

# Assignment 1: Heat Loss Calculations

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First Floor:

**Main Building: (window-walls)**

**Front** 18000mm x2 (these walls are not connected)

**Back** 54500mm

**Left** 28550mm

**Right** 288500mm

**Pushback: (curtain wall + standard wall assembly)**

**Front** 18802mm (curtain wall)

**Left** 4820mm = 500mm standard wall + 4320mm curtain wall

**Right** 4820mm = 500mm standard wall + 4320mm curtain wall

Second Floor:

**Main Building: (standard wall assemblies + windows)**

**Front** 18000mm x2 (these walls are not connected)

**Back** 54500mm

**Left** 30250mm

**Right** 30250mm

**Pushback: (curtain wall + standard wall assembly)**

**Front** 18802mm (curtain wall)

**Left** 3130mm = 500mm standard wall + 2630mm curtain wall

**Right** 3130mm = 500mm standard wall + 2630mm curtain wall



Third-Fifth Floor:

**Main Building: (standard wall assemblies + windows)**

**Front** 18000mm x2 (these walls are not connected)

**Back** 54500mm

**Left** 33150mm

**Right** 33150mm

**Pushback: (curtain wall + standard wall assembly)**

**Front** 18802mm (curtain wall)

**Left** 1450mm = 500mm standard wall + 950mm curtain wall

**Right** 1450mm = 500mm standard wall + 950mm curtain wall

**Roof:**

$$1740730000\text{mm}^2 + 44623522.7188\text{mm}^2$$

$$- 274665600\text{mm}^2$$

$$= \frac{1}{2} \times 1510.68\text{m}^2$$

$$\boxed{1510.68\text{m}^2}$$

Mechanical Penthouse:

**Front:** 18360mm

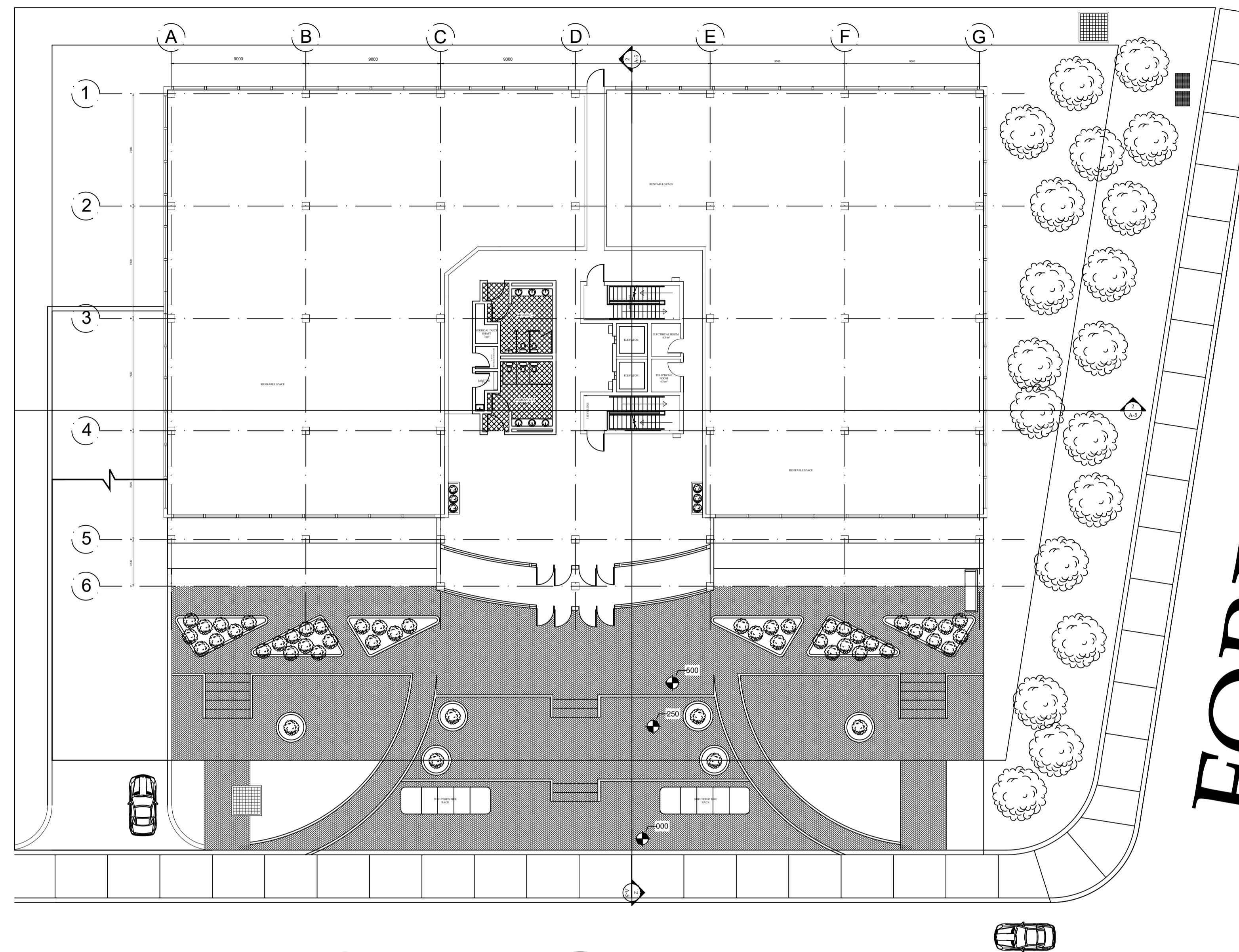
**Back:** 18360mm

**Left:** 14960mm [1 opening(door)]

**Right:** 14960mm

FIRST FLOOR							
Wall Type and Composition	Length (mm)	Height (mm)	Gross Area (ft^2)	ΔT	R Value	U Value	BTU/h
South Wall (window wall)	54500.00	4300.00	2522.54	60.00	6.00	0.17	25225.43
West Wall (Window wall)	28550.00	4300.00	1321.44	60.00	6.00	0.17	13214.42
East Wall (Window Wall)	28550.00	4300.00	1321.44	60.00	6.00	0.17	13214.42
Northern Walls (Window Wall)	36000.00	4300.00	1666.27	60.00	6.00	0.17	16662.67
Eastern Extension (Window Wall)	4320.00	4300.00	199.95	60.00	6.00	0.17	1999.52
Western Extension (Window Wall)	4320.00	4300.00	199.95	60.00	6.00	0.17	1999.52
Eastern Extension (Standard Wall Assembly)	500.00	4300.00	23.14	60.00	25.98	0.04	53.45
Western Extension (Standard Wall Assembly)	500.00	4300.00	23.14	60.00	25.98	0.04	53.45
Curved Wall (Curtain Wall)	18802.00	4300.00	870.25	60.00	8.00	0.13	6526.91
						TOTAL=	78949.81
Air Changes	Length (mm)	Height (mm)	Width (mm)	Gross volume (ft^3)	ΔT	Air Changes	BTU/h
Eastern Wing	25750.00	4300.00	28550.00	111624.25	60.00	1.50	180831.28
Western Wing	25750.00	4300.00	28550.00	111624.25	60.00	1.50	180831.28
Entrance	22910.00	4300.00	17475.00	60787.95	60.00	2.00	131301.97
						TOTAL=	492964.54
MECHANICAL PENTHOUSE							
Wall Type and Composition	Length (mm)	Height (mm)	Gross Area (ft^2)	ΔT	R Value	U Value	BTU/h
Mech Room (North)	18360.00	4100.00	810.27	60.00	22.43	0.04	2167.95
Mech Room (South)	18360.00	4100.00	810.27	60.00	22.43	0.04	2167.95
Mech Room (East)	14960.00	4100.00	660.24	60.00	22.43	0.04	1766.52
Mech Room (West)	14960.00	4100.00	660.24	60.00	22.43	0.04	1766.52
Door (East)	1800.00	1800.00	19.38	60.00	15.00	0.07	77.50
						TOTAL=	7946.44
Air Changes	Length (mm)	Height (mm)	Width (mm)	Gross volume (ft^2)	ΔT	Air Changes	BTU/h
Mechanical Room (1 wall with 1 door)	18360.00	4100.00	14960.00	39764.44	60.00	1.00	42945.60
						TOTAL=	42945.60
ROOF							
Roof Type and Composition	Length (mm)	Height (mm)	Gross Area (ft^2)	ΔT	R Value	U Value	BTU/h
Roof	N/A	N/A	16260.82	60.00	43.78	0.02	22283.55
						TOTAL=	22283.55
THIRD-FIFTH FLOORS							
Wall Type and Composition	Length (mm)	Height (mm)	Gross Area (ft^2)	ΔT	R Value	U Value	BTU/h
South Wall (standard wall composition)	54500.00	4100.00	1876.48	60.00	25.98	0.04	4334.10
West Wall (standard wall composition)	33150.00	4100.00	1110.50	60.00	25.98	0.04	2564.91
East Wall (standard wall composition)	33150.00	4100.00	1110.50	60.00	25.98	0.04	2564.91
Northern Walls (standard wall composition)	36000.00	4100.00	1236.28	60.00	25.98	0.04	2855.42
Eastern Extension (curtain wall)	950.00	4100.00	41.93	60.00	8.00	0.13	314.44
Western Extension (curtain wall)	950.00	4100.00	41.93	60.00	8.00	0.13	314.44
Eastern Extension (Standard Wall Assembly)	500.00	4100.00	22.07	60.00	25.98	0.04	50.97
Western Extension (Standard Wall Assembly)	500.00	4100.00	22.07	60.00	25.98	0.04	50.97
Curved Wall (Curtain Wall)	18802.00	4100.00	829.78	60.00	8.00	0.13	6223.33
						TOTAL=	19273.49
THIRD-FIFTH FLOOR TOTAL WINDOWS							
Windows	Length (mm)	Height (mm)	Gross Area (ft^2)	ΔT	R Value	U Value	BTU/h
Total Windows (27)	2373.00	2300.00	1586.22	60.00	8.00	0.13	11896.64
						TOTAL=	11896.64
Air Changes	Length (mm)	Height (mm)	Width (mm)	Gross volume (ft^2)	ΔT	Air Changes	BTU/h
Eastern Wing	25750.00	4300.00	28550.00	111624.25	60.00	1.50	180831.28
Western Wing	25750.00	4300.00	28550.00	111624.25	60.00	1.50	180831.28
South Wing + Core	22910.00	4300.00	17475.00	60787.95	60.00	0.50	32825.49
						TOTAL=	394488.06
SECOND FLOOR							
Wall Type and Composition	Length (mm)	Height (mm)	Gross Area (ft^2)	ΔT	R Value	U Value	BTU/h
South Wall (standard wall composition)	54500.00	4100.00	1876.48	60.00	25.98	0.04	4334.10
West Wall (standard wall composition)	30250.00	4100.00	982.52	60.00	25.98	0.04	2269.31
East Wall (standard wall composition)	30250.00	4100.00	982.52	60.00	25.98	0.04	2269.31
Northern Walls (standard wall composition)	36000.00	4100.00	1236.28	60.00	25.98	0.04	2855.42
Eastern Extension (curtain wall)	2630.00	4100.00	116.07	60.00	8.00	0.13	870.51
Western Extension (curtain wall)	2630.00	4100.00	116.07	60.00	8.00	0.13	870.51
						TOTAL=	1276974.58

Eastern Extension (Standard Wall Assembly)	500.00	4100.00	22.07	60.00	25.98	0.04	50.97					
Western Extension (Standard Wall Assembly)	500.00	4100.00	22.07	60.00	25.98	0.04	50.97					
Curved Wall (Curtain Wall)	18802.00	4100.00	829.78	60.00	8.00	0.13	6223.33					
					TOTAL=		19794.42					
<b>SECOND FLOOR TOTAL WINDOWS</b>												
Windows	Length (mm)	Height (mm)	Gross Area (ft <sup>2</sup> ) - window area	ΔT	R Value	U Value	BTU/h					
Total Windows (27)	2373.00	2300.00	1586.22	60.00	8.00	0.13	11896.64					
					TOTAL=		11896.64					
Air Changes	Length (mm)	Height (mm)	Width (mm)	Gross volume (ft <sup>3</sup> )	ΔT	Air Changes	BTU/h					
Eastern Wing	25750.00	4300.00	28550.00	111624.25	60.00	1.50	180831.28					
Western Wing	25750.00	4300.00	28550.00	111624.25	60.00	1.50	180831.28					
South Wing + Core	22910.00	4300.00	17475.00	60787.95	60.00	0.50	32825.49					
					TOTAL=		394488.06					
						TOTAL BTUs/h	426179.12					



# FOREST BLVD.

# MAIN STREET

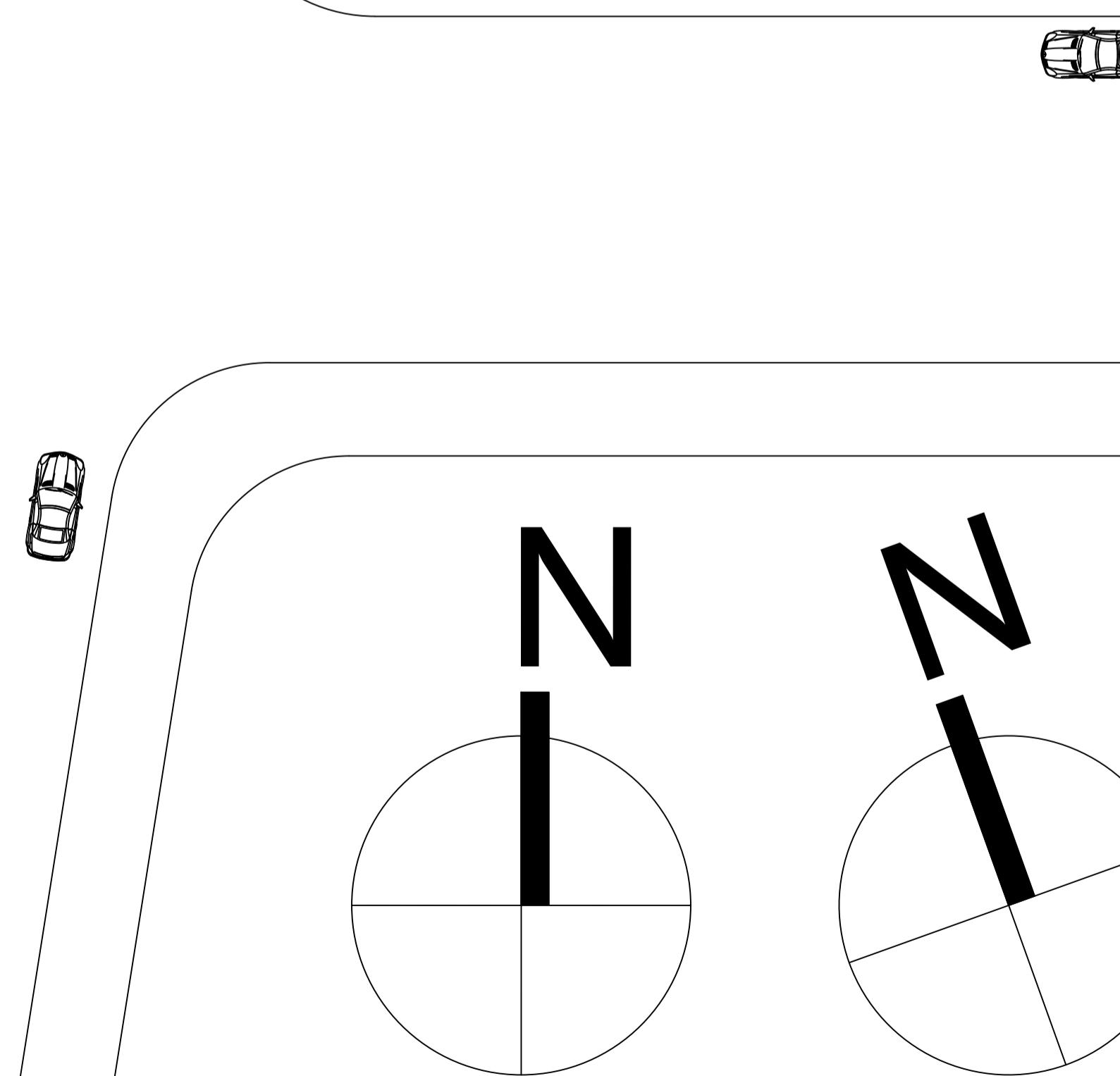
## SITE & BUILDING STATISTICS

BUILDING LOT COVERAGE: 1770M<sup>2</sup>  
BAY SIZE: 900MM X 700MM  
FLOOR AREAS: Parking Area 380M<sup>2</sup>  
1st Floor 160M<sup>2</sup>  
2nd Floor 171M<sup>2</sup>  
3rd Floor 173M<sup>2</sup>  
4th Floor 178M<sup>2</sup>  
5th Floor 178M<sup>2</sup>  
Total Area: 1254M<sup>2</sup>  
Occupant Load: Parking Level 82  
1st Floor 192  
2nd Floor 184  
3rd Floor 192  
4th Floor 192  
5th Floor 192  
Total Occupant load: +1209  
Parking: 75

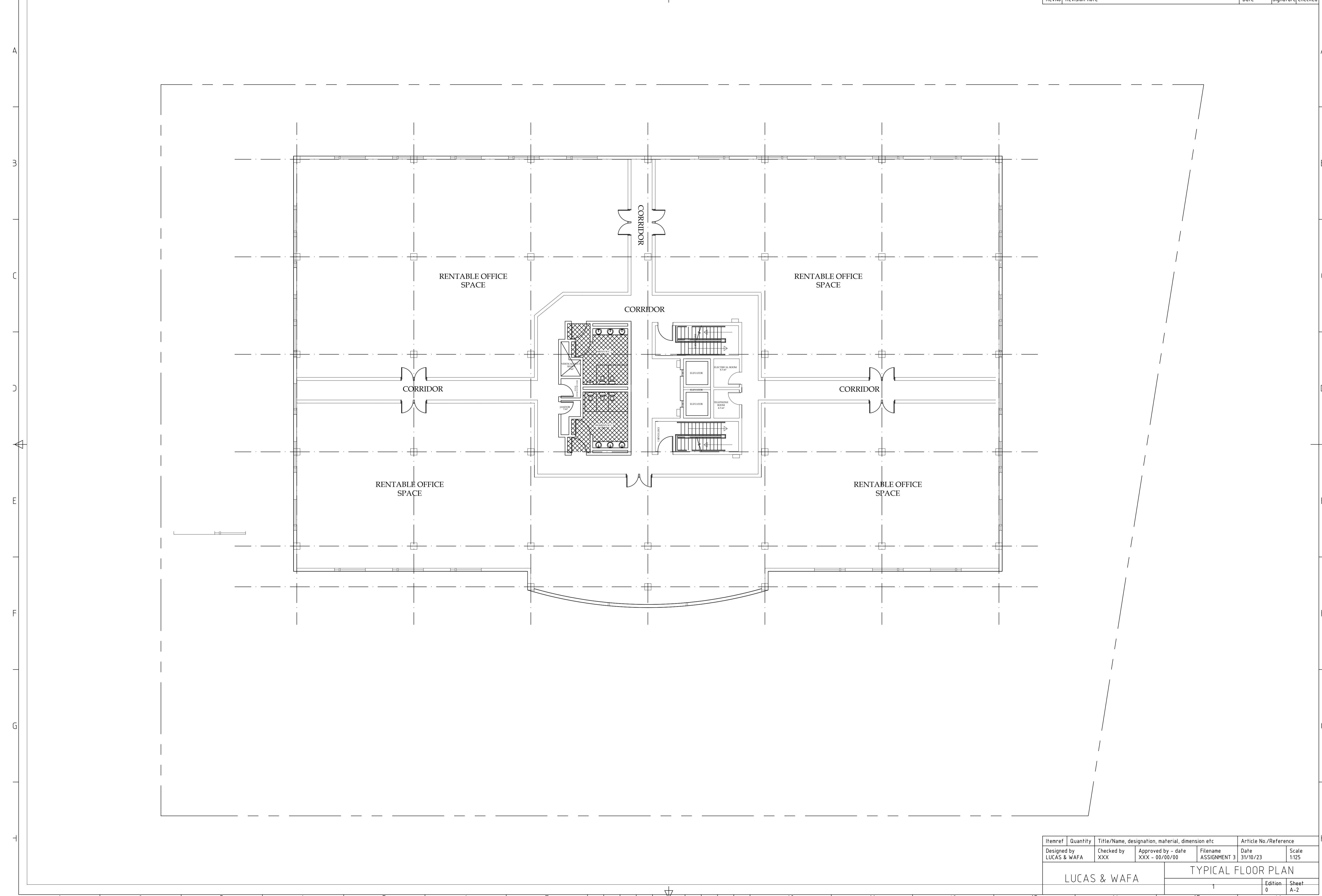


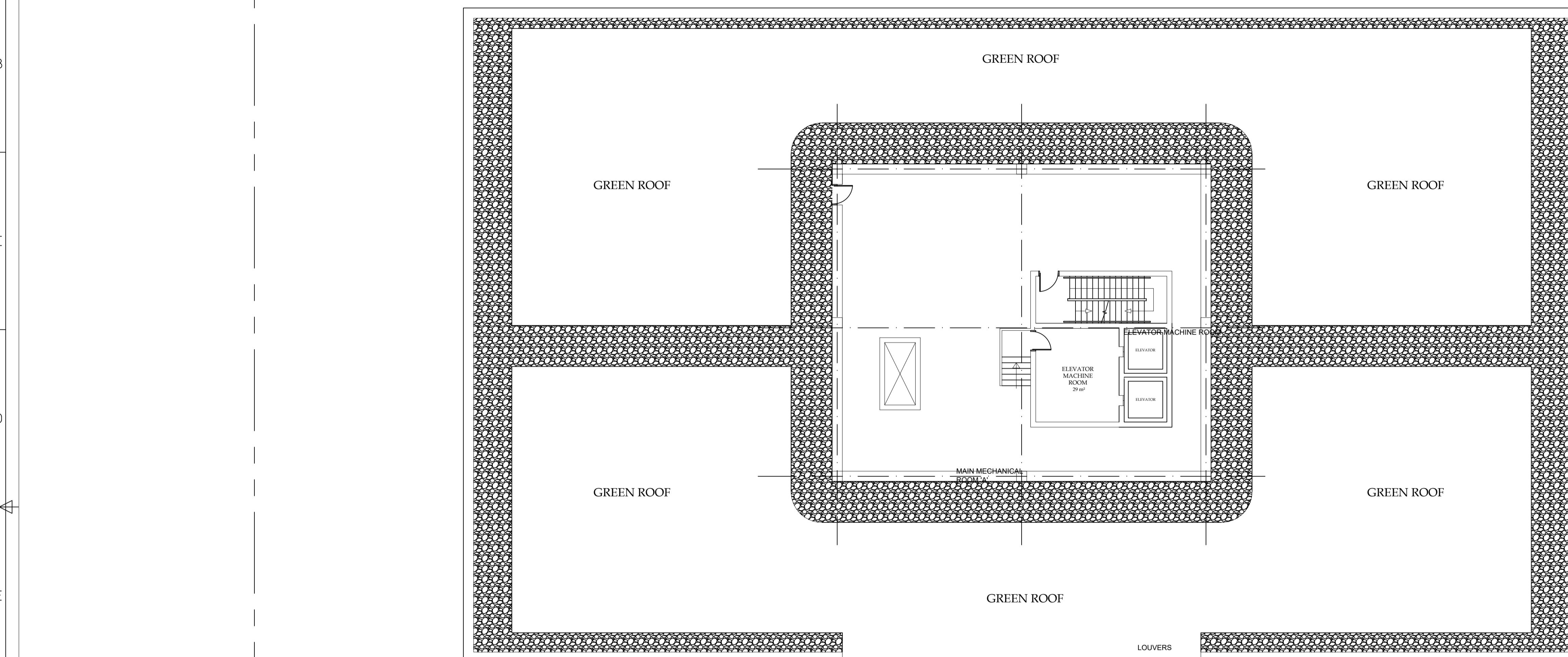
## CORE DESIGN

ELECTRICAL ROOM: 4m<sup>2</sup>  
JANITOR CLOSET: 3m<sup>2</sup>  
RENTABLE STORAGE: 4m<sup>2</sup>  
TELEPHONE ROOM: 4m<sup>2</sup>  
MENS WASHROOM: 15m<sup>2</sup>  
WOMENS WASHROOM: 15m<sup>2</sup>  
VERTICAL DUCT SHAFT: 3m<sup>2</sup>  
ELEVATOR SHAFT: 4m<sup>2</sup>  
EXIT STAIRS (x2) 15m<sup>2</sup>

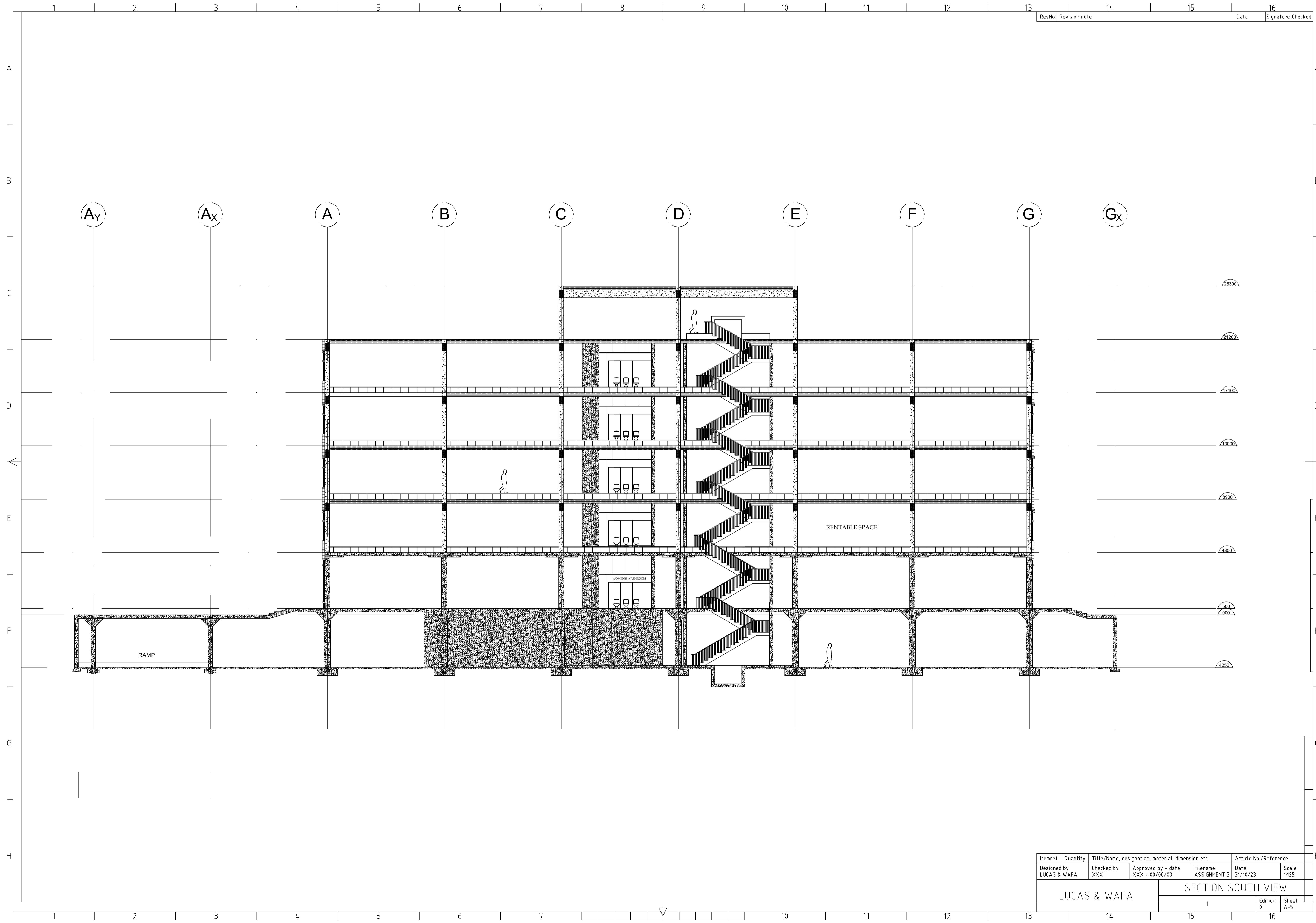


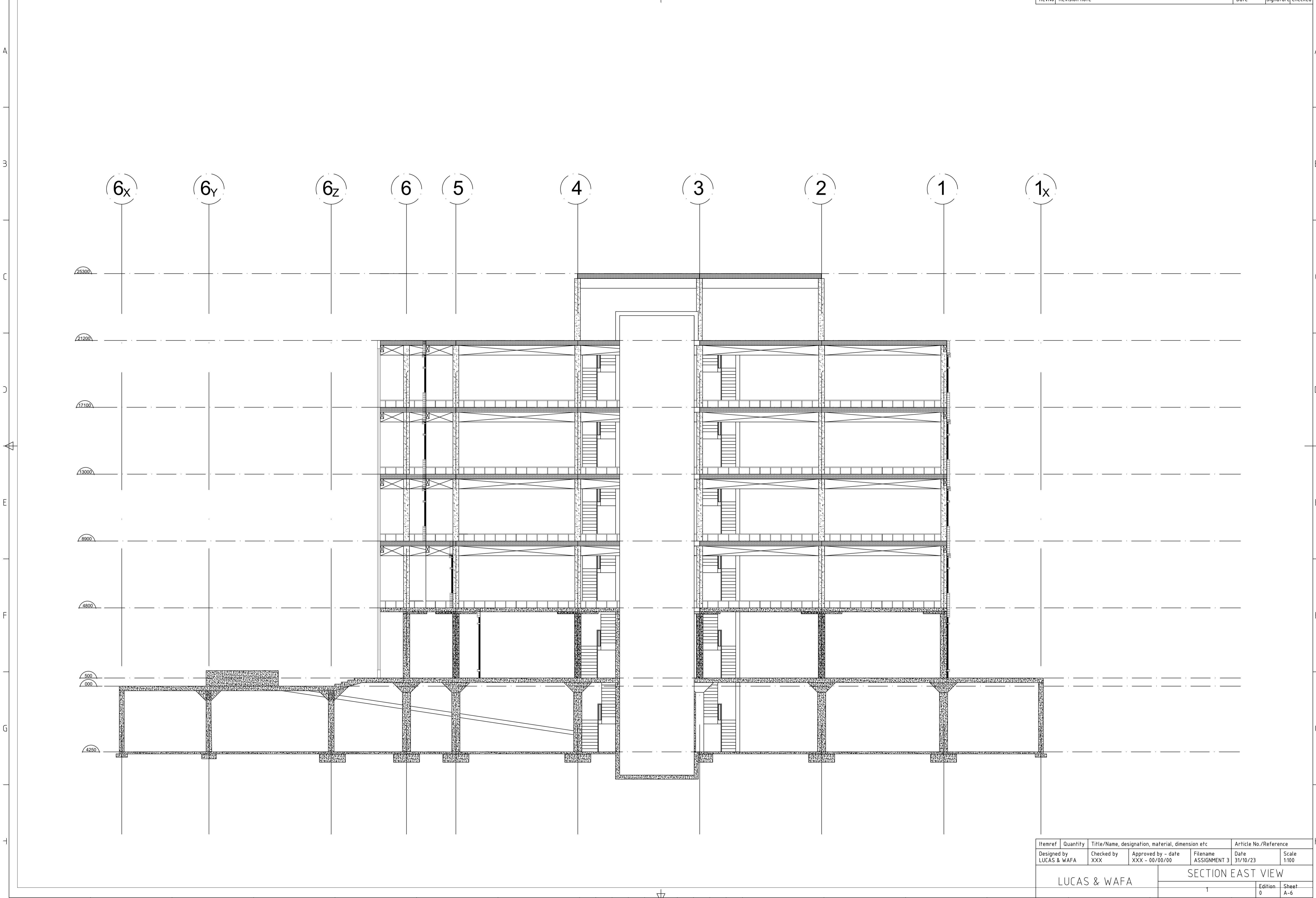
Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
Designed by		Approved by - date	Date
LUCAS & WAFA	XXX	XXX - 00/00/00	31/10/23
		Filename	Scale
		ASSIGNMENT 3	1:200
SITE PLAN			
LUCAS & WAFA	1	Edition	Sheet
	0		A-1





Itemref	Quantity	Title/Name, designation, material, dimension etc			Article No./Reference
Designed by LUCAS & WAFA	Checked by XXX	Approved by - date XXX - 00/00/00	Filename ASSIGNMENT 3	Date 31/10/23	Scale 1:125
<b>MECHANICAL PENTHOUSE</b>					
LUCAS & WAFA		1	Edition 0		Sheet A-4





1	2	3	4	5	6	7	8	9	10	11	12	13	RevNo	Revision note	Date	Signature	Checked
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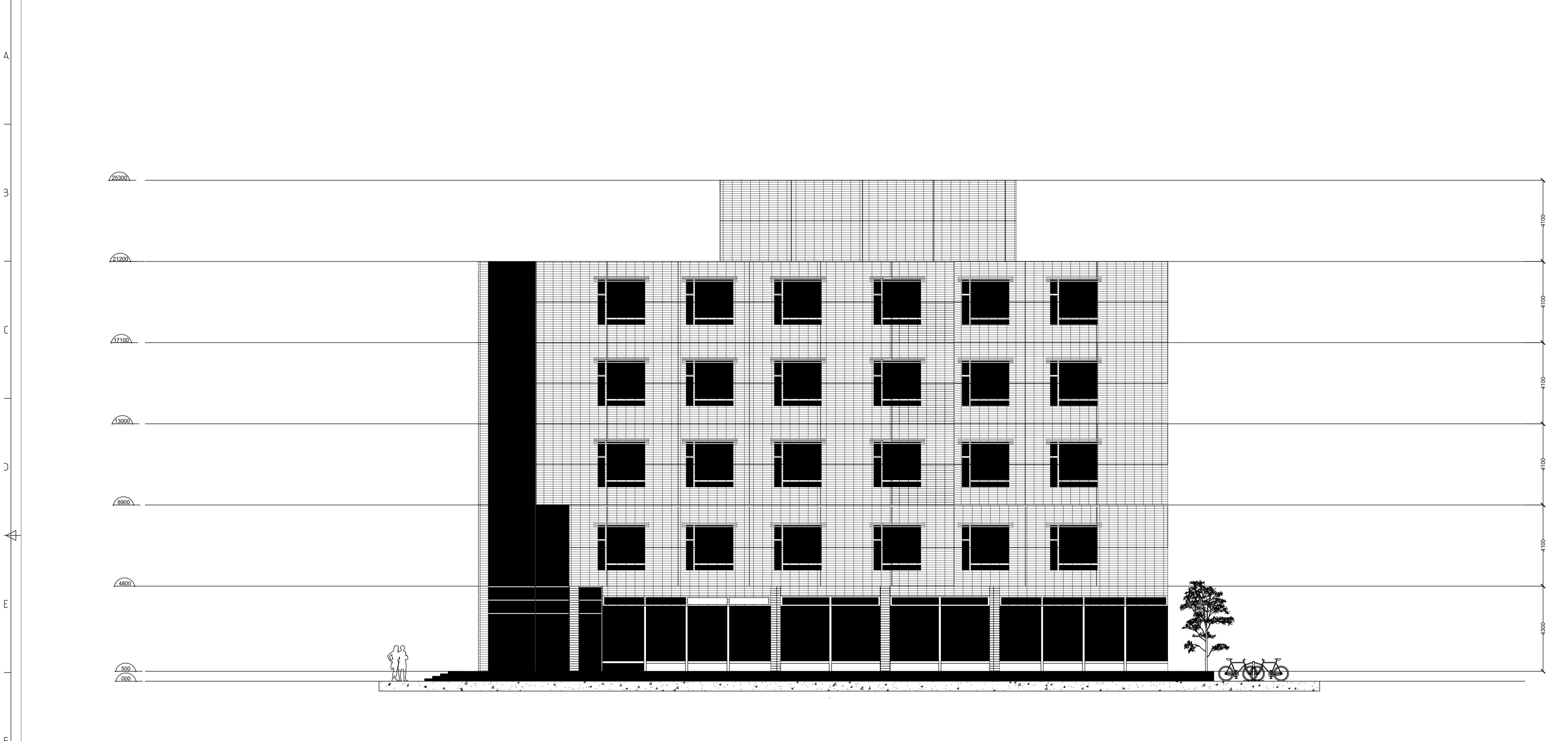
A																	A
3																	B
C																	C
D																	D

E																	E
F																	F
G																	G
H																	H
I																	I



Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No/Reference
Designed by LUCAS & WAFA	Checked by XXX	Approved by - date XXX - 00/00/00	Filename ASSIGNMENT 2
ELEVATION SOUTH VIEW			Date 10/10/23
LUCAS & WAFA		Scale 1:100	
		1	Edition 0
			Sheet A-7

RevNo	Revision note	Date	Signature	Checked
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Itemref	Quantity	Title/Name, designation, material, dimension etc		Article No./Reference	
Designed by LUCAS & WAFA	Checked by XXX	Approved by - date XXX - 00/00/00	Filename ASSIGNMENT 3	Date 31/10/23	Scale 1:100
LUCAS & WAFA		ELEVATION EAST VIEW			
		1		Edition 0	Sheet A-8
12	1/	1F		16	

**First Fl.**

**Third Fl.**

**Second Fl.**