THE HASHEMITE UNIVERSITY

Civil Engineering Department

GRADUATION PROJECT I

QUANTITES SURVEYING MANAGEMENT FOR (SMASCO TOWER)

A graduation project submitted to the Civil Engineering Department in partial fulfillment of the requirements for the degree Of Bachelor of Science in Civil Engineering

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Dedication

Every difficult job requires self-effort and making research, our project is dedicated to our doctor ODEY AL SHBOUL, who encouraged and helped us, with all respect.

Chapter 1: INTRODUCTION

Project management

Firstly, we will write about project management … definition, processing, etc...

Project: A group of milestones or phases, activities or tasks that support an effort to accomplish something

Management: is the process of Planning, Organizing, Controlling and Measuring.

Also, project is defined as A collection of linked activities, carried out in an organized manner, with a clearly defined START POINT and END POINT to achieve some specific results desired to satisfy the needs of the project at the current time.

> **Project management is** defined as: A dynamic process that utilizes the appropriate resources of the organization in a controlled and structured manner, to achieve some clearly defined objectives identified as needs.

- It is always conducted within a defined set of constraints.

What does Project Management Entail?

Figure 1-1: Project Management

Why is Project Management used?

- It is necessary to Track or Measure the progress we have achieved towards a Goal we wish to accomplish.
- We use Project Management to Aid us in Maximizing and Optimizing our resources to accomplish our goals.

Why is Project Management Important?

- Enables us to map out a course of action or work plan.
- Helps us to think systematically and thoroughly.
- Unique Task.
- Specific Objective.
- Variety of Resources.
- Time bound.

Advantages of good project management:

- In built Monitoring/ Sequencing.
- Easy and Early identification of Bottlenecks.
- Activity based costing.
- Identification and Addition of missing and new activities.
- Preempting unnecessary activity/expenditure.
- Timely Completion.
- Assigning tasks.
- Reporting.

The Project Life Cycle

Another way of illustrating the unique nature of project work is in terms of the project life cycle. Some project managers find it useful to use the project life cycle as the cornerstone for managing projects. The life cycle recognizes that projects have a limited life span and that there are predictable changes in level of effort and focus over the life of the project. There are a number of different life-cycle models in project management literature. Many are unique to a specific industry or type of project. For example, a new software development project may consist of five phases: definition, design, code, integration/test, and maintenance.

Phases of project

Business Planning • Conceptual Design • Detailed Design • Procurement • Construction • Testing, Start-up & Implementation • Operations & Utilization • Decommissioning.

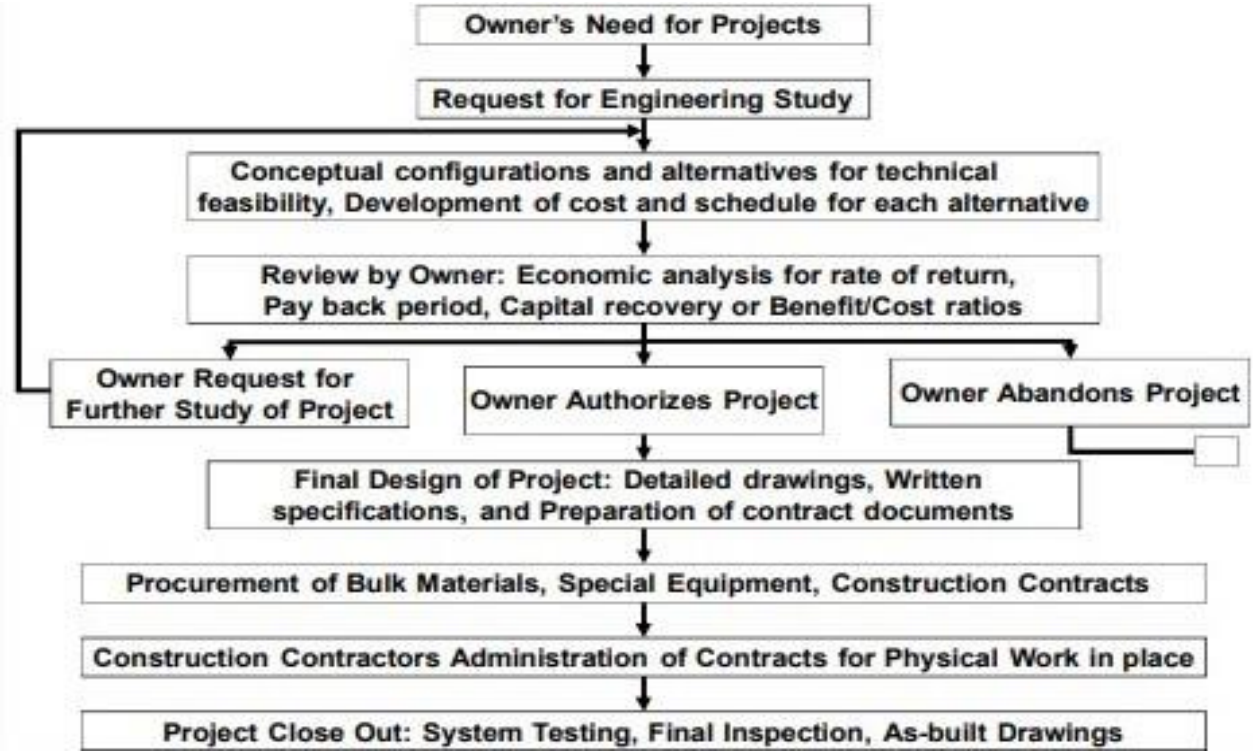


Figure 1-2: Phases of Project.

Description

This project was designed in July 2019 and it is expected to be executed in June 2021 in Saudi Arabia - Riyadh. Smasco Tower project was designed by Consolidated Consultant Group. The tower consists of twenty floors and 3 basement floors.

The project is a mixed-use tower accommodating commercial and Offices functions besides SMASCO headquarter which accommodates 500 staff members, in Riyadh, Kingdom of Saudi Arabia, with a total built up area of 25270 m^2.

The Project is located on King Fahd Road, the main business spine in Riyadh, Kingdom of Saudi Arabia, Project Site area is 4,108 m^2.

The Structural Part

From the structural notes footings are designed for a net allowable bearing capacity of 500Kpa without grouting for raft foundation, 800Kpa after grouting to a depth of 10m below the foundation level at a grid of (5m X 5m) and an allowable bearing capacity of 1200 KPa by drilling probes at a grid of (2.5mX2.5m) and grouting with appropriate design mix.

Compressive strength of concrete as defined by a standard 150mm X 300mm cylinder at 28 days shall be:

40Mpa: for reinforced concrete columns, walls and basement walls

30Mpa: for reinforced concrete solid slabs, beams, stairs, ramps, foundations and slab on grade.

15Mpa: for plain concrete.

All reinforcing steel bars used are high yield strength bars with a minimum yield strength of 420Mpa, and an 8mm stirrups of a 280Mpa yield strength are used.

A numerous dimension for columns where selected; Due to the difference in load distribution: 170cm×90cm, 110cm×100cm, 160cm×100cm, 130cm×100cm, and 90cm×140cm. columns are selected where needed.

Table 1. Main building areas in square meters

Floor	*Function*	*Circulation*	*Rentable Area*	*Total Area*
3rd Basement	Parking&service	0	0	4100
2nd Basement	Parking&service	0	0	4100
1st Basement	Parking&service	0	0	4100
Ground Floor	Commercial	669	480	1149
Mezzanine	Commercial	496.36	566	1062.36
1st Floor	Offices	383	406	789
2nd Floor	Offices	338	374	712
3rd Floor	Offices	229	415	644
Technical Floor	Services	0	0	
4th Floor	Offices	229	415	644
5th Floor	Offices	229	415	644
6th Floor	Offices	229	415	644
7th Floor	Offices	229	415	644
8th Floor	Offices	229	415	644
9th Floor	Offices	232.4	337.6	570
10th Floor	Offices	229	415	644
11th Floor	Offices	229	415	644
12th Floor	Offices	229	415	644
13th Floor	Offices	232.4	337.6	570

14th Floor	Offices	232.4	337.6	570
15th Floor	Offices	232.4	337.6	570
16th Floor	Health Club	129	231	360
Roof Floor	Services	200	0	175
Total Built-Up Area Above Ground	**12323.36 m^2**			
Total Rentable Area	**7142.4 m^2**			
Total Built-Up Area	**25267.36 m^2**			

Table 1-1: Main building areas.

Drawings:

Figure 1-3: Smasco Tower Shop Drawings.

Chapter 2:
QUANTITIES SURVEYING

Excavation works:

We are going to start working in our project. First of all, we should calculate The Quantity of Excavation, which is Site Excavations, Foundations' Excavations. Site settlement Excavations, we have to calculate the Reduced level (R.L), which is under the base-coarse layer, hereby we refer to the section of the existing layers in the cross section which was drawn by architect. The excavation quantities we have already calculated, divided into positive quantity (Cut), and a negative quantity (Fill). Foundation Excavations, after we found the site settlement excavations, we could know the height at which the foundations will be excavated, and the number of footings, in our project we have two types of footings: 1-Single Footing, 2-Retaining Wall, 3-Shear Wall and 4-Raft Foundation. We could find the types in the general foundation plan, and the volume of excavation for the footings depending on cleaning dimensions as a reference taken from FIDIC 99.

Figure 2-1: Excavation works from the site of buliding.

2-1) A. Calculations for the site Excavations:

NUMBER	AREA (m^2)	NL (m)	RL (m)	HEIGHT (m)	QUANTITY (m^3)
1	95.5	650.4	638.12	12.28	1172.74
2	100	650.4	638.11	12.29	1229
3	100	650.4	638.08	12.32	1232
17	100	650.4	637.55	12.85	1285
18	100	650.4	636.82	13.58	1358
31	100	650.4	638.08	12.32	1232
32	50	650.4	638.12	12.28	614
46	50	650.4	638.12	12.28	614
47	50	650.4	638.12	12.28	614
48	25	650.4	638.12	12.28	307
Total	4108			611.95	**52316.115**

Table 2-1: Site Excavation Sample of Calculations.

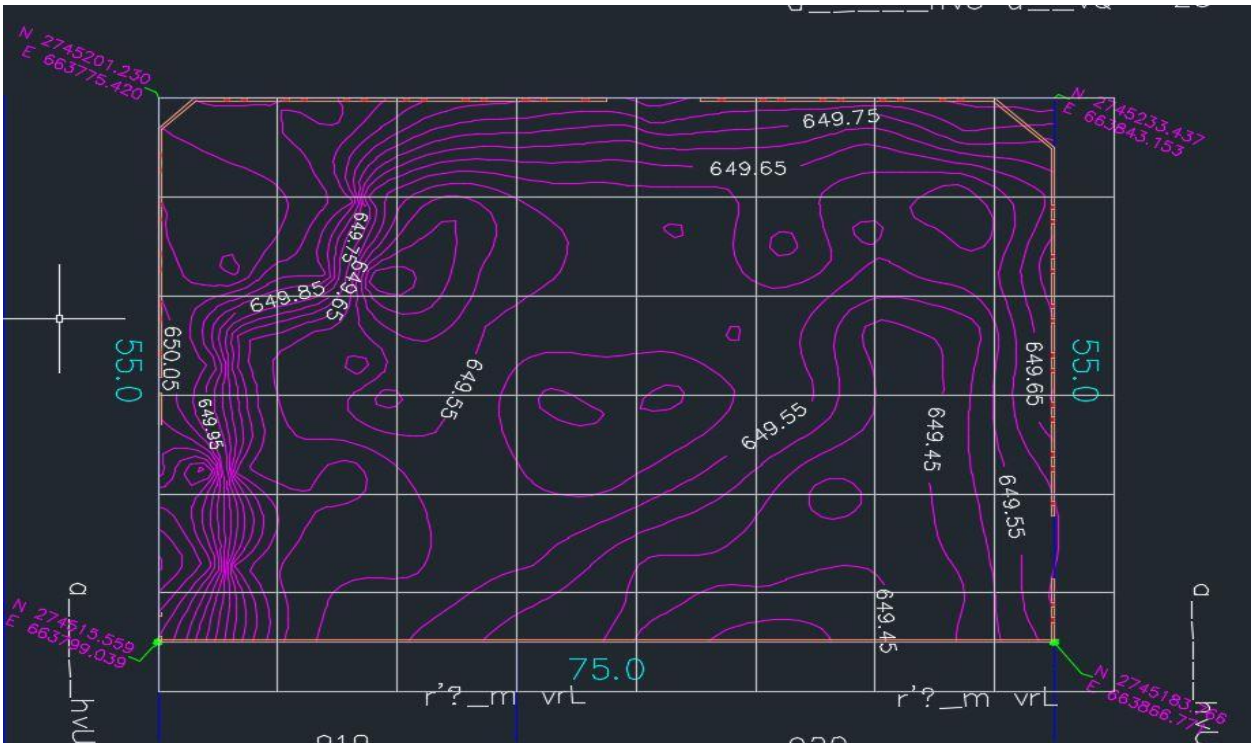


Figure 2-2: Topographic map of the site.

2-2) Calculations for the concrete of foundations:

	No.	LENGTH (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
F1	23	3	3	9	0.9	8.1	186.3
F2	11	4.5	4.5	20.25	1.9	38.475	423.225
Sec1	1	202.182	0.4	80.8728	12.4	1002.82272	1002.8227
Sec2	1	44.55	0.4	17.82	13.9	247.698	247.698
Sec3	1	0	0.4	0	12.4	0	0
Sec4	1	28	0.3	8.4	4.6	38.64	38.64
Sec5	1	35.2	0.4	14.08	12.6	177.408	177.408
Sec6	1	23.8	0.4	9.52	5.9	56.168	56.168
Sec7	1	30.55	0.3	9.165	13.95	127.85175	127.85175
Sec8	1	7.5	0.3	2.25	9.86	22.185	22.185
Ramp	3	24.76	0.3	7.428	7.5	55.71	167.13
SW1	1	62.7	0.3	18.81	55.6	1045.836	1045.836
SW2	1	21.61	0.4	8.644	55.6	480.6064	480.6064
SW3	1	14.3	0.3	4.29	12.02	51.5658	51.5658
SW4	1	7.85	0.3	2.355	25.5	60.0525	60.0525
SW5	1	2.8	0.3	0.84	25.5	21.42	21.42
RF1	1	/	/	2533	0.6	1519.8	1519.8
RF2	1	/	/	655.75	1.9	1245.925	1245.925
							6874.6342

Table 2-2: Foundations' Concrete Calculations.

Figure 2-3: Foundation plan.

2-3) Calculations for the Blinding Concrete of foundations:

	No.	LENGTH (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
F1	23	3	3.2	9.6	0.15	1.44	33.12
F2	11	4.5	4.7	21.15	0.15	3.1725	34.8975
Sec1	1	202.182	0.6	121.3092	0.15	18.19638	18.19638
Sec2	1	44.55	0.6	26.73	0.15	4.0095	4.0095
Sec3	1	0	0.6	0	0.15	0	0
Sec4	1	28	0.5	14	0.15	2.1	2.1
Sec5	1	35.2	0.6	21.12	0.15	3.168	3.168
Sec6	1	23.8	0.6	14.28	0.15	2.142	2.142
Sec7	1	30.55	0.5	15.275	0.15	2.29125	2.29125
SW1	1	62.7	0.3	18.81	0.15	2.8215	2.8215
SW2	1	21.61	0.4	8.644	0.15	1.2966	1.2966
SW3	1	14.3	0.3	4.29	0.15	0.6435	0.6435
SW4	1	7.85	0.3	2.355	0.15	0.35325	0.35325
SW5	1	2.8	0.3	0.84	0.15	0.126	0.126
RF1	1	/	/	2533	0.15	379.95	379.95
RF2	1	/	/	655.75	0.15	98.3625	98.3625
							493.2546

Table 2-3: Foundations' Blinding Concrete Calculations.

Figure 2-4: Foundation Blinding Concrete from the site.

TOTAL FOUNDATIONS CONCRETE (m3) = 7367.889

Columns concrete works:

Columns are defined as vertical load-bearing members supporting axial compressive loads chiefly. This structural member is used to transmit the load of the structure to the foundation. In reinforced concrete buildings beams, floors, and columns are cast monolithically. The bending action in the column may produce tensile forces over a part of cross-section. Still, columns are called compression members because compressive forces dominate their behavior.

Concrete columns can be roughly divided into three categories- *Pedestals*, *Short reinforced columns*, *and Long reinforced columns*. Besides in modern days

Figure 2-5: installing columns Concrete in the site.

In our project we have a lot of columns types such as:

Spiral …. Rectangular….. Square columns as can be seen below.

We have 17 types of columns in the tower with different shapes and cross sections

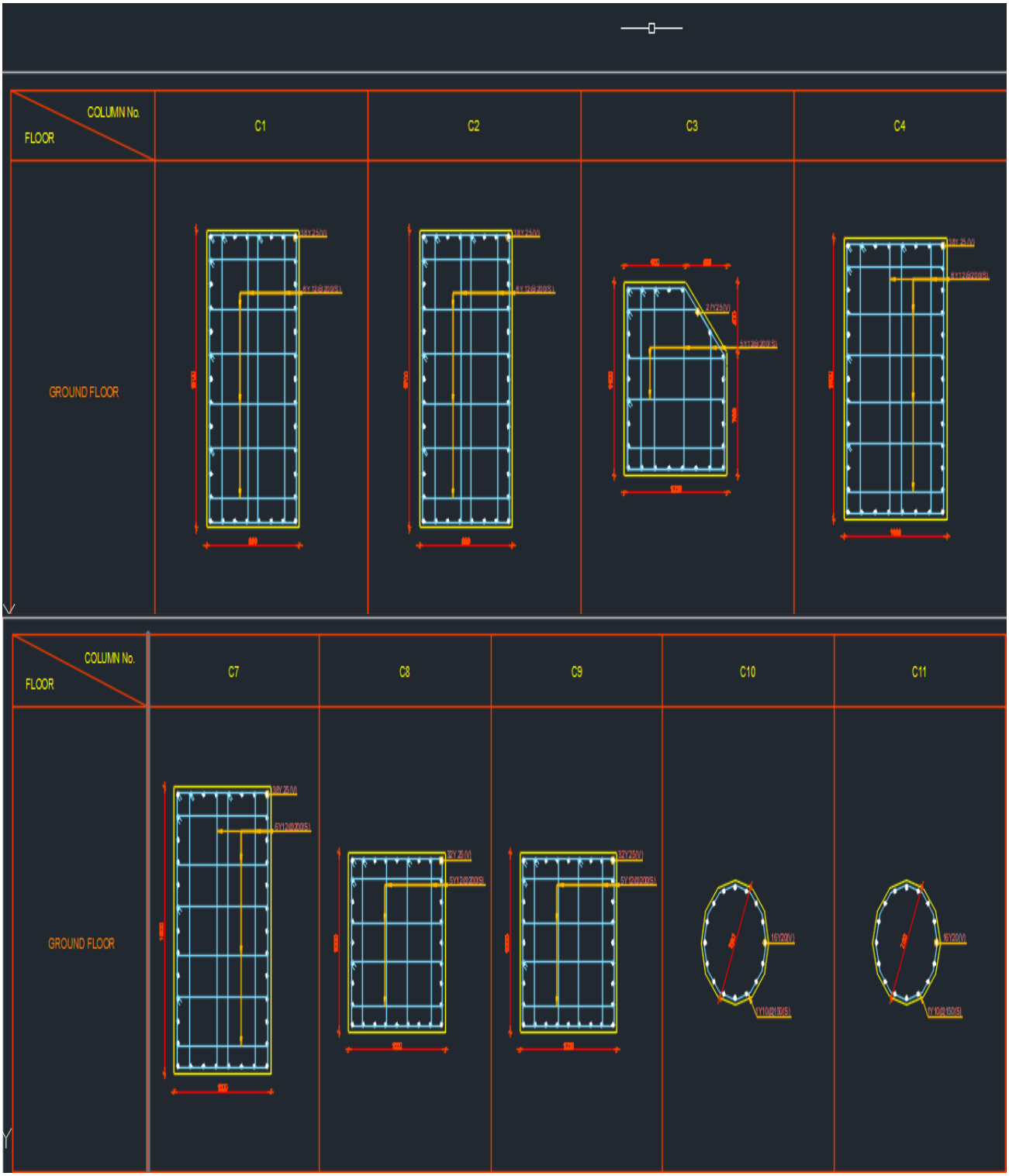


Figure 2-6: sample for column types.

Columns concrete calculations:

Concrete of column = number of columns * area * height

COLUMN CONCRETE

Basement 1&2&3

	NUMBER	LENGTH/DIAMETER (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
C1	2	1.7	0.9	1.53	4	6.12	12.24
C2	1	1.7	0.9	1.53	4	6.12	6.12
C3	1	1.1	1	1.1	4	4.4	4.4
C4	1	1.6	1	1.6	4	6.4	6.4
C5	1	1.3	1	1.3	4	5.2	5.2
C6	1	0.9	1.4	1.26	4	5.04	5.04
C7	1	1.6	1	1.6	4	6.4	6.4

Ground Floor

	NUMBER	LENGTH/DIAMETER (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
C1	1	1.7	0.9	1.53	5.5	8.415	8.415
C2	1	1.7	0.9	1.53	5.5	8.415	8.415
C3	1	/	/	1.02	5.5	5.61	5.61
C4	1	1.6	1	1.6	5.5	8.8	8.8
C5	1	1.3	1	1.3	5.5	7.15	7.15
C6	1	0.9	1.4	1.26	5.5	6.93	6.93
C7	1	1.6	1	1.6	5.5	8.8	8.8
C8	1	1	1	1	5.5	5.5	5.5

18th Floor

	NUMBER	LENGTH/DIAMETER (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
C1	1	0.9	0.4	0.36	4.5	1.62	1.62
C2	1	0.9	0.4	0.36	4.5	1.62	1.62
C3	1	/	/	0.4457	4.5	2.00565	2.00565
C4	1	0.6	0.6	0.36	4.5	1.62	1.62
C5	1	0.6	0.6	0.36	4.5	1.62	1.62
C6	1	0.6	0.6	0.36	4.5	1.62	1.62

Roof							
	NUMBER	LENGTH/DIAMETER (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
C1	0	0.9	0.4	0.36	2.6	0.936	0
C2	0	0.9	0.4	0.36	2.6	0.936	0
C3	0	/	/	0.4457	2.6	1.15882	0
C4	0	0.6	0.6	0.36	2.6	0.936	0
C5	0	0.6	0.6	0.36	2.6	0.936	0
C6	0	0	0	0	2.6	0	0

15th&16th&17th Floor							
	NUMBER	LENGTH/DIAMETER (m)	WIDTH (m)	AREA (m2)	HEIGHT (m)	VOLUME (m3)	TOTAL(m3)
C1	1	0.9	0.4	0.36	3.75	1.35	1.35
C2	1	0.9	0.4	0.36	3.75	1.35	1.35
C3	1	/	/	0.4457	3.75	1.671375	1.671375
C4	1	0.6	0.6	0.36	3.75	1.35	1.35
C5	1	0.6	0.6	0.36	3.75	1.35	1.35
C6	1	0.6	0.6	0.36	3.75	1.35	1.35
C7	1	0.6	0.6	0.36	3.75	1.35	1.35

Figure 2-7: sample of calculations for columns concrete.

TOTAL COLUMNS CONCRETE (m3) = 859.392

Slabs concrete works:

A **slab** is a structural element, made of concrete, that is used to create flat horizontal surfaces such as floors, roof decks and ceilings. A **slab** is generally several inches thick and supported by beams ,columns , walls, or the ground.

All slabs in our project is solid slabs .

Types of Solid RCC Slab.
Ans.
RCC solid slabs are three types depending on design criteria.
One-way slab….. Two-way slab….. Cantilever slab
One-way slab – When can we called a solid slab one-way slab? If a solid RCC slab meets the following criteria then we can call that one-way slab -
The slab rests on two beams only,
The slab can be rested on four beams but the long-span of slab should be greater than two times of short-span. See the image below “One Way Slab”.
In one way slab, the main reinforcement should be along slab’s short direction.
Two-way slab – When a Solid RCC slab rests on four beams but long-span of slab is less than or equal to two times of short-span then we can call that slab a “two-way slab”. See Image below “Two-Way Slab”. In two-way slab, main reinforcement runs both in short and long direction and stay perpendicularly with one another.

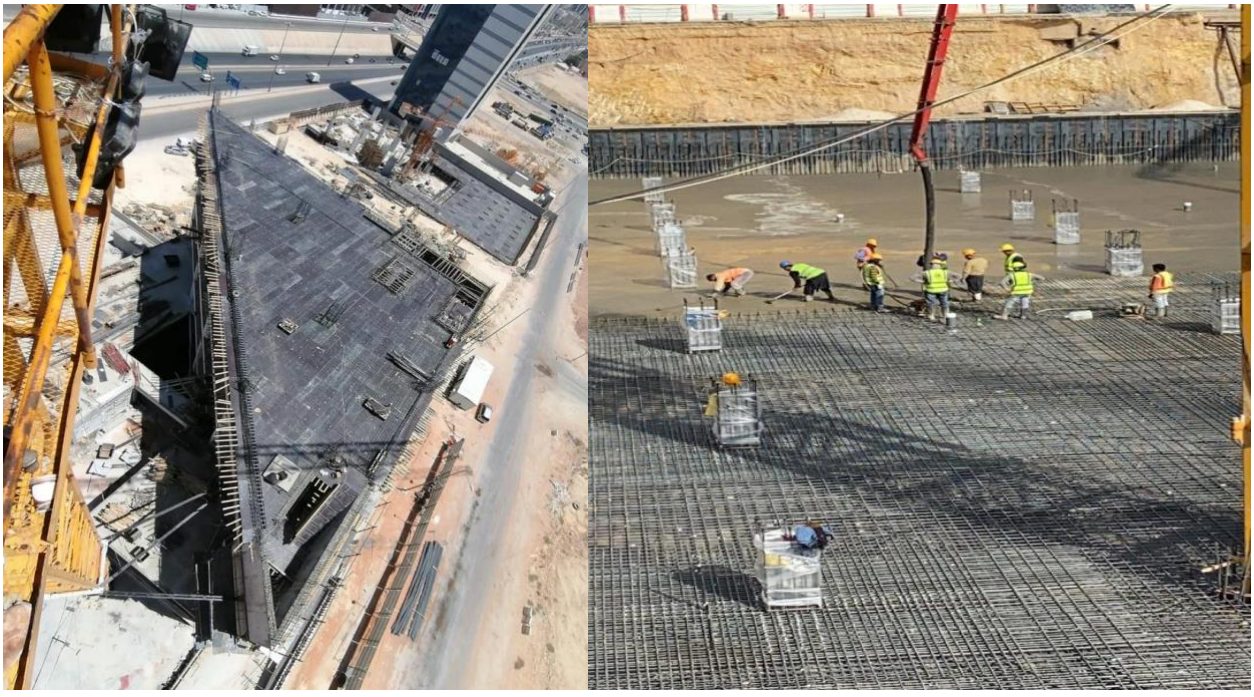


Figure 2-8 : samsco tower slabs .

Slabs concrete calculations:

Concrete of Slabs = volume slab - volume hollow block

SLAB CONCRETE			
	AREA (m2)	THICKNESS (m)	TOTAL VOLUME (m3)
B3	4085.32	0.4	1634.128
B2	4085.32	0.4	1634.128
B1	4085.32	0.4	1634.128
GF	1134.95	0.4	453.98
1	1049.25	0.4	419.7
2	780.5	0.4	312.2
3	702.89	0.4	281.156
4	635.02	0.4	254.008
7	637.24	0.4	254.896
8	637.24	0.4	254.896
9	637.24	0.4	254.896
10	637.24	0.4	254.896
13	639.3	0.4	255.72
14	639.3	0.4	255.72
15	566.7	0.4	226.68
16	566.7	0.4	226.68
17	566.7	0.4	226.68
18	356.9	0.4	142.76
19	172.62	0.4	69.048
			10037.324

TOTAL SLABS CONCRETE (m3) = 10037.324

STEEL:

Steel design, or more specifically, structural steel design, is an area of structural engineering used to design steel structures.

The design and use of steel frames are commonly employed in the design of steel structures. More advanced structures include steel plates and shells.

In structural engineering, a structure is a body or combination of pieces of rigid bodies in space that form a fitness system for supporting loads and resisting moments. The effects of loads and moments on structures are determined through structural analysis. A steel structure is composed of structural members that are made of steel, usually with standard cross-sectional profiles and standards of chemical composition and mechanical properties. The depth of steel beams used in the construction of bridges is usually governed by the maximum moment, and the cross section is then verified for shear strength near supports and lateral torsion buckling (by determining the distance between transverse members connecting adjacent beams). Steel column members must be verified as adequate to prevent buckling after axial and moment requirements are met.

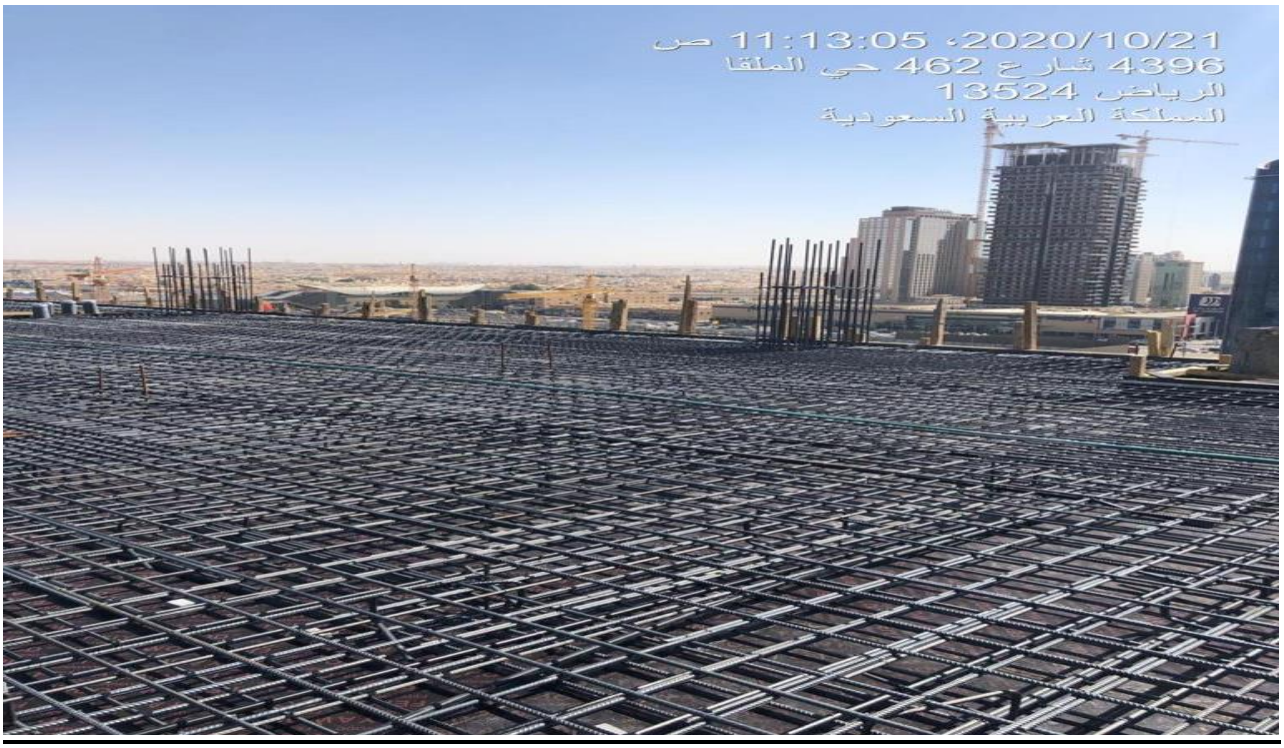


*Photo from the site taken on 2020/10/21

Steel Foundations calculations:

Single foundation steel(kg/m3) = length of bar * no. Bars * weight of linear meter

Percent of existence = single foundation steel(kg/m3) / volume of single foundation(m3)

Total single foundation steel(tonne)= Avg percent of existence * single foundation concrete

Sample of calculations:

single foundation steel						
Foundation 1-A						
Steel	Ø	length	spacing	bars no.	W/M	Kg/m3
X direction	25	4	0.15	20	3.85	308
y direction	25	4	0.15	20	3.85	308
dowels	32	2.425	/	32	6.318	490.2768
Sum						1106.277
the percent of existence in the cubic meter for F1 -A						
136.577						
Foundation 1-B						
Steel	Ø	length	spacing	bars no.	W/M	KG
X direction	20	4	0.15	20	2.46	196.8
y direction	20	4	0.15	20	2.46	196.8
dowels	25	2.425	/	38	3.85	354.7775
Sum						748.3775
the percent of existence in the cubic meter for F1 -B						
92.392						
Avg percent of existence in one cubic meter for single foundation						
99.443						
Total steel in single foundation						
60.6129945 tonne						

Raft foundation steel = no. bars * Area * linear meter

Raft foundation								
	Ø	AREA	BAR / METER SQUAR			SPACING	W/M	KG
RF1	20	2533	28			0.15	2.46	174473.04
RF2-T	25	655.75	14			0.15	3.85	35344.925
RF2-B	32	655.75	14			0.15	6.318	58002.399
SUM								267820.364
BAR NO / METER SQUARE=1000/150=14 AT BOTH DIRECTION								
Total raft steel								
267.8204 tonne								

Wall foundation = no. bars * Area * linear meter

Wall foundation								
W1	Ø	AREA	SPACING	BAR NO/METER SQUARE			W/M	KG
H BARS	14	2507	0.15	14			1.21	42468.58
V1 BARS	25	80.87	0.15	7			3.85	2179.4465
V2 BARS	16	80.87	0.15	7			1.59	900.0831
SUM								45548.1096

W2	Ø	AREA	SPACING	BAR NO/METER SQUARE			W/M	KG
H BARS	14	619.245	0.15	14			1.21	10490.0103
V1 BARS	20	17.82	0.15	7			2.46	306.8604
V2 BARS	16	17.82	0.15	7			1.59	198.3366
SUM								10995.2073

TOTAL WALLS STEEL = 90.90949 tonne

Shear Walls = no. bars * Area * linear meter

SW1	Ø	AREA	SPACING	BAR NO/METER SQUARE	W/M	KG
H BARS	12	3486.12	0.15	14	0.888	43339.44
V1 BARS	12	18.81	0.15	7	0.888	116.923
V2 BARS	12	18.81	0.15	7	0.888	116.923
SUM						43573.29
SW2	Ø	AREA	SPACING	BAR NO/METER SQUARE	W/M	KG
H BARS	12	1201.516	0.15	14	0.888	14937.25
V1 BARS	12	8.644	0.15	7	0.888	53.7311
V2 BARS	12	8.644	0.15	7	0.888	53.7311
SUM						15044.71
TOTAL SHEAR WALLS STEEL = 64.22204 tonne						

Ramp Steel = no. bars * Area * linear meter

Ramp	Ø	AREA	SPACING	BAR NO/METER SQUARE	W/M	KG
H BARS	12	185.7	0.2	14	0.888	2308.6224
V1 BARS	12	7.428	0.15	7	0.888	46.172448
V2 BARS	12	7.428	0.15	7	0.888	46.172448
SUM						2400.967296
RAMP STEEL = 2400.97 Kg						
TOTAL FOUNDATION STEEL = 485.967874 tonne						

Steel Columns calculations:

Columns Steel(kg/m3) = bar length * no. bars * linear meter

Percent of existence = column steel(kg/m3) / volume of column(m3)

Total steel columns = Avg percent of existence * total columns concrete

Sample of calculations:

Floor 2								
C1	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.99	1.01	30	3.85	/	116.66
	ties	12	0.99	9.9	5	0.888	0.2	43.956
C2	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.99	1.01	30	3.85	/	116.66
	ties	12	0.99	9.9	5	0.888	0.2	43.956
C3	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.6932	1.442	23	3.85	/	127.69
	ties	12	0.6932	4.63	8	0.888	0.2	32.892
C4	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	1.3	0.769	32	3.85	/	94.741
	ties	12	1.3	10.9	4	0.888	0.2	38.717
C5	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	1.173	0.852	30	3.85	/	98.406
	ties	12	1.173	10.1	5	0.888	0.2	44.844
C6	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.81	1.234	24	3.85	/	114.02
	ties	12	0.81	5.04	7	0.888	0.2	31.329
C7	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	1.3	0.769	32	3.85	/	94.741
	ties	12	1.3	10.9	4	0.888	0.2	38.717
C8	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.8725	1.146	30	3.85	/	132.36
	ties	12	0.8725	6.92	6	0.888	0.2	36.87
C9	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.6	1.667	30	3.85	/	192.54
	ties	12	0.6	5.92	9	0.888	0.2	47.313
C10	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.384	2.604	16	3.85	/	160.41
	ties	10	0.384	4.02	18	0.617	0.15	44.646
C11	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.384	2.604	16	3.85	/	160.41
	ties	10	0.384	4.02	18	0.617	0.15	44.646

Floor 7-10								
C1	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.77	1.298	30	2.46	/	95.7924
	ties	12	0.77	6.72	9	0.888	0.15	53.70624
C2	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.77	1.298	30	2.46	/	95.7924
	ties	12	0.77	6.72	9	0.888	0.15	53.70624
C3	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.5745	1.74	21	3.85	/	140.679
	ties	12	0.5745	4.48	12	0.888	0.15	47.73888
C4	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	1	1	28	3.85	/	107.8
	ties	12	1	9.4	7	0.888	0.15	58.4304
C5	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.8342	1.198	30	3.85	/	138.369
	ties	12	0.8342	7.24	8	0.888	0.15	51.43296
C6	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.64	1.562	24	3.85	/	144.3288
	ties	12	0.64	4.44	11	0.888	0.15	43.36992
C7	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	1	1	28	3.85	/	107.8
	ties	12	1	9.4	7	0.888	0.15	58.4304
C8	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.7183	1.392	22	3.85	/	117.9024
	ties	12	0.7183	6.69	10	0.888	0.15	59.4072
C9	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.4575	2.185	19	2.46	/	102.1269
	ties	12	0.4575	4.01	15	0.888	0.15	53.4132

Floor 19								
C1	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.36	2.778	22	2.46	/	150.35
	ties	12	0.36	4.72	19	0.888	0.15	79.636
C2	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.36	2.778	22	2.46	/	150.35
	ties	12	0.36	4.72	19	0.888	0.15	79.636
C3	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	25	0.4457	2.243	17	3.85	/	146.8
	ties	12	0.4457	3.96	15	0.888	0.15	52.747
C4	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.36	2.778	16	2.46	/	109.34
	ties	12	0.36	3.24	19	0.888	0.15	54.665
C5	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	20	0.36	2.778	16	2.46	/	109.34
	ties	12	0.36	3.24	19	0.888	0.15	54.665
PLC5	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	16	0.15	6.667	12	1.59	/	127.21
	ties	10	0.15	2.04	45	0.617	0.15	56.641
Roof								
PLC6	steel	Ø	Area	length	NO.	W/M	spacing	Kg
	main	16	0.09	11.11	8	1.59	/	141.32
	ties	10	0.09	1.2	74	0.617	0.15	54.79
							Total	20623.65kg

NUMBER OF SAMPELS =74

Avg percent of existance in one cubic meter (P) = 20623.65/74= 278.697 kg

TOTAL COLUMNS CONCRETE (CC) = 859.392 m3

TOTAL COLUMNS STEEL = P*CC = 239.5108 tonne

SLABS STEEL CALCULATIONS:

Steel Slabs (KG)= NO. in X&Y * W/M * Slab Area

Calculations Sheet:

SLAB REINFORCEMENT					
BASEMENT 3 (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	4085.32	158183.5904
BASEMENT 2 (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	4085.32	158183.5904
BASEMENT 1 (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	4085.32	158183.5904
GR FLOOR (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	16	1.59	1	1134.95	57746.256
1ST FLOOR (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	16	1.59	1	1049.25	53385.84
2ND FLOOR (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	780.5	30220.96
3RD (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	702.89	27215.9008
4TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	635.02	24587.9744
5TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	636.48	24644.5056
6TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	636.48	24644.5056
7TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	637.24	24673.9328

8TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	637.24	24673.9328
9TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	637.24	24673.9328
10TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	637.24	24673.9328
11TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	565.3	21888.416
12TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	639.3	24753.696
13TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	639.3	24753.696
14TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	14	1.21	1	639.3	24753.696
15TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	12	0.888	1	566.7	16103.3472
16TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	12	0.888	1	566.7	16103.3472
17TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	12	0.888	1	566.7	16103.3472
18TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	12	0.888	1	356.9	10141.6704
19TH (TOP&BOT)					
NO. in X&Y	ø	W/M	BAR LENGTH	SLAB AREA	KG
32	12	0.888	1	172.67	4906.59072

TOTAL SLABS REINFORCEMENT
975.2 TONNE

FINISHING DIVISION

Plastering

Clay plaster is a mixture of clay, sand, and water with the addition of plant fibers for tensile strength over wood lath. Clay plaster has been used since antiquity.

And the plasterwork is construction or ornamentation done with plaster, such as a layer of plaster on an interior or exterior wall structure or plaster decorative modeling on ceilings or walls. This is also sometimes called pargeting. The process of creating plasterwork, called plastering, or rendering, has been used in building construction for centuries. For the art history of three-dimensional plaster

Plastering calculations:

Sample of calculations:

Painting length, width = (length, width) – 10 cm

Plastering (m^2) = (Circumference * height) + Area

= (17.5 * 4.65) + (6.25 * 2.5) = 97 m^2

sample of calculations:

Ground and 1st Floor						
LENGTH	WIDTH	Height	AREA	Circumference	Partition Area	Total Painting
6.25	2.5	4.65	15.625	17.5	81.375	97
7.6	4.3	4.65	32.68	23.8	110.67	143.35
2.8	2.7	4.65	7.56	11	51.15	58.71
4.9	3.7	4.65	18.13	17.2	79.98	98.11
2.7	1.7	4.65	4.59	8.8	40.92	45.51
4.9	2.4	4.65	11.76	14.6	67.89	79.65
5.9	4.9	4.65	28.91	21.6	100.44	129.35
7.8	2.7	4.65	21.06	21	97.65	118.71
7.8	1.7	4.65	13.26	19	88.35	101.61
14.15	8.52	4.65	120.558	45.34	210.831	331.389
7.05	5.65	4.65	39.8325	25.4	118.11	157.9425
14.15	20.85	4.65	295.0275	70	325.5	620.5275
3.85	1.8	4.65	6.93	11.3	52.545	59.475
2.2	1.8	4.65	3.96	8	37.2	41.16
2.75	1.5	4.65	4.125	8.5	39.525	43.65
2.75	2	4.65	5.5	9.5	44.175	49.675
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
14.75	8.35	4.65	123.1625	46.2	214.83	337.9925
0	0	4.65	1.015	0	0	0
0	0	4.65	18.838	0	0	0
6.25	2.5	4.65	15.625	17.5	81.375	97
9.3	8.45	4.65	78.585	35.5	165.075	243.66
						3083.2715
					GF&1st	6166.543

2nd to 7th Floor						
LENGTH	WIDTH	Height	AREA	Circumference	Partition Area	Total Painting
7.175	3.8	3.8	27.265	21.95	83.41	110.675
7.175	4.45	3.8	31.92875	23.25	88.35	120.27875
0	0	3.8	0	0	0	0
6	2.5	3.8	15	17	64.6	79.6
0	0	3.8	0	0	0	0
8.2	3.875	3.8	31.775	24.15	91.77	123.545
2.25	2	3.8	4.5	8.5	32.3	36.8
2.75	1	3.8	2.75	7.5	28.5	31.25
1.6	0.85	3.8	1.36	4.9	18.62	19.98
1.55	1	3.8	1.55	5.1	19.38	20.93
1.5	1	3.8	1.5	5	19	20.5
1.6	1.4	3.8	2.24	6	22.8	25.04
2.75	0.9	3.8	2.475	7.3	27.74	30.215
1.6	1.25	3.8	2	5.7	21.66	23.66
0.75	0.4	3.8	0.3	2.3	8.74	9.04
1.6	1.3	3.8	2.08	5.8	22.04	24.12
1.45	1	3.8	1.45	4.9	18.62	20.07
2.75	0.9	3.8	2.475	7.3	27.74	30.215
2.4	1.6	3.8	3.84	8	30.4	34.24
1.5	1	3.8	1.5	5	19	20.5
2.75	2	3.8	5.5	9.5	36.1	41.6
2.2	2.2	3.8	4.84	8.8	33.44	38.28
2.2	2.2	3.8	4.84	8.8	33.44	38.28
2.2	2.2	3.8	4.84	8.8	33.44	38.28
6.9	3.5	3.8	24.15	20.8	79.04	103.19
2.5	2.4	3.8	6	9.8	37.24	43.24
6.25	2.5	3.8	15.625	17.5	66.5	82.125
3.65	15.5	3.8	56.575	38.3	145.54	202.115
3	3.85	3.8	11.55	13.7	52.06	63.61
4.8	3.15	3.8	15.12	15.9	60.42	75.54
3.9	3.15	3.8	12.285	14.1	53.58	65.865
3.15	3.1	3.8	9.765	12.5	47.5	57.265
3.6	2.5	3.8	9	12.2	46.36	55.36
0	0	3.8	0	0	0	0
0	0	3.8	0	0	0	0
13	6	3.8	78	38	144.4	222.4
8.2	3.9	3.8	31.98	24.2	91.96	123.94
13	2.2	3.8	28.6	30.4	115.52	144.12
6.9	3.4	3.8	23.46	20.6	78.28	101.74
6	1.5	3.8	9	15	57	66
						2343.60875
					2nd to 7th	14061.6525

TOTAL Plastering (m2) = 79730.55

Painting:

surface (called the "matrix" or "support").

In art, the term **painting** describes both the act and the result of the action (the final work is called "a **painting**").

painting, the expression of ideas and emotions, with the creation of certain aesthetic qualities, in a two-dimensional visual language. The elements of this language—its shapes, lines, colors, tones, and textures—are **used in** various ways to produce sensations of volume, space, movement, and light on a flat surface.

Types of Painting Techniques:

- **Oil** painting.
- **Watercolor** painting.
- **Pastel** painting.
- **Acrylic** painting.
- Digital painting.

Painting calculations:

Sample of calculations:

Painting length , width = (length , width) – 10 cm

Painting (m^2) = (Circumference * Height) + (Area)

= (23.8 * 4.65) + (32.68) = 143.35 m^2

Ground and 1st Floor						
LENGTH	WIDTH	Height	AREA	Circumference	Partition Area	Total Painting
6.25	2.5	4.65	15.625	17.5	81.375	97
7.6	4.3	4.65	32.68	23.8	110.67	143.35
2.8	2.7	4.65	7.56	11	51.15	58.71
4.9	3.7	4.65	18.13	17.2	79.98	98.11
2.7	1.7	4.65	4.59	8.8	40.92	45.51
4.9	2.4	4.65	11.76	14.6	67.89	79.65
5.9	4.9	4.65	28.91	21.6	100.44	129.35
7.8	2.7	4.65	21.06	21	97.65	118.71
7.8	1.7	4.65	13.26	19	88.35	101.61
14.15	8.52	4.65	120.558	45.34	210.831	331.389
7.05	5.65	4.65	39.8325	25.4	118.11	157.9425
14.15	20.85	4.65	295.0275	70	325.5	620.5275
3.85	1.8	4.65	6.93	11.3	52.545	59.475
2.2	1.8	4.65	3.96	8	37.2	41.16
2.75	1.5	4.65	4.125	8.5	39.525	43.65
2.75	2	4.65	5.5	9.5	44.175	49.675
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
2.2	2.2	4.65	4.84	8.8	40.92	45.76
14.75	8.35	4.65	123.1625	46.2	214.83	337.9925
0	0	4.65	1.015	0	0	0
0	0	4.65	18.838	0	0	0
6.25	2.5	4.65	15.625	17.5	81.375	97
9.3	8.45	4.65	78.585	35.5	165.075	243.66
						3083.2715
					GF&1st	6166.543

2nd to 7th Floor

LENGTH	WIDTH	Height	AREA	Circumference	Partition Area	Total Painting
7.175	3.8	3.8	27.265	21.95	83.41	110.675
7.175	4.45	3.8	31.92875	23.25	88.35	120.27875
0	0	3.8	0	0	0	0
6	2.5	3.8	15	17	64.6	79.6
0	0	3.8	0	0	0	0
8.2	3.875	3.8	31.775	24.15	91.77	123.545
2.25	2	3.8	4.5	8.5	32.3	36.8
2.75	1	3.8	2.75	7.5	28.5	31.25
1.6	0.85	3.8	1.36	4.9	18.62	19.98
1.55	1	3.8	1.55	5.1	19.38	20.93
1.5	1	3.8	1.5	5	19	20.5
1.6	1.4	3.8	2.24	6	22.8	25.04
2.75	0.9	3.8	2.475	7.3	27.74	30.215
1.6	1.25	3.8	2	5.7	21.66	23.66
0.75	0.4	3.8	0.3	2.3	8.74	9.04
1.6	1.3	3.8	2.08	5.8	22.04	24.12
1.45	1	3.8	1.45	4.9	18.62	20.07
2.75	0.9	3.8	2.475	7.3	27.74	30.215
2.4	1.6	3.8	3.84	8	30.4	34.24
1.5	1	3.8	1.5	5	19	20.5
2.75	2	3.8	5.5	9.5	36.1	41.6
2.2	2.2	3.8	4.84	8.8	33.44	38.28
2.2	2.2	3.8	4.84	8.8	33.44	38.28
2.2	2.2	3.8	4.84	8.8	33.44	38.28
6.9	3.5	3.8	24.15	20.8	79.04	103.19
2.5	2.4	3.8	6	9.8	37.24	43.24
6.25	2.5	3.8	15.625	17.5	66.5	82.125
3.65	15.5	3.8	56.575	38.3	145.54	202.115
3	3.85	3.8	11.55	13.7	52.06	63.61
4.8	3.15	3.8	15.12	15.9	60.42	75.54
3.9	3.15	3.8	12.285	14.1	53.58	65.865
3.15	3.1	3.8	9.765	12.5	47.5	57.265
3.6	2.5	3.8	9	12.2	46.36	55.36
0	0	3.8	0	0	0	0
0	0	3.8	0	0	0	0
13	6	3.8	78	38	144.4	222.4
8.2	3.9	3.8	31.98	24.2	91.96	123.94
13	2.2	3.8	28.6	30.4	115.52	144.12
6.9	3.4	3.8	23.46	20.6	78.28	101.74
6	1.5	3.8	9	15	57	66
						2343.60875
					2nd to 7th	14061.6525

TOTAL Painting (m2) =79730.52

Tiles and skirts:

tile is a thin object usually square or rectangular in shape. A tile is a manufactured piece of hard-wearing material such as ceramic, stone, metal, baked clay, or even glass, generally used for covering roofs, floors, walls, or other objects such as tabletops. Alternatively, tile can sometimes refer to similar units made from lightweight materials such as perlite, wood, and mineral wool, typically used for wall and ceiling applications. In another sense, a tile is a construction tile or similar object, such as rectangular counters used in playing games.

The word is derived from the French word **tuile**, which is, in turn, from the Latin word **tegul*a***, meaning a roof tile composed of fired clay.

Tiles are often used to form wall and floor coverings and can range from simple square tiles to complex or mosaics. Tiles are most often made of ceramic, typically glazed for internal uses and unglazed for roofing, but other materials are also commonly used, such as glass, cork, concrete and other composite materials, and stone. Tiling stone is typically marble, onyx, granite or slate. Thinner tiles can be used on walls than on floors, which require more durable surfaces that will resist impacts.

Tiles and skirts calculations

Sample of calculations:

Tile size = 0.5 * 0.5 m …….. So, the coefficient that we use:

Number of tiles in 1 m^2 = $\frac{100*100}{50*50}$ = 4 tiles

Number of tiles = (Area * coefficient)

Skirts = circumference in m.

Ground and 1st Floor					
LENGTH	WIDTH	AREA	coff..	no.tiles	Circumference
6.25	2.5	15.625	4	62.5	36.25
7.6	4.3	32.68	4	130.72	73.96
2.8	2.7	7.56	4	30.24	20.52
4.9	3.7	18.13	4	72.52	43.66
2.7	1.7	4.59	4	18.36	12.58
4.9	2.4	11.76	4	47.04	28.32
5.9	4.9	28.91	4	115.64	67.62
7.8	2.7	21.06	4	84.24	47.52
7.8	1.7	13.26	4	53.04	29.92
14.15	8.52	120.558	4	482.232	258.156
7.05	5.65	39.8325	4	159.33	90.965
14.15	20.85	295.0275	4	1180.11	631.755
3.85	1.8	6.93	4	27.72	17.46
2.2	1.8	3.96	4	15.84	11.52
2.75	1.5	4.125	4	16.5	11.25
2.75	2	5.5	4	22	15
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
14.75	8.35	123.1625	4	492.65	263.025
0	0	1.015	4	4.06	2.03
0	0	18.838	4	75.352	37.676
6.25	2.5	15.625	4	62.5	36.25
9.3	8.45	78.585	4	314.34	174.07
				3563.734	1979.907
			GF&1st	7127.468	3959.814

2nd to 7th Floor					
LENGTH	WIDTH	AREA	coff..	no.tiles	Circumference
7.175	3.8	27.265	4	109.06	62.13
7.175	4.45	31.92875	4	127.715	72.7575
0	0	4.95	4	19.8	9.9
6	2.5	15	4	60	35
0	0	4	4	16	8
8.2	3.875	31.775	4	127.1	71.3
2.25	2	4.5	4	18	13
2.75	1	2.75	4	11	7.5
1.6	0.85	1.36	4	5.44	4.42
1.55	1	1.55	4	6.2	5.1
1.5	1	1.5	4	6	5
1.6	1.4	2.24	4	8.96	7.28
2.75	0.9	2.475	4	9.9	6.75
1.6	1.25	2	4	8	6.5
0.75	0.4	0.3	4	1.2	1.4
1.6	1.3	2.08	4	8.32	6.76
1.45	1	1.45	4	5.8	4.9
2.75	0.9	2.475	4	9.9	6.75
2.4	1.6	3.84	4	15.36	10.88
1.5	1	1.5	4	6	5
2.75	2	5.5	4	22	15
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
6.9	3.5	24.15	4	96.6	55.3
2.5	2.4	6	4	24	16.8
6.25	2.5	15.625	4	62.5	36.25
3.65	15.5	56.575	4	226.3	144.15
3	3.85	11.55	4	46.2	30.8
4.8	3.15	15.12	4	60.48	36.54
3.9	3.15	12.285	4	49.14	30.87
3.15	3.1	9.765	4	39.06	25.73
3.6	2.5	9	4	36	23
0	0	6.3	4	25.2	12.6
0	0	235	4	940	470
13	6	78	4	312	168
8.2	3.9	31.98	4	127.92	71.76
13	2.2	28.6	4	114.4	61.6
6.9	3.4	23.46	4	93.84	53.72
6	1.5	9	4	36	21
				2949.475	1665.6875
			2nd to 7th	17696.85	9994.125

8th to 13th Floor					
LENGTH	WIDTH	AREA	coff..	no.tiles	Circumference
2.5	2.35	5.875	4	23.5	16.45
0	0	2.685	4	10.74	5.37
0	0	3.838	4	15.352	7.676
5.2	2.4	12.48	4	49.92	29.76
0	0	5.125	4	20.5	10.25
5.85	1.1	6.435	4	25.74	15.07
5.9	3.5	20.65	4	82.6	48.3
7.2	6	43.2	4	172.8	98.4
0	0	171	4	684	342
18.1	11	199.1	4	796.4	420.2
19	3.4	64.6	4	258.4	136
3.7	3.25	12.025	4	48.1	30.55
3.6	1.55	5.58	4	22.32	14.26
3.2	2.7	8.64	4	34.56	22.68
3.3	4.5	14.85	4	59.4	38.7
3.15	3.3	10.395	4	41.58	27.39
3.15	3.3	10.395	4	41.58	27.39
3.15	2.3	7.245	4	28.98	19.09
0	0	5.998	4	23.992	11.996
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
2.7	1.55	4.185	4	16.74	11.47
4	1.8	7.2	4	28.8	18
2.5	2.4	6	4	24	16.8
3.25	2.5	8.125	4	32.5	21.25
3.99	3.5	13.965	4	55.86	34.93
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
2.2	2.2	4.84	4	19.36	14.08
17.5	3.05	53.375	4	213.5	112.85
2.75	2	5.5	4	22	15
1.5	1	1.5	4	6	5
2	1.6	3.2	4	12.8	9.6
2.75	0.9	2.475	4	9.9	6.75
1.6	1.3	2.08	4	8.32	6.76
1.45	1	1.45	4	5.8	4.9
2.75	1	2.75	4	11	7.5
1.5	1	1.5	4	6	5
2	1.6	3.2	4	12.8	9.6
2.75	0.9	2.475	4	9.9	6.75
1.5	1	1.5	4	6	5
1.6	0.85	1.36	4	5.44	4.42
2.75	2	5.5	4	22	15
2.25	2	4.5	4	18	13
6	2.5	15	4	60	35
				3124.624	1756.512
			8th to 13th	18747.744	10539.072

TOTAL Number of Tiles = 98270

TOTAL Skirts Length = 54645.475

Glass

Glass is a non-crystalline, often transparent amorphous solid, that has widespread practical, technological, and decorative use in, for example, windowpanes, tableware, and optics. Glass is most often formed by rapid cooling (quenching) of the molten form; some glasses such as volcanic glass are naturally occurring.

The most familiar, and historically the oldest, types of manufactured glass are "silicate glasses" based on the chemical compound silica (silicon dioxide, or quartz), the primary constituent of sand. Soda-lime glass, containing around 70% silica, accounts for around 90% of manufactured glass. The term *glass*, in popular usage, is often used to refer only to this type of material, although silica-free glasses often have desirable properties for applications in modern communications technology. Some objects, such as drinking glasses and eyeglasses, are so commonly made of silicate-based glass that they are simply called by the name of the material.

Glass panes calculations:

Glass proprieties:

- Double faces glass.
- Ground floor and 1st size = 2 m * 1.5m.
- 2nd to 19th floor size = 1.75 * 1.5 m.

Sample of calculations:

Number of glass panes = (length * height) * (coff)

Number of panes in 1 m^2 = $\frac{100*100}{200*1.5}$ = 0.333 tiles .

Number of panes in 1 m^2 = $\frac{100*100}{175*1.5}$ = 0.38 tiles .

Calculation sheet:

Ground Floor				
LENGTH	Height	AREA	coff..	no. Pane
62.372	5.5	343.046	0.3333	114.3372318
1st Floor				
LENGTH	Height	AREA	coff..	no. Pane
52.77	4	211.08	0.3333	70.352964
2nd Floor				
LENGTH	Height	AREA	coff..	no. Pane
79.81	4	319.24	0.38	121.3112
3rd Floor				
LENGTH	Height	AREA	coff..	no. Pane
76.96	4	307.84	0.38	116.9792
4th Floor				
LENGTH	Height	AREA	coff..	no. Pane
76.96	4	307.84	0.38	116.9792
5th Floor				
LENGTH	Height	AREA	coff..	no. Pane
76.96	3.75	288.6	0.38	109.668
6th Floor				
LENGTH	Height	AREA	coff..	no.Pane
76.96	3.75	288.6	0.38	109.668
7th Floor				
LENGTH	Height	AREA	coff..	no.Pane
76.96	3.75	288.6	0.38	109.668
8th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
9th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
10th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
11th Floor				

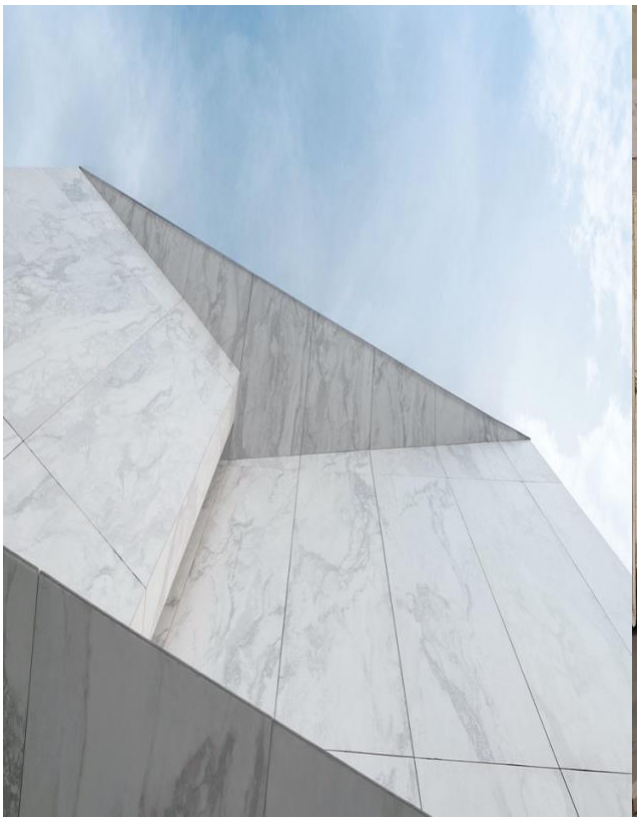
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
12th Floor				
LENGTH	Height	AREA	coff..	no.Pane
79.38	3.75	297.675	0.38	113.1165
13th Floor				
LENGTH	Height	AREA	coff..	no.Pane
79.38	3.75	297.675	0.38	113.1165
14th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
15th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
16th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
17th Floor				
LENGTH	Height	AREA	coff..	no.Pane
74.21	3.75	278.2875	0.38	105.74925
18th Floor				
LENGTH	Height	AREA	coff..	no.Pane
79.59	4.5	358.155	0.38	136.0989
19th Floor				
LENGTH	Height	AREA	coff..	no.Pane
56.18	4.5	252.81	0.38	96.0678

TOTAL Number of Glass Panes = 2174

Marble:

Marble is a metamorphic rock composed of recrystallized carbonate minerals, most commonly calcite or dolomite. Marble is typically not foliated, although there are exceptions. In geology, the term *marble* refers to metamorphosed limestone, but its use in stonemasonry more broadly encompasses unmetamorphosed limestone. Marble is commonly used for sculpture and as a building material.

Construction marble is a stone which is composed of calcite, dolomite or serpentine that is capable of taking a polish. More generally in construction, specifically the dimension stone trade, the term *marble* is used for any crystalline calcitic rock (and some non-calcitic rocks) useful as building stone.



Marble Calculations:

No. of Marbles = length * height * coefficient

Sample of calculations:

81.06m * 5.5m * 0.3333 = 148.59

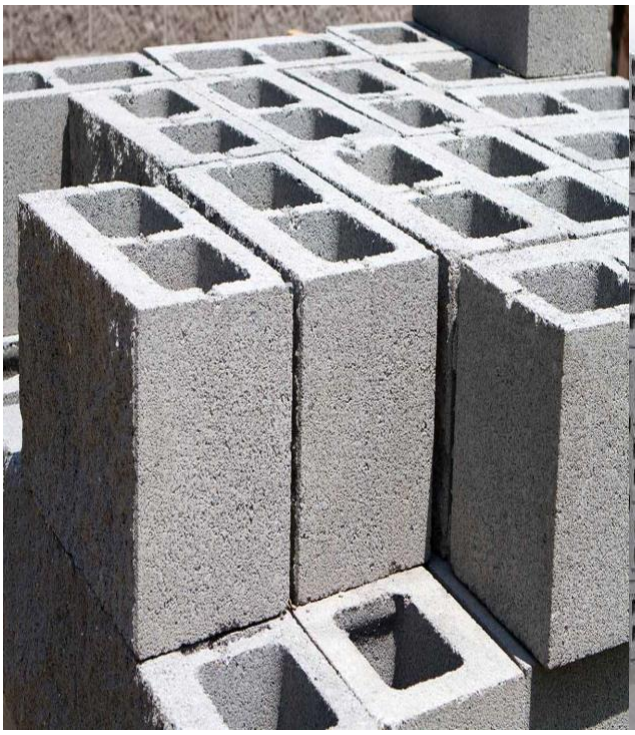
Ground Floor				
LENGTH	Height	AREA	coff..	no.Stone
81.06	5.5	445.83	0.3333	148.595139
1st Floor				
LENGTH	Height	AREA	coff..	no.Stone
85.11	4	340.44	0.3333	113.468652
2nd Floor				
LENGTH	Height	AREA	coff..	no.Stone
68.28	4	273.12	0.38	103.7856
3rd Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	4	184.92	0.38	70.2696
4th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	4	184.92	0.38	70.2696
5th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
6th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
7th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
8th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775

9th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
10th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
11th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
12th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
13th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
14th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
15th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
16th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
17th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	3.75	173.3625	0.38	65.87775
18th Floor				
LENGTH	Height	AREA	coff..	no.Stone
46.23	4.5	208.035	0.38	79.0533
19th Floor				
LENGTH	Height	AREA	coff..	no.Stone
30.94	4.5	139.23	0.38	52.9074
TOTAL Number of Marble = 1495				

Concrete Blocks:

A **concrete masonry unit** is a standard size rectangular block used in building construction. concrete masonry units are some of the most versatile building products available because of the wide variety of appearances that can be achieved using them.

Concrete blocks are made from cast concrete (e.g., Portland cement and aggregate, usually sand and fine gravel, for high-density blocks). Lower density blocks may use industrial wastes, such as fly ash or bottom ash, as an aggregate. Recycled materials, such as post-consumer glass, slag cement, or recycled aggregate, are often used in the composition of the blocks. Use of recycled materials within blocks can create different appearances in the block, such as a terrazzo finish, and may help the finished structure earn LEED certification. Lightweight blocks can also be produced using autoclaved aerated concrete.



Concrete Blocks Calculation:

No. of blocks= length*height*coefficient

Sample of calculation:

length*height*coefficient =

6m*4m*12.5= 300 Block

Calculation sheets:

number of blocks basement 1.2.3				
length	hieght	area	coff..	no.blocks
6	4	24	12.5	300
6	4	24	12.5	300
6	4	24	12.5	300
6	4	24	12.5	300
12.7	4	50.8	12.5	635
12.7	4	50.8	12.5	635
12.7	4	50.8	12.5	635
12.7	4	50.8	12.5	635
6	4	24	12.5	300
6	4	24	12.5	300
6	4	24	12.5	300
6	4	24	12.5	300
12.7	4	50.8	12.5	635
12.7	4	50.8	12.5	635
12.7	4	50.8	12.5	635
12.7	4	50.8	12.5	635
2.8	4	11.2	12.5	140
3.85	4	15.4	12.5	192.5
2.5	4	10	12.5	125
2.8	4	11.2	12.5	140
5.5	4	22	12.5	275
4.8	4	19.2	12.5	240
0.5	4	2	12.5	25
2.3	4	9.2	12.5	115
3.5	4	14	12.5	175
0.5	4	2	12.5	25
0.65	4	2.6	12.5	32.5
0.65	4	2.6	12.5	32.5
1.75	4	7	12.5	87.5
2.6	4	10.4	12.5	130
3	4	12	12.5	150
2.5	4	10	12.5	125
2.6	4	10.4	12.5	130
1	4	4	12.5	50
0.6	4	2.4	12.5	30
7.6	4	30.4	12.5	380
7.6	4	30.4	12.5	380
1	4	4	12.5	50
0.9	4	3.6	12.5	45
1.9	4	7.6	12.5	95
22.35	4	89.4	12.5	1117.5
number of blocks of one basement				11767.5

number of blocks (5-10)				
length	hieght	area	coff..	no.blocks
6	3.75	22.5	12.5	281.25
6	3.75	22.5	12.5	281.25
3.6	3.75	13.5	12.5	168.75
17.5	3.75	65.625	12.5	820.3125
4.65	3.75	17.4375	12.5	217.9688
0.2	3.75	0.75	12.5	9.375
0.55	3.75	2.0625	12.5	25.78125
0.55	3.75	2.0625	12.5	25.78125
2.2	3.75	8.25	12.5	103.125
2.2	3.75	8.25	12.5	103.125
2.2	3.75	8.25	12.5	103.125
2.2	3.75	8.25	12.5	103.125
2.2	3.75	8.25	12.5	103.125
2.2	3.75	8.25	12.5	103.125
2	3.75	7.5	12.5	93.75
1	3.75	3.75	12.5	46.875
2.75	3.75	10.3125	12.5	128.9063
1.55	3.75	5.8125	12.5	72.65625
1.6	3.75	6	12.5	75
1.5	3.75	5.625	12.5	70.3125
1	3.75	3.75	12.5	46.875
1.5	3.75	5.625	12.5	70.3125
1.6	3.75	6	12.5	75
0.5	3.75	1.875	12.5	23.4375
2.75	3.75	10.3125	12.5	128.9063
0.9	3.75	3.375	12.5	42.1875
1	3.75	3.75	12.5	46.875
1	3.75	3.75	12.5	46.875
1.45	3.75	5.4375	12.5	67.96875
1.6	3.75	6	12.5	75
2	3.75	7.5	12.5	93.75
1.5	3.75	5.625	12.5	70.3125
1.6	3.75	6	12.5	75
1.5	3.75	5.625	12.5	70.3125
2	3.75	7.5	12.5	93.75
18.1	3.75	67.875	12.5	848.4375
2	3.75	7.5	12.5	93.75
1.342	3.75	5.0325	12.5	62.90625
3.323	3.75	12.46125	12.5	155.7656
3.188	3.75	11.955	12.5	149.4375
1.561	3.75	5.85375	12.5	73.17188
3.6	3.75	13.5	12.5	168.75
2.606	3.75	9.7725	12.5	122.1563
1.811	3.75	6.79125	12.5	84.89063
3.1	3.75	11.625	12.5	145.3125
number of blocks of one floor				5867.859
number of blocks all floor				29339.3

Total Number of Blocks= 161282

Windows and Doors:

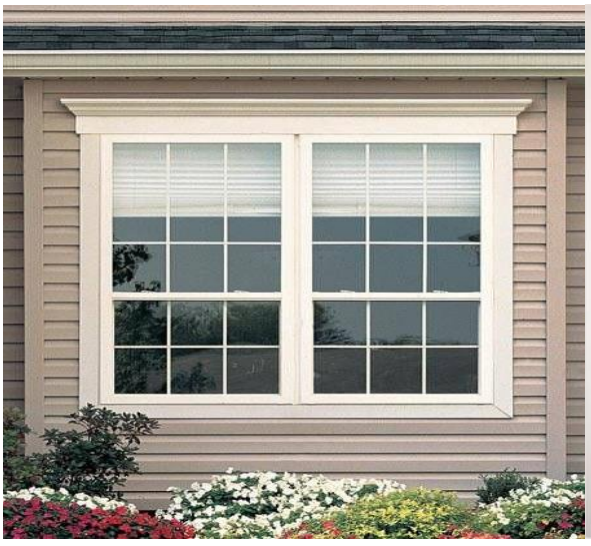
Windows:

A **window** is an opening in a wall, door, roof or vehicle that allows the passage of light and may also allow the passage of sound and sometimes air. Modern windows are usually glazed or covered in some other transparent or translucent material, a sash set in a frame in the opening; the sash and frame are also referred to as a window. Many glazed windows may be opened, to allow ventilation, or closed, to exclude inclement weather. Windows may have a latch or similar mechanism to lock the window shut or to hold it open by various amounts.

Doors:

A **door** is a hinged or otherwise movable barrier that allows ingress into and egress from an enclosure. The created opening in the wall is a *doorway* or *portal*. A door's essential and primary purpose is to provide security by controlling access to the doorway (portal).

Conventionally, it is a panel that fits into the portal of a building, room, or vehicle. Doors are generally made of a material suited to the door's task. Doors are commonly attached by hinges, but can move by other means, such as slides or counterbalancing.



floor	Number of windows	number of doors
ground floor	0	48
1st	5	40
2nd	5	30
3rd	5	37
4rth	5	31
5th	5	28
6th	5	31
7th	5	19
8th	5	28
9th	5	28
10th	5	28
11th	5	29
12th	5	31
13th	5	32
14th	5	31
15th	6	32
16th	6	30
17th	6	31
18th	6	33
19th	3	22
	97	619

total numbers of windows = 97

total numbers of doors = 619

Summary Of Quantities

ITEM	QUANTITY
EXCAVATION	**52316.115 m3**
CONCRETE	21399.51 m3
STEEL	726.4539 Tone
PLASTRING	**79730.52 m3**
PAINTS	**79730.52 m3**
TILES AND SKIRTS	**98270 Tiles**
GLASS	**2174 panels**
MARBLE	**1495 marble**
BLOCKS	**16500 block**
WINDOWS	**97 windows**
DOORS	**619 doors**

By thanking the GOD, this is the end of our graduation project “1”

“Management and Quantity Surveying for Smasco Tower building”

All the greetings to our Dr. Oday Alshboul who was our guidance all the semester for complete this project.

Omar Obead. Zaki Batarseh. Ahmad Alkhmaiseh. Ahmad Dodeen. Haitham Dawoud.