

BHIMPHEDI AWASUKA



भीमफेदी आवासुका



Program developed by:

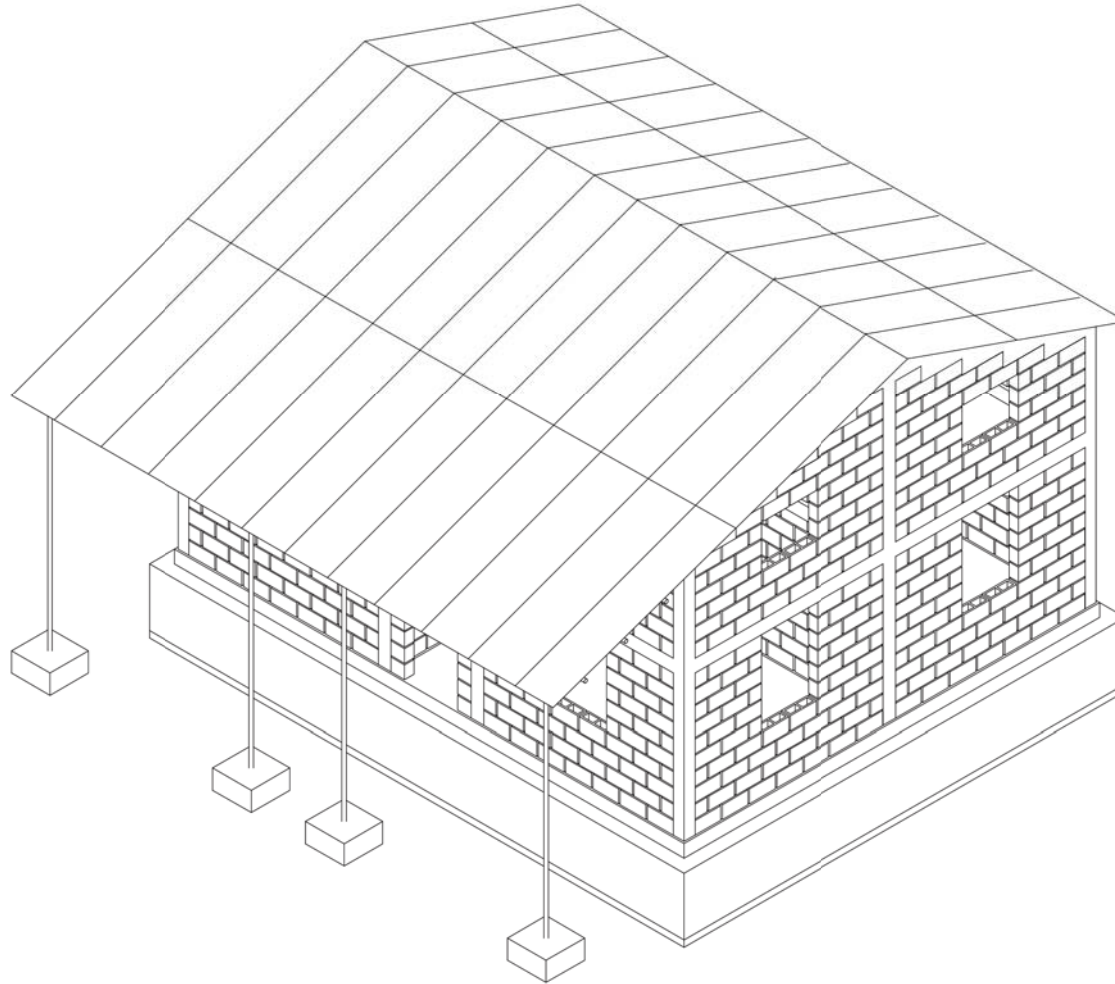
AMICS DEL NEPAL * BASE A * CCD-UPC University



ARCHITECTURAL & STRUCTURAL DRAWINGS

CONFINED HOLLOW CONCRETE BLOCK MODEL HOUSE





BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

+977 57410050
 Bhimphedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimphedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

This technique consists of an anti-seismic wall composed of reinforced concrete blocks surrounded by horizontal and vertical structural RCC elements. The whole set forms a high resistance structural unit with a very good response to earthquake demands. The wall organizes closed volumetric units, designed with anti-seismic criteria, which determines a good behaviour of the building. This construction system is widely used in various parts of the world that are subject to earthquake demands.

The horizontal structural RCC elements are located at the plinth beam, floor beam and upper ring beam; and the vertical ones (every 3m minimum) at the corners of each room. The concrete block wall is also reinforced vertically every 80 cm, plus in both sides of all openings (doors and windows); and horizontally at least every three block-rows.

The floor is made of wooden joists that rest on the walls, leaning on the ring-beams. The joists are joined to the concrete ring-beam by a metal angle and a bolt put before concreting.

The roof system is designed out of tubular profiles of 2" diameter that rest on the concrete walls, leaning on the upper ring-beam. The roof is finished with CGI sheets, allowing attachment of false-ceiling and bamboo insulation.

The featured typology is presented in its basic layout: 4 ground floor spaces, 4 first floor spaces and 1 verandah. However, the basic typology can be adapted according to the users' needs, either reducing it to 2 spaces only, or extending the basic module dimensions (currently 3m x 3m).

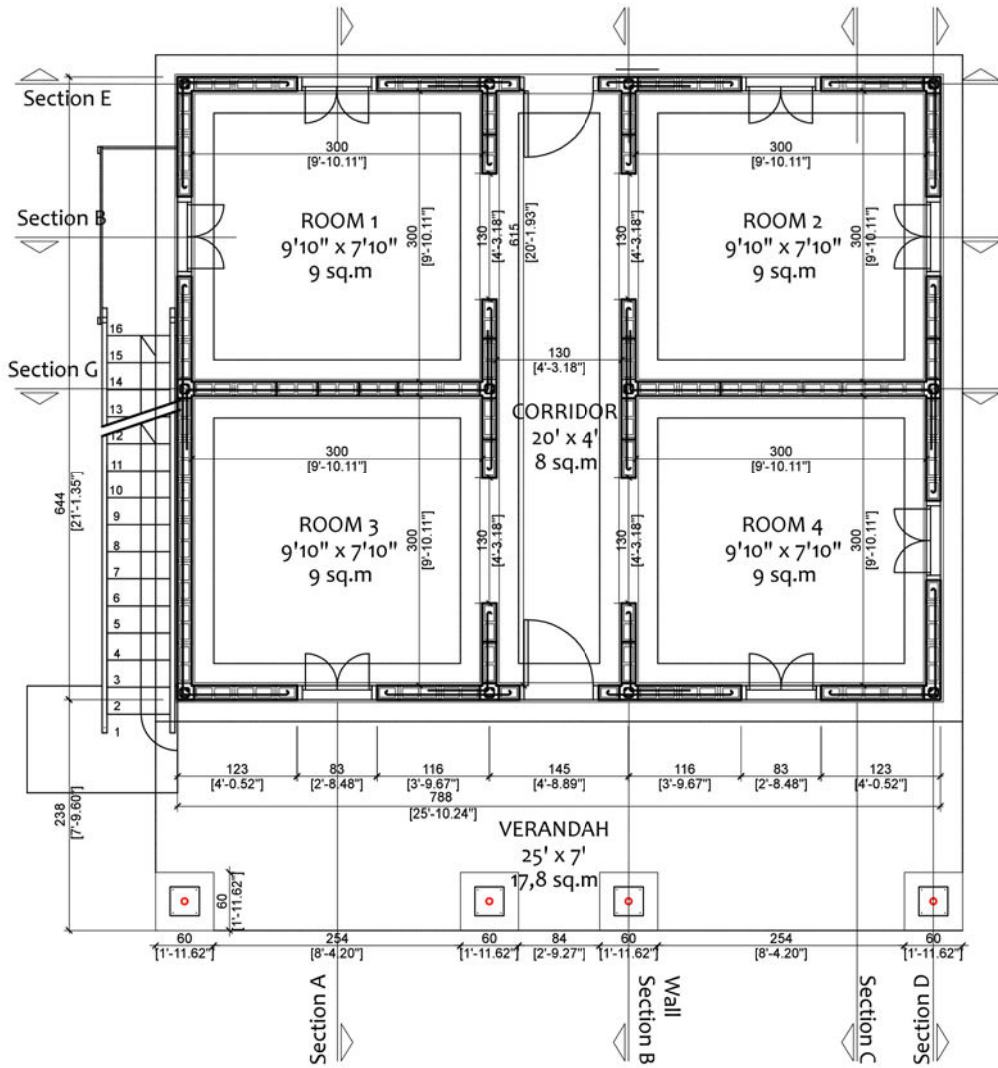
MATERIAL PROPERTIES

Block Size:	400 x 200 x 150mm
Minimum Compressive strength of block:	5N/mm ²
Grade of Steel:	Fe 500 MPa
Nominal Mix Ratio:	1:1,5:3 (C:S:A)

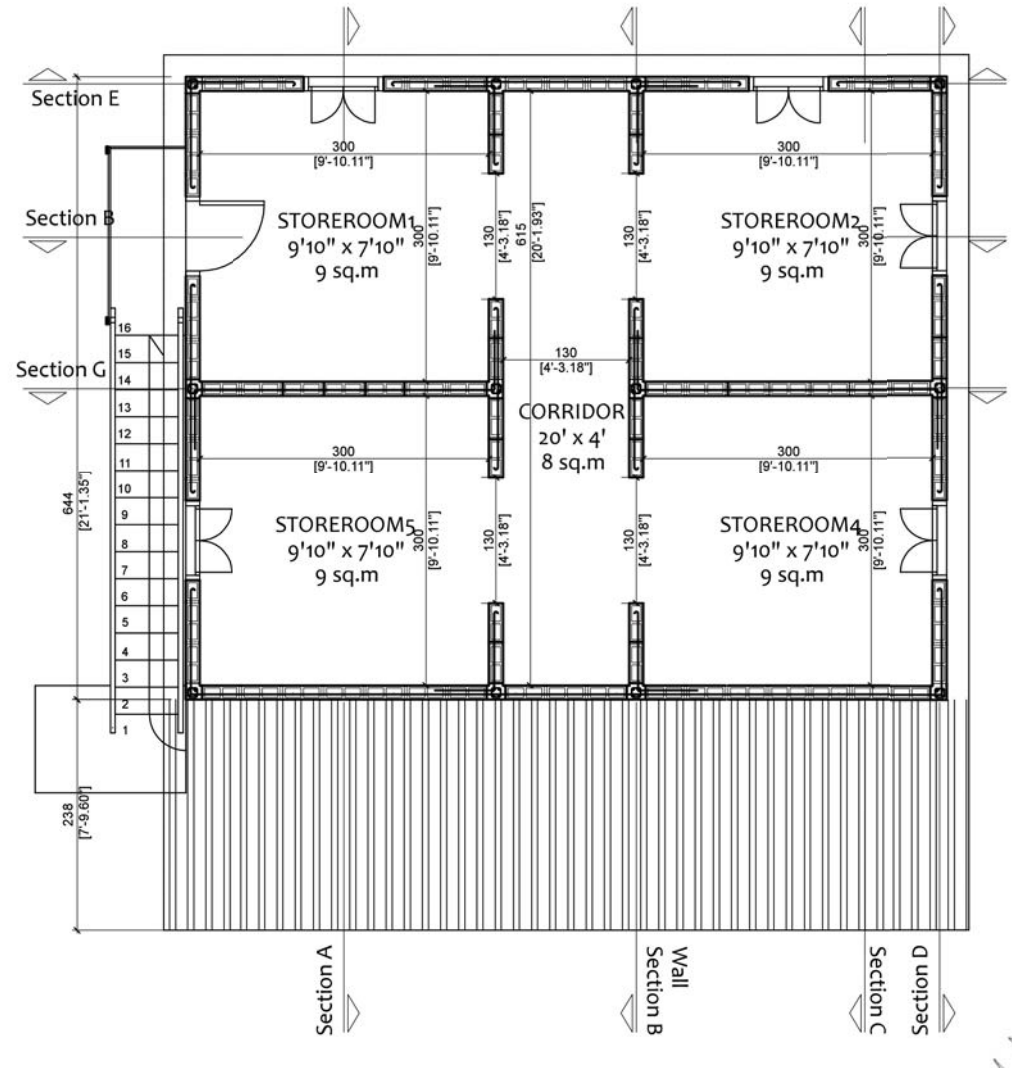


BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भौमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY		
DRAWING TITLE: SYSTEM DESCRIPTION	DATE: 11/2017	A.01



GROUND FLOOR



FIRST FLOOR

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
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CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: GROUND FLOOR & FIRST FLOOR PLAN VIEW

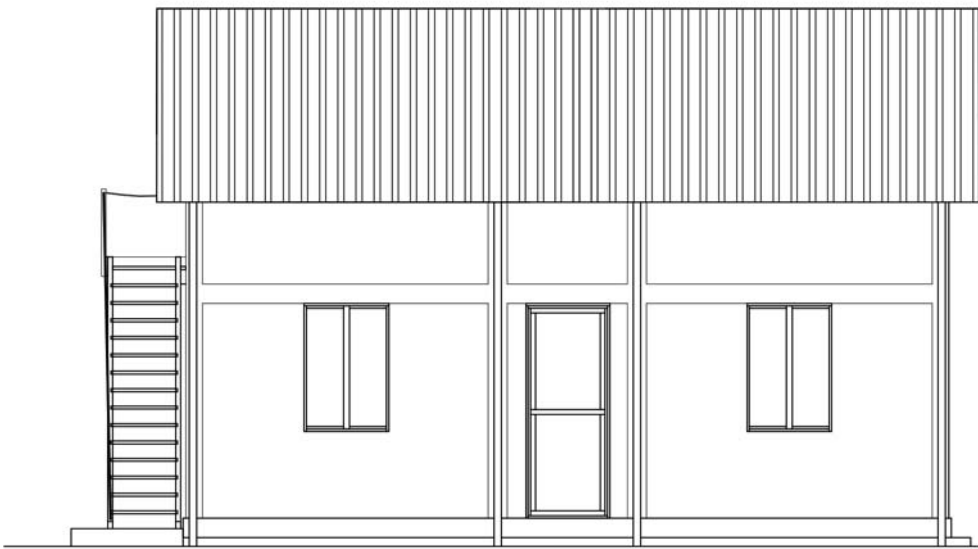


SCALE: 1:75

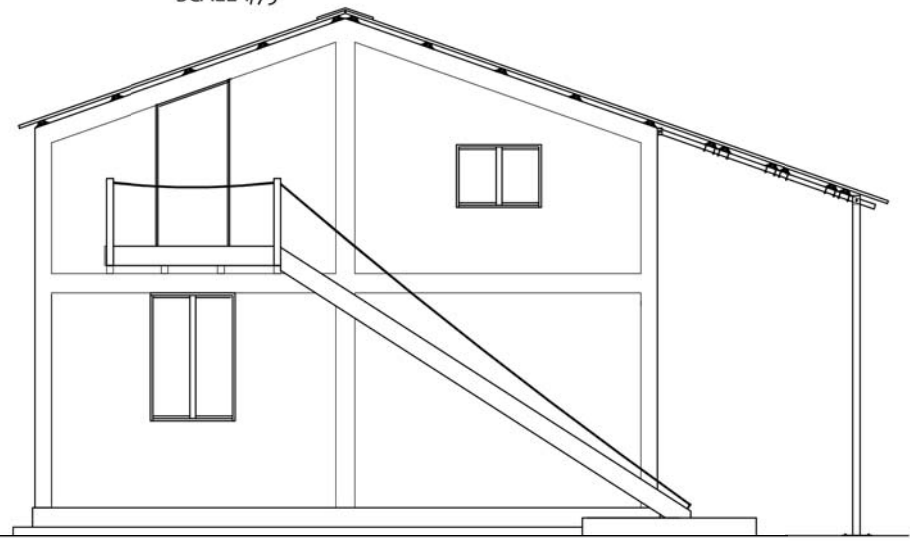
DATE: 11/2017



A.02



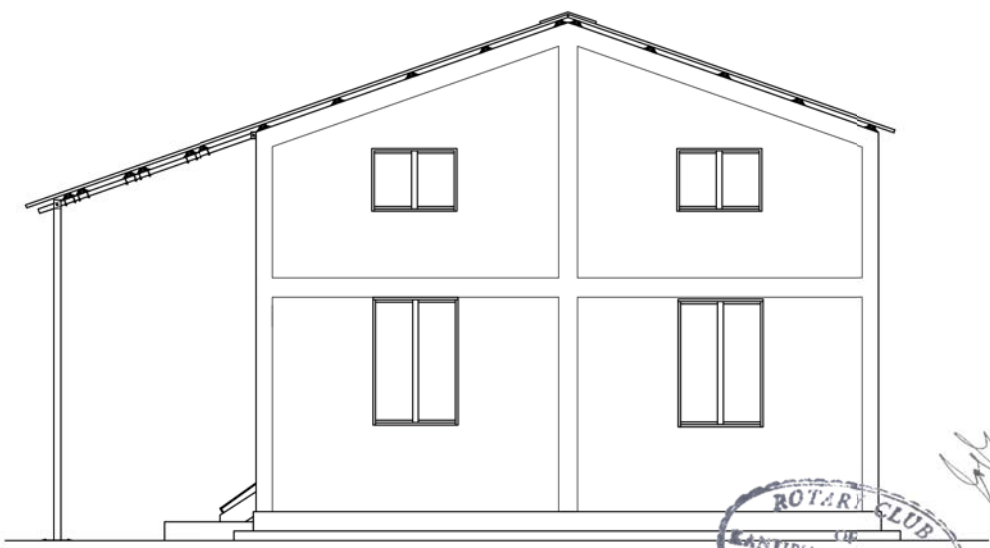
FRONT ELEVATION



SIDE ELEVATION



BACK ELEVATION



SIDE ELEVATION

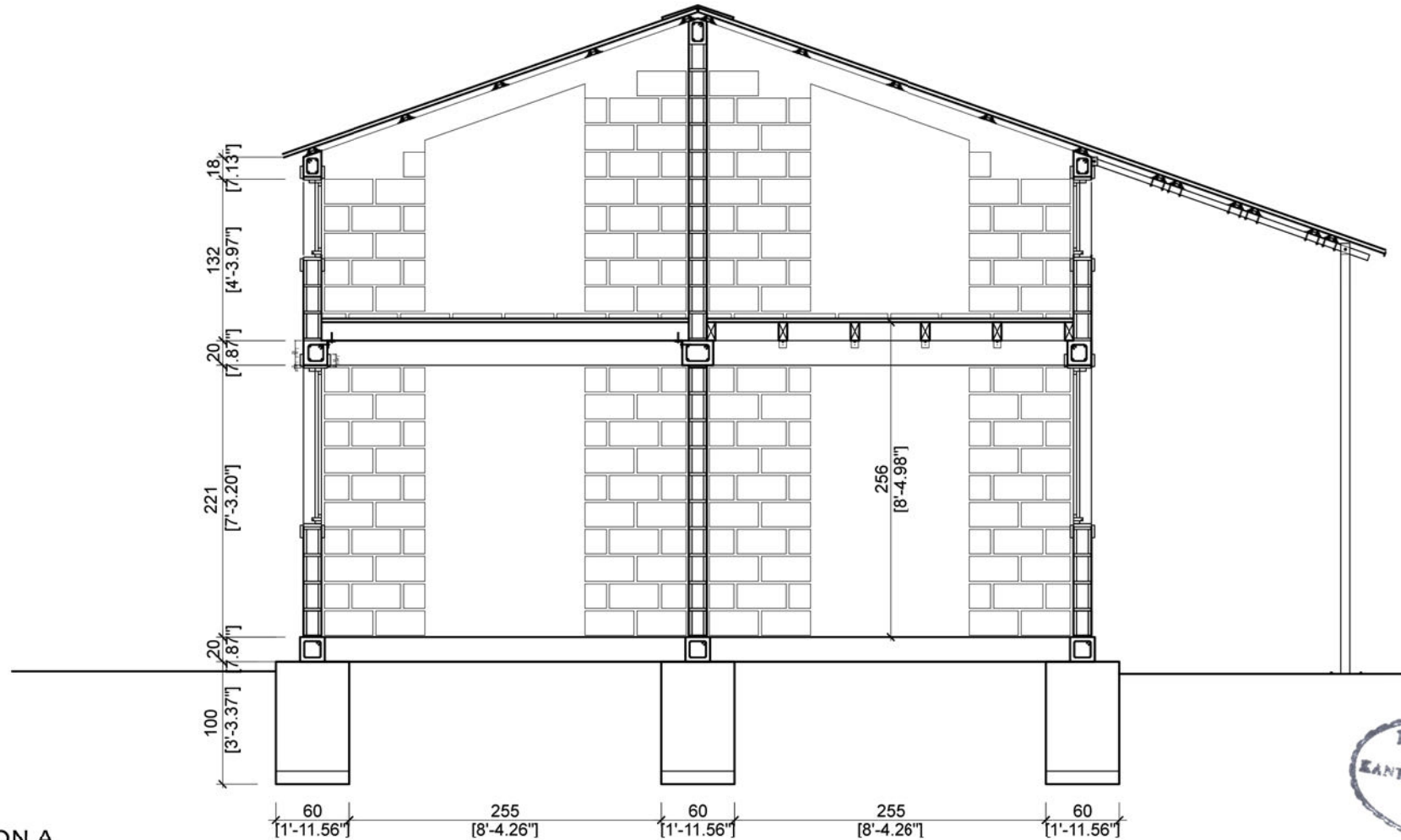


BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भीमफेदी आवासुका
 +977 57410050
 Bhimphedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimphedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY
 DRAWING TITLE: ELEVATIONS

SCALE: 1:75
 DATE: 11/2017

A.03



SECTION A



BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भीमफेदी आवासुका
 +977 57410050
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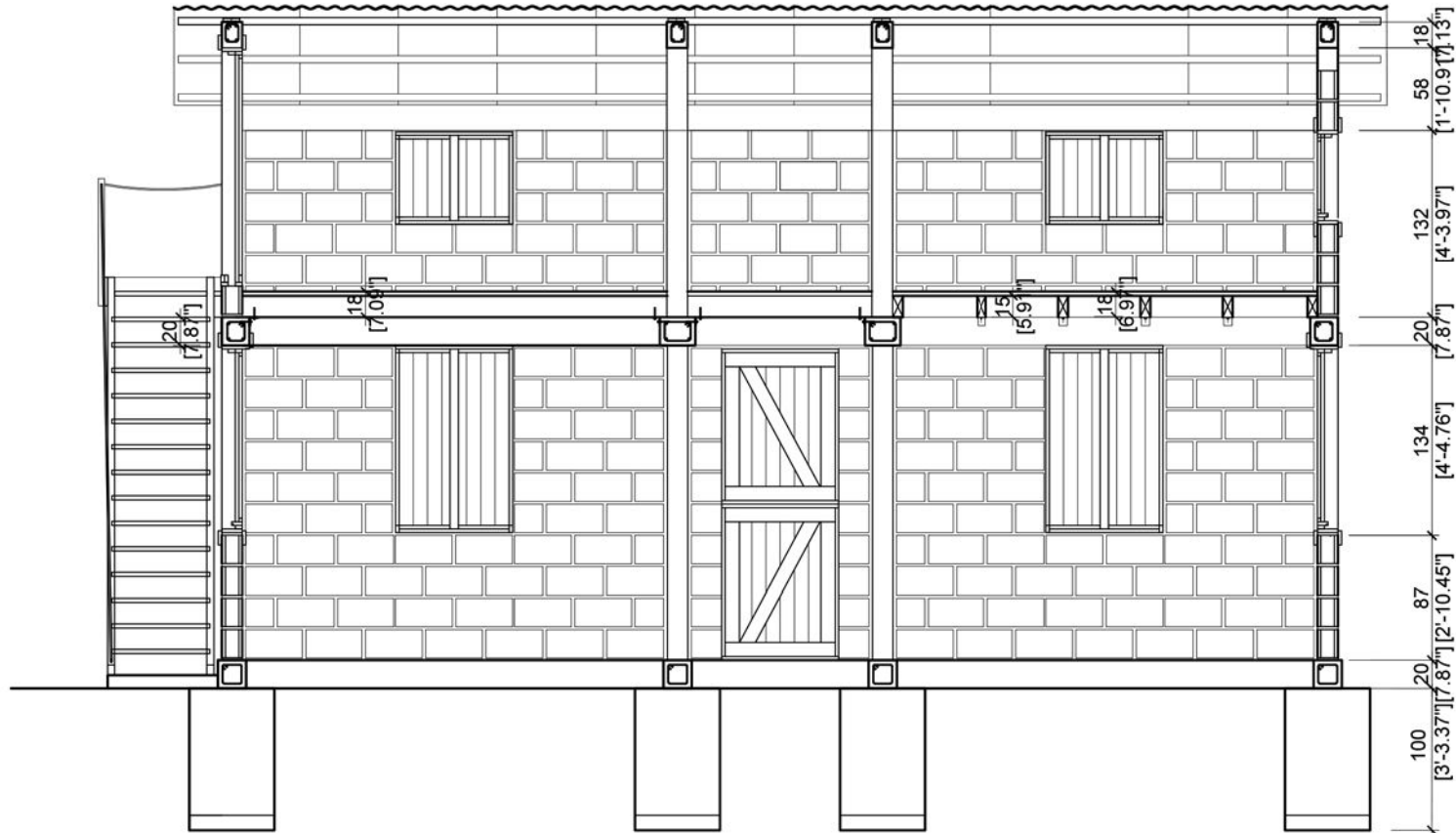
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: SECTION A

SCALE: 1:50

DATE: 11/2017

A.04

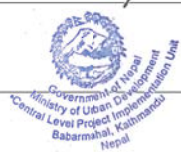


SECTION B



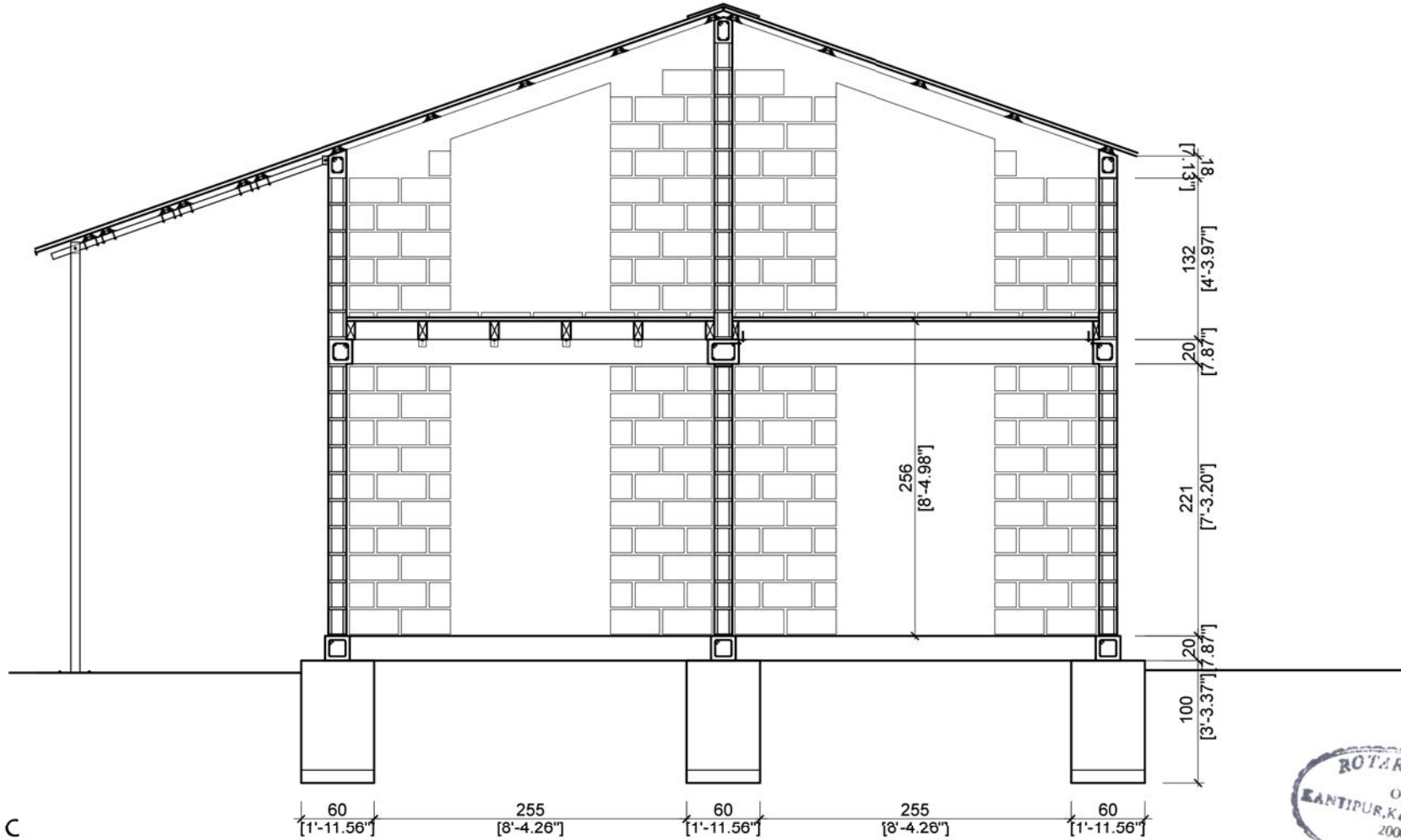
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 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY
 DRAWING TITLE: SECTION B



SCALE: 1:50
 DATE: 11/2017

A.05



SECTION C



BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

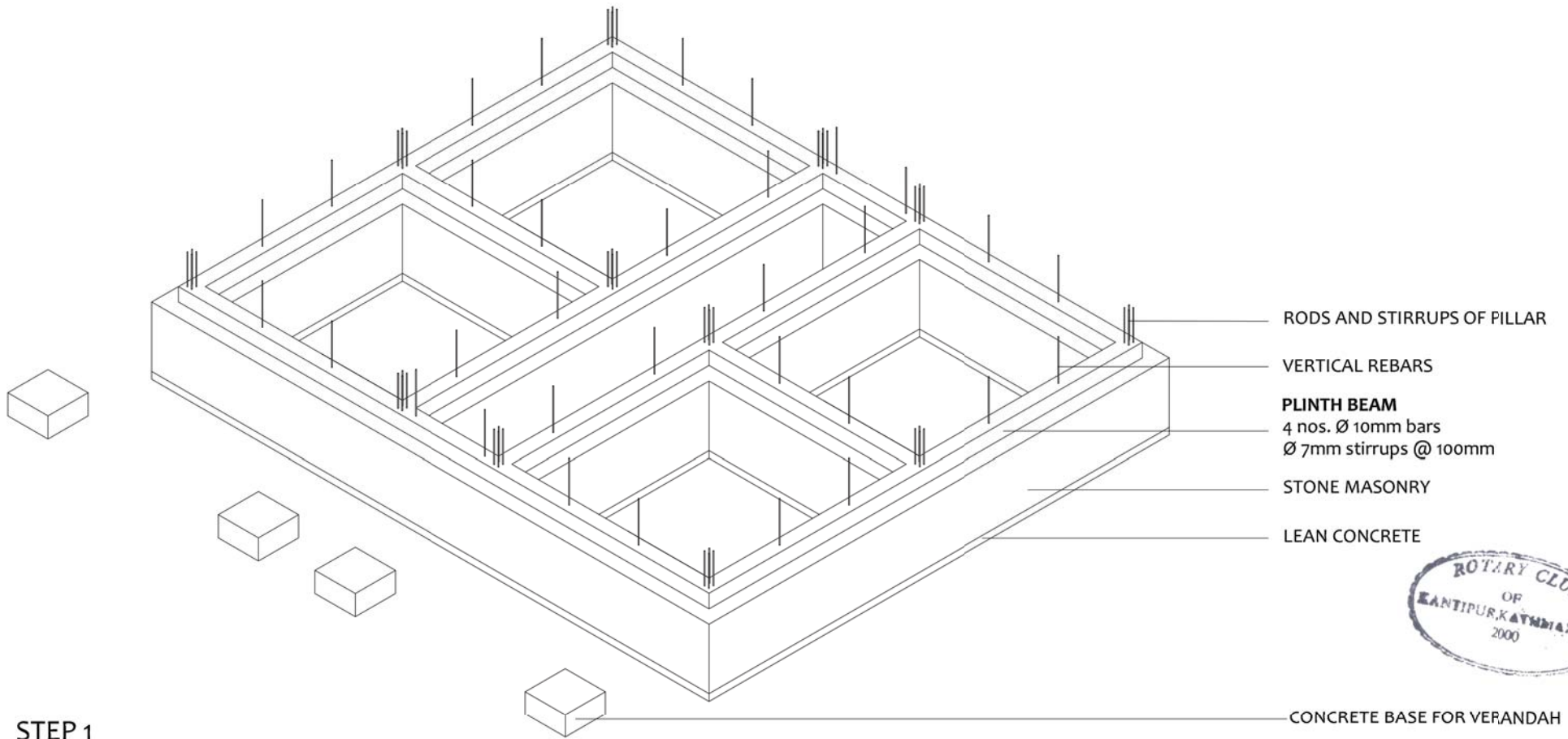
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SCALE: 1:50

DATE: 11/2017

A.06



STEP 1

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

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Bhimphedi Rural Municipality
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MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

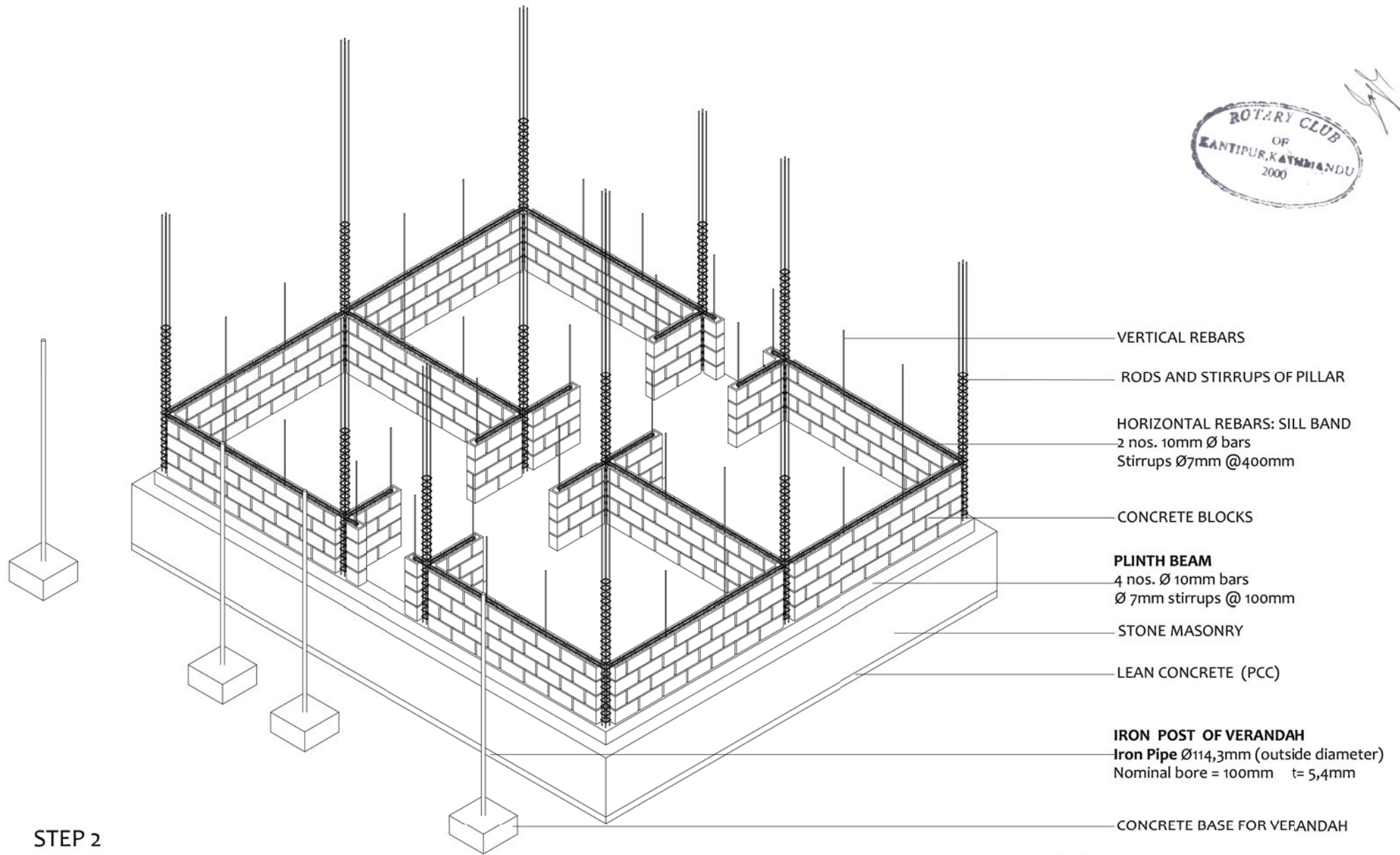
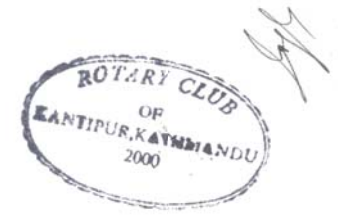
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 1



DATE: 11/2017

P.01



STEP 2

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

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Bhimphedi Rural Municipality
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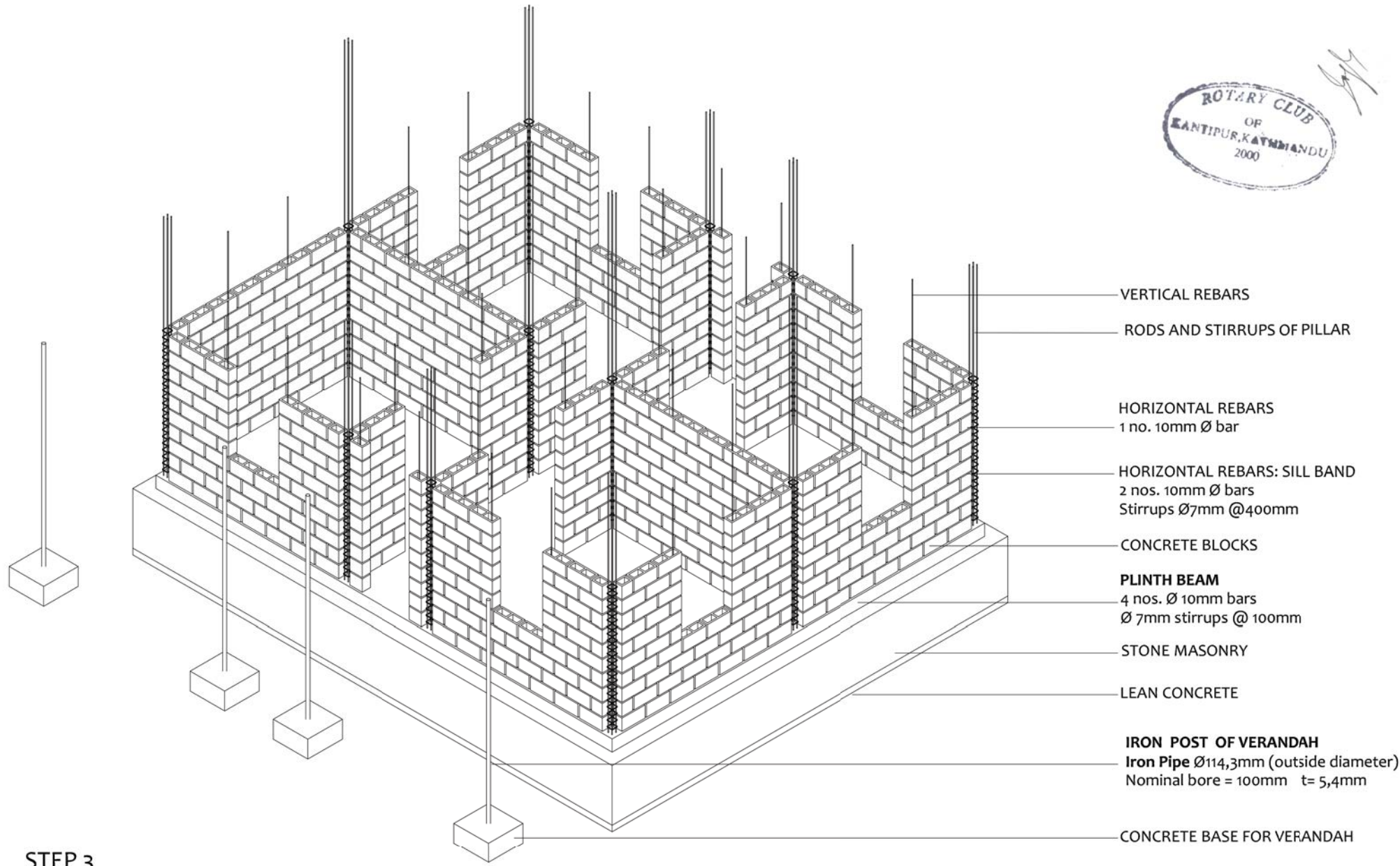
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 2



DATE: 11/2017

P.02



- VERTICAL REBARS
- RODS AND STIRRUPS OF PILLAR
- HORIZONTAL REBARS
1 no. 10mm Ø bar
- HORIZONTAL REBARS: SILL BAND
2 nos. 10mm Ø bars
Stirrups Ø7mm @400mm
- CONCRETE BLOCKS
- PLINTH BEAM**
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm
- STONE MASONRY
- LEAN CONCRETE
- IRON POST OF VERANDAH**
Iron Pipe Ø114,3mm (outside diameter)
Nominal bore = 100mm t= 5,4mm
- CONCRETE BASE FOR VERANDAH

STEP 3

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

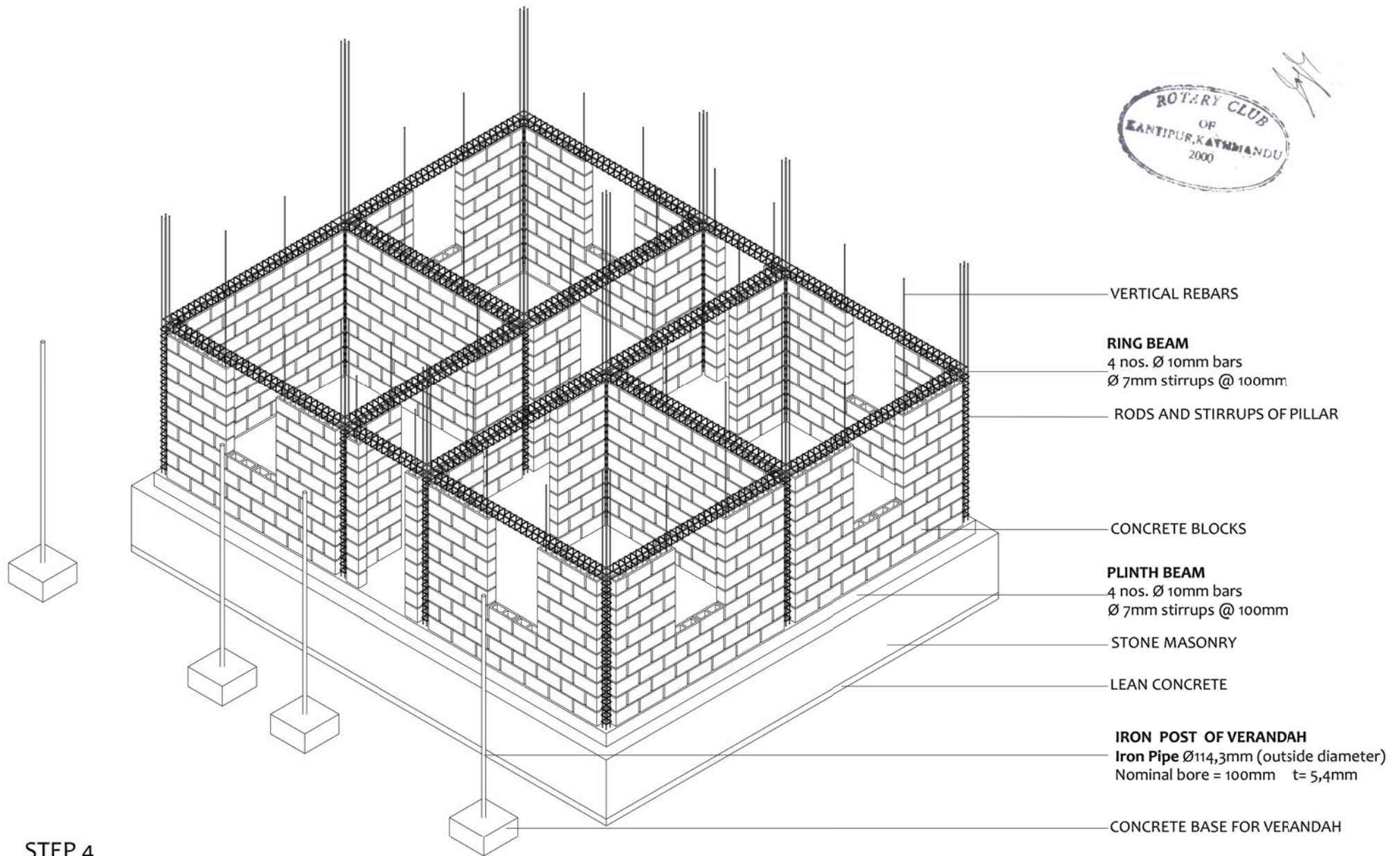
+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheidi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 3

DATE: 11/2017

P.03



STEP 4

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

+977 57410050
Bhimphedi Rural Municipality
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MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

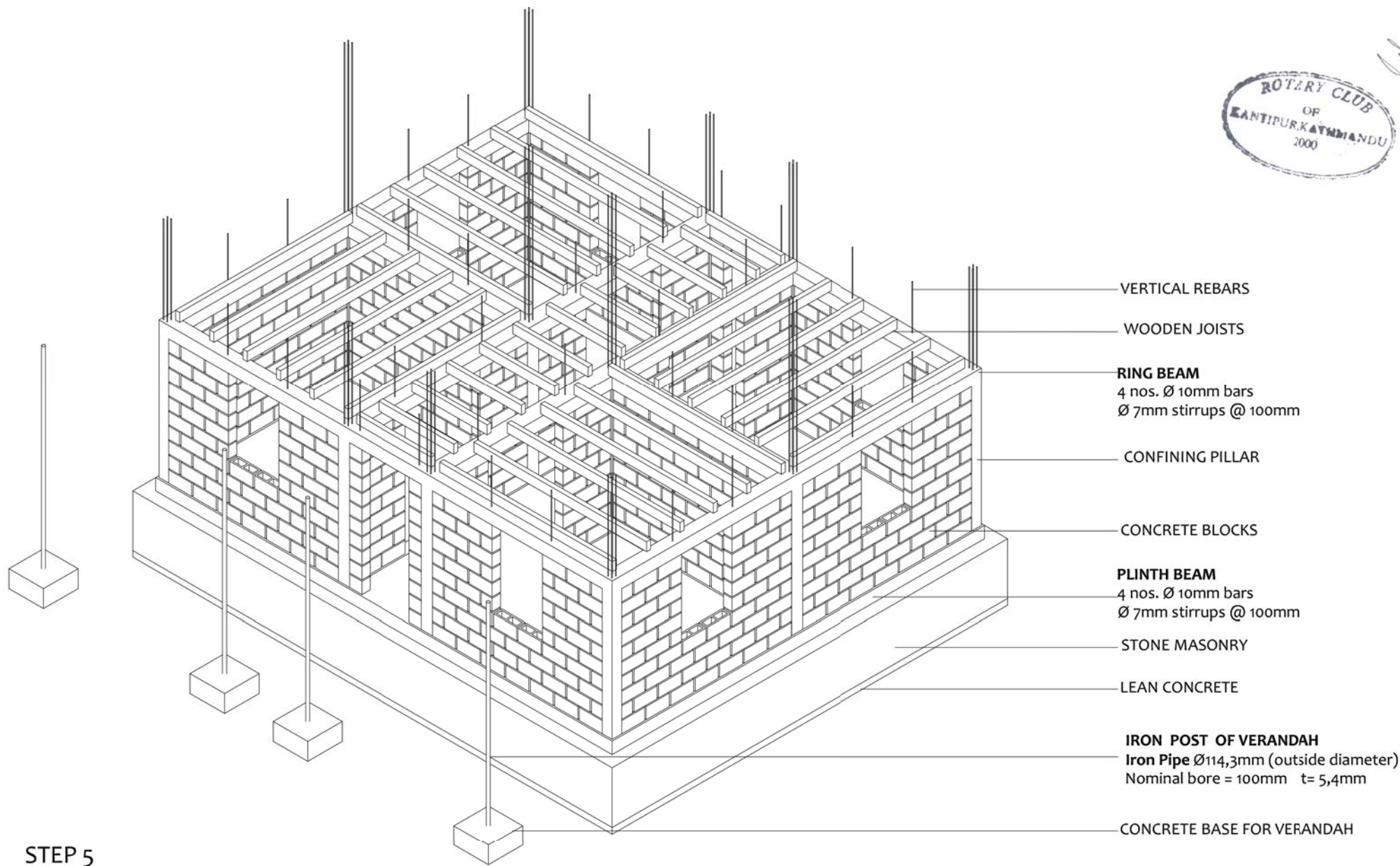
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 4



DATE: 11/2017

P.04



- VERTICAL REBARS
- WOODEN JOISTS
- RING BEAM**
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm
- CONFINING PILLAR
- CONCRETE BLOCKS
- PLINTH BEAM**
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm
- STONE MASONRY
- LEAN CONCRETE
- IRON POST OF VERANDAH**
Iron Pipe Ø114,3mm (outside diameter)
Nominal bore = 100mm t= 5,4mm
- CONCRETE BASE FOR VERANDAH

STEP 5

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

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+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

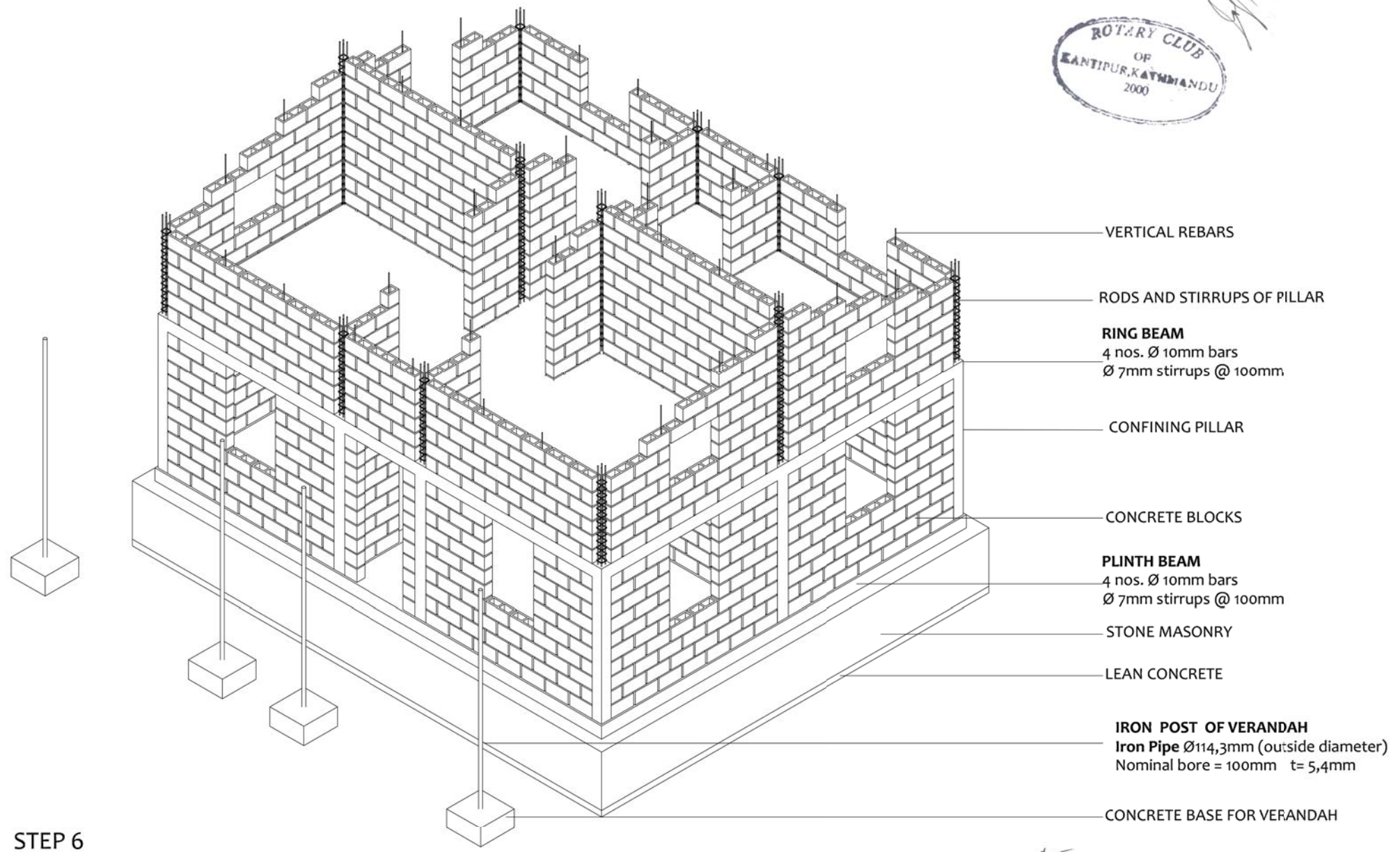
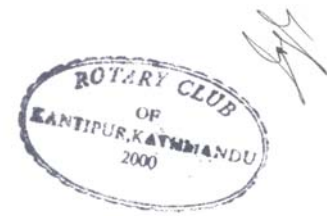
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 5



DATE: 11/2017

P.05



- VERTICAL REBARS
- RODS AND STIRRUPS OF PILLAR
- RING BEAM**
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm
- CONFINING PILLAR
- CONCRETE BLOCKS
- PLINTH BEAM**
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm
- STONE MASONRY
- LEAN CONCRETE
- IRON POST OF VERANDAH**
Iron Pipe Ø114,3mm (outside diameter)
Nominal bore = 100mm t= 5,4mm
- CONCRETE BASE FOR VERANDAH

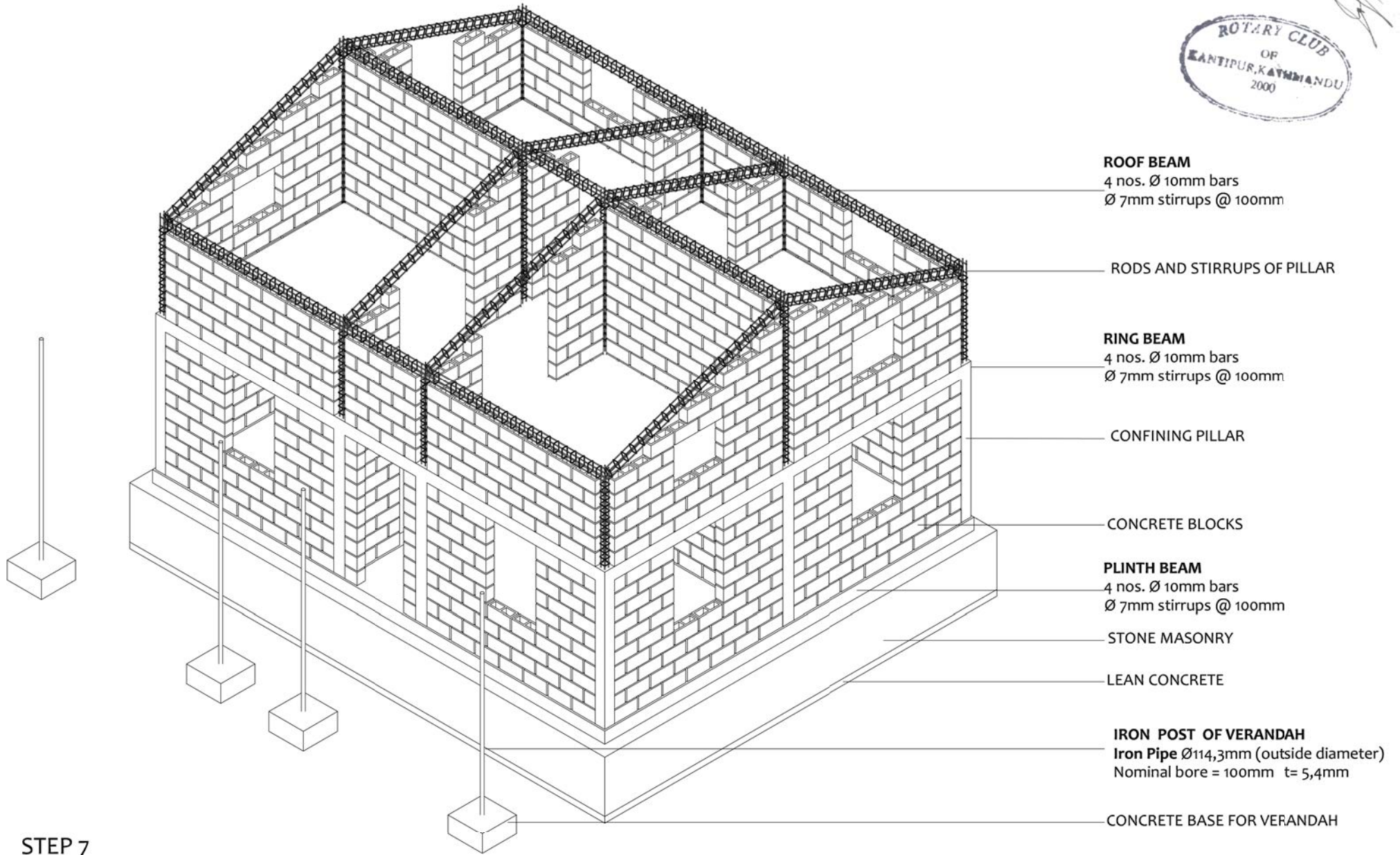
STEP 6

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheidi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY	 Government of Nepal Ministry of Urban Development Central Level Project Implementation Unit Babarmahal, Kathmandu Nepal	DATE: 11/2017	P.06
DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 6			



ROOF BEAM
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm

RODS AND STIRRUPS OF PILLAR

RING BEAM
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm

CONFINING PILLAR

CONCRETE BLOCKS

PLINTH BEAM
4 nos. Ø 10mm bars
Ø 7mm stirrups @ 100mm

STONE MASONRY

LEAN CONCRETE

IRON POST OF VERANDAH
Iron Pipe Ø114,3mm (outside diameter)
Nominal bore = 100mm t= 5,4mm

CONCRETE BASE FOR VERANDAH

STEP 7

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

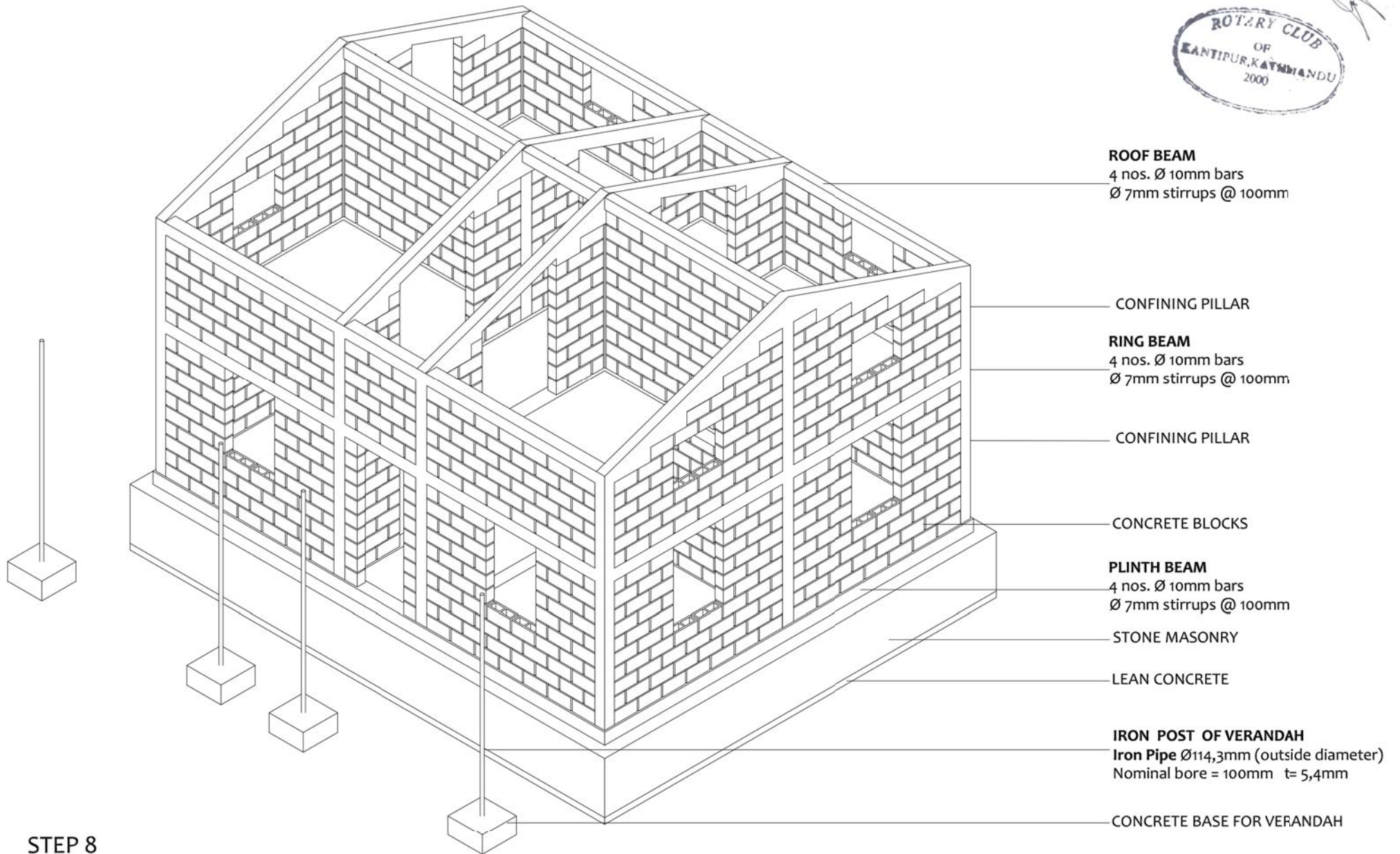
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 7



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P.07



STEP 8

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

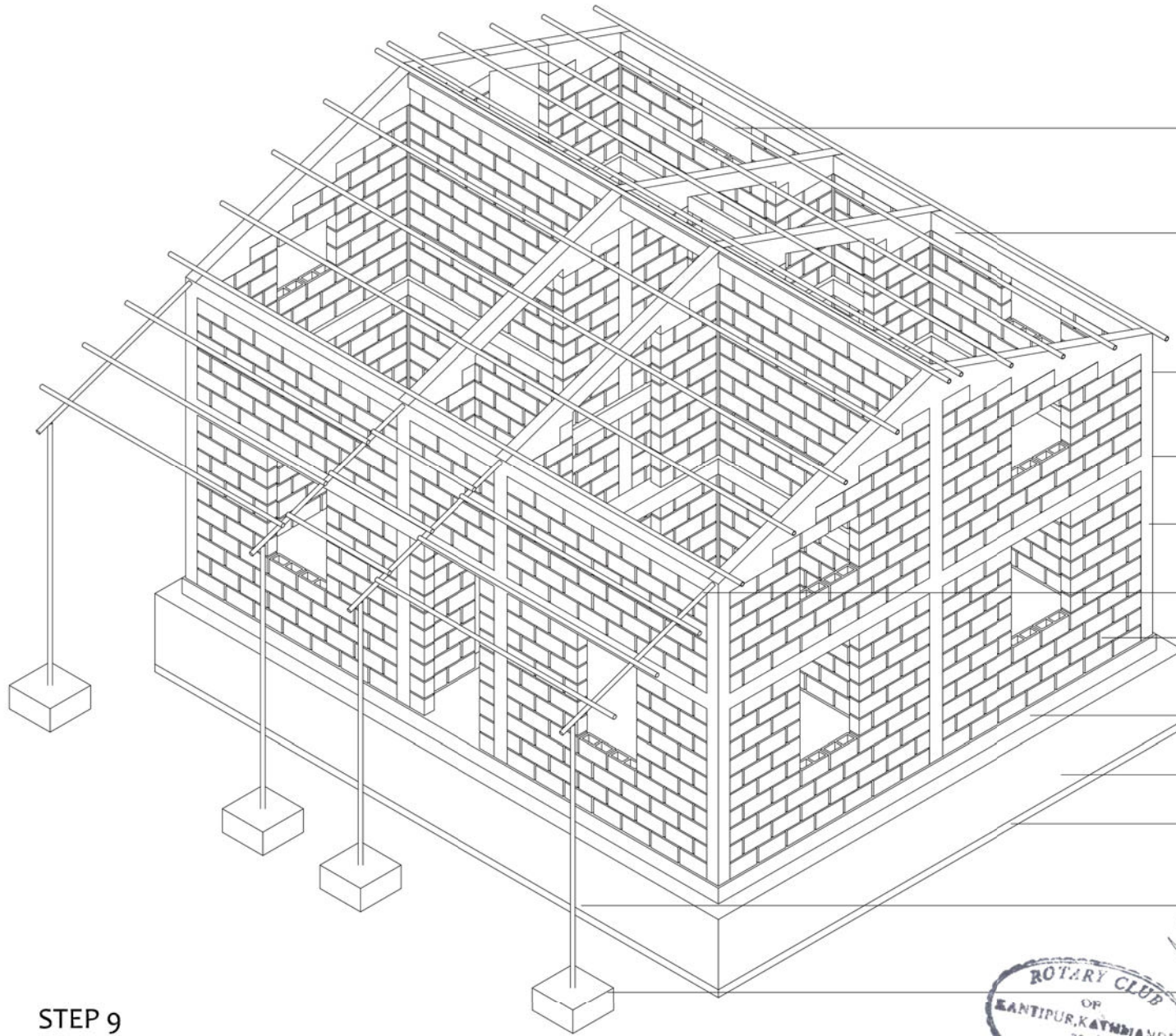
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 8



DATE: 11/2017

P.08



ROOF PURLINS
 Iron Pipes \varnothing 60,3mm (outside diameter)
 nominal bore = 50mm t= 4,5mm

ROOF BEAM
 4 nos. \varnothing 10mm bars
 \varnothing 7mm stirrups @ 100mm

CONFINING PILLAR

RING BEAM
 4 nos. \varnothing 10mm bars
 \varnothing 7mm stirrups @ 100mm

CONFINING PILLAR

VERANDAH RAFTERS
 Iron Pipes of \varnothing 50mm

CONCRETE BLOCKS

PLINTH BEAM
 4 nos. \varnothing 10mm bars
 \varnothing 7mm stirrups @ 100mm

STONE MASONRY

LEAN CONCRETE

IRON POST OF VERANDAH
 Iron Pipe \varnothing 114,3mm (outside diameter)
 Nominal bore = 100mm t= 5,4mm

CONCRETE BASE FOR VERANDAH



STEP 9

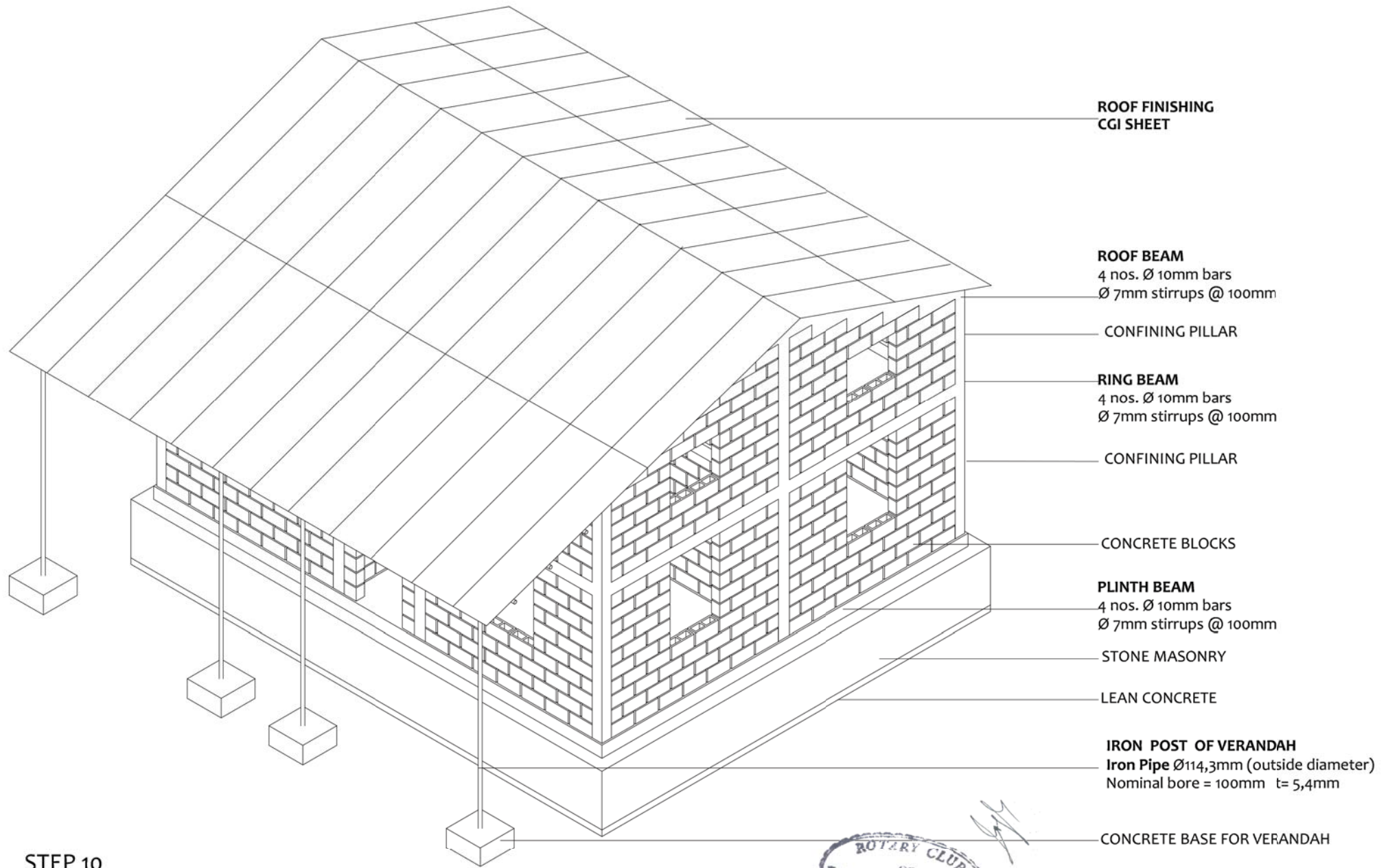
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 भीमफेदी आवासुका
 +977 57410050
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 Dhangodan Ward #6
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 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 9

DATE: 11/2017

P.09



STEP 10



BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

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Bhimphedi Rural Municipality
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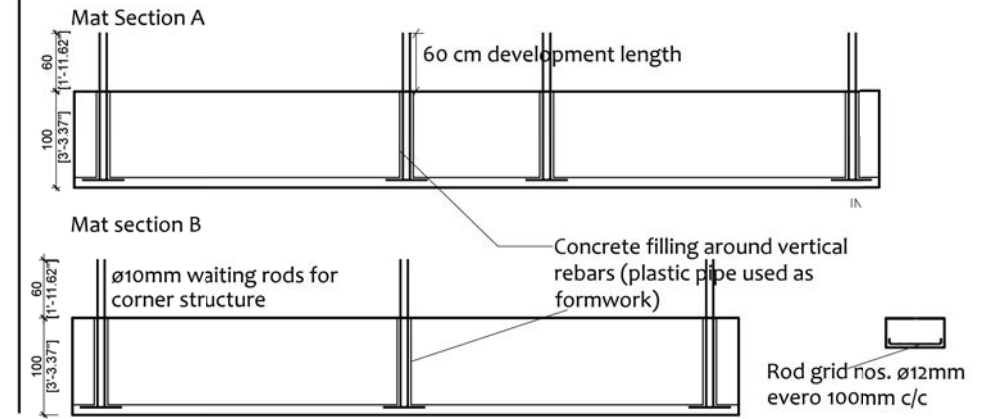
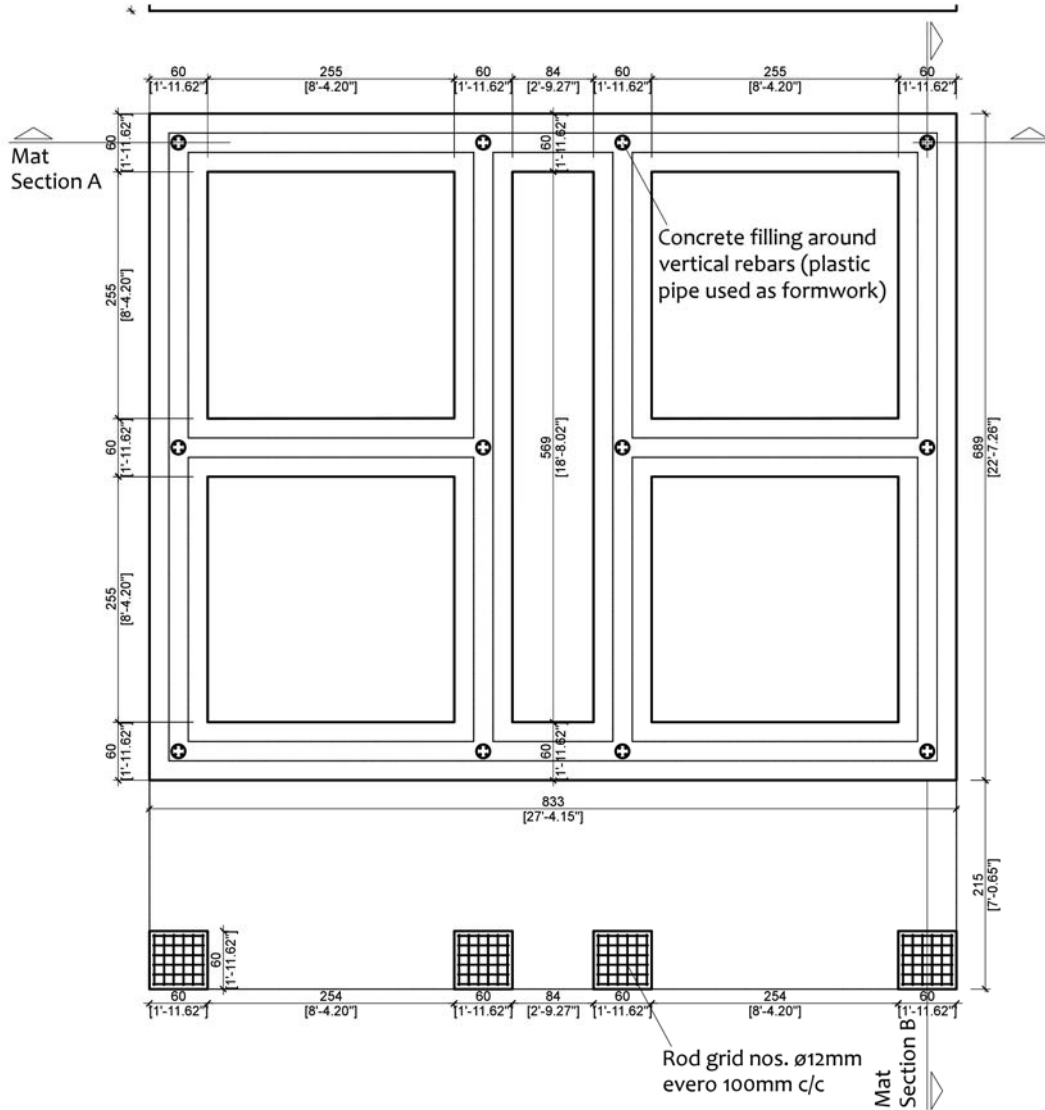
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: CONSTRUCTIVE PROCESS STEP 10



DATE: 11/2017

P.10



MAT FOUNDATION SECTIONS + ROD DISTRIBUTION

MAT FOUNDATION LEVEL

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram

भीमफेदी आवासुका

+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: FOUNDATIONS. MAT FOUNDATION

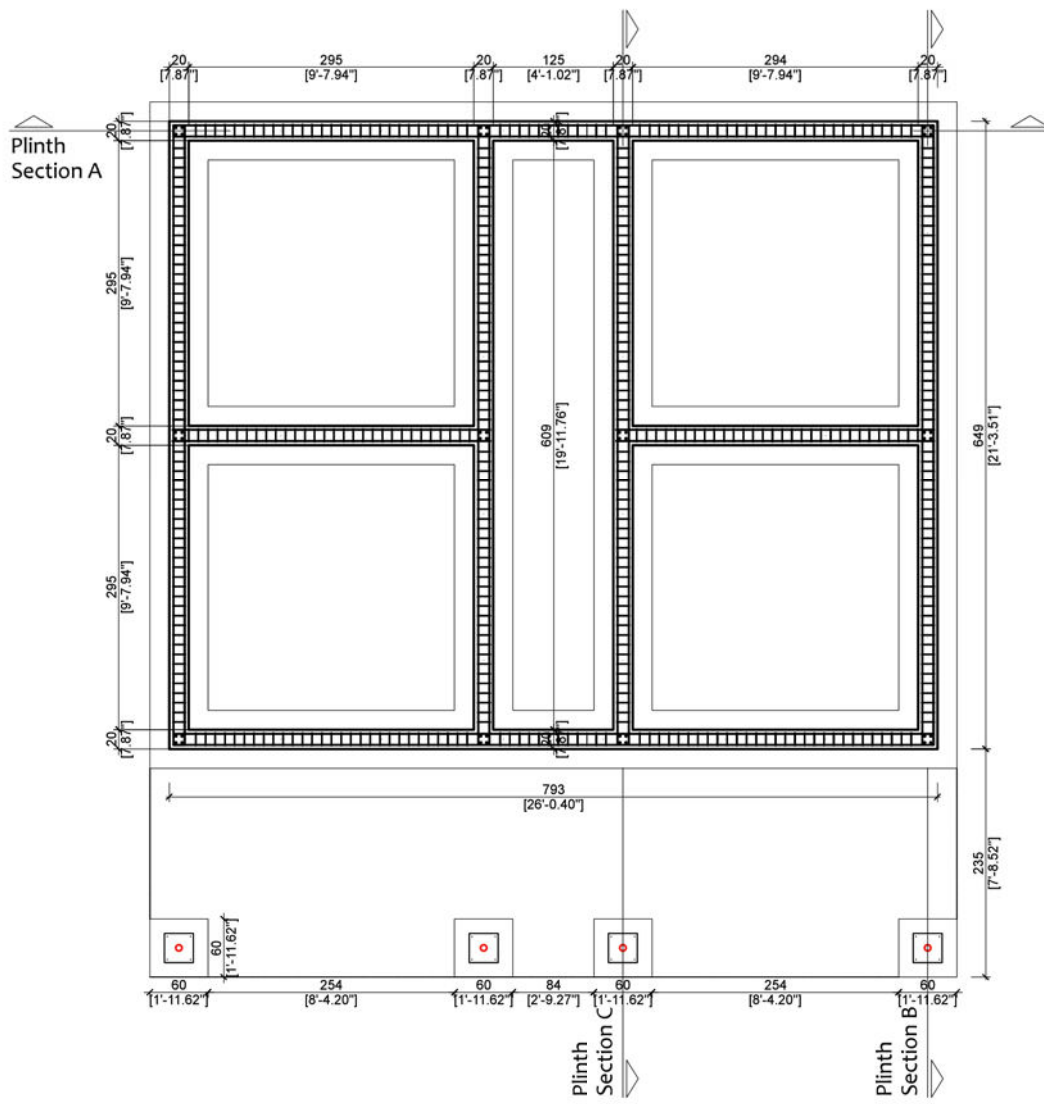


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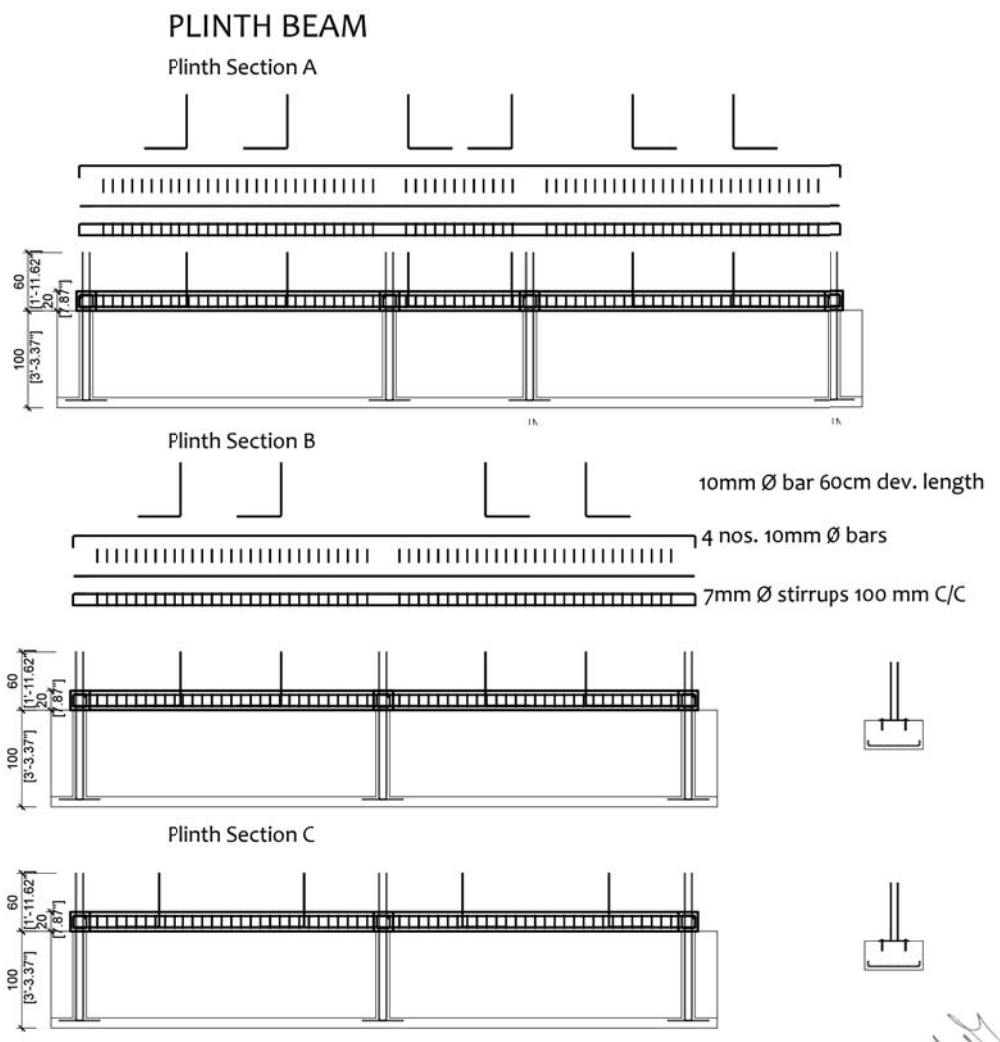
DATE: 11/2017

S.01





PLINTH BEAM LEVEL



PLINTH BEAM SECTIONS + ROD DISTRIBUTION

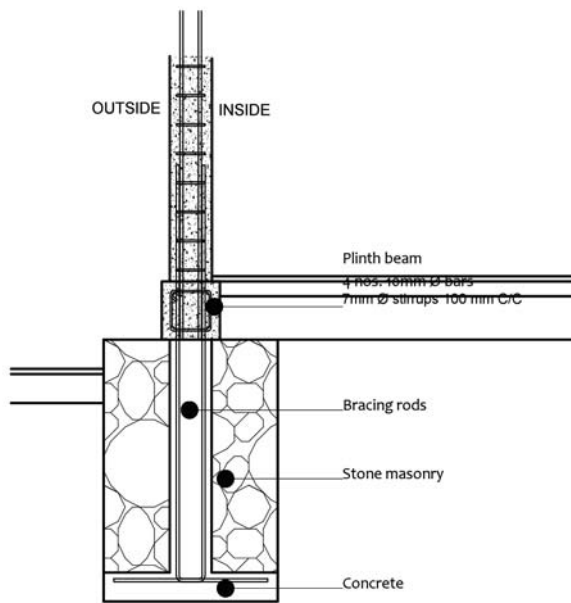


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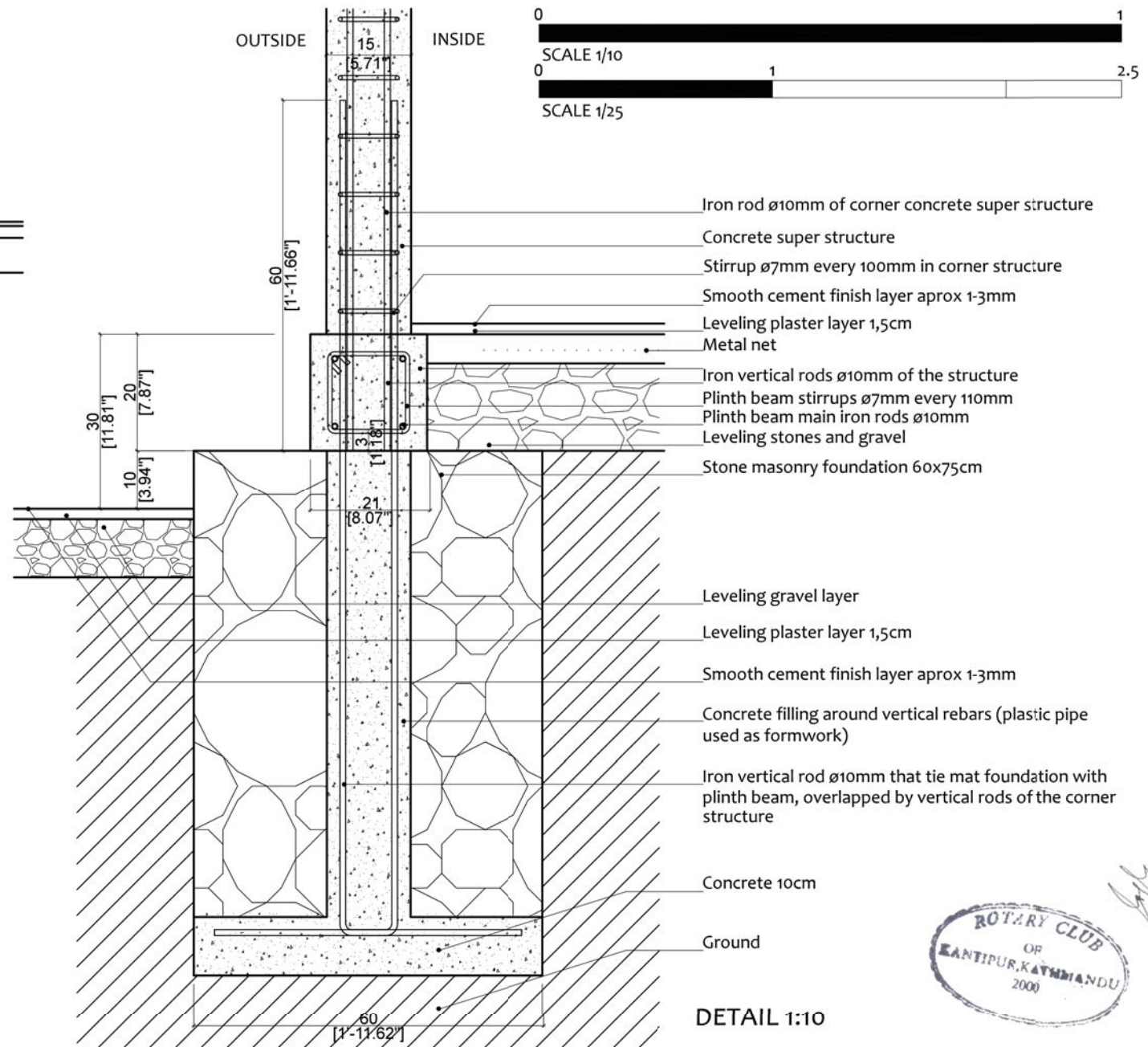
CONFINED CONCRETE BLOCK MASONRY
 DRAWING TITLE: FOUNDATIONS. PLINTH BEAM

SCALE: 1:75
 DATE: 11/2017

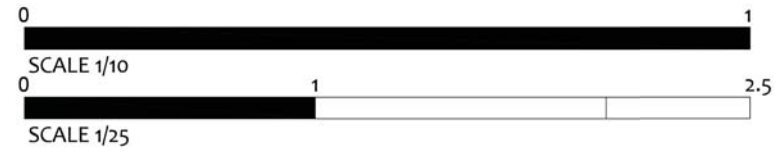
S.02



DETAIL 1:25



DETAIL 1:10



PILLAR-FOUNDATION DETAIL

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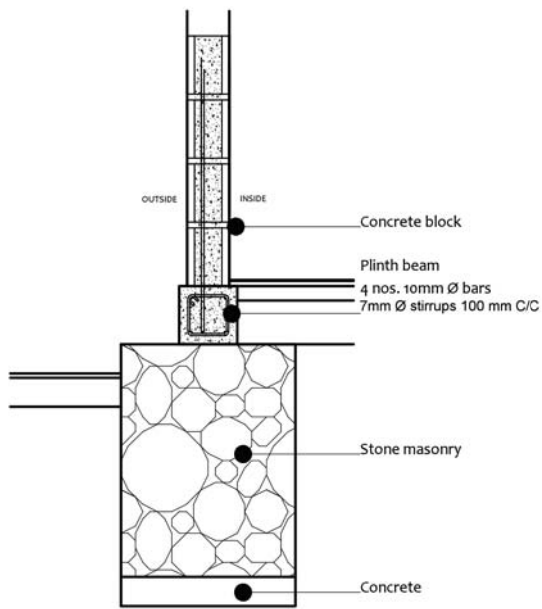
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: FOUNDATIONS. DETAILS

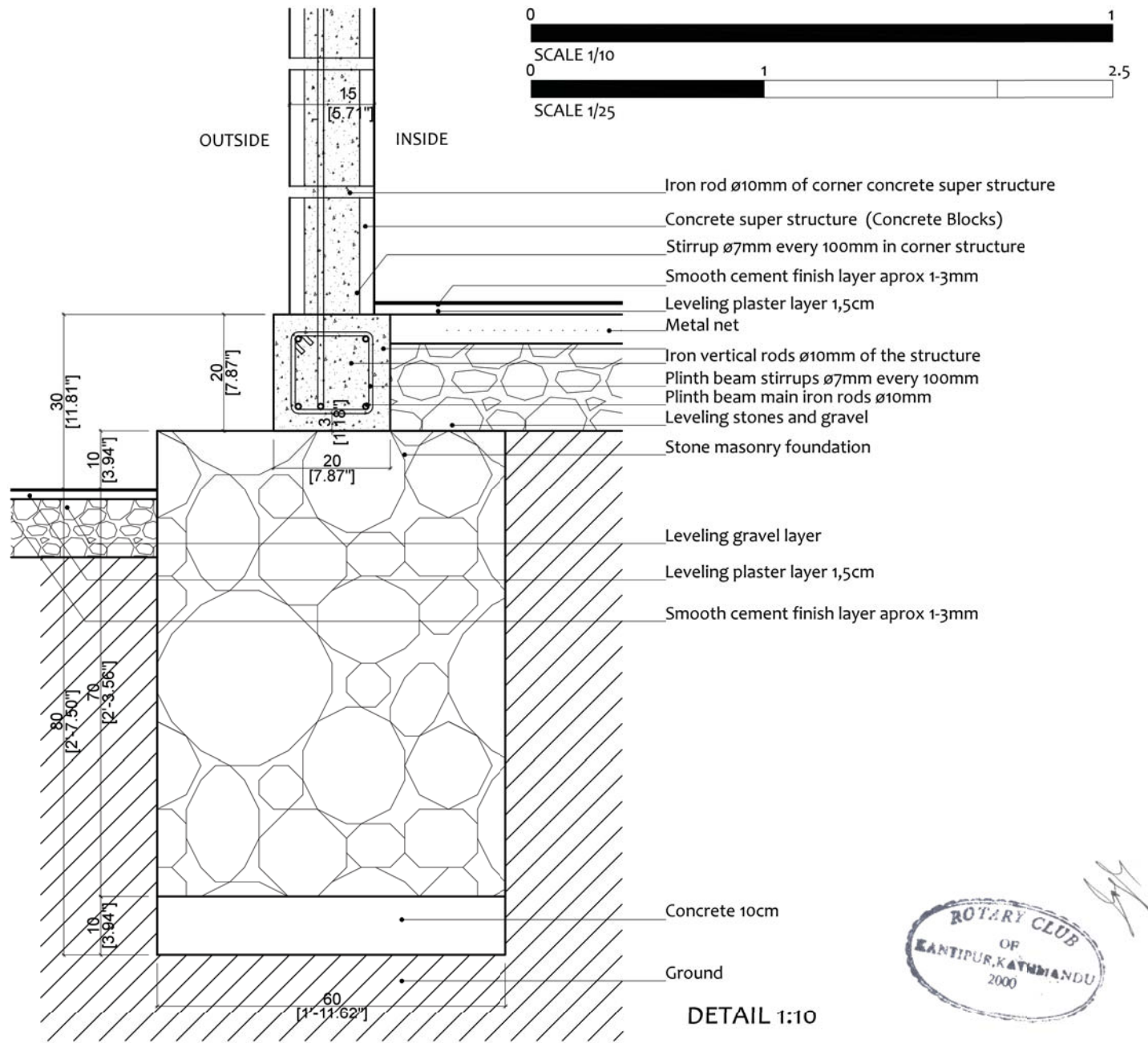
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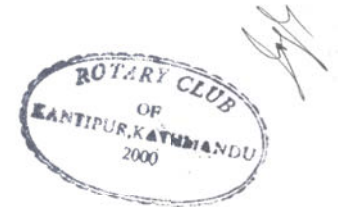
S.03



DETAIL 1:25



DETAIL 1:10

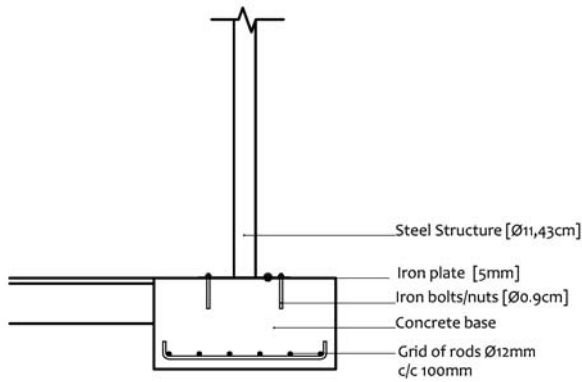


WALL- FOUNDATION DETAIL

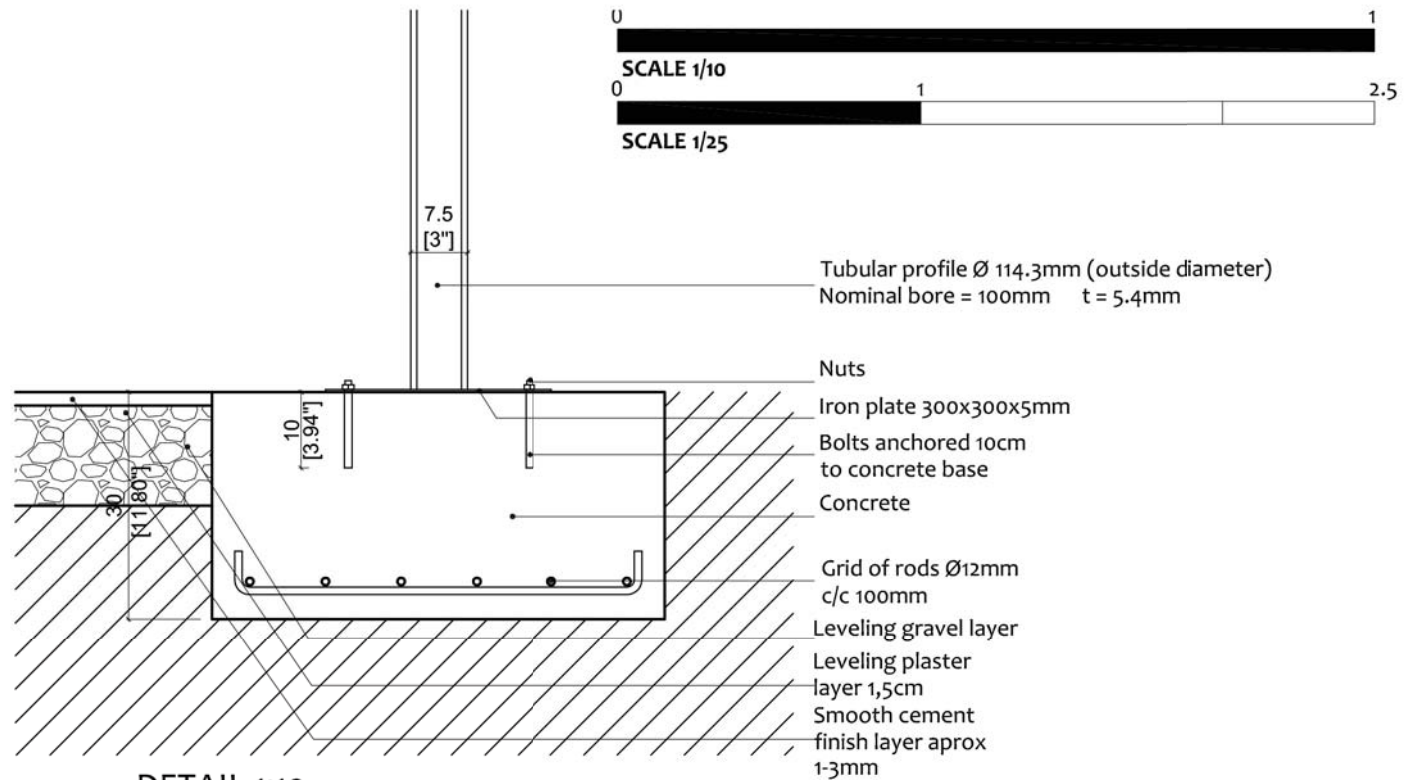
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 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
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<p>CONFINED CONCRETE BLOCK MASONRY</p> <p>DRAWING TITLE: FOUNDATIONS. DETAILS</p>	<p>SCALE: 1:25 / 1:10</p> <p>DATE: 11/2017</p>	<p>S.04</p>
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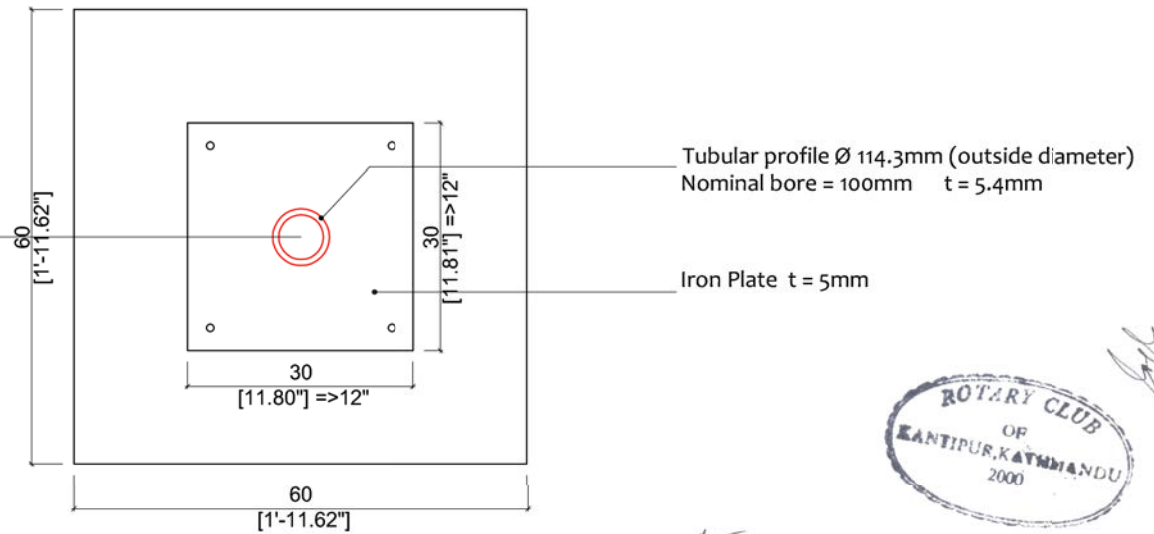
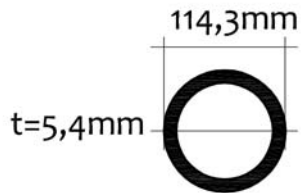


DETAIL 1:25



DETAIL 1:10

TUBULAR PROFILE VERANDAH 1:5



VERANDAH POST-FOUNDATION DETAIL

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भीमफेदी आवासुका
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 Bhimpheedi Rural Municipality
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 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: FOUNDATIONS. DETAILS



SCALE: 1:25 / 1:10

DATE: 11/2017

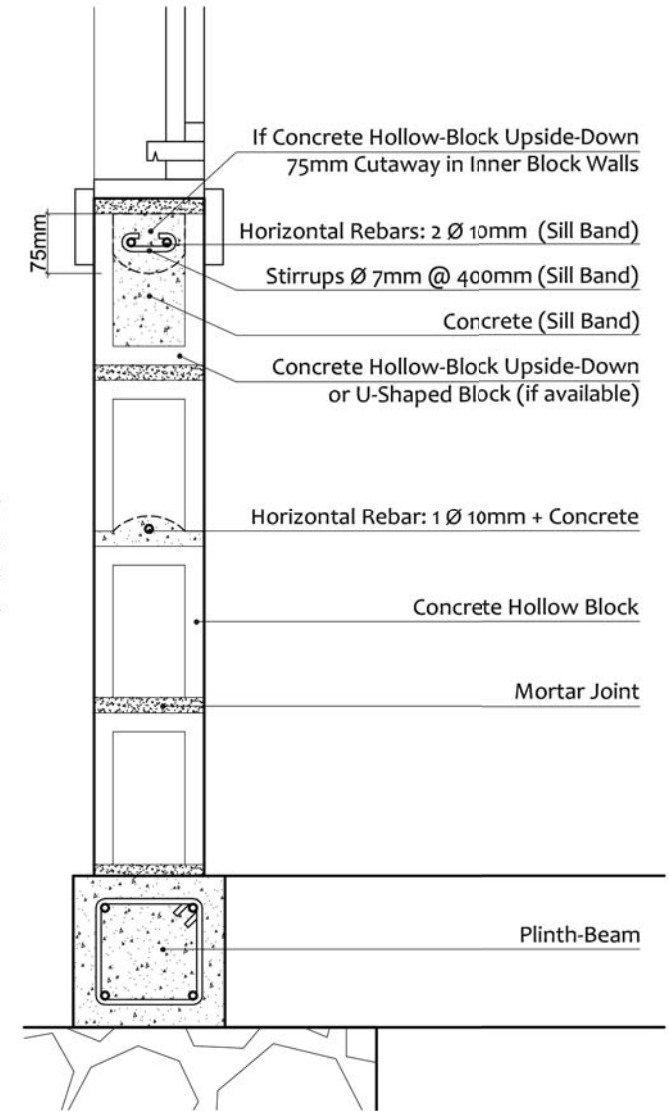
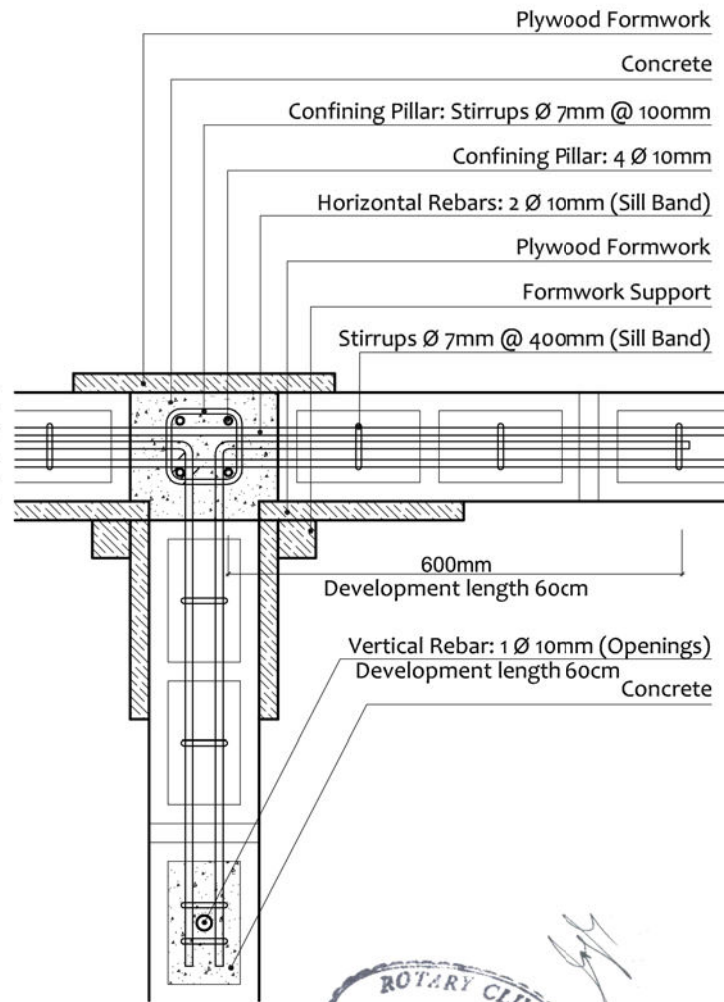
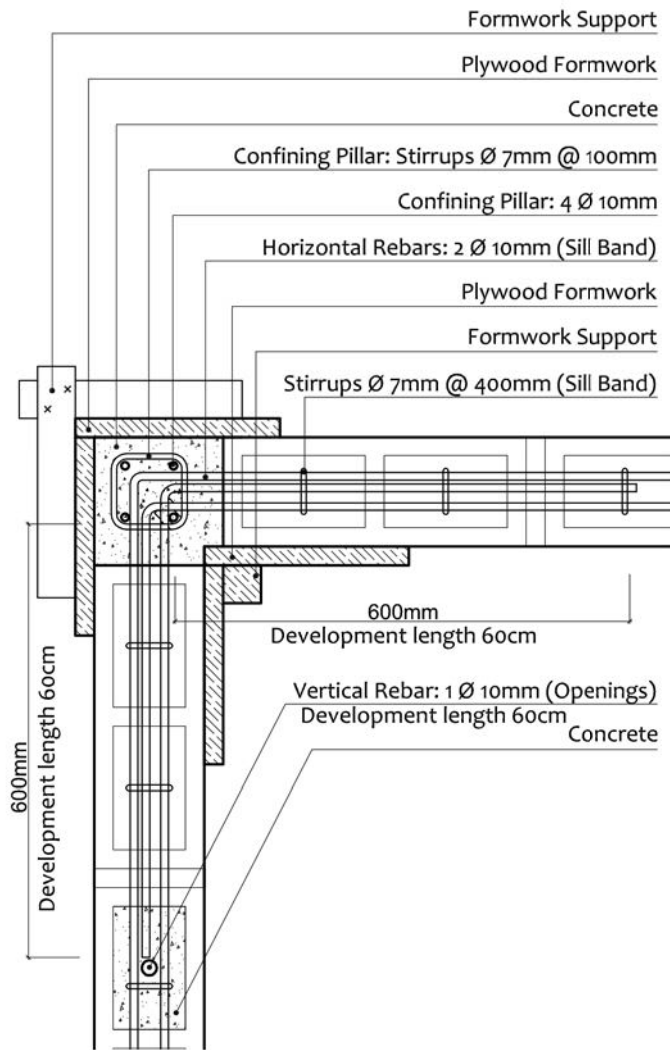
S.05



**DETAIL 1
PLAN VIEW SILL LEVEL**

**DETAIL 2
PLAN VIEW SILL LEVEL**

**DETAIL 3
WALL-WINDOW SECTION**



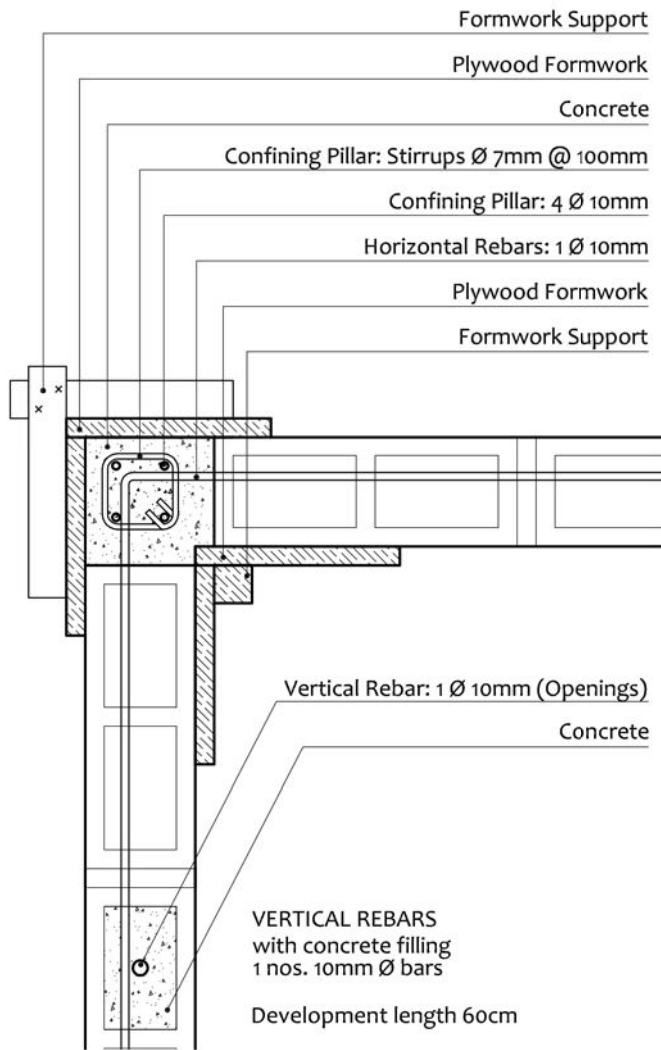
PILLAR DETAILS AT SILL BAND LEVEL 1:10



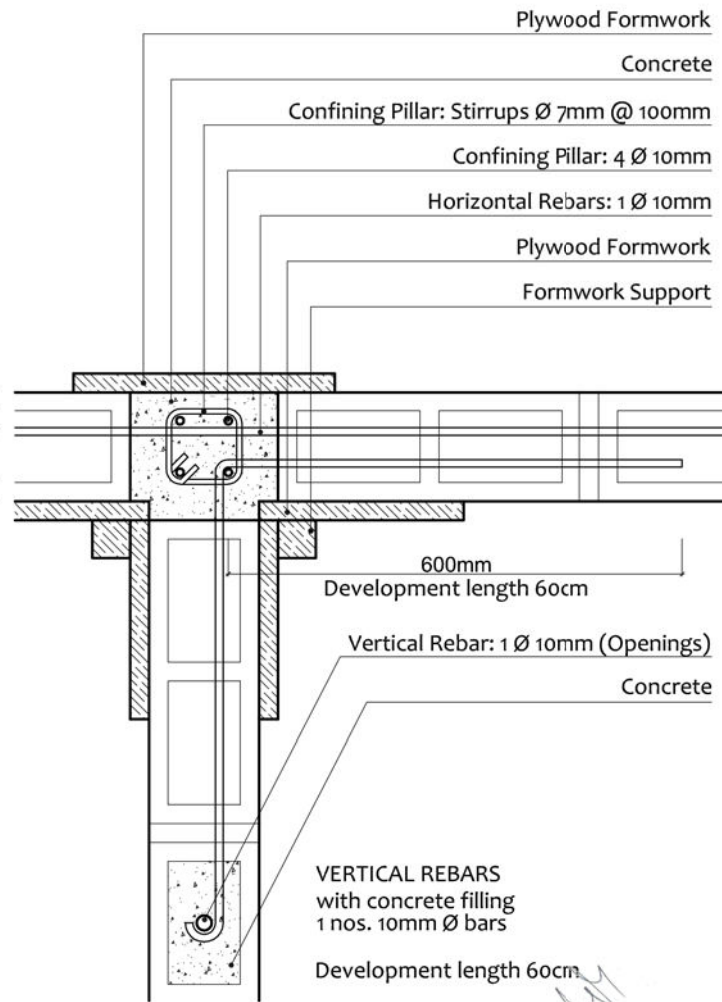
BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
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 +977 57410050
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 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

<p>CONFINED CONCRETE BLOCK MASONRY</p> <p>DRAWING TITLE: WALLS & PILLARS. PILLAR DETAILS. SILL-BAND</p>	<p>SCALE: 1:10</p>	<p>S.06</p>
	<p>DATE: 11/2017</p>	

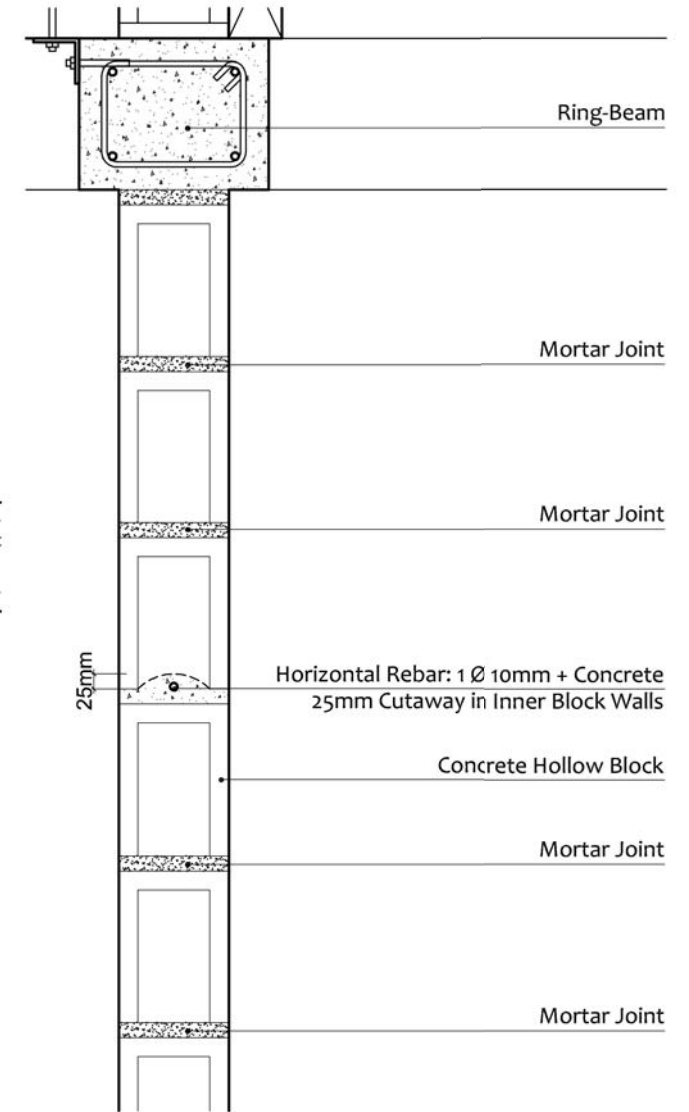
**DETAIL 1
PLAN VIEW JAMB LEVEL**



**DETAIL 2
PLAN VIEW JAMB LEVEL**



**DETAIL 3
WALL SECTION**



PILLAR DETAILS AT JAMB LEVEL 1:10



SCALE 1/10

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CONFINED CONCRETE BLOCK MASONRY

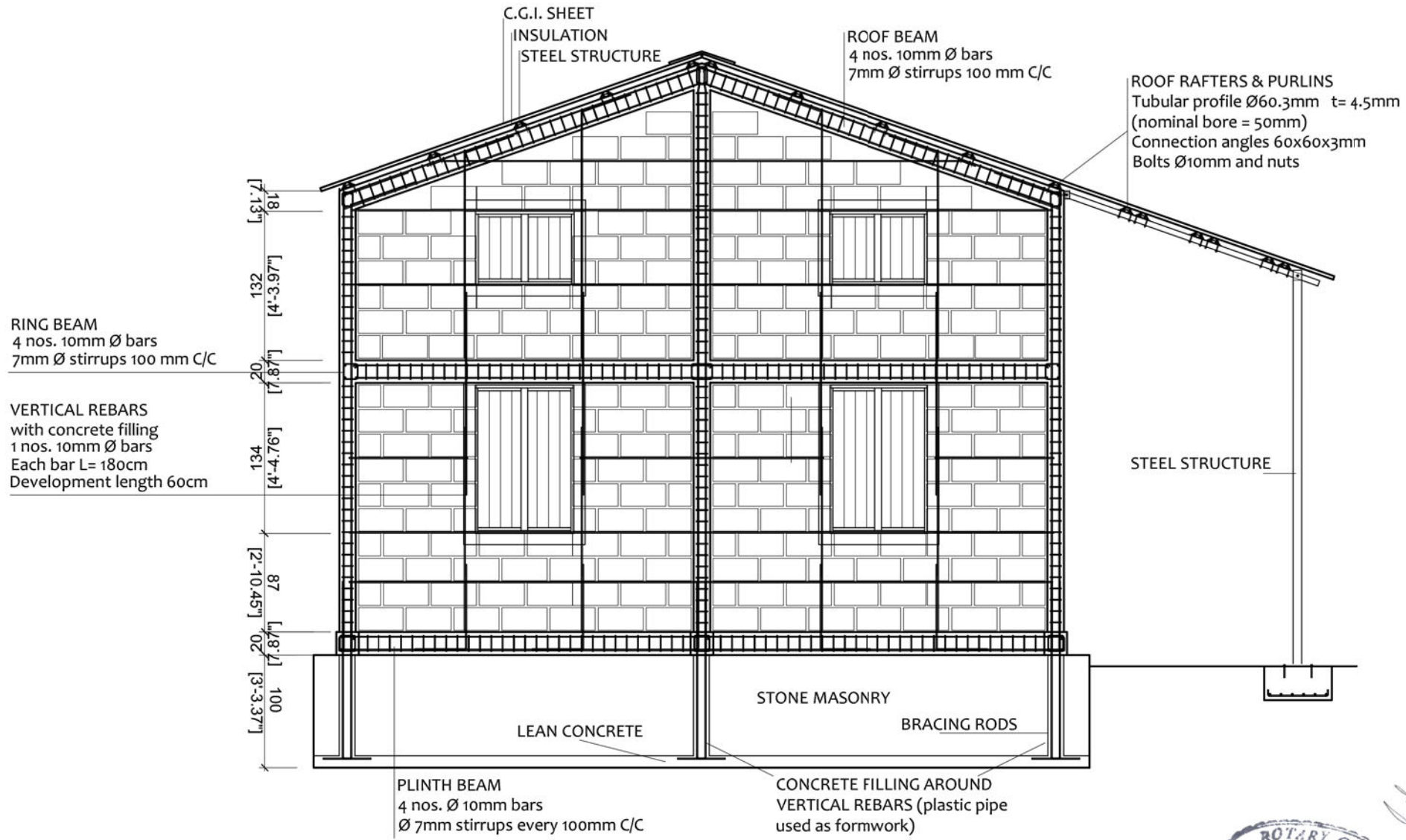
DRAWING TITLE: WALLS & PILLARS. PILLAR DETAILS



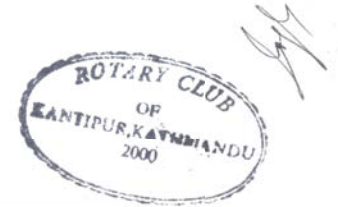
SCALE: 1:10

DATE: 11/2017

S.07



WALL SECTION D



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+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

<p>CONFINED CONCRETE BLOCK MASONRY</p>	<p>SCALE: 1:50</p>	
<p>DRAWING TITLE: WALLS & PILLARS. WALL SECTIONS</p>	<p>DATE: 11/2017</p>	<p>S.08</p>



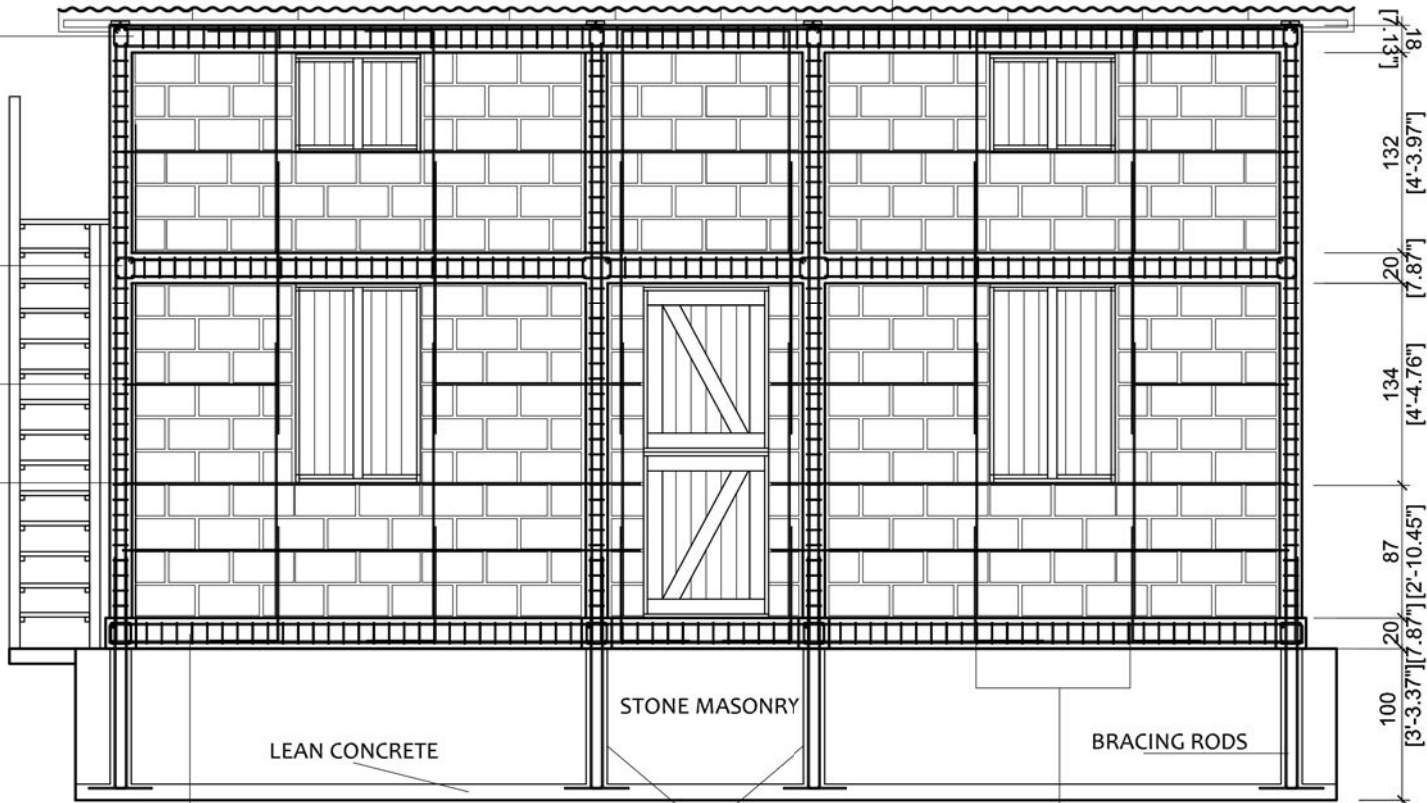
ROOF BEAM
4 nos. 10mm Ø bars
7mm Ø stirrups @100 mm

ROOF PURLINS
Tubular profile Ø60.3mm t= 4.5mm
(nominal bore = 50mm)
Connection angles 60x60x3mm
Bolts Ø10mm and nuts

FLOOR BEAM
4 nos. 10mm Ø bars
7mm Ø stirrups @100 mm

HORIZONTAL REBARS
with concrete filling
1 nos. 10mm Ø bars
Development length 60cm

SILL BAND with Concrete
2 nos. 10mm Ø bars
Stirrups Ø7mm @400mm

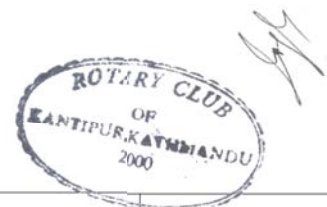


PLINTH BEAM
4 nos. Ø 10mm bars
Ø 7mm stirrups every 100mm C/C

CONCRETE FILLING AROUND VERTICAL REBARS (plastic pipe used as formwork)

VERTICAL REBARS
with concrete filling
1 nos. 10mm Ø bars
Each bar L= 180cm
Development length 60cm

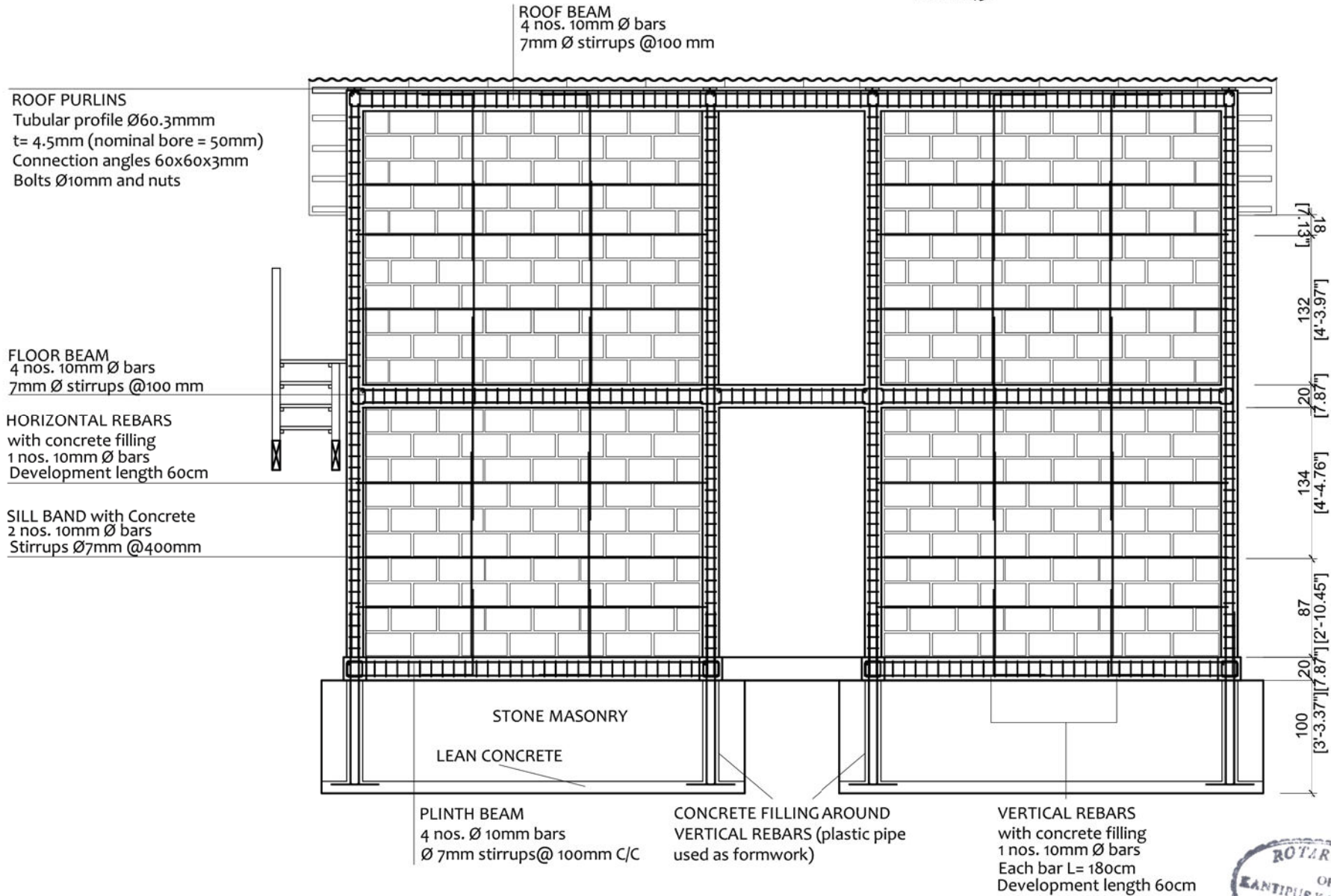
WALL SECTION E



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भीमफेदी आवासुका
+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

<p>CONFINED CONCRETE BLOCK MASONRY</p> <p>DRAWING TITLE: WALLS & PILLARS. WALL SECTIONS</p>	<p>SCALE: 1:50</p>	<p>S.09</p>
	<p>DATE: 11/2017</p>	





WALL SECTION F



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भीमफेदी आवासुका

+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: WALLS & PILLARS. WALL SECTIONS

SCALE: 1:50

DATE: 11/2017

S.10



ROOF PURLINS
 Tubular profile Ø60.3mm t= 4.5mm
 (nominal bore = 50mm)
 Connection angles 60x60x3mm
 Bolts Ø10mm and nuts

FLOOR BEAM
 4 nos. 10mm Ø bars
 7mm Ø stirrups @100 mm

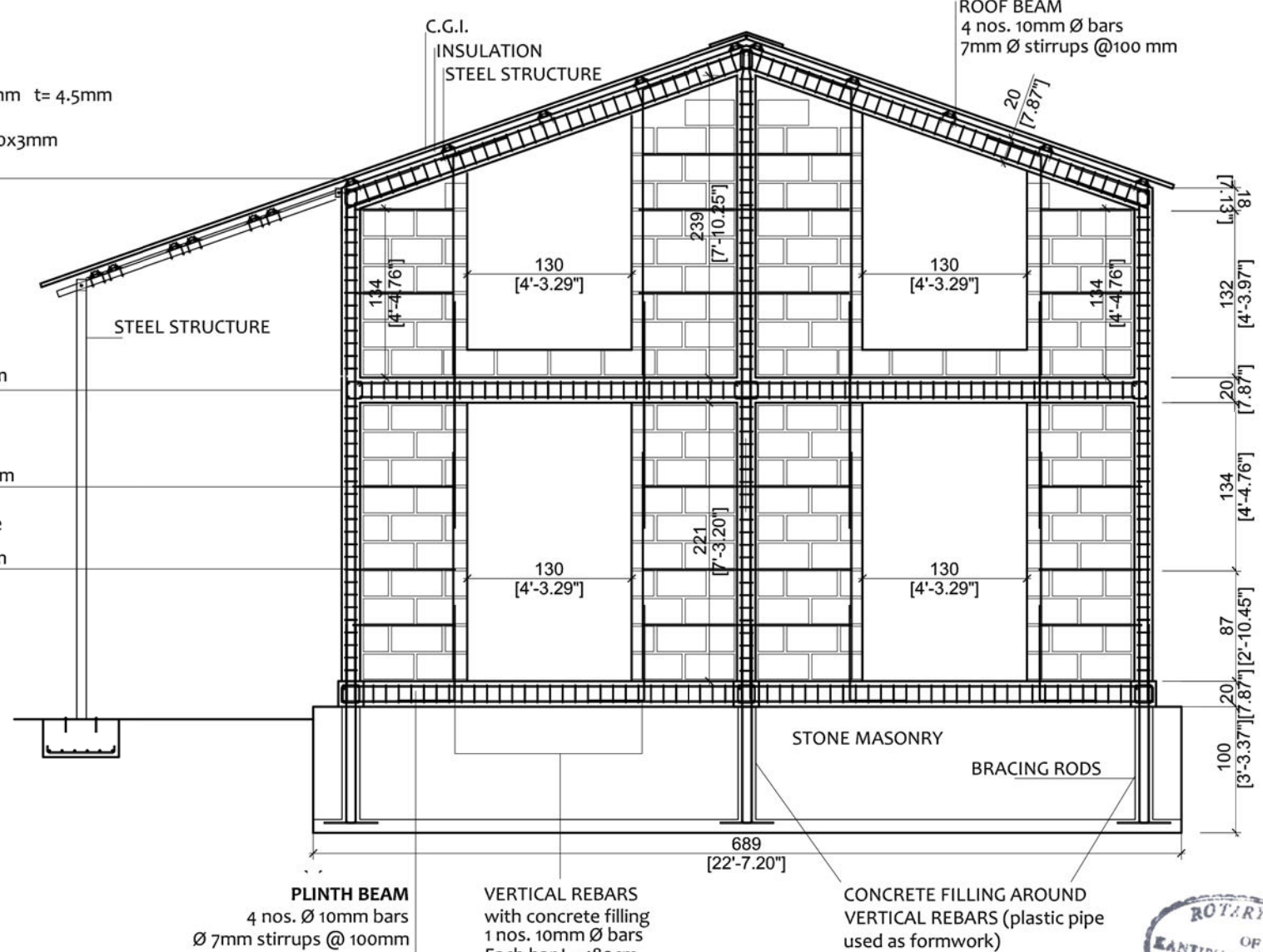
HORIZONTAL REBARS
 with concrete filling
 1 nos. 10mm Ø bars
 Development length 60cm

SILL BAND with Concrete
 2 nos. 10mm Ø bars
 Stirrups Ø7mm @400mm

PLINTH BEAM
 4 nos. Ø 10mm bars
 Ø 7mm stirrups @ 100mm

VERTICAL REBARS
 with concrete filling
 1 nos. 10mm Ø bars
 Each bar L= 180cm
 Development length 60cm

CONCRETE FILLING AROUND VERTICAL REBARS (plastic pipe used as formwork)



WALL SECTION G



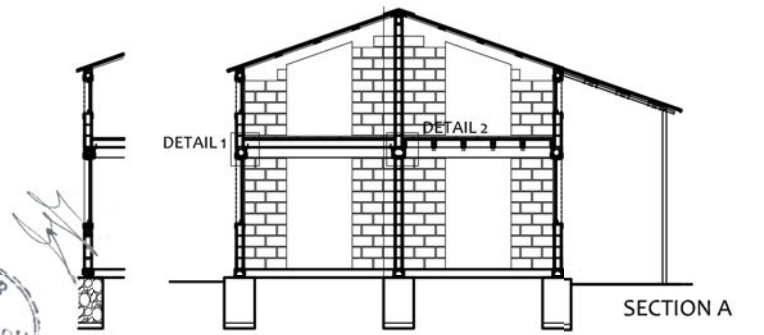
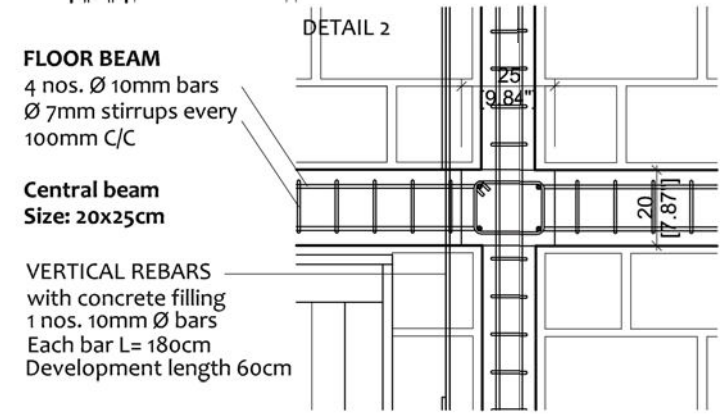
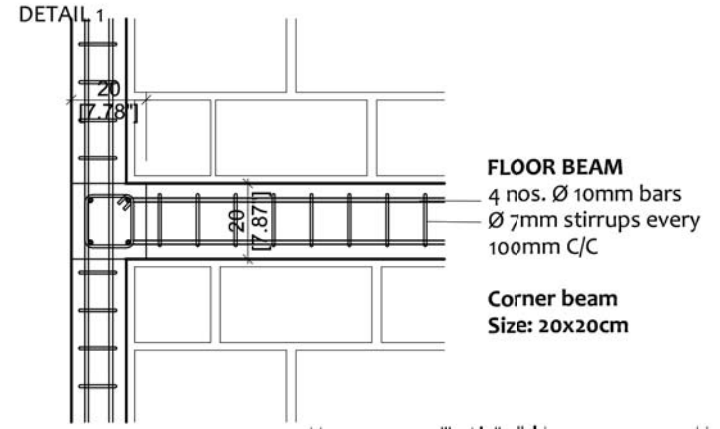
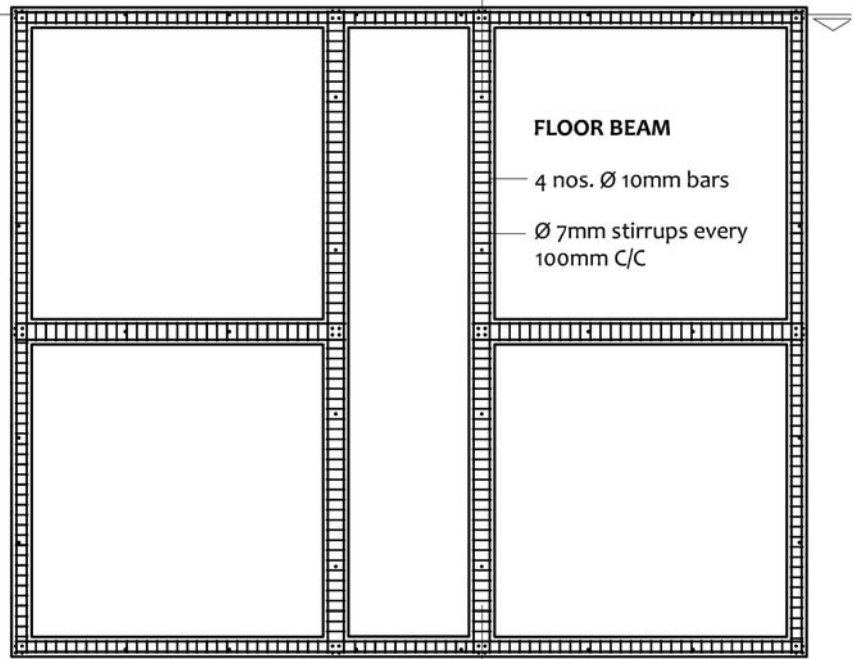
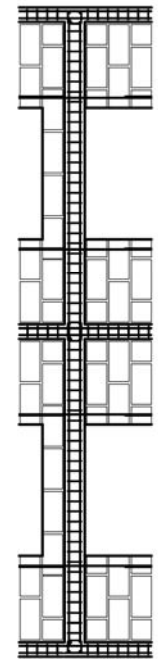
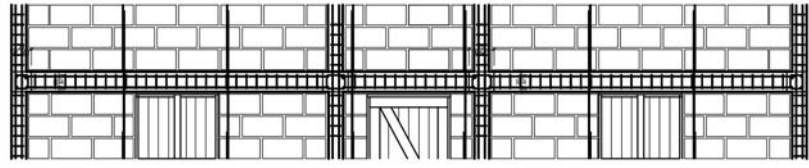
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 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: WALLS & PILLARS. WALL SECTIONS

SCALE: 1:50
 DATE: 11/2017

S.11



FLOOR BEAM DETAILS



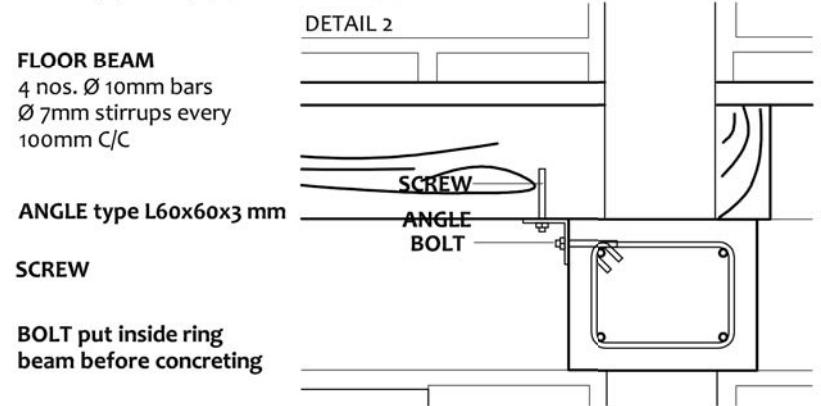
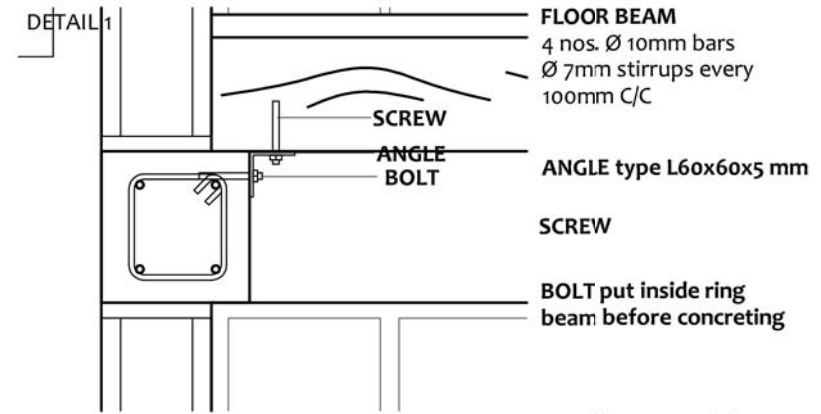
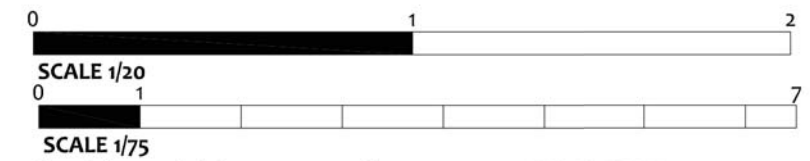
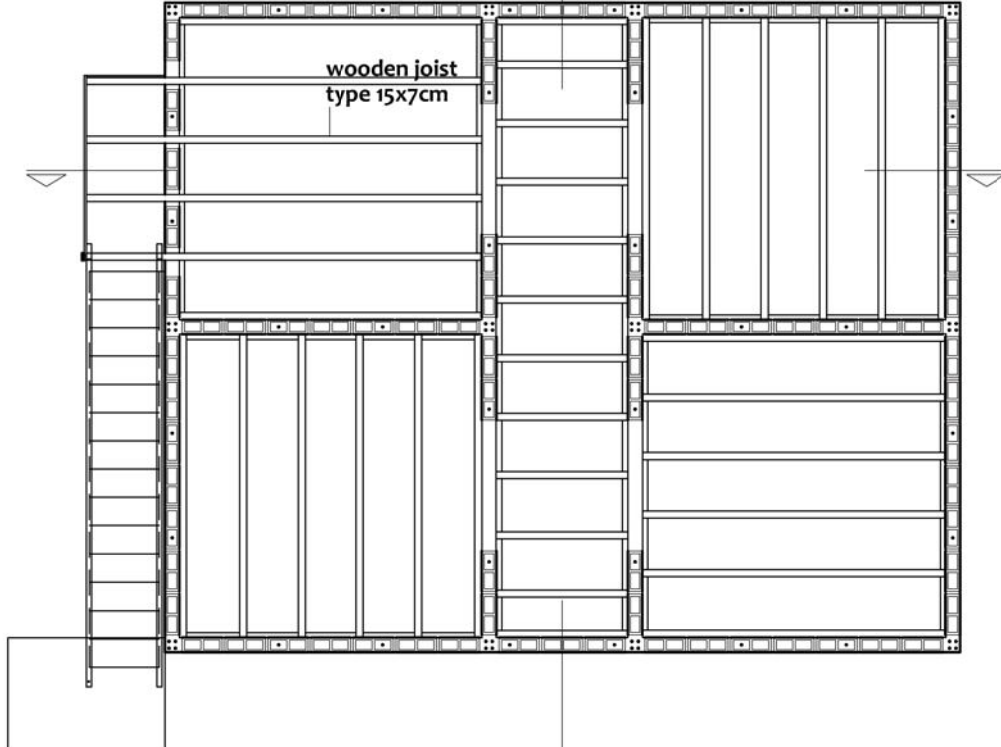
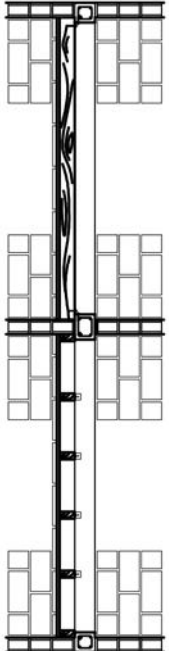
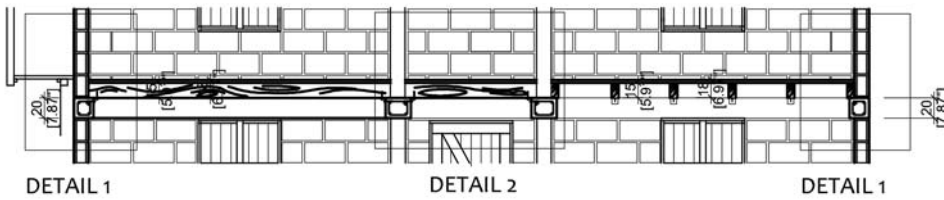
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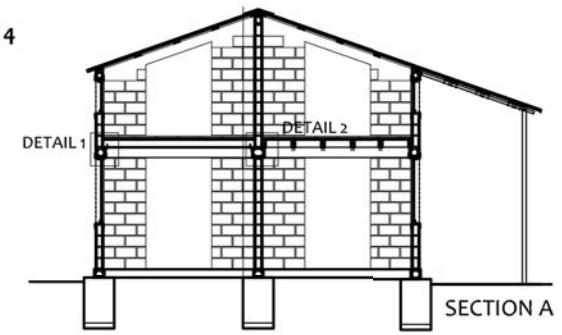
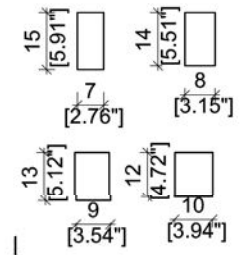
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Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
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CONFINED CONCRETE BLOCK MASONRY	SCALE: 1:75 / 1:10	S.12
DRAWING TITLE: FLOOR BEAM DETAILS	DATE: 11/2017	





EQUIVALENT WOODEN JOISTS
Choose 1 from these 4 possible types



WOODEN JOISTS DETAILS



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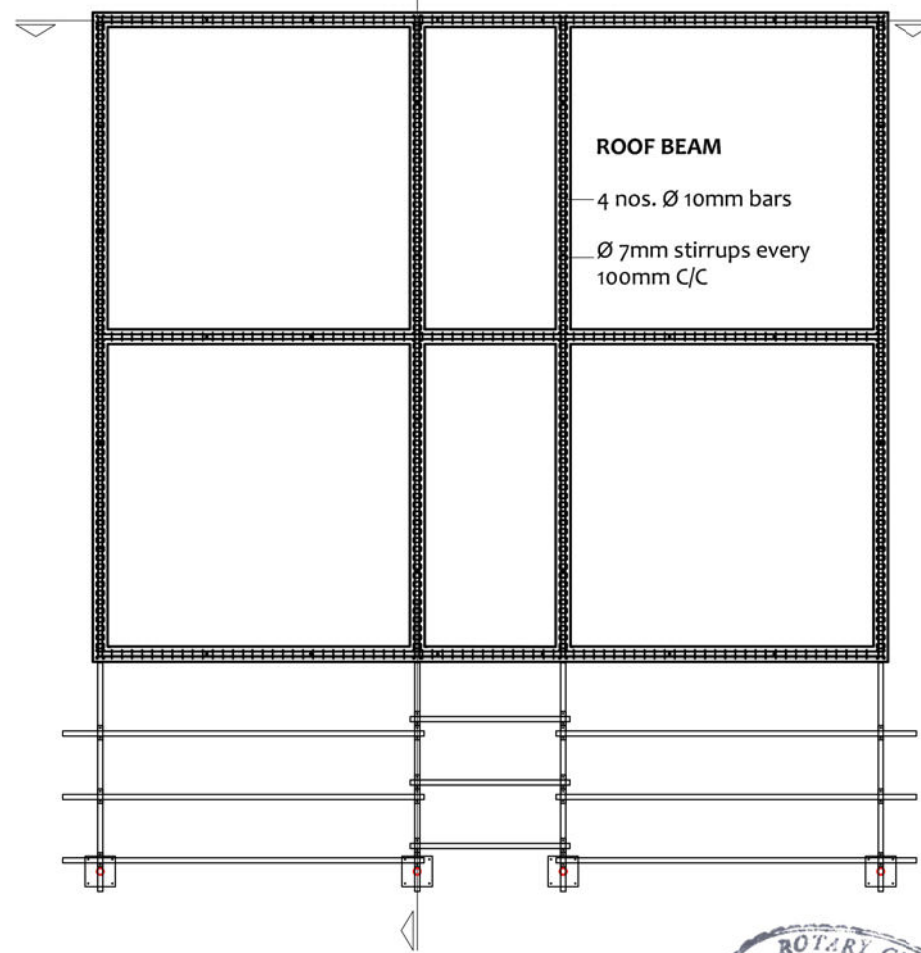
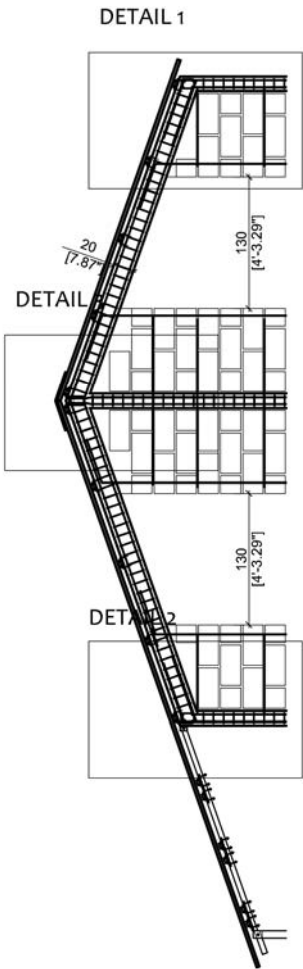
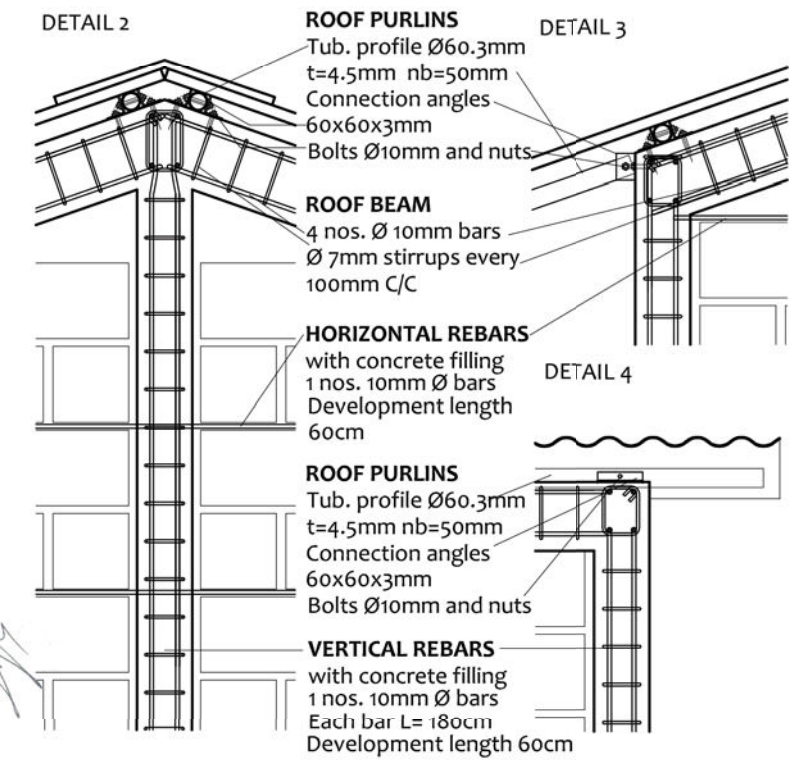
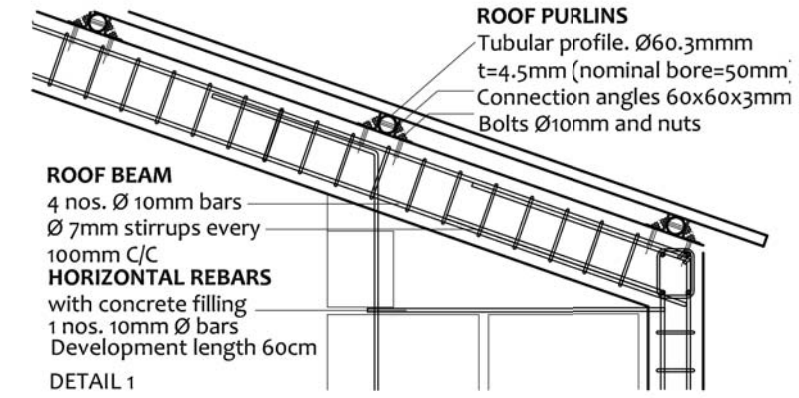
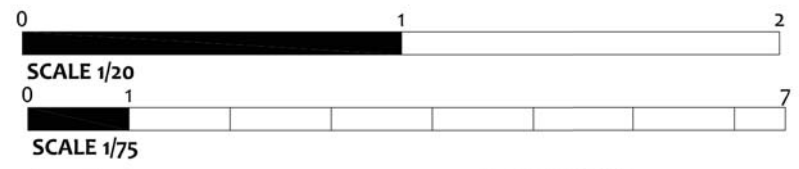
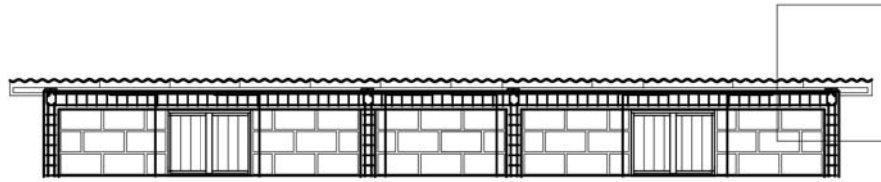
CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: 1st FLOOR. WOODEN JOISTS DETAILS

SCALE: 1:75 / 1:20

DATE: 11/2017

S.13



ROOF BEAM DETAILS

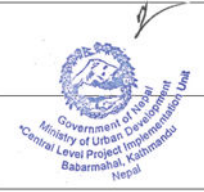


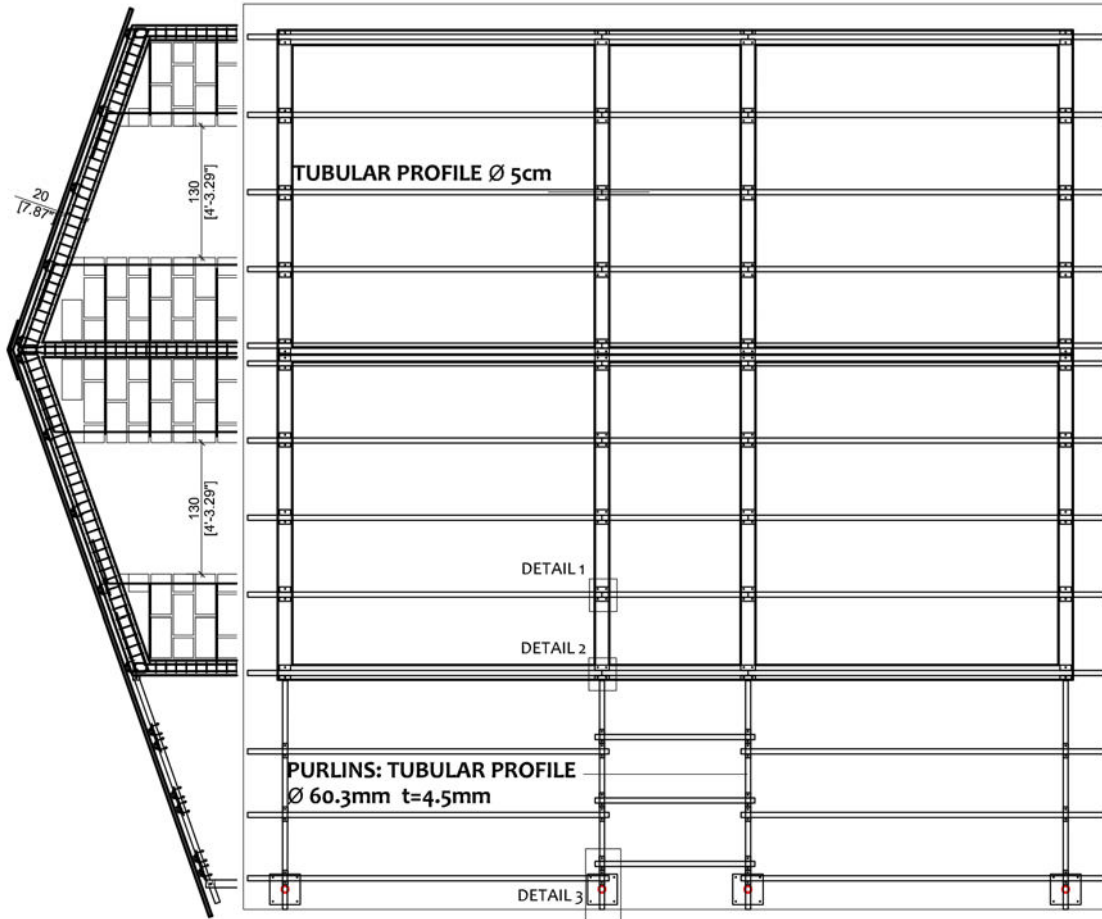
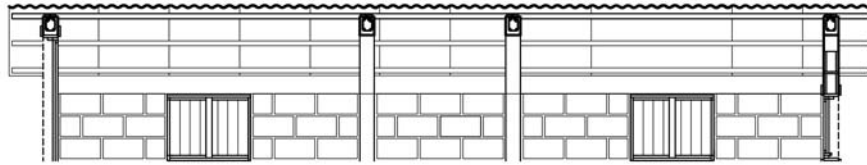
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भीमफेदी आवासुका

+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
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CONFINED CONCRETE BLOCK MASONRY	SCALE: 1:75/1:20	S.14
DRAWING TITLE: ROOF BEAM	DATE: 11/2017	



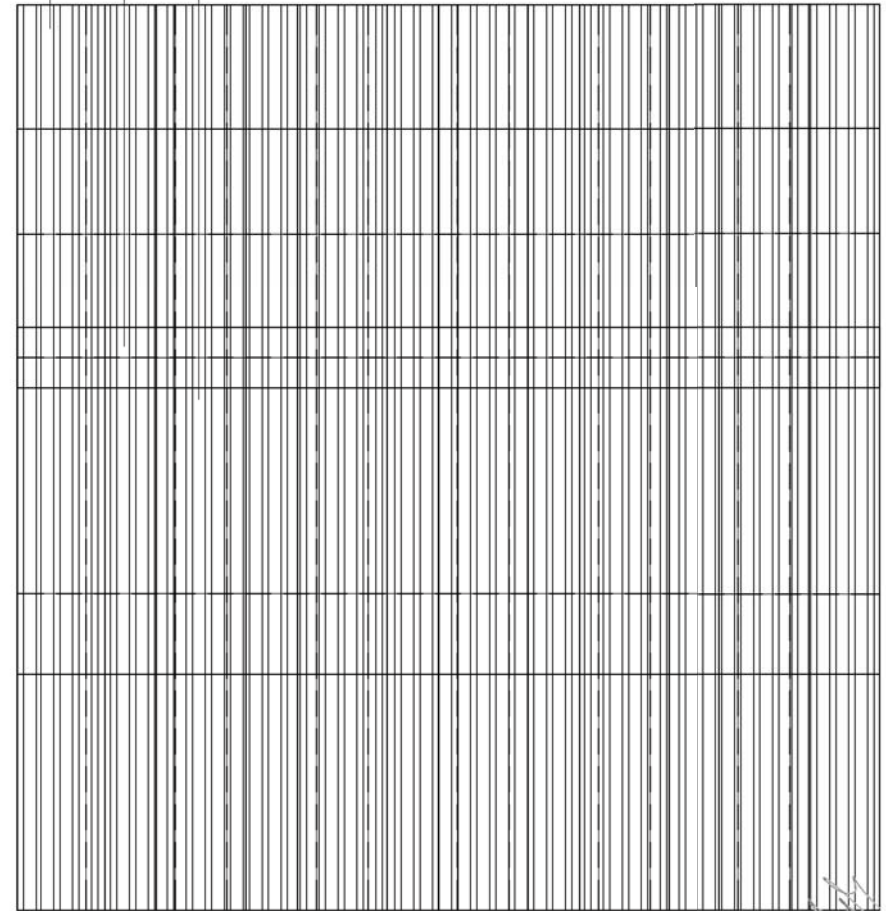


METAL PIPES for ROOF SYSTEM

CGI sheet 8feet/240cm_24 sheets

GI sheet

CGI sheet 11 feet/330cm_24 sheets



CGI LAYOUT



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 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
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 bhimpheedi.awasuka@gmail.com

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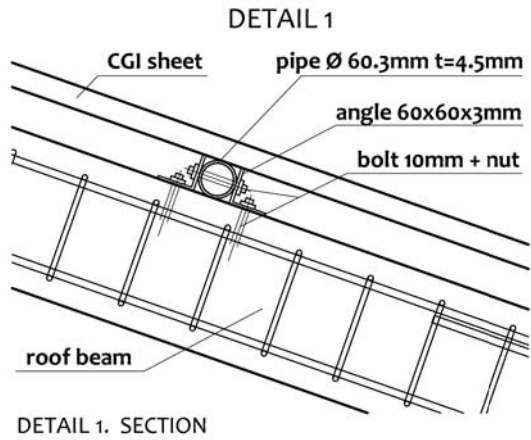
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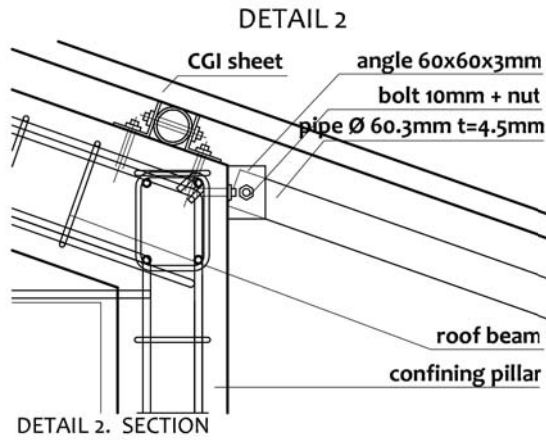
SCALE: 1:75

DATE: 11/2017

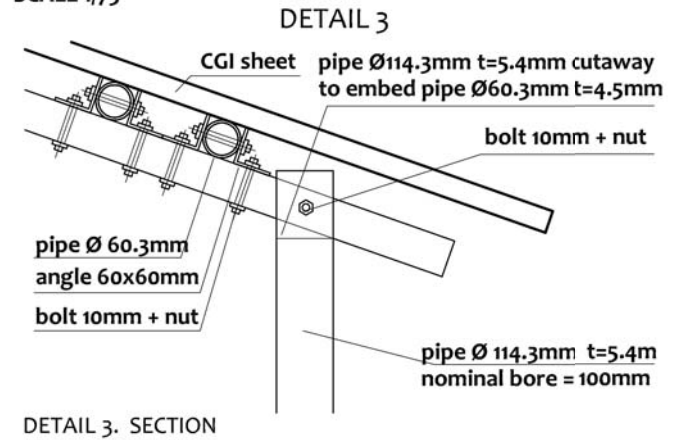
S.15



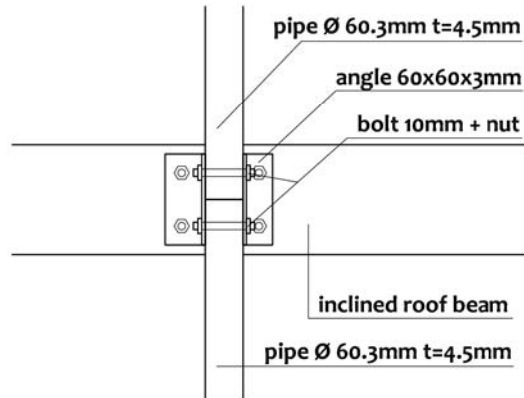
DETAIL 1. SECTION



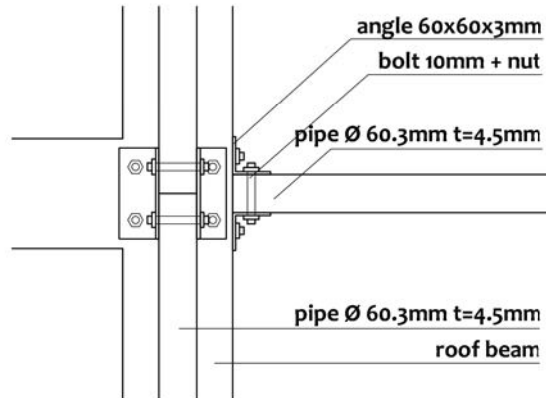
DETAIL 2. SECTION



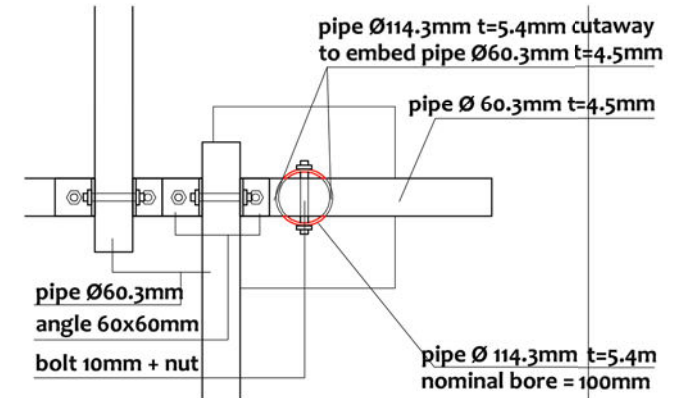
DETAIL 3. SECTION



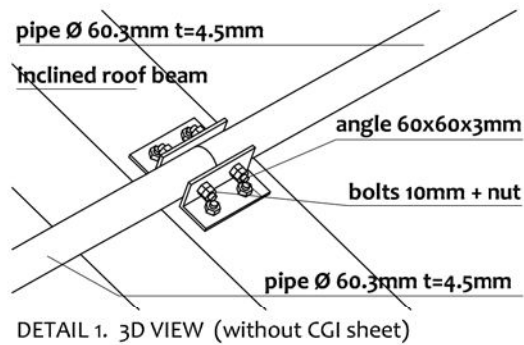
DETAIL 1. PLAN VIEW (without CGI sheet)



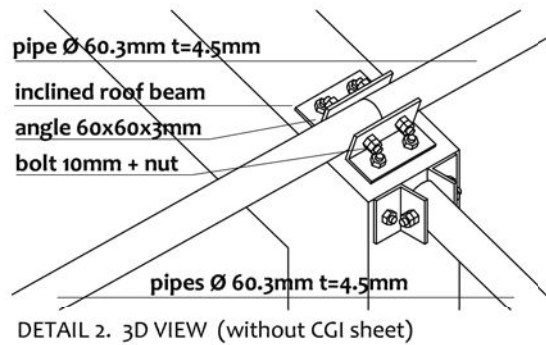
DETAIL 2. PLAN VIEW (without CGI sheet)



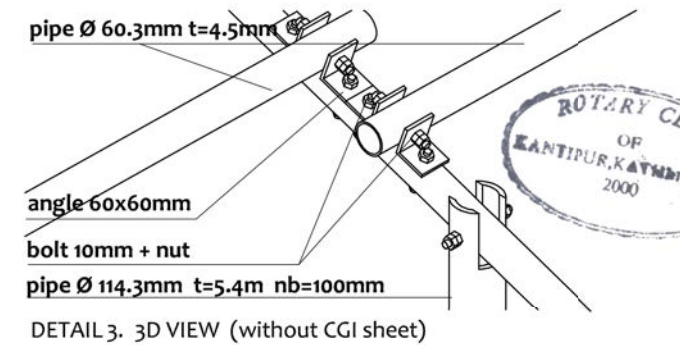
DETAIL 3. PLAN VIEW (without CGI sheet)



DETAIL 1. 3D VIEW (without CGI sheet)



DETAIL 2. 3D VIEW (without CGI sheet)

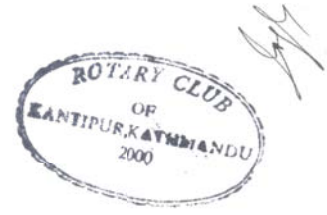
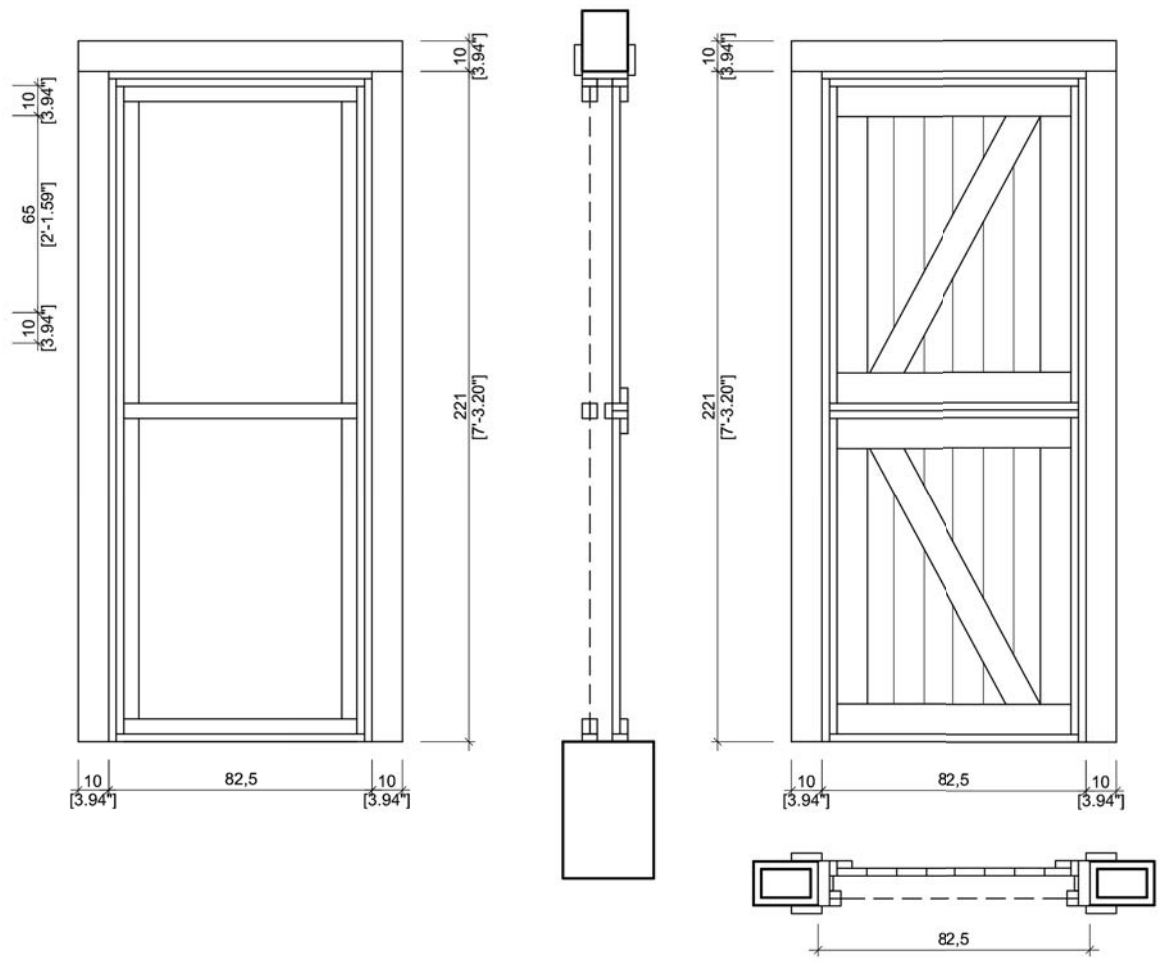
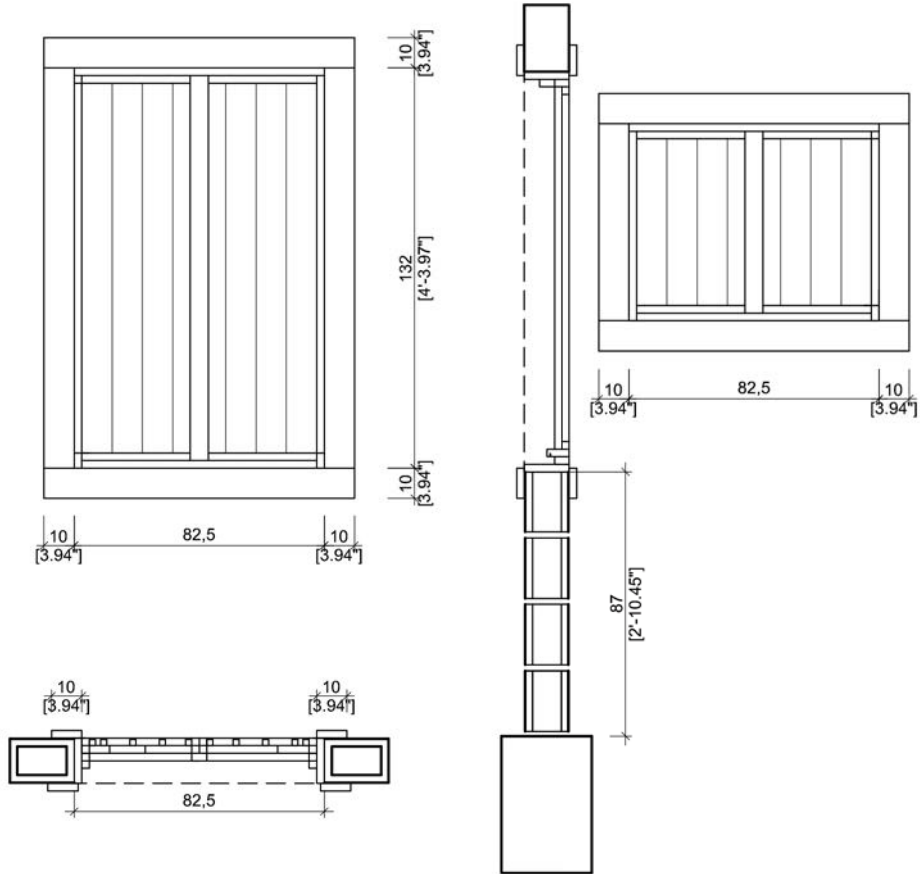


DETAIL 3. 3D VIEW (without CGI sheet)



WINDOWS

DOOR

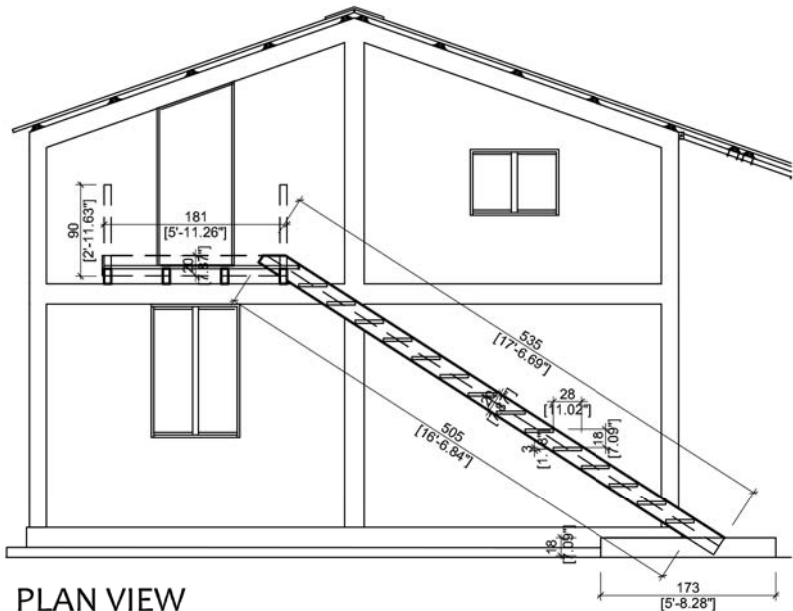


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 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
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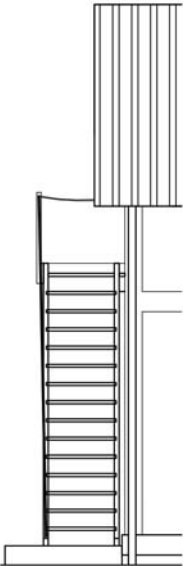
<p>CONFINED CONCRETE BLOCK MASONRY</p> <p>DRAWING TITLE: OPENINGS</p>	<p>SCALE: 1:25</p>	<p>S.17</p>
	<p>DATE: 11/2017</p>	



SECTION



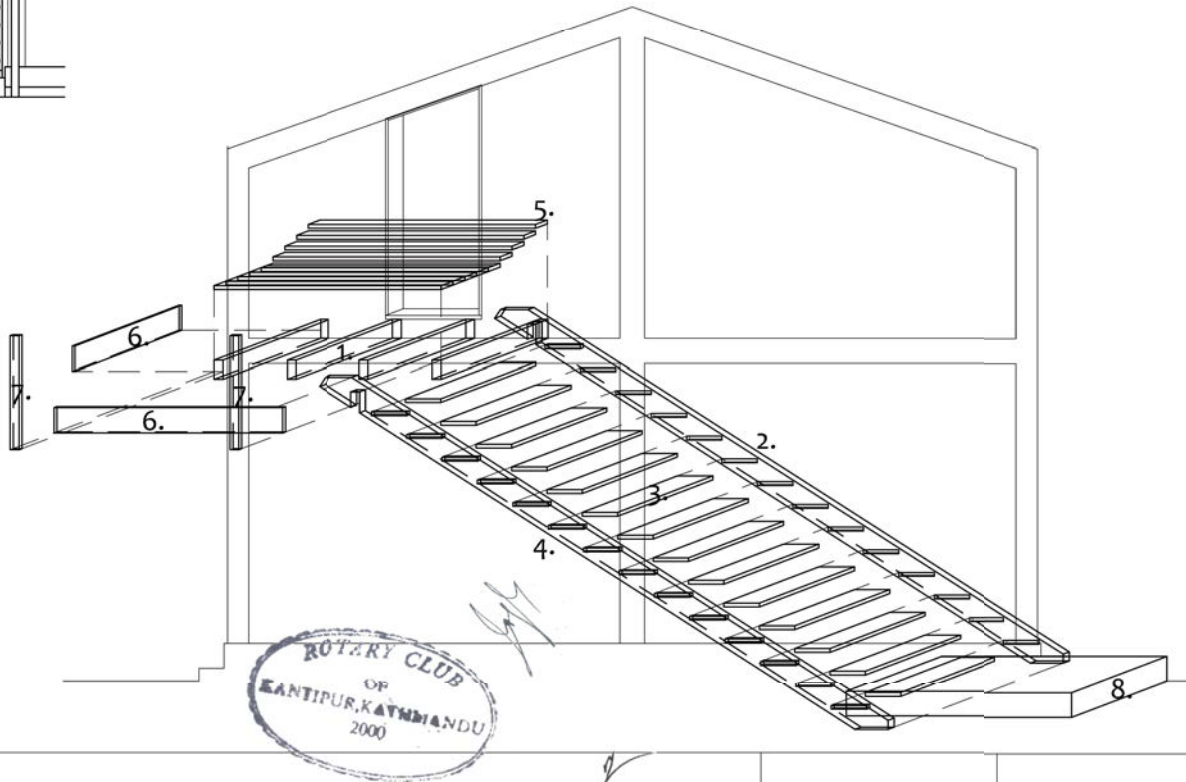
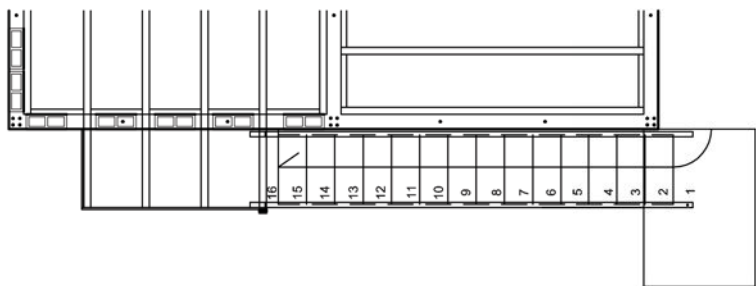
ELEVATION



PARTS OF THE CONSTRUCTION PROCESS OF THE STAIRS

1. Extended First floor joists
2. Interior wooden beam= 535x20x5cm with steps carved 2cm deep and cutaway piece to cast with wooden joist
3. Wooden steps 70x28x2cm ended between interior and outer wooden beams
4. Outer wooden beam= 535x20x5cm with steps carved 2cm deep and cutaway piece to cast with wooden joist
5. Wooden pavement of 3cm height
6. Wooden outer cover and protection= 181x20x2cm/75x20x2cm
7. Wooden poles=90x7x2cm
8. Concrete Support and first step

PLAN VIEW



BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
 भीमफेदी आवासुका
 +977 57410050
 Bhimpheedi Rural Municipality
 Dhangodan Ward #6
 MAKAWANPUR DISTRICT
 bhimpheedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: STAIRS



SCALE: 1:30

DATE: 11/2017

S.18

TECHNICAL REQUIREMENTS

STRUCTURAL SYSTEM	Confined concrete block wall, vertically reinforced every 80cms and in all openings' sides; and horizontally, at least every three rows. Surrounded by vertical and horizontal structural concrete elements: vertical pillars at the corners of the rooms (every 3m maximum) and horizontal rings in: plinth beam, floor beam and upper ring beams. All reinforcements are continuous, always overlapping with one another.
FOUNDATION	Shall be done at the required depth and width, depending on the type of soil defined by Nepal National Building Code: soft, medium or hard. Done with stone masonry: stone and concrete (1 : 3 : 6), resting on a layer of lean concrete.
PLINTH BEAM	Concrete (1 : 1,5 : 3), of size 30 cms x 45 cms (horizontal and vertical dimensions respectively), reinforced with 4 nos. 10mm \emptyset bars with 7mm stirrups at 100mm c/c
WALL SYSTEM	Concrete blocks shall be of size 400 x 200 x150mm and be of good quality, reinforced with 10mm \emptyset bars. Vertical concrete elements (1 : 1,5 : 3), reinforced with 4 nos. 10mm \emptyset bars with 7mm \emptyset stirrups at 100mm c/c
SILL BAND	Openings (doors and windows) shall reach up to the floor beam.
LINTEL BAND	Concrete (1 : 1,5 : 3), shall be of size 15 x 20cms (horizontal and vertical dimensions respectively), reinforced with 4 nos. 10mm \emptyset bars with 7mm \emptyset stirrups at 100mm c/c.
FLOOR BEAM	Concrete (1 : 1,5 : 3), reinforced with 4 nos. 10mm \emptyset bars with 7mm \emptyset stirrups at 100mm c/c.
GROUND FLOOR	100mm thick reinforced concrete slab (1 : 1,5 : 3), resting on a 200mm thick hard rock bed and finished with a 50mm thick layer of lean concrete.
FIRST FLOOR	Wooden floor with variable size of wooden beams
ROOF	Metal roof designed out of a tubular profile \emptyset 2"

BHIMPHEDI AWASUKA



भीमफेदी आवासुका



Program developed by:

Amics del Nepal - Base-A - CCD-UPC University - Agragaami Krishak Krishi Sahakaari - Rotary Club Kantipur

Program Director

Mònica Sans Duran, Architect - Musician, **Amics del Nepal NGO**, Barcelona

Technical Coordinator

Berta Marín Pascal, Architect, **base-A NGO**, Barcelona

Program Advisor

Pedro Lorenzo Gálligo, PhD. Architect, **CCD-UPC University**, Barcelona

Local Counterpart

Agragaami Krishak Krishi Sahakaari Sastaa, Bhimpheedi

Local Partner

Rotary Club Kantipur, Kathmandu

Technical Team

Architecture: Andrea Llanas, Valèria Cid, Àlex Espina, Diego Guerra, Victoria Tous, Adrian Àlvarez, Alba Corbella, Andrea Martín, Jose Carlos Sánchez, Andreu Lull, Àngel Joaniquet, Marta Guilera, Irene Vidal, Victoria Solina, Marc Socias, Martí Domènech, Irina Berdonces, Arnau Montoya, Nerea Gezuraga, Mikel Zubiaga. **Surveying:** Marc Crespo. **Geology:** Yuliya Zuck. **Local Coordinator:** Niranjan Pudassainee.

Website:

<http://www.amicsnepal.org>

Blog:

<http://base-a-org.blogspot.com.es/search/label/Nepal>

Email:

coord.basea@gmail.com

BHIMPHEDI AWASUKA Aawaas Sudhar Karyakram
भीमफेदी आवासुका
+977 57410050
Bhimphedi Rural Municipality
Dhangodan Ward #6
MAKAWANPUR DISTRICT
bhimphedi.awasuka@gmail.com

CONFINED CONCRETE BLOCK MASONRY

DRAWING TITLE: TEAM CREDITS



DATE: 11/2017

S.20