ADVANCED CONSTRUCTION ESTIMATE REPORT

Project Details

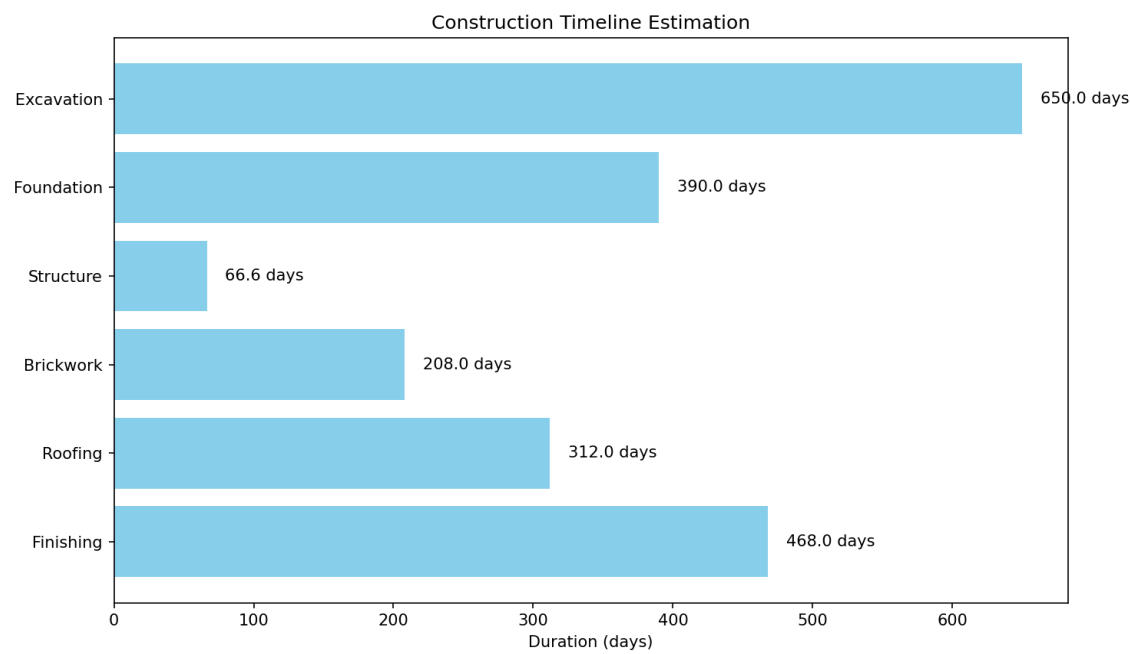|	
Project Name:	Emerald Oasis Villa
Client Name:	Mohammed
Location:	Hills, Dubai, UAE
Date:	2025-07-23
Construction Method:	RCC Framed Structure
Climate Zone:	Arid (Temp Factor: 1.3)
Seismic Zone:	Zone II (Zone Factor: 0.16)
Roof Type:	Flat RCC Roof
Design Wind Speed:	160.0 km/h
Soil Bearing Capacity:	120.0 kN/m²
Project Duration:	24.0 months

Building Dimensions and Loads

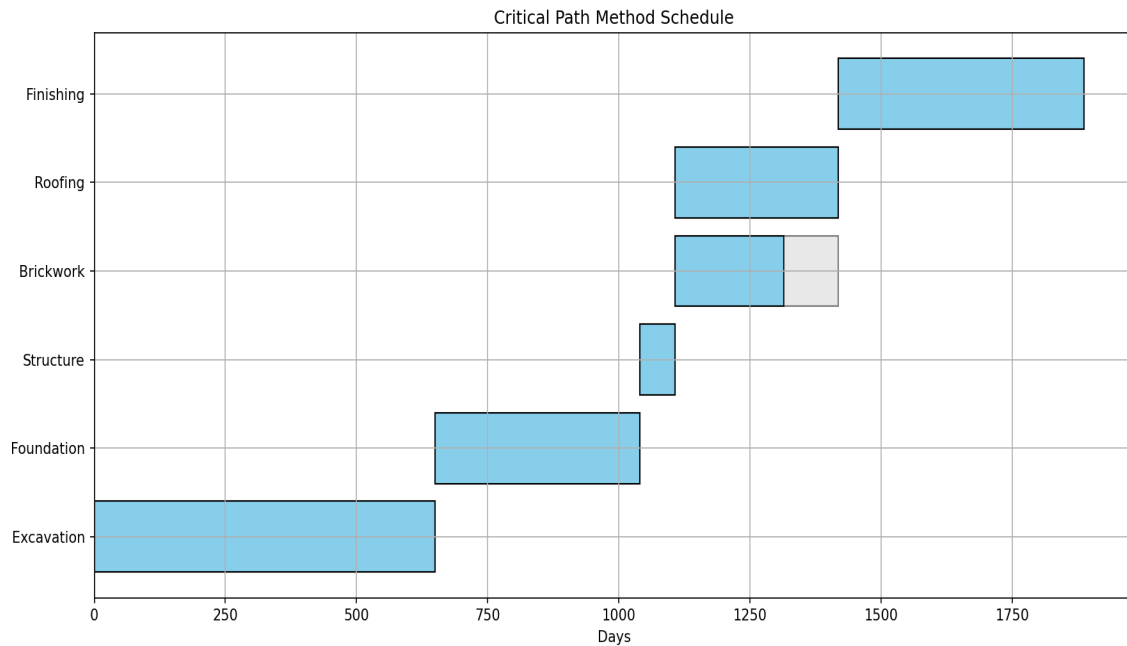|	
Length:	30.0 m
Width:	20.0 m
Height:	4.0 m
Floors:	2
Wall Thickness:	0.25 m
Footing Depth:	2.0 m
Footing Width:	2.5 m
Column Size:	0.5x0.5 m
Beam Size:	0.4x0.7 m
Slab Thickness:	3.0 m
Live Load:	0.25 kN/m²
Calculated Wind Load:	-0.787 kN/m²
Calculated Seismic Shear:	1792.00 kN
Soil Pressure:	89.60 kN/m²

Selected Materials with Specifications

Brick Type:	Concrete Block	Comp. Strength: 15.0 MPa, Water Abs: 8.0%

Cement Type:	OPC 53 Grade	Grade: 53, Setting Time: 90 min
Steel Rod Type:	Fe 550	Yield Strength: 550.0 MPa, Elongation: 10.0%
Roofing Material:	Solar Tiles	Wind Rating: 120 km/h, Fire Rating: Class A
Door Type:	Fiberglass Door	Sound Reduction: 40.0 dB
Window Type:	Double Glazed	U-Value: 2.8, SHGC: 0.6
Insulation Type:	Spray Foam	R-Value: 4.35 m²K/W

Construction Timeline Estimation

Construction Timeline Estimation

- Excavation: 650.0 days
- Foundation: 390.0 days
- Structure: 66.6 days
- Brickwork: 208.0 days
- Roofing: 312.0 days
- Finishing: 468.0 days

Duration (days)

Critical Path Method Schedule
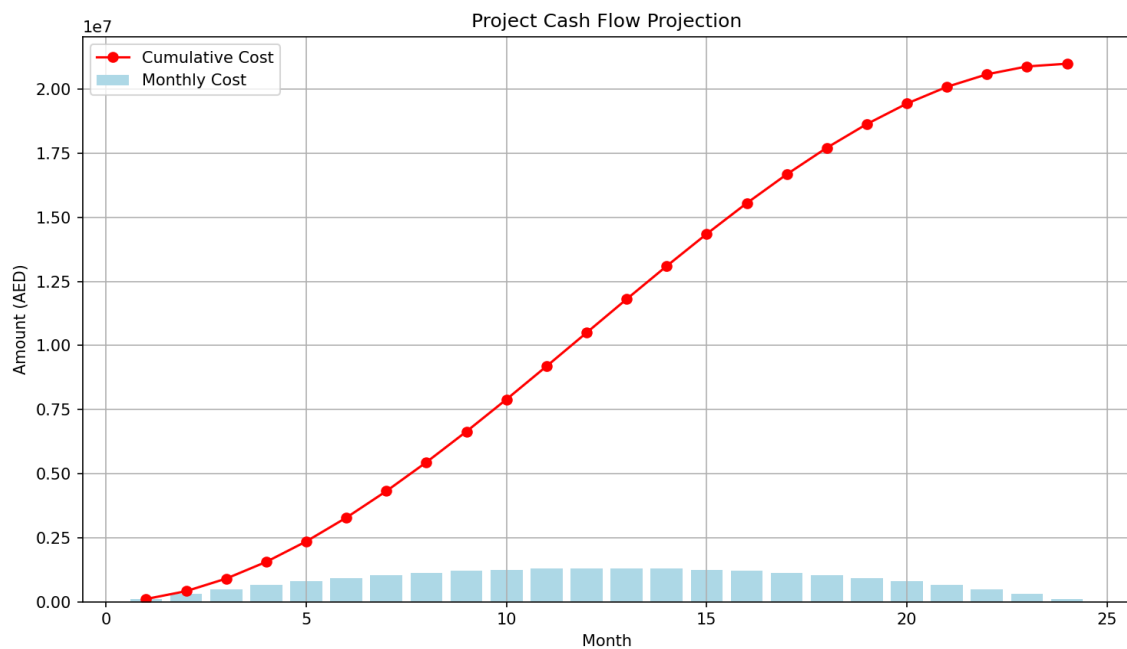
Critical Path Method Schedule

Cash Flow Projection

Structural Design Summary

Beam Design

Design Parameter	Value

Width	300 mm
Depth	2167.4738846497994 mm
Steel Reinforcement	31-16mm bars
Stirrups	8mm @ 150mm c/c
Design Moment	3712.50 kN-m

Column Design

Design Parameter	Value
Size	1050x1050 mm
Steel Reinforcement	55-16mm bars
Lateral Ties	8mm @ 256mm c/c
Axial Capacity	5600.00 kN

Footing Design

Design Parameter	Value
Size	6.9x6.9 m
Depth	1.3800000000000001 m
Steel Reinforcement	51-12mm bars each way
Soil Pressure	117.62 kN/m²

Thermal Performance Analysis

Component	U-Value (W/m²K)	R-Value (m²K/W)	Code Compliance
Wall	0.228	4.39	Compliant
Roof	1.500	0.25	Not Compliant
Window	2.800	-	Compliant
Door	2.500	-	-
Energy Code:	ASHRAE 90.1-2019		
Max Wall U-Value:	0.57 W/m²K		
Max Roof U-Value:	0.27 W/m²K		
Max Window U-Value:	3.3 W/m²K		

Lifecycle Cost Analysis (30 years)

Component	Initial Cost	Replacements	Replacement Cost	Lifecycle Cost

Bricks	306000.00	0	0.00	306000.00
Cement	11595074.40	0	0.00	11595074.40
Steel	107084000.00	0	0.00	107084000.00
Roofing	1260000.00	1	679632.14	1939632.14
Doors	140000.00	12	1150436.11	1290436.11
Windows	245000.00	50	8588987.44	8833987.44
Insulation	64000.00	6	268127.77	332127.77
Total	20994965.70	-	10687183.47	31682149.17

Value Engineering Suggestions

• Consider using Engineering Brick bricks instead (AED153000.00 savings, 50.0 MPa strength)
• Consider using Fe 500 steel instead (AED13385500.00 savings, 500.0 MPa yield strength)
• Consider using Concrete Tiles roofing instead (AED1229760.00 savings, 40 year lifespan)

Material Calculations with Engineering Formulas

Item	Quantity	Unit	Formula Used
Total Floor Area	1200.00	sqm	Length × Width × Floors
Wall Area	800.00	sqm	Perimeter × Height × Floors
Total Concrete	4164.00	cum	Footing + Columns + Beams + Slab
Total Bricks	10200	units	Wall Area × 12.5 bricks/sqm + 2.0% wastage
Total Cement	27607.32	bags	6.5 bags/cum × Total Concrete + 2.0% wastage
Total Steel	1338.55	tons	4164.00 cum × 3.8999999999999995% × 7850 kg/m³ + 5.0% wastage
Wind Load	-0.787	kN/m²	ASCE 7: $qz = 0.613 \times Kz \times Kzt \times Kd \times V^2$; Cp based on roof angle
Seismic Shear	1792.00	kN	IS 1893: $V = (Z \times I \times Sa)/(2 \times R) \times W$; Z=0.16, R=3.0
Beam Design Moment	3712.50	kN-m	$w = (DL+LL) \times span/2$; $M = w \times span^2/10$; DL=2.5 kN/m², LL=0.25 kN/m²

Summary Estimate

Item	Quantity	Unit	Total Cost
Cement	27607	bags	11595074.40
Steel	1338.55	tons	107084000.00
Bricks	10200	units	306000.00
Roofing	2520	units	1260000.00

Doors	20	units	140000.00
Windows	35	units	245000.00
Insulation	-	-	64000.00
Labor	-	-	1828800.00
Transport	-	-	5449007.38
Embodied Carbon	4599202	kg CO2e	
		TOTAL:	**20994965.70**

Labor Cost Breakdown

Activity	Cost
Excavation	30000.0
Foundation	165000.0
Brickwork	208000.0
Concreting	1041000.0
Plastering	140800.0
Painting	64000.0
Roofing	125999.99999999999
Plumbing	10000.0
Electrical	12000.0
Insulation	32000.0

Cash Flow Projection Details

Month	Amount	Cumulative
1	106311.31	106311.31
2	306784.08	413095.39
3	489032.04	902127.43
4	653055.21	1555182.64
5	798853.58	2354036.23
6	926427.16	3280463.39
7	1035775.94	4316239.33
8	1126899.92	5443139.26
9	1199799.11	6642938.37
10	1254473.50	7897411.87
11	1290923.09	9188334.96

12	1309147.89	10497482.85
13	1309147.89	11806630.74
14	1290923.09	13097553.83
15	1254473.50	14352027.33
16	1199799.11	15551826.44
17	1126899.92	16678726.37
18	1035775.94	17714502.31
19	926427.16	18640929.47
20	798853.58	19439783.06
21	653055.21	20092838.27
22	489032.04	20581870.31
23	306784.08	20888654.39
24	106311.31	20994965.70

Critical Path Method Details

Activity	Duration	Early Start	Early Finish	Late Start	Late Finish	Total Float
Excavation	650.0	0.0	650.0	0.0	650.0	0.0
Foundation	390.0	650.0	1040.0	650.0	1040.0	0.0
Structure	66.6	1040.0	1106.6	1040.0	1106.6	0.0
Brickwork	208.0	1106.6	1314.6	1210.6	1418.6	104.0
Roofing	312.0	1106.6	1418.6	1106.6	1418.6	0.0
Finishing	468.0	1418.6	1886.6	1418.6	1886.6	0.0

Critical Path: Excavation → Foundation → Structure → Roofing → Finishing
Total Project Duration: 1886.6 days

Alternative Material Options

Brick Alternatives

Type	Price/Unit	Strength (MPa)	Thermal Conductivity	Lifecycle (years)	Embodied Carbon
Standard Red Brick	10.00	10.5	0.800	50	0.80
Hollow Brick	25.00	7.5	0.500	50	0.60
Engineering Brick	15.00	50.0	0.700	75	0.90
Fly Ash Brick	12.00	12.0	0.600	55	0.50

Cement Alternatives

Type	Price/Bag	Strength (MPa)	Lifecycle (years)	Embodied Carbon

OPC 43 Grade	400.00	43.0	50	0.90
PPC	380.00	33.0	60	0.70
SRC	450.00	33.0	60	1.00
White Cement	600.00	43.0	50	1.20

Steel Alternatives

Type	Price/kg	Yield Strength (MPa)	Lifecycle (years)	Embodied Carbon
Fe 415	65.00	415.0	50	2.50
Fe 500	70.00	500.0	50	2.50
Fe 415	65.00	415.0	50	2.50
Fe 500	70.00	500.0	50	2.50

Roofing Alternatives

Type	Price/Unit	Lifespan (years)	U-Value	R-Value	Embodied Carbon
Clay Tiles	15.00	50	2.500	0.40	0.70
Concrete Tiles	12.00	40	2.000	0.50	1.00
Metal Sheets	300.00	30	5.000	0.20	1.50
Asphalt Shingles	200.00	20	3.000	0.30	1.20

Engineering Notes:

1. All quantities include standard wastage percentages for each material type.

2. Wind load calculated according to ASCE 7 standards using velocity pressure method.

3. Seismic load calculated using equivalent static force method per IS 1893.

4. Steel percentage adjusted for seismic zone factor and construction method.

5. Timeline estimates include climate factor adjustments for productivity.

6. All structural calculations should be verified by a licensed engineer.

7. Material specifications are based on manufacturer data and standard codes.

8. Lifecycle costs are calculated using net present value method with discount rate.

9. Energy code compliance is based on selected climate zone requirements.