on several fronts without completing phases, delaying plumbing and electrical rough-ins. No <b>zone-specific ODS</b> or consistent <b>progress reports</b> were issued. The reference project was better organized with <b>carence PV</b> for each delay and daily site reports.
<b>Construction, Rendering, Tiling</b>	8.5 months	6.5 months	8.5 months (ongoing, Bligwa method)	6.5 months (August to April,	Absence of specific <b>ODS for each stage</b> (construction, rendering, tiling) caused disorganized work progress,

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				Bligwa method)	resulting in overlap with other trades. Monthly progress reports were inconsistent and not reflective of actual site conditions. No <b>order to resume works</b> was issued after interruptions. In contrast, the reference project had daily technical committee supervision despite working Bligwa.
<b>Waterproofing</b>	8 months	1 month	7.5 months (ongoing, Bligwa method)	1 month (January to April)	Severe delay compared to the reference project. No <b>additional works ODS or deadline extension addendum (Avenant)</b> issued, although waterproofing works were affected by delays in structural works. Lack of <b>partial situation PVs and carence PVs</b> for the contractor who executed without

#### III.3.2. Comparative study with applied standards: (Official Gazette, 2021)

According to Article 32 from Executive Decree No. 21-219 dated May 20, 2021, regarding how deadlines and durations are calculated and defined in public works contracts:

#### Article 32 – Methods for Defining and Calculating Deadlines and Durations

#### Article 38: Extension of Execution Deadline and Duration for a Public Works Contract

**Table 13** :Comparative study with applied standards (stuednt, 2025)

Standards	Planning	Reality	Interpretation
Any deadline or duration specified in the contract becomes effective from midnight (00:00) of the day following the date the contract was signed, which marks the official start of the period.	The start date for the works was agreed upon as April 13, 2023.	The contractor started the floor cleaning and project installation on February 14, 2023.	The contractor did not comply with the <b>contractual provisions and regulatory standards</b> , as he began the works one month prior to the issuance of the official <b>Start Order (ODS de démarrage des travaux)</b> . This early commencement was agreed upon with the <b>Architectural Supervisor</b> and the <b>Project Owner (Maitre d’Ouvrage)</b> as an exceptional decision to optimize the <b>mobilization period</b> and avoid delays in the <b>initial site installation and preparatory works</b> . However, no <b>formal Variation Order (ordre de modification)</b> or <b>written</b>

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			<p><b>addendum (Avenant)</b> was issued to regularize this deviation from the approved <b>Baseline Schedule</b>, placing the project in a state of <b>non-conformity with standard time management procedures</b>.</p>
<p>If the deadline is defined in days, it is calculated using calendar days. The deadline concludes at midnight of the final day.</p>	<ol style="list-style-type: none"> <li>1. The earth leveling works in the planning lasted four months.</li> <li>2. The major infrastructure works with special cement were agreed to be completed within a duration of 6 months.</li> <li>3. The major superstructure works were planned to be completed within a duration of 8 months.</li> <li>4. In the schedule, the duration for construction, plastering, and tiling was set at eight and a half months.</li> <li>5. The sealing works were agreed to be completed within a period not exceeding eight months.</li> <li>6. The plumbing works were divided in the schedule into two phases. The first phase lasts two months and starts two months after the beginning of the works, meaning it begins alongside the superstructure works. Then, it pauses for three and a half months before resuming, and it is completed in the</li> </ol>	<ol style="list-style-type: none"> <li>1. The contractor completed the works in two months.</li> <li>2. The major infrastructure works actually lasted 7 months.</li> <li>3. The superstructure works started on 23/01/2024.</li> <li>4. Masonry, cladding, and tiling works started on March 5, 2024, which is two months after the start of the superstructure works, and are still in progress.</li> <li>5. Waterproofing works started on November 13, 2024, which is nine months after the start of the superstructure works, and are still ongoing.</li> <li>6. Sanitary plumbing works started on October 2, 2024, which is eight months after the start of the superstructure works, and are still in progress.</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>The works were completed at a faster pace than planned</b>, creating a discrepancy with the approved <b>Baseline Schedule</b> and without issuing a corresponding <b>Variation Order</b> or formal amendment. This deviation exposes the project to contractual and procedural irregularities.</li> <li>2. <b>Infrastructure works faced delays due to geotechnical constraints</b>, but the work pace still exceeded the originally planned productivity rates in the <b>Master Time Schedule</b>. However, no <b>Recovery Plan</b> or <b>Time Extension Request (TER)</b> was submitted to formally regularize this variance.</li> <li>3. <b>Appropriate mobilization timing</b>, but the critical requirement now is to strictly comply with the remaining <b>Contractual Timeframe</b> and systematically track <b>work progress percentages through</b></li> </ol>

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	<p>13th month. Its total duration is set at seven months.</p> <p>7. The gas installation works start after 10 months from the beginning of the project and are to be completed within a period not exceeding 3 months. These works will run in parallel with the plumbing works.</p> <p>8. The electrical works will run in parallel with the infrastructure works for a duration of two months, then pause for four months, before resuming and being completed after an additional five months.</p> <p>9. The carpentry works (wood, PVC, aluminum, and iron) have been set to last for five months and will be completed alongside the electrical works.</p> <p>10. The painting and glazing works started 11 months after the commencement of the project.</p> <p>11. The external works began in the middle of the 3rd month from the start of the project and were carried out in parallel with the superstructure works. They then paused after three and a half months for a duration of three months, before</p>	<p>7. Gas installation works began on January 10, 2025, after the sanitary plumbing works, and are still in progress.</p> <p>8. Electrical works started on February 23, 2024, 18 days after the start of the masonry works, and are still ongoing.</p> <p>9. Carpentry works (wood, PVC, iron, and aluminum) began on March 1, 2025, and are still ongoing.</p> <p>10. Painting and glazing works started on February 11, 2025, and are still in progress.</p> <p>11. External landscaping works began on November 24, 2024, and are still ongoing.</p>	<p><b>KPIs and Monthly Progress Reports.</b> Regular and detailed <b>internal site control and supervision reports</b> are mandatory at this stage.</p> <p>4. <b>Progress currently aligns with the approved schedule</b>, provided <b>execution quality</b> is continuously monitored alongside work speed. Close control through <b>Daily Site Visit Reports (PV de visite de chantier journalier)</b> is recommended.</p> <p>5. <b>A serious 9-month delay after superstructure launch</b>, which will inevitably disrupt <b>second-fix activities</b> (painting, carpentry). This indicates poor <b>prioritization and sequencing management</b>. An urgent <b>schedule rescheduling (programme réajusté)</b> and application of possible <b>Delay Penalties</b> are required.</p> <p>6. <b>8-month delay due to coordination failures</b> between <b>technical supervision</b> and the contractor, risking <b>trade overlapping (chevauchement des corps d'état secondaires)</b> and loss of control over the site workflow. Absence of <b>Time Extension</b></p>
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	<p>resuming and being completed in an additional three months.</p>		<p><b>Requests (TER)</b> worsens the situation.</p> <p>7. <b>Off-plan sequencing</b> — this activity should have run in parallel with <b>plumbing and HVAC</b>. Poor coordination between <b>technical trades</b> caused significant delays in both interior and external finishing. No <b>Variation Order</b> or corrective action was issued.</p> <p>8. <b>Acceptable start timing</b>, yet it's vital to manage <b>work stoppages (arrêts de chantier)</b> and ensure <b>service network readiness</b> before proceeding to finishing. A relatively positive point if paired with proper <b>progress monitoring tools</b>.</p> <p>9. <b>Noticeable delay; this work package should be synchronized with electrical installations</b>. Its misalignment will inevitably affect <b>painting and glazing</b>, leading to <b>workflow conflicts</b> and <b>schedule management issues</b> due to the lack of a <b>Look-Ahead Schedule</b> and continuous control.</p> <p>10. <b>Acceptable start</b>, however, it will be directly impacted by <b>pending joinery and carpentry works</b>. An urgent <b>accelerated work plan (plan d'accélération)</b> is needed to minimize</p>
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			<p>cumulative delays and prevent disruption to final handover.</p> <p>11. <b>A critical 9-month delay in waterproofing</b>, one of the most damaging scheduling errors. It risks delaying <b>Provisional Acceptance (réception provisoire)</b> procedures. This scope should have been progressively executed alongside <b>superstructure works</b> as per <b>planned sequencing requirements</b>.</p>
<p>Should the final day fall on an official public holiday, the deadline is automatically extended to the next working day, ending at midnight.</p>	<p>The Eid al-Fitr holiday, as well as the regular weekend days, were not explicitly identified or accounted for within the project planning schedule.</p>	<p>April 14, 2024, construction works on the project site were officially suspended due to the Eid al-Fitr holiday, Friday — traditionally observed as a weekend day which extended over a period of three days.</p>	<p><b>Construction works on the project site were officially suspended following an ODS d'arrêt des travaux (Work Suspension Order)</b> due to the <b>Eid al-Fitr holiday</b>, which extended over three days. This <b>unforeseen downtime</b> was neither anticipated nor formally incorporated into the <b>Baseline Schedule</b> or covered by a <b>Work Variation Order (ordre de modification)</b>.</p> <p>Additionally, <b>Fridays</b>, traditionally observed as <b>non-working days</b>, were not designated as official <b>non-working periods within the approved Time Schedule</b>, which reflects a deficiency in <b>calendar setting and</b></p>

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			<p><b>resource allocation planning.</b></p> <p>Consequently, these unforeseen and unaccounted <b>interruptions and unplanned idle times</b> contributed directly to a delay in reaching the <b>Contractual Deadline (Délai contractuel)</b>. The absence of an immediate <b>Time Extension Request (TER)</b> or an updated <b>Recovery Plan (Plan de rattrapage)</b> to absorb these stoppages worsened the situation and affected the final <b>Provisional Acceptance (Réception provisoire)</b> target.</p>
<p>If the deadline or duration is specified in months, it is counted from the date in the starting month to the corresponding date in the final month.</p>	<ol style="list-style-type: none"> <li>1. The earth leveling works were agreed to start on 14/04/2024, with a duration of four months, meaning they were to be completed on 14/08/2024</li> <li>2. The major infrastructure works in the planning were set to start one and a half months after the earth leveling works, i.e., on March 31, 2023. The duration for their completion was set at 6</li> </ol>	<ol style="list-style-type: none"> <li>1. The earth leveling works began on 14/02/2023 and were completed on 12/04/2023</li> <li>2. The major infrastructure works started on April 16, 2023, and were completed on November 16, 2023.</li> <li>3. The superstructure works started on <b>23/01/2023</b> and have not yet been completed.</li> <li>4. All the remaining works have been delayed</li> </ol>	<ol style="list-style-type: none"> <li>1. The work was <b>delivered faster than planned</b>, which constitutes a clear contradiction to the contractual standard. According to the <b>Contractual Deadline (Délai contractuel)</b>, delivery was scheduled for <b>August 14, 2024</b>, on the same day within the specified month. However, it was completed prematurely, two months ahead of the planned date. Such early completion, without issuing a formal <b>Variation Order (Ordre de modification)</b> or obtaining approval from the <b>Project Owner (Maitre d’Ouvrage)</b>, represents a breach of</li> </ol>

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	<p>months, meaning they were to be delivered on September 31, 2023.</p> <p>3. The major superstructure works were scheduled to start one month after the infrastructure works, on <b>31/04/2023</b>.</p>	<p>compared to what was planned in the approved schedule, and none of them have been delivered to date, as they are still in progress.</p>	<p>the agreed <b>Baseline Schedule</b> and regulatory procedures.</p> <p>2. According to the approved planning, <b>major infrastructure works (Gros Œuvre en infrastructure)</b> were to commence on <b>31/03/2023</b> and be completed within 6 months by <b>31/09/2023</b>. In actual practice, works started <b>16 days late, on 16/04/2023</b>, and finished on <b>16/11/2023</b>, accumulating a total delay of <b>46 calendar days</b> beyond the scheduled completion date. This constitutes a clear <b>non-compliance with planning standards</b>, which stipulate both start and finish dates to fall on the corresponding days of the specified month. Immediate <b>corrective action</b> and <b>schedule re-adjustment (réajustement du planning)</b> should have been undertaken after the initial delay to avoid impacting subsequent project phases and the final <b>Provisional Acceptance (Réception provisoire)</b>.</p> <p>3. As per the approved schedule, <b>superstructure works (Gros Œuvre en superstructure)</b> were planned to start <b>one</b></p>
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			<p><b>month after infrastructure works, on 31/04/2023.</b> In reality, they began much earlier on <b>23/01/2023</b>, reflecting a <b>3-month deviation</b> from the scheduled date. This early start, though it may seem advantageous, constitutes a formal breach of the <b>agreed project timeline</b> and disrupts the logical sequencing of project activities. It critically affects the scheduling of dependent activities and risks creating <b>workflow conflicts</b> and resource misallocations. Immediate <b>programme adjustment (programme réajusté)</b> and formal <b>Avenant de prorogation</b> should have been implemented to restore control over the <b>Baseline Schedule</b>.</p> <p>4. The fact that <b>all remaining works have experienced delays compared to the approved schedule</b> and none have been completed to date represents a <b>substantial deviation from the original Master Time Schedule</b>. This indicates weak <b>schedule control (Pilotage du planning)</b> and a clear absence of <b>corrective</b></p>
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			<p><b>interventions</b> following early delays. The cumulative delays across successive phases increase the risk of <b>overlapping works</b> (<b>Chevauchement des corps d'état secondaires</b>), <b>resource conflicts</b>, and ultimately jeopardize <b>execution quality</b>. It is imperative to conduct an urgent <b>project progress reassessment</b>, revise the <b>Baseline Schedule</b>, implement a <b>Recovery Plan (Plan de rattrapage)</b>, and activate strict <b>monitoring mechanisms</b> to compensate for lost time and preserve the final <b>Contractual Deadline (Délai contractuel)</b>.</p>
<p>If the final month lacks a corresponding date (e.g., from January 31 to a shorter month), the deadline ends on the last day of that month, also at midnight.</p>	<ul style="list-style-type: none"> <li>• According to the approved schedule, earthworks were planned to start on 14/04/2024 and last for 4 months, with completion expected on 14/08/2024. The infrastructure works were scheduled to start on 31/03/2023 and be completed within 6 months, by 31/09/2023. As for the superstructure</li> </ul>	<ul style="list-style-type: none"> <li>• In reality, the earthworks were completed 2 months ahead of schedule, on 12/04/2023 instead of 14/06/2023, which contradicts the standard that states delivery should occur on the same day in the specified month. The</li> </ul>	<p>It appears that the project is experiencing <b>multiple deviations from the approved Baseline Schedule</b>, with certain tasks commencing <b>behind schedule (delayed start dates)</b> and others being <b>completed prematurely (advanced completions)</b>, both of which contradict the provisions of the <b>Contractual Deadline (Délai contractuel)</b> and standard project controls.</p> <p>This irregular progress sequencing highlights a deficiency in <b>schedule control and performance monitoring (Pilotage et suivi</b></p>

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	<p>works, they were planned to start on 31/04/2023. However, since April does not have 31 days, the works should have started on the last day of April, i.e., 30/04/2023.</p>	<p>infrastructure works started with a delay of 16 days on 16/04/2023 and were completed on 16/11/2023, resulting in a total delay of 46 days compared to the scheduled completion date. As for the superstructure works, they were supposed to start on 30/04/2023, but in reality, they began on 23/01/2023, which is a delay of about 3 months, and they have not yet been completed. These deviations from the planned schedule require urgent corrective actions to ensure adherence to the final project deadlines.</p>	<p><b>d'avancement</b>). Accordingly, an urgent <b>project timeline reassessment and programme rescheduling (Réajustement du planning)</b> is required, alongside immediate implementation of <b>corrective actions (Actions correctives)</b> and, if necessary, issuing <b>Variation Orders (Ordres de modification)</b> or <b>Time Extension Requests (TER)</b> to regularize deviations and ensure compliance with planned deadlines.</p>
<p>The extension of the execution deadline for a public works contract must</p>	<p>According to the approved project schedule, in the event of any delays or obstacles during execution, it was</p>	<p>In the actual execution of the project, despite several recorded delays in the start and</p>	<p>No official <b>Time Extension Request (TER)</b> or <b>Avenant de prorogation des délais</b> was recorded despite the presence of significant delays,</p>

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<p>occur <b>before</b> the scheduled completion date for the works, without affecting the periods related to execution deadlines.</p>	<p>necessary to submit an <b>official request for an extension of the execution deadline before the scheduled completion date</b>. This is in accordance with the administrative standard, which requires maintaining the periods related to execution deadlines. This procedure allows the project owner to control the contractual timelines legally and ensures the continuity of the works without violating the regulatory framework or affecting the subsequent phases.</p>	<p>completion of certain works, no official request for a deadline extension was submitted before the agreed completion date. This constitutes a regulatory non-compliance with the standard applied to public works contracts and exposes the project to potential legal and administrative consequences, especially regarding phase overlaps and exceeding the overall project duration without an updated contractual framework.</p>	<p>which constitutes a breach of the applicable <b>contractual and regulatory procedures</b> governing the management of project schedules.</p> <p>As a result, it was necessary to implement <b>close performance monitoring through Daily and Monthly Progress Reports</b>, and formally request a <b>contractual deadline extension (Prorogation du Délai contractuel)</b> within the prescribed time limits to avoid <b>activity overlapping (Chevauchement des corps d'état)</b> and to ensure adherence to the final delivery date specified in the <b>Contractual Timeframe (Délai contractuel)</b>.</p> <p>For future projects, it is essential to enforce <b>strict time control mechanisms (Contrôle rigoureux des délais)</b>, continuously track schedule performance through <b>Baseline and Look-Ahead Schedules</b>, and activate <b>contractual legal procedures</b> such as <b>Work Suspension Orders (ODS d'arrêt des travaux)</b>, <b>Variation Orders (Ordres de modification)</b>, and official extensions at the appropriate moments to maintain workflow discipline and guarantee orderly project execution.</p>
<p>All extensions must be subject to a formal order from the contracting authority, based on a report</p>	<p>According to the approved schedule, the project was supposed to be executed according to specific deadlines, including the determination of start</p>	<p>However, in reality, no official extension was recorded for the work despite significant delays in several phases of the project. The</p>	<p>By comparing the <b>planned timeline (Baseline Schedule)</b> with actual site progress, it is clear that the project experienced <b>significant delays across multiple phases</b>. Although the</p>

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<p>justifying the reason for the extension, and must indicate the new final deadline for completion.</p>	<p>and end dates for each phase of the work. It was expected that official extension requests would be submitted in case of any unexpected delays, following the regulatory procedures that require providing a justified report for the reason behind the delay, along with a new final deadline for completing the work.</p>	<p>regulatory procedures for requesting an extension were not followed accurately, which affected the progress of the project and led to delays in some phases. Despite the unplanned delays, no official reports were submitted to request an extension, meaning the project was not executed in accordance with the procedures outlined in the scheduling plan.</p>	<p>approved schedule incorporated clear mechanisms for managing delays — including the submission of <b>official Time Extension Requests (TER)</b> with justifications and the issuance of a revised <b>Contractual Deadline (Délai contractuel)</b> — these contractual procedures were not applied in practice.</p> <p>The failure to issue <b>formal extension requests (Avenants de prorogation des délais)</b> despite substantial delays led to <b>task overlapping (Chevauchement des activités)</b> and failure to meet key milestones within the <b>Contractual Timeframe</b>. These irregular practices are inconsistent with the <b>regulatory procedures defined within the approved project schedule</b> and have placed the project in a state of <b>non-compliance</b>.</p> <p>Accordingly, immediate intervention is required through the implementation of a <b>programme rescheduling (Réajustement du planning)</b>, submission of pending <b>Time Extension Requests</b>, and strict enforcement of <b>schedule control and coordination measures</b> to recover progress and ensure the project’s final delivery within the agreed contractual deadlines.</p>
<p>1 When the contract specifies installment-based payments, and</p>	<p>In the approved project planning, it was expected that the payments would be</p>	<p>in reality, the payment for Annex No. 2 was delayed, which goes against</p>	<p>The <b>delay in payment as per Annex 2 (payment schedule)</b> had a direct negative impact on the project’s progress, as</p>

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<p>the delay in payment impacts the timeline for completing certain milestones, the contractor may request a deadline extension. This extension will be assessed in light of the justification provided and will only apply to the portion of the work affected by the delayed payment.</p>	<p>made according to the payment schedule specified in the contract. The payments should be aligned with the completion of specific project milestones. The received payments were intended to ensure the continuity of work according to the timelines set in the project schedule. In case of delays in payments, an official request for an extension should have been submitted, along with a justification explaining how the delayed payment would affect the progress of the work.</p>	<p>the expectations outlined in the planning. No action was taken to address the delayed payments, and work continued despite the payment delays. This led to overlapping stages in the execution of tasks and failure to meet the scheduled delivery dates. With the absence of corrective actions, such as submitting requests for deadline extensions due to payment delays, the progress of the work was directly impacted, reflecting poor project and financial management practices.</p>	<p>no <b>corrective contractual action</b>, such as submitting a <b>Time Extension Request (TER)</b> with proper justification, was undertaken to account for this financial delay. This situation reflects a clear flaw in both <b>project financial management and administrative contract management</b> processes, which inevitably affects the pace of work execution.</p> <p>In standard practice, in cases of <b>payment delays</b>, it is expected to activate appropriate <b>contractual procedures</b>, including the submission of a <b>formal Time Extension Request (Avenant de prorogation des délais)</b> accompanied by a justified explanation, to adjust the <b>Contractual Deadline (Délai contractuel)</b> accordingly. However, in this case, those procedures were not applied, and the works proceeded despite the financial gap, causing cumulative scheduling risks and leaving the project out of compliance with its approved <b>Baseline Schedule</b>.</p> <p>This situation clearly highlights the necessity of <b>close coordination between the financial, contractual, and technical components of project management</b> to ensure that any financial constraints do not negatively impact <b>work progress, scheduling milestones, or final delivery deadlines</b>.</p>
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### III.4.1. Constraints and causes encountered in the project:

#### **Change from a two-story to a single-story design**

The project underwent a major change during execution following the client's decision to modify the initial two-level building plan to a single-level building. This change required a revision of the technical and architectural study, with the excavation depth modified from 4 meters and 1.5 meters to a single depth of 9 meters.

In accordance with public procurement rules:

- The ETP had to request a work stoppage order to formally halt the project.
- A report had to be drawn up justifying the additional and supplementary work, specifying the reasons for and impact of this change.
- Obtain an ODS to start the additional and supplementary work after validation of the new provisions.
- Sign an Amendment No. X to extend the deadlines to adjust the contractual deadline accordingly.

Failure to comply with these procedures exposes the ETP to the application of late penalties in the event of exceeding the initial deadline.

#### **Discovery of suitable soil at a depth of 4 meters**

During the earthworks, and according to the external technical inspection reports and daily site visit reports, it was found that the load-bearing soil was at a uniform depth of 4 meters, contrary to the initial plans.

This contingency is a technical contingency beyond the control of the ETP and required:

- The immediate issuance of an ODS to stop the work.
- The technical study to be updated.
- An ODS to be requested to resume work in accordance with the new data.
- An amendment to be signed to extend the deadlines in the event of an impact on the schedule, indicating the number of months added.
- The monthly progress report to be updated to justify the impact of this contingency on the provisional schedule.

#### **Delay in the execution of Addendum No. 2**

The infrastructure work was delayed due to the ETP's failure to comply with the provisions of Addendum No. 2 relating to additional earthworks and backfilling, as well as unforeseen services.

This delay constitutes a breach of contract by the ETP, as it is an amendment that was signed and incorporated into the initial contract.

In this case:

- A deficiency report had to be drawn up to record the failure.



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- Monitoring work progress.
- Directing resources toward critical tasks.
- Analyzing time-related risks and making decisions based on precise time priorities.

The absence of this information in the analyzed timeline reduces the effectiveness of time monitoring and makes it difficult to:

- Track critical time slippages.
- Assess the time impact of any delay on the overall project duration.
- Identify urgent intervention points in case of obstacles or imbalances at the site.

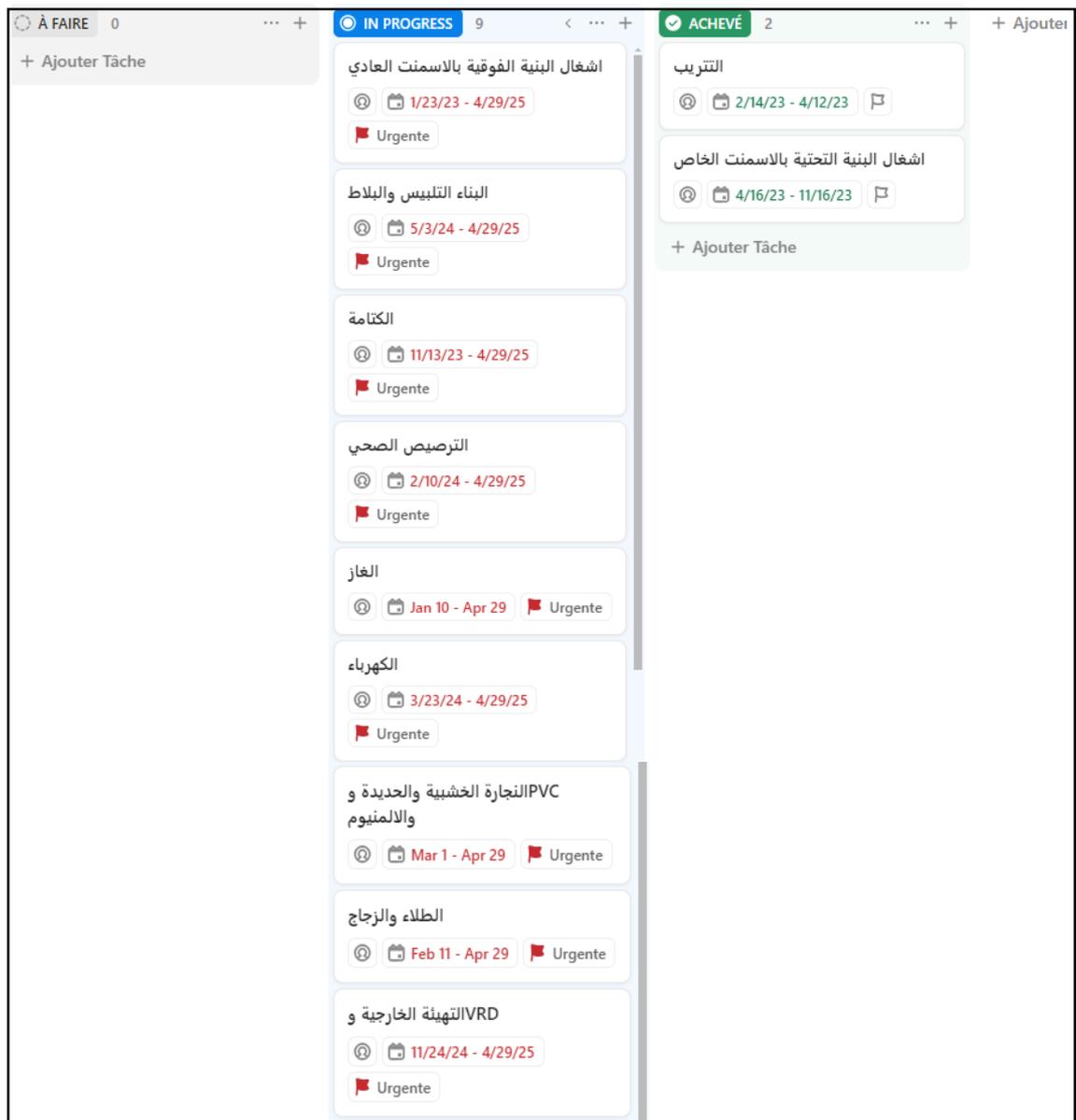
It also leads to a reduction in transparency during monitoring by the project owner and oversight office, and may hinder the preparation of accurate and justified time ext\*ensions in case of delays.

## Chapter III: Management study in the case study

### III4.2.2. Analysis of the schedule aspect using CKLIC-UP



Nom	Assigné	Date d'échéance	Priorité
اشغال البنية الفوقية بالاسمنت العادي	👤	Apr 29	Urgente
البناء التلبيس والبلاط	👤	Apr 29	Urgente
الكتابة	👤	Apr 29	Urgente
التزويص الصحي	👤	Apr 29	Urgente
الغاز	👤	Apr 29	Urgente
الكهرباء	👤	Apr 29	Urgente
والالمنيوم PVC النجارة الخشبية والحديدة و	👤	Apr 29	Urgente
الطلاء والزجاج	👤	Apr 29	Urgente
VRD التهيئة الخارجية و	👤	Apr 29	Urgente



**À FAIRE** 0

**IN PROGRESS** 9

**ACHEVÉ** 2

**À FAIRE**

- اشغال البنية الفوقية بالاسمنت العادي  
1/23/23 - 4/29/25  
Urgente
- البناء التلبيس والبلاط  
5/3/24 - 4/29/25  
Urgente
- الكتابة  
11/13/23 - 4/29/25  
Urgente
- التزويص الصحي  
2/10/24 - 4/29/25  
Urgente
- الغاز  
Jan 10 - Apr 29  
Urgente
- الكهرباء  
3/23/24 - 4/29/25  
Urgente
- والالمنيوم PVC النجارة الخشبية والحديدة و  
Mar 1 - Apr 29  
Urgente
- الطلاء والزجاج  
Feb 11 - Apr 29  
Urgente
- VRD التهيئة الخارجية و  
11/24/24 - 4/29/25  
Urgente

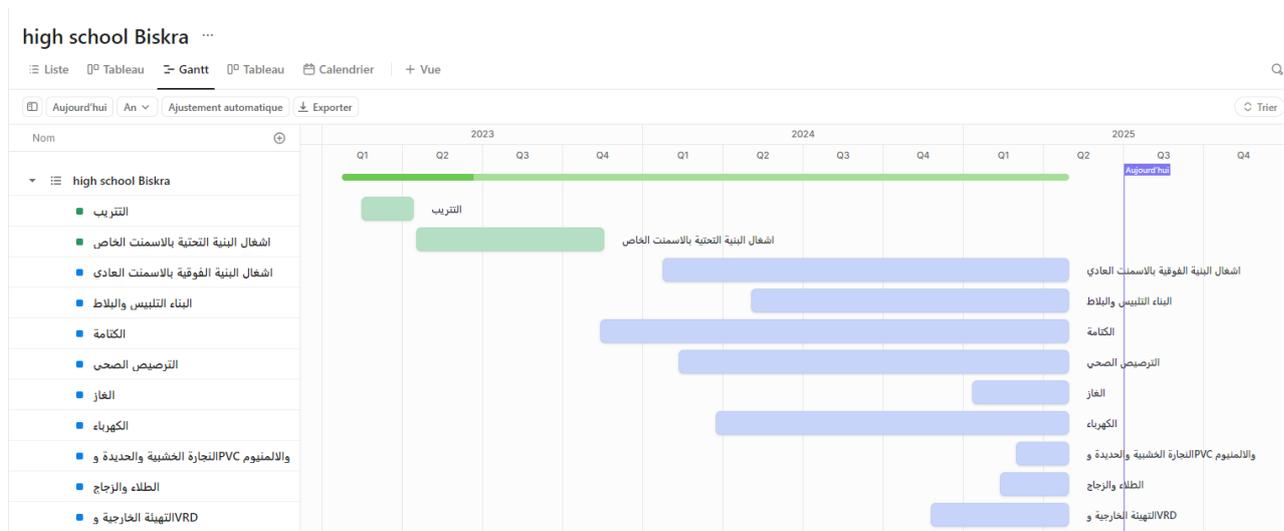
**ACHEVÉ**

- التتريب  
2/14/23 - 4/12/23
- اشغال البنية التحتية بالاسمنت الخاص  
4/16/23 - 11/16/23

Figure175: The actual planning of the work progress using cklic-up (student, 2025)

## Chapter III: Management study in the case study

Using the ClickUp program, the project's **To Do list** was identified, showing the tasks that have been completed, those currently in progress, and those that have not yet been started.



**Figure176:**The actual planning of the work progress using cklik-up (student, 2025)

The planning in the ClickUp program shows the same information as the planning in Microsoft Project.

After reviewing the progress status of the works and comparing it with the initial project schedule (Planning), the following observations were made:

### **Partial Compliance with Deadlines**

Some activities were completed within the scheduled deadlines; however, this compliance was limited to minor tasks and did not cover the major and critical activities of the project.

### **Significant Delays Recorded**

Several essential tasks experienced substantial delays compared to the planned dates, which threatens the final delivery date of the project.

### **Lack of Accurate Monitoring of the Critical Path**

No effective follow-up of the critical path was observed, despite its importance in controlling the project's timeline. This represents a clear shortcoming in the time management methodology applied to the works.

### **Irregular Workflow Progression**

The execution of works experienced disruptions due to the failure to respect the logical sequencing of activities as established in the approved schedule.

### **Weak Coordination Between Stakeholders**

It was noted that there is a coordination deficiency between the contractor, the design office, and the supervision office, which negatively impacted the timely handling of scheduling deviations.

### **Absence of Updated Time Appendices**

Despite the evident delays, the contractor did not take the initiative to prepare or propose official, justified updated time appendices to redefine the remaining completion deadlines.

## Chapter III: Management study in the case study

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### **Poor Management of Human and Material Resources**

There was no observed effort to redistribute or reinforce resources in favor of critical or delayed activities, which further aggravated the project delays.

### **Exceeding the Contractual Execution Period**

The contractor exceeded the initially scheduled duration (14 months) without delivering the project or providing official justifications, which constitutes a clear breach of contract terms.

### **Non-compliance with the Planned Execution Sequence**

The contractor began work on the **educational block**, followed by the **administrative block**, then the **sanitary block**, and is currently completing the **restaurant**, thus disregarding the planned sequence of execution. This resulted in on-site workflow disruptions and delays in the interdependent tasks of the other blocks.

## III.5 Orientations and solutions :

### **Project Guidelines and Solutions Based on the Current Work Analysis Compared to the Schedule:**

Based on the detailed analysis of the current status of the work progress and its comparison with the initial schedule, several key challenges that have significantly impacted the progress of work can be identified. In this context, we propose the following solutions aimed at improving the workflow and ensuring the desired progress in the project, with the aim of reducing delays and minimizing their negative effects on the timeline.

Prepare an extension agreement to cover recorded delays and adjust the contractual deadline with a new revised schedule.

Extract and update the critical path using planning tools (Primavera/MS Project) to identify the critical path for delayed work and tasks that must be prioritized.

Reorder and sequence the works according to priority and direct impact on the critical path, with an adjusted readjusted schedule.

Reinforce resources in terms of manpower, equipment, and tools via a Supplementary Service Order requiring the contractor to mobilize additional teams and sufficient equipment.

Require the contractor to respect the sequence of works by issuing a Supplementary Service Order that specifies the logical sequence of work and does not allow any activity to be performed before the previous one has been completed.

Hold weekly technical coordination meetings attended by the project owner, the design office, the supervision office, and the contractor, with minutes of the meeting signed by all parties.

Organize work in rotation by dividing teams into day or night shifts especially for critical and essential activities to make up for delays.

Accelerate the pace of work under Addendum No. 2 by using a special Supplementary Service Order and strengthening human and material resources with strict field supervision.

Apply penalties for delays as stipulated in the penal clause when delays continue without justification, with a penalty calculated for each week of delay.

Prepare a daily schedule that specifies the daily tasks for each team with clear timelines and objectives in order to control time and resources.

Reschedule all delayed activities as intermediate tasks with new deadlines specified for each sub-activity.

Improve coordination between stakeholders through the adoption of a WhatsApp technical group or a daily digital platform for sharing reports, photos, and monitoring work in real time.

### **Chapter III: Management study in the case study**

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Prepare justified time extension addenda for each new delay, specifying the activity concerned, the reason for the delay, the duration of the extension, and proposed solutions.

Accelerate the approval of modifications by issuing a provisional service order allowing urgent work to begin before final approval.

Organize preparatory work to clean up the site (as the ground was littered with waste) as an urgent step before completing the rest of the work.

Allocate qualified resources to critical works to ensure speed of completion and quality of execution.

Continuously update the critical path on a weekly basis, monitoring the difference between planned and actual progress.

#### **Conclusion:**

In conclusion, the study revealed that managing a construction company requires careful monitoring of both material and human resources, as well as tracking the progress of work according to the established schedule. Through the comparative analysis between the actual work progress and the approved timeline, it was concluded that significant deviations could negatively affect the project's progress. Additionally, the standards related to deadlines outlined in the Algerian Official Gazette provide an important framework for monitoring and evaluation, but may need updates to address the practical challenges that companies face on-site.

It became clear that improving coordination between the contractor, the design office, and the monitoring office, along with enhancing their focus on the critical path, is the key to reducing future delays. Furthermore, the importance of allocating additional resources when necessary was emphasized to ensure faster completion of critical activities, which contributes to minimizing the negative impacts on the project.

## General conclusion

At the conclusion of this dissertation, entitled “*Deadline Planning and Operational Monitoring of a Project: Case Study of a High School*”, which combined theoretical foundations with field application, several key findings were established, enabling the study to address its main research problem, answer its questions, and achieve its initial objectives.

The study confirmed that educational construction projects in Algeria frequently encounter serious operational challenges, particularly during critical periods. These difficulties often stem from weak coordination between stakeholders — notably the contractor (ETP), the design office (BET), and the technical control office — insufficient allocation of human and material resources, and poor control over the critical path (*chemin critique*), leading to significant time deviations (*écarts de délai*) that threaten to delay the *délai contractuel* and affect the quality of works.

Furthermore, the comparison between actual site progress and the pre-approved *planning prévisionnel* highlighted several discrepancies, revealing the limitations of traditional scheduling and monitoring methods in handling increasingly complex projects. It also emphasized the necessity of adopting modern digital scheduling tools, notably **Microsoft Project**, which demonstrated its efficiency in recalculating schedules (*planning recalculé*), detecting gaps early, and enabling timely corrective measures, including the issuance of **service orders (ODS)** and contract **amendments (avenants)** when necessary.

In terms of research questions, the study succeeded in:

- Identifying effective tools for project scheduling and operational monitoring, with a clear recommendation for integrating modern digital tools into site management.
- Proposing an organizational model for systematic daily monitoring of critical activities and continuous coordination between project parties.
- Diagnosing the primary field difficulties encountered in educational projects and suggesting flexible, realistic solutions to address them.

As for the study’s objectives:

- The first was achieved by demonstrating the impact of continuous operational monitoring in managing project delays.
- The second was fulfilled by evaluating the role of precise field monitoring in workflow control and deadline adherence.
- The third was accomplished by analyzing how proper scheduling directly influences resource management and project pacing.
- The fourth objective was realized through assessing the balance between cost, time, and quality in educational projects.
- Finally, the fifth objective was met by presenting practical recommendations to improve time management and operational monitoring practices in future projects.

In conclusion, this research established a practical, evidence-based framework for managing educational construction projects in Algeria, advocating for the adoption of proactive, flexible scheduling methods, continuous field monitoring of the *chemin critique*, and the integration of digital tools like **MS Project**. It also stressed the importance of revising regulatory texts related to *délais d’exécution* to better reflect field realities and technical challenges.

Ultimately, achieving the desired objectives within contractual deadlines depends on three essential pillars:

- Regular and effective coordination between all project stakeholders through periodic meetings and weekly monitoring sessions.
- Accurate, daily on-site follow-up of critical and priority activities with immediate corrective actions when deviations arise.
- Reinforcement of site resources during sensitive periods to avoid delays without compromising work quality.

**This study thus provides a structured operational model and practical recommendations that can serve as a valuable reference for similar educational construction projects in Algeria and comparable contexts.**

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رئنامه الإجازة المتوقعة

مشروع : انجاز ثانوية صنف 300 / 1000 بلدية بسكرة (المنطقة الغربية حي عموري )

حصنة رقم 01: الجناح الاداري + الجناح البيداغوجي + المدرج + نصف داخلية 300 وجبة +VRD.

الخصص / الشهر	01	02	03	04	05	06	07	08	09	10	11	12	13	4
التنظيف														
الأشغال الكبرى: الهيكل الخرساني HTS														
الأشغال الكبرى: الخرسانة العادية CPA														
البناء - التليس - البلاط														
الكتامة														
الترصيص الصحي														
الترصيص الغاز														
الترصيص الكهربائي														
التجارة الخشبية، PVC والحديدية														
الطلاء والزجاج														
VRD														

## الجمهورية الجزائرية الديمقراطية الشعبية

<p><b>رقم العملية:</b> NE 5.622.1.262.107.22.02</p> <p><b>تسمية العملية:</b> انجاز وتجهيز ثانوية صنف 300/1000 وجبة بلدية بسكرة (المنطقة الغربية حي عموري)</p> <p><b>المشروع:</b> انجاز ثانوية صنف 300/1000 وجبة بلدية بسكرة (المنطقة الغربية حي عموري)</p> <p><b>الحصة رقم 01:</b> الجناح الإداري+الجناح البيداغوجي+المدراج+نصف داخلية 300 وجبة +VRD</p> <p><b>مقاول:</b> مؤسسة اشغال العمومية والبناء * برحاييل محمد*</p> <p><b>أمر بالعمل لبدء الأشغال</b></p> <p><b>مقاول:</b> مؤسسة اشغال العمومية والبناء برحاييل محمد الساكن بـ:          اريش القنطرة تحت رقم: 2023/068 بتاريخ: 2023/03/05 المؤشر من طرف مراقب المعالي          تحت رقم: 2023/322 بتاريخ: 2023/04/13 وصدق من طرف المصلحة المتعاقدة تحت          رقم: 2023/622/93 بتاريخ: 2023/04/13 وذلك فاته مدعوا للأخذ والتبليغ نسخة من          الصفحة ومباشرة في الأشغال ابتداء من تاريخ: 2023/04/13</p> <p>يشهد الأمر بالعمل مطبقا لسجل تحت رقم: 137، وهذا الأخير يتم التبليغ          إلى السيد(ة) مسير (ة) برحاييل محمد الساكن بـ: اريس باتنة ، من طرف          السيد مدير التجهيزات العمومية لولاية بسكرة. هذا الأمر بالعمل يسجل تحت          رقم: 137 بتاريخ: 13 أبريل 2023</p> <p><b>عبد الوالي وشفاء المديري</b>  <b>مدير التجهيزات العمومية لولاية بسكرة</b>  <b>بوكرسي محمد</b></p>	<p>وزارة السكن والعمران والمدينة</p> <p>مديرية التجهيزات العمومية ولاية بسكرة</p> <p>ضنرقم الأمر: مسجل: 137 م.ت.م.ع.م.ت.ع/2023</p> <p>التقسيم الفرعي الإقليمي للتجهيزات العمومية لولاية بسكرة</p> <p>التوقيع: محمد البرحاييل</p>
<p><b>رقم العملية:</b> NE 5.622.1.262.107.22.02</p> <p><b>تسمية العملية:</b> انجاز وتجهيز ثانوية صنف 300/1000 وجبة بلدية بسكرة (المنطقة الغربية حي عموري)</p> <p><b>المشروع:</b> انجاز ثانوية صنف 300/1000 وجبة بلدية بسكرة (المنطقة الغربية حي عموري)</p> <p><b>الحصة رقم 01:</b> الجناح الإداري+الجناح البيداغوجي+المدراج+نصف داخلية 300 وجبة +VRD</p> <p><b>مقاول:</b> مؤسسة اشغال العمومية والبناء * برحاييل محمد*</p> <p><b>التبليغ</b></p> <p>هذا الأخير يتم إرفاقه في سجل وان يكون مبعوث من طرف المقاول</p> <p>التقسيم الفرعي الإقليمي للتجهيزات العمومية لولاية بسكرة</p> <p>التوقيع: محمد البرحاييل</p> <p>المقاول: 20 أبريل 2023</p>	<p>مديرية التجهيزات العمومية ولاية بسكرة</p> <p>رقم الأمر: مسجل: ..... م.ت.م.ع.م.ت.ع/2023</p> <p>ملاحظة هذه لوثيقة التبليغ يجب أن تفصل من أمر بالعمل وتحفظ بمكتب القسم الفرعي المؤهل اقليمي.</p> <p>هذا الأخير يتم إرفاقه في سجل وان يكون مبعوث من طرف المقاول</p> <p>التقسيم الفرعي الإقليمي للتجهيزات العمومية لولاية بسكرة</p> <p>التوقيع: محمد البرحاييل</p>

BUREAU D'ETUDES D'ARCHITECTURE ET D'URBANISME  
ZAHZAH ABDELGHANI ARCHITECTE AGREE



مكتب الدراسات المعمارية والعمرائية  
عبد الغني زحزاح مهندس معماري معتمد من طرف الدولة رقم: 06/05/02146 حر

الجمهورية الجزائرية الديمقراطية الشعبية  
مديرية التجهيزات العمومية

## تقرير شهري لمتابعة الاشغال تقرير شهر افريل



المشروع : انجاز و تجهيز ثانوية صنف 300 / 1000 بلدية بسكرة  
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صاحب المشروع: مديرية التجهيزات العمومية لولاية بسكرة

مكتب الدراسات: تجمع مكاتب الدراسات المعمارية والعمرائية زحزاح عبد  
الغني و برحاييل رضوان

المقولة : مقولة الأشغال العمومية والبناء برحاييل محمد

جمهورية الجزائر الديمقراطية الشعبية  
مديرية التجهيزات العمومية  
ولاية بسكرة

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رقم... 8... 0... 3... 2  
بتاريخ... 0... 5... 2008

صفحة

المشروع: انجاز ثانوية صنف 300 / 1000 وجبة بلدية بسكرة (المنطقة الغربية حي عموري)

الحصة رقم 01: الجناح الاداري + الجناح البيداغوجي + المدرج + نصف داخلية 300 وجبة  
VRD+

رقم العملية: NE.5.622.1.262.107.22.02

تسمية العملية: انجاز وتجهيز ثانوية صنف 300/1000 وجبة بلدية بسكرة (المنطقة الغربية حي عموري)

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2008/04/23

المقاولة: مقاونة الأشغال العمومية والبناء

برحنايل محمد

الجمهورية الجزائرية الديمقراطية الشعبية

مديرية التجهيزات العمومية

ولاية بسكرة

دفتر شروط

## ملف الترشيح

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حي عموري )

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الحصة رقم 02 : قاعة رياضة

الحصة رقم 03 : 07 سكنات وظيفية

رقم العملية: .....

تسمية العملية: انجاز وتجهيز ثانوية صنف 1000 / 300 ببلدية بسكرة (المنطقة الغربية حي عموري

(

رقم التعريف الجبائي: 000007019004951

العنوان: شارع أحمد ومان بسكرة-

الجمهورية الجزائرية الديمقراطية الشعبية  
مديرية التجهيزات العمومية  
لولاية بسكرة

دفتر شروط

العرض المالي

المشروع : انجاز ثانوية صنف 300 /1000 ببلدية بسكرة (المنطقة الغربية  
حي عموري)

الحصة رقم 01 : الجناح الاداري +الجناح البيداغوجي+ المدرج + نصف داخلية  
300 وجبة +VRD.

الحصة رقم 02 : قاعة رياضة

الحصة رقم 03 : 07 سكنات وظيفية

رقم العملية:

تسمية العملية: انجاز وتجهيز ثانوية صنف Ra 300 / 1000 ببلدية بسكرة (المنطقة الغربية حي  
عموري).

رقم التعريف الجبائي: 000007019004951

العنوان: شارع أحمد ومان - بسكرة

الجمهورية الجزائرية الديمقراطية الشعبية

رسالة التعهد

1/- تحديد المصلحة المتعاقدة :

تعيين المصلحة المتعاقدة : مديرية التجهيزات العمومية لولاية بسكرة

اسم ونقب وصفة الممضي على الصفحة العمومية: بوكرسي محمد مدير التجهيزات العمومية لولاية بسكرة

2/ تقديم المتعهد :

الجمهورية الجزائرية الديمقراطية الشعبية  
مديرية التجهيزات العمومية  
لولاية بسكرة

دفتر شروط

العرض التقني

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رقم العملية: .....

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العنوان: شارع أحمد ومان – بسكرة

République algérienne démocratique et populaire  
MINISTÈRE DE L'HABITAT, DE L'URBANISME ET DE LA VILLE  
Direction des Equipements Publics de Biskra

**GROUPEMENT  
ZAHZAH ET BERREHAIL**

**MARCHÉ**

**MAITRISE D'ŒUVRE**  
**(ETUDE-D'ADAPTATION ET SUIVI)**  
**POUR LA REALISATION D'UN LYCEE**  
**1000/300R A LA CNE DE BISKRA**  
**(ZONE OUEST CITE AMMOURI)**

**Numéro D'opération** :NE 5. 622 .1 .262. 107. 21 .02

**Intitulé de l'opération** : (Etude- Et Suivi)

Pour La Réalisation D'un Lycée 1000/300 repas à La Cne De Biskra (Zone Ouest Cite  
Ammouri)