

**PROPOSED STRUCTURE DESIGN
FOR
RESIDENCE FLATES**



Engineering & Technical Associates

Engineers, Architects, Planners, Developers and
Management Specialists

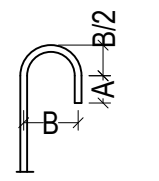
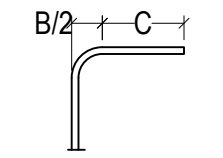
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GENERAL NOTES:

01. The structural drawings and specifications present the finished structure. They do not indicate the method of construction. The structure is designed to be a stable unit as a compacted whole. It is the responsibility of field supervisory staff to design, erect and inspect temporary shores and braces etc. to support the structure against all anticipated loads including gravity, wind and lateral earth pressure until its completion. Observation visits (if any) to the site by the structural engineer shall not include inspection of these methods of construction. Construction material shall be placed on framed floors and roof such that design live loads are not exceeded.
02. All structural drawings should be read in conjunction with architectural drawings.
03. All dimensions are to be read, not to be measured.
04. Minimum 28 days cylinder crushing strength of concrete used in all the members shall not be less than 3000 psi.
05. Steel reinforcement of grade 60 with minimum yield strength of 60 Ksi (Conforming to ASTM A615) should be used in piles, slabs, beam stirrups and column ties.
06. Steel reinforcement of grade 60 with minimum yield strength of 60 Ksi (Conforming to ASTM A615) should be used in raft, basement retaining walls longitudinal reinforcement of beams and columns of all floors.
07. The ratio of ultimate strength to the yield strength of the steel used in all members shall not be less than 1.25.
08. Bricks used in the infill masonry walls shall be of minimum compressive strength of 1500 psi.
09. Thickness of the mortar in the Bricks masonry shall be 3 / 8 inch.
10. All Bricks shall be laid such that not to form vertical joint.
11. The effect of the infill masonry walls, in the lateral stiffness of the frame, is not considered.
12. The location of infill Masonry walls shall not be changed without consulting structure engineer.
13. Lap splice in the longitudinal reinforcement of the column, if required, shall be provided in the center of column, as per detail shown in the drawings.
14. lap splice in the longitudinal reinforcement of the beam, if required, shall be provided as per typical detail of beam given in the drawings.
15. At the terminal end of beams, the longitudinal reinforcement, top and bottom both, should reach the far end of the edge column with the standard hook at the end. as per detail shown in the drawings.

16. 1 inch diameter spacer bar shall be used between two rows of longitudinal bars in beams, as per typical detail of beam shown in the drawing.
17. Clear distance between the longitudinal bars in the beams shall be more than 1 inch or the diameter of the bar used, whichever is greater.
18. The stirrups in the beams and columns shall be provided with 135 hook and with an extension of 6db or 3 inch, whichever is greater.
19. The hooks in the column and beams stirrups shall be provided at alternate corners.
20. In beams, first stirrup shall be placed at 2 inch distance from the face of the support.
21. The stirrups of columns shall continue into the beam column joint, as per detail given in the drawings.
22. The bearing capacity of the site is taken as 1.00 Tonne/SFT as communicated verbally by the client. Bear all footing on inorganic, undisturbed soil or on controlled compacted, if approved by the geographical engineer.
23. The footing of the complete building Shall be placed on the level surface. Structural engineer should be informed if the ground in not leveled.
24. The building has been designed for three storeys.

STANDARD HOOKS (ACI 7.1- 7.2)

BAR DIA	A	B	C	
1/4"	2.5"	1.5"	3"	 180° HOOK
3/8"	2.5"	2.25"	4.5"	
1/2"	2.5"	3"	6"	
5/8"	2.5"	3.75"	7.5"	 90° HOOK
3/4"	3"	4.5"	9"	
1"	4"	6"	12"	

MINIMUM CLEAR COVER

S.No	LOCATION	MINIMUM COVER
1.	FOOTING	3"
2.	COLUMN	1-1/2"
3.	BEAM	1-1/2"
4.	SLAB	3/4"
5.	WATER RETAINING STRUCTURES	3"

DEVELOPMENT LENGTH (ACI 21.5.4)

BAR DIA	Fc' = 3,000 psi Fy = 40,000 psi	
	STRAIGHT BARS	WITH STANDARD HOOK
1/4"	8"	4"
3/8"	12"	5"
1/2"	16"	6.5"
5/8"	20"	8"
3/4"	24"	10"
1"	40"	13"

LAP SPLICE (ACI 21.3.2.4) CLASS B SPLICE

BAR DIA	Fc' = 3,000 psi Fy = 40,000 psi	
	LENGTH OF LAP SPLICE	
1/4"	10"	
3/8"	15"	
1/2"	20"	
5/8"	26"	
3/4"	30"	
1"	52"	

LOCATION:-

RESIDENCE FLATES

OWNERS:-

TITLE

GENERAL NOTES

Scale: Read As Shown

Dwg. No. **i**

Design by:

Checked by:

Drafted by:

Date:

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NOVEMBER 2021

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DESIGN REPORT FOR EARTHQUAKE RESISTANT DESIGN OF Faculty Residence Flats at GIKI, Topi, Swabi.

1. Introduction
This document contains information about the structural design of subject project. The gravity and lateral load resisting system of the structure consists of a Reinforced Concrete Frame shear walls as detailed in the structural drawings. The 3-D Finite Element based software ETABS has been used for the analysis and design of the structural members. ACI code has been used for the design of all reinforced concrete members.
2. Design Specifications
 - 2.1. ACI (American Concrete Institute) Building code 318-99
 - 2.2. UBC (Uniform Building Code) 1997
 - 2.3. AISC LRFD Specifications 1999
 - 2.4. ASCE
 - 2.5. Engineering Judgment is used where code does not satisfy local requirements
3. Design Philosophy
 - 3.1. ACI Ultimate Strength Design (USD) method has been used for design of all reinforced concrete members
4. Unit Weights
 - 4.1. Unit weight of Reinforced Cement Concrete = 150.00 PCF
 - 4.2. Unit weight of Plain Cement Concrete = 140.00 PCF
 - 4.3. Unit weight of brick masonry = 120.00 PCF
 - 4.4. Unit weight of Steel = 490.00 PCF
5. Loads
 - 5.1. Dead Loads: Dead load consists of self load of structure & a superimposed dead load of 25 PSF for roofing, 4.5 inch thick partition walls etc.
 - 5.2. Live Loads: The live load of 60 PSF is considered on the floor of hall and 30 psf is considered on the roof.
 - 5.3. Earthquake Loads: Following Earthquake analysis have been carried out for the design of buildings:
 - a. Equivalent Static Load Analysis: UBC-97 code with the parameters given in table 1 has been used for equivalent static analysis of the school building.

Table 1	
Seismic Zone Factor	0.2B
UBC-97 Soil Type	Type-D
Importance Factor	1.00
Seismic Source Type	-
SDistance to Source (km)	-
Over Strength Factor, R	8.5
Mass source	Dead load + Super dead loads

Earthquake loads have been applied separately in both X and Y direction with 5% eccentricity in the other direction.

6. Structural System and Elements used in ETABS Modeling

The gravity and lateral load resisting system of the structure consists of a Reinforced Concrete Frame and shear walls as detailed in the structural drawings. The 3-D Finite Element based software ETABS has been used for the analysis and design of the structural members. Beams, Columns were modeled as follows.

- | | |
|---------------------|-----------------------------|
| 6.1. Beams, Columns | Modeled as Frame element |
| 6.2. Slab | Modeled as Shell element |
| 6.3. | Modeled as Membrane element |


7. General Information about Design Parameters:

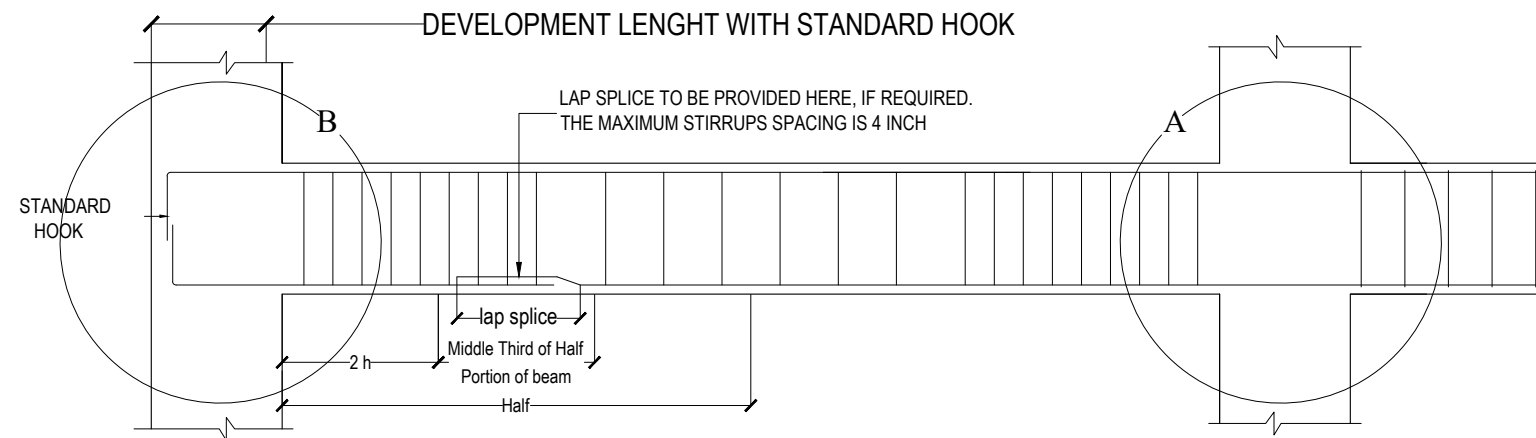
- 7.1. Resistance factors, Φ ,
 - Flexure and tension for concrete Members = 0.90
 - Shear and torsion for concrete Members = 0.85
 - Axial Compression for concrete Members = 0.70
 - Tension (yield) in steel members = 0.90
- 7.2. Load Combinations: Load combinations used in the design consist of the following:
 - U = 1.4 DL (UBC 1909.2.1)
 - U = 1.4 DL + 1.7 LL (UBC 1909.2.1)
 - U = 0.9 DL ± 1.3 WL (UBC 1909.2.2)
 - U = 0.75 (1.4 DL + 1.7 LL ± 1.7 WL) (UBC 1909.2.2)
 - U = 0.9 DL ± 1.0 EL (UBC 1909.2.3, 1612.2.1)
 - U = 1.2 DL + 0.5 LL ± 1.0 EL (UBC 1909.2.3, 1612.2.1)

8. Material Properties

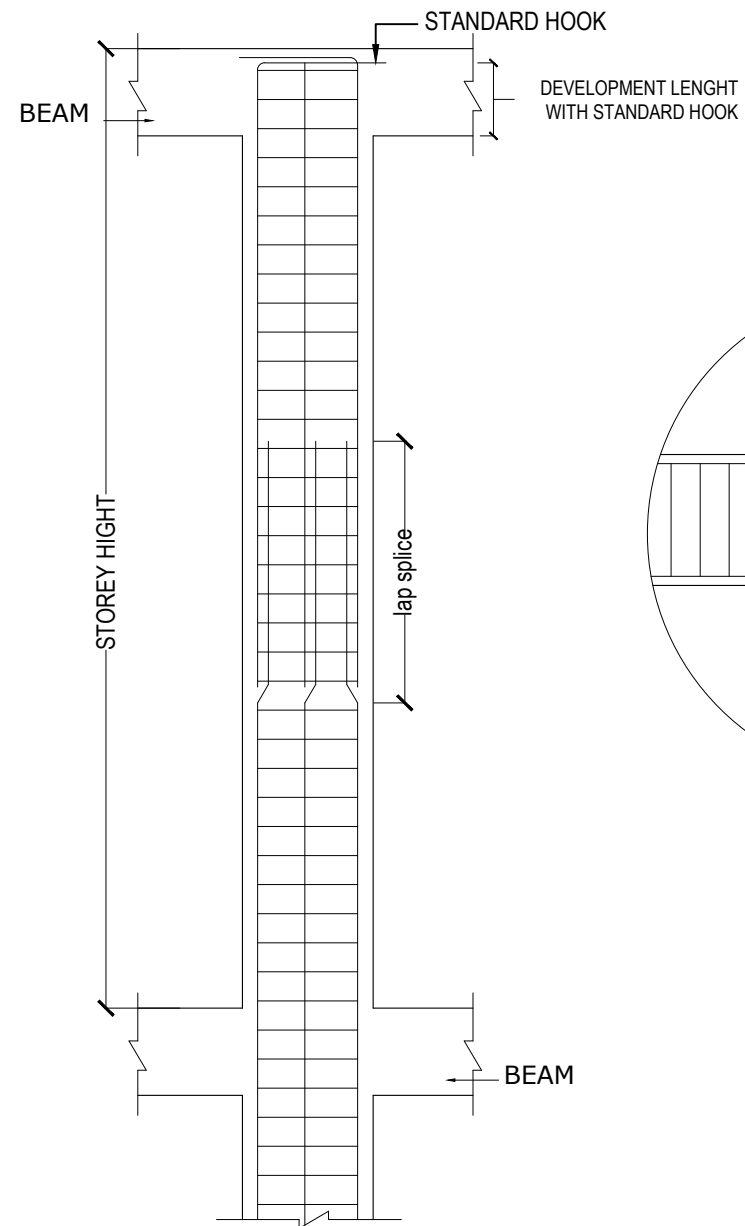
Following material properties have been used in the analysis and design of structures:

Table 2			
S.No.	Material Description	Material Property	Remarks and ASTM / AWS Designation
1	Concrete used in Reinforced Concrete Members	Compressive Strength = 3000 psi Modulus of Elasticity = 3600 ksi Poisson's ratio = 0.20	28-days compressive cylinder strength
2	Reinforcement Steel used in Reinforced Concrete Members	Yield Strength = 60,000 psi (basement retaining walls, slabs, beam stirrups and column ties.) Yield Strength = 60,000 psi (piles, raft, longitudinal reinforcement of beams and columns.) Modulus of Elasticity = 29000 ksi Poisson's ratio = 0.30	Grade-60, deformed round bars conforming to ASTM A-615

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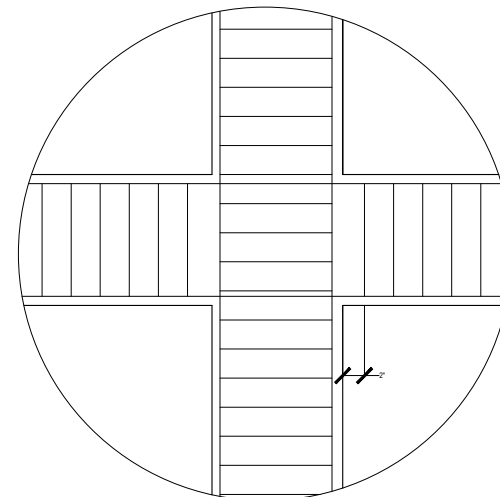


TYPICAL BEAM DETAIL

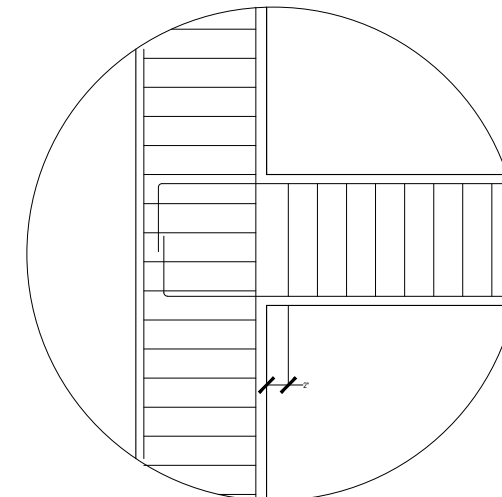


TYPICAL COLUMN DETAIL

Lap in this location, if required.
spacing of stirrup within lap length 3" c/c.

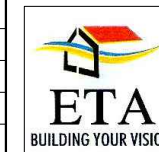


DETAIL A

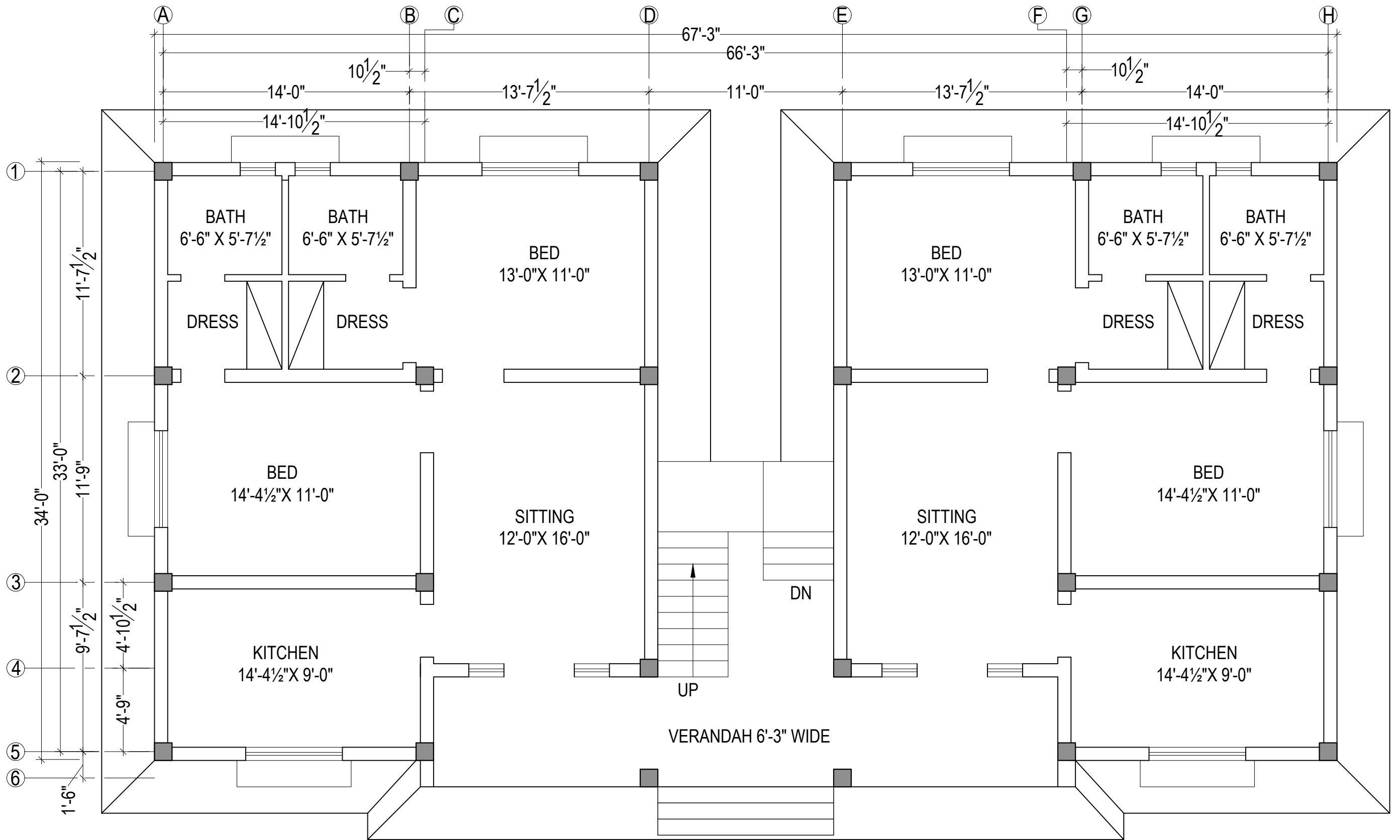


DETAIL B

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TITLE
GROUND FLOOR PLAN

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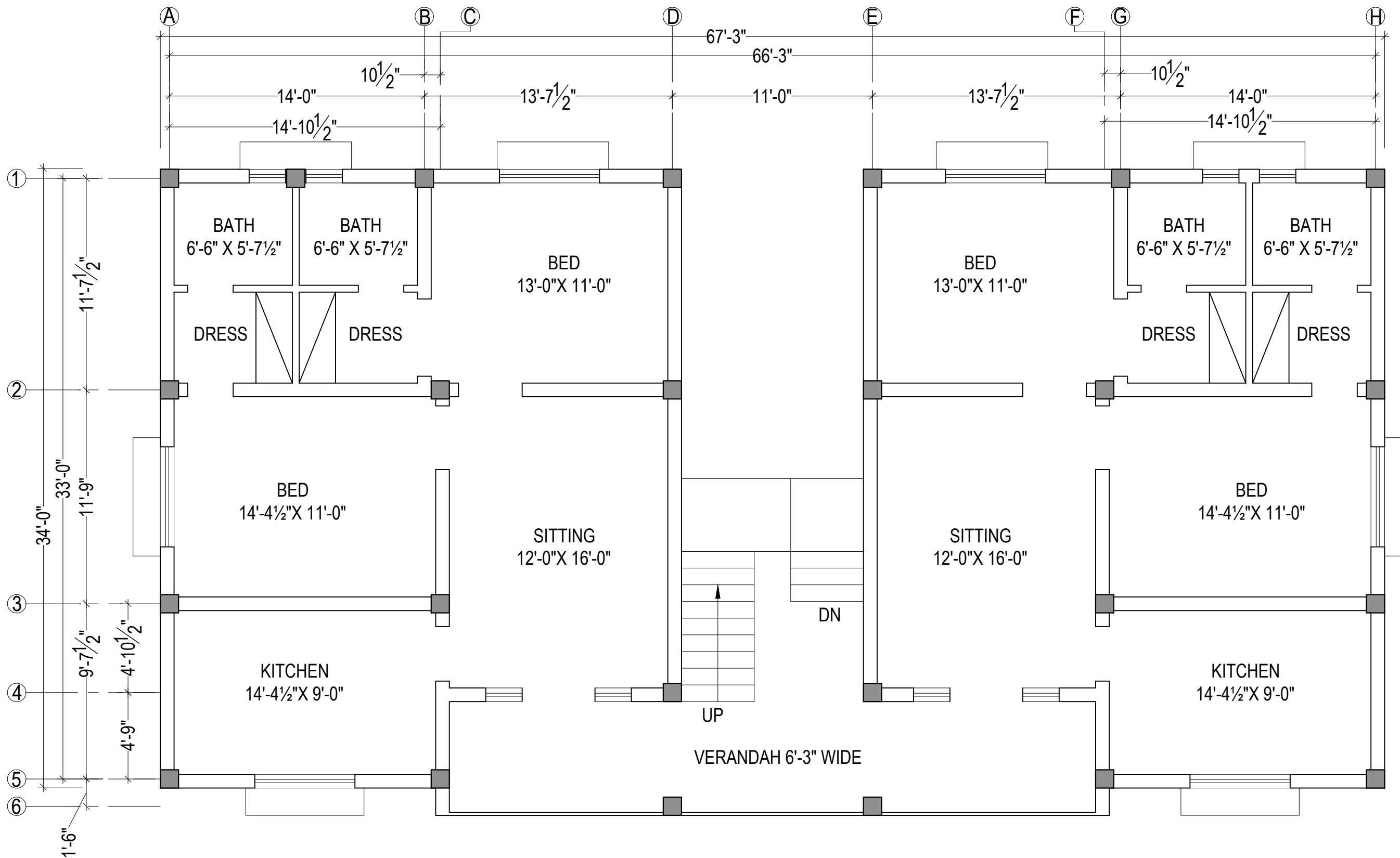
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TITLE
FIRST FLOOR PLAN

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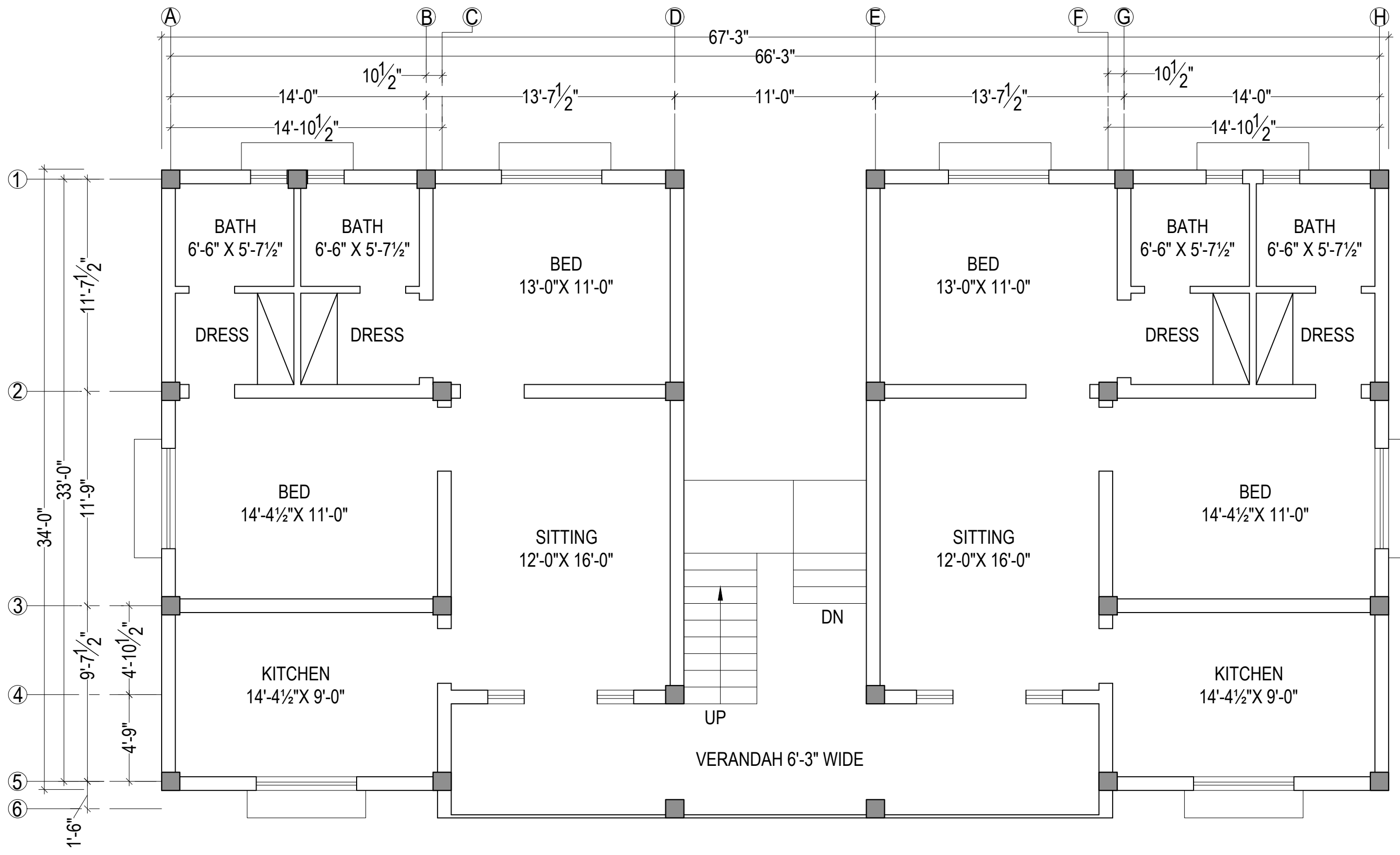
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TITLE
FOUNDATION PLAN

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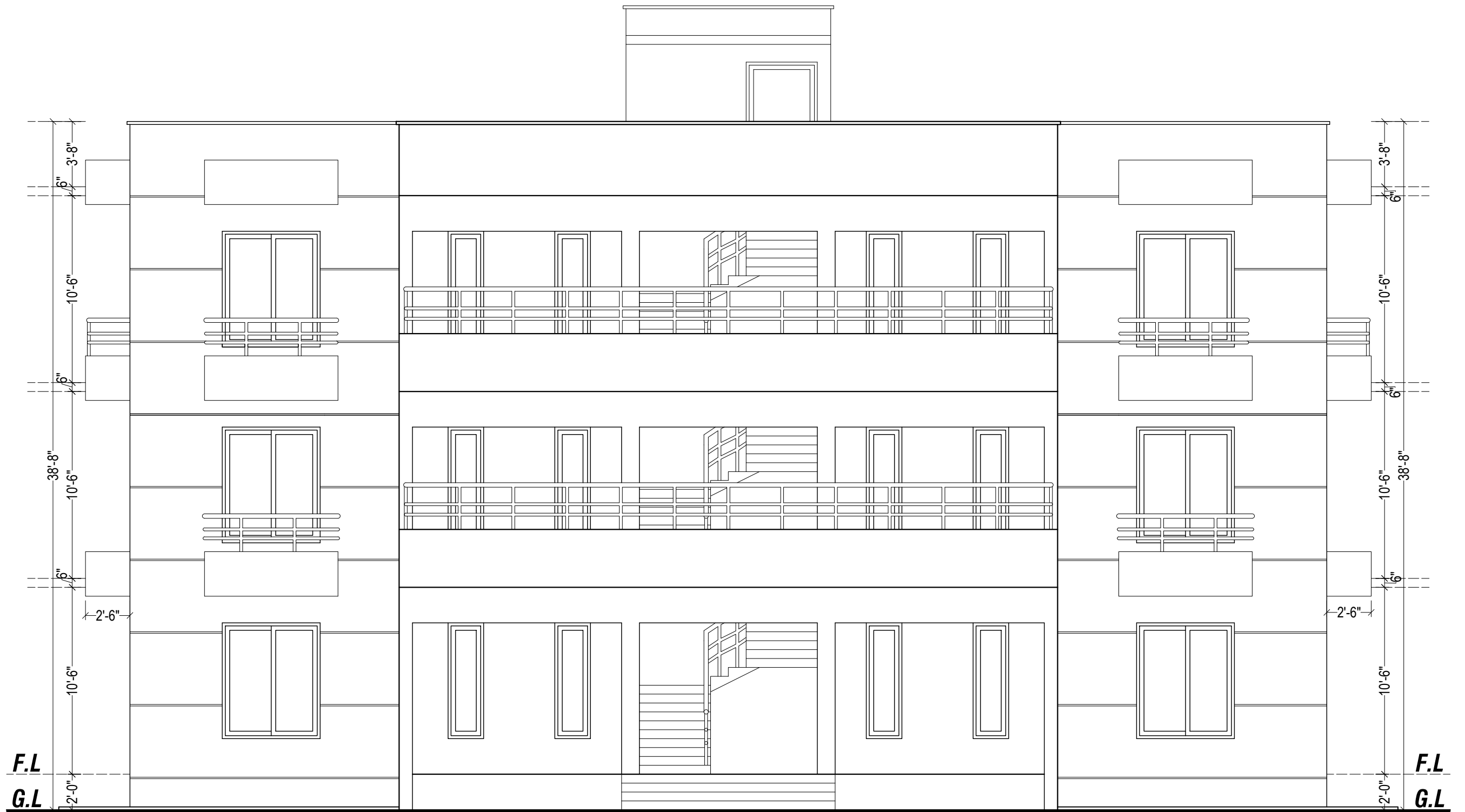
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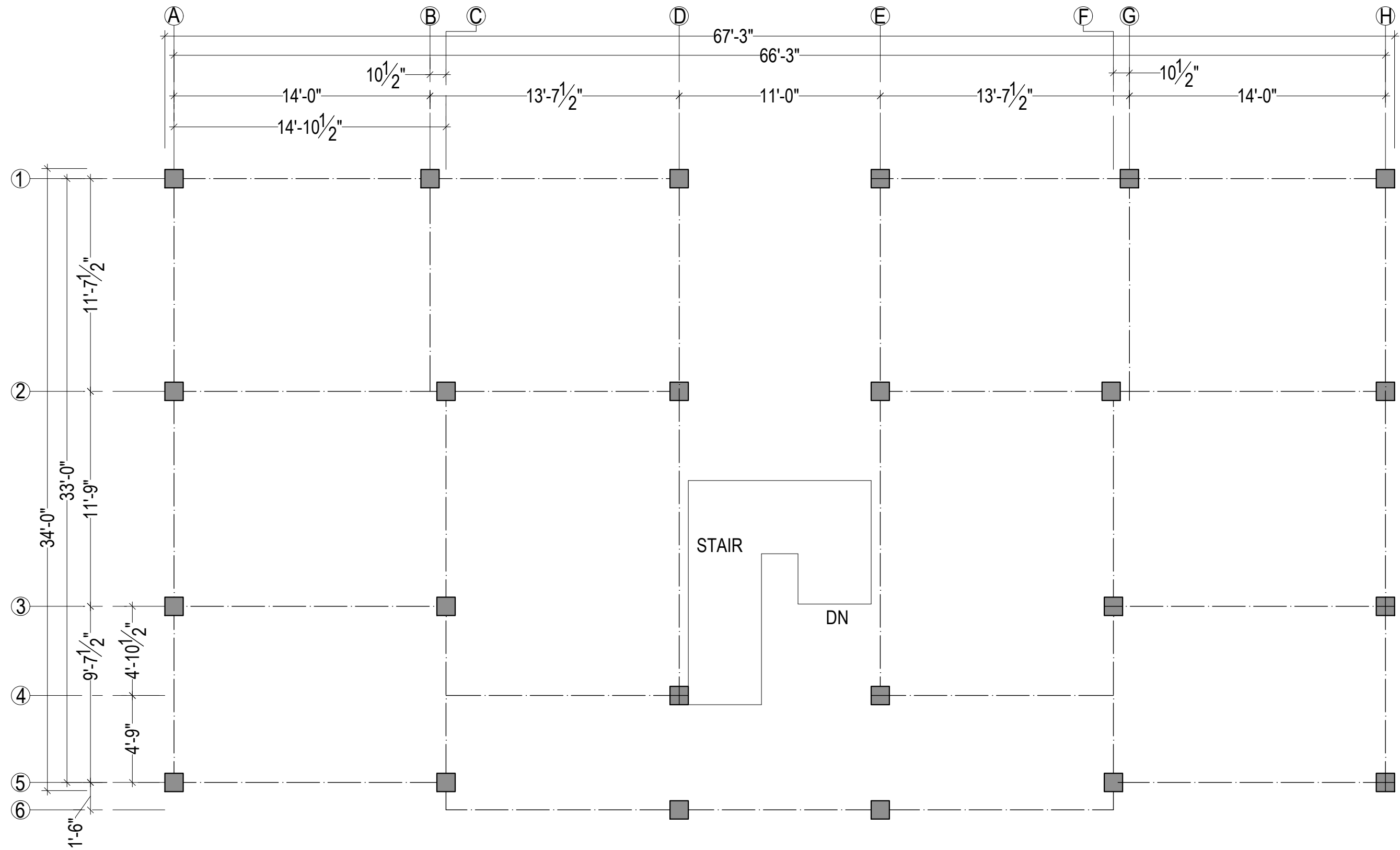


FRONT ELEVATION

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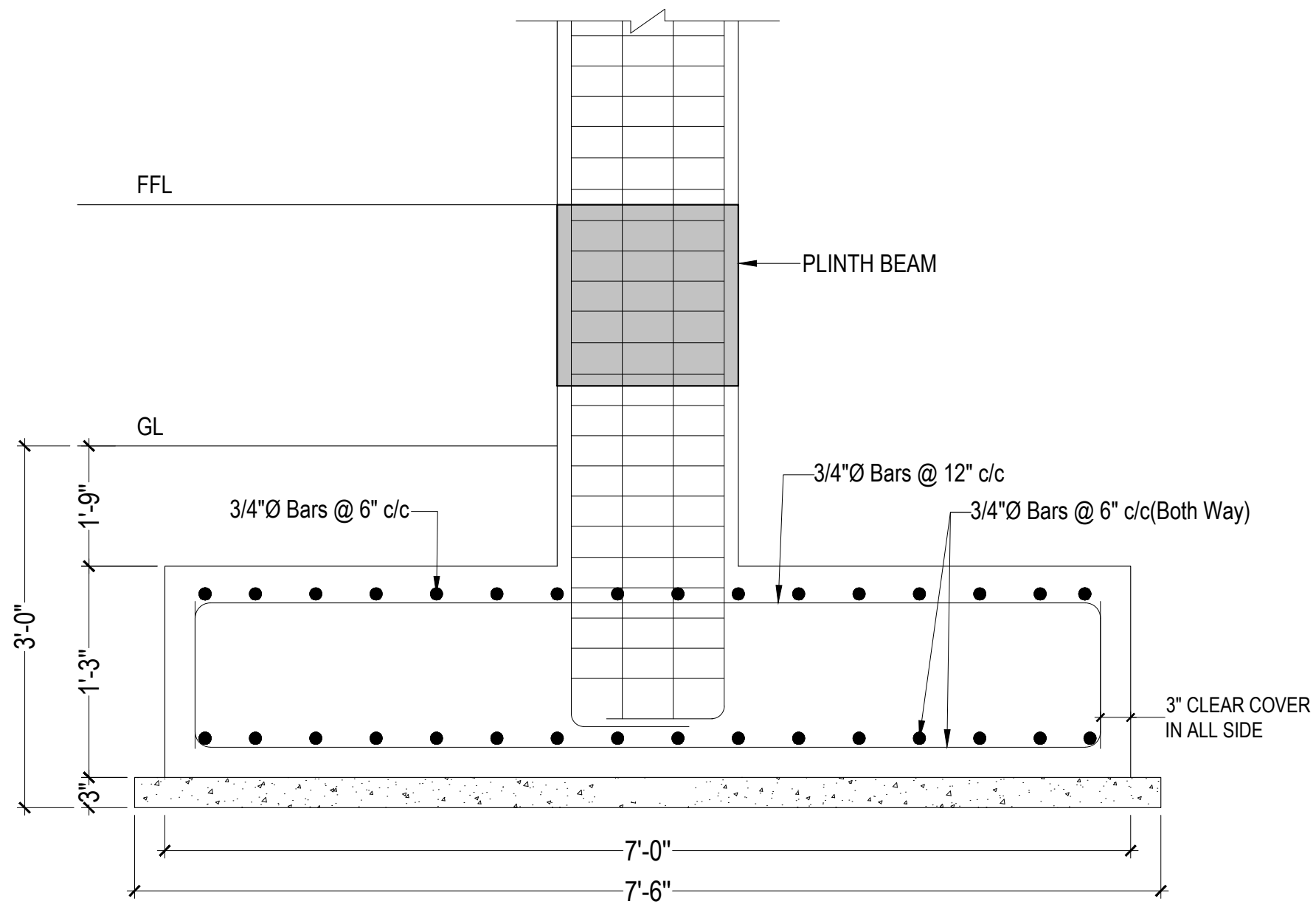
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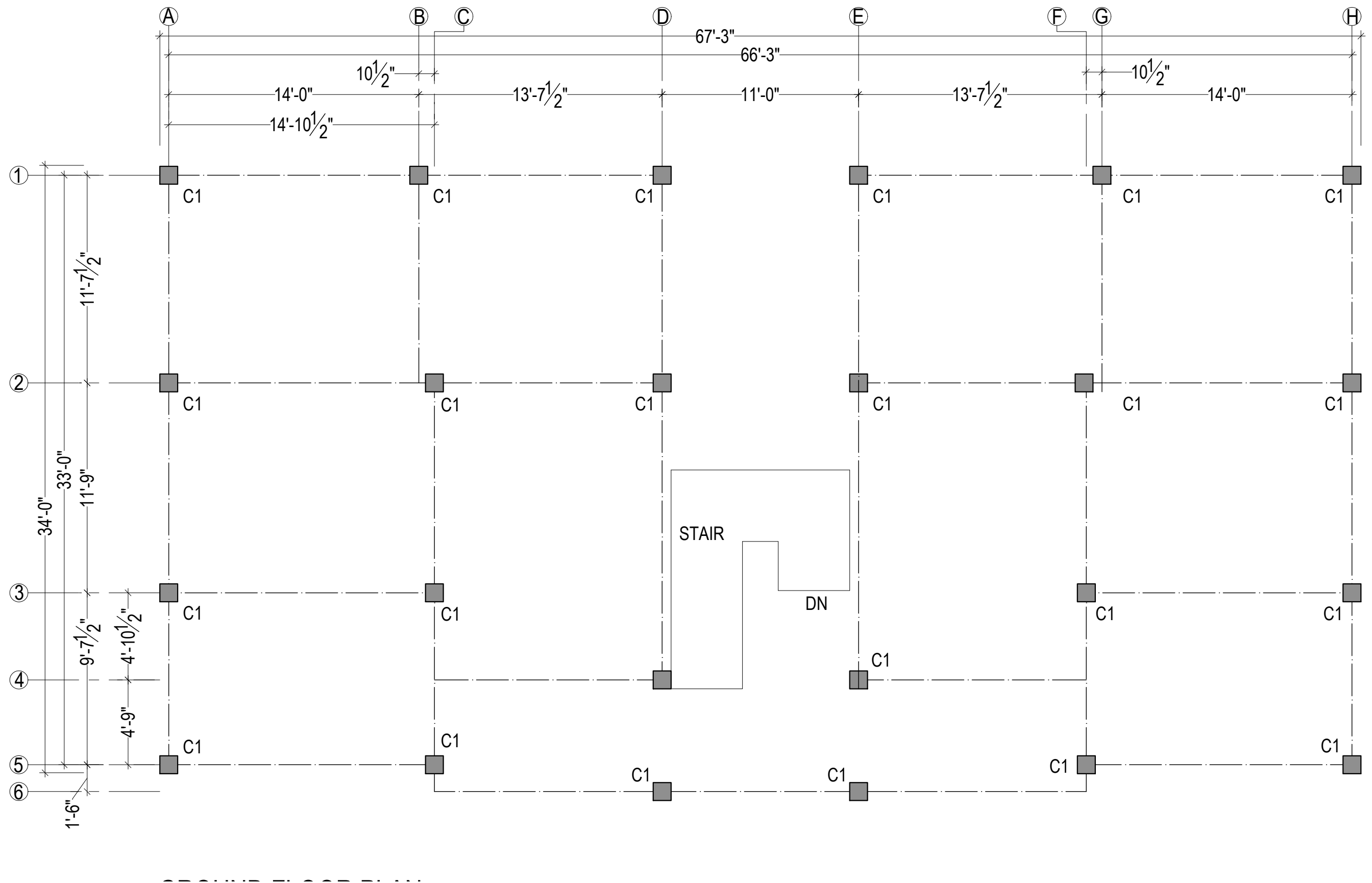


SECTION F1

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TITLE
GROUND FLOOR COLUMN PLAN

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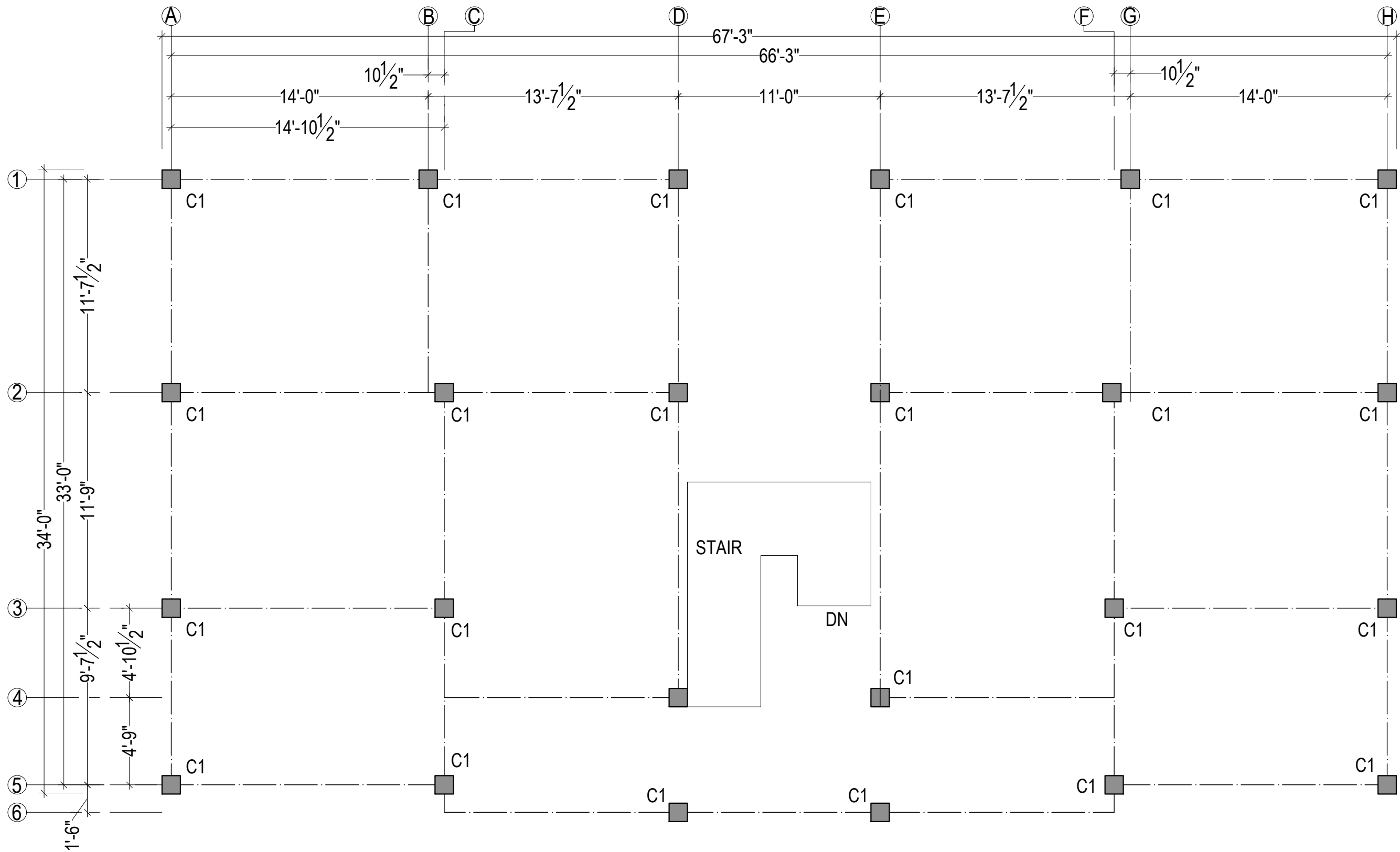
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TITLE
FIRST FLOOR COLUMN PLAN

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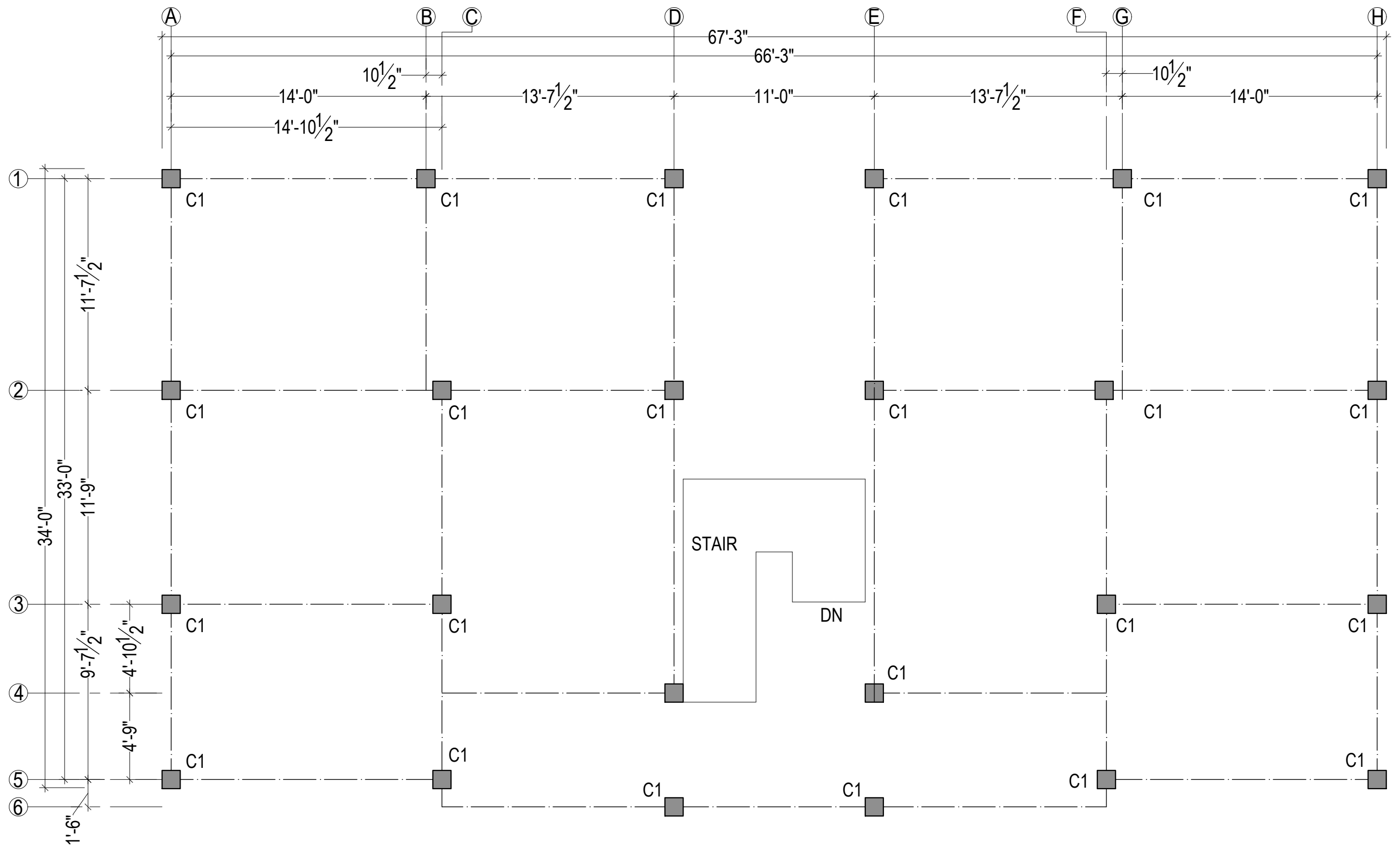
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TITLE
SECOND FLOOR COLUMN PLAN

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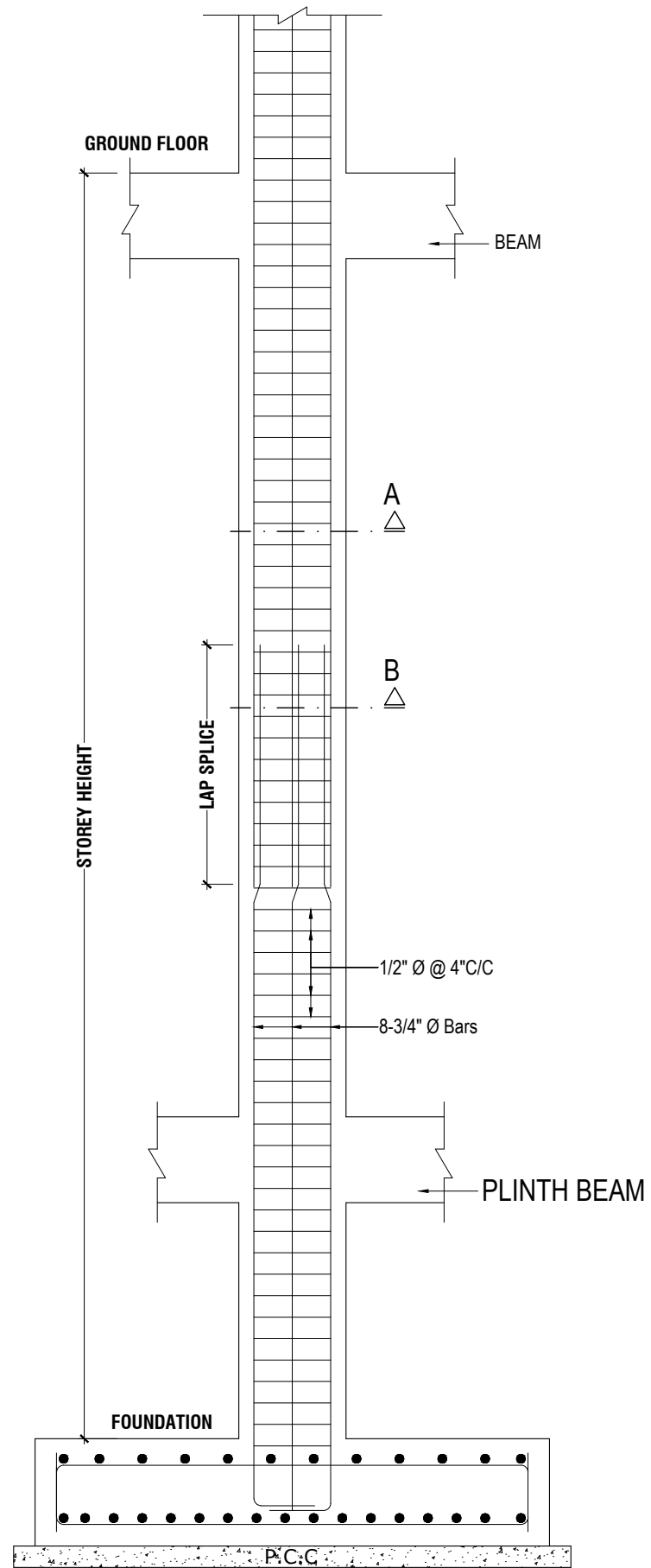
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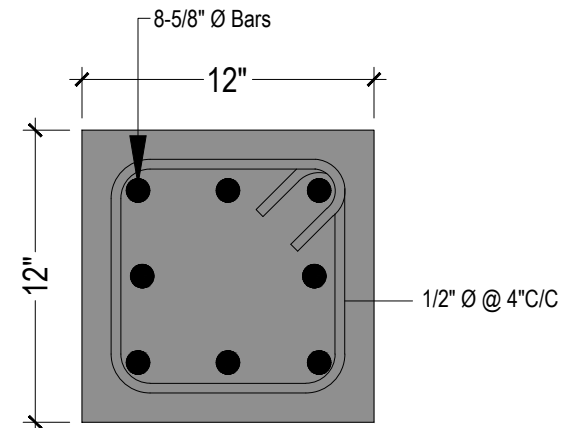


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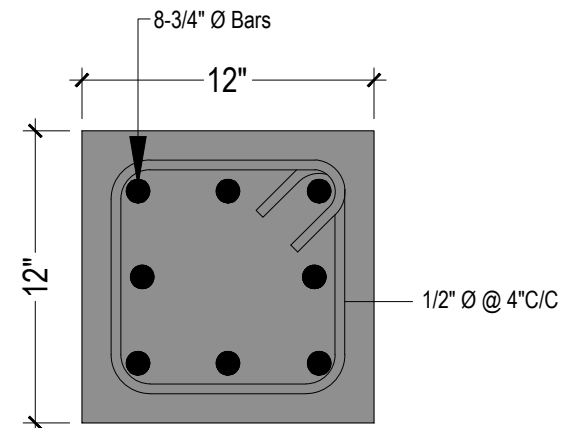
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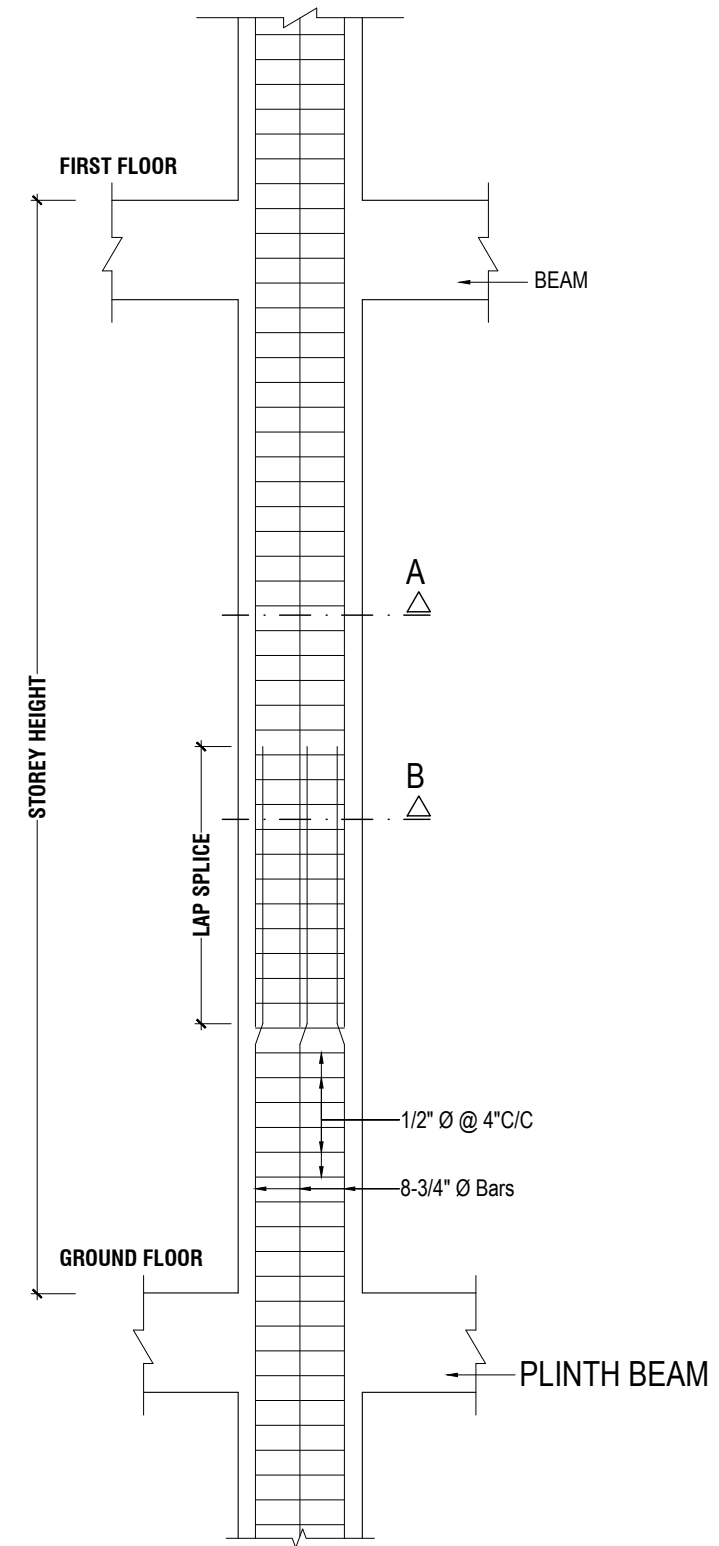
COLUMN C1 DETAIL



SECTION B



SECTION A



COLUMN C1 DETAIL

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TITLE
COLUMN DETAIL

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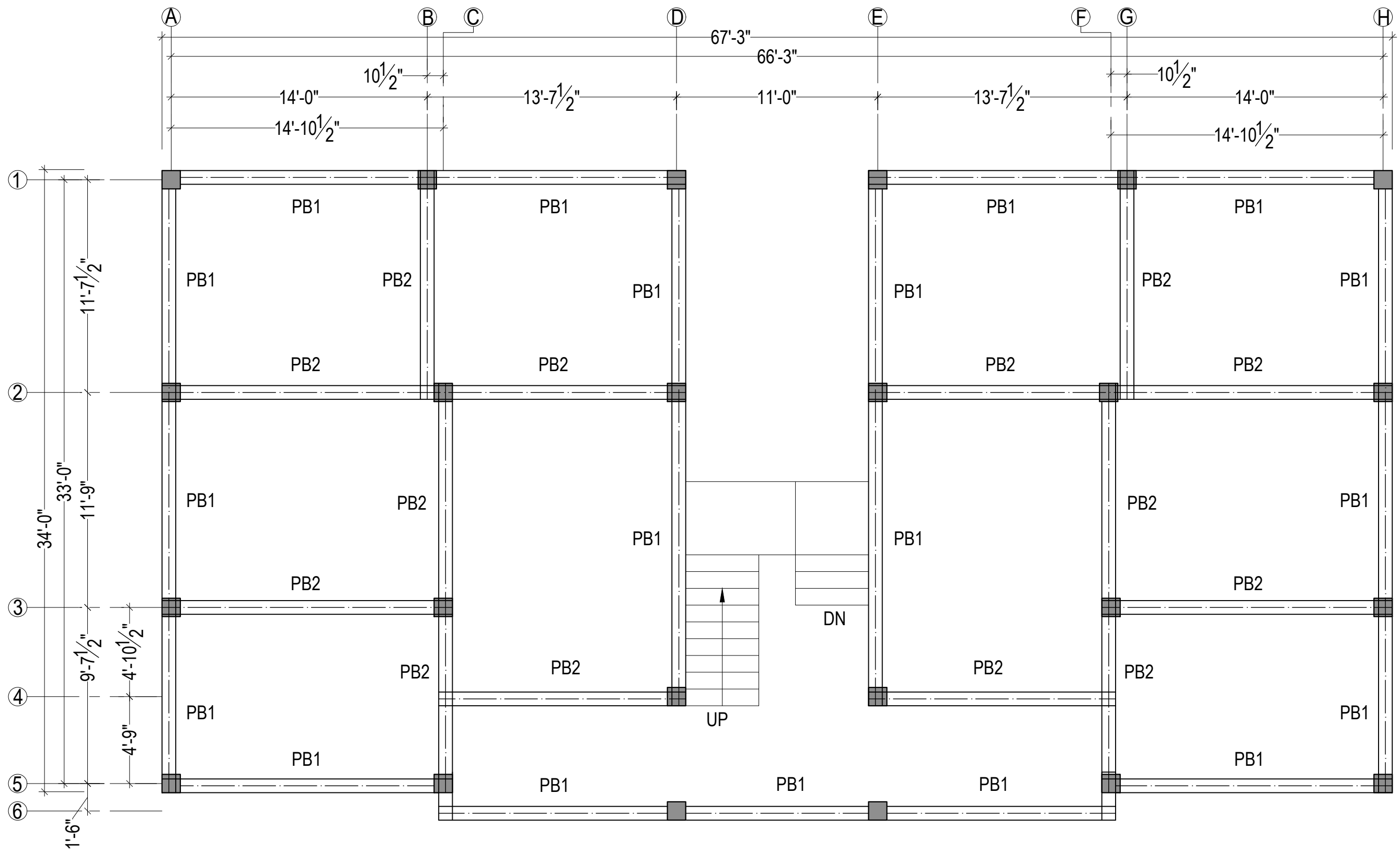
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LOCATION:-
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TITLE
PLINTH BEAM PLAN

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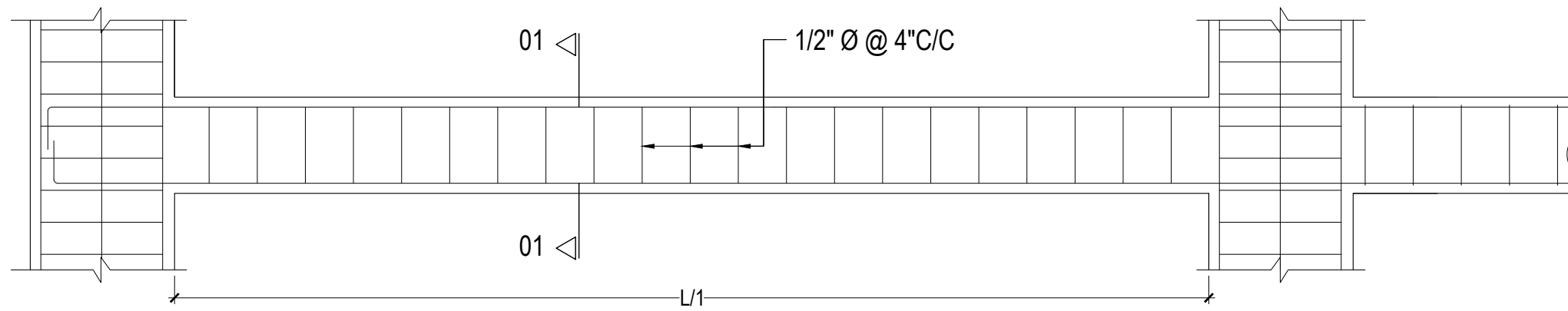
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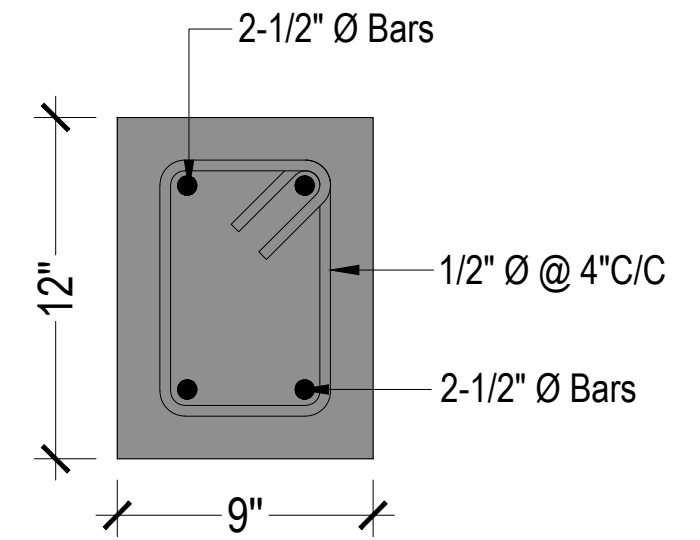


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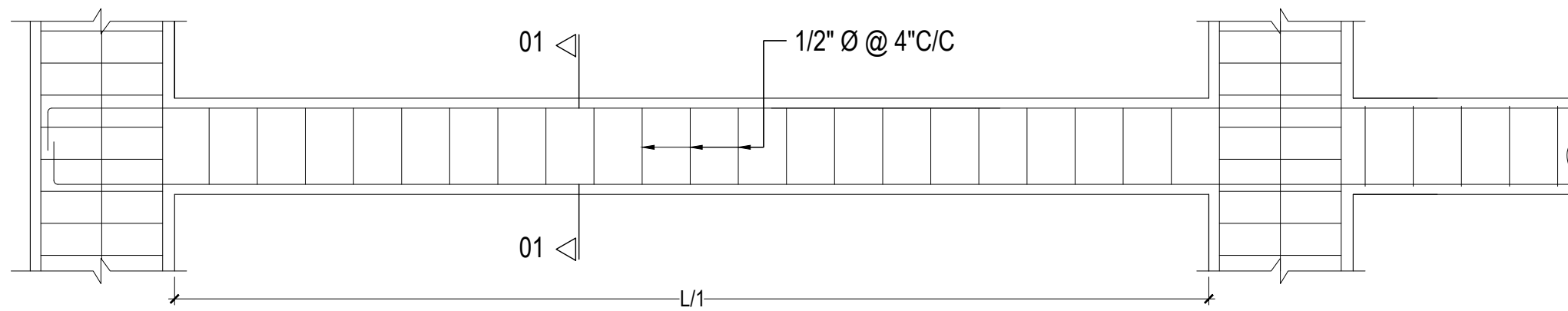
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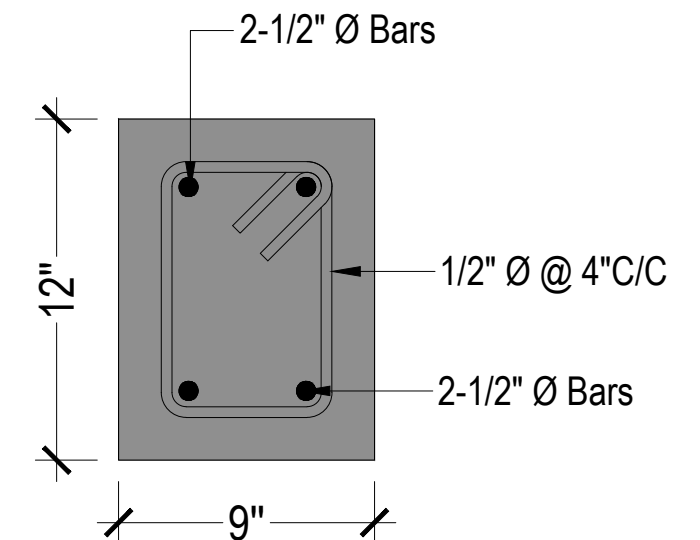
PLINTH BEAM PB1



SECTION 01



PLINTH BEAM PB1

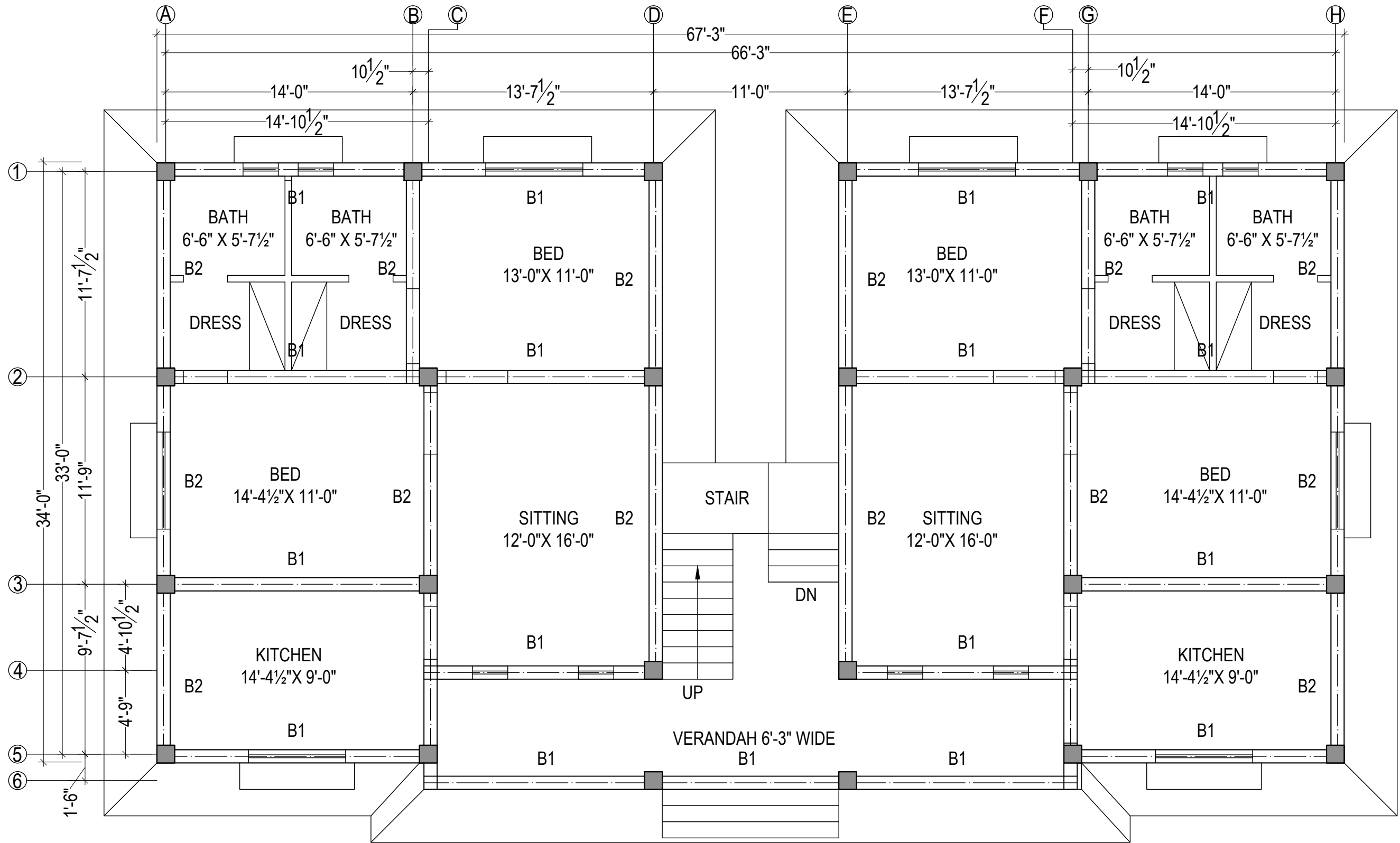


SECTION 02

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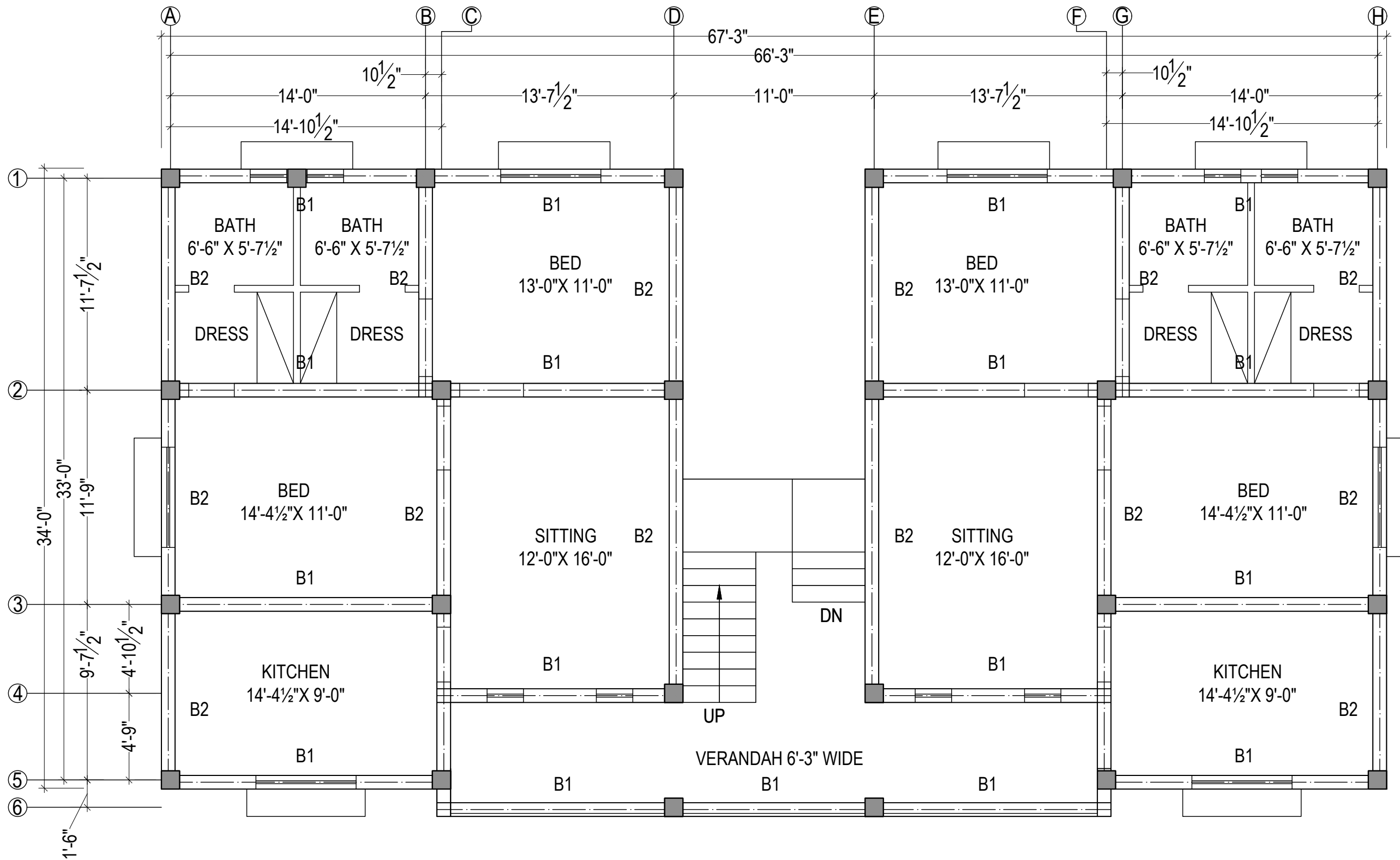


GROUND FLOOR PLAN

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TITLE
FIRST FLOOR FRAMING PLAN

Scale: Read As Shown Dwg. No. **14**

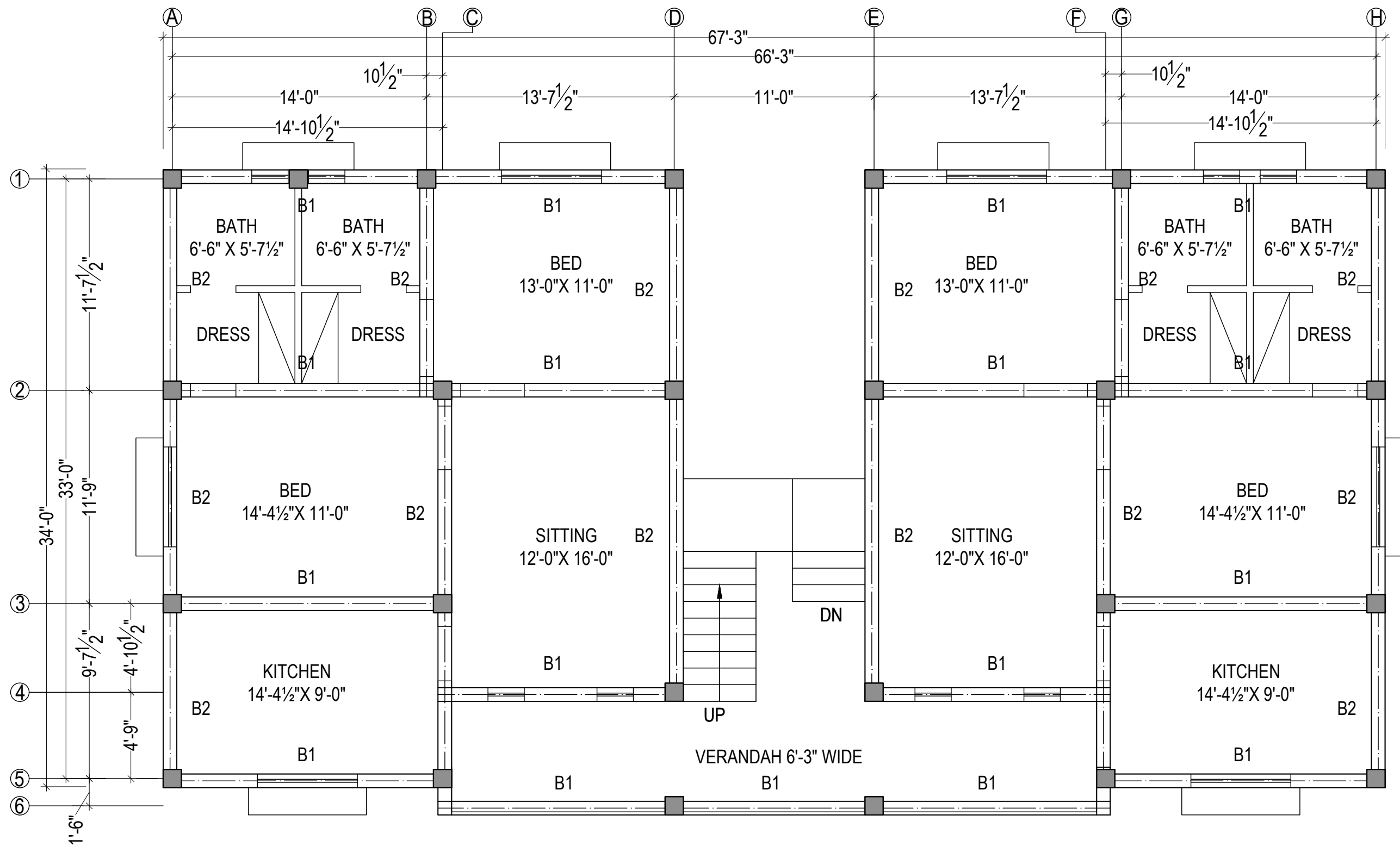
Design by: .
Checked by: .
Drafted by: .
Date: NOVEMBER 2021

REVISION / MODIFICATION		
S/No.	Date	Revision
1		
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E-mail: engg.eta@gmail.com



LOCATION:-
RESIDENCE FLATES

OWNERS:-
.

TITLE
SECOND FLOOR FRAMING PLAN

Scale: Read As Shown Dwg. No. **15**

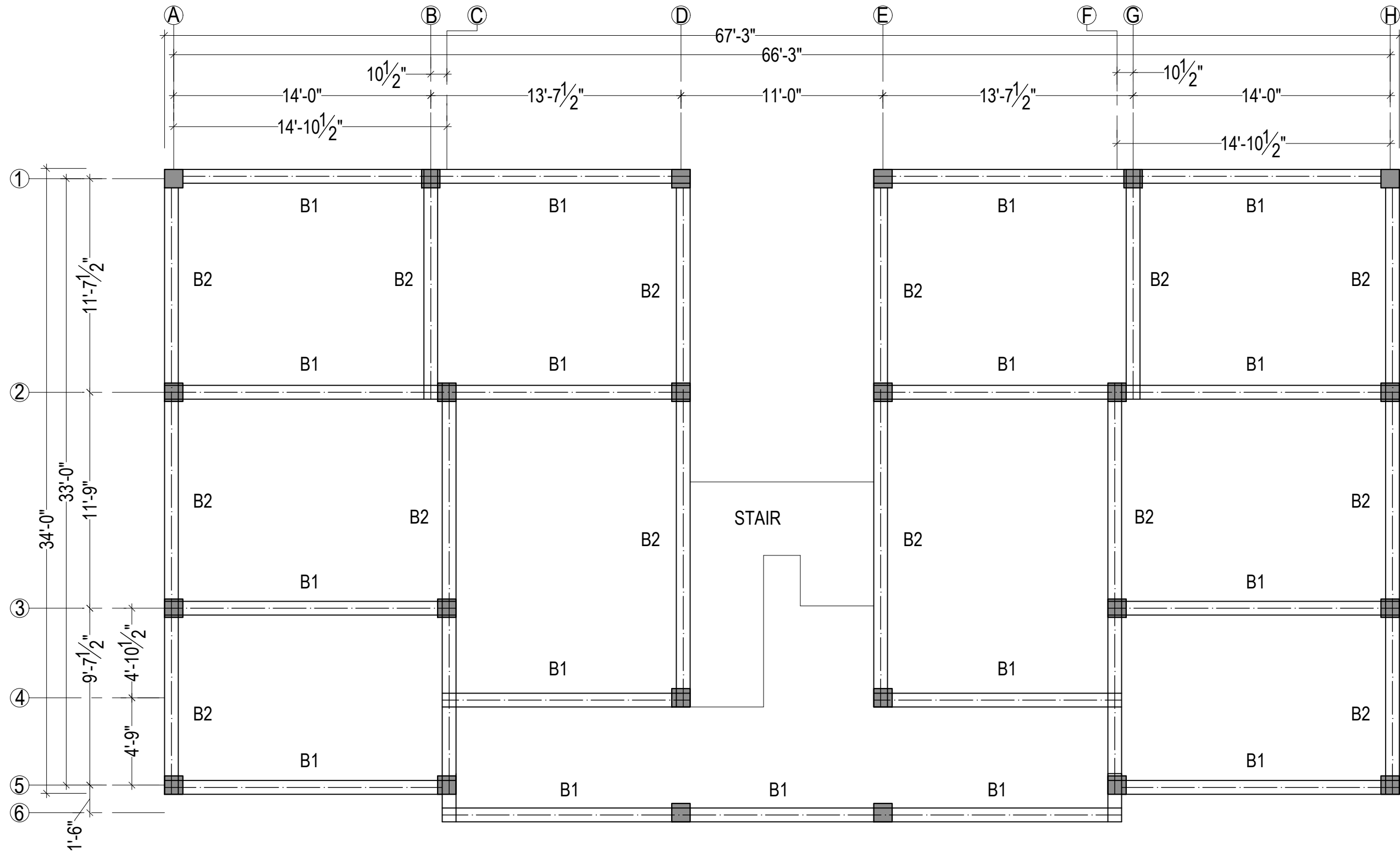
Design by: .
Checked by: .
Drafted by: .
Date: NOVEMBER 2021

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LOCATION:-
RESIDENCE FLATES

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TITLE
GROUND FLOOR BEAM PLAN

Scale: Read As Shown Dwg. No. **16**

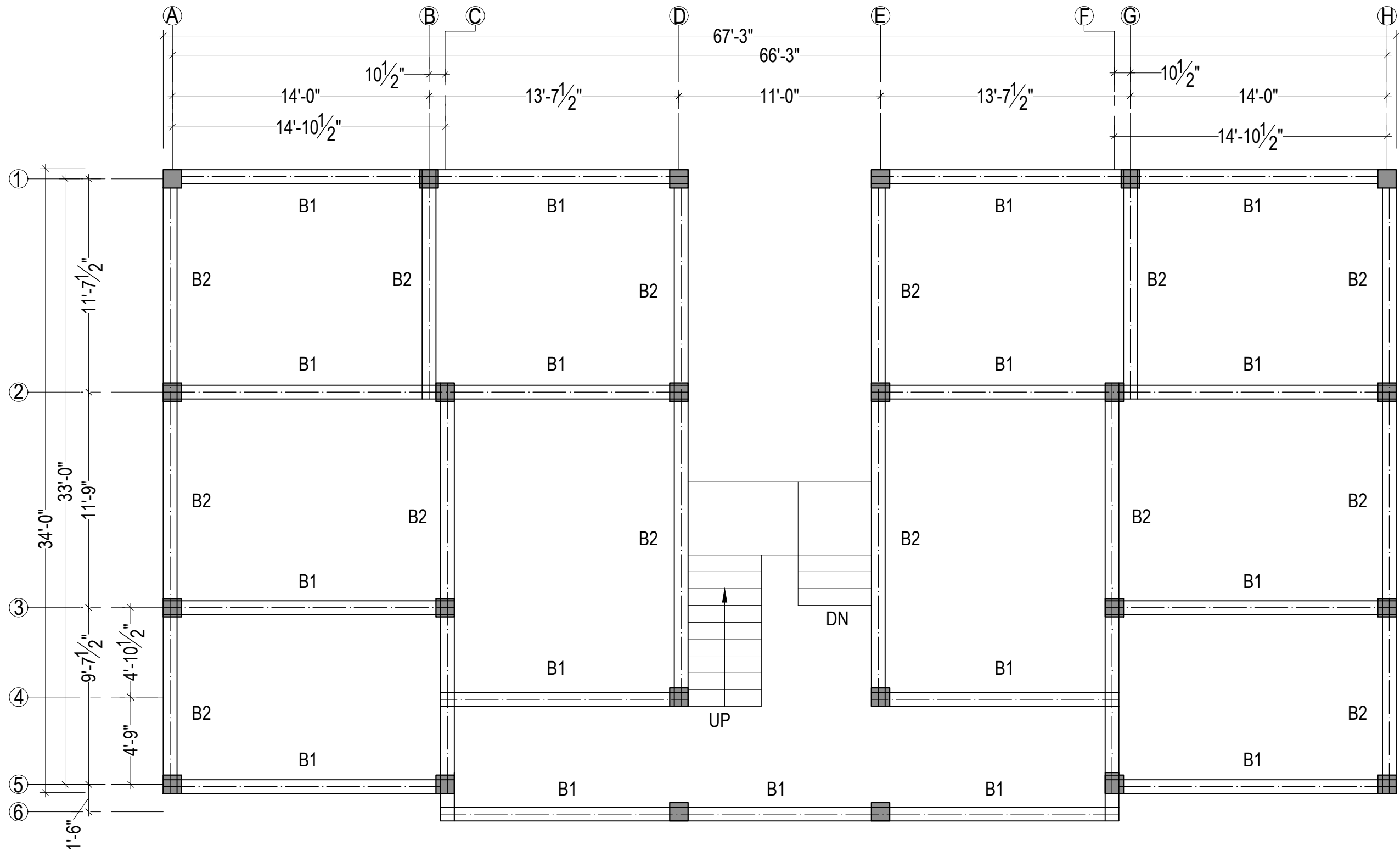
Design by: .
Checked by: .
Drafted by: .
Date: **NOVEMBER 2021**

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LOCATION:-
RESIDENCE FLATES

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TITLE
FIRST FLOOR BEAM PLAN

Scale: Read As Shown Dwg. No. 17

Design by: .

Checked by: .

Drafted by: .

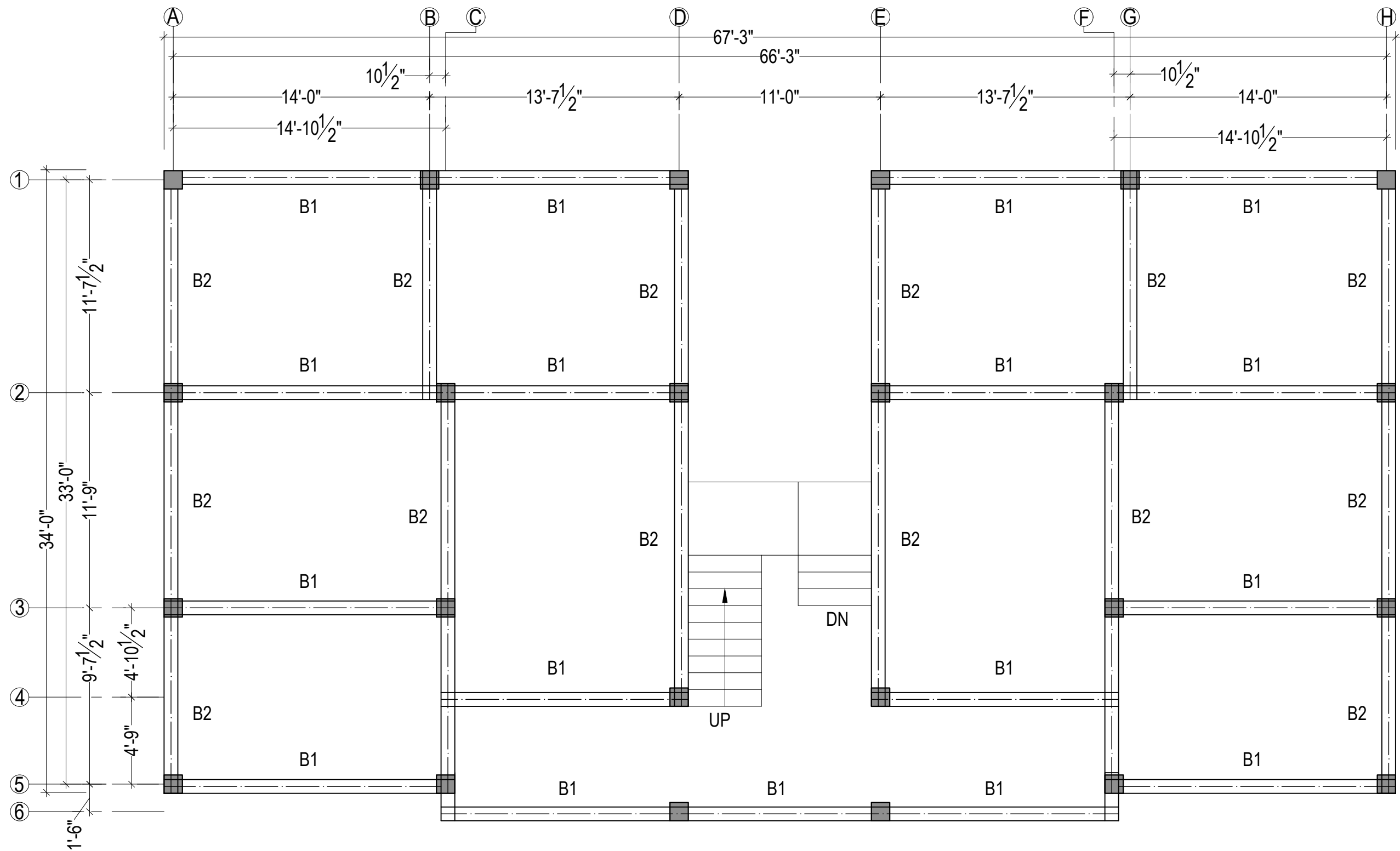
Date: NOVEMBER 2021

REVISION / MODIFICATION		
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1		
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LOCATION:-
RESIDENCE FLATES

OWNERS:-

TITLE
SECOND FLOOR BEAM PLAN

Scale: Read As Shown Dwg. No. 18

Design by: .

Checked by: .

Drafted by: .

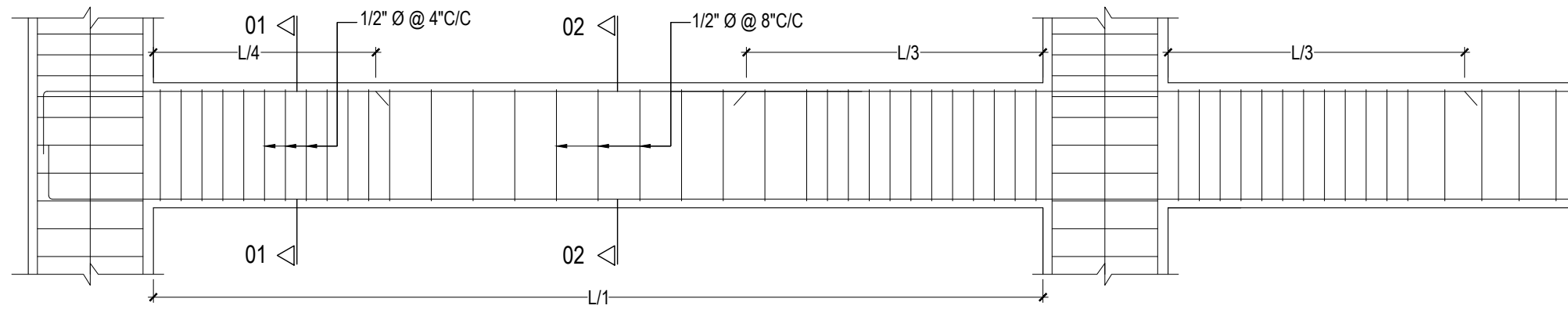
Date: NOVEMBER 2021

REVISION / MODIFICATION		
S/No.	Date	Revision
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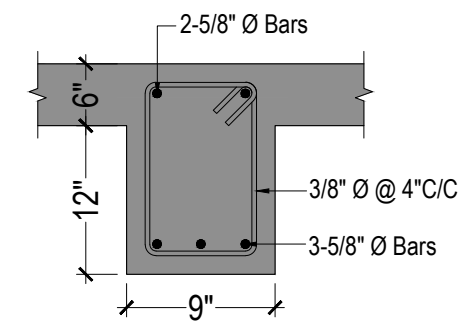


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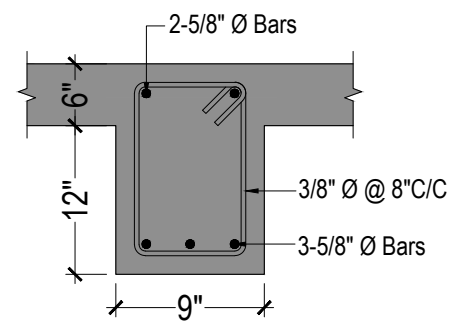
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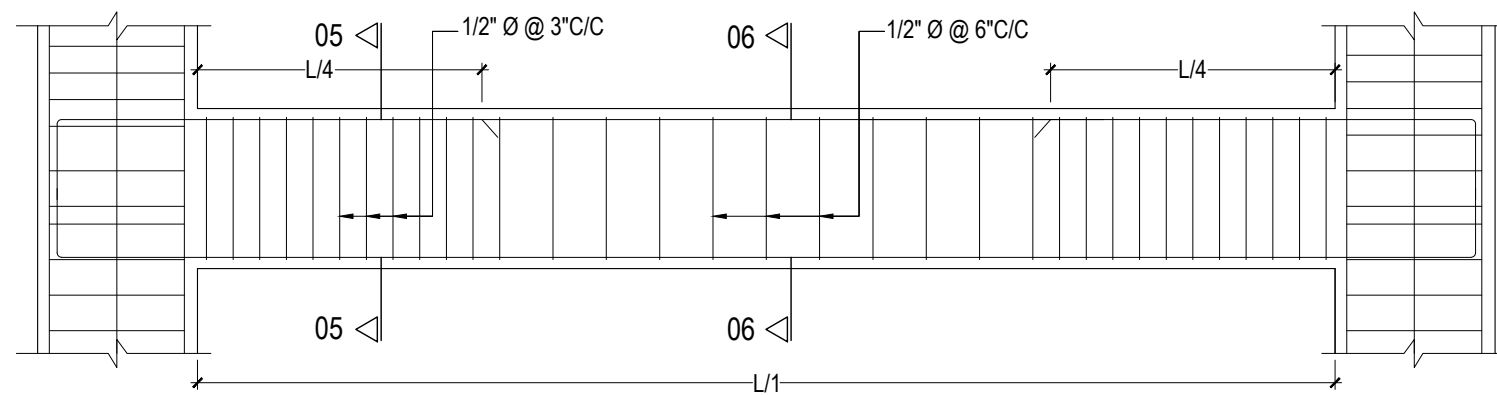
BEAM B1



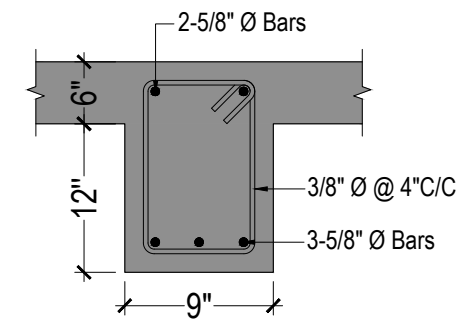
SECTION 01



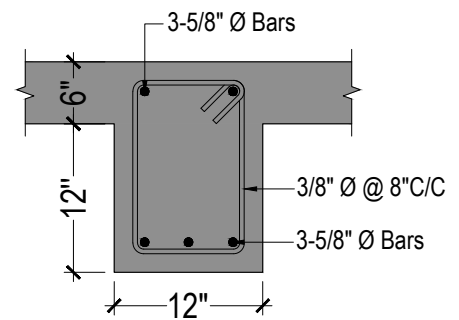
SECTION 02



BEAM B3



SECTION 03



SECTION 04

LOCATION:-
RESIDENCE FLATES

OWNERS:-

TITLE
BEAM DETAIL

Scale: Read As Shown

Dwg. No. 19

Design by:

Checked by:

Drafted by:

Date:

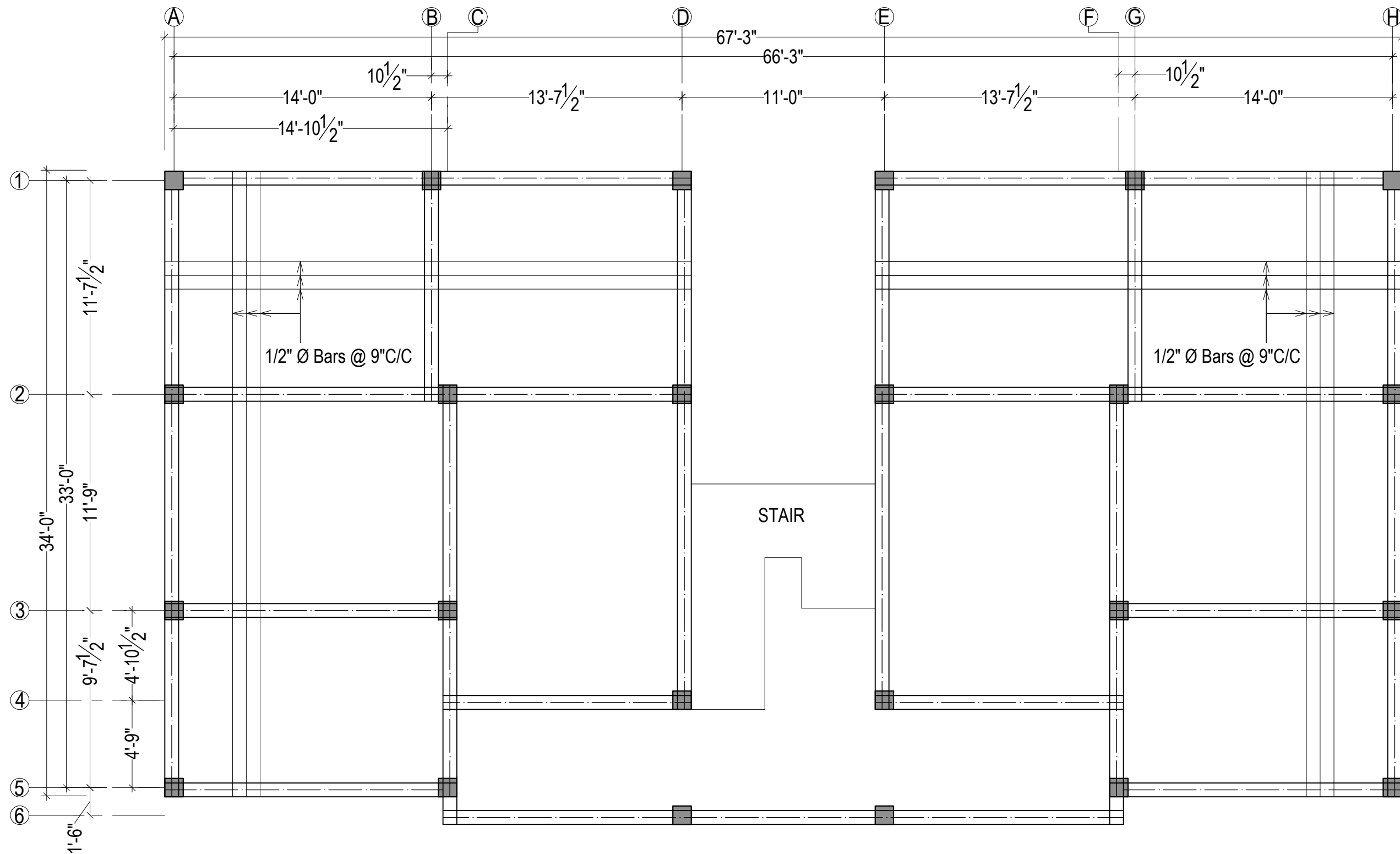
NOVEMBER 2021

REVISION / MODIFICATION

S/No.	Date	Revision
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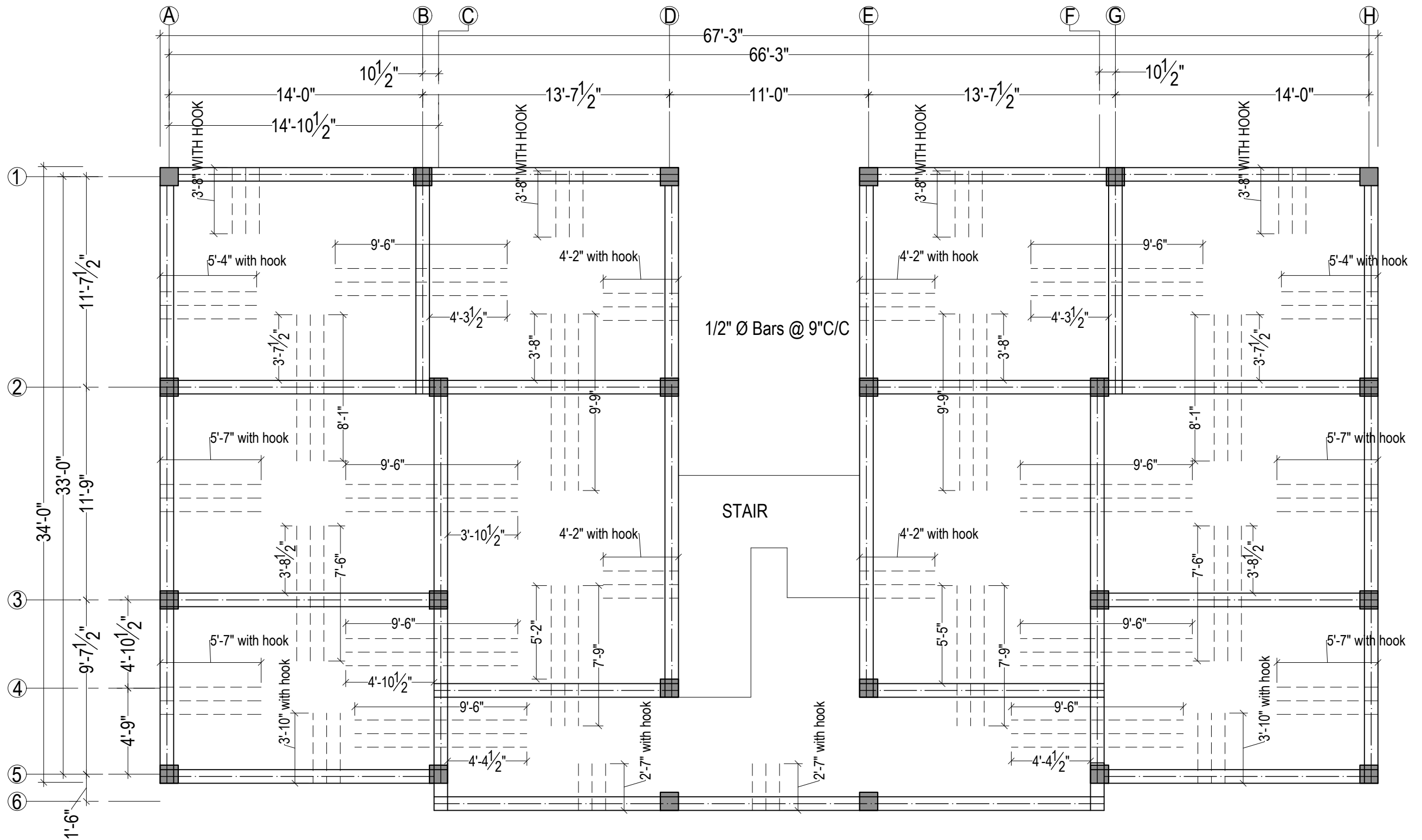


BOTTOM CONTINUOUS REINFORCEMENT SLAB PLAN

LOCATION:- RESIDENCE FLATES	OWNERS:- .	TITLE	Design by:	REVISION / MODIFICATION		
		GROUND FLOOR SLAB PLAN	Checked by:	S/No.	Date	Revision
		Scale: Read As Shown	Drafted by:	1		
		Dwg. No. 20	Date:	2		
			NOVEMBER 2021	3		
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TOP EXTRA REINFORCEMENT SLAB

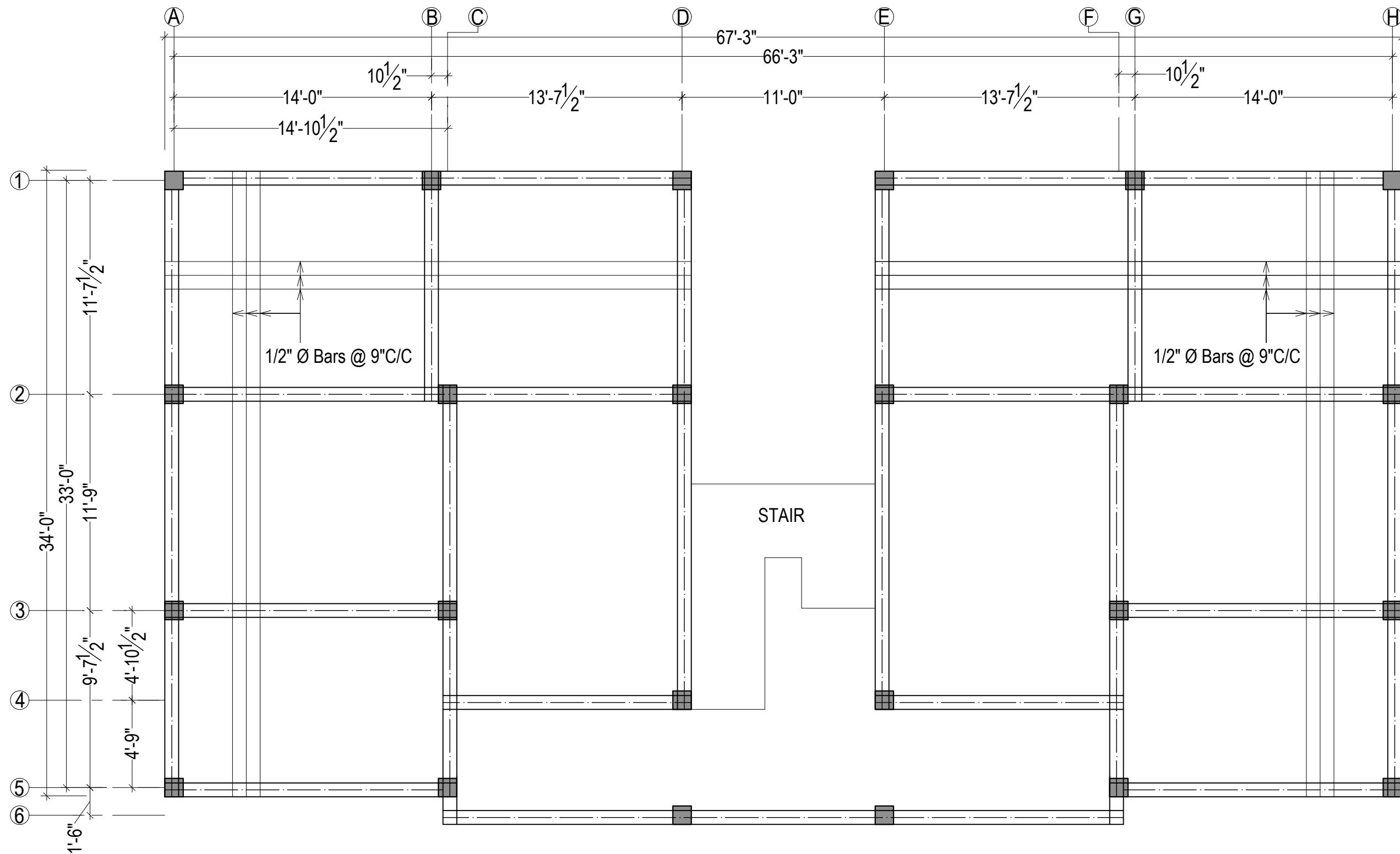
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TITLE GROUND FLOOR SLAB PLAN	Scale: Read As Shown	Dwg. No. 21
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Design by:	.
Checked by:	.
Drafted by:	.
Date:	NOVEMBER 2021

REVISION / MODIFICATION		
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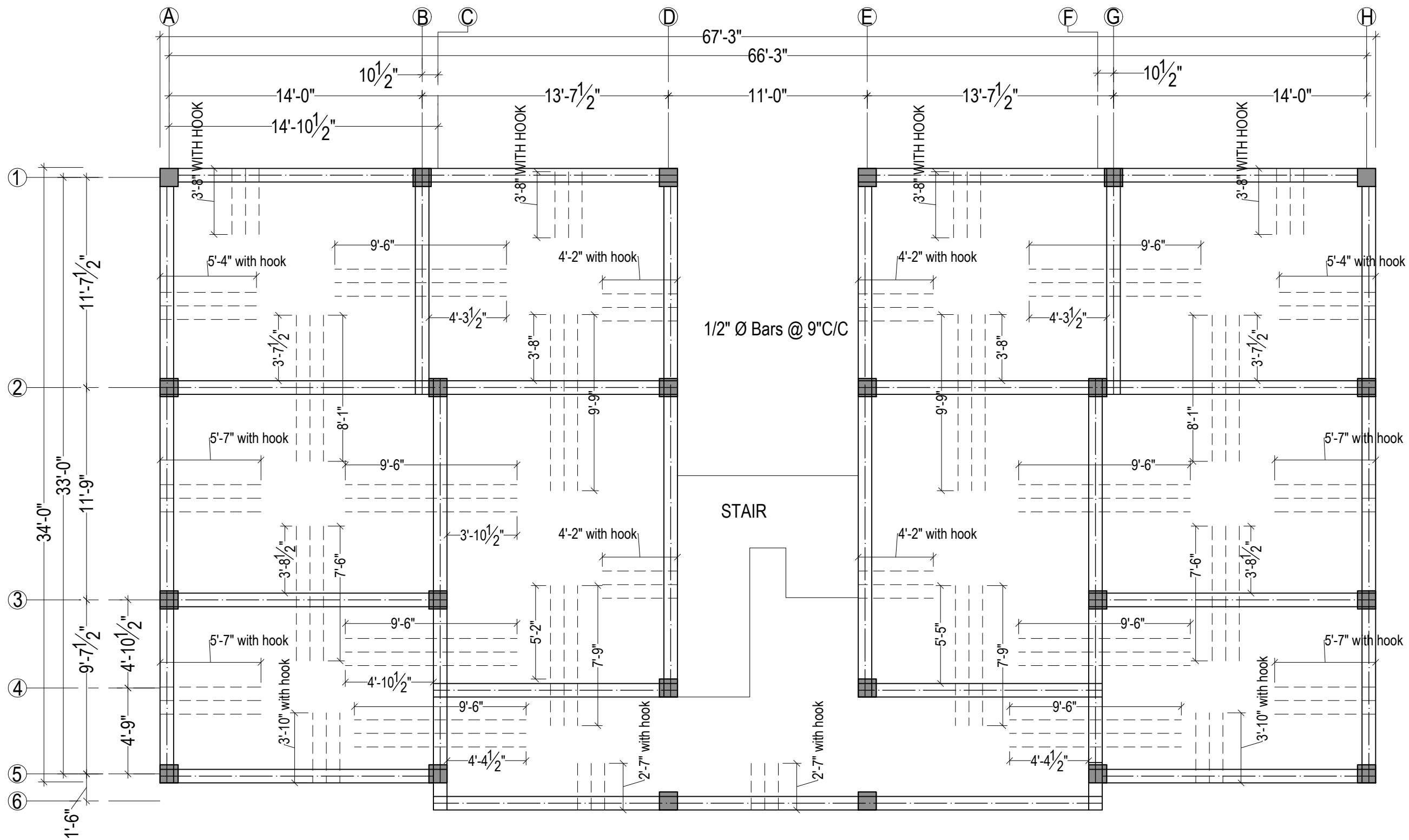


BOTTOM CONTINUOUS REINFORCEMENT SLAB PLAN

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		Scale: Read As Shown	Dwg. No. 22	Drafted by:	.	1		
				Date:	NOVEMBER 2021	2		
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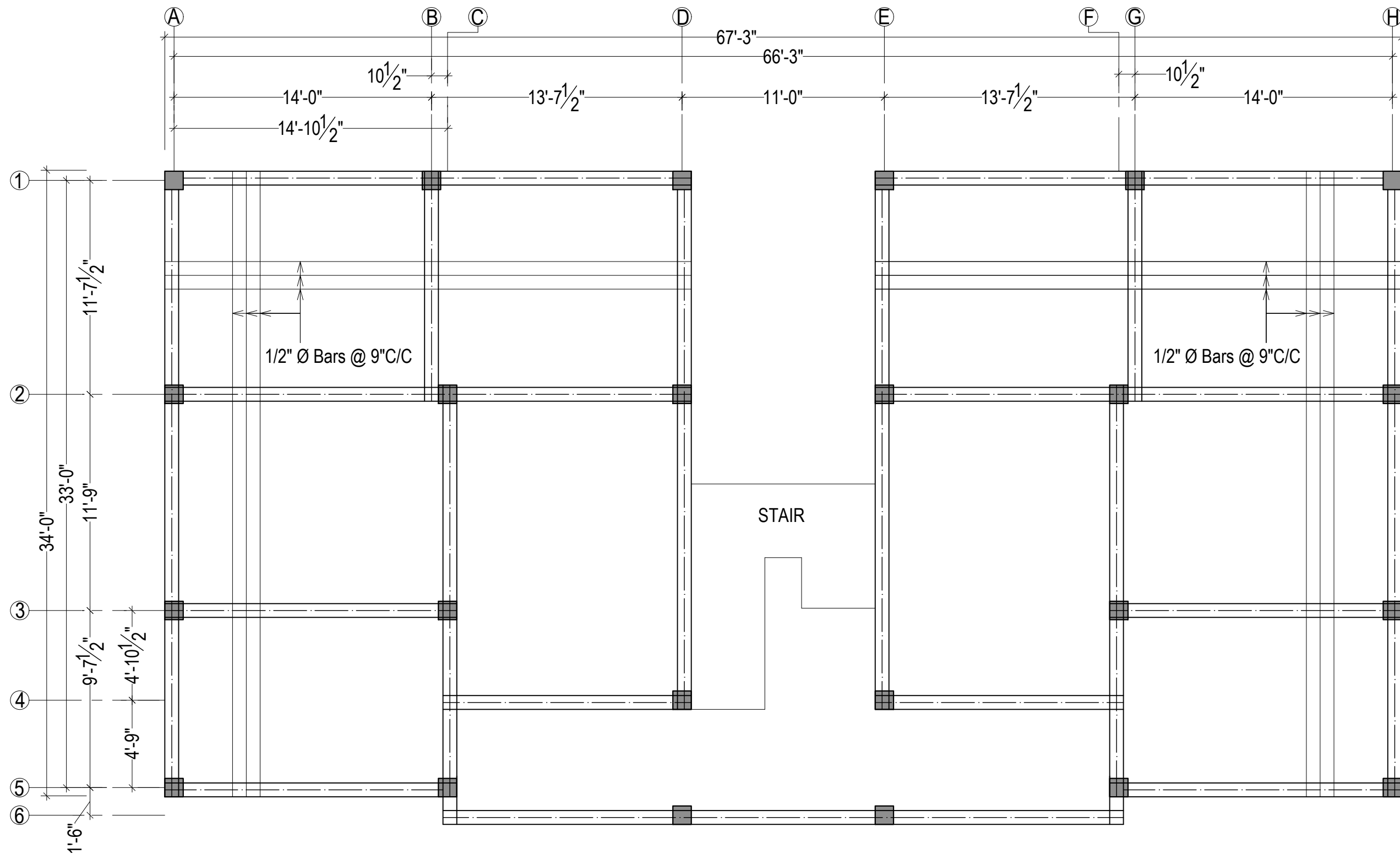


TOP EXTRA REINFORCEMENT SLAB

LOCATION:- RESIDENCE FLATES	OWNERS:- .	TITLE		Design by:	REVISION / MODIFICATION		
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		Scale: Read As Shown	Dwg. No. 23	Drafted by:	1		
				Date: NOVEMBER 2021	2		
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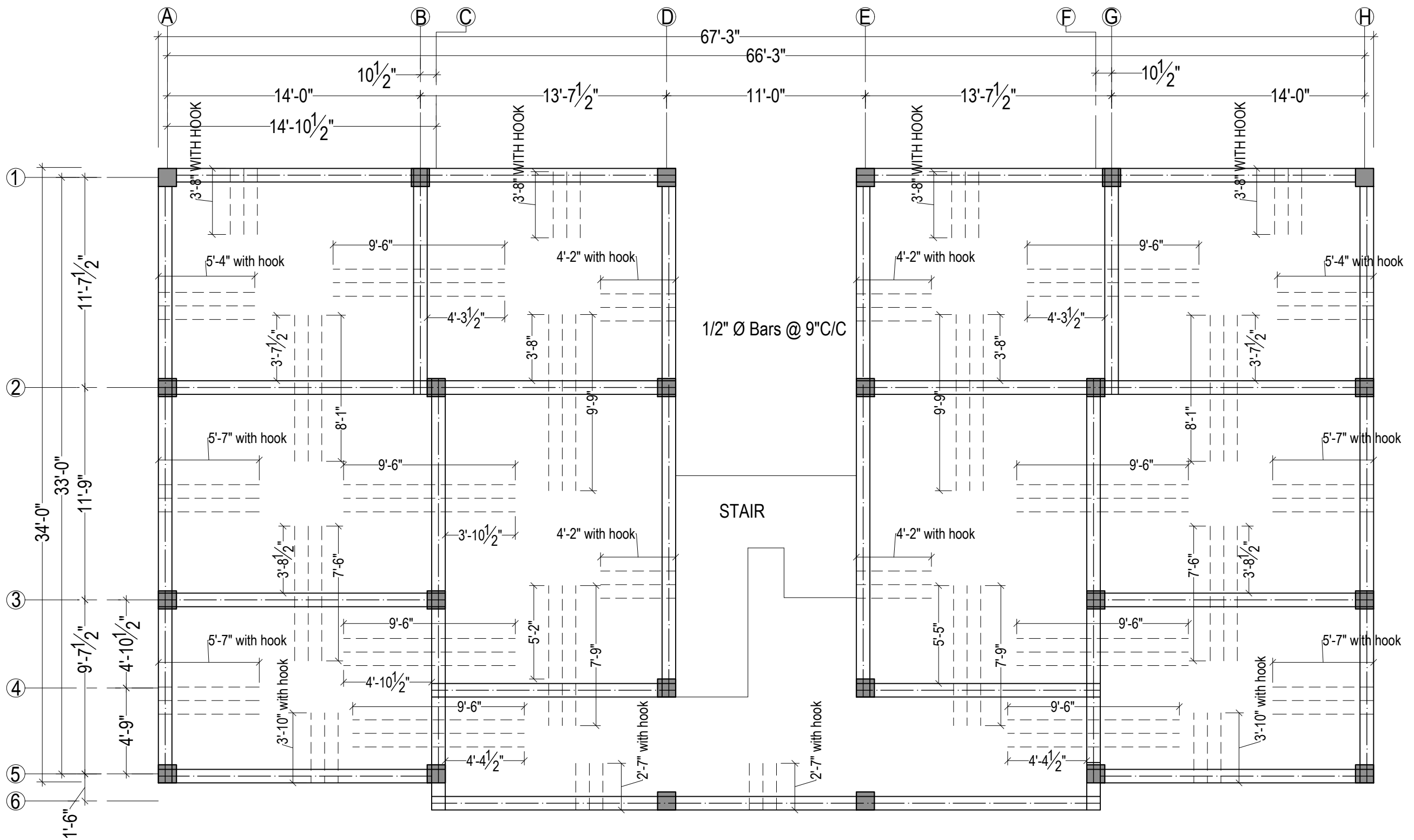


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LOCATION:- RESIDENCE FLATES	OWNERS:- .	TITLE		Design by:	.	REVISION / MODIFICATION		
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		Scale: Read As Shown	Dwg. No. 24	Drafted by:	.	1		
				Date:	NOVEMBER 2021	2		
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TOP EXTRA REINFORCEMENT SLAB

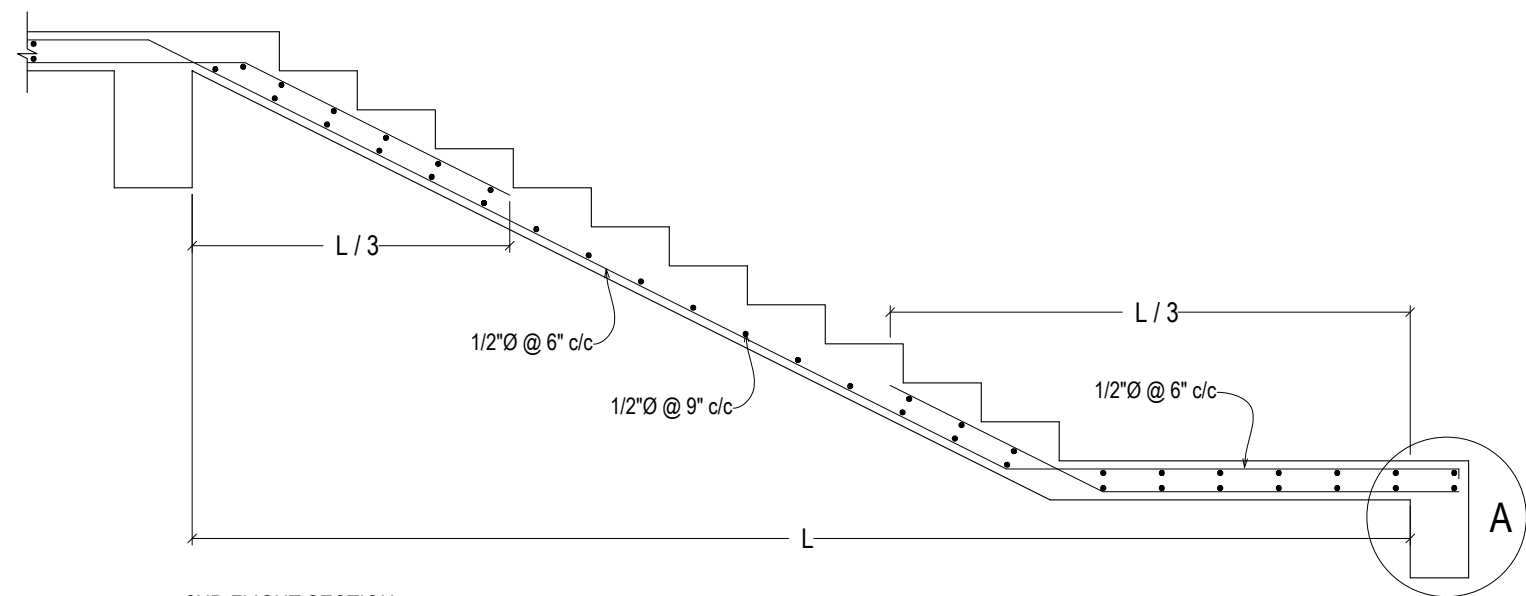
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Dwg. No. 25	Drafted by: .
Date: NOVEMBER 2021	

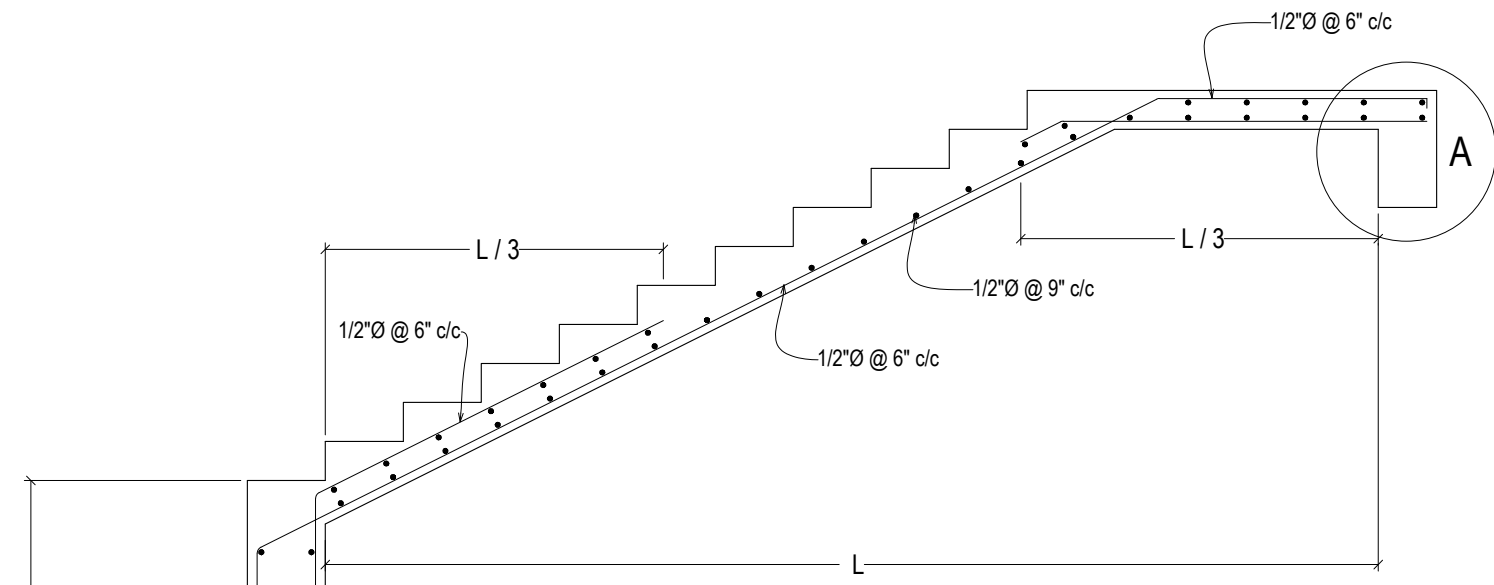
REVISION / MODIFICATION		
S/No.	Date	Revision
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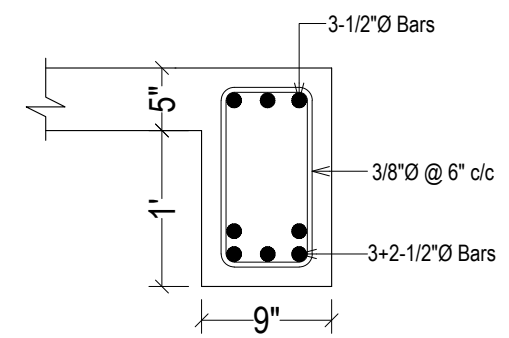
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2ND FLIGHT SECTION



FIRST FLIGHT SECTION



DETAIL A

LOCATION:-
RESIDENCE FLATES

OWNERS:-
.

TITLE
STAIR DETAIL

Scale: Read As Shown Dwg. No. **26**

Design by: .
Checked by: .
Drafted by: .
Date: **NOVEMBER 2021**

REVISION / MODIFICATION		
S/No.	Date	Revision
1		
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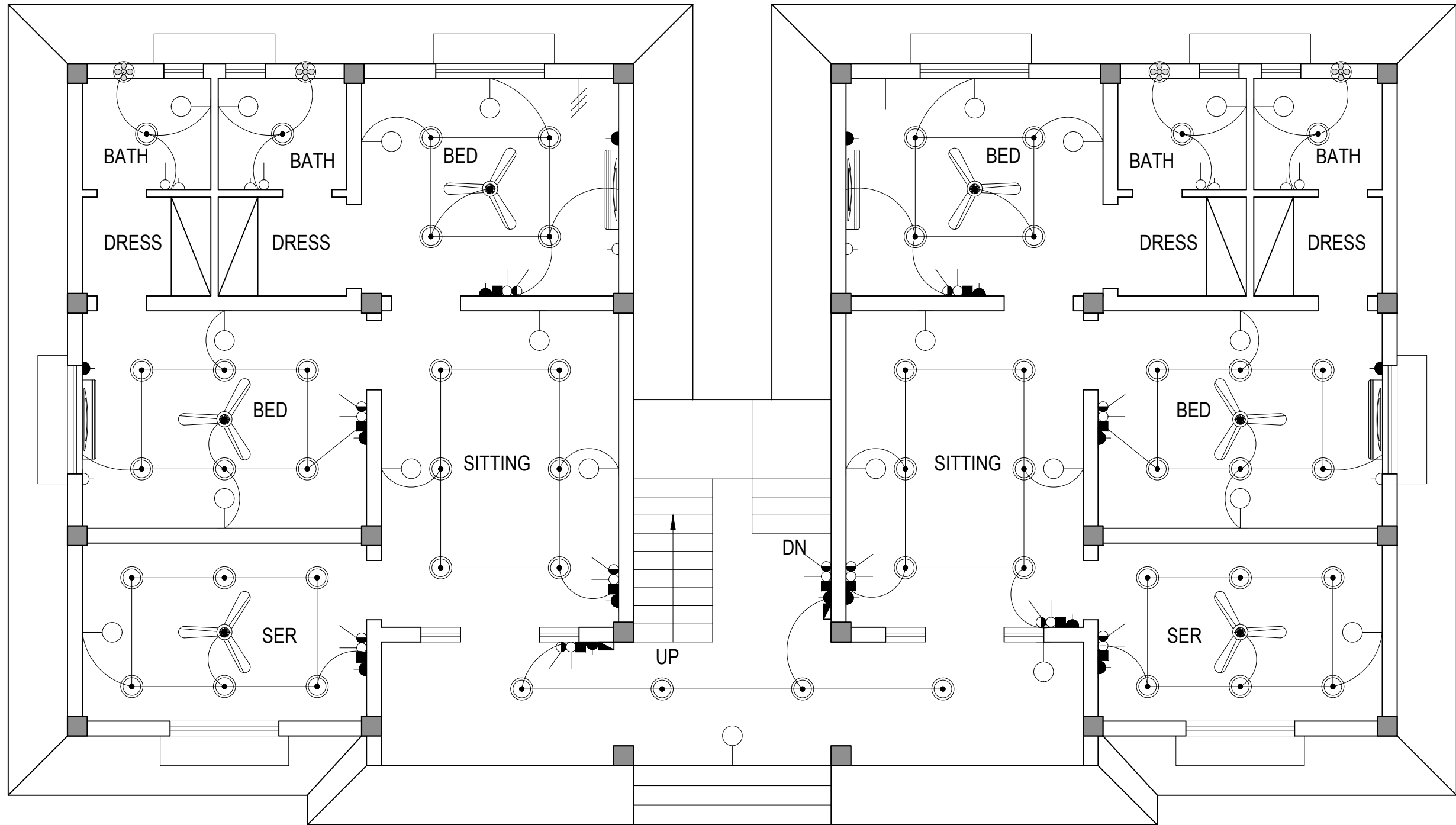
ELECTRICAL



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LOCATION:-
RESIDENCE FLATES

OWNERS:-

TITLE
GROUND FLOOR PLAN

Scale: Read As Shown

Dwg. No. E1

Design by:

Checked by:

Drafted by:

Date:

NOVEMBER 2021

REVISION / MODIFICATION

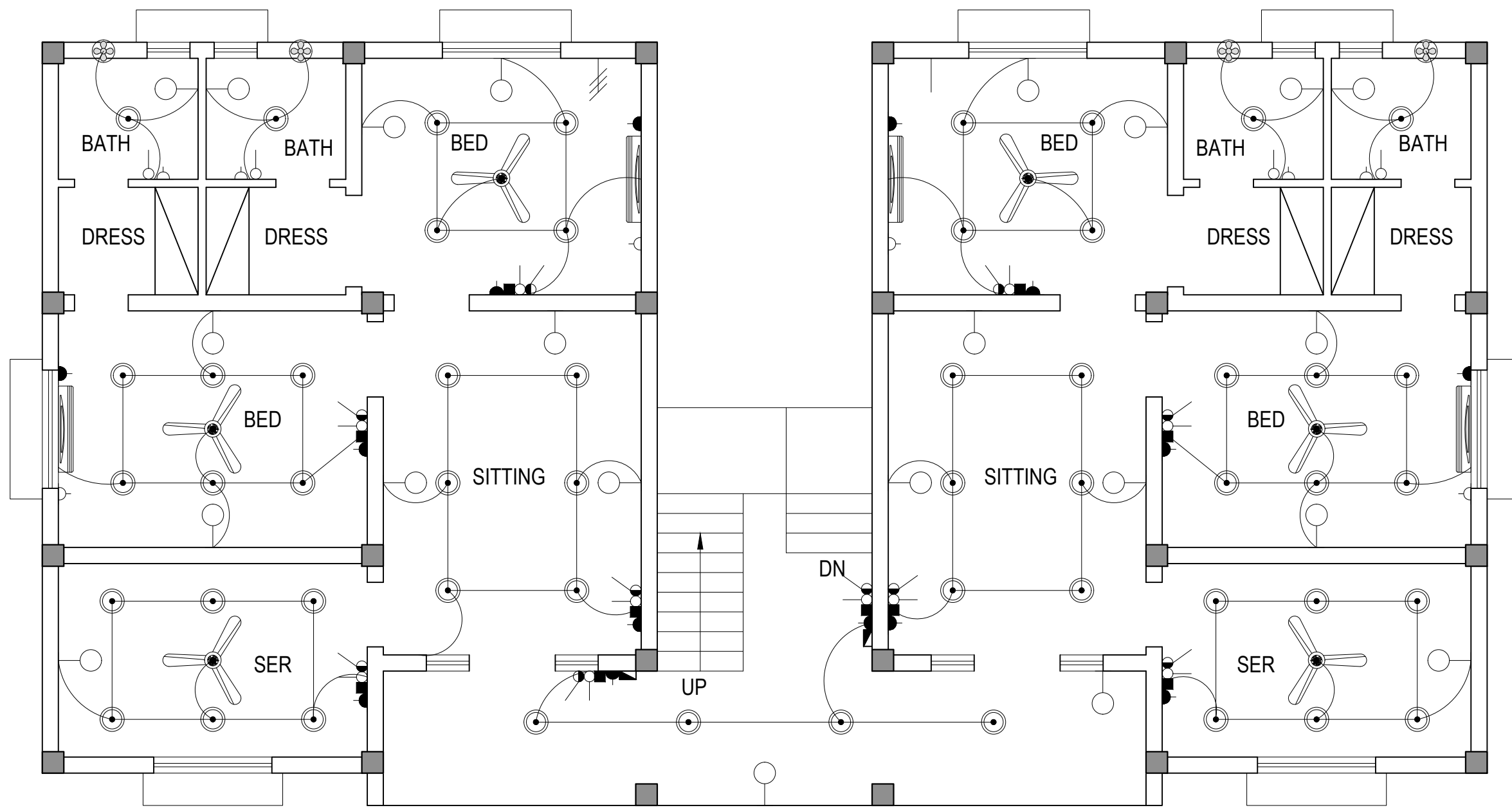
S/No.	Date	Revision
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LOCATION:-
RESIDENCE FLATES

OWNERS:-
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TITLE
FIRST FLOOR PLAN

Scale: Read As Shown Dwg. No. E2

Design by: .

Checked by: .

Drafted by: .

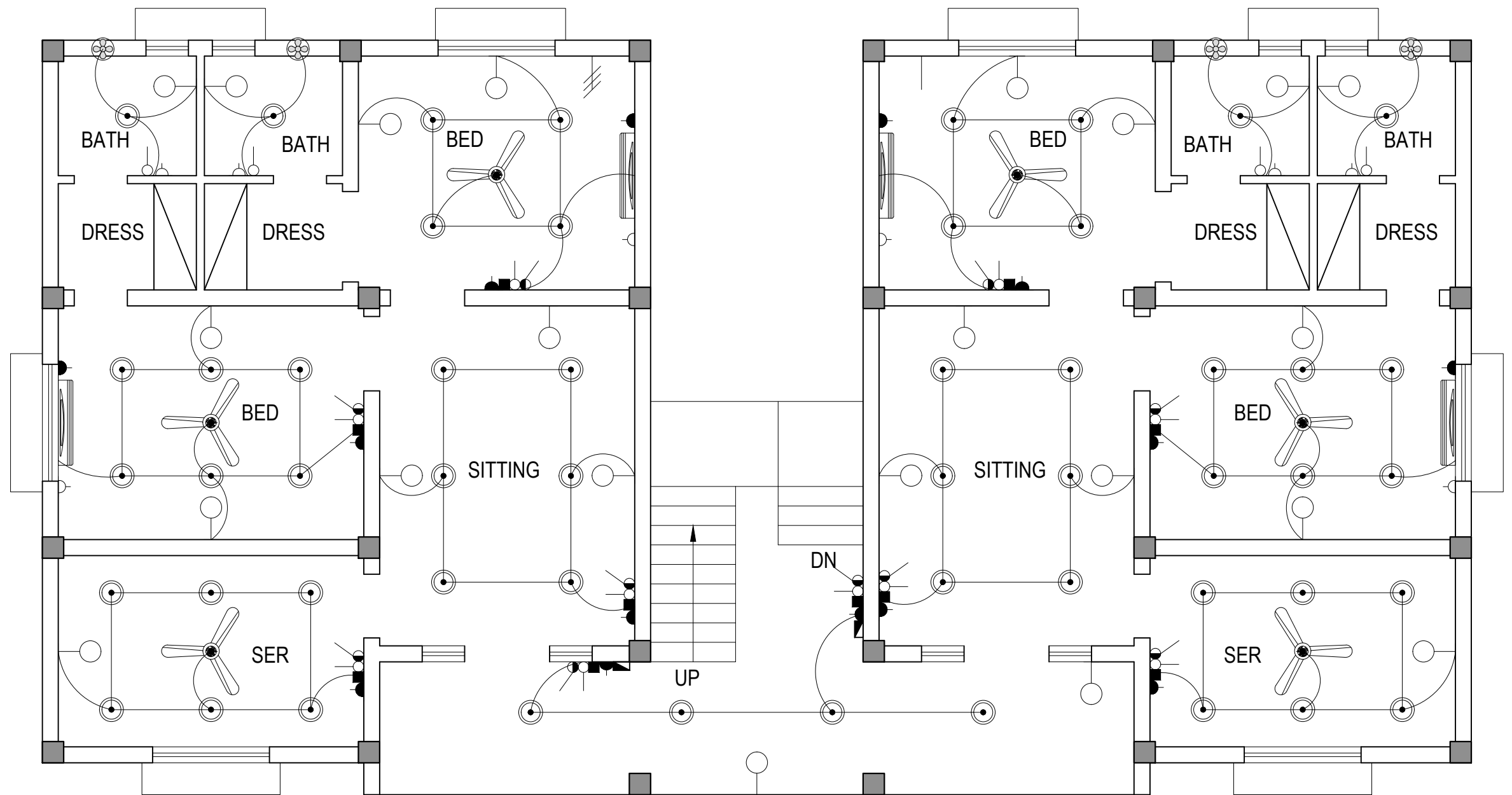
Date: NOVEMBER 2021

REVISION / MODIFICATION		
S/No.	Date	Revision
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LOCATION:-
RESIDENCE FLATES

OWNERS:-

TITLE
SECOND FLOOR PLAN

Scale: Read As Shown

Dwg. No. E3

Design by:

Checked by:

Drafted by:

Date:

NOVEMBER 2021

REVISION / MODIFICATION



S/No.	Date	Revision
1		
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	SWITCH BOARD.
	SPLIT A.C.
	CEILING LIGHT POINT/ HING LIGHT
	FANCY WALL BRACKET LIGHT POINT.
	CEILING FAN POINT 56" SWEEP.
	CEILING FAN POINT 48" SWEEP.
	LIGHT PLUG POINT (15 AMP 2 PIN).
	LIGHT PLUG POINT (15 AMP 3 PIN).
	POWER PLUG POINT (32 AMP 3 PIN).
	TELEPHONE POINT.
	DIMMER POINT.
	ON / OFF SWITCH
	TWO WAY SWITCH.
	ELECTRIC PUSH BUTTON.
	ELECTRIC BELL POINT.
	DISTRIBUTION MAIN SWITCH BOARD.
	EXHAUST FAN POINT.
	TUBE LIGHT POINT.
a.b.c	LIGHT POINT ON RESPECTIVE CIRCUIT.
	INTERCOM.
	T.V.ANTENA OUT LET POINT.
	EARTH POINT.
	CHANDELIER CEILING LIGHT POINT.
	WATER PROOF LIGHT POINT.
	LIGHT WITH PULL DOWN AND PROVIDED IN W/R.
	LIGHTPOINT.
	GARDAN LAMP

LOCATION:- RESIDENCE FLATES	OWNERS:- .	TITLE		Design by:	.	REVISION / MODIFICATION		
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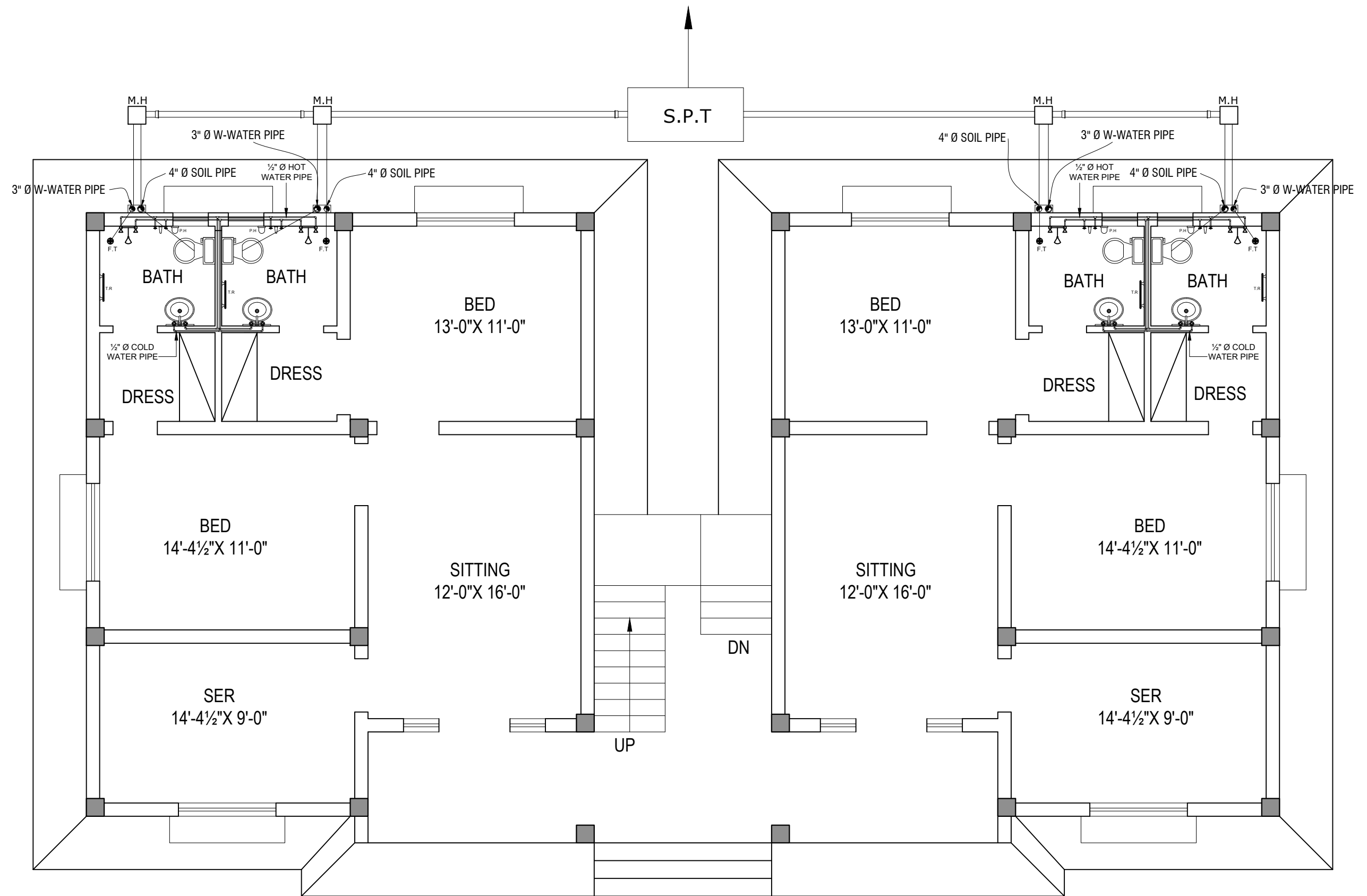
PLUMBING



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LOCATION:-
RESIDENCE FLATES

OWNERS:-
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TITLE
GROUND FLOOR PLAN

Scale: Read As Shown Dwg. No. **P1**

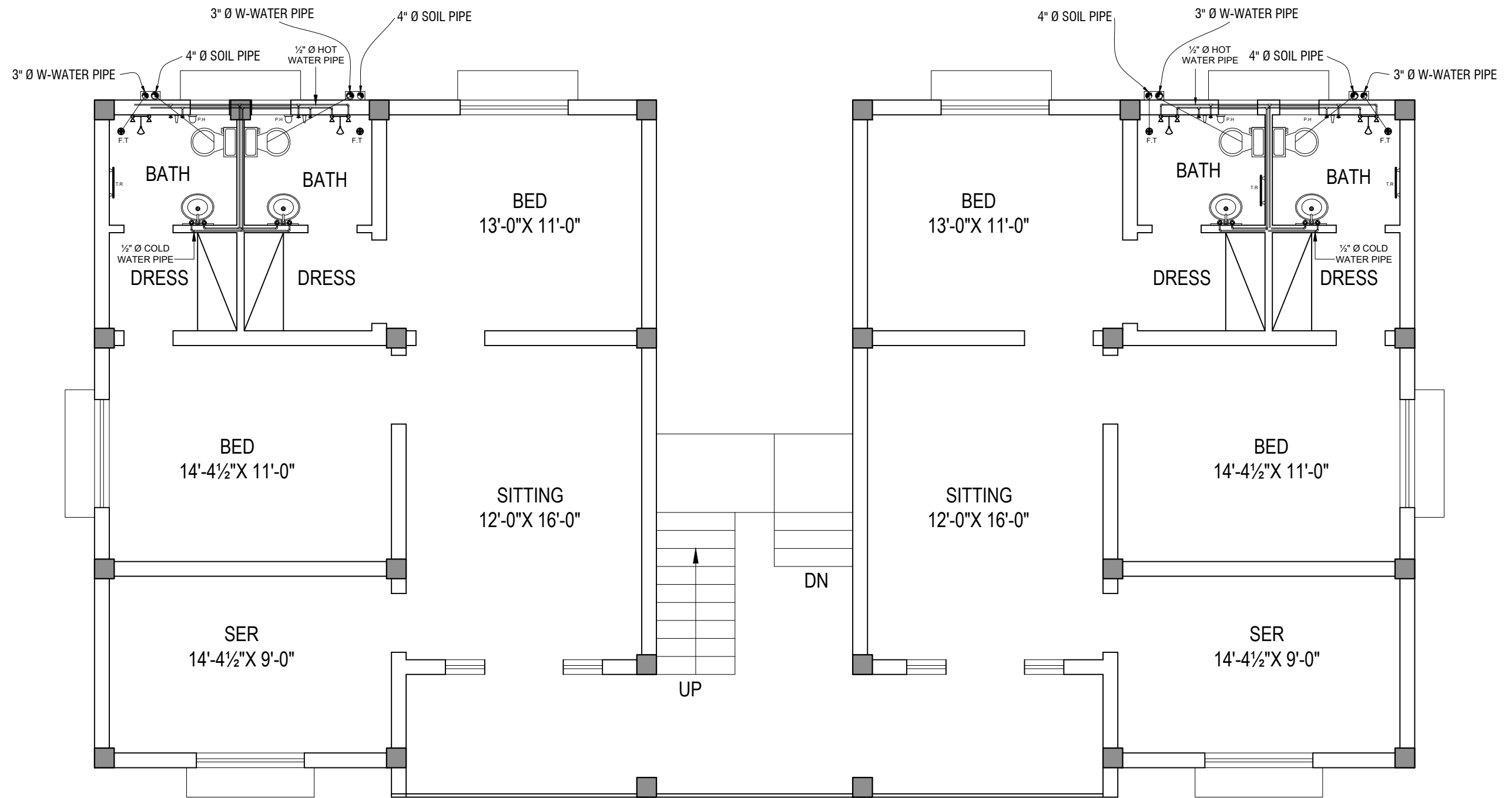
Design by: .
Checked by: .
Drafted by: .
Date: **NOVEMBER 2021**

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LOCATION:-
RESIDENCE FLATES

OWNERS:-
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TITLE
FIRST FLOOR PLAN

Scale: Read As Shown Dwg. No. **P2**

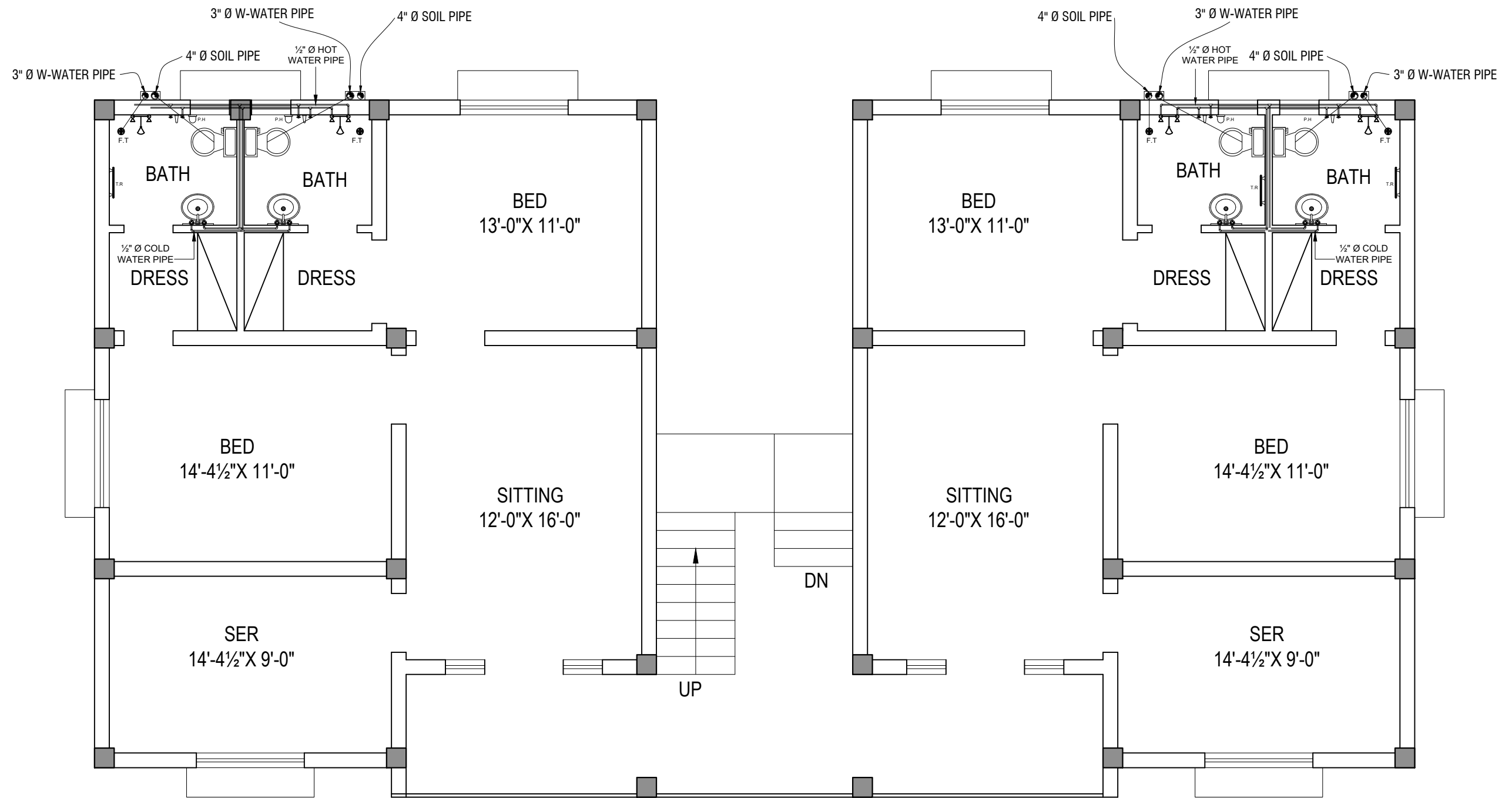
Design by: .
Checked by: .
Drafted by: .
Date: **NOVEMBER 2021**

REVISION / MODIFICATION		
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1		
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LOCATION:-
RESIDENCE FLATES

OWNERS:-

TITLE
SECOND FLOOR PLAN

Scale: Read As Shown

Dwg. No. P3

Design by: .
Checked by: .
Drafted by: .
Date: NOVEMBER 2021

REVISION / MODIFICATION

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1		
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