Ministry of Education and Science of Ukraine
Dnipro University of Technology

FACULTY OF CONSTRUCTION

Department of Construction, Geotechnics and Geomechanics

EXPLANATORY NOTE
of a Bachelor's qualification work

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academic group 192-17-1 IC

specialty 192 Building and Civil Engineering

under educational programme Building and Civil Engineering

topic: "Construction project of comprehensive school in Cairo City, Egypt (Arab Republic of Egypt)"

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		ranking	institutional	
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3 chapter	Volkova V.E.	95	excelent	
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TASK
for a Bachelor's qualification work

studentAhmed Mohamed Reda Mohamed Ibrahim**academic group** ____192-17-1 IC__
(name) (code)
Specialty 192 Building and Civil Engineering
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topic: Construction project of comprehensive school in Cairo City, Egypt (Arab Republic of Egypt)"
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Chapter	Content	Deadlines
1	Architecturalandconstructionsection	31.05.2021- 06.06.2021
2	Bases and foundation	07.06.2021- 15.06.2021
3	Calculationanddesignsection	16.06.2021- 29.06.2021
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Acceptance for execution _____Ahmed Mohamed Reda Mohamed Ibrahim(student's signature) (name)

ABSTRACT

QUALIFYING WORK: 112 PP., 15 TABLES, 28 FIGURES, APENDIX

CIVIL BUILDING, COMPREHENSIVE SCHOOL, DESIGN, TECHNOLOGY AND ORGANIZATION OF WORKS.

Object of work - A project to build a comprehensive school in Cairo City (Arabic Republic Egypt).

The purpose of the project to design a school, using progressive methods of construction production.

The results and their novelty - the three-dimensional planning and design solution of the building, the general plan of the building. Designed building with brick walls and monolithic reinforced concrete flooring:

Selected and substantiated basic design and construction solutions. The calculation of the piles, slab, beam, column structures were performed. In the calculation and design section the collection of loads on the structure of the building frame is performed, strength calculations are performed and the construction of the floor slab, floor beams, columns and foundation are given.

The building has a compact plan in its three-dimensional solution, which allows you to easily place it on a dedicated site. Capital class - I.

- the shape of building is rectangular
- building length =32 m
-building width = 14 m
- number of level= 5 floor
-the height of floor =3.30 m
-the total height of building = 17 m

Contents

1. ARCHITECTURAL AND CONSTRUCTION SECTION

1.1. Objectives and goals of the project

1. The school is an educational, and social institution whose objective is to provide the student with a broad culture that is compatible with the developments of our time in order to face life with dignity and courage.

2. Refining the student's personality, developing his abilities and personal inclinations, and considering him a supreme value.

3. Providing the student with various life skills.

4. Developing and consolidating social and democratic values of human respect and consolidating the values of equality, justice, tolerance, and patience.

5. Renouncing violence, which is a corrupt social phenomenon, and working to reduce it as much as possible and with the greatest possible efforts.

6. Develop the spirit of belonging to the school, ensuring its good reputation, and always working to raise its level and achieve the foundations of mutual respect between the faculty and students.

7. Share Effectiveness of parents and parents in the educational process and the development of building the student's personality and work together in achieving educational and personal goals.

8. Encouraging the student to take responsibility, initiative, and leadership in a group setting.

9. the teacher to be a role model for his students as an example for all the above.

1.2. Brief description of the natural and climatic zone of the building

The building is rectangular in shape. Total height of building is 17 m. Its length is32 m, building width is 14 m. Number of building level is 5. The height of floor is 3.30 m The total area is of 426.79m^2. Perimeter is 90.7m.

The building consists of 18 rooms - 4 classes for children-meeting room - – library - developed lab Preparation room - room for computers - room fields - Teachers office room - administration office room - office of the Director - admin room - doctor's room - 2 private rooms with toiletries - requested toilet - female students' toilet - children's toilet - toilet for the disabled.

1.1. Climatic characteristics of the construction area

The climate during winter is characterized by winter between 18°C and 9°C.

The climate is characterized by high temperature during the summer months and its moderation with a tendency to cold sometimes during the winter months, where the average temperature today ranges in July (summer) between 36 degrees at a temperature and 21 at the lowest temperature, while the daily average ranges during the month of January (winter) between 18 degrees Celsius and 8 degrees Celsius.

Cairo is sometimes exposed to the fall of the Khamaseen winds during the period starting between March and June, and these winds raise the average temperature by an amount that may reach 14 degrees suddenly, and also reduce the humidity in the air to a percentage that does not exceed 10%

The population suffers from a lot of fine dust from the red hills and mountains during the period of surface wind activity.

Figure 1.1. – The main facade

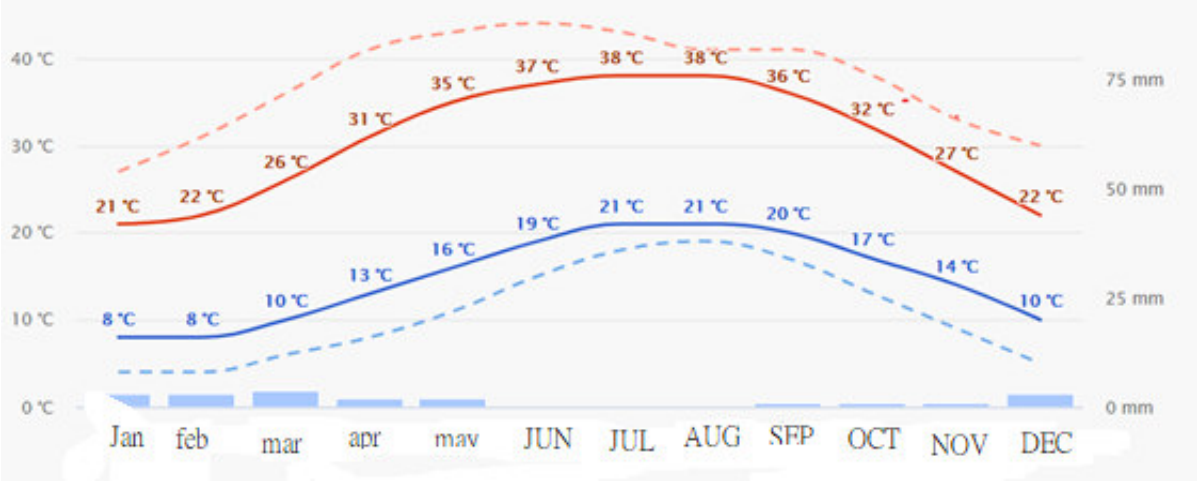


Figure 1.2. - Climatic characteristics of the construction area [1]

Similarly, the 'Minimum Daily Mean' (full blue line) shows the mean minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average hottest day and coldest night in each month for the past 30 years. For vacation planning, you can expect average temperatures, and prepare for the hottest day and coldest night. Wind speed is not displayed by default but can be viewed by clicking below the graph.

The rainfall chart is useful for plotting seasonal effects such as the monsoon in India or the rainy season in Africa. Monthly forecast over 150 mm is predominantly rainy, and less than 30 mm is predominantly dry Note: Precipitation amounts represented in the tropics and complex terrain tend to be less than the local measurement - receives between 20 mm (0.79 in) and 200 mm (7.87 in) of annual average precipitation. In general it is a hot desert climate. Precipitation all over the country.

1.1. **Basic requirements for functional and technological process**

To be owned in creating an atmospheric working environment. The second stage, the attitude of society to the first stage in the first stage. Therefore, it depends on the design of public buildings, constructive and economic, and architectural and

artistic. Before starting the work of the buildings for the walls in the building from the inside and outside, all areas of the doors and windows must be taken into account

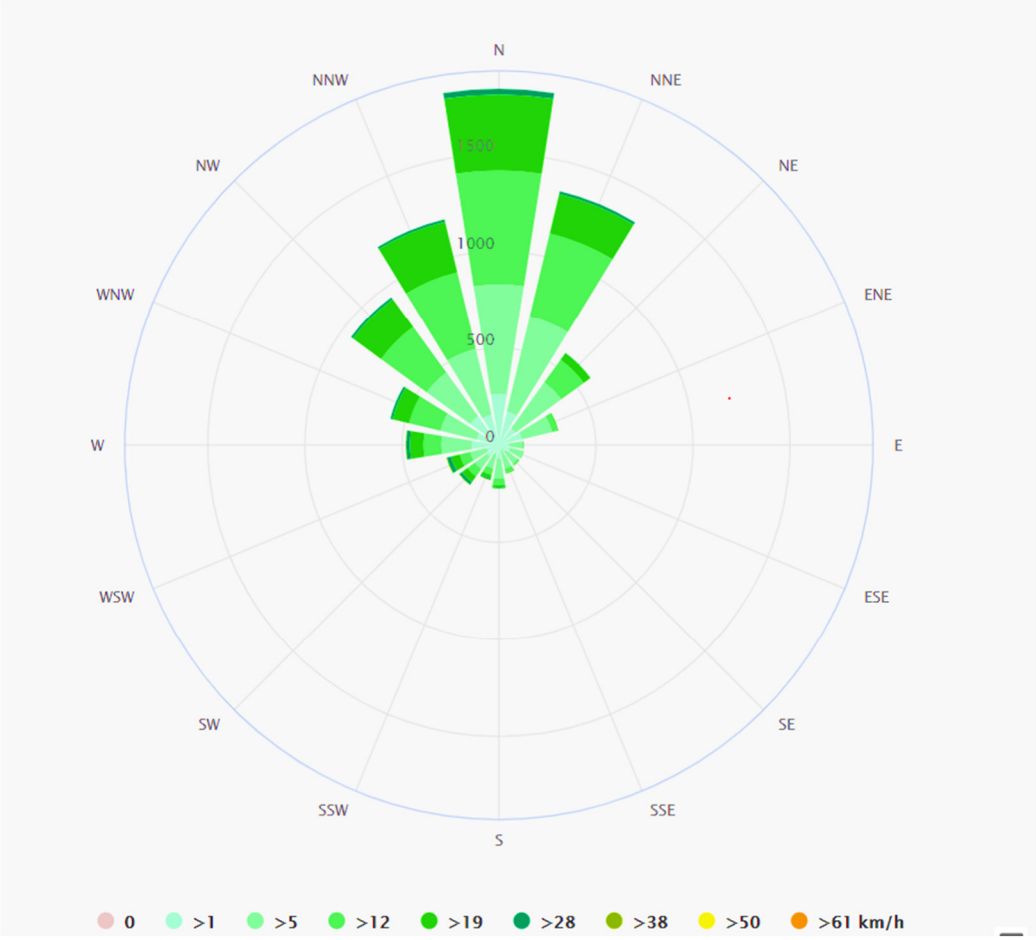


Figure 1.3. - Wind rose [1]

1.2. **Windows and doors**

The door ring consists of three pieces (2 uprights and a head). The window session is 1 m from the finishing level. Bathroom windows sitting, and the kitchen is 1.4 m from the finishing level. A 10 cm thick lintel must be placed at the top of the doors, and windows are required to be installed. There are 6 types of plastic windows are used

Table 1.1 - Climate date for Cairo [1]

Climate data for Cairo													
9Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	31 (88)	34.2 (93.6)	37.9 (100.2)	43.2 (109.8)	47.8 (118.0)	46.4 (115.5)	42.6 (108.7)	43.4 (110.1)	43.7 (110.7)	41 (106)	37.4 (99.3)	30.2 (86.4)	47.8 (118.0)
Average high °C (°F)	18.9 (66.0)	20.4 (68.7)	23.5 (74.3)	28.3 (82.9)	32 (90)	33.9 (93.0)	34.7 (94.5)	34.2 (93.6)	32.6 (90.7)	29.2 (84.6)	24.8 (76.6)	20.3 (68.5)	27.7 (81.9)
Daily mean °C (°F)	14.0 (57.2)	15.1 (59.2)	17.6 (63.7)	21.5 (70.7)	24.9 (76.8)	27.0 (80.6)	28.4 (83.1)	28.2 (82.8)	26.6 (79.9)	23.3 (73.9)	19.5 (67.1)	15.4 (59.7)	21.8 (71.2)
Average low °C (°F)	9 (48)	9.7 (49.5)	11.6 (52.9)	14.6 (58.3)	17.7 (63.9)	20.1 (68.2)	22 (72)	22.1 (71.8)	20.5 (68.9)	17.4 (63.3)	14.1 (57.4)	10.4 (50.7)	15.8 (60.4)
Record low °C (°F)	1.2 (34.2)	3.6 (38.5)	5 (41)	7.6 (45.7)	12.3 (54.1)	16 (61)	18.2 (64.8)	19 (66)	14.5 (58.1)	12.3 (54.1)	5.2 (41.4)	3 (37)	1.2 (34.2)
Average precipitation mm (inches)	5 (0.2)	3.8 (0.15)	3.8 (0.15)	1.1 (0.04)	0.5 (0.02)	0.1 (0.00)	0 (0)	0 (0)	0 (0)	0.7 (0.03)	3.8 (0.15)	5.9 (0.23)	24.7 (0.97)
Average precipitation days (≥ 0.01 mm)	3.5	2.7	1.9	0.9	0.5	0.1	0	0	0	0.5	1.3	2.8	14.2
Average relative humidity (%)	59	54	53	47	46	49	58	61	60	60	61	61	56
Mean monthly sunshine hours	213	234	269	291	324	357	363	351	311	292	248	198	3,451
Average ultraviolet index	4	5	7	9	10	11.5	11.5	11	9	7	5	3	7.8

Table 1.2 - Windows

Models	Width, m	Weight, m
W1	2.30	1.55
W2	2.28	1.05
W3	0.60	0.90
W4	1.40	1.55
W5	0.70	1.55
W6	0.65	0.50

There are wooden doors of 9 types are used.

Table 1.3 - Doors

Models	Width, m	Height, m
D1	1	2.20
D2	0.90	2.20
D3	1	2.20
D4	0.75	2.10
D5	1.45	2.20
D6	2	2.20
D7	0.80	2.20
D8	1	2.20
D9	1.45	2.20

The door ring consists of three pieces (2 uprights and a head). Shaving the door to the balcony, and shaving the window consists of 4 pieces (2 pedestals, a head, and a sitting).

The level of the head of the throat for each of the doors and windows is 2.2 m from the finishing level.

The width of the door throat is 14.5 cm, and the thickness is 5 cm (2 inches). Doors open inside the space, whether it is the door to an apartment, room, bathroom...etc. The door leaf should be at the highest finishing level by about 2 cm.

Installation of door hinges and nets:

1. The finishing drink is transferred on both sides of the door opening to ensure that the level of the head of the halls is equal

2. The side adjacent to the brick wall is painted with bitumen before it is installed in order to avoid the transfer of moisture from the bricks to the door throat.

3. Three canals are installed on both sides of the throat, and they are divided equally at the height of the throat. The canisters must be galvanized iron, and they are fixed with nails in the walls so that they do not appear after the plastering.

Receipt of carpentry work for door and window:

1. Revise the throat paint with paint the part that touches the wall with bitumen.

2. The necessity of fixing the throat on a drink to determine the level of the head, and swearing, and sitting only.

3. Reviewing the places and the number of canes in the throat.

4. Make sure that the canes are fixed to the throat with screws.

5. In the case of recessed doors, there is an increase in the length of the throat stalk (plaiting) of not less than 5 cm.

6. Checking the verticality of the throat post using the thread scale from the inside and outside.

7. Make sure that the front of the throat is at the level of the pupil, strings or the surface of the white.

8. Measure the width of the throat, making sure that it is equal at the top, middle and bottom of the throat.

9. Make sure to grit the canes with cement mortar and sand, and not to use gypsum.

10. Check the horizontal head of the doors, and the top and bottom heads of the windows with the water scale.

11. Reviewing any defects in the eye sockets that resulted from the installation (fracture or crack).

1.3. Basic requirements of planning – plumbing and sanitation work procedure

The plumbing system includes:

1-Water supply.

2-Soil pipes and fixtures.

3-Sanitary drainage system, to carry the wastewater from the plumbing fixtures to the public or private disposal system.

4-Stormwater drainage system to collect and carry rainwater.

5-Fire fighting systems for high rise buildings as per the statutory provisions. (All buildings may not need this)

1.3.1. Water supply system

An adequate quantity of clean and potable water for drinking purposes should be supplied. Water from other sources should also be made available for daily use, for twenty-four hours of efficient flushing. Proper pumping systems with adequate stand by arrangements should be made.

Water should be supplied with the required pressure, up to O.H.W.T. (Over Head Water Tank), and then to the individual residential units with the minimum prescribed pressure. The system should invoke minimum maintenance.

1.3.2. Sanitary and drainage systems

It should be well designed, executed, operated, and maintained according to the national standards. And as per the provisions of the local municipal authority.

It should be leak-proof while crossing the potable water supply system. Should be properly ventilated and have adequate trap system, provided with necessary water seals to avoid foul gases. It should have properly prescribed slopes. It should require minimum water for proper performance and cleaning.

1.3.3. Stormwater drainage

All building terraces should have proper slopes for carrying rainwater towards a catch point. The total project should be well planned to avoid the accumulation of ‘rainwater in ducts, parking, on roads, or on open grounds.

We should have well-connected stormwater drains with proper slopes for carrying unused water. These drains should be inspected and maintained properly, especially before rains.

1.4. Fire fighting system

Requirements as per municipal rules. If the height of the building exceeds 15.0m, the fire fighting system must be installed in the building as per the Municipal corporation rules. Details of requirements, work procedure, etc. is discussed in.

1.5. The establishment of, electricity, and carpentry

After the pit work is completed, we leave the rooms or facades to the electrician, and we leave the bathrooms and kitchens to the health technician, each technician specialized in

For electrical work, the technician is obligated to break the hoses and electrical pipes at the same level as the pit. Marble or paints. Also, the carpenter must be committed to making the doors and windows at the same level as the pit.

Electricity cracking treatment by milling around pipes and stitching around carpentry rings. Extension nets and building installation treatments are done or in areas where columns or beams meet with brick barriers in vertical and horizontal betrayals. It is also equipped with installing corners. The Egyptian market is called to protect the corners and the sock from breakage subject to shocks.

Figure 1.4- The establishment of plumbing, electricity, and carpentry

After implementing the previous points, it is allowed to move to the stage of filling with cement mortar to complete the plastering work.

1.6. Inspection of the school's technical condition

The selection of the optimum study for a particular building or structure for its additional operation with minimal energy consumption is achieved through an energy audit procedure - conducting thermal inspections of closed structures and engineering systems and technical and economic comparison of their efficiency.

Comprehensive technical inspections of buildings or structures conducted during the period of new construction, reconstruction, restoration, renovation, return of technical equipment, preservation and liquidation (hereinafter - construction) shall include the following sections:

-Surveys of the microclimate of buildings;

-Inspections of the condition of closed structures;

-Perform an energy audit.

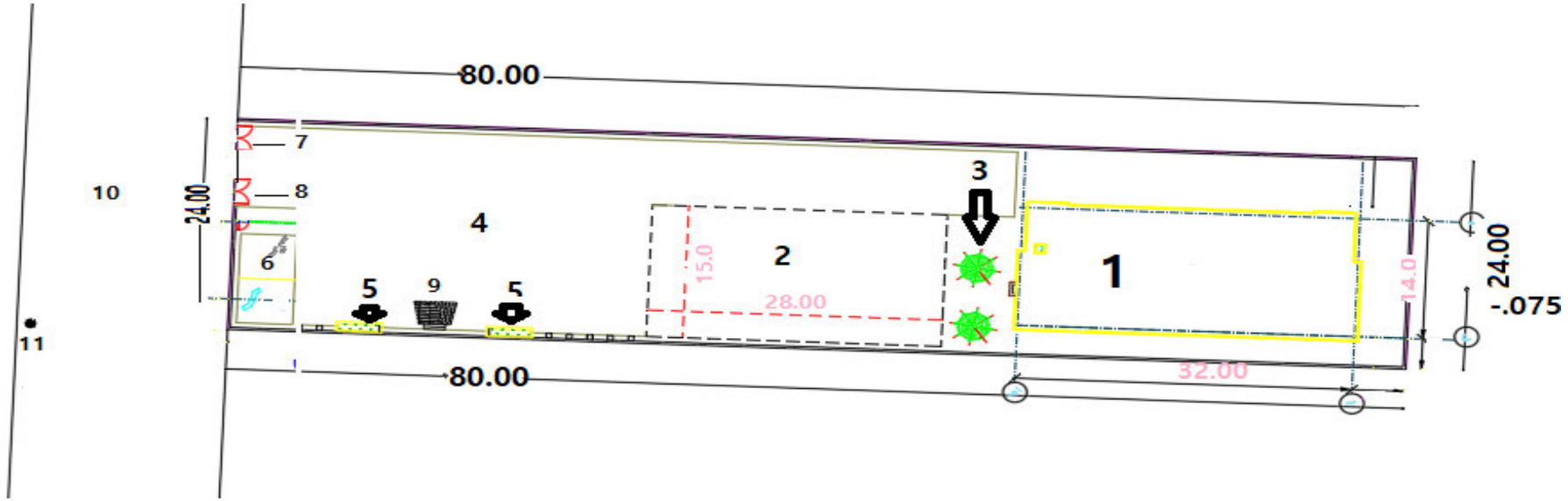
The general purpose of the building structures technical condition survey is to determine the actual capacity and performance of the structures, the degree of their physical wear and the causes of their current condition.

The purpose of the energy audit is to obtain data on the energy consumption of the home and to study the feasibility of an optimal version of a building reconstruction that meets modern thermal requirements.

1.7. **Master plan**

School are being built mostly within new housing estates on the outskirts of large cities for people using public and private transport, or for pedestrians. They are located in areas with a well-maintained pedestrian zone, convenient transport entrances and parking lots; their location is connected with the transport system of the city and, in particular, with the main pedestrian flows, directions to public transport stops.

The location of the building is designed in conjunction with existing buildings and transport networks. The entrance to the territory is taken from the existing paved road. There are also an entrance for unloading 1 and a parking lot for visitors from the facade.



1 - The school

2 - Playground

3 - Two trees

4 - School yard

5 - Plant pot(100×0.50)

6 - Security room

7 - Student entry gate

8 - Entry gate for teachers

9 - School radio platform

10 - Asphalt street T 20 meters wide

11 - Lamppost

Figure 1.5- Master plan

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2. BASES AND FOUNDATION

2.1. Basic hydrogeological characteristics of the construction area

A number of (3) boring were carried out with a depth of (15) & (30) m from the natural ground level for each boring separately by rotary auger drilling method, where the mechanical method was used. The boring was carried out at a depth of (3,000) m within the boundaries of the building, while the weaving was carried out at a depth of (15.00) m in the site. Disturbed samples and undisturbed samples were extracted for each linear meter of the boring and at every noticeable change in the soil during digging of the pelvis, while keeping the samples in plastic bags for the necessary tests. The samples were numbered in a way that shows the palpation number and the depth of the sample. An appendix to the end of the report is a general site sketch showing the locations of the boring that have been implemented. The average natural ground level was considered to be the zero level for the implemented boring.

2.2. Soil characteristics

To study and analyze the results of the checks on the breeding samples on the site, we recommend the following:

Soil borings work : A number of (3) boring were carried out with a depth of (15) & (30) m from the natural ground level for each boring separately by rotary auger drilling method, where the mechanical method was used. The boring was carried out at a depth of (3,000) m within the boundaries of the building, while the weaving was carried out at a depth of (15.00) m in the site. Disturbed samples and undisturbed samples were extracted for each linear meter of the boring and at every noticeable change in the soil during digging of the pelvis, while keeping the samples

in plastic bags for the necessary tests. The samples were numbered in a way that shows the palpation number and the depth of the sample. An appendix to the end of the report is a general site sketch showing the locations of the boring that have been implemented. The average natural ground level was considered to be the zero level for the implemented boring

Boring No. (1): "From the level of zero (the natural ground) to the level of (1,000) m: loose brown clay mixed with plant roots:

from a level of (-1.00) m to a level of (6,000) m: clay Very weak light gray and traces of snails

-from a level of (-6.00) m to a level of (-9.00) m: very weak dark gray silt,

from a level of (-9.00) m to a level of (-14,000) m

-From a level of (-14.00) m to a level of (20,000) m: sand that is brown to light yellow, medium coarse to coarse and traces of silt,

-from a level of (-20 000) m To a level of (-25.00) m: light yellow sand of medium rough to coarse and traces of silt

From a level of (-25.00) m to a level of (-30.00) m: light yellow sand of medium to coarse coarseness.

Boring No. (2), from the zero level (the natural ground) to the set point (-1.00) m: a disintegrated brown medicinal clay mixed with plant roots.

From a level of (-1,000) m to a level of (-4,000) m: cohesive light gray clay and some silt,

-from a level of 4,000) m to a level of (-8.0) m: very weak dark Gray silt clay

-From Level (-0.08) m to level (-13.00) m: light brown sand of medium coarse to coarse and ramified,

-from a level of (13.000) m to a level of (-15.00) m: sand up to Light yellow, medium rough to coarse, with traces of silt,

from a level of (-15.00) m to a level of (-23.00): light yellow sand of medium to coarse coarseness and traces of silt

-from a level of (-23.00) m to a level of (-30.00) m: light yellow sand, medium to coarse. (End of the panel) Panel

Boring No. (3): From the zero level (the natural ground) to the metropolis (1000) m: loose brown clay mixed with the roots of the plant. • From the level of (-1.00) m to the level of (-3.00) m: silt gray to light brown, with medium tensile strength: from the level of (-3.5) m to the level of (-5.00) m: light gray clay of medium consistency

From a level of (-5.00) m to a level of (-11.00) m: a very weak dark Gray alluvial clay.

From a level of (-11.00) m to a level of (-13.00) m: fine light Gray sand to medium to coarse-to-coarse sand and traces of clay.

And from a level of (-13.00) m to a level of (-15.00) m: light gray sand of medium to coarse coarseness and traces of clay.

2.3. Recommendations for the establishment

In the foregoing report, and based on the results of the tests, the following can be recommended for the school building:

The foundation is carried out using concrete foundations implemented (mechanical unloading) of reinforced concrete by the Continuous boring Auger, or known for its acronym (CFA) with a length of not less than about 16.0 m from the average natural level of the land during the implementation of the surveys

-High rigidity reinforced concrete bases are used based on piles to transfer study and horizontal loads. Thickness and reinforcement are determined according to design requirements, taking into account all expected load cases of live and horizontal loads on the structure according to the Egyptian Code for Loads. And take into account linking the bases use round beam standing in both direction.

A layer of ordinary concrete with a thickness of 20 centimeters is implemented below the level of the reinforced concrete bases.

2.4. Calculated values for the physical and mechanical properties of the soil

Table 2.1 -Plasticity Results Atterber Limits

Layer	UCSC Designation	PI	P.L (%)	L.L(%)	Depth(m)	BH No.
1	CH	25.44	25.63	51.07	4	2
2	CL	8.64	20.82	29.46	7	1
3	CL	21.80	24.20	46.0	9	3
4	0.09	0.17	0.25	2.78	1.28	12.0
5	0.20	0.32	0.46	2.30	1.11	17.0
6	0.41	0.50	0.61	1.49	1.0	26.0

The sample is classified according to USCS as Highly plastic clay given the symbol(CH). The sample is classified according to USCS as Low plastic clay given the symbol(CL). From gradation curve the sample is classified as poorly graded fine to medium send with traces of silt.

2.5. Important generalities that are considered upon implementation

The vertical main reinforcement area of the pile shall not be less than 0.80% of the pile section area, and a diameter of less than 16 mm shall not be used as the main pile for reinforcing the pile. The vertical pile reinforcement extends with a length of not less than 100 m, taking into account the implementation of the connections of the vertical skewers by welding and taking into account an overlap distance of not less than 50 times the diameter of the skewer used.

Iron collars with a diameter of no less than 16 mm or the diameter of the iron used to reinforce the pile vertically, whichever is greater, shall be used at distances of (1.50 - 2.0) m with welding.

Withdrawal of groundwater from within the boundaries of the excavation using submersible pumps with a follow-up to ensure that there are no fine particles from the soil with the water that is withdrawn and the disposal of the water that is collected away from the work site and the need to follow up the neighboring facilities and to ensure that they are not exposed to any problems as a result of sufficient water withdrawal

It must be ensured that the pile is anchored inside the sand layers with a distance of not less than three times the diameter of the pile.

It should be performed on layers every 20 cm, taking into account good compaction with the use of mud rammer, and plate loading tests are carried out to ensure soil design effort (security)

Piling integrity tests are carried out using sound waves on at least 25% of the executed piles.

The cement content of the reinforced concrete used in the piles is less than 350 kg sulfate-resistant Portland cement and 400 kg/ m sulfate-resistant Portland cement in the piles.

The characteristic strength of a standard cube of reinforced concrete in wreckers and piles shall not be less than 200 kg/cm after 28 days from the date of casting.

The compressive strength of a standard cube of ordinary concrete shall not be less than 200 kg/cm after 28 days from the date of casting.

It must be ensured that the concrete is completely filled with the pile size, by constantly observing during the casting the amount of concrete used in the casting and comparing it with the theoretical size of the pile. Ensure that sandy soil does not erupt at the bottom of the excavation, or that there are gaps or shortages in the pile sector, or any interference that occurs between the pile body and the soil during casting. Concrete must have a workability that fits with the

method of pouring, condensation and the formation of the pile without conflicting with the ratio of water / cement in the concrete mixture.

The pits are filled with clean sandy soil or regular concrete with new compaction, such as sand column, to prevent any problems.

Before starting the drilling operations at the site, seriously, take into account the determination of the locations of lines and pipes of all public utilities, including telephone and electricity cables, gas and water pipes, and sewers near the drilling site.

Attention Supporting aspects of excavation and preserving the foundations of neighboring facilities.

The rise in the groundwater level must be taken into account during drilling, and one of the appropriate groundwater drainage methods is used to lower its level so that the concrete sticks out to avoid any problems.

Filling is done around the foundations with sand or dirt from the output of the Khafre until reaching the final level with compaction well according to technical principles and specifications.

The foundations and concrete sectors buried under the ground shall be well insulated.

Ordinary Portland cement is used for all foundation works with a ratio of 200 kg / m3 for the normal and proportionate to 400 kg for the armed or according to the supervisory and design authority and the thickness of the concrete cover is not less than 7 cm with complete insulation of all buried sectors in a good way with isolating the necks of the buried columns by painting them with two faces of hot bitumen Oxidizer.

The Egyptian standard specifications for mixing, pouring and compacting concrete must be followed

The ratio of water to cement in the concrete mixture should not exceed 0.45. And the fracture effort of the reinforced concrete cubes shall not be less than 20 kg name 3 after 7 days from the date of pouring

2.6. The foundations

The foundations are the bottom part of the engineering building and its role is to lift building loads and ensure their fixation on the ground. The foundations are usually inserted into the ground at a depth suitable for construction and the foundation is chosen according to the type of building, design style and soil bearing capacity

The foundations were designed to withstand 5 floors and a net soil effort of 0.85 kg / cm. The foundations were designed based on the soil report prepared by the Soil Mechanics and Foundations Laboratory

The soil report states that a depth of up to 1.50 meters shall be excavated below the natural surface of the earth, while making sure to reach the cohesive clay soil suitable for foundation.

1- Raise the foundation level

2- Increase the bearing capacity of the soil

3- The distance from the area of influence of the groundwater or the protection of the foundations from its influence.

4- Also, substitution soil is resorted to when the original soil is not suitable for foundation for the origin to be built on.

Stronger than the original soil or at least equal to it and applied in layers

2.7. Piles

They are columns that hammer into the ground below the armed bases to a great depth inside the ground because the surface soil is weak and helps to transfer.

We resort to the use of piles for the following reasons:

The soil is weak and its bearing capacity is low, and its loading may lead to a decline in the origin.

If the source is close to the sea or if the groundwater level is high. ads from the surface to a deeper depth that has the ability to carry those loads.

The method of piling and it is done when there is a layer of strong soil at a certain depth that is suitable for basing on it.

In this method, the loads of the origin are transmitted from its columns to its bases, which in turn are based on groups (bundles) of piles of a certain length so that they reach a strong layer of ground on which they rest.

The friction method, which takes place in the absence of a strong layer that can be based on, as in the method of piling, so we resort to transferring the loads of origin from its columns to its bases, which in turn are based on bundles of piles of undetermined length. The loads are transmitted to the soil by friction between them and the side surfaces for piles.

The method of anchoring and friction together, in which case there is a layer of soil that can be relied upon for anchoring and friction together.

In that case, we use the full capacity of the soil to withstand pivoting and friction, where the pile transfers part of the load to the soil by resting it on a medium-strength layer, and at the same time, the rest of the load is transferred to the soil by friction on its sides.

2.7.1. Safe load of pile

Table 2.2 – Bearing capacity of piles

pile diameter(cm)	permissible loads
50	60 tan
60	90 tan

2.7.2. Piles reinforcement

The diameter of the pile used is not less than 50 cm with 10 ϕ16 reinforcement and a length of 10 m from the bottom of the concrete bases and 8 cages with a step

of 10 cm and intensification of the first two meters below the concrete bases to become 8 Ø 8 A400C.

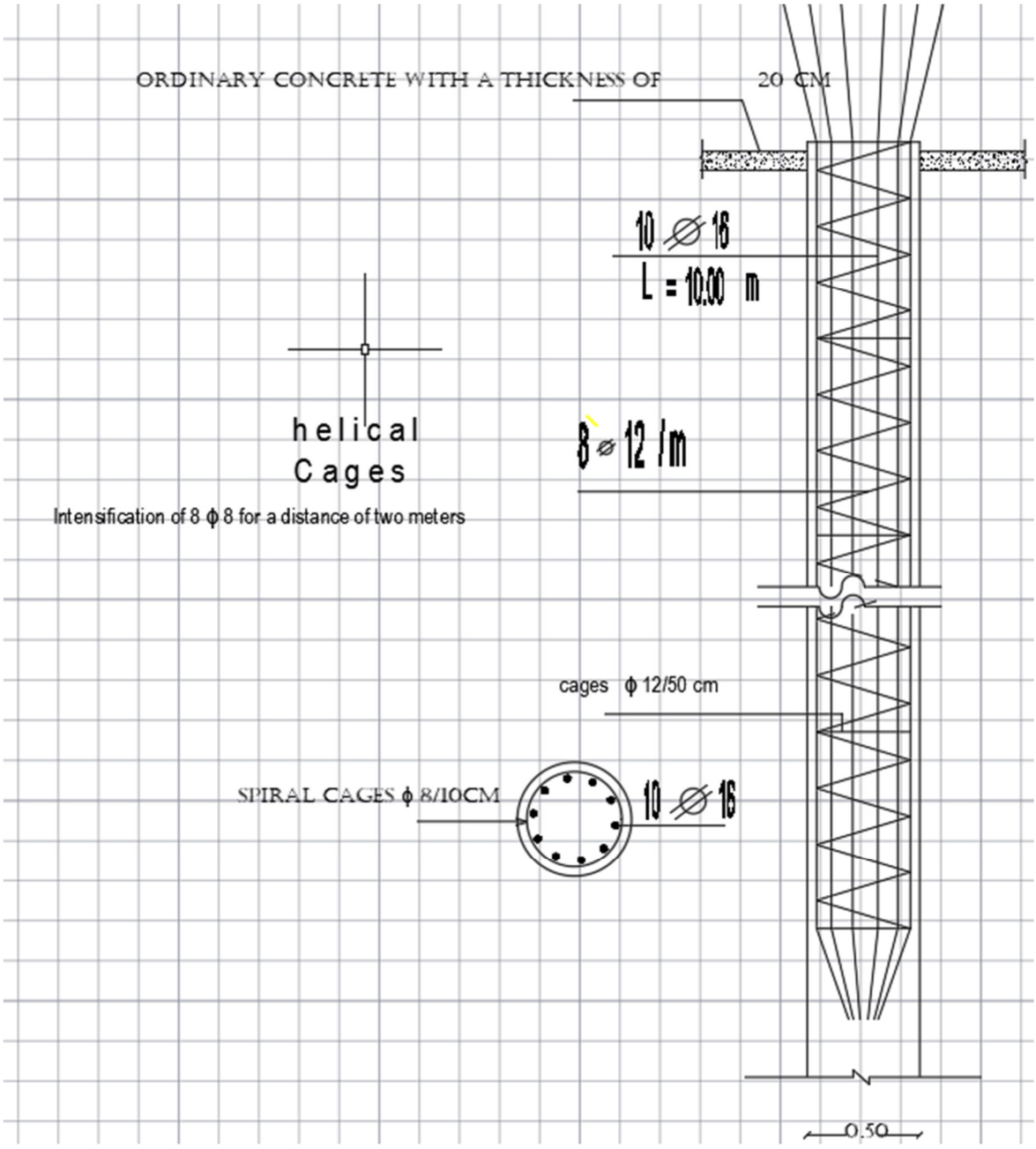


Figure 2.1- Reinforcement of piles

The operating load of the pile is 55 tons. The pile shall be 15 meters deep

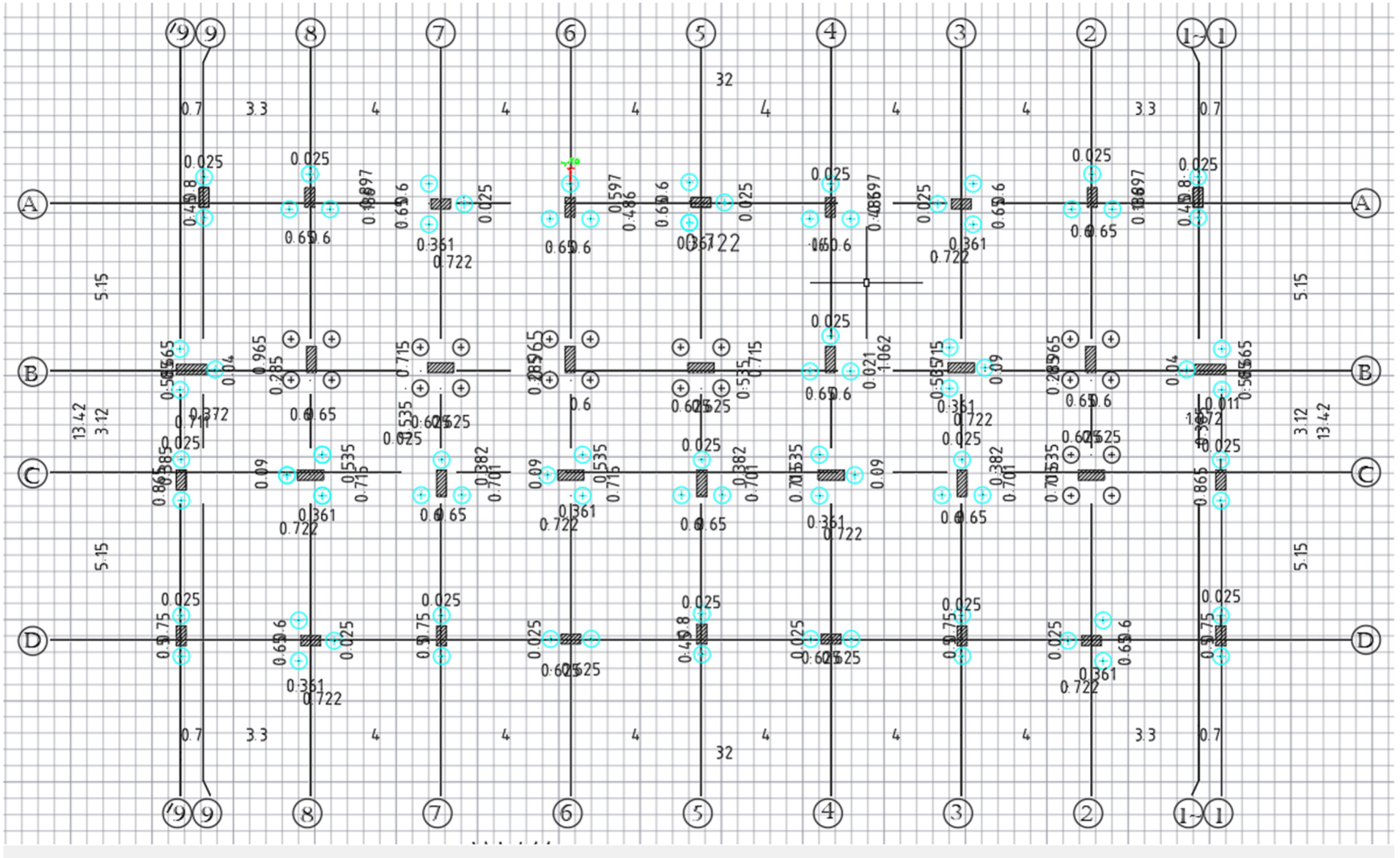


Figure 2.3 - Pile drawings

2.8. Pile test stages

2.8.1. First: a load test by loads.

In this case, the loads are made of sandbags or reinforced concrete cubes, where the loads rest on a pallet consisting of one or more iron beams, and cross beams are anchored above them, and the spaces between them are covered with wooden boards or secondary beams.

It must be ensured that the loads are not transmitted directly to the pile during stacking, so care must be taken of the piles placed on the ground.

To ensure the distribution of loads on the base, an iron bracket with a thickness of not less than 30 mm must be placed under the hydraulic jack, especially in the case of more than one main beam, and the area of the iron bracket should not be less than twice the area of the base of the hydraulic jack,

Note: The loads must be at least 25% greater than the required test load.

2.8.2. Preparing the pile for test loading.

-Digging around the vent was done at a depth of 1.00 m according to the required depth, and the vent's head was broken at the same depth. And show the iron of the armament of the duffel, and then make a loading pad (square base of armed concrete). To ensure the regular transmission of loads to the porter

-The cleaning layer: It is used when the sagging of the soft soil or the efflorescence of the sandy soil in the presence of ground water, and a layer with a thickness of 20 cm of sand or gravel and sand is used for the foundation on it.

2.8.3. Bases concrete.

-The foundations is piles caps

Now the concrete bases should be laid before anything, the engineering drawings should be well studied, and then the implementation according to the drawings

The bases are equipped with better the wood then their armament is placed from iron, and there are ways to arm them. The rules, especially the fence rules that some engineers put lazily, such as the building's bases, even though there is no load on them or buildings.

- Concrete bases consist of two layers of reinforcing steel.

1- The first layer consists of two layers, which are brushes and a cover

2- The second layer consists of two layers of brushes and a cover They are both positioned in two different directions, one lengthwise and the other crosswise.

2.8.4. Formwork of bases

The ability of the high to shape them in different shapes in proportion to the different forms of architectural design is therefore free to form concrete works of the facades of the buildings during the design work. As a result of this advantage, the metal tights are not without the work of armed carpentry in forming the work of the bishop, especially in the outer circles.

Ease of transport and circulation by traditional means of transport due to the small components of the intensity parts.

They are used primarily in armed carpentry for the work of foundations (pig work, rules, meds) because of the variety of design dimensions of these works and thus the variety of dimensions of the base models, the meds according to the loads on them, and thus the ease with which the armed carpentry of these works is shaped using wood from other tenets where there are no fixed design models for these construction elements.

Hodgins. The ease with which wooden shafts are carried out because of the availability of highly trained labor in the execution of armed carpentry, owing to the age of their use in construction in most Arab States.

2.8.5. Steel rebar for reinforcement concrete:

All concrete bases in the school are 1 meter thick.

The pile bears a load of 55 tons.

The diameter of the used pile is 50 cm.

The length of the impale is not less than 15 cm.

Then 20 cm of regular concrete is poured as a layer of cleaning.

Then the concrete bases were built on a regular layer of concrete.

The distance between the piles is 2.5 the diameter of the pile.

Sulfate-resistant Portland cement is used with a ratio of 400kg/m^3

The iron used is a high-strength steel with a yield stress of 3600kg/m^3

The characteristic strength of concrete shall not be less than 250 kg/m^3 after28 days.

The concrete cover shall not be less than 7 cm.

The bases are equipped with better the wood then their armament is placed from iron, and there are ways to arm them. The rules, especially the fence rules that some engineers put lazily, such as the building's bases, even though there is no load on them or buildings.

Concrete bases consist of two layers of reinforcing steel.

The first layer consists of two layers, which are brushes and a cover

The second layer consists of two layers of brushes and a cover They are both positioned in two different directions, one lengthwise and the other crosswise the first layer consist of two layers.

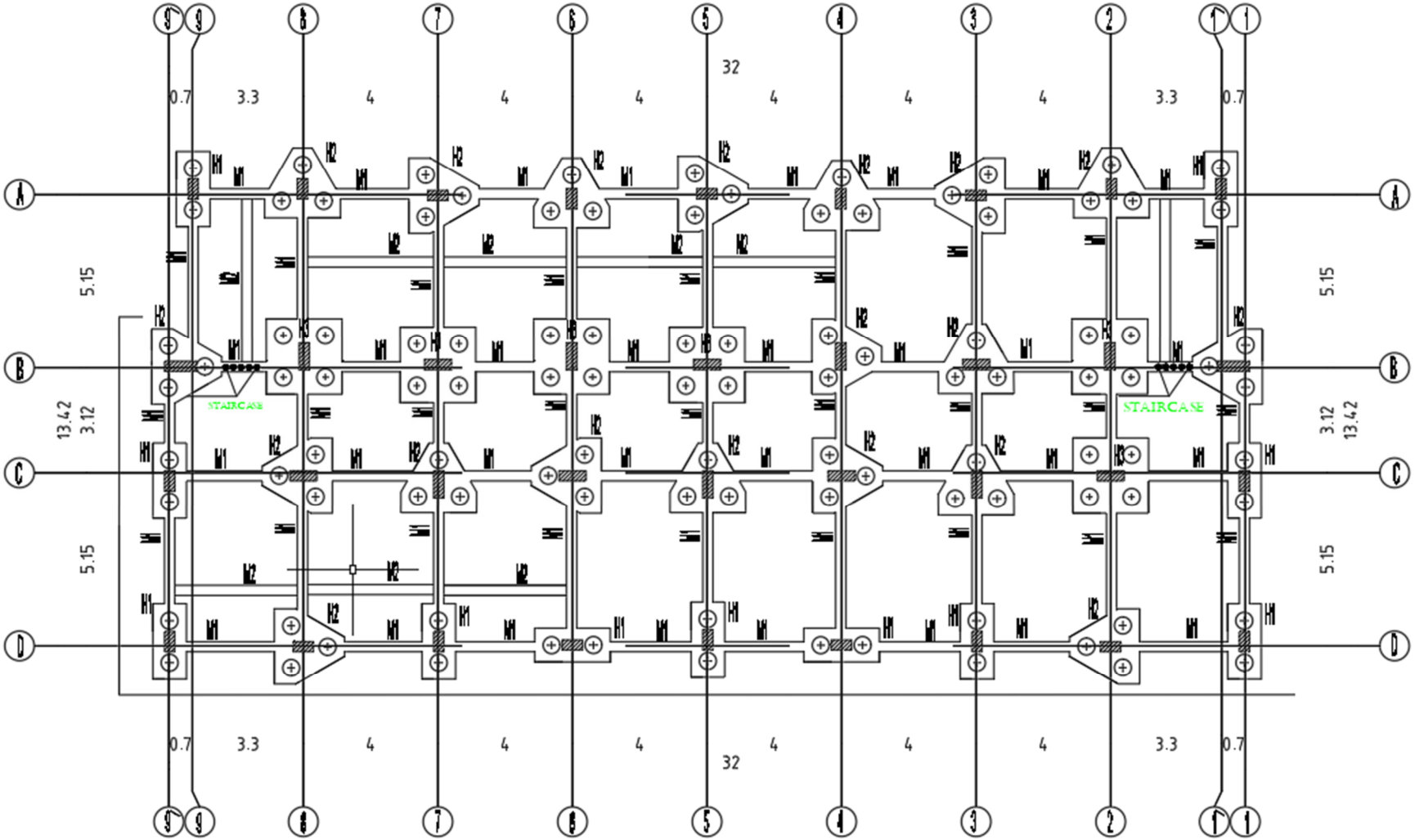


Figure 2.3 - Pile caps

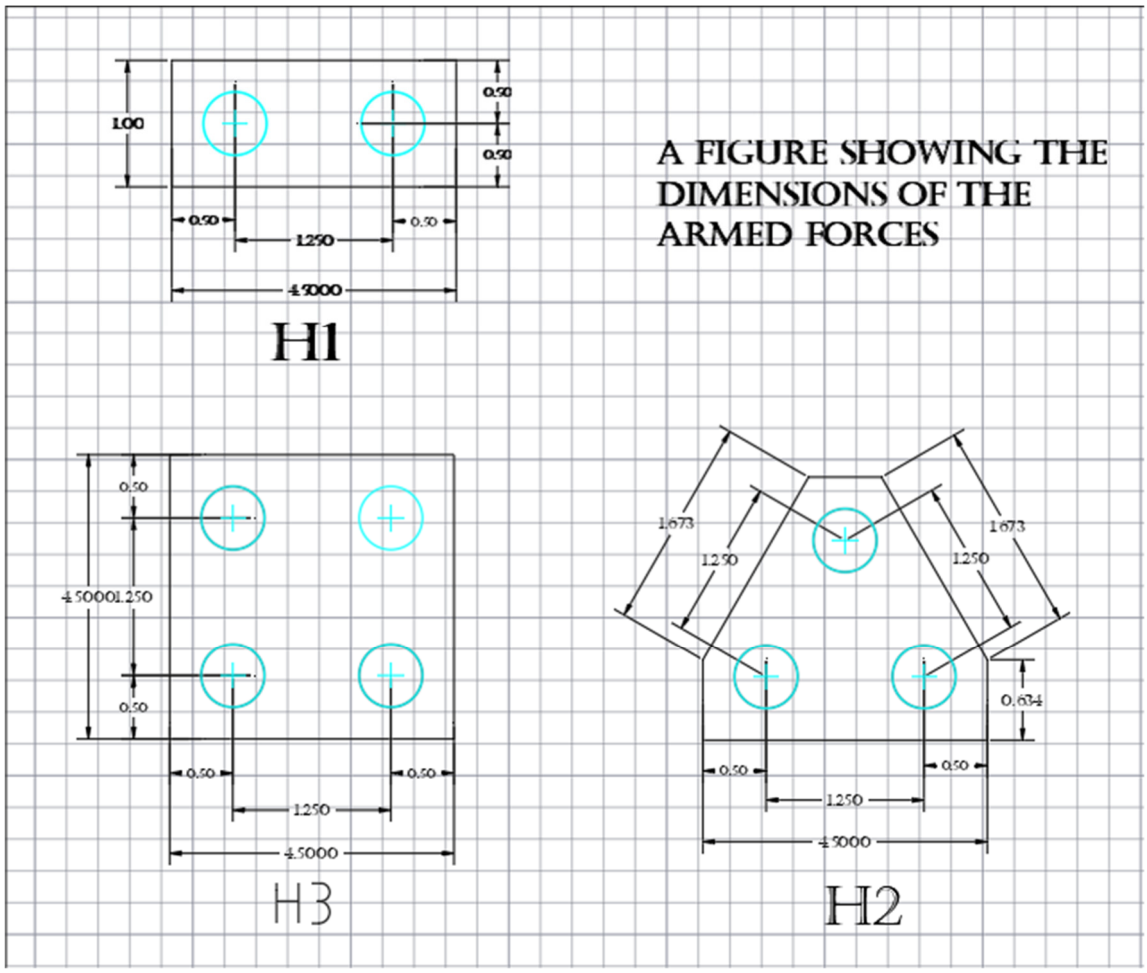


Figure 2.4 - Pile caps. Details.

H1- The roods is (7 Φ12 A400C) and the cover is (7Φ12 A400C). They are both positioned in two different directions, one lengthwise and the other crosswise

- The second layer also consists of two layers,

the roods and the cover, and they are both (7 Φ16A400C)

H2- The roods is (8 Φ16) A00C and the cover is (8Φ16) A400C They are both positioned in two different directions, one lengthwise and the other crosswise

- The second layer also consists of two layers,

the roods and the cover, and they are both (8Φ18A400C)

H3- The brushes is (8 Φ12A400C) and the cover is (8Φ12A400C) They are both positioned in two different directions, one lengthwise and the other crosswise

- The second layer also consists of two layers,

the roods and the cover, and they are both (8Φ18A400C).

table 2.8- reinforcement pile caps

Table 2.3 – Base reinforcement

Model	Concrete dimension			Down bars		Top bars	
	L	B	D	Long	Short	Long	Short
H1	225	100	100	7Ø16A400C	7Ø16A400C	7Ø12A400C	7Ø12A400C
H2	See drawing		100	8Ø18A400C	8Ø18A400C	8Ø16A400C	8Ø16A400C
H3	225	225	100	8Ø18A400C	8Ø18A400C	8Ø12A400C	8Ø12A400C

Strap Beams: A strap footing is a component of a building's foundation. It is a type of combined footing, consisting of two or more column footings connected by a concrete beam. This type of beam is called a strap beam. The strap beam restrains the tendency of the footing to overturn by connecting it to nearby footings. It is usually built at the same level but it is not required. The reason it is built at the same level is to reduce the overall cost as no separate scaffolding or shuttering is required. Further taking the re-bars into a footing they can be anchored adequately. Strap Footing or Cantilever Footing. The Cantilever or strap footing is used to connect an eccentrically loading column to inside a column, while the strap is used to transmit the moment caused by an eccentricity to the interior columnar foot so that a uniform soil pressure is produced under both footings.

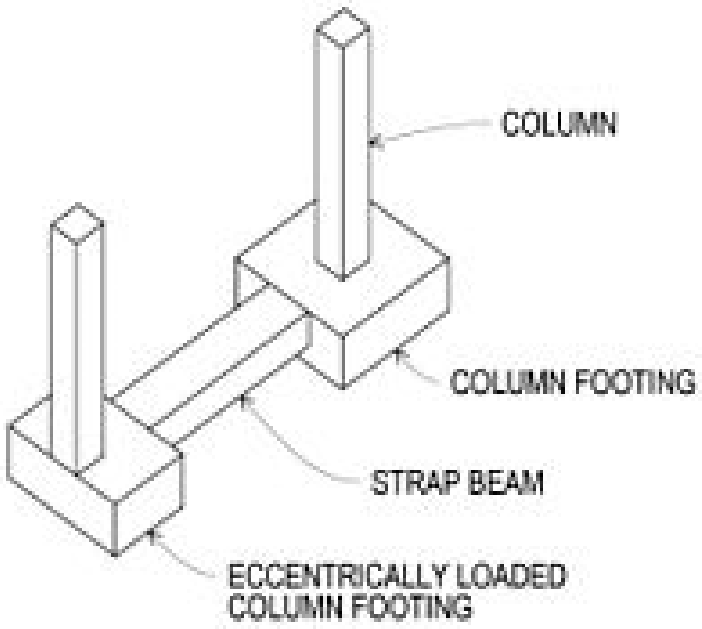


Figure 2.5 - Pile caps.

2.8.6. Advantages of strap beam

Following are the advantages of ground beams:

Ground beams can be constructed quickly.

Resists the settlement of the supporting walls.

Bearing capacity of soil may increase indirectly due to the generated pressure.

2.8.7. Design details of strap beam

Table 2.9 Design details of strap beam

model	section		down bars	Top bars	stirrups
	width	height			
b1	30	100	6 Φ 18 A400C	6 Φ 18 A400C	6 Φ 10 A240C
b2	25	70	4 Φ 16 A400C	4 Φ 16 A400C	6 Φ 8 A240C
B3	15	60	2 Φ 16 A400C	2 Φ 16 A400C	6 Φ 8 A240C

One of the most common methods for curing concrete is to hose it down frequently with water - 5 to 10 times per day, or as often as you can—for the first seven days. Known as “moist curing,” this allows the moisture in the concrete to evaporate slowly. Moist-cured concrete can be up to 50 percent stronger than concrete that was cured without being dampened! Spraying is not recommended for concrete poured during cold weather, however; for pours in chilly weather, see “Don’t Let Concrete Get Too Cold,” below.

You may rightly consider concrete to be one of the most durable and attractive construction materials around, but did you know that everything you do after pouring has just as much impact on its strength as the mixing process? In fact, the chemical reaction between cement and water that binds sand and gravel together to make concrete takes nearly 28 days to fully complete. During this process, which is known as hydration, you want to keep moisture in the concrete. Otherwise, water evaporating too quickly from the surface—which can happen easily outdoors and in direct sun—will weaken the finished product with stresses and cracking.

Controlling the moisture content and the temperature of the new concrete for the first several days through curing take top priority. By giving concrete mix extra attention during this period rather than walking away as soon as it’s poured, you can increase the structural integrity of the concrete and make it more resistant to future cracking. For the best results, check out our list of best (and worst) concrete-curing practices before you tackle your next project.

When you don’t have time to revisit your concrete with a hose as many times as necessary for true moist curing, another option is to use a cover that can trap and slow the evaporation of the moisture in the mix. Either polyethylene sheeting that’s at least 4mm thick or a concrete curing insulating blanket—both available from DIY stores—are good for this task. Wet the concrete thoroughly, and then cover it with the sheeting of your choice, using bricks, rocks, or other heavy items to hold it in place. Remove the sheeting or blanket daily, wet the concrete again, re-cover it, and repeat for seven days. This technique can also be used for upright concrete columns

and walls by wetting them down and wrapping them with a curing blanket or plastic sheeting.

2.8.8. The importance of isolating concrete bases

The benefit of this is that the bulk is not eroded due to soil or water intrusion and salts, and this is done by specialized institutions or labor

1. Preserving the iron used in building foundations from rust and corrosion

2. Preventing the occurrence of dampness in the house, which is caused by water vapor. This moisture is observed on the walls of the ground floor, which comes from underground water from the ground, rain water or sewage water.

While not every school in Raleigh has a basement, the ones that do will appreciate having a dry one.

Foundation waterproofing enables this by reducing the amount of water that seeps into a school. It can divert it while adding a waterproof barrier.

The result is a basement that can be used for everything from recreation to storage. This allows you to utilize your basement to its fullest without having to worry about floods, leaks or moisture that can cause extensive damage.

Moisture in a home can make your home feel warmer during the summer, cause oxidation on metal objects, destroy paper products, foster environments where mold thrives, and reduce the comfort you feel in your own home.

The first step to reducing moisture in your home is waterproofing the foundation. This is because water tends to travel upwards as it evaporates, which is why homes with a water-logged foundation tend to be more humid than homes with dry foundations.

Water and homes seldom mix unless that water is in a controlled environment. This is a fact that remains true both inside and outside of your home.

Waterproofing your foundation can prevent water from seeping into your home where it can warp boards, cause walls to rot, and ruin your possessions. It minimizes the amount of water that seeps inside of your home.

Waterproofing the foundation also helps the outside of your home. It can help ensure that the ground where your foundation sits is less prone to shifting, which in turn can reduce the occurrence of foundation problems and leaks.

A Waterproofed Foundation Makes for a Smart Home

Waterproofing your foundation is one of the most important improvements you can make to your home. It keeps the inside dry while ensuring that the structure itself does not experience costly and bothersome foundation issues.

2.8.9. Fill the pile caps with sand.

Then comes the first the bases , and the burial is the best types of which are sand and the strongest, and be careful not to be buried with very large pebbles, as this plateau occurs after that in the building, and among the types of burial is dirt mixed with small, shredded pebbles. so then put the sand in the final stage, then spraying is even leaking sand to fill in the blanks.

3. CALCULATION AND DESIGN SECTION

Initial date:

a) heavy-weight concrete class C20;

b) the plate is reinforced with welded fabric with transverse working armature (in the accepted variant, class A400C; (Ø 6, 8mm);

c) life load, 3 kN / m2;

d) reliability factor for the purpose of the building $\gamma_n = 0,95$;

e) weight of floor with preparation $q_f = 1,2$ kN / m^2.

3.1. Calculation of piles foundation

3.1.1. Calculation of piles

Design Assumption & Date

Fcu = 250 Kg/cm2

Fy = 3600 Kg/cm2

O = 0.50 m

Pile P= 55 t

Design Of Piles Cap:

- Foot-No (2)

P col = 140 t.

N.Pile = 140 * 1.15/55 = 2.93

assume space between piles = 2.5 = 1.25 m

P col = 140 t.

O.wt of cap = 5.06 2.50 12.65 t

wt of filling = KO5 * 1.80=5.06 9.563 t

wt of smell = 2k60 *x.00 0.30 (4.00+4.135) 6.1t

wt of wall = 0.45 * 1.80 (8.135

P- 174.9t

Pp= No. *pplle = 4*55 =220t

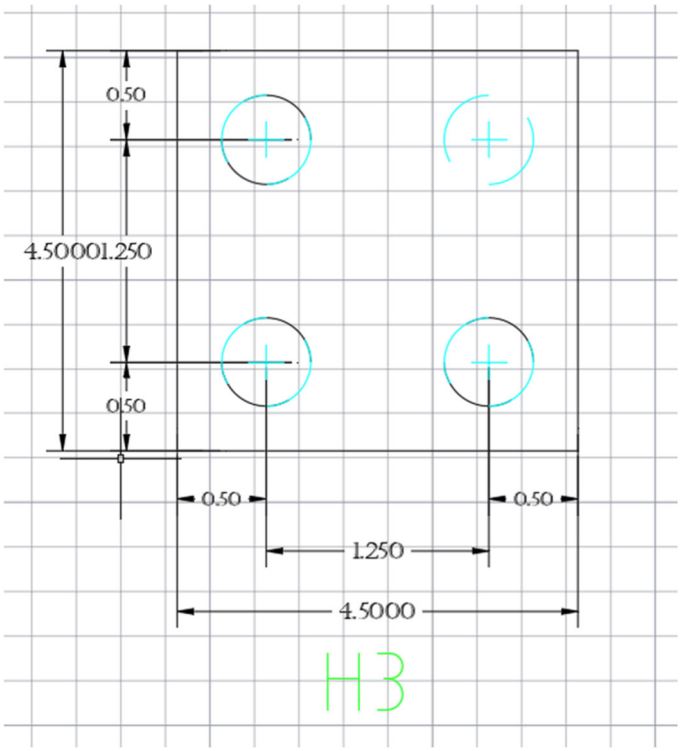


Figure 3.1. - To piles calculation

Moment on cap:- Take T = 1.00m d=93 cm M =2*55x0.48/2.25 =23.47 m.t As =23.47x10 /1500x93 = 16.82cm As = 8 18/ m

Design Assumption & Date

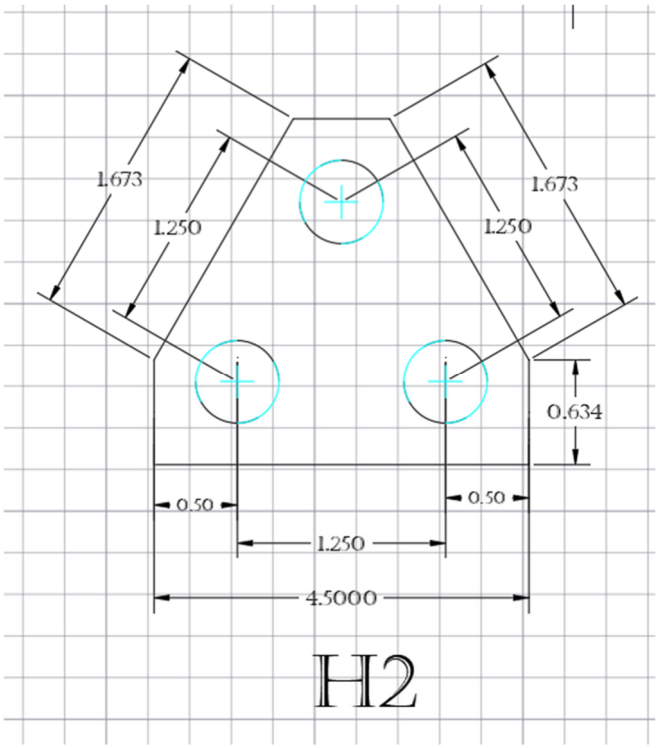


Figure 3.2. - To piles calculation

Fcu = 250 Kg/cm2

Fy = 3600 Kg/cm2

Diameter of pile= 0.50 m

P P=55t

Design Of Piles Cap:

- Foot-No (1)

Pcol = 130 t

Npile= 130 * 1.15 / 55 = 2.72

assume space between piles = 2.5 = 1.25m

P col = 130 t.

o.wt of cap = 6.00 2.50 12.5t

wt of filling = KO5* 1.80 = 5.00 9.45 t

wt of semell = 250 *.00 0.30 = (2.95*0.5+1.92*0.50+1.89*.50) 2.535t

wt of wall = 0.45 x 1.30 (429*.5+3.58*.5+2.95*.5) 3.16 t

P t = 157.65

Pp- No. *ppile = 3*55p =165t

P<P P OK

* Moment on cap:-

Take T= 1.00m, d=93cm M =55x.423 =31.35 m.t

As =31.35x10 /1B00x93 =22.47cm

As =8 Ø 18 A400C

in three direction

Design Assumption & Date

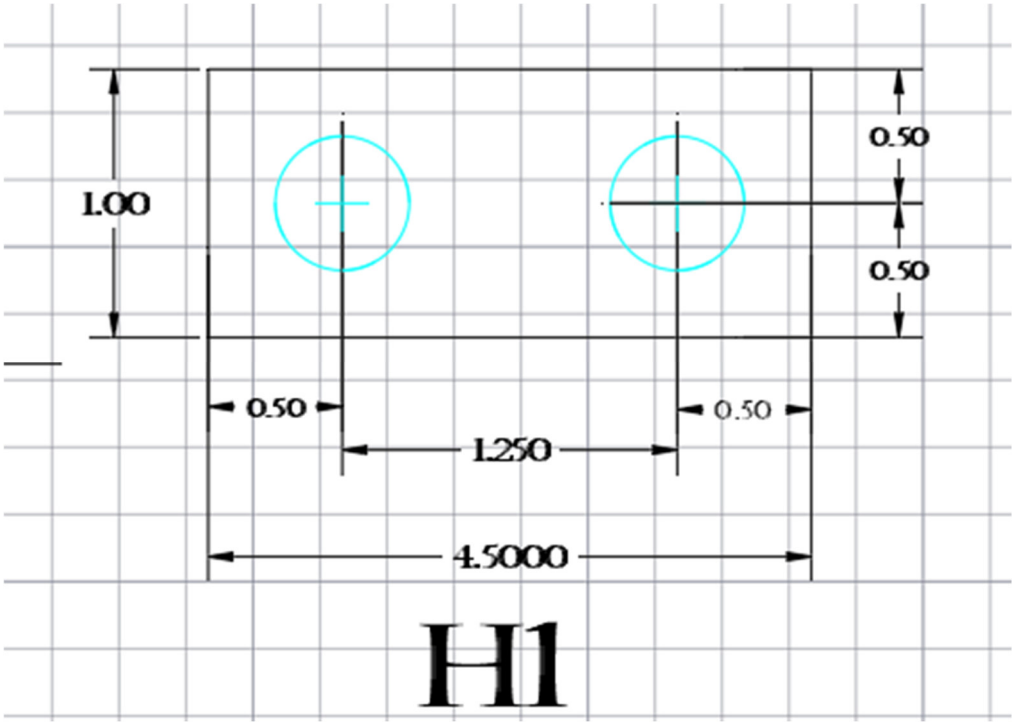


Figure 3.3. - To piles calculation

Fcu = 250 Kg/cm2

Fy = 3600 Kg/cm2

Øpile = 0.5 m

Pp= 55t

3.1.2. Design of piles cap

Foot-No (2)

P col = 90 t.

N pile = 90 *1.15/ 55 = 1.88

assume space between piles = 2.50 = 1.25 m

P col = 95 t.

o.wt of cap =* 2.25 2.50 5.625 t

wt of filling = 105 * 1.80 2:25 4.2525

wt of semell = 260 *.00 0.30= (2.40*0.5+2.65*0.5+2.35*0.5) 2.775

wt of wall = 0.45 x 1.05 (3.53*0.5 + 3.58 *0.50+3.99*0.5) 2.622

P t = 105.275

Pp= No. *p pile =2*55 =110t

Pt<p OK

Moment on cap:-

Take T= 1.000m

d=93 cm

M =55x0.33/1.00 = 18.15 m.t/m

As =18.15*10 /1500x93 = 13.0cm/m

As = 7 ∅ 16 A400C

3.1.3. Calculation of slab

vertical layers

T.H=0.12m

Mmax=0.392 m/t

d=10.5 = k1$\sqrt{0.392 * 10^3}$

k1=0.53 →k2=1665

As=$\frac{0.392*10^5}{1665*10^5}$=2.24$cm^2$ →6∅10A400C

-horizontal layers

Mmax=0.65m/t

d=10.5 = k1$\sqrt{0.65 * 10^3}$

k1=0.44 →k2=1626

As=$\frac{0.0.65*10^5}{1626*10^5}$=2.24c$m^2$ →6∅10 A400 C

-case of load T.H= 0.14 m

Total load =0.14*2.5+0.4+0.13+0.15=1.03t/m^2

Steel D.M→3.75*5.5

r=$\frac{5.5}{3.75}$=1.47

wα=0.583*1.05=0.61 t/m^2

WB=0.16*1.05=0.171 t/m^2

d= 12.5=k1$\sqrt{1.072 * 10^3}$ →K1=0.38→K2=16

As=$\frac{1.072*10^5}{1611*10^5}$=5.33c$m^2$ →6∅10A400C

3.1.4. Calculation of stairs

T.H=0.25

o.w=(0.25+0.075)3.5=0.9125 t/m^2

L.L= 0.4 t/m^2

C.L = 0.15 t/m^2

Total load =1.46 t/m^2

L=3.9+1+=5.9m

M=$\frac{W*L*L'}{8}$ =$\frac{1.46(5.5)(5.9)}{8}$ =5.92 m.t

d=23.25 = k1$\sqrt{5.92 * 10^3}$ →k1=0.3→k2=1590

As=$\frac{5.92**10^5}{1590*23.2}$=15.84c$m^2$ →8∅16/m

As =5∅12/m

3.2. Calculation of beams

3.2.1. Beam1 (25×70)

-Vertical load

P.L=2.75*0.5=1.375 t/m

Ws.L1=$\frac{3.75}{2}$*0.75*2=3.8 t/m

Ws.L2=$\frac{3}{2}$*0.85*2=2.55 t/m

*M=11.3m.t → d =67.5 = k1$\sqrt{\frac{11.3*10^3}{25}}$ →k1=0.317→k2=1589

As=$\frac{11.3*10^5}{1589*67.5}$=10.6c$m^2$ →6∅18/m=15.24 cm^2

-m=0.9m.t - As=$\frac{9.0*10^5}{1589*67.5}$=8.4→6∅16/m

3.2.2. Beam2 (25*70)

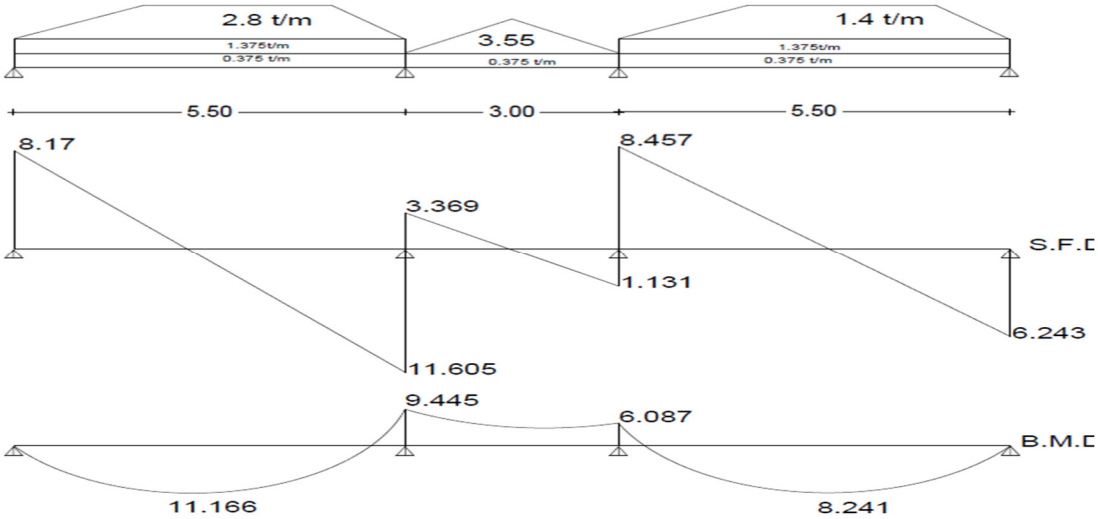


Figure 3.4. – Structural scheme of beam 1

o.w =0.375t/m

P.L=2.75*0.5=1.375 t/m

Ws.L1=$\frac{3.75}{2}$*0.75*2=3.8 =1.4t/m

Ws.L2=1.4 ∗*2=2.8 t/m

B=16*12*25=217

M=11.166m.t

D=67.5=k1$\sqrt{\frac{11.16*10^5}{217}}$=0.94→k2=1714

As=$\frac{11.16*10^5}{1714*67.5}$=9.65c$m^2$ →6Ø18/m=15.24 cm^2

For m=8.241→As=7.123 cm^2 →5Ø16→10.05 cm^2

For m=9.445m.t →As=$\frac{9.445*10^5}{1600*67.5}$=8.745c$m^2$ →5Ø16/m=10.05 cm^2

For m=6.087 m.t→As=$\frac{6.087*10^5}{1600*67.5}$=5.64c$m^2$ →5Ø16/m=10.05 cm^2

3.2.3. Beam 3

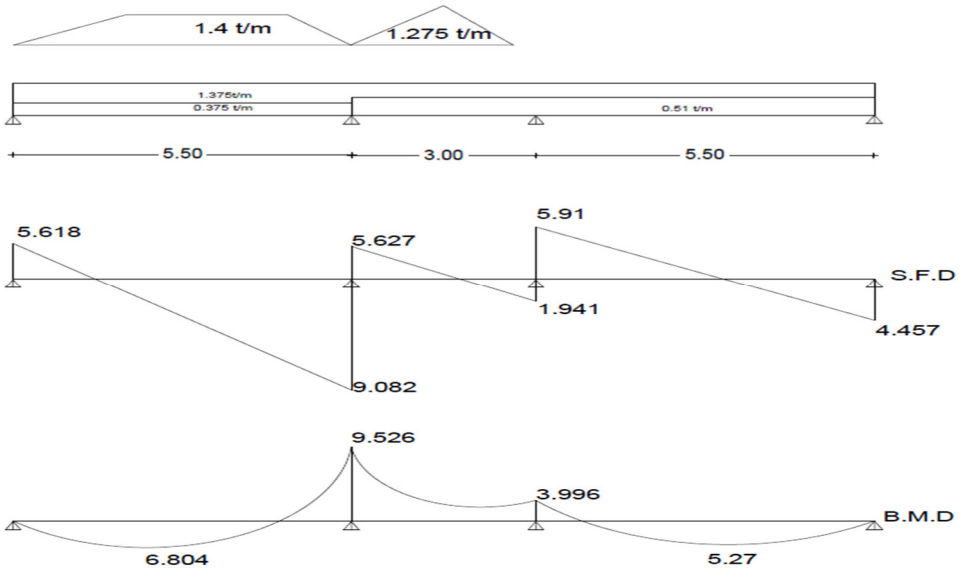


Figure 3.5. – Structural scheme of beam 3

o.w =0.375t/m

o.w=0.2*1.02*2.3=0.6 t/m

P.L=1.375 t/m

Ws.L1=$\frac{3.75}{2}$*0.75*2=3.8 =1.4t/m

Ws.L2=$\frac{3}{2}$*0.85=1.275 t/m

For M=6.804 m.t →As =$\frac{6.704*10^5}{1700*67.5}$=5.93c$m^2$ → 5Ø18A400C As= =12.7 cm^2

For M=9.526 m.t → As =$\frac{9.526*10^5}{1600*67.5}$=8.82$cm^2$ → 5Ø16A400C As= =10.5 cm^2

For M =5.27 m.t → As =$\frac{5.27*10^5}{1600*67.5}$=2.99$cm^2$ → Ø14A400C As=5/m=6.3 cm^2

3.2.4. Beam 4

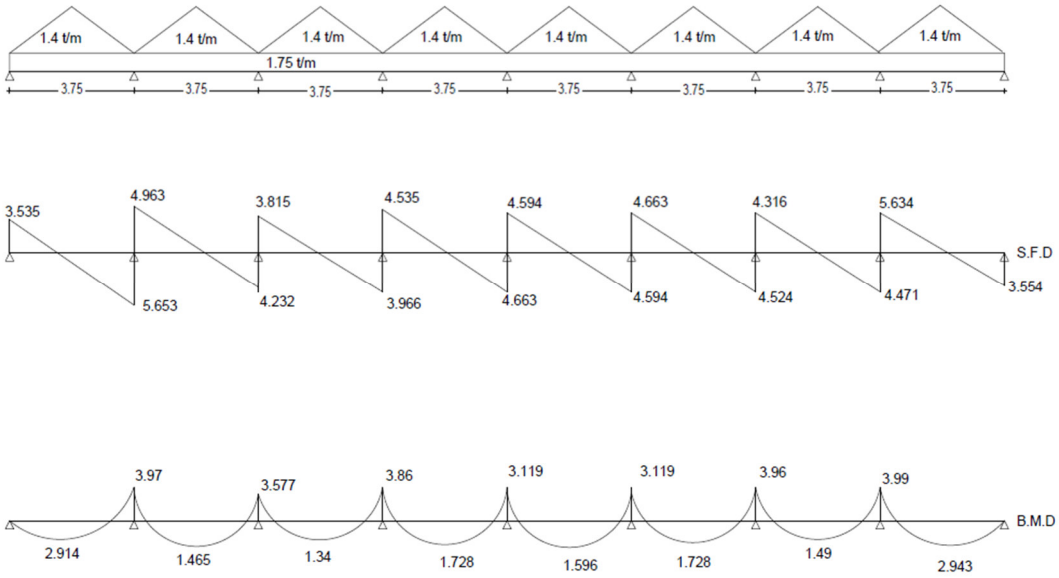


Figure 3.6. – Structural scheme of beam 4

o.w =0.375t/m

P.L=1.375 t/m

Ws.L1=$\frac{3.75}{2}$*0.75*2=3.8 =1.4t/m

For M=3.97 m.t →As =$\frac{3.97*10^5}{1600*67.5}$=3.68$cm^2$ →As=3Ø18/m=6.03 cm^2

3.2.5. Beam 5

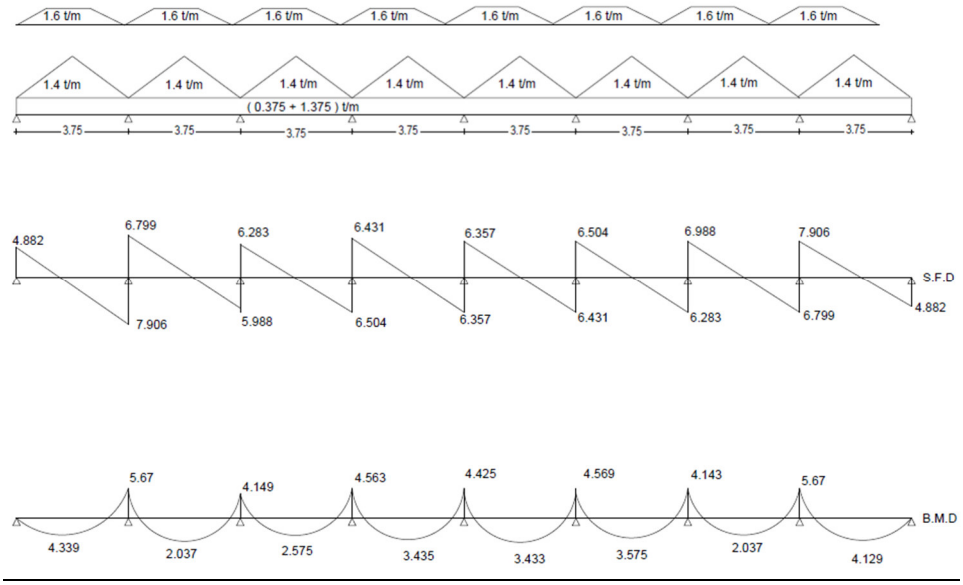


Figure 3.7. – Structural scheme of beam 5

o.w =0.375t/m

P.L=1.375 t/m

Ws.L1=$\frac{3.75}{3}$*0.85* =1.6t/m

Ws.L2=$\frac{3.75}{2}$*0.75* =1.4t/m

For M=5.67 m.t →As =$\frac{5.67*10^5}{1600*67.5}$=5.25c$m^2$ →As=3∅16/m=6.03 cm^2

3.2.6. Beam 6 (25×70)

o.w=0.25*0.6*2.5=0.375 t/m

P.L=1.375t/m

WsL1=0.75($\frac{3-75}{2}$)=1.4t/m

Ws.L1=$\frac{3.75}{3}$*0.85* =1.6t/m

For M=7.319 m.t →As =$\frac{7.319*10^5}{11638*67.5}$=6.66c$m^2$ →As=4∅16/m=8.03 cm^2

For M=4.609 m.t →As =4.27cm^2 →As=4∅16/m=6.03 cm^2

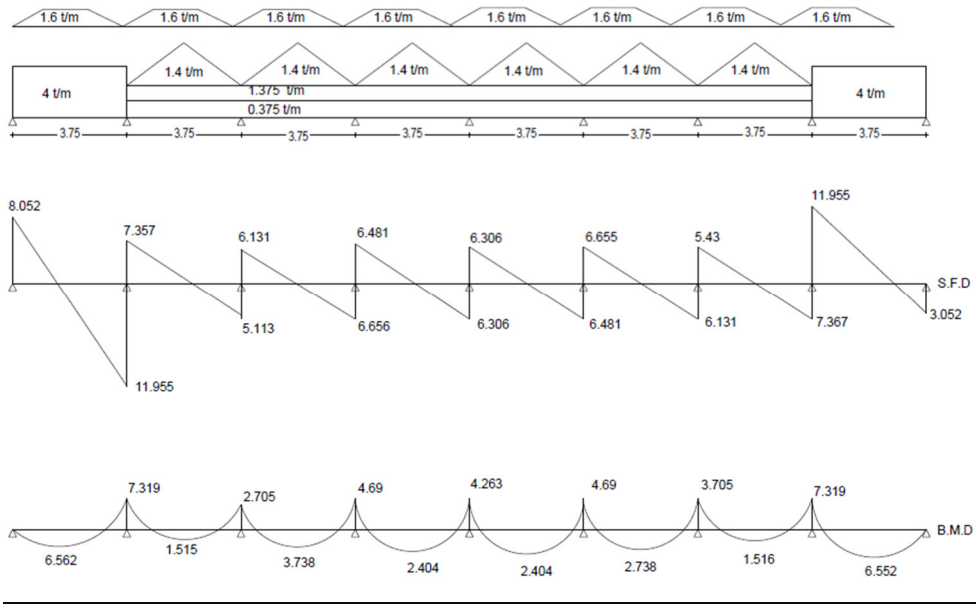


Figure 3.8. – Structural scheme of beam 6

3.2.7. Beam design

A beam is a structural element that primarily resists loads applied laterally to the beam's axis. Its mode of deflection is primarily by bending. The loads applied to the beam result in reaction forces at the beam's support points. The total effect of all the forces acting on the beam is to produce shear forces and bending moments within the beams, that in turn induce internal stresses, strains and deflections of the beam. Beams are characterized by their manner of support, profile (shape of cross-section), equilibrium conditions, length, and their material.

Beams are traditionally descriptions of building or civil engineering structural elements, but any structures such as automotive automobile frames, aircraft components, machine frames, and other mechanical or structural systems contain beam structures that are designed to carry lateral loads are analyzed in a similar fashion.

3.2.8. Beam design detail

Table 3.1 -Beams reinforcement details

Figure 3.9- beam reinforced cages

3.3. **Slab**

Concrete slab is a common structural element of modern buildings, consisting of a flat, horizontal surface made of cast concrete. Steel-reinforced slabs, typically between 100 and 500 mm thick, are most often used to construct floors and ceilings, while thinner mud slabs may be used for exterior paving (see below).

Solid Slabs are fully customizable concrete slabs of varying width, length and thickness. Solid Slabs can be designed and produced with mild reinforcing or by adding prestressing strands. Solid Slabs can be cast with specialty inserts for lifting, mounting or connecting hardware.

Figure 3.10 – Slab reinforcing

In many domestic and industrial buildings, a thick concrete slab supported on foundations or directly on the subsoil, is used to construct the ground floor. These slabs are generally classified as ground-bearing or suspended. A slab is ground-bearing if it rests directly on the foundation, otherwise the slab is suspended. For multi-story buildings, there are several common slab designs

Beam and block, also referred to as rib and block, is mostly used in residential and industrial applications. This slab type is made up of pre-stressed beams and hollow blocks and are temporarily propped until set, typically after 21 days.

A hollow core slab which is precast and installed on site with a crane

In high rise buildings and skyscrapers, thinner, pre-cast concrete slabs are slung between the steel frames to form the floors and ceilings on each level. Cast in-situ slabs are used in high rise buildings and large shopping complexes as well as houses. These in-situ slabs are cast on site using shutters and reinforced steel.

*Tile thickness 12 and tile thickness 14.

*We used an iron *6 Φ10 A400C - 5 Φ10 A400C -2.5 Φ10 A400C - 3 Φ10 A400C

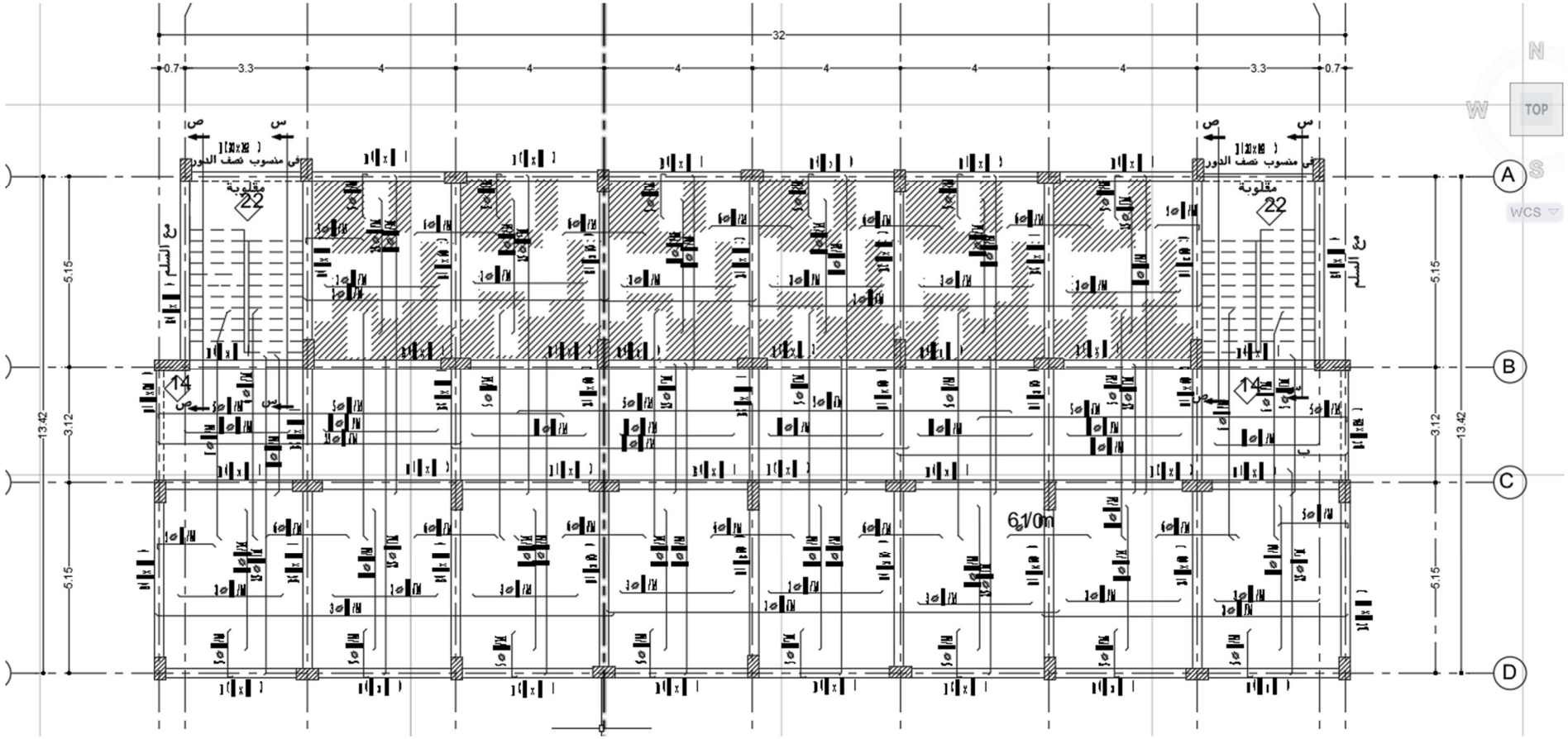


Figure 3.11 -Slab reinforcement

3.3.1. The basics of solid slab reinforcement

-Bottom iron (grid) sheet only as long as the thickness does not exceed 16 cm (according to the Egyptian code). -The common armament in Egypt is 6 or 7 by 10 per meter. Iron stops at Zero moment meaning. It is absolutely not allowed to stop the skewer in the middle of the weeping (between two columns). The minimum thickness of the slab is calculated from the equations and we check it or from the tables and we do not check it because the tables are given a large thickness and everyone uses the equations whether one-way or both. The thickness of the slab is not less than 12 cm (preferred), but it can remain 10 cm.

The infidelity in the slab is from (1.5 - 2 cm). The maximum distance between the iron skewers is 20 cm. If the thickness of the slab is more than 16 cm, we make an upper grid aimed at resisting shrinkage. If the thickness of the slab exceeds 16 cm, two sheets (brushes + cover) must be made

-The direction of the brushes in the slab: in general, the brushes are in the direction of the greatest torque, and we in the solid slab brush in the short direction; Where the load - often - the greatest torque is in the short direction and the load is moving in it. The reinforcement in the tiles shall be in the same proportions as the beams.

3.4. Columns calculation and design

3.4.1. Column 1 (30×70)

C1=19.2*5+0.3*0.7**5*3.45*2.5=105 tan

P =105t → Pu =105*1.5=157.5

Ho=3.45-0.7=2.75t

Hc= K Ho=1.2(2*75) =3.3m

$\frac{He}{b}=\lambda \rightarrow \frac{3.3}{0.3}=11$

$\delta=\frac{\lambda^2 b}{2000}=\frac{(11)^2(30)}{2000}=1.815\text{cm}$

M=Pu δ=157.5(1.815/100)=2.88t

K=$\frac{pu}{fcu\ bt}$=$\frac{157.5*10^3}{250*30*70}$=0.3→ (1)

K*(L/t)=$\frac{mu}{fcu\ bt^2}$=$\frac{3.86*10^5}{250*70*(30)^2}$=→ (2)

From 1'2→ $s = 2$

μ=2(250)(10^{-5})=0.005

As= μ.b.t=0.005*30*70=10.5 cm^2 - As=16∅16

3.4.2. Column 2 (40*70)

C1=5*3.45*2.5*0.7*0.4+5*71.4=110tan

P =110t → Pu =105*1.5=165t

Ho=2.75

Hc= K Ho=1.2(2*75) =3.3m

$\frac{He}{b}$= λ → $\frac{3.3}{0.4}$=8.25

δ=$\frac{\lambda^2 b}{2000}$=$\frac{(8.15)^2(40)}{2000}$=1.56cm

M=Pu δ=165(1.36/100)=2.25m.t

K=$\frac{pu}{fcu\ bt}$=$\frac{165*10^3}{250*40*70}$= 0.236 → (1)

K*(L/t)=$\frac{mu}{fcu\ bt^2}$=$\frac{2.25*10^3}{250*40*70}$= 0.008 → (2)

From 1'2→ $s = 2$

μ=2(250)(10^{-5})=0.005

As= μ.b.t=0.005*40*70=14 cm^2 - As=16∅18

3.4.3. Column 3 (30×80)

C1=5*3.45*2.5*0.8*0.3+5*22.85=110tan

P =125t → Pu =125*1.5=187.t

Ho=2.75

Hc= K Ho=1.2(2*75) =3.3m

$\frac{He}{b}$= λ → $\frac{3.3}{0.3}$=0.11

$\delta=\frac{\lambda^2 b}{2000}=\frac{(11)^2(30)}{2000}$=1.815cm

M=Pu δ=187.5(1.815/100)=3.4m.t

$K=\frac{pu}{fcu\,bt}=\frac{187.5*10^3}{250*30*80}=0.325 \rightarrow (1)$

$K*(L/t)=\frac{mu}{fcu\,bt^2}=\frac{3.4*10^5}{250*30*80}=0.0185 \rightarrow (2)$

From 1'2→ $s = 2$

μ=2(250)(10^{-5})=0.005

As= μ.b.t=0.005*30*80=12cm^2 - As=18Ø18 A400C

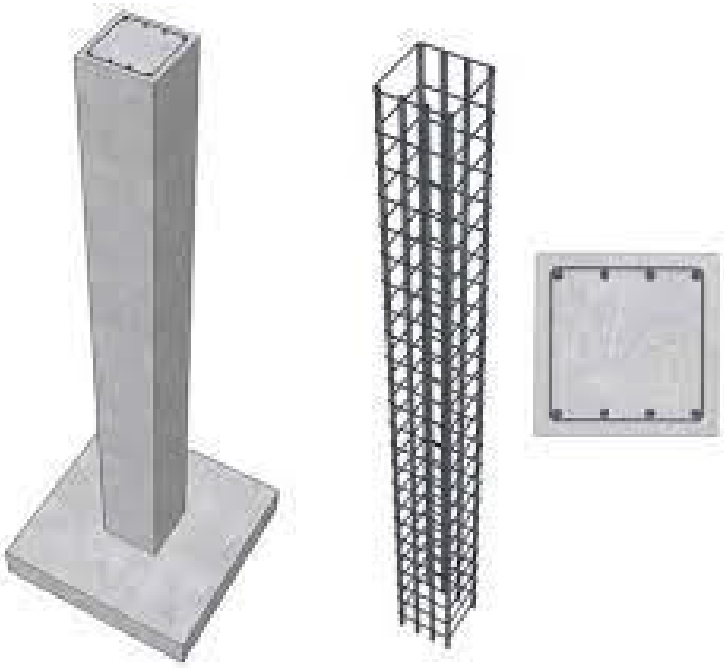


Figure 3.12. Column. Scheme of reinforcement.

A concrete column is simply a round or square column that is made out of concrete. The size, shape, and placement of a column depends on its purpose. In some cases, concrete columns are used just for decoration, while in other cases they are integral to the construction of buildings and other structures. Concrete is a versatile building material because it can be molded into many sizes and shapes, making it appealing to architects and designers for use in columns.

In most cases, however, a concrete column is an important part of the structural integrity of a building. In fact, it is common for a concrete column to carry part of a structural load. This means that the column is used to keep the building from collapsing or shifting in a way that could cause damage to the overall structure. It is quite common for a concrete column to be part of a design for a large building such as an office building, a high rise, a hospital, and many other types of structures.

One of the benefits of working with concrete is that the product can be used in areas that are on the interior of a building as well as in areas that will be exposed to the elements. For example, a concrete column can be used on the interior of a school building or it can be used to support a highway overpass. Also, as concrete is molded while it is in a liquid form, it can be shaped into many kinds of columns to suit many kinds of building and structural needs. In this manner, it is a unique building material.

The size, shape, and design of a concrete column is often defined by an architect or engineer when a building is in the process of being designed. The physics of the building which takes many factors into account including the pressure that will be put on the building from occupants, the way that the building will be affected by weather, and the way that the building will settle over the years, will define the design of each concrete column in a building. Incorrect calculations can lead to premature cracking or buckling in one or more of the columns in any given structure. The columns were 36 columns, 20 of them were columns with a sector of 30 × 60 And 14 columns 30 × 80, And 2 columns 30 × 95 and the spaces between the columns ranged between 4 meters and 3 meters

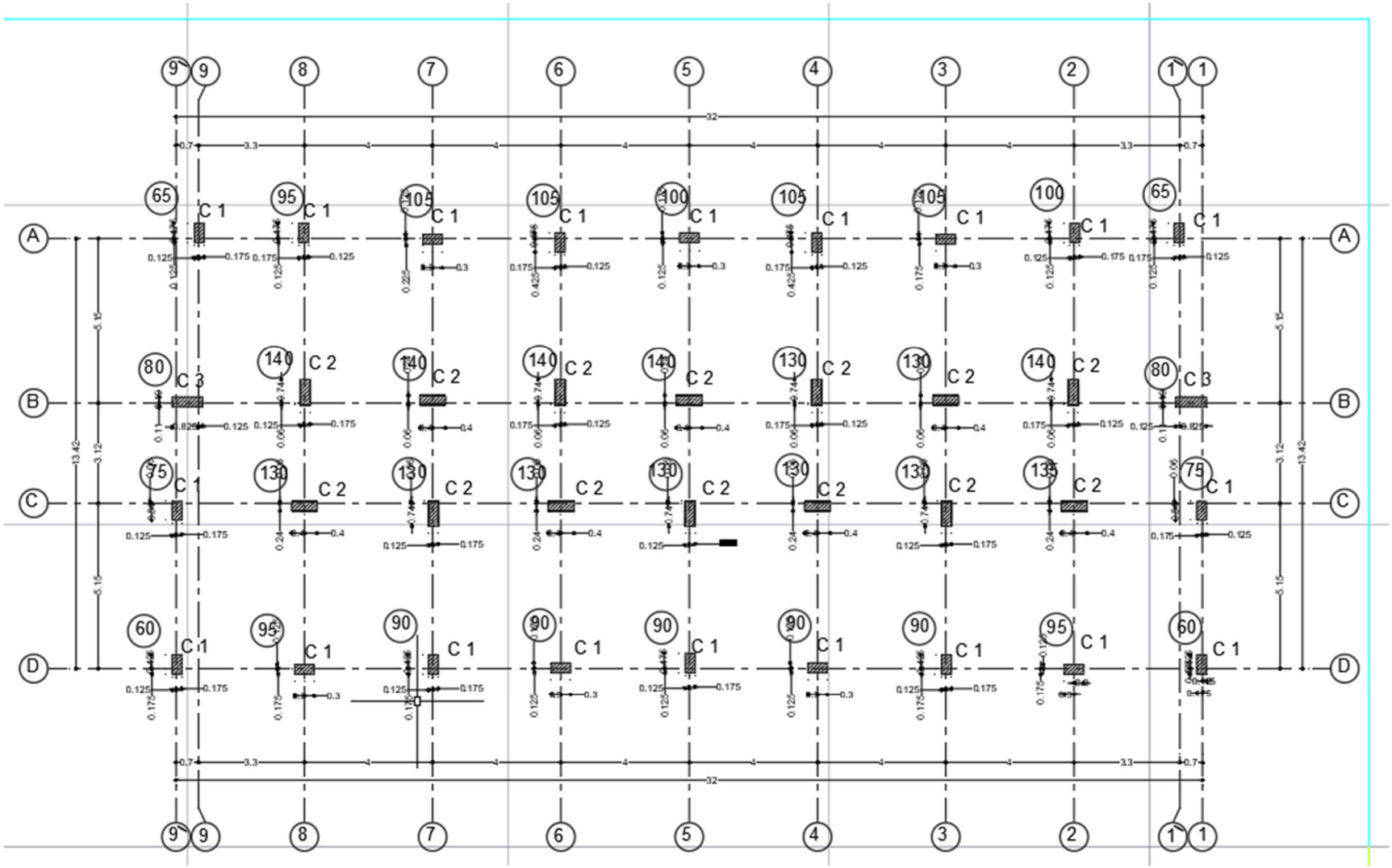


Figure 3.14.-- Columns scheme

3.4.4. Formwork of columns:

Wood panels 3 m long and 0.10 × 0.25. Putting a cover with a thickness of 0.25 between the steel and the plates. The intensity of special veins for the columns is made, in which four veins are placed surrounding each column at a distance s uitable from the point of view.

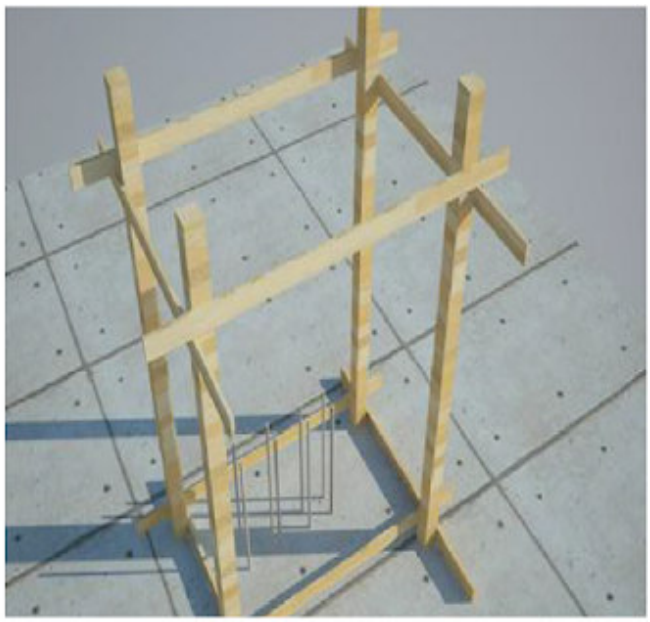


Figure 3.13. Formwork of columns.

And then there's the shaft stage. And the woodcuts were put in their heads, and they were fixed in the bottom and the top. Three or three sides of the column have been shown and left one side without one. Set the edge of the shaft. And I notice leaving the bigger side, not the smaller side.

And after we set up a corner, the column is on a separate topic from what we're talking about right now.

3.4.5. Columns reinforcement.

Tables 3.2. - - Columns design details

model	Ground and first floor		The second and the third floor		Fourth Floor	
	Section	Reinforcement bars	Section	Reinforcement bars	Section	Reinforcement bars
C1	300×600	12Ø 16 A400C	300×600	10Ø 16 A400C	300×600	10Ø 16 A400C
C2	300800	16Ø 16 A400C	300×700	14Ø 16 A400C	300×600	12Ø 16 A400C
C2 *	300×950	16Ø 16 A400C	300×950	16 Ø16 A400C	300×950	14Ø 16 A400C

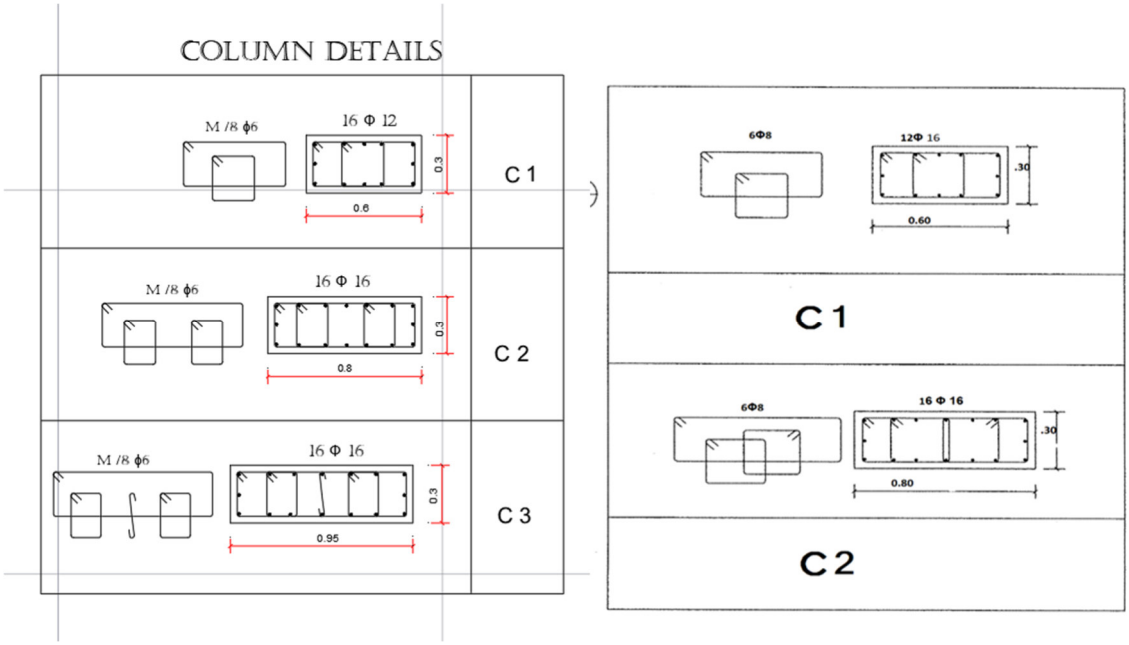


Figure 3.15. - Column’s reinforcement details

Figure 3.16- Connecting the steel link with a length of 1 meter

Plastic spacers is placed in order to give me the right cover–

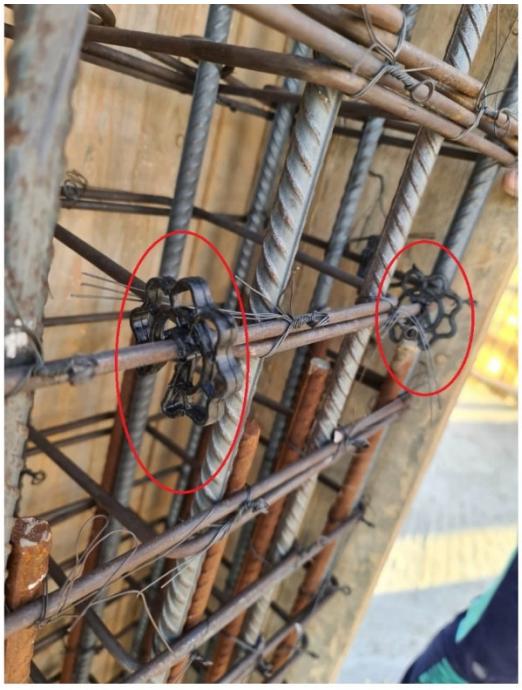


Table 3.17 - Columns design detail

3.4.6. Locking columns

Then the columns are locked up and tied to a strong piece of iron so that it doesn't explode when the concrete in it. Wooden formworks are sprayed for

columns to take advantage of the wood's swelling property when exposed to water, thus closing the holes in the wooden formwork and preserving concrete water that it is not absorbed by the mold or leaked into the holes in the mold.

4. ORGANIZATIONAL ANDTECHNOLOGICAL SECTION

4.1. Drilling wells and extensions

The necessary equipment and technology for drilling wells with or without widening should be selected based on an analysis of the results of geological, hydrogeological and hydrological surveys of the foundation site, its design features and the technical characteristics of the existing drilling equipment.

Work on drilling wells and widening should be carried out in accordance with the requirements of the factory operating instructions for the drilling equipment used and the instructions below.

When drilling wells in clayey soils, their development is allowed to be carried out 2-3 m below the casing knife with a grab, bucket or auger drill, and then upset the pipe into the formed depression. For such a technology of work, the grab or drill must be equipped with guides that ensure its unhindered extraction from under the casing knife.

Loose and medium-density water-saturated sands should be removed from the wells with an airlift or hydraulic elevator while ensuring constant water filling into their cavity in such an amount that its level in the inventory pipe exceeds the water level in the ground by at least 4 m.

If it turns out that after the end of the drilling work it is impossible to immediately start placing the concrete mixture, drilling of wells should be stopped without bringing the bottomhole to the design mark by 1-2 m, and the broadening should not be drilled out.

Boulders, rock layers or other solid obstacles encountered when drilling holes in the ground should be drilled out with a bit, a percussion grab, or turbodrills should be used for this purpose. If it is impossible to overcome the obstacle encountered in the process of drilling wells, the decision on the possibility of using them for the installation of piles should be made by the organization that designed the foundation.

The method of securing the lateral surface of drilled wells with a reinforced concrete shell left in the pile structure, casing, clay solution or excessive water pressure against possible soil collapse should be selected depending on the design features of the pile, the technological equipment used, the physical and mechanical properties of the soil and the presence of underground or surface waters, guided by the instructions below. In refractory, semi-solid and solid clayey soils, wells can be drilled without fixing the lateral surface.

It is necessary to fasten the entire surface of the wells with a casing pipe when drilling them near the foundations of existing buildings and structures. For casing wells, an inventory should be used, consisting of separate bolted sections of steel pipe with an inner diameter of 5-10 cm larger than the overall size of the excavation body.

The length of the inventory casing used for securing the entire surface of the wells should be assigned based on the location of its upper end at least 0.5 m above the water level in the water area, and within the land - not below the soil surface at the drilling site. In this case, the bottom of the pipe should be buried at least 1 m below the design level of the pile end into fine and silty sands, plastic sandy loams and at least 0.5 m - into gravelly, coarse and medium-sized sands, refractory loams and clays. To prevent the influx of unstable soils into the casing pipes, they should be developed while maintaining the soil core in the pipe cavity with a height of at least half of its diameter. In this case, it is required to ensure that the water level in the wells is at least 1 m higher than the level of surface or groundwater.

It is allowed to develop such soils to the bottom of the casing knife, provided that the water level in its cavity is maintained at least 3 m above the water level outside the pipe.

Operations for pushing in and removing the inventory casing with special equipment of the used drilling rig should be carried out in accordance with the instructions of the factory instructions for its operation. Excessive water pressure when drilling wells without casing should be used in cases specified by DBN. If the surface of the wells is fastened with excess water pressure or clay solution, an

inventory pipe must be installed within their mouth to prevent the possibility of soil shattering. The length of the nozzle is prescribed, guided by the data in the table, and is specified empirically, especially when working on an area covered with water.

Clay mud is required to be used for casing wells in all cases when there is no equipment with inventory casing pipes and it is impossible to use excess water pressure, as well as when drilling widening in sandy soils.

Quality control of shells immersion or well drilling and widening is entrusted to the foreman who supervises the drilling operations. The results of submersion of each shell or drilling of each well shall be reflected in the logbook and in the attached summary sheet of submerged shells or drilled wells.

The diameter of the well, which is supported by excess water pressure or mud, should be controlled using a bucket drill and cylindrical drill string guides when they are lowered or raised. When using grabs, the diameter of the borehole, its depth and shape must be controlled using a gauge that is lowered into the finished borehole on a cable. The depth of lowering the gauge into the well is determined by the marks on the cable. The control of the shape and diameter of the broadening should be carried out with the help of the used broadener.

Deviations of the actual dimensions of the well and the widening from the design ones should not exceed the following values: along the depth of the well and the location of the widening ± 10 cm; borehole diameter ± 5 cm; by the diameter of the broadening ± 10 cm; along the height of the cylindrical part of the broadening ± 3 cm.

The deviation (total from the slope, horizontal displacement in the plan) of the actual position from the design piles located in the foundation (along the facade of the bridge) in two or more rows should not exceed the following values: in the plan at land surface level 0.05d, at the level water area 0.1 d, at an axis inclination of 100: 1, and for foundations single-row along the facade of the bridge, respectively 0.02 d; 0.04d and 200: 1 (here (d is the pile diameter).

4.2. Installation of reinforcement frames

. Piles should, as a rule, be reinforced with prefabricated frames of design length. It is allowed to assemble reinforcing cages from separate sections in accordance with the project for the production of such works.

Before installing the frame in the well, it is necessary to check whether the outer diameter of the frame (in the places where the protective layer clips are fixed) corresponds to the diameter of the casing, and whether the rods are free of rust, oil and soil. The methods of slinging, raising, moving and lowering the reinforcement cage into the well should exclude the possibility of residual deformations of the cage or its individual rods, as well as disturbance of the soil stability of the lateral surface of the well.

In order to prevent the reinforcement cage from lifting during the process of concreting the piles, it must be anchored. To do this, in piles, reinforced only in the upper part, two rods should be welded to two diametrically located frame rods, having a length to the bottom of the well and equipped at the lower end with anchors in the form of short ones from the corners. Anchoring of the frame, starting from the bottom of the wells, is allowed to be carried out with the help of shorts from the corners welded directly to the lower stiffening ring. To ensure control of the position of the frame along the depth of the well after its installation and in the process of placing the concrete mixture, it is necessary to weld a rod of such length to one of the longitudinal rods (and the initial period of lowering the frame into the well) so that its top rises 10-20 cm above the casing or branch pipe.

4.3. Filling with concrete mixture of wells and extensions

If it is impossible to lay the concrete mixture dry into the cavity of the shell, wells and broadening, it should be applied underwater laying it using the HLM method, carried out under the influence of the own weight of the cast mixture or

under the influence of vibrators attached to the lower end of the concrete pipes on the inactive mixture.

The use of a concrete pump for laying the mixture into wells is allowed after the development of the technology for the production of such works.

Laying the mixture using the HMW method should be carried out in accordance with SNiP III-15-76) and the additional instructions given below.

Before lowering the concrete pipe, it is necessary to check the mark of the bottom of the well with a plumb line. If the measured bottom mark exceeds by more than 5 cm the mark obtained at the end of drilling the well, then the crumbling soil must be removed.

Immediately before the underwater placement of the concrete mixture into the well drilled in the rocky soil, it is necessary to wash off the drill cuttings from the surface of the face, using for this purpose an airlift and jetting pipes fixed on the concrete pipe. For flushing, it is necessary to provide a water supply under a pressure of 0.8-1 MPa at a flow rate of 150-300 m3 / h.

Flushing should be continued for 5 - 15 minutes until the sludge residues disappear, as evidenced by the color of the water overflowing over the edge of the casing or branch pipe. Flushing should be stopped only at the moment the concrete mixture starts to move in the concrete-cast pipe. The level of the concrete mixture placed in the well, which controls the depth of the pipe bottom into the mixture, as well as its level in the pipe, should be measured with an accuracy of 10 cm: in vertical wells - using a plumb line or a float, in inclined ones - using a float.

After raising the level of the concrete mixture to the bottom of the reinforcing cage, it is necessary to monitor its position in the well, not allowing it to rise with the mixture coming from the concrete-cast pipe.

In the process of concreting the piles, it is necessary to strictly comply with the requirements for the selection of the composition of the concrete mixture, ensuring the minimum permissible depth of the pipe in the mixture to be laid and the required intensity of concreting. If these requirements are not met, the pipe becomes clogged with a mixture or water breaks through into the pipe.

Blockage of the concrete pipe should be eliminated by shaking it (by a sharp rise and fall within the permissible depth) or by turning on a vibrator located at the base of the funnel, and, if necessary, use both of these methods. If there is a movement of the mixture, the pipe must be quickly lowered.

If the blockage of the pipe is not eliminated by the above methods, concreting should be stopped, the pipe should be removed from the well, the concrete mixture should be removed from it, cleaned and rinsed with water.

In case of water or clay solution breakthrough into the concrete pipe through the leaks in the flange joints of individual links that appeared during concreting or through the bottom of the pipe due to insufficient penetration into the mixture, as well as in case of careless lifting, the concreting should be stopped immediately, removed and washed out the concrete pipe.

Immediate resumption of the concreting of the pile should be carried out by methods that ensure the supply of fresh mixture to the mass of the previously laid mixture before it begins to set without contact with water or clay mortar, for example, by using a concrete-cast pipe with a bottom cover.

After a long break in the concreting of the pile in the section with the reinforcing cage, it is allowed to continue work, having previously removed the surface layer of sludge and weak concrete within not only the frame, but also the protective layer.

When using an inventory casing pipe, in case of a long break in concreting, it must be raised to a level at which a layer of concrete mixture with a height of 0.5-0.7 m remains in it, and periodically rotated to avoid the pipe seizing with concrete. If the well cannot be drained to continue the interrupted concreting of the pile, the decision on the possibility of using it as part of the foundation must be made by the organization that designed the foundation.

After placing in the borehole every 4 m3 of concrete mix, its level should be determined by comparing the actually laid volume of the mix with that calculated according to the recommended Appendix 2. The position of the mix level should be

additionally checked after each lift of the concrete pipe and after the end of concreting.

Deviations of the volume of the concrete mix from the volume of the well, calculated according to the actual dimensions, should not exceed:

in sandy soils, plus 25% and minus 12%;

in clayey soils, plus 15% and minus 10%.

When drilling out a core, special attention should be paid to the drilling mode in the contact zone of a concrete layer laid in violation of the concreting requirements, with a normally laid or with a borehole bottom in rocky soil. Rapid immersion (failure) of the drilling tool in this zone indicates the presence of a layer of cuttings formed as a result of violation of the regime of underwater concreting.

4.4. **Masonry Work**

The building is made of bricks of 25×12× 6. Each wall of the building in the outside is full brick, while the walls of the building from the inside are half brick.- The building needs some kind of brick, solid brick and red brick-

4.4.1. Solid brick

Protect the foundations and deck from groundwater and then isolate them for two days. It is used in bathroom buildings- bearing ground water. Bricks that do not contain industrially formed voids or holes. The American specifications stipulate those solid bricks contain 25% less industrial voids.

The most used types of bricks are hollow clay bricks and solid cement bricks

Places where it is preferable to use solid cement bricks instead of hollow clay bricks:

1. All places exposed to moisture or water, such as the walls of bathrooms

2. Underground buildings such as backfill story buildings and concrete wall insulation protection buildings

3. Places prone to cracking, such as around window openings, doors and sitting areas

4. Your first 3 courses on all the walls

5. Wall bonding courses (nerves), which are the reinforcement of hollow walls with solid brick courses, each 1 meter high.

4.4.2. Red brick

Red bricks are known as one of the oldest and most ancient types of bricks. It is simple in production with high specifications and excellent construction quality, and any brick factory can manufacture red bricks with high productivity.

The history of the use of red bricks in construction goes back tens of years, as it represented the beginning of construction and architecture. In the past, red bricks were used in construction for several advantages, including:

It is good heat insulator. Era, where the red brick is made of clay and becomes like pottery, and it insulates heat significantly better than many other building materials, and it also provides a large percentage of thermal insulation, which affects the rationalization of electrical consumption in our days.

The pressure of cold and heat, the red brick with this characteristic is characterized by that it is not affected by climate change, as it is used in cold areas such as cold European cities, and in hot areas such as the Arabian Gulf.

For heat and fire, red bricks are known to be used in kilns, as they are used in building the inner wall of kilns to preserve heat and not be affected by it.

4.4.3. Implementation steps

1- Starting to start the beginning of the appearance of the bricks well (to prevent the occurrence of the bricks).

2 - The place of the first course (first row) is cleaned from any dirt to the surface of the surface, and the place of the first course is sprayed.

3 - The process of building the first course begins, which is used to build the road of the first course, which uses the threads as a guide or a ruler for the side, and the installation of cables (vertical threads) and a review of only by meters, considering leaving the places of the openings (doors).

An image from the internet showing the hours

4- The building is lifted by another course with the entire school, then comes the receipt of the engineer (or the owner) and making sure that the drawings and designs match, based on reality

5- Elevation height is raised about 1.5 meters per day.

6- The way of making switches between buildings and buildings, and through iron cans between buildings and concrete.

7. Before the cleanliness work of the day, it is necessary to ensure the the site and the mortar fermentation place for the cement (workshops) and to add all the welds in the buildings from fallen or excess cement mortar

8- At the height of the lintel installation, with a ride not less than 10 cm from each direction.

9- When you reach your last (last 5 or 7) courses, the height is measured up to the ceiling, with the height divided by an integer number of bricks.

10- Is that it must again be necessary that all the trusses be clean of the remaining cement mortar, or the mortar has fallen off.

11- It is preferable to spray the walls with water on a daily basis for several days after the completion of construction and before carrying out the work of the oyster.

4.4.4. Cement plaster

Cement plaster is used to plaster the interior as well as the exterior walls of the house. The best quality of cement plastering is needed to do a great job. Cement plaster is a mixture of water, fine aggregates, and Portland cement. Cement and sand are mixed in different amounts to obtain the cement plaster.

It is the first and most important stage of building finishing after the completion of building works, which is considered the first stage of construction work. Albedo functions through the following points:

4.4.4.1. Spatter dash coat

After the completion of the building work, the Cement plaster work begins through an authorization process, which is the Spatter dash coat, where the surfaces of the walls are roughened by the cohesion of the Cement plaster, in which we focus on the following:

The walls are washed well with water before splashing. Cement plaster is made of sand and cement at the rate of 8 cement sacks per cubic meter of sand, provided that the consistency of the splash cement mortar is coherent in a way that makes it fixed on the board that puts it above the technician and direct ejection from the mortar is not allowed to prevent cement deposition and the difference in the consistency of the Cement plaster.

The splash cement mortar has been thrown on the clean wall by forceful extrusion, and it must be thrown with good cohesion force between the splash mortar and the walls.

All activities are dealt with at all levels without leaving spaces or cavities.

It is placed because the surface of the wall after the splash has become excellently grainy and rough.

The Cement plaster is treated by spraying before waiting for a period of no less than two days, according to the requirements of the Egyptian code.

4.4.5. -Dots and bands

After the completion of the wall and ceiling splatter work, a day or two, the technician can start making the necessary Dots and Bands. The main objective of the pits and strings in the white work is to create a correct guide for the technician,

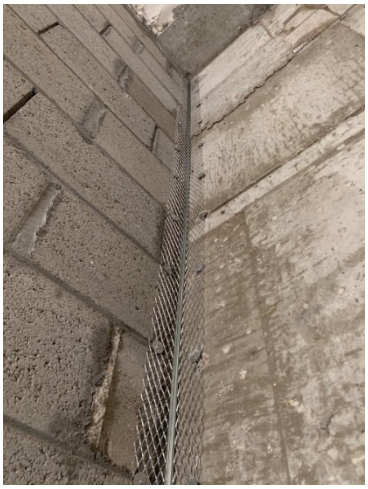
based on which he can fill in cement mortar by Cement plaster at the level of these marks. The puppy is the guarantor of maintaining the horizontal squareness and the vertical straightness of the spaces and walls.

Dots is made from cement mortar of size (3 cm * 10 cm) without adding any percentage of gypsum or any other type of additive. In the case of the use of gypsum Dots, take into account their complete removal after the work of the strings. The bulge starts from a level of 0.5 m from the floor and 0.5 m from the ceiling and is repeated for every 2-horizontal m. The number of bulges on one wall is not less than (2 * 2). Vertical to make sure the albedo layer will start.

It is preferable to choose an axis parallel to the longest house in the house, squared from it, and adjust the positions of the corners and make sure the horizontal distances are equal to the same room in the same direction. In the facades of large heights, it is preferable to make strings, not vertical slugs, while in the interior spaces, strings are made and strings are not made except in large and high-rise spaces.

4.4.6. Plastering

Wire tape must be placed in all joints and corners in the building to avoid any cracks



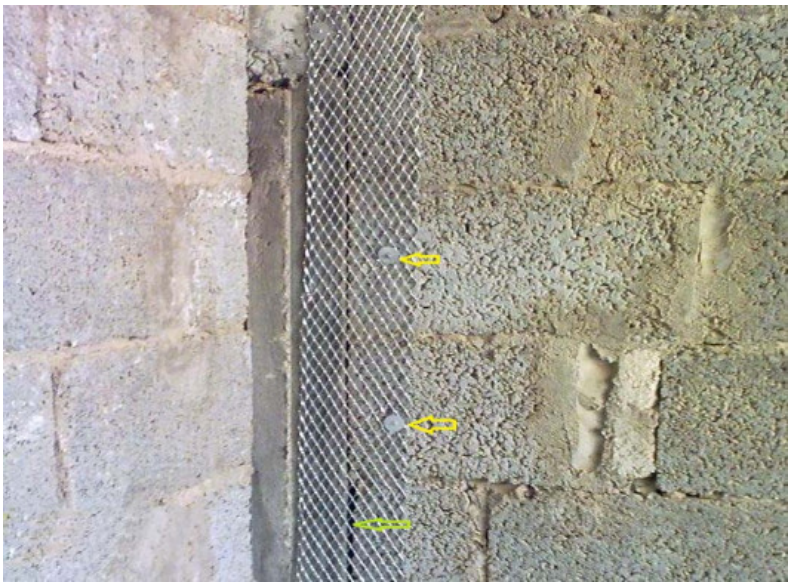


Figure 4.1 - Plastering must be placed in all joints and corners in the building to avoid any cracks

After confirming the correct implementation of the bots and the completion of the sanitary and electrical foundation works, the technician begins to spread the cement mortar on the walls after spraying it with water, provided that the cement mortar is 3 sacks per cubic meter according to the requirements of the Egyptian Code and well-graded sand of the sand.

The white work must be received day by day.

4.5. **Sanitary fittings**

These fittings are used to control water flow in bathrooms, toilets, water closets, kitchen, etc. These fittings are available in brass, powder-coated chromium-plated (C.P.). Polyvinyl chloride (P.V.C.), iron, etc. most popular and common are C.P. fittings**.** Full half threaded waste coupling, stop valves of open and concealed type, pillar tap, sink basin wall mixer, bib tap, extension piece with flange, etc.

4.5.1. Procedure of internal plumbing

Preferably ‘B’ class pipes should be used.

Marking should be done for horizontal and vertical pipelines with the help of line Dori and robin blue and the pipelines should be fixed on the wall.

All pipe joints should be properly clamped to the wall using the required size of the clamps. For clamping, drill holes and insert wooden plug inside. Pressure testing should be done as per the concealed line. Open G.1. pipes should be painted with oil paint during the finishing stages, to prevent any rusting of the line.

4.5.2. Drainage systems and it's works procedure

The Drainage systems method of collecting and disposing of the waste has been modernized and replaced by a system, where wastes are mixed with a sufficient quantity of water and carried through closed conduits under the gravity flow condition. This waste sewage automatically flows up to the place of disposal after suitable treatments. The treated sewage effluents may be disposed of either in a running stream or may be used for cultivation. The drainage system is the art of installing and laying the network of pipes along with fixtures and fittings in a systematic manner, considering the aesthetics.

Drainage system includes drainage pipes, fixtures, traps, vent pipes, stormwater pipes, sewer lines, manholes, etc, along with their devices and the necessary connections for disposal of the wastewater in a defined way.

4.5.3. Internal drainage system

The choice of the system can be decided according to the location of the sanitary units, considered at the time of planning.

This system can be used if a suitable grouping of all soil and waste pipes is possible. This system can be used if the layout of the kitchen, bath, and W.C. is isolated. If a grouping of all pipes is not possible. If wastewater from the kitchen and bath is to be used for gardening.

4.5.4. External drainage system

The network of pipes laid for carrying waste and night soil from the vertical stacks to the septic tank or sewer main. A network of pipes usually comprises of 10cm dia. Pipes for a branch line from the gully trap to the first chamber and 15cm dia. Pipes for the mainline. Subsequently, the diameter of sewer increases from manhole to manhole, as per the increase in discharge. Usually, the following types of sewer pipes are used.

4.6. Carrying out ceramic works

- Drinking is done on the floor, and it should be attributed to (+1.00) m of rubber, the benefit of drinking easily, the level of finishing for each weeping. A ceramic tile is installed at the beginning of the tile, the level of another tile at the end of the tile, and this is done by tightening a thread between the two tiles to adjust the two tiles with some one level. Ceramic is installed, and it is manufactured on the horizontal with a keg, and a water meter.

The seams between the ceramic tiles shall be equal, provided that they are 2 mm and equal.

Ceramic welds cannot be executed without joints. After the ceramics are finished in ceramics. An overall with a height of (7:10) cm is installed on the wall, in order to protect your senses from water when washing. Ceramic tiles are watered with white cement. Horizontal installation without tilts (tilt only in bathroom floors, kitchen and balcony in case of rain drainage).

4.6.1. • Receipt of ceramic works

1- To put a clean sand of the composition.

2- Review the evenness of the Suk, and the perpendicularity of the letters.

3- Reviewing the regularity of welding lines

4- That there are no spaces behind the tiles (drumming).

5- Review the level of the area that has been paved.

6- The mortar must be completely dry before the watering process.

7- The watering should be with white cement, and not with dry white cement.

8- Make sure it is horizontal using an aluminum cap and a water balance

4.7. Painting work

Painting work procedure is the finishing item in any construction. Painting affects the total appearance of building from inside and outside. Therefore, it should be carried out with the great skill of workmanship.

4.7.1. Objects of painting work

Paints and varnishes are used in building and other engineering works for covering the surfaces of wood, metal, masonry, plastered walls, slabs, etc. Following are the main objectives of painting work

To protect the surfaces from atmospheric influences and to preserve them from the decay, oxidation, and corrosion. To improve the appearance of surfaces. To facilitate the cleaning of surfaces.

Scraping Patti, ladder, goad, Zula, distemper brush, wash brush, oil paint brush, fine brush; scraping papers 60 No., 80 No., 100 No., 120 No., scraper (metallic sheet), measuring jar, weighing balance, spray for whitewash, burning stove, fine chisel, and hammer.

4.7.2. Painting work procedure stages

1. Donga is the lime water coat that is applied on plastered walls after the curing period is completed. Donga should be applied after a minimum of 21 days on Nero finished walls and ceilings.

Use of donga:

It absorbs moisture from the walls and helps achieve a better paint finish afterward. It acts as a crack filler for hairline cracks, on freshly plastered surface of the walls. It acts as a basic coat for distemper and whitewash.

Preparation and procedure of donga. Ensure that all plastering work is a plate, along with the necessary curing. All Ghobadi work (wall punctures) should be complete along with the necessary curing.

Scrap the wall with a steel scraper of size 10cm x 7.5cm (4″ x 3″), to remove any unwanted material on walls, i.e., excess cement mortar, nails, dust. Take 1/2 kg of lime to cover 10sq.m. (108s.ft.) area of the wall surface. Take the lime in a drum and mix the water in a 1:2.5 ratio (1kg lime to 2.5 liters of water). Stir this mixture properly. If required, sieve the lime water through a fine cotton cloth and remove the residue.

Take a small quantity of lime water in a 5 liters tin. Apply donga with a 10cm (4″) wide bristle hairbrush. The Donga layer should not be very thick. Water should not be spread on donga until the application of distemper.

2. Whitewash

Whitewash can be applied to ceilings or walls, as specified. preparation and procedure for whitewash

The preparation of whitewash is the same as donga. Add “Blue” to the lime water paste and mix properly. Then sieve through fine cotton cloth. Surfaces, where whitewash is to be applied, should be made smooth by rubbing out donga with a fine paper.Apply the first coat of whitewash and allow it to dry for a minimum of 24 hours.Before applying the second coat of whitewash on the walls, ensure that the final coat of tile polishing is complete. This prevents stains of the polishing slurry.After the touch-up work is over, apply the third and the final coat on the walls/ceilings and check that no brush impression is visible.

The final coat of the whitewash can be applied with a spray machine.

After the coat has dried, check the appearance of the whitewash. Rectify any shade differences with another coat.

3. Dry distemper

Dry distemper is normally applied to the smooth finished surface of the walls in school. It is available in the Selection of shades that should be approved by the chief engineer. Shades can also be made as required.

Surface preparation for dry distemper.

Clean the wall surface thoroughly. Remove donga completely with a scraper and polish paper. Rub the wall surface with fine grade paper 120 No. to ensure the proper adhesion of colour. Clean any greasy spots and smoky surfaces carefully.

Work procedure for dry distemper.

There are two methods to apply the dry distemper.

Dry distemper with primer and putty over the wall. Simple three coats of dry distemper. The first method is expensive. The cost is almost double that of the second method. Primer and putty give a smooth finish to the surfaces and eliminate defects such as cracks, undulations in the wall, etc.

4. Oil paint

For m.s. doors, gates, windows preparation of surface. Remove all cement mortar with a scraping Patti. Use sandpaper and emery black stone to remove any unwanted welding burr. The inner sides of the steel sections of the windows should be scraped properly. (Painters usually neglect this). Check for the free movement of hinges, working systems. If required, get them repaired before the primer/first coat. Apply zinc chromite metal primer to the total surface of M.S. doors, windows, gates, etc. For the first coat of oil paint.

Application of oil paints m.s. windows gates

After checking the required preparations, apply the first coat of oil paint with a good quality brush. After 24 hours of drying, apply the second coat of oil paint. Ensure that all the inner sides of the steel sections of the windows are painted. Ensure that the painter uses 0.5 liters of oil paint per coat to cover 10sq.m. (108s.ft.) of the plain surface. For quick drying of the paint, add a drier like Litharge or Massicot.

Preparation and application for oil paint to wooden doors. Check the door shutters for free movements/bend/termite attack etc. Check the door frames for line/level/ plumb/quality etc. Do not fix the door fittings unless the first coat of oil paint is applied to the door shutters. Apply a wood primer to door frames and shutters. The top of the door shutters should also be painted during every coat of oil paint. After primer application, fill up any holes/depressions with primer putty. as mentioned earlier. Apply this putty on the total surface of the door shutter evenly with a metal sheet, to fill up all the dents, depressions, etc. The site engineer should approve the preparations before starting the first coat of oil paint. Mix the stainer in oil paint and prepare a sample of the approved color. sample of shade from the C.E. Check the approved quality/brand of oil paint and ensure that the sealed tins of the paint are opened in the presence of the engineer. Apply the first coat of oil paint with a varnish brush. Allow drying for a minimum of 24 hours. Check the quantity of stainer added in the first coat. The same quantity should be continued in the second coat. Use a small brush, in case of any narrow or underside of the door shutter/frame. Ensure that the sides of the cover moulding are painted with a small brush. (Painters usually neglect this). After completing the first coat, apply putty again on the portion where cracks/dents/depressions are observed. After rubbing off the putty patches, apply the second coat of oil paint as the final coat. Check the mixing for the perfect shade of both the coats, to avoid any variations in shade. Do not disturb the shutter until it has dried completely. After drying, clean the door fittings with a paint remover solution or turpentine. Use the paint remover carefully. Do not allow it to come in contact with the shutter paint. Do not forget to paint the top of the shutter and sides of the cover moulding. Paints used for all the coats should be of the same make and quality.

4.7.2.1. Exterior wall painting work procedure

(a) cement paint

Normally cement paint is used for the external walls of the building. Plastering of these walls is done with the sand faced finish. Textured paints can be used for elevational features. For external painting, follow the procedure mentioned below. For better work quality, all exterior painting work procedure should be carried out on scaffolding. Try to avoid using Zula. Clean the external wall surface by removing dust, mortar droppings, etc. with a scraper and sandpaper 80 No. Finish all the internal as well as external works including all finishing. plumbing lines, electrical works, Water the surface for at least 12 hours, before applying the first coat of cement paint. Fill all the cracks with white cement or crack filler chemicals. Prepare the cement paint by adding water to the ready-made cement paint which is available in the powder form. Add 1 liter of water to 1kg of cement paint. Mix thoroughly to get a creamy consistency. 3kg of cement paint should cover two coats of 10sq.m. (108s.ft.) wall surface. Apply the first coat with a good quality brush. Brushstrokes should be first horizontal and then vertical, to avoid brush marks on the surface. Cure the first coat 6 times a day for 7 days, by using spray pumps.

Fill up the hairline cracks with filler material. Ensure that the first coat is a bit thicker. Do not allow the painter to do the second coat until the curing period of the first coat is over. Apply the second coat by using 1.25kg cement paint to cover 10sq. m. (108s.ft.) of the wall surface. Allow the second coat to dry for a minimum of 24 hours. Cure the second coat for 7 days with a spray pump or water pipe. Clean the surfaces like windows, glass, terrace floor, pipes, doors, fixtures, electrical switches, etc.

Textured paint.

Normally, textured paint is applied in three coats, including the base coat. Basecoat should match the color of cement paint. Apply two coats of textured paint. Sometimes one coat of cement paint as a base coat and one coat of textured paint suffices for the required finish.1.7 liters of textured paint should cover 2 coats of 10sq.m. (108s.ft.) wall surface. Follow the same procedures as cement paint, for textured painting work procedure. Textured paint is available in liquid form. Ready-

made textured paint is also available in the required consistency. It can be directly applied with a brush.

4.8. Timetable

The preparation of the project schedule helps in the effective use of financial and human resources and helps in defining the scope of supervision for each official, which avoids overlapping responsibilities, facilitates the implementation process and clarity of purpose.

Table 4.1-Timetable

ID	**Outline Number**	**Name**	**Start**	**Finish**
1	2	3	4	5
1	1	Contracts	6/5/21	6/5/21
2	1.1	- Supply Lot Sale Agreement	6/5/21	6/5/21
3	1.2	- Supply Construction Agreement	6/5/21	6/5/21
4	1.3	- Supply Contract Plans	6/5/21	6/5/21
5	1.4	- Supply Contract Specifications	6/5/21	6/5/21
6	1.5	- Supply Contract Site Plan	6/5/21	6/5/21
7	1.6	- Secure Financing	6/5/21	6/5/21

8	1.7	- Construction Loan Settlement	6/5/21	6/5/21
9	2	Document Review & Revision	6/5/21	7/9/21
10	2.1	- Review & Finalize Plans	6/5/21	6/5/21
11	2.2	- Review & Finalize Specifications	6/5/21	7/2/21
12	2.3	- Review & Finalize Site Plan	6/26/121	6/26/21
13	2.4	- Print Construction Drawings	7/3/21	7/9/21
14	2.5	- Approve Revised Plans	7/9/21	7/9/21
15	2.6	- Approve Revised Specifications	7/9/21	7/9/21
16	2.7	- Approve Revised Site Plan	7/9/21	7/9/21
17	3	Bids & Contracts	7/10/21	8/12/21
18	3.1	- Make Copies of Plans	7/10/21	7/14/21
19	3.2	- Make Copies of Specifications	7/10/21	7/11/21
20	3.3	- Distribute Plans & Specifications	7/15/12	7/15/21
21	3.4	- Receive Bids	7/16/21	7/29/21

22	3.5	Review Bids	7/30/21	8/5/21
25	3.6	- Execute Subcontractor Agreements	8/6/21	8/12/21
26	4	Grading & Building Permits	7/10/21	8/1/21
27	4.1	- Schedule lot stake-out	7/10/21	7/10/21
28	4.2	- Stake lot	7/16/21	7/16/21
29	4.3	- File Grading Permit Application	7/10/21	7/10/21
30	4.4	- File Building Permit Application	7/10/21	7/14/21
31	4.5	- Post Lot Identification	7/17/21	7/17/21
32	4.6	- Meet Sed. Control Insp.	7/18/21	7/18/21
33	4.7	- Walk Lot w/ Owner	7/21/21	7/21/21
34	4.8	- Install Construction Entrance	7/22/21	7/22/21
35	4.9	- Install Sediment Controls	7/22/21	7/23/21
36	4.10	- Sediment Control Insp.	7/24/21	7/24/21
37	4.11	- Grading Permit Issued	7/25/21	7/25/21

38	4.12	- County Permit Process	7/15/21	7/28/21
39	4.13	- Building Permit Approved	Tue 7/29/21	7/29/21
40	4.14	- Pay Permit Fees and Excise Taxes	8/1/21	8/1/21
41	4.15	- Building Permit Issued	8/1/21	8/1/21
42	5	Site Work	7/28/21	8/5/21
43	5.1	- Clear Lot	7/28/21	7/30/21
44	5.2	- Strip Topsoil & Stockpile	7/31/21	7/31/21
45	5.3	- Stake Lot for Excavation	7/31/21	7/31/21
46	5.4	- Rough grade lot	8/1/21	8/1/21
47	5.5	- Excavate for foundation	8/4/21	8/5/21
48	6	Foundation	8/6/21	9/8/21
49	6.1	- Layout footings	8/6/21	8/6/21
50	6.2	- Dig Footings & Install Reinforcing	8/7/21	8/7/21
51	6.3	- Footing Inspection	8/7/21	8/7/21
52	6.4	- Pour footings	8/8/21	8/8/21
53	6.5	- Pin Footings	8/11/21	8/11/21
54	6.6	- Stock Block, Mortar, Sand	8/12/21	8/12/21

55	6.7	- Build Block Foundation	8/13/21	9/2/21
56	6.8	- Foundation Certification	9/2/21	9/2/21
57	6.9	- Draw #1 (Location Survey)	9/2/21	9/2/21
58	6.10	- Fill Block Cores w/ Concrete	9/3/21	9/3/21
59	6.11	- Steel Delivery	9/4/21	9/4/21
60	6.12	- Set Lintels, Bolts, Cap Block	9/5/21	9/8/21
61	6.13	- Lumber Delivery	9/4/21	9/4/21
62	6.14	- Waterproofing and Drain Tile	9/5/21	9/5/21
63	7	Rough Carpentry	9/9/21	11/7/21
64	7.1	- Set Steel	9/9/21	9/9/21
65	7.2	- 1st Floor Deck Framing	9/10/21	9/15/21
66	7.3	- 1st Floor Wall Framing	9/16/21	9/19/21
67	7.4	- Draw #2 (First Floor Deck)	9/19/21	9/19/21
68	7.5	- 2nd Floor Deck Framing	9/22/21	9/23/21
69	7.6	- Draw #3 (Second Floor Deck)	9/23/21	9/23/21

70	7.7	- 2nd Floor Wall Framing	9/24/21	9/2621
71	7.8	- Set Roof Trusses	9/29/21	9/30/21
72	7.9	- Frame Roof	10/1/21	10/9/21
73	7.10	- Install Roof Plywood	10/10/21	10/16/21
74	7.11	- Install Windows & Doors	10/22/21	10/23/21
75	7.12	- Frame Basement	10/10/21	10/14/21
76	7.13	- Frame Basement Bulkheads	11/6/21	11/7/21
77	8	Concrete Slabs	9/18/21	9/29/21
78	8.1	- Basement Slab Preparation	9/18/21	9/19/21
79	8.2	- Termite Treatment Basment Slab	9/22/21	9/22/121
80	8.3	- Slab Inspection	9/2321	9/23/21
81	8.4	- Pour Basement Slab	9/24/21	9/24/21
82	8.5	- Prep Garage Slab	9/25/21	9/25/21
83	8.6	- Termite Treatment Garage Slab	9/26/21	9/26/21
84	8.7	- Pour Garage Slab	9/29/21	9/29/21
85	9	H.V.A.C.	10/10/21	11/3/21

86	9.1	- HVAC Layout & Measure	10/10/21	10/10/21
87	9.2	- HVAC Rough-in	10/22/21	10/28/21
88	9.3	- HVAC Set Indoor Units	10/29/21	10/30/21
89	9.4	- HVAC Temporary Heat	10/31/21	11/3/21
90	10	Plumbing Rough-in	9/16/21	11/5/21
91	10.1	- Plumbing Sub-slab	9/16/21	9/17/21
92	10.2	- Plumbing Layout	10/29/21	10/29/21
93	10.3	- Plumbing rough-in	10/30/21	11/5/21
94	11	County Plumbing Sub-slab Inspection	9/17/21	9/17/21
95	12	County Plumbing Rough-in Inspection	11/5/21	11/5/21
96	13	Electric Rough-in	10/24/21	11/19/21
97	13.1	- Set Electric Boxes	10/24/21	10/27/21
98	13.2	- Install Electric Service Panel	10/28/21	10/29/21
99	13.3	- Electrical Walk-through	10/30/21	10/30/21

100	13.4	- Electrical Rough-wire	10/31/21	11/19/21
101	14	Specialty Rough-ins	11/20/21	11/26/21
102	14.1	- Central Vacuum Rough-in	11/20/21	11/26/21
103	14.2	- Alarm System Rough-in	11/20/21	11/26/21
104	14.3	- Telephone System Rough-in	11/20/21	11/26/21
105	14.4	- Television System Rough-in	11/20/21	11/26/21
106	14.5	- Audio Visual Rough-in	11/20/21	11/26/21
107	15	County Electrical inspection	11/26/21	11/26/21
108	16	Draw #5 (Rough-ins complete)	11/26/21	11/26/21
109	17	County Framing Inspection	11/27/21	11/27/21
110	18	Roofing	10/17/21	1/20/21
111	18.1	- Roofing Paper Installed	10/17/21	10/21/21
112	18.2	- Draw #4 (Roof, windows, doors)	10/23/21	10/23/21
113	18.3	- Stock Roof Shingles	10/24/21	10/24/21
114	18.4	- Install Roof Shingles	1/12/22	1/20/22

115	19	Exterior Finishes	10/24/22	1/9/22
116	19.1	- Siding	10/24/21	10/28/21
117	19.2	- Exterior Trim	10/29/21	11/6/21
118	19.3	- Brick Arch Forms	11/7/21	11/7/21
119	19.4	- Brick Veneer	11/10/21	1/9/21
120	20	Insulation	11/28/21	12/4/21
121	20.1	- Caulk & Air Seal	11/28/21	11/28/21
122	20.2	- Draft & Fire Stop	12/1/21	12/1/21
123	20.3	- Batt Insulation	Tue 12/2/21	12/4/21
124	21	County Insulation Inspection	12/4/21	12/4/21
125	22	BGE Energy Wise Inspection	12/4/21	12/4/21
126	23	Drywall	12/5/21	1/9/22
127	23.1	- Stock Drywall	12/5/22	12/5/22
128	23.2	- Hang Drywall	12/8/21	12/12/21
129	23.3	- Remove Scrap Drywall	12/15/21	12/15/21
130	23.4	- Tape and Finish Drywall	12/16/21	1/5/22
131	23.5	- Sand Drywall	1/6/22	1/6/22
132	23.6	- Drywall Point-up	1/7/22	1/9/22

133	24	Draw #6 (Insulation & drywall applied)	i 1/9/22	1/9/22
134	25	Floor Finishes	1/13/22	4/28/122
135	25.1	- Ceramic Tile	1/13/22	2/2/22
136	25.2	- Install Hardwood Floor	3/27/22	4/1/22
137	25.3	- Sand, Stain, Seal Hardwood	4/16/22	4/22/22
138	25.4	- Install Carpet	4/23/22	4/28/22
139	25.5	- Final Coat Hardwood	4/16/22	4/17/22
140	26	Paint	1/7/22	3/30/22
141	26.1	- Prep Drywall for Prime Coat	1/7/22	1/8/22
142	26.2	- Prime Paint Drywall	1/9/22	1/12/22
143	26.3	- Prep Trim for Prime Coat	1/21/22	1/22/22
144	26.4	- Prime Trim	1/23/22	1/26/22
145	26.5	- Finish Coat Trim	2/23/22	3/6/22
146	26.6	- Finish Coat Drywall	3/9/22	3/26/22
147	26.7	- Caulk Exterior Windows & Doors	3/27/22	3/27/22
148	26.8	- Finish Coat Exterior Trim & Siding	3/30/22	3/30/22

149	27	Draw #7 (Roofing, masonry, siding)	3/31/22	3/31/22
150	28	Interior Trim	1/13/22	2/20/22
151	28.1	- Interior Trim Delivery	1/13/22	1/13/22
152	28.2	- Install Interior Doors	1/14/22	1/20/22
153	28.3	- Install Interior Trim	1/21/22	2/10/22
154	28.4	- Install Cabinetry	2/11/22	2/17/22
155	28.5	- Install Appliances	2/18/22	2/18/22
156	28.6	- 1st Punch-out Interior Trim	2/19/22	2/20/22
157	29	H.V.A.C. Trim	Tue 3/31/22	3/31/22
158	29.1	- Install Grills & Registers for Paint	3/31/22	3/31/22
159	29.2	- Set Outdoor Units	3/31/22	3/31/22
160	30	Plumbing Trim	4/2/22	4/8/22
161	30.1	- Set Fixtures	4/2/22	4/7/22
162	30.2	- Connect Appliances	4/8/22	4/8/22
163	31	County Final Plumbing Inspection	4/8/22	4/8/22
164	32	Exterior Landscaping	1/12/22	2/24/22

165	32.1	- Rough Final Grade	1/12/22	1/12/22
166	32.2	- Patios	1/13/22	1/21/22
167	32.3	- Porches	1/22/22	1/28/22
168	32.4	- Sidewalks	1/29/22	2/6/22
169	32.5	- Decks	2/9/22	2/17/22
170	32.6	- Driveways	2/18/22	2/19/22
171	32.7	- Final Grade and Seed	2/20/22	2/24/22
172	33	Electrical Final Trim	6/5/22	1/14/22
173	33.1	- Switch & Plug	1/13/22	1/14/22
174	33.2	- Install Fixtures	3/27/22	3/27/22
175	33.3	- Connect Appliances	4/9/22	4/10/22
176	34	Hardware	3/27/22	4/13/22
177	34.1	- Door Hardware	3/27/22	3/30/22
178	34.2	- Bath Hardware	3/27/22	3/30/22
179	34.3	- Mirrors	3/31/22	4/6/22
180	34.4	- Shower Doors	3/31/22	4/13/22
181	35	Draw #8 (Prime paint, cabinets, doors)	2/17/22	2/17/22
182	36	Draw #9 (Trim, furnace, hrdwd, tile, rails)	2/17/22	2/17/22
183	37	Draw #10 (Plumbing & elec. trim, final paint)	3/26/22	3/26/22

184	38	Final Building Inspection	3/26/22	3/26/22
185	39	Use & Occupancy Certificate	3/31/22	3/31/22
186	40	First Walk-thru	3/31/22	3/31/22
187	41	Draw #11 (Final payment per contract)	3/31/22	3/31/22
188	42	Final Punch-out	4/1/22	4/13/22
189	42.1	- Punch Out Walk-thru List	4/1/22	4/6/22
190	42.2	- Trim and Adjust Doors	4/7/22	4/8/22
191	42.3	- Paint Touch-up	4/9/22	4/13/22
192	43	Cleaning	3/27/22	4/15/22
193	43.1	- Windows	3/27/22	3/31/22
194	43.2	- Rough Clean	4/1/22	4/3/22
195	43.3	- Final Clean	4/14/22	4/15/22
196	44	Final Walk-through	4/15/22	4/15/22
197	45	Move-in	4/16/22	4/16/22

4.9. Safety and hazard instructions

The working scaffold must have the necessary strength and stability at various positions of the machine in the process of drilling wells.

It is forbidden to carry out any work on the elimination of malfunctions of the machine with a suspended working body. Malfunctions of the machine and

working bodies can be eliminated after installation and fixing them in a stable position.

Unloading and cleaning operations on a non-rotating drill or reamer must be carried out by workers at a distance of at least 1 m to the side of them.If the drill or reamer is rotating, personnel must not approach them at a distance of less than 2 m.

During lifting and lowering of the drill, reamer, grab or moving them to the side (for unloading from the ground, changing or repairing), workers are prohibited from staying within a radius of less than 3 m from the working body being moved above the ground surface.

To perform work on the well, including when tightening the bolts at the joints of the drill string elements, the well should be closed with removable shields.

The work of a diver for underwater survey of the bottom of the well or for other purposes is allowed only within the zone of deepening of the casing in the presence of a shift foreman who is directly responsible for the safety of the diver's work. It is forbidden for the diver to descend below the pipe, which casing the well to a part of its depth.

Shells or reinforcing cages for lifting them from a horizontal position to a vertical one should be slinged according to the developed schemes that ensure the safety of workers and exclude the possibility of deformation and accidental fracture of the shell or frame. The design of the gripper should exclude the possibility of spontaneous disconnection of the sling in the event of an unforeseen support of the shell or frame against any obstacle.

When moving the shell or frame with a crane, workers must be outside the danger zone. The approach of workers to the well is allowed after the bottom of the frame is located above the casing pipe or branch pipe) at a height of 0.1-0.2 m from its top.

When concreting the cavity of shells or wells and widening, carried out on the same site in parallel with drilling operations, control over the observance of safety rules by workers is assigned to the manufacturer of the work and shift foremen.

A crane designed to supply concrete mixture to a bunker or to a funnel of a concrete-cast pipe must be installed so that the bucket is moved outside the area where workers are involved in laying the concrete mixture.

At the receiving hopper, it is necessary to arrange a platform with handrails to accommodate workers who receive the concrete mixture. It is allowed to unload the concrete mix from the bucket when its bottom rises above the bunker no more than 1 m.

Slinging, transportation, shortening and extraction of the concrete-cast pipe, as well as its initial filling with concrete mixture, must be carried out under the supervision of a shift foreman.

Important:

-First ,you must enter from the main gate of the project and not enter from any other places and when you enter, you should look above that in order to not to fall things on you and look down also not to stumbling electric wires or other things and We explain to the workers the safety factors and identify who is the responsible for the project safety and must listen to him.

-we should Wear the safety clothes: Wear your hard hat, safety boots and Hi-Viz vest as a minimum, along with any additional PPE required for the task being carried out.

-Taking information from the company: It is also important to prepare all the important documents from the company which shows the number of the equipment and the number of workers and all the related thing in the project and we have to repeat safety regulations every three months.

-Make a report every day : Report defects and near misses If you notice a problem, do not ignore it; report to your supervisor immediately. Action cannot be taken quickly if management are not aware of the problem, and the sooner problems are resolved the less chance for an accident to occur

N	The Workers	first month	second	third	Fourth	fifth	sixth	seventh	eighth	ninth	tenth	eleventh	twelfth	thirteenth	fourteenth
1	Receiving the site and preparing for excavation and backfilling														
2	pilies work														
3	Foundation works														
4	Regular concrete works														
5	concrete structure works														
6	Insulation layer works														
7	masonry work														
8	plastering work														
9	Ceramic and marble works														
10	Painting work														
11	Window and door works														
12	metal works														
13	PLUMBING WORK														
14	Electricity works														
15	Finish All Works														

Figure 4.2 – Timetable

Take care when handling equipment: Never tamper With equipment Never remove guardrails or Scaffold ties. Do not remove guards. Do not attempt to fix defective equipment unless you are competent to do so. Do not ever tamper With equipment without authorization

Warning:

This structure and its manufactured components are engineered per the instructions and engineering plans provided

In the event that your structure is enclosed, be sure to provide proper and adequate ventilation and egress and ingress. Hazardous, poisonous or noxious substances should not be stored in the structure absent proper ventilation and all warnings and instructions of the manufacturer of the substance. Also, proper ingress and egress should be provided to prevent adults or children from becoming trapped inside the structure.

Metal conducts electricity and electrical shock hazards exist since. During installation or storage, keep the structure and all components away from electrical sources. Make sure that your selected location is away from power lines, underground cables, and any other source.

4.10. **Building machines**

4.10.1. Loaders

Loaders are used in construction site to load the material onto dumpers, trucks etc. The materials may be excavated soil, demolition waste, raw materials, etc. A loader contain large sized bucket at its front with shorter moving arm. Loader may be either tracked or wheeled. Wheeled loaders are widely used in sites while tracked or crawled loaders are used in sites where wheeled vehicles cannot reach.

Figure 4.3 – Loaders

4.10.2. Pile boring equipment

Pile boring equipment is used to make bore holes in the construction site to install precast piles.

Figure 4.4 – Pile boring equipment

4.10.3. Pile driving equipment

Another heavy equipment used in construction site is pile driving equipment in case of pile foundation construction. This equipment lifts the pile and holds it in proper position and drives into the ground up to required depth. Different types of pile driving equipment are available namely, piling rigs, piling hammer, hammer

guides etc. in any case the pile is driven into the ground by hammering the pile top which is done hydraulically or by dropping.

Figure 4.5 – Pile boring equipment

4.10.4. Excavator

An excavator is a heavy piece of machinery used to dig and crush material on a site. It consists of a hydraulic crane-like boom with a metal shovel that has sharp prongs on the end. The driver's cab is set on a rotating platform, making the machine more maneuverable. The machine is mobile due to an undercarriage consisting of heavy-duty tracks. Although sometimes called a "power shovel," an excavator and a power shovel have their differences.

Figure 4.6 – Excavator

4.10.5. Concrete mixer

A concrete mixer is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses.

Figure 4.7 – Excavator

4.10.6. Dump truck

A dump truck or a dump truck is a truck intended for transporting bulk materials such as sand and gravel. Dump trucks are equipped with a pallet that opens from the rear and the front is hydraulically raised to unload the contents. Dump trucks transport and unload construction materials

Figure 4.8 – Dump truck

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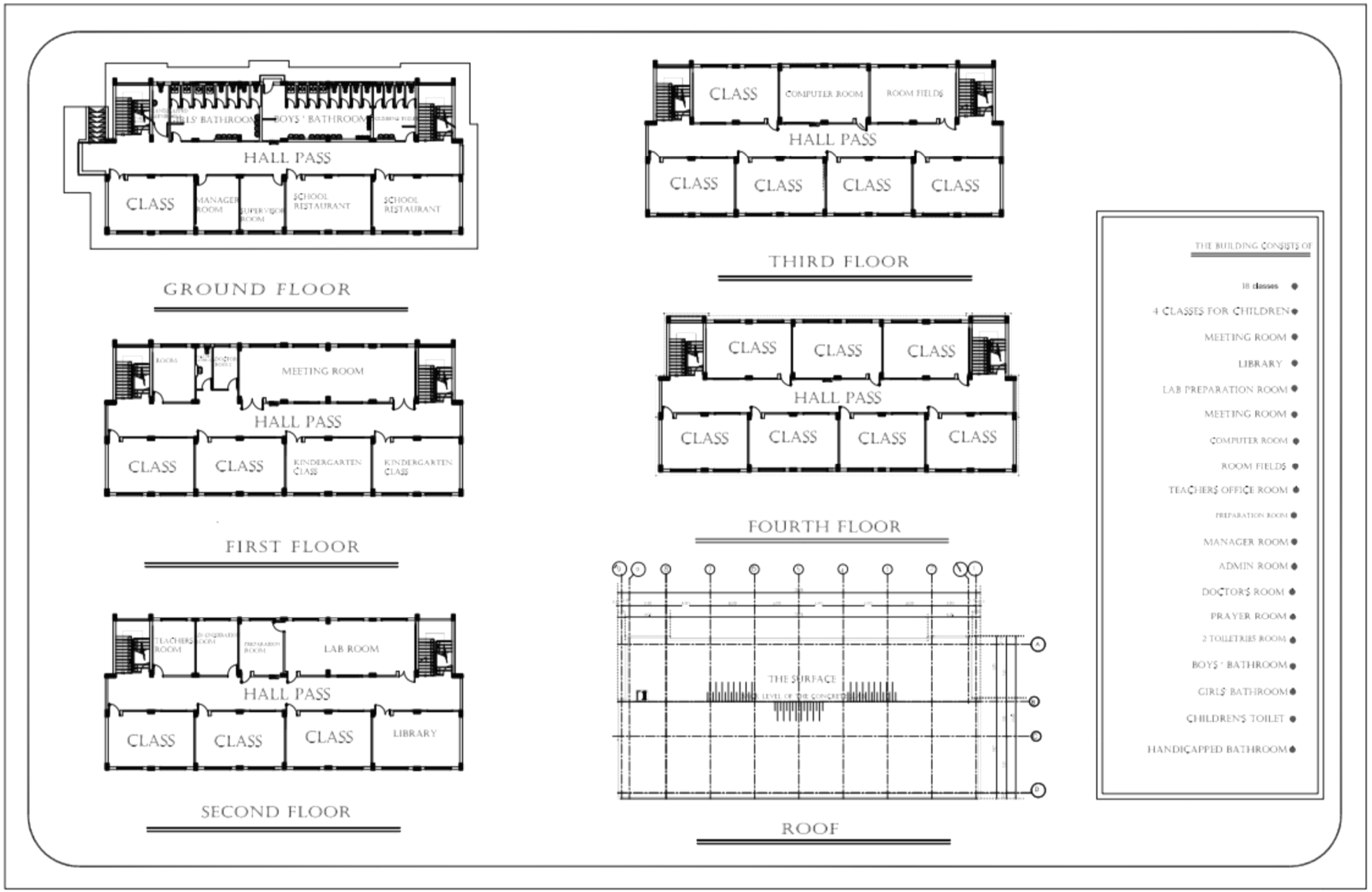
APPENDIX


GIRLS' BATHROOM
BOYS ' BATHROOM
HALL PASS
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MANAGER ROOM
SUPERVISOR ROOM
SCHOOL RESTAURANT
SCHOOL RESTAURANT
GROUND FLOOR
CLASS
COMPUTER ROOM
ROOM FIELDS
HALL PASS
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THIRD FLOOR
MEETING ROOM
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FOURTH FLOOR
LAB ROOM
HALL PASS
CLASS
CLASS
CLASS
LIBRARY
SECOND FLOOR
THE SURFACE
ROOF
THE BUILDING CONSISTS OF
18 classes
4 CLASSES FOR CHILDREN
MEETING ROOM
LIBRARY
LAB PREPARATION ROOM
MEETING ROOM
COMPUTER ROOM
ROOM FIELDS
TEACHERS OFFICE ROOM
PREPARATION ROOM
MANAGER ROOM
ADMIN ROOM
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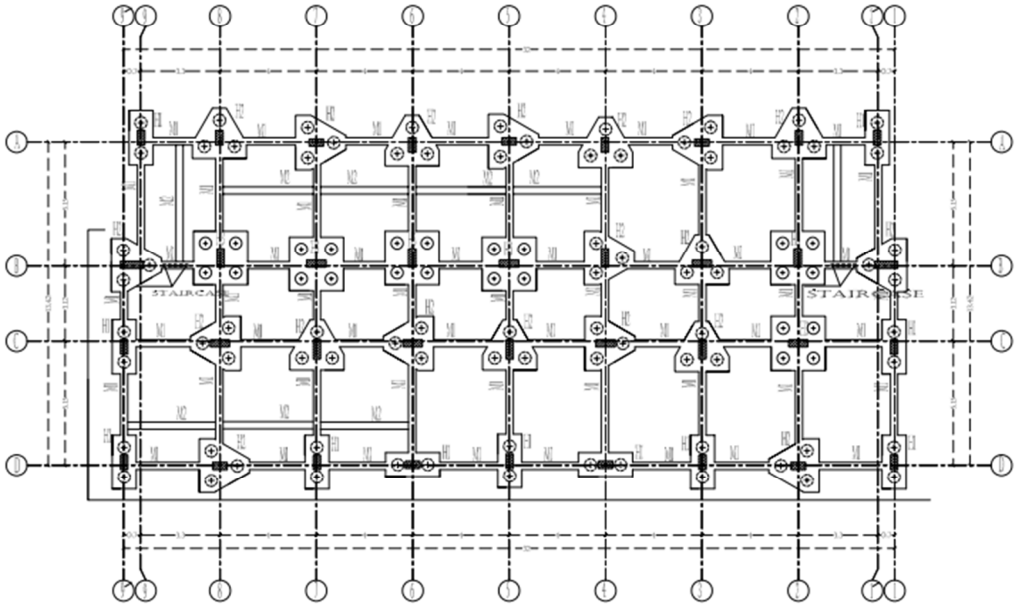
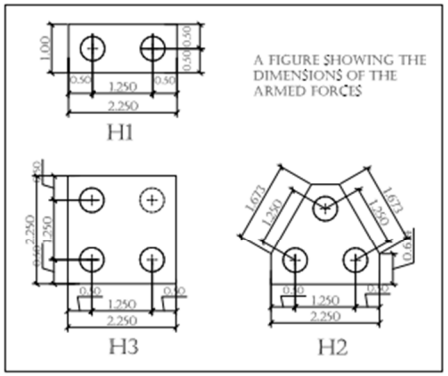
GIRLS' BATHROOM
CHILDRENS TOILET
HANDICAPPED BATHROOM





BASES ARMAMENT TABLE

MODEL	CONCRET DIMENTION L	S	D	DOWN BARS LONG	SHORT	TOP BARS LONG	SHORT	NOTES
H1	2.25	1.00	1.00	7●16 / 1.90	8●16 / 1.90	7●12 / 1.90	8●12 / 1.90	
H2	SEE DRAWING		1.00	8●20 / 1.90	8●20 / 1.90	8●15 / 1.90	8●15 / 1.90	
H3	2.25	2.25	1.00	8●16 / 1.90	8●16 / 1.90	8●12 / 1.90	8●12 / 1.90	

design details) ground beam

MODEL	SECTION B	D	DOWN BARS	TOP BARS	CAGES	NOTES
M1	0.30	1.00	6●18	6●18	6●10 / 1.90	
M2	0.25	0.70	5●16	4●16	6●8 / 1.90	
M3	0.15	0.60	3●16	3●16	4●8 / 1.90	

NOTICE :

1-The foundations were designed to withstand 5 floors

2-THE FOUNDATIONS WERE DESIGNED BASED ON THE SOIL REPORT

3-ALL CONCRETE BASES ARE 1 METER THICK

4-THE OPERATING LOAD OF THE PILE IS 55 TONS

5-THE LEVEL OF THE PILE IS NOT LESS THAN 15 METERS FROM THE NORMAL GROUND LEVEL

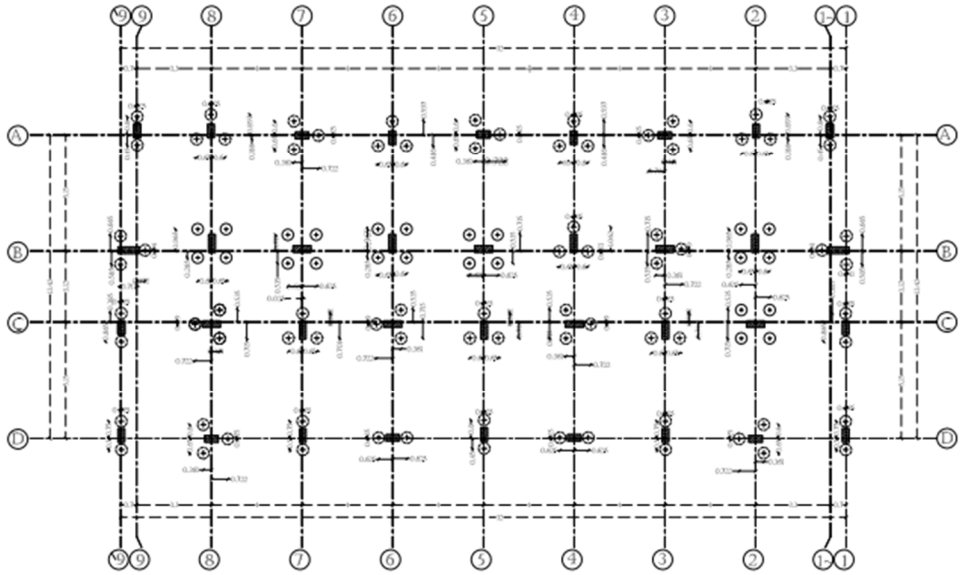
6-THE DIAMETER OF THE PILE USED IS NOT LESS THAN 50 CM WITH 10 ϕ16 REINFORCEMENT AND A LENGTH OF 10 M FROM THE BOTTOM OF THE CONCRETE BASES AND 8 CAGES WITH A STEP OF 10 CM AND INTENSIFICATION OF THE FIRST TWO METERS BELOW THE CONCRETE BASES TO BECOME 8 ϕ 8 / CM

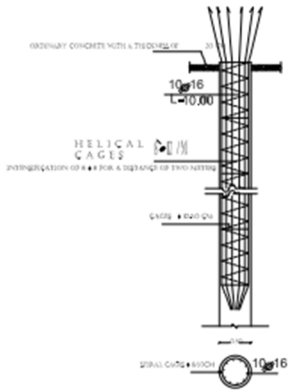
7-SULFATE-RESISTANT PORTLAND CEMENT USES 400 KG OF REINFORCED CONCRETE AND 300 KG OF ORDINARY CONCRETE.

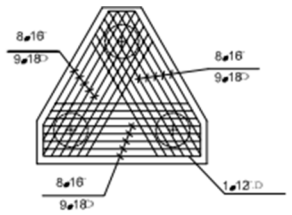
8-THE IRON USED IS A HIGH-STRENGTH STEEL WITH A YIELD STRESS OF 3600 KG

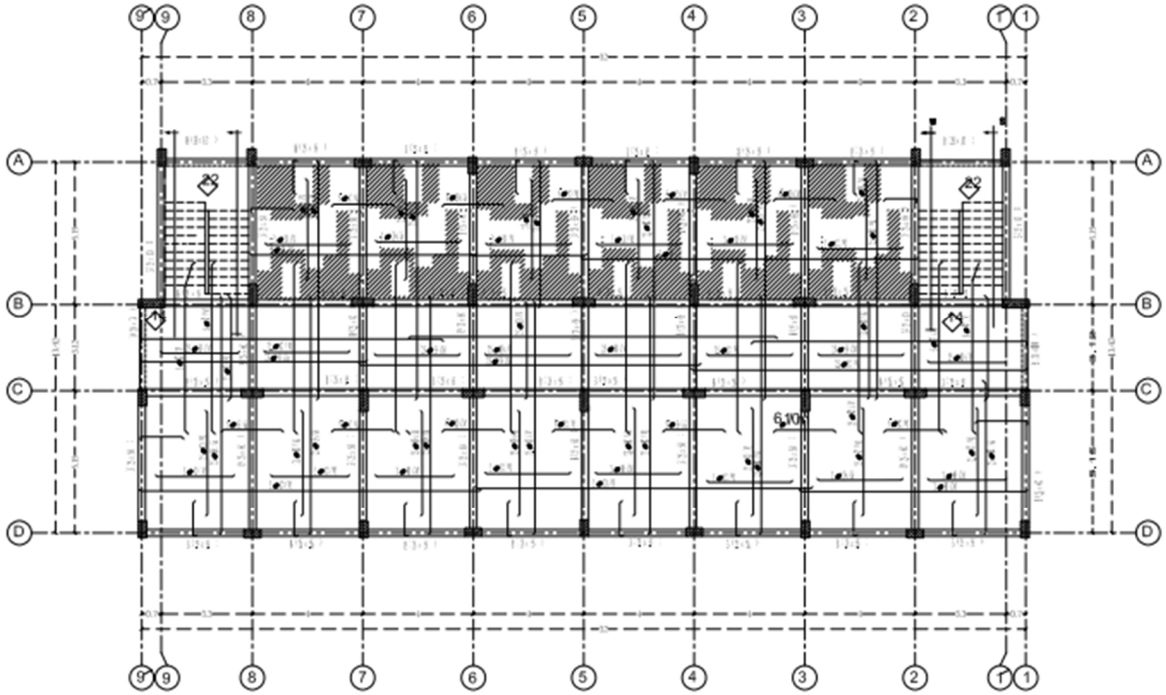
9-THE CHARACTERISTIC STRENGTH OF A STANDARD CUBE OF REINFORCED CONCRETE IN WRECKERS AND PILES SHALL NOT BE LESS THAN 200 KG/CM AFTER 28 DAYS FROM THE DATE OF CASTING.

10-THE CONCRETE COVER IN THE CONCRETE BASES SHALL NOT BE LESS THAN 7 CM









GROUND FLOOR CEILING