A Proposed Local Youth Development Center and Public Library with Function Hall in Badiangan, Iloilo

A Project Study

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The Research Team

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PROPOSED LOCAL YOUTH DEVELOPMENT CENTER AND PUBLIC LIBRARY WITH FUNCTION HALL IN BADIANGAN, ILOILO

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ABSTRACT

The Local Youth Development Council (LYDC), a multi-sectoral youth association led by the SK Federation President, comprises representatives from various youth-serving organizations at the provincial, city, and municipal levels. This sector contributed significantly to public service by addressing key areas such as social welfare, law enforcement, healthcare, education, and youth development. However, the Municipality of Badiangan faced challenges due to the absence of office space and storage facilities for the LYDC, inadequate space for the public library, and a limited-capacity social hall, affecting the community's overall productivity. To resolve these issues, this study proposed the design of a two-storey Local Youth Development Center, incorporating a public library and function hall in Badiangan, Iloilo. The project covered architectural, structural, electrical, plumbing, and fire protection plans, in compliance with Philippine codes and standards. Green building technologies, such as a rainwater harvesting system connected to the existing water source, were integrated to reduce municipal water usage and mitigate flooding risks. The design also included a soil investigation report, cost estimates, project work schedules, and technical specifications. A 309.75-square-meter lot was allocated for the project, with an estimated completion time of 201 calendar days and a projected cost of PHP 15,611,240.37. Funding would come from the local government, supported by private sector donations. It was recommended that material and labor prices be reassessed before construction, as inflation could impact the budget. Approval of the site development plan by the Local Government Unit (LGU) was required before construction could begin.

Chapter 1

Introduction

1.1 Background and Rationale

The public sector consists of businesses owned and run by the government and was responsible for supplying the public with goods and services. By carrying out vital tasks such as social welfare, law enforcement, healthcare, education, and infrastructure development, it contributes significantly to the economy. The public sector prioritizes serving the public interest and guaranteeing fair access to key services, unlike the private sector, which is motivated by profit. Taxes, government appropriations, and occasionally user fees fund public sector enterprises, which prioritize service delivery over profit-making (Haque & Pinto, 2010).

Local, state, and federal governments are some of the levels at which public sector organizations operate. Government departments, administrative offices, agencies, municipalities, public hospitals, schools, police departments, and public utilities such as water and sanitation services are a few examples of public sector organizations. For example, the United States Environmental Protection Agency (EPA) is a federal agency tasked with using regulatory monitoring and enforcement to protect the environment and public health. In a similar vein, public schools are funded by the government and offer students a free or heavily discounted education (McKinney, 2019).

In April 2023, the Province of Iloilo launched the "MoRProGRes Iloilo" program, to make a major advancement in its public sector. Under Governor Arthur Defensor Jr.'s direction, this program aims to advance social justice and economic growth through attracting capital, generating employment, enhancing food security, expanding access to social and medical services, and fortifying public safety. To position Iloilo as a top investment destination, the program places a high priority on infrastructure development, notably in the areas of power, energy, water, and telecommunications (Iloilo Provincial Government, 2023). To achieve sustainable progress for Iloilo, the government, private sector, and local communities collaborate in a "whole province approach" (Iloilo Provincial Government, 2023).

According to PhilAtlas (2024), one of the municipalities in the Philippines, especially in the Province of Iloilo, is the Municipality of Badiangan, situated 40 kilometers north of Iloilo City. Badiangan is bordered by the Municipality of Lambunao on the northwest, Dueñas on the north, Pototan on the east, Mina on the southeast, and Janiuay on the southwest. As shown in Figure 1, it contributes to the outstanding organization of the public sectors in the province.

Figure 1

Badiangan Location in the Province of Iloilo

According to the official website of the Provincial Government of Iloilo (2022), the economy of Badiangan has grown and changed in numerous distinctive ways. In particular, its backyard sectors have grown faster, propelled by both its own culture and a more easily accessible capital market. The municipality makes up 1.55% of the total area of Iloilo, with its land area measuring 77.50 square kilometers or 29.92 square miles. As of the 2020 Census, 27,056 people were living there. This represents 0.34 percent of the Western Visayas region's total population and 1.32% of the province of Iloilo's entire population. With 31 barangays, as shown in Table 1, the population density amounts to 349 inhabitants per square kilometer (PhilAtlas, 2024).

Table 1

Badiangan Population (PhilAtlas, 2024)

BARANGAY	POPULATION	BARANGAY	POPULATION
Agusipan	1,064	**Mainguit**	654
Astorga	672	**Malublub**	887
Bingauan	980	**Manaolan**	1,340
Bita-oyan	1,180	**Mapili Grande**	948
Botong	1,405	**Mapili Sanjo**	251
Budiawe	1,607	**Odiongan**	770
Cabanga-an	650	**Poblacion**	1,922
Cabayogan	892	**San Julian**	744
Calansanan	1,446	**Sariri**	644
Catubig	752	**Sianon**	1,021
Guinawahan	433	**Sinuagan**	910
Ilongbukid	515	**Talaba**	634
Indorohan	334	**Tamocol**	636
Inilagan	1,606	**Teneclan**	307
Latawan	490	**Tina**	947
Linayuan	955		
TOTAL		**27, 056**	

Administrative office, a specific area within an organization or company where administrative and management responsibilities are carried out. This office is critical to an organization's overall operations. It serves as the foundation for multiple departments, ensuring that day-to-day operations run smoothly (Gary, 2023). Furthermore, the administrative office oversees and implements government policies and programs that benefit citizens, maintain infrastructure, and serve the public good (Central Michigan University, 2023). Government policies like the establishment of the Local Youth Development Council (LYDC) are crucial for economic growth and cultural exchange, highlighting the importance of including facilities like a public library within administrative complexes to enhance community service through access to information and education.

Local Youth Department. According to Republic Act No. 10742 Sections 3.g & 3.h, the Local Youth Development Council is a multi-sectoral youth association that led the concerned SK Pederasyon President and was composed of representatives from youth as well as provincial, city, and municipal youth-serving organizations. Furthermore, according to Rule III Section 24 of the said law, the LYDC would be led by the concerned SK Pederasyon President and comprised of representatives from youth and youth-serving organizations which were made up entirely of youth ranging in age from fifteen (15) to thirty (30) years old, with a core advocacy that benefits the youth at the provincial, city, and municipal levels.

The Local Youth Development Council (LYDC) in Badiangan, Iloilo oversees promoting the growth and development of the municipality's youth. LYDC's commitment to Badiangan's youth is demonstrated by its dedication to providing programs and services that meet their needs and aspirations. According to R.A. 10742 Section 24, programs, projects, and activities that support and ensure meaningful youth participation in nation-building, sustainable youth development and empowerment, equitable access to high-quality education, climate change adaptation, disaster risk reduction and resilience, youth employment and livelihood, gender sensitivity, social protection, health and anti-drug abuse, and sports development are all included in LYDC's development plan. The LYDC of Badiangan, Iloilo has 10 organizations under it including the Sangguniang Kabataan. This includes the PYAP Federation, 4H Club (Mainguit, Calansanan, Malublob, Agusipan), One Badiangan, Movers for Christ, and Soar High Linayuan.

The Pag-Asa Youth Association of the Philippines (PYAP) prioritizes the holistic development of underprivileged youth, addressing socio-economic, physical, psychological, cultural, and spiritual aspects. Its aim is to instill self-reliance in out-of-school and disadvantaged youth, empowering them to contribute economically and socially to their families and communities.

The 4H (Head-Heart-Hands-Health) Club, initiated by the Department of Agriculture, is a youth organization aimed at children of farmers and prospective farmers in the places of Mainguit, Calansanan, and Malublob, Agusipan. It provides a platform for them to engage in agricultural education, leadership development, and community service, fostering a sense of responsibility towards agricultural practices and rural development.

One Badiangan, distinctively, concentrates on sports-centric activities for the youth. Through various sports programs and events, it promotes physical fitness, teamwork, and sportsmanship among its participants, contributing to the overall well-being and recreation of the youth population in Badiangan.

The Movers for Christ is primarily focused on facilitating religious engagement and spiritual growth among young individuals. Through prayer meetings, retreats, and other religious activities, it aims to instill moral values, faith-based principles, and a sense of belonging within the youth community, fostering a deeper connection to their religious beliefs.

Lastly, Soar High Linayuan places a strong emphasis on developing leadership skills and promoting unity among the youth. Through workshops, seminars, and community projects, it provides opportunities for young people to hone their leadership abilities, collaborate with others, and actively participate in initiatives that contribute to the betterment of their local community, encouraging them to become proactive and responsible citizens.

Public Library. A structure designed and constructed for open community involvement space that houses a collection of information, sources, resources, and services organized for use and maintained by a public body, institution, or private individual. In the more traditional sense, it refers to a collection of books. In addition to materials, they offer librarians, experts in finding and organizing information and interpreting information needs. Libraries were valuable institutions for preserving and expanding cultural and traditional elements from generation to generation, as well as facilitating the smooth and accurate flow of information globally (Library - New World Encyclopedia, n.d.).

Municipal libraries, on the other hand, are open to the public and are typically supported by local, district, provincial, city, and regional taxes (Public Library - New World Encyclopedia, n.d.). The establishment of such a structure may be legal, requiring mandatory funding, bidding, design, and construction (Municipal Library Definition | Law Insider, n.d.). In the Philippines, Republic Act No. 7743 Section 2 mandates the establishment of public libraries in districts, cities, and municipalities. Section 3 expands on the content of the public library, which includes the standard set of reference books, encyclopedias, dictionaries, maps, and globes. Non-book materials would also be added, including the most recent computer and electronic facilities.

Function Hall. Whether within a building or a standalone structure, this was designed for a wide range of social gatherings, events, and recreational activities, emphasizing community engagement and cultural enrichment over profit-seeking. Typically, spacious, and well-equipped with amenities such as seating arrangements, audiovisual equipment, and sometimes kitchen facilities, social halls serve as versatile venues for meetings, parties, workshops, receptions, and various community events. These spaces foster social interactions, bring people together, and support cultural activities, serving as essential centers for social cohesion and citizen involvement (Law Insider, 2018).

In a governmental context, a social hall often serves as a multifunctional space for various community-related activities and events organized or supported by local government agencies. These activities may include public meetings, town hall gatherings, community forums, workshops, training sessions, and cultural or recreational events. Governmental social halls facilitate dialogue between government officials and the public, they also provided a venue for citizens to voice their concerns, participate in decision-making processes, and access essential information about local government initiatives and services (Zoning Trilogy, 2019).

Figure 2 shows the current position of the social hall near the municipal hall of Badiangan. The highlighted area, where the existing social hall stands, is also designated as the proposed site for the proposed two-storey Local Youth Development Office, which will include a library and social hall.

Figure 2

Vicinity Map of the Proposed Site

Badiangan's social hall was constructed in the 1980s, with dimensions of 3 meters in height, 6 meters in width, and 24 meters in length, as depicted in Figure 3 and 4. Adjacent to this hall is the office of the MSWDO consisting of DSWD and DAR, measuring 4 meters in width and 6 meters in length, situated at the far end of the structure. This social hall serves as the primary meeting venue for the municipality and the citizens of Badiangan.

Figure 3

Existing Social Hall of Badiangan (Interior)

Figure 4

Existing Social Hall of Badiangan with DSWD Office (Exterior)

1.2 Problem Identification

1.2.1. Need for Dedicated Office Space for the Local Youth Development Office

The Municipality of Badiangan has faced a significant shortage of office space for its government offices in recent years. Among the affected offices was the Local Youth Development Office (LYDO), which currently lacks a permanent office space. As a result, the LYDO has been forced to relocate frequently, sharing common rooms with other agencies. At times, it had operated within the Pasalubong Center alongside the Office of Tourism, as illustrated in Figure 5. Currently, the LYDO shares an office with the Department of Social Welfare and Development (DSWD) at the back of the existing social hall, as depicted in Figures 6 and 7, where their workspace was adjacent to the Old Social Hall.

The need for a dedicated office space for the LYDO was crucial to ensure effective operations, program implementation, and support for the municipality's youth. A stable environment would enable the office to better serve the community and enhance collaboration with other youth-serving organizations.

Figure 5

Tourism Office in Pasalubong Center

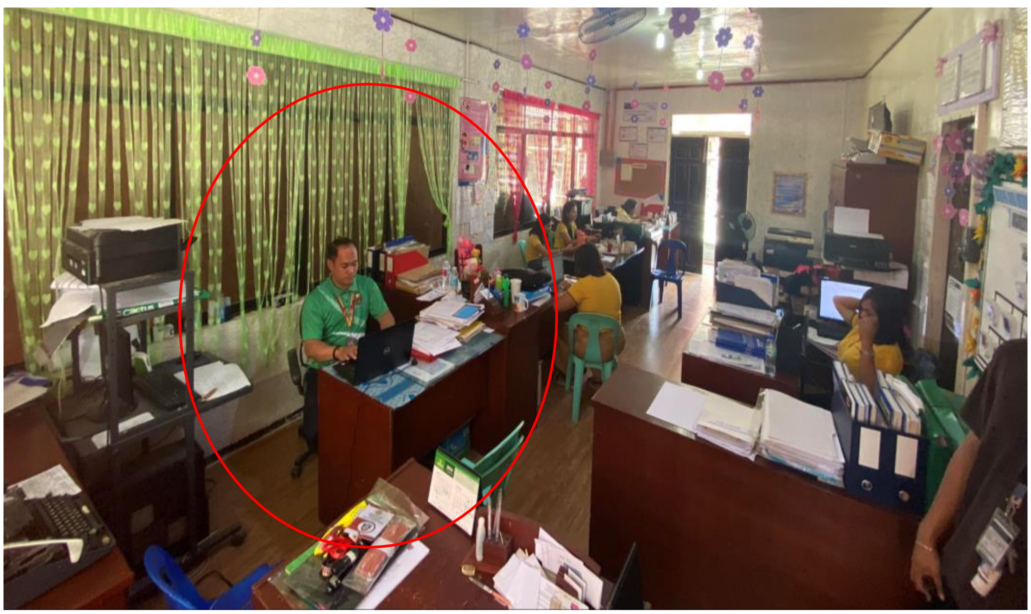


Figure 6

LYDC Office Inside the DSWD Office

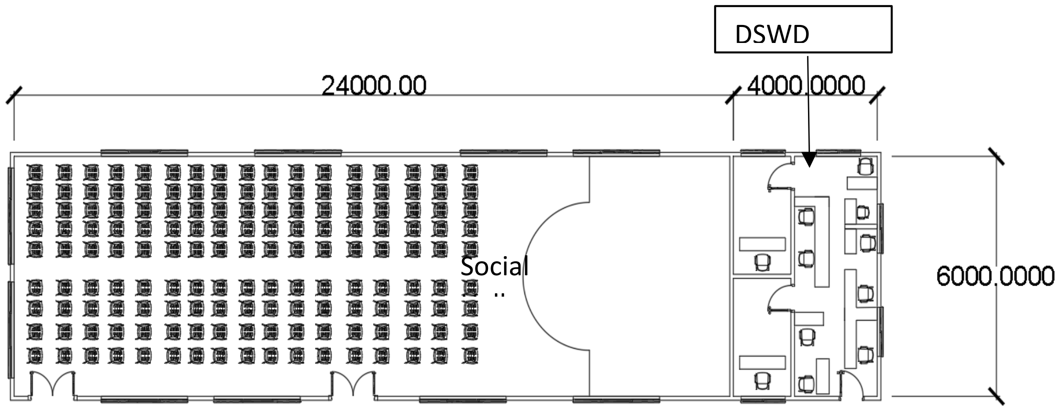


Figure 7

Area of Old Social Hall with DSWD Office

The Local Youth Development Office (LYDO) has nine organizations under its purview, including the Sangguniang Kabataan of Badiangan, Iloilo. However, a physical organizational chart was not available, as they did not have a dedicated office to establish one. Instead, they were sharing common space with other offices, according to LYDC Officer I, Cressel Grace S. Florida (March 19, 2024). The list of officers is provided by the LYDO Officer, as shown in Figure 8. The Local Youth Development Office (LYDO) plays a significant role within the administrative framework of the Municipality of Badiangan, actively organizing and overseeing various events and programs.

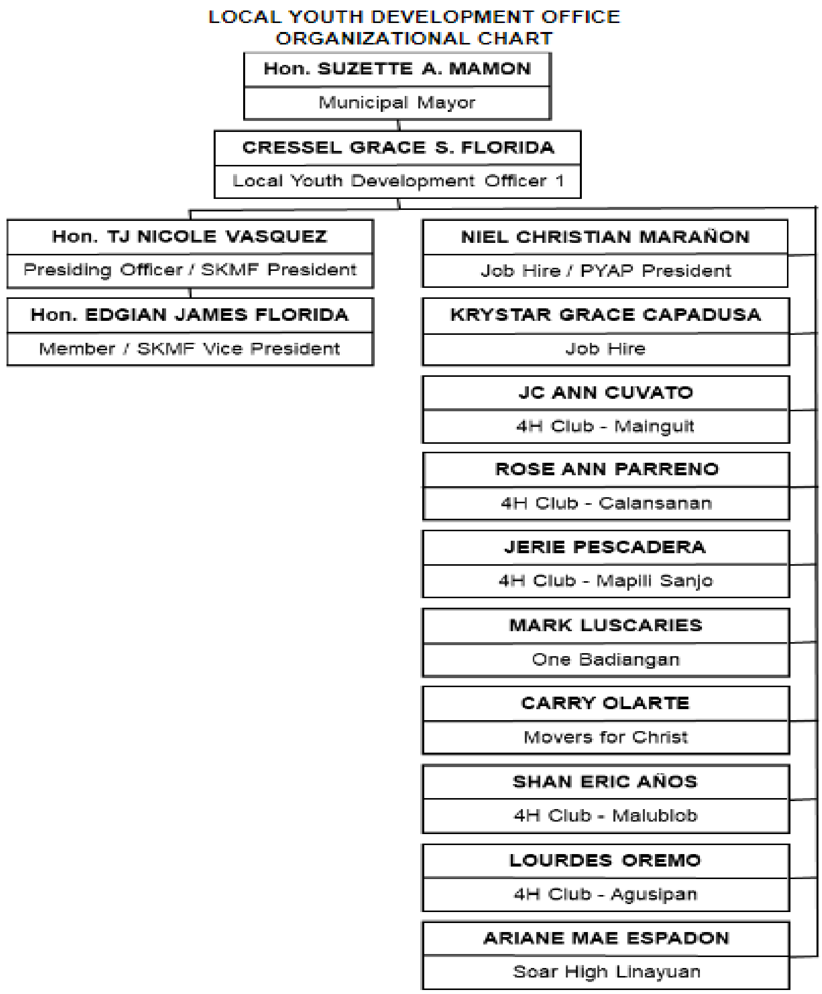


Figure 8

LYDO Organizational Chart

LYDO transactions with its clients, especially those predominantly consisting of young people, typically lasted one to two hours. These transactions varied depending on the client's concerns, but they most often involved the planning and execution of events. The lengthiest part was when LYDO officers delved into the technical aspects of the event, emphasizing the budget, materials, and equipment allocation. Following this discussion, a registration form was filled out by the client to be submitted to the Youth Organization Registration Program (YORP). After this, the proposal was forwarded to the mayor's office for approval, which typically took between five hours to three days, depending on the mayor's schedule. Figure 9 illustrates the transaction process at LYDO.

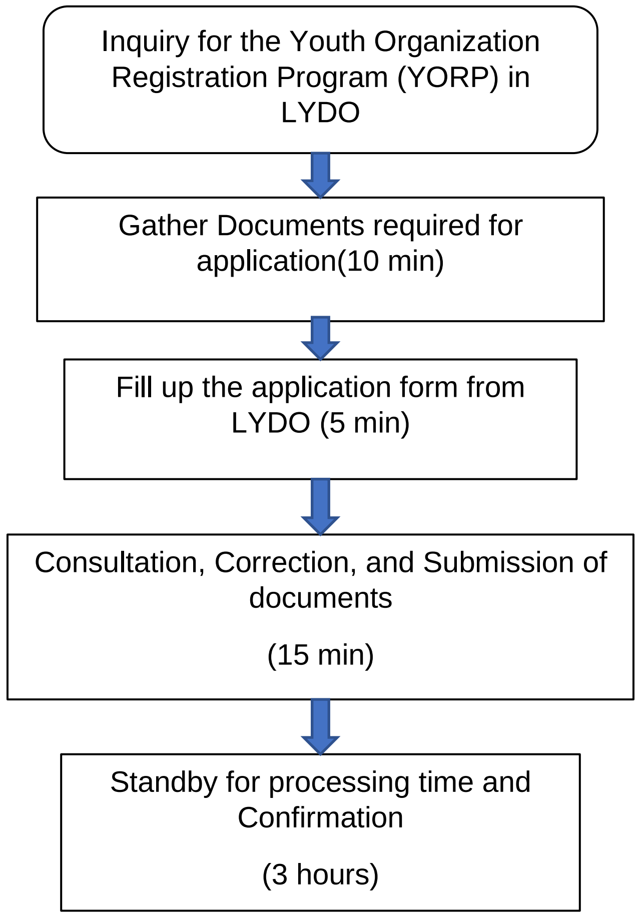


Figure 9

Flowchart of Transaction in LYDO

Table 2 outlines the events scheduled for the year 2023, coordinated by the youth organizations of Badiangan. Acting as the central coordinator, the LYDO plays a pivotal role, overseeing the logistical aspects of these events, while the youth organizations provide updates and details to ensure smooth execution.

LYDO facilitated 53 events in 2023, with Active Citizenship as the most frequent theme, including Tree Planting and Climate Change and Disaster Training, as shown in Table 2. However, the committee faced challenges in conducting transactions and gatherings with youth organizations due to the lack of office space. LYDC Officer I, Cressel Grace S. Florida (March 19, 2024), noted that several meetings were canceled due to the unavailability of office space for efficient gathering and discussion, leading to event delays and rescheduling for youth organizations.

Table 2

History of Events in the Year 2023 Handled by LYDO

CONCERN	EVENTS	TYPE	FREQUENCY
HEALTH	- Mental Health Related Concern	Seminar	4
	- Teen-Age Related Symposium	Seminar	3
	- Anti-Underage Alcohol and Smoking Implementation	Seminar	2
EDUCATION	- Financial Assistance	Ordinance	1
	- Free Tutorials	Tutorial	4
	- Art Workshop	Workshop	2
	- Student Absenteeism Symposium	Program	1
ECONOMY	- Livelihood and Entrepreneurship Program	Seminar & Training	3
SOCIAL INCLUSION	- PWD Day	Program	3
	- Gender Sensitivity/Discrimination	Seminar	2
SECURITY & PEACE	- Violence and Illegal Drugs Symposium	Seminar	1
GOVERNANCE	- Youth Camp and Consultation	Training & Program	2
	- Barangay Youth Organization	Program	4
ACTIVE CITIZENSHIP	- Sports & Cultural Youth Activities	Program	10
ENVIRONMENT	- Tree Planting	Program & Training	2

SURVIVAL RIGHTS	- Climate Change & Disaster Training	Seminar & Training	4
	- Parental & Postnatal Care	Program	1
	- Food Supplementation	Program	2
	- Children's Congress	Program	2
TOTAL			53

LYDC Officer I, Cressel Grace S. Florida (March 19, 2024), highlighted the significance of the quarterly meetings held by the nine organizational presidents of LYDC. During these sessions, each president shared progress reports, project updates, and plans about their respective areas of responsibility within LYDC. However, since LYDO lacked designated office space, they did not have access to conference rooms. Consequently, they frequently requested the mayor's office conference room, but this was not always possible as it was often used by various governmental departments. As a result, their quarterly meetings were sometimes delayed or rescheduled. Such delays not only inconvenienced the organizational presidents but also hindered timely discussions, decision-making, and coordination of activities essential for LYDC's effective functioning.

The number of employees, which included the SK Officers, and the weekly number of clients of LYDO was shown in Table 3. According to Mr. Christian Neil Marañon (February 23, 2024), the PYAP Federation President of the Municipality of Badiangan, the Local Youth Development Office (LYDO) faced constraints in expanding its personnel capacity due to limited office space. Consequently, this shortage has led to clients being redirected to other offices during transactions, such as the Department of Social Welfare and Development (DSWD) and the Department of Agrarian Reform (DAR), to seek assistance with their concerns.

Table 3

No. Of Employees and Weekly No. Of Clients of LYDO

Office	Employee	Number of Clients per Week
LYDO	5	60

Currently, the office space designated to the LYDO per personnel was 2.5 square meters or 7.5 cubic meters in air space, as shown in Figure 7. Adhering to the National Building Code Section 806 and Section 807, a standard office space should have a dimension of 6 square meters, with a height between 2 to 3 meters, and 12 cubic meters of air space per person.

In addition, provinces, cities, and municipalities were required to work toward creating a government center where, to the extent that it was feasible, offices, agencies, or branches of the federal government, local government units, or corporations owned or controlled by the government may be located (Republic Act No. 7160, An Act Providing for a Local Government Code of 1991, Section 12 on Government Centers). In designating such a center, the local government unit concerned shall consider the existing facilities of national and local agencies and offices that may serve as the government center as contemplated under this Section.

1.2.2. Lack of Storage Room

Due to the absence of office space, LYDC faced challenges in storing documents and equipment essential for their various programs and events, including those related to sports, the environment, health, etc. Figures 10 and 11 illustrate that relief goods, equipment, and materials provided by LYDO and DSWD were stored on the stage of the Old Social Hall, covered by blue tarpaulin to conceal them, thereby limiting the venue's capacity and functionality. Additionally, LYDO's lack of dedicated storage space was evident in Figure 12, where compiled documents took up the employee's desk space.

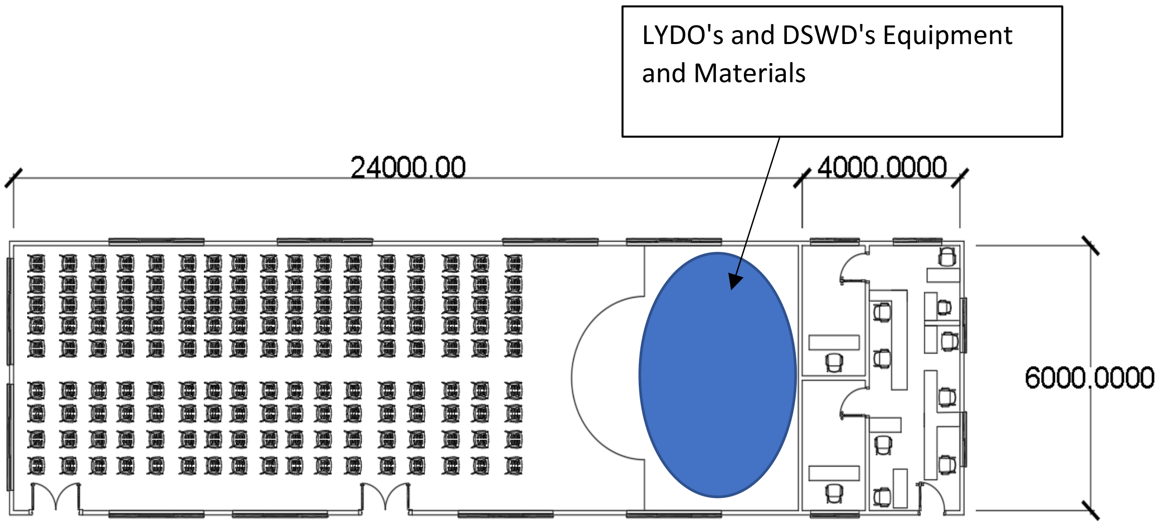


Figure 10

Equipment and Goods Stored on Stage of Social Hall

Figure 11

Location of LYDO's Storage inside the Old Social Hall Area

Figure 12

LYDO and DSWD Documents on their Table Spaces

LYDC Officer I, Cressel Grace S. Florida (March 19, 2024), also highlighted the constraint posed by the insufficient storage space. This limitation restricted the addition of equipment and materials for their programs and events, occasionally has led to cancellations. To address this insufficiency, Miss Cressel Grace S. Florida emphasized the urgent need for additional storage facilities for LYDO. Such expansion was deemed essential to fully realize and optimize the potential of their upcoming events and programs.

1.2.3. Lack of Public Library

In the 1990's a Municipal Library was built in the Municipality of Badiangan, Iloilo with an area of 100 square meters founded by the CDF of Senator Edgardo Angara as shown in Figure 13. However, due to the demolition of the Old Municipal Library, the municipality was facing a challenge in the absence of a Public Library as the municipality constructed a new building for its four government offices (DSWD, DAR, Kalahi, and 4P's) as the locality had a shortage of office spaces.

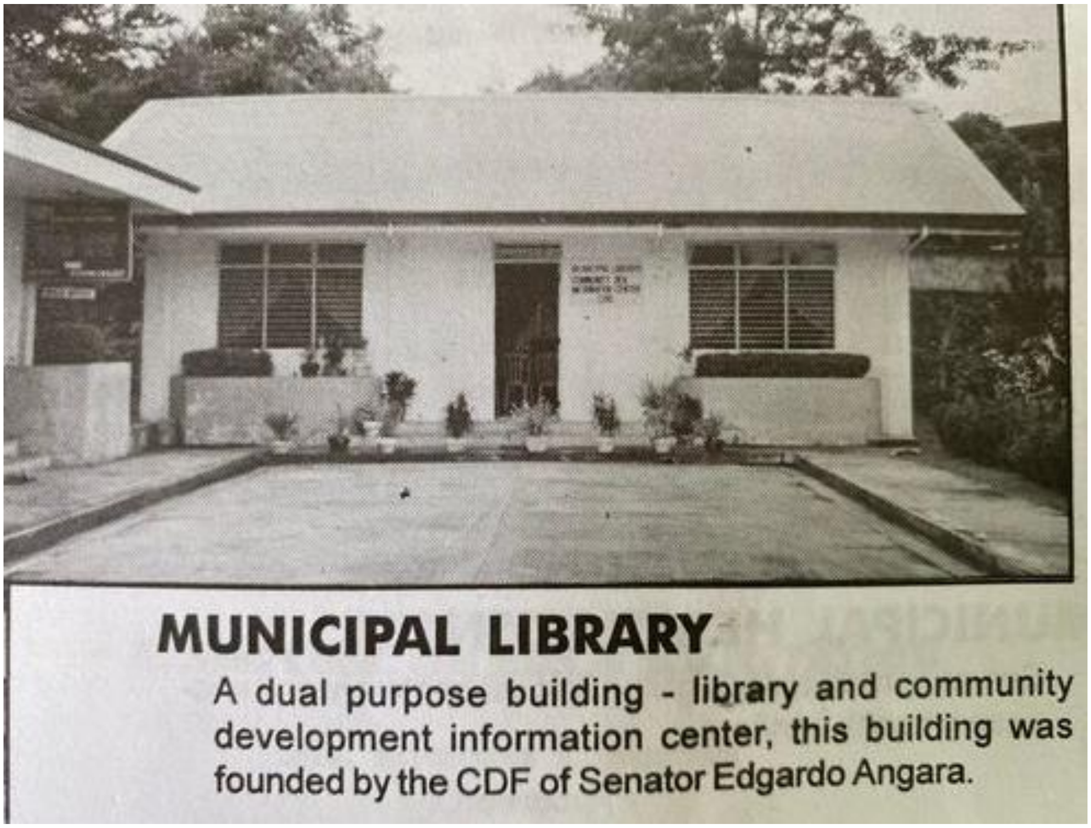


Figure 13

Photo of the Municipal Library of Badiangan, Iloilo

However, Republic Act 7743 of the Philippines required the establishment and maintenance of a public library in each municipality and emphasized the significance of these institutions in promoting education and literacy. Consequently, the amendment of the article, which was introduced by Senator Loren Legarda in 2023, stated that the public libraries must be equipped with modern computer and electronic library equipment to ensure that Filipinos have access to a wide variety of up-to-date learning materials. As depicted in Table 4 is the list of public libraries near Badiangan, Iloilo.

Table 4

Lists of Public Library Near Badiangan, Iloilo

Public Library	Distance to Badiangan
Bingawan Municipal Library	41 km
Passi City Library	29.2 km
Dingle Municipal Library	27.2 km
Pototan Public Library	19.6 km
Cabatuan Public Library	20.4 km

The existing library in Badiangan, Iloilo, was a school library located inside Badiangan National High School, which is 0.70 miles away from the proposed site, as shown in Figure 14. According to one student from Badiangan National High School, the contents of the books available in their library focus solely on topics taught at the high school level. The high school library was accessible exclusively to students enrolled at Badiangan National High School, with limited access for youth from outside the school. This limitation highlights a constraint, as not all young people in the Municipality of Badiangan could avail themselves of the resources offered by the library.

Figure 14

Distance of Badiangan National High School Library to the Proposed Site

According to Mrs. Fe Martinez, the Municipality of Badiangan was planning to incorporate a library within the Pasalubong Center as they would renovate the said building as the proposed library would include information about the history, culture, and tradition of the Municipality of Badiangan. Due to this renovation, the Tourism Office sharing space inside the Pasalubong Center faced constraints for they would be relocated to other places and their area would be consumed by the incorporation of the Public Library. It was noted that the municipality faced a shortage of office space, and this included the office space for Tourism. Following the recommendation of the Municipal Engineer, the plan for the proposed two-story LYDO and social hall building would include the integration of the public library. Additionally, the tourism committee would be allocated an office space within the forthcoming renovation of the Pasalubong Center, rather than housing a public library.

As depicted in Figure 15, books related to the Municipality of Badiangan and those from the demolished Municipal Library were presently housed in the Pasalubong Center, exhibiting disorganization and mess. Figure 5 illustrates an office space within the Pasalubong Center, a factor that discourages visitor engagement. This observation was confirmed by a tourism employee's testimony, indicating that the center fails to fulfill its intended role as a tourist attraction due to this setup.

Figure 15

Unorganized Location of Books from Old Municipal Library in Pasalubong Center

According to the Standards for Philippine Libraries (2007), the library should provide storage space for the print collection, a reading area, a workroom, a storeroom, an office for the head librarian/media center coordinator, and a space for formal library instruction. The library shall maintain local historical and cultural materials for preservation and conservation. The content of every public library should include books, multimedia, and other non-book materials, such as state-of-the-art technologies, periodicals, maps, pamphlets, and other audiovisual materials. For libraries in municipalities classified lower than the first class, an initial book collection of 2,000 is recommended as a starting collection.

Without a public library, Badiangan residents lack access to essential reading materials, educational resources, and opportunities for intellectual and cultural enrichment. Establishing a public library in Badiangan would not only meet the requirements of Republic Act 7743 but would also provide a valuable resource to the community by promoting literacy and supporting education. Additionally, the losses that resulted from the demolition of the Old Municipal Library would be regained. The construction of the proposed two-storey Local Youth Development Office (LYDO) with a library and social hall building in Badiangan is highly recommended by the Municipal Engineer, as it would cater to the locality's need for a public library

1.2.4. Limited Capacity of Existing Social Hall

The Old Social Hall was located beside the Municipal Hall of Badiangan, Iloilo, as shown in Figures 16 and 17. According to the Municipal Engineer of Badiangan, Engr. Rosilla A. Villa, on February 23, 2024, during every municipal meeting, as shown in Figure 18, the Old Social Hall’s area could not accommodate the total number of attending officials from the 31 barangays, which include: (1) Barangay Captain, (7) Sangguniang Barangay Members, (1) Sangguniang Kabataan Chairperson, and (7) SK Members, amounting to a total of 496 officials at every municipal meeting. This was in contrast to the Old Social Hall’s limited area, which could cater to a maximum of 200 seats, as shown in Figure 8.

Figure 16

Location of the Old Social Hall

Figure 17

The perspective of the Old Social Hall

Aside from the municipal meetings, other social events and meetings were also held throughout the year. The lowest recorded number of participants was 50, and the highest was 570. As depicted in Figure 18 and Table 5, when comparing the number of participants and the frequency of events to the Old Social Hall's maximum capacity of 200 seats, it was evident that out of the 110 events held in 2023, 41 occasions exceeded the venue's capacity, demonstrating its inability to accommodate all participants. According to the HRMO Head Officer, Mrs. Fe Martinez, in certain instances, events needed to be relocated to the nearby gymnasium to accommodate the required number of participants due to the limited capacity of the Old Social Hall. This difference highlights the existing Social Hall's inability to cater to the population of an event, indicating the need for a larger and more spacious Social Hall in Badiangan, Iloilo.

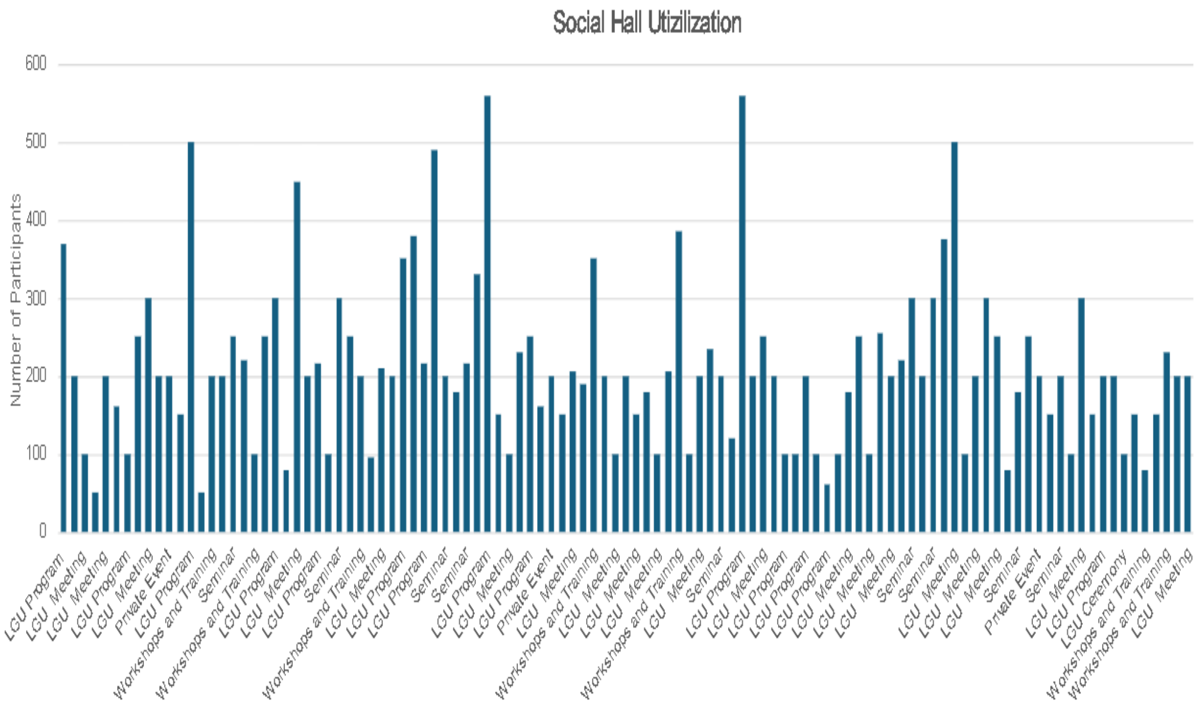


Figure 18

Social Hall 2023 Utilization's Number of Participants

Table 5

Frequency of Events in Old Social Hall in Year 2023

Month	LGU Meeting	Seminar	LGU Program	Workshop & Training	Private Event	TOTAL
January	2	1	2	0	1	**6**
February	1	1	5	2	1	**10**
March	2	3	1	1	1	**8**
April	1	0	1	0	1	**3**
May	4	1	0	1	0	**6**
June	2	4	7	0	0	**13**
July	3	1	3	1	1	**9**
August	4	1	1	3	1	**10**
September	7	2	8	2	0	**19**
October	5	1	3	0	0	**9**
November	3	2	3	2	1	**11**
December	2	1	0	2	1	**6**
TOTAL	**36**	**18**	**34**	**14**	**8**	**110**

Additionally, according to Engineer Rosilla A. Villa, the current social hall was constructed in the 1980s under the administration of the late Congressman Hon. Gloria Tabiana. Its expected lifespan was around forty years. Depending on the mix of materials and climate, low-quality construction might shorten usable life by up to 20 years (Dias, 2003).

Furthermore, regarding the office space needs of other agencies, Engr. Rosilla A. Villa stated that the design of the Old Social Hall was intended only for a single-story building. Rebuilding it as a two-storey structure would not ensure safety and would lead to higher costs. Therefore, Engr. Rosilla A. Villa highly recommended replacing the Old Social Hall with the proposed two-storey office and social hall building in the area.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study aimed to propose a local youth development center and public library with function hall building in Badiangan, Iloilo.

1.3.2 Specific Objectives

To reach the general objective, the following specific goals of the study were achieved:

a. Gathered and analyzed relevant information to determine the need of the Local Government Unit for office space, particularly for LYDO, library, and function hall area;

b. Geotechnical investigation was conducted on the project site to determine the soil's bearing capacity.

c. Comprehensive design documentation was done that encompassed architectural, structural, electrical, and plumbing design, with an integration of green building technology;

d. A total cost estimation was provided; and

e. Developed a project work schedule for construction using a PERT-CPM.

1.4 Significance of the Study

The Municipality. The design of the proposed reconstruction of the function hall would benefit the Local Government Unit (LGU) and the residents of Badiangan, Iloilo upon implementation. The design was provided by the researchers with comprehensive plans to guide the building's reconstruction process, which would be utilized by the Municipal Engineering Office.

The Researchers. The implementation of knowledge and skills acquired in civil engineering, derived from both on-the-job training and academic experiences, was integral to the design process. The primary beneficiaries of this application were the researchers who conducted the study. By incorporating this knowledge into their academic pursuits, these acquired skills would not only prepare them for potential challenges in their future professions but would also contribute to their overall development and readiness for successful careers.

The Future Researchers. This study would serve as a basis and reference for future studies on related projects, specifically in the context of the two-storey local youth development office with a library and social hall building in Badiangan, Iloilo.

1.5 Scope and Limitations of the Study

The study was limited to the design of a two-storey local youth development office with a library and social hall building in Badiangan, Iloilo. An ideal design for the social hall and offices, intended for the benefit of the community and the Local Government Unit, was provided. The design included plans for architectural, structural, plumbing, and electrical systems, along with project scheduling and cost estimation. The offices and library were located on the first floor, while function hall was on the second floor. Other necessary facilities, such as comfort rooms, a storage room, a lounge area, and utility rooms, were also included in the plan. A Rainwater Harvesting System, a green building technology, was incorporated into this study.

The lot area, 396 square meters, and the proposed total building area was approximately 532 square meters, with 252 square meters on the first floor and 280 on the second floor; derived from adjusting the width from 6 meters to 9 meters while retaining the same length of the building. The total funds amount to ₱20,000,000, which will come from the Finance Section of the Municipality of Badiangan. For water supply, the Municipality of Badiangan had its water district, and the sewage system is also included in the design.

However, the study would not encompass the specific aspects of the demolition of the existing building, nor would it directly address the construction, operation, and maintenance of the proposed project. The implementation of the project would be facilitated by the local government un

Chapter 2

Review of Related Literature

2.1 Introduction

The legislation indicated that the local government must consider and prioritize the overall well-being of individuals, particularly youth and residents of local provinces, by providing public facilities for general use, encouraging the conservation and enrichment of social activities, and providing convenience and comfort during these events. The government had also taken several steps to improve youth empowerment and foster effective knowledge acquisition through Republic Acts and Executive Orders.

Social halls were one type of infrastructure designed for a variety of social gatherings, events, and recreational activities, with a focus on community engagement and cultural enrichment rather than profit (Law Insider, 2018). As a result, it could host a wide range of community activities and events such as fiestas and traditional performances, fostering a sense of community pride and heritage, as well as educational workshops, health seminars, and government outreach programs, which provide valuable resources and information to residents of Badiangan, Iloilo.

The Local Youth Development Council (LYDC) in Badiangan, Iloilo is responsible for promoting the growth and development of the municipality's youth by providing skill development, leadership training, and civic engagement opportunities. However, the LYDC lacks a properly designated office to effectively serve the residents of Badiangan, as they were temporarily relocated to the DSWD office, which shares a common area. To ensure the organization's efficiency, an administrative office for LYDC employees must be established.

Public libraries are crucial for preserving our resilient history, fostering healthy communities, and providing educational support to individuals of all ages (Payton, 2022).

Nevertheless, public libraries are essential facilities that not only preserve our heritage but also serve as dynamic centers for community engagement and lifelong learning. Their role in ensuring equitable access to knowledge and resources plays an important part in creating informed, empowered societies for future generations.

Essentially, the proposed two-story building in Badiangan, Iloilo, would house administrative offices for the Local Youth Development Council (LYDC), a dedicated area for the Public Library, and a social hall, addressing the current lack of these facilities. The goal is to establish a well-structured administrative office, public library, and social hall, enhancing operational efficiency and productivity while also providing a valuable resource and communal space for the community.

This chapter provides an overview of relevant studies and literature on the proposed two-story local youth development office with public library and social hall building. It assesses design specifications in accordance with established codes and standards, and investigates the contextual framework of such a building, including its types, features, and examples both domestically and internationally. The chapter concludes by synthesizing the findings from related studies and incorporating key concepts discovered during the research.

2.2 Codes and Design Standards

The proposed design of the project shall adhere to the National Building Code of the Philippines (NBCP), National Structural Code of the Philippines (NSCP) 2015, National Plumbing Code of the Philippines (NPCP), and Philippine Electrical Code (PEC). For the design to ensure safety, it is necessary to adhere to all applicable codes and engineering principles.

2.3 Common Characteristics of Community-Centric Administrative Hub Buildings

2.3.1 Convenient Accessibility and Centralized Location

The majority of the municipality's government buildings are in convenient locations that are easily accessible by public transportation or private vehicles, particularly in the city center. This accessibility provides comfort and flexibility to Badiangan residents.

2.3.2 Size of Offices and Social Hall

The social hall and administrative offices must be large. It communicates the nature and scope of their work at a national level. Particularly on the social hall, to carry out agency functions, they must manage, direct, and coordinate a large number of people in Badiangan, Iloilo.

2.3.3 Spaces that accommodate multiple disciplines

When building an administrative office, it is necessary to identify partitions and their purposes to maximize the building's utility. Although people's and municipalities' interests in a community could be investigated, a specific building design based on the data gathered might remain inaccurate due to differences in community preferences. Multidisciplinary spaces are inherently flexible since each division serves a distinctive purpose. Each department and agency would be divided into partitions based on its areas of expertise.

2.4 Related Articles

2.4.1 Republic Act No. 10742 January 15, 2016

Republic Act 10742, known as the "Sangguniang Kabataan Reform Act of 2015," aims to revitalize the youth council system in the Philippines. It seeks to empower young leaders, promote transparency and accountability in governance, and ensure that youth voices are heard in decision-making processes at the local level. The law introduces reforms such as adjusting the age bracket for youth council officials, extending their term of office, providing mandatory training programs, and granting fiscal autonomy to youth councils.

Section 24 (Creation of the Local Youth Development Council). To ensure broad and diverse youth participation in local governance, each province, city, and municipality would form a Local Youth Development Council (LYDC), also known as the Provincial Youth Development Council (PYDC), City Youth Development Council (CYDC), and Municipal Youth Development Council (MYDC), respectively. The LYDC would be led by the President of the SK Federation and would include representatives from youth and youth-serving organizations at the provincial, city, and municipal levels. The LYDC would help plan and implement projects and programs for the SK and the Federation at all levels.

Section 26 (Creation of the Local Youth Development Office). It necessitates the establishment of a Youth Development Office in each province, city, and municipality throughout the Philippines. This office would be led by a youth development officer with a rank at least equivalent to the division chief. If the local government unit has the funds, the Youth Development Office can be organized as a separate department with divisions and units for policy and planning, administration and finance, and programs and operations. This provision emphasizes the importance of prioritizing youth development and allocating dedicated resources and personnel to oversee and implement programs and initiatives that benefit the youth sector.

2.5 Related Studies

2.5.1 Foreign Studies

2.5.1.1 Reconstruction of an existing building with one additional storey by Mariya Zhulidova (Saimaa University of Applied Sciences Technology, Lappeenranta Double Degree Programme in Civil and Construction Engineering).

This study intends to examine potential constructive solutions for adding more floors to existing buildings. The goal was to create the best applicable storey-adding structure, as well as scenarios when the strengthening scheme was or was not considered. The study focuses on the jacket-type storey-adding technique, which involves erecting portal frames on independent foundations around an existing building. The frames were joined together to form a structure that can support the load of the superstructure being built. In this framework, the overlap represents a steel-concrete composite slab on steel profiled decking. The supporting frame consists of columns, beams, and bracing. This combined frame-bracing system ensures the structure's spatial stability.

Figure 19

General View and Internal Space of the original building

Source: Saimaa University of Applied Sciences Technology

As depicted in Figure 19, the original Building represents a two-storey frameless construction with brick load-bearing walls and prefabricated reinforced concrete ceilings. The foundations are driven reinforced concrete piles with a 30x30 cm cross-section. The cast-in-place pile grating is 550 millimeters wide. The 4m pile has a load-bearing capacity of 34.3 tons. The plan shows a rectangular building with dimensions of 19.8 x 12.5 meters. The structure was built in 2010.

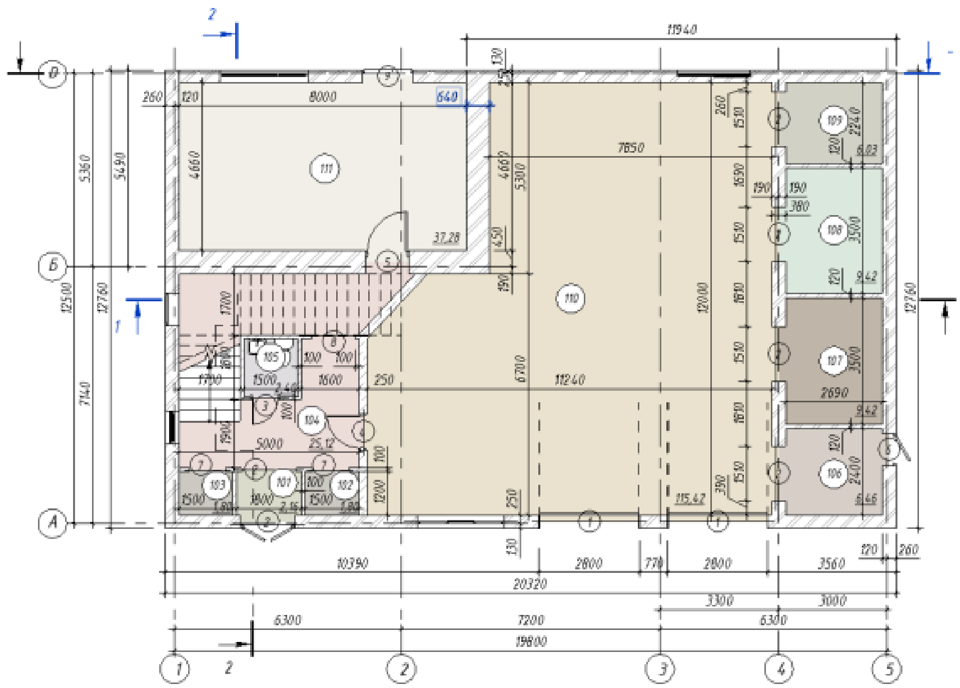


Figure 20

First Floor Plan of the Building

Source: Saimaa University of Applied Sciences Technology

Figure 20 illustrates the first-floor plan, which demonstrates the great difficulty of bearing the vertical expansion load shown in the original architectural facade, preserving the original architectural facade partitioning (floor-to-floor distance requirements), and building compliance for office needs.

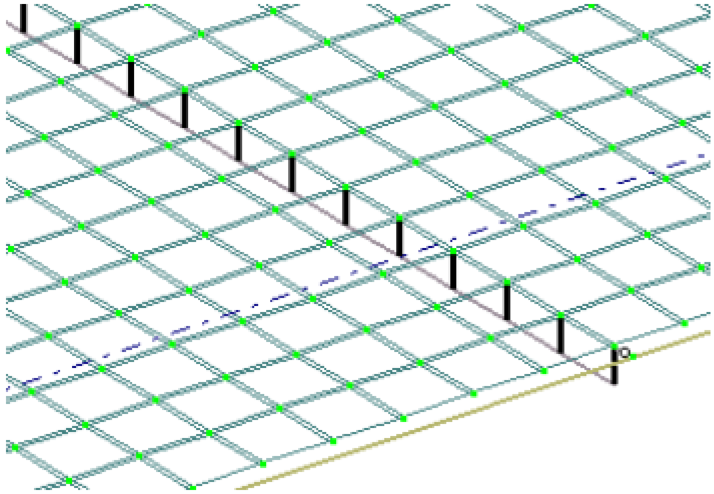


Figure 21

Composite Steel-Concrete Stimulation utilizing Software Structural Analysis

Source: Saimaa University of Applied Sciences Technology

Figure 21 shows that a combination frame-bracing system provides spatial stability to the structure. Rigid frames ensure global stability in the transverse direction, whereas bracing and secondary beams installed between columns in floor levels provide longitudinal rigidity. The composite floor structure provides transverse and longitudinal horizontal rigidity to the frame. Vertical bracing systems are installed to prevent obstructions to the free use of interior space. Calculations using the LIRA software-computing complex confirm sufficient rigidity in transverse and longitudinal directions even without diagonal connections.

2.5.1.2 The Ontrack Social Hall building in Wellington, New Zealand

Reputable architect Gray Young created Wellington's railway district, which includes the 1936-erected Ontrack Social Hall structure. It is classified as a NZHPT Heritage building of Category 2. CCM Architects was tasked by Ontrack to preserve all significant historical elements while strengthening and renovating the two-story structure into a boutique office space with character. (Ontrack Social Hall - CCM Architects, n.d.)ble architect Gray Young created Wellington's railway district, which includes the 1936-erected Ontrack Social Hall structure. It is classified as a NZHPT Heritage building of Category 2. CCM Architects was tasked by Ontrack to preserve all significant historical elements while strengthening and renovating the two-story structure into a boutique office space with character. (Ontrack Social Hall - CCM Architects, n.d.)

Figure 22

External Overview of the Social Hall Building

Source: ccm.co.nz

Figure 22 shows that the garage area on the ground floor is straightforward, yet it has some interesting elements, such as a beautiful Art Deco staircase leading to an upper hall. Although the hall appeared spacious, the windowsills, which were 1.5 meters above the floor, were deemed inappropriate for the intended modern office setting. The wooden garage doors for vehicles were swapped out for a lengthy fully glazed wall that includes a new main entrance, directing attention to the railway station and shielded from wind (Ontrack Social Hall - CCM Architects, n.d.).

Figure 23

Internal View of the Social Hall Building

Source: ccm.co.nz

On the upper floor, as shown in Figure 23, a new elevated floor was built 500mm (about 1.64 ft) higher than the existing one, lowering the windowsill height and forming a delightful, light-filled office area. This raised floor also serves as a space for the distribution of building services on both levels, keeping the original ceilings free of ducts and cable trays. All seismic reinforcement work was concealed, preserving the integrity of the original design.

2.5.1.3 The K.O. Lee Aberdeen Public Library

This library replaces Aberdeen's old public library. This project aims to create a new social living room. The result is shown in Figure 26, which is an innovative structure that can both inspire and meet the needs of the community. This library was not intended to be a storage facility for dusty books and card files; rather, it was intended to be a center of creativity, research, and collaboration, open to the public (Caballero, 2022).

Figure 24

K.O. Lee Aberdeen Public Library External View

Source: Archdaily.com

Figure 25

K.O. Lee Aberdeen Public Library Floor Plan

Source: Archdaily.com

The Public Library floor plan, which is illustrated in Figure 24, features an inviting entryway leading to an administrative office with a conference room. It includes a well-equipped kitchen, children's area, study room, archive room, and restrooms, all strategically placed for convenience and functionality. The layout encourages learning, collaboration, and community engagement.

2.5.2 Local Studies

2.5.2.1 Proposed Design of a Government Administrative Center in Poblacion Badiangan, Iloilo.

A project study that was nearly identical to ours was discovered. This proposed study is located in Poblacion, Badiangan, Iloilo which is also a two-storey structure which is shown in Figure 26. The study included the complete site development, architectural, structural, plumbing, and electrical plans. The total area of the government administrative center is 1000 square meters. The project would be completed in 457 calendar days and would cost PHP 33,000,000.

Figure 26

3-Dimensional View of the Two-Storey Building

Source: repository.cpu.edu.ph

The proposed design addressed the current issues in the different local and national government agency offices in Barangay Poblacion Badiangan, Iloilo, which includes a lack of office, additional working space, lack of storage facilities, and inefficient accessibility for transactions that limit the working capabilities and gives inconvenience to both employees and clients for their daily transactions. Therefore, the newly proposed design of the government administrative center has resolved the problems existing in the municipality.

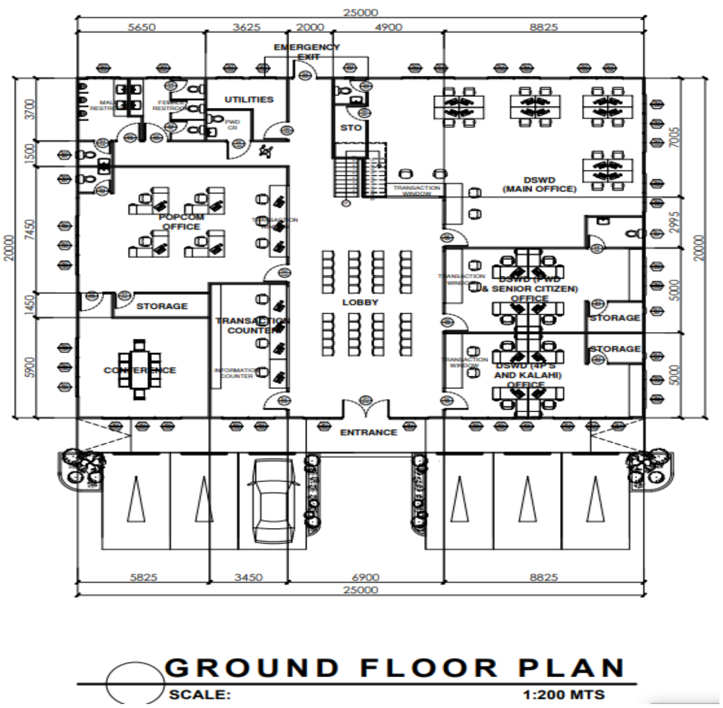


Figure 27

First Floor Plan of the Government Building

Source: repository.cpu.edu.ph

The first-floor plan as depicted in Figure 27; the plan of the building includes a variety of essential facilities to meet various needs. The Conference Room is ideal for meetings and discussions, and the Storage facilities provide ample storage space for a variety of items. The office for Persons with Disabilities

(PWD) and Senior Citizens is designed to meet the specific needs of these groups while maintaining accessibility and convenience. The Department of Social Welfare and Development (DSWD) is the main office in charge of the various social welfare programs and services. This floor also houses the Commission on Population's (Popcom) office, which focuses on population and family planning initiatives.

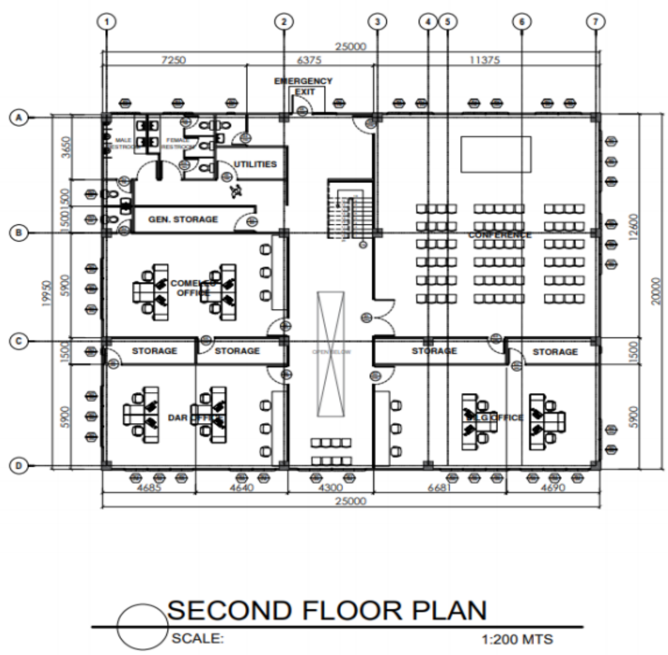


Figure 28

Second Floor Plan of the Government Building

Source: repository.cpu.edu.ph

As illustrated in Figure 28, the second floor of the building is designed to provide functional spaces for various government offices. Storage areas are strategically placed to efficiently store documents and supplies. The Department of Agrarian Reform (DAR) office is on this floor, focusing on agrarian reform programs and services. The Commission on Elections (Comelec) office is also situated here, overseeing electoral processes and activities. Additionally, the

Department of the Interior and Local Government (DILG) office is included, focusing on local governance and community development. A Conference Room is available on this floor too, providing a space for meetings and discussions. Overall, the second-floor layout ensures that each office has a designated space that is conducive to its specific functions and requirements.

2.5.2.2 Design and Implementation of the Proposed Two-Storey Multi-Purpose Green Building at Barangay Bagong Pook, Malvar Batangas.

The objective of this study is to create a structural design for a two-story multi-purpose green building in Barangay Bagong Pook, Malvar, Batangas. The building is designed to serve various purposes, including hosting activities, holding public and private meetings, and serving as an evacuation center. The primary goal of green design is to protect the natural environment surrounding the project site while building a functional structure (Lat et al., 2019).

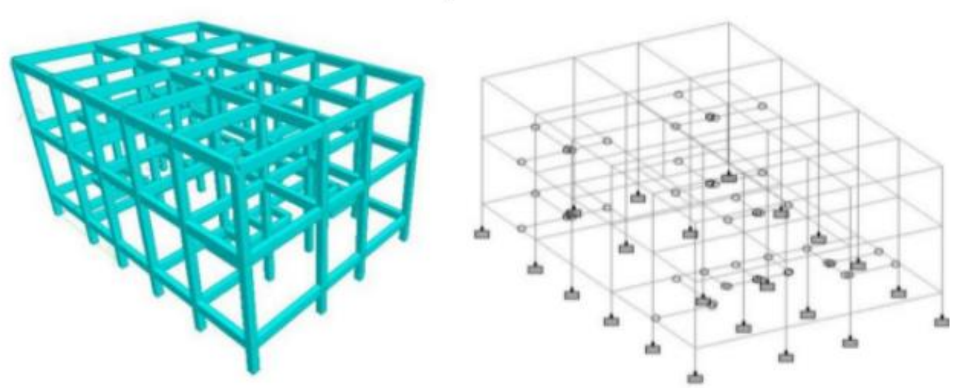


Figure 29

3D Framing Plan using STAAD

Source: lpulaguna.edu.ph

The structural design, created with STAAD, includes the footings, columns, beams, slabs, and walls as shown in Figure 29. This project effectively incorporates Green Design principles while meeting the minimum requirements outlined in the NSCP 2015, NSCP 2010, and the Philippines Green Building Code. The building's Green Design aims to improve quality of life, reduce energy and water consumption, and lower daily expenses for future residents (Lat et al., 2019).

2.5.2.3 A proposed government office by Buensalido+Architects weaves spaces

Buensalido+Architects conceptualized the building with weaving as the primary design strategy, as evidenced by its spatial organization, zoning, massing, and visual representation. The architects divided the building into smaller, more relatable structures to integrate it into Ortigas' dense urban landscape and nearby residential areas. They designed a series of two-story, L-shaped volumes that are stacked and linked around three central plazas, with terraces that follow the slope of the property. This approach allows the building to blend in with its surroundings while remaining human scale (Mata, 2023).

Figure 30

External 3D View of the Office Building

Source: bluprint-onemega.com

As shown in Figure 30, commercial spaces are at the front of the building, gradually stepping up along with a grand staircase and outdoor seating areas to the elevated plaza on the third floor. These public areas are designed to flow into certain semi-public spaces, ensuring that the building remains vibrant with people and activity even outside of office hours for the Metropolitan Manila Development Authority (MMDA). Private and commercial vehicles are separated and located at the property's rear, behind the shops, and sheltered under the elevated plaza. Placing the drop-off area within the construction site allows for the orderly arrangement of cars without disrupting traffic flow on the main road (Mata, 2023).

Figure 31

Interior 3D View of the Office Building

Source: bluprint-onemega.com

Distinctively, the example interior view of the office shown in Figure 31 begins from the raised plaza and is evenly distributed vertically, ensuring privacy from the surrounding public areas. The design strategically places lobbies and vertical circulation spaces throughout the development to ensure easy access to and from the offices (Mata, 2023).

2.6 Synthesis

The proposed project will incorporate standards and guidelines into its design, with structural design specifications based on relevant codes. The most important design elements were determined after a thorough evaluation of related building designs. Each component of the government administrative center will be calculated and designed to meet these specifications.

In comparison to other government and private buildings, the proposed government building in Poblacion, Badiangan, Iloilo, exhibits similarities with typical offices found throughout the country. These similarities align with the considerations typically considered when designing a government administrative office in the area. The building includes facilities such as storage spaces, public toilets on all floors, offices for the Commission on Population and Development, Commission on Elections, Department of Agrarian Reform (DAR), Department of the Interior and Local Government (DILG), a convention hall, and the Department of Social Welfare and Development (DSWD), which is subdivided into four sections for KALAHI, 4 P's, Persons with Disabilities (PWD), and Senior Citizens. Additionally, the building is designed with stair ramps for accessibility at all levels. Overall, each area is generously spacious, well-ventilated, and thoughtfully integrated with the relevant government offices in the Philippines.

The K.O. Aberdeen Public Library stands out among other public libraries due to its thoughtfully designed floor plan. The layout features an inviting entryway leading to an administrative office with a conference room, a children's area, a study room, an archive room, and restrooms, all strategically placed for convenience and functionality. This design encourages learning, collaboration, and community engagement, making it a standout among public libraries.

Furthermore, the Ontrack Social Hall building in Wellington, New Zealand, presents a compelling case for integration into the proposed design of the researchers due to its innovative architectural approach and functional layout. The building's use of wide spaces for a social hall and its materials reflects a modern and sustainable design ethos, aligning to create a versatile and environmentally conscious structure. The incorporation of natural light, ventilation, and energy-efficient features in the Ontrack Social Hall building highlights best practices in sustainable design, which could serve as inspiration for the project. Additionally, the building's integration into the urban landscape of Wellington demonstrates how a public building can successfully blend with its surroundings while maintaining a distinct identity. Overall, the Ontrack Social Hall building stands as a testament to thoughtful design and could provide valuable insights and ideas for this project.

The two-storey local youth development office with a public library and a social hall building stands out for its comprehensive facilities, integrating best practices from other government offices in the Philippines. Additionally, the design aims to innovate by addressing the shortcomings identified in previous studies. The findings from the literature review provide strong justification for pursuing the project study.

Chapter 3

Methodology

This chapter provides a comprehensive analysis of the research plan and methodology utilized in the study. Following the establishment of research objectives and literature review, a qualitative approach was deemed appropriate.

3.1 Design Constraints

3.1.1 Choice of Materials

3.1.1.1 Lighting

LED Panel Lights. LED panels offer several advantages for illuminating a two-storey office and social hall. They are energy-efficient, with a lifespan of up to 50,000 hours, produce minimal heat, and have dimmable options that allow for brightness adjustments. However, potential drawbacks include high upfront costs, variable quality affecting brightness and longevity, possible color inaccuracies, and glare issues when not properly positioned, which may hinder comfort and focus in various areas (Lighting Style, 2020).

Recessed LED Downlights. These lights provide a streamlined appearance as they are discreetly embedded in the ceiling, making them suitable for spaces like offices and reception areas. They ensure even lighting across rooms, preventing dimly lit spots, and maintaining a timeless style. However, they require multiple installations for adequate brightness, increasing costs, and their installation is complex, necessitating professional expertise to avoid issues like air leaks (TIO Electric, 2019).

Skylights. Skylights offer increased daylight, energy savings by reducing artificial lighting and heating needs, various design options, and ventilation for airtight spaces. Drawbacks include potential overheating, heat loss in winter, installation issues leading to leaks, and moisture problems that can elevate energy costs. Proper installation by experienced professionals can mitigate these risks (Roof Doctors, 2022).

Fluorescent Tube Lights. These lights are energy-efficient, offering a significant reduction in energy consumption compared to traditional bulbs. Their long lifespan leads to lower maintenance costs, and they can provide a return on investment in a short time. However, they contain mercury, posing disposal challenges, and may have issues like flickering or buzzing (Energy Star). Incandescent Bulbs: These bulbs provide a full spectrum of light and are safe regarding electromagnetic frequency exposure. However, they have high maintenance costs, energy consumption issues, limited quality options, and risks of heating (Health Lighting, 2021). Transitioning to more energy-efficient options like LED bulbs is recommended for cost-effectiveness and sustainability (Liquid LEDs, 2018).

Halogen Bulbs. Halogen bulbs are energy-efficient, providing immediate full illumination and compatibility with dimmers. Despite their benefits, they generate more heat and require careful handling. Their higher upfront cost is often offset by energy savings, although not all bulbs perform consistently (Miley, 2016).

LED Bulbs. LED bulbs are preferred for their long lifespan and remarkable energy efficiency. However, they may deter some buyers due to initial costs, incompatibility with dimmers, and sensitivity to heat. Despite these drawbacks, their efficiency and longevity make them a popular choice (Brennan Electric, 2020).

The selection of a lighting system involves considerations of functionality, energy efficiency, initial costs, ongoing expenses, structure lifespan, and aesthetic preferences. A thorough evaluation of options will identify the most cost-effective solution.

3.1.1.2 Windows

Double Hung Windows. Double hung windows offer enhanced ventilation capabilities, allowing for easy control of airflow by sliding the bottom sash upward and the upper sash downward, accommodating air conditioning units, ensuring convenient opening, and closing. Their design also promotes significant energy savings through a double locking mechanism that seals tightly against weather elements, enabling fresh air circulation on hot days while keeping chilly air out during colder periods, thereby reducing reliance on electrical cooling and heating systems. Additionally, their versatile design makes them easy to clean by tilting each sash for cleaning on both sides, eliminating the need for ladders when cleaning exterior surfaces on higher stories and ensuring convenient maintenance. However, drawbacks include air leakage issues compared to casement windows, requiring regular weatherstripping maintenance to prevent pests and chilly air infiltration, and necessitating regular maintenance such as dusting, cleaning, and lubrication of pulley mechanisms and locks. Despite modern options with fiberglass or vinyl frames potentially reducing maintenance needs, they still require more attention than simpler window styles like picture and single hang systems. Moreover, the design complexity of double hung windows contributes to their higher cost compared to other window styles, making them a more expensive investment eventually (Innovative, 2020).

Fixed Windows. Picture windows offer several advantages, including excellent insulation and weatherproofing due to their tight seal, making them highly energy-efficient when equipped with features like Low-E coating and warm-edge spacers. Their structural simplicity allows for larger sizes, maximizing natural lighting and reducing the need for artificial light during the day. Maintenance is straightforward as they lack moving components, simplifying the cleaning process. Additionally, they are cost-effective as they do not require replacing mechanical parts and are generally less expensive than other window types of equivalent size. However, drawbacks include limited ventilation, particularly in warm climates where other operable windows may be preferred, and challenges in cleaning from the outside, especially for larger or upper-floor installations. They may also contribute to unwanted heat gain due to their enormous size and abundance of sunlight, although this can be mitigated by considering U-factor and Solar Heat Gain Coefficient values. Furthermore, while picture windows have fewer replaceable parts, their eventual wear and tear may necessitate full unit replacement, unlike other windows where specific parts can be replaced, adding to long-term maintenance costs (Euro Choice, 2021).

Awning Windows. Awning windows offer several advantages, including better ventilation and lighting compared to traditional sliding windows, as they can remain open during rain while keeping the interior dry. They are also affordable options for homeowners on a budget and contribute to energy efficiency by sealing the home from outside weather, reducing air leakage, and enhancing security due to their difficult-to-break-into design. Additionally, awning windows come in various materials, shapes, and sizes, providing versatility in design to meet specific preferences. However, there are drawbacks to consider, such as the potential crash hazard posed by their outward opening, especially in high-traffic areas, and their limited suitability as emergency exit routes due to their opening mechanism. Cleaning awning windows can also be challenging due to their slanted design, requiring extra effort to reach difficult areas for dusting and cleaning (Long Home Products, 2021).

Sliding Windows. Sliding windows offer several advantages, including trouble-free operation with a simple sideways slide to open, making them convenient and hassle-free without the need for cranks or mechanisms that wear down over time. They are also cost-effective, being generally the least expensive operational window option available, and feature locking mechanisms that are durable and less prone to wear compared to other window types like casement and awning windows. Depending on the manufacturer, various locking mechanisms are available, offering diverse levels of security, including single lever latch, dual-track latches for dual-sliders, multi-point and keyed locks for high-end products, and self-locking mechanisms. Additionally, sliding windows provide excellent ventilation, with options for dual-slider windows allowing for two areas of ventilation, and configurations of fixed or sliding windows to suit diverse needs. They are space-efficient and suitable for areas where extruding windows are not desired, such as decks, stairs, or porches. Cleaning is also made easy with tilt and double-tilt sliding windows that tilt inwards for cleaning the exterior pane from inside the home, while double-tilt-out windows allow for easy removal of the window from its frame for thorough cleaning. Moreover, sliding windows are suitable for accommodating single-room air conditioners, providing a versatile solution for various needs. However, they come with certain drawbacks, including snow and ice accumulation in the sliding track in winter, potential gaps between sliding sashes compromising energy efficiency, and challenges in cleaning and maintenance due to dirt accumulation and exterior screen removal. Security concerns include latches that may not close easily, necessitating a tight shut, and slider windows are best suited for horizontal orientations and wide openings rather than narrow ones. Additionally, they are typically not available in wood-only configurations due to their sliding nature (Bayview Windows, 2016).

Louvered Windows. Louvre windows offer several advantages, including enhanced ventilation ideal for hot and humid climates like Sydney, potentially reducing reliance on air conditioning and lowering energy costs. Their adjustability extends to light control, making them suitable for various rooms and accommodating diverse needs, while also adding aesthetic appeal with numerous styles, colors, and materials available to complement home architecture. However, they come with limitations, including providing limited privacy compared to solid windows, making them less suitable for privacy-sensitive areas. Additionally, Louvre windows are not the best choice for insulation, as the spaces between slats can allow heat transfer, potentially leading to discomfort and increased energy costs. Cleaning Louvre windows can also be challenging due to the positioning of their horizontal slats, requiring special tools or disassembly for proper cleaning (Splendid WGR, 2023).

Choosing an appropriate window type for architectural applications involves careful consideration of various criteria. Energy efficiency is paramount, with options like double-pane or low-emissivity glass contributing to insulation and reduced energy consumption. Architectural coherence and aesthetic alignment with the overall design are crucial factors in creating a visually harmonious structure. Functionality considerations include ease of operation, secure locking mechanisms, and provisions for effective ventilation. Durability and maintenance requirements play a pivotal role, emphasizing the importance of selecting materials that ensure long-lasting performance and minimal upkeep. Regional climate conditions, noise attenuation features, and adherence to budget constraints further influence the decision-making process. These criteria collectively guide the selection of a window type that not only meets practical needs but also aligns.

3.1.2 Integration of Conference Room for the LYDC

Fixed Location of Conference Room. The conference room is proposed to be on the second floor of the LYDO building, allocated with its own space. Placing the conference room on the second floor offers several potential benefits. Firstly, it provides a more secluded and quieter environment conducive to meetings and conferences, away from the potentially bustling activities of the social hall on the first floor. This separation could enhance the overall productivity and focus during meetings. Additionally, having a designated conference space on the second floor may impart a sense of professionalism and formality, which could be advantageous for LYDC's office operations and public library services. Furthermore, locating the conference room upstairs could optimize the utilization of space, allowing for efficient organization and layout of both the social hall and office/library areas. However, it is essential to consider potential drawbacks such as accessibility issues, particularly for individuals with mobility impairments, and the need for adequate soundproofing to prevent disturbances to the office and library spaces located nearby. Evaluating these factors comprehensively would be crucial in determining the feas ibility and effectiveness of Alternative 1 for meeting LYDO's needs and objectives.

Retractable Partition Wall within Function Hall. The conference room is proposed to be integrated within the function hall area on the second floor of the LYDO building, utilizing a removable partition for flexibility. This approach offers several unique advantages that warrant consideration. Firstly, situating the conference room within the social hall allows for smooth integration of meeting and event spaces, promoting versatility in the use of the facility. During non-conference times, the social hall can function as a multi-use area for community gatherings, events, and activities, maximizing the utilization of the space. The use of a removable partition enables quick adaptation of the area to accommodate larger events or conferences, providing the flexibility to adjust the layout according to specific needs. However, careful consideration must be given to soundproofing measures to ensure that conference activities do not disrupt ongoing events or activities in the social hall. Additionally, logistical challenges such as storage and management of the partition when not in use must be addressed to ensure smooth operations. Assessing these factors comprehensively would be essential in determining the feasibility and effectiveness of Alternative 2 in meeting the requirements of LYDO's proposed building.

In determining which alternative is better suited for LYDO's needs, several key criteria should be considered. These include functionality and flexibility, assessing how well each alternative meets LYDO's operational requirements and adapts to varying needs. Space utilization is crucial, evaluating the efficiency of each option in utilizing available space and potential for future expansion. Cost-effectiveness is critical, considering initial investment, maintenance costs, and potential savings. Accessibility and inclusivity must be ensured, addressing the needs of all users, including those with disabilities. Noise control and privacy are essential, requiring effective soundproofing measures. By weighing these criteria, LYDO can make an informed decision that best serves its objectives for the proposed building project.

3.1. Sustainable Water Source

Sustainable water sourcing and management are crucial for buildings to address the pressing global water challenges and ensure environmental sustainability eventually. With increasing strains on freshwater reserves due to population growth, urbanization, and climate change, adopting sustainable water practices becomes essential to relieve pressure on freshwater ecosystems and secure a dependable water supply for current and future generations.

Rainwater Harvesting System. Rainwater harvesting offers several advantages. Firstly, it benefits the environment by preventing soil erosion caused by rainwater runoff and reducing pollutants entering water sources. Additionally, it aids in energy conservation by eliminating the need for water treatment for outdoor applications. Secondly, rainwater harvesting saves money overall, with low maintenance costs for storage systems and potential savings on water bills, especially in regions prone to drought. Moreover, it provides a reliable water source during dry spells, particularly beneficial in urban areas where water scarcity is prevalent. Lastly, rainwater harvesting is easy to install, suitable for outdoor applications like gardening, and can contribute to water conservation efforts. However, considerations such as maintenance expenses, potential contamination risks, high initial costs, storage limitations, and unpredictable collection amounts should be considered when opting for this system (Wise, 2023).

Greywater Recycling. Greywater recycling systems offer several advantages. Firstly, they significantly reduce water usage by repurposing water from sources like showers and sinks, cutting consumption by half and promoting conservation for future generations. Secondly, they lead to substantial cost savings by reducing water bills, particularly beneficial for those facing heavy charges for water usage. Additionally, these systems capture thermal energy from heated water, which can then be used to warm incoming cold water, thereby reducing energy consumption by up to 60%. Moreover, they divert less water to sewage facilities, preventing untreated wastewater from polluting water bodies and alleviating strain on sewage systems. By promoting conscientious water use, they contribute to environmental sustainability and offer potential benefits for both individuals and nature. Furthermore, recycled greywater contains nutrients beneficial for plant growth, making it an ideal option for irrigation. Lastly, homes equipped with greywater systems become more attractive to buyers due to their water-saving features, thereby increasing property value (Clean Tech Water, 2023). However, disadvantages include potential health hazards if improperly handled, complex permit requirements in some areas, prohibitions on indoor greywater use in certain jurisdictions, high installation and maintenance costs, and potential misinformation from retailers about system effectiveness (Gromicko, 2023).

Water-Efficient Fixtures. Installing water-efficient fixtures offers several benefits. Firstly, it promotes water conservation, reducing the environmental impact of households by minimizing water usage. This not only benefits the environment but also helps in preserving water resources for future generations. Secondly, it leads to significant savings on water bills since less water is consumed, resulting in lower monthly expenses. Moreover, water-efficient fixtures contribute to energy savings by reducing the demand for water heating or cooling, resulting in reduced energy bills. Additionally, these fixtures can improve indoor air quality by reducing moisture levels, thus lowering the risk of mold growth, and creating a healthier living environment. Overall, the installation of water-efficient fixtures not only saves money but also promotes environmental sustainability and enhances indoor comfort and health (Gold Coast Plumbing Co., 2023).

In choosing a sustainable water source, several critical criteria should be considered. These include evaluating the reliability and availability of the source, considering factors such as seasonal variations and long-term water security. Additionally, it is essential to assess the environmental impact of the source, including its contribution to water conservation, ecosystem health, and pollution prevention. Economic feasibility is another crucial aspect, involving initial investment costs, operational expenses, and potential long-term benefits. Moreover, prioritizing social acceptability and equity ensures that the chosen source meets community needs and adheres to local regulations. Finally, considering technological feasibility and compatibility with existing infrastructure is vital for effective implementation and long-term sustainability.

3.2 Contemporary Issues

3.2.1 Maintenance

Prioritizing regular maintenance was crucial due to its potential to prevent costly repairs in the future. Effective maintenance practices ensure that buildings receive adequate care, function optimally, and provide a conducive environment for occupants. This emphasis on maintenance was particularly important in the country, as it helps uphold property value, ensures occupant safety, and prolongs serviceability over an extended period. By investing in proactive maintenance measures, buildings could retain their structural integrity, enhance safety standards, and remain viable assets within the community for years to come.

3.2.2 Disruption of Services and Events

Community members, event organizers, and businesses relying on the existing social hall for hosting events or activities may express concerns about disruptions to their regular schedules. This can affect various events, such as community meetings, cultural celebrations, workshops, and private functions. The displacement of these events may lead to logistical challenges, inconvenience for participants, and potential economic losses for local businesses dependent on event-related activities. Providing alternative venues, temporary facilities, or assistance in relocating events to nearby spaces can help mitigate the impact of construction on the community's ability to host and participate in various activities. Clear communication about the construction timeline and efforts to minimize disruptions can contribute to community understanding and cooperation during this temporary displacement period.

The DSWD and DAR offices adjacent to the proposed demolition site will also be affected by the proposed project's construction. However, both departments will relocate to new offices within the municipality's ongoing construction project for the DSWD building, as shown in Figure 32. Along with these two departments, the offices of 4P's and Kalahi will also move, as illustrated in Figure 33. As a result, the imminent demolition of their former offices will not pose significant issues or challenges for these departments. They can smoothly transition to their new locations, ensuring continuity of their operations and services without disruption.

Figure 32

DSWD Building, Badiangan, Iloilo

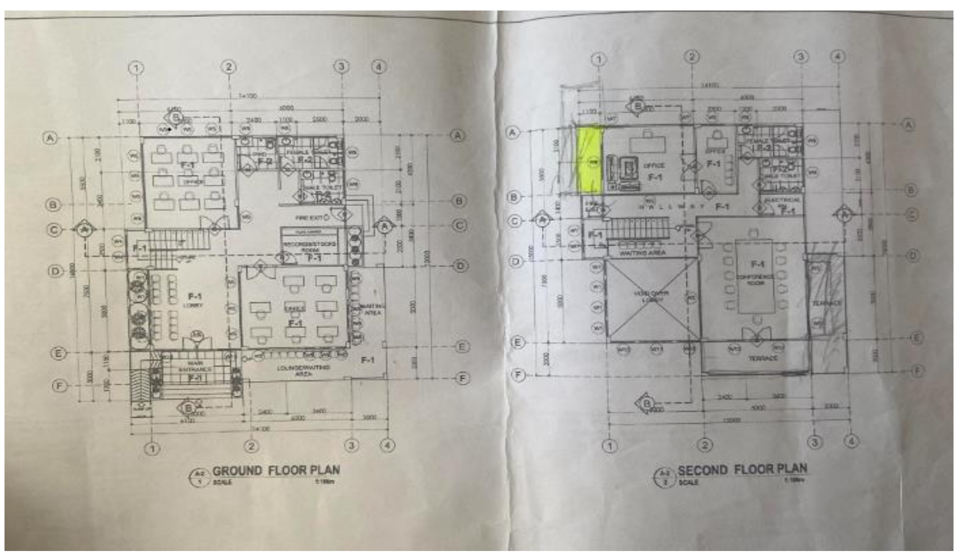


Figure 33

Floorplan of the DSWD Building in Badiangan

Source: DPWH

3.2.3 Sustainable Development Goals

3.2.3.1 Goal Number 9:

Industry, Innovation, and Infrastructure. This study aims to incorporate sustainable materials, energy-efficient systems, and innovative construction techniques to reduce environmental impact. By addressing this issue, the project could contribute by promoting infrastructure development that was resilient, inclusive, and environmentally responsible, while also providing a conducive space for government services and youth development initiatives.

3.2.3.2 Goal Number 11:

Sustainable Cities and Communities. The study aims to design buildings with sustainability in mind, aiming to foster community development and cater to the specific requirements of the local population.

3.3. Design Framework

Figure 34 displays the design framework for the Proposed Two-Storey Local Youth Development Office with Library and Social Hall Building in Badiangan, Iloilo. Data collection and analysis would involve primary and secondary sources. Subsequently, architectural, structural, electrical, and plumbing plans would be developed. Finally, the project's cost estimates, and scheduling would be compiled.

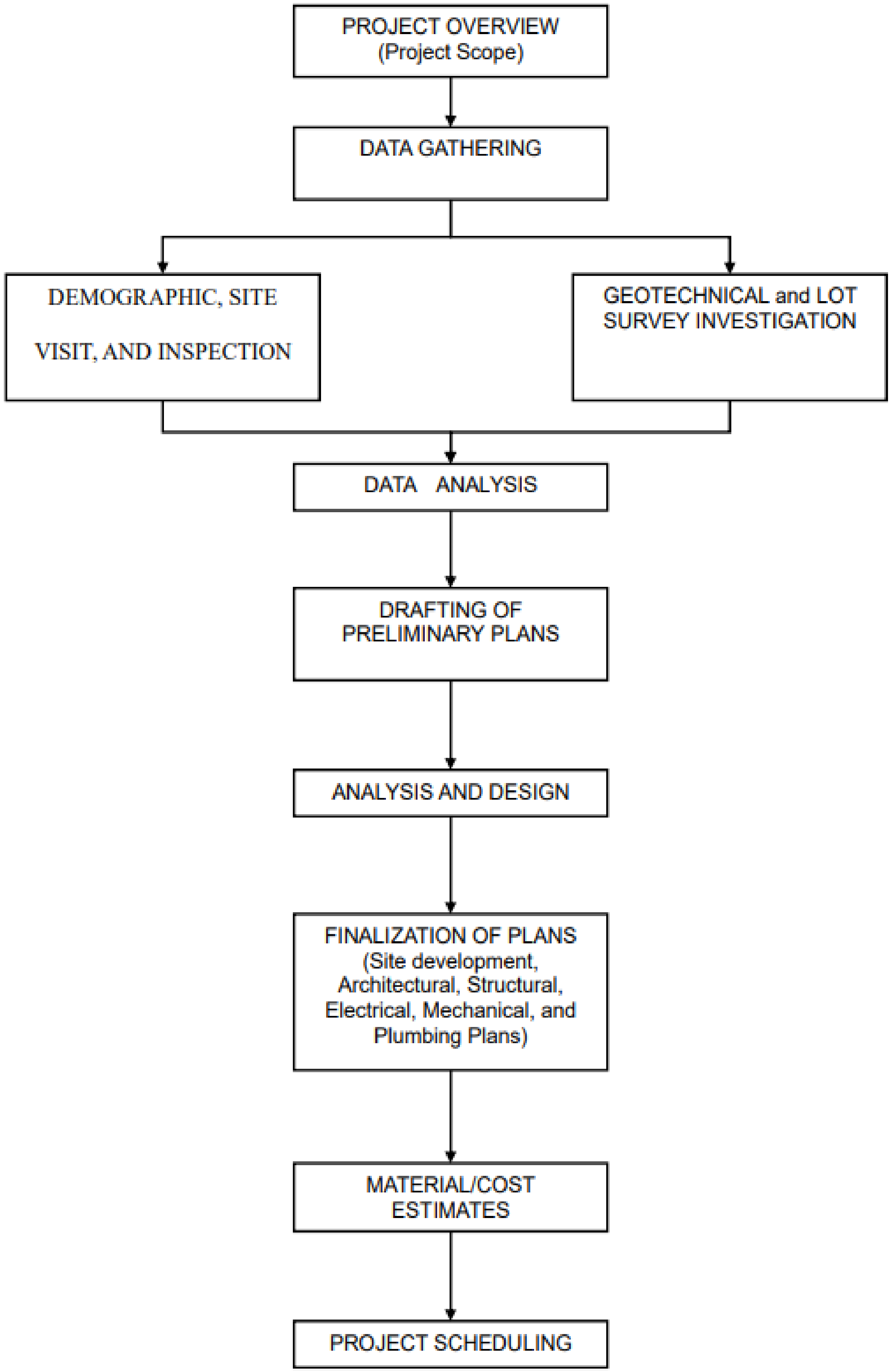


Figure 34

Design of Framework for the Proposed Project

3.3.1 Project Overview

The research project focuses on the Proposed Two-Storey Local Youth Development Office with Library and Social Hall Building in Badiangan, Iloilo. Currently, the Municipality of Badiangan operates a one-storey social hall building constructed in the 1980s. However, this facility is inadequate for accommodating large meetings, particularly those involving officials from all 31 barangays. Additionally, administrative offices like the Local Youth Development Office lack dedicated space and currently share quarters with other agencies. Furthermore, Badiangan did not have a public library accessible to its youth, as the previous one was demolished due to office shortages. Upon completion, the proposed design would be submitted to the Municipal Engineering Office of Badiangan. The effective utilization of the building could significantly contribute to the province's overall development.

3.3.1.1 Project Scope

This research aims to lay the groundwork for constructing the two-storey Local Youth Development Office with Library and Social Hall in Badiangan, Iloilo. The structure's lot area will be 500 square meters, with a floor area of 250 square meters. The research encompasses a comprehensive geotechnical investigation of the project site and the formulation of architectural, structural, electrical, plumbing, and fire protection plans. Additionally, it includes the delineation of construction specifications, cost estimates, and a detailed work schedule. Essential amenities like comfort rooms, a kitchen, and wash areas will be incorporated into the plan. The overall construction budget is approximately ₱20,000,000.00. The analysis and design computations will adhere to the National Structural Code of the Philippines, National Building Code of the Philippines, National Plumbing Code of the Philippines, and Philippine Electrical Code. Notably, the design will incorporate green building technology. It is crucial to emphasize that this decision entails a significant level of responsibility and necessitates careful consideration. Should the municipality choose to proceed with the plan, it assumes the responsibility for overseeing its successful realization.

3.3.2 Data Gathering

Data collection was conducted to help establish the project description. This would involve conducting surveys of the project site and performing soil testing to acquire the necessary information for specifying the site boundaries and assessing the soil-bearing capacity. Data collection methods such as on-the-spot face-to-face interviews, telephone interviews, electronic mail, and internet research will be employed to gather essential information. This includes details about the building's purposes, specifications, and various functions, such as a commercial area on the first floor and office spaces on the second floor. Additionally, the data collection process would encompass obtained information related to government records, general histories, and sample plans.

3.3.2.1 Demographic, Site Visit, and Inspection

A site visit and inspection in Poblacion, Badiangan, Iloilo, were conducted to determine the proposed structure's location and assess the premises' current state. The data collected during the inspection will be thoroughly evaluated and will play an essential role in shaping the proposed structure's design. By prioritizing these key factors, the researchers aim to create a design that efficiently accommodates and plans for any potential changes to the project.

3.3.2.2 Geotechnical and Lot Survey Investigation

Soil tests were conducted. The liquid limit, plastic limit, specific gravity, moisture content, and other properties necessary for the proposed structure's foundation design were determined. The obtained soil samples would be ready for analysis according to the minimum testing requirements. The Unified Soil Classification System would be utilized for soil classification. The outcome would be used to determine the soil-bearing capacity and classification for the proposed upper-floor food stall building foundation. Using total stations and GPS technology, a thorough topographic survey would be conducted to collect data on the features, contours, and elevation of the site. Geotechnical factors would be assessed by soil testing, and ecological concerns would be included in an environmental impact assessment. The integration and analysis of data would guide the design process, which would prioritize accuracy and dependability. The expected outcomes would be subjected to thorough analysis and reporting conducted by the esteemed Soils Laboratory within the CPU Civil Engineering Department. This process delivers practical and insightful perspectives.

The planned project in Badiangan, Iloilo were surveyed using a methodical approach that aims to gather accurate data and insights. Geodetic control points would be set up after an initial on-site inspection to guarantee accurate measurements and identify significant features and potential roadblocks.

3.3.3 Data Analysis

To enhance the design and construction phases of the Proposed Two-Storey Local Youth Development Office with Library and Social Hall Building, a comprehensive site analysis would be undertaken. Soil samples would be collected and analyzed to determine the soil composition and geotechnical properties, guiding the design of foundation systems capable of withstanding local soil conditions. In addition, a thorough review and analysis of local building codes and zoning ordinances would be carried out to pinpoint specific requirements and constraints, ensuring complete compliance throughout the design process. Surveys and interviews would be conducted with local community members, farmers, and relevant authorities. The collected data would undergo analysis to integrate valuable insights into the design process.

3.3.4 Drafting of Preliminary Plans

The design process commences with a thorough analysis of spatial requirements and functional needs. The architectural team would collaborate to translate the project's objectives into initial sketches and layout designs, carefully considering the joint facility of the function hall and the offices. Special attention would be devoted to zoning regulations, local building codes, and accessibility standards to ensure full compliance. The preliminary plans would delve into spatial organization, circulation patterns, and the optimal placement of equipment to enhance operational efficiency. Additionally, initial considerations for the structural framework and building systems would be outlined, aligning with safety and construction standards. Throughout this phase, feedback from officials, including local community members and relevant authorities, is actively sought to incorporate valuable insights into the evolving design.

3.3.5 Analysis and Design

Elements were thoroughly adjusted to align precisely with specified design constraints, with a primary focus on functionality and adherence to environmental standards. A comprehensive examination covers both architectural to plumbing designs, making sure they strictly follow national regulations. It involves incorporating sustainable features and addressing challenges related to design and construction constraints. The design phase includes needed changes and improvements based on acquired insights. Advanced computer-aided design (CAD) software is used to improve floor plans, elevations, and 3D models, focusing on both functional efficiency and aesthetic appeal.

3.3.6 Finalization of Plans

3.3.6.1 Architectural Plan

This plan would include the proposed structure's vicinity map, traffic flow plan, and architectural floor and elevation plan. Optimal Architectural design was formulated based on the combination of a social hall, a library, and a local youth development office. The design would encompass essential facilities like a restroom, conference room, reception area, common area, and storage space. The design inspiration for the architectural plan would be provided by the Architect and the National Building Code of the Philippines was utilized.

3.3.6.2 Structural Plan

The structure was designed using the 2015 National Structural Code of the Philippines (NSCP 2015). The study addresses the structural components of the structure, ensuring compliance with safety regulations and capacity to endure the demanded loads linked to live loads and storage. The structure's foundation, column, beam, slab, wall, roof framework, and roof plans were all included in this plan. This also included any additional design considerations deemed necessary, such as material qualities and specifications, design loads, etc.

3.3.6.3 Electrical Plan

The electrical plan encompasses the electrical layout of the proposed structure which includes the loads, diagrams, and computations, adhering to the specifications outlined in the Philippine Electrical Code. The design inspiration for the Electrical Plan was provided by the Electrical Engineer.

3.3.6.4 Plumbing Plan

This plan encompasses the plumbing layout of the proposed structure, aligning with the stipulations outlined in the National Plumbing Code of the Philippines. The study integrates a plumbing plan to address the water supply and drainage necessities of the two-storey office with social hall. The design inspiration for the Plumbing Plan was provided by the Master Plumber.

3.3.6.5 Fire Protection Plan

This plan includes the fire risk detection systems of the proposed structure and was designed according to the provisions found in the National Building Code of the Philippines.

3.3.7 Materials Quantity and Cost Estimation

Suitable materials were identified, as well as the quantities required. The total cost estimate was based on the materials required for project construction. The cost estimate was based on the project cost, including labor and general requirements.

3.3.8 Project Scheduling

The Critical Path Method, Program Evaluator, and Review Technique (PERT-CPM) were used to determine how long each activity and the entire project would take. The project schedule would serve as both the project's starting point and construction goal.

3.4 Resource and Facilities

The proposal was written using a variety of sources, including legal documents obtained from the Municipality of Badiangan and other government agencies, online journals, articles, and books, previous project studies, and the most recent edition of the NSCP.

Municipal Engineer's Office of Badiangan, Iloilo. The location map and the thorough list of information that described the project's location, proposed scope, and financial details were extremely useful in laying the foundation for the project proposal.

Google Docs and M365. The researchers used M365 and Google Docs to simultaneously create and edit documents for the study.

Microsoft Office and Canva. The Researchers used Microsoft Office such as Microsoft Word for editing and formatting of Final Manuscript, Canva for presentations for the project proposal and final defense, and Microsoft Spreadsheets were used for computations.

Internet. The information gathered from various online platforms, such as literature reviews and relevant project studies, had greatly enriched our understanding and influenced the direction of our initiative.

National Structural Code of the Philippines (NSCP 2015). The structure of our project had been notably impacted by the guidelines outlined in NSCP.

Chapter 4

Project Area

4.1 Background and General Features of Poblacion, Badiangan Iloilo

4.1.1 Historical Background

According to legend, the name "Badiangan" comes from the word "kabadiangan," which indicates that an abundance of "badiang" plants grows in that area. The badiang plant is part of the gabi family and was recognized by its large leafy section. It grows extensively in the region. Years ago, when Badiangan was still a remote settlement, a group of Spanish conquistadores encountered the locals bathing and washing in a spring. When one of the Spaniards inquired about the name of the plant near the spring, the locals replied "kabadiangan." From that moment forward, the settlement became a barrio, named after the plant, which was later shortened to "Badiangan." The name was subsequently adopted when the barrio was established as the seat of municipal government (Pandayan Festival of Badiangan, 2005).

On June 17, 1967, the late President Ferdinand Marcos signed Republic Act 5006, which formed the municipality of Badiangan. Congresswoman Gloria Tabiana of Iloilo's 3rd district created this bill, previously known as House Bill No. 987 (Republic Act No. 5006 - Badiangan, Iloilo Municipality Creation, n.d.).

4.1.2 Location and Accessibility

The municipality of Badiangan was located in the middle northwestern region of Iloilo province, approximately 40 kilometers (24.85 miles) from the city of Iloilo. It was located within 122 degrees, 29 minutes and 122 degrees, 35 minutes east longitude, as well as 10 degrees, 58 minutes and 11 degrees, 2 minutes north latitude. The municipality is bounded by Janiuay to the southwest, Mina to the southeast, Pototan to the east, Dueñas to the north, and Lambunao to the northwest (Badiangan, Iloilo Profile – PhilAtlas, 1990).

The Municipal Town Hall of Badiangan was accessible via two major routes from the municipality's center. One route is 35 kilometers long and takes 49 minutes to travel in any motor vehicle. The other route, shown in Figure 35, takes 51 minutes and is 41 kilometers long, with Jaro Bus Terminal in Iloilo City serving as a reference point for both routes.

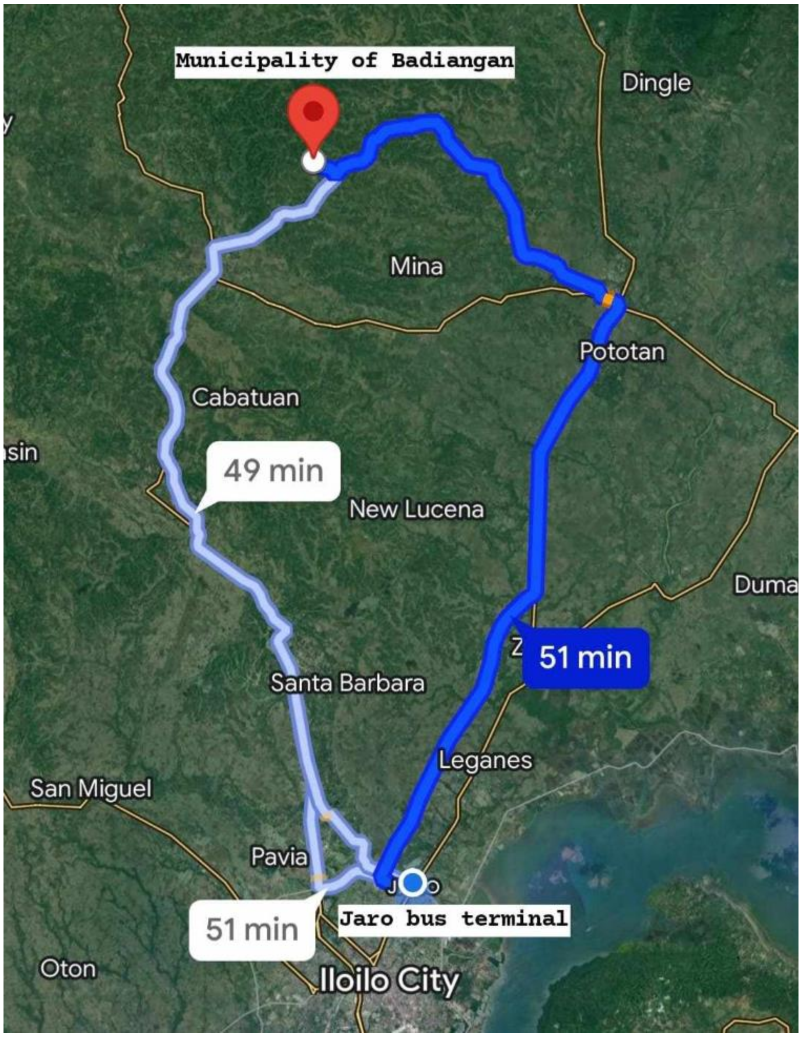


Figure 35

Routes from the Jaro Bus Terminal to Badiangan Town

Source: Google Maps

4.1.3 Political Subdivision

The municipality of Badiangan is currently divided into 31 barangays, including barangay Poblacion, which covers an area of 7,750 hectares. Botong is the largest barangay, covering 481.12 hectares, while Indorohan was the smallest at 51.27

hectares. Barangay Poblacion covers an area of about 286.38 hectares. The municipality of Badiangan belongs to the third congressional district (Badiangan | Iloilo Provincial Government, n.d.).

The Sangguinang Bayan of Badiangan, led by the currently serving mayor, was made up of men and women with expertise, competency, and knowledge. They have shown and proven their worth by actively participating in the development of laws and regulations that improve the well-being of the constituents they represent.

Every barangay in the province was led by a punong barangay, assisted by a member of the barangay council. The barangay council also serves as the policymaking body, the smallest political organization.

4.1.4 Topography, Slopes, and Elevations

In general, the province of Badiangan features a gently sloping and rolling land relief, with no rivers and only a few intermittent creeks. The highest elevation was 126 meters (413.39 feet) above sea level in the barangay of Manaolan in the northwest, and the lowest elevation is 49 meters in the barangay of San Julian in the northeastern section of the province (Municipality of Badiangan, 2009).

Badiangan had a total land area of approximately 7,750 hectares, 29.14% of which, or approximately 2,258.35 hectares, has a slope of 0-3%, and this region was primarily used for agriculture. 23.65% of the area, or 1,832.88 hectares, has a slope of 3.1-8%, which is ideal for intensive food grains and upland crops. Furthermore, 47.21% of the total land area, or around 3,658.877 hectares, had a slope ranging from 8.1 to 18% and was utilized to grow coffee, coconuts, orchards, corn, and upland crops, where intensive agriculture and properly designed erosion control methods must be maintained and always applied (Badiangan | Iloilo Provincial Government, n.d

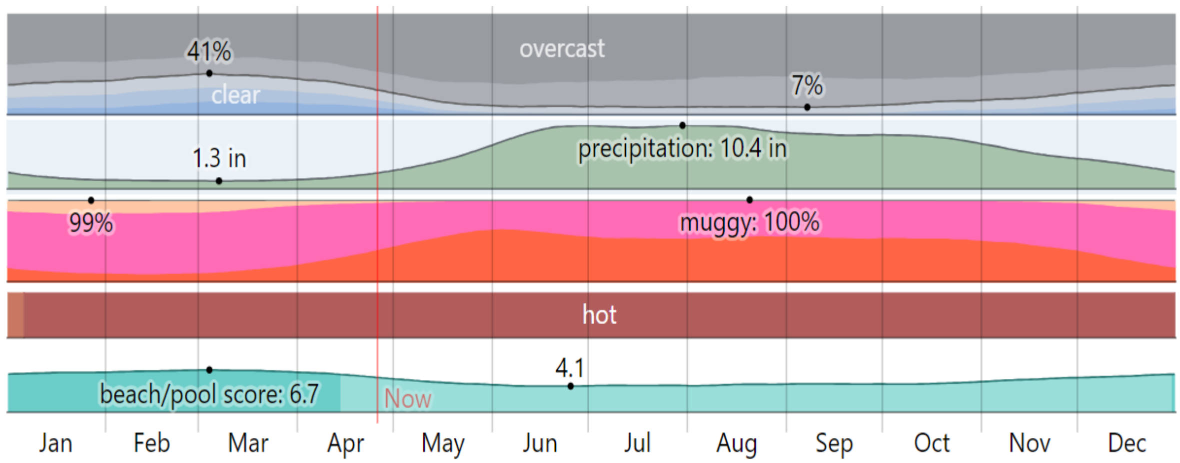


Figure 36

Monthly Weather Forecast in Badiangan

Source: weatherspark.com

4.***1.5 Climate***

The Municipality of Badiangan had a third type of climate, which means it was mostly dry from December to April and wet throughout the rest of the year. According to Figure 36, the extreme wet season occurs in August, though the extreme dry season occurs in late March. The lowest temperature in the provinces is recorded in July, while the highest is in April. Between July and December, three typhoons occur on average per month. The municipality had two separate climates: dry and moist. On average, the dry season runs from December to April. At Badiangan, the wet season was cloudy, while the dry season was windy and mostly cloudy. The town's position in a tropical area means that it had a hot climate all year. Due to climate change, wet and dry seasons could stay longer and begin earlier than usual.

4.1.6 Soil

The Municipality of Badiangan had two types of soil, namely Sta. Rita and Alimodian clay. The Sta. Rita clay extends through the municipality's western to eastern borders, covering around 36.75% of the entire land area (2,848 hectares). The northern and southern portions of the municipality are covered with Alimodian clay loam, which accounts for around 63.25% of the total area (4,902 hectares). These two types of soil have been determined to be ideal for sugarcane and rice production, the municipality's primary crops (Municipality of Badiangan, 2009).

4.1.7 Drainage

This municipality's surface drainage was very efficient, even without a major river serving as a natural waterway. This effectiveness was due to various factors such as the prevailing relief of the ground surface, the overall slope of the terrain, and the intermittent creeks found in the narrow valleys.

4.1.8 Water Resources

There were no natural surface water sources, such as rivers or creeks, available for irrigation or drinking water in the municipality of Badiangan. However, the area was rich in underground water resources, which were used as the principal source of domestic water supply. This groundwater exists in two forms: artesian flow, contained beneath the surface, and gravity flow, accessible via shallow pumps or drilled wells. The barangays of Sariri, Astorga, Iniligan, and San Julian contain artesian flow water. Iniligan and Sariri have confined subsurface water sources that serve both domestic water supply and sewage utilities. Furthermore, in the Astorga barangay, a drilled artesian flow well serves as a family water source.

4.1.9 Demography

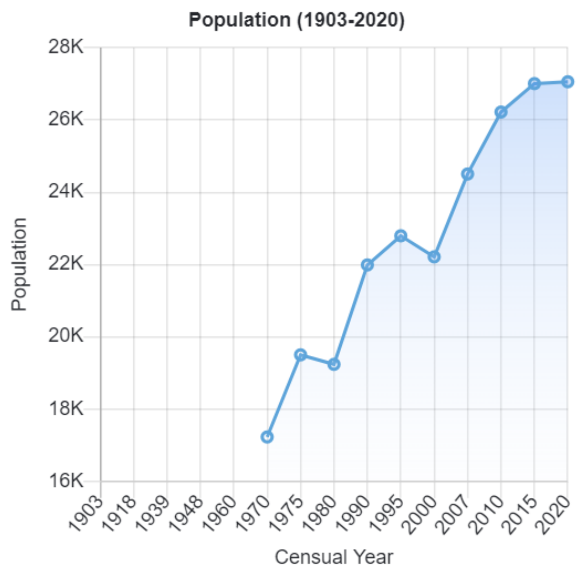


Figure 37

Population rate of Badiangan in the year 1903-2020

Source: Philatlas.com

As shown in Figure 37, the population data for Badiangan municipality was first recorded in 1970, showing a population of approximately 17,230. By 1975, this figure had increased to 19,502, indicating a growth rate of 2.51% using the geometric method. In 1980, the population slightly declined to 19,239, but by 1990, it had risen to 21,989, with a growth rate of 1.34%. According to the 1995 Census conducted by the National Statistics Office, Badiangan's population reached 22,879, with a growth rate of 0.725%. However, in the 2000 Census on Population and Housing by the National Census and Statistics Office, the population decreased slightly to 22,213 from the 22,795 recorded in 1995, resulting in a growth rate of -0.55%. Using the 2000 Census as the base year and employing the geometric method, the growth rate from 1990 to 2000 was calculated at 0.10% (Badiangan, Iloilo Profile – PhilAtlas, 1990).

4.1.10 Population Density

In 2000, the Badiangan municipality had a population of 22,213 people, dispersed within an area of 77.50 square kilometers. This corresponded to a population density of 287 persons per square kilometer or 2.87 per hectare. Predictions showed a modest increase to 288 by 2005. Barangay Poblacion stood out as the most densely populated area, with a population density of 484 people per square kilometer, or 4.84 per hectare. Similarly, among the rural barangays, Barangay Tina had the highest population density, with 464 people per square kilometer, or 4.64 people per hectare. Consequently, Barangay Talaba has the lowest population density, with only 171 people per square kilometer. According to the 2000 Population and Housing Census, there were 1.71 people per hectare of land (Population Statistics, n.d).

4.2 Background and General Features of the Project Site

4.2.1 Brief Historical Background

The planned project site was located at Zone 2, National Badiangan Road in Poblacion and was owned by the Municipality of Badiangan. The adjacent area was also designated for municipal use. Currently, the project site houses a social hall. A two-storey government building adjacent to the project site was also under construction. A total of 901.708 square meters was alloted for the project site while the project area measures 309.75 square meters and was specially designated for the construction of this two-storey building.

4.2.2 Land Area

Figure 38 represents the vicinity map of Poblacion, Badiangan, Iloilo to the project site, indicating that the area of the project site was a government-owned lot.

As determined by the project site survey, figure 39 depicts the results, which showed 900 square meters.

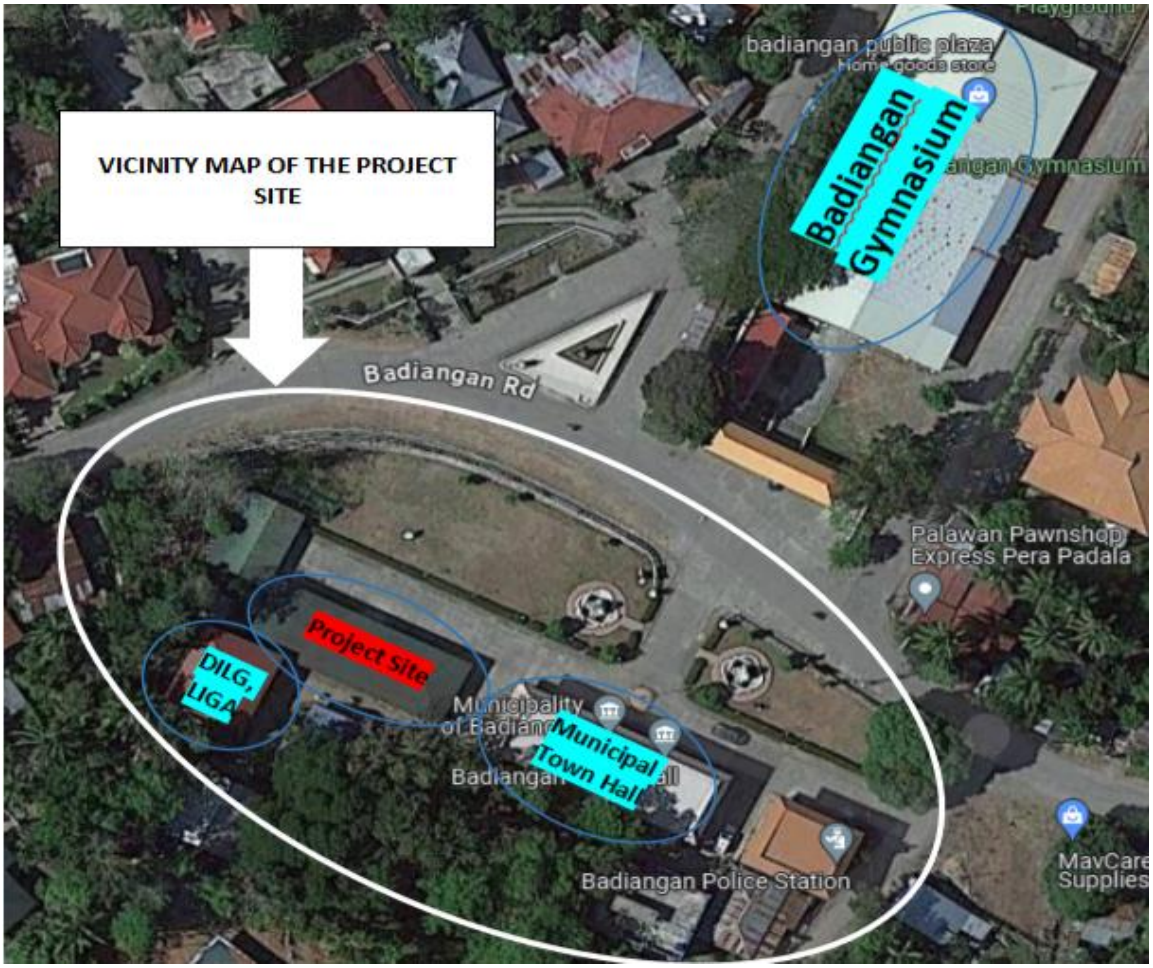


Figure 38

Vicinity Map of Poblacion, Badiangan, Iloilo with the project site

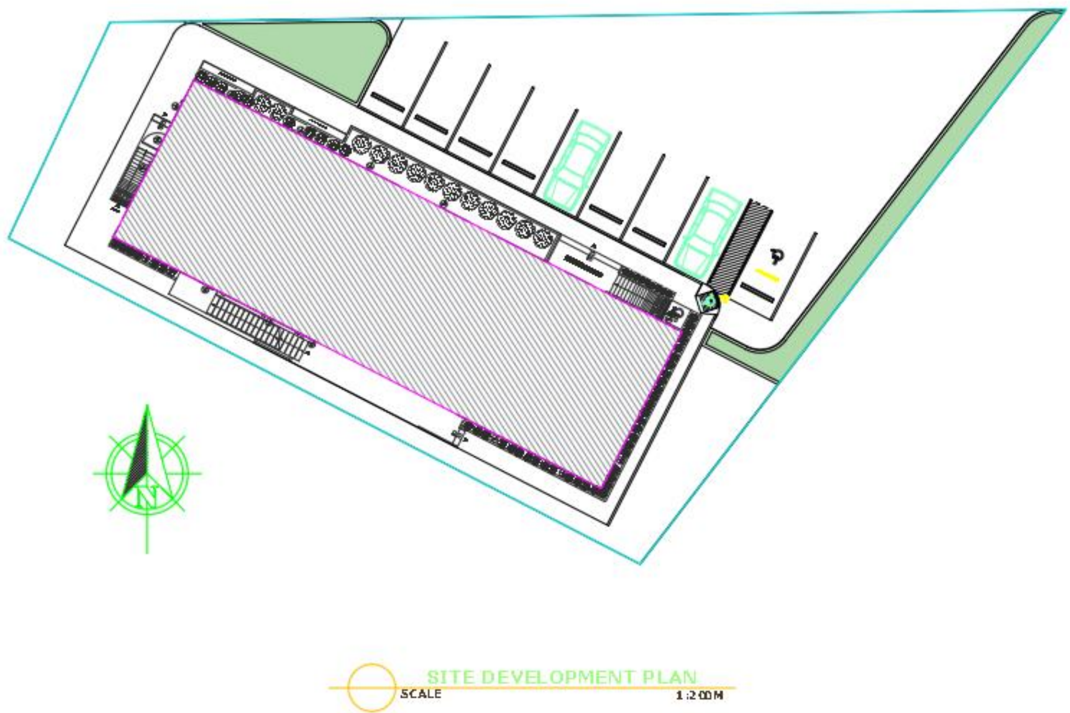


Figure 39

Site Development Plan of the Project Site

4.2.3 Topography

The project site had an average elevation of 92 meters at its highest point and 80 meters at its lowest. During the site visit, a visual assessment revealed that the area was currently used by the Municipality of Badiangan. The terrain was mostly level with slopes ranging from 0% to 8%, with occasional gentle inclines.

4.2.4 Geology

The most predominant type of soil that were found in Badiangan was clay loam soil. Regardless of the classification of land use, any topographic area had these as its dominant features.

The researchers performed a six-foot-deep soil investigation, as shown in Figure 40. A visual inspection of the area's proposed preliminary site development's soil profile as depicted in Figure 41. According to the soil investigation, clayey sand extends from the top layer to the bottom of the excavation. As a result, the investigation's findings were consistent with Badiangan's soil's general loam classification.

Figure 40

Six-foot soil excavation in the project site

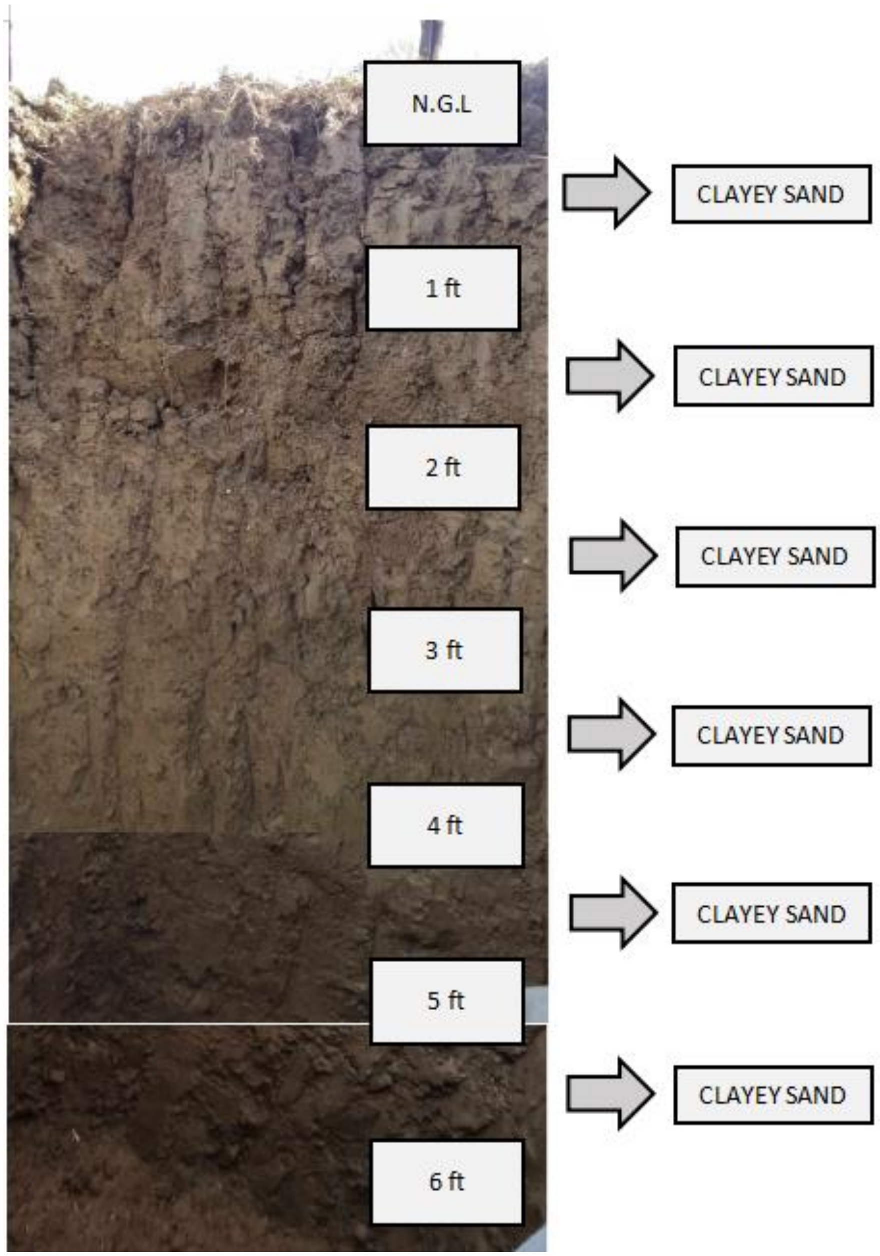


Figure 41

Diagram of the soil profile of the project site

Chapter 5

The Proposed Project

5.1. Design of the Proposed Multi-Functional Building

The purpose of the two-storey multi-purpose building in Badiangan, Iloilo: 1) provide enough office spaces for local youth development offices of employees and meetings, 2) facilitate smooth transaction flows for employees and clients of LYDO,3) provide public libarary area, 4) provide enough space for the function hall.

5.1.1. Consideration of Constraints

The following are potential solutions to the constraints identified in the methodology of the study:

5.1.1.1 Lighting

Energy efficiency is an important factor to consider, especially in government offices and social halls that operate for long hours and consume a considerable amount of energy for lighting purposes. LED Lighting, specifically Recessed LED Downlight, is highly recommended to be incorporated into the hallways, conference room, storage area, and the outdoors because of its extremely long lifespan, low power consumption, high light quality, and low maintenance costs, while also supporting sustainability initiatives and providing long-term financial benefits. Fluorescent Tube Lighting is incorporated in government offices, libraries, lounge area, and function hall because it emits a brighter environment and would help increase productivity as shown in Table 6.

Table 6

Comparative table of consideration of Constraints for Choice of Lighting System

Options	Functionality	Cost	Energy Efficiency	Ongoing Expenses	Lifespan	Aesthetic
LED Panel Lights	High energy efficiency, dimmable options, long lifespan	Upfront cost	High	Low	Up to 50,000 hours	Modern
Recessed LED Downlights	Discreet appearance, even illumination, timeless style	Higher upfront	High	Low	Varies	Modern
Skylights	Extra daylight, energy savings, ventilations, design options	High upfront	High	Moderate	Varies	Natural, expansive
Fluorescent Tube Lights	Energy efficient, cost savings, prolonged lifespan	Modera te	Moderate	Moderate	Up to 50,000 hours	Functional
Incandescent Bulbs	Full spectrum light, minimal flicker, lom EMF	Low	Low	Hight	Varies	Traditional
Halogen Bulbs	Aesthetic appeal, energy efficiency, instant illumination	Modera te	Moderate	Moderate	Up to 1 year	Warm, traditional
LED Bulbs	Long lifespan, energy efficiency, minimal heat production	Modera te - high	High	Low	Up to 100,000 hours	Modern, efficient

Source: The table presented was adapted from Happy Hiller's Indoor Interior Lighting Guide (2023), which provides a comprehensive overview of lighting options and techniques for indoor spaces.

5.1.1.2 Windows

Efficiency and Maintenance are some of the considerations in selecting the right kind of window for the government building with offices, function, and socials halls. Fixed, awning, and sliding windows were chosen to be incorporated in this structure. Awning windows have moderate to high energy efficiency, are easy to clean, are convenient in terms of opening and closing, and are suitable for any climate. Fixed windows have high energy efficiency, excellent insulation for offices with air conditioning, and are also suitable for all climates. They will be used in the bathrooms.

Sliding windows have moderate to high energy efficiency, provide trouble-free operation, are cost-effective, give excellent ventilation, and are also suitable for all climates as shown in Table 7.

Table 7

Comparative table of consideration of Constraints for Choice of Windows

Options	Energy Efficiency	Aesthetic Alignment	Functionality	Regional Climate Condition	Noise Features	Budget
Double Hung Windows	Moderate to High	Versatile, traditional	Excellent ventilation, easy to clean, convenient opening and closing	Suitable for various climates, may require additional weatherproofing in extreme conditions	Moderate	Moderate to high
Fixed Windows	High	Clean, modern	Excellent insulation, straightforward maintenance	Suitable for all climates, especially those with extreme temperatures	Low to moderate	Low to moderate
Awning Windows	Moderate to High	Versatile	Better ventilation, difficult to break into	Suitable for most climates, may require additional sealing in	Moderate	Moderate

				extreme conditions		
Sliding Windows	Moderate to High	Versatile, modern	Trouble-free operation, excellent ventilation	Suitable for all climates, may require additional insulation in extreme conditions	Moderate	Low to Moderate
Louvered Windows	Low to Moderate	Versatile	Enhanced ventilation, light control	Suitable for hot and humid climates	Low to Moderate	Moderate

5.1.1.3 Integration of Conference Room for LYDC

A fixed partition wall of the conference room was integrated into the LYDC on the ground floor to provide easy access for employees and other organization members to start meetings efficiently. The alternative option of installing a retractable partition wall in the function hall was deemed impractical, as it would necessitate placing the LYDC and the function hall on the same floor to ensure convenient access between the two areas. However, if the function hall and conference room were to be situated on different floors, it would result in inconvenient access for LYDC employees and organization members due to the increased distance.

5.1.1.4 Sustainable Water Source

Various water management techniques within the context of sustainability limitations were investigated. While water-efficient fixtures and greywater recycling presented potential benefits, a rainwater harvesting system integrated with the existing water source emerged as the most practical solution. Rainwater harvesting offers a compelling combination of economic and environmental advantages. This strategy conserves water resources, reduces dependence on municipal supplies, and lowers utility costs. By collecting and storing rainwater for non-potable uses like irrigation and toilet flushing, it decreases overall freshwater demand. Furthermore, rainwater harvesting mitigates stormwater runoff, thereby decreasing erosion and flood risks. Prioritizing cost-effective solutions like rainwater harvesting allowed the project to balance its sustainability goals with economic viability. Engaging the community and stakeholders regarding the advantages of sustainable building practices further bolstered project support and ensured long-term success. Table 8 shows the comparative consideration of constraints with the following options: greywater recycling & existing water source, rainwater harvesting system & existing water source, and water-efficient fixtures & existing water resource.

Table 8

Comparative table of consideration of Constraints for Alternatives of Sustainable Water Sources

Options	Greywater Recycling	Greywater Recycling	Water-efficient Fixtures
Initial Cost (Php)	46,000-1,153,000	50,000 - 100,000	1,153,000 – 1,765,000
Advantage	Conserves water, reduces reliance on municipal supply	Reduces municipal water consumption, water costs, stormwater management, and the risk of flooding.	Simple to implement, reduces water consumption
Disadvantage	Requires treatment, potential health risks if not properly maintained	High expense and installation process	Limited water savings compared to other options
Maintenance	Filter cleaning, disinfection	Regular inspection and cleaning	Minimal maintenance

Source: The table presented was adapted from 4 Perfect Water's blog post on rainwater harvesting and water comparison (2023), which offers valuable insights and a comprehensive comparison of different water sources

5.1.2 Structural System

The structural design of the proposed two-storey government building includes the design of all load-bearing structural members, i.e., beams, concrete slabs, columns, footings, tie beams, stairs, and rafters. The calculated sizes of the structural members are in accordance with the minimum requirements as stated in the National Structural Code of the Philippines (NSPC 2015). Seismic analysis was performed to verify that the design can resist the effects of potential earthquakes.

5.2.2.1 Codes, Standards, and References

The structural design and computations strictly adhere to the National Structural Code of the Philippines 2015 (NSCP 2015) and its referenced codes and standards. The following were the detailed references of structural design for every structural member.

Wind Loads. determine C&C Wind Loads Enclosed and Partially Enclosed Lowrise Buildings based on Table 207E.4-1 of the NSCP 2015.

One-way Slabs. design of non-prestressed and prestressed slabs reinforced for flexure in one direction from Section 407.

Two-way Slabs. design of non-prestressed and prestressed slabs reinforced for flexure in two directions, with or without beams between supports from Section 408.

Beams. design of non-prestressed and prestressed beams from Section 409.

Columns. design of non-prestressed, prestressed, and composite columns, including reinforced concrete pedestals from Section 410.

5.2.2.2 Materials.

Concrete. Concrete compressive strength in all members of the structure assumed in this study is shown in Table 11. During the design of the building, in consideration for a two-storey building design, member sections did not require a higher concrete strength greater than 21 Mpa.

Reinforcing steel. Reinforcing steel yield strength used in the design of the case study building is also shown in Table 11.

Table 9

Material Properties used in the Design

Description	Loads
Concrete Compressive Strength	21 MPa
Yield Strength of Steel	
Beams, Columns, and Footings	Grade 60 (420 MPa)
Slab and Stirrups in Beam (10mm to 12mm)	Grade 40 (275 MPa)
Truss Member (2”x2”x1/4” & 3”x2”x3/16”)	ASTM A36 (248 MPa)
Unit Weight of Concrete	23.6 kN/cu. m

5.2.2.3. Geotechnical Investigation

Soil samples collected at the site were taken to a laboratory and examined. The following tests were performed: grain size analysis, moisture content, specific gravity, unit weight analysis, unconfined compression test, and Atterberg's limit analysis as shown in Table 12. The tests were repeated three times, with the results averaged. The unit weight obtained was 16.787 kN/m3.

The ultimate soil carrying capacity was calculated using specific gravity values, which served as the basis for footing construction. The design base shear and other critical parameters were based on the 2015 NSCP.

Table 10

Geotechnical Properties

Description	Values
Soil Type	Clayey Sand
Specific Gravity	2.5
Moisture Content	35.414 %
Ultimate Bearing Capacity	395.19 KPa
Allowable Soil Bearing Capacity	121.66 KPa

5.2.2.4. Building Loads

Gravity and Seismic Loads were considered for the structural design of the two-storey building. This was due to the said loads governing the design of low to mid-rise buildings.

5.2.2.4.1 Gravity Loads

Table 13 shows the design loads in addition to the self-weight of the structure. These Loads were obtained from the minimum design load requirements in Table 204-2 and Table 205-1 of NSCP 2015. Dead loads were taken from Table 204-2, while live loads were acquired from Table 205-1. In addition to the uniformly distributed area loads in the structure, a uniformly distributed line load of 6.0024kN/m was assigned to the exterior perimeter of the upper floors in consideration of the exterior walls on 2nd

floor, the interior wall on the intermediate beam, entering the function hall area, and parapet walls on the roof beams

Table 11
Design Load Specification used for the Design of Structural Members

Description	Loads
Roof Dead Loads	
$2in\ x\ 2in\ x\ \frac{1}{4}$ Angle bar	0.1 kPa
$3in\ x\ 2in\ x\ \frac{3}{16}$ Angle bar	0.1 kPa
$LC\ 150\ x\ 65\ x\ 20\ x\ 4.5$	0.11 kPa
Ceramic or quarry tile (20mm) on 25 mm mortar bed	1.1 kPa
Suspended steel channel System	0.1 kPa
Gypsum board 12.5 mm	0.1 kPA
Mechanical Duct allowance	0.2 kPa
Second Floor Dead Loads	
Ceramic or quarry tile (20mm) on 25 mm mortar bed	1.1 kPa
Suspended steel channel System	0.1 kPa
Gypsum board 12.5 mm	0.1 kPA
Mechanical Duct allowance	0.2 kPa
Second Floor Live Loads	
Stage Areas (Function Hall)	7.2 kPa
Movable Seats	4. 8 kPa

5.2.2.4.2 Seismic Loads

Design Basis Earthquake (DBE). DBE, as defined in NSCP, was a ground motion that has (10) percent chance of being exceed in 50 years. Generating the response spectrum for analysis and design required the factors shown in Table 14. These factors were based on the Standard Occupancy on Stiff Soil Profile (SD). The latest and nearest epicenter of earthquake near Badiangan is subjected to a moment magnitude between 7.0 and 8.4 resulting to a type A seismic source type and response spectrum from the factors as shown in Table 14.

Table 12

NSCP Response Spectrum Earthquake Factors

Description	Values
Seismic Importance Factor, I	1
Numerical Coefficient, R (Concrete SMRF)	8.5
Seismic Source Type	Type A
Soil Profile Type	SD
Seismic Factor Zone, Na	1
Seismic Zone Factor, Nv	1
Seismic Coefficient, Ca 0.40	0.40
Seismic Coefficient, Cv	0.56

5.2.2.5. Load Combinations

Code-Based Design. Table 15 shows the load combinations used for strength design in the preliminary or code-based design. Also included in the table was the governing or primary load. In the case of the combination governed by seismic load, both horizontal and vertical components of the earthquake were included, as indicated in Section 208.6.1 of NSCP 2015. The vertical component of the earthquake was given by equation 4.1. This component was added or subtracted to the deadload to have a maximum effect on the structure.

Table 13. Strength Design Load Combination

No.	**Load Combination**	**Primary Load**
1	1.4D	D
2	1.2D + 1.6L	L
3	1.2D+Ev + 1.0L + 1.0Eh	E
4	0.9D-Ev + 1.0L + 1.0Eh	E
	Considering Seismic Orthogonal Effects	
3.1	1.2D+Ev + 1.0L + 1.0Ex + 0.3Ey	E
3.2	1.2D+Ev + 1.0L + 0.3Ex + 1.0Ey	E
4.1	0.9D-Ev + 1.0L + 1.0Ex + 0.3Ey	E
4.2	0.9D-Ev + 1.0L + 0.3Ex + 1.0Ey	E

Where:

D= Dead Load

L = Live Load

E= Earthquake Load

Ev = Earthquake Load Vertical Component

Eh = Earthquake Load Horizontal Component

5.2.2.6. Analysis and Design Procedure

5.2.2.6.1. Seismic Performance Objective

Section 208.1.1 of the NSCP stated that "the purpose of the earthquake provisions was to design seismic-resistant structures to safeguard against major structural damage that may lead to loss of life and property". The level of earthquake to which this objective was to be achieved was defined as a minimum ground motion having a 10% probability of exceedance in 50 years. This was set in section 208.5.3.2 of the code.

5.2.2.6.2. Seismic Analysis and Design Procedure

The response spectrum analysis procedure outlined in section 208.5.3.4.1 of NSCP was chosen as the seismic analysis technique. As stated in the section, this analysis procedure was an "elastic dynamic analysis procedure utilizing the peak dynamic response of all modes having a significant contribution to the total structural response. Responses to calculated using the ordinance of appropriate response spectrum curb, which corresponded to the model periods". The response spectrum used was in line with Section 208.5.3.2.

5.2.2.7. Acceptance Criteria

Under the code provisions, there should be three criteria involved for structural design to be acceptable. However, due to the limitations of the study and consideration of the project as a low-rise building, checking of the demand-to-capacity ratios was used.

5.2.2.7.1 Strength Check

Strength criterion was in terms of demand-to-capacity ratios. The maximum members for strength design were set to unity.

5.2.2.8. Serviceability Check.

To ensure adequate serviceability and control deflections, minimum member dimensions for beams and slabs were determined based on the National Structural Code of the Philippines 2015 (NSCP 2015). Specifically: minimum required thickness for non-prestressed two-way slabs was obtained from Table 4.8.3.1.2 of the code. The minimum required thickness for non-prestressed one-way slabs was obtained from Table 4.7.3.1.1 of the code. Minimum depth for non-prestressed beams was obtained from Table 4.9.3.1.1 of the code.

***5.2.2.9.* Modeling Assumptions.**

Seismic analysis was performed using STAAD Pro with the following modeling assumptions.

Table 4 0 6.6.3.1.1(a) Moment of Inertia and Cross-Sectional Area Permitted for Elastic Analysis at Factored Load Level

Member and condition		Moment of Inertia	Cross-Sectional Area
Columns		$0.70I_g$	$1.0A_g$
Walls	Uncracked	$0.70I_g$	
	Cracked	$0.35I_g$	
Beams		$0.35I_g$	
Flat plates and flat slabs		$0.25I_g$	

a.) Reduction of Moment of Inertia based on Table 406.4.1.1 of NSCP 2015

b.) Analysis Model support was assumed to be fixed. 103

c.) A multiplying factor for Accidental Torsion Moment of 5% was applied.

d.) Multiplying factor for Natural Torsion Moment of 100% was applied.

e.) Strength Design was used for model analysis.

f.) To ensure proper distribution of seismic loads to vertical and horizontal resisting elements throughout the structure, diaphragms were incorporated at each floor level during model analysis. The roof level was excluded as it typically functions differently in resisting lateral loads.

5.2 Technical Plans and Specifications

5.2.1 Architectural Plan

The architectural plans for the proposed two-storey government building include the perspective, floor plans, elevations, site development plan, sections, and schedule of doors and windows.

5.2.2 Structural Plan

All load-bearing structural members, such as concrete slabs, beams, columns, footings, tie beams, stairs, and rafters, are designed as part of the structural plan for the proposed two-storey multi-purpose building. The National Structural Code of the Philippines' (NSCP) minimum requirements are achieved by the computed sizes of the structural members.

5.2.3 Electrical Layout Plan

Electrical designs for the proposed two-storey building were based on the provisions of the Philippine Electrical Code (PEC). The lighting used in the project were energy-saving lamps to minimize the expenses on power. Detailed specifications are found in the Electrical Plans.

5.2.4 Plumbing Plan

The plumbing design for the proposed project was based on the provisions of the National Plumbing Code of the Philippines. Detailed specifications are found in the Plumbing Plans.

5.3 Project Cost and Estimates, Construction Project Management

The total project cost was estimated at ₱ 15,611,240.37. This includes expenses from the Pre-Construction Stage (Project Management, Legal Documents, Mobilization, etc.), Building Structure (Architectural, Structural, Electrical, Plumbing, and Fire Protection Plans), Miscellaneous and Contingencies, and the Contractor's Overhead and Profits. A detailed cost breakdown is provided in Appendix G.

5.4 Construction Work Schedule

The two-storey multi-functional building was planned within an estimated 201-day project duration. An additional document titled "Proposed Local Youth Development Center and Public Library with Function Hall and Details" contains the S-Curve and the sequence of activities.

5.5 Green Technologies

The proposed research project incorporates a rainwater collection system as one of the key sustainable technologies. By capturing rainwater in large tanks, the rainwater collection system can reduce the building's reliance on commercial water sources, meet part of its water supply needs, and lower energy costs. The calculations for this green technology are as follows:

$$\frac{Rainwater\ collected}{1\ day} = \left(\frac{Ave.\ Monthly\ Precipitation\ in\ mm}{Ave.\ Rainfall\ Days}\right)\left(\frac{1L}{m^2}\right)(Area\ of\ Roof)$$

The data on the yearly average temperature, precipitation, and number of precipitation days in Badiangan, Iloilo, are shown in Figure 47. July has the highest average precipitation of any month, averaging 346 mm and 13.6 days. The rainwater collected amounts to 7667.59 liters or 7.67 cubic meters with a net roof area of 301.385 square meters. When converting this into monetary savings, the rainfall volume and cumulative precipitation days are multiplied by the current district water cost of Php 200.00 for the first 10 cubic meters, yielding a total savings for July of Php 20,862.40. For this system, two 15,000-liter water tanks will be put on the right or back side of the structure.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean daily maximum °C (°F)	29 (84)	30 (86)	32 (90)	33 (91)	31 (88)	30 (86)	29 (84)	28 (82)	28 (82)	29 (84)	29 (84)	29 (84)	30 (85)
Mean daily minimum °C (°F)	21 (70)	21 (70)	22 (72)	23 (73)	25 (77)	25 (77)	24 (75)	24 (75)	24 (75)	24 (75)	23 (73)	22 (72)	23 (74)
Average precipitation mm (inches)	48 (1.9)	41 (1.6)	58 (2.3)	82 (3.2)	223 (8.8)	300 (11.8)	346 (13.6)	307 (12.1)	311 (12.2)	292 (11.5)	167 (6.6)	81 (3.2)	2,256 (88.8)
Average rainy days	11.4	7.7	11.3	15.4	25.7	28.5	29.5	28.7	28.3	28.7	21.8	15.2	252.2

Figure 42. A yearly average precipitation per mm and average precipitation days of Badiangan, Iloilo

ARCHITECTURAL

PLAN

PERSPECTIVE 1

SCALE **NTS**

PERSPECTIVE 2

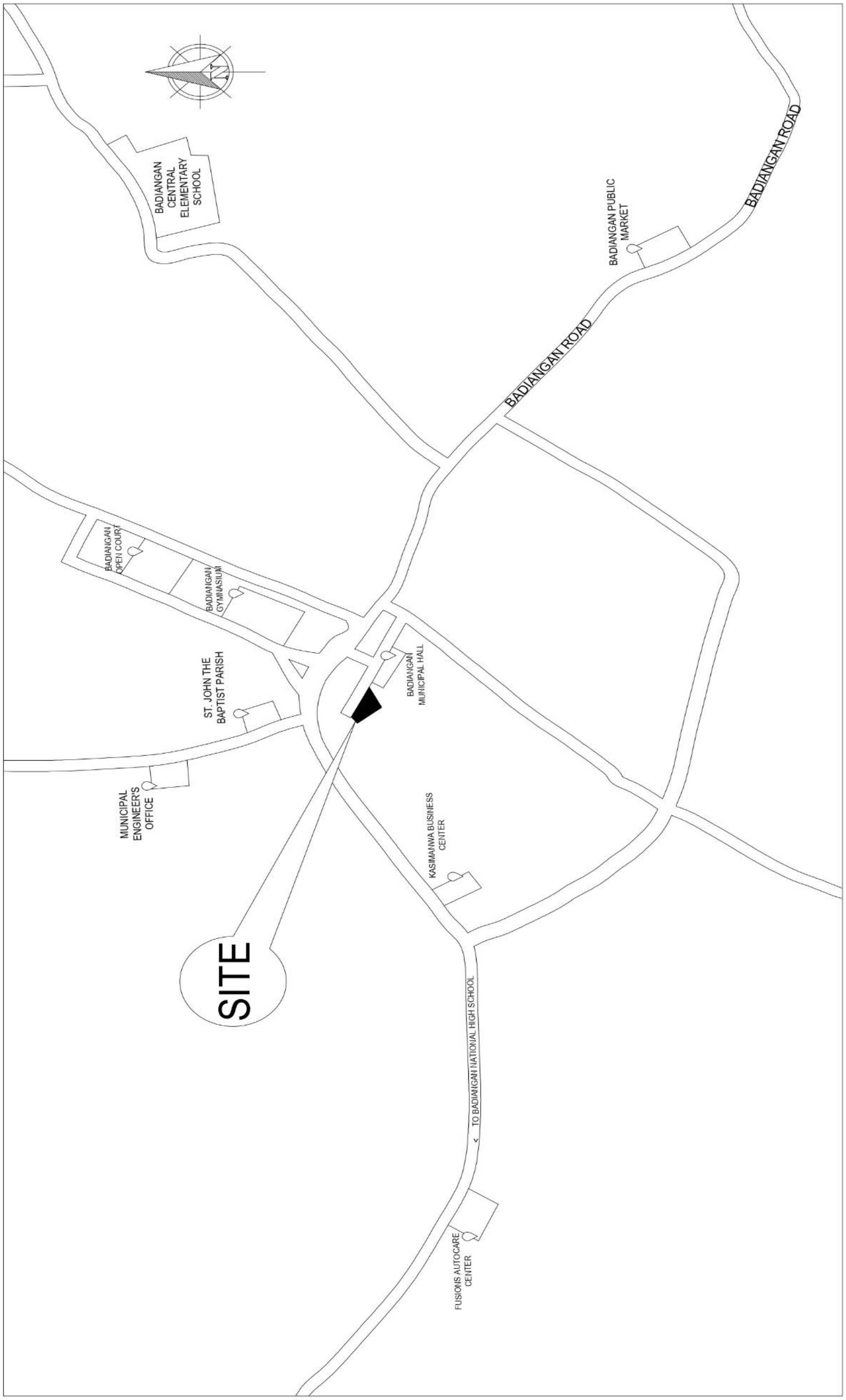
SCALE NTS

PERSPECTIVE 3

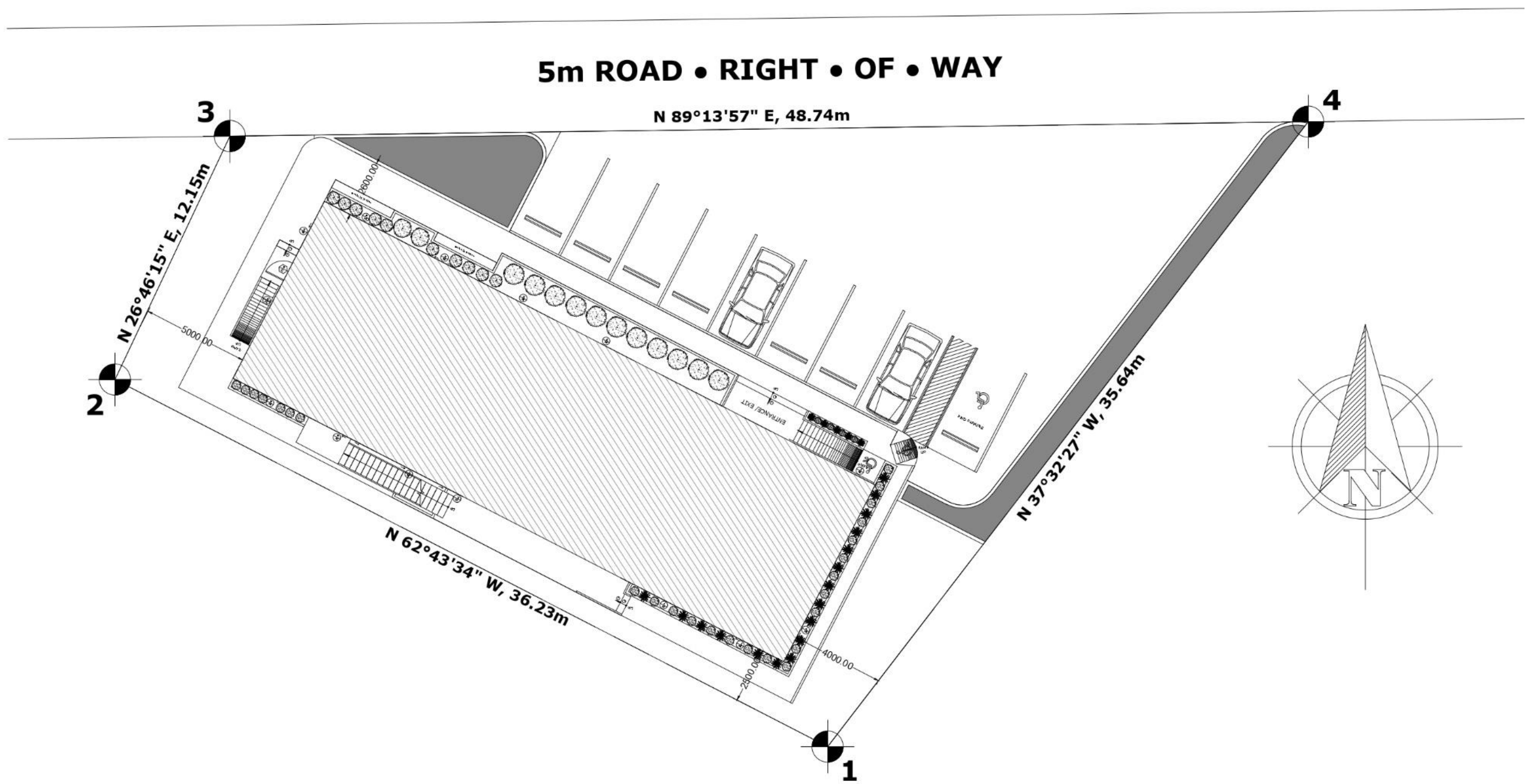
SCALE **NTS**

PERSPECTIVE 4

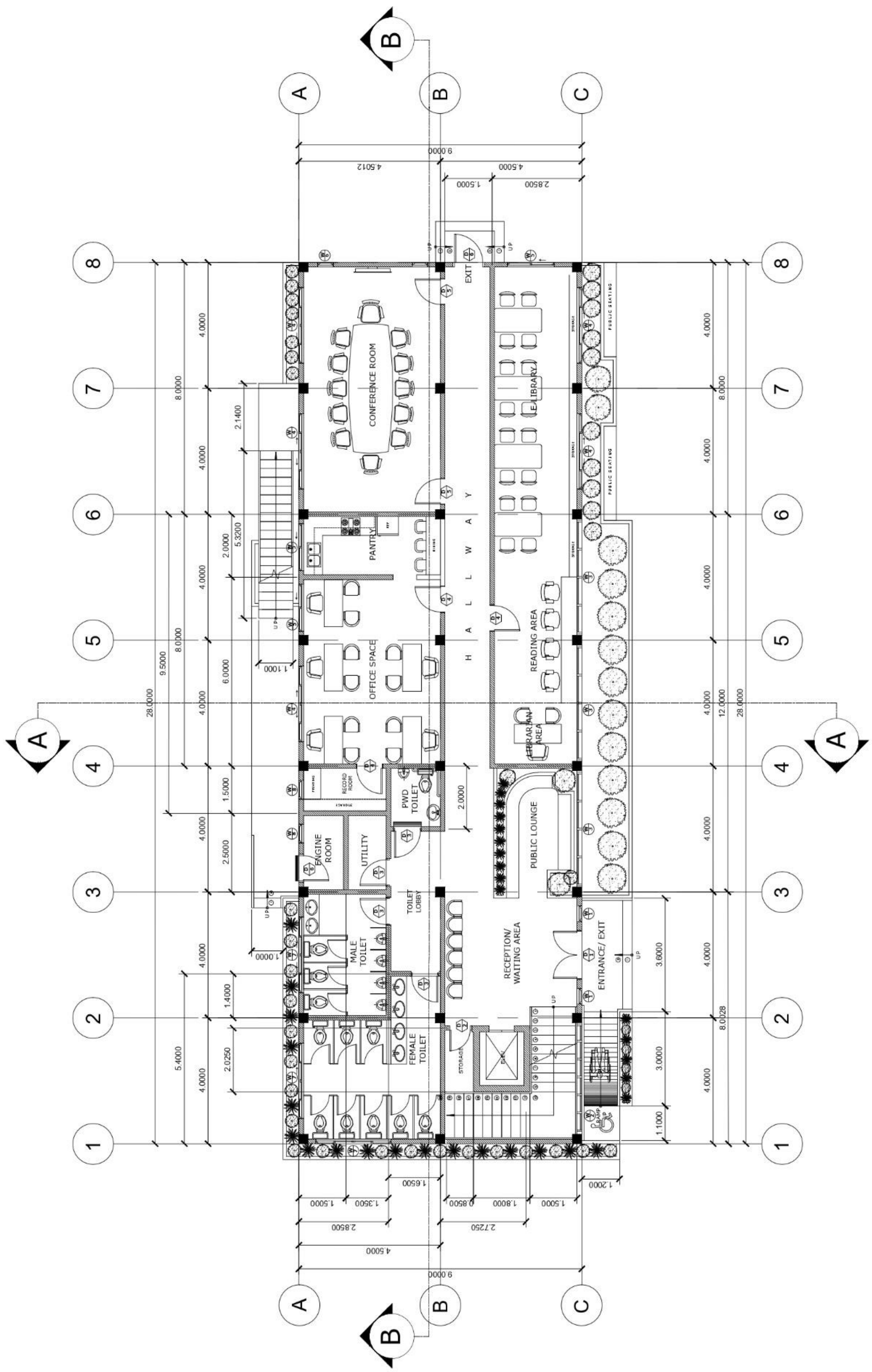
SCALE **NTS**



VICINITY MAP
SCALE NTS

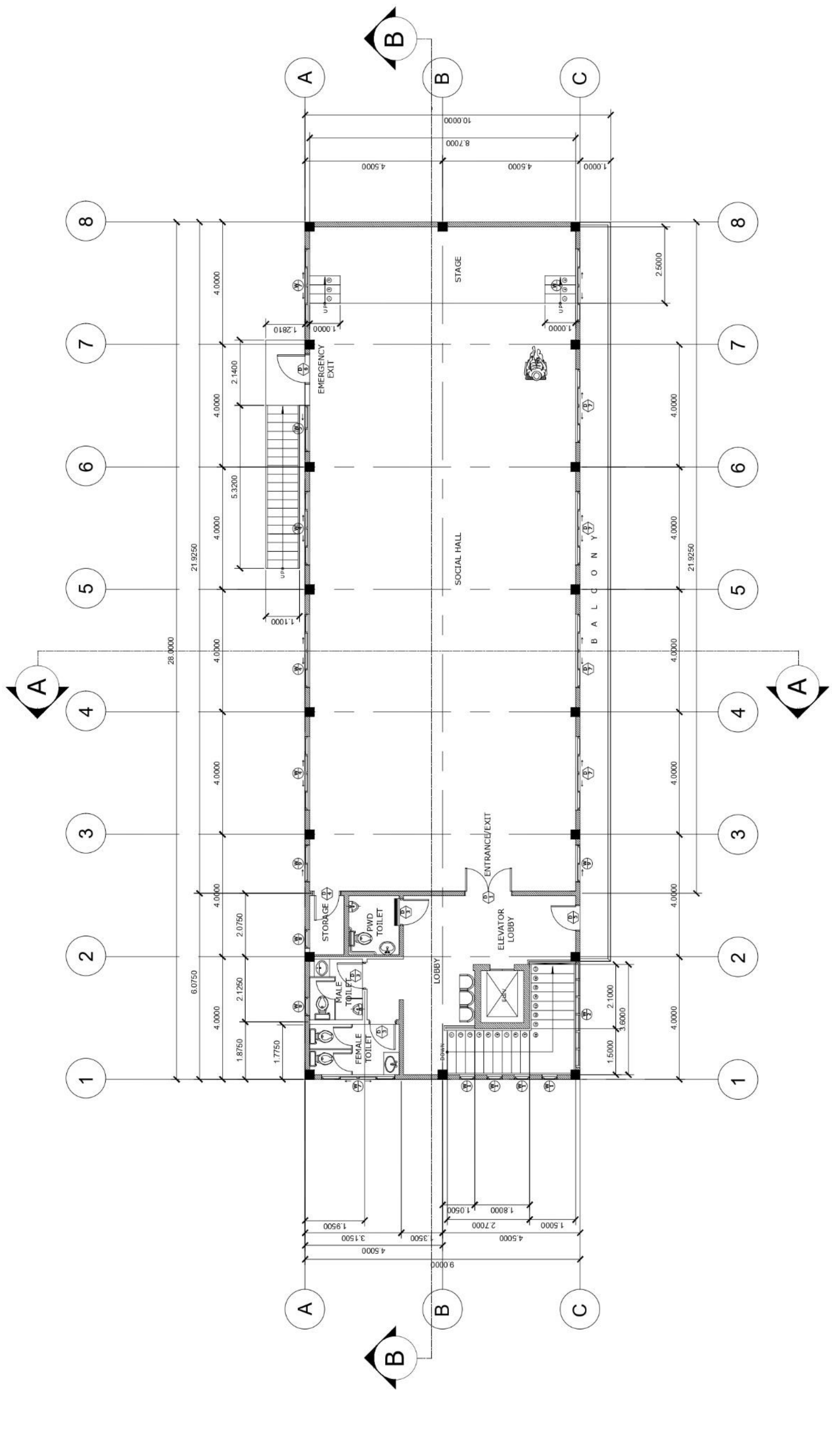


SITE DEVELOPMENT PLAN
SCALE 1:300M



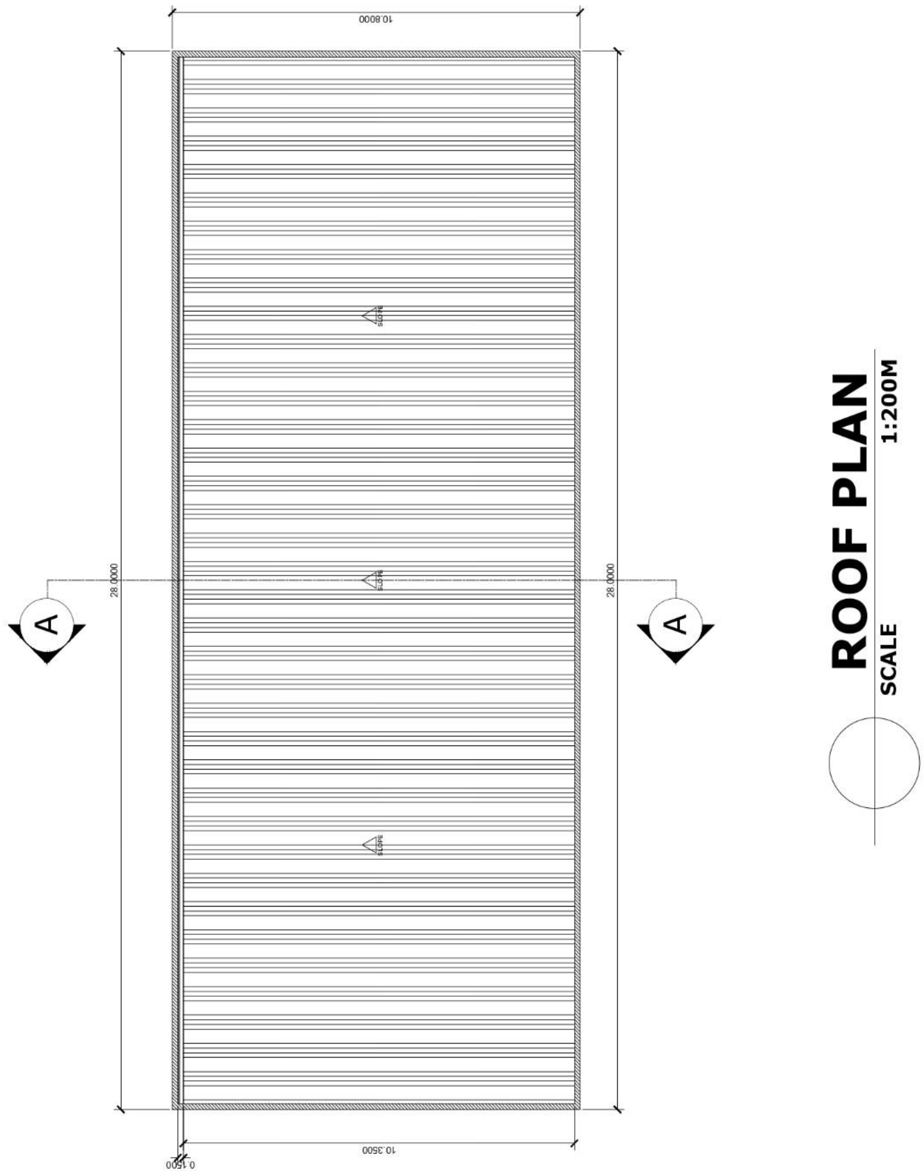
GROUND FLOOR PLAN

SCALE 1:200M

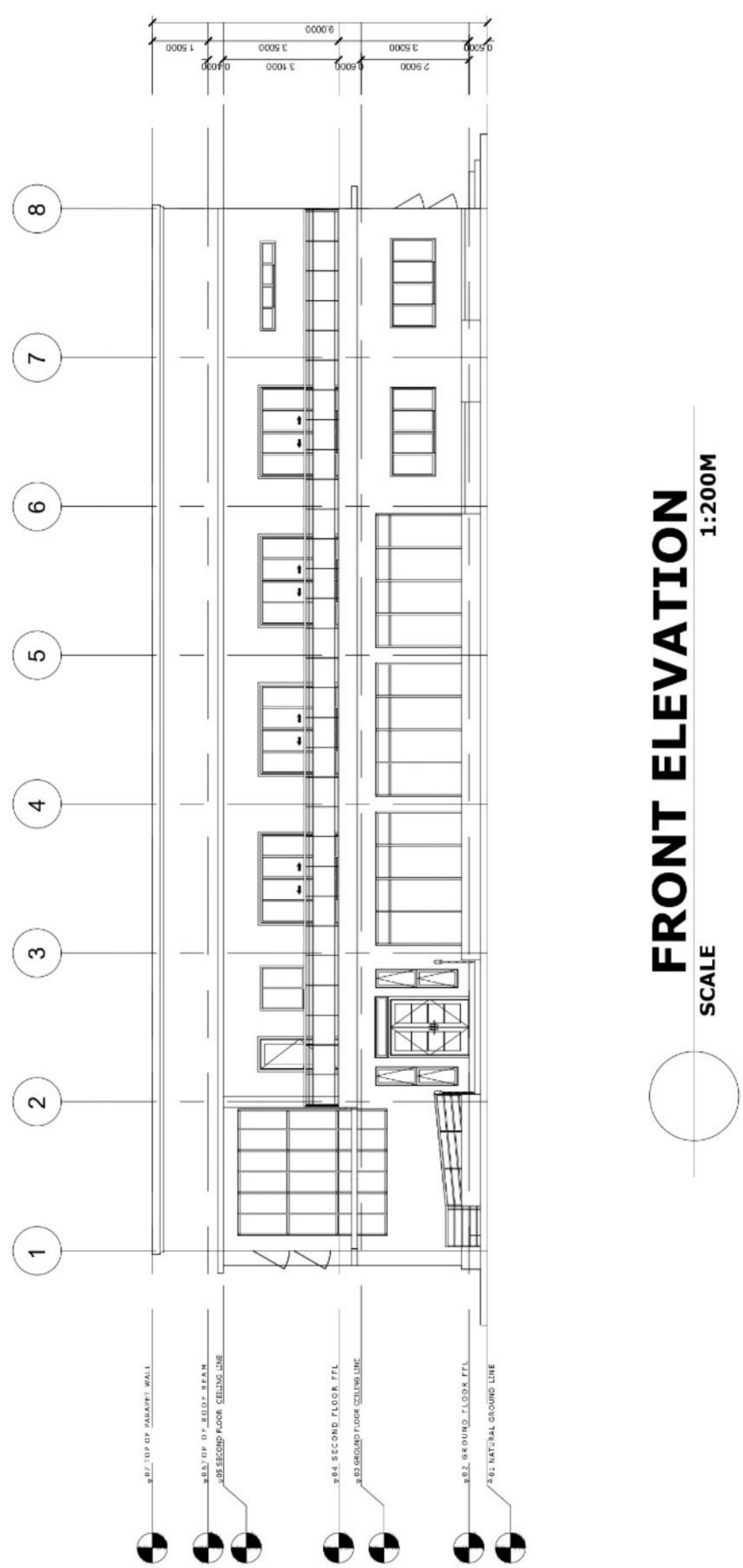


SECOND FLOOR PLAN

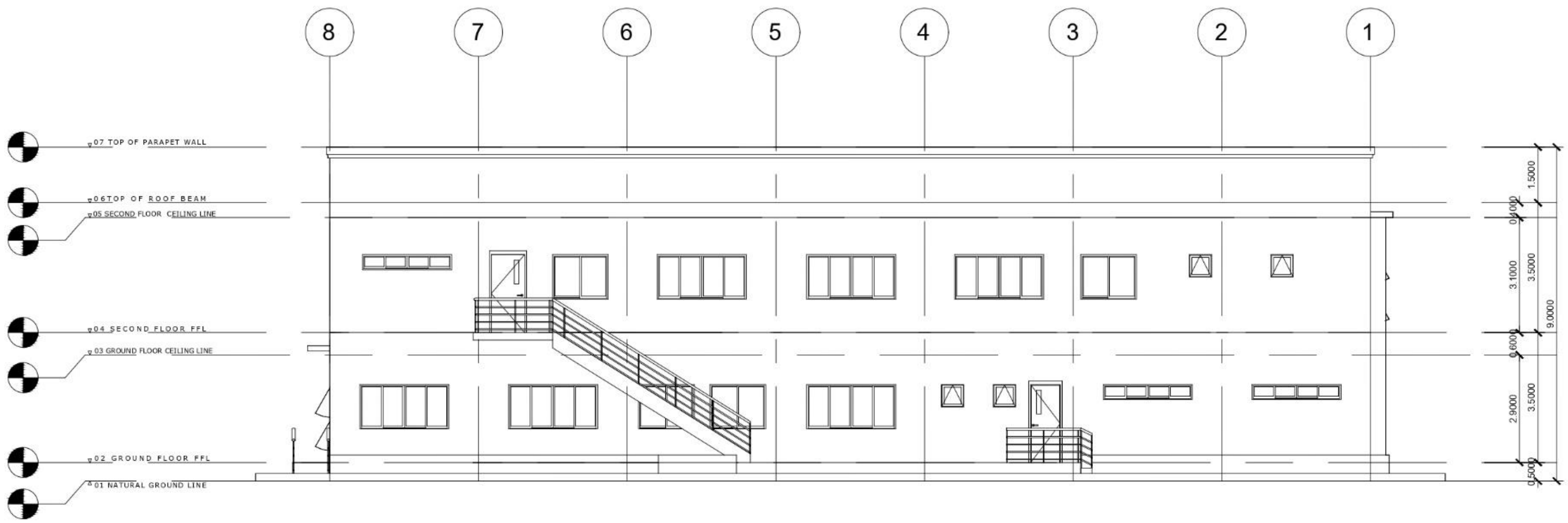
SCALE 1:200M



10.8000
28.0000
28.0000
A
A
10.3500
0.1500
ROOF PLAN
SCALE 1:200M

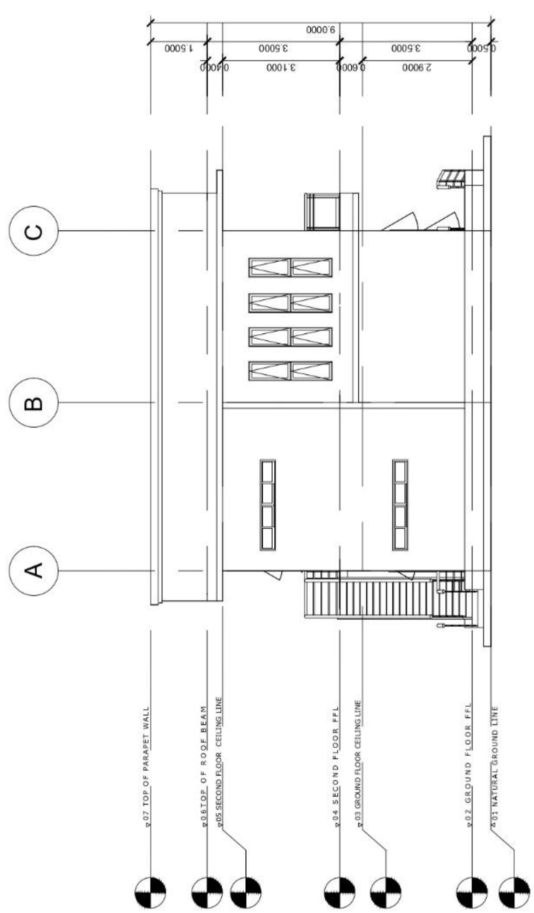


FRONT ELEVATION
SCALE 1:200M
1
2
3
4
5
6
7
8



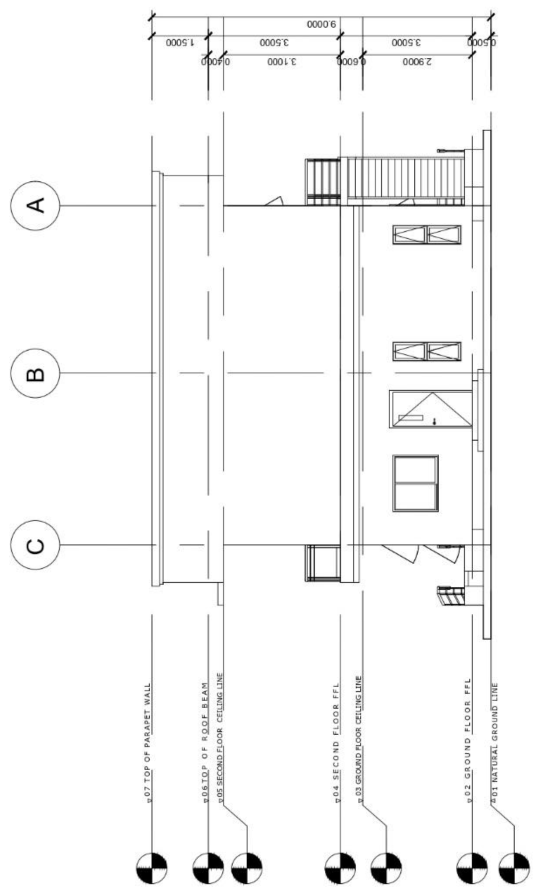
REAR ELEVATION

SCALE **1:200M**



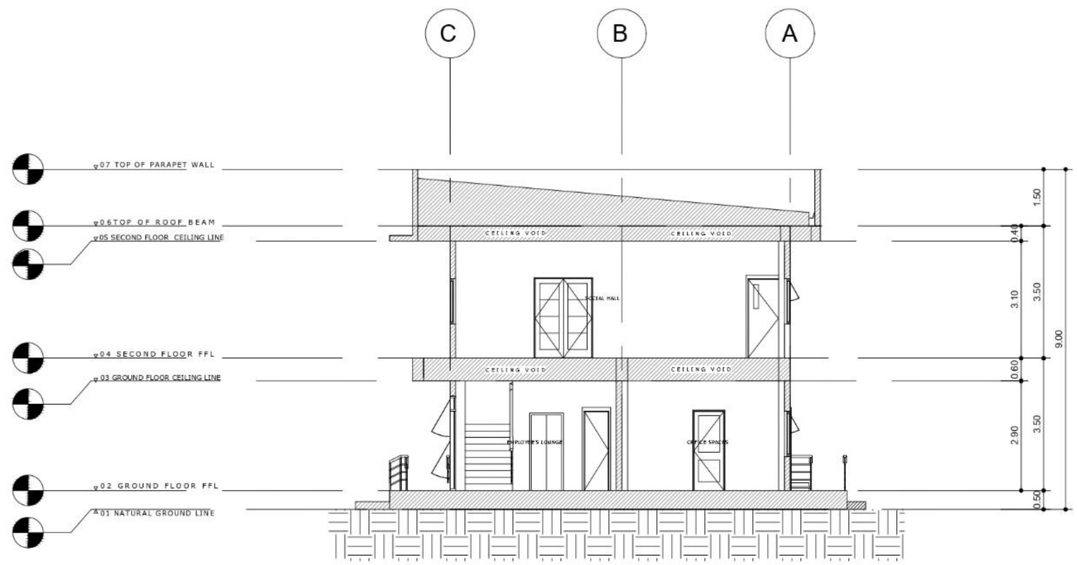
RIGHT SIDE ELEVATION

SCALE 1:200M



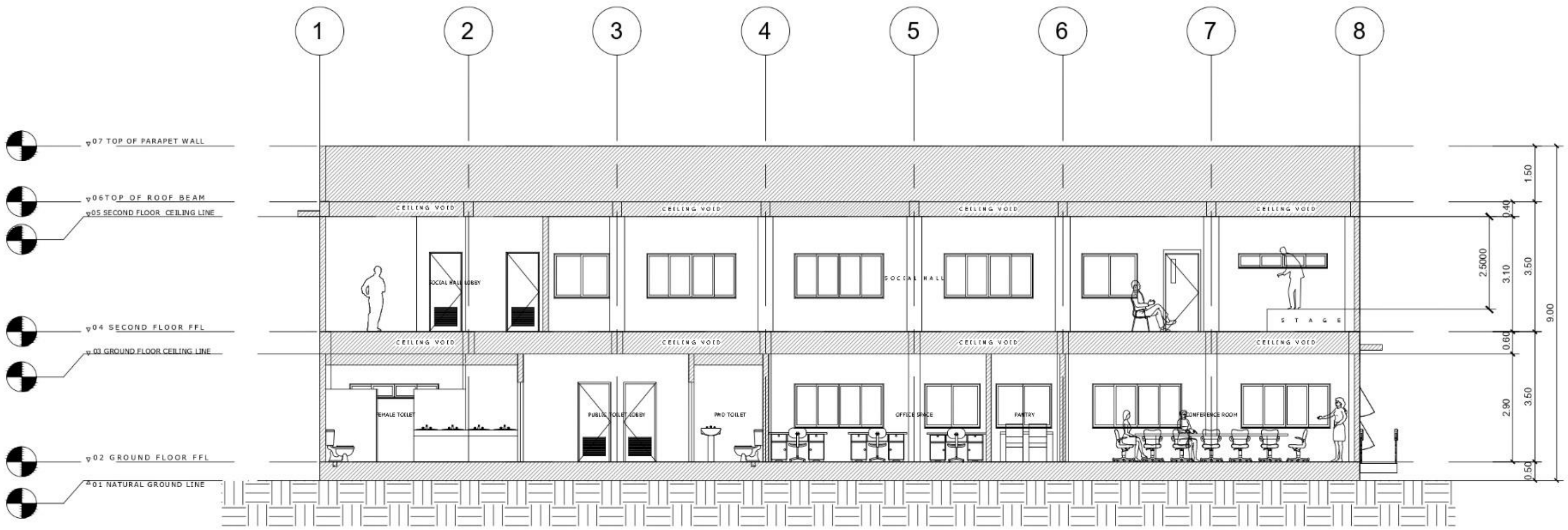
LEFT SIDE ELEVATION

SCALE 1:200M



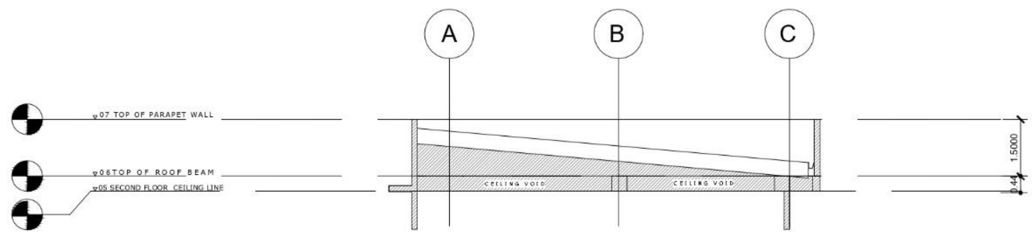
LONGITUDINAL SECTION THRU- A

SCALE **1:200M**



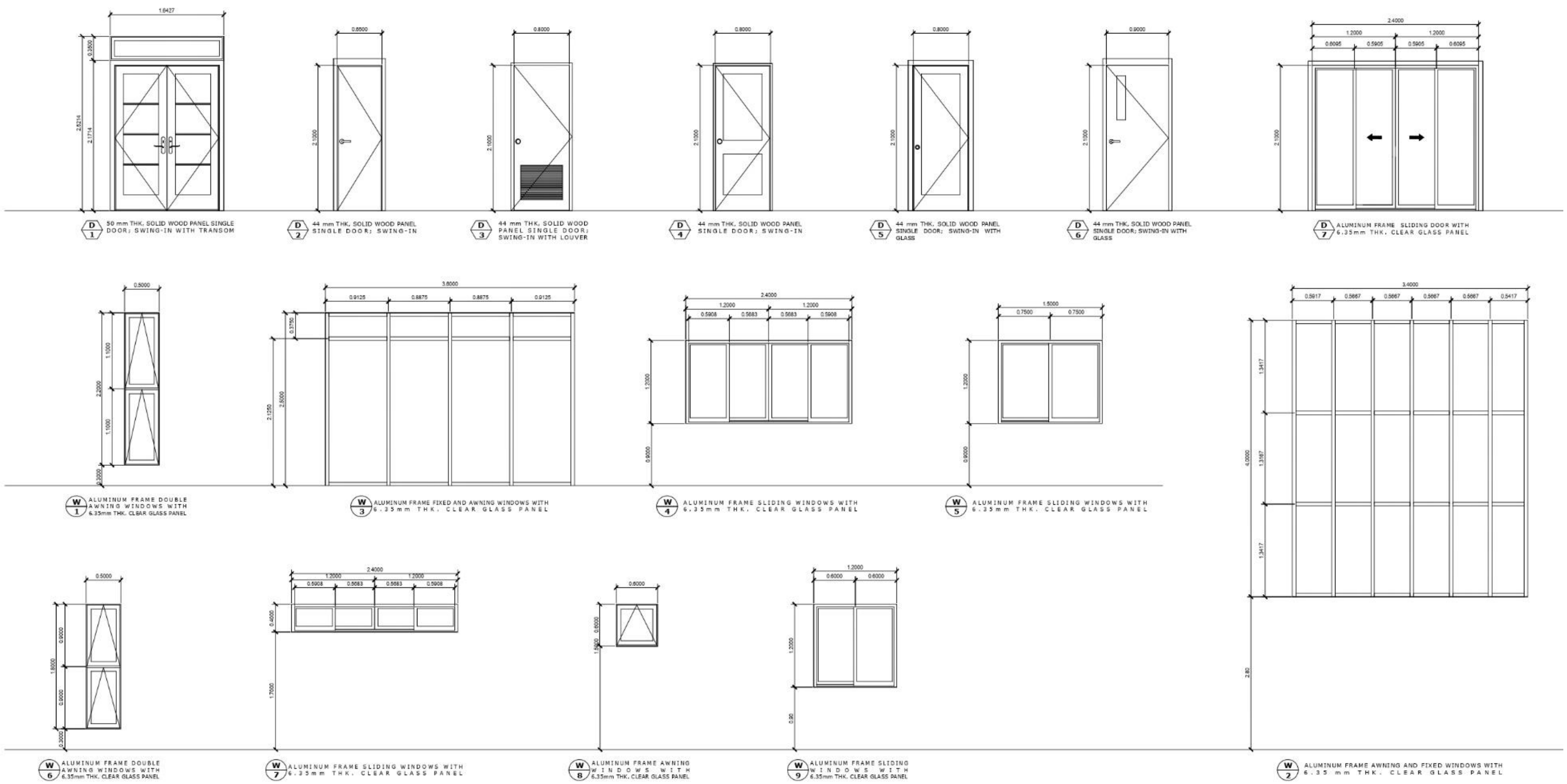
LONGITUDINAL SECTION THRU- B

SCALE **1:200M**



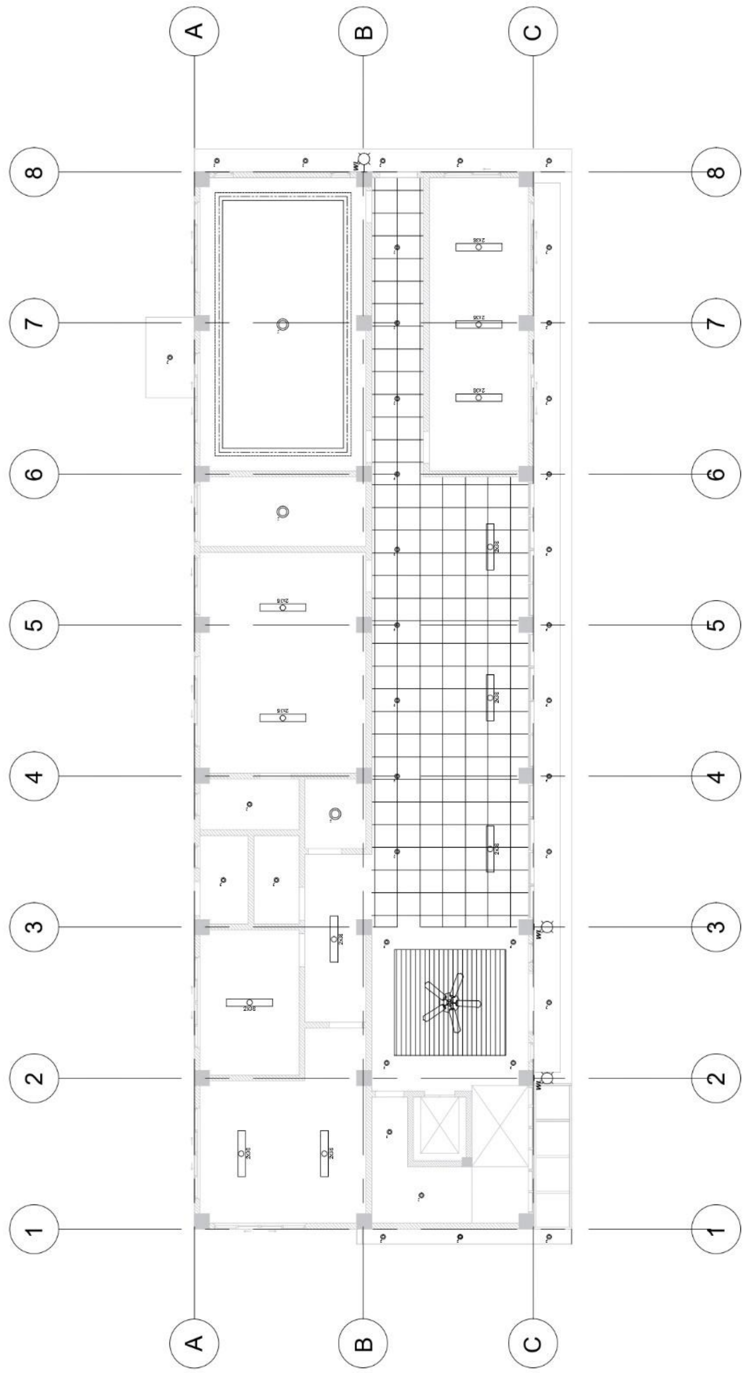
ROOF SECTION TRHU- A

SCALE **1:200M**



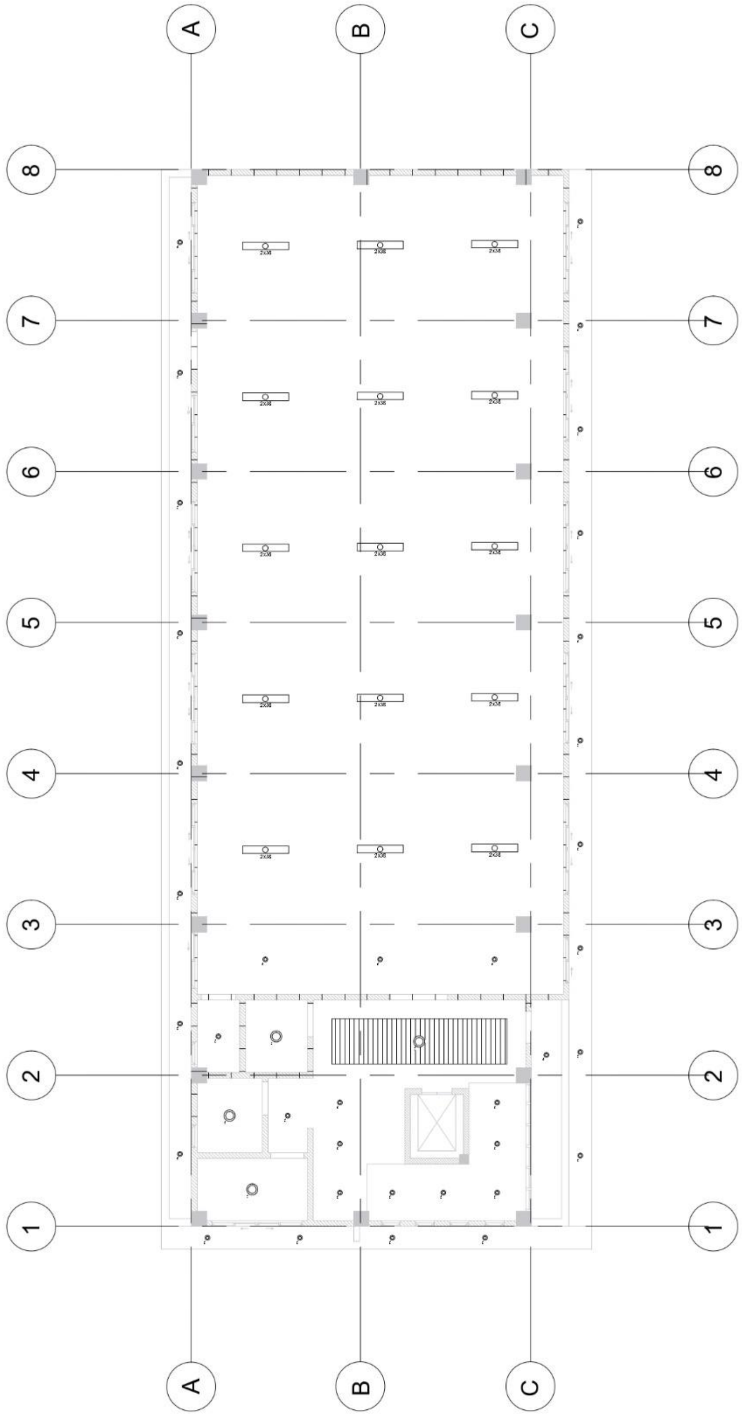
SCHEDULE OF DOORS & WINDOWS

SCALE **1:100M**



GROUND FLOOR
REFLECTED CEILING PLAN

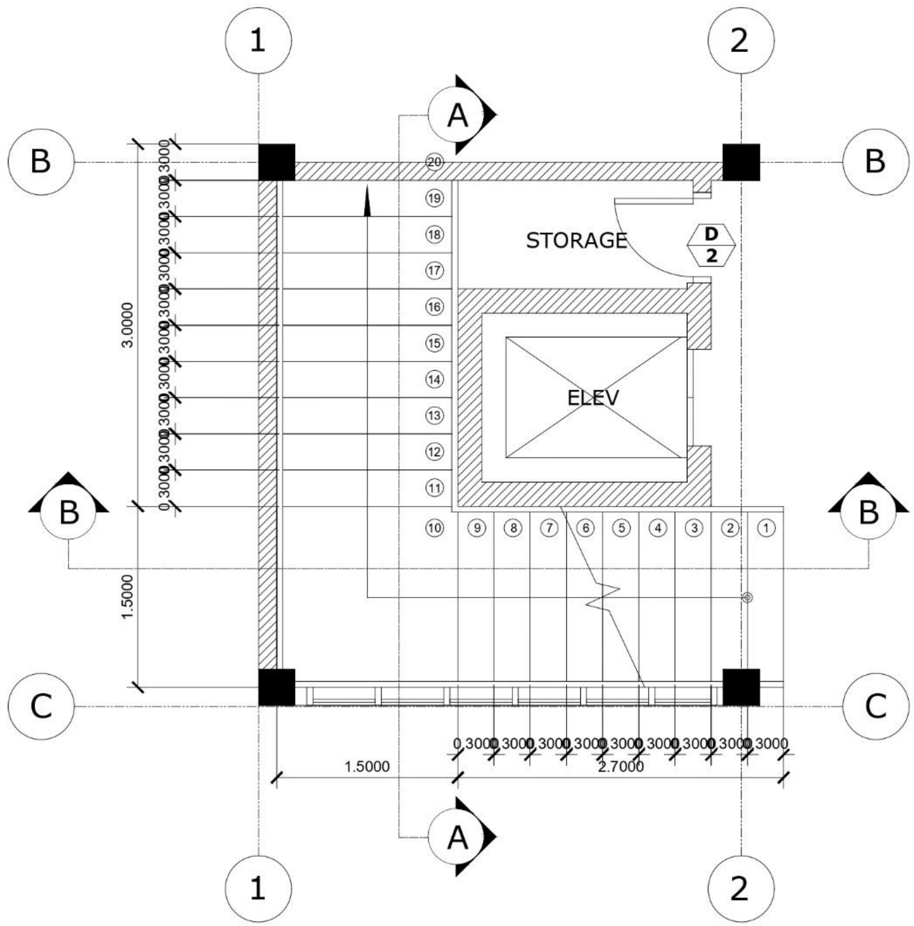
SCALE 1:200M



SECOND FLOOR

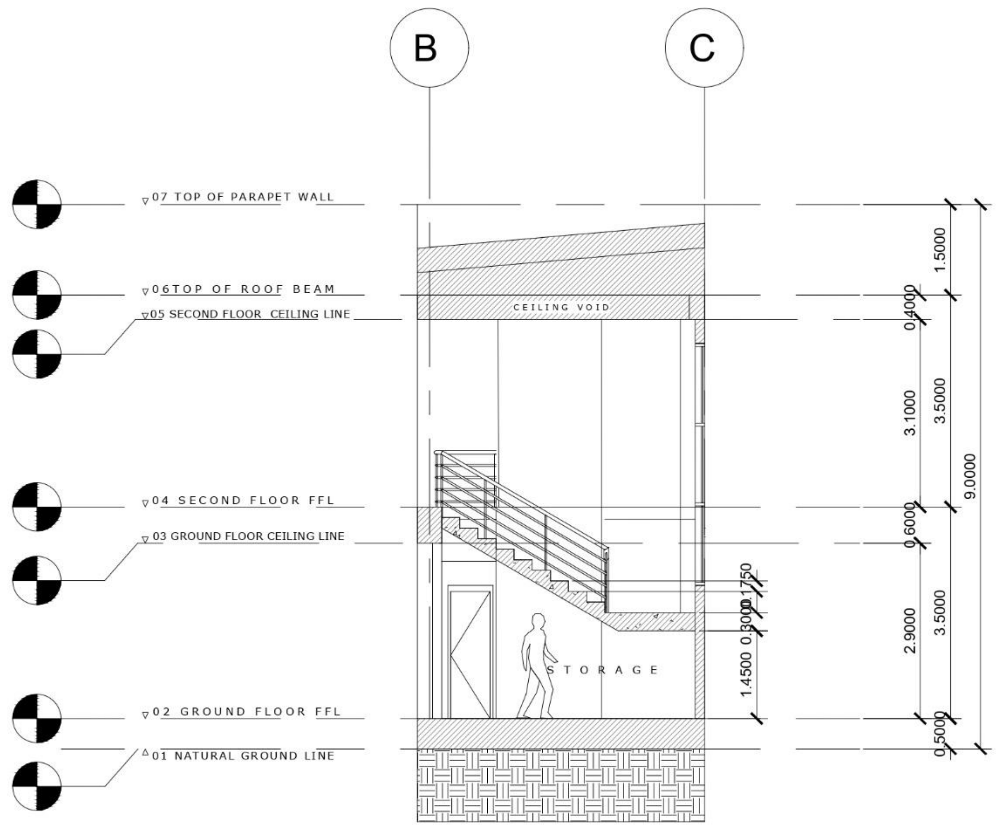
REFLECTED CEILING PLAN

SCALE 1:200M



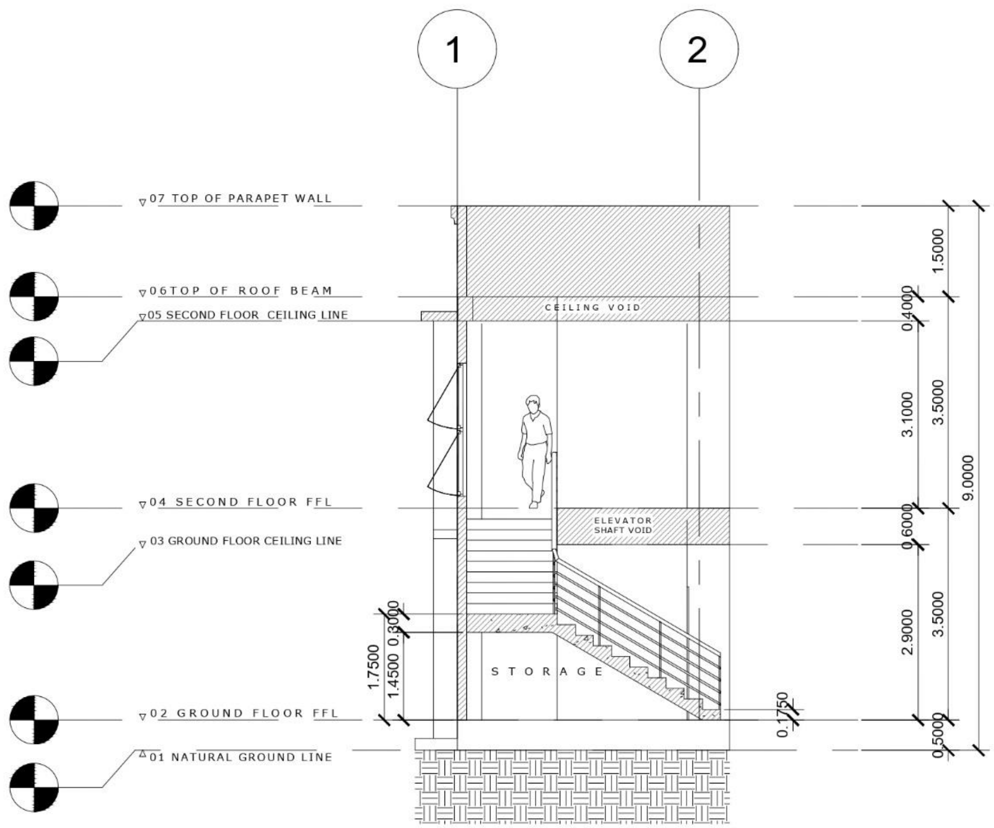
STAIR DETAIL PLAN

SCALE **1:125M**



STAIR DETAIL SECTION THRU- A

SCALE **1:125M**

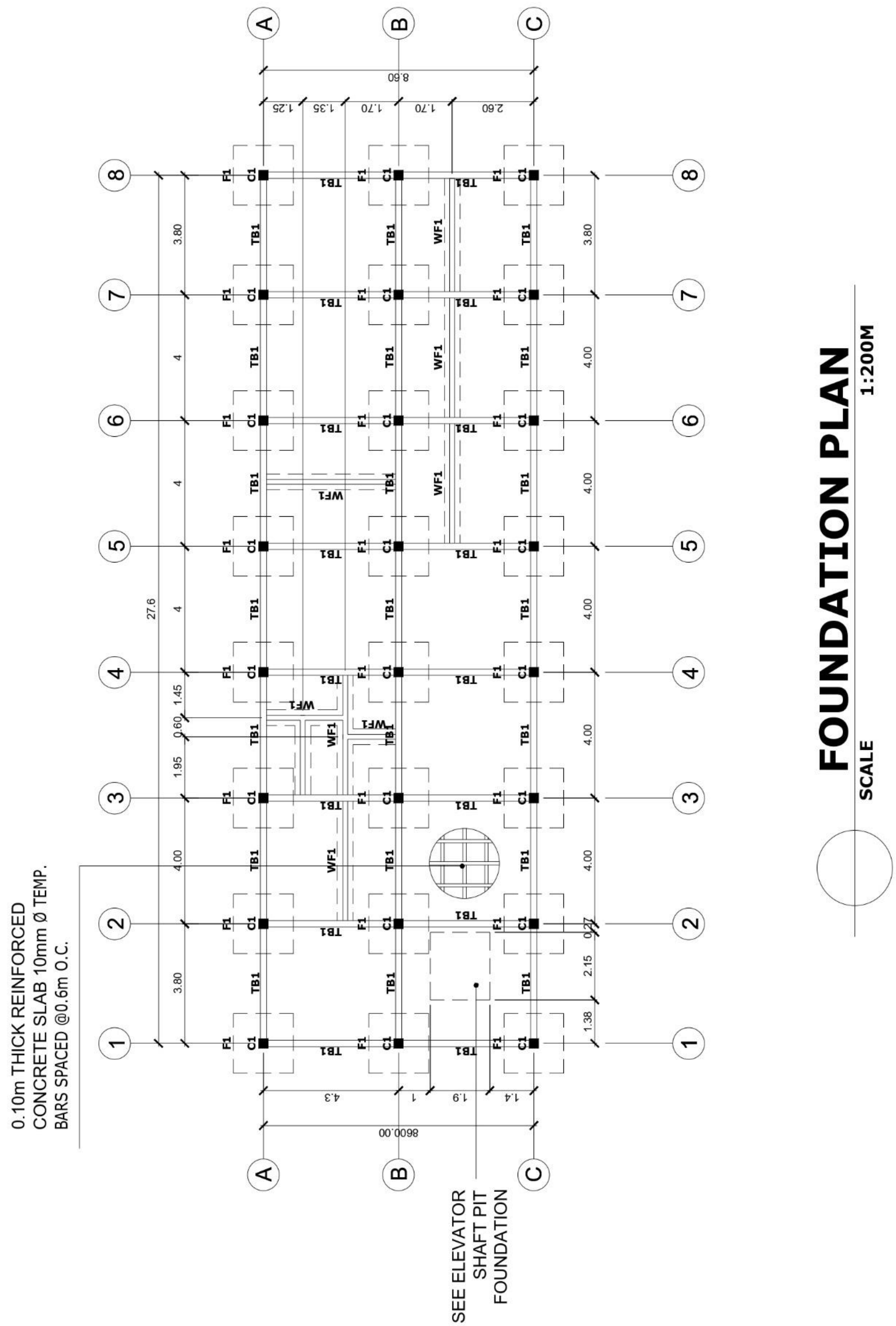


STAIR DETAIL SECTION THRU- B

SCALE **1:125M**

STRUCTURAL

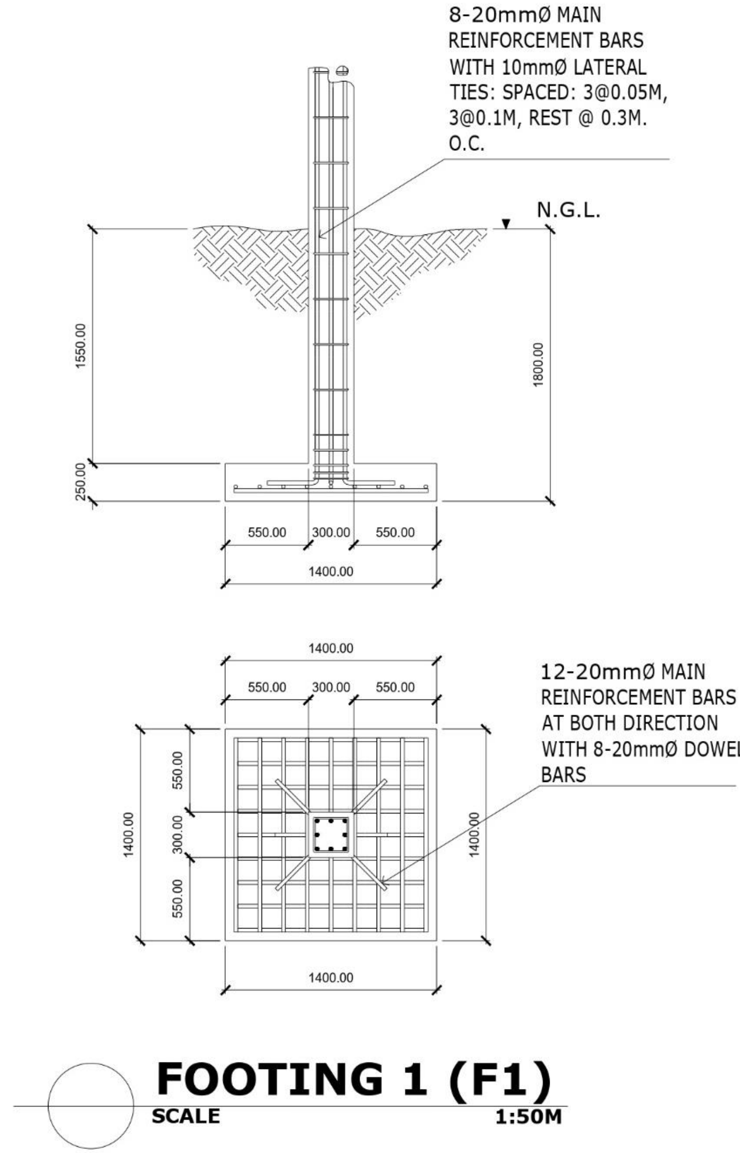
PLAN



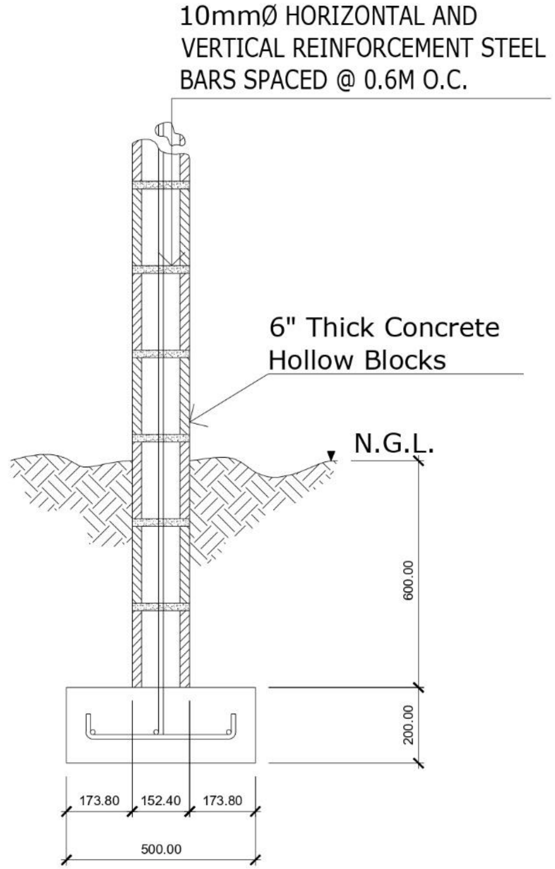
0.10m THICK REINFORCED CONCRETE SLAB 10mm Ø TEMP. BARS SPACED @0.6m O.C.
SEE ELEVATOR SHAFT PIT FOUNDATION
FOUNDATION PLAN
SCALE 1:200M

SCHEDULE OF FOOTING

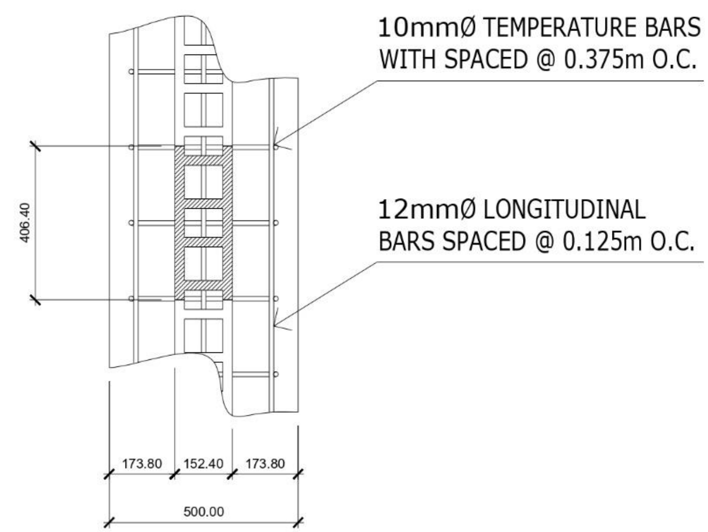
MARK	SIZE		THICKNESS (mm)	DEPTH (mm)	REINFORCEMENT (both direction)
	Width (mm)	Length (mm)			
F1	1900	1900	250	1800	12 pcs 20mmØ RSB



FOOTING 1 (F1)
SCALE 1:50M



SECTION

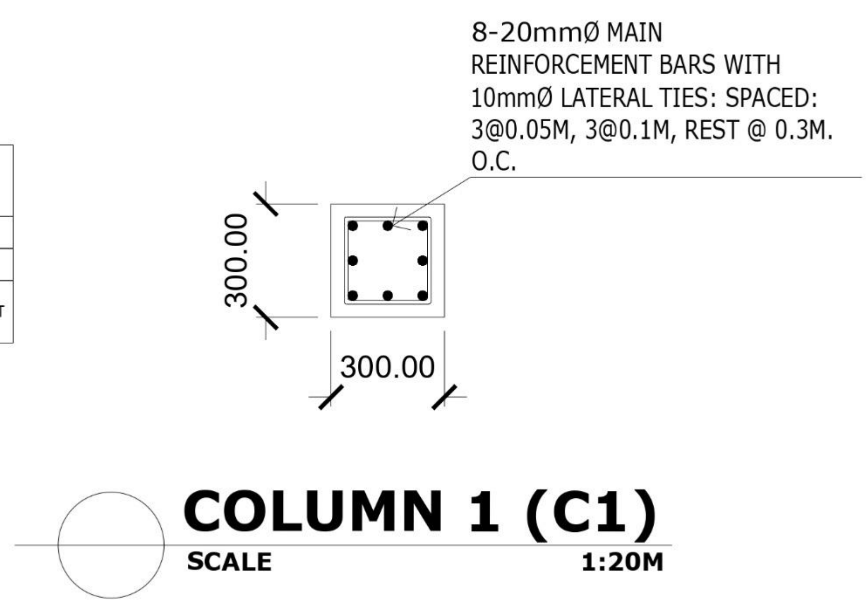


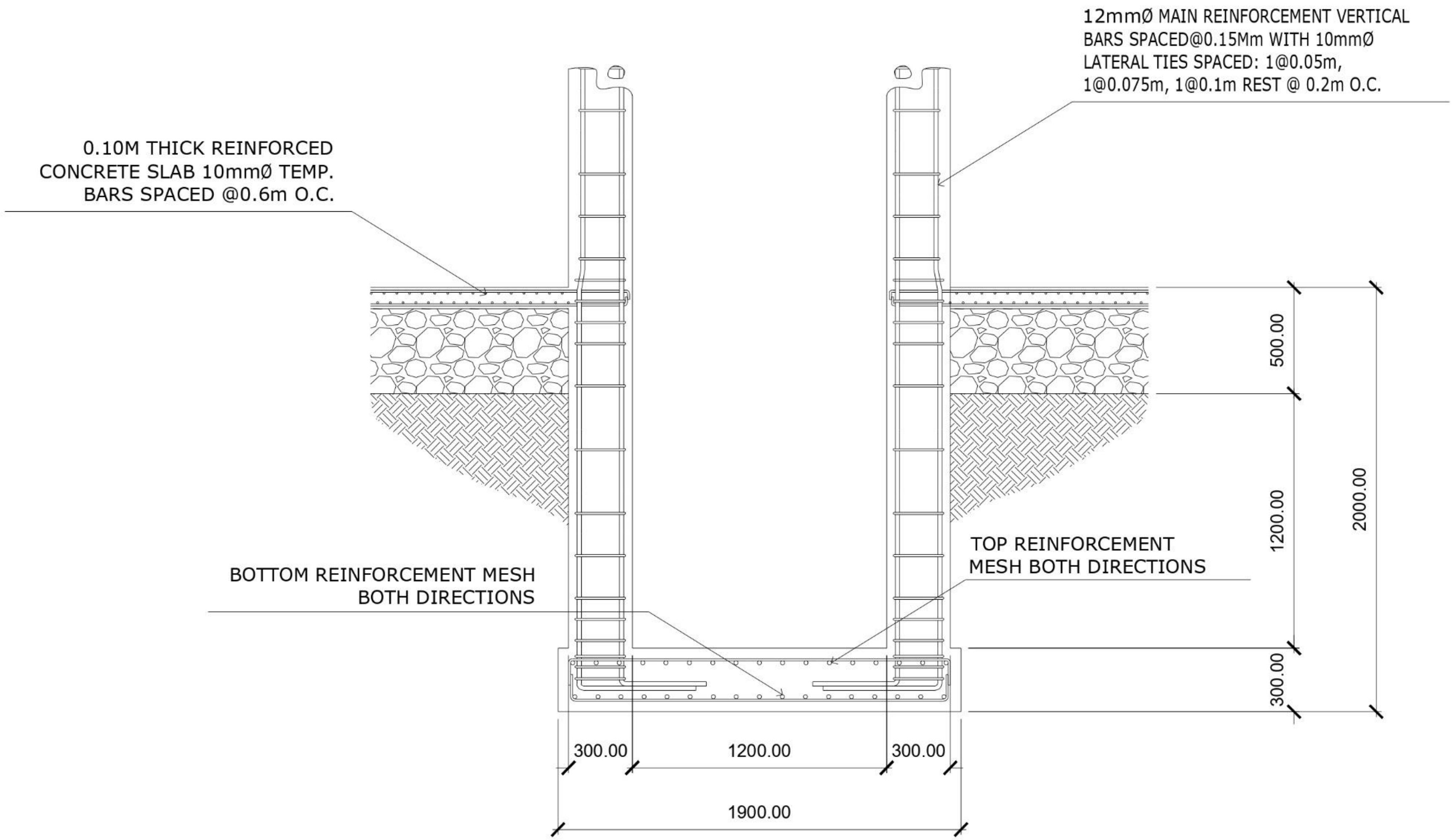
PLAN

WALL FOOTING 1 (WF1)

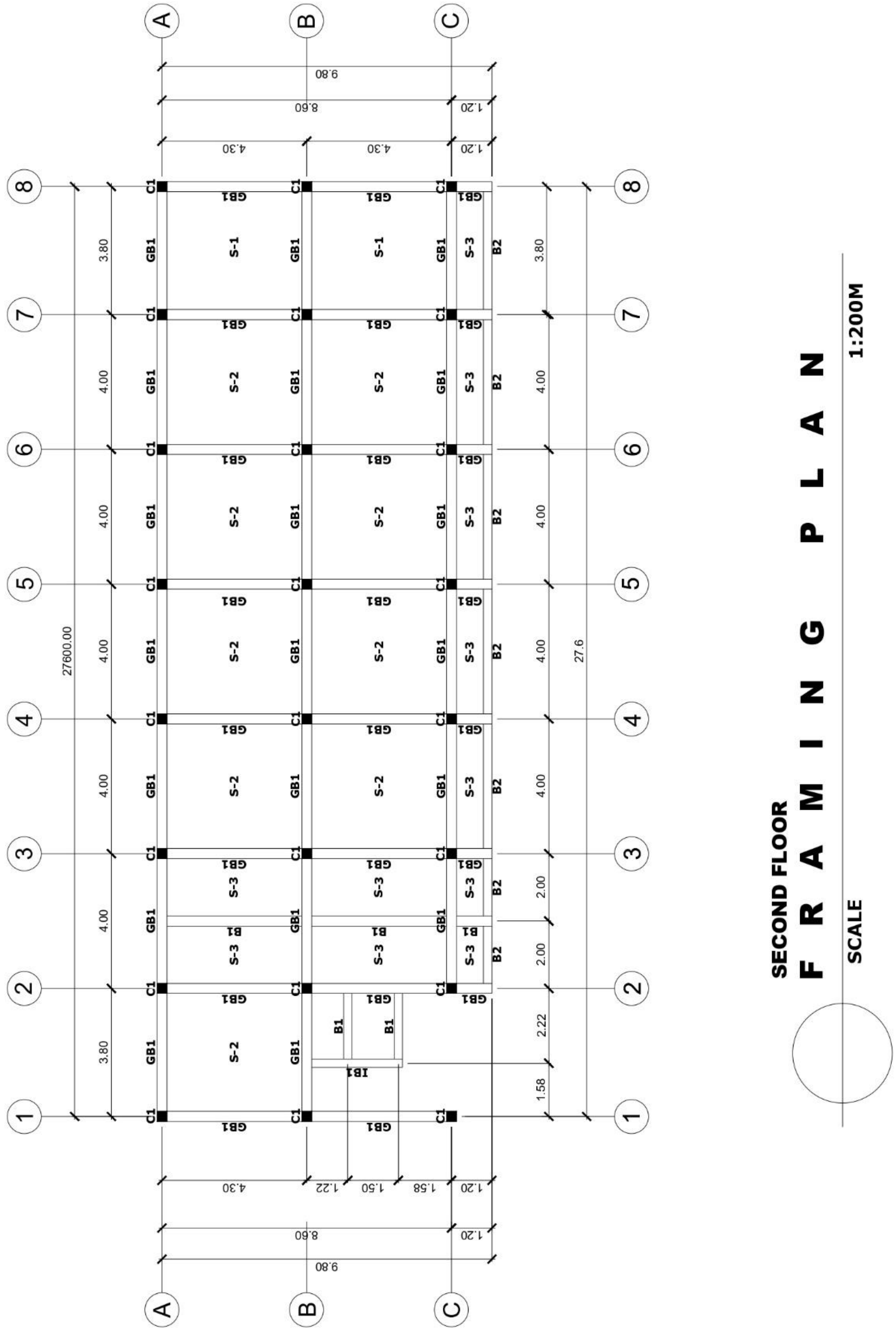
SCALE **1:20M**

SCHEDULE OF COLUMN				
MARK	SIZE		REINFORCEMENT	
	Width (mm)	Length (mm)	MAIN BARS	LATERAL TIES
C1	300	300	8-20mmØ	10mmØ SPACED: 3@0.05m, 3@0.1m, REST @0.3m O.C.

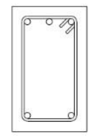
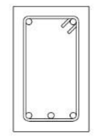
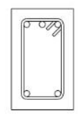
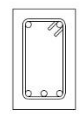
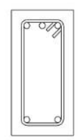
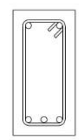
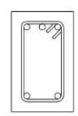
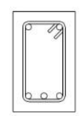
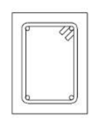
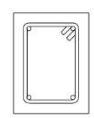


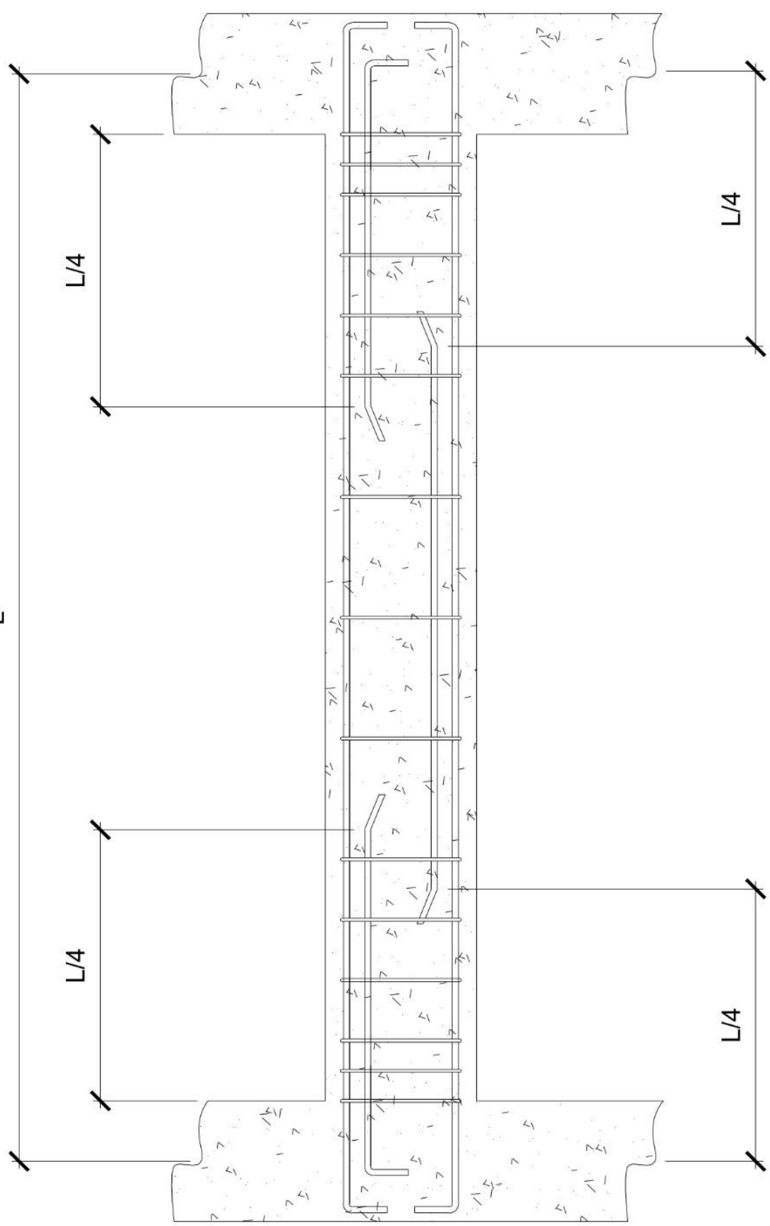


ELEVATOR SHAFT PIT FOUNDATION
SCALE 1:30M

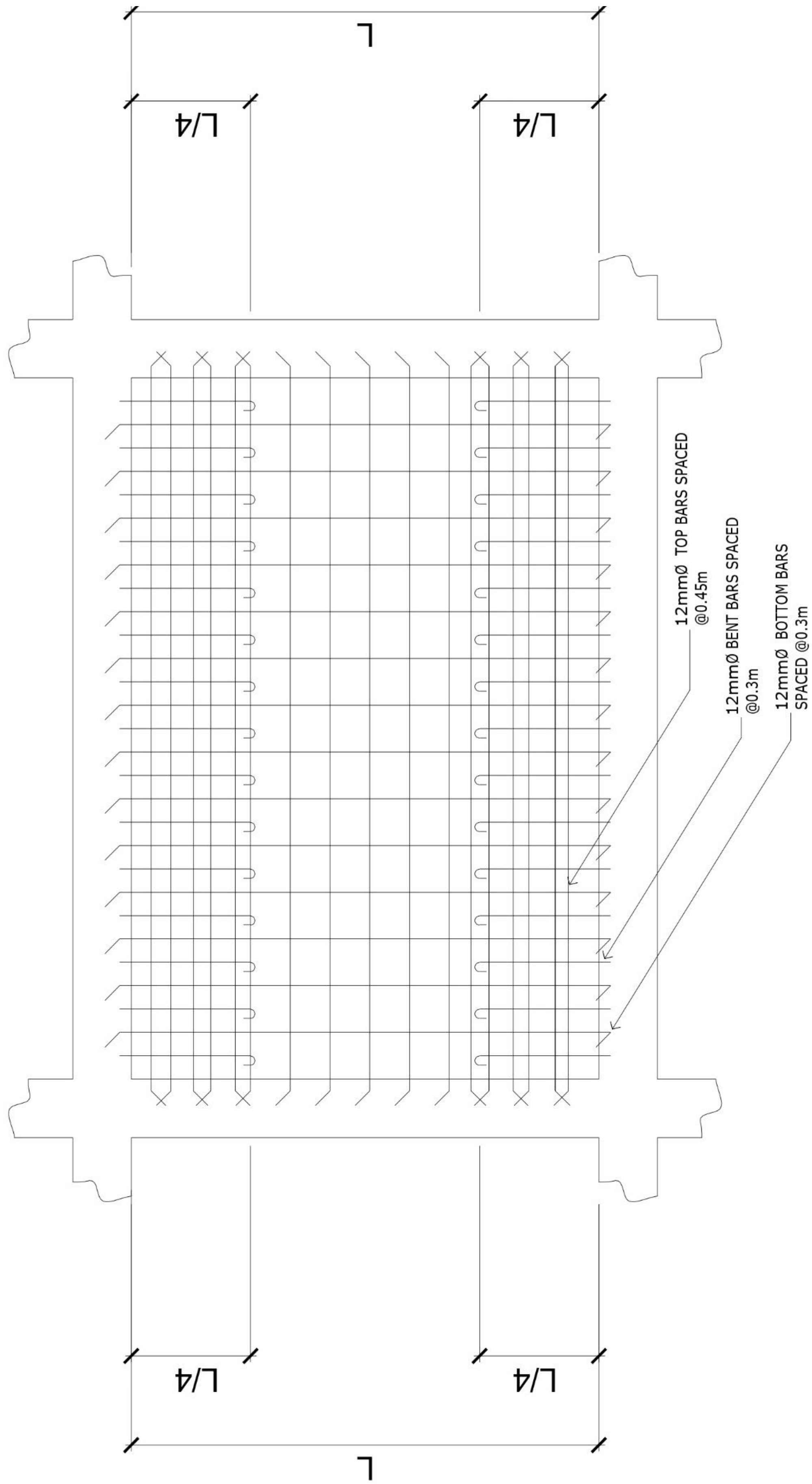

SECOND FLOOR
FRAMING PLAN
SCALE
1:200M

SCHEDULE OF BEAMS

MARK	DIMENSION		REINFORCEMENT BARS						STIRRUPS
	WIDTH	HEIGHT	SUPPORTS		MIDSPAN		SUPPORTS	MIDSPAN	
	B (mm)	H (mm)	TOP (mm)	BOTTOM (mm)	TOP (mm)	BOTTOM (mm)			
GB1	300	500	3-25	2-25	2-25	3-25			**10mm**Ø STIRRUPS SPACED: 10@0.05m, 5@0.10m, AND REST @0.15m O.C.
B1	250	400	3-25	2-25	2-25	3-25			**10mm**Ø STIRRUPS SPACED: 10@0.05m, 5@0.10m, AND REST @0.15m O.C.
B2	250	500	3-25	2-25	2-25	3-25			**10mm**Ø STIRRUPS SPACED: 10@0.05m, 5@0.10m, AND REST @0.125m O.C.
RB1	250	400	3-25	2-25	2-25	3-25			**10mm**Ø STIRRUPS SPACED: 10@0.05m, 5@0.75m, AND REST @0.10m O.C.
TB1	300	400	2-25	2-25	2-25	2-25			**10mm**Ø STIRRUPS SPACED: 10@0.05m, 5@0.10m, AND REST @0.15m O.C.



TYPICAL BEAM DETAIL
SCALE NTS

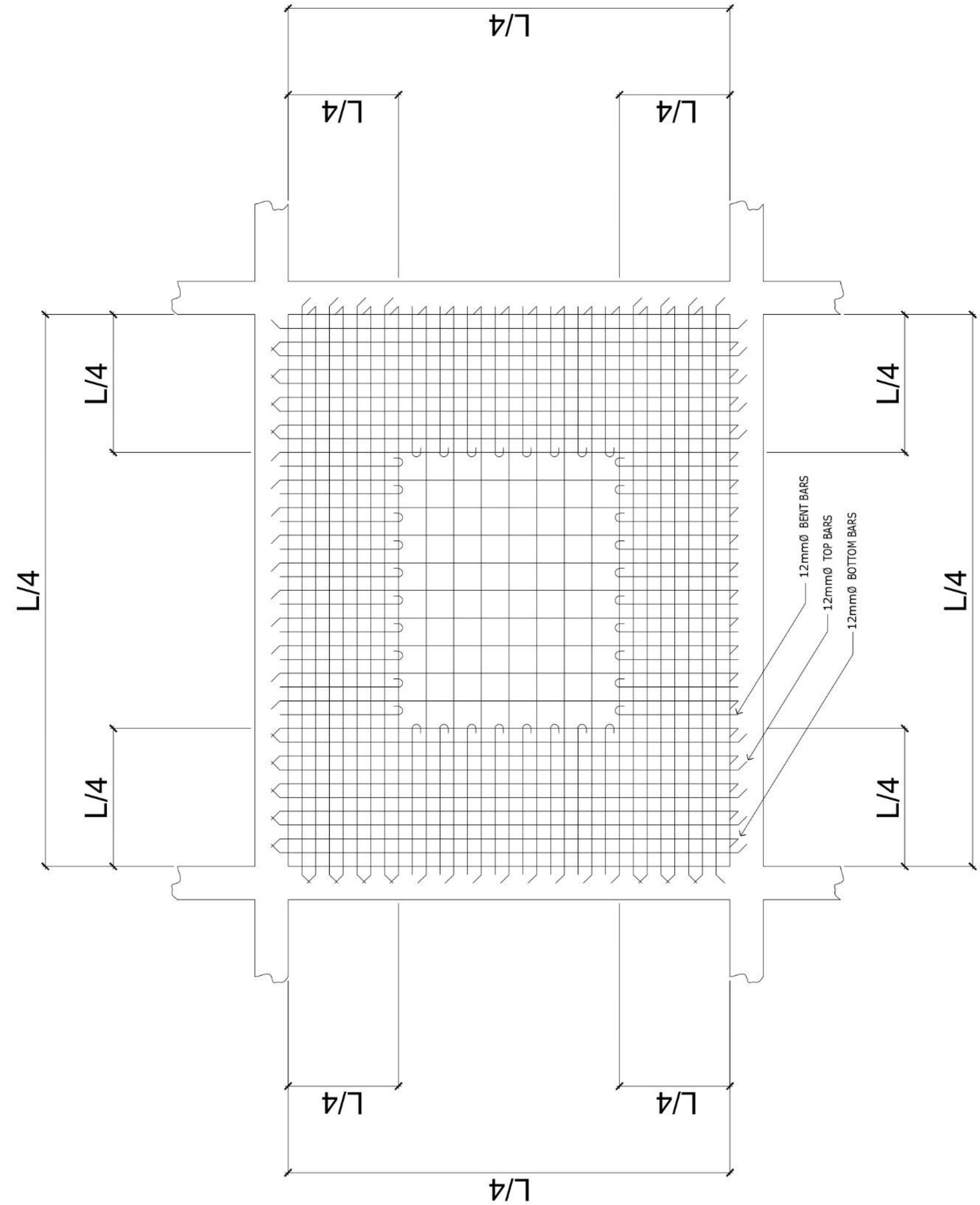


ONE-WAY SLAB (S-3)

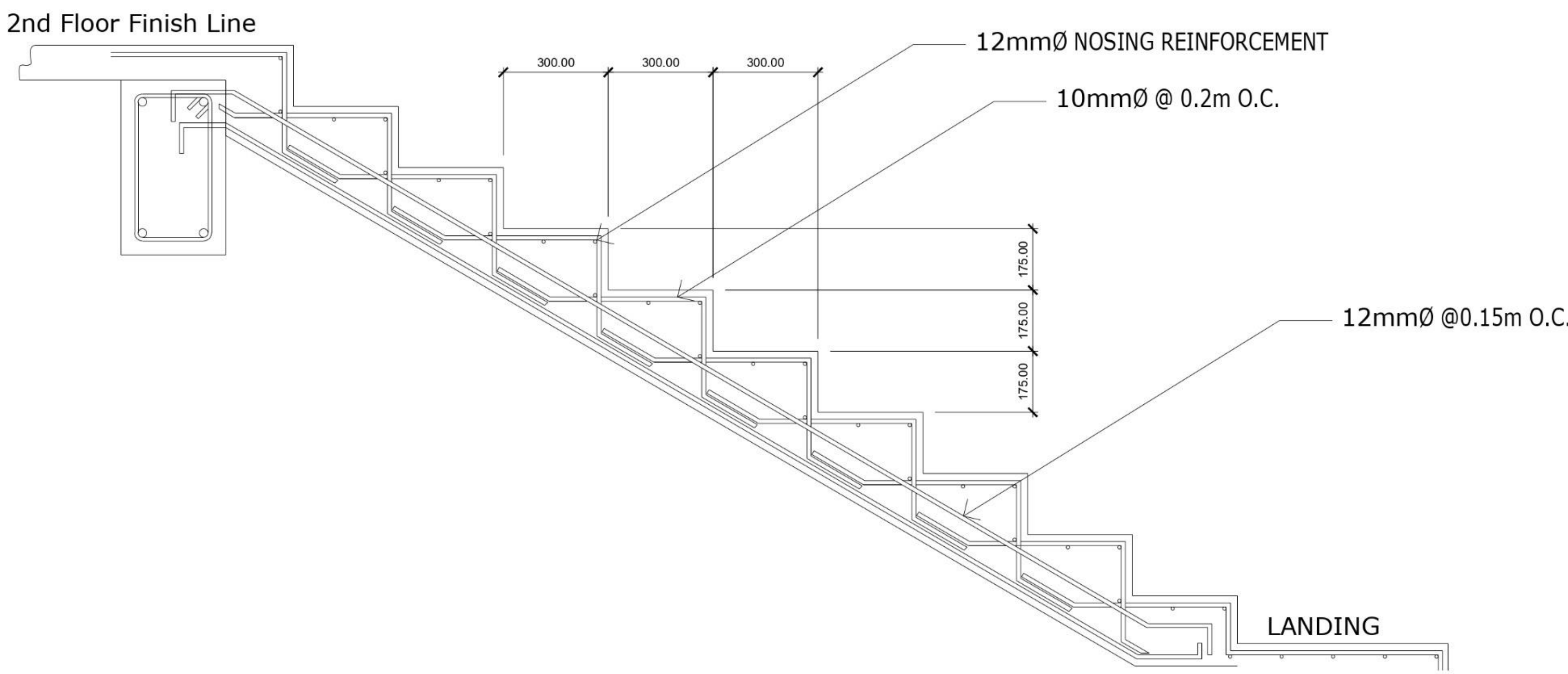
SCALE NTS

SCHEDULE OF TWO-WAY SLABS

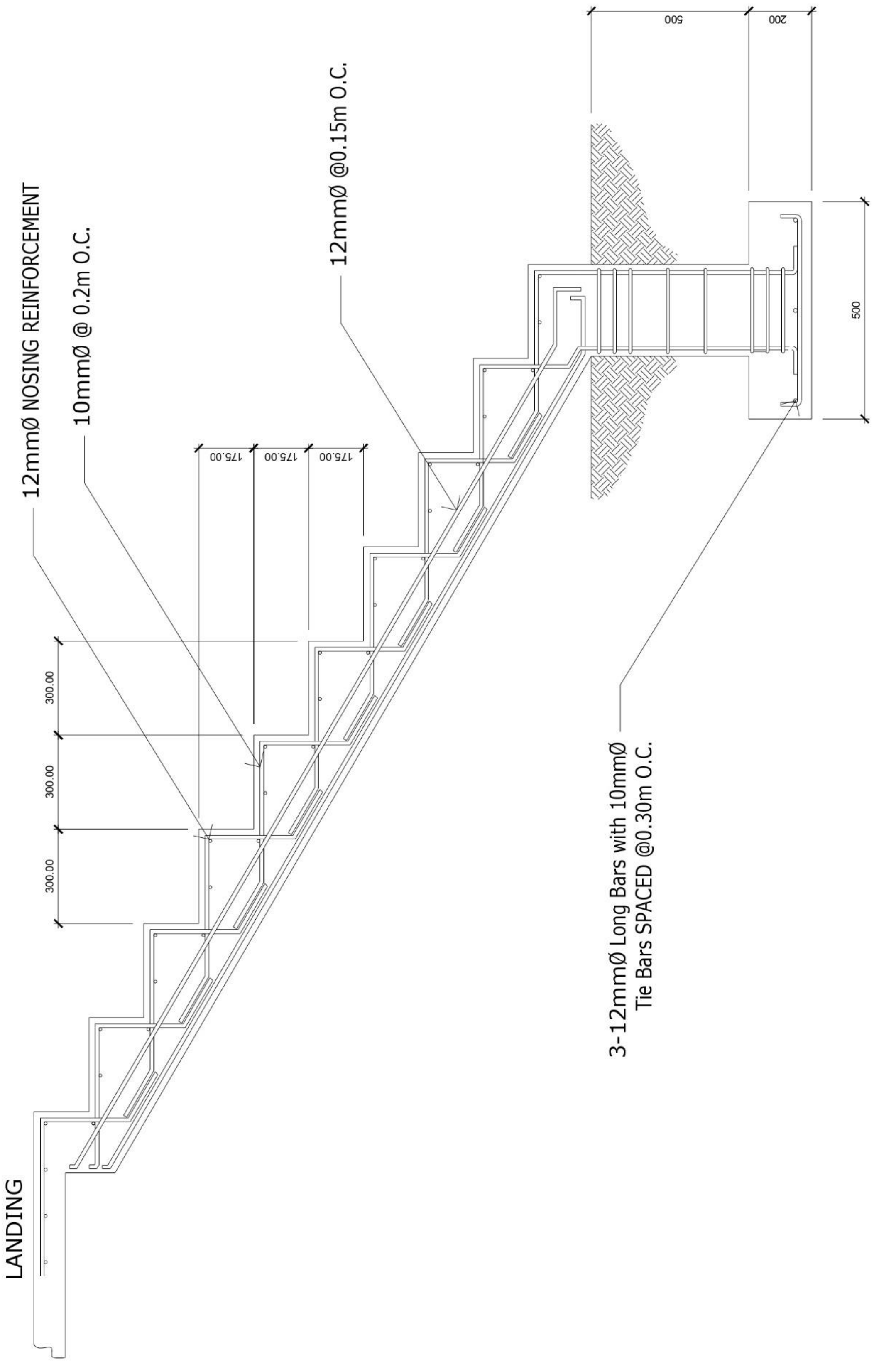
SLAB MARK	THICKNESS (mm)	BAR DIAMETER (mm)	SHORT SPAN SPACING (mm)			LONG SPAN SPACING (mm)		
			TOP BARS (DISCONTINUOUS)	BOTTOM BARS	TOP BARS (CONTINUOS)	TOP BARS (DISCONTINUOUS)	BOTTOM BARS	TOP BARS (CONTINUOUS)
S-1	100	12	200	125	200	200	150	200
S-2	100	12	200	150	200	200	200	200



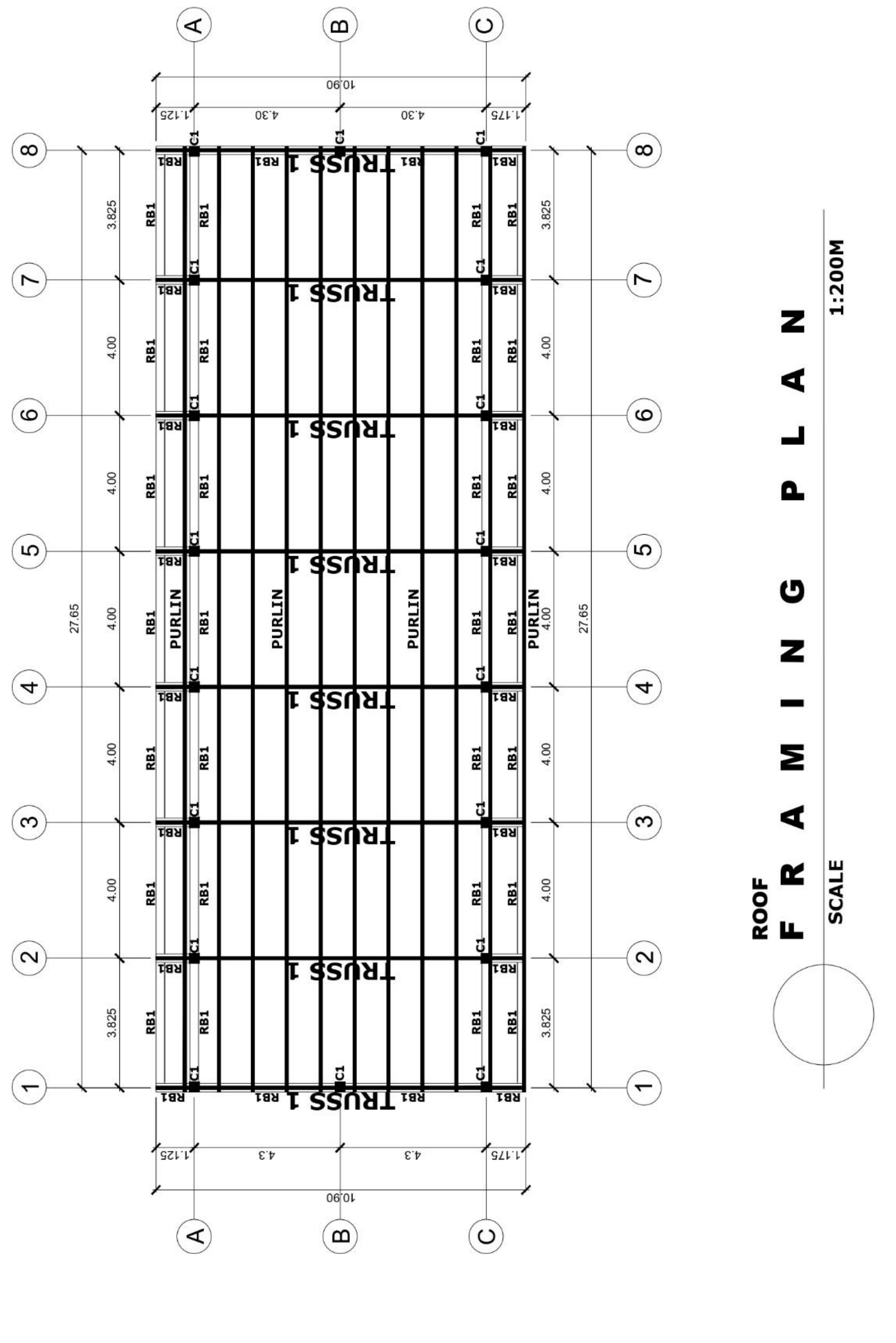
TYPICAL TWO-WAY SLAB DETAIL SCALE NTS

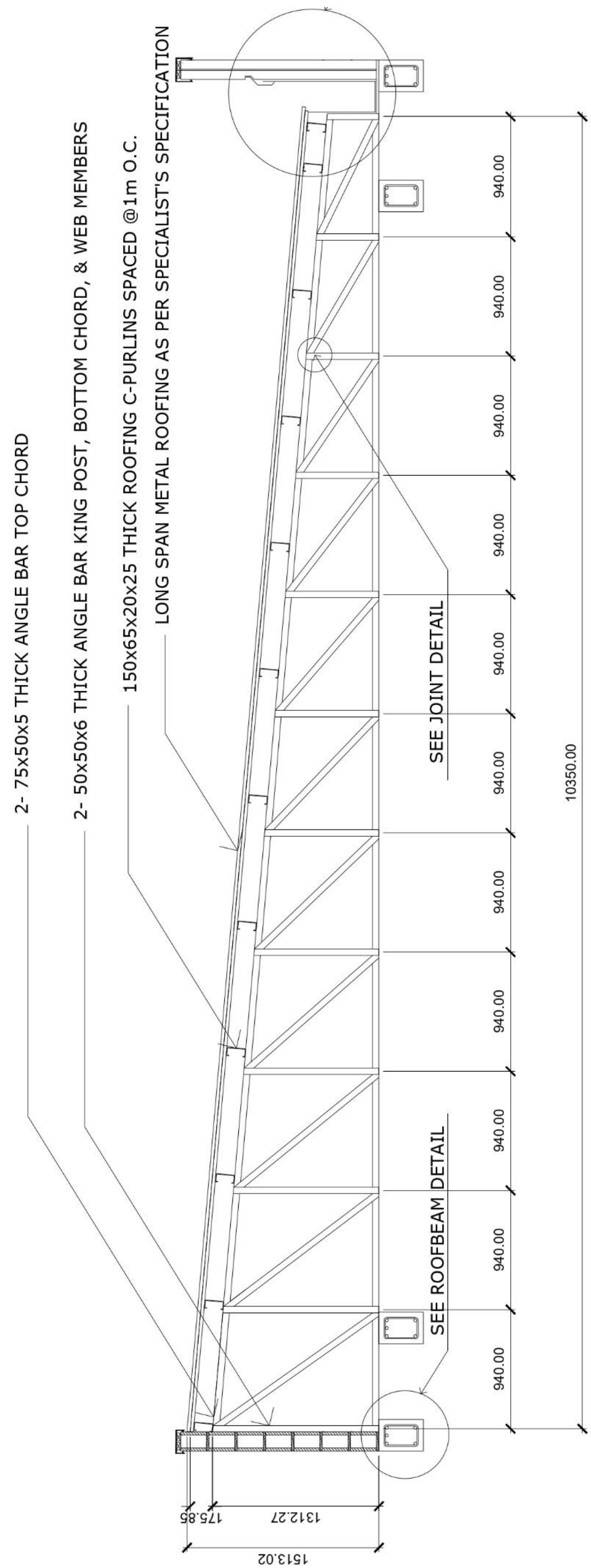


STAIR DETAIL BLOW UP 1
SCALE 1:20M

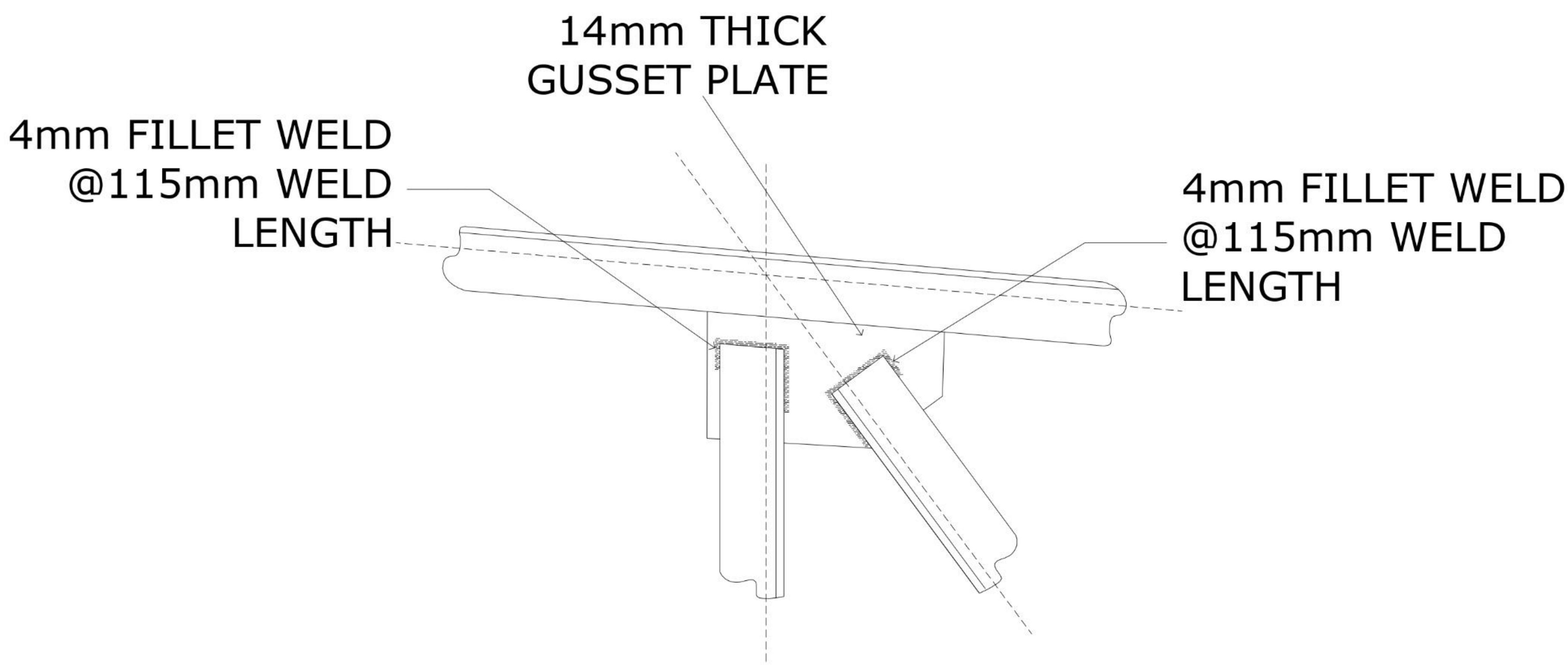


STAIR DETAIL BLOW UP 2
SCALE 1:20M


ROOF
FRAMING PLAN
SCALE 1:200M
TRUSS 1
PURLIN
RB1
C1
A
B
C
1
2
3
4
5
6
7
8
10.90
1.125
4.30
1.175
4.3
27.65
3.825
4.00

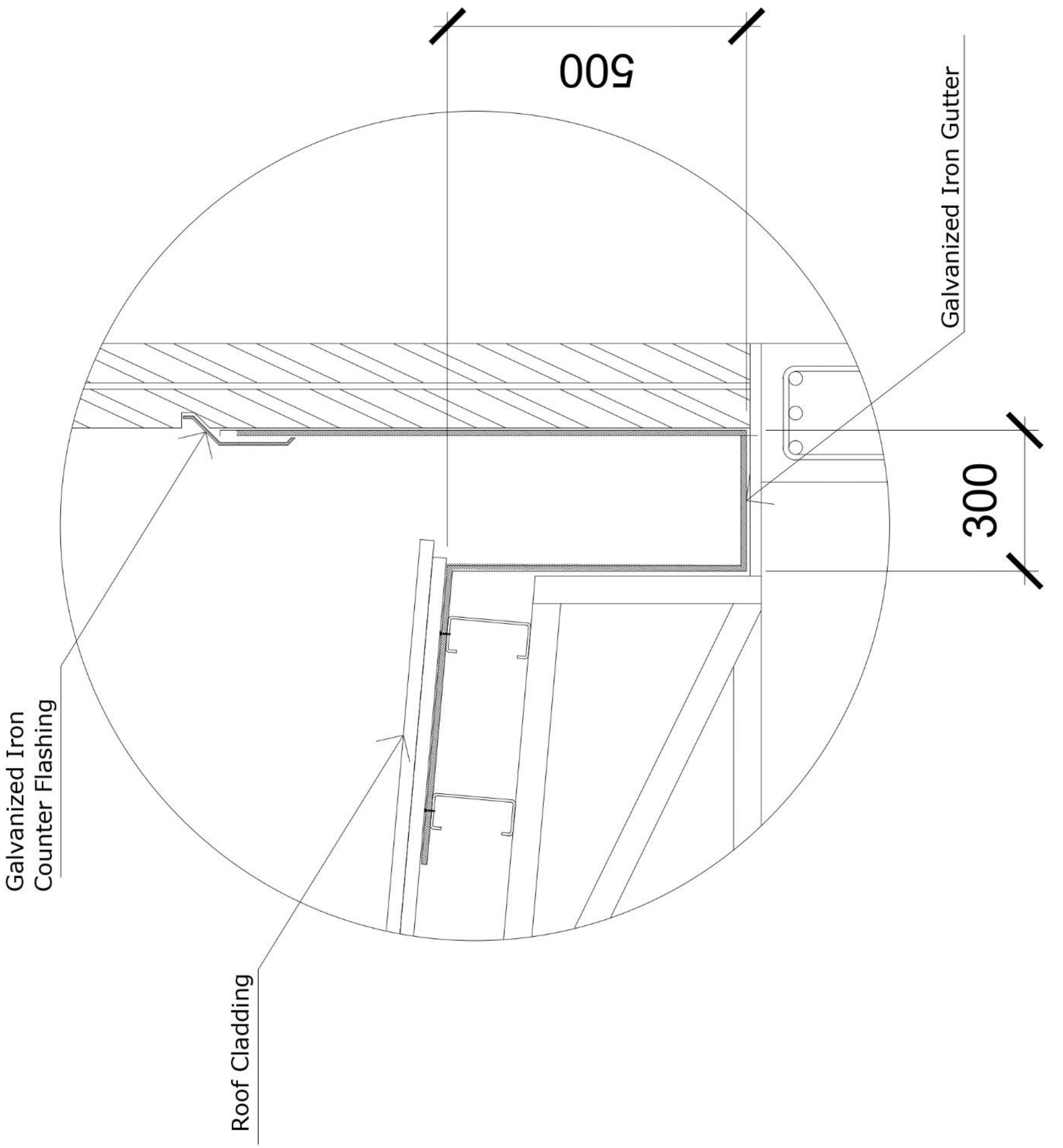


TRUSS 1
SCALE 1:50M



JOINT DETAIL BLOW UP

SCALE NTS



GUTTER DETAIL BLOW UP
SCALE NTS

ELECTRICAL

PLAN

SPECIFICATIONS

1. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE PROVISION OF THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE (PEC). THE RULES AND REGULATIONS OF THE LOCAL AND NATIONAL AUTHORITIES CONCERNED WITH ENFORCEMENT OF RULES AND REGULATIONS OF LOCAL UTILITY COMPANY;

2. THE SERVICE VOLTAGE TO THE BUILDING IS SINGLE PHASE, TWO WIRES, + GROUND 230 VOLTS, 60 HERTZ SYSTEM;

3. THE INSTALLATION ARE DONE AS FOLLOWS:

   a) POLYVINYL CHLORIDE (PVC) - - - - LIGHTING, POWER BRANCH CIRCUITS , AND AUXILIARY LAYOUT, SERVICE ENTRANCE;

4. ALL WIRES TO BE BE USED ARE COPPER AND THERMOPLASTIC HEAT INSULATED TYPE "THN / THW" UNLESS NOTED OTHERWISE SPECIFIED;

5. ALL MATERIALS TO BE USED SHALL BE BRAND NEW AND OF THE APPROVED TYPE FOR THE LOCATION AND PURPOSED INTENDED:

6. THE MINIMUM SIZE OF WIRE AND CONDUIT TO BE USED SHALL BE 2.0 sq. mm. THNN & 3.5 sq. mm. TW in 20mm Dia. Conduit RESPECTIVELY

7. CONDUCTORS TO BE USED SHALL BE NOT LESS THAN AS FOLLOWS:

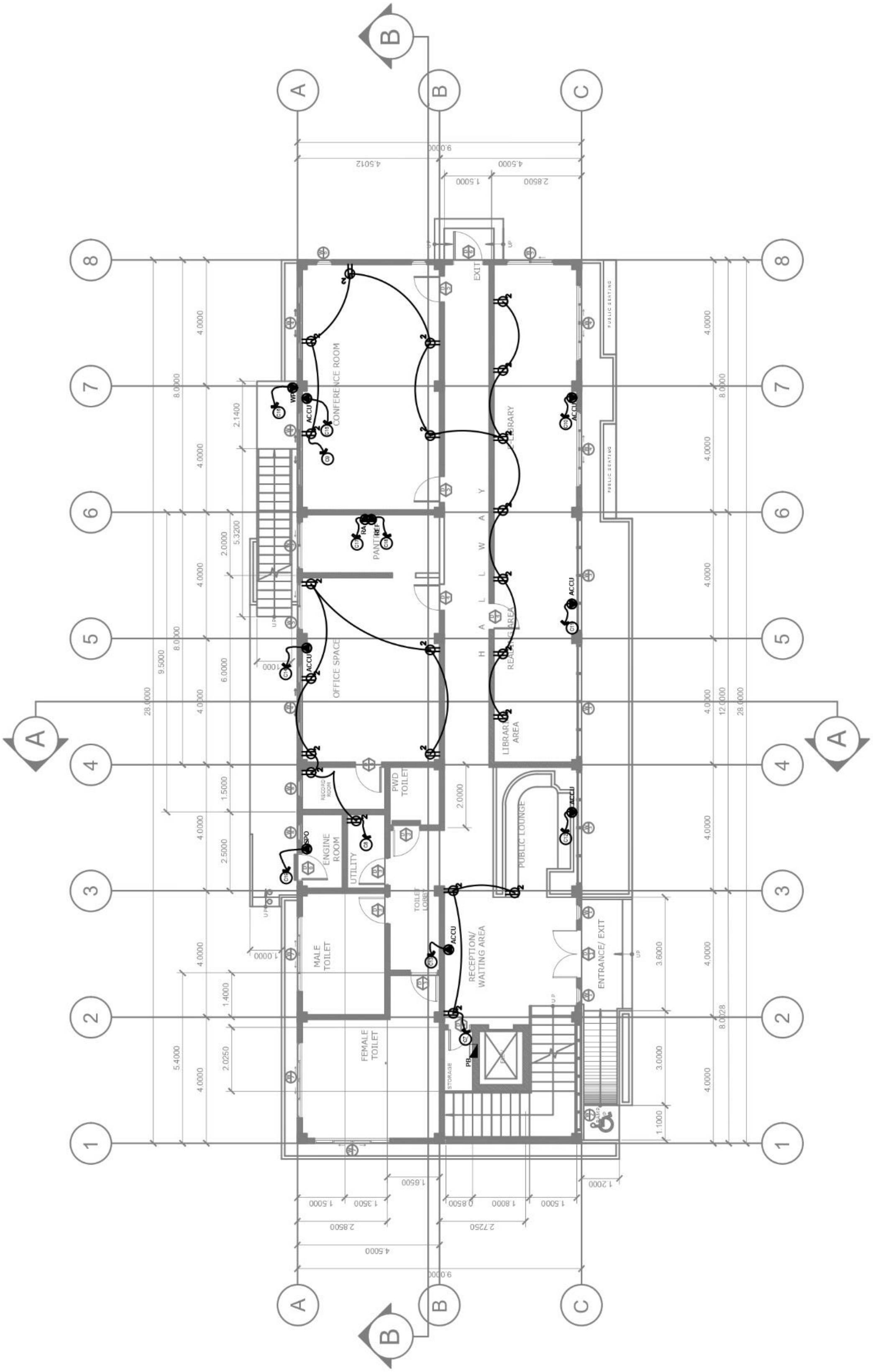
5W-12W L. O.	20 NO. 2 - 2.0mm² THHN
380VA C. O.	20 NO. 2 - 3.5mm² THHN
AIR CONDITION	22 NO. 2 - 5.5mm² THHN
WASHING MACHINE	3 NO. 2 - 5.5mm² THHN
REFRIGERATOR	2 NO. 2 - 5.5mm² THHN
WATER PUMP	3 NO. 2 - 5.5mm² THHN
RANGE	2 NO. 2 - 5.5mm² THHN

8. ALL SERVICE ENTRANCE EQUIPMENTS SUCH AS PANEL BOARD SHALL BE PROPERLY GROUNDED IN ACCORDANCE WITH THE PROVISION OF THE PHILIPPINE ELECTRICAL CODE;

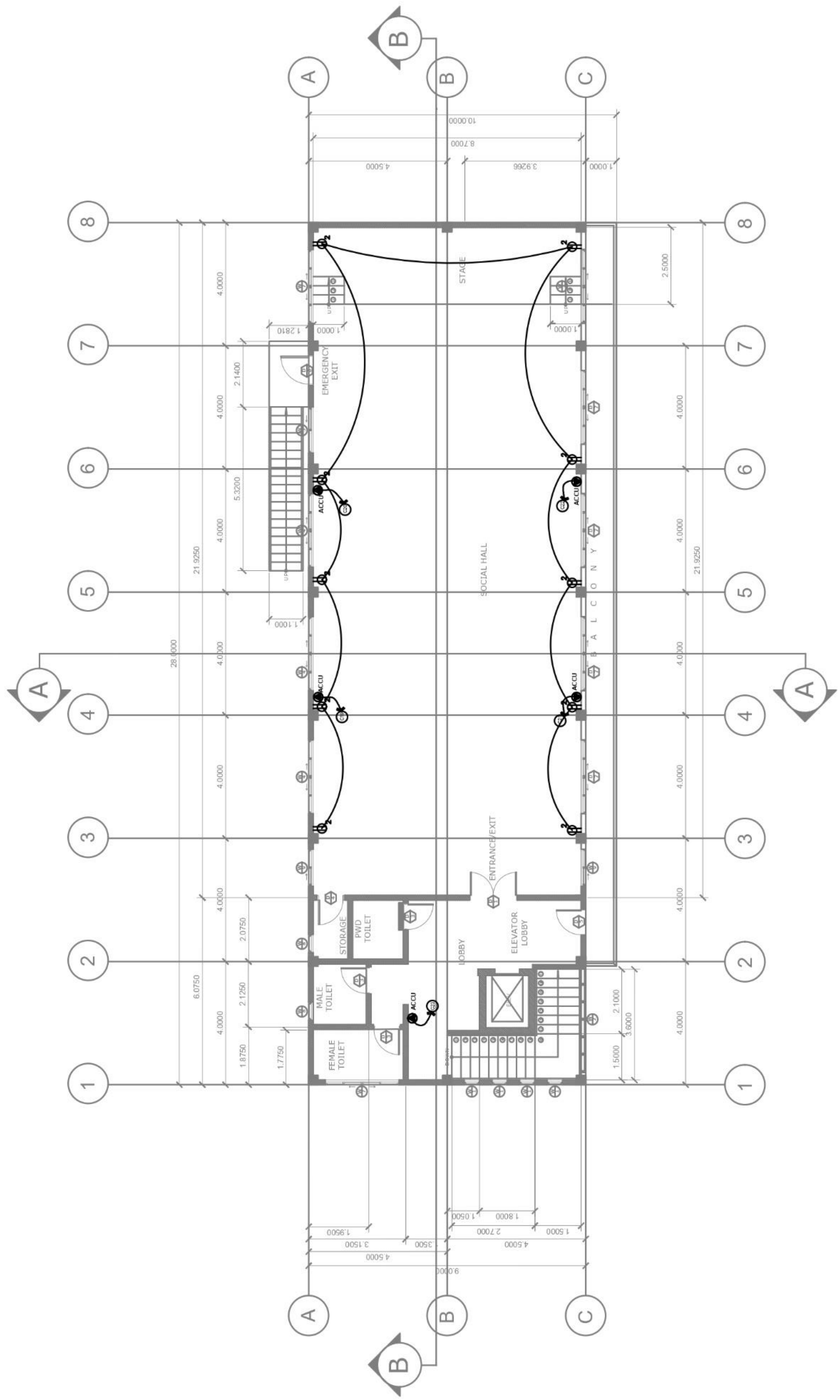
9. ALL ELECTRICAL WORKS AND INSTALLATIONS HEREIN SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A DULY REGISTERED ELECTRICAL ENGINEER OR MASTER ELECTRICIAN.

LEGEND

	12 W SPECIAL LIGHT
	5 W PILOT LIGHT
	POWER LINE
SL	1-GANG SWITCH
S2 KH	2-GANG SWITCH
S3 ABC	3-GANG SWITCH
S3 Ws	THREE-WAY SWITCH
2	DUPLEX CONVENIENT OUTLET
RA	RANGE
REF	REFRIGERATOR
WP	WATER MOTOR PUMP
ACCU	AIR-CONDITIONING UNIT
	CIRCUIT NO.
	PANEL BOARD



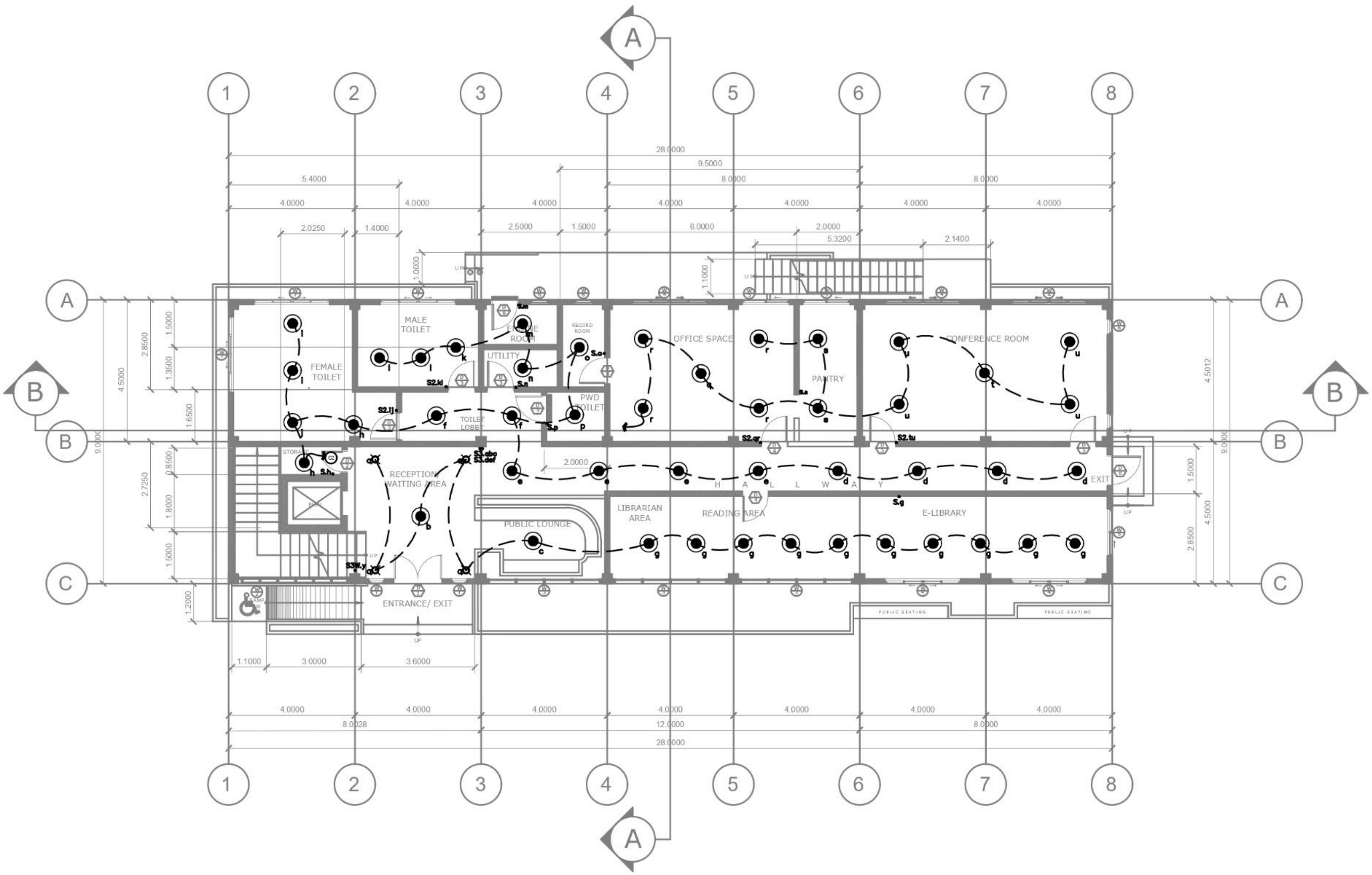
GROUND FLOOR
POWER LAYOUT
SCALE 1:200M



SECOND FLOOR

P O W E R L A Y O U T

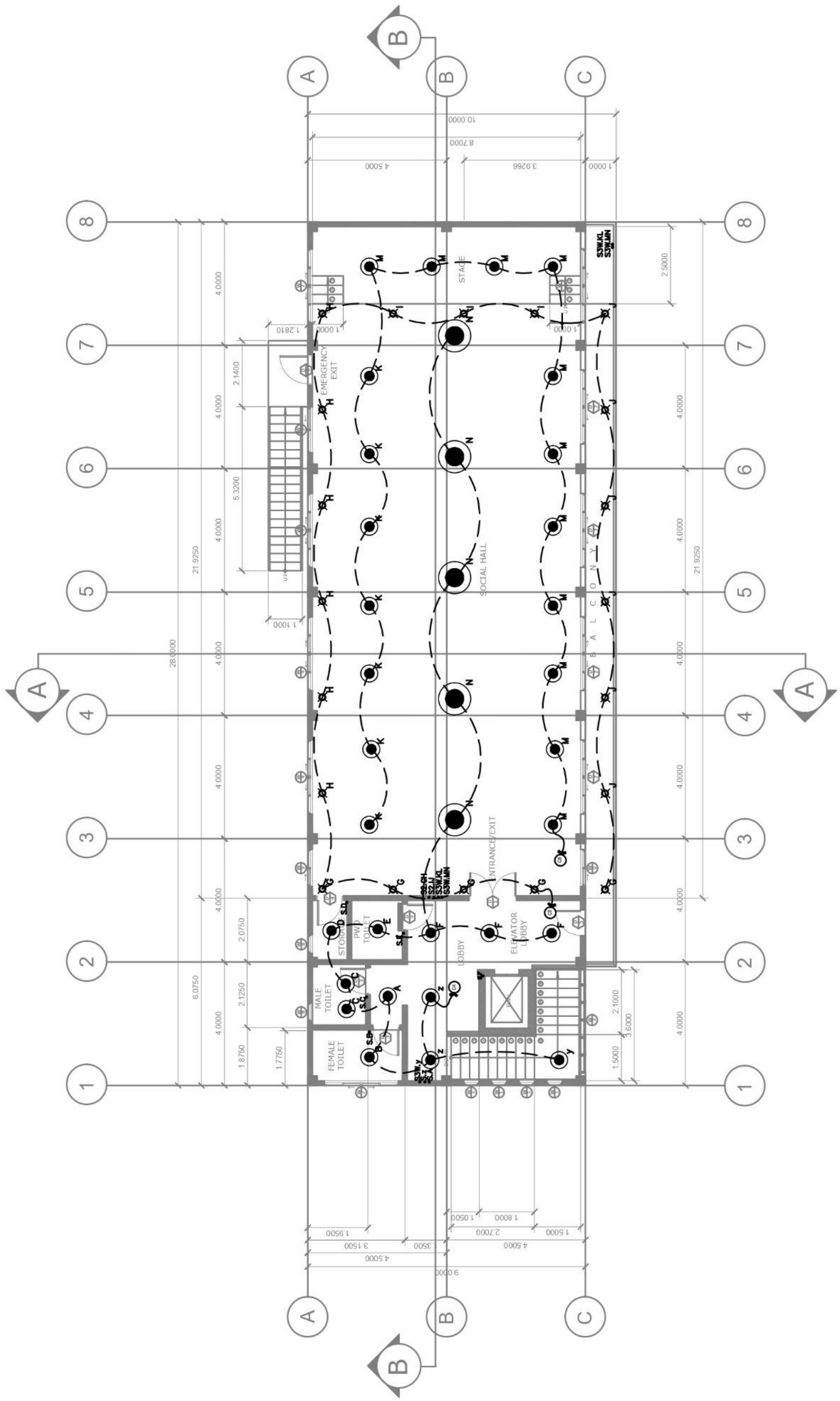
SCALE **1:200M**



GROUND FLOOR

L I G H T I N G   L A Y O U T

SCALE **1:200M**



SECOND FLOOR

LIGHTING LAYOUT

SCALE **1:200M**

CKT NO.	DESCRIPTION OF LOADS	VOLT AMPERE	VOLT	POLE	AT	AF	AMPERE	WIRE AND RACEWAY
1	12 LIGHTING OUTLET	144	230	2	20	100	0.63	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
2	22 LIGHTING OUTLET	264	230	2	20	100	1.15	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
3	16 LIGHTING OUTLET	164	230	2	20	100	0.71	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
4	14 LIGHTING OUTLET	168	230	2	20	100	0.73	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
5	20 LIGHTING OUTLET	100	230	2	20	100	0.43	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
6	18 LIGHTING OUTLET	216	230	2	20	100	0.94	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
7	3-DUPLEX CONVENIENCE OUTLET	540	230	2	20	100	2.35	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
8	7-DUPLEX CONVENIENCE OUTLET	1260	230	2	20	100	5.48	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
9	12-DUPLEX CONVENIENCE OUTLET	2160	230	2	20	100	9.39	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
10	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
11	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
12	1HP ACCU	1840	230	2	20	100	8.00	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
13	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
14	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
15	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
16	WATER MOTOR PUMP	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
17	RANGE	9200	230	2	50	100	40.0	2-8.0mm² THHN + 1-5.5mm²THHN in 32mmØ PVC
18	REFRIGERATOR	600	230	2	20	100	2.61	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
19	SPECIAL PURPOSE OUTLET	1500	230	2	20	100	6.52	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
20	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
21	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
22	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
23	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
24	2HP ACCU	2760	230	2	30	100	12.00	2-5.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
25	10-DUPLEX CONVENIENCE OUTLET	1800	230	2	20	100	7.83	2-3.5mm² THHN + 1-3.5mm²THHN in 20mmØ PVC
26	SPACE							
27	SPACE							
28	SPACE							
	TOTAL	50316					218.77	MAXIMUM DEMAND LOAD @ 80% DF

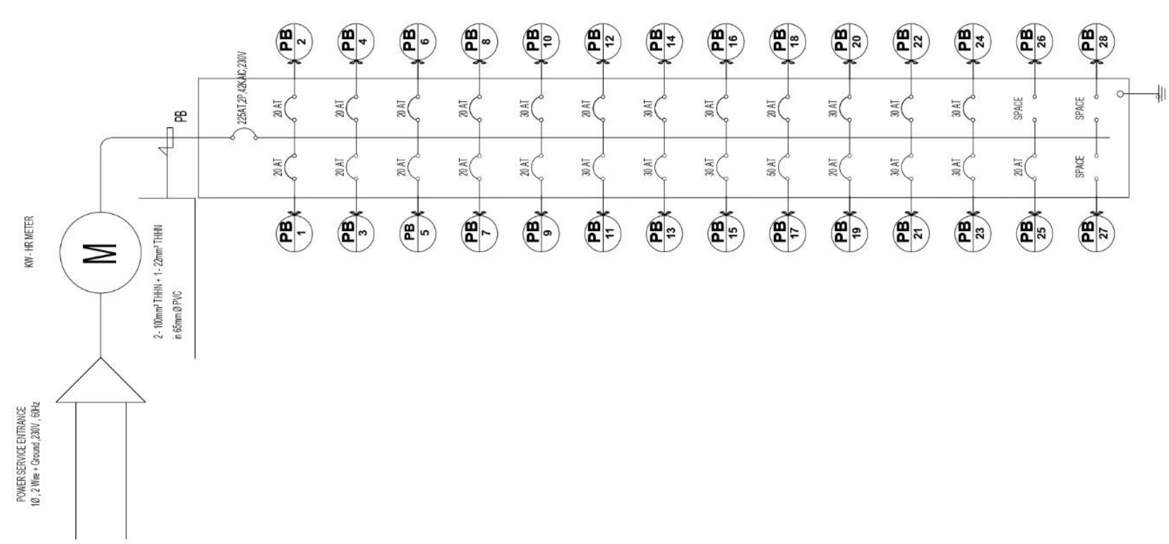
IFL = (218.77 x 0.8) + (12 x 0.25) = 178.02 A

SERVICE FEEDER CONDUCTOR:
2 - 100mm² THHN + 1 - 22mm² THHN
in 65mm Ø PVC

MAIN : 225 AT , 250 AF , 42KAIC ,230 V , 60Hz ,1Ø

SCHEDULE OF LOADS

SCALE NTS



SINGLE LINE DIAGRAM
SCALE NTS

SHORT CIRCUIT CALCULATION

The electrical system will be tapped to Power Source Line with single phase distribution transformer rated 50 KVA, 230 Volts and 2.5% impedance. Assuming that the primary source is of infinite MVA capacity and neglecting feeder conductor impedances up to panelboard.

Transformer Secondary Current (Isec)

$$I_{sec} = \frac{\text{TRANSFORMER kVA (1000)}}{\text{SECONDARY VOLTAGE}}$$

$$= \frac{50 \text{ kVA } (1000)}{230V} = 217.39 \text{ A}$$

SHORT CIRCUIT CURRENT (Isc)

$$I_{sc} = \frac{\text{TRANSFORMER kVA (1000)}}{\text{SECONDARY VOLTAGE (\%Z / 100)}} = \frac{50 \text{ kVA } (1000)}{230V\ (2.5\% / 100)} = 8696 \text{ A}$$

Interrupting Rating of ACPDB Panel should be 10 KAIC Minimum.

FEEDER CONDUCTOR AND PROTECTION

Demand load kVA is 50.32 kVA base on 80% demand factor. Supply Voltage (Vs) is 230 volts.

Full load Current (I fl)

$$I_{fl} = \frac{\text{DEMAND LOAD kVA (1000)}}{\text{SUPPLY VOLTAGE}} = \frac{50.32 \text{ kVA } (0.8)(1000)}{230} = 175.03 \text{ A}$$

$I_c = I_{fl}(1.25) = 175.03\,(1.25) = 218.79$ A

Use 2-100 mm² THHN + 1-22 mm² in 65 mm diameter PVC and 225AT, 1P CB.

VOLTAGE DROP CALCULATION

100 mm² in PVC, 40 meters run feeder cable from service entrance to panelboard. Conductor Resistance and reactance data from PEC 2009 Book R = 0.063 Ohmn per 305 m and X = 0.051 per 305 m.

R = 0.00826
X = 0.00669

Voltage Drop (VD)

$VD = I_{fl}\sqrt{(R^2 + X^2)} = 175.03\sqrt{(0.00826^2 + 0.00669^2)} = 1.45$ Volts

$\%VD = (VD / V_s)\ 100 = (1.45 / 230)100 = 0.63\%$

Percent voltage drop of 0.63% is within acceptable limit base on 3% PEC Requirement

DESIGN ANALYSIS
SCALE NTS

PLUMBING PLAN

GENERAL NOTES:

1. ALL PLUMBING WORKS HEREIN SHALL BE EXECUTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL PLUMBING CODE, AND THE RULES AND REGULATIONS OF THE CITY.

2. COORDINATE THE DRAWINGS WITH OTHER RELATED DRAWINGS AND SPECIFICATIONS. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY FOUND HEREIN.

3. PIPES SHALL BE INSTALLED AS INDICATED. ANY RELOCATION REQUIRED FOR PROPER EXECUTION OF OTHER TRADES SHALL BE WITH THE PRIOR APPROVAL OF THE ARCHITECT OR ENGINEER.

4. SANITARY AND DRAINAGE LINES SHALL HAVE A MINIMUM SLOPE OF 1 %.

5. ALL INDIVIDUAL BRANCHES SHALL BE VENTED UNLESS OTHERWISE NOTED.

6. DIMENSIONS ARE IN MILLIMETER (mm) UNLESS OTHERWISE INDICATED.

7. SIZES OF WATER SUPPLY PIPES TO FIXTURES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

8. THE CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES AT SITE AND COORDINATE THE WORKS WITH SEWER EFFLUENT DISPOSAL AND WATERLLINE SERVICES CONNECTING POINT.

9. THE WORK THROUGHOUT SHALL BE EXECUTED IN THE BEST AND MOST THOROUGH MANNER KNOWN TO SATISFACTION OF ARCHITECT AND OR ENGINEER.

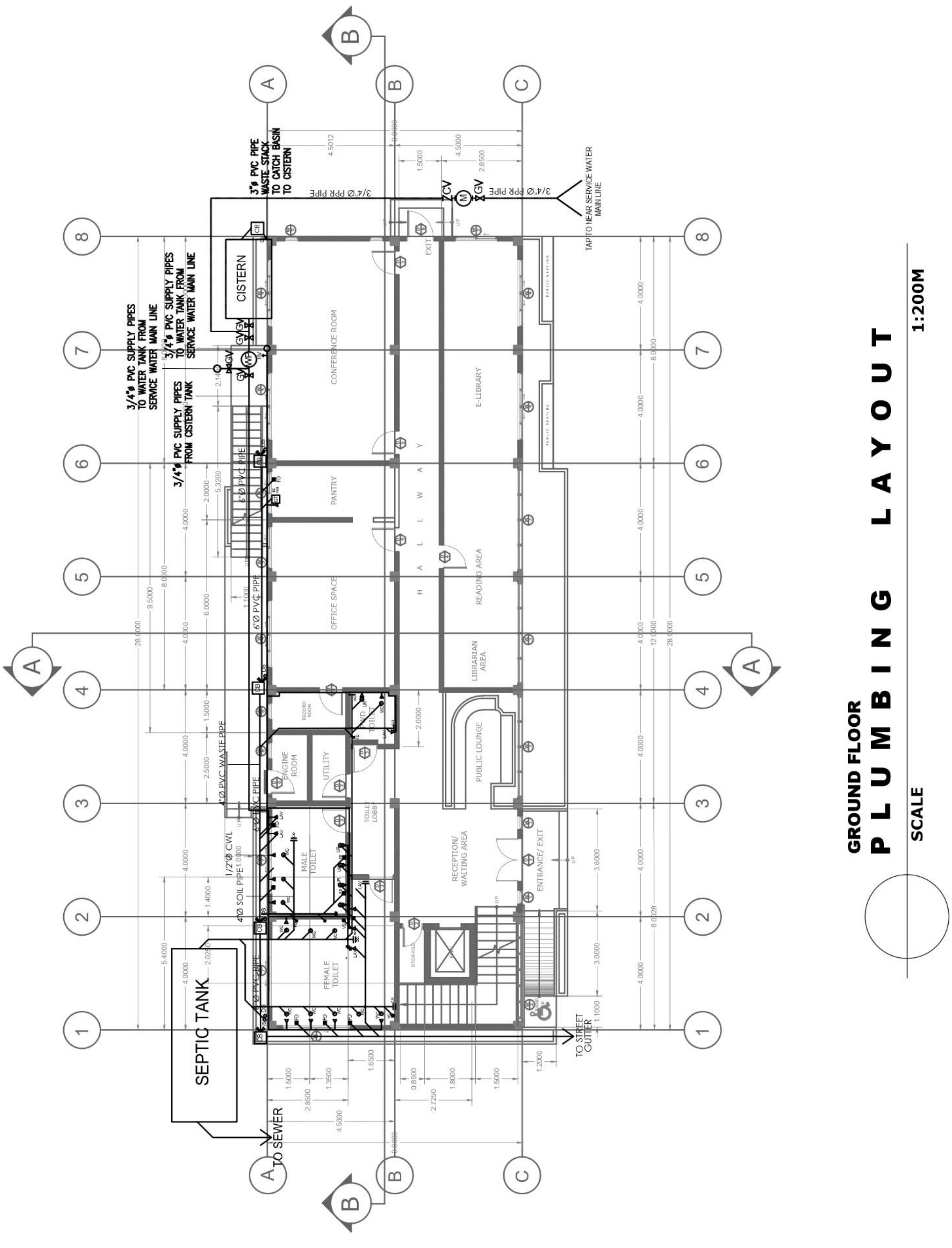
10. PIPES FOR COLD WATER LINES SHALL BE AS POLYPROPYLENE (PPr). FOR HOT WATER LINE SHALL BE XLPE (RED COLOR) BY UNILEX AND SHALL BE TESTED AT 150 PSI FOR THE PERIOD OF 2 HOURS BEFORE BACKFILLING OR COVERING.

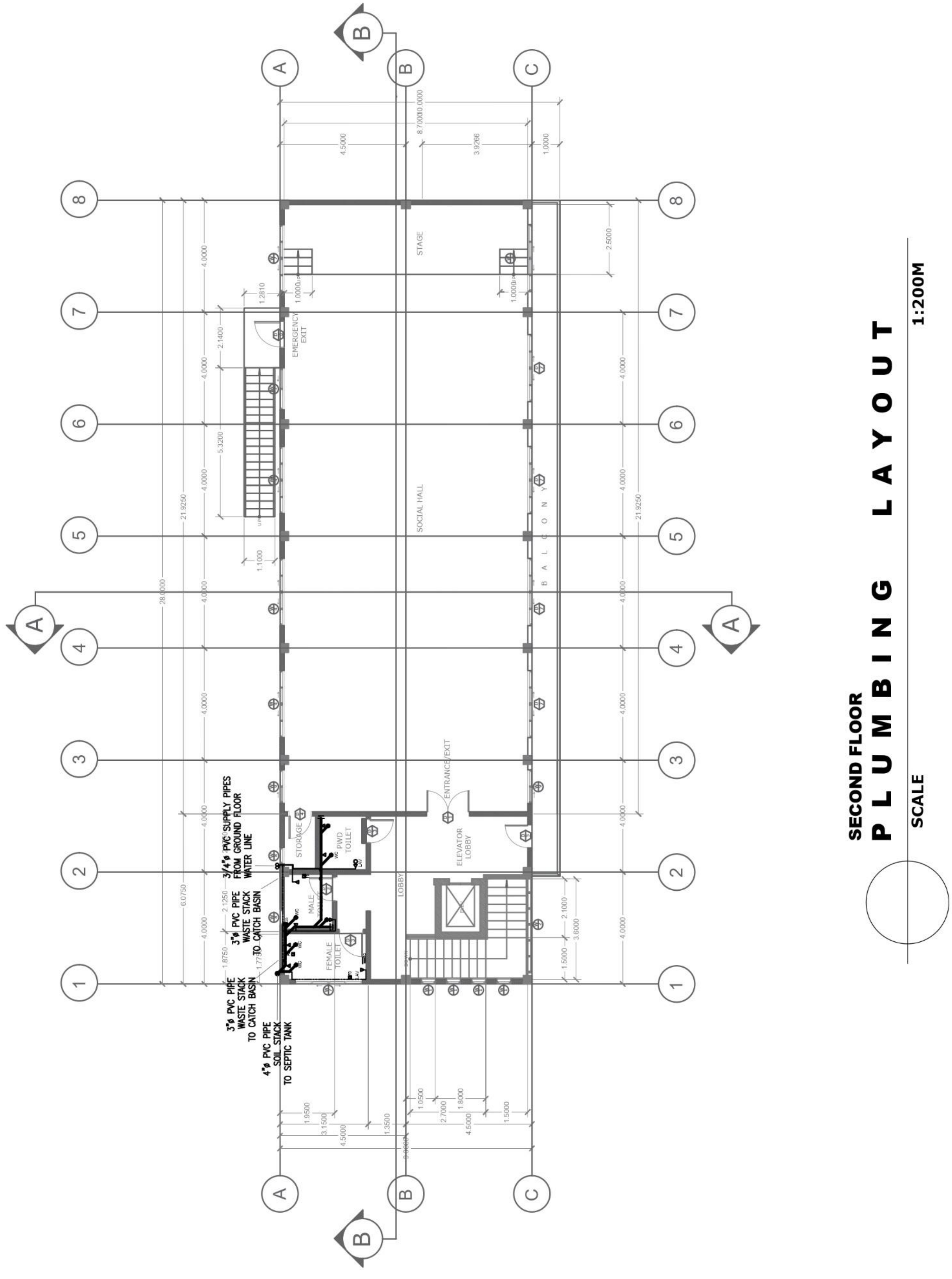
11. PIPES FOR SANITARY LINES SHALL BE PVC PIPES SERIES 1000 (HIGH IMPACT) AS MANUFACTURED BY ATLANTA OR OTHER APPROVED EQUAL BRANDS.

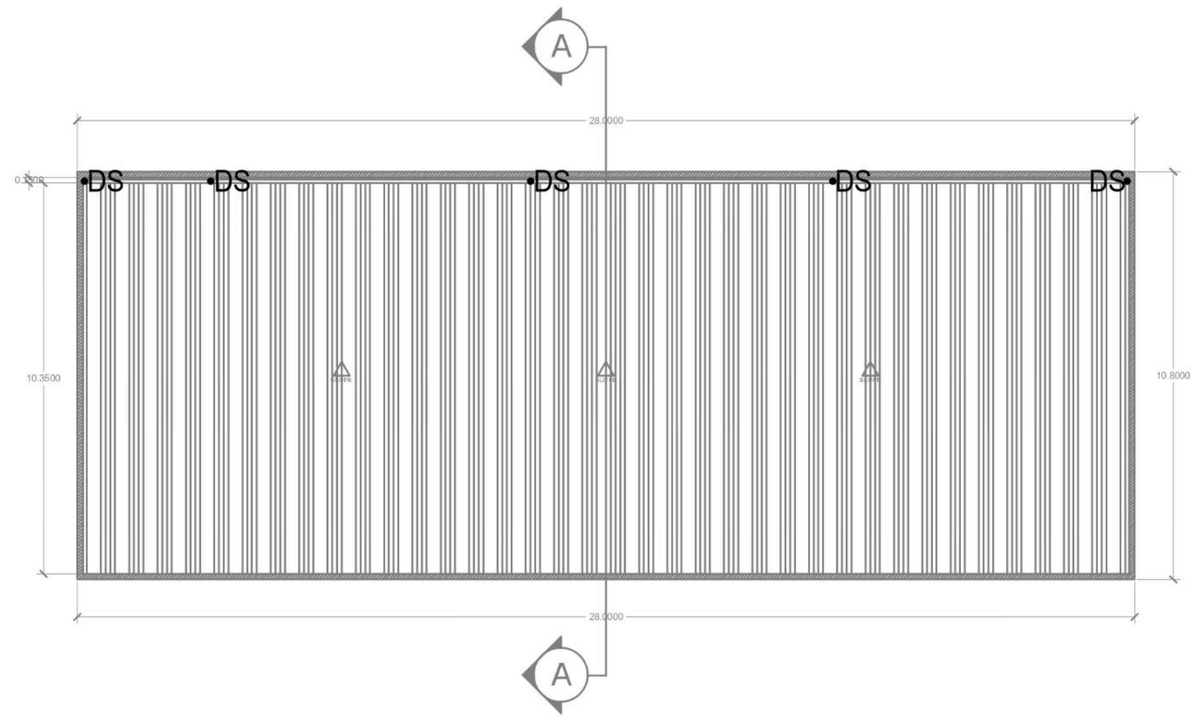
12. PIPES FOR VENT LINES SHALL BE PVC PIPES SERIES 600 AS MANUFACTURED BY ATLANTA, OR OTHER APPROVED EQUAL BRANDS.

LEGEND

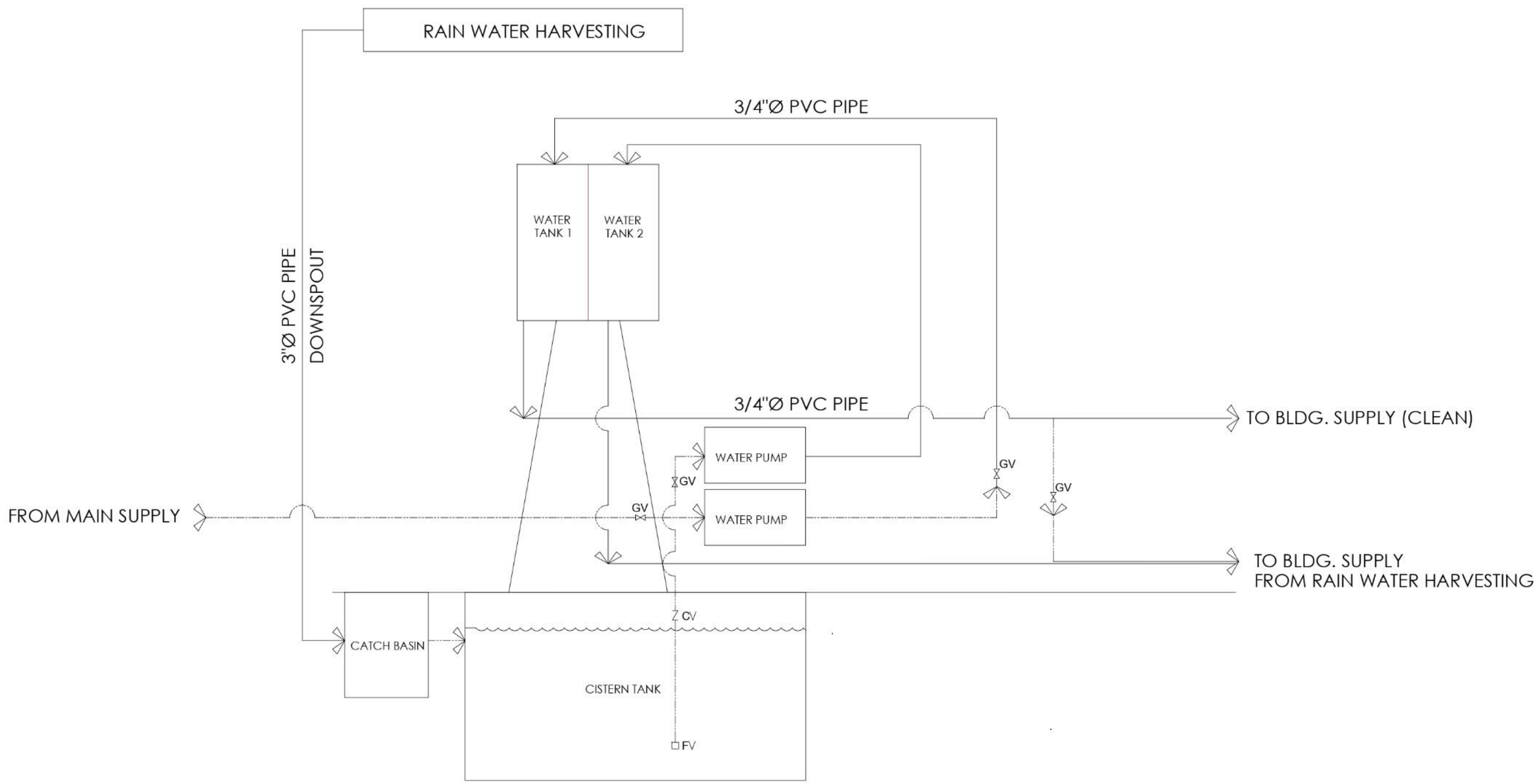
AV	ANGLE VALVE	S T	SEPTIC TANK
C B	C A T C H B A S I N	K S	KITCHEN SINK
F D	FLOOR DRAIN	———	SEWAGE LINE
W C	WATER CLOSET	- - —	WATER LINE
UR	URINAL	GV	GATE VALVE
L A V	LAVATORY	M	WATER METER
F A U	FAUCET	GV	GATE VALVE
V S	VENT STACK	CV	CHECK VALVE
GT	GREASE TRAP	M H	MANHOLE
C O	CLEANOUT		


GROUND FLOOR
PLUMBING LAYOUT
SCALE
1:200M
SEPTIC TANK
TO SEWER
CISTERN
CONFERENCE ROOM
PANTRY
OFFICE SPACE
E-LIBRARY
READING AREA
LIBRARIAN AREA
PUBLIC LOUNGE
RECEPTION/ WAITING AREA
ENTRANCE/ EXIT
HALLWAY
EXIT
ENGINE ROOM
UTILITY
RECORD ROOM
MALE TOILET
FEMALE TOILET
TOILET LOBBY
STORAGE
3/4"Ø PVC SUPPLY PIPES TO WATER TANK FROM SERVICE WATER MAIN LINE
3/4"Ø PVC SUPPLY PIPES FROM CISTERN TANK
3"Ø PVC PIPE WASTE STACK TO CATCH BASIN TO CISTERN
3/4"Ø PPR PIPE
TAP TO NEAR SERVICE WATER MAIN LINE
6"Ø PVC PIPE
4"Ø PVC WASTE PIPE
4"Ø SOIL PIPE
1/2"Ø CWL
TO STREET GUTTER


SECOND FLOOR
PLUMBING LAYOUT
SCALE
1:200M
3/4"ø PVC SUPPLY PIPES FROM GROUND FLOOR WATER LINE
3"ø PVC PIPE WASTE STACK TO CATCH BASIN
3"ø PVC PIPE WASTE STACK TO CATCH BASIN
4"ø PVC PIPE SOIL STACK TO SEPTIC TANK
STAGE
EMERGENCY EXIT
SOCIAL HALL
BALCONY
ENTRANCE/EXIT
STORAGE
PWD TOILET
ELEVATOR LOBBY
LOBBY
MALE TOILET
FEMALE TOILET

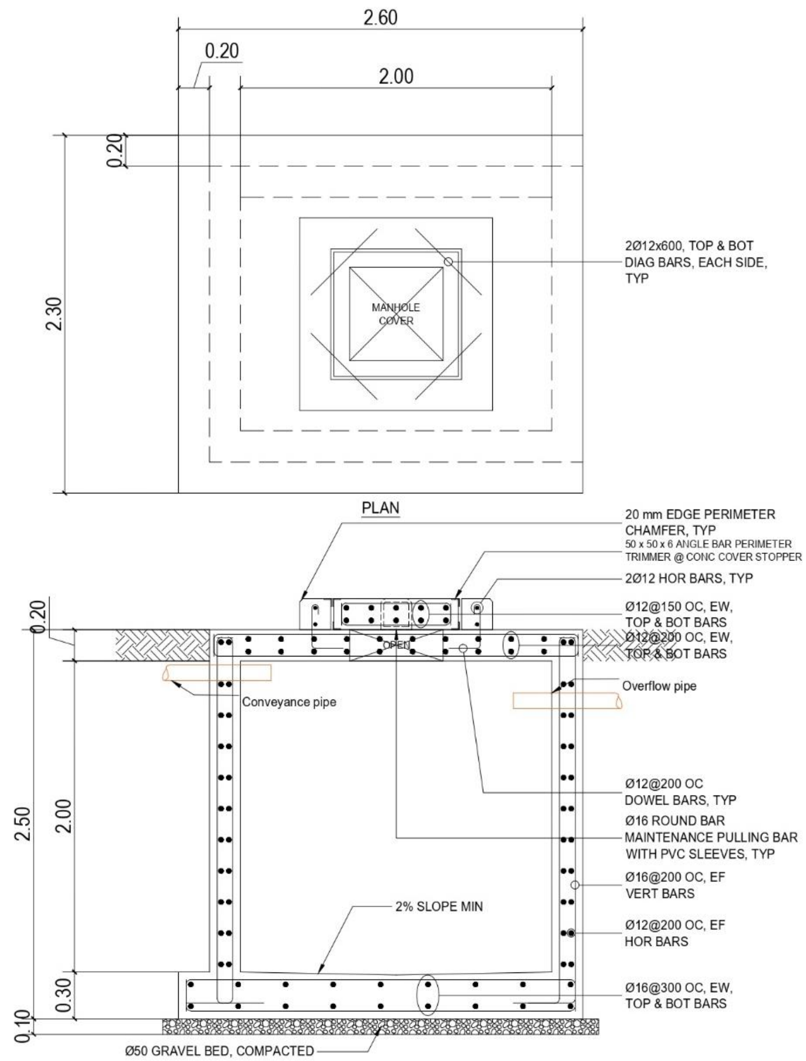


ROOF
PLUMBING LAYOUT
SCALE 1:200M



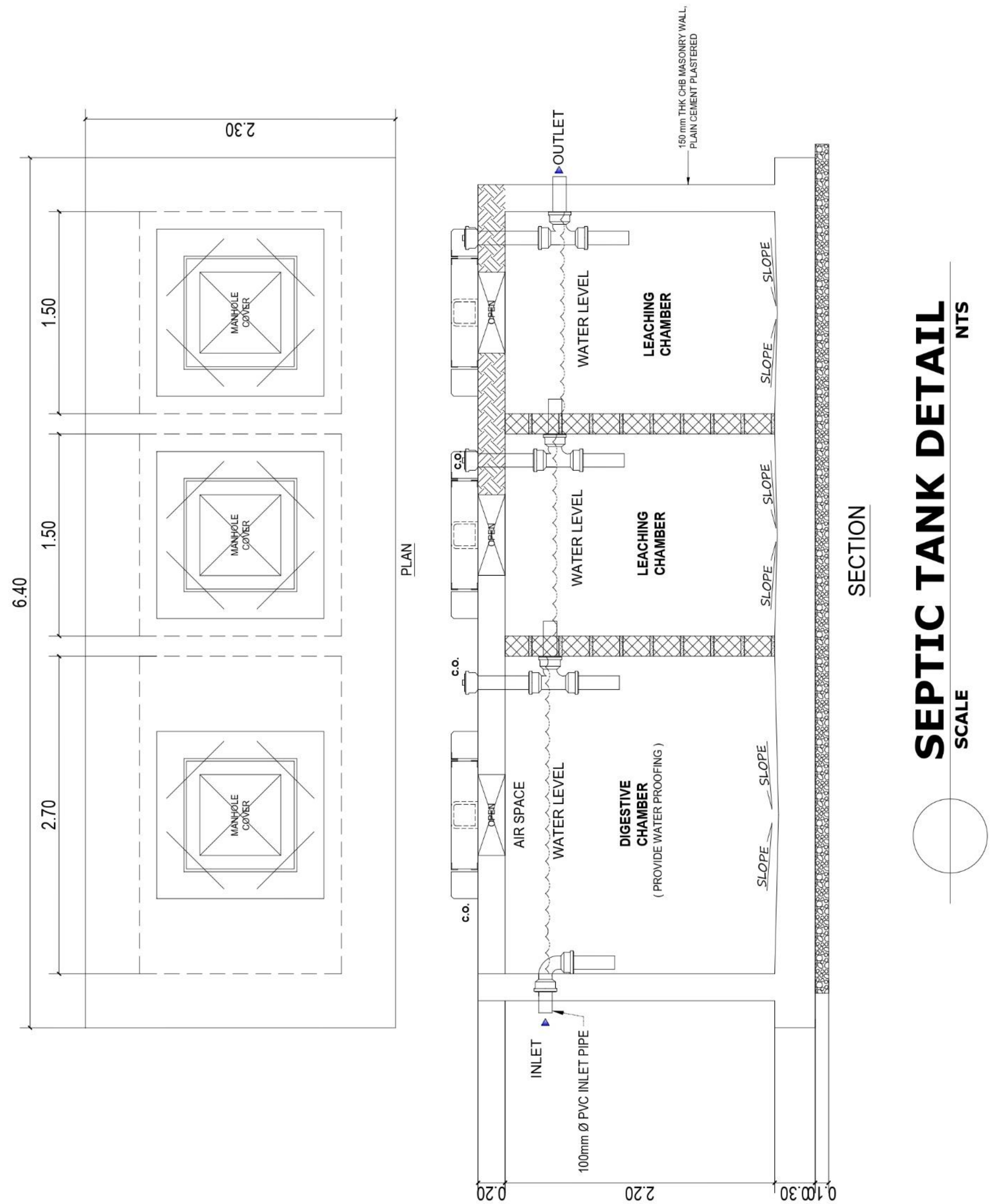
RAINWATER HARVESTING DIAGRAM

SCALE NTS



UNDERGROUND CISTERN TANK DETAIL

SCALE **NTS**


PLAN
6.40
2.70
1.50
1.50
2.30
MANHOLE COVER
MANHOLE COVER
MANHOLE COVER
SECTION
150 mm THK CHB MASONRY WALL, PLAIN CEMENT PLASTERED
OUTLET
INLET
100mm Ø PVC INLET PIPE
C.O.
C.O.
C.O.
OPEN
OPEN
OPEN
AIR SPACE
WATER LEVEL
WATER LEVEL
WATER LEVEL
DIGESTIVE CHAMBER
(PROVIDE WATER PROOFING)
LEACHING CHAMBER
LEACHING CHAMBER
SLOPE
0.20
2.20
0.30
0.10
SEPTIC TANK DETAIL
SCALE
NTS

MINIMUM SEPTIC TANK CAPACITY COMPUTATION

DRAINAGE FIXTURE VALUE (DFU)			
FIXTURE	PIECES	DRAINAGE FIXTURE UNIT (DFU)	PIECES x DRAINAGE FIXTURE UNIT (DFU)
Floor Drains	10	2	20
Interceptors (Grease Trap)	1	3	3
Sinks	1	2	2
Urinal	5	1	5
Wash Basin (Set)	2	2	4
Wash Basin (Single)	4	1	4
Water Closet (Public Installation)	16	6	96
TOTAL DRAINAGE FIXTURE UNIT (DFU) =			134

CAPACITY OF SEPTIC TANKS`		
Maximum Drainage Fixture Units (DFU)	Minimum Septic Tank Capacity	
	Gallons	Liters
15	750	2838
20	1000	3785
25	1200	4542
33	1500	5677.5
45	2000	7570
55	2250	8516.3
60	2500	9462.5
70	2750	10408.8
80	3000	11355
90	3250	12301.3
100	3500	13247.5

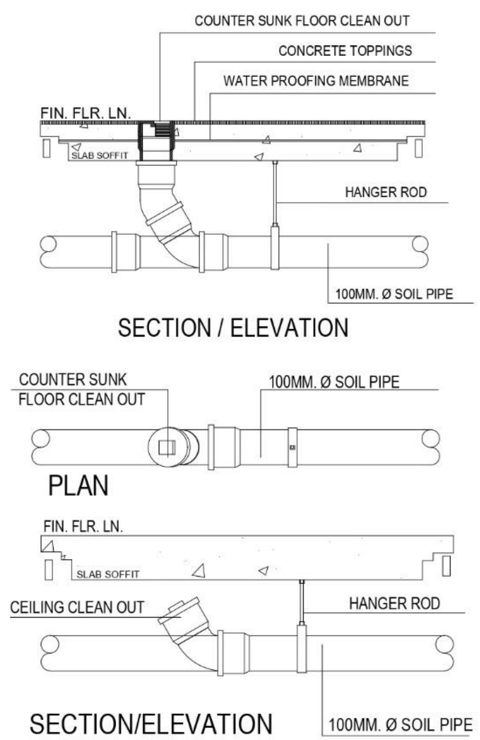
Minimum Capacity of Septic Tank:
134 DFU = 3500 Gallons = 13247.5 Liters

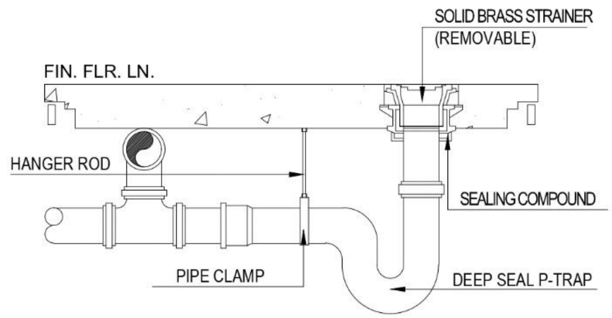
Actual Capacity of Septic Tank:
V = (2.7m + 1.5m +1.5m) x (2.3m - 0.3m) x 2.2m
V = 25.08 cubic meter = 6625.44 Gallons = 25080 Liters

Since the Actual Capacity exceeds the Minimum Capacity, Septic Tank Size is Adequate.

DESIGN ANALYSIS

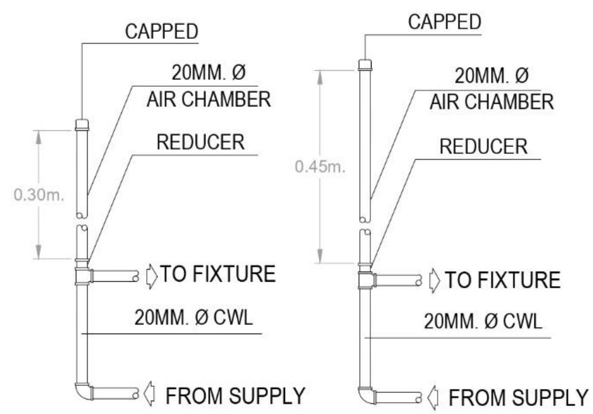
SCALE NTS

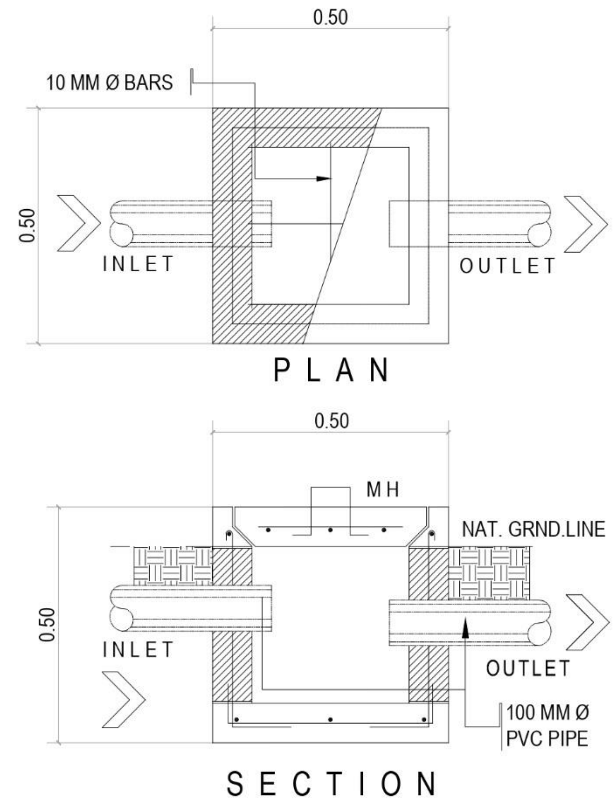




FLOOR DRAIN DTL

DRAWN NOT TO SCALE





CLEAN OUT DTL.
SCALE NTS

AIR CHAMBER DTL.
SCALE NTS

CATCH BASIN DTL.
SCALE NTS

FIRE

PROTECTION

PLAN

1. FIRE AUTHORITY REQUIREMENTS AND CURRENT EDITION OF THE FOLLOWING STANDARDS:

a) STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEM — NFPA 13
b) STANDARD FOR THE INSTALLATION OF STAND PIPE AND HOSE SYSTEM — NFPA 14
c) STANDARD FOR PORTABLE FIRE EXTINGUISHER — NFPA 10
d) STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION — NFPA 20
e) STANDARD FOR WATER TANKS FOR PRIVATE FIRE PROTECTION — NFPA 22
f) STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES — NFPA 24

2. HAZARD CLASSIFICATION:

a) LIGHT HAZARD: CHURCHES, EDUCATIONAL, HOSPITALS, INSTITUTIONAL, RESIDENTIAL, OFFICES LIBRARIES AND MUSEUMS.
b) ORDINARY HAZARD GROUP 1: AUTOMOBILE PARKING AND SHOWROOMS, BAKERIES, BEVERAGE MANUFACTURING, CANNERIES AND DAIRY PRODUCT MANUFACTURING.
c) ORDINARY HAZARD GROUP 2: CEREAL MILLS, CHEMICAL PLANTS, CONFECTIONERY PRODUCTS, DISTILLERIES, DRY CLEANERS, FEED MILLS, MACHINE SHOPS AND METAL WORKING.

3. SPRINKLER DENSITY AND SPACING:

a) LIGHT HAZARD ($18.2m^2$) @ DENSITY OF 4.1 LPM/m^2 AREA OF SPRINKLER OPERATION.
b) ORDINARY HAZARD ($12.1m^2$) @ DENSITY OF 6.1 LPM/m^2 (GROUP 1) – 8.1 LPM/m^2 (GROUP 2) AREA OF SPRINKLER OPERATION.
c) FIRE WATER RESERVE SHALL HAVE A MINIMUM OF 60 MINUTES CAPACITY.
d) MINIMUM AND MAXIMUM SPRINKLER SPACING SHALL BE 2.40 AND 4.60m.

4. TYPE OF SPRINKLER AND TEMPERATURE RATING:

a) HALLWAYS, OFFICE SPACE, RESIDENTIAL UNITS AND OTHERS WITH CEILING AREAS – PENDENT TYPE (STANDARD RESPONSE @ 165'F)
b) RESIDENTIAL UNIT AREAS WITHOUT CEILING – STANDARD OR EXTENDED SIDEWALL TYPE (STANDARD RESPONSE @ 165'F)
c) PARKING AREAS – UPRIGHT TYPE (STANDARD RESPONSE @ 165'F)
d) KITCHEN – PENDENT TYPE (QRS @ 212'F)
e) FIRE EXIT STAIRWELLS – EXTENDED SIDEWALL TYPE (QRS @ 165'F)

5. PORTABLE FIRE EXTINGUISHER

a) FE-36 TYPE FIRE EXTINGUISHER FOR ELECTRICAL ROOMS, GENSET ROOMS, TRANSFORMER ROOMS AND TELCO ROOMS.
b) ABC TYPE FIRE EXTINGUISHER FOR COMMON AREAS

6. ALL EQUIPMENT AND FITTINGS ARE TO BE SUBMITTED FOR ENGINEER'S APPROVAL BEFORE PURCHASE ORDER IS ISSUED.

7. PIPES AND PIPE FITTINGS MATERIAL:

a) ASTM A53 GRADE 'B' ERW G.I. PIPES SCH 40 (EMBEDDED PIPES)
b) ASTM A53 GRADE 'B' ERW B.I. PIPES SCH 40 (ABOVE GROUND PIPES)
c) ASTM A-234 SCH 40 B.I. PIPE FITTINGS.

8. ALL PIPEWORK SHALL BE SUITABLY SUPPORTED BE APPROVED SUPPORT BRACKETS.

9. ALL PIPEWORK SHALL BE PAINTED RED.

10. ANY DISCREPANCY BETWEEN THE STANDARD LISTED IN ITEM 1 AND CONTRACT DOCUMENT MUST BE RAISED IMMEDIATELY TO ENGINEER'S ATTENTION.

11. THE SUB-CONTRACTOR SHOULD ENSURE THAT A FINAL INSPECTION MUST BE MADE WITH THE ENGINEER.

12. BRIGADE PERSONNELS ARE INVITED TO INSPECT AND APPROVE THE SYSTEM.

13. ALL PIPES PASSING THROUGH FLOOR AND WALL SHALL HAVE STEEL PIPE SLEEVES ONE DIAMETER LARGER THAN THE PIPE.

14. THE SPACE BETWEEN THE SLEEVES AND PIPES SHALL BE CAULKED WITH ROCKWOOL OR FIBERGLASS.

15. PROVIDE LOW LEVEL SPRINKLER PROTECTION AS AND WHERE REQUIRED DUE TO CONSTRUCTION OF OTHERS M&E SERVICES, FOR EXAMPLE OTHER EXHAUST DUCT, A/C DUCTS, PIPES, ETC.

16. FIRE BARRIERS AS SPECIFIED.

17. ALL PIPE CONNECTORS SHALL BE VICTAULIC OR APPROVED EQUAL.

18. PIPE JOINTS MAY BE DEFLECTED WITHIN THE LIMITS RECOMMENDED BY THE MANUFACTURER.

LIGHT HAZARD

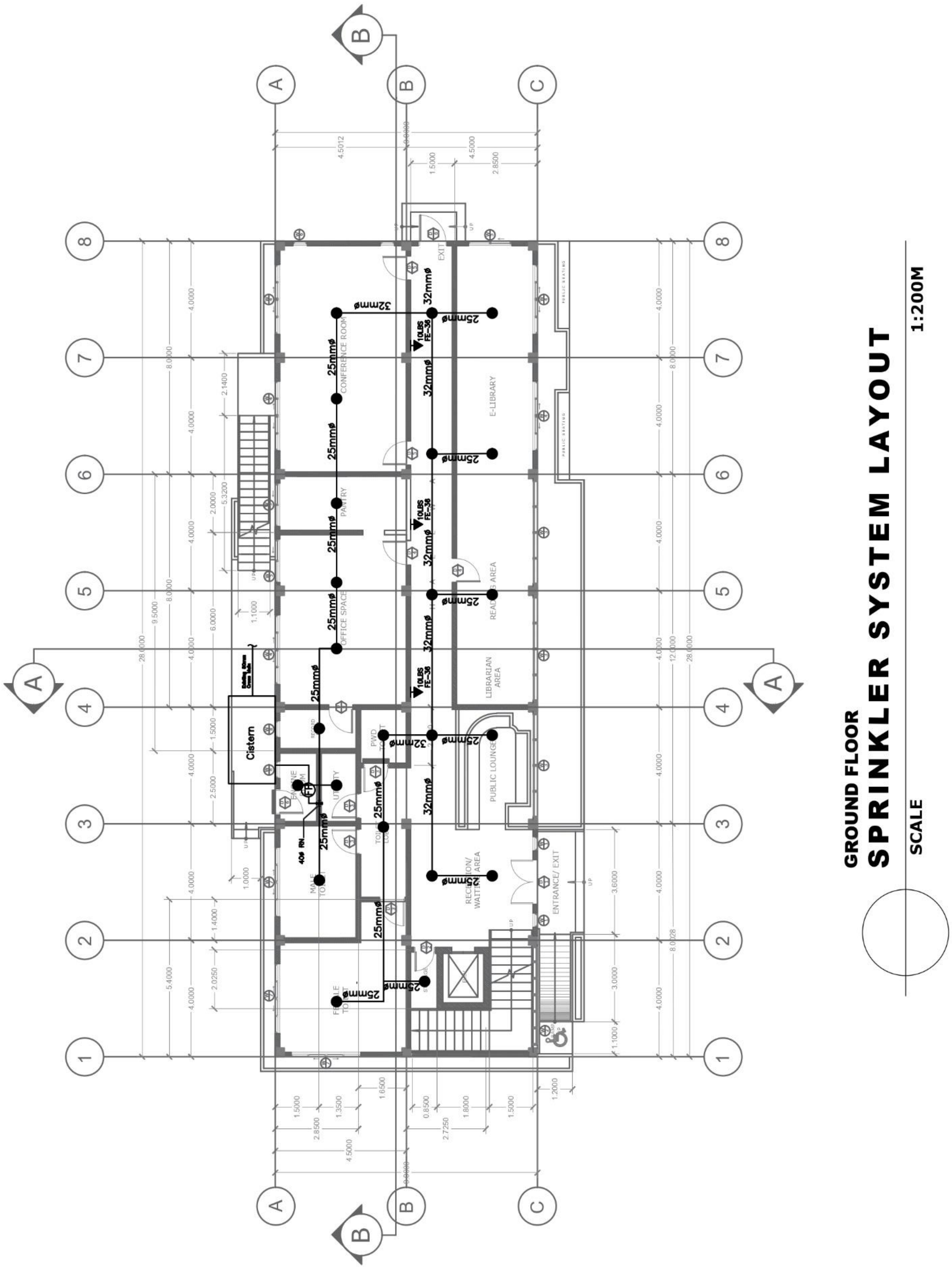
PIPE NOMINAL SIZE (mm)	MAX. NUMBER OF SPRINKLERS TO BE FED BY PIPE OF SIZE LISTED
25	2
32	3
40	5
50	10
65	30
75	60
100	SEE NFPA 13 SECTION 8.2

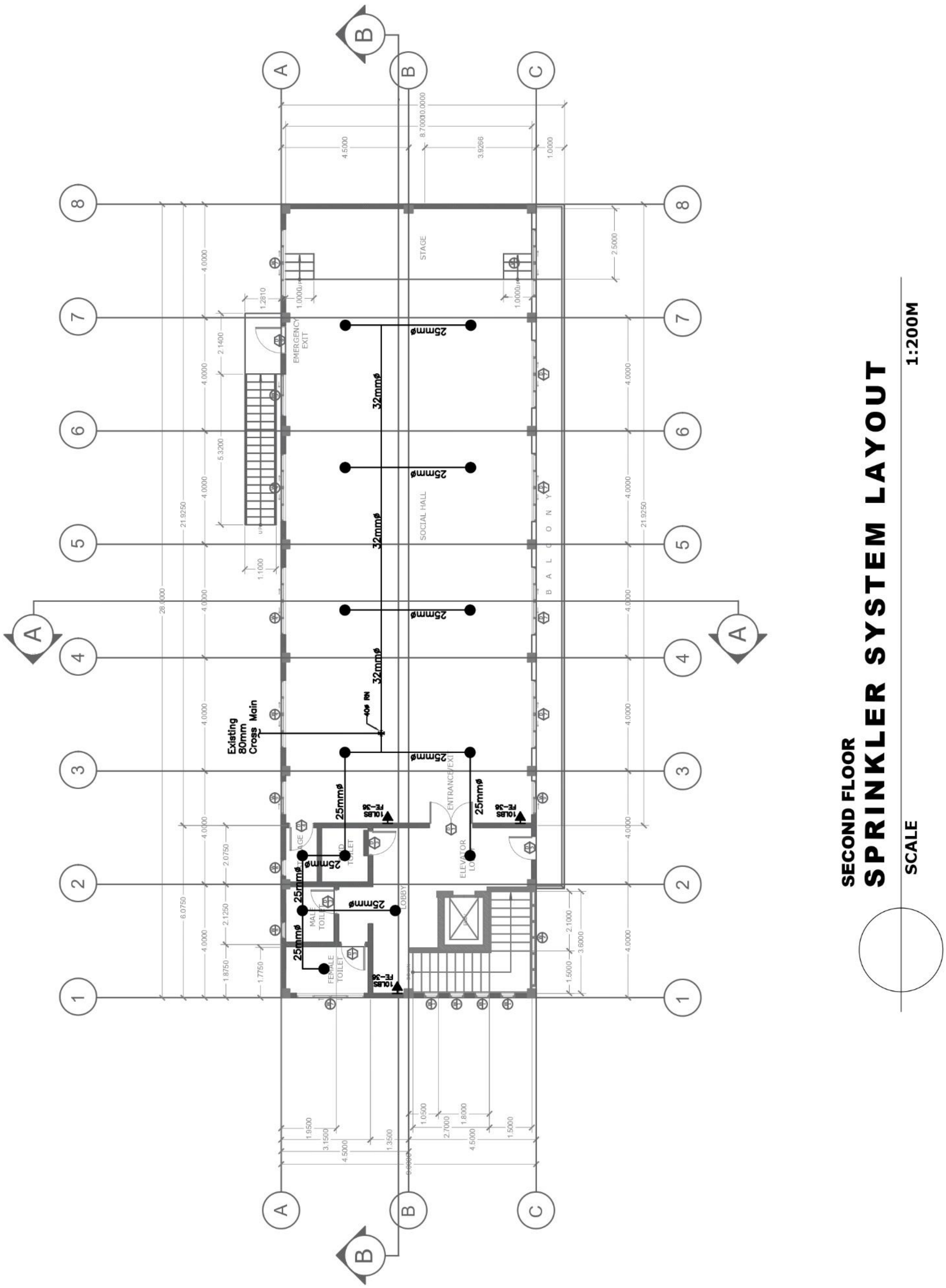
LEGEND & SYMBOLS

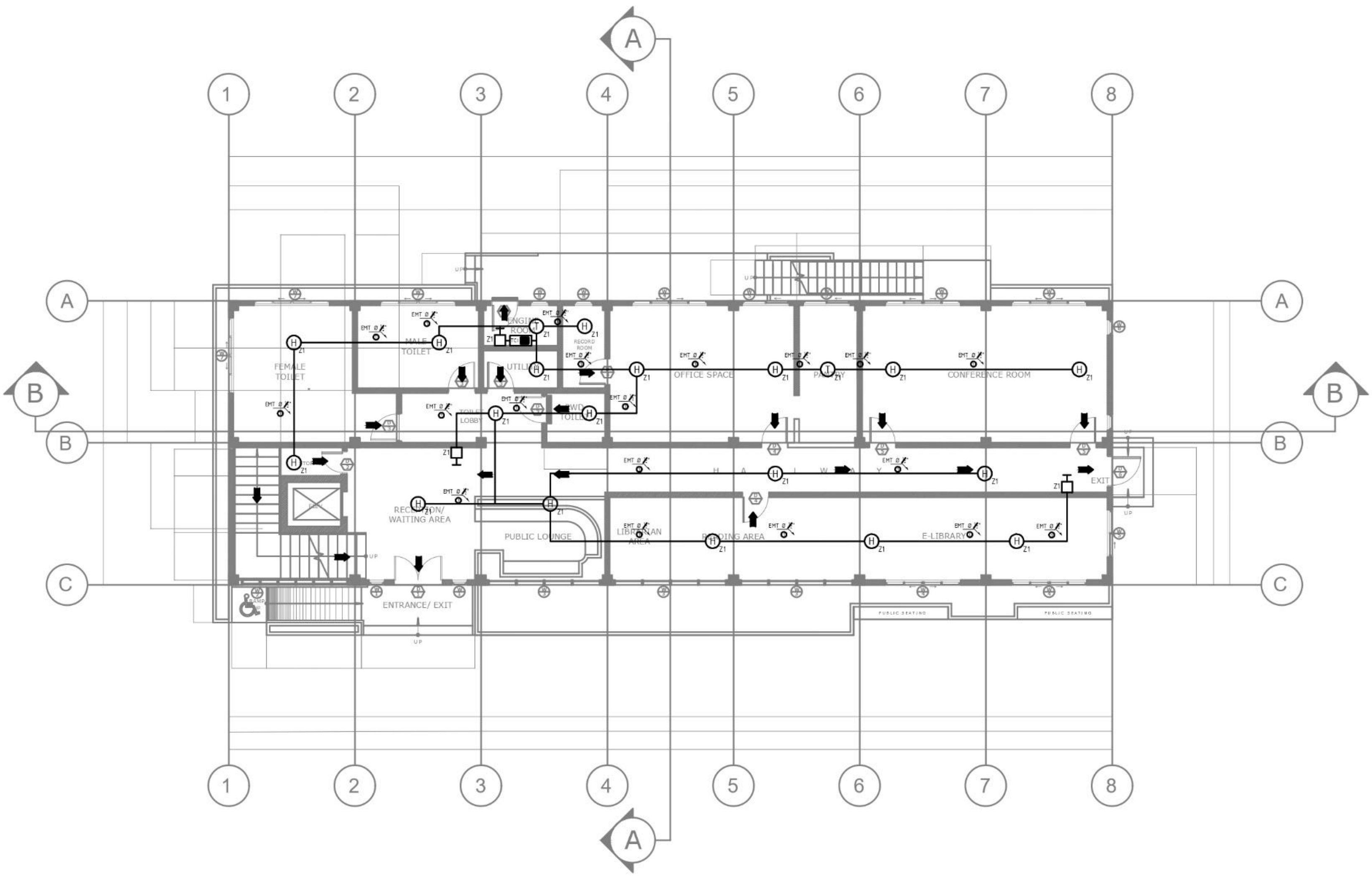
SYMBOLS	DESCRIPTIONS
	RISER NIPPLE
●	PENDENT SPRINKLER HEAD
▲	ABC DRY CHEMICAL FIRE EXTINGUISHER
TCI	FIRE DETECTION PANEL, CM 24 100 W TYPE 24 ZONES
	SINGLE MANUAL STATION
(T)	FIXED THERMAL DETECTOR 135 °F MODEL 601-S
(H)	SMOKE DETECTOR
⬅	ESCAPE ROUTE SIGNALING
(1)	TF 18 CABLE
—	EMT PIPE MEASUREMENTS INDICATED IN THE DRAWINGS

ABBREVIATIONS

ABBREVIATIONS	DESCRIPTIONS
mm	MILIMETERS
LBS	POUNDS
DIA. / ø	DIAMETER


GROUND FLOOR
SPRINKLER SYSTEM LAYOUT
SCALE
1:200M
CONFERENCE ROOM
E-LIBRARY
PANTRY
OFFICE SPACE
READING AREA
LIBRARIAN AREA
Cistern
PUBLIC LOUNGE
RECEPTION/ WAITING AREA
ENTRANCE/ EXIT
EXIT
PWD
25mmø
32mmø

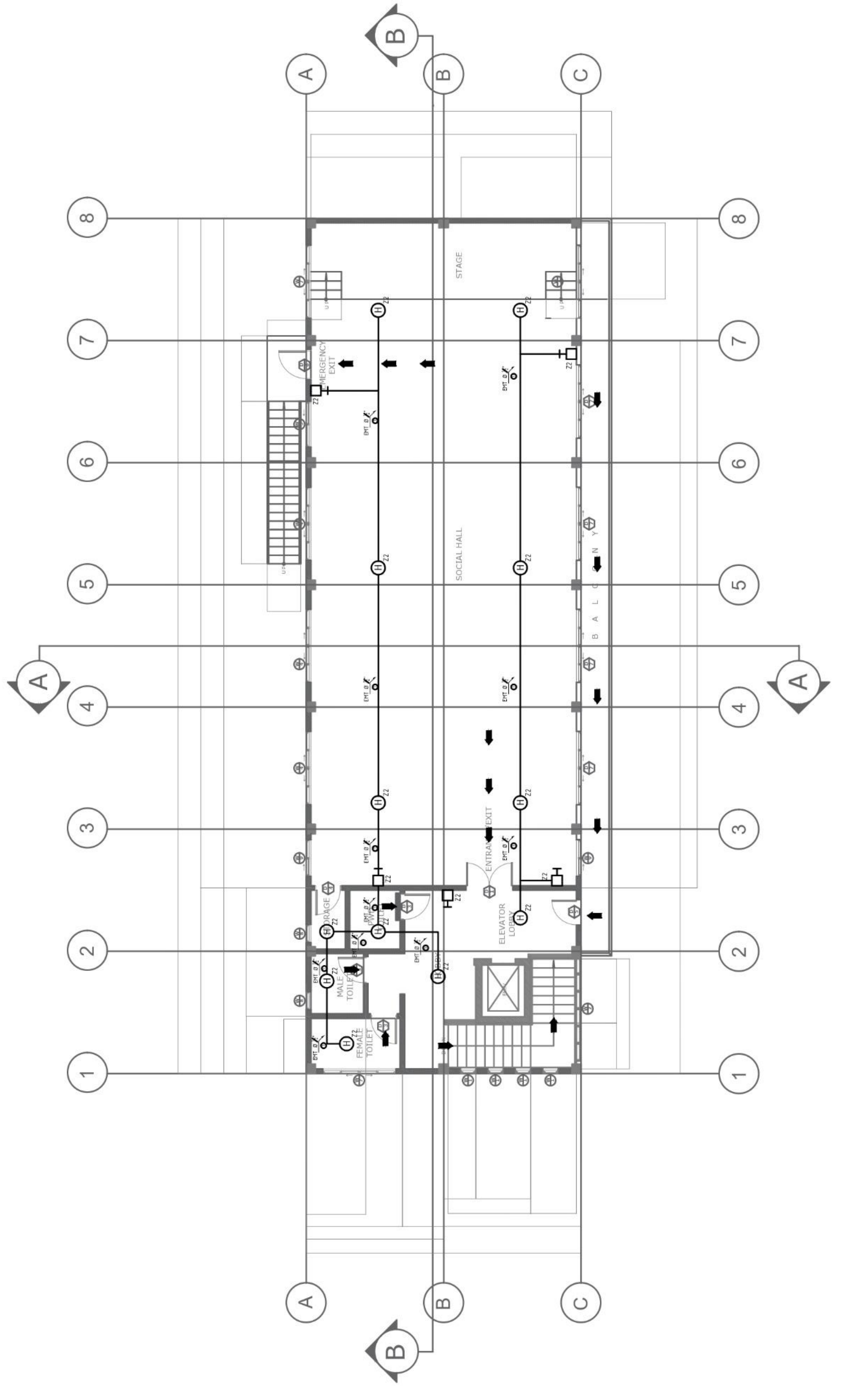

SECOND FLOOR
SPRINKLER SYSTEM LAYOUT
SCALE
1:200M
STAGE
SOCIAL HALL
EMERGENCY EXIT
BALCONY
ENTRANCE/EXIT
ELEVATOR LOBBY
LOBBY
MALE TOILET
FEMALE TOILET
Existing 80mm Cross Main
32mmø
25mmø
FE-36 10LBS



GROUND FLOOR

FIRE DETECTION LAYOUT

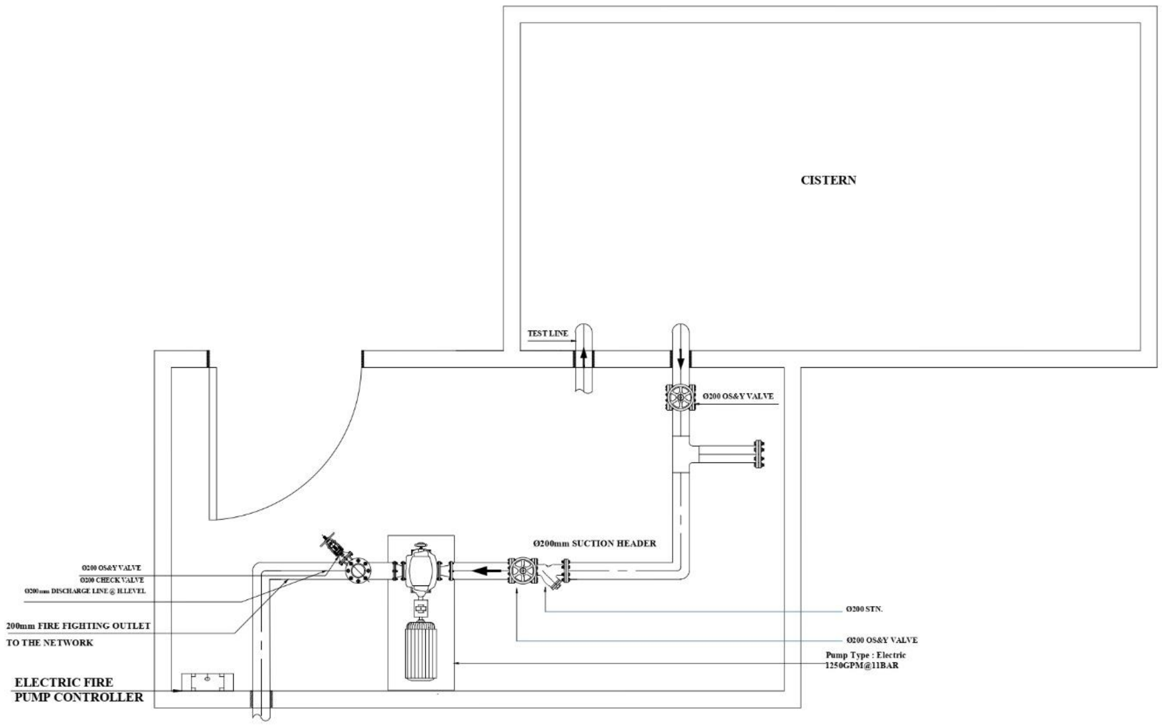
SCALE **1:200M**



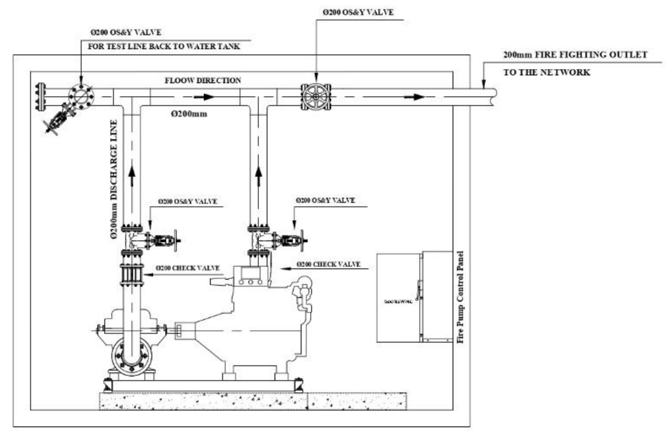
SECOND FLOOR

FIRE DETECTION LAYOUT

SCALE **1:200M**



PLAN VIEW



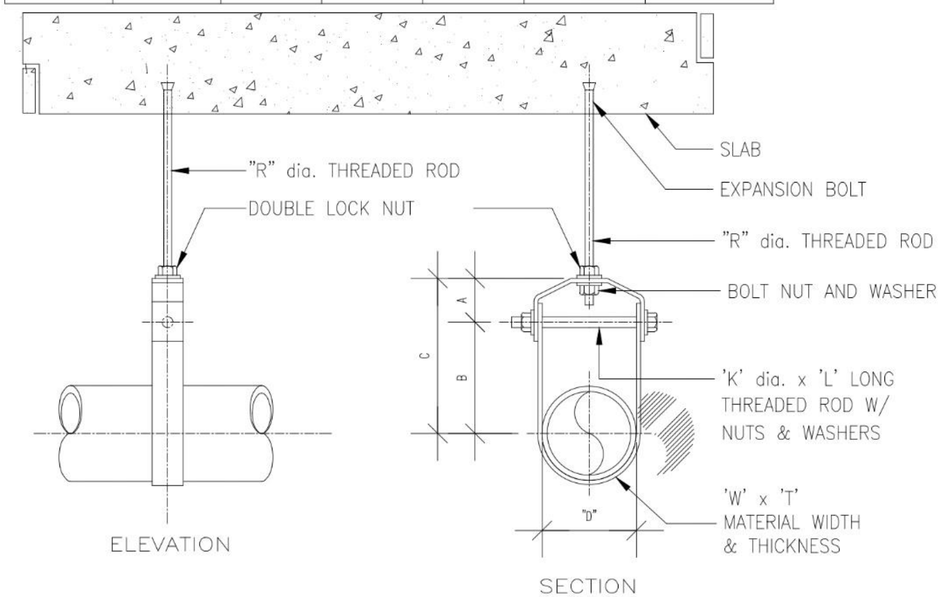
SIDE VIEW

FIRE PUMP ROOM DETAIL

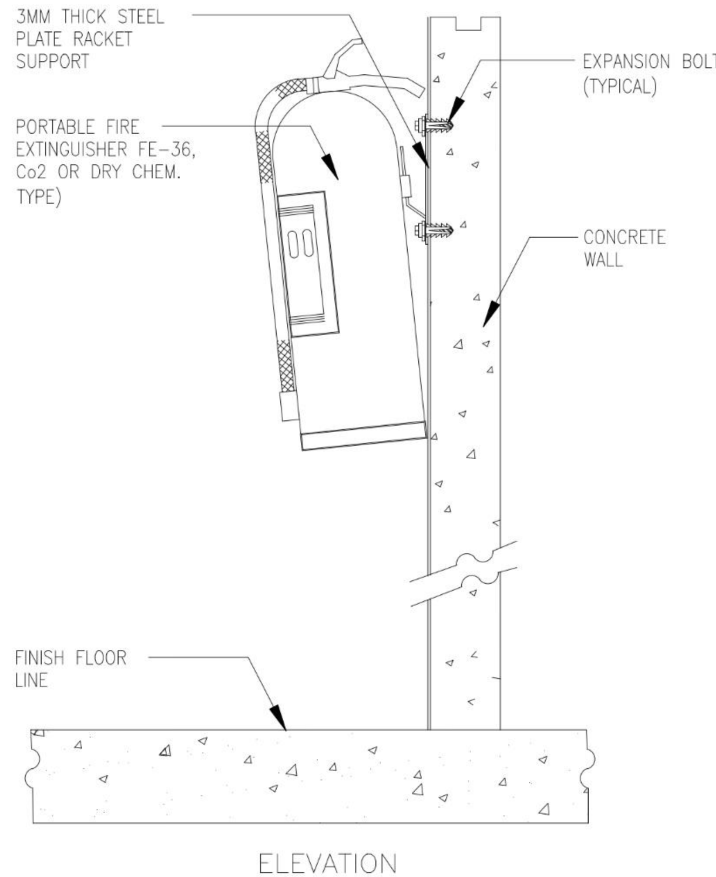
SCALE NTS

TABLE OF DIMENSIONS IN MM

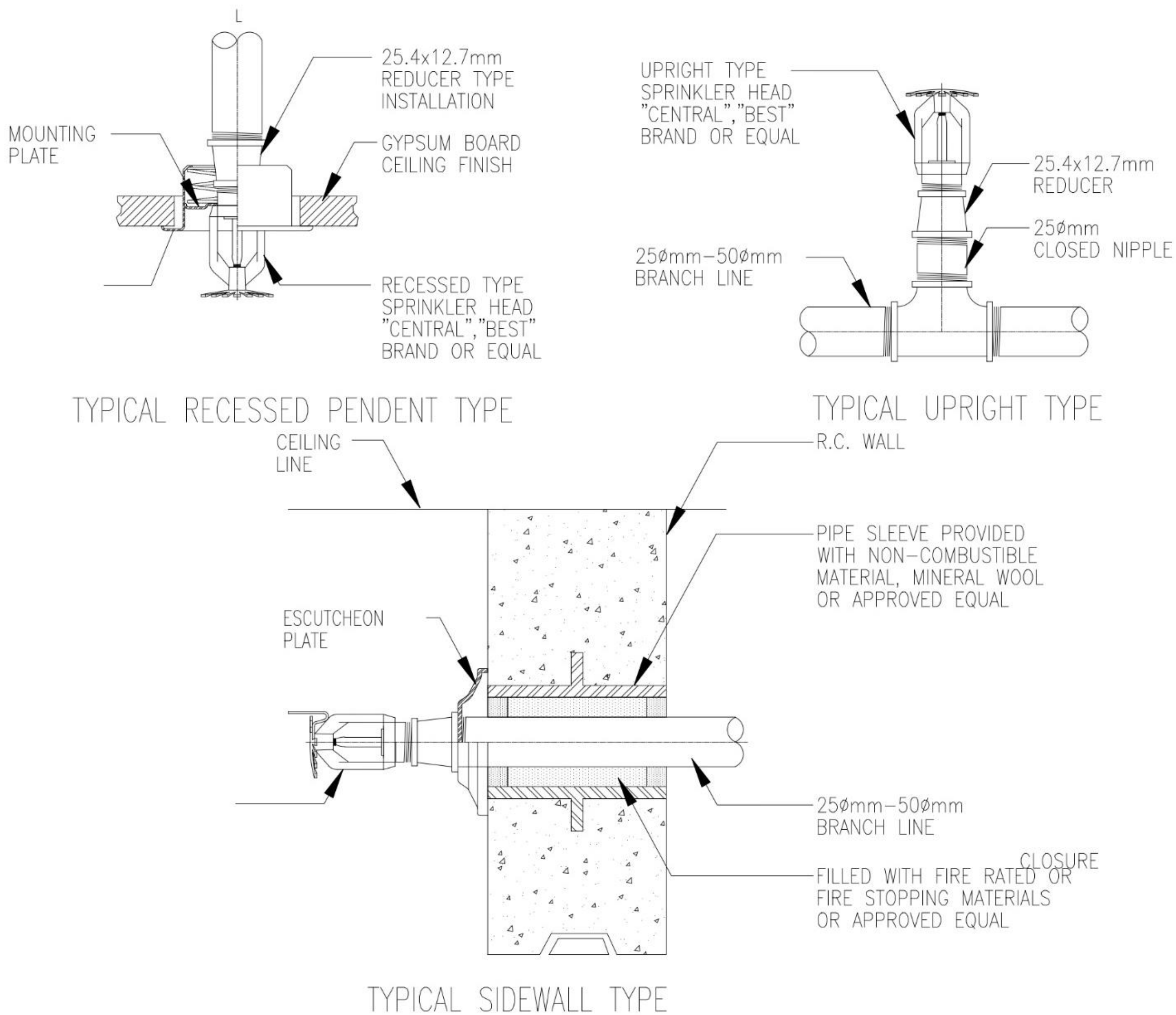
PIPE SIZE "D" (MM)	ROD DIA. "R" (MM)	B	C	A MAX.	W x T	K x L
50	9.65	111.12	143	69.30	25 x 3	M10 x 85
75	12.7	105.0	165.1	30.23	40 x 6	M12 x 115
100	15.9	133.35	40	33.27	40 x 6	M12 x 130
150	19.1	176.12	267	50.00	40 x 6	M16 x 190



PIPE HANGER DETAIL
SCALE NTS

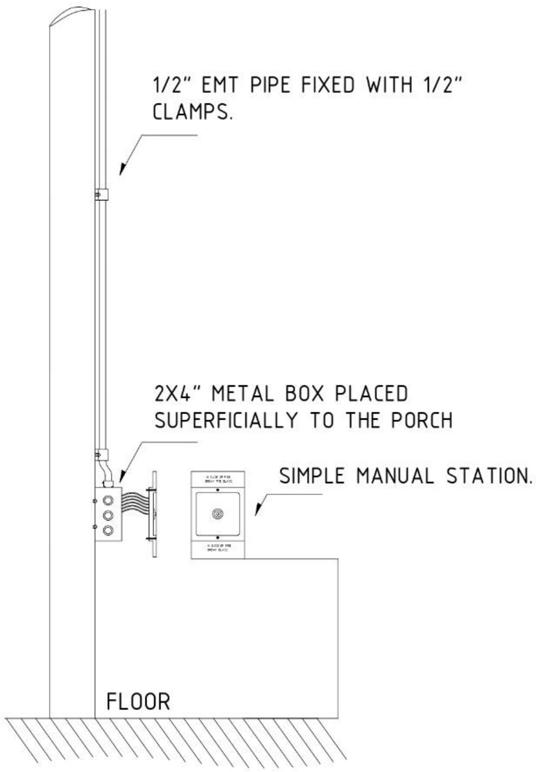


PORTABLE FIRE EXTINGUISHER
SCALE NTS

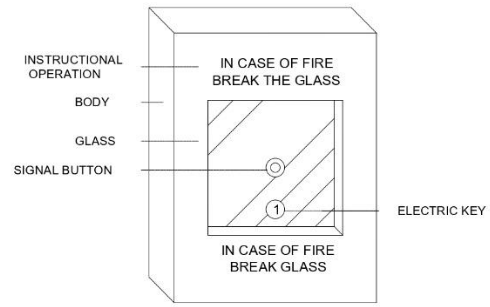


SPRINKLER HEAD DETAIL

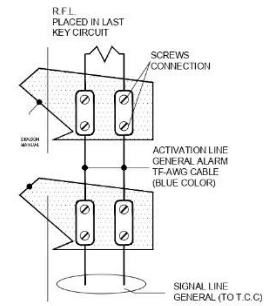
SCALE NTS



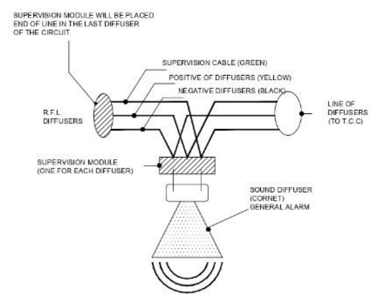
MANUAL STATION DETAIL
SCALE NTS



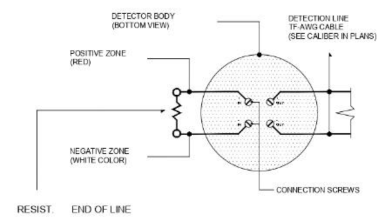
COMPOSITE MANUAL STATION DETAIL
SCALE NTS



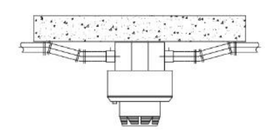
MANUAL STATION CONNECTION (DOUBLE ACTION)
SCALE NTS



SOUND DIFFUSER CONNECTION DETAIL
SCALE NTS



DETECTOR WIRING CONNECTION DETAIL
SCALE NTS



DETECTOR DETAIL
SCALE NTS

Chapter 6

Project Implementation

6.1 Implementation Scheme

The project proposal was submitted to the Municipality of Badiangan, Iloilo, where it underwent thorough verification and review for viability by the engineering department. The work techniques and design were also evaluated. Following approval and any necessary changes or adjustments, the municipal government would oversee and manage a bidding process open to all private and public contractors. Participants will be invited to submit bids based on the preferences of the local authority, with the project awarded to the lowest bidder. Considering the project's size, the municipal government will appoint one authority to oversee its construction, which will be executed by a single contractor as shown in Figure 43.

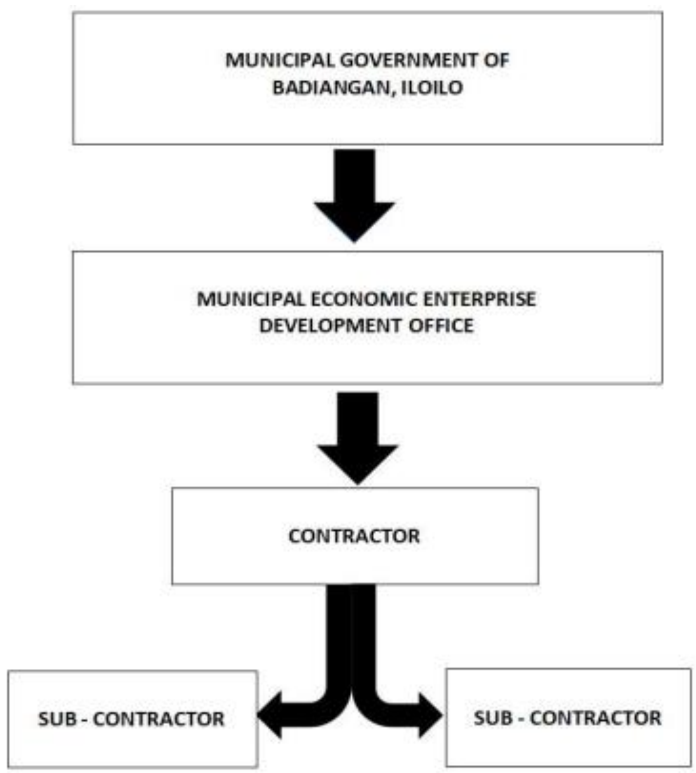


Figure 43

Organizational Structure

6.2 Construction Management

Once the local government has selected the authorities, the contractor will be responsible for overseeing the project's construction and presenting progress reports at the end of a timeframe specified by the municipal government. These progress reports will be utilized to track the project's advancement and ensure compliance with the specifications.

6.3 Finance and Management

The municipal government of Badiangan, Iloilo, will fund the proposed project's first and second floors. The municipal administration will manage and oversee proper budgeting throughout the project's construction. Progress will also be monitored, with the budgeting plan significantly impacting the construction timeline.

Chapter 7

Conclusions & Recommendations

7.1 Summary

The proposed design addressed the current issues in the different local and national government agency offices in Poblacion, Badiangan, Iloilo, which include a lack of offices, additional working space, lack of storage facilities, inefficient accessibility for transactions that limit the working capabilities and causes inconvenience to both employees and clients for their daily transactions, and a relatively small function hall that limits the number of occupants in every event. As a result, the newly proposed design of a two-storey government building has resolved the municipality's existing issues.

7.2 Conclusion

The proposed design addresses the current issues faced by various local and national government agency offices in Poblacion, Badiangan, Iloilo. These issues include a lack of office space, inadequate working areas, insufficient storage facilities, inefficient accessibility for transactions that limit operational capabilities, and a relatively small function hall that restricts the number of occupants at events. Consequently, the newly proposed design for a two-storey government building aims to resolve the municipality's existing challenges.

A new office space had been created to address the shortage of office areas, along with a conference room for the Local Youth Development Council (LYDC). The design features a larger office area that can accommodate staff, clients, and visitors essential for daily operations. Furthermore, the conference room will serve as a venue for meetings and discussions.

The Municipality of Badiangan currently lacks a public library, leaving residents without access to important reading materials and educational resources. To address this issue, a design for a library has been proposed. This new library will offer a variety of books and e-resources to facilitate learning and development, aiming to improve access to education for everyone in Badiangan. The proposed design also includes an expanded function hall to alleviate space constraints and congestion experienced during events. The new design expands the function hall's length and width, allowing it to accommodate a larger number of people. Additionally, strategically positioned storage areas will ensure effective organization of event equipment and supplies.

A soil investigation was conducted to determine the properties and conditions of the soil on which the structure will be built. The soil was classified as clayey sand, with a unit weight of 16.7865 kN/m^3, and an allowable soil bearing capacity of 121.66 kPa.

The study included comprehensive site development, architectural, structural, plumbing, and electrical plans. The total area for the construction of the two-storey government building is 534 square meters. The project is expected to be completed in 201 calendar days and will cost PHP 15,611,240.37.

7.2 Recommendations

The Proposed Two-Storey Local Youth Development Center and Function Hall building is one of the most important facilities in Poblacion, Badiangan, Iloilo. This project is supported by comprehensive and detailed working drawings, a timetable, and cost projections. The results and data have been collected and evaluated in accordance with the National Structural Code of the Philippines (NSCP 2015).

The structural designs for the building were developed under the guidance and supervision of qualified civil engineers and faculty members from Central Philippine University. However, it is recommended that the plans undergo a re-evaluation to ensure the building's integrity.

The implementation of the project, which encompasses the construction, operation, and maintenance of the administrative center and its landscape design, is not included in this study. Therefore, it should be delegated to the management of the Local Government Unit (LGU).If construction proceeds, it is advisable to conduct a field boring test, specifically the Standard Penetration Test, to verify the soil-bearing capacity used in the foundation design and to assess the soil profile and properties at deeper depths.

Materials and labor prices may fluctuate over time due to inflation and price increases. Therefore, it is recommended to double-check costs before commencing construction.

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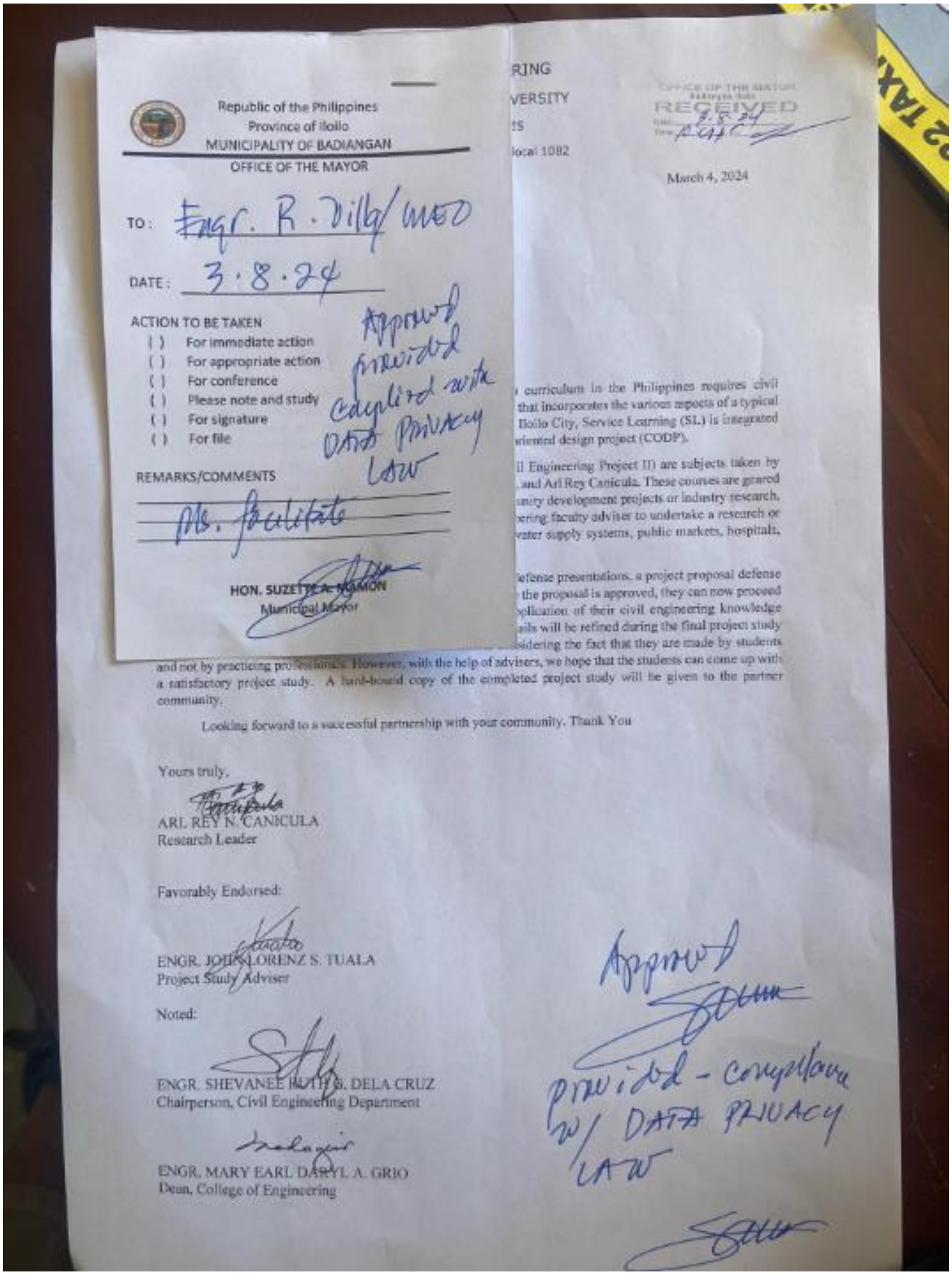
APPENDICES

APPENDIX A

Letters and Certifications



Republic of the Philippines
Province of Iloilo
MUNICIPALITY OF BADIANGAN
OFFICE OF THE MAYOR

TO: Engr. R. Villa/MEO

DATE: 3·8·24

ACTION TO BE TAKEN
( ) For immediate action
( ) For appropriate action
( ) For conference
( ) Please note and study
( ) For signature
( ) For file

Approved provided complied with DATA PRIVACY LAW

REMARKS/COMMENTS

Ms. facilitate

HON. SUZETTE A. MAMON
Municipal Mayor

...RING
...VERSITY
...ES
...local 1082

OFFICE OF THE MAYOR
RECEIVED
Date: 3.8.24

March 4, 2024

... curriculum in the Philippines requires civil ... that incorporates the various aspects of a typical ... Iloilo City, Service Learning (SL) is integrated ... oriented design project (CODP).

... il Engineering Project II) are subjects taken by ... and Arl Rey Canicula. These courses are geared ... unity development projects or industry research. ... eering faculty adviser to undertake a research or ... water supply systems, public markets, hospitals.

... efense presentations, a project proposal defense ... the proposal is approved, they can now proceed ... plication of their civil engineering knowledge ... ails will be refined during the final project study ... sidering the fact that they are made by students and not by practicing professionals. However, with the help of advisers, we hope that the students can come up with a satisfactory project study. A hard-bound copy of the completed project study will be given to the partner community.

Looking forward to a successful partnership with your community. Thank You

Yours truly,

ARL REY N. CANICULA
Research Leader

Favorably Endorsed:

ENGR. JOHN LORENZ S. TUALA
Project Study Adviser

Noted:

ENGR. SHEVANEE RUTH G. DELA CRUZ
Chairperson, Civil Engineering Department

ENGR. MARY EARL DARYL A. GRIO
Dean, College of Engineering

Approved
provided - compliance w/ DATA PRIVACY LAW

COLLEGE of ENGINEERING
CENTRAL PHILIPPINE UNIVERSITY
ILOILO CITY PHILIPPINES
Tel Nos (033) 329 1971 (to79) local 1082
Fax No (033) 320 3004
CIVIL ENGINEERING DEPARTMENT

MUNICIPALITY OF BADIANGAN
HRMO
RECEIVED
DATE: 03/05/24
BY:
ILOILO

March 4, 2024

Mrs. Fe O. Martinez
Administrative Office IV (HRMO)
Badiangan, Iloilo

Dear Ma'am Martinez,

Greetings!

We, the civil engineering students of Central Philippine University, are writing to present our proposal for the two-storey office and social hall building in Badiangan, Iloilo.

Our proposal encompasses a comprehensive plan for the design of the two-storey office and social hall building, aimed at modernizing the facility and ensuring its structural integrity and resilience to natural hazards. We have exactly prepared the following documents to support our proposal:

History of Events in the Social Hall. This may include the name of events, date, number of participants, or seats in the year 2023.

Number of Employees and Clients per Week. Specifically in the Local Youth Development Office and Possible Clients for the Civil Service Office

Demography of Badiangan

We sincerely appreciate your time and consideration of our proposal. Any further information or clarification, please do not hesitate to contact us at your convenience under the contact number of the research leader Arl Rey Canicula, 09064661241. We eagerly anticipate the opportunity to collaborate with the HRMO of Badiangan in realizing this significant endeavor for the betterment of our community. Thank you

Yours truly,

ARL REY N. CANICULA
Research Leader

Favorably Endorsed:

ENGR. JOHN LORENZ S. TUALA
Project Study Adviser

Noted:

ENGR. SHEVANEE RUTH G. DELA CRUZ
Chairperson, Civil Engineering Department

ENGR. MARY EARL DARYL A. GRIO
Dean, College of Engineering

REVIEW, CONTINUING EDUCATION and CONSULTANCY CENTER
Central Philippine University
Jaro, Iloilo City
Tel. No. 329-1971 local 1008 email: rceccsec@cpu.edu.ph
Website: rcecc.cpu.edu.ph

May 16, 2024

CERTIFICATION

This is to certify that the paper entitled **"A Proposed Two-Storey Local Youth Development Center and Function Hall Building in Badiangan, Iloilo"** by **Arl Rey N. Canicula Franz, Aldrei O. Bayhon, and Joshua S. Bagaforo** has undergone Turnitin Similarity Checking with a passing percentage of 19% and has passed the requirements (Chapters 1-7).

Prepared by:

PINKY E. LUMERO-TONGOL
Staff-in-charged

Approved by:

LENNY ROSE P. MUCHO, EdD
Director, RCECC

COLLEGE of ENGINEERING
CENTRAL PHILIPPINE UNIVERSITY
ILOILO CITY, PHILIPPINES
Tel Nos (033) 329 1971 (to79) local 1082
Fax No (033) 320 3004
CIVIL ENGINEERING DEPARTMENT

CERTIFICATION OF APPROVED ARCHITECTURAL DESIGN

This is to certify that ENGR. ROSILIA A. VILLA of the Municipal Engineering Office of Municipality of Badiangan, Iloilo approves the proposed architectural design of the following:

BAGAFORO, Joshua S.
BAYHON, Franz Aldrei O.
CANICULA, Arl Rey N.

in their project study entitled "A Proposed Two-Storey Local Youth Development Center and Function Hall Building in Badiangan, Iloilo"

ROSILIA A. VILLA
Municipal Engineering Officer

____
Date

Department of **L**anguages, **M**ass **C**ommunication and **H**umanities
College of Arts and Sciences
Central Philippine University
Telephone No: (033)329-1971 local 1060/2114
Fax: (033) 320-3685 | www.cpu.edu.ph | dlmch@cpu.edu.ph

CERTIFICATION

This certifies that the Project Study entitled **A Proposed Local Youth Development Center and Public Library with Function Hall in Badiangan, Iloilo** by ***Arl Rey N. Canicula, Franz Aldrei O. Bayhon,*** and ***Joshua S. Bagaforo*** has been reviewed for grammar, style, and other mechanics of writing.

Issued this 9th day of October 2024.

CLAIRE ANNE D. JARDENIL, M.A.
Faculty Member

APPENDIX B

Work Budget

PARTICULAR	DESCRIPTION	AMOUNT
Documentation		
	Grammarian	₱1,500.00
	Plagiarism Scan	₱750.00
	Paper Allowance	₱1,000.00
	Printer Ink	₱1,000.00
	Plastic Folder	₱100.00
	Book Bind	₱3,500.00
	Binding Clip	₱100.00
	Sub Total:	₱7,950.00
Professional Fees		
	Soil Sampling Labor	₱600.00
	Architectural Plans	₱3,000.00
	Electrical Plans	₱3,000.00
	Plumbing Plans	₱3,000.00
	Sub Total:	₱9,600.00
Miscellaneous		
	Transportation	₱2,000.00
	Sub Total:	₱2,000.00
	TOTAL:	₱19,550.00

APPENDIX C

Work Schedule and Gantt Chart

COLLEGE OF ENGINEERING CENTRAL PHILIPPINE UNIVERSITY
Jaro, Iloilo City, Philippines
Tel No: 63 (33) 3291971 loc 1084

A Proposed Two-Storey Office with a Social Hall Building in Badiangan, Iloilo

Methods of Research Schedule of Activities

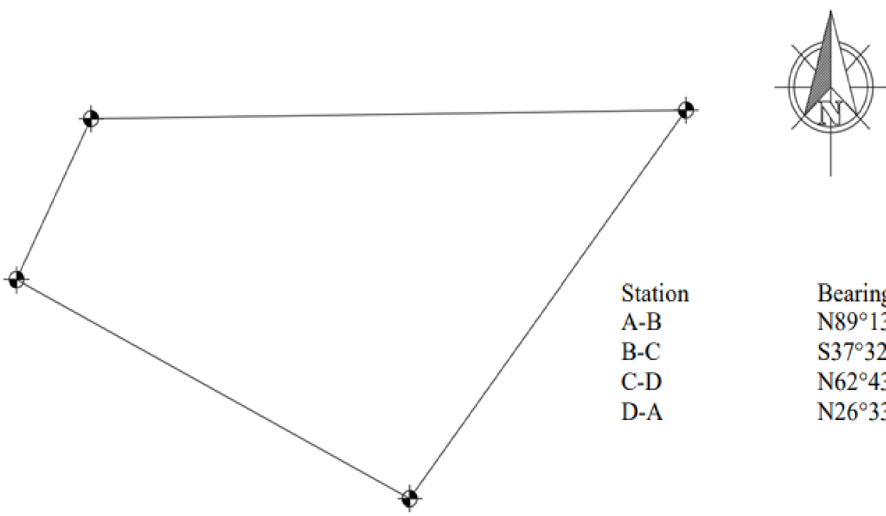
Legend: Projected Duration / Actual Duration

	DATE	AUGUST 16 - AUGUST 22, 2023	AUGUST 23 - AUGUST 29, 2023	AUGUST 30 - SEPTEMBER 3, 2023	SEPTEMBER 4 - SEPTEMBER 14, 2023	SEPTEMBER 15 - SEPTEMBER 29, 2023	SEPTEMBER 29 - OCTOBER 10, 2023	OCTOBER 11- OCTOBER 26, 2023	OCTOBER 27 - NOVEMBER 9, 2023	NOVEMBER 10 - NOVEMBER 30, 2023	NOVEMBER 31 - DECEMBER 5, 2023	DECEMBER 6 - DECEMBER 12, 2023	DECEMBER 13 - DECEMBER 19, 2023
	WEEK	1	2	3	4	5 to 6	7	8 to 10	11 to 12	13 to 15	16	17	18
TASK TO EXECUTE	CLASS ORIENTATION AND FORMATION OF TEAMS												
	MEETING OF TEAMS (BRAINSTORMING)												
	SIGNING OF LETTERS FROM DEAN TO MAYORS AND THE DEPARTMENT HEAD												
	PROCESS OF LETTERS TO MAYORS IN DIFFERENT TARGETED MUNICIPALITIES												
	OBTAINING FUTURE PROJECTS FOR POTENTIAL PROJECT STUDY IN DIFFERENT MUNICIPALITIES												
	DISCUSSION OF CONCEPT PAPERS												
	FINALIZATION/POLISHING OF CONCEPT PAPERS												
	SUBMISSION OF CONCEPT PAPERS												
	REVISION OF CONCEPT PAPERS/PRIORITY LIST												
	APPROVAL OF PROPOSED PROJECT												
	SITE VISIT												
	CHAPTER 1 DISCUSSION AND SUBMISSION												
	CHAPTER 2 DISCUSSION AND SUBMISSION												
	CONSULTATION OF CHAPTER 1 AND 2												
	CHAPTER 3 DISCUSSION AND SUBMISSION												
	CONSULTATION OF CHAPTER 3												

	DATE	DECEMBER 20 - DECEMBER 26, 2023	DECEMBER 27 - JANUARY 2, 2024	JANUARY 3 - JANUARY 9, 2024	JANUARY 10 - JANUARY 16, 2024	JANUARY 17 - JANUARY 23, 2024	JANUARY 24 - JANUARY 30, 2024	JANUARY 31 - FEBRUARY 6, 2024	FEBRUARY 7 - FEBRUARY 13, 2024	FEBRUARY 14 - JANUARY 20, 2024	FEBRUARY 21 - FEBRUARY 27, 2024	FEBRUARY 28 - MARCH 5, 2024	MARCH 5 - MARCH 11, 2024	MARCH 5 - MARCH 11, 2024	MARCH 12 - MARCH 18, 2024	MARCH 19 - MARCH 25, 2024	MARCH 26 - APRIL 1, 2024	APRIL 2 - APRIL 8, 2024	APRIL 9 - APRIL 15, 2024	APRIL 16 - APRIL 22, 2024	APRIL 23 - APRIL 29, 2024	APRIL 30 - MAY 6, 2024	MAY 7 - MAY 13, 2024	MAY 14 - MAY 20, 2024
	WEEK	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
TASK TO EXECUTE	REVISION OF CHAPTERS 1 TO 3																							
	FINAL CONSULTATION OF PAPER TO ADVISER																							
	SIGNING OF ENDORSEMENT LETTER																							
	SUBMISSION OF FINAL PROPOSAL PAPER, ENDORSMENT LETTER																							
	PREPARATION OF PROPOSAL PRESENTATION																							
	PROJECT PROPOSAL PRESENTATION DEFENSE																							
	SUBMISSION OF EDITED PROPOSAL PAPER																							
	ARCHITECTURAL PLAN																							
	SURVEY/GEOTECHNICAL INVESTIGATION																							
	STRUCTURAL DESIGN AND ANALYSIS																							
	CHAPTER 4 DISCUSSION AND SUBMISSION																							
	PLUMBING AND ELECTRICAL PLAN																							
	CHAPTER 5 DISCUSSION AND SUBMISSION																							
	CHAPTER 6 DISCUSSION AND SUBMISSION																							
	CHAPTER 7 DISCUSSION AND SUBMISSION																							
	PREPERATION FOR FINAL DEFENSE																							
	FINAL DEFENSE																							
	FINAL REVISION																							
	PASSING OF HARDBOUND																							

APPENDIX D

Lot Plan



Station	Bearing	Distance (m)
A-B	N89°13’57”E	48.74
B-C	S37°32’26”W	37.14
C-D	N62°43’34”W	36.23
D-A	N26°33’51”E	13.6333

APPENDIX E

Geotechnical Report

GEOTECHNICAL REPORT

On the Soil Tests Performed

In Partial Fulfillment of the Project Study Entitled

A Proposed Two-Storey Youth Development Center and Function Hall Building in Badiangan, Iloilo

In Partial Fulfillment

of the Requirements for the Degree of

Bachelor of Science in Civil Engineering

By

Arl Rey N. Canicula

Franz Aldrei O. Bayhon

Joshua S. Bagaforo

Engr. John Lorenz S. Tuala

Adviser

Introduction

The purpose of this geotechnical report was to provide information for the project study titled "A Proposed Two-Storey Local Youth Development Center and Function Hall Building in Badiangan, Iloilo." The report describes the techniques used to determine the soil-bearing capacity required for the project's foundation plan.

The open test pit method is utilized as a subsurface exploration technique for soil sampling. This method is widely regarded as the most cost-effective and practical approach for shallow-depth site investigations. The open test pit method involves excavating at least one pit at the site and collecting soil samples at various levels. This allows for the inspection of soil layers in their natural state and the convenient collection of undisturbed and disturbed soil samples.

Soil sampling was conducted on March 31, 2024, between 1 and 4 p.m., under favorable weather conditions. A member of the local community assisted the researchers in using the open test pit method, and the team selected one borehole location for the project area. Soil samples were collected by digging through the borehole at specific depths, with one sample taken at six feet below ground level. Water was discovered on the excavated surface, and sampling was halted. The soil samples were collected in their natural state and transported to the soil laboratory.

Soil samples were tested between April 1 and 7, 2024, to determine their properties for design purposes. The laboratory tested only the soil sample taken at a depth of six feet, which was the furthest from the natural ground line. Tests for moisture content, sieve analysis, unit weight, and specific gravity were performed. Additionally, Atterberg limits and unconfined compressive strength tests were conducted on the soil sample.

Laboratory Tests Performed

Various laboratory tests were conducted on the soil samples collected using the open test pit method.

Moisture Content Test

To determine the needed water to be added for the optimum compaction and other earthworks, the moisture content test was performed on the gathered soil sample. Moisture content was evaluated in general accordance with ASTM Test Method D 2216.

Grain Size Analysis Test

Sieve analysis was performed to evaluate material gradation characteristics and aid in soil classification. Testing was conducted in accordance with ASTM Test Method C 136 and D 2487 (Unified Soil Classification System).

Specific Gravity Test

The density and specific gravity tests were carried out for these were some of the most important tests in determining soil properties and soil-bearing properties. ASTM D 845 was used as the basis for performing the test.

Unit Weight Determination

Unit weight is the product of density and acceleration due to gravity. It represents the force exerted by the mass of a substance in a specific volume (density) per cubic meter in the SI unit, measured in Newtons.

Unconfined Compressive Strength Test

To obtain an approximate measurement of soil strength, the unconfined compressive strength test is utilized in all geotechnical engineering designs.

Atterberg Limits

Liquid and plastic limit tests were performed to help classify the soil type. ASTM Test Method D 4318 served as the basis for the test performed to determine the Atterberg limits.

Laboratory Test Results

I. SIEVE ANALYSIS TEST

sieve #	sieve size (mm)	Wt. of soil retained (g)	Wt. of soil passing (g)	percent retained (%)	percent passing (%)	Cumulative Percent retained (%)	Percent Finer (%)
4	4.75	135.5	1941.6	6.523518367	93.47648163	6.523518367	93.4764816
10	2	455.7	1485.9	21.93924221	71.53723942	28.46276058	71.5372394
20	0.85	577.6	908.3	27.80800154	43.72923788	56.27076212	43.7292379
40	0.425	433	475.3	20.84637235	22.88286553	77.11713447	22.8828655
100	0.15	205.8	269.5	9.90804487	12.97482066	87.02517934	12.9748207
200	0.075	207.4	62.1	9.985075345	2.989745318	97.01025468	2.98974532
Pan	0	62.1	2.77112E-13	2.989745318	2.62013E-14	100	0
Total =		2077.1					

A. % FINE-GRAINED AND COARSE-GRAINED SOIL

% FINE-GRAINED SOIL = 2.989745318

% COARSE-GRAINED SOIL = **97.01025468**

CHECK ANSWER:

97.01025468 + 6.523518367 = **100 % *CORRECT**

B. % COURSE FRACTION = 97.01025468

%GRAVEL (Retained at Sieve #4) = **6.5235184**

%SAND (Passing at Sieve #4 - #200) = 93.47648163 - 2.989745318 =

90.48673632

%FINE (Passing at Sieve #200) = **2.989745318**

CHECK ANSWER:

6.5235184 + 90.48673632 + 2.989745318 = **100**

SOIL CLASSIFICATION USING UCSC:

Plasticity Index	36.3623516 > 7

Liquid Limit	71.77639772
Percent Finer No. 4	93.47648163%
Percent Finer No. 200	2.989745318% < 5%
Using Interpolation to obtain D60, D30, D10	
D60	1.181715935
D30	0.622537658
D10	0.127655497
Cu	9.257070526 > 6
Cc	2.569086006 < 3
SOIL CLASSICATION	**SW-SC**

Criteria for assigning group symbols				Group symbol
Coarse-grained soils More than 50% of retained on No. 200 sieve	**Gravels** More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[a]	$C_u \geq 4$ and $1 \leq C_c \leq 3$[c]	GW
			$C_u < 4$ and/or $1 > C_c > 3$[c]	GP
		Gravels with Fines More than 12% fines[a,d]	$PI < 4$ or plots below "A" line (Figure 5.3)	GM
			$PI > 7$ and plots on or above "A" line (Figure 5.3)	GC
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[b]	$C_u \geq 6$ and $1 \leq C_c \leq 3$[c]	SW
			$C_u < 6$ and/or $1 > C_c > 3$[c]	SP
		Sands with Fines More than 12% fines[b,d]	$PI < 4$ or plots below "A" line (Figure 5.3)	SM
			$PI > 7$ and plots on or above "A" line (Figure 5.3)	SC
Fine-grained soils 50% or more passes No. 200 sieve	**Silts and clays** Liquid limit less than 50	Inorganic	$PI > 7$ and plots on or above "A" line (Figure 5.3)	CL
			$PI < 4$ or plots below "A" line (Figure 5.3)[e]	ML
		Organic	$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$; see Figure 5.3; OL zone	OL
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line (Figure 5.3)	CH
			PI plots below "A" line (Figure 5.3)	MH
		Organic	$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$; see Figure 5.3; OH zone	OH
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor			Pt

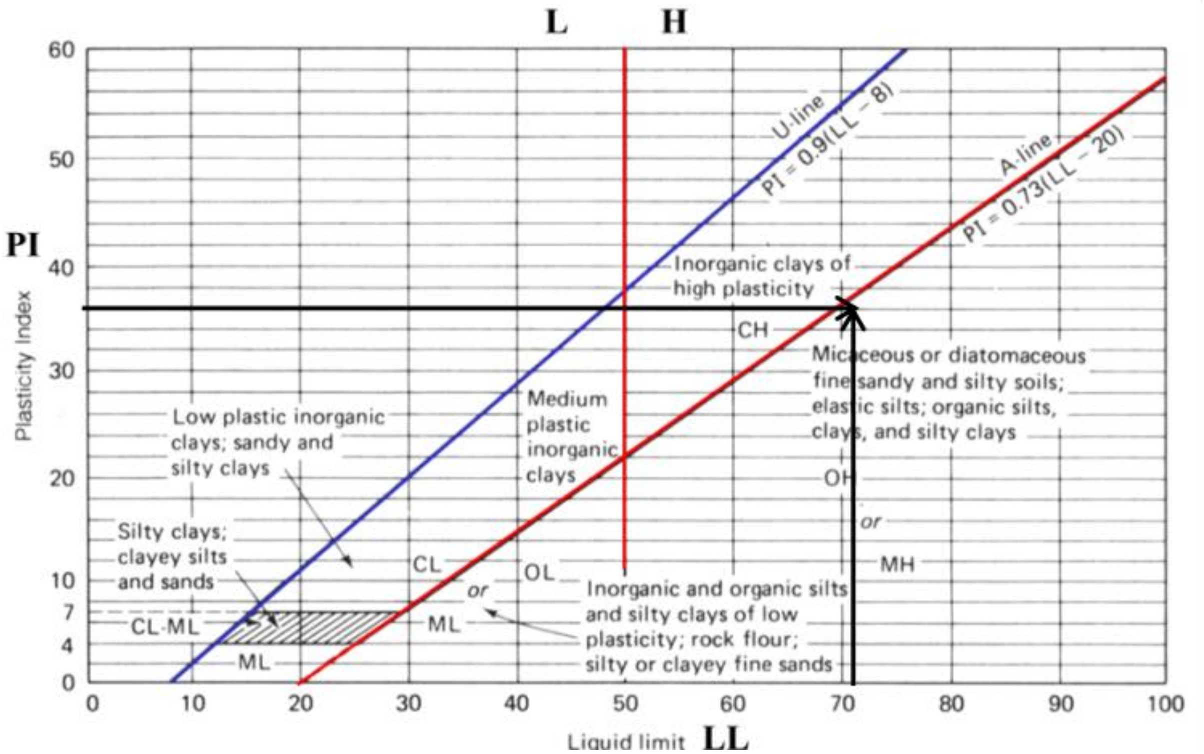
[a] Gravels with 5 to 12% fine require dual symbols: GW-GM, GW-GC, GP-GM, GP-GC.

[b] Sands with 5 to 12% fines require dual symbols: SW-SM, SW-SC, SP-SM, SP-SC.

[c] $C_u = \frac{D_{60}}{D_{10}}$; $C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}}$

[d] If $4 \leq PI \leq 7$ and plots in the hatched area, use dual symbol GC-GM or SC-SM.

[e] If $4 \leq PI \leq 7$ and plots in the hatched area, use dual symbol CL-ML.



- No.200 < 5%; $C_u \geq 6$, and $1 \leq C_c \leq 3$	**SW**	**Well-graded sands, gravelly sands with little or no fines.**
- No.200 > 12%; Atterberg's limits plot above "A" line in the plasticity chart or plasticity index greater than 7.	**SC**	**Clayey sands, sand-clay mixtures.**

SW	**< 15% gravel**	**Well-graded sand**
	≥ 15% gravel	**Well-graded sand with gravel**
SC	**< 15% gravel**	**Clayey sand**
	≥ 15% gravel	**Clayey sand with gravel**

Soil samples collected on-site indicate a SW SC result. This indicates that the soil sample is composed of pure gravel with less than 5% fines. Because Cu is greater than 6 and Cc is between 1 and 3, the soil is SW (well-graded sands, gravel-sand mixtures with few particles). It would further be identified as SC soil since it fulfills the requirement for a plastic index greater than 7. Finally, the soil produced less than 15% gravel on both SW and SC requirements, consequently it would be labeled as SW-SC, a well-graded sand with clayey properties.

II. WATER CONTENT

Trial	1	2	3
M1 - mass of can	10.1	9.7	11.5
M2 - mass of can with moist soil(g)	74.7	80.4	86.6
M3 - mass of can with dry soil (g)	52.6	56.4	61.2
Mw - Mass of Water (g)	22.1	24	25.4
Ms - Mass of Dry Soil (g)	42.5	46.7	49.7
W - Water Content (Mw/Ms)*100	52	51.391863	51.1066398

$$Wave = \frac{(w1 + w2 + w3)}{3} = 51.4995009\%$$

WATER CONTENT = 51.4995009%

III. SPECIFIC GRAVITY TEST

Mp - Mass of Pycnometer (g)	86.7
Mw - Mass of Pycnometer + Water (g)	334
Ms - Mass of Soil (g)	50
Mw - Mass of Water (g)	247.3
Mpws - Mass of Pycnometer + Water + Soil	364.3
Ti - Initial Temperature of Water (°C)	31
Tx - Final Temperature of Water (°C)	34
D1 - Density of Water at 31°C (g/m^3)	0.99541
D2 - Density of Water at 34°C (g/m^3)	0.99443

K - Conversion Factor of Water at 31°C	0.9971

Mass of Pycnometer with Water at 31°C:

$$Mpw\ at\ 31\circ C\ =\ \frac{D1}{D2}(Mw)\ +\ Mp\ =\ 334.224g$$

Specific Gravity of Soil:

$$GS\ =\ \frac{KMs}{(Ms\ +\ Mpw)\ at\ Tx\ -\ (Mpws)} =\ 2.4998$$

Say, **SPECIFIC GRAVITY** = 2.5

IV. SPECIFIC WEIGHT TEST

	Trial 1	**Trial 2**	**Trial 3**	**Trial 4**
Mass (Kg)	1.061442	1.061442	1.155618	1.080081
Volume (m^3)	0.00006	0.000065	0.00007	0.000065

$$Unit\ Weight\ of\ Soil\ =\ \frac{\sum Mass}{\sum Volume}\ =\ 16.787\ \frac{KN}{m^3}$$

UNIT WEIGHT OF SOIL = 16.787 KN/m^3

V. UNCONFINED COMPRESSION TEST

Sample Description = SW – SC, Sandy Clay

Date of Testing = April 7, 2024

TRIAL 1

Trial 1

D(in) = 1.2598

A0 (in^2) = 1.2466

Lo (in) = 2.4803

Proving ring Calibration = 3000.0000

input diameter 3.2

input length 6.3000

Deformation Dial Reading, △L (in)	Unit Strain, ε (in/in)	Cross-Sectional Area, A (in^2)	Proving Ring Dial, (in)	Applied Axial Load, P(in)	Load Per Unit Area	
					Lb/in^2	Lb/ft^2
*(1)	(2)= 1/Lo	3=Ao/(1-e)	4	5=4*proving ring calibration	6=5/3	7=6*144
0.00	0.0000	1.2466	0.0000	0.0000	0.0000	0.0000
0.05	0.0202	1.2722	0.0005	1.5000	1.1790	169.7802
0.10	0.0403	1.2990	0.0008	2.4000	1.8476	266.0596
0.15	0.0605	1.3268	0.0013	3.9000	2.9393	423.2651
0.20	0.0806	1.3559	0.0017	5.1000	3.7613	541.6245
0.25	0.1008	1.3863	0.0020	6.0000	4.3280	623.2334
0.30	0.1210	1.4181	0.0025	7.5000	5.2887	761.5769
0.35	0.1411	1.4514	0.0028	8.4000	5.7875	833.4055
0.40	0.1613	1.4863	0.0031	9.3000	6.2572	901.0425
0.45	0.1814	1.5229	0.0035	10.5000	6.8948	992.8553
0.50	0.2016	1.5613	0.0038	11.4000	7.3015	1051.4107
0.55	0.2217	1.6018	0.0041	12.3000	7.6790	1105.7744
0.60	0.2419	1.6444	0.0044	13.2000	8.0274	1155.9466
0.65	0.2621	1.6893	0.0046	13.8000	8.1691	1176.3544
0.70	0.2822	1.7367	0.0048	14.4000	8.2914	1193.9677
0.75	0.3024	1.7869	0.0050	15.0000	8.3944	1208.7867
0.80	0.3225	1.8401	0.0053	15.9000	8.6409	1244.2885
0.85	0.3427	1.8965	0.0055	16.5000	8.7001	1252.8201
0.90	0.3629	1.9565	0.0057	17.1000	8.7400	1258.5574
0.95	0.3830	2.0205	0.0058	17.4000	8.6119	1240.1189
1.00	0.4032	2.0887	0.0060	18.0000	8.6178	1240.9660
1.05	0.4233	2.1617	0.0062	18.6000	8.6043	1239.0188
1.10	0.4435	2.2400	0.0065	19.5000	8.7053	1253.5627
1.15	0.4637	2.3242	0.0066	19.8000	8.5190	1226.7411
1.20	0.4838	2.4150	0.0067	20.1000	8.3231	1198.5223
1.25	0.5040	2.5131	0.0066	19.8000	7.8787	1134.5268
1.30	0.5241	2.6196	0.0065	19.5000	7.4439	1071.9284
1.35	0.5443	2.7355	0.0064	19.2000	7.0189	1010.7272
1.40	0.5644	2.8621	0.0063	18.9000	6.6036	950.9232
		Max Value for Load per unit Area =			1258.56	Lb/ft^2

TRIAL 2

Trial 2 | input diameter 3.3

D(in) = 1.2992 | input length 6.6000

A0 (in^2) = 1.3257

Lo (in) = 2.5984

Proving ring Calibration = 3000.0000

Deformation Dial Reading, △L (in)	Unit Strain, ε (in/in)	Cross-Sectional Area, A	Proving Ring Dial, (in)	Applied Axial Load, P(in)	Load Per Unit Area	
					Lb/in^2	Lb/ft^2
*(1)	(2)= 1/Lo	=Ao/(1-e	4	5=4*proving ring calibration	6=5/3	7=6*144
0.00	0.0000	1.3257	0.0000	0.0000	0.0000	0.0000
0.05	0.0192	1.3517	0.0010	3.0000	2.2194	319.5914
0.10	0.0385	1.3788	0.0016	4.8000	3.4813	501.3137
0.15	0.0577	1.4069	0.0020	6.0000	4.2646	614.1013
0.20	0.0770	1.4363	0.0025	7.5000	5.2219	751.9507
0.25	0.0962	1.4668	0.0030	9.0000	6.1356	883.5298
0.30	0.1155	1.4988	0.0033	9.9000	6.6055	951.1905
0.35	0.1347	1.5321	0.0036	10.8000	7.0492	1015.0891
0.40	0.1539	1.5669	0.0039	11.7000	7.4668	1075.2254
0.45	0.1732	1.6034	0.0044	13.2000	8.2325	1185.4851
0.50	0.1924	1.6416	0.0049	14.7000	8.9547	1289.4745
0.55	0.2117	1.6817	0.0052	15.6000	9.2765	1335.8160
0.60	0.2309	1.7237	0.0055	16.5000	9.5722	1378.3953
0.65	0.2502	1.7680	0.0058	17.4000	9.8418	1417.2124
0.70	0.2694	1.8145	0.0060	18.0000	9.9199	1428.4595
0.75	0.2886	1.8636	0.0063	18.9000	10.1415	1460.3792
0.80	0.3079	1.9154	0.0066	19.8000	10.3371	1488.5366
0.85	0.3271	1.9702	0.0068	20.4000	10.3542	1491.0052
0.90	0.3464	2.0282	0.0070	21.0000	10.3539	1490.9657
0.95	0.3656	2.0897	0.0073	21.9000	10.4798	1509.0906
1.00	0.3848	2.1551	0.0075	22.5000	10.4403	1503.4077
1.05	0.4041	2.2247	0.0076	22.8000	10.2486	1475.7984
1.10	0.4233	2.2989	0.0078	23.4000	10.1787	1465.7263
1.15	0.4426	2.3783	0.0079	23.7000	9.9652	1434.9817
1.20	0.4618	2.4633	0.0080	24.0000	9.7429	1402.9831
1.25	0.4811	2.5547	0.0080	24.0000	9.3946	1352.8201
1.30	0.5003	2.6530	0.0081	24.3000	9.1593	1318.9403
1.35	0.5195	2.7593	0.0082	24.6000	8.9153	1283.8065
1.40	0.5388	2.8744	0.0084	25.2000	8.7670	1262.4478
1.45	0.5580	2.9996	0.0085	25.5000	8.5012	1224.1788
1.50	0.5773	3.1361	0.0085	25.5000	8.1311	1170.8806
1.55	0.5965	3.2857	0.0087	26.1000	7.9436	1143.8785
1.60	0.6158	3.4502	0.0089	26.7000	7.7387	1114.3683
1.65	0.6350	3.6321	0.0090	27.0000	7.4337	1070.4559
1.70	0.6542	3.8342	0.0087	26.1000	6.8071	980.2218
	Max Value for Load per unit Area =				1509.0906	Lb/ft^2

TRIAL 3

Trial 3				input diameter	3.2	
D(in) =	1.2598			input length	6.5000	
A0 (in^2) =	1.2466					
Lo (in) =	2.5591					
Proving ring Calibration =	3000.0000					
Deformation Dial Reading, ΔL (in)	Unit Strain, ε (in/in)	Cross-Sectional Area, A (in^2)	Proving Ring Dial, (in)	Applied Axial Load, P(in)	Load Per Unit Area Lb/in^2	Lb/ft^2
*(1)	(2)= 1/Lo	3=Ao/(1-ε)	4	5=4*proving ring calibration	6=5/3	7=6*144
0.00	0.0000	1.3257	0.0000	0.0000	0.0000	0.0000
0.05	0.0195	1.3521	0.0003	0.9000	0.6656	95.8485
0.10	0.0391	1.3796	0.0004	1.2000	0.8698	125.2512
0.15	0.0586	1.4083	0.0005	1.5000	1.0651	153.3806
0.20	0.0782	1.4381	0.0008	2.4000	1.6689	240.3155
0.25	0.0977	1.4692	0.0010	3.0000	2.0419	294.0276
0.30	0.1172	1.5018	0.0014	4.2000	2.7967	402.7250
0.35	0.1368	1.5358	0.0016	4.8000	3.1255	450.0703
0.40	0.1563	1.5713	0.0020	6.0000	3.8184	549.8541
0.45	0.1758	1.6086	0.0023	6.9000	4.2895	617.6885
0.50	0.1954	1.6476	0.0026	7.8000	4.7340	681.7028
0.55	0.2149	1.6886	0.0029	8.7000	5.1521	741.8970
0.60	0.2345	1.7317	0.0031	9.3000	5.3703	773.3251
0.65	0.2540	1.7771	0.0035	10.5000	5.9085	850.8251
0.70	0.2735	1.8249	0.0040	12.0000	6.5757	946.9042
0.75	0.2931	1.8753	0.0042	12.6000	6.7188	967.5087
0.80	0.3126	1.9286	0.0044	13.2000	6.8442	985.5664
0.85	0.3322	1.9851	0.0048	14.4000	7.2542	1044.6026
0.90	0.3517	2.0449	0.0050	15.0000	7.3354	1056.2935
0.95	0.3712	2.1084	0.0051	15.3000	7.2566	1044.9485
1.00	0.3908	2.1760	0.0054	16.2000	7.4447	1072.0351
1.05	0.4103	2.2481	0.0056	16.8000	7.4728	1076.0858
1.10	0.4298	2.3252	0.0059	17.7000	7.6123	1096.1689
1.15	0.4494	2.4077	0.0060	18.0000	7.4760	1076.5470
1.20	0.4689	2.4963	0.0062	18.6000	7.4511	1072.9575
1.25	0.4885	2.5916	0.0063	18.9000	7.2927	1050.1522
1.30	0.5080	2.6945	0.0065	19.5000	7.2368	1042.1060
1.35	0.5275	2.8060	0.0070	21.0000	7.4840	1077.7001
1.40	0.5471	2.9270	0.0070	21.0000	7.1745	1033.1322
1.45	0.5666	3.0590	0.0070	21.0000	6.8650	988.5644
1.50	0.5862	3.2034	0.0070	21.0000	6.5555	943.9965
1.55	0.6057	3.3621	0.0072	21.6000	6.4245	925.1266
1.60	0.6252	3.5374	0.0073	21.9000	6.1910	891.4977
1.65	0.6448	3.7320	0.0071	21.3000	5.7074	821.8685
	Max Value for Load per unit Area =				1096.1689	Lb/ft^2

Unconfined Compressive Strength (Qult) = $\frac{Qult1 + Qult2 + Qult\,3}{3}$ **=** $1287.94\ \frac{Lb}{ft^3}$

Cohesion = $\frac{Qu}{2} = 643.97\ \frac{Lb}{ft^2}$

VI. ATTERBERGS LIMIT

A. LIQUID LIMIT

Trial 1			
Test Number	**1-A (50-60)**	**1-B (20-30)**	**1-C (10-1**
Number of Blows	53	30	13
M1 - Mass of empty can (g)	10.1	9.7	11.5
M2 - Mass of can with wet soil (g)	29.12	34.3	34.4
M3 - Mass of can with ovened soil (g)	24.5	23.3	23.7
Mw - Mass of water (g)	4.62	11	10.7
Mdry - Mass of dry soil (g)	14.4	13.6	12.2
W - Water Content (wwater/wdry)*100	**32.08333333**	**80.8823529**	**87.7049**

$$LL1 = \frac{(W1 + W2 + W3)}{3} = 66.8902014\,\%$$

Trial 2			
Test Number	**2-A**	**2-B**	**2-C**
Number of Blows	52	29	15
M1 - Mass of empty can (g)	11.5	37.5	42.4
M2 - Mass of can with wet soil (g)	32.43	48.4	64.4
M3 - Mass of can with ovened soil (g)	26.9	43.5	54.3
Mw - Mass of water (g)	5.53	4.9	10.1
Mdry - Mass of dry soil (g)	15.4	6	11.9
W - Water Content (wwater/wdry)*100	**35.90909091**	**81.6666667**	**84.8739**

$$LL2 = \frac{(W1 + W2 + W3)}{3} = 67.4832357$$

Trial 3			
Test Number	**3-A**	**3-B**	**3-C**
Number of Blows	52	29	14
M1 - Mass of empty can (g)	12.4	11.5	11.8
M2 - Mass of can with wet soil (g)	46.3	40.4	35.8
M3 - Mass of can with ovened soil (g)	31.8	27.5	24.6
Mw - Mass of water (g)	14.5	12.9	11.2
Mdry - Mass of dry soil (g)	19.4	16	12.8
W - Water Content (wwater/wdry)*100	**74.74226804**	**80.625**	**87.5**

$$LL3 = \frac{(W1 + W2 + W3)}{3} = 80.95575601$$

$$LLave = \frac{(LL1+LL2+LL3)}{3} = 71.776398$$

Liquid Limit of Soil = 71.776398 %

B. PLASTIC LIMIT

TRIALS	**1**	**2**	**3**
M1 - Mass of empty can (g)	9.5	12.1	10.1
M2 - Mass of can with wet soil (g)	14.42	17	14.5
M3 - Mass of can with ovened soil (g)	13.1	15.81	13.3
Mw - Mass of water (g)	1.32	1.19	1.2
Mdry - Mass of dry soil (g)	3.6	3.71	3.2
W - Water Content (wwater/wdry)*100	36.66666667	32.0754717	37.5

$$Trial\ 1\ (\%) = LL - PL = 31.47615531$$

$$Trial\ 2\ (\%) = LL - PL = 32.0691896$$

$$Trial\ 3\ (\%) = LL - PL = 45.54170989$$

Plastic Limit = $\frac{(Trial\ 1 + Trial\ 2 + Trial\ 3)}{3}$ **= 36.362352**

∴ **Plastic Limit is 36.362352, Highly Plasti**

VII. SOIL BEARING CAPACITY

ϕ'	N_c	N_q	N_γ	ϕ'	N_c	N_q	N_γ
0	5.14	1.00	0.00	26	22.25	11.85	12.54
1	5.38	1.09	0.07	27	23.94	13.20	14.47
2	5.63	1.20	0.15	28	25.80	14.72	16.72
3	5.90	1.31	0.24	29	27.86	16.44	19.34
4	6.19	1.43	0.34	30	30.14	18.40	22.40
5	6.49	1.57	0.45	31	32.67	20.63	25.99
6	6.81	1.72	0.57	32	35.49	23.18	30.22
7	7.16	1.88	0.71	33	38.64	26.09	35.19
8	7.53	2.06	0.86	34	42.16	29.44	41.06
9	7.92	2.25	1.03	35	46.12	33.30	48.03
10	8.35	2.47	1.22	36	50.59	37.75	56.31
11	8.80	2.71	1.44	37	55.63	42.92	66.19
12	9.28	2.97	1.69	38	61.35	48.93	78.03
13	9.81	3.26	1.97	39	67.87	55.96	92.25
14	10.37	3.59	2.29	40	75.31	64.20	109.41
15	10.98	3.94	2.65	41	83.86	73.90	130.22
16	11.63	4.34	3.06	42	93.71	85.38	155.55
17	12.34	4.77	3.53	43	105.11	99.02	186.54
18	13.10	5.26	4.07	44	118.37	115.31	224.64
19	13.93	5.80	4.68	45	133.88	134.88	271.76
20	14.83	6.40	5.39	46	152.10	158.51	330.35
21	15.82	7.07	6.20	47	173.64	187.21	403.67
22	16.88	7.82	7.13	48	199.26	222.31	496.01
23	18.05	8.66	8.20	49	229.93	265.51	613.16
24	19.32	9.60	9.44	50	266.89	319.07	762.89
25	20.72	10.66	10.88				

Properties

Soil classification	SW-SC	Sandy-clayey	**Pu** 1287.94	psf
Depth of Soil Sample	1.8m		**Pu** 61.66	KPa
Angle of Friction	25	As dictated and adviced by Engr. Erwin Rizard		
Factor of Safety	3			
Soil Unit Weight	16.78651	KN/m^3		
Cohesion (c)	0.00			
Nc	20.72			
Nq	10.662			
Nγ	10.876			

Using Terzaghi's Bearing Capacity Principle

$$Qu = 1.3cNc + qNq + 0.4\gamma BN\gamma$$

Assume C = 0 — Disregard cNc if %fines<5%

Assume 1 meter Strip

B = 1 m

D = 1.80 m

Effective Stress(q) 30.22 KPa

Qultimate = 395.19 KPa

Qnet = 364.97 KPa

Qallowable = 121.66 KPa

APPENDIX F

Structural Design Computations

SAMPLE COMPUTATION FOR PURLIN DESIGN

DEAD LOAD		
θ	5 degrees	
DL	1 kPa	
DLtotal		

ROOF LIVE LOAD (Reduced, Method 2)		
Roof Dimension		
L	27.7 m	
B	10.35 m	
A	286.695 m2	
r	0.08	
R	21.7356	0.217356 %
Lr	0.217356 kPa	

WIND LOAD	
W	1.39542219 kPa
Windward Coefficient	0.2
Leeward Coefficient	0.6

Stress Due to Dead and Live Load			
Wt	1.217356		
fx	1.21272359	fy	0.10609957
fbx	42.1816902	fby	3.49011731

Stress due to Wind	
fx	0.27802244
fbx	9.67034566

Spacing	
smax	7.78876907 m
s	1 m
Adopt spacing of	1 m

Force Analysis

Uniform Loads

Steel Section	LC 150x65x20x4.5			x
Deadload		1.2 kN/m	DLx	1.19543364 N/mm
Liveload		0.3477696 kN/m	LLx	0.34644623 N/mm
Windload		0.139542219 kN/m	Wx	0.13901122 N/mm
	x			y
Mx		3.374623638 kN-m	My	0.7738848 kN-m
		3374623.638 N-mm		773884.8 N-mm
fbx		88.92288902 mPa	fby	67.8846316 mPa

Interaction Value

0.454514552 < 1

Safe!

Use LC 150x65x20x4.5 Thick Lipped Channel spaced @ 1 m, provide Sag Rod at L/2

SAMPLE COMPUTATION FOR TRUSS DESIGN

Top Chord (Compression)				
Parameters				
Design Load	131.29	kN	131290.6	N
No. of Member	2	pcs		
Per Member	65.64531	kN	65645.31	N
Length	0.94	m	940	mm
fy	248	MPa		
E	200	GPa	200000	MPa
K	1			
Steel Section				
L3X2X3/16				
Ag	0.917	in2	591.6117	mm2
rx	0.961	in	24.4094	mm
ry	0.577	in	14.6558	mm
r	0.577	in	14.6558	mm

Check Allowable Compressive Stress					
Kl/r	64.13843				
Using Table:			Using AISC Formula		
x1	117.41 y1	64	C	126.1694	
x2	116.72 y2	65	FS	1.840877	
σa	117.3145 MPa		σa	117.3113 MPa	
	σa	117.3113 MPa			

Required Cross-Sectional Area		
Areq	559.5821	mm2
Asupp	591.6117	mm2

Since Asupp>Areq, Safe!

Use 2 pcs <u>L3X2X3/16</u> Thick Angle Bar

Bottom Chord (Tension)				
Parameters				
Design Load	46.60	kN	46602.39	N
No. of Member	2	pcs		
Per Member	23.30119	kN	23301.19	N
Length	0.94	m	940	mm
fy	248	MPa		
E	200	GPa	200000	MPa
k	1			
Steel Section				
L2X2X1/4				
Ag	0.944	in2	609.031	mm2
Check Allowable Tensile Stress				
σa	111.6	MPa		
Required Cross-Sectional Area				
Assume Welded Connection, Anet = Agross				
Areq	208.7921	mm2		
Asupp	609.031	mm2		
Since Asupp>Areq, Safe!				
Use 2 pcs L2X2X1/4 Thick Angle Bar				

Web (Compression)						
Parameters						
Design Load	80.11695	kN	80116.95	N		
No. of Member	2	pcs				
Per Member	40.05847	kN	40058.47	N		
Length	1.04	m	1040	mm		
fy	248	MPa				
E	200	GPa	200000	MPa		
k	1					
Steel Section						
L2X2X1/4						
Ag	0.944	in2	609.031	mm2		
rx	0.605	in	15.367	mm		
ry	0.605	in	15.367	mm		
r	0.605	in	15.367	mm		
Check Allowable Compressive Stress						
Kl/r	67.67749					
Using Table:				Using AISC Formula		
x1	115.33	y1	67	C	126.1694	
x2	114.63	y2	68	FS	1.848525	
σa	114.8558	MPa		σa	114.8601	MPa
	σa	114.8558	MPa			

Required Cross-Sectional Area		
Areq	348.772	mm2
Asupp	609.031	mm2
Since Asupp>Areq, Safe!		
Use 2 pcs <u>L2X2X1/4</u> Thick Angle Bar		

SAMPLE COMPUTATION FOR SLAB DESIGN

TWO WAY SLAB (Coefficient method)

PROPERTIES:

h	100	mm
d	72	mm
b	1000	mm
fy	275	mm
f'c	21	Mpa
fyt	275	Mpa
cc	20	mm
db slab	16	mm
t&s bars	12	mm
beta	0.85	

LOADINGS:

qu_{TOTAL}	13.32	Kpa
Wu slab	2.832	kN/m
Wu DL	3.6864	kN/m
Wu LL	11.52	kN/m
Wu LL(Seats)	7.68	
Wu_{TOTAL}	16.7184	kN/m
Wu_{TOTAL}	12.8784	kN/m

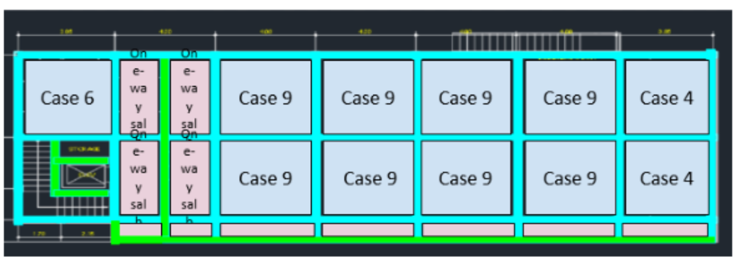
LOADS:

2nd Floor	SLAB	(Long span of building perspective)		
	DEAD LOADS:			
		Floor Finish	1.1	kPa
	Suspended steel channel System		0.1	kPa
	Gypsum board 12.5mm		1	kPa
	Mechanical Duct allowance		0.2	kPa
	CHB WALL w/ plaster		2.74	kPa
	LIVE LOADS:			
category: Theaters, Assembly Areas and Auditorium				
	Stage areas		7.2	kPa
	Movable Seats		4.8	kPA

I. MINIMUM HEIGHT

From Two-Way				From one-Way	
Edge spans		**Interior Spans**			
Long span	4.05	Long span	4.05		
Short Span	3.55	Short Span	3.7		
h_{min}	90 mm			h_{min}	90 mm

Say h= 100mm



II. MOMENTS PER CASES AND SLABS

CASE 6

A	3.55
B	4.05
m (A/B)	0.87654321

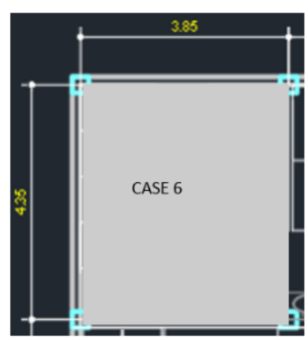
NEGATIVE

$C_A = C_B$	0.08112346	
$-M_{NEG\,A}$	9.772110188	kN-m
$-M_{NEG\,B}$	12.7186699	kN-m

SHEAR		
C_A	0.08087654	
C_B	0.01912346	
V_A	4.80004872	kN
V_B	1.29484008	kN

POSITVE

DEAD LOAD	C_A	0.04040741	
	C_B	0.01912346	
$M_{POS\,A\,DL}$	1.87724151	kN-m	
$M_{POS\,B\,DL}$	1.1563223	kN-m	
LIVE LOAD	C_A	0.04387654	
	C_B	0.02359259	
$M_{POS\,A\,LL}$	1.68098057	kN-m	
$M_{POS\,B\,LL}$	1.1764116	kN-m	
$M_{POS\,A\,TOTAL}$	3.55822209	kN-m	
$M_{POS\,B\,TOTAL}$	2.3327339	kN-m	



-0.778

2.333

-0.778

-1.187 3.559 -9.773

CASE 4 (Right side)		Wu Total	Wu deadload	Wu of stage
A	3.55	33.7104	20.6784	16.992
B	4.05	33.7104	20.6784	16.992
m (A/B)	0.87654321			

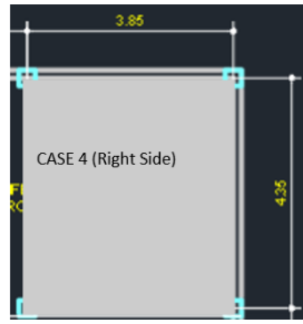
NEGATIVE

C_A	0.06281481	
C_B	0.03718519	
$-M_{NEG\,A}$	13.45126997	kN-m
$-M_{NEG\,B}$	10.36393056	kN-m

SHEAR		
C_A	0.06281481	
C_B	0.03718519	
V_A	3.72807936	kN
V_B	2.51779104	kN

POSITVE

DEAD LOAD	C_A	0.03440741	
	C_B	0.02059259	
$M_{POS\,A\,DL}$		8.96655441	kN-m
$M_{POS\,B\,DL}$		6.98454317	kN-m
LIVE LOAD	C_A	0.04087654	
	C_B	0.02459259	
$M_{POS\,A\,LL}$		5.93448924	kN-m
$M_{POS\,B\,LL}$		4.6469376	kN-m
$M_{POS\,A\,TOTAL}$		14.9010436	kN-m
$M_{POS\,B\,TOTAL}$		11.6314808	kN-m



-3.878
11.632
10.364

CASE 9	
A	3.7
B	4.05
m (A/B)	0.913580247

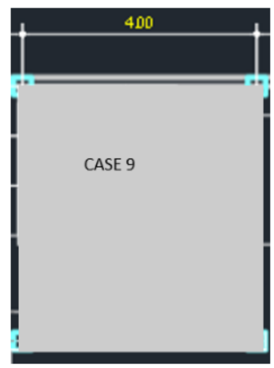
NEGATIVE

C_A	0.06718519	
C_B	0.02608642	
$-M_{NEG\,A}$	11.84510396	kN-m
$-M_{NEG\,B}$	5.510441988	kN-m

SHEAR		
C_A	0.07391358	
C_B	0.02608642	
V_A	4.57215216	kN
V_B	1.76629896	kN

POSITVE

DEAD LOAD	C_A	0.02545679	
	C_B	0.01554321	
$M_{POS\,A\,DL}$		1.28472314	kN-m
$M_{POS\,B\,DL}$		0.93983846	kN-m
LIVE LOAD	C_A	0.03491358	
	C_B	0.02281481	
$M_{POS\,A\,LL}$		3.6707859	kN-m
$M_{POS\,B\,LL}$		2.8740096	kN-m
$M_{POS\,A\,TOTAL}$		4.95550904	kN-m
$M_{POS\,B\,TOTAL}$		3.81384806	kN-m



-1.272
3.814
-5.511

-11.846 4.956 -11.846

STAGE AREA

III. DESIGN FOR TWO WAY SLABS

Consider Maximum moments

MAX A *short span*		MAX B *long span*	
$-M_{NEG\,A}$	13.45127	$-M_{NEG\,B}$	12.7186699
$M_{POS\,A\,TOTAL}$	14.9010436	$M_{POS\,B\,TOTAL}$	11.6314808

Edge SLAB			Interior SLAB				
L1	4.35	m	L1	4.35	m		
L2	3.85	m	L2	4	m		
L col1	1.2125	m	L col1	1.2125	m		
L col2	1.0875	m	L col2	1.125	m		
L col	1.0875	m	L col	1.125	m	Lcol (O.C)	1
L middle	0.9625	m	L middle	1	m		

MAIN BARS	@ Shortspan					@ Longspan			
	-Mu	13.45127 kN-m				-Mu	12.7186699 kN-m		
cmax	30.85714286	Mu max	29.1908263 >						
amax	26.22857143	As max	2002.90909						
a1	12.75985872 mm	a	-0.5		a1	11.99500996 mm	a	-0.5	
a2	131.2401413 mm	b	72		a2	132.00499 mm	b	72	
		c	-837.302831				c	-791.700585	
a	12.75985872 mm				a	11.99500996 mm			
c	15.01159849	fs	275 Mpa		c	14.11177642 mm		275 Mpa	
As	828.2308297 sq. mm				As	778.5851917			
As min 1	299.9504091 sq. mm				As min 1	299.9504091 sq. mm			
As min 2	366.5454545 sq. mm				As min 2	366.5454545 sq. mm			
As (pakto)	828.2308297 sq. mm				As (pakto)	778.5851917 sq. mm			
Spacing	225 mm (for column strip)	Ab	201.06193		**Spacing**	250 mm (for column strip)			
Smax	200				Smax	200			

	Mu	14.9010436 kN-m			Mu	11.6314808 kN-m		
a1	14.30332883	a	-0.5		a1	10.87760135	a	-0.5
a2	129.6966712	b	72		a2	133.1223987	b	72
		c	-927.547068				c	-724.026192
a	14.30332883				a	10.87760135		
c	16.82744569	fs	275 Mpa		c	12.79717806	fs	275 Mpa
					As	706.0552149 sq. mm		
As	928.4160715 sq. mm							
Spacing	200 mm (middle strip)				**Spacing**	275 mm		
Smax	200 mm (middle strip)				smax	200 mm		

DISTRIBUTION BARS (TOP)

As	144 sq. mm	Ab	113.097336 sq. mm
Spacing	775 mm		
Smax	200 mm		

Z

Two-way Slabs

III. DESIGN FOR TWO WAY SLABS

Consider Maximum moments

MAX A *short span*		MAX B *long span*	
-M NEG A	11.846	-M NEG B	5.511
M POS A TOTAL	4.956	M POS B TOTAL	3.814

Edge SLAB		Interior SLAB			
L1	4.35 m	L1	4.35 m		
L2	3.85 m	L2	4 m		
L col1	1.0875 m	L col1	1.0875 m		
L col2	0.9625 m	L col2	1 m		
L col	0.9625 m	L col	1 m	Lcol (O.C)	1
L middle	0.9625 m	L middle	1 m		

MAIN BARS

@ *Shortspan*				@ *Longspan*			
-Mu	11.846 kN-m			-Mu	5.511 kN-m		
a1	11.09645981 mm	a	-0.5	a1	4.935523788 mm	a	-0.5
a2	132.9035402 mm	b	72	a2	139.0664762 mm	b	72
		c	-737.379396			c	-343.043884
a	11.09645981 mm			a	4.935523788 mm		
c	13.0546586	fs	275 Mpa	c	5.804145632 mm		275 Mpa
As	720.2611186 sq. mm			As	320.230544		
As min 1	299.9504091 sq. mm			As min 1	299.9504091 sq. mm		
As min 2	366.5454545 sq. mm			As min 2	366.5454545 sq. mm		
As (sakto)	720.2611186 sq. mm			As (sakto)	366.5454545 sq. mm		
Spacing	275 mm (for column strip)	Ab	201.06193	**Spacing**	525 mm (for column strip)		
Smax	200			Smax	200		

Mu	4.956 kN-m			Mu	3.814 kN-m		
a1	4.420368927	a	-0.5	a1	3.3765422	a	-0.5
a2	139.5796311	b	72	a2	140.6234578	b	72
		c	-308.496732			c	-237.41052
a	4.420368927			a	3.3765422		
c	5.200434032	fs	275 Mpa	c	3.972402588	fs	275 Mpa
				As	219.1682846 sq. mm		
As	286.9221285 sq. mm						
Spacing	700 mm (middle strip)			**Spacing**	900 mm		
Smax	200 mm (middle strip)			smax	200 mm		

DISTRIBUTION BARS (TOP)

As	144 sq. mm	Ab	113.097336 sq. mm
Spacing	775 mm		
Smax	200 mm		

Beam Design (Gravity Loads)

SAMPLE COMPUTATION FOR BEAM DESIGN

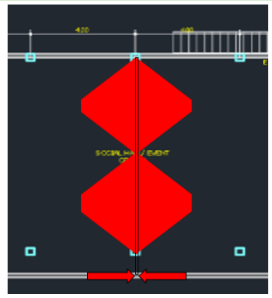
I. TRIBUTARY AREA

N-S (Middle)

Trapezoid	a	4.3 m	Ln	3.9 m
	b	0.3 m		
	h	2 m		

Tributary Area 9.2 sq. m

Total Tributary Area 18.4 sq. m



II. LOADINGS

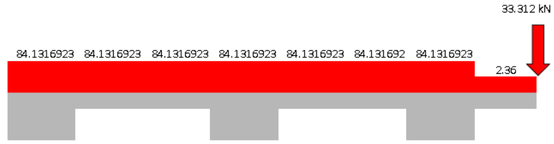
42.0658462

Super Imposed Dead Load	11.3230769	kN/m
Slab weight	11.134359	
BEAM Self Weight Dead Load	2.36	kN/m
DEAD LOAD total	24.8174359	kN/m
LIVE LOAD	33.9692308	kN/m

Wu 84.13169231 kN/m

Point Load

Pu 33.312 kN



III. THREE MOMENT EQUATION METHOD

$$M_1L_1 + 2M_2(L_1+L_2) + M_3L_2 + \frac{6A_1\bar{a}_1}{L_1} + \frac{6A_2\bar{b}_2}{L_2} = 6EI\left(\frac{h_1}{L_1} + \frac{h_3}{L_2}\right)$$

Mc 34.492 kN-m

0+2Ma(0+4.35)+Mb(4.35)+0+(w1(4.35^3)/4)

Ma(4.35)+2Mb(4.35+4.35)+Mc(4.35)+(w2(4.35^3)/4)+(w2(4.35^3)/4)

M_A	M_B	CONSTANTS
8.7	4.35	-1731.28037
4.35	17.4	-3612.60094
0.13136289	-0.03284072	-108.785568
-0.032840722	0.06568144	-180.424352

M_A	M_B	M_C
108.7855677	180.424352	34.492

108.785568 180.424352 34.492

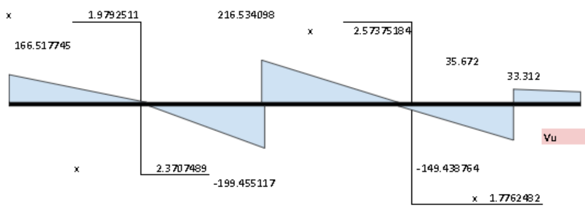
182.986431 182.986431 182.98643 182.986431 35.672

-16.4686859 16.4686859 33.547667 -33.547667

R_A 166.517745 R_B 415.989215 R_C 185.11076

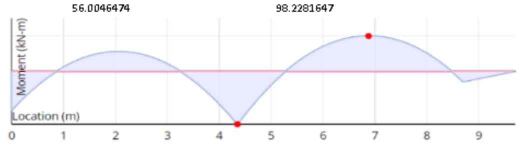
IV. SHEAR AND MOMENT DIAGRAM

SHEAR DIAGRAM



Vu 187.92932 kN

MOMENT DIAGRAM



Mu(Neg)	180.424352	kN-m
Mu(Pos)	98.2281647	kN-m

Tu 2.43564922 kN-m

II. DESIGN

@ SUPPORT

PROPERTIES:

h	500 mm	Tu	2.43564922 kN-m
d	437.5 mm	Vu	187.929322 kN
b	300 mm		
fy	420 MPa		
f'c	21 MPa		
fyt	275 MPa		
cc	40 mm		
db	25 mm		
tb	10 mm		
beta	0.85		
Es	200000 MPa		

@ SUPPORT

Mu 180.4243515 kN-m

I. DETERMINATION OF RF TYPE

cmax 187.5
amax 159.375

II. pHI

fs 800
1000 MPa
phi 0.8137931

III. Φ Mn

Φ Mn 248.5130425 kN-m — Φ Mn>Mu, SINGLY!

@ MIDSPAN

PROPERTIES:

h	500 mm	Tu	2.43564922 kN-m
d	437.5 mm	Vu	187.929322 kN
b	300 mm		
fy	420 MPa		
f'c	21 MPa		
fyt	275 MPa		
cc	40 mm		
db	25 mm		
tb	10 mm		
beta	0.85		
Es	200000 MPa		

@ MIDSPAN

Mu 98.22816465 kN-m

I. DETERMINATION OF RF TYPE

cmax 187.5
amax 159.375

II. pHI

fs 800
1000 MPa
phi 0.8137931

III. Φ Mn

Φ Mn 248.513042 kN-m — Φ Mn>Mu, SINGLY!

FOR SINGLY (SUPPORT)

IV. CAPACITY

IV.a
a -0.5
b 437.5
c -37436.3215

a1 96.12980949
a2 778.8701905

a 96.12980949 96.1298095 mm
c 113.0938935

V. Check if Yield

fs 1721.080227
fs 420 YIELD
Φ 0.9

VI. LONGITUDINAL BARS

As 1225.655071
n 2.496884007
n 3
As actual 1472.621556

VI.a
Asmin1 358.013726
Asmin2 437.5
Asmin 437.5

202500
2300

VII. Capacity

ΦMn 216.7795 kN-m
ΦMn>Mu, SAFE!

FOR SINGLY (MIDSPAN)

IV. CAPACITY

IV.a
a -0.5
b 437.5
c -20381.4015

a1 49.3718679
a2 825.628132

a 49.3718679 49.371868 mm
c 58.0845504

V. Check if Yield

fs 3919.27402
fs 420 YIELD
Φ 0.9

VI. LONGITUDINAL BARS

As 629.491315
n 1.28238918
n 2
As actual 981.747704

VI.a
Asmin1 358.013726
Asmin2 437.5
Asmin 437.5

202500
2300

VII. Capacity

ΦMn 153.1956 kN-m
ΦMn>Mu, SAFE!

VIII. CHECK FOR TORSION (SUPPORT)

Tuth 4.011543802 kN-m
Tucr 15.9495115 kN-m
Tu 2.435649216 kN-m

bf 650
Acp 150000 sq. mm
Pcp 1600 mm

Neglect Torsion
&
Torsion Need Not be Reduced

IF TORSION IS CONSIDERED

Vc 102248.7202 N
~ 102.2487202 kN

b' 175 mm
h' 437.5 mm
Aoh 76562.5 sq. mm
Ph 1225 mm

a. For solid sections

$$\sqrt{\left(\frac{V_u}{b_w d}\right)^2+\left(\frac{T_u p_h}{1.7A_{oh}^2}\right)^2} \le \phi\left(\frac{V_c}{b_w d}+0.66\sqrt{f'_c}\right) \quad (422.7.7.1a)$$

Therefore, Cross Section is Goods

1.43184249 Mpa 2.85265337 Mpa

VIII. CHECK FOR TORSION (MIDSPAN)

Tuth 4.0115438 kN-m
Tucr 15.9495115 kN-m
Tu 2.43564922 kN-m

bf 650
Acp 150000 sq. mm
Pcp 1600 mm

Neglect Torsion
&
Torsion Need Not be Reduced

IF TORSION IS CONSIDERED

Vc 102248.72 N
~ 102.24872 kN

b' 175 mm
h' 437.5 mm
Aoh 76562.5 sq. mm
Ph 1225 mm

a. For solid sections

$$\sqrt{\left(\frac{V_u}{b_w d}\right)^2+\left(\frac{T_u p_h}{1.7A_{oh}^2}\right)^2} \le \phi\left(\frac{V_c}{b_w d}+0.66\sqrt{f'_c}\right) \quad (422.7.7.1a)$$

Therefore, Cross Section is Goods

1.4318425 Mpa 2.8526534 Mpa

LONGITUDINAL REINFORCEMENT w/ TORSION (SUPPORT)

Number of Torsion bars Longitudnal 0 pcs
db torsion 0 mm -- edit if you want
db 25 mm

Almin1 614.612521 sq. mm
Almin2 587.125938 sq. mm

A'l 307.3062607
Almin 614.612521 sq. mm

Required Longitudinal Reinforcement in Influence of TORSION
Al 111.14549 sq. mm

Choose:
A's 1779.927817 sq. mm
Asmin 437.5 sq. mm

Number of Bars
Ab 490.873852 sq. mm
n 3.62603917
~ 4 pcs

LONGITUDINAL REINFORCEMENT w/ TORSION (MIDSPAN)

Number of Torsion bars Longitudnal 0 pcs
db torsion 0 mm -- edit if you want
db 25 mm

Almin1 614.612521 sq. mm
Almin2 587.125938 sq. mm

A'l 307.306261
Almin 614.612521 sq. mm

Required Longitudinal Reinforcement in Influence of TORSION
Al 111.14549 sq. mm

Choose:
A's 1289.05396 sq. mm
Asmin 437.5 sq. mm

Number of Bars
Ab 490.873852 sq. mm
n 2.6260392
~ 3 pcs

IX. SHEAR REINFORCEMENT DESIGN only

Vu	187.9293224 kN	0.33 sqrt (f'c)bwd	198.48281 kN
Vuc (concrete	76.68654015 kN		
Vus (steel)	111.2427823 kN	Use:	d/2 or 300
Vs	148.3237097 kN		
Av	157.0796327 sq. mm		
SPACING:			
Spacing 1	200 mm		
Spacing 2	300 mm		
Spacing 3	1E+21 mm		
Spacing Min1	600 mm		
Spacing Min 2	475 mm		
Spacing	200 mm		

IX. SHEAR REINFORCEMENT DESIGN only

Vu	187.929322 kN	0.33 sqrt (f'c)bwd	198.48281 kN
Vuc (concret	76.6865401 kN		
Vus (steel)	111.242782 kN	Use:	d/2 or 300
Vs	148.32371 kN		
Av	157.079633 sq. mm		
SPACING:			
Spacing 1	200 mm		
Spacing 2	300 mm		
Spacing 3	1E+21 mm		
Spacing Min	600 mm		
Spacing Min	475 mm		
Spacing	200 mm		

@ SUPPORT

SUMMARY in BEAM DESIGN

Beam Dimension	500 mm		300 mm
Tension bars	3 :s diameter of 25		
Compression bars	2 :cs diameter c 25		
Web Bars			
Stirrups Spacing	200 mm using a d 10		
Φ Mn	216.7795 kN-m	Φ Mn>Mu, SINGLY!	
		ΦMn>Mu, SAFE!	

@ MIDSPAN

SUMMARY in BEAM DESIGN

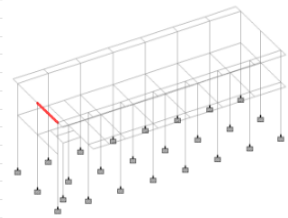
Beam Dimensio	500 mm	x	300 mm
Tension bars	2 pcs diameter of 25		
Compression ba	2 pcs diameter of 25		
Web Bars			
Stirrups Spacing	200 mm using a diar 10		
Φ Mn	153.1956 kN-m	Φ Mn>Mu, SINGLY!	
		ΦMn>Mu, SAFE!	

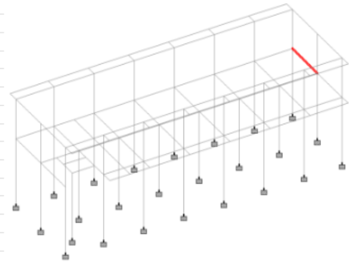
IV. DETAILING

			84.1316923	84.1316923		84.1316923	84.1316923		2.36
support reaction			166.517745		415.989215			185.110764	
moment	pos		56.0046474			98.2281647			
	neg	108.7855677		180.424352					34.492
Top Reinforcement									
				2.04231135					
				2.1					
				2.1					
				2.4					
				2.4 m					
Bottom Reinforcments			2.30768865			3.05621002			
			2.4			3.1			
			2.4			3.1			
			2.4 m			3.1 m			

SEISMIC LOADS USING RESPONSE SPECTRUM ANALYSIS (STAAD PRO 2023)

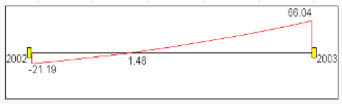
CRITICAL ROOFBEAM (E-W)	CRITICAL 2F BEAM (N-S)





Load Combination 1 = 1.42DL + 0.5LL +1.1SEISMIC-H(1) (Positive X-Axis)

Critical Roofbeam (E-W)



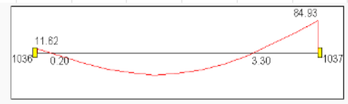
Section Forces

Dist. m	Fy kN	Mz kN-m
2.508	-21.817	20.084
2.867	-23.350	28.176
3.225	-24.882	36.818
3.583	-26.415	46.009
3.942	-27.948	55.749
4.300	-29.480	66.038

Dist. m	Fy kN	Mz kN-m
0.000	-11.089	-21.186

Selection Type
Load Case : 101:COMB - 1.42 D
Bending - Z | Bending - Y | Shear - Y | Shear - Z

Critical 2F Beam (N-S)



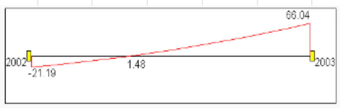
Section Forces

Dist. m	Fy kN	Mz kN-m
2.508	-32.237	-44.892
2.867	-55.424	-27.954
3.225	-66.424	-5.884
3.583	-81.009	21.580
3.942	-89.858	52.063
4.300	-93.689	84.933

Dist. m	Fy kN	Mz kN-m
0.000	59.588	11.615

Selection Type
Load Case : 101:COMB - 1.42 D
Bending - Z | Bending - Y | Shear - Y | Shear - Z

Load Combination 1 = 1.42DL + 0.5LL +1.1SEISMIC-H(1) (Positive X-Axis)

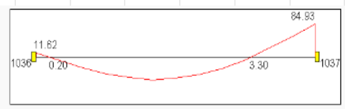


Section Forces

Dist. m	Fy kN	Mz kN-m
2.508	-21.817	20.084
2.867	-23.350	28.176
3.225	-24.882	36.818
3.583	-26.415	46.009
3.942	-27.948	55.749
4.300	-29.480	66.038

Dist. m	Fy kN	Mz kN-m
0.000	-11.089	-21.186

Selection Type
Load Case : 101:COMB - 1.42 D
Bending - Z | Bending - Y | Shear - Y | Shear - Z



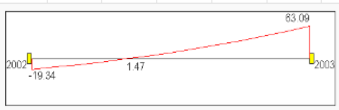
Section Forces

Dist. m	Fy kN	Mz kN-m
2.508	-32.237	-44.892
2.867	-55.424	-27.954
3.225	-66.424	-5.884
3.583	-81.009	21.580
3.942	-89.858	52.063
4.300	-93.689	84.933

Dist. m	Fy kN	Mz kN-m
0.000	59.588	11.615

Selection Type
Load Case : 101:COMB - 1.42 D
Bending - Z | Bending - Y | Shear - Y | Shear - Z

Load Combination 2 = 1.42DL + 0.5LL +1.1SEISMIC-H(2) (Negative X-Axis)

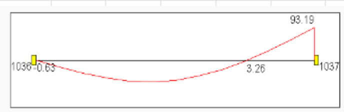


Section Forces

Dist. m	Fy kN	Mz kN-m
2.508	-20.703	19.136
2.867	-22.236	26.829
3.225	-23.768	35.071
3.583	-25.301	43.863
3.942	-26.834	53.204
4.300	-28.366	63.094

Dist. m	Fy kN	Mz kN-m
0.000	-9.975	-19.340

Selection Type
Load Case : 102:COMB - 1.42 D
Bending - Z | Bending - Y | Shear - Y | Shear - Z



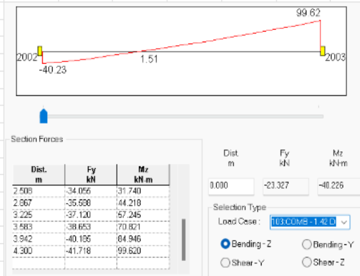
Section Forces

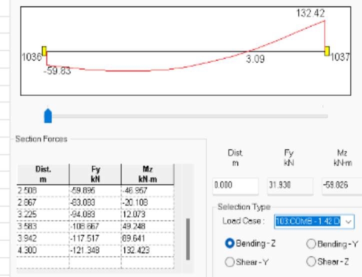
Dist. m	Fy kN	Mz kN-m
2.508	-37.003	-45.180
2.867	-60.191	-26.534
3.225	-71.191	-2.556
3.583	-85.776	26.416
3.942	-94.625	58.607
4.300	-98.456	93.186

Dist. m	Fy kN	Mz kN-m
0.000	54.821	-0.629

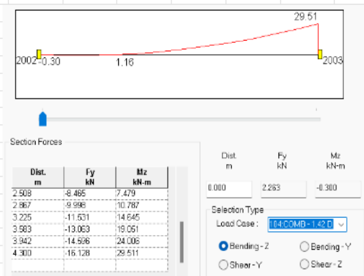
Selection Type
Load Case : 102:COMB - 1.42 D
Bending - Z | Bending - Y | Shear - Y | Shear - Z

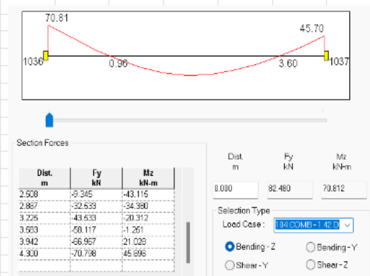
Load Combination 3 = 1.42DL + 0.5LL +1.1SEISMIC-H(2) (Positive Z-Axis)





Load Combination 4 = 1.42DL + 0.5LL +1.1SEISMIC-H(2) (Negative Z-Axis)





MOMENT COMPARISON (SEISMIC AND GRAVITY)

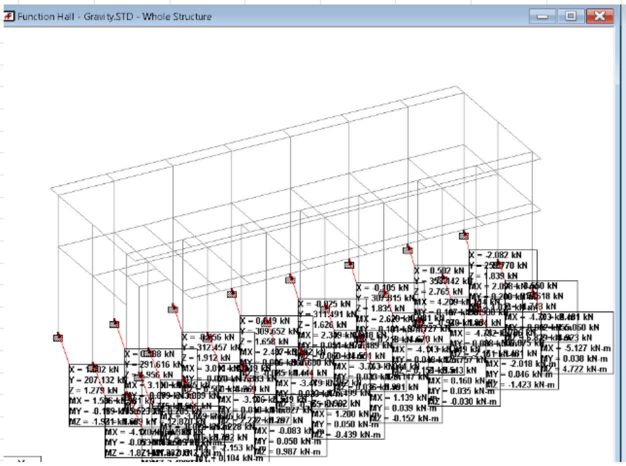
SEISMIC		SEISMIC	
Load Combination 3 = 1.42DL + 0.5LL +1.1SEISMIC-H(2) (Positive Z-Axis)		Load Combination 3 = 1.42DL + 0.5LL +1.1SEISMIC-H(2) (Positive Z-Axis)	
Mmax	99.62 kN-m	Mmax	132.42 kN-m
GRAVITY		GRAVITY	
Load Combination = 1.2DL + 1.6LL		Load Combination = 1.2DL + 1.6LL	
Mmax	179.0804 kN-m	Mmax	179.0804 kN-m
Since Seismic<Gravity, Redesigning is Unecessary		Since Seismic<Gravity, Redesigning is Unecessary	

Design of Column with Axial and Bending in its Weak Axis

GRAVITY - AXIAL LOAD

Ultimate

Fy	500.875 kN



Function Hall - Gravity.STD - Support Reactions:

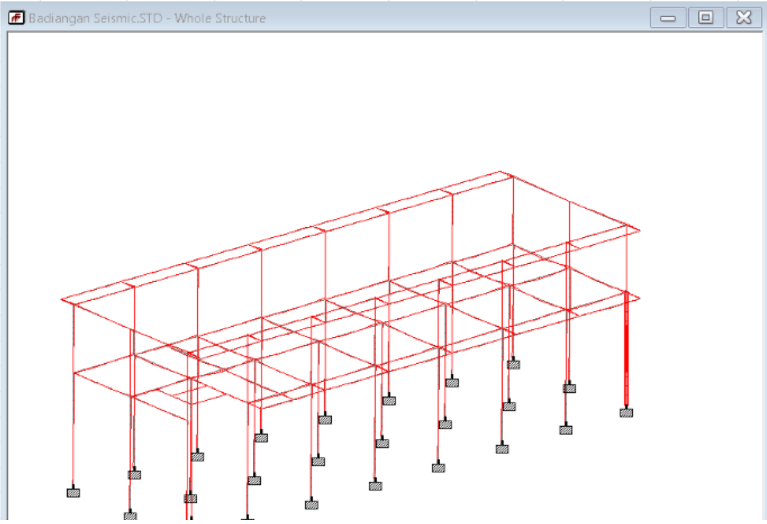
All | Summary | Envelope

			Horizontal	Vertical	Horizontal	Mome
	Node	L/C	Fx kN	Fy kN	Fz kN	Mx kN-m
Max Fx	18	101 COMB - 1	**2.625**	252.228	-0.792	-2.153
Min Fx	16	101 COMB - 1	**-3.550**	319.618	-1.743	-4.793
Max Fy	23	101 COMB - 1	0.706	**500.875**	-0.481	-2.018
Min Fy	106	101 COMB - 1	0.205	**12.870**	-0.338	-0.797
Max Fz	7	101 COMB - 1	0.502	353.142	**2.765**	4.209
Min Fz	24	101 COMB - 1	-2.481	356.060	**-1.923**	-5.127
Max Mx	7	101 COMB - 1	0.502	353.142	2.765	**4.209**
Min Mx	24	101 COMB - 1	-2.481	356.060	-1.923	**-5.127**
Max My	17	101 COMB - 1	0.687	143.519	-1.332	-3.420
Min My	1	101 COMB - 1	1.002	207.132	1.279	1.586
Max Mz	16	101 COMB - 1	-3.550	319.618	-1.743	-4.793
Min Mz	18	101 COMB - 1	2.625	252.228	-0.792	-2.153

BENDING FOR COLUMNS

Seismic

Max Mu	56.907 kN-m



Badiangan Seismic.STD - Beam Force Detail:

All | Max Axial Forces | Max Bending Moments | Max Shear Forces

Beam	L/C	Dist m	Fy kN	Fz kN	Mx kN-m	My kN-m	Mz kN-m
88	101 COMB - 1.	0.000	19.697	0.681	-0.279	-2.557	56.907
		1.450	19.697	0.681	-0.279	-1.569	28.347
		2.900	19.697	0.681	-0.279	-0.582	-0.213
		4.350	19.697	0.681	-0.279	0.406	-28.773
		5.800	19.697	0.681	-0.279	1.394	-57.333
	102 COMB - 1.	0.000	-16.024	-3.327	0.346	9.326	-50.051
		1.450	-16.024	-3.327	0.346	4.502	-26.816
		2.900	-16.024	-3.327	0.346	-0.323	-3.580
		4.350	-16.024	-3.327	0.346	-5.147	19.655
		5.800	-16.024	-3.327	0.346	-9.972	42.891
	103 COMB - 1.	0.000	1.579	-18.860	0.137	56.689	2.718
		1.450	1.579	-18.860	0.137	29.341	0.429
		2.900	1.579	-18.860	0.137	1.993	-1.860
		4.350	1.579	-18.860	0.137	-25.355	-4.149
		5.800	1.579	-18.860	0.137	-52.703	-6.438
	104 COMB - 1.	0.000	2.094	16.214	-0.069	-49.919	4.139
		1.450	2.094	16.214	-0.069	-26.408	1.103
		2.900	2.094	16.214	-0.069	-2.897	-1.933
		4.350	2.094	16.214	-0.069	20.614	-4.969
		5.800	2.094	16.214	-0.069	44.125	-8.005
	105 COMB - 1.	0.000	19.113	1.128	-0.287	-3.666	55.813
		1.450	19.113	1.128	-0.287	-2.030	28.098
		2.900	19.113	1.128	-0.287	-0.395	0.384
		4.350	19.113	1.128	-0.287	1.241	-27.331
		5.800	19.113	1.128	-0.287	2.876	-55.045
	106 COMB - 1.	0.000	-16.608	-2.881	0.338	8.218	-51.145
		1.450	-16.608	-2.881	0.338	4.041	-27.064

SAMPLE COMPUTATION FOR COLUMN ANALYSIS

Parameters

fy	275 MPa		Preliminary Column Design			
f'c	21 MPa		b	0.3 m	300	
db	20 mm		b	0.3 m	300	
dt	10 mm		Ag	0.09 m2	90000 mm2	
pg	0.025		Bars	8 pcs		
Φtied	0.8		d	260 mm		
cc	40 mm		As(Total)	2513.274 mm2		
β	0.85		As	1256.637 mm2		
			As'	1256.637 mm2		

Loadings

Pu (Gravity)	500.875 kN
Mu (Seismic)	56.907 kN-m
e	113.6152 mm

Axial Resistance (Po)

pg	0.027925	
Po	2185088 N	2185.0875 kN
Pr	1748070 N	1748.07 kN

Since Axial Resistance>Axial Demand, Safe!

Moment Resistance

c	178.2857 mm	
a	151.5429 mm	
	Assuming fy = fs = fs'	
Pb	811512 N	811.512 kN
eb	277.9136 mm	

Since e<eb, Compression Controlled

RECOMPUTING c

Summation of Vertical Forces

T	1256.637
Cc	4551.75 c
Cs	345575.2

$$T = As\left(600 \cdot \frac{d-c}{c}\right)$$

$$Cc = 0.85 f'c \beta_1 cb$$

$$Cs = A'sfy$$

$$T\left(600 \cdot \frac{d-c}{c}\right) + P_N = Cc + Cs$$

Moment at a point

$$P_N = \frac{Cc\left[d - cc - \frac{\beta_1 c}{2}\right] + Cs\left[d - 2cc\right]}{e}$$

Final Equation

$$T\left(600\cdot\frac{d-c}{c}\right)+\left[\frac{Cc\left[d-cc-\frac{\beta_1 c}{2}\right]+Cs\left[d-2cc\right]}{e}\right]=Cc+Cs$$

c	280.8418 mm					
Design Capacity						
Pn	1679852 N	1679.85203 kN	>	Pu	500.875 kN
Mn	4.67E+08 N-mm	466.853761 kN	>	Mu	56.907 kN-m

Since Axial Capacity>Axial Demand, Safe!

Since Moment Capacity>Moment Demand, Safe!

Lateral Tie Spacing	
smin1	320 mm
smin2	480 mm
smin3	300 mm
s	300 mm

Square Column Design Summary

Dimension:

300 mm x 300

Reinforcement

8 - 20 mm ⌀ vertical bars

Lateral Ties

10 mm ⌀ Lateral Ties spaced at 300 mm

SAMPLE COMPUTATION FOR ISOLATED SQUARE FOOTING DESIGN

Parameters			
f'c	21 MPa	COL	300x300
fy	420 MPa	a	0.3 m
γc	23.6 kN/m3		
qa	281.82 kPa		
Pdl	35.49997436 kN		
Pll	123.84 kN		
Φshear	0.85		
Φflexure	0.9		
Φbearing	0.7		
cc	70 mm		
db	25 mm		

Footing Weight			
Assume wt	10%		
Assumed Weight	15.93399744 kN		
Total Assumed Weight	175.2739718 kN		
Footing Area			
Required Area	0.621930722 m2		
L	0.788625844	0.8 m	
Pu	240.7439692 kN		
qu	376.1624519 kPa		
Footing Depth			
Vc	0.763762616 MPa		
x	0.25 m		
de	0.091714667	91.71466708 mm	92 mm
dt	200 mm		

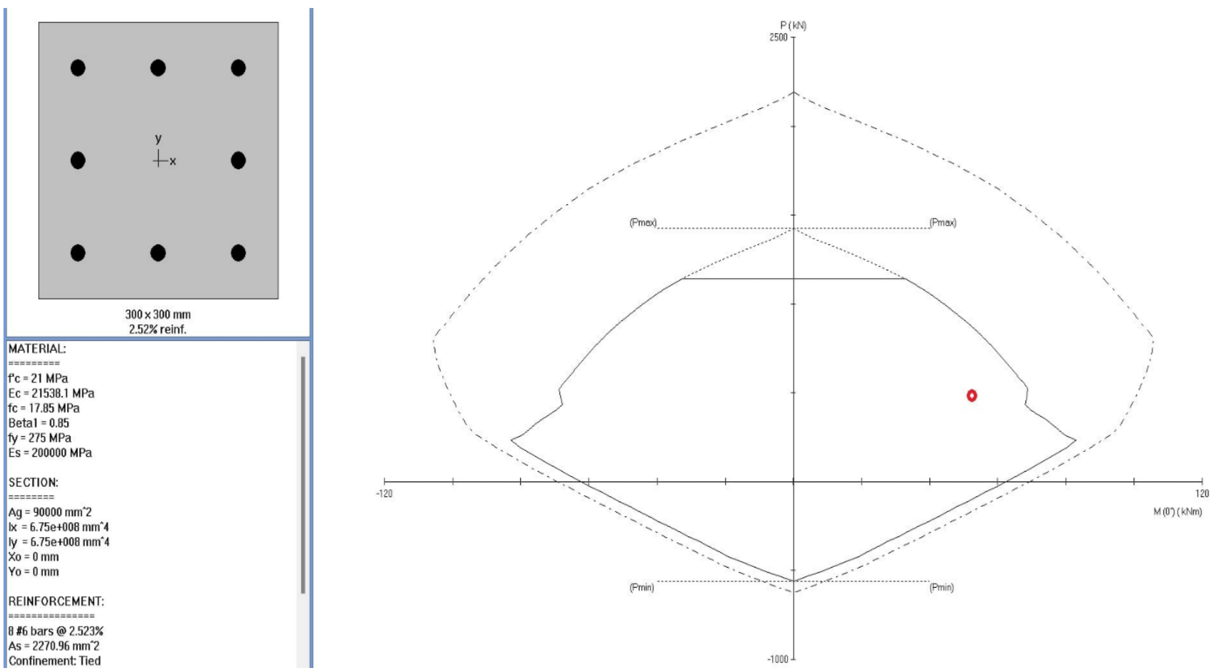
Check Footing Weight		
Actual Weight	3.0208 kN	
Since Actual Weight<Assumed Weight, Safe!		

Check Punching Shear		
$v_p = \frac{V_p}{\phi b_o d}$		
Be	0.55 m	
Vu	126.9548275 KN	
Vpunching	0.271561128 MPa	
Vallowable	1.527525232 MPa	
Since Allowable Shear>Punching Shear, Safe!		

Check Development Length		
LDrequired	899.7866336	900 mm
LDmininimum	630	630 mm
Since Required Developmental Length>Minimum Developmental Length, Adopt Required Developmental Length!		
LD	900 mm	
LDavailable	480 mm	
Since Developmental Length>Available Developmental Length, Hooks are needed!		

Check Dowels		
Asmin	450 mm2	
Dowels	4 pcs	
db	11.96826841	12 mm
LDreq	274.9545417	275 mm
LDmin1	201.6	202 mm
LDmin2	200 mm	
LDmin	202 mm	
Since Required Developmental Length>Minimum Developmental Length, Adopt Required Developmental Length!		
LD	275 mm	

Check Bearing Capacity of Footing at the base of Column				
A1	90000 mm2			
A2	444700.4835 mm2			
Check Ratio	2.222862228	2		
Fb	2249100 N		Pu	240.743969 kN
Fb	2249.1 kN			
Since Bearing Capacity (Fb)>Ultimate Load (Pu), Safe!				
Isolated Square Footing Design Summary				
Dimensions:				
0.8 m	x	0.8 m	x	0.2 m
Reinforcement:				
4	-	25 mm ø bars both ways		
Development Length				
For Footing Reinforcement:	0.66 mm	with	90 Degree Hook	
For Dowels:	275 mm			
4	-	12 mm ø bars		



APPENDIX G

Bill of Quantities

PROJECT TITLE: **PROPOSED LOCAL YOUTH DEVELOPMENT CENTER AND PUBLIC LIBRARY WITH FUNCTION HALL IN BADIANGAN, ILOILO**
LOCATION **BADIANGAN, ILOILO**

BILL OF QUANTITIES

ITEM NO.	ITEMS OF WORK	QTY	UNIT	UNIT COST	TOTAL
I.	**GENERAL REQUIREMENTS**				
	Permits	1.00	l.s	99,120.00	99,120.00
	Billboard/Signboard	2.00	each	13,529.88	13,529.88
	Occupational Safety and Health	7.18	mos	52,642.09	377,895.00
	Mobilization/Demobilization	1.00	l.s	70,623.00	70,623.00
	Lay-outing/Staking	309.75	sq.m	52.00	16,107.00
	SUBTOTAL				**577,274.88**
II.	**FACILITIES FOR THE ENGINEER**				
	Provision of the Office for the Engineer	50.00	sq.m	1,239.00	61,950.00
	Operation & Maintenance of the Office for the Engineer	7.18	mos	10,520.26	75,520.43
	SUBTOTAL				**137,470.43**
III.	**CIVIL, ELECTRICAL, AND PLUMBING WORKS**				
PART A	**SITE WORKS**				
	Clearing & Grubbing	359.19	sq.m	162.05	58,208.22
	Demolition Works	237.36	sq.m	770.69	182,930.00
	Excavation	41.27	cu.m	1,590.74	65,642.22
	Embankment from Excavation	37.51	cu.m	2,387.67	89,570.52
	Embankment from Borrow	63.29	cu.m	1,598.08	101,136.36
	Gravel Bedding	9.86	cu.m	4,051.09	39,944.20
	Soil Poisoning	359.19	sq.m	14.97	5,377.26
	SUBTOTAL				**542,808.78**
PART B	**CONCRETE WORKS**				
	Footing	24.87	cu.m	8,686.97	216,045.05
	Elevator Shaft	5.68	cu.m	8,456.61	48,033.55
	Column	32.72	cu.m	9,649.61	315,773.77
	Beams & Girders	37.51	cu.m	9,108.83	341,685.75
	Roof Beams	10.85	cu.m	9,053.73	98,269.18
	Tie Beams	8.96	cu.m	8,396.16	75,229.60
	Slab	47.85	cu.m	8,785.08	420,323.34
	Concrete Canopies & Balcony	18.32	cu.m	7,468.53	136,800.06
	Concrete Stairs	6.40	cu.m	9,043.40	57,902.64
	SUBTOTAL				**1,710,062.95**
PART C	**STEELWORKS**				
	Footing	3,225.53	kg	89.90	289,985.47
	Columns	5,534.25	kg	89.58	495,756.11
	Beams & Girders	9,035.80	kg	89.66	810,131.30
	Roof Beams	4,242.19	kg	84.03	356,491.28
	Tie Beams	1,689.44	kg	87.81	148,356.62
	Slab	5,308.18	kg	88.50	469,773.05
	Canopies	218.06	kg	84.69	18,467.30
	CHB Walls	5,779.18	kg	87.63	506,452.40
	Elevator Shaft	1,049.66	kg	89.51	93,953.37
	Stair Railings	8,012.03	kg	88.70	710,640.84
	Overhead Water Tank Steel Frame	1,265.68	kg	43.87	55,527.02
	Concrete Stairs	724.61	kg	92.30	66,881.22
	SUBTOTAL				**4,022,415.98**
PART D	**FORMWORKS & SCAFFOLDINGS**				
	Columns	235.20	sq.m	2,042.57	480,411.32
	Beams & Girders	322.70	sq.m	794.15	256,273.16
	Roof Beams	245.48	sq.m	796.36	195,489.25
	Slab	11.18	sq.m	4,905.96	54,848.63

	Canopies	41.61	sq.m	1,030.80	42,894.06
	Concrete Stairs	56.97	sq.m	1,417.08	80,731.26
	SUBTOTAL				**1,110,647.67**
PART E	**MASONRY WORKS**				
	Ground Floor Walls	607.32	sq.m	1,064.63	646,564.40
	Second Floor Walls	236.12	sq.m	1,118.98	264,212.59
	Parapet Walls	116.40	sq.m	1,029.02	119,778.09
	SUBTOTAL				**1,030,555.08**
PART F	**PLASTERING WORKS**				
	Ground Floor Walls	561.59	sq.m	255.11	143,267.13
	Second Floor Walls	531.92	sq.m	275.77	146,687.69
	Parapet Walls	116.40	sq.m	822.47	95,735.30
	Concrete Stairs	12.47	sq.m	1,108.69	13,823.68
	SUBTOTAL				**399,513.80**
PART G	**TILEWORKS**				
	Slab Floor Tiles	459.05	sq.m	1,077.17	494,469.18
	Stair Floor Tiles	13.50	sq.m	2,927.71	39,524.10
	SUBTOTAL				**533,993.28**
PART H	**ROOF & CEILINGWORKS**				
	Steel Truss Rafter	35.28	sq.m	9,731.28	343,319.47
	Roofsheets	287.79	sq.m	261.61	75,289.07
	Ceiling	430.73	sq.m	765.16	329,574.00
	SUBTOTAL				**748,182.54**
PART I	**PAINTWORKS**				
	Interior Walls with Columns	751.19	sq.m	238.38	179,066.48
	Exterior Walls with Columns	342.32	sq.m	435.55	149,095.07
	Canopies & Stairs	54.08	sq.m	726.82	39,307.28
	Steel Truss Rafter	91.11	sq.m	237.09	21,601.97
	Ceiling	484.27	sq.m	333.33	161,423.12
	SUBTOTAL				**550,493.90**
PART J	**GLASSWORKS/FABRICATED MATERIALS**				
	Windows	40.00	sets	24,632.56	985,302.36
	Doors	17.00	sets	39,446.84	670,596.36
	SUBTOTAL				**1,655,898.72**
PART K	**ELECTRICAL WORKS**				
	Luminaire and Lighting	1.00	lot	322,988.72	322,988.72
	Conduits/Fittings	1.00	lot	183,010.52	183,010.52
	Wiring Device and Fixtures	1.00	lot	192,873.89	192,873.89
	SUBTOTAL				**698,873.13**
PART L	**PLUMBING WORKS**				
	Cold Water Line	1.00	lot	120989.59	120,989.59
	Sanitary Line	1.00	lot	517159.56	517,159.56
	Plumbing Fixtures	1.00	lot	448561.37	448,561.37
	SUBTOTAL				**1,086,710.52**
PART M	**FIRE DETECTION & ALARM SYSTEM**				
	Devices and Pumps	1.00	lot	404719.35	404,719.35
	Pipes Fittings & Accessories	1.00	lot	233902.14	233,902.14
	Valves	1.00	lot	167717.24	167,717.24
	SUBTOTAL				**806,338.72**
				TOTAL PROJECT COST =	**15,611,240.37**

29234.53253 per sq.m

DETAILED ESTIMATES

Item No.	Description	Quantity	Unit	Unit Price	Amount
I.	**GENERAL REQUIREMENTS**				
	A. Materials				
	Permits	1.00	l.s	80,000.00	80,000.00
	Materials				80,000.00
				Material Cost	80,000.00
				Direct Cost =	80,000.00
				Indirect Cost (OCM) =	8,000.00
				Indirect Cost (Contractor's Profit) =	6,400.00
				Vat =	4,720.00
				Sub Total =	**99,120.00**
	Billboard/Signboard	2.00	each		
	A. Materials				
	1.2m x 2.4m x 0.0065mm THK oridinary plywood	6.00	pcs	395.00	2,370.00
	2" x 2" x 8' Coco Lumber	30.00	pcs	50.00	1,500.00
	Assorted CW Nails	2.00	kg	95.00	190.00
	Tarpaulin (4' x 8')	64.00	ft2	35.00	2,240.00
	Materials				6,300.00
	B. Man Power Consumption				
1	Foreman	1.00	days	900.00	900.00
6	Laborers	1.00	days	550.00	3,300.00
	Labor				4,200.00
	C. Equipment				
	Minor Tools (10%)				420.00
	Equipment Rentals				420.00
				Material Cost	6,300.00
				Labor Cost	4,200.00
				Equipment Rentals	420.00
				Direct Cost =	10,920.00
				Indirect Cost (OCM - 10%) =	1,092.00
				Indirect Cost (Contractor's Profit - 8%) =	873.60
				Vat (5%) =	644.28
				Sub Total =	**13,529.88**
	Occupational Safety and Health	7.18	mo.s		
	A. Materials				
	Personal Protective Equipment (PPE)	1.00	lot	105,000.00	105,000.00
	Safety Signages & Barriers	1.00	lot	10,000.00	10,000.00
	Medical Exam & First Aid Kits	1.00	lot	40,000.00	40,000.00
	Materials				155,000.00
	B. Man Power Consumption				
	Full-Time Safety Officer	1.00	lot	150,000.00	150,000.00
	Labor				150,000.00
				Material Cost	155,000.00
				Labor Cost	150,000.00
				Direct Cost =	305,000.00
				Indirect Cost (OCM - 10%) =	30,500.00
				Indirect Cost (Contractor's Profit - 8%) =	24,400.00
				Vat (5%) =	17,995.00
				Sub Total =	**377,895.00**
	Mobilization/Demobilization	1.00	l.s	57,000.00	57,000.00
	Materials				57,000.00
				Material Cost	57,000.00
				Direct Cost =	57,000.00
				Indirect Cost (OCM - 10%) =	5,700.00
				Indirect Cost (Contractor's Profit - 8%) =	4,560.00
				Vat (5%) =	3,363.00
				Sub Total =	**70,623.00**
	Lay-outing/Staking	**309.75**	**sq.m**		
	A. Materials				
	2"x2"x8' Coco Lumber	27.00	pcs	50.00	1,350.00
	Nylon String	11.00	roll	75.00	825.00
	Assorted CW Nails	5.00	kgs	90.00	450.00
	Materials				2,625.00

	B. Man Power Consumption				
1	Foreman	1.00	days	900.00	900.00
6	Laborers	1.00	days	550.00	3,300.00
	Labor				4,200.00
	C. Equipment				
	Minor Tools (10%)				420.00
	Equipment Rentals				420.00

Material Cost	2,625.00
Labor Cost	4,200.00
Equipment Rentals	420.00
Direct Cost =	6,825.00
Indirect Cost (OCM - 10%) =	682.50
Indirect Cost (Contractor's Profit - 8%) =	546.00
Vat (5%) =	8,053.50
Sub Total =	**16,107.00**

II.	**FACILITIES FOR THE ENGINEER**				
	A. Materials				
	Provision of the Office for the Engineer	50.00	sq.m	1,000.00	50,000.00
	Materials				50,000.00

Material Cost	50,000.00
Direct Cost =	50,000.00
Indirect Cost (OCM - 10%) =	5,000.00
Indirect Cost (Contractor's Profit - 8%) =	4,000.00
Vat (5%) =	2,950.00
Sub Total =	**61,950.00**

	Operation & Maintenance of the Office for the Engineer	7.18	mos		
	A. Bills				
	Water Bill	24.36	cu.m	19.41	472.73
	Electricity Bill	5,040.00	kwh	12.00	60,480.00
	Bills				60,952.73

Billing Cost	60,952.73
Direct Cost =	60,952.73
Indirect Cost (OCM - 10%) =	6,095.27
Indirect Cost (Contractor's Profit - 8%) =	4,876.22
Vat (5%) =	3,596.21
Sub Total =	**75,520.43**

III.	**CIVIL, ELECTRICAL, AND PLUMBING WORKS**				
PART A.1	**SITE WORKS**				
	A. Equipment				
	Clearing & Grubbing	359.19	sq.m		
1	Plate Compactor	2.00	days	1,000.00	2,000.00
1	Backhoe (0.5 cu.m)	2.00	days	16,000.00	32,000.00
	Minor Tools (10%)				1,180.00
	Equipment Rentals				35,180.00
	B. Man Power Consumption				
1	Construction Foreman	2.00	days	900.00	1,800.00
8	Laborers	2.00	days	550.00	8,800.00
1	Equipment Operator	2.00	days	600.00	1,200.00
	Labor				11,800.00

Labor Cost	11,800.00
Equipment Rentals	35,180.00
Direct Cost =	46,980.00
Indirect Cost (OCM - 10%) =	4,698.00
Indirect Cost (Contractor's Profit - 8%) =	3,758.40
Vat (5%) =	2,771.82
Sub Total =	**58,208.22**

PART A.2	**DEMOLITION WORKS**	**237.36**	**sq.m**		
	A. Equipment				
2	Jack Hammer	6.00	days	1,500.00	18,000.00
1	Backhoe (0.5 cu.m)	2.00	days	56,000.00	112,000.00
	Minor Tools (10%)				3,300.00
	Equipment Rentals				133,300.00
	B. Man Power Consumption				
1	Construction Foreman	6.00	days	900.00	5,400.00
8	Laborers	6.00	days	550.00	26,400.00
1	Equipment Operator	2.00	days	600.00	1,200.00
	Labor				33,000.00

Labor Cost	33,000.00

Equipment Rentals	133,300.00
Direct Cost =	166,300.00
Indirect Cost (OCM - 10%) =	16,630.00
Indirect Cost (Contractor's Profit - 8%) =	133,040.00
Vat (5%) =	15,798.50
Sub Total =	**182,930.00**

PART A.4	EXCAVATION	41.27	cu.m		
	A. Equipment				
1	Backhoe (0.5 cu.m)	2.00	days	20,000.00	40,000.00
	Minor Tools (10%)				1,180.00
	Equipment Rentals				41,180.00
	B. Man Power Consumption				
1	Construction Foreman	2.00	days	900.00	1,800.00
8	Laborers	2.00	days	550.00	8,800.00
1	Equipment Operator	2.00	days	600.00	1,200.00
	Labor				11,800.00

Labor Cost	11,800.00
Equipment Rentals	41,180.00
Direct Cost =	52,980.00
Indirect Cost (OCM - 10%) =	5,298.00
Indirect Cost (Contractor's Profit - 8%) =	4,238.40
Vat (5%) =	3,125.82
Sub Total =	**65,642.22**

PART A.5	EMBANKMENT FROM EXCAVATION	37.51	cu.m		
	A. Materials				
	Common Borrow	37.51	cu.m	550.00	20,632.59
	Materials				20,632.59
	B. Man Power Consumption				
1	Foreman	2.00	m.d	900.00	1,800.00
8	Laborers	2.00	days	550.00	8,800.00
	Labor				10,600.00
	C. Equipment				
1	Backhoe (0.5 cu.m)	2.00	days	20,000.00	40,000.00
	Minor Tools (10%)				1,060.00
	Equipment Rentals				41,060.00

Material Cost	20,632.59
Labor Cost	10,600.00
Equipment Rentals	41,060.00
Direct Cost =	72,292.59
Indirect Cost (OCM - 10%) =	7,229.26
Indirect Cost (Contractor's Profit - 8%) =	5,783.41
Vat (5%) =	4,265.26
Sub Total =	**89,570.52**

PART A.6	EMBANKMENT FROM BORROW	63.29	cu.m		
	A. Materials				
	Common Borrow	63.29	cu.m	550.00	34,807.41
	Materials				34,807.41
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
4	Laborers	2.00	days	550.00	4,400.00
8	**Labor**				6,200.00
	C. Equipment				
1	Backhoe (0.5 cu.m)	2.00	days	20,000.00	40,000.00
	Minor Tools (10%)				620.00
	Equipment Rentals				40,620.00

Material Cost	34,807.41
Labor Cost	6,200.00
Equipment Rentals	40,620.00
Direct Cost =	81,627.41
Indirect Cost (OCM - 10%) =	8,162.74
Indirect Cost (Contractor's Profit - 8%) =	6,530.19
Vat (5%) =	4,816.02
Sub Total =	**101,136.36**

PART A.7	GRAVEL BEDDING	9.86	cu.m		
	A. Materials				
	Crushed Gravel	9.86	cu.m	650.00	6,409.07
	Materials				6,409.07

	B. Man Power Consumption				
1	Foreman	1.00	days	900.00	900.00
8	Laborers	1.00	days	550.00	4,400.00
	Labor				5,300.00
	C. Equipment				
1	Backhoe (0.5 cu.m)	1.00	days	20,000.00	20,000.00
	Minor Tools (10%)				530.00
	Equipment Rentals				20,530.00
				Material Cost	6,409.07
				Labor Cost	5,300.00
				Equipment Rentals	20,530.00
				Direct Cost =	32,239.07
				Indirect Cost (OCM - 10%) =	3,223.91
				Indirect Cost (Contractor's Profit - 8%) =	2,579.13
				Vat (5%) =	1,902.10
				Sub Total =	**39,944.20**

PART A.5	**SOIL POISONING**	**359.19**	**sq.m**		
	A. Materials				
	Soil Poisoning	309.75	sq.m	150.00	46,462.50
	Materials				46,462.50
	B. Man Power Consumption				
1	Foreman	1.00	days	900.00	900.00
4	Laborers	1.00	days	550.00	2,200.00
	Labor				3,100.00
				Material Cost	46,462.50
				Labor Cost	3,100.00
				Direct Cost =	1,240.00
				Indirect Cost (OCM - 10%) =	4,340.00
				Indirect Cost (Contractor's Profit - 8%) =	434.00
				Vat (5%) =	347.20
				Sub Total =	256.06
					5,377.26

PART B	**CONCRETE WORKS**				
	CONCRETE SLAB	**47.85**	**cu.m**		
	A. Materials				
	Portland Cement	431.00	bags	286.00	123,266.00
	Washed Gravel	23.92	cu.m	1,400.00	33,491.60
	Washed Sand	47.85	cu.m	1,250.00	59,806.43
	Materials				216,564.02
	B. Man Power Consumption				
1	Foreman	4.00	days	900.00	3,600.00
16	Laborers	4.00	days	550.00	35,200.00
	Labor				38,800.00
	C. Equipment				
2	Concrete Batching Truck including Fuel and Lubricants	4.00	days	8,000.00	64,000.00
4	Concrete Vibrator including Fuel and Lubricants	4.00	days	1,000.00	16,000.00
	Minor Tools (10%)				3,880.00
	Equipment Rentals				83,880.00
				Material Cost	216,564.02
				Labor Cost	38,800.00
				Equipment Rentals	83,880.00
				Direct Cost =	339,244.02
				Indirect Cost (OCM - 10%) =	33,924.40
				Indirect Cost (Contractor's Profit - 8%) =	27,139.52
				Vat (5%) =	20,015.40
				Sub Total =	**420,323.34**

	CONCRETE BEAMS & GIRDERS	**37.51**	**cu.m**		
	A. Materials				
	Portland Cement	338.00	bags	286.00	96,668.00
	Washed Gravel	18.76	cu.m	1,400.00	26,258.05
	Washed Sand	37.51	cu.m	1,250.00	46,889.38
	Materials				169,815.43
	B. Man Power Consumption				
1	Foreman	12.00	days	900.00	10,800.00
8	Laborers	12.00	days	550.00	52,800.00
	Labor				63,600.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	12.00	days	2,000.00	24,000.00
1	Concrete Vibrator including Fuel and Lubricants	12.00	days	1,000.00	12,000.00

	Minor Tools (10%)				6,360.00
	Equipment Rentals				42,360.00
				Material Cost	169,815.43
				Labor Cost	63,600.00
				Equipment Rentals	42,360.00
				Direct Cost =	275,775.43
				Indirect Cost (OCM - 10%) =	27,577.54
				Indirect Cost (Contractor's Profit - 8%) =	22,062.03
				Vat (5%) =	16,270.75
				Sub Total =	**341,685.75**

	CONCRETE COLUMNS	**32.72**	**cu.m**		
	A. Materials				
	Portland Cement	295.00	bags	286.00	84,370.00
	Washed Gravel	16.36	cu.m	1,400.00	22,906.80
	Washed Sand	32.72	cu.m	1,250.00	40,905.00
	Materials				148,181.80
	B. Man Power Consumption				
1	Foreman	14.00	days	900.00	12,600.00
6	Laborers	14.00	days	550.00	46,200.00
	Labor				58,800.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	14.00	days	2,000.00	28,000.00
1	Concrete Vibrator including Fuel and Lubricants	14.00	days	1,000.00	14,000.00
	Minor Tools (10%)				5,880.00
	Equipment Rentals				47,880.00
				Material Cost	148,181.80
				Labor Cost	58,800.00
				Equipment Rentals	47,880.00
				Direct Cost =	254,861.80
				Indirect Cost (OCM - 10%) =	25,486.18
				Indirect Cost (Contractor's Profit - 8%) =	20,388.94
				Vat (5%) =	15,036.85
				Sub Total =	**315,773.77**

	CONCRETE STAIRS	**6.40**	**cu.m**		
	A. Materials				
	Portland Cement	58.00	bags	286.00	16,588.00
	Washed Gravel	3.20	cu.m	1,400.00	4,481.93
	Washed Sand	6.40	cu.m	1,250.00	8,003.44
	Materials				29,073.36
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
8	Laborers	2.00	days	550.00	8,800.00
	Labor				10,600.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	2.00	days	2,000.00	4,000.00
1	Concrete Vibrator including Fuel and Lubricants	2.00	days	1,000.00	2,000.00
	Minor Tools (10%)				1,060.00
	Equipment Rentals				7,060.00
				Material Cost	29,073.36
				Labor Cost	10,600.00
				Equipment Rentals	7,060.00
				Direct Cost =	46,733.36
				Indirect Cost (OCM - 10%) =	4,673.34
				Indirect Cost (Contractor's Profit - 8%) =	3,738.67
				Vat (5%) =	2,757.27
				Sub Total =	**57,902.64**

	CONCRETE FOOTING	**24.87**	**cu.m**		
	A. Materials				
	Portland Cement	224.00	bags	286.00	64,064.00
	Washed Gravel	12.44	cu.m	1,400.00	17,409.00
	Washed Sand	24.87	cu.m	1,250.00	31,087.50
	Materials				112,560.50
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
8	Laborers	7.00	days	550.00	30,800.00
	Labor				37,100.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	7.00	days	2,000.00	14,000.00
1	Concrete Vibrator including Fuel and Lubricants	7.00	days	1,000.00	7,000.00

	Minor Tools (10%)				3,710.00
	Equipment Rentals				24,710.00
				Material Cost	112,560.50
				Labor Cost	37,100.00
				Equipment Rentals	24,710.00
				Direct Cost =	174,370.50
				Indirect Cost (OCM - 10%) =	17,437.05
				Indirect Cost (Contractor's Profit - 8%) =	13,949.64
				Vat (5%) =	10,287.86
				Sub Total =	**216,045.05**

	CONCRETE CANOPIES and BALCONY	**18.32**	**cu.m**		
	A. Materials				
	Portland Cement	220.00	bags	286.00	62,920.00
	Washed Gravel	18.32	cu.m	1,400.00	25,643.63
	Washed Sand	9.16	cu.m	1,250.00	11,448.05
	Materials				100,011.67
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
2	Laborers	2.00	days	550.00	2,200.00
	Labor				4,000.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	2.00	days	2,000.00	4,000.00
1	Concrete Vibrator including Fuel and Lubricants	2.00	days	1,000.00	2,000.00
	Minor Tools (10%)				400.00
	Equipment Rentals				6,400.00
				Material Cost	100,011.67
				Labor Cost	4,000.00
				Equipment Rentals	6,400.00
				Direct Cost =	110,411.67
				Indirect Cost (OCM - 10%) =	11,041.17
				Indirect Cost (Contractor's Profit - 8%) =	8,832.93
				Vat (5%) =	6,514.29
				Sub Total =	**136,800.06**

	ELEVATOR SHAFT	**5.68**	**cu.m**		
	A. Materials				
	Portland Cement	52.00	bags	286.00	14,872.00
	Washed Gravel	2.84	cu.m	1,400.00	3,976.00
	Washed Sand	5.68	cu.m	1,250.00	7,100.00
	Materials				25,948.00
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
4	Laborers	2.00	days	550.00	4,400.00
	Labor				6,200.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	2.00	days	2,000.00	4,000.00
1	Concrete Vibrator including Fuel and Lubricants	2.00	days	1,000.00	2,000.00
	Minor Tools (10%)				620.00
	Equipment Rentals				6,620.00
				Material Cost	25,948.00
				Labor Cost	6,200.00
				Equipment Rentals	6,620.00
				Direct Cost =	38,768.00
				Indirect Cost (OCM - 10%) =	3,876.80
				Indirect Cost (Contractor's Profit - 8%) =	3,101.44
				Vat (5%) =	2,287.31
				Sub Total =	**48,033.55**

	ROOF BEAMS	**10.85**	**cu.m**		
	A. Materials				
	Portland Cement	98.00	bags	286.00	28,028.00
	Washed Gravel	5.43	cu.m	1,400.00	7,597.80
	Washed Sand	10.85	cu.m	1,250.00	13,567.50
	Materials				49,193.30
	B. Man Power Consumption				
1	Foreman	3.00	days	900.00	2,700.00
10	Laborers	3.00	days	550.00	16,500.00
	Labor				19,200.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	3.00	days	2,000.00	6,000.00
1	Concrete Vibrator including Fuel and Lubricants	3.00	days	1,000.00	3,000.00

	Minor Tools (10%)				1,920.00
	Equipment Rentals				10,920.00
				Material Cost	49,193.30
				Labor Cost	19,200.00
				Equipment Rentals	10,920.00
				Direct Cost =	79,313.30
				Indirect Cost (OCM - 10%) =	7,931.33
				Indirect Cost (Contractor's Profit - 8%) =	6,345.06
				Vat (5%) =	4,679.48
				Sub Total =	**98,269.18**

	TIE BEAMS	**8.96**	**cu.m**		
	A. Materials				
	Portland Cement	81.00	bags	286.00	23,166.00
	Washed Gravel	4.48	cu.m	1,400.00	6,272.00
	Washed Sand	8.96	cu.m	1,250.00	11,200.00
	Materials				40,638.00
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
10	Laborers	2.00	days	550.00	11,000.00
	Labor				12,800.00
	C. Equipment				
1	Concrete Mixer (1 bagger mixer) including Fuel and Lubricants	2.00	days	2,000.00	4,000.00
1	Concrete Vibrator including Fuel and Lubricants	2.00	days	1,000.00	2,000.00
	Minor Tools (10%)				1,280.00
	Equipment Rentals				7,280.00
				Material Cost	40,638.00
				Labor Cost	12,800.00
				Equipment Rentals	7,280.00
				Direct Cost =	60,718.00
				Indirect Cost (OCM - 10%) =	6,071.80
				Indirect Cost (Contractor's Profit - 8%) =	4,857.44
				Vat (5%) =	3,582.36
				Sub Total =	**75,229.60**

PART E	**MASONRY WORKS**				
	GROUND FLOOR WALLS (Mortar Filling)	**607.32**	**sq.m**		
	A. Materials				
	6" CHB	7,592.00	pc	20.00	151,840.00
	Portland Cement	927.00	bags	286.00	265,122.00
	Washed Sand	51.26	cu.m	1,250.00	64,071.74
	Materials				481,033.74
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
8	Laborers	7.00	days	550.00	30,800.00
	Labor				37,100.00
	C. Equipment				
	Minor Tools (10%)				3,710.00
	Equipment Rentals				3,710.00
				Material Cost	481,033.74
				Labor Cost	37,100.00
				Equipment Rentals	3,710.00
				Direct Cost =	521,843.74
				Indirect Cost (OCM - 10%) =	52,184.37
				Indirect Cost (Contractor's Profit - 8%) =	41,747.50
				Vat (5%) =	30,788.78
				Sub Total =	**646,564.40**

	SECOND FLOOR WALLS (Mortar Filling)	**236.12**	**sq.m**		
	A. Materials				
	4" CHB	2,952.00	pc	15.00	44,280.00
	Portland Cement	361.00	bags	286.00	103,246.00
	Washed Sand	19.93	cu.m	1,250.00	24,910.64
	Materials				172,436.64
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
8	Laborers	7.00	days	550.00	30,800.00
	Labor				37,100.00
	C. Equipment				

	Minor Tools (10%)				3,710.00
	Equipment Rentals				3,710.00
				Material Cost	172,436.64
				Labor Cost	37,100.00
				Equipment Rentals	3,710.00
				Direct Cost =	213,246.64
				Indirect Cost (OCM - 10%) =	21,324.66
				Indirect Cost (Contractor's Profit - 8%) =	17,059.73
				Vat (5%) =	12,581.55
				Sub Total =	**264,212.59**

	PARAPET WALLS (Mortar Filling)	**116.40**	**sq.m**		
	A. Materials				
	4" CHB	1,455.00	pc	15.00	21,825.00
	Portland Cement	178.00	bags	286.00	50,908.00
	Washed Sand	9.82	cu.m	1,250.00	12,280.20
	Materials				85,013.20
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
8	Laborers	2.00	days	550.00	8,800.00
	Labor				10,600.00
	C. Equipment				
	Minor Tools (10%)				1,060.00
	Equipment Rentals				1,060.00
				Material Cost	85,013.20
				Labor Cost	10,600.00
				Equipment Rentals	1,060.00
				Direct Cost =	96,673.20
				Indirect Cost (OCM - 10%) =	9,667.32
				Indirect Cost (Contractor's Profit - 8%) =	7,733.86
				Vat (5%) =	5,703.72
				Sub Total =	**119,778.09**

PART F	**PLASTERING WORKS**				
	GROUND FLOOR WALLS (Plastering)	**561.59**	**sq.m**		
	A. Materials				
	Portland Cement	105.00	bags	286.00	30,030.00
	Washed Sand	29.06	cu.m	1,250.00	36,321.26
	Materials				66,351.26
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
10	Laborers	7.00	days	550.00	38,500.00
	Labor				44,800.00
	C. Equipment				
	Minor Tools (10%)				4,480.00
	Equipment Rentals				4,480.00
				Material Cost	66,351.26
				Labor Cost	44,800.00
				Equipment Rentals	4,480.00
				Direct Cost =	115,631.26
				Indirect Cost (OCM - 10%) =	11,563.13
				Indirect Cost (Contractor's Profit - 8%) =	9,250.50
				Vat (5%) =	6,822.24
				Sub Total =	**143,267.13**

	SECOND FLOOR WALLS (Plastering)	**531.92**	**sq.m**		
	A. Materials				
	Portland Cement	103.00	bags	286.00	29,458.00
	Washed Sand	31.72	cu.m	1,250.00	39,654.00
	Materials				69,112.00
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
10	Laborers	7.00	days	550.00	38,500.00
	Labor				44,800.00
	C. Equipment				
	Minor Tools (10%)				4,480.00
	Equipment Rentals				4,480.00
				Material Cost	69,112.00
				Labor Cost	44,800.00

Equipment Rentals	4,480.00
Direct Cost =	118,392.00
Indirect Cost (OCM - 10%) =	11,839.20
Indirect Cost (Contractor's Profit - 8%) =	9,471.36
Vat (5%) =	6,985.13
Sub Total =	**146,687.69**

	PARAPET WALLS (Plastering)	**116.40**	**sq.m**		
	A. Materials				
	Portland Cement	178.00	bags	286.00	50,908.00
	Washed Sand	9.82	cu.m	1,250.00	12,280.20
	Materials				63,188.20
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
10	Laborers	2.00	days	550.00	11,000.00
	Labor				12,800.00
	C. Equipment				
	Minor Tools (10%)				1,280.00
	Equipment Rentals				1,280.00

Material Cost	63,188.20
Labor Cost	12,800.00
Equipment Rentals	1,280.00
Direct Cost =	77,268.20
Indirect Cost (OCM - 10%) =	7,726.82
Indirect Cost (Contractor's Profit - 8%) =	6,181.46
Vat (5%) =	4,558.82
Sub Total =	**95,735.30**

	STAIRS (Plastering)	**12.47**	**sq.m**		
	A. Materials				
	Portland Cement	19.03	bags	286.00	5,441.70
	Washed Sand	1.05	cu.m	1,250.00	1,315.43
	Materials				6,757.13
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
2	Laborers	2.00	days	550.00	2,200.00
	Labor				4,000.00
	C. Equipment				
	Minor Tools (10%)				400.00
	Equipment Rentals				400.00

Material Cost	6,757.13
Labor Cost (40%)	4,000.00
Equipment Rentals	400.00
Direct Cost =	11,157.13
Indirect Cost (OCM - 10%) =	1,115.71
Indirect Cost (Contractor's Profit - 8%) =	892.57
Vat (5%) =	658.27
Sub Total =	**13,823.68**

PART C	**STEELWORKS**				
	SLAB	**5,308.18**	**kgs**		
	A. Materials				
	12mmøx6m RSB	741.00	pcs	295.00	218,595.00
	10mmøx6m RSB	368.00	pcs	205.00	75,440.00
	Tie Wire #16	63.00	kgs	110.00	6,930.00
	Materials				300,965.00
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
16	Laborers	7.00	days	550.00	61,600.00
	Labor				67,900.00
	C. Equipment				
1	Cut-off Wheel Machine	7.00	days	500.00	3,500.00
	Minor Tools (10%)				6,790.00
	Equipment Rentals				10,290.00

Material Cost	300,965.00
Labor Cost	67,900.00
Equipment Rentals	10,290.00
Direct Cost =	379,155.00
Indirect Cost (OCM - 10%) =	37,915.50
Indirect Cost (Contractor's Profit - 8%) =	30,332.40
Vat (5%) =	22,370.15
Sub Total =	**469,773.05**

	BEAMS & GIRDERS	**9,035.80**	**kgs**		
	A. Materials				
	25mmøx6m RSB	298.00	pc	1,298.00	386,804.00
	10mmøx6m RSB	567.00	pc	205.00	116,235.00
	Tie Wire #16	51.00	Kg	110.00	5,610.00
	Materials				508,649.00
	B. Man Power Consumption				
1	Foreman	13.00	days	900.00	11,700.00
16	Laborers	13.00	days	550.00	114,400.00
	Labor				126,100.00
	C. Equipment				
1	Cut-off Wheel Machine	13.00	days	500.00	6,500.00
	Minor Tools (10%)				12,610.00
	Equipment Rentals				19,110.00

Material Cost	508,649.00
Labor Cost	126,100.00
Equipment Rentals	19,110.00
Direct Cost =	653,859.00
Indirect Cost (OCM - 10%) =	65,385.90
Indirect Cost (Contractor's Profit - 8%) =	52,308.72
Vat (5%) =	38,577.68
Sub Total =	**810,131.30**

	COLUMNS	**5,534.25**	**kgs**		
	A. Materials				
	20mmøx6m RSB	336.00	pc	831.00	279,216.00
	10mmøx6m RSB	152.00	pc	205.00	31,160.00
	Tie Wire #16	1.00	Kg	110.00	110.00
	Materials				310,486.00
	B. Man Power Consumption				
1	Foreman	9.00	days	900.00	8,100.00
14	Laborers	9.00	days	550.00	69,300.00
	Labor				77,400.00
	C. Equipment				
1	Cut-off Wheel Machine	9.00	days	500.00	4,500.00
	Minor Tools (10%)				7,740.00
	Equipment Rentals				12,240.00

Material Cost	310,486.00
Labor Cost	77,400.00
Equipment Rentals	12,240.00
Direct Cost =	400,126.00
Indirect Cost (OCM - 10%) =	40,012.60
Indirect Cost (Contractor's Profit - 8%) =	32,010.08
Vat (5%) =	23,607.43
Sub Total =	**495,756.11**

	CHB WALLS	**5,779.18**	**kgs**		
	A. Materials				
	20mmøx6m RSB	194.00	pc	831.00	161,214.00
	10mmøx6m RSB	787.00	pc	205.00	161,335.00
	Tie Wire #16	7.00	Kg	110.00	770.00
	Materials				323,319.00
	B. Man Power Consumption				
1	Foreman	11.00	days	900.00	9,900.00
10	Laborers	11.00	days	550.00	60,500.00
	Labor				70,400.00
	C. Equipment				
1	Cut-off Wheel Machine	16.00	days	500.00	8,000.00
	Minor Tools (10%)				7,040.00
	Equipment Rentals				15,040.00

Material Cost	323,319.00
Labor Cost	70,400.00
Equipment Rentals	15,040.00
Direct Cost =	408,759.00
Indirect Cost (OCM - 10%) =	40,875.90
Indirect Cost (Contractor's Profit - 8%) =	32,700.72
Vat (5%) =	24,116.78

			Sub Total =	**506,452.40**

	STAIRS	**724.61**	**kgs**		
	A. Materials				
	12mmøx6m RSB	110.00	pc	295.00	32,450.00
	10mmøx6m RSB	26.00	pc	205.00	5,330.00
	Tie Wire #16	1.00	Kg	110.00	110.00
	Materials				37,780.00
	B. Man Power Consumption				
1	Foreman	6.00	days	900.00	5,400.00
2	Laborers	6.00	days	550.00	6,600.00
	Labor				12,000.00
	C. Equipment				
1	Cut-off Wheel Machine	6.00	days	500.00	3,000.00
	Minor Tools (10%)				1,200.00
	Equipment Rentals				4,200.00
				Material Cost	37,780.00
				Labor Cost	12,000.00
				Equipment Rentals	4,200.00
				Direct Cost =	53,980.00
				Indirect Cost (OCM - 10%) =	5,398.00
				Indirect Cost (Contractor's Profit - 8%) =	4,318.40
				Vat (5%) =	3,184.82
				Sub Total =	**66,881.22**

	FOOTING	**3,225.53**	**kgs**		
	A. Materials				
	20mmøx6m RSB	218.00	pc	831.00	181,158.00
	Tie Wire #16	1.00	Kg	110.00	110.00
	Materials				181,268.00
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
10	Laborers	7.00	days	550.00	38,500.00
	Labor				44,800.00
	C. Equipment				
1	Cut-off Wheel Machine	7.00	days	500.00	3,500.00
	Minor Tools (10%)				4,480.00
	Equipment Rentals				7,980.00
				Material Cost	181,268.00
				Labor Cost	44,800.00
				Equipment Rentals	7,980.00
				Direct Cost =	234,048.00
				Indirect Cost (OCM - 10%) =	23,404.80
				Indirect Cost (Contractor's Profit - 8%) =	18,723.84
				Vat (5%) =	13,808.83
				Sub Total =	**289,985.47**

	STAIR RAILINGS	**8,012.03**	**kgs**		
	A. Materials				
	Stainless Round Bar 1.5"	200.00	lgts	2,200.00	440,000.00
	Materials				440,000.00
	B. Man Power Consumption				
1	Foreman	14.00	days	900.00	12,600.00
10	Laborers	14.00	days	550.00	77,000.00
	Labor				89,600.00
	C. Equipment				
1	Cut-off Wheel Machine	14.00	days	500.00	7,000.00
2	Welding Machine	14.00	days	1,000.00	28,000.00
	Minor Tools (10%)				8,960.00
	Equipment Rentals				43,960.00
				Material Cost	440,000.00
				Labor Cost (40%)	89,600.00
				Equipment Rentals	43,960.00
				Direct Cost =	573,560.00
				Indirect Cost (OCM - 10%) =	57,356.00
				Indirect Cost (Contractor's Profit - 8%) =	45,884.80
				Vat (5%) =	33,840.04
				Sub Total =	**710,640.84**

	ROOF BEAMS	**4,242.19**	**kgs**		
	A. Materials				

	25mmøx6m RSB	160.00	pc	1,298.00	207,680.00
	10mmøx6m RSB	147.00	pc	205.00	30,135.00
	Tie Wire #16	1.00	Kg	110.00	110.00
	Materials				237,925.00
	B. Man Power Consumption				
1	Foreman	5.00	days	900.00	4,500.00
14	Laborers	5.00	days	550.00	38,500.00
	Labor				43,000.00
	C. Equipment				
1	Cut-off Wheel Machine	5.00	days	500.00	2,500.00
	Minor Tools (10%)				4,300.00
	Equipment Rentals				6,800.00
				Material Cost	237,925.00
				Labor Cost	43,000.00
				Equipment Rentals	6,800.00
				Direct Cost =	287,725.00
				Indirect Cost (OCM - 10%) =	28,772.50
				Indirect Cost (Contractor's Profit - 8%) =	23,018.00
				Vat (5%) =	16,975.78
				Sub Total =	**356,491.28**

	TIE BEAM	**1,689.44**	**kgs**		
	A. Materials				
	16mmøx6m RSB	107.00	pc	522.00	55,854.00
	10mmøx6m RSB	183.00	pc	205.00	37,515.00
	Tie Wire #16	7.00	Kg	110.00	770.00
	Materials				94,139.00
	B. Man Power Consumption				
1	Foreman	5.00	days	900.00	4,500.00
6	Laborers	5.00	days	550.00	16,500.00
	Labor				21,000.00
	C. Equipment				
1	Cut-off Wheel Machine	5.00	days	500.00	2,500.00
	Minor Tools (10%)				2,100.00
	Equipment Rentals				4,600.00
				Material Cost	94,139.00
				Labor Cost	21,000.00
				Equipment Rentals	4,600.00
				Direct Cost =	119,739.00
				Indirect Cost (OCM - 10%) =	11,973.90
				Indirect Cost (Contractor's Profit - 8%) =	9,579.12
				Vat (5%) =	7,064.60
				Sub Total =	**148,356.62**

	CANOPIES	**218.06**	**kgs**		
	A. Materials				
	10mmøx6m RSB	59.00	pc	205.00	12,095.00
	Tie Wire #16	1.00	Kg	110.00	110.00
	Materials				12,205.00
	B. Man Power Consumption				
1	Foreman	1.00	days	900.00	900.00
2	Laborers	1.00	days	550.00	1,100.00
	Labor				2,000.00
	C. Equipment				
1	Cut-off Wheel Machine	1.00	days	500.00	500.00
	Minor Tools (10%)				200.00
	Equipment Rentals				700.00
				Material Cost	12,205.00
				Labor Cost	2,000.00
				Equipment Rentals	700.00
				Direct Cost =	14,905.00
				Indirect Cost (OCM - 10%) =	1,490.50
				Indirect Cost (Contractor's Profit - 8%) =	1,192.40
				Vat (5%) =	879.40
				Sub Total =	**18,467.30**

	ELEVATOR SHAFT	**1,049.66**	**kgs**		
	A. Materials				
	10mmøx6m RSB	284.00	pc	205.00	58,220.00
	Tie Wire #16	1.00	Kg	110.00	110.00
	Materials				58,330.00
	B. Man Power Consumption				

1	Foreman	2.00	m.d	900.00	1,800.00
12	Laborers	2.00	m.d	550.00	13,200.00
	Labor				15,000.00
	C. Equipment				
1	Cut-off Wheel Machine	2.00	days	500.00	1,000.00
	Minor Tools (10%)				1,500.00
	Equipment Rentals				2,500.00
				Material Cost	58,330.00
				Labor Cost	15,000.00
				Equipment Rentals	2,500.00
				Direct Cost =	75,830.00
				Indirect Cost (OCM - 10%) =	7,583.00
				Indirect Cost (Contractor's Profit - 8%) =	6,066.40
				Vat (5%) =	4,473.97
				Sub Total =	**93,953.37**

	OVERHEAD WATER TANK STEEL FRAME	**1,265.68**	**kgs**		
	A. Materials				
	2"x2"x1/4" THK Angle Bar	16.00	pc	831.00	13,296.00
	3"x3"x1/4" THK Angle Bar	20.00	pc	110.00	2,200.00
	Materials				15,496.00
	B. Man Power Consumption				
1	Foreman	4.00	m.d	900.00	3,600.00
8	Laborers	4.00	m.d	550.00	17,600.00
	Labor				21,200.00
	C. Equipment				
1	Cut-off Wheel Machine	4.00	days	500.00	2,000.00
1	Welding Machine	4.00	days	1,000.00	4,000.00
	Minor Tools (10%)				2,120.00
	Equipment Rentals				8,120.00
				Material Cost	15,496.00
				Labor Cost	21,200.00
				Equipment Rentals	8,120.00
				Direct Cost =	44,816.00
				Indirect Cost (OCM - 10%) =	4,481.60
				Indirect Cost (Contractor's Profit - 8%) =	3,585.28
				Vat (5%) =	2,644.14
				Sub Total =	**55,527.02**

PART D	**FORMWORKS & SCAFFOLDINGS**				
	COLUMNS	**235.20**	**sq.m**		
	A. Materials				
	1.2mx2.4mx0..00625mm THK ordinary plywood	82.00	pc	505.00	41,410.00
	2"x2"x8" Coco Lumber	4,353.13	bd.ft	50.00	217,656.25
	Assorted CW Nails 2"	16.00	kg	58.00	928.00
	Assorted CW Nails 4"	95.00	kg	55.00	5,225.00
	Materials				265,219.25
	B. Man Power Consumption				
1	Foreman	12.00	m.d	900.00	10,800.00
12	Laborers	12.00	m.d	550.00	79,200.00
	Labor				90,000.00
	C. Equipment				
1	Cut-off Wheel Machine	12.00	days	500.00	6,000.00
	Minor Tools (10%)				26,521.93
	Equipment Rentals				32,521.93
				Material Cost	265,219.25
				Labor Cost	90,000.00
				Equipment Rentals	32,521.93
				Direct Cost =	387,741.18
				Indirect Cost (OCM - 10%) =	38,774.12
				Indirect Cost (Contractor's Profit - 8%) =	31,019.29
				Vat (5%) =	22,876.73
				Sub Total =	**480,411.32**

	BEAMS & GIRDERS	**322.70**	**sq.m**		
	A. Materials				
	1.2mx2.4mx0.00625mm THK marine plywood	113.00	pc	545.00	61,585.00
	2"x2"x8" Coco Lumber	2,109.11	bd.ft	50.00	105,455.71
	Assorted CW Nails 2"	21.00	kg	58.00	1,218.00
	Assorted CW Nails 4"	126.00	kg	55.00	6,930.00
	Materials				175,188.71

	B. Man Power Consumption				
1	Foreman	5.00	m.d	900.00	4,500.00
8	Laborers	5.00	m.d	550.00	22,000.00
	Labor				26,500.00
	C. Equipment				
1	Cut-off Wheel Machine	5.00	days	500.00	2,500.00
	Minor Tools (10%)				2,650.00
	Equipment Rentals				5,150.00
				Material Cost	175,188.71
				Labor Cost	26,500.00
				Equipment Rentals	5,150.00
				Direct Cost =	206,838.71
				Indirect Cost (OCM - 10%) =	20,683.87
				Indirect Cost (Contractor's Profit - 8%) =	16,547.10
				Vat (5%) =	12,203.48
				Sub Total =	**256,273.16**

	CANOPIES	**41.61**	**sq.m**		
	A. Materials				
	1.2mx2.4mx0.00625mm THK marine plywood	15.00	pc	545.00	8,175.00
	2"x2"x8" Coco Lumber	126.92	bd.ft	50.00	6,345.91
	Assorted CW Nails 2"	3.00	Kg	58.00	174.00
	Assorted CW Nails 4"	17.00	kg	55.00	935.00
	Materials				15,629.91
	B. Man Power Consumption				
1	Foreman	3.00	m.d	900.00	2,700.00
8	Laborers	3.00	m.d	550.00	13,200.00
	Labor				15,900.00
	C. Equipment				
1	Cut-off Wheel Machine	3.00	days	500.00	1,500.00
	Minor Tools (10%)				1,590.00
	Equipment Rentals				3,090.00
				Material Cost	15,629.91
				Labor Cost	15,900.00
				Equipment Rentals	3,090.00
				Direct Cost =	34,619.91
				Indirect Cost (OCM - 10%) =	3,461.99
				Indirect Cost (Contractor's Profit - 8%) =	2,769.59
				Vat (5%) =	2,042.57
				Sub Total =	**42,894.06**

	STAIRS	**56.97**	**sq.m**		
	A. Materials				
	1.2mx2.4mx0..00625mm THK marine plywood	20.00	pc	545.00	10,900.00
	2"x2"x8" Coco Lumber	354.94	bd.ft	50.00	17,747.00
	Assorted CW Nails 2"	4.00	kg	58.00	232.00
	Assorted CW Nails 4"	23.00	kg	55.00	1,265.00
	Materials				30,144.00
	B. Man Power Consumption				
1	Foreman	4.00	days	900.00	3,600.00
12	Laborers	4.00	days	550.00	26,400.00
	Labor				30,000.00
	C. Equipment				
1	Cut-off Wheel Machine	4.00	days	500.00	2,000.00
	Minor Tools (10%)				3,014.40
	Equipment Rentals				5,014.40
				Material Cost	30,144.00
				Labor Cost	30,000.00
				Equipment Rentals	5,014.40
				Direct Cost =	65,158.40
				Indirect Cost (OCM - 10%) =	6,515.84
				Indirect Cost (Contractor's Profit - 8%) =	5,212.67
				Vat (5%) =	3,844.35
				Sub Total =	**80,731.26**

	ROOF BEAMS	**245.48**	**sq.m**		
	A. Materials				
	1.2mx2.4mx0.00625mm THK marine plywood	86.00	pc	545.00	46,870.00
	2"x2"x8" Coco Lumber	1,565.74	bd.ft	50.00	78,286.86
	Assorted CW Nails 2"	16.00	kg	58.00	928.00
	Assorted CW Nails 4"	99.00	kg	55.00	5,445.00
	Materials				131,529.86

	B. Man Power Consumption				
1	Foreman	3.00	days	900.00	2,700.00
12	Laborers	3.00	days	550.00	19,800.00
	Labor				22,500.00
	C. Equipment				
1	Cut-off Wheel Machine	3.00	days	500.00	1,500.00
	Minor Tools (10%)				2,250.00
	Equipment Rentals				3,750.00
				Material Cost	131,529.86
				Labor Cost	22,500.00
				Equipment Rentals	3,750.00
				Direct Cost =	157,779.86
				Indirect Cost (OCM - 10%) =	15,777.99
				Indirect Cost (Contractor's Profit - 8%) =	12,622.39
				Vat (5%) =	9,309.01
				Sub Total =	**195,489.25**

	SLAB	**11.18**	**sq.m**		
	A. Materials				
	1.2mx2.4mx0.00625mm THK marine plywood	4.00	pc	545.00	2,180.00
	2"x2"x8" Coco Lumber	34.10	bd.ft	50.00	1,704.95
	Assorted CW Nails 2"	0.73	Kg	71.00	51.60
	Assorted CW Nails 4"	4.47	kg	110.00	491.92
	Materials				4,428.47
	B. Man Power Consumption				
1	Foreman	4.00	days	900.00	3,600.00
14	Laborers	4.00	days	550.00	30,800.00
	Labor				34,400.00
	C. Equipment				
1	Cut-off Wheel Machine	4.00	days	500.00	2,000.00
	Minor Tools (10%)				3,440.00
	Equipment Rentals				5,440.00
				Material Cost	4,428.47
				Labor Cost	34,400.00
				Equipment Rentals	5,440.00
				Direct Cost =	44,268.47
				Indirect Cost (OCM - 10%) =	4,426.85
				Indirect Cost (Contractor's Profit - 8%) =	3,541.48
				Vat (5%) =	2,611.84
				Sub Total =	**54,848.63**

PART H	**ROOFWORKS & CEILINGWORKS**				
	STEEL TRUSS RAFTER	**35.28**	**sq.m**		
	A. Materials				
	3"x2"x3/16" THK Angle Bar (Top) @6m length	16.00	pc	2,036.00	32,576.00
	2"x2"x1/4" THNK Angle Bar (Bot-Web) @6m length	52.00	pc	1,107.00	57,564.00
	2"x6"x2mmx6mm THK C-Purlins @6m length	51.00	pc	1,610.00	82,110.00
	12mm sag rods @6m length	14.00	pc	76.00	1,064.00
	Cutting Disc	5.00	pc	188.00	940.00
	Welding Rod	3.00	Kg	120.00	360.00
	Materials				174,614.00
	B. Man Power Consumption				
1	Foreman	12.00	days	900.00	10,800.00
10	Laborers	12.00	days	550.00	66,000.00
	Labor				76,800.00
	C. Equipment				
1	Electric Grinder/Sander	12.00	days	500.00	6,000.00
1	Welding Machine	12.00	days	1,000.00	12,000.00
	Minor Tools (10%)				7,680.00
	Equipment Rentals				25,680.00
				Material Cost	174,614.00
				Labor Cost	76,800.00
				Equipment Rentals	25,680.00
				Direct Cost =	277,094.00
				Indirect Cost (OCM - 10%) =	27,709.40
				Indirect Cost (Contractor's Profit - 8%) =	22,167.52
				Vat (5%) =	16,348.55
				Sub Total =	**343,319.47**

	ROOFSHEETS	**287.79**	**sq.m**		
	A. Materials				
	3.6mx0.8mx0.18m THK Corrugated G.I. Sheets	142.00	pc	300.00	42,600.00

	Rivets	10.00	Kg	160.00	1,600.00
	G.I. Washer	28.00	Kg	155.00	4,340.00
	Cutting Disc	2.00	Pc	188.00	376.00
	Welding Rod	1.00	Kg	120.00	120.00
	Materials				49,036.00
	B. Man Power Consumption				
1	Foreman	3.00	days	900.00	2,700.00
4	Laborers	3.00	days	550.00	6,600.00
	Labor				9,300.00
	C. Equipment				
	Electric Drill	3.00	days	500.00	1,500.00
	Minor Tools (10%)				930.00
	Equipment Rentals				2,430.00
				Material Cost	49,036.00
				Labor Cost	9,300.00
				Equipment Rentals	2,430.00
				Direct Cost =	60,766.00
				Indirect Cost (OCM - 10%) =	6,076.60
				Indirect Cost (Contractor's Profit - 8%) =	4,861.28
				Vat (5%) =	3,585.19
				Sub Total =	**75,289.07**

	CEILING	**430.73**	**sq.m**		
	A. Materials				
	1.2mx2.4m gypsum board	150.00	pc	725.00	108,750.00
	Metal Furring @5m long	160.00	pc	120.00	19,200.00
	Carrying Channel @5m long	90.00	pc	150.00	13,500.00
	Wall Angle @2.4m long	89.00	pc	52.00	4,628.00
	Double U Clip	1,476.00	pc	6.00	8,856.00
	Hanging Rod @3m long	81.00	pc	187.00	15,147.00
	Expansion Bolt	369.00	pc	55.00	20,295.00
	J-clip	369.00	pc	16.00	5,904.00
	Materials				196,280.00
	B. Man Power Consumption				
1	Foreman	7.00	days	900.00	6,300.00
14	Laborers	7.00	days	550.00	53,900.00
	Labor				60,200.00
	C. Equipment				
	Electric Drill	7.00	days	500.00	3,500.00
	Minor Tools (10%)				6,020.00
	Equipment Rentals				9,520.00
				Material Cost	196,280.00
				Labor Cost	60,200.00
				Equipment Rentals	9,520.00
				Direct Cost =	266,000.00
				Indirect Cost (OCM - 10%) =	26,600.00
				Indirect Cost (Contractor's Profit - 8%) =	21,280.00
				Vat (5%) =	15,694.00
				Sub Total =	**329,574.00**

PART G	**TILEWORKS**				
	SLAB FLOOR TILES	**459.05**	**sq.m**		
	A. Materials				
	30cmx30cm Ceramic Glazed Floor Tiles	615.00	pc	31.00	19,065.00
	60cmx60cm Porcelain Tiles	1,139.00	pc	139.00	158,321.00
	Heavy Duty Tile Adhesive	3.00	bags	499.00	
	Sand	22.95	cu.m	1,250.00	28,690.31
	Portland Cement	276.00	pcs	286.00	78,936.00
	Tile Grout (2kg/bag)	121.00	bags	75.00	9,075.00
	Materials				294,087.31
	B. Man Power Consumption				
1	Foreman	12.00	days	900.00	10,800.00
12	Laborers	12.00	days	550.00	79,200.00
	Labor				90,000.00
	B. Equipment				
	Electric Grinder/Sander	12.00	days	500.00	6,000.00
	Minor Tools (10%)				9,000.00
	Equipment Rentals				15,000.00
				Material Cost	294,087.31
				Labor Cost	90,000.00
				Equipment Rentals	15,000.00
				Direct Cost =	399,087.31

Indirect Cost (OCM - 10%) =	39,908.73
Indirect Cost (Contractor's Profit - 8%) =	31,926.99
Vat (5%) =	23,546.15
Sub Total =	**494,469.18**

	STAIR FLOOR TILES	**13.50**	**sq.m**		
	A. Materials				
	60cmx60cm Porcelain Tiles	38.00	pc	139.00	5,282.00
	Heavy Duty Tile Adhesive	2.00	bags	499.00	998.00
	Tile Grout	4.00	bags	75.00	300.00
	Materials				6,580.00
	B. Man Power Consumption				
1	Foreman	4.00	days	900.00	3,600.00
8	Laborers	4.00	days	550.00	17,600.00
	Labor				21,200.00
	B. Equipment				
	Electric Grinder/Sander	4.00	days	500.00	2,000.00
	Minor Tools (10%)				2,120.00
	Equipment Rentals				4,120.00

Material Cost	6,580.00
Labor Cost	21,200.00
Equipment Rentals	4,120.00
Direct Cost =	31,900.00
Indirect Cost (OCM - 10%) =	3,190.00
Indirect Cost (Contractor's Profit - 8%) =	2,552.00
Vat (5%) =	1,882.10
Sub Total =	**39,524.10**

PART I	**PAINTWORKS**				
	INTERIOR WALLS WITH COLUMNS	**751.19**	**sq.m**		
	A. Materials				
	Skim Coat	38.00	bags	440.00	16,720.00
	Flat Latex Paint	42.00	gal	635.00	26,670.00
	Acrylic Semi-Gloss Latex	42.00	gal	690.00	28,980.00
	Masonry Putty	30.25	gal	340.00	10,285.00
	Concrete Neutralizer	2.00	gal	640.00	1,280.00
	Sanding Paper	20.00	pc	10.00	200.00
	Paint Roller	2.00	pc	75.00	150.00
	Paint Brush	2.00	box	90.00	180.00
	Materials				84,465.00
	B. Man Power Consumption				
1	Foreman	13.00	days	900.00	11,700.00
6	Laborers	13.00	days	550.00	42,900.00
	Labor				54,600.00
	B. Equipment				
	Minor Tools (10%)				5,460.00
	Equipment Rentals				5,460.00

Material Cost	84,465.00
Labor Cost	54,600.00
Equipment Rentals	5,460.00
Direct Cost =	144,525.00
Indirect Cost (OCM - 10%) =	14,452.50
Indirect Cost (Contractor's Profit - 8%) =	11,562.00
Vat (5%) =	8,526.98
Sub Total =	**179,066.48**

	EXTERIOR WALLS WITH COLUMNS	**342.32**	**sq.m**		
	A. Materials				
	Skim Coat	18.00	bags	440.00	7,920.00
	Flat Latex Paint	27.00	gal	635.00	17,145.00
	Acrylic Semi-Gloss Latex	27.00	gal	690.00	18,630.00
	Masonry Putty	55.00	gal	340.00	18,700.00
	Concrete Neutralizer	2.00	gal	640.00	1,280.00
	Sanding Paper	10.00	pc	10.00	100.00
	Paint Roller	2.00	pc	75.00	150.00
	Paint Brush	1.00	box	90.00	90.00
	Materials				64,015.00
	B. Man Power Consumption				
1	Foreman	8.00	days	900.00	7,200.00
10	Laborers	8.00	days	550.00	44,000.00
	Labor				51,200.00
	B. Equipment				

	Minor Tools (10%)				5,120.00
	Equipment Rentals				5,120.00
				Material Cost	64,015.00
				Labor Cost	51,200.00
				Equipment Rentals	5,120.00
				Direct Cost =	120,335.00
				Indirect Cost (OCM - 10%) =	12,033.50
				Indirect Cost (Contractor's Profit - 8%) =	9,626.80
				Vat (5%) =	7,099.77
				Sub Total =	**149,095.07**

	CANOPIES & STAIRS	**54.08**	**sq.m**		
	A. Materials				
	Skim Coat	4.00	bags	440.00	1,760.00
	Flat Latex Paint	8.00	gal	635.00	5,080.00
	Acrylic Semi-Gloss Latex	8.00	gal	690.00	5,520.00
	Masonry Putty	9.00	gal	340.00	3,060.00
	Concrete Neutralizer	3.00	gal	640.00	1,920.00
	Sanding Paper	12.00	pcs	10.00	120.00
	Paint Roller	3.00	pcs	75.00	225.00
	Paint Brush	2.00	box	90.00	180.00
	Materials				17,865.00
	B. Man Power Consumption				
1	Foreman	3.00	days	900.00	2,700.00
6	Laborers	3.00	days	550.00	9,900.00
	Labor				12,600.00
	C. Equipment				
	Minor Tools (10%)				1,260.00
	Equipment Rentals				1,260.00
				Material Cost	17,865.00
				Labor Cost	12,600.00
				Equipment Rentals	1,260.00
				Direct Cost =	31,725.00
				Indirect Cost (OCM - 10%) =	3,172.50
				Indirect Cost (Contractor's Profit - 8%) =	2,538.00
				Vat (5%) =	1,871.78
				Sub Total =	**39,307.28**

	CEILING	**484.27**	**sq.m**		
	A. Materials				
	Skim Coat	17.00	bags	475.00	8,075.00
	Flat Wall Enamel	36.00	gal	740.00	26,640.00
	Wood Putty	20.00	gal	627.00	12,540.00
	Sanding Paper	20.00	pc	10.00	200.00
	Paint Roller	2.00	pc	75.00	150.00
	Paint Brush	2.00	box	90.00	180.00
	Materials				47,785.00
	B. Man Power Consumption				
1	Foreman	10.00	days	900.00	9,000.00
12	Laborers	10.00	days	550.00	66,000.00
	Labor				75,000.00
	C. Equipment				
	Minor Tools (10%)				7,500.00
	Equipment Rentals				7,500.00
				Material Cost	47,785.00
				Labor Cost	75,000.00
				Equipment Rentals	7,500.00
				Direct Cost =	130,285.00
				Indirect Cost (OCM - 10%) =	13,028.50
				Indirect Cost (Contractor's Profit - 8%) =	10,422.80
				Vat (5%) =	7,686.82
				Sub Total =	**161,423.12**

	STEEL TRUSS RAFTER	**91.11**	**sq.m**		
	A. Materials				
	Metal Primer	7.00	gal	945.00	6,615.00
	Baby Roller	5.00	pc	30.00	150.00
	Materials				6,765.00
	B. Man Power Consumption				
1	Foreman	1.00	days	900.00	900.00
16	Laborers	1.00	days	550.00	8,800.00

	Labor				9,700.00
	C. Equipment				
	Minor Tools (10%)				970.00
	Equipment Rentals				970.00
				Material Cost	6,765.00
				Labor Cost	9,700.00
				Equipment Rentals	970.00
				Direct Cost =	17,435.00
				Indirect Cost (OCM - 10%) =	1,743.50
				Indirect Cost (Contractor's Profit - 8%) =	1,394.80
				Vat (5%) =	1,028.67
				Sub Total =	**21,601.97**
PART J	**GLASSWORKS/FABRICATED MATERIALS**				
	WINDOWS				
	A. Materials				
	Aluminum Frame Fixed and Awning Windows with 6.35mm THK. Clear Glass Panel	3.00	sets	30,000.00	90,000.00
	Aluminum Frame Sliding windows with 6.35mm THK. Clear Glass Panel	10.00	sets	20,000.00	200,000.00
	Aluminum Frame Sliding windows with 6.35mm THK. Clear Glass Panel	5.00	sets	15,000.00	75,000.00
	Aluminum Frame Sliding windows with 6.35mm THK. Clear Glass Panel	6.00	sets	15,000.00	90,000.00
	Aluminum Frame Awning with 6.35mm THK. Clear Glass Panel	2.00	sets	14,000.00	28,000.00
	Aluminum Frame Awning windows with 6.35mm THK. Clear Glass Panel	4.00	sets	15,000.00	60,000.00
	Aluminum Frame Double Awning windows with 6.35mm THK. Clear Glass Panel	3.00	sets	20,000.00	60,000.00
	Aluminum Frame Double Awning windows with 6.35mm THK. Clear Glass Panel	6.00	sets	20,000.00	120,000.00
	Aluminum Frame Awning and Fixed Windows with 6.35mm THK. Clear Glass Panel	1.00	sets	30,000.00	30,000.00
	Materials				753,000.00
	B. Man Power Consumption				
1	Foreman	6.00	days	900.00	5,400.00
10	Laborers	6.00	days	550.00	33,000.00
	Labor				38,400.00
	C. Equipment				
	Minor Tools (10%)				3,840.00
	Equipment Rentals				3,840.00
				Material Cost	753,000.00
				Labor Cost	38,400.00
				Equipment Rentals	3,840.00
				Direct Cost =	795,240.00
				Indirect Cost (OCM - 10%) =	79,524.00
				Indirect Cost (Contractor's Profit - 8%) =	63,619.20
				Vat (5%) =	46,919.16
				Sub Total =	**985,302.36**
	DOORS				
	A. Materials				
	50mm THK. SOLID WOOD PANEL SINGLE DOOR; Swing in with transom	2.00	sets	25,000.00	50,000.00
	44mm THK. SOLID WOOD PANEL SINGLE DOOR; Swing-in	1.00	sets	20,000.00	20,000.00
	44mm THK. SOLID WOOD PANEL SINGLE DOOR; Swing-in with louver	7.00	sets	22,000.00	154,000.00
	44mm THK. SOLID WOOD PANEL SINGLE DOOR; Swing-in	4.00	sets	20,000.00	80,000.00
	44mm THK. SOLID WOOD PANEL SINGLE DOOR; Swing-in with glass	3.00	sets	25,000.00	75,000.00
	ALUMINUM FRAME SLIDING DOOR WITH 6.35MM THK. CLEAR GLASS PANEL	4.00	sets	30,000.00	120,000.00
	Materials				499,000.00
	B. Man Power Consumption				
1	Foreman	6.00	days	900.00	5,400.00
10	Laborers	6.00	days	550.00	33,000.00
	Labor				38,400.00
	C. Equipment				
	Minor Tools (10%)				3,840.00
	Equipment Rentals				3,840.00
				Material Cost	499,000.00
				Labor Cost	38,400.00
				Equipment Rentals	3,840.00
				Direct Cost =	541,240.00
				Indirect Cost (OCM - 10%) =	54,124.00
				Indirect Cost (Contractor's Profit - 8%) =	43,299.20
				Vat (5%) =	31,933.16
				Sub Total =	**670,596.36**
PART K	**ELECTRICAL WORKS**				
	Luminaire and Lightings				
	A. Materials				
	12W Recessed LED downlight	55.00	pcs	406.00	22,330.00
	5W Recessed LED downlight	50.00	pcs	310.00	15,500.00

	Emergency Light	10.00	pcs	1,500.00	15,000.00
	9W Emergency Light	12.00	pcs	65.00	780.00
	800W Refrigerator Outlet	1.00	pcs	300.00	300.00
	Air Conditioner Window Type 1.0 HP 230V	1.00	pcs	12,550.00	12,550.00
	Air Conditioner Window Type 2.0 HP 230V	10.00	pcs	16,700.00	167,000.00
	Materials				233,460.00
	B. Man Power Consumption				
1	Foreman	5.00	days	900.00	4,500.00
2	Electrician	5.00	days	750.00	3,750.00
6	Laborers	5.00	days	550.00	16,500.00
	Labor				24,750.00
	C. Equipment				
	Minor Tools (10%)				2,475.00
	Equipment Rentals				2,475.00

Material Cost	233,460.00
Labor Cost	24,750.00
Equipment Rentals	2,475.00
Direct Cost =	260,685.00
Indirect Cost (OCM - 10%) =	26,068.50
Indirect Cost (Contractor's Profit - 8%) =	20,854.80
Vat (5%) =	15,380.42
Sub Total =	**322,988.72**

	Conduits				
	A. Materials				
	Panel Board (100A, 2P-main)	1.00	pcs	2,500.00	2,500.00
	300 Ampere Trip CB	1.00	pcs	41,600.00	41,600.00
	Kilowatt-hour meter	1.00	pcs	5,000.00	5,000.00
	Circuit Breaker	25.00	pcs	600.00	15,000.00
	Duplex convenience outlet	32.00	pcs	149.75	4,792.00
	Water Proof Outlet	1.00	pcs	137.00	137.00
	Range Outlet	1.00	pcs	352.00	352.00
	Refrigerator Outlet	1.00	pcs	300.00	300.00
	Air Conditioning Unit Outlet	11.00	pcs	149.75	1,647.25
	Special Purpose Outlet	1.00	pcs	150.00	150.00
	Materials				71,478.25
	B. Man Power Consumption				
1	Foreman	14.00	days	900.00	12,600.00
2	Electrician	14.00	days	750.00	10,500.00
6	Laborers	14.00	days	550.00	46,200.00
	Labor				69,300.00
	C. Equipment				
	Minor Tools (10%)				6,930.00
	Equipment Rentals				6,930.00

Material Cost	71,478.25
Labor Cost	69,300.00
Equipment Rentals	6,930.00
Direct Cost =	147,708.25
Indirect Cost (OCM - 10%) =	14,770.83
Indirect Cost (Contractor's Profit - 8%) =	11,816.66
Vat (5%) =	8,714.79
Sub Total =	**183,010.52**

	Wiring Device and Fixtures				
	A. Materials				
	2-5.5mm2 THHN Cu. Wire (5M)	3.00	pcs	755.00	2,265.00
	2-3.5mm2 THHN Cu. Wire (5M)	19.00	pcs	755.00	14,345.00
	2-2.0mm2 THHN Cu. Wire (5M)	48.00	pcs	755.00	36,240.00
	2-100mm2 THHN Cu. Wire (1M)	8.00	pcs	1,108.00	8,864.00
	1-22mm2 THHN Cu. Wire (5M)	8.00	pcs	755.00	6,040.00
	Utility Box, PVC	141.00	pcs	55.00	7,755.00
	Junction Box, PVC	105.00	pcs	45.00	4,725.00
	20mm dia.UPVC Pipe (1M)	350.00	pcs	40.00	14,000.00
	32mm dia. UPVC Pipe (1M)	8.00	pcs	263.00	2,104.00
	110mm dia. UPVC Pipe (1m)	8.00	pcs	1,700.00	13,600.00
	1-gang switch	13.00	pcs	200.00	2,600.00
	2-gang switch	6.00	pcs	252.00	1,512.00
	3-gang switch	6.00	pcs	344.00	2,064.00
	Three-way switch	2.00	pcs	270.00	540.00
	Electrical Tape	15.00	rolls	60.00	900.00
	Materials				117,554.00
	B. Man Power Consumption				

1	Foreman	7.00	days	900.00	6,300.00
2	Electrician	7.00	days	750.00	5,250.00
6	Laborers	7.00	days	550.00	23,100.00
	Labor				34,650.00
	C. Equipment				
	Minor Tools (10%)				3,465.00
	Equipment Rentals				3,465.00

Material Cost	117,554.00
Labor Cost	34,650.00
Equipment Rentals	3,465.00
Direct Cost =	155,669.00
Indirect Cost (OCM - 10%) =	15,566.90
Indirect Cost (Contractor's Profit - 8%) =	12,453.52
Vat (5%) =	9,184.47
Sub Total =	**192,873.89**

PART L	**PLUMBING WORKS**				
	Cold Water Line				
	A. Materials				
	PVC Pipe				
	a. 20mm PVC Pipe x 3m	14.00	pcs	144.00	2,016.00
	b. 25mm PVC Pipe x 3m	25.00	pcs	162.00	4,050.00
	PVC Elbow				
	a.PVC 90° Elbow - 20mm dia.	7.00	pcs	24.00	168.00
	b. PVC Tee Elbow	14.00	pcs	98.00	1,372.00
	c. PVC Side Flow/Elbow	6.00	pcs	25.00	150.00
	PVC End Caps				
	a. PVC End Caps 20mm dia.	10.00	pcs	40.00	400.00
	PVc Reducer				
	a.PVC Reducer 3m x 12mm dia.	12.00	pcs	180.00	2,160.00
	PVC Tee				
	a.PVC Tee 50mm x 20mm dia.	19.00	pcs	200.00	3,800.00
	PVC Coupling				
	a. PVC Coupling 20mm	10.00	pcs	7.00	70.00
	b. PVC Coupling 25mm	10.00	pcs	10.00	100.00
	Valves & Meter				
	a. Gate Valve	6.00	pcs	480.00	2,880.00
	b. Check Valve	1.00	pcs	1,600.00	1,600.00
	c. Water Meter 20mm dia	1.00	pcs	5,095.00	5,095.00
	Tank				
	a. Firstank 2000L	2.00	l.s	31,450.00	62,900.00
	materials				86,761.00
	B. Man Power Consumption				
1	Foreman	3.00	days	900.00	2,700.00
2	Plumber	3.00	days	750.00	2,250.00
3	Laborers	3.00	days	550.00	4,950.00
	Labor				9,900.00
	C. Equipment				
	Minor Tools (10%)				990.00
	Equipment Rentals				990.00

Material Cost	86,761.00
Labor Cost	9,900.00
Equipment Rentals	990.00
Direct Cost =	97,651.00
Indirect Cost (OCM - 10%) =	9,765.10
Indirect Cost (Contractor's Profit - 8%) =	7,812.08
Vat (5%) =	5,761.41
Sub Total =	**120,989.59**

	Sanitary Line				
	A. Materials				
	PVC Pipe				
	a. 90mm PVC pipe x 3m	7.00	pcs	767.00	5,369.00
	b. 100mm PVC pipe x 3m	3.00	pcs	1,020.00	3,060.00
	c. 160mm PVC pipe x 3m	21.00	pcs	1,898.00	39,858.00
	PVC Clean Out				
	a. 100mm PVC Clean Out	11.00	pcs	572.00	6,292.00
	P-Trap				
	a. PVC Trap 90mm dia.	22.00	pcs	221.00	4,862.00
	Valve				
	a. Angle Valve 20mm dia.	14.00	pcs	272.00	3,808.00

	Pump				
	a. Water Pump	2.00	pcs	41,000.00	82,000.00
	Basin & Tanks				
	a. Catch Basin	5.00	pcs	10,000.00	50,000.00
	b. PE Vertical Cistern Tank, 0.6m3	2.00	l.s	20,000.00	40,000.00
	c. Septic Tank	1.00	l.s	24,016.78	24,016.78
	d. Sanitary Tank 1000L	2.00	pcs	8,000.00	16,000.00
	Bolts & Accessories				
	a. Bolts, Nuts & Washer	1.00	lot	5,000.00	5,000.00
	b. 4 mm x 25mm x 25 mm Angle Bar Holder w/ Stainless Fine Screen	17.00	lgth	700.00	11,900.00
	materials				292,165.78
	B. Man Power Consumption				
1	Foreman	23.00	days	900.00	20,700.00
2	Plumber	23.00	days	750.00	17,250.00
6	Laborers	23.00	days	550.00	75,900.00
	Labor				113,850.00
	C. Equipment				
	Minor Tools (10%)				11,385.00
	Equipment Rentals				11,385.00
				Material Cost	292,165.78
				Labor Cost	113,850.00
				Equipment Rentals	11,385.00
				Direct Cost =	417,400.78
				Indirect Cost (OCM - 10%) =	41,740.08
				Indirect Cost (Contractor's Profit - 8%) =	33,392.06
				Vat (5%) =	24,626.65
				Sub Total =	**517,159.56**

	Plumbing Fixtures				
	A. Materials				
	WC -Water Closet c/w Flash valve accessories	14.00	pcs	7,500.00	105,000.00
	UR - Urinal c/w Flash Valve and Accessories	5.00	pcs	7,900.00	39,500.00
	LAV -Wall Mounted Lavatory c/w Angle Valve, Faucet and Flexible Hose Connection	8.00	pcs	4,500.00	36,000.00
	FD- Floor Drain	11.00	pcs	4,500.00	49,500.00
	FAU- Faucets (Kitchen & Lav.)	8.00	pcs	850.00	6,800.00
	materials				236,800.00
	B. Man Power Consumption				
1	Foreman	23.00	days	900.00	20,700.00
2	Plumber	23.00	days	750.00	17,250.00
6	Laborers	23.00	days	550.00	75,900.00
	Labor				113,850.00
	C. Equipment				
	Minor Tools (10%)				11,385.00
	Equipment Rentals				11,385.00
				Material Cost	236,800.00
				Labor Cost	113,850.00
				Equipment Rentals	11,385.00
				Direct Cost =	362,035.00
				Indirect Cost (OCM - 10%) =	36,203.50
				Indirect Cost (Contractor's Profit - 8%) =	28,962.80
				Vat (5%) =	21,360.07
				Sub Total =	**448,561.37**

PART M	**FIRE DETECTION & ALARM SYSTEM**				
	A. Materials				
	Devices & Pumps				
	a. Sprinkler Head 1/2" NTP, Pendent, Wet Type, Quick Response,	37.00	pc	300.00	11,100.00
	b. Smoke Detector	17.00	pc	3,200.00	54,400.00
	c. Electrc fire pump 1250GPM@11BAR w/ complete accessories	1.00	set	200,000.00	200,000.00
	d. Fire Pump Control Panel	1.00	pc	15,000.00	15,000.00
	Materials				280,500.00
	B. Man Power Consumption				
1	Foreman	2.00	days	900.00	1,800.00
2	Plumber	2.00	days	750.00	1,500.00
8	Laborers	2.00	days	550.00	8,800.00
	Labor				12,100.00
	C. Equipment				
2	Electric Grinder/Sander	2.00	days	500.00	2,000.00
2	Welding Machine	2.00	days	1,000.00	4,000.00
	Minor Tools				28,050.00
	Equipment Rentals				34050.00
				Material Cost	280,500.00

Labor Cost	12,100.00
Equipment Rentals	34,050.00
Direct Cost =	326,650.00
Indirect Cost (OCM - 10%) =	32,665.00
Indirect Cost (Contractor's Profit - 8%) =	26,132.00
Vat (5%) =	19,272.35
Sub Total =	**404,719.35**

	Pipes, Fittings, & Accessories				
	a. GI Pipe s.40 25mm x 6m	35.00	pc	588.00	20,580.00
	b. GI Pipe s.40 100mm x 6m	22.00	pc	1,418.00	31,196.00
	c. GI Pipe s.40 200mm x 6m	12.00	pc	2,397.00	28,764.00
	d. 25mm dia. G.I. Elbow 90°	65.00	pc	31.00	2,015.00
	e. 200mm dia. G.I. Elbow 90°	3.00	pc	281.00	843.00
	f. 100mm dia. G.I. Tee	35.00	pc	115.00	4,025.00
	g. 200mm dia. G.I. Tee	15.00	pc	362.00	5,430.00
	h. 100mm dia. G.I. Cross	36.00	pc	115.00	4,140.00
	i. 200mm dia. - 100mm dia. G.I. Reducer coupling	12.00	pc	220.00	2,640.00
	j. 100mm dia. - 25mm dia. G.I. Reducer coupling	38.00	pc	65.00	2,470.00
	k. Sprinkler other accessories & fittings	1.00	set	10,000.00	10,000.00
	l. Nipple Threaded 25x75	38.00	pc	40.00	1,520.00
	m. Bolts and Nuts with Washer 5/8" x 2 1/2"	47.00	pc	75.00	3,525.00
	n. Bolts and Nuts 1/2" x 2 1/2"	47.00	pc	65.00	3,055.00
	o. Bolts and Nuts 1/2" x 2"	47.00	pc	60.00	2,820.00
	p. Plain Round Bar 3/8" x 6m	12.00	pc	280.00	3,360.00
	q. B.I. Flange 3"	20.00	pc	550.00	11,000.00
	r. Angle Bar 3/16" x 1 1/2" x 1 1/2" x 6	19.00	pc	620.00	11,780.00
	s. Flat Bar 3/16" x 1" x 6m	19.00	pc	220.00	4,180.00
	t. Welding Rod	5.00	pc	105.00	525.00
	u. Red Primer	5.00	pc	350.00	1,750.00
	v. Paint Thinner	5.00	pc	150.00	750.00
	w. Paint Brush (2")	10.00	pc	45.00	450.00
	x. 75mm dia. Brass Siamese twin	1.00	pc	6,000.00	6,000.00
	Materials				162,818.00
	B. Man Power Consumption				
1	Foreman	3.00	days	900.00	2,700.00
2	Plumber	3.00	days	750.00	2,250.00
8	Laborers	3.00	days	550.00	13,200.00
	Labor				18,150.00
	C. Equipment				
2	Electric Grinder/Sander	2.00	days	500.00	2,000.00
2	Welding Machine	2.00	days	1,000.00	4,000.00
	Minor Tools				1,815.00
	Equipment Rentals				7815.00

Material Cost	162,818.00
Labor Cost	18,150.00
Equipment Rentals	7,815.00
Direct Cost =	188,783.00
Indirect Cost (OCM - 10%) =	18,878.30
Indirect Cost (Contractor's Profit - 8%) =	15,102.64
Vat (5%) =	11,138.20
Sub Total =	**233,902.14**

	Valves				
	a. Angle Valve 2 1/2" dia.	4.00	pc	4,000.00	16,000.00
	b. Angle Valve 1 1/2" dia.	3.00	pc	3,000.00	9,000.00
	c. OS&Y Valve 200mm dia.	3	pc	5000	15000
	d. Check Valve 200mm dia.	3.00	pc	950.00	2,850.00
	Materials				42,850.00
	B. Man Power Consumption				
1	Foreman	13.00	days	900.00	11,700.00
2	Plumber	13.00	days	750.00	9,750.00
8	Laborers	13.00	days	550.00	57,200.00
	Labor				78,650.00
	C. Equipment				
2	Electric Grinder/Sander	2.00	days	500.00	2,000.00
2	Welding Machine	2.00	days	1,000.00	4,000.00
	Minor Tools				7,865.00
	Equipment Rentals				13865.00

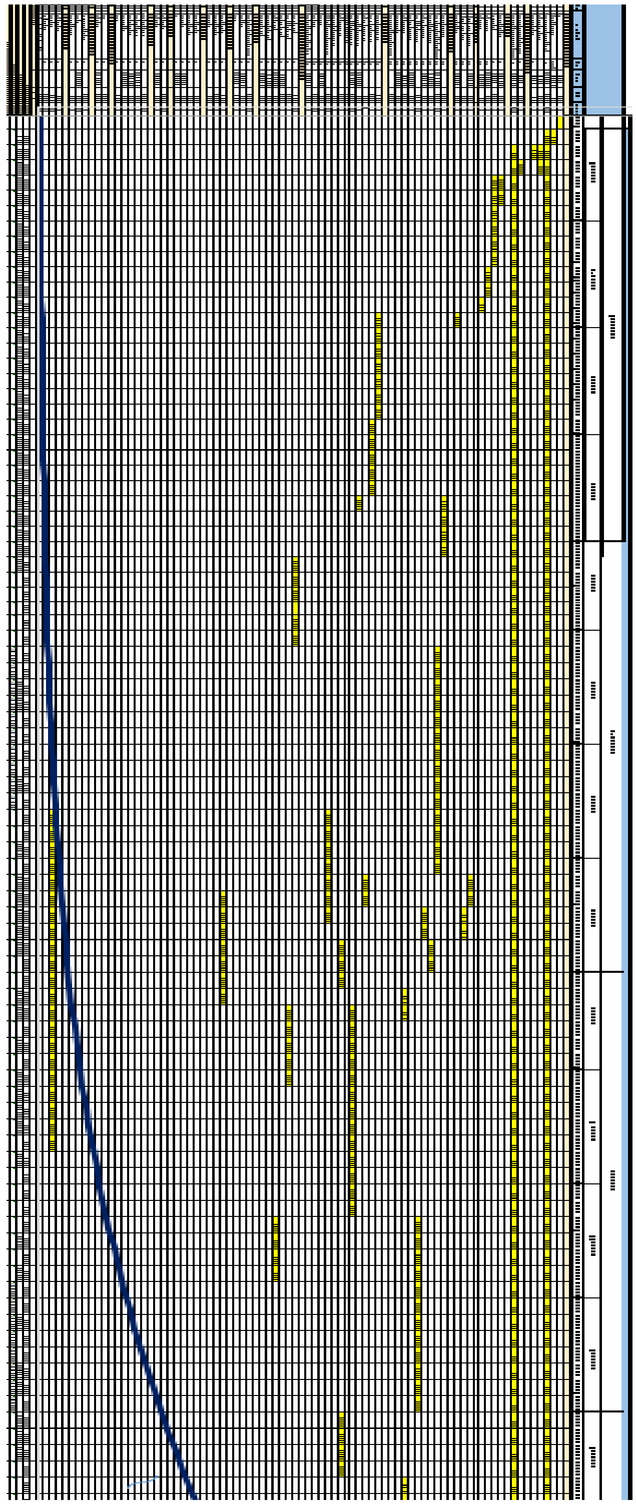
Material Cost	42,850.00
Labor Cost	78,650.00
Equipment Rentals	13,865.00

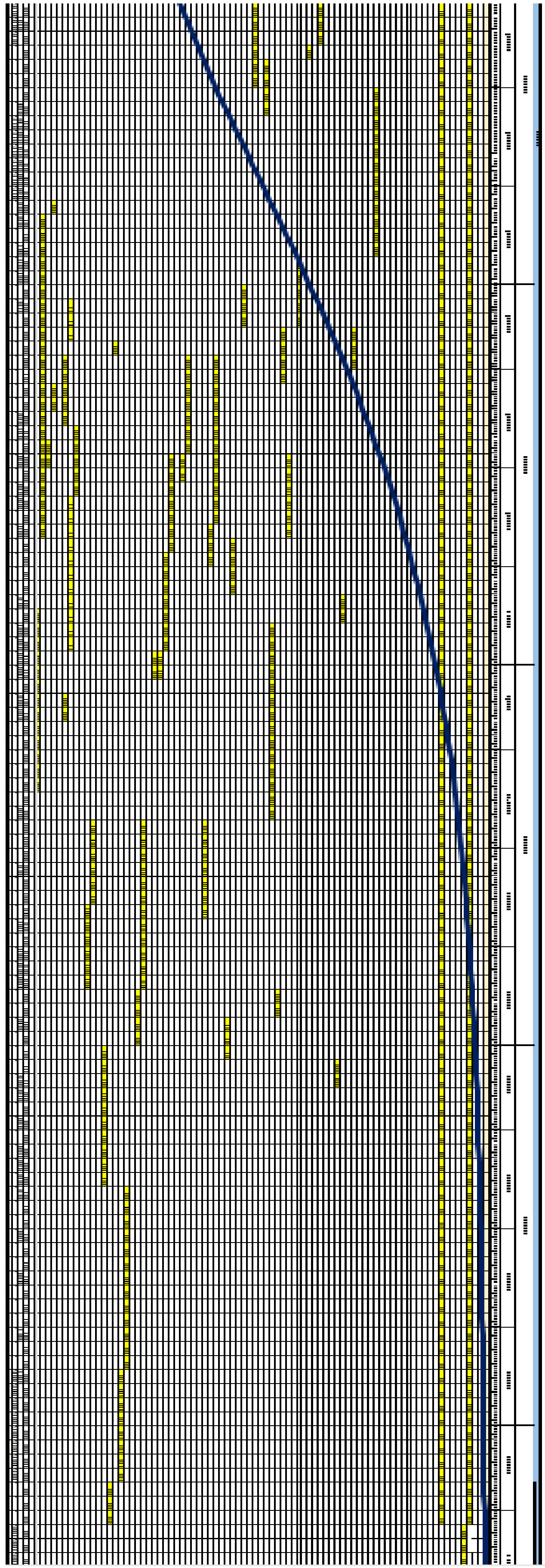
Direct Cost =	135,365.00
Indirect Cost (OCM - 10%) =	13,536.50
Indirect Cost (Contractor's Profit - 8%) =	10,829.20
Vat (5%) =	7,986.54
Sub Total =	**167,717.24**

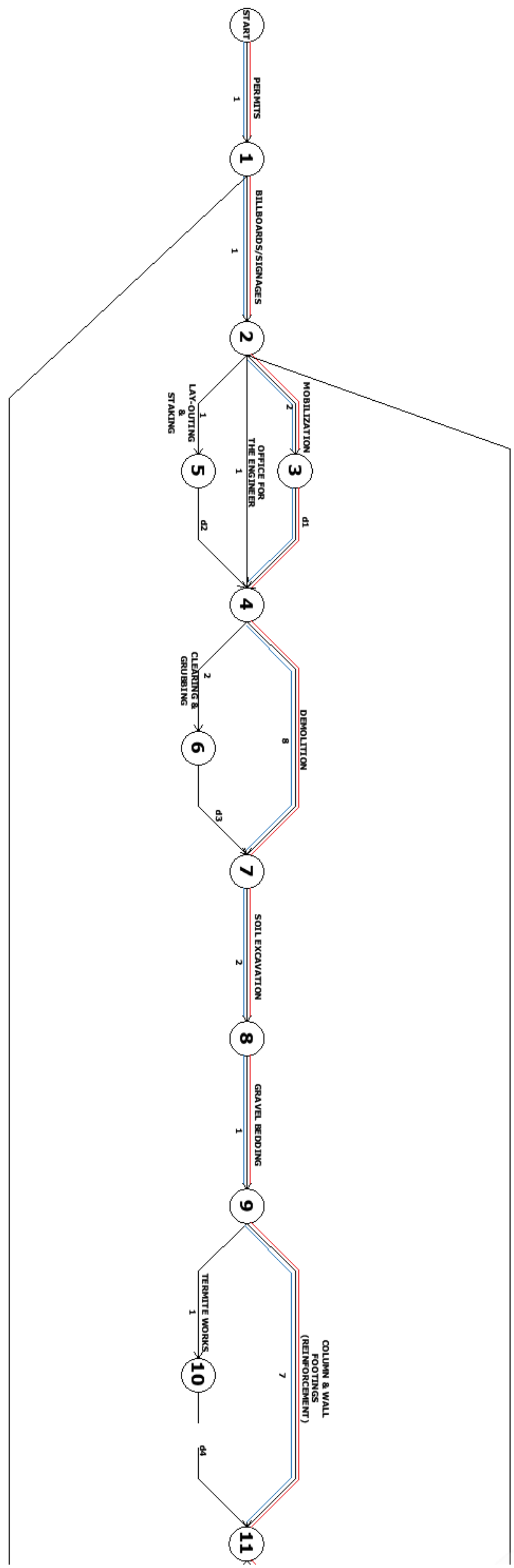
TAL PROJECT COST	**15,611,240.37**

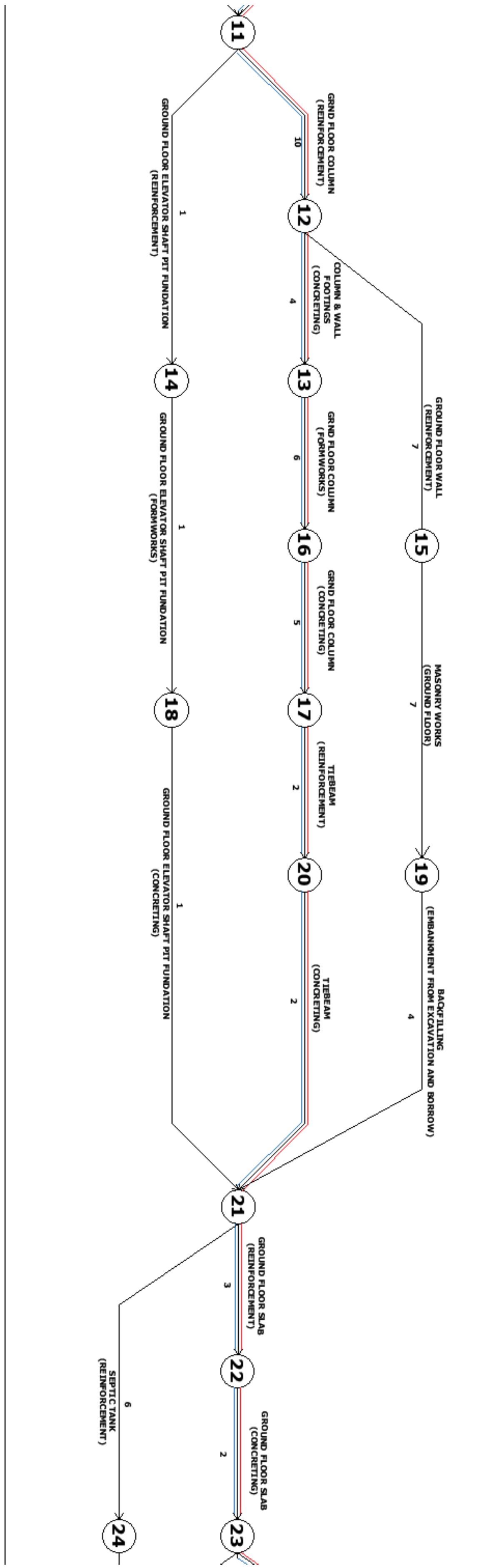
APPENDIX H

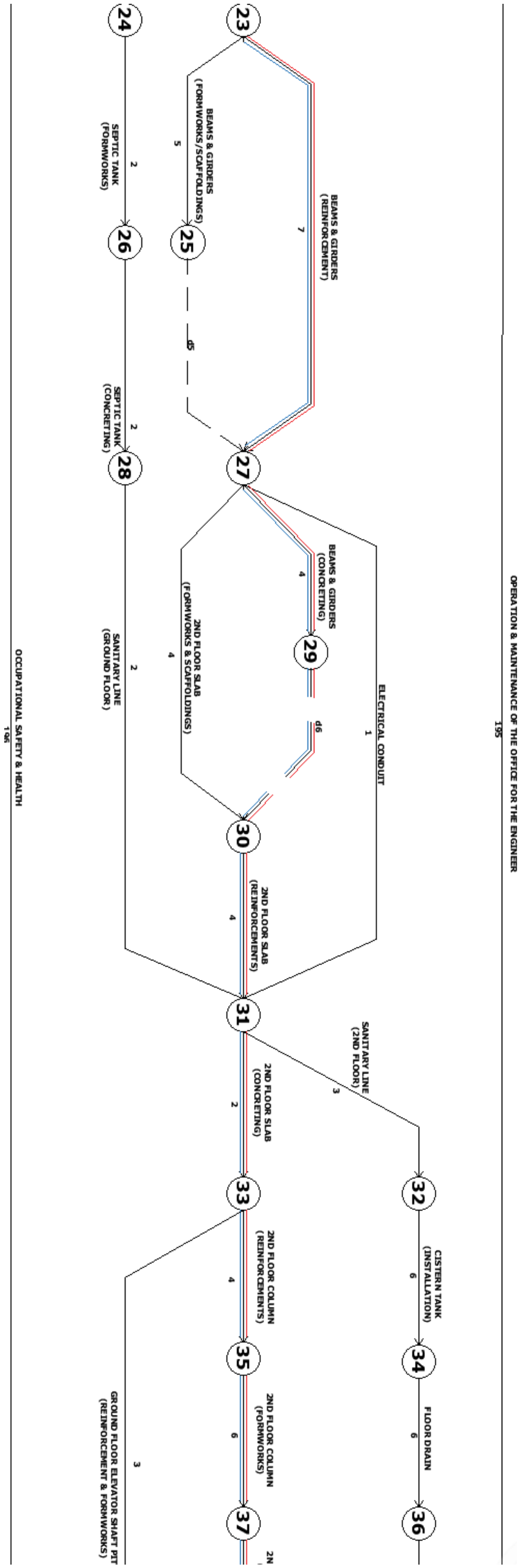
Project Scheduling

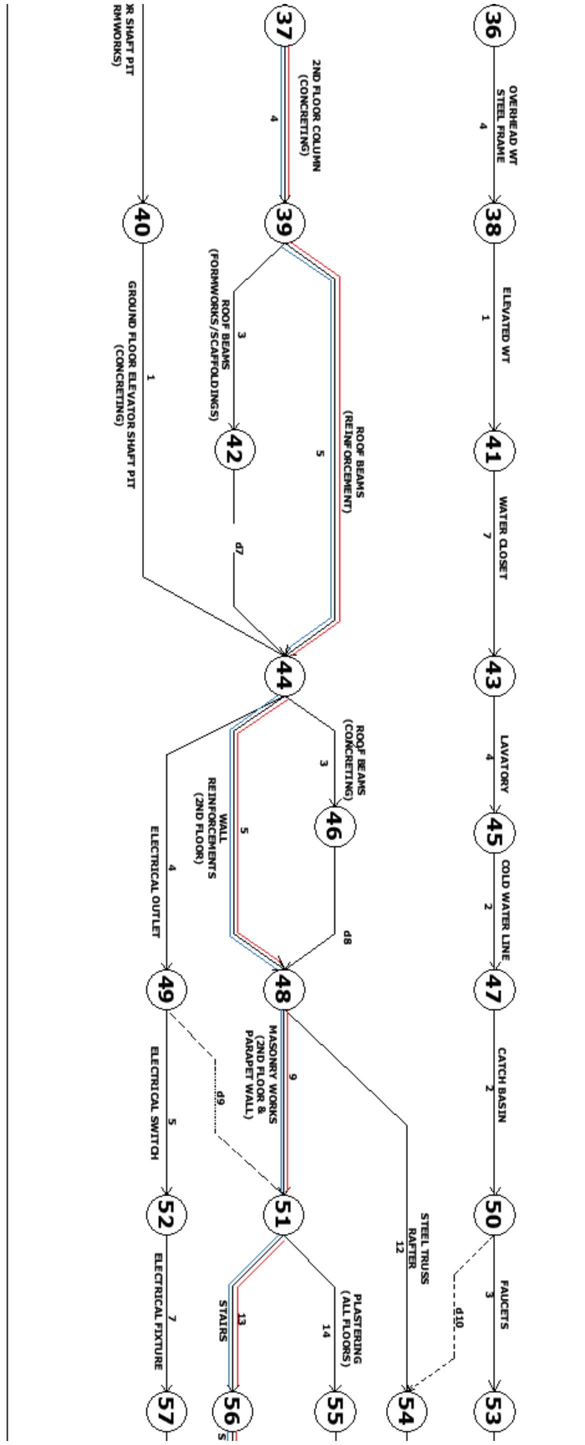




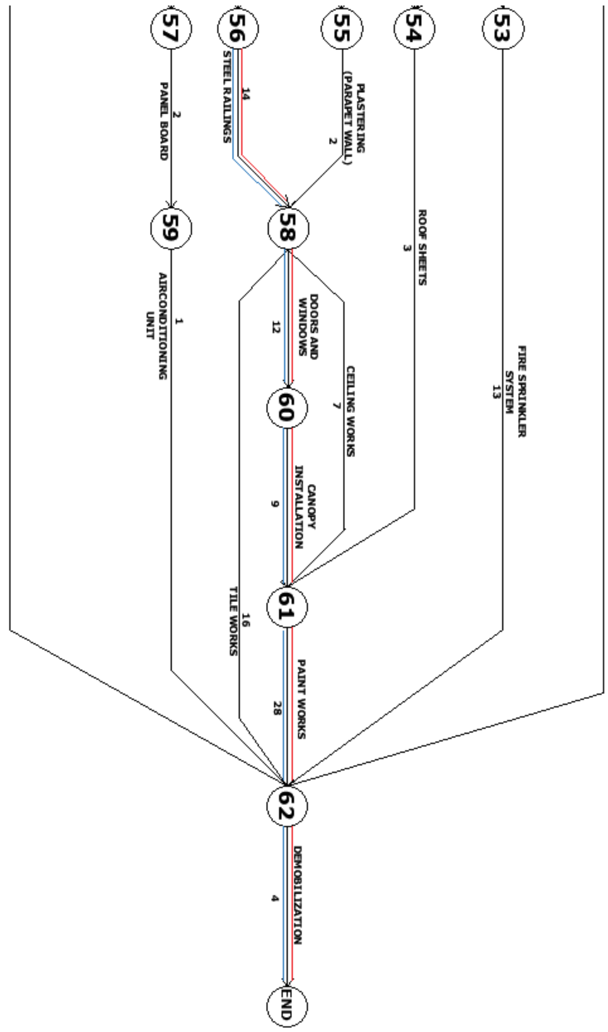

START
PERMITS
1
1
BILLBOARDS/SIGNAGES
1
2
MOBILIZATION
2
3
OFFICE FOR
THE ENGINEER
1
LAY-OUTING
&
STAKING
1
5
d1
d2
4
DEMOLITION
8
CLEARING &
GRUBBING
2
6
d3
7
SOIL EXCAVATION
2
8
GRAVEL BEDDING
1
9
COLUMN & WALL
FOOTINGS
(REINFORCEMENT)
7
TERMITE WORKS
1
10
d4
11


11
GRND FLOOR COLUMN (REINFORCEMENT)
10
12
GROUND FLOOR ELEVATOR SHAFT PIT FUNDATION (REINFORCEMENT)
1
COLUMN & WALL FOOTINGS (CONCRETING)
4
GROUND FLOOR WALL (REINFORCEMENT)
7
13
14
GRND FLOOR COLUMN (FORMWORKS)
6
GROUND FLOOR ELEVATOR SHAFT PIT FUNDATION (FORMWORKS)
1
15
16
GRND FLOOR COLUMN (CONCRETING)
5
MASONRY WORKS (GROUND FLOOR)
7
17
18
TIEBEAM (REINFORCEMENT)
2
GROUND FLOOR ELEVATOR SHAFT PIT FUNDATION (CONCRETING)
1
19
20
BACKFILLING (EMBANKMENT FROM EXCAVATION AND BORROW)
4
TIEBEAM (CONCRETING)
2
21
GROUND FLOOR SLAB (REINFORCEMENT)
3
SEPTIC TANK (REINFORCEMENT)
6
22
GROUND FLOOR SLAB (CONCRETING)
2
23
24


OPERATION & MAINTENANCE OF THE OFFICE FOR THE ENGINEER
195
OCCUPATIONAL SAFETY & HEALTH
196
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
BEAMS & GIRDERS (REINFORCEMENT)
7
BEAMS & GIRDERS (FORMWORKS/SCAFFOLDINGS)
5
SEPTIC TANK (FORMWORKS)
2
d5
SEPTIC TANK (CONCRETING)
2
BEAMS & GIRDERS (CONCRETING)
4
2ND FLOOR SLAB (FORMWORKS & SCAFFOLDINGS)
4
ELECTRICAL CONDUIT
1
d6
SANITARY LINE (GROUND FLOOR)
2
2ND FLOOR SLAB (REINFORCEMENTS)
4
SANITARY LINE (2ND FLOOR)
3
2ND FLOOR SLAB (CONCRETING)
2
CISTERN TANK (INSTALLATION)
6
2ND FLOOR COLUMN (REINFORCEMENTS)
4
FLOOR DRAIN
6
2ND FLOOR COLUMN (FORMWORKS)
6
GROUND FLOOR ELEVATOR SHAFT PIT (REINFORCEMENT & FORMWORKS)
3



36
OVERHEAD WT STEEL FRAME
4
38
ELEVATED WT
1
41
WATER CLOSET
7
43
LAVATORY
4
45
COLD WATER LINE
2
47
CATCH BASIN
2
50
FAUCETS
3
53
d10
STEEL TRUSS RAFTER
12
54
37
2ND FLOOR COLUMN (CONCRETING)
4
39
ROOF BEAMS (REINFORCEMENT)
5
ROOF BEAMS (FORMWORKS/SCAFFOLDINGS)
3
42
d7
44
ROOF BEAMS (CONCRETING)
3
46
d8
WALL REINFORCEMENTS (2ND FLOOR)
5
48
MASONRY WORKS (2ND FLOOR & PARAPET WALL)
9
51
PLASTERING (ALL FLOORS)
14
55
STAIRS
13
56
40
GROUND FLOOR ELEVATOR SHAFT PIT (CONCRETING)
1
ELECTRICAL OUTLET
4
49
d9
ELECTRICAL SWITCH
5
52
ELECTRICAL FIXTURE
7
57



53
54
55
56
57
58
59
60
61
62
END
PLASTERING (PARAPET WALL)
2
STEEL RAILINGS
14
PANEL BOARD
2
ROOF SHEETS
3
FIRE SPRINKLER SYSTEM
13
DOORS AND WINDOWS
12
CEILING WORKS
7
AIRCONDITIONING UNIT
1
CANOPY INSTALLATION
9
TILE WORKS
16
PAINT WORKS
28
DEMOBILIZATION
4

APPENDIX I

Designer’s Vitae

BAGAFORO, Joshua S.

Joshua S. Bagaforo, 22, was born on December 4, 2001, and is the youngest of four children of Mrs. Matria Diosdada and Dr. Jerry S. Bagaforo. His siblings include his older sister, Myrianne Jade, who is 35 years old; his second eldest sister, Ava Marie, who is 34; and his older brother, Jeremy, who is 26. Joshua currently resides in Buhang, Jaro, Iloilo City.

In his leisure time, Joshua enjoys watching Netflix, walking, jogging, working out, and playing video games. He believes in the life quote by Eddie Vedder: “Whatever your walk of life is, I think you have to be real about it.”

Joshua completed his elementary education at Doane Baptist Academy and finished both junior and senior high school at Iloilo National High School. He is currently pursuing a Bachelor of Science in Civil Engineering at Central Philippine University.

BAYHON, Franz Aldrei O.

Franz Aldrei R. Bayhon, born on April 4, 2002, is the eldest son of Mrs. Lanie Lyn O. Bayhon and Archie R. Bayhon. He resides in Lumina Homes, Abilay Norte, Oton, Iloilo. He has two younger siblings: Ashley Jane, who is 18, and Chalz Andrei, who is 8.

Franz graduated from Jaro II Elementary School and completed his junior and senior high school education at Iloilo National High School. An introspective person, he enjoys playing video games.

Currently, Franz is a fourth-year college student pursuing a Bachelor of Science in Civil Engineering at Central Philippine University. His motivation is to pass the Civil Engineering Licensure Exam in April 2025.

CANICULA, Arl Rey N.

Arl Rey N. Canicula, 23, is the son of Mrs. Arlyn and Mr. Rey T. Canicula. Born on March 10, 2001, he resides in Lapayon, Leganes, Iloilo. He completed his education at Leganes Central Elementary School and attended Iloilo National High School for both junior and senior high school. Arl has a passion for animals and a strong faith in Jesus Christ, our one and only savior.

Arl is committed to serving the Lord amidst his daily struggles in life and academics. He maintains a positive outlook and refuses to let his inner demons consume him, believing that with the Lord, he can overcome any challenge. Currently, he is enrolled at Central Philippine University, pursuing a Bachelor of Science in Civil Engineering. He won the Battle of the Bands within the Engineering Department and is a grateful scholar under the care of The Ruth Scholarship Foundation.