DECLARATION

I declare that this project/REPORT is a product of my personal research work. It has not been presented in any previous application and any award of any degree at any Polytechnic. The ideas, observations, comments, suggestions are here in present my own convictions, except quotations, which have been acknowledge in accordance with conventional academic traditions. Under the supervisor of Arc. Olanrewaju F.A

STUDENT NAME:

SULYMAN KAMILUDEEN OLAMILEKAN

MATRIC NUMBER:

ND/23/ARC/FT/020

05/08/2025

.....

Signature/Date

CERTIFICATION

This is to certify that this project was carried out by **KAMILUDEEN SULYMAN OLAMILEKAN** with matriculation number **ND/23/ARC/FT/0020** of the Department of Architectural Technology, Institute of Environmental Studies (I.E.S) Kwara State Polytechnic, Ilorin. The project has been read and approved as meeting the requirement for the award of National Diploma (ND) in Architectural Technology. Under the supervisor of Arc. Olanrewaju F. A.

ARC. OLANREWAJU F. A
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Signature/Date

ARC. MRS. TOMORI J.M.
(Head of Department)

11/08/2025
Signature/Date

External Examiner

.....
Signature/Date

A TECHNICAL PROJECT REPORT

ON
PROPOSED DENTAL CLINIC

FOR
MR. AJIBOLA AREMU
AT OGELE, ILORIN, KWARA STATE.

BY
KAMILUDEEN SULYMAN, OLAMILEKAN
ND/23/ARC/FT/0020

SUBMITTED TO:
THE DEPARTMENT
OF
ARCHITECTURAL TECHNOLOGY, INSTITUTE OF ENVIRONMENTAL STUDIES (IES), KWARA STATE POLYTECHNIC.

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF NATIONAL DIPLOMA (ND) IN ARCHITECTURALT ECHNOLOGY

JULY, 2025

DECLARATION

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ARC. OLAREWAJU F.A. .....
(Project Supervisor) Signature/Date

ARC. OLAREWAJU F.A .....
(Project Coordinator) Signature/Date

ARC. MRS. TOMORI J.M .....
(Head of Department) Signature/Date

External Examiner

.....
Signature/Date

DEDICATION

This project is dedicated to Almighty Allah, the all sufficient and most beneficent God for his guidance and grace towards me to and also of my beloved parents MR. and MRS. AJIBOLA and my siblings for their support morally, spiritually, financially and in every other way to see that I finish my program successfully. May Allah Almighty bless and reward them abundantly and every other supporter to my Academic life.

ACKNOWLEDGEMENT

I express gratitude to the Al-Powerful Allah, the Almighty One who created everything and who has kept me alive to this day. I am grateful to him for his love, concern, and guidance in all of my life's endeavors. My appreciation goes to my project supervisor ARC. ADEYEMI F.A for his selfless support and motivation to keep me focus till this very time. Head of Department, ARC. MRS. TOMORI J.M. and also the entire lecturers and staff of the Department of Architectural Technology, for making my learning experience in the Department one to always remember.

I also appreciate my Parents Mr. And Mrs. AJIBOLA may Almighty Allāh provide you all ample reward. My sincere thanks also go to my real friends and classmates. Also, to my loving brother. I can only express my gratitude for your assistance in getting me through this course. May Allah continue to provide you all his favor and blessing (Ameen).

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ABSTRACT

This technical report presents a detailed analysis for the architectural design and planning of a ***Dental clinic****, focusing on the integration of functionality, patient comfort, and operational efficiency. The project aims to create a modern, hygienic, and welcoming environment for both patients and staff while adhering to stringent health and safety standards. The design incorporates an optimized layout that balances clinical treatment areas, patient waiting spaces, administrative functions, and support services. Consideration is given to natural lighting, acoustic control, and air quality to enhance the patient experience. The report also addresses the selection of materials, sustainable practices, and the use of technology to improve the clinic's overall efficiency and patient care. By following evidence-based design principles and industry best practices, this dental clinic design fosters a healing environment while ensuring smooth workflow for dental professionals.*

CHAPTER ONE

1.0 INTRODUCTION

The design of a dental clinic plays a crucial role in shaping the overall experience for both patients and healthcare professionals. As healthcare environments evolve, the architectural approach to dental clinics must address not only functional requirements but also the psychological impact of the space on patients. A well-designed dental clinic promotes patient comfort, enhances operational efficiency, and ensures a safe, hygienic environment that complies with health regulations and standards.

This report explores the architectural design process for a modern dental clinic, emphasizing the integration of various design elements to create a harmonious balance between medical functionality and patient well-being. The design focuses on optimizing space planning, workflow, and the incorporation of advanced technologies while maintaining a welcoming atmosphere. Elements such as natural lighting, acoustics, and privacy are carefully considered to reduce patient anxiety and foster a calm and professional environment. Additionally, the clinic's layout supports efficient movement and interaction between clinical, administrative, and support areas, ensuring a seamless operation.

By adhering to the principles of evidence-based design, the dental clinic not only caters to the needs of the dental professionals but also prioritizes the comfort, safety, and overall experience of patients. This introduction sets the stage for a detailed exploration of the design considerations, challenges, and solutions applied throughout the development of the dental clinic.

1.1 HISTORICAL BACKGROUND OF A DENTAL CLINIC

The evolution of dental clinics has been marked by significant changes in both medical practices and architectural design, shaped by advancements in technology, patient care, and societal views on health and wellness. From rudimentary practices in ancient civilizations to the highly specialized, patient-focused spaces we see today, the design and function of dental clinics have undergone a remarkable transformation.

Early Practices (Pre-18th Century)

In ancient civilizations, dental care was primarily focused on basic oral health maintenance and tooth extraction, performed by individuals with limited medical

training. The Egyptians, Greeks, and Romans used primitive tools made from bone, ivory, and metal to treat dental issues, including tooth decay and abscesses. Dental practices were informal, often conducted by barbers, healers, or craftsmen rather than dedicated professionals. As a result, there were no formal dental "clinics" as we know them today, and treatments were rudimentary, sometimes carried out in private homes or small workshops.

The Birth of Modern Dentistry (18th Century)

The 18th century saw the establishment of dentistry as a recognized medical field, largely due to the contributions of pioneers like Pierre Fauchard, a French dentist credited with laying the foundation for modern dental practices. Fauchard's work in dental surgery, the development of dental instruments, and the introduction of better dental materials marked the beginning of a more scientific approach to dental care. However, dental clinics at this time remained modest spaces—typically private practices run by individual dentists in homes or small rented offices. These early clinics focused primarily on tooth extraction and rudimentary dental treatments.

The Rise of Specialized Dental Clinics (19th Century)

As dental techniques improved in the 19th century, so too did the need for more formalized clinic spaces. The invention of the dental drill, the development of anesthesia, and the introduction of new materials like amalgam fillings transformed dental care, making it more effective and accessible. During this period, dental clinics began to evolve into purpose-built spaces designed to accommodate these new procedures. However, the design of dental clinics remained relatively simple, often consisting of small treatment rooms and waiting areas, with limited attention paid to patient comfort or privacy. The primary concern was the functionality and cleanliness of the spaces, which were designed to ensure hygienic conditions as dental care became more complex.

The Early 20th Century: Modernization and Institutionalization

By the early 20th century, the rise of modern healthcare architecture began to influence the design of dental clinics. The increasing focus on patient care, sterilization, and more sophisticated procedures led to the development of larger, more standardized clinic layouts. Dental clinics were increasingly designed to meet the growing demand for dental services in urban centers, with features such as multiple treatment rooms, sterilization areas, and dedicated waiting spaces for patients. The clinic’s design began to reflect the shift towards a more

professionalized healthcare environment, characterized by improved workflows, the adoption of modern equipment, and a greater emphasis on patient comfort.

Mid to Late 20th Century: Technological Advancements and Aesthetic Considerations

The mid-20th century saw dental clinics become more integrated with the broader healthcare system. The post-World War II era saw advances in dental technology and the widespread use of digital imaging, sedation techniques, and more advanced dental equipment. As a result, the architecture of dental clinics began to focus more on creating efficient, welcoming environments for patients, with attention to aesthetics, lighting, and acoustics to reduce patient anxiety.

This period also saw the rise of specialized dental practices such as orthodontics and periodontics, which influenced clinic layouts. The introduction of open-plan designs and patient-focused spaces became more common, with waiting areas designed to feel less clinical and more comfortable. Dental clinics became less sterile and more inviting, often incorporating elements of interior design that emphasized a calming and pleasant atmosphere.

21st Century: Patient-Centered Design and Technological Integration

Today, dental clinics are highly specialized facilities that integrate advanced technologies, ergonomic designs, and patient-centered care. The architectural focus has shifted to creating spaces that prioritize not only the functional needs of the clinic but also the emotional and psychological comfort of the patients. Modern dental clinics are designed with a strong emphasis on natural light, acoustic control, and air quality to create a calm and healing environment. Open-plan layouts, state-of-the-art dental equipment, and high-tech digital diagnostics are standard features in contemporary clinics.

The design of dental clinics now reflects the growing importance of patient experience, incorporating elements like comfortable waiting areas, private treatment rooms, and child-friendly spaces to cater to a diverse patient base. Additionally, there is a focus on sustainability, with eco-friendly materials, energy-efficient systems, and green building practices being increasingly incorporated into clinic designs..

1.2 PROJECT DEFINITION

Definition of a Dental Clinic

A dental clinic is a healthcare facility specifically designed for the diagnosis, treatment, and prevention of oral health issues. It is a specialized environment where dental professionals, including general dentists, specialists, hygienists, and support staff, provide a range of dental services to patients. These services typically include routine check-ups, dental cleanings, fillings, crowns, extractions, orthodontics, and cosmetic procedures, as well as more advanced treatments such as root canals, dental implants, and surgeries.

1. **Project Overview:**

This report outlines the architectural design and technical specifications for a new Dental Clinic. The project aims to develop a modern, efficient, and patient-centered healthcare facility that promotes the highest standards of dental care while ensuring a comfortable and aesthetically pleasing environment for patients and staff. The clinic will serve as a comprehensive facility offering a wide range of dental services, including general dentistry, cosmetic dentistry, and specialized treatments.

1.3 AIM AND OBJECTIVES

1.3.1 AIM

This project aims to design a state-of-the-art dental clinic that provides a high standard of care while prioritizing patient comfort, operational efficiency, and compliance with health and safety standards. The design will focus on creating a space that is both functional for dental practitioners and inviting for patients, fostering an environment conducive to health, trust, and relaxation. The clinic will incorporate the latest advancements in dental technology and modern architectural practices to deliver an optimal healthcare experience.

1.3.2OBJECTIVES

The primary objectives of this dental clinic design project are:

- **Functionality**: The design will create efficient layouts for clinical, administrative, and support areas that optimize workflow, enhance patient care, and support the daily operations of the clinic.
- **Patient Comfort**: The clinic will prioritize creating a welcoming, comfortable environment that reduces patient anxiety, offering private treatment rooms, relaxing

waiting areas, and pleasant interior design features.

- **Compliance with Regulations**: The design will adhere to all relevant local and international healthcare regulations, ensuring that the clinic meets or exceeds health and safety standards for dental care facilities.
- **Sustainability**: The project will incorporate sustainable design practices, focusing on energy efficiency, eco-friendly materials, and low environmental impact.
- **Technology Integration**: The clinic will be equipped with the latest dental technologies, including digital imaging, automated systems, and ergonomic equipment, to improve treatment efficiency and overall patient experience.

1.4 JUSTIFICATION

The architectural design for this dental clinic has been developed with the primary goal of delivering a highly functional, efficient, and patient-focused healthcare facility. **The justification** for the design lies in its ability to provide an optimal environment for both patients and staff, ensure compliance with healthcare standards, integrate modern technology, and promote long-term sustainability. This approach not only enhances the overall patient experience but also contributes to the clinic's success, operational efficiency, and future adaptability.

1.5 PROJECT SCOPE

Architectural Design

- **Building Layout and Floor Plan**: Development of detailed layouts for all spaces within the clinic, ensuring an efficient and logical flow of patient movement and staff interaction. This includes:
    - **Reception Area**: Design of a welcoming reception area with comfortable seating, clear signage, and accessibility features.
    - **Waiting Area**: Thoughtfully designed to be comfortable and calming, with privacy features and ample seating.
    - **Treatment Rooms**: Multiple treatment rooms designed for general dentistry, cosmetic procedures, and specialized services.
    - **Consultation Rooms**: Private spaces for patient consultations, ensuring confidentiality and comfort.
    - **X-Ray and Imaging Rooms**: Adequately equipped spaces for diagnostic

imaging and other dental technologies.

- **Sterilization and Sanitation Areas**: Dedicated rooms for sterilizing dental tools and equipment to ensure compliance with infection control protocols.
- **Staff Areas**: Including offices, break rooms, storage, and staff restrooms to support the clinic's daily operations.
- **Utility and Mechanical Spaces**: Designated areas for HVAC systems, electrical equipment, water supply, and waste management.

1.6 Compliance and Standards

- **Health and Safety Compliance**: The design will adhere to all local healthcare regulations, including infection control standards, accessibility guidelines (e.g., ADA compliance in the U.S.), fire safety codes, and patient privacy regulations (e.g., HIPAA).
- **Sustainability Standards**: Incorporation of energy-efficient building systems, use of eco-friendly materials, and sustainable design practices to minimize the clinic's environmental footprint.

1.7 Sustainability

- **Energy-Efficient Systems**: Installation of energy-efficient HVAC systems, LED lighting, and natural ventilation techniques to reduce energy consumption.
- **Water Conservation**: Implementation of water-saving fixtures and technologies to minimize the clinic's water usage.
- **Sustainable Materials**: Use of low-impact, durable, and recyclable materials in the construction and finishes to ensure long-term sustainability.

1.8 Circulation and Accessibility

- **Patient Flow Design**: Efficient layout of spaces to allow for smooth patient flow, reducing wait times and ensuring a positive experience.
- **Staff Movement**: The design will ensure that staff can move efficiently between areas such as treatment rooms, sterilization areas, and consultation spaces to streamline operations.
- **Accessibility for All**: Compliance with accessibility standards for people with disabilities, including wheelchair access, accessible restrooms, and elevators if necessary.

1.9 Safety and Security

- **Security Systems**: Design of secure access points, surveillance cameras, and

alarm systems to ensure the safety of patients, staff, and sensitive equipment.

- Fire Safety: Adherence to fire safety codes, including appropriate exits, alarms, and fire suppression systems in critical areas of the clinic.

1.10 Design Scope

The design scope is limited to the design of administration and treatment building only. Developing the layout for key functional areas, including:

Main building units

- Entrance
- Treatment rooms (for general dentistry, specialized care, and surgeries)
- Diagnostic and imaging rooms (equipped with digital X-rays, 3D imaging, etc.)
- Patient waiting areas (designed to reduce anxiety and promote comfort)
- Reception and administrative offices
- Sterilization and storage areas
- Staff rooms (offices, break rooms, etc.)
- Restrooms and other necessary facilities
- Exit

1.11 LIMITATION AND CONSTRAINT

Limitations referred to an imposed restriction that cannot be exceeded or side stepped. The limitations encountered are:

I. Inaccessibility to some area and Retention of information by some of the interviewee during the case study.
II. Difficulty in getting literature materials on the project topic.
III. Financial constrain during the course of the project.

1.12 RESEARCH METHODOLOGY

To achieve a balanced concise planning and design, the following research method were adopted:

I. Case studies
II. Photography

III. Internet review
IV. Oral interview
V. Review of published materials

CHAPTERTWO

2.0 LITERATURE REVIEW AND CASE STUDIES

2.1 REVIEW OF RELIVANT LITERATURE

Workflow Optimization and Functional Layouts

Efficient space planning is crucial for the successful operation of a dental clinic. Studies on workflow in healthcare environments emphasize the importance of minimizing unnecessary movement for staff and patients. The American Institute of Architects (AIA, 2015) suggests that healthcare facilities, including dental clinics, should have clearly defined zones for patient flow. This reduces the risk of contamination, enhances patient care, and maximizes operational efficiency.

- Patient Flow: A well-designed layout allows for smooth transitions between stages of treatment, from reception to consultation, treatment, and post-treatment care. In a study by Kim et al. (2015), dental clinics that adopted efficient layouts saw improvements in patient throughput and reduced waiting times, leading to greater patient satisfaction.

- Staff Movement: The placement of clinical areas relative to sterilization and support zones plays a crucial role in improving staff efficiency and safety. According to Gifford (2007), a design that minimizes staff movement between patient rooms and treatment areas can enhance productivity and reduce staff fatigue.

2.2 Infection Control and Health Regulations

Compliance with health and safety regulations is a critical factor in the design of any healthcare facility. For dental clinics, infection control is a particularly important consideration due to the nature of dental procedures. Research from the Centers for Disease Control and Prevention (CDC, 2003) outlines infection control protocols for dental practices, which include adequate space for sterilization, the use of antimicrobial materials, and proper waste disposal systems.

- Sterilization and Sanitation Areas: Dedicated sterilization rooms are essential in ensuring infection control. The CDC recommends that dental clinics design these areas to prevent cross-contamination and ensure that equipment is properly sanitized (CDC, 2003). A study by Zimmer et al. (2010) emphasized the importance of separate sterilization rooms in reducing the risk of healthcare-associated infections in dental practices.

- Surface Materials: The choice of materials in treatment rooms and common areas is equally important. Non-porous, easy-to-clean surfaces such as stainless steel, vinyl, and antimicrobial coatings reduce the potential for bacterial growth and contamination (Fitzgerald, 2012).

2.3 Sustainability in Healthcare Design

Sustainability has become a critical concern in the design of modern healthcare facilities, including dental clinics. Sustainable building practices not only contribute to environmental protection but also result in long-term cost savings for clinic operators. Studies show that energy-efficient designs, waste reduction systems, and the use of sustainable materials can significantly reduce a clinic's environmental footprint (Carter et al., 2014).

- Energy Efficiency: According to the U.S. Green Building Council (USGBC, 2013), energy-efficient designs can reduce the energy consumption of dental clinics by as much as 30%, lowering operational costs. Features such as LED lighting, high-efficiency HVAC systems, and passive solar heating can all contribute to reducing energy use.

- Water Conservation: The use of water-efficient fixtures in dental clinics, including low-flow faucets and water-saving sterilization equipment, can reduce water usage. A study by the American Water Works Association (AWWA, 2015) found that the incorporation of water-saving technologies in healthcare buildings can cut water consumption by up to 40%.

2.4 SUSTAINABILITY IN HEALTCARE ARCHITECTURE

Sustainability has become a central theme in modern architectural design, particularly in healthcare settings. Studies highlight the importance of incorporating green building practices to reduce the environmental impact of healthcare facilities. According to Kibert (2016), sustainable design principles, such as energy-efficient systems, renewable energy sources, and sustainable materials, are essential for creating environmentally responsible dental clinics. These practices not only reduce operational costs but also serve as educational tools, teaching patients and staff the importance of sustainability through example. The adoption of sustainable design is exemplified in the architecture of modern dental clinics, which incorporate natural ventilation, green roofs, and energy-efficient systems. This approach not only minimizes the carbon footprint of the clinic but also

provides a healthier indoor environment, enhancing the well-being and comfort of both patients and staff (Yeang, 2006)."

2.5 SAFETY AND SECURITY

- Security Systems: Design of secure access points, surveillance cameras, and alarm systems to ensure the safety of patients, staff, and sensitive equipment.
- Fire Safety: Adherence to fire safety codes, including appropriate exits, alarms, and fire suppression systems in critical areas of the clinic.

CHAPTER THREE

3.1 CASE STUDIES

3.1.1 INTRODUCTION

A case study is an in-depth examination of a specific instance, event, or project within a real-world context. It involves the detailed analysis of a single or a small number of subjects, such as buildings, projects, or practices, to understand their complexities, outcomes, and under lying factors. Case studies typically include qualitative and quantitative data collected through various methods such as interviews, observations, and document reviews.

3.2.2 RELEVANCE OF CASE STUDIES TO ARCHITECTURAL DESIGN

1. Learning from Existing Projects:

Case studies provide valuable insights into how similar Architectural projects have been executed. They help designers understand what worked well and what challenges were encountered, offering practical lessons that can be applied to new projects.

2. Understanding Design Solutions:

By examining case studies, Architects can explore different design solutions and approaches used in various buildings. This helps in evaluating the effectiveness of different design strategies in solving specific Architectural problems.

3. Contextual Analysis:

Case studies of ten include information about the context in which a project was designed and built, such as geographical, cultural, and environmental factors. This contextual understanding helps Architects tailor their designs to fit the specific needs and conditions of a new project.

4. Innovation and Trends:

Analyzing case studies can reveal emerging trends and innovative practices in Architecture. This knowledge allows Architects to incorporate contemporary design element sand technologies into their own projects.

5. Problem-Solving:

6. Case studies of ten highlight the challenges faced during a project and the solutions implemented to overcome them. This problem-solving aspect can be instrumental for Architects in anticipating and addressing potential issues in their own designs.

7. Regulatory and Compliance Insights:

8. Case studies can offer insights into how different projects addressed regulatory requirements and compliance issues. Understanding these aspects can aid architects in navigating legal and regulatory challenges in their own designs.

9. Client and User Perspectives:

Case studies often include feedback from clients and users, providing architects with perspectives on the usability and effectiveness of a design. This feedback is valuable for creating designs that meet the needs and expectations of end-users

Outline of Cases Studied

- ILORIN KWARA STATE
- KWARA STATE
- LAGOS STATE

- Online case study 1
- Online case study 2

3.3 CASE STUDY ONE

LOCATION: KWARA STATE GENERAL HOSPITAL ILORIN.

Brief History of Kwara State General Hospital Ilorin

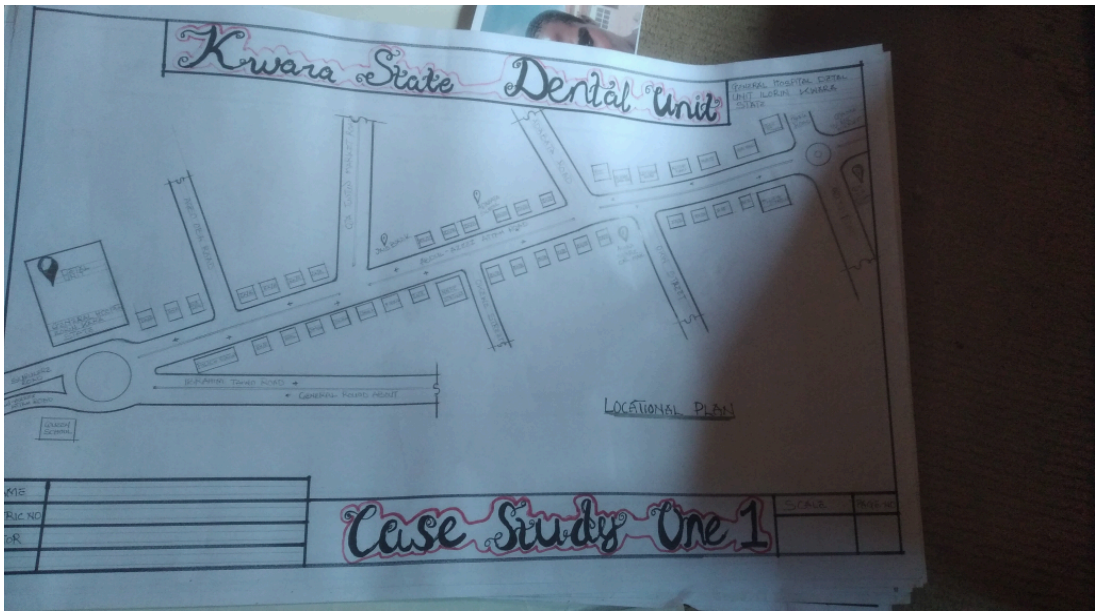


PLATE 3.1: Location Plan for case study one

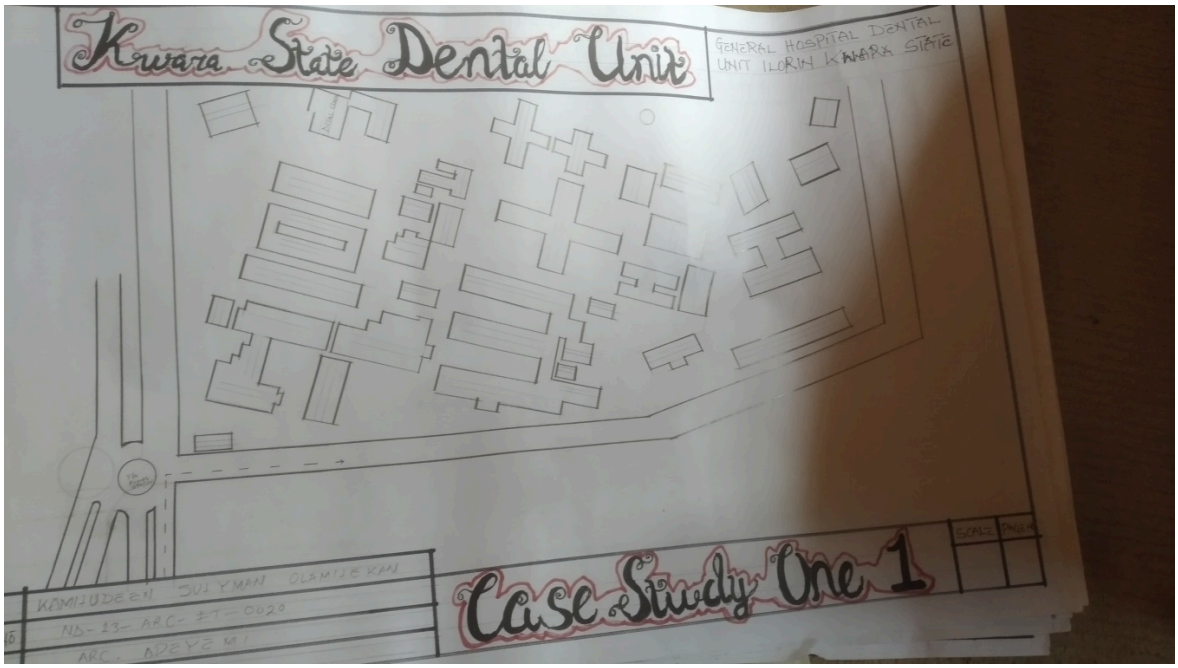


PLATE 3.2: Site Plan for case study one


DENTAL
UNIT

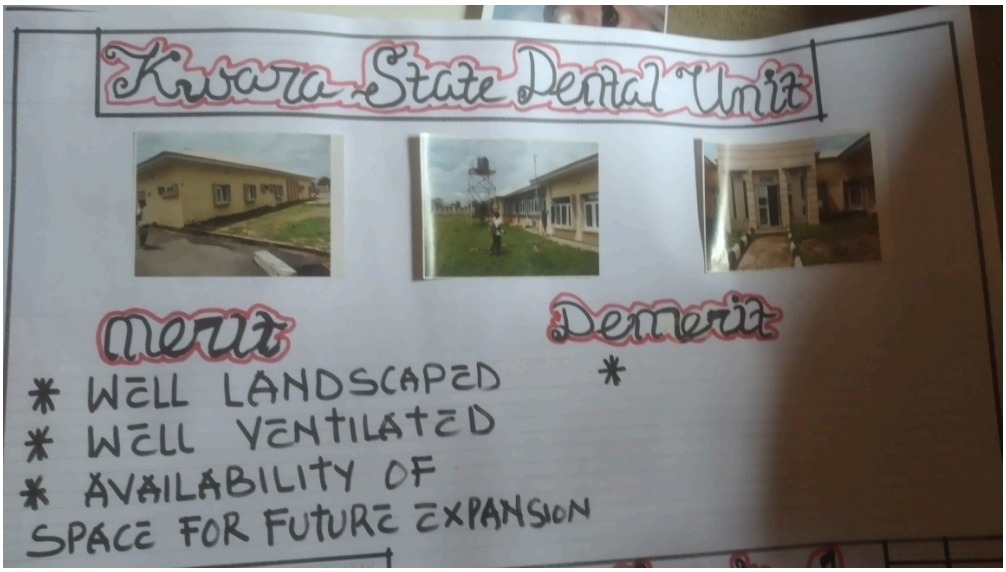


PLATE 3.3: Picture showing the rear view of case study one

OBSERVATIONS

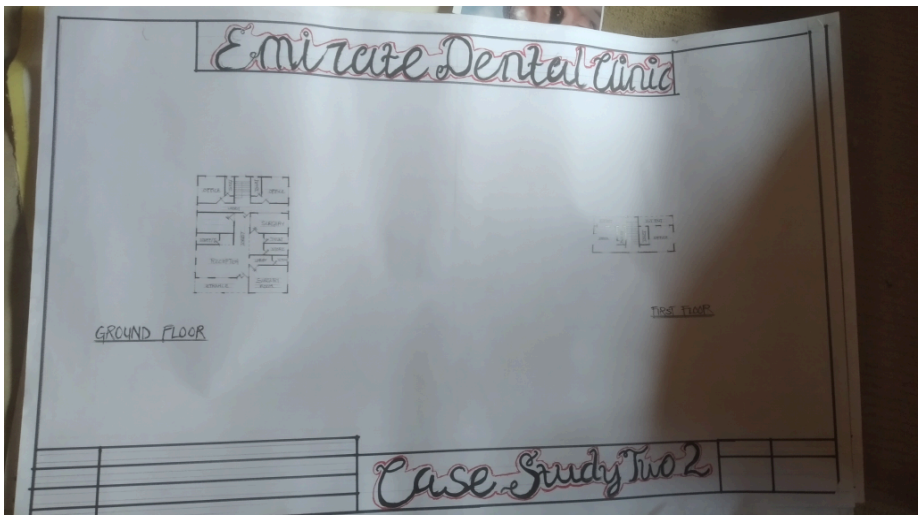
MERITS

- The rooms are well ventilated and adequate lighting
- Well landscap
- Good orientation and the buildings are well arranged

3.4 CASE STUDY TWO

LOCATION: EMIRATE DENTAL CLINIC, KWARA.


Emirate
Dental Clinic
EMIRATE
DENTAL CLINIC
LOCATIONAL PLAN
Case Study Two 2


Emirate Dental Clinic
GROUND FLOOR
FIRST FLOOR
Case Study Two 2

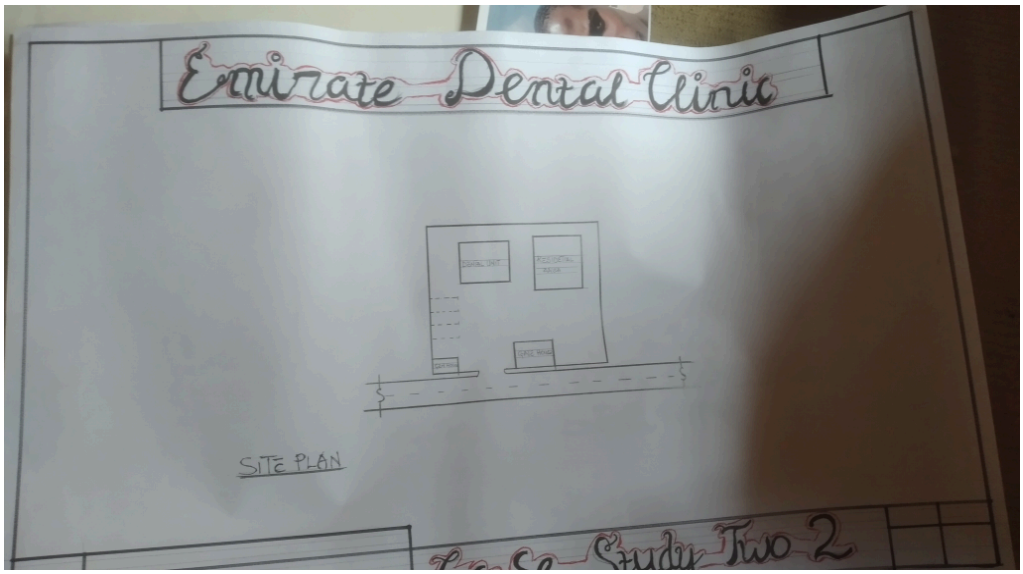


PLATE 3.4: Picture view of case study two

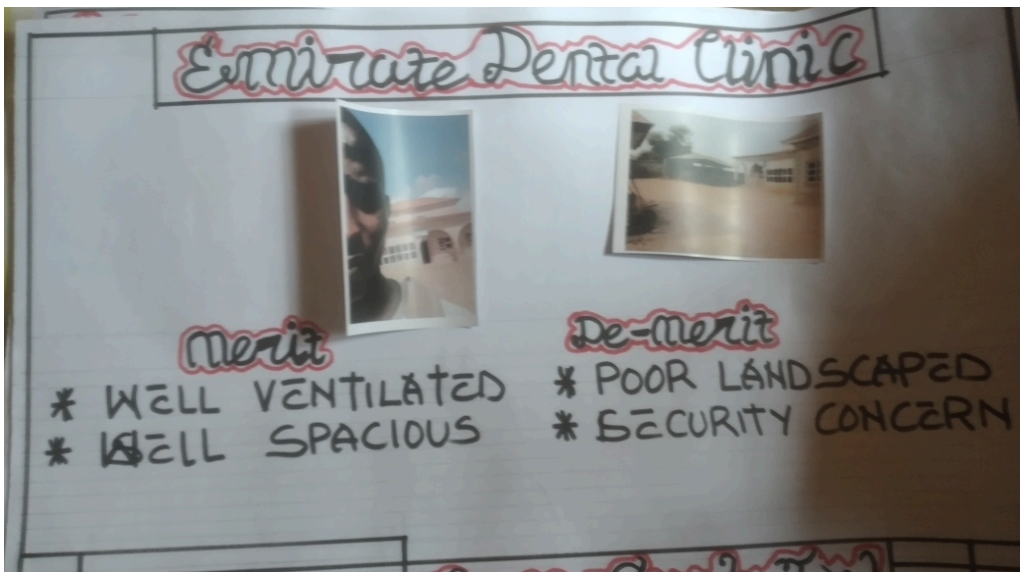


PLATE 3.5: Picture showing the view of case study two

OBSERVATIONS

MERITS

- Well spacious
- Good ventilation

DEMERITS

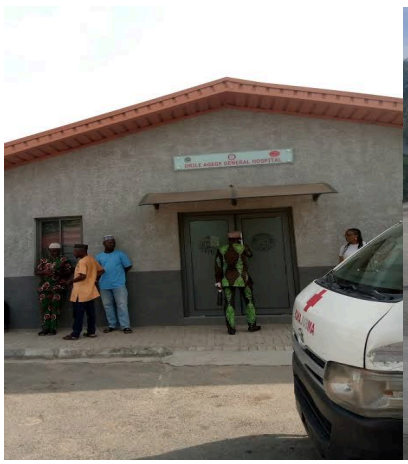
- Poor landscape
- Security concern

3.5 CASE STUDY THREE

LOCATION: LAGOS


LAGOS STATE GOVERNMENT
ORILE-AGEGE
GENERAL HOSPITAL
OLD OTTA ROAD, ORILE-AGEGE, LAGOS
LAGOS STATE GOVERN
ORILE AGEGE GENERAL H


ORILE AGEGE
GENERAL HOSPITAL
DENTAL CENTER
12H
DENTAL
PROTECTION




AMBULANCE

PLATE 3.6:Picture showing view of case study three

OBSERVATIONS

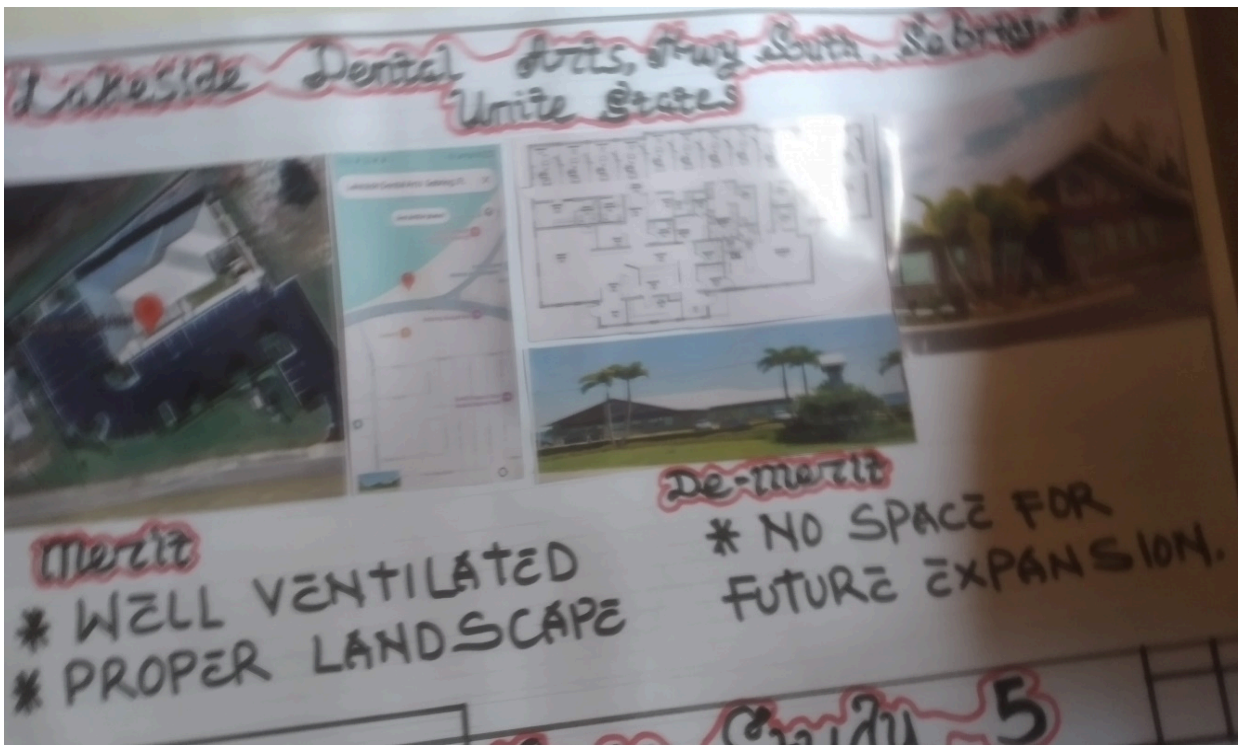
MERITS

- Well ventilated
- Good flooring

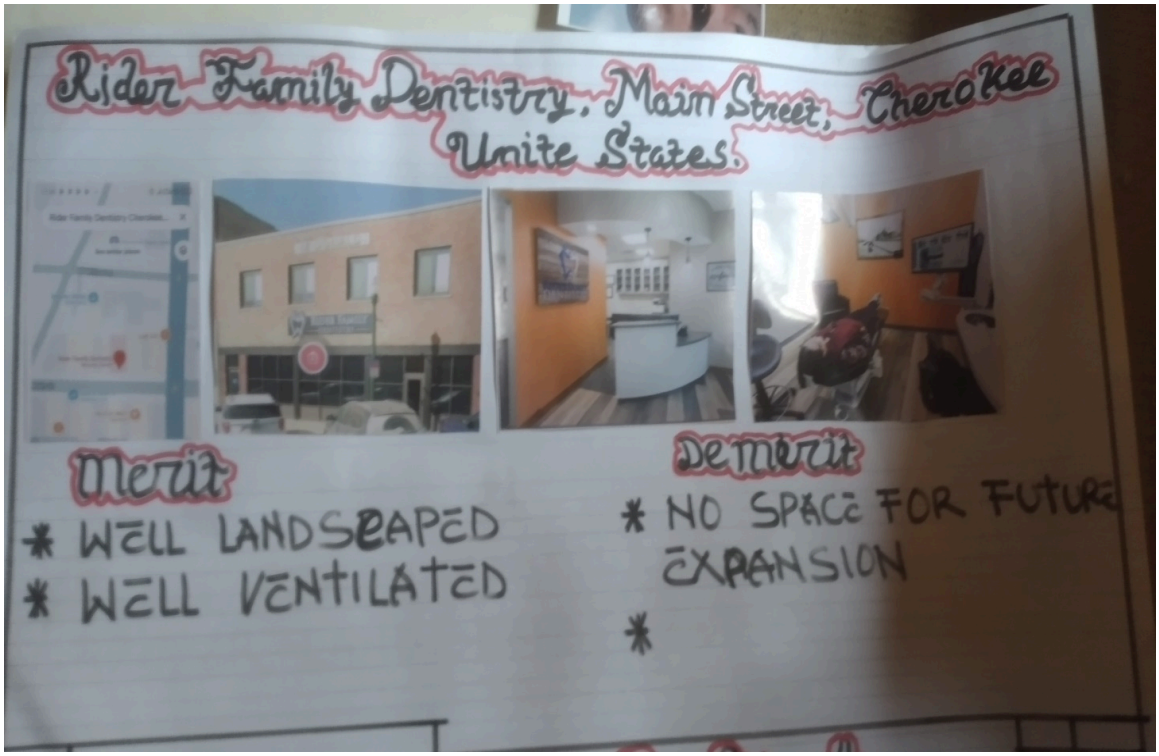
DEMERITS

- Less spacious
- Clumsiness and no nurse room

ONLINE CASE STUDY



ON LINE CASE STUDY 1



ONLINE CASE STUDY 2

DEDUCTION FROM CASESTUDIES

The building lacks adequate passive cooling strategies such as cooling devices also observe poor zooning of activities.

CHAPTER FOUR

4.0 STUDY AREA/PROJECT SITE

4.1 INTRODUCTION

Ilorin, the capital city of Kwara State in Nigeria, holds a rich history shaped by various cultural influences. Established in 1450 as a Yoruba settlement, its strategic location at the crossroads of northern and southern Nigeria facilitated its growth into a significant trading hub.

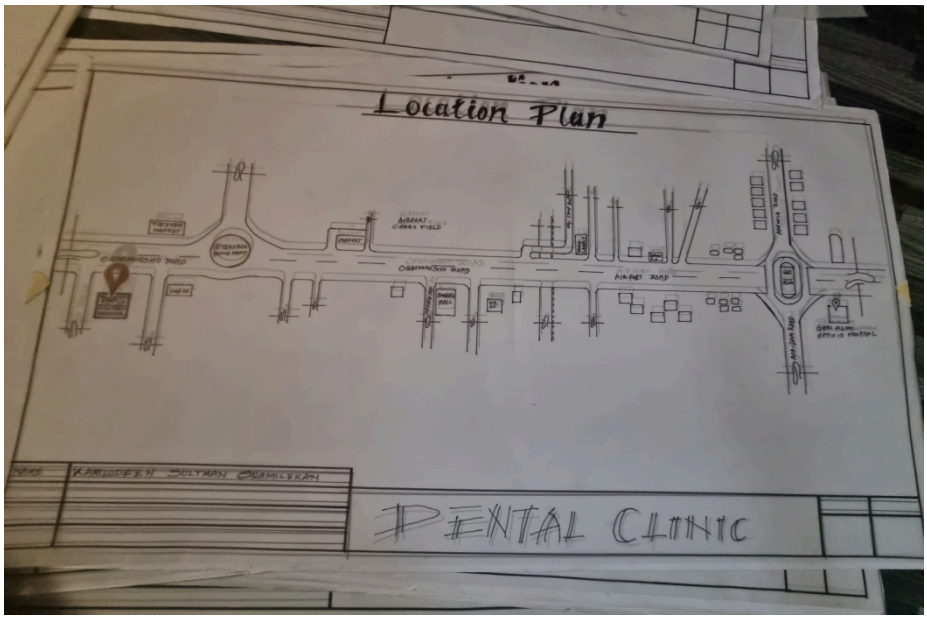
In the early 19th century, Ilorin's history took a pivotal turn during the Fulani Jihad, led by Usman dan Fodio. In 1823, the city was conquered by the Fulani leader Shehu Alimi, transforming it into an emirate under the Sokoto Caliphate's influence. This conquest introduced a blend of Yoruba and Fulani cultures, which remains evident today.

Under British colonial rule in the late 19th and early 20th centuries, Ilorin developed as an administrative and commercial center. Post-independence, it became the capital of Kwara State when the state was created in 1967.

Today, Ilorin is a vibrant city known for its educational institutions, including the University of Ilorin, and its rich cultural heritage, reflecting its diverse historical influences.

4.2 Site Location

The is located at Ogidi in Asa local government



4.2.1 Site Selection Criteria

The site was selected based on the following criteria:

i. Navigation

ii. Accessibility

iii. Electricity

iv. Security

v. Soil Type

vi. Service

i. **Location:**

The site is in proximity to public transportation hub and can be easily Located.

ii. **ACCESSIBILITY:**

The site is easily accessible, due to availability and in good proximity to existing road.

iii. Electricity:

At the location of the site there are distribution of electricity and electric pole seen.

iv. Security:

The site is located in a secure area and proximity to police checkpoint.

v. Soil type:

Sandy and loamy soil type which area stable and suitable for construction seen on site.

vi. Services ;

Easy access to water and water pipes.

4.3 Environmental Features

4.3.1 Vegetation

The vegetation on the site includes safe trees of different species and shrubs. Some of these trees and shrubs will be retained to enhance the landscape and act as windbreaker sand dust filters during the harmattan.

4.3.2 Topography

The site's topography is fairly level, with slight variations that can be leveled to suit the design requirements.

4.3.3 Drainage

There is no existing drainage system on the site, so a new drainage system will be constructed.

4.3.4 Climate

Ilorin experiences a warm climate, with an average daily high temperature of around 33°C. The weather is generally tropical and humid, with distinct wet and dry seasons. The best time to visit Ilorin is from November to March, when the weather is drier and more comfortable for outdoor activities. The wet season, with most precipitation, occurs from April to October, with rainfall peaking between June and September. In Ilorin, February is the sunniest month, with an average of 7 hours of sunshine per day. Conversely, August has the shortest duration of sunshine throughout the year. June is the most humid month, with an average humidity of 87%, while March has lower humidity levels, making it more comfortable.

4.3.5 Noise Sources

The site experiences minimal noise, primarily from the position of zooning ,which are considered after noting the environment and surrounding activities .

4.4 Site Analysis

A site analysis ,including a study of the natural and man-made components present in and around the site, as well as the climatic conditions of Kwara State, was conducted. The analysis takes into account various factors:

i. Rainfall:

Minimum rainfall is recorded in December, while June experiences the most rainfall.

ii. Vegetation and Topography:

The site's vegetation consists of a few trees and shrubs. The site has a gentle slope and highload-bearing capacity soil.

Iii. Prevailing Wind Direction & Sun-Path Angles:

Two predominant winds influence the area: the South West Trade wind and then North East Trade wind. The former, blowing from the Atlantic Ocean, is cold and brings moisture, leading to the wet season. The latter, blowing from the Sahara Desert, is dry and dusty, marking the dry season. Trees will be planted to reduce the effects of wind.

iv. Sunrise and Sunset:

The sunrises in the east at around 6:30-7:00AM and sets in the west at about 6:45PM.

v. Accessibility:

The site is accessible by an existing road leading from adjoining buildings.

vi. Man-made Features:

- **Electricity:** Supplied via overhead cables along the site boundary.
- **Foot paths:** None exist on the site,but a few will be constructed.
- **Noise:** Primarily from adjacent structures.

CHAPTER FIVE

5.0 DESIGN CRITERIA

The proposed design focuses on the development of a Dental Clinic, with an emphasis on fire safety to ensure the safety of patients and staffs.

5.1 Design Considerations

Key factors considered in the design include:

i. Passive and Active Fire Safety

ii. Durability

iii. Functionality

iv. Lighting and Fenestration

v. Sustainability and Materials

vi. Accessibility

vii. Disable Movement

viii. Safety

5.2 Brief Analysis

The Dental clinic will provide occupant with clinical facilities and functional spaces, including:

ix. Therapy room

x. Laboratory/ X-Ray Room

xi. Surgery Rooms

xii. Dentist Offices

xiii. Recovery Room

xiv. Nurse Locker

xv. Restrooms

xvi. Store

xvii. Waiting Area

xviii. Sterilizing/Kitchen

xix. Card Room

xx. Cashier desk

xxi. Pharmacy

xxii. Parking Area

5.3 SPACE ALLOCATION/SCHEDULE OF ACCOMODATION

S/N	SPACES	NO	DIMENSION(m)	AREA(m^2)
1	ENTRANCE	1	10x3	30.6
2	WAITING AREA	1	6.4x13.1	83.8
3	CARD ROOM	1	3.6x3.3	
4	CASHIER	1	3.6x3.4	12.6
5	PHARMACY	1	3.6x3.4	12.6
6	TOILET	2	2.0x1.2	5.2
7	THERAPY	2	3.6x5.0	36.0
8	TOILET	2	1.5x1.2	3.0
9	DENTISIT OFFICE	1	5.0x6.0	30.0
10	DENTIST OFFICE	1	5.0x3.8	19.0
11	NURE LOCKERS	1	5.0x3.6	18.0
12	TOILET	1	2.2x2.0	4.4
13	TOILET	1	3.0x1.2	3.6
14	TOILET	2	2.2x1.4	6.18
15	LAB/X-RAY	1	5.0x3.6	18.0
16	SUEGERY	2	5.0x3.6	36
17	RECOVERY	2	5.0x4.0	40
18	TOILET	2	3.4x1.2	8.16
19	STERILIZING ROOM	1	5.0x2.4	12.0
20	KITCHEN	1	5.0x2.4	12.0
21	STORE	1	5.0x2.38	11.9
22	PRIVATE RECOVERY	1	5.0x2.5	12.5
23	PRIVATE CAR PARK	1	8.3x5.0	42.4
24	EXIT	1	2.5x2.1	5.3

TABLE5.1: Schedule of accommodation

5.4 Design Concept

The design approach is based on functionalism, ensuring the building is designed primarily for its intended purpose.

5.5 Functional Relationship

A functional relationship, often represented by a bubble diagram, illustrate show different units within the design interact and function in relation to each other. This relationship was established before any sketches were made, contributing to the project's overall effectiveness and functionality.

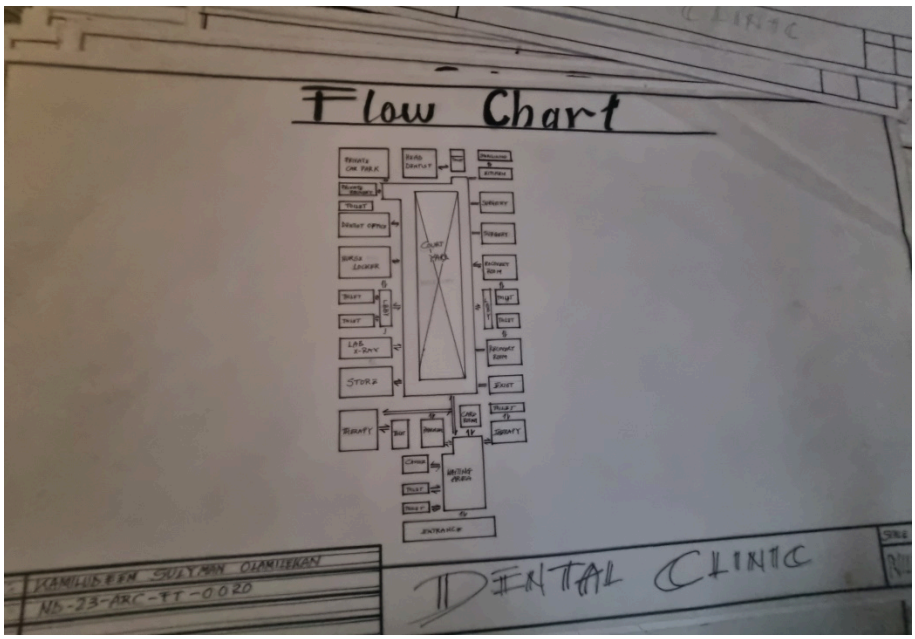


FIGURE 5.1: FUNCTIONAL FLOW CHART

5.6 Conceptual Development

The guiding design concept focuses on creating free-flowing and spacious walkways for Patients and clinic staffs. Additionally, the design aims to simplify movement within the clinic, enhancing accessibility to space units ,offices, and parking areas.

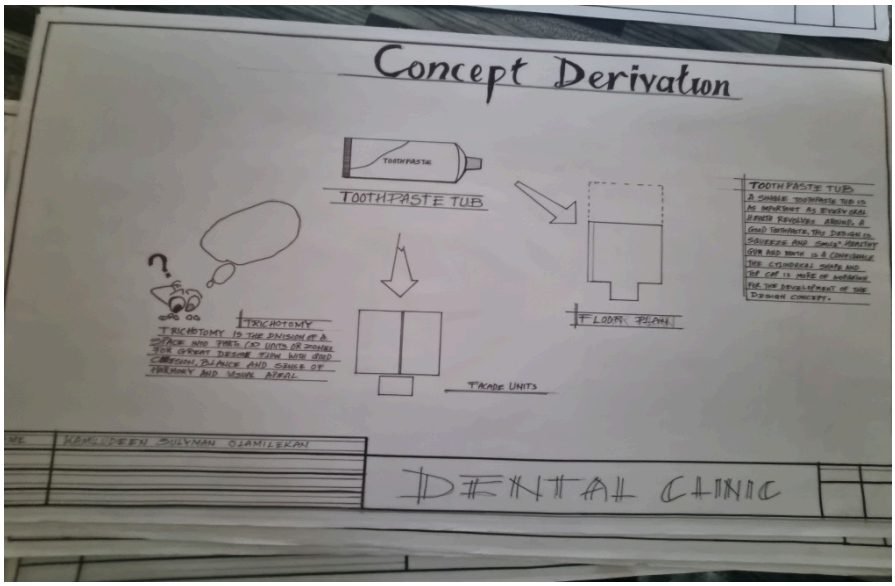


FIGURE 5.2: CONCEPT DERIVATION

5.7 Bubble Diagram

A bubble diagram is a graphical representation that translates functional activities into spatial arrangements, illustrating the connections between spaces and their orientation on the site.

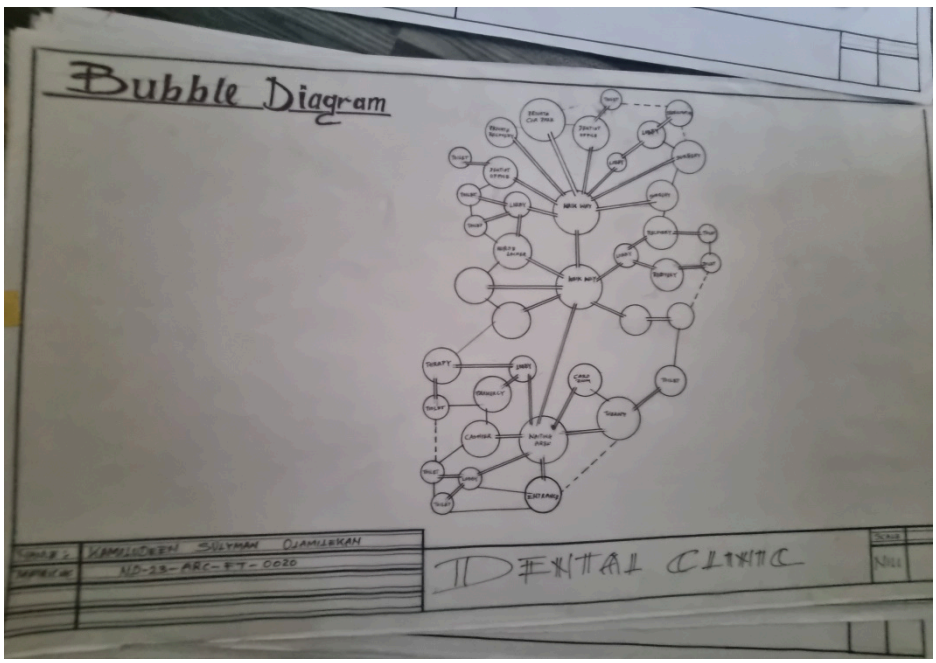


FIGURE 5.3:BUBLE DIAGRAM

5.8 APPROACH TO THE DESIGN / DESIGN REALIZATION

5.8.1 Specifications and Construction

5.8.2 Material and Finishes

The selection of materials and finishes plays a crucial role in ensuring sustainability and hygiene in the dental clinic. The materials and finishes to be used will be discussed in detail.

Walls

Blockwork will be used in conjunction with reinforced concrete columns. For each treatment compartment, the blocks will be filled with concrete to increase its resistance to fire and also reduce the spread. Stone trowel paint or graphite trowel paint can be used as finishes on the walls as natural stone definitely has inherent fire resistance and is easy to clean.

Floors

The floors will generally be composed of mass concrete of adequate thickness (150mm) as the oversite concrete with hard-core filling beneath the mass concrete. The floor finishes would be non-slip ceramic tiles. The tile is non-inflammable, meaning it does not produce smoke flames in a fire, reduces flame spread, and does not burn or give off toxic fumes.

Ceiling

A good ceiling material for a dental clinic must be durable, easily cleaned, of acceptable fire rating, and acoustically accepted. Plaster or acoustic tiles are to be used in corridors to reduce the noise generated by traffic. The acoustical materials and its wrappings must be those that are non-combustible. Fire-rated ceiling with

horizontal protective membrane will be used.

Roof

The trusses roofing structure will be used, while the roof covering will be of aluminum long-span roofing sheets.

Windows and Doors

Dental clinic facility doors should possess the following qualities:

- The doors must be easily operated

- Escape doors must be wide enough and capable of aiding escape in case of emergency.

- Escape doors must open in the direction of escape.

So generally, flush and metal doors, glass panels in aluminum frames will be used throughout.

Aluminum frame casement windows with integrity and insulation glass will be used for the glazing.

Integrity and insulation glass, when exposed to a fire, prevents flames and hot gases from penetrating through and also maintains the average temperature of the unexposed surface to below 140°C.

5.9 Structural System

The structural systems of the proposed project (divided into sub-structure and super -structure) include foundation, walls, columns, beams, roof, etc.

Sub-structure (Foundation)

A foundation is the lower portion of a building structure or substructure that transfers all coming load of the structure to the ground. The foundation system must distribute vertical loads and hold the superstructure of the dental clinic against uplift and racking forces.

The nature, texture, and composition of the soil in the site show that it has a high

load-bearing capacity. The use of a deep strip foundation is being proposed.

Super-structure

The super-structural systems such as walls, floors, and roofs of the proposed dental clinic shall be constructed with adherence to the specifications already stated under the materials and finishes section.

Building Service

Power Supply.

The main source of power supply to the proposed building will be from the University's PHCN. Due to the fluctuation in power from PHCN, it will be connected to the university independent power source to cater for the requirements of the clinic.

Lighting

The effect of natural lighting was greatly considered within the building. This factor is one which is largely considered in buildings. Adequate fenestration is provided within each space for effective luminosity; the courtyards also aid natural lighting flow, while artificial lighting will be in the form of incandescent luminaires which will maximize direct light into the space.

Ventilation

Natural ventilation is also achieved in the building spaces through cross openings in all spaces provided with special interest on the direction of the southwest wind on site. Courtyards, large air spaces, and adequate openings are some design strategies put in place to achieve proper ventilation within the building. The ventilation system is a hybrid of both natural and artificial means. Temperature is controlled actively with the use of mechanical fans.

Fire Protection

This is achieved through passive defense in the clarity of design, good access, creation of buffers between high and low-risk areas, effective circulation lobbies, good means and location of stairways and exits, resistance of materials against spread of flame, and ventilation.

Also, active through detectors, fire alarm systems, and smoke exhaust. These will be in the form of fire hose reels situated in the lobby spaces/staircase of each floor. Fire alarm points will be provided in various places with easy access and control. Adequate escape route will be provided for evacuation of people in case of any emergency.

Plumbing and Electrical Installation

Mechanical and electrical installations within the building are done through conduit pipes passed through specially molded conduit walls; this is in order to ensure that services are concealed in the walls, therefore giving the walls a neater finish.

Water Supply

The major source of water supply for the site is through the use of boreholes channeled to other parts of the building and site through pipes. Consequently, overhead water storage tanks will also be utilized as storage facilities and for use in times of water shortage on campus. This will help in fighting fire in case of any outbreak.

Drainage and Sewage Disposal

Surface water will be drained out to the direction of flow toward the topography of the site while an underground system of sewage disposal such as inspection chambers, septic tanks, and soakaway pits shall be utilized through the connection of 300mm polyvinyl chloride (PVC) channels and pipes.

Refuse Disposal

Solid waste from the site is collected by placing dustbins, open cans, and baskets at strategic positions in every facility provided in the clinic.

5.10 Landscaping and External Works

Landscaping deals with an alteration of the earth's existing features, planting trees, shrubs, and flowers to recreate an environment more habitable, aesthetic, and functional to man.

Landscape features provide a major aesthetic benefit to any environment. The main

objective is to create a good interrelation between the building and the site and to also integrate available site features to its utmost advantage.

For the purpose of this project, both the soft and hard landscape were used. Such as the use of different shrubs and trees that will survive well and add to the environment positively, well-paved walkways for easy access and links to various buildings, proper vehicular access so that there is a well-coordinated flow of traffic within the premises and also provision of adequate parking spaces.

The site can be accessed from two points. The main access (gate) to the dental clinic is from the south-west of the site while the other gate is behind the building. The second gate serves the clinic residents and non-clinic visitors such as people who come for services. Both accesses are for easy accessibility and movement.

5.11 Conclusion

The architectural design of a dental clinic involves the integration of various functional, aesthetic, and safety considerations to create an environment conducive to dental care and patient comfort. Throughout this project, a comprehensive analysis of site selection, environmental impact, and design principles has been conducted to ensure the proposed dental clinic meets the highest standards of healthcare infrastructure.

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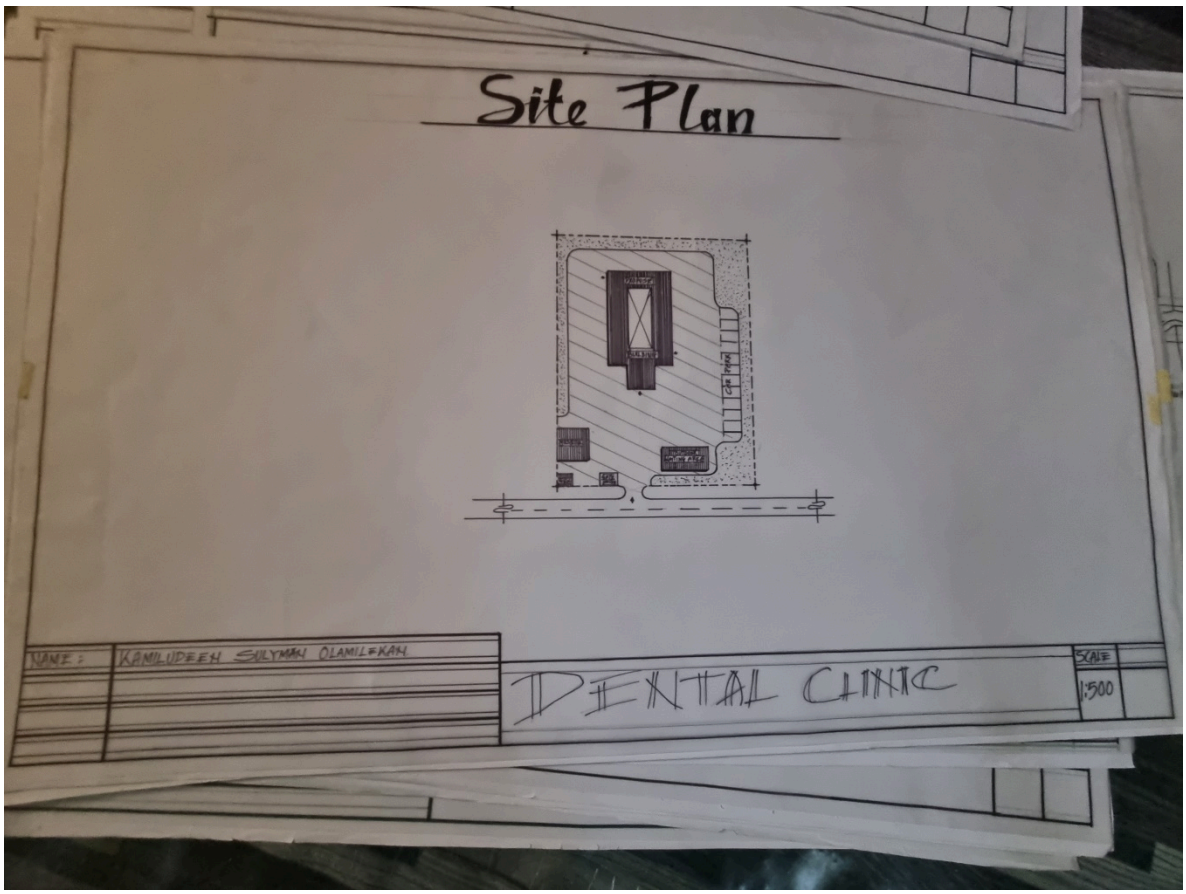

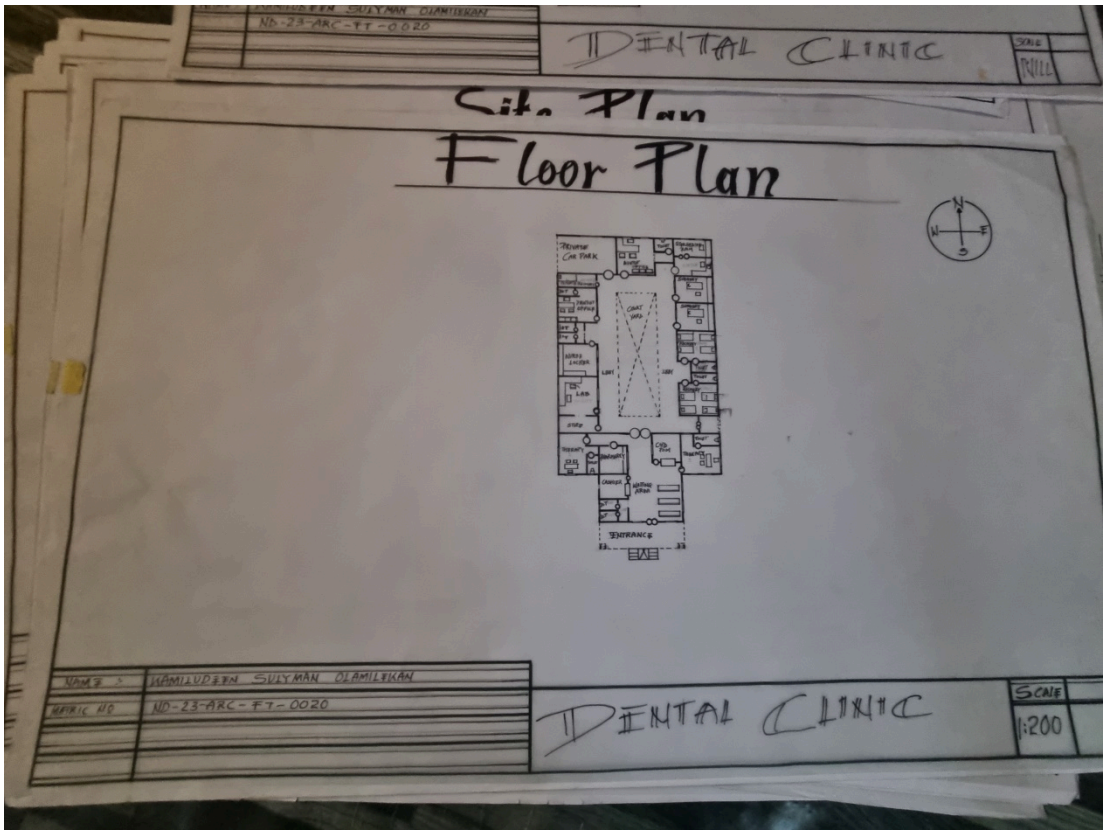
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Floor Plan
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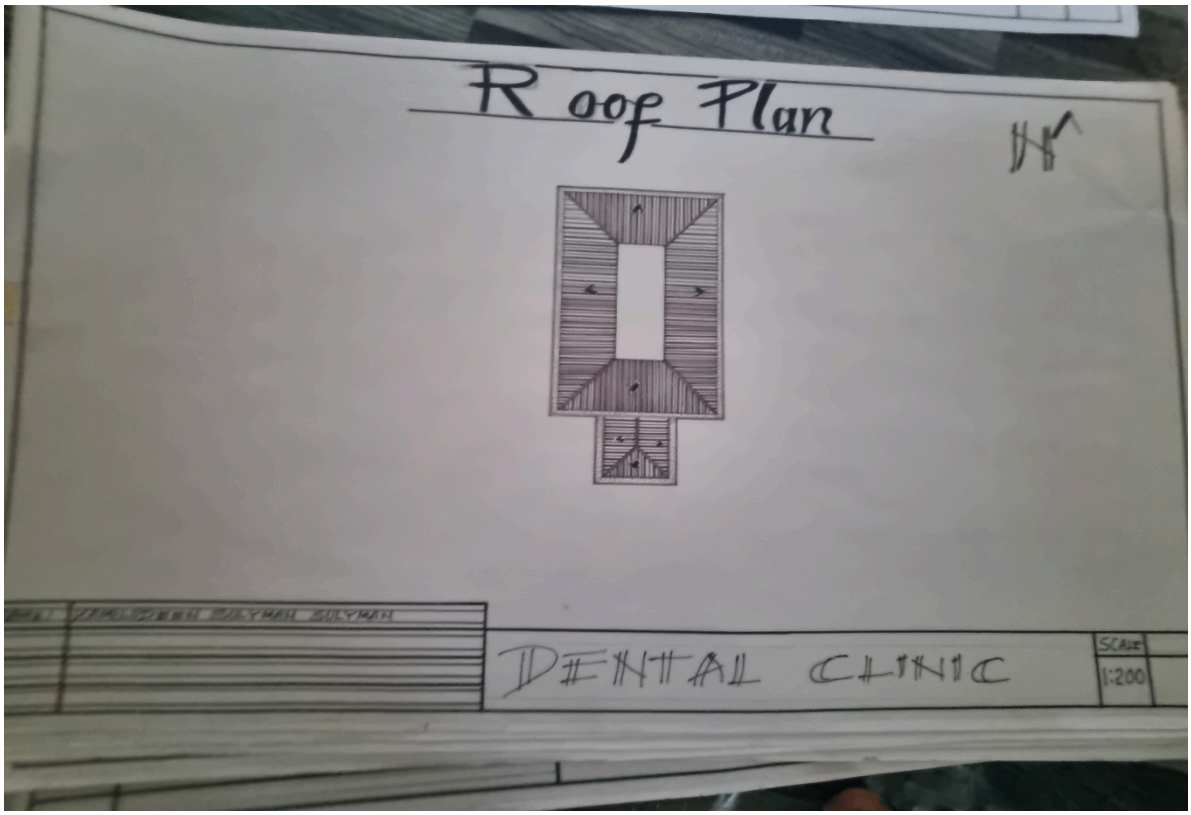
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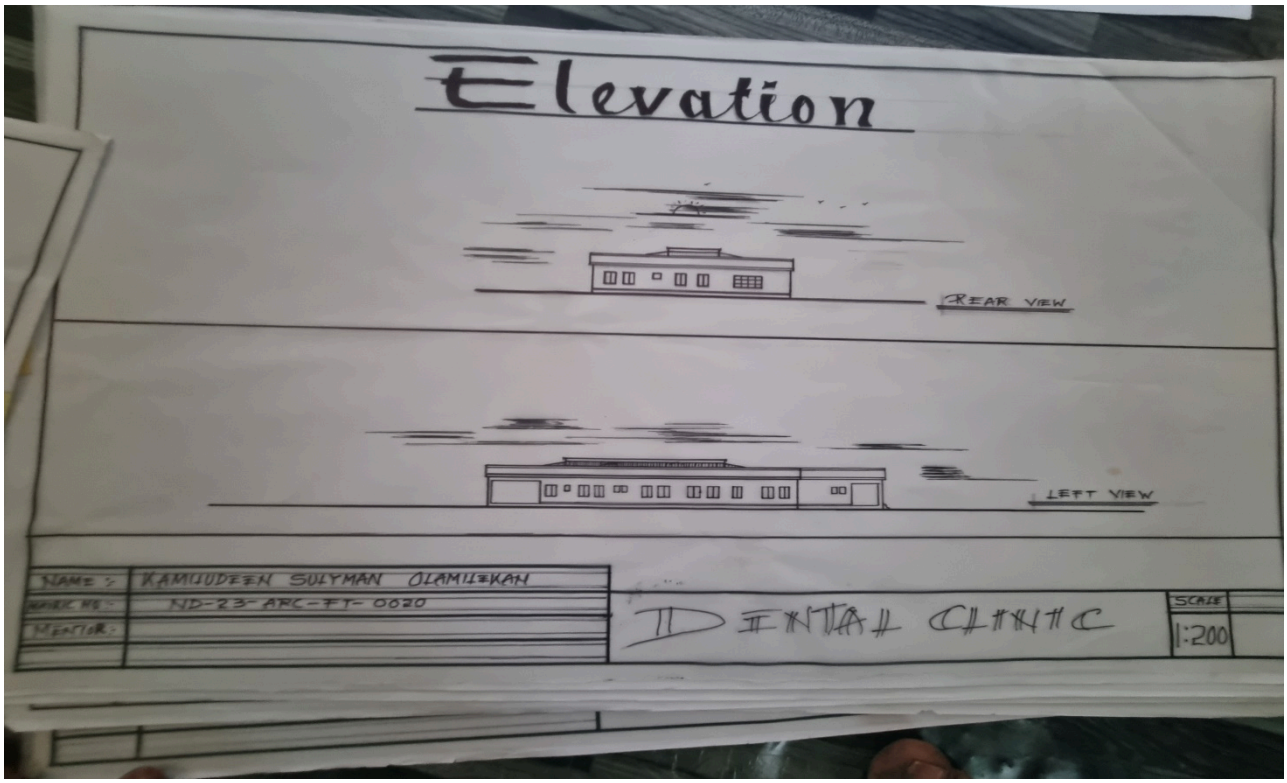
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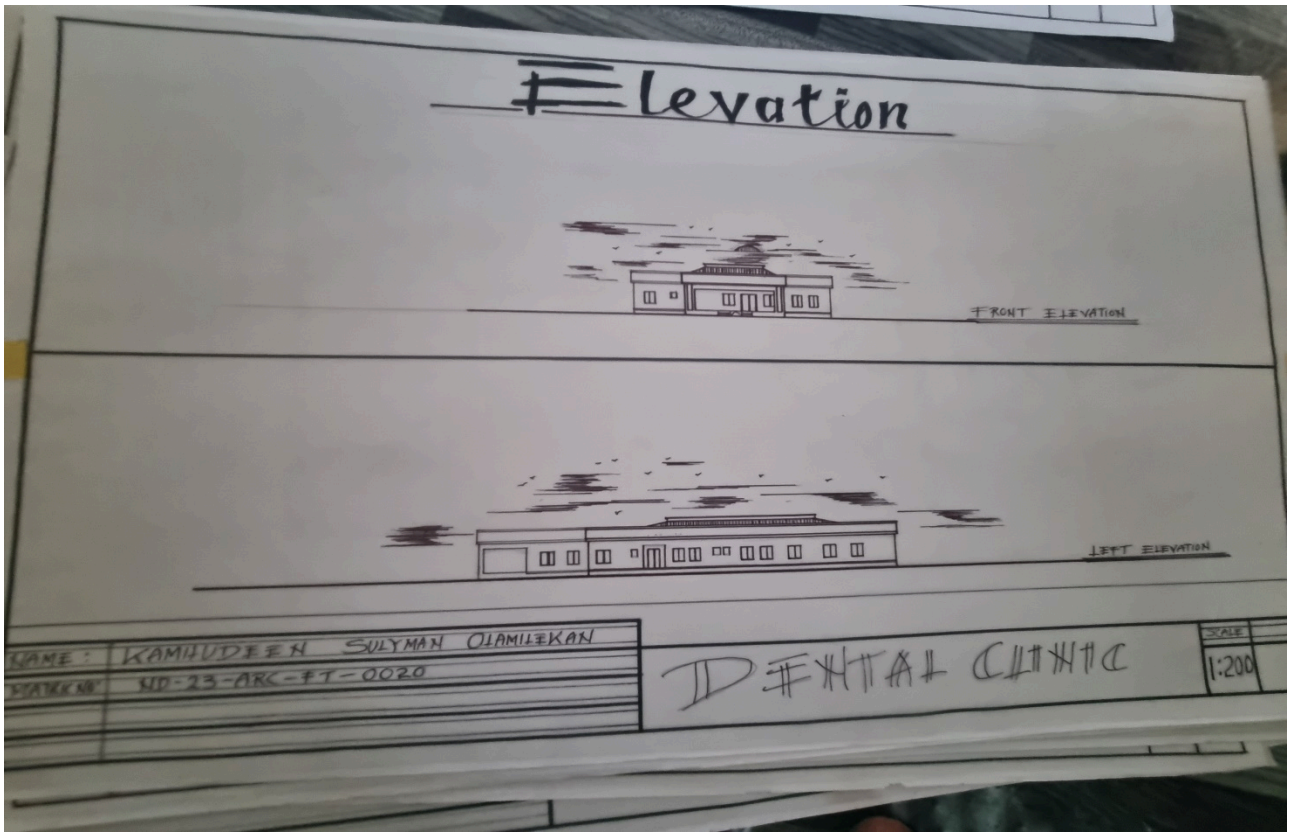
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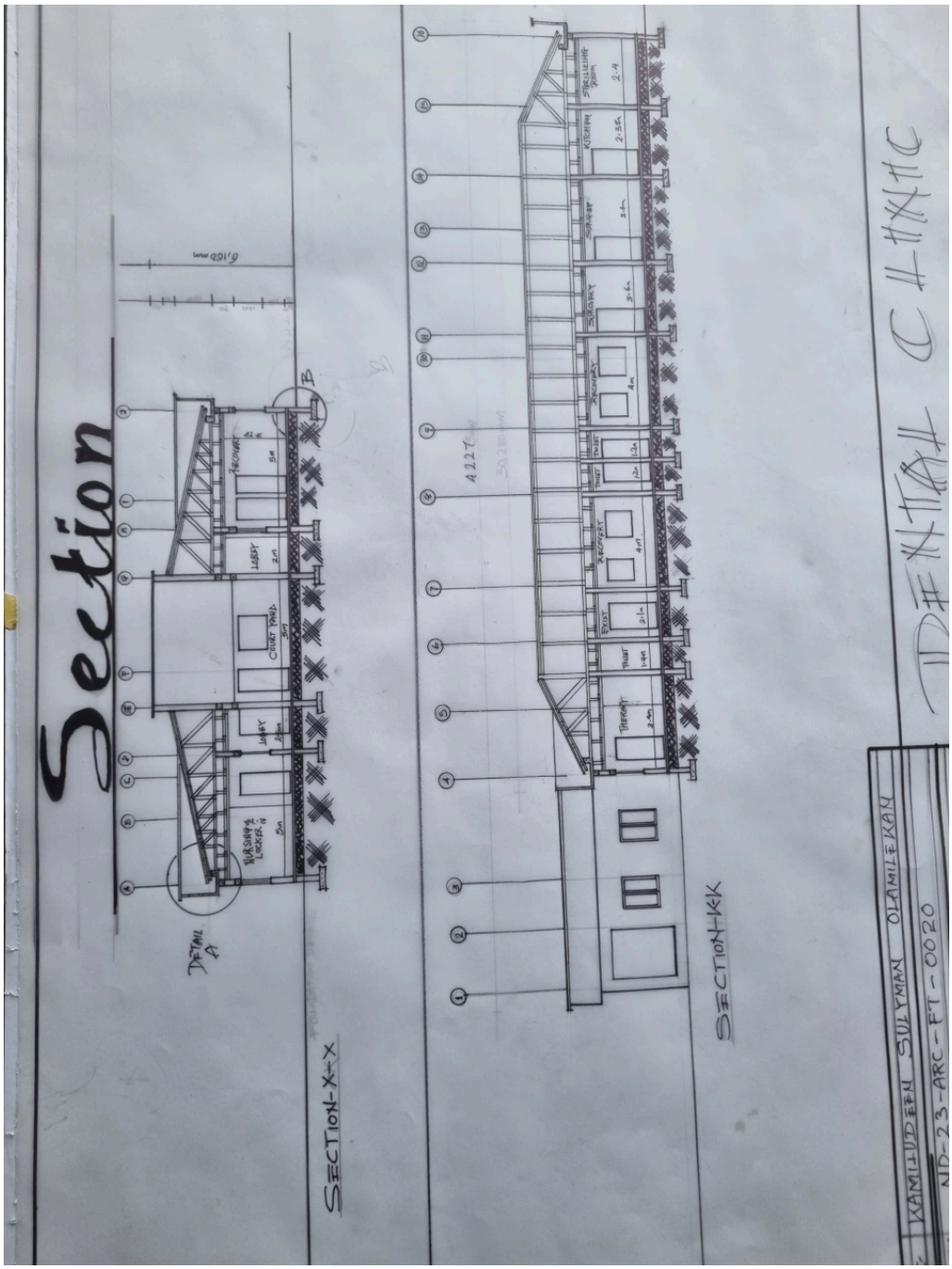
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