DESIGN LAYOUT AND CONSTRUCTION DETAILS FOR DIFFERENT TYPOLOGIES OF BUILDINGS IN MOUNTAINOUS REGIONS (UTTARAKHAND)

Design Compendium

सत्यमेव जयते
Government of India
Department of Science & Technology
Ministry of Science & Technology

Development Alternatives

DESIGN LAYOUT AND CONSTRUCTION DETAILS FOR
DIFFERENT TYPOLOGIES OF BUILDINGS IN MOUNTAINOUS REGIONS (UTTARAKHAND)
Design Compendium

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Layout	:	Binu K George

Disclaimer

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INTRODUCTION

Multi-hazard prone mountain states like Uttarakhand are seeing intensive construction activity. Most of this construction uses energy and resource intensive brick and RCC based technologies, forgetting the rich heritage of vernacular architecture the region has. The new systems of construction, besides being expensive and energy intensive due to non-local materials that have to be carried to remote mountain locations have also demonstrated to be hazard prone with significant damages to life and property in the earthquakes, flash floods and landslides etc. being faced by the region.

A five-pronged solution is being proposed with this project i.e. Research & Assessment, Technology Adaptation, Technology Integration& Design, Training & Capacity Building, Technology demonstration and Knowledge Dissemination.

Hence, the proposed design for the community building in *Kamad* village, Uttarkashi consists of typical construction details followed by the use of locally available material such as mud and stone used for walls and masonry keeping in mind the safe construction practises in the earthquake prone zone. The design incorporates multiple green building technologies used in various components of the building such as-

1. **Compressed Stabilized Earth Blocks for wall construction**
2. **Concrete Block for construction of walls**
3. **Pine Shingle for roofing material for sloping roofs**
4. **Plank and Joist for intermediate roof slabs and flat roofs**
5. **RCC door-window frames**

Furthermore, the community building in *Kamad* village has been constructed as a model for disaster resistant construction in the mountainous district of Uttarkashi. As such, structural safety of the given building technologies was essential pre-requisite for architectural design. The design of the building was based on structural guidelines which have been developed for earthquake resistant construction in the country, with focus on non-engineered construction in rural areas, such as the *Kamad* village in Uttarkashi. Land available in *Kamad* is located opposite the main mandir of the village. It is a 40’ by 28’ plot with a plinth of 2’7” and situated on an internal village lane. As per the assessment and observation, first draft of the design was developed.

Detail description of the above-mentioned features are further described in the structural validation report.

1. Community Building

Kamad village, Dunda Block, Uttarkashi

Set of Drawings

Under the project:
Delivery of Eco-friendly Multi-Hazard Resistant Construction Technologies and Habitat Solutions in Mountain States

Supported by:
Department of Science and Technology, Government of India
Programme: TIME-LEARN

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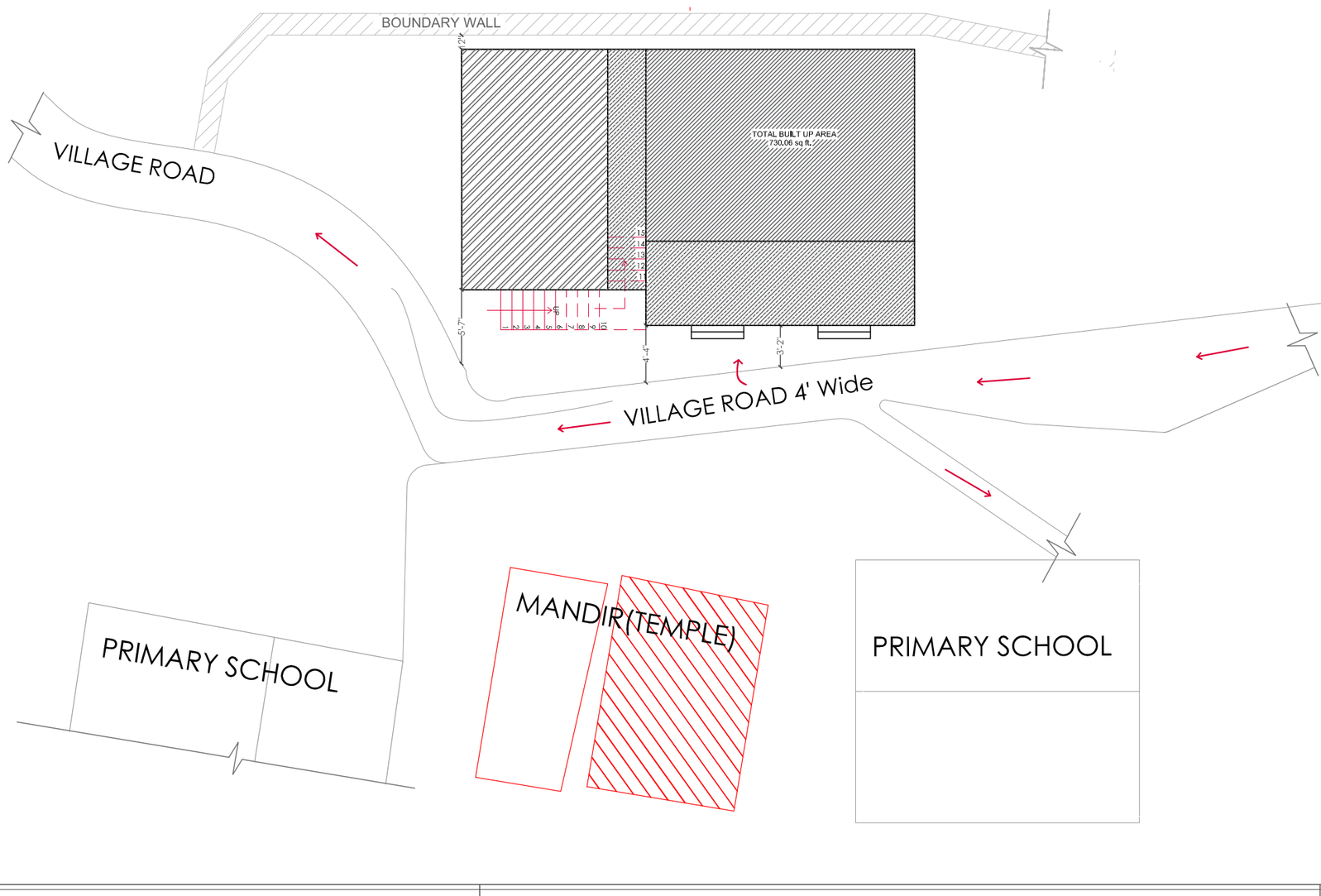
Construction and Structural Drawings



EARTHQUAKE GUIDELINES:

IS 13827:1993
IS 4326:1993 - EDITION 3.2
IS 13828:1993
IS 1893-1984

REINFORCEMENT
STUB COLUMN
TREE
BOUNDARY WALL
SPILL OVER AREA

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:
SITE PLAN
REV. DATE:

PROJECT
DST TIME LEARN
DRAWING
PINE SHINGLEMTIMBER TRUSS

SCALE	DRG. NO. TRUSS
ARCHITECT	
DEALT 12-12-2019	
DATE 06.06.2018	

N

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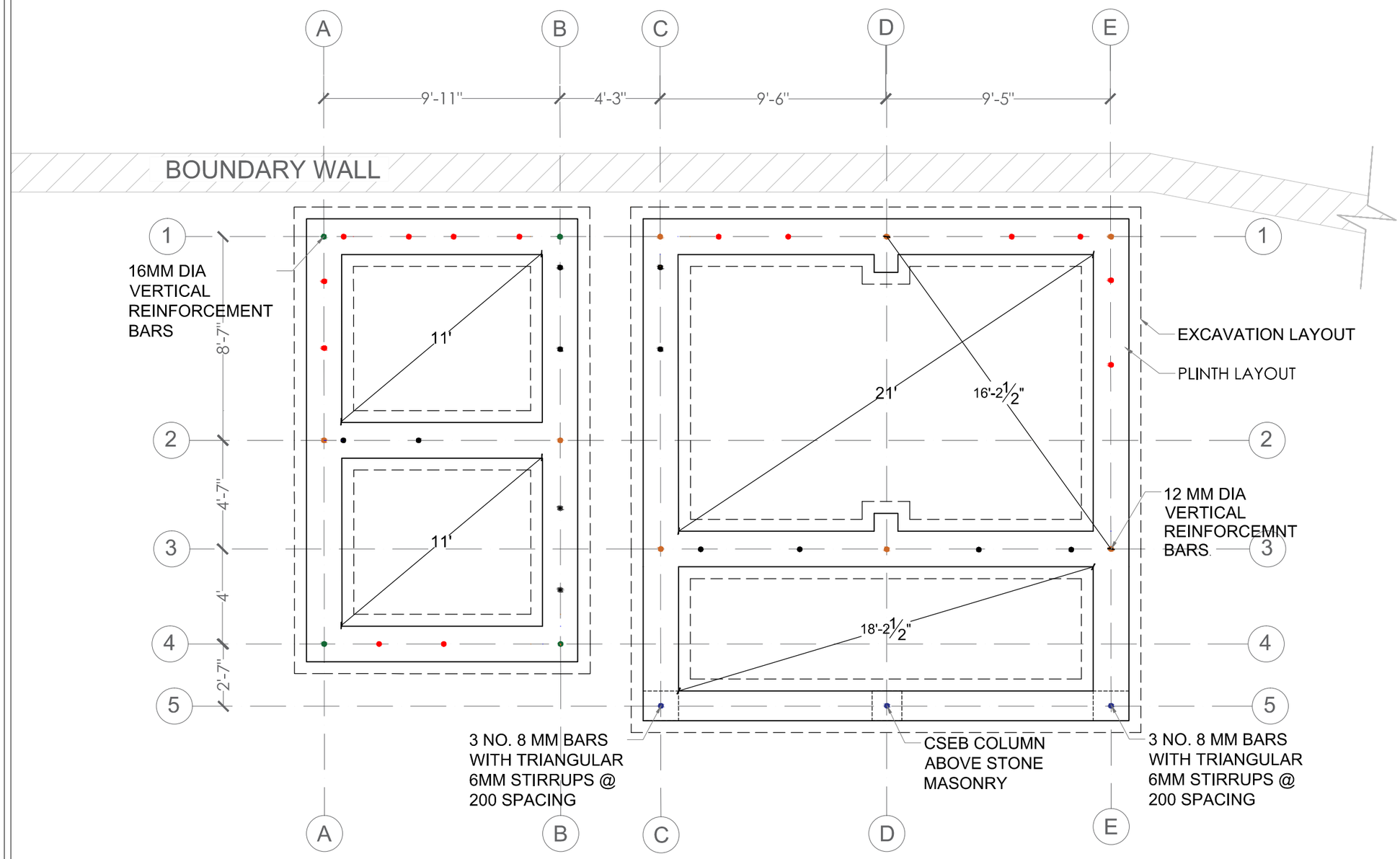

SHEET - 1

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:

PLINTH& EXCAVATION LAYOUT

REV. DATE:

02/06/2020

VERTICAL REINFORCEMENT DETAILS

DOOR	10mm	From foundation till Lintel band
WINDOW	10mm	From Sill Band till Lintel band
CORNERS & T-JUNCTIONS	16mm	From Foundation till Roof Band
	12mm	From Foundation till Roof Band
VERENDAH	8mm	From Foundation till Lintel Beam

PROJECT

DRAWING
Plinth & Excavation Layout

SCALE | DRG. NO. DRG/NO

ARCHITECT

DEALT

DATE

N

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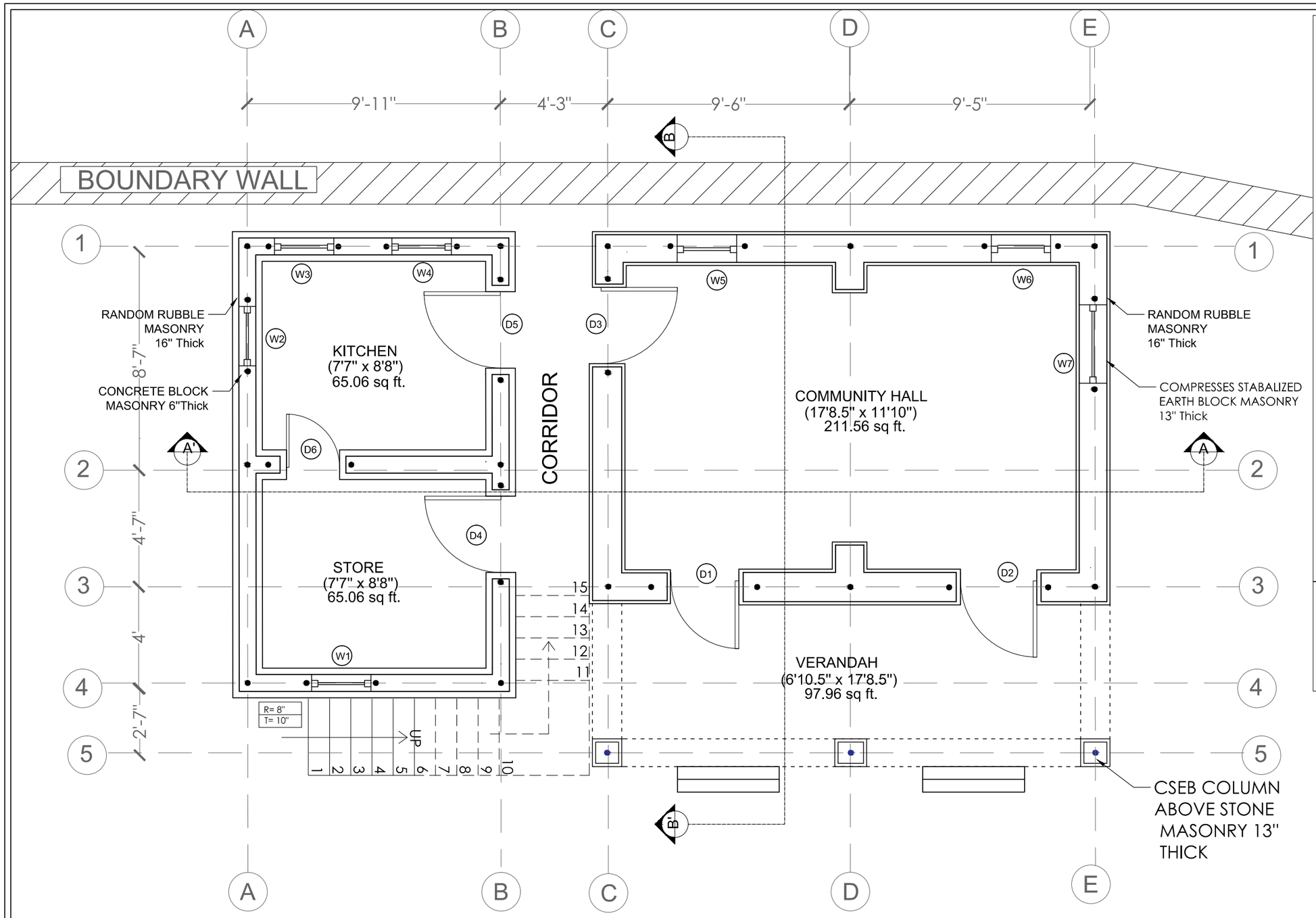

SCHEDULE OF OPENINGS - WINDOWS AND DOORS	
NAME	SIZE
W1	2'-4"x3'-9"
W2	3'-0"x3'-9"
W3	2'-4"x1'-9"
W4	2'-4"x1'-9"
W5	2'-4"x1'-9"
W6	2'-4"x1'-9"
W7	3'-0"x3'-9"
D1	3'-4"x7'-0"
D2	3'-4"x7'-0"
D3	3'-4"x7'-0"
D4	3'-4"x7'-0"
D5	3'-4"x7'-0"
D6	2'-5"x7'-0"

EARTHQUAKE GUIDELINES:

IS 13827:1993
IS 4326:1993 - EDITION 3.2
IS 13828:1993
IS 1893-1984

SHEET - 3

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:
GROUND FLOOR PLAN

REV. DATE:
31/10/2018

PROJECT
DST TIME LEARN
DRAWING
GF LEVEL PLAN

SCALE	DRG. NO.
	K.GF-1.1
ARCHITECT	
DEALT	
DATE	
06.06.2018	

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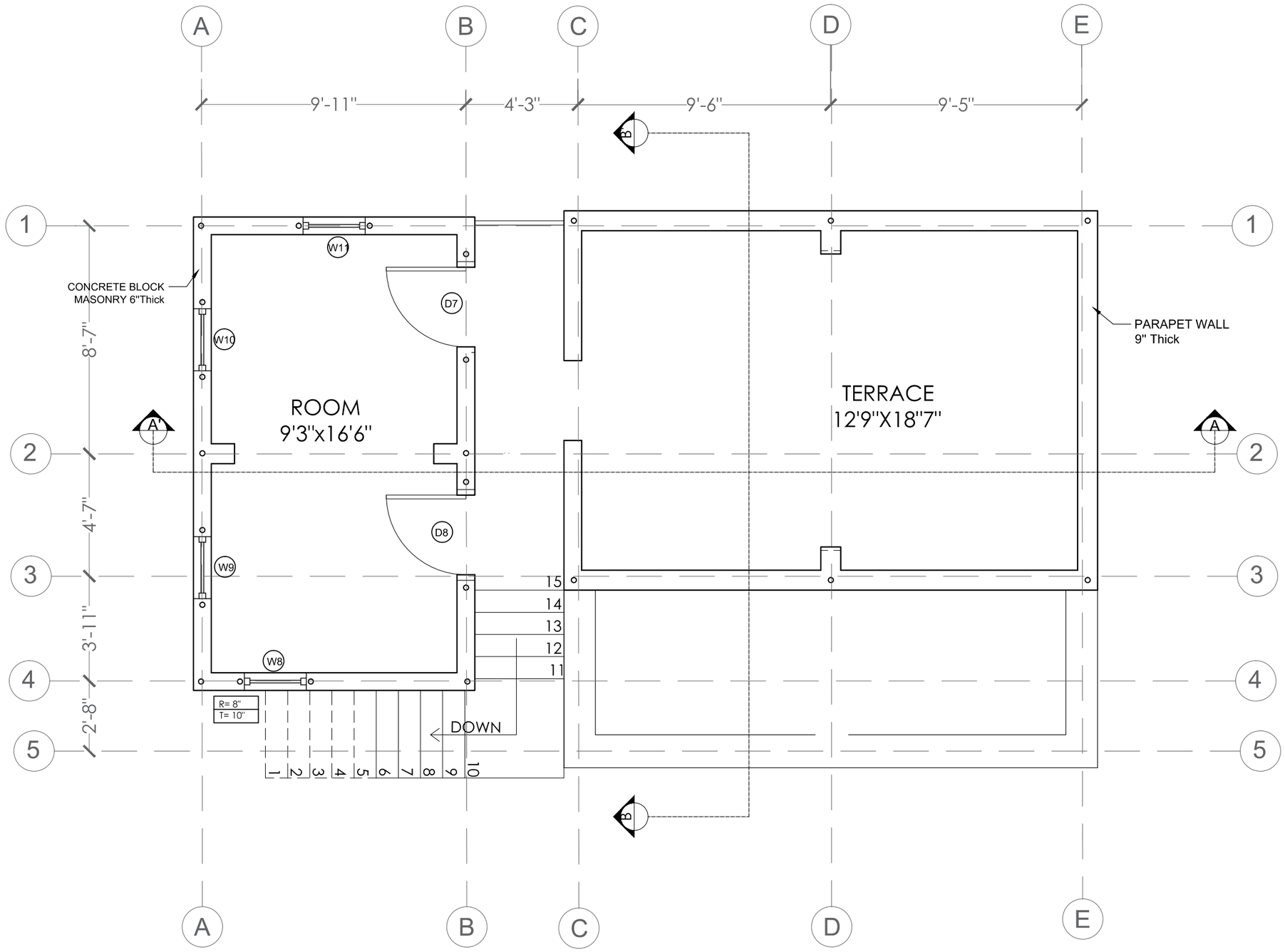

SCHEDULE OF OPENINGS - WINDOWS AND DOORS	
NAME	SIZE
W8	2'-4"x3'-9"
W9	3'-0"x3'-9"
W10	2'-4"x1'-9"
W11	2'-4"x1'-9"
D7	3'-4"x7'-0"
D8	3'-4"x7'-0"

EARTHQUAKE GUIDELINES:

IS 13827:1993
IS 4326:1993 - EDITION 3.2
IS 13828:1993
IS 1893-1984

SHEET - 4

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:
FIRST FLOOR PLAN
REV. DATE:
02/06/2020

PROJECT
DST TIME LEARN
DRAWING
FIRST FLOOR PLAN

SCALE	DRG. NO.
	K.FF-1.1
ARCHITECT	
DEALT	
DATE	
06.06.2018	

N

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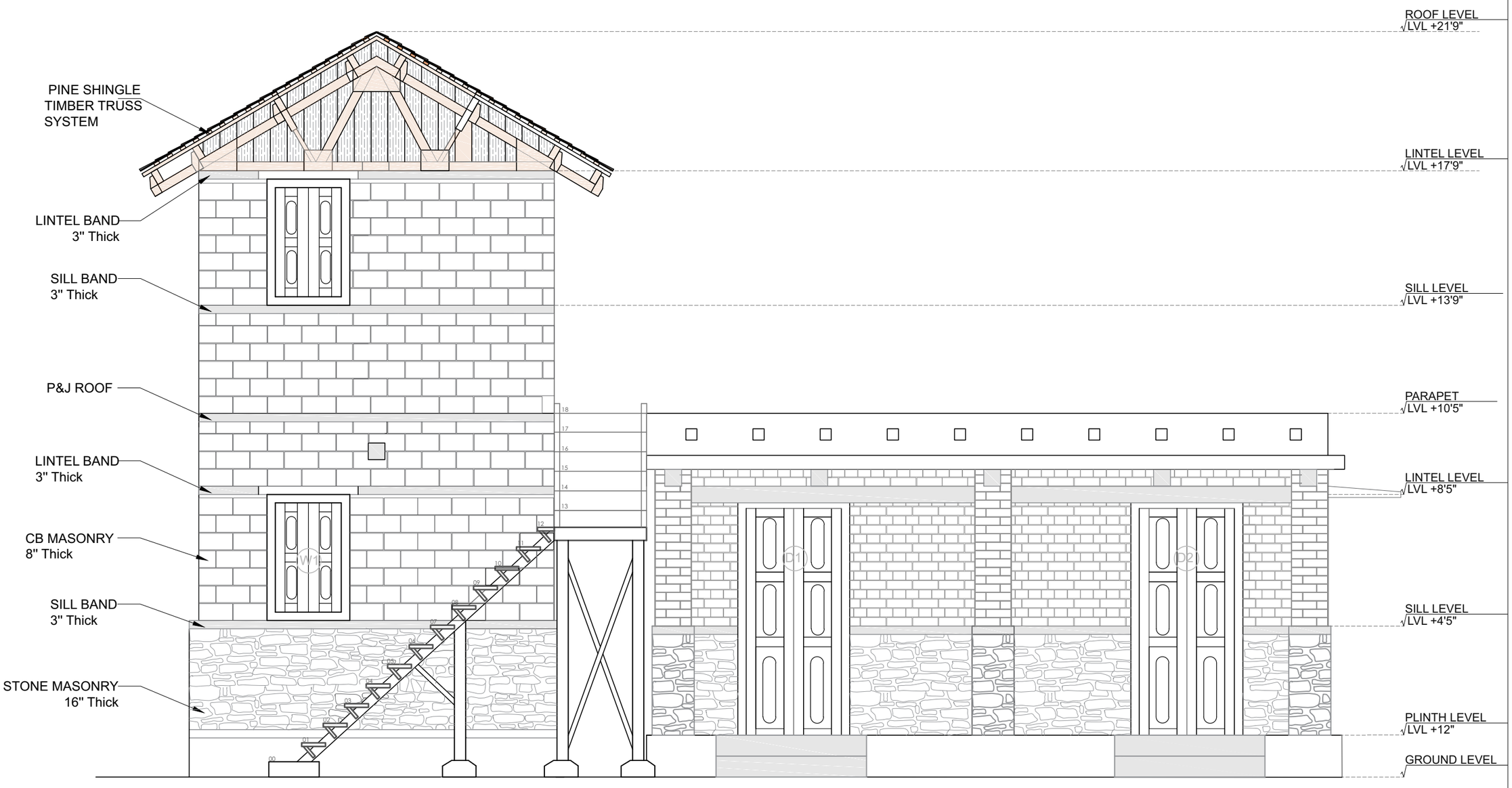

NORTH ELEVATION

SHEET-5

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
NORTH ELEVATION

REV DATE-
23/01/2021

PROJECT NAME-
DST TIME LEARN
DRAWING-
NORTH ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

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Qutumb institutional area

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INDIA

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SOUTH ELEVATION

SHEET-6

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SOUTH ELEVATION

REV DATE-
01/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
NORTH ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

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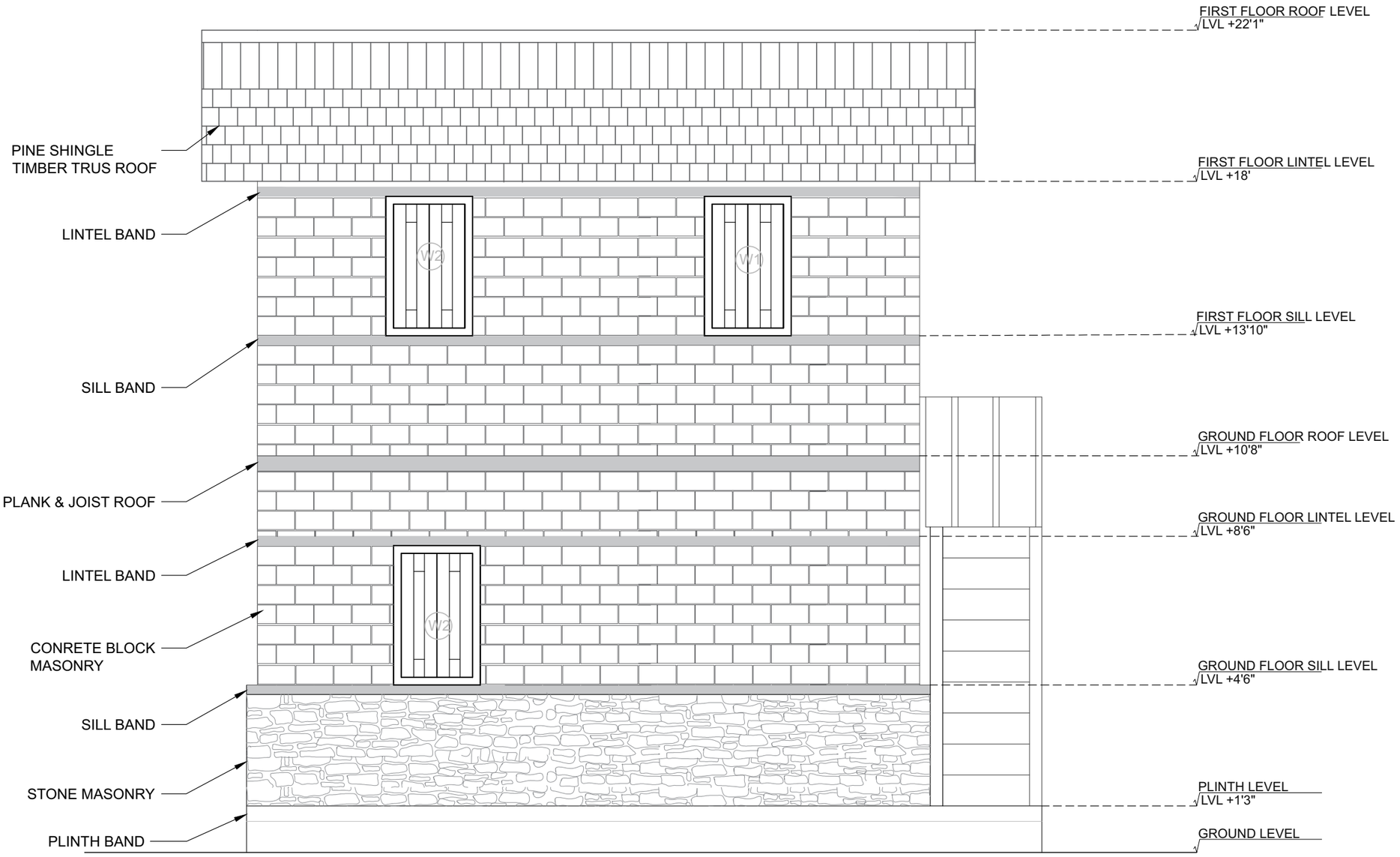

EAST ELEVATION

SHEET-7

NOTE: 1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE 2-ALL MEASUREMENTS IN FEET AND INCHES 3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED 4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.	DWG- EAST ELEVATION REV DATE- 01/06/2020		PROJECT NAME- DST TIME LEARN DRAWING- NORTH ELEVATION SCALE-1:75 ARCHITECT- DEALT- DATE-	N	**Development alternatives,** **B-32 Tara crescent marg** **Qutumb institutional area** **New Delhi 110016** **INDIA** **Ph.01126544100** **email-www.devalt.org**

WEST ELEVATION

SHEET-8

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
WEST ELEVATION

REV DATE-
01/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
NORTH ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

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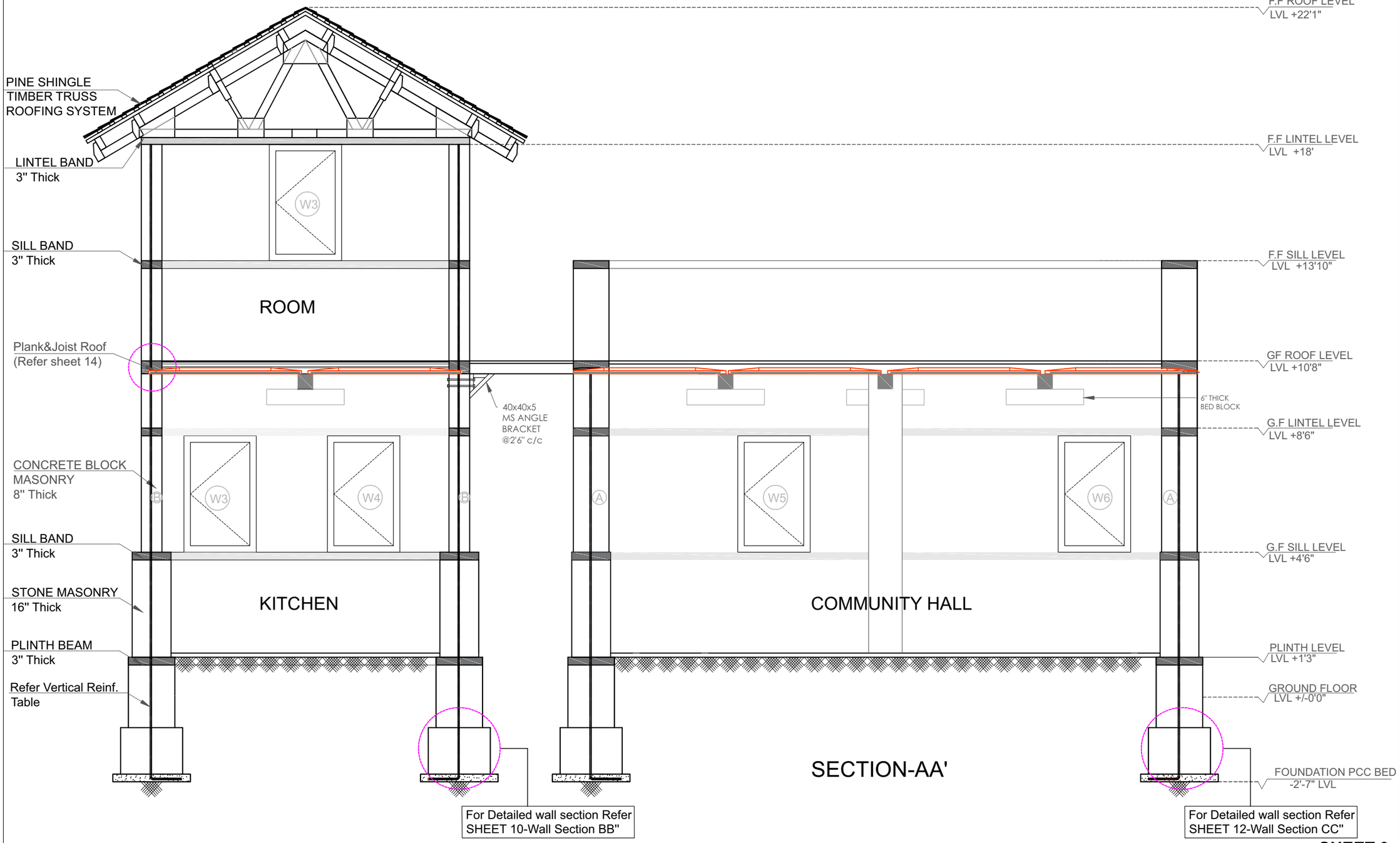

SHEET-9

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
NORTH ELEVATION

REV DATE-
01/06/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	A	10mm	From foundation PCC to Lintel Band
WINDOW	A	10mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS	B	16mm	From foundation PCC to Roof Band
		12mm	From foundation PCC to Roof Band
VERRANDAH		8mm	From foundation PCC to Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
NORTH ELEVATION
SCALE-1:75
ARCHITECT-
DEALT-
DATE-

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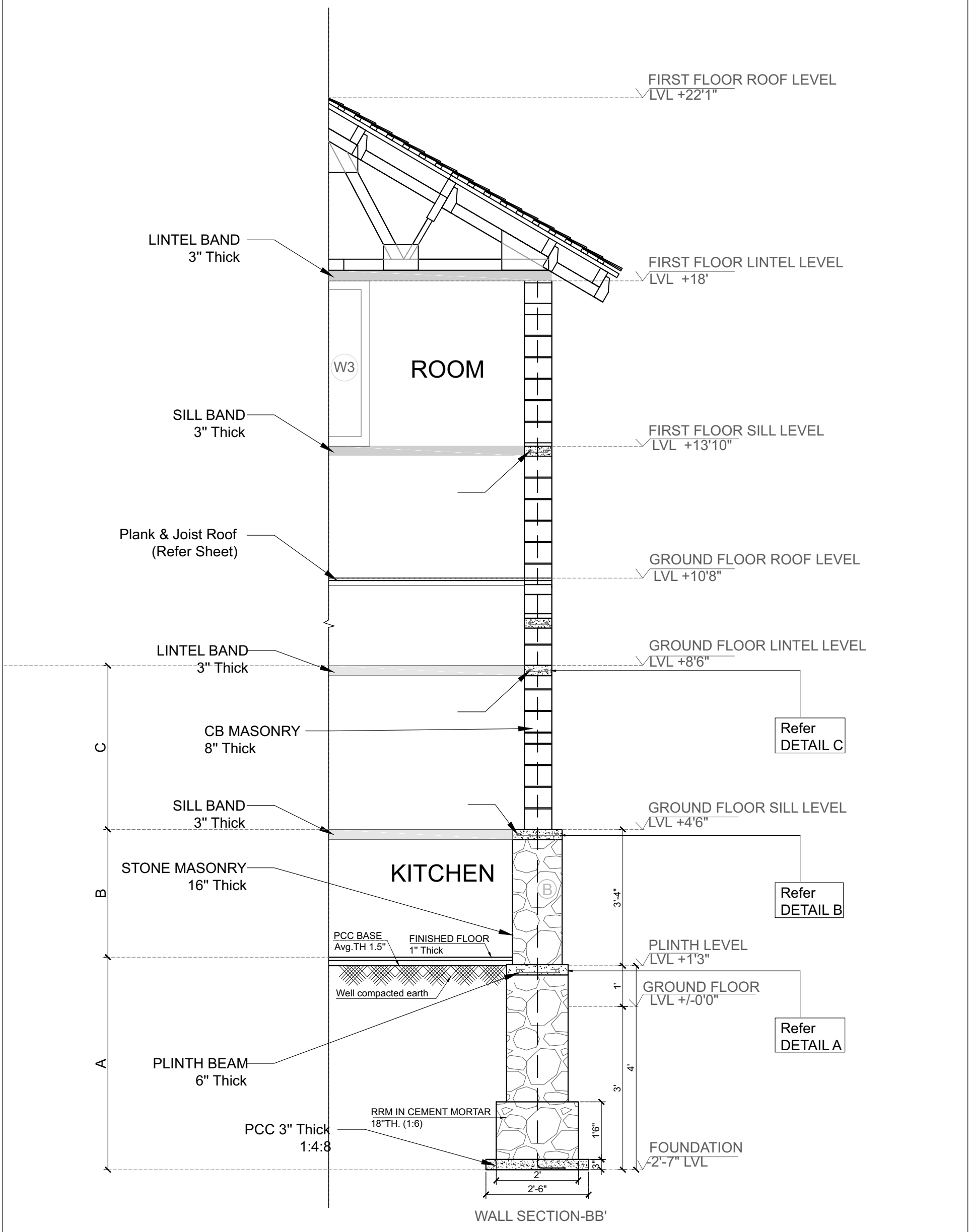

WALL SECTION-BB'

SHEET-10

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
Wall Section BB'

REV DATE-
02/06/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		10mm	From foundation PCC to Lintel Band
WINDOW		10mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS		16mm	From foundation PCC to Roof Band
	B	12mm	From foundation PCC to Roof Band
VERRANDAH		8mm	From foundation PCC to Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
WALL SECTION BB'
SCALE-
ARCHITECT-
DEALT-
DATE-

N

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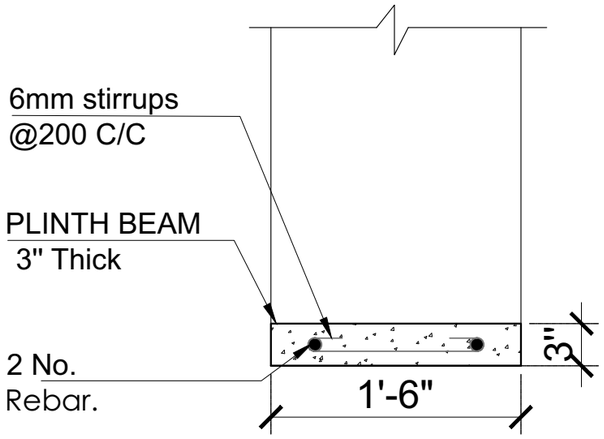
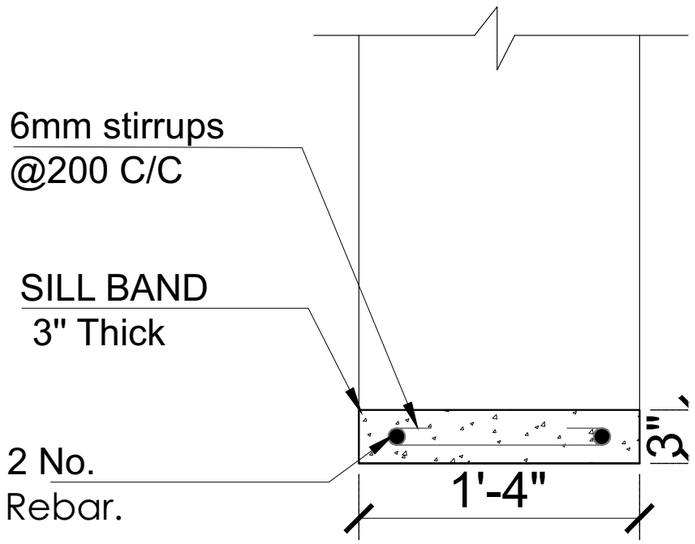
DETAIL -A



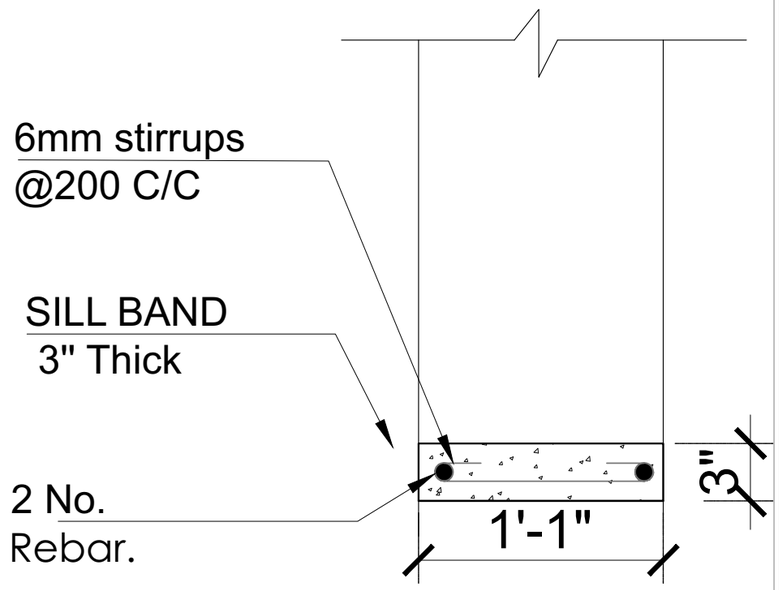
PLINTH BEAM

DETAIL -B



SILL BAND

DETAIL- C



LINTEL BAND

CONSTRUCTION DETAILS- PLINTH, SILL AND LINTEL BAND

SHEET-11

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONSTRUCTION DETAILS-WALL BANDS

REV DATE-
12/05/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		12mm	From foundation PCC to Lintel Band	
WINDOW		12mm	From Sill band to Lintel Band	
CORNERS& T-JUNCTIONS		10mm	From foundation PCC to Roof Band	
		12mm	From foundation PCC to Roof Band	
VERRANDAH		8mm	From foundation PCC to Lintel beam	

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONSTRUCTION DETAILS
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

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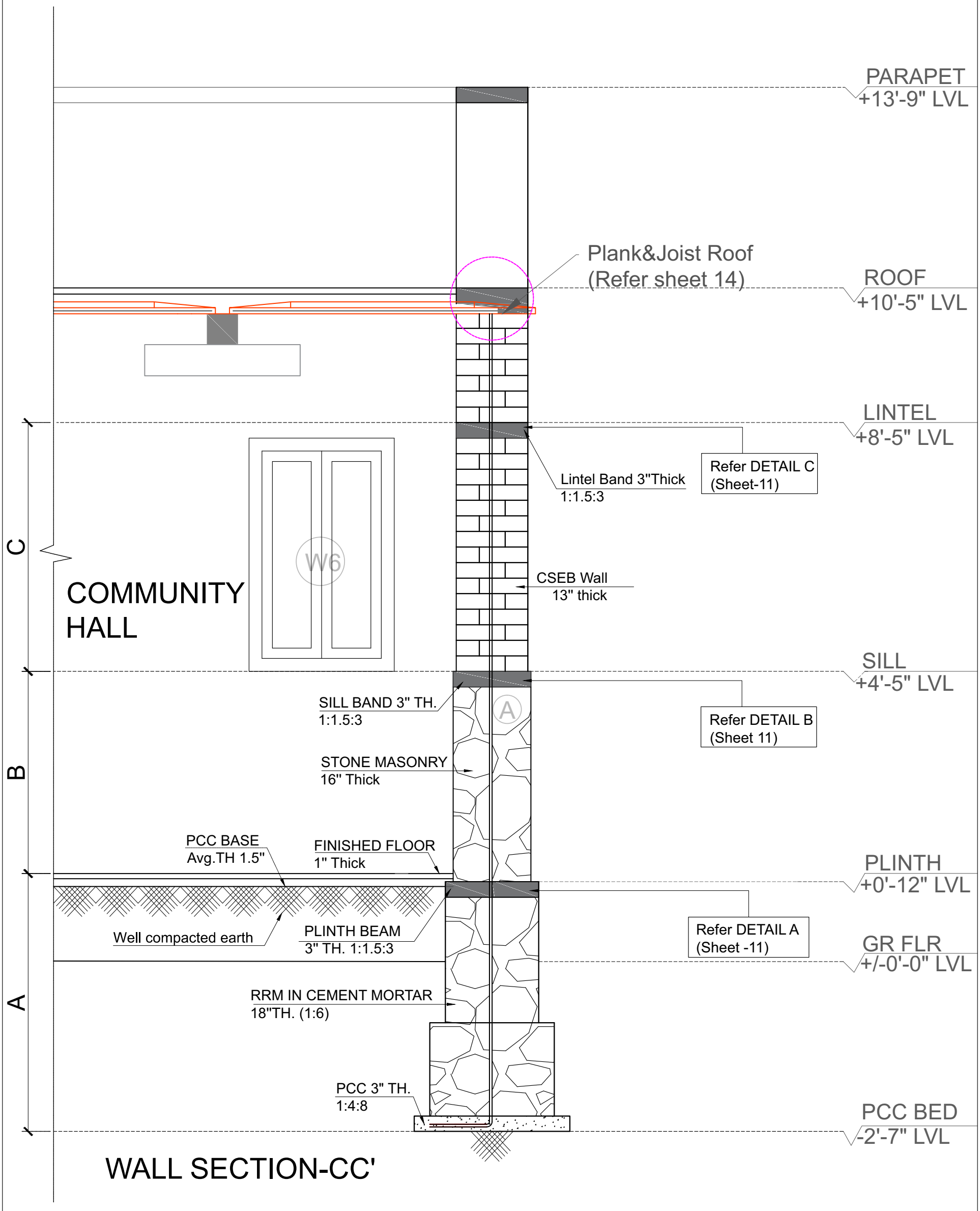

WALL SECTION-CC'

SHEET-12

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
Wall Section CC'

REV DATE-
02/06/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		10mm	From foundation PCC to Lintel Band
WINDOW	A	10mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS		16mm	From foundation PCC to Roof Band
		12mm	From foundation PCC to Roof Band
VERRANDAH		8mm	From foundation PCC to Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
WALL SECTION CC'
SCALE-
ARCHITECT-
DEALT-
DATE-

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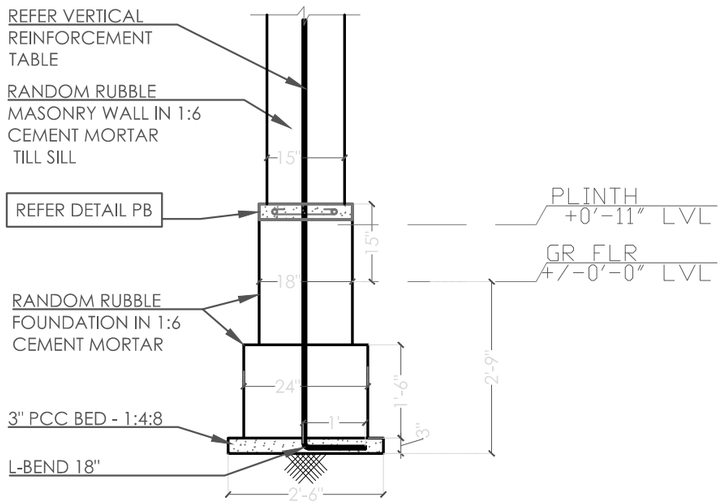
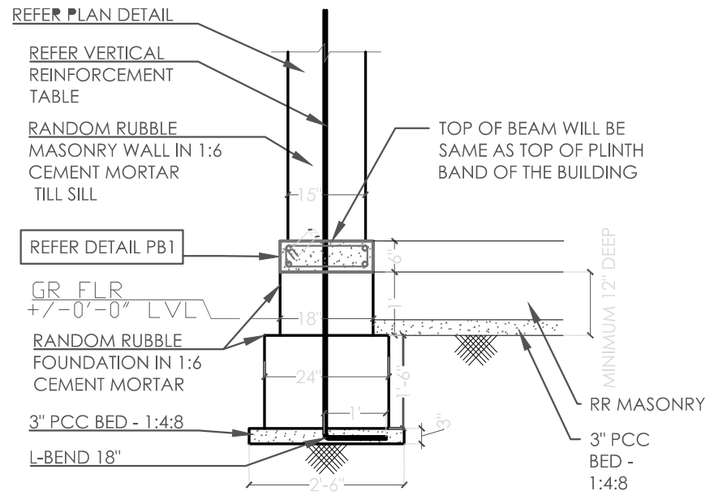
FOUNDATION DETAIL

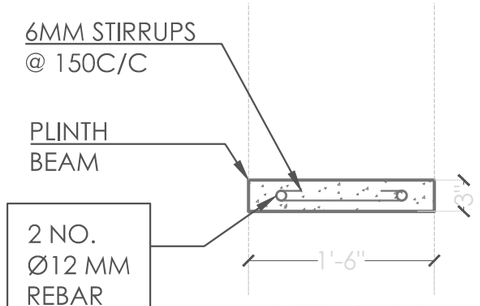


WALL FOUNDATION

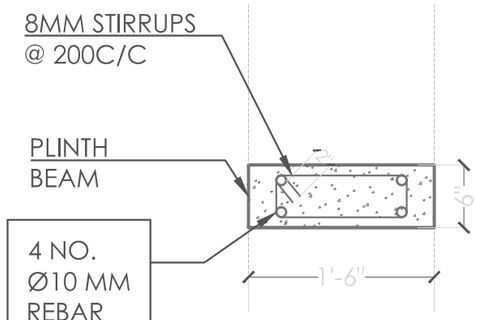


MASONRY COLUMN FOUNDATION - VERANDAH

PLINTH DETAIL

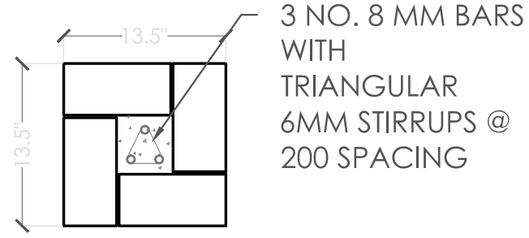


DETAIL PB-
PLINTH BEAM



PLINTH BEAM-
STRIP FOUNDATION
(VERANDAH)

VERTICAL REINFORCEMENT DETAIL



VERTICAL REINFORCEMENT
PLAN - CSEB COLUMN DETAIL
(VERANDAH)

SHEET-13

NOTE:
1.ALL CONCRETE MIX SHALL BE M20 (1:1.5:3), UNLESS OTHERWISE NOTED
2.CLEAR COVER TO REINFORCEMENT SHALL BE AS FOLLOWS-
-TOP AND BOTTOM - MIN. 20MM
-SIDES - MIN 30MM

3.LAP LENGTH FOR MAIN REINFORCEMENT BARS SHALL BE 50D (D=DIA OF BAR)

4.NOT MORE THAN 50% OF THE BARS SHALL BE LAPPED AT ONE SECTION

DWG:
CONSTRUCTION DETAILS
REV. DATE:

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	10mm	From foundation PCC to Lintel Band
WINDOW	10mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS	16mm	From foundation PCC to Roof Band
	12mm	From foundation PCC to Roof Band
VERRANDAH	8mm	From foundation PCC to Lintel beam

PROJECT
DST TIME LEARN
DRAWING
Construction Details
SCALE
DRG. NO. Construction_Details
ARCHITECT
DEALT
DATE 06.06.2018
N

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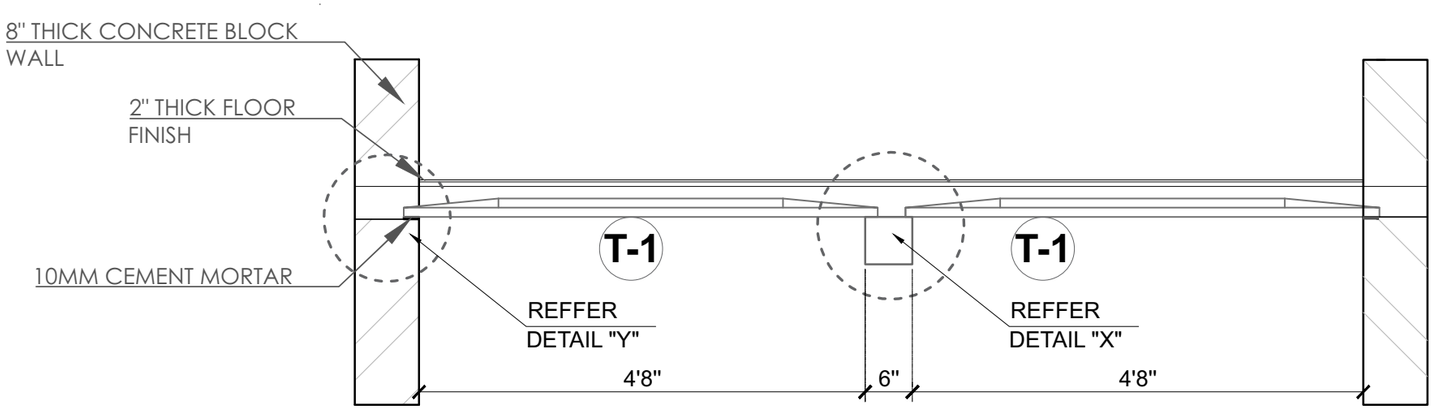
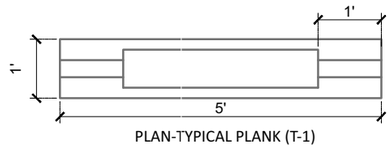
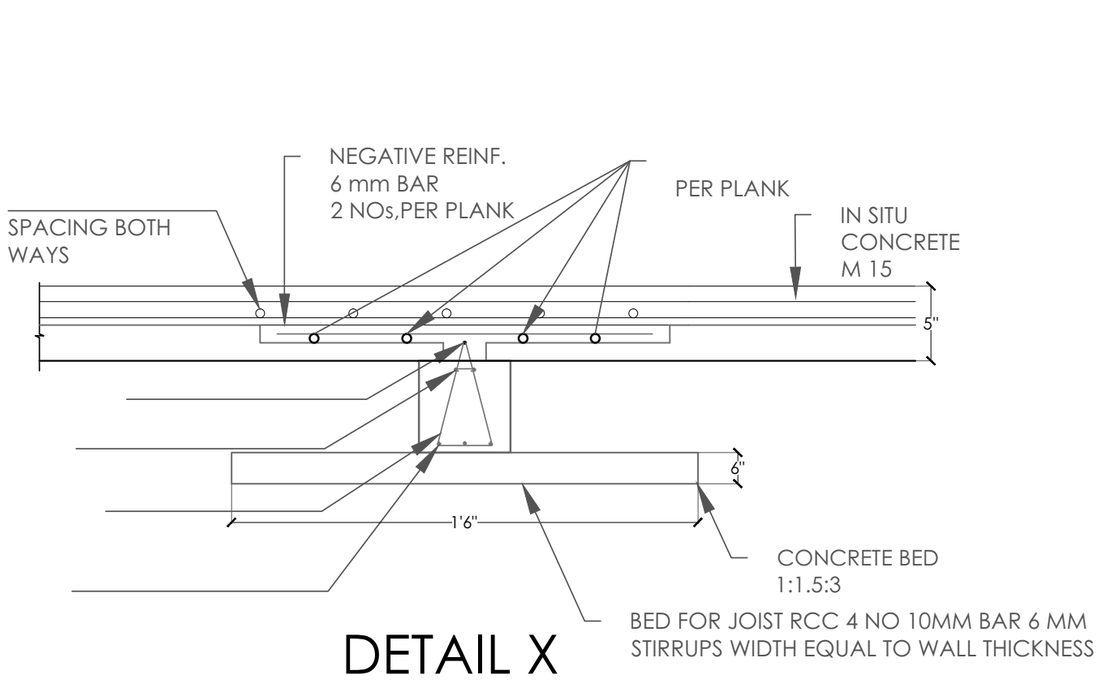
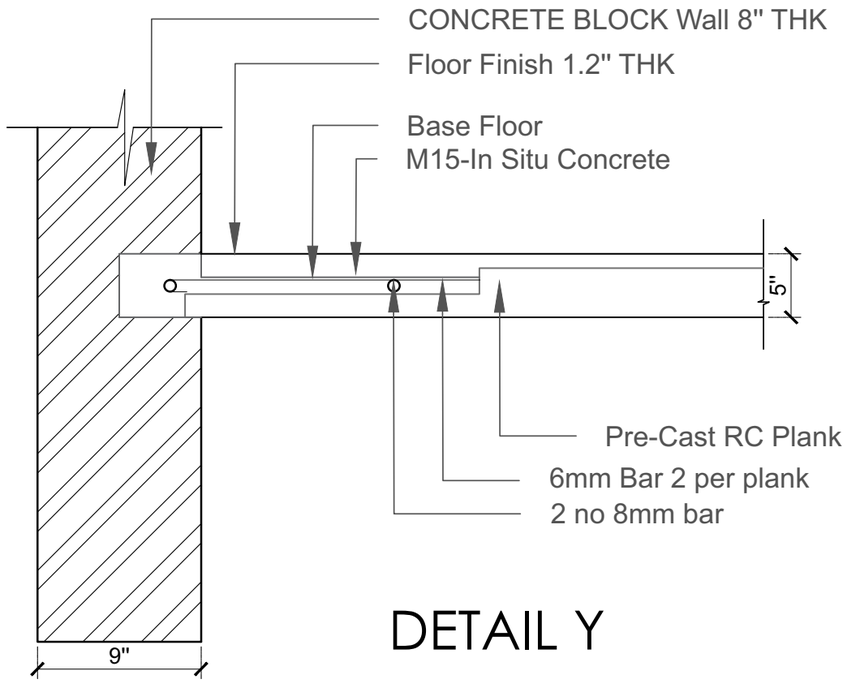




PLAN-TYPICAL PLANK (T-1)



DETAIL X



DETAIL Y

SHEET-14

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONSTRUCTION DETAILS-Plank&Joist Roof

REV DATE-
23/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONSTRUCTION DETAILS
SCALE-1:75
ARCHITECT-
DEALT-
DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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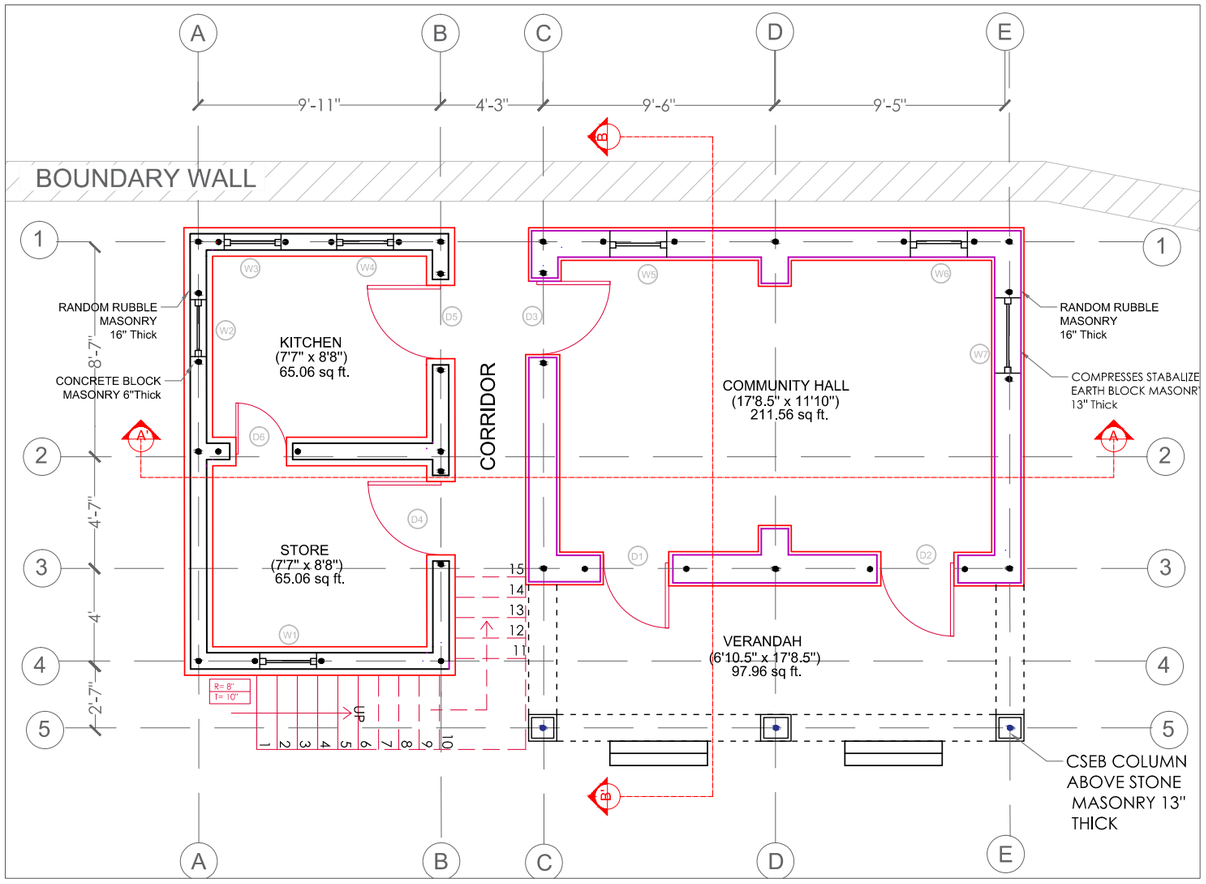

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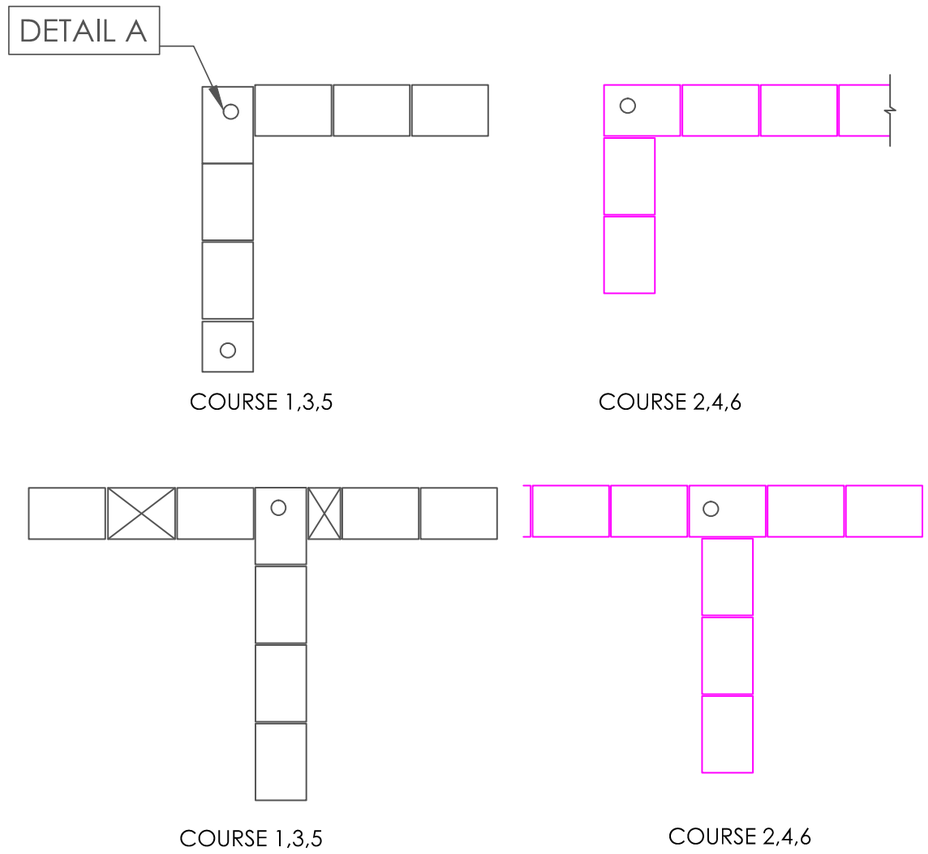
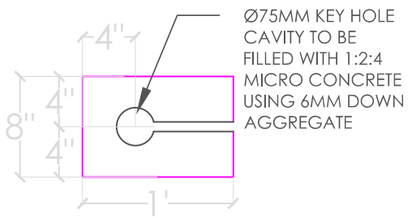


COURSE PLAN-
CONCRETE BLOCK MASONRY



DETAIL A

SHEET - 15

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
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4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:
COURSE DETAIL-Concrete Block

REV. DATE:
02/06/2020

PROJECT
DST TIME LEARN
DRAWING
GROUND FLOOR COURSE PLAN

SCALE	DRG. NO. K.GF-1.1
ARCHITECT	
DEALT 12-12-2019	
DATE 06.06.2018	

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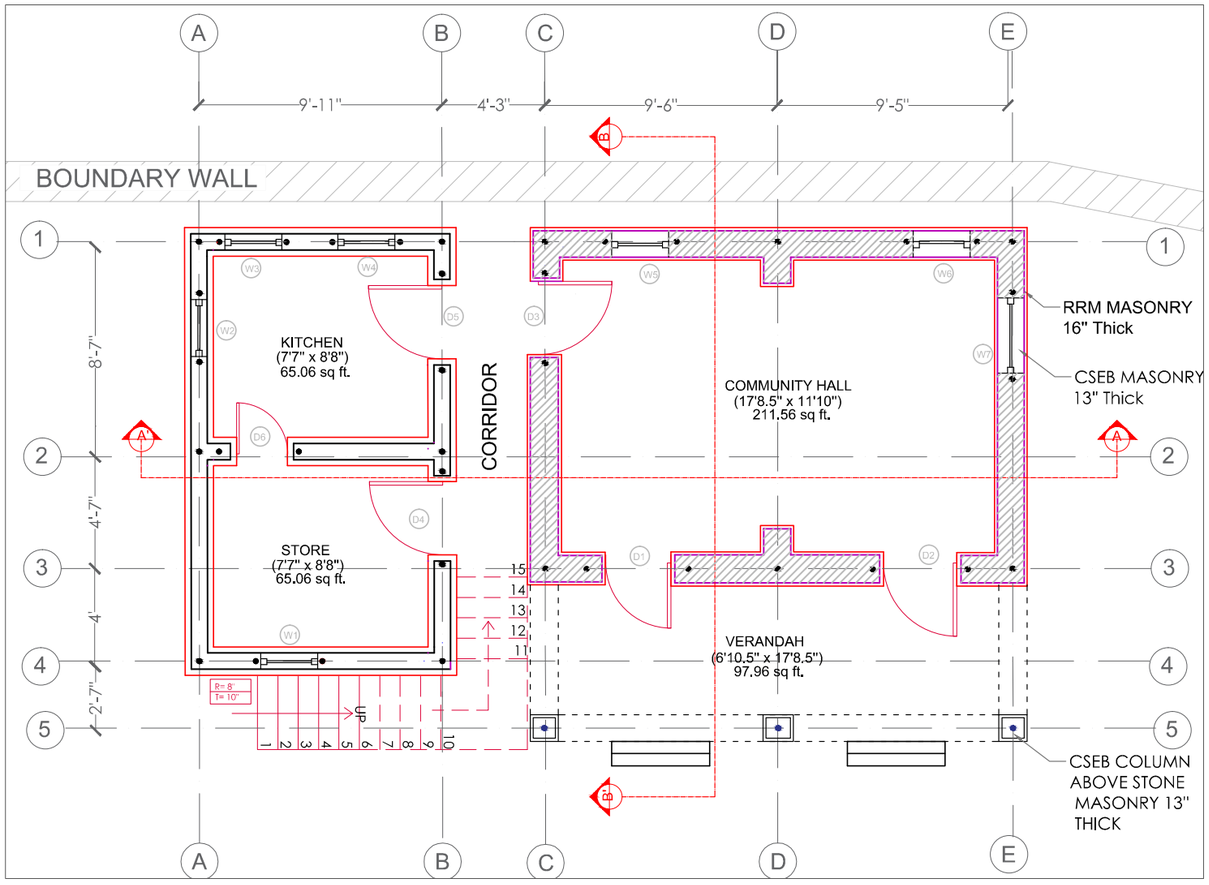
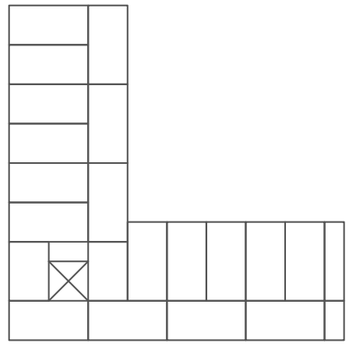
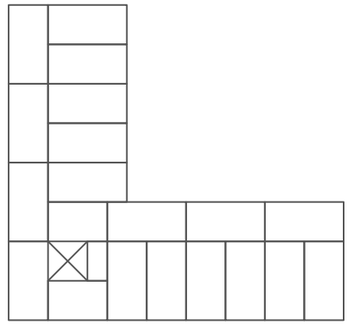


REFERENCE PLAN

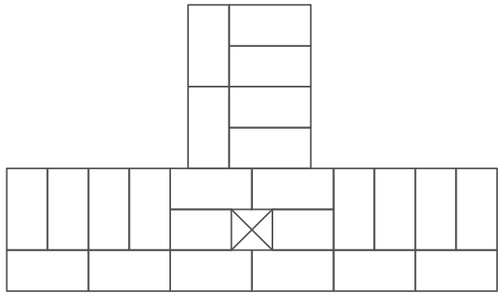
CSEB BLOCK



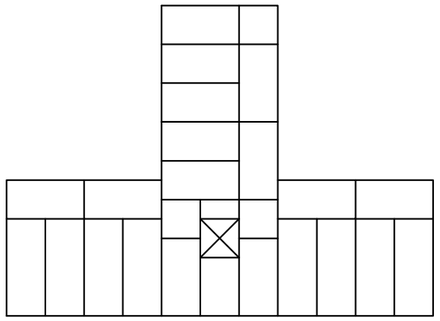
COURSE 1,3,5



COURSE 2,4,6

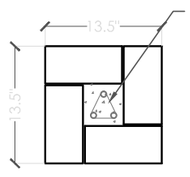


COURSE 1,3,5



COURSE 2,4,6

COURSE PLAN-
COMPRESSED STABALIZED EARTH BLOCK



3 NO. 8 MM BARS
WITH
TRIANGULAR
6MM STIRRUPS @
200 SPACING

VERTICAL REINFORCEMENT
PLAN - CSEB COLUMN DETAIL
(VERANDAH)

SHEET - 16

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:
COURSE DETAIL-CSEB Block

REV. DATE:
02/06/2020

PROJECT
DST TIME LEARN
DRAWING
GROUND FLOOR COURSE PLAN

SCALE	DRG. NO. K.GF-1.1
ARCHITECT	
DEALT 12-12-2019	
DATE 06.06.2018	

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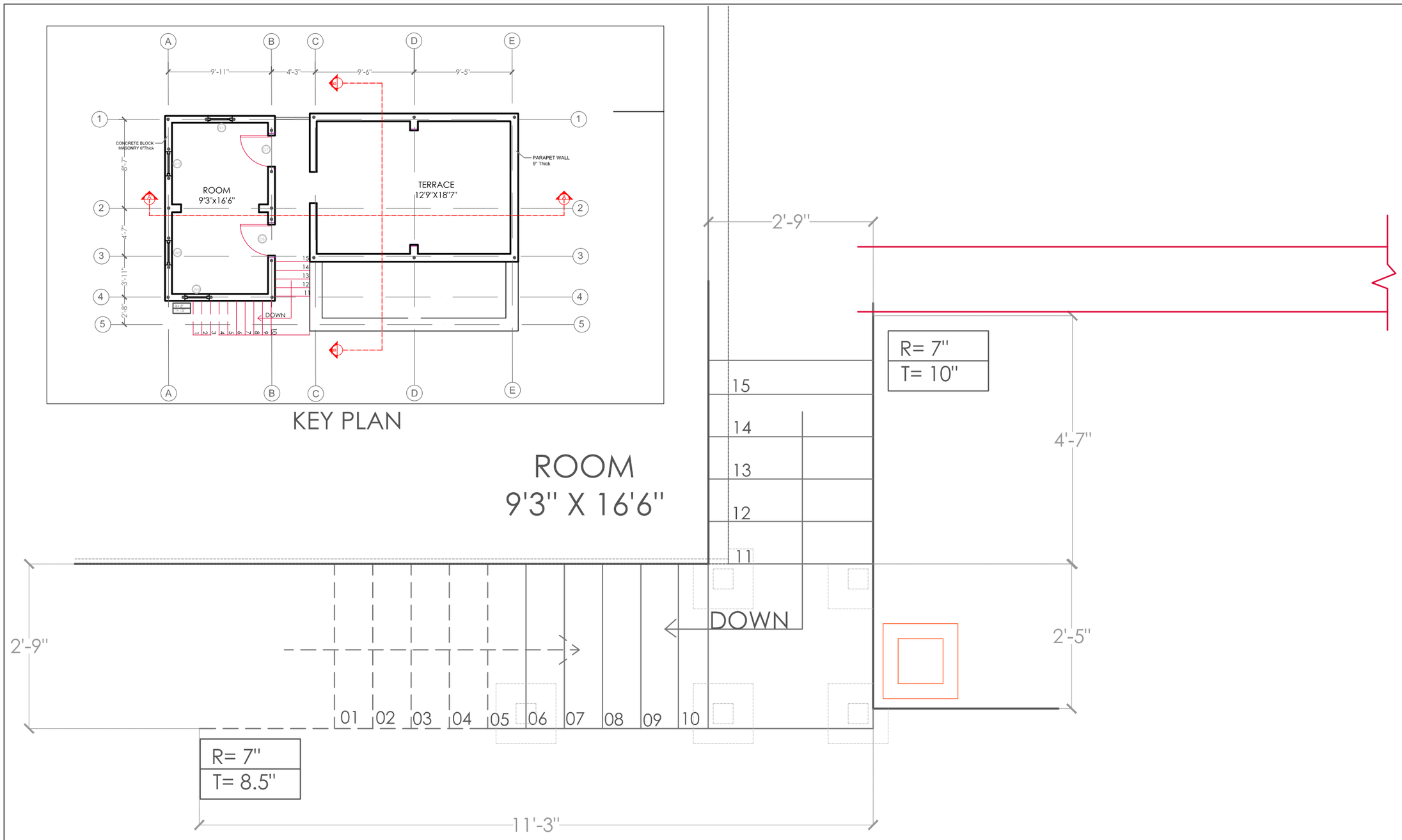
KEY PLAN

ROOM
9'3" X 16'6"



SHEET - 17

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:
STAIRCASE DETAILS

REV. DATE:

PROJECT
DST TIME LEARN
DRAWING
P&J Detail

SCALE	DRG. NO. K. P&J Detail
ARCHITECT	
DEALT	
DATE 26.03.2019	

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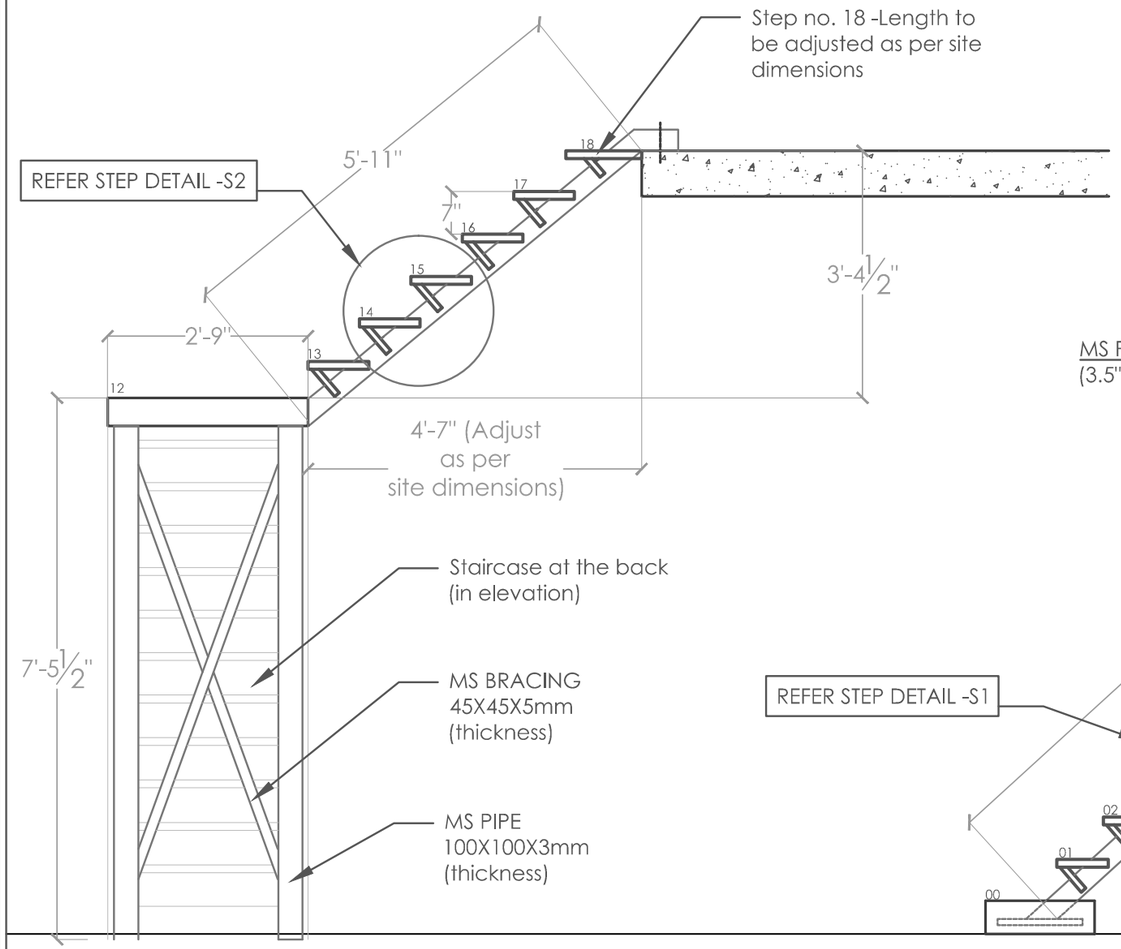
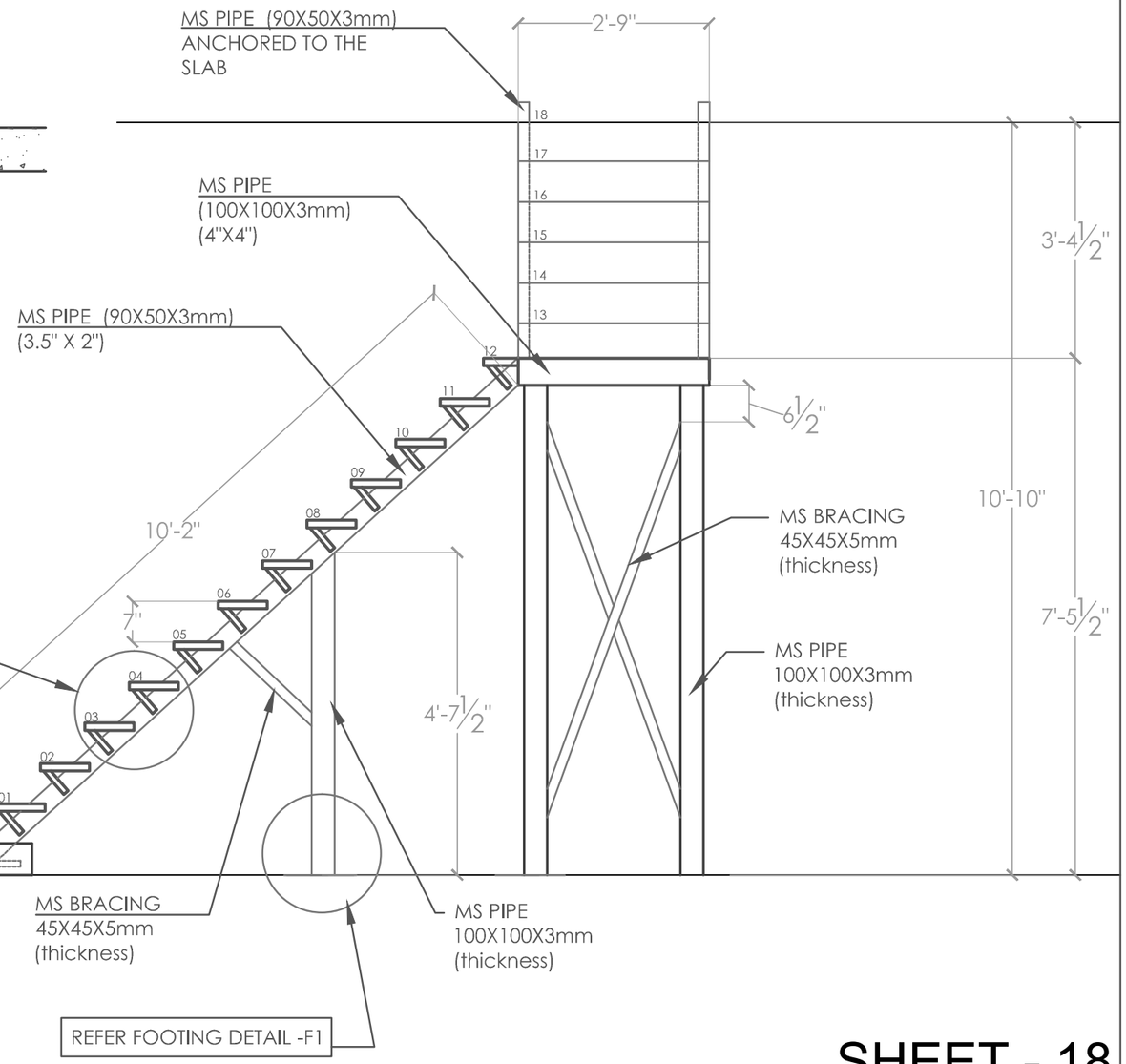
Department of Science & Technology
Ministry of Science & Technology

Development Alternatives





SHEET - 18

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
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4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:

STAIRCASE

REV. DATE:

PROJECT
DST TIME LEARN
DRAWING
staircase detail

SCALE	DRG. NO.
	K. P&J Detail
ARCHITECT	
DEALT	
DATE	
26.03.2019	

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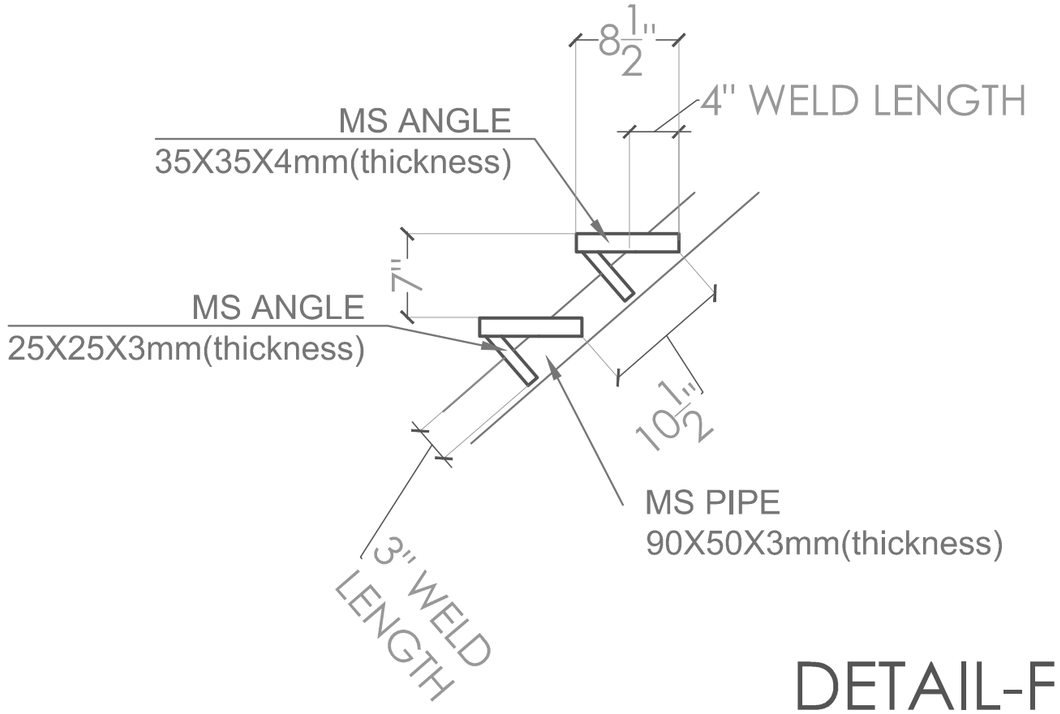
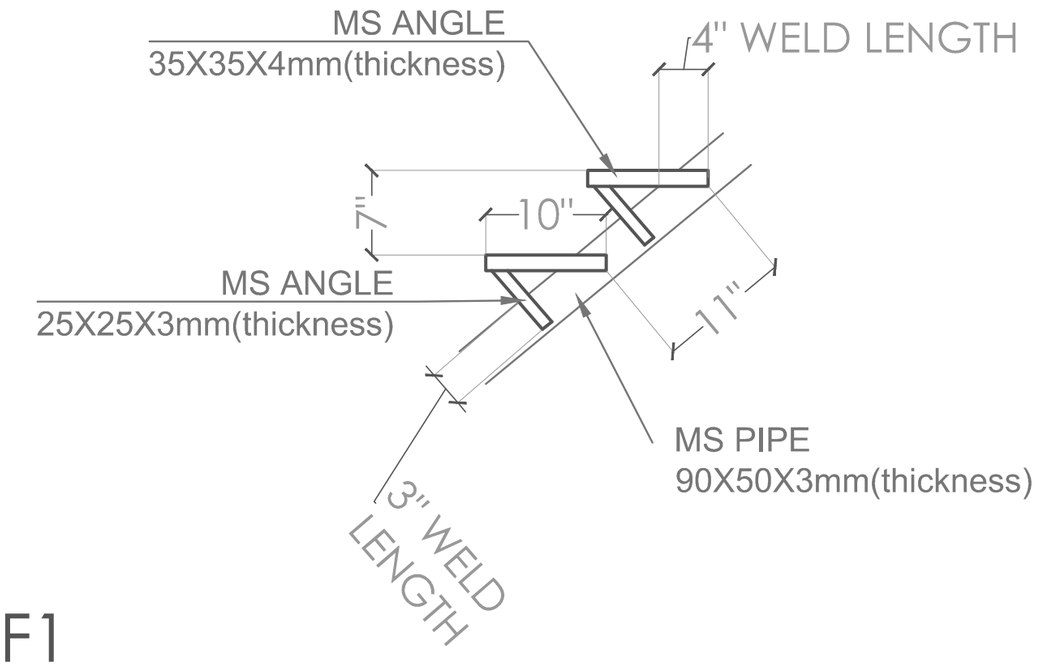
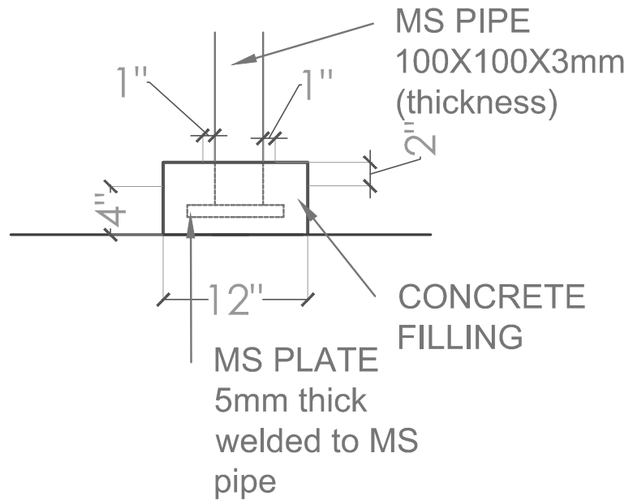
DETAIL-S1



DETAIL-S2



DETAIL-F1



SHEET - 19

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
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DWG:

STAIRCASE DETAILS

REV. DATE:

PROJECT
DST TIME LEARN
DRAWING

SCALE	DRG. NO.
	K. P&J Detail

ARCHITECT

DEALT

DATE 26.03.2019

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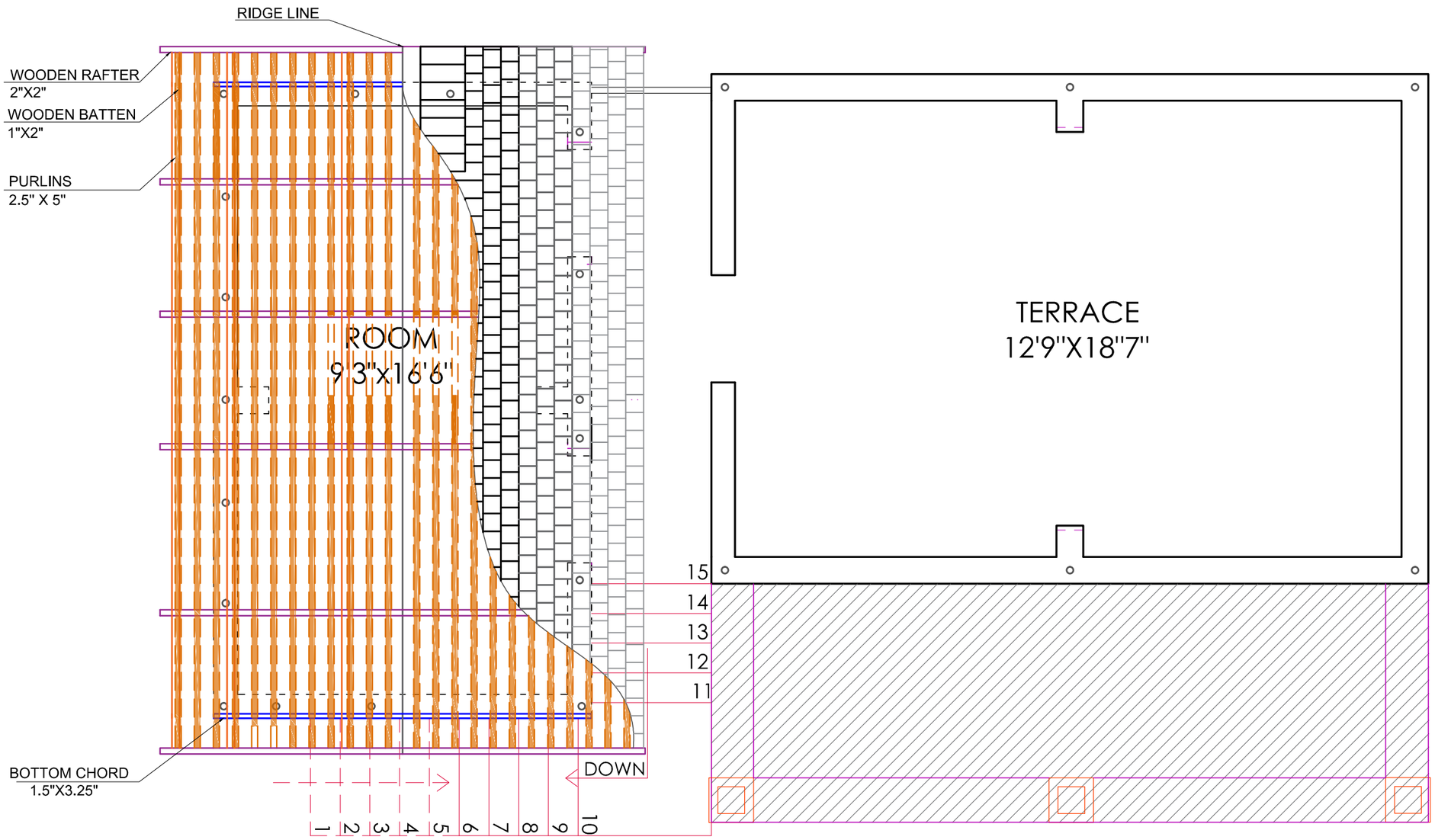

SHEET - 20

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
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3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:

ROOF PLAN-Timber Truss

REV. DATE:

01/06/2020

PROJECT
DST TIME LEARN
DRAWING
ELEVATION

SCALE | DRG. NO.

ARCHITECT

DEALT

DATE
17.07.2018

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Department of Science & Technology
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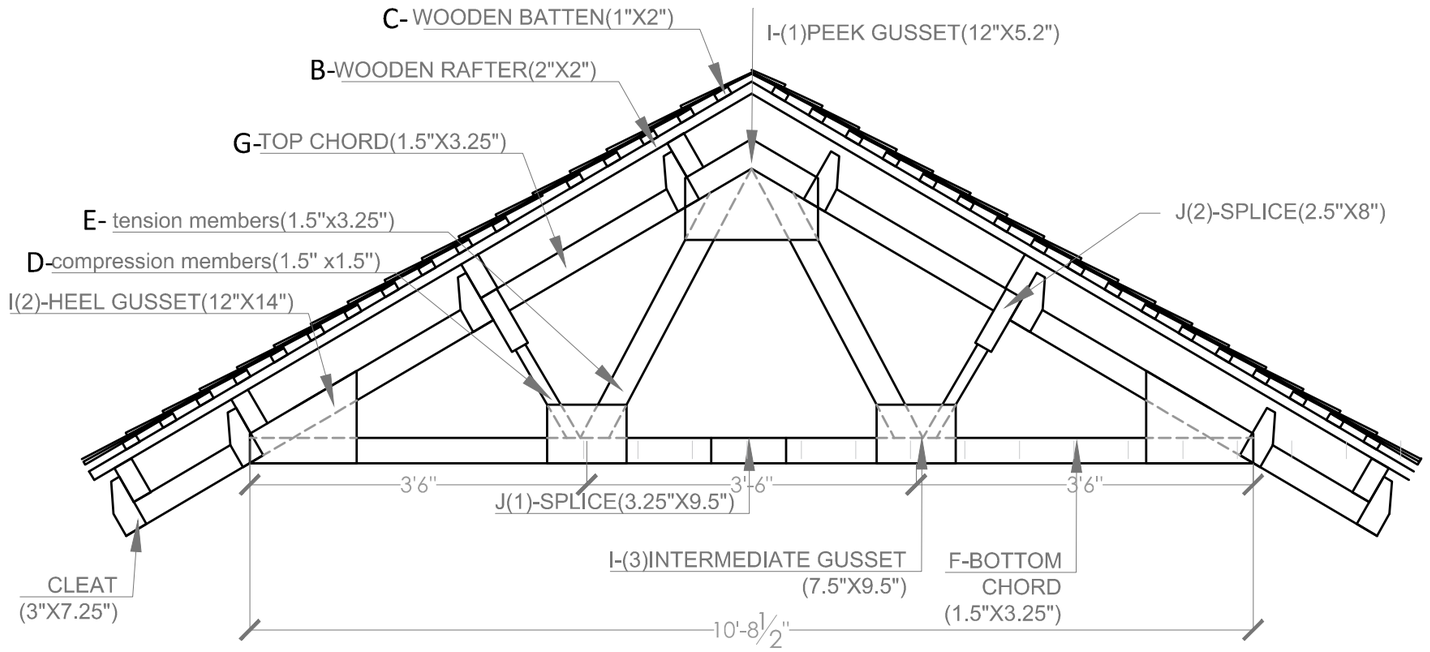
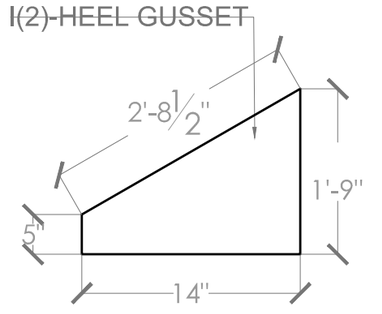
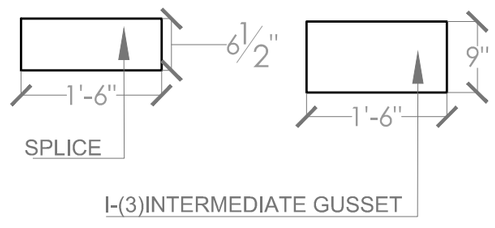
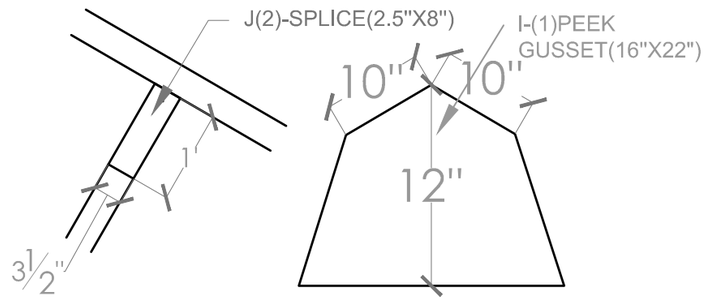
Development Alternatives









SHEET - 21

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
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DWG:

COMPONENTS OF ROOF

REV. DATE:

31/10/2018

PROJECT
DST TIME LEARN
DRAWING
ELEVATION

SCALE | DRG. NO.

ARCHITECT

DEALT

DATE
17.07.2018

N

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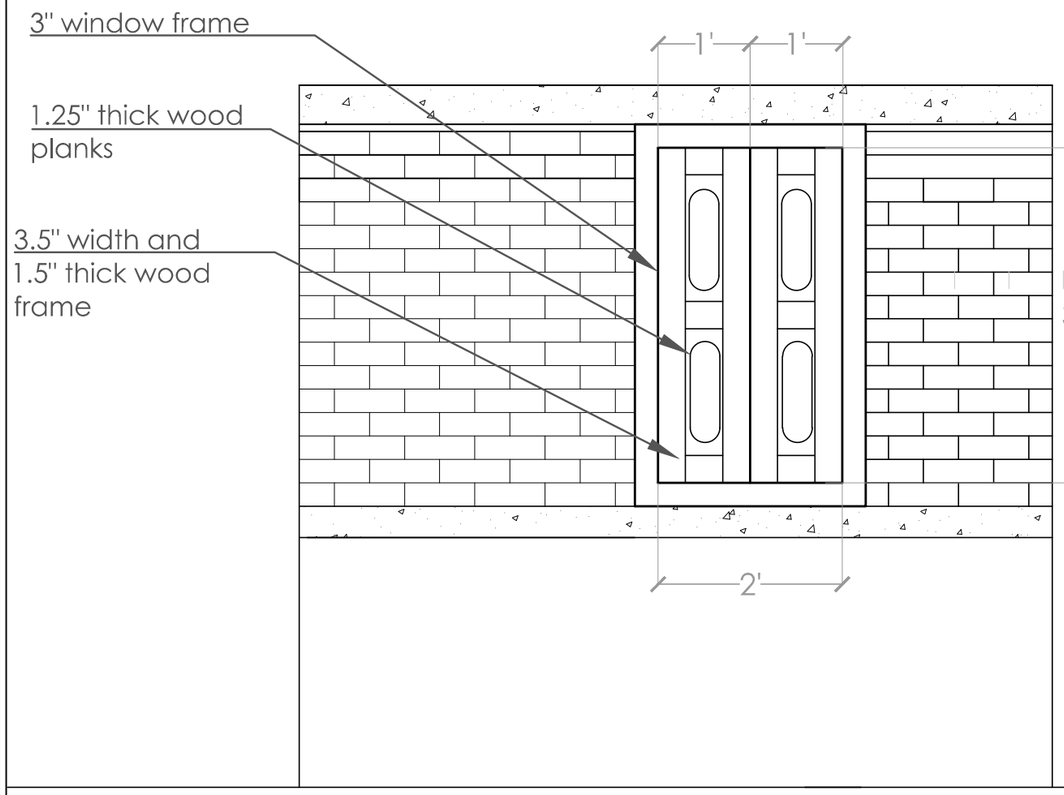
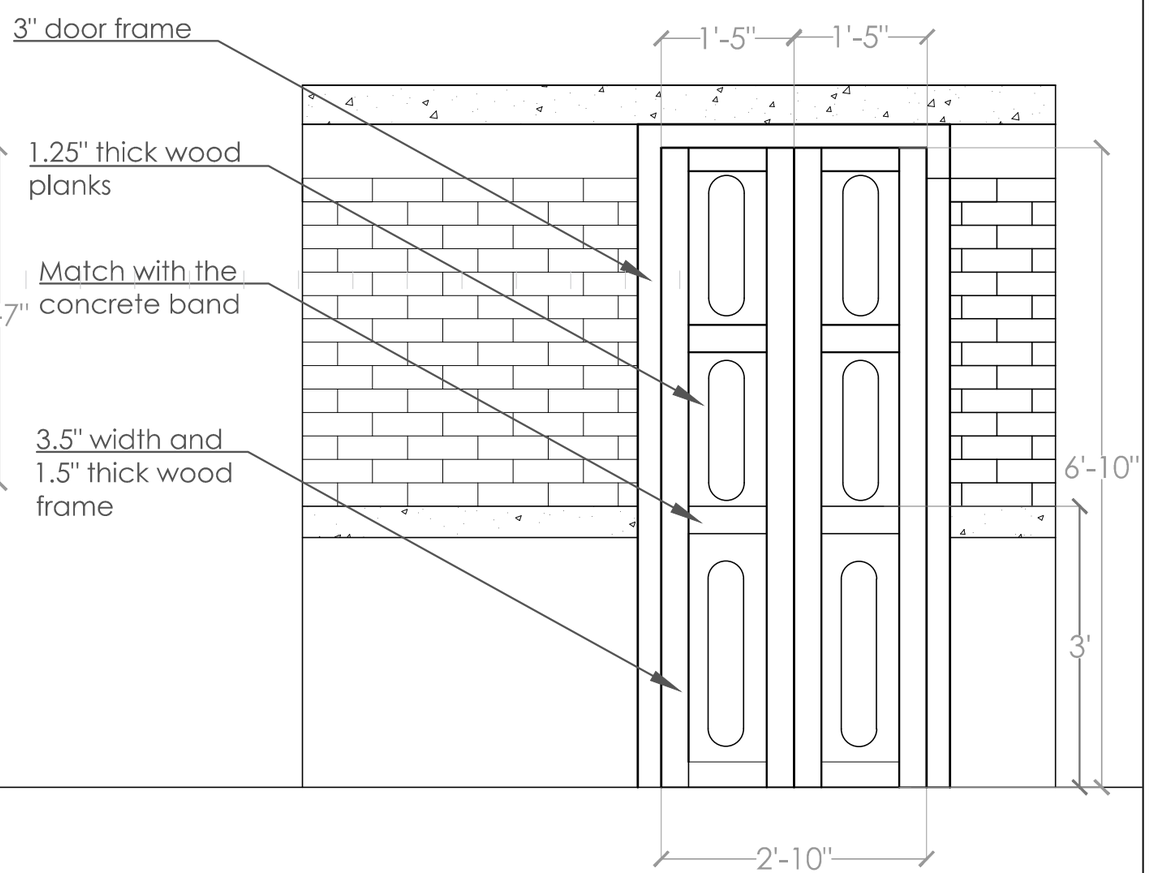
DOUBLE SHUTTER LARGE WINDOW



DOUBLE SHUTTER DOOR



SHEET - 22

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
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DWG:

DETAIL-D/W

REV. DATE:

31/10/2018

PROJECT
DST TIME LEARN
DRAWING
ELEVATION

SCALE | DRG. NO.

ARCHITECT

DEALT

DATE
17.07.2018

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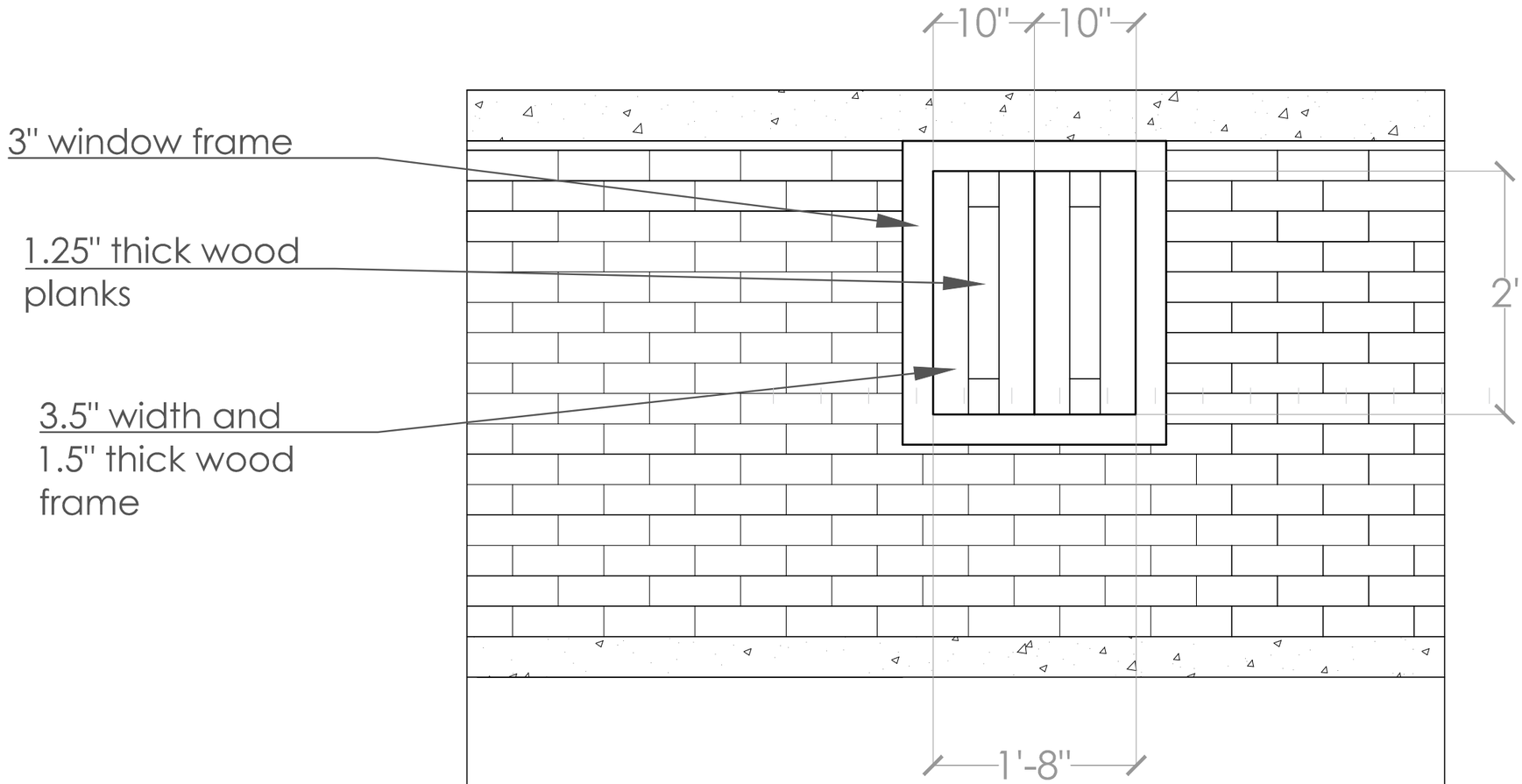
DOUBLE SHUTTER SMALL WINDOW



SHEET - 23

NOTE:

1. TO RETAIN AND CONSERVE ALL TREES ON SITE.
2. ALL MEASUREMENT IN FEET'/ INCHES".
3. ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONNED.
4. ANY DESCREPENCIES SHOULD BROUGHT TO THE ATTENTION OF THE ARCHITECT.

DWG:

DETAIL-D/W

REV. DATE:

31/10/2018

PROJECT
DST TIME LEARN
DRAWING
ELEVATION

SCALE | DRG. NO.

ARCHITECT

DEALT

DATE
17.07.2018

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Specifications and Bill of Quantities

S. No.	ITEM	QTY	UNIT
1	**FOUNDATION**		
1.1	**EXCAVATION**		
1.1.1	Earth work in excavation for trench, 6' wide and 2.83' deep	2249.18	cuft
1.2	**PCC BED AT TRENCH**		
1.2.1	Laying of P.C.C in foundation 3" thick with 1:4:8	148.22	cuft
1.3	**REINFORCEMENTS**		
1.3.1	Laying of vertical reinforcement (40, 12mm bars) and (5, 8mm bars for triangular reinforcement tie) with stirups tie of 8mm bars @ 200mm spacing	1095.88	ft
1.4	**RRM IN FOUNDATION**		
1.4.1	Laying of foundation Type 1, 2 & 3 : RRM 1:6 mortar Foundation Type 1 - (Step 1 -3.5' wide and 1' deep & Step 2 - 2.5' wide and 1' deep), Foundation Type 2(Step 1 - 2.25'wide and 1' deep & Step 2 - 1.75' wide and 1' deep & Step 3 - 1.25' wide and 1.17' deep), Foundation Type 3 (Step 1 - 2.5' wide and 1.8' deep & Step 2 - 1.25' wide and 1.8' deep)	1045.40	cuft
1.5	**PLINTH BAND**		
1.5.1	Laying of horizontal reinforcement, 4- 16mm bars with stirup tie of 8mm bars @ 200mm spacing	451.07	ft
1.5.2	Laying plinth beam 1.25' wide and 0.5' thick in 1:1.5:3 ratio with laying of DPC 1.25' wide and 0.08' thick in 1:2:4 ratio	160.54	cuft
2	**SUPER STRUCTURE- GROUND FLOOR**		
2.1	**SILL LEVEL MASONARY**		
2.1.1	Total stone masonary: RRM 1:6 mortar, (1.25' wide and 3' high)	428.33	cuft
2.1.2	Installation of precast concrete door frames	136.00	running ft
2.2	**SILL BAND**		
2.2.1	Laying sill band 1.25' wide and 0.25' thick in 1:1.5:3 ratio- Part A+B	40.07	cuft
2.2.2	Laying of horizontal reinforcement(4, 16mm) bars with stirups tie (8mm bars) @ 200mm spacing	318.95	ft
2.2.3	Installation of precast concrete window frames	168	running ft
2.3	**LINTEL LEVEL MASONARY- PART A**		
2.3.1	Total concrete block masonary (1:2:4) in 1:6 mortar (0.66' wide and 3.75' high)	134.24	cuft
2.4	**LINTEL BAND- PART A**		
2.4.1	Laying of horizontal reinforcement, 2 16mm bars with Stirups tie of 8mm bar @200mm spacing	158.95	ft
2.4.2	Laying lintel band 1.25' wide and 0.25' thick in 1:1.5:3 ratio	19.97	cuft
2.5	**LINTEL LEVEL MASONARY- PART B**		
2.5.1	Total CSEB block masonary (1:2:4) masonary in 1:6 mortar (0.66' wide and 3.75' high)	226.76	cuft
2.6	**LINTEL BAND- PART B**		
2.6.1	Laying of horizontal reinforcement, 2 16mm bars with Stirups tie of 8mm bar @200mm spacing	239.99	ft
2.6.2	Laying lintel band 1.25' wide and 0.25' thick in 1:1.5:3 ratio	30.15	cuft

S. No.	ITEM	QTY	UNIT
3	**INTERMIDIATORY FLOOR**		
3.1	**ROOF**		
3.1.1	Laying of planks in 1:6 mortar	131	nos
3.1.2	Laying of joist in 1:6 mortar	90.00	running ft
3.2	**ROOF BAND**		
3.2.1	Laying of roof band horizontal reinforcement, 2 10mm bars with stirup tie of 8mm bar @ 200mm spacing	160.00	ft
3.2.2	Laying roof band 1.25' wide and 0.25' thick in 1:1.5:3 Ratio	20.10	cuft
3.3	**PARAPET**		
3.3.1	Parapet CSEB (1:2:4) masonary in 1:6 mortar (0.66' wide and 3' high)	127.35	cuft
4	**FIRST FLOOR- PART A**		
4.1	**SILL LEVEL MASONARY**		
4.1.1	Total concrete block masonary (1:2:4) in 1:6 mortar (0.66' wide and 3' high)	114.64	cuft
4.2	**SILL BAND**		
4.2.1	Laying of horizontal reinforcement, 2 16mm bars with Stirups tie of 8mm bar @200mm spacing	158.95	ft
4.2.2	Laying sill band 0.66' wide and 0.25' thick in 1:1.5:3 ratio	0.94	cuft
4.3	**LINTEL LEVEL MASONARY**		
4.3.1	Total concrete block (1:2:4) masonary in 1:6 mortar (0.66' wide and 4' high)	152.86	cuft
4.4	**LINTEL BAND**		
4.4.1	Laying of horizontal reinforcement, 2 16mm bars with Stirups tie of 8mm bar @200mm spacing	158.95	ft
4.4.2	Laying lintel band 0.66' wide and 0.25' thick in 1:1.5:3 ratio	19.97	cuft
4.5	**GABLE WALL MASONARY**		
4.5.1	Concrete block (1:2:4) masonary in 1:6 mortar (0.66' wide and 4' high)	126.52	cuft
5	**INSTALLATION ITEMS**		
5.1	**TIMBER TRUSS**		
5.1.1	Chir Pine Shingles	2600.00	nos
5.1.2	Installation of pine purlin, batten, rafters, gausset plates, bottom and top chord, splice and cleat for 3 truss	99.00	cuft
5.2	**STAIRCASE**		
5.2.1	Staricase fabricated in MS angle and steps in timber planks	25.40	sqft
5.3	**DOORS AND WINDOWS**		
5.3.1	Installation of pine wood doors	8.00	nos.
5.3.2	Installation of pine wood windows	10.00	nos.
6	**FINISHING**		
6.1	**PLASTERING**		
6.1.1	Cement plaster finish of internal surfaces in (1:4) ratio cement sand mortar	1488.58	sqft
6.2	**FLOORING**		
6.2.1	IPS Flooring in ratio (1:2:4)	409.64	sqft
6.2.2	Mud flooring with concrete base 1:4:6 and mud plaster in 1:3 ratio	208.86	sqft
6.3	**TERRACING**		
6.3.1	Terracing in 1:4.ratio with proper slope and cutting	236.80	sqft

2. Rural Home Stay

Bagi Village, Dunda Block, Uttarkashi

Set of Drawings

Under the project:
Delivery of Eco-friendly Multi-Hazard Resistant Construction Technologies and Habitat Solutions in Mountain States

Supported by:
Department of Science and Technology, Government of India
Programme: TIME-LEARN

In collaboration with:
Project: Developing livelihoods by creating sustainable ecotourism opportunities in Uttarakhand and Himachal Pradesh

Supported by:
NMHS (National Mission on Himalayan Studies),
Ministry of Environment, Forest and Climate Change, Government of India

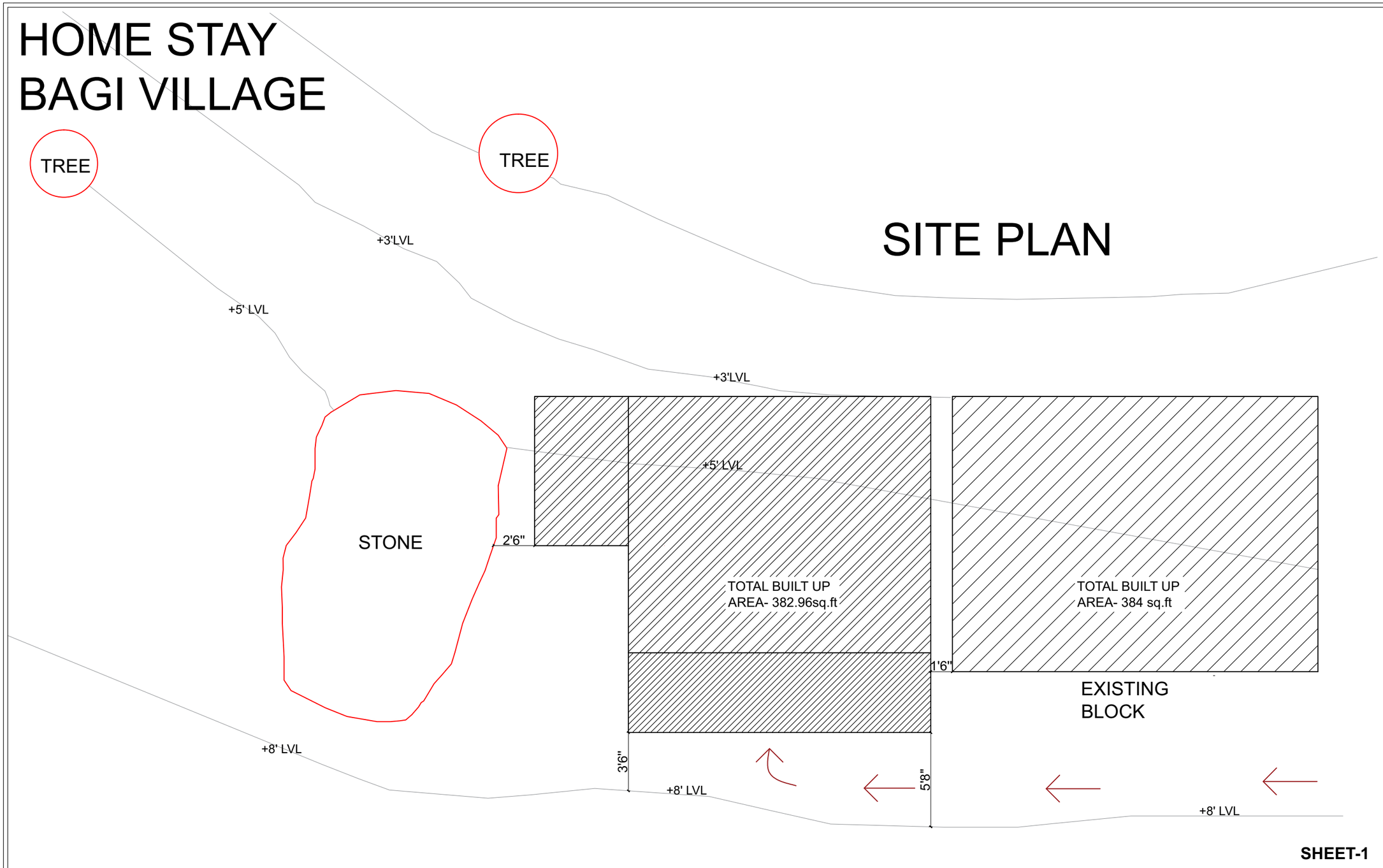
सत्यमेव जयते
Government of India
Department of Science & Technology
Ministry of Science & Technology

Development Alternatives

Construction and Structural Drawings

HOME STAY
BAGI VILLAGE

SITE PLAN



SHEET-1

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SITE PLAN

REV DATE-
11/05/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
SITE PLAN
SCALE-1:25

ARCHITECT-

DEALT-

DATE-

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

New Delhi 110016
INDIA

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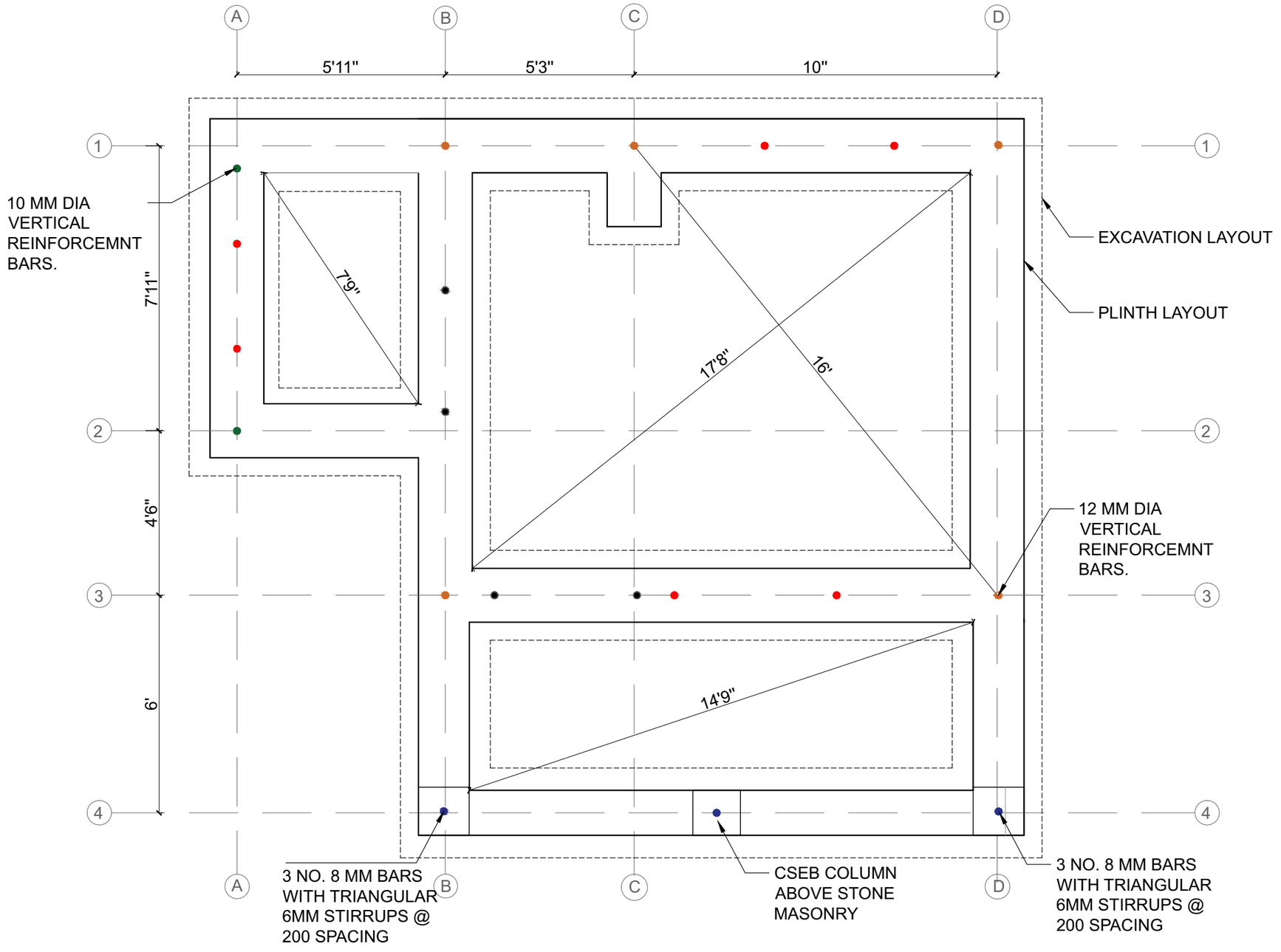

SHEET-2

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
PLINTH & EXCAVATION LAYOUT

REV DATE-
14/05/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	12mm	From foundation till Lintel Band
WINDOW	12mm	From Sill band till Lintel Band
CORNERS& T-JUNCTIONS	10mm	From foundation till Roof Band
	12mm	From foundation till Roof Band
VERRANDAH	8mm	From foundation till Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
PLINTH LAYOUT
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area
New Delhi 110016
INDIA
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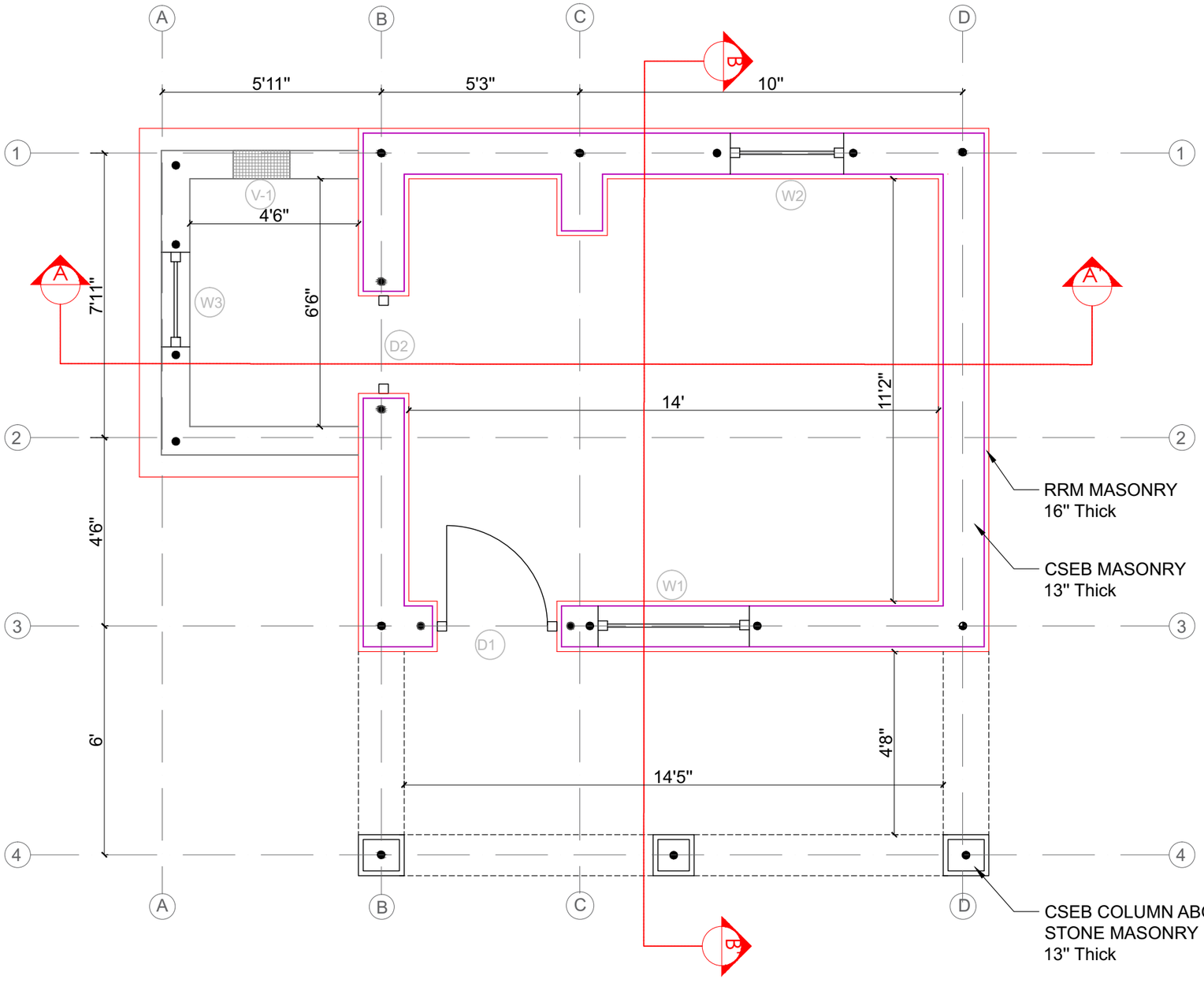

SCHEDULE OF OPENINGS: WINDOWS	
NAME	SIZE
W1	4' X 4'-3"
W2	3' X 4'-3"
W3	2'6" X 4'-3"
V-I	1'6" X 1'-6"

SCHEDULE OF OPENINGS: DOORS	
NAME	SIZE
D1	3'-2" X 6'-9"
D2	2'-6" X 6'-9"

SHEET-3

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
GROUND FLOOR PLAN

REV DATE-
14/05/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
GROUND FLOOR PLAN
SCALE-1:75
ARCHITECT-
DEALT-
DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

New Delhi 110016
INDIA

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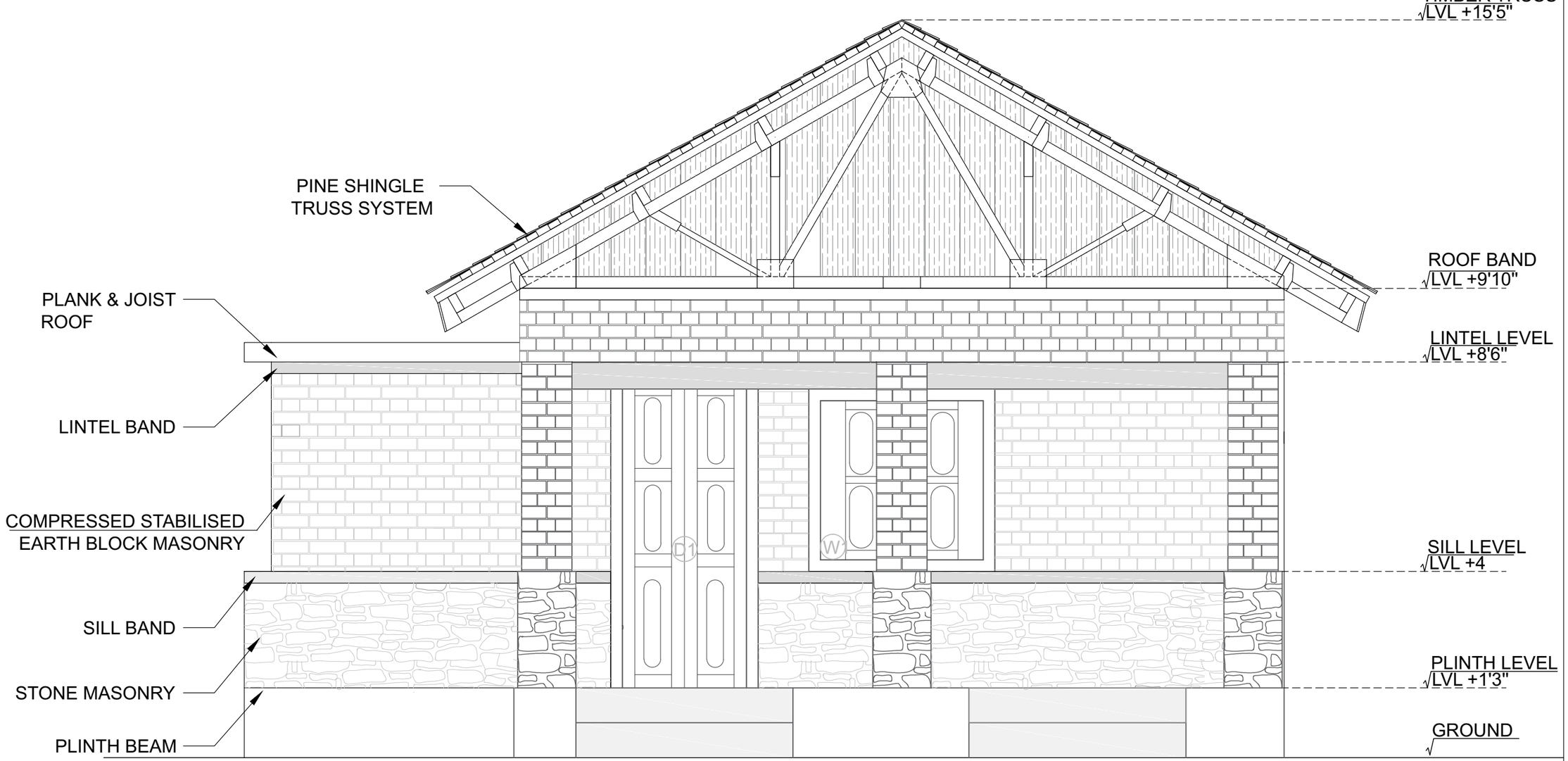

NORTH ELEVATION

SHEET-4

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
NORTH ELEVATION

REV DATE-
22/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
NORTH ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

New Delhi 110016
INDIA

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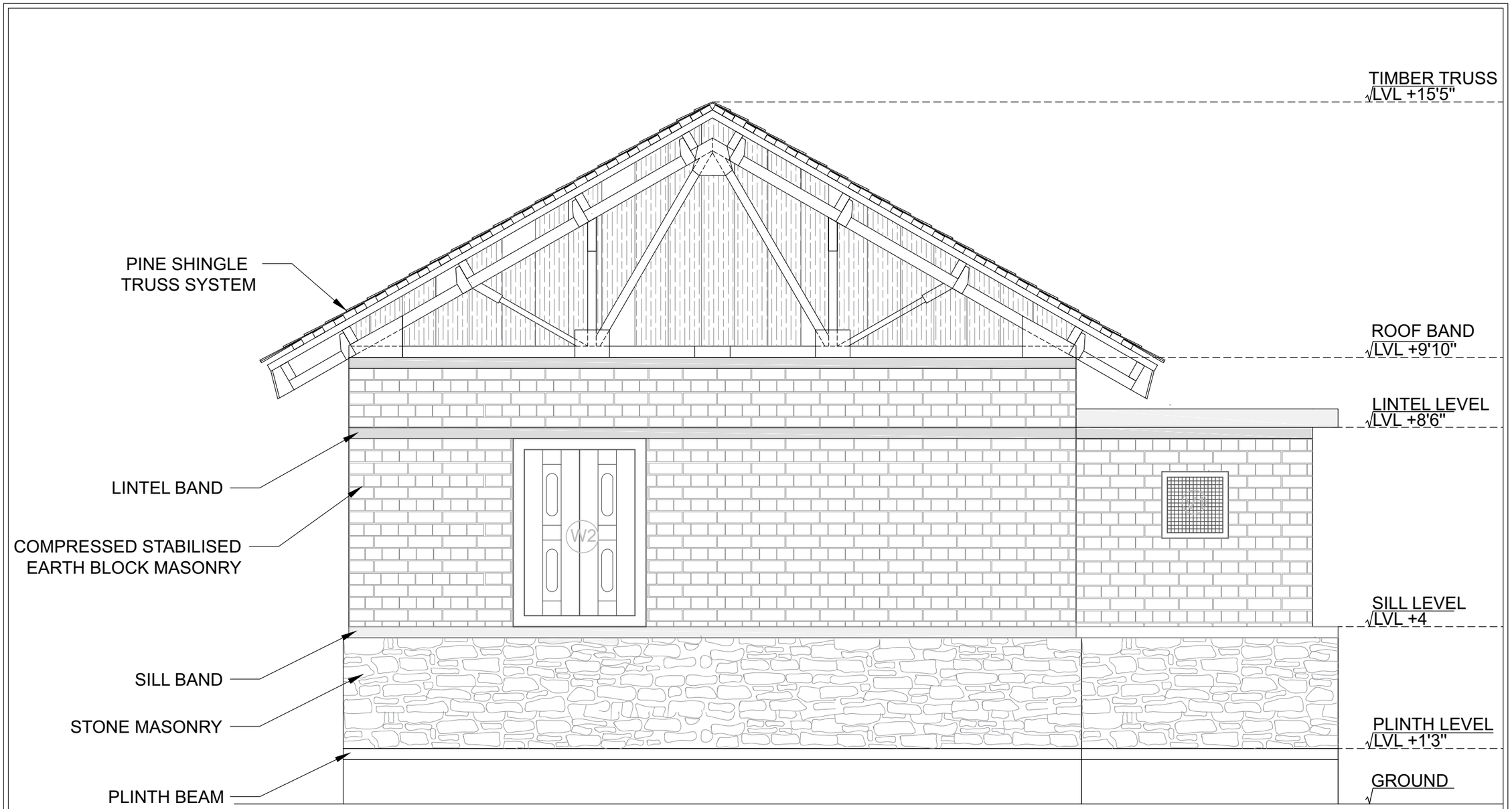

SOUTH ELEVATION

SHEET-5

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SOUTH ELEVATION

REV DATE-
22/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
SOUTH ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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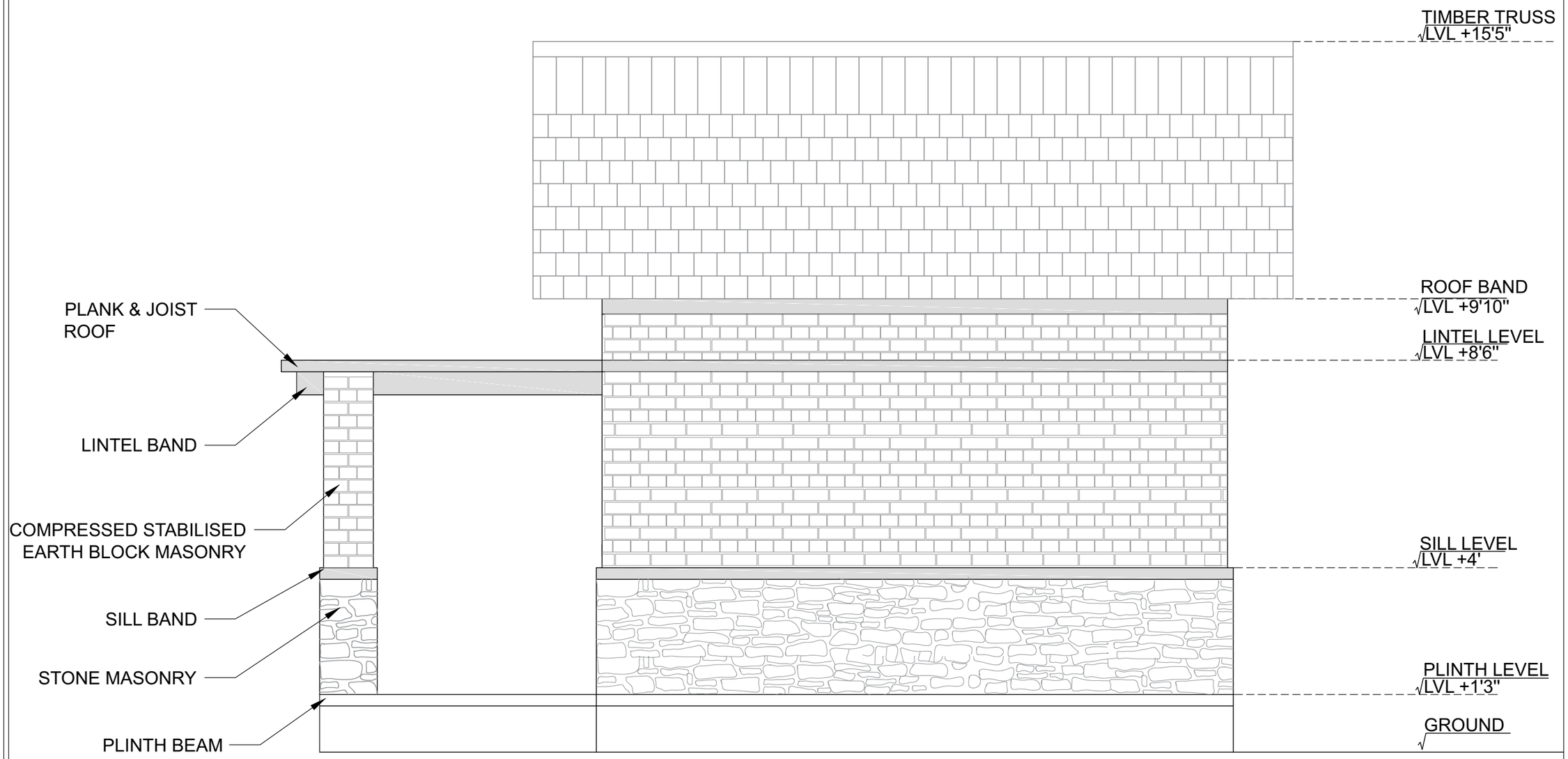

EAST ELEVATION

SHEET-7

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SOUTH ELEVATION

REV DATE-
22/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
EAST ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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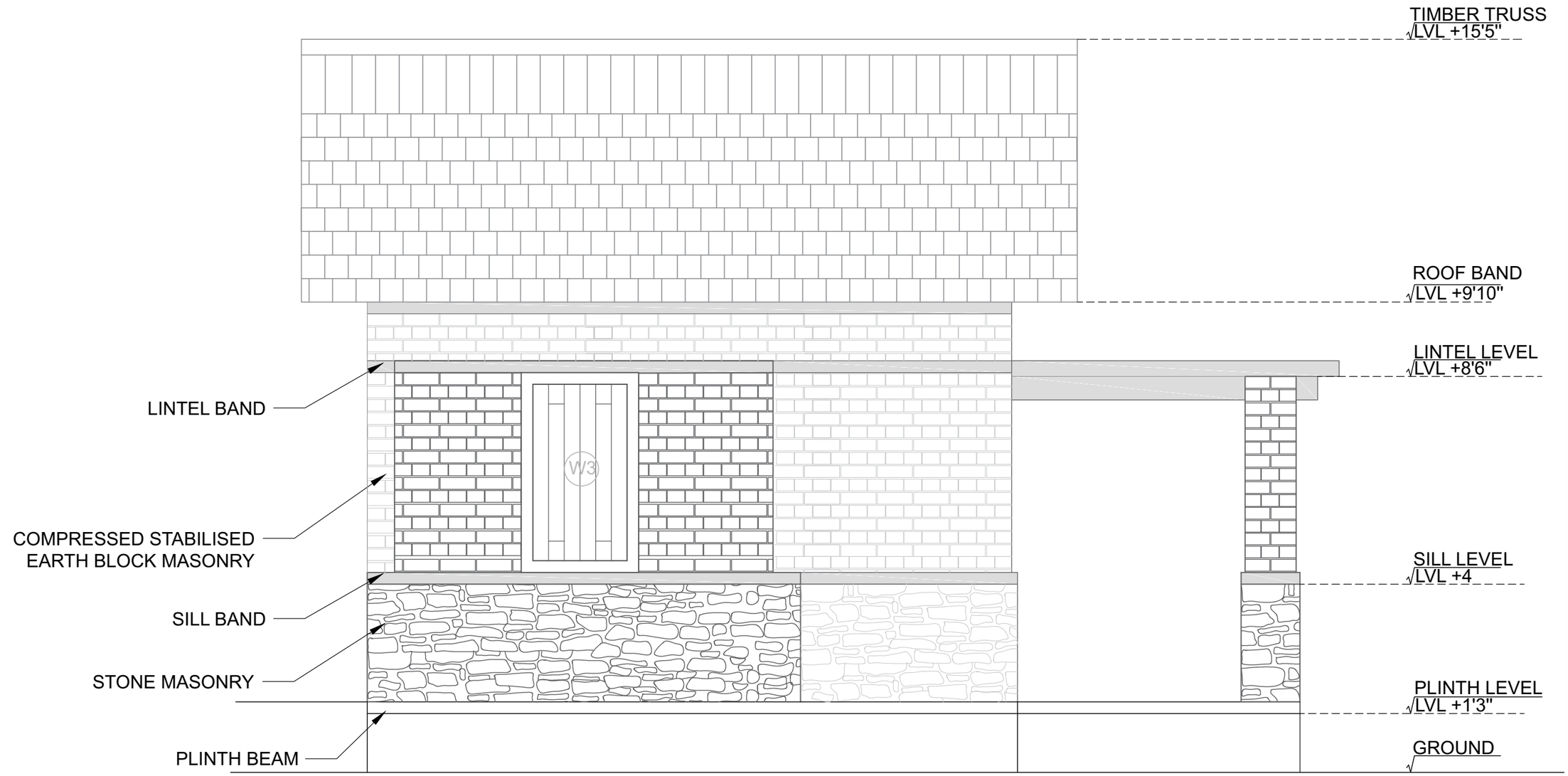

WEST ELEVATION

SHEET-8

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
WEST ELEVATION

REV DATE-
22/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
WEST ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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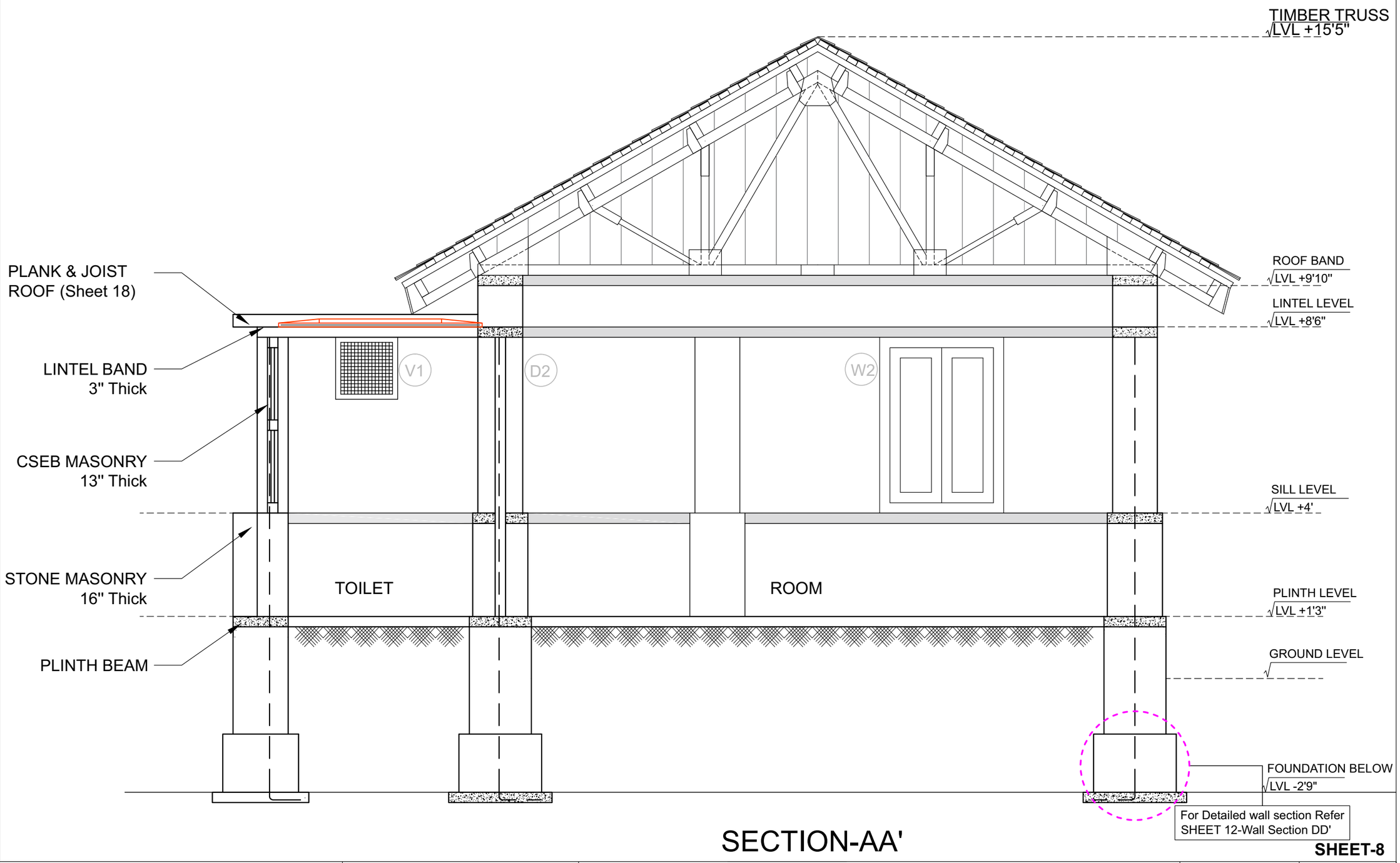

SECTION-AA'

SHEET-8

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SECTION AA'

REV DATE-
11/05/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
SECTION AA'
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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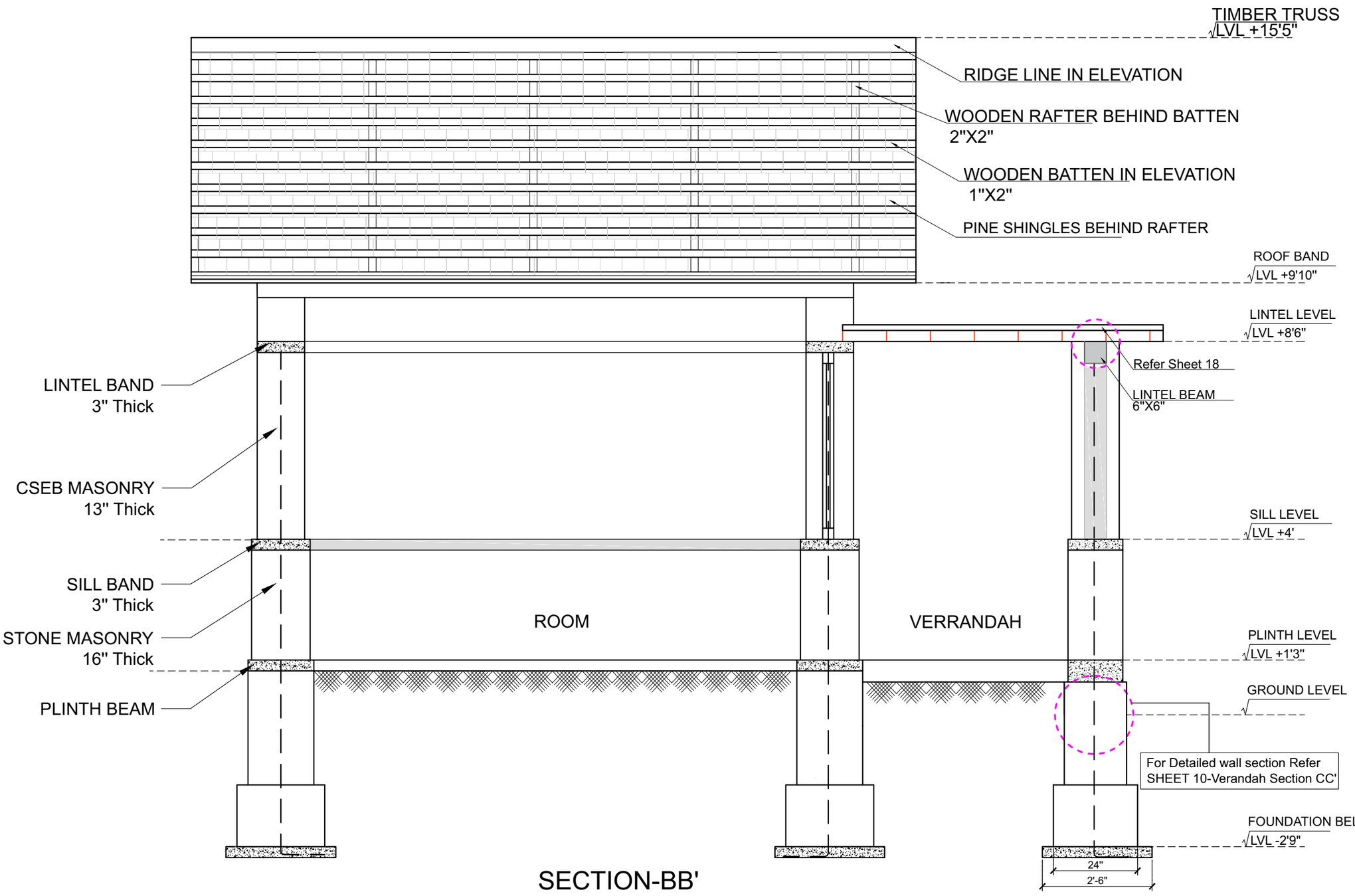

SECTION-BB'

SHEET-8

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SECTION BB'

REV DATE-
12/05/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
SECTION BB'
SCALE-1:75
ARCHITECT-
DEALT-
DATE-

N

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B-32 Tara crescent marg
Qutumb institutional area

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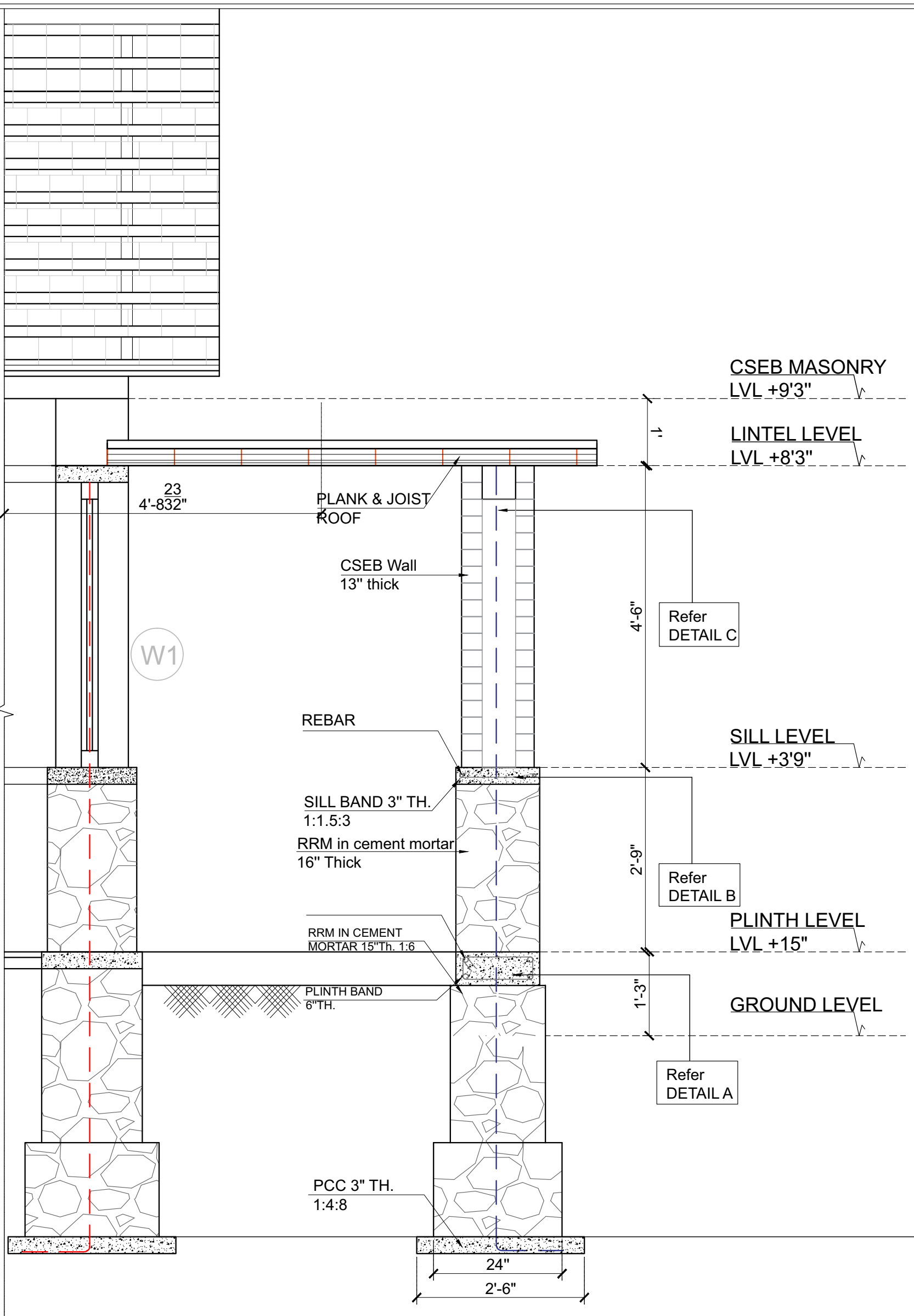

VERRANDAH SECTION-CC'

SHEET-10

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
Verandah Section CC'

REV DATE-
12/05/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	12mm	From foundation PCC to Lintel Band	
WINDOW	12mm	From Sill band to Lintel Band	
CORNERS& T-JUNCTIONS	12mm	From foundation PCC to Roof Band	
	12mm	From foundation PCC to Roof Band	
VERRANDAH	8mm	From foundation PCC to Lintel beam	

PROJECT NAME-
DST TIME LEARN
DRAWING-
VERANDAH SECTION CC'
SCALE-
ARCHITECT-
DEALT-
DATE-

N

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B-32 Tara crescent marg
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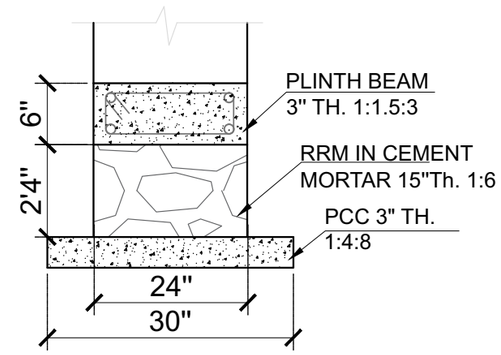
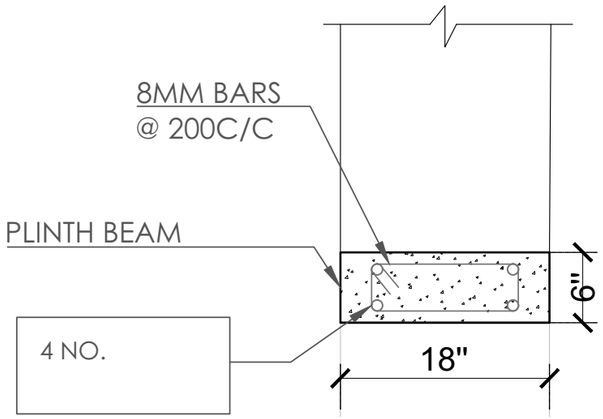
DETAIL -A



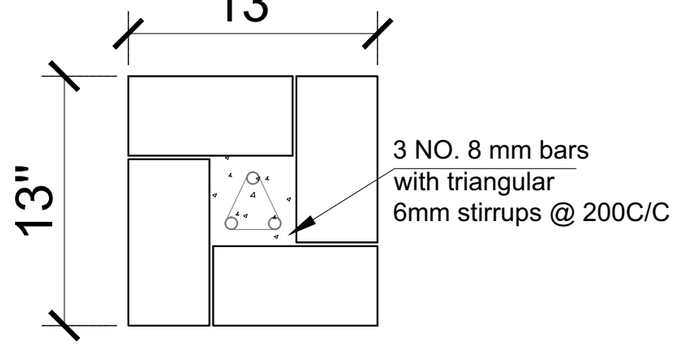
FOUNDATION DETAIL-VERRANDAH

DETAIL -B



PLINTH BEAM
STRIP FOUNDATION (VERANDAH)

DETAIL- C



VERTICAL REINFORCEMENT PLAN
CSEB COLUMN DETAIL
(VERANDAH)

CONSTRUCTION DETAILS- VERANDAH

SHEET-11

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONSTRUCTION DETAILS-VERANDAH

REV DATE-
12/05/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	12mm	From foundation PCC to Lintel Band
WINDOW	12mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS	10mm	From foundation PCC to Roof Band
	12mm	From foundation PCC to Roof Band
VERRANDAH	8mm	From foundation PCC to Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONSTRUCTION DETAILS
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area
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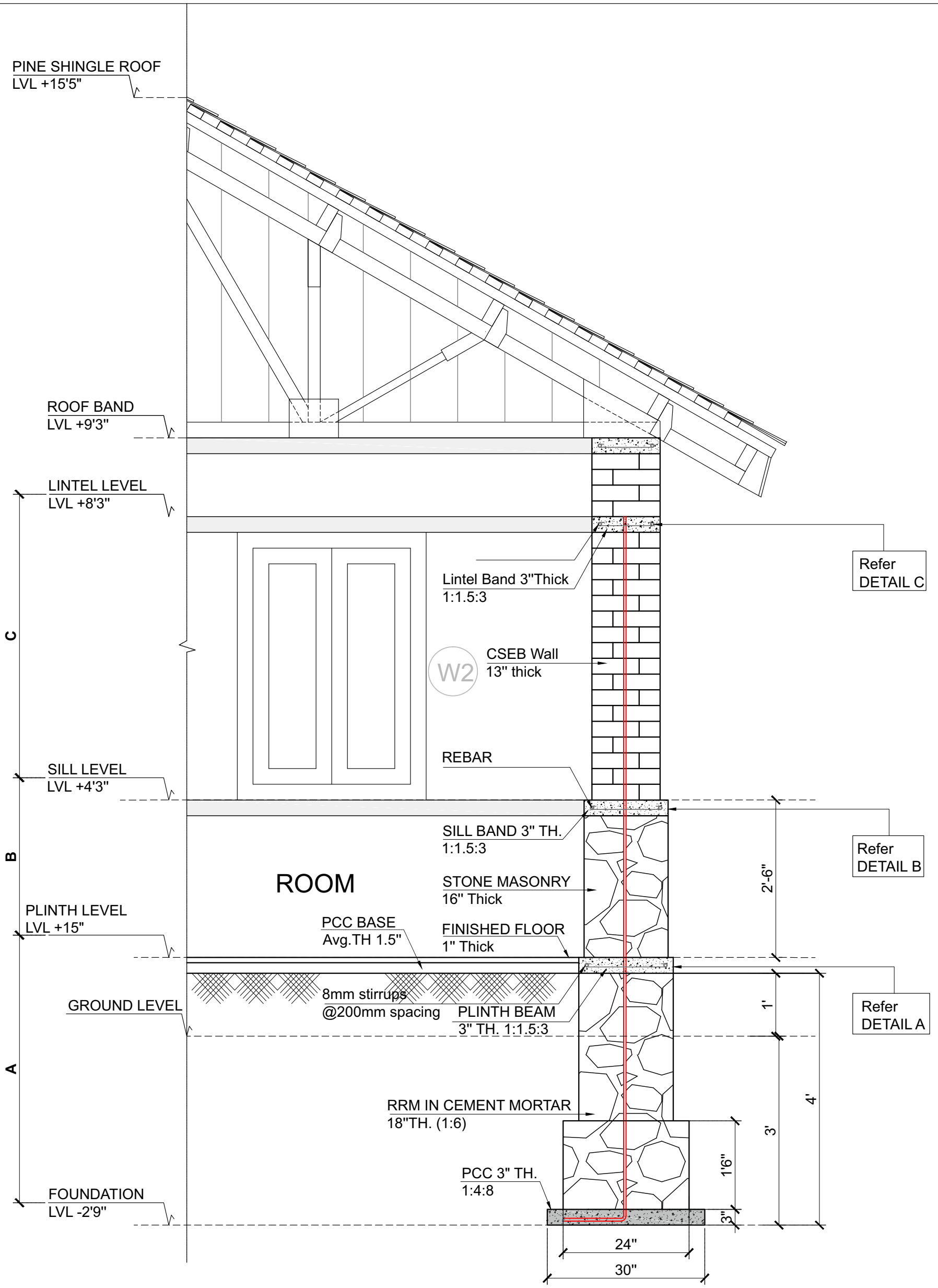

SHEET-12

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
Wall section DD'
REV DATE-
11/09/2019

Vertical Reinforcement Details

DOOR	12mm	From foundation PCC to Lintel Band
WINDOW	12mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS	12mm	From foundation PCC to Roof Band
	12mm	From foundation PCC to Roof Band
VERRANDAH	8mm	From foundation PCC to Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
WALL SECTION DD'
SCALE-
ARCHITECT-
DEALT-
DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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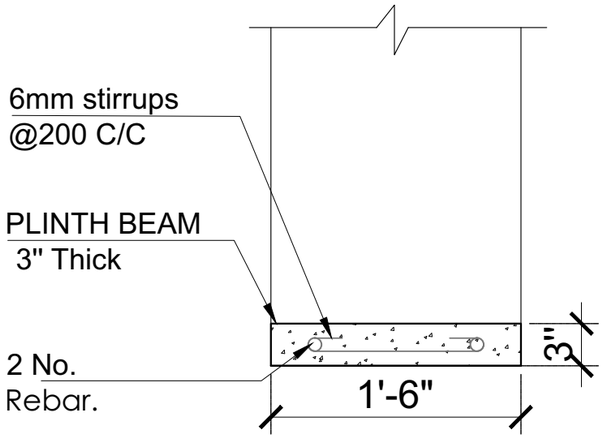
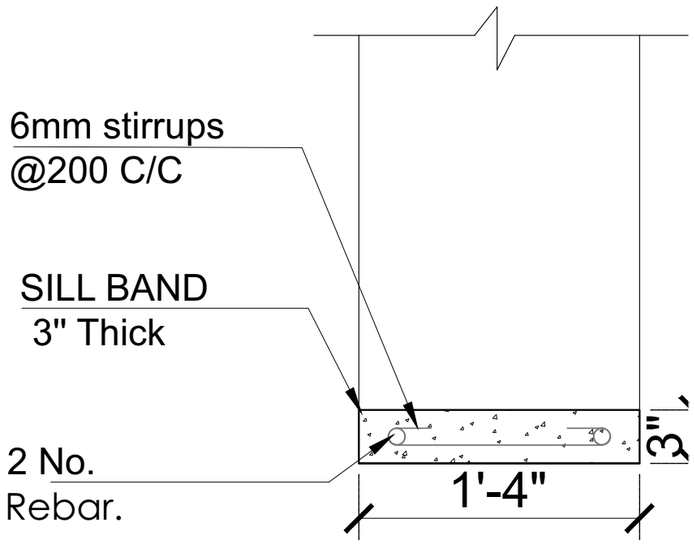
DETAIL -A



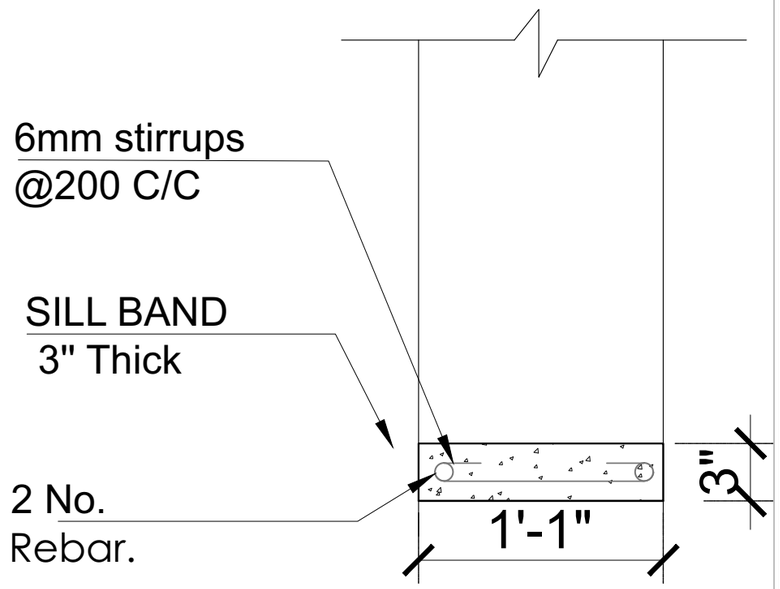
PLINTH BEAM

DETAIL -B



SILL BAND

DETAIL- C



LINTEL BAND

CONSTRUCTION DETAILS- PLINTH, SILL AND LINTEL BAND

SHEET-13

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONSTRUCTION DETAILS-WALL BANDS

REV DATE-
12/05/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	12mm	From foundation PCC to Lintel Band
WINDOW	12mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS	10mm	From foundation PCC to Roof Band
	12mm	From foundation PCC to Roof Band
VERRANDAH	8mm	From foundation PCC to Lintel beam

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONSTRUCTION DETAILS
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

New Delhi 110016
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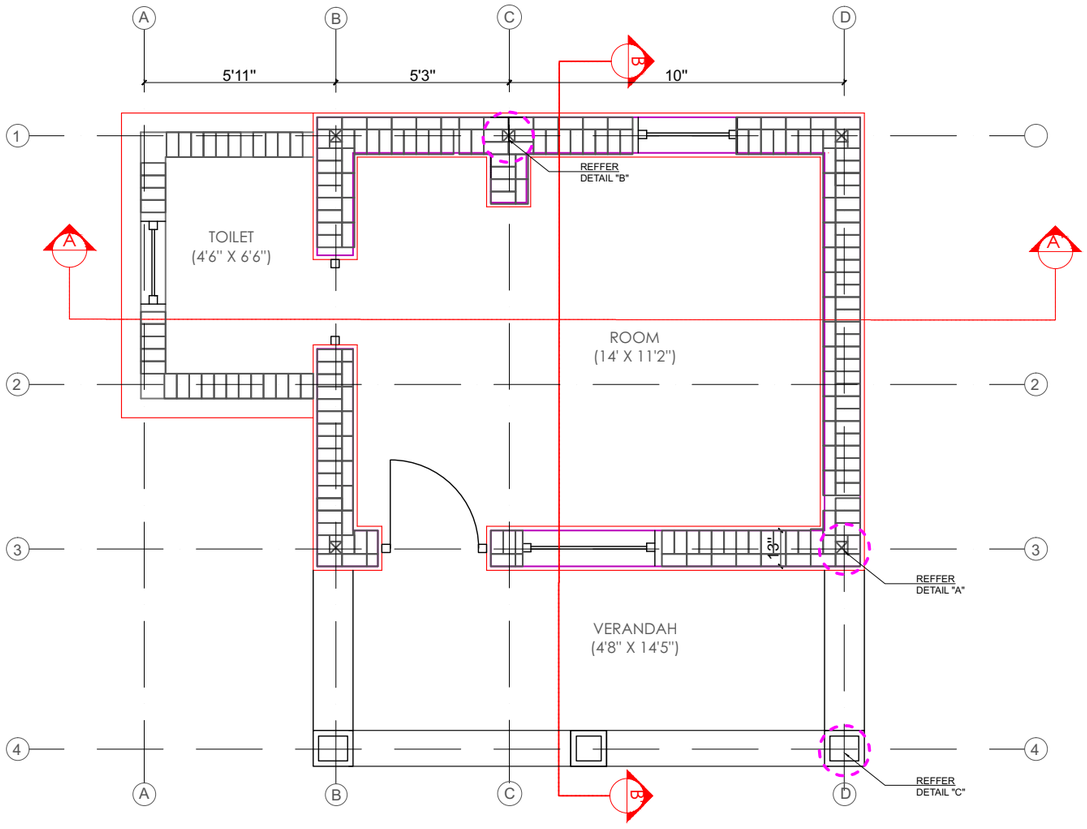
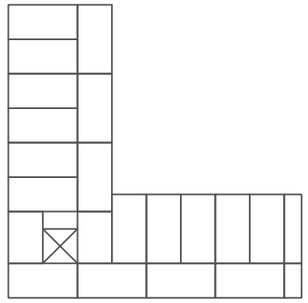
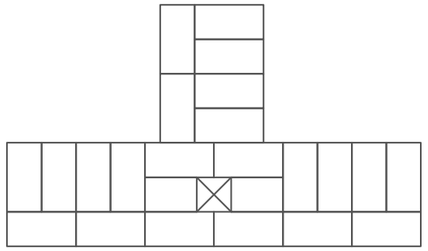


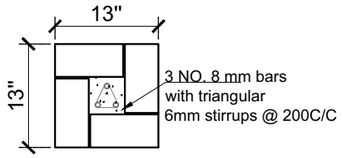
REFRENCE PLAN



DETAIL A-COURSE 1,3,5



DETAIL B-COURSE 1,3,5



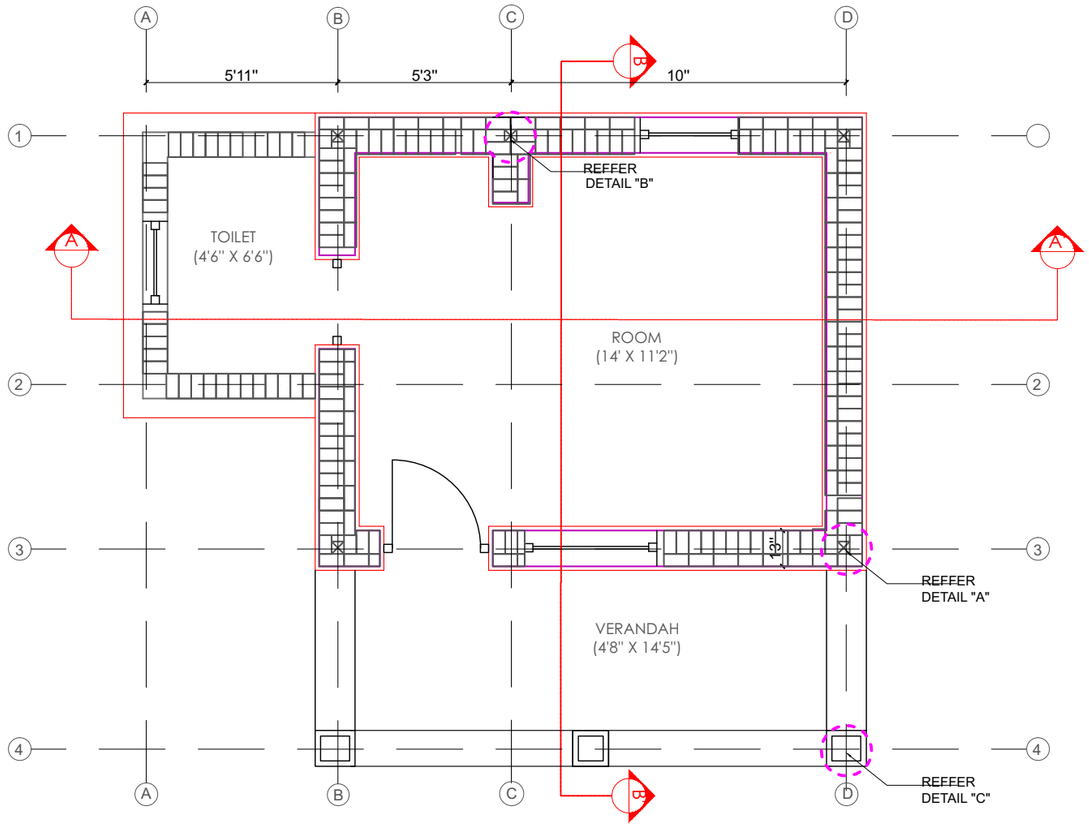
VERTICAL REINFORCEMENT PLAN -
CSEB COLUMN DETAIL
(VERANDAH)

DETAIL C

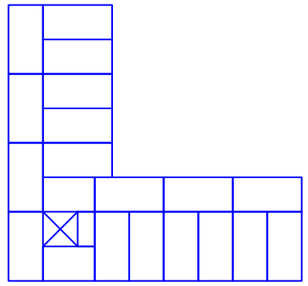
COURSE PLAN -COMPRESSED STABALIZED EARTH BLOCK

SHEET-14

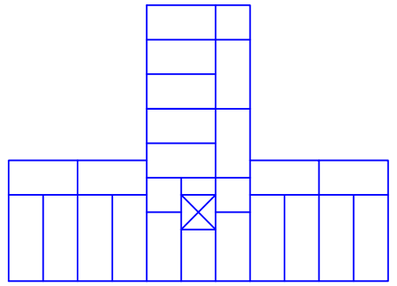
NOTE: 1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE 2-ALL MEASUREMENTS IN FEET AND INCHES 3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED 4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.	DWG- COURSE LAYOUT-Odd REV DATE- 12/05/2020		PROJECT NAME- DST TIME LEARN DRAWING- COURSE LAYOUT-ODD SCALE-1:75 ARCHITECT- DEALT- DATE-	**Development alternatives,** **B-32 Tara crescent marg** **Qutumb institutional area** **New Delhi 110016** **INDIA** **Ph.01126544100** **email-www.devalt.org**



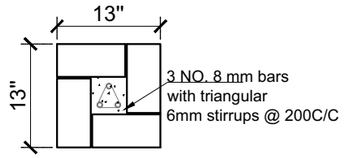
REFRENCE PLAN



DETAIL A-COURSE 2,4,6



DETAIL B-COURSE 2,4,6



VERTICAL REINFORCEMENT PLAN -
CSEB COLUMN DETAIL
(VERANDAH)

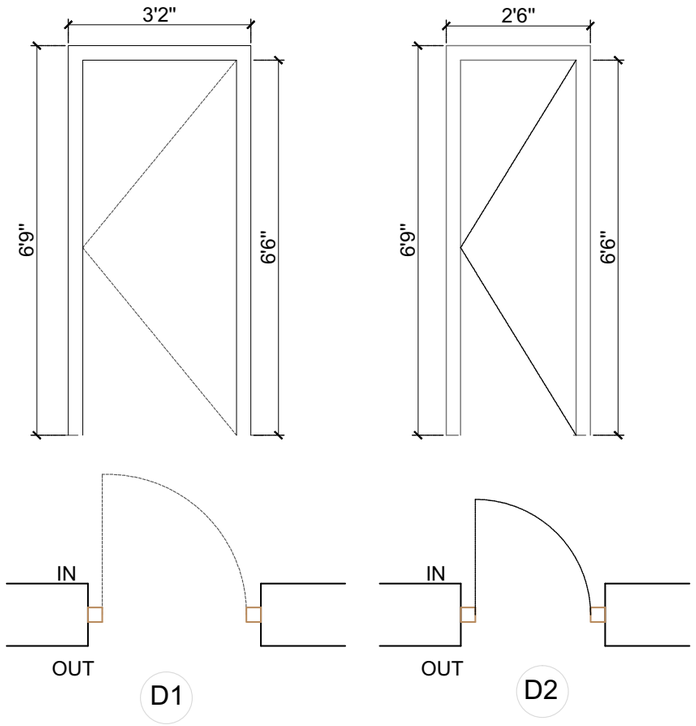
DETAIL C

COURSE PLAN -COMPRESSED STABALIZED EARTH BLOCK

SHEET-15

NOTE: 1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE 2-ALL MEASUREMENTS IN FEET AND INCHES 3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED 4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.	DWG- COURSE LAYOUT-Even REV DATE- 12/05/2020		PROJECT NAME- DST TIME LEARN DRAWING- COURSE LAYOUT-EVEN SCALE-1:75 ARCHITECT- DEALT- DATE-	**Development alternatives,** **B-32 Tara crescent marg** **Qutumb institutional area** **New Delhi 110016** **INDIA** **Ph.01126544100** **email-www.devalt.org**

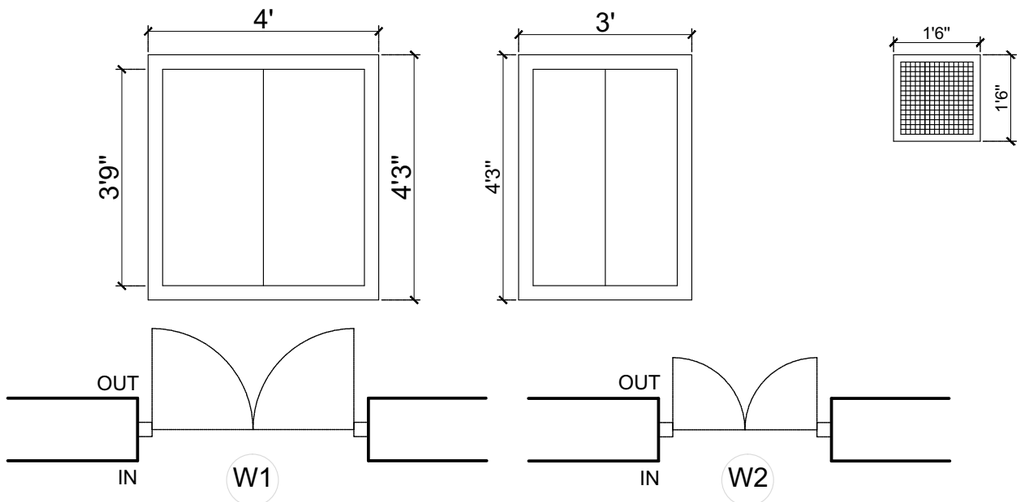
DOOR SCHEDULE



SCHEDULE OF OPENINGS: **WINDOWS**	
NAME	SIZE
W1	4' X 4'-3"
W2	3' X 4'-3"
W3	3' X 4'3"
V1	1'6" X 1'6"

SCHEDULE OF OPENINGS: **DOORS**	
NAME	SIZE
D1	3'-2" X 6'-9"
D2	2'-6" X 6'-9"

WINDOW SCHEDULE



SHEET-16

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
DOOR /WINDOW-Schedule

REV DATE-

12/05/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
DOOR/WINDOW SCHEDULE
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

New Delhi 110016
INDIA

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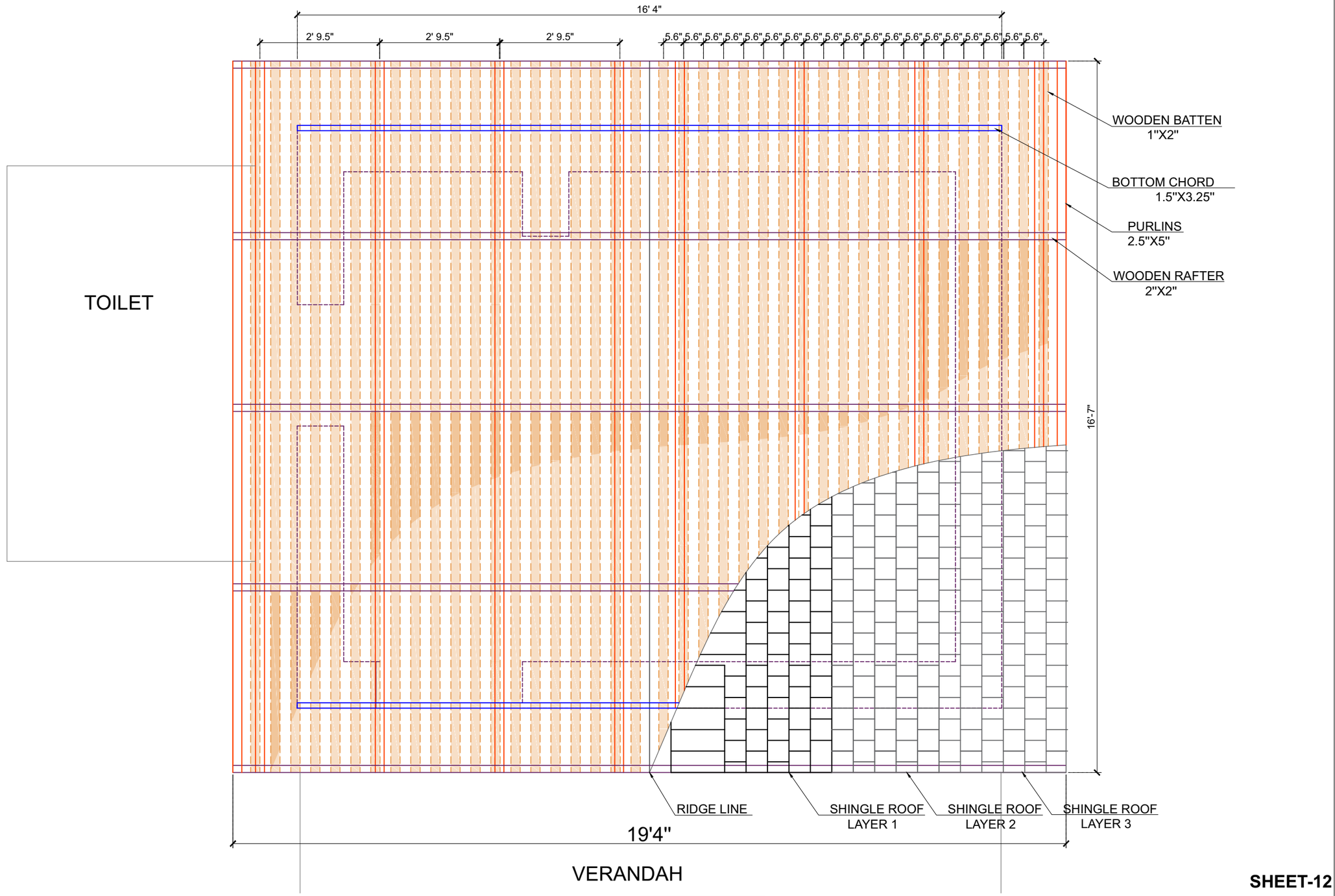

SHEET-12

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
PINE SHINGLE TIMBER TRUSS-Building 2
REV DATE-
07/04/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
PINE SHINGLE TIMBER TRUSS
Building-2
SCALE-1:75

ARCHITECT-
DEALT-

DATE-07/04/2020

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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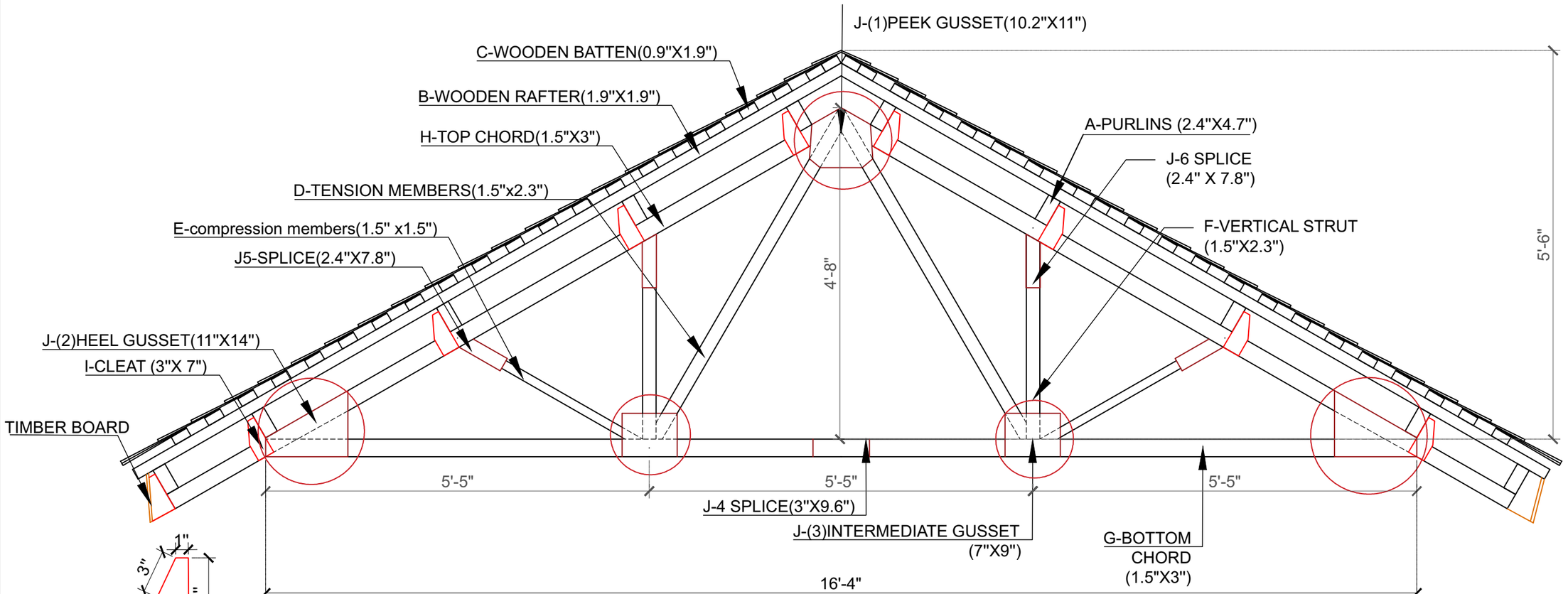
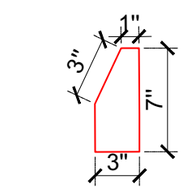
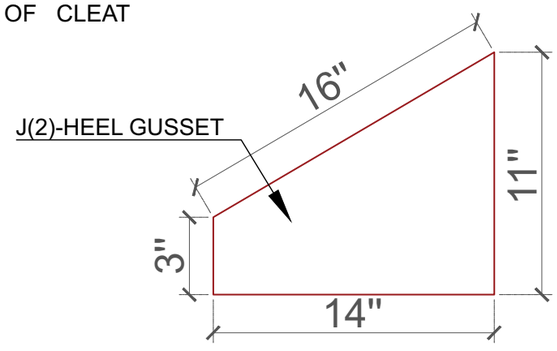
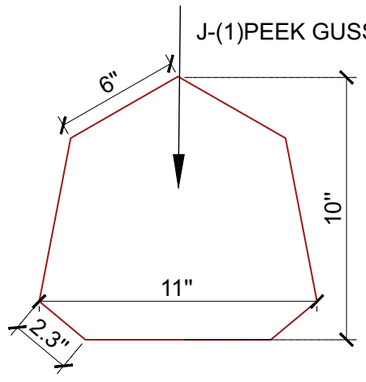
TIMBER TRUSS ROOF DETAIL

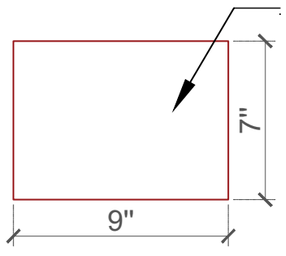


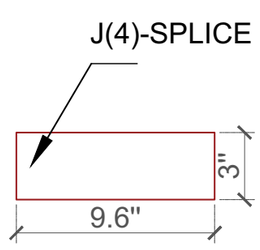


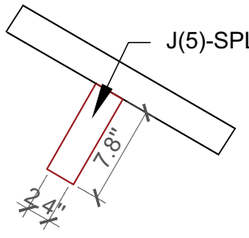
DETAIL OF CLEAT











SHEET-12

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
TRUSS DIAGRAM

REV DATE-

14/05/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
TRUSS DIAGRAM
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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INDIA

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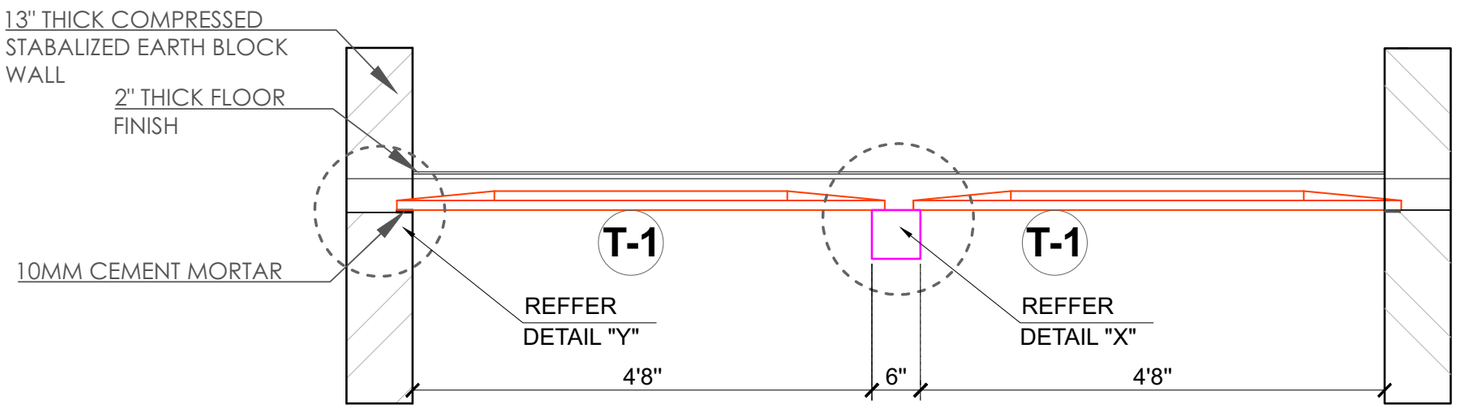
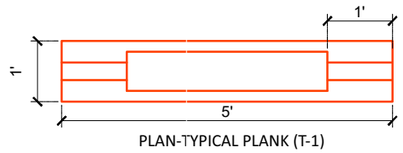
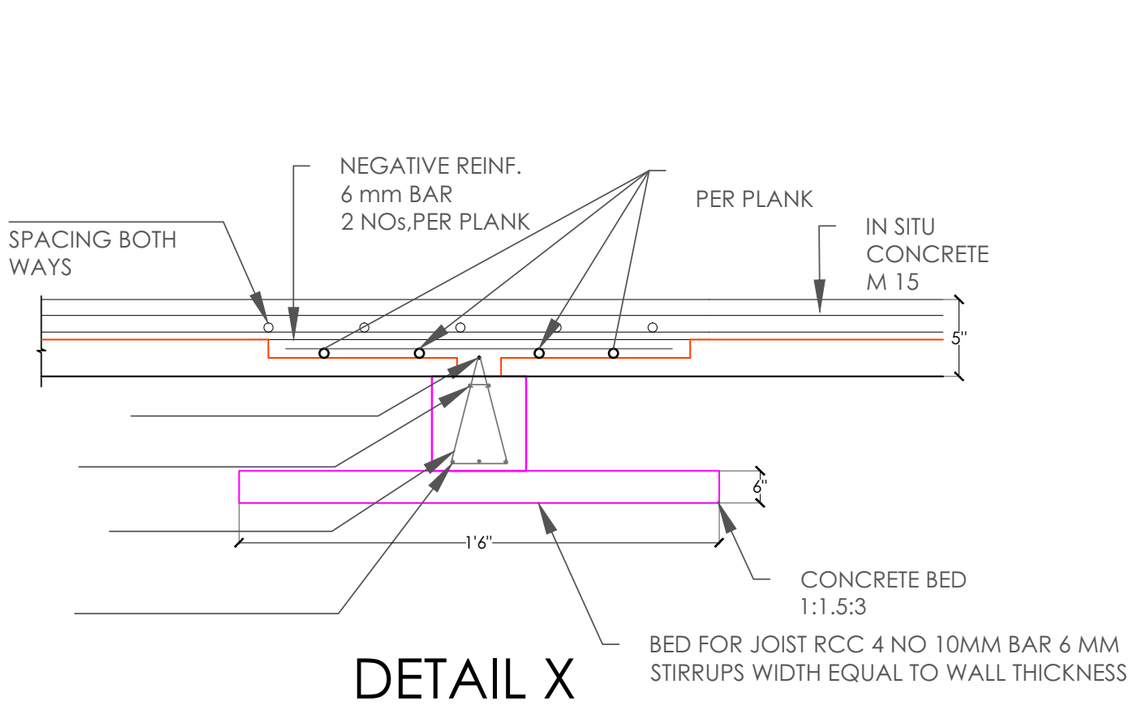
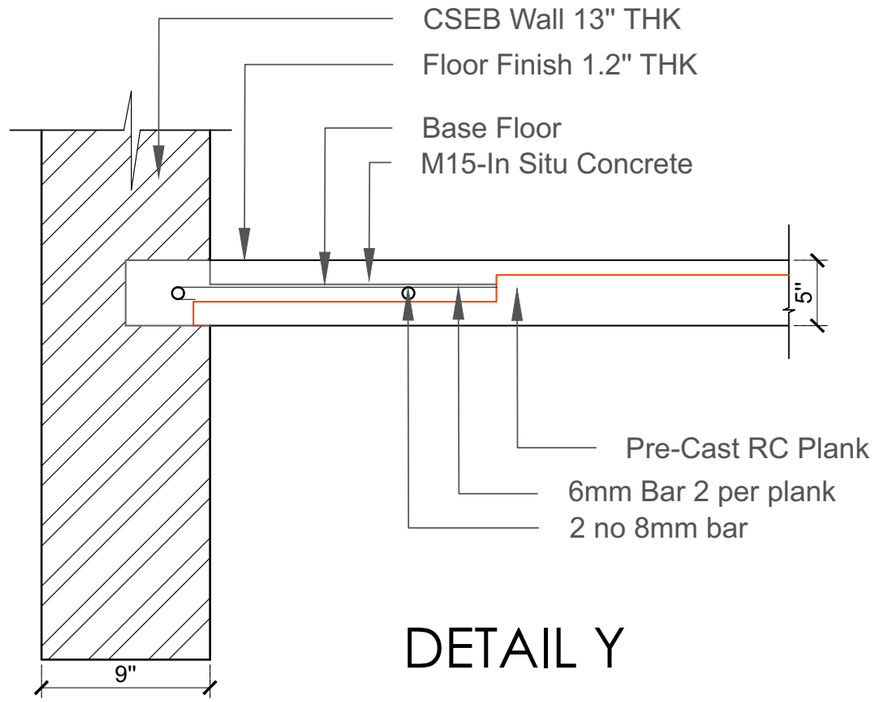




PLAN-TYPICAL PLANK (T-1)



DETAIL X



DETAIL Y

SHEET-18

NOTE: 1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE 2-ALL MEASUREMENTS IN FEET AND INCHES 3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED 4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.	DWG- CONSTRUCTION DETAILS-Plank&Joist Roof REV DATE- 23/06/2020		PROJECT NAME- DST TIME LEARN DRAWING- CONSTRUCTION DETAILS SCALE-1:75 ARCHITECT- DEALT- DATE- N	Development alternatives, B-32 Tara crescent marg Qutumb institutional area New Delhi 110016 INDIA Ph.01126544100 email-www.devalt.org

Specifications and Bill of Quantities

S. No.	ITEM	QTY	UNIT
A	**FOUNDATION**		
A.1	**EXCAVATION**		
A.1.1	Tota Earth work inl excavation for trench (2.5' wide and 2.9' deep) in room, toilet and bathroom and (2' wide and 1' deep in verandah)	563.95	cuft
A.2	**PCC BED AT TRENCH**		
A.2.1	Total P.C.C in foundation 3" thick and 2.5' wide with 1:4:8 running over the excavation in room and toilet/bathroom and 3" thick and 2' wide in verandah.	56.45	cuft
A.3	**VERTICAL REINFORCEMENTS**		
A.3.1	Laying of vertical reinforcement (12mm bars) in room and toilet/bathroom	230.40	ft
A.3.2	Laying vertical reinforcements (9, traingular 8mm bars) in verandah columns	100.80	ft
A.3.3	Stirups tie for vertical reinforcement @200mm spacing in verandah columns (Number 18)	18.00	ft
A.4	**RRM IN FOUNDATION**		
A.4.1	Total RRM in Foundation Type-1, 1:6 mortar (2' wide at step 1 and 1.5' wide at step -2 and 3.4' deep) & Foundation Type-2, 1:6 mortar (9" wide and 1' deep).	395.35	cuft
A.5	**PLINTH BAND**		
A.5.1	Plinth band horizontal reinforcement (4, 12mm bars)	190.60	ft
A.5.2	Stirups tie for horizontal reinforcement @200mm spacing, 6mm bars	176.00	ft
A.5.3	Plinth band in concrete 1:1.5:3 ratio - 3" deep and 1.5' wide in room and bathroom & 9" wide and 6" deep in verandah	40.40	cuft
B	**SUPER STRUCTURE- GROUND FLOOR**		
B.1	**RANDOM RUBBLE STONE MASONARY**		
B.1.1	Total RRM from plinth to sill level 1:6 mortar (1.3' wide and 2.5' deep	291.525	cuft
B.2	**SILL BAND**		
B.2.1	Sill band horizontal reinforcement (2, 12mm bars)	63.53	ft
B.2.2	Stirups tie for horizontal reinforcement @200mm spacing, 6mm bars	45.00	ft
B.2.3	Sill band in concrete 1:1.5:3 ratio - 3" deep and 1.5' wide in room and bathroom	27.46	cuft
B.3	**DOOR WINDOW FRAMES**		
B.3.1	Installation of door frames in room and toilet (2 Nos.)	33.00	ft
	Installation of window frames in room (3 Nos.)	37.00	ft
B.4	**COMPRESSED STABILIZED EARTH BLOCKS MASONRY**		
B.4.1	Total CSEB production	3500.00	Nos.
B.4.2	CSEB Masonry mortar 1:6	250.00	cuft
B.5	**LINTEL BAND**		
B.5.1	Lintel band horizontal reinforcement (2, 12mm bars)	190.60	ft
B.5.2	Stirups tie for horizontal reinforcement @200mm spacing, 6mm bars	120.00	ft
B.5.3	Lintel band in concrete 1:1.5:3 ratio - 3" deep and 1.5' wide in room and bathroom and verandah	31.45	cuft

S. No.	ITEM	QTY	UNIT
B.6	**ROOF BAND**		
B.6.1	Roof band horizontal reinforcement (2, 12mm bars)	63.53	ft
B.6.2	Stirups tie for horizontal reinforcement @200mm spacing, 6mm bars	45.00	ft
B.6.3	Roof band in concrete 1:1.5:3 ratio - 3" deep and 1.5' wide in room and bathroom	23.23	Cuft
C	**ROOF- PLANK AND JOIST**		
C.1.1	Installation of planks at roof of Room	25.00	Nos.
C.1.2	Installation of joist at roof of Room, kitchen and toilet, 3 nos.	28.00	ft
C.1.3	Laying of 6mm horizontal steel bars with 6mm stirrups in 4" thick cement concrete for screeding over plank and joist roof in 1:1.5:3 ratio	140.80	cuft
D	**ROOF- TIMBER TRUSS**		
D.1.1	Installation of chir pin timber truss	1000.00	Nos.
D.1.1	Laying of chir pine timber shingles	30.00	cuft
E	**INSTALLATION OF DOORS AND WINDOWS**		
E.1.1	Installation of two doors, one each in room, nd toilet. Two doors size - 2.5 ft x 6.9 ft and one door size 3.1 ft x 6.9ft		
E.1.2	Installation of two windows, two in room window sizes - 3ft x 4 ft (1 Nos.) 4 ft x 4 ft (1 Nos.)		
E.1.3	Installation of MS ventilator in toilet, size - 1.5 ft x 1.5 ft		

3. Residence

Siror Village, Bhatwari Block, Uttarkashi

Set of Drawings

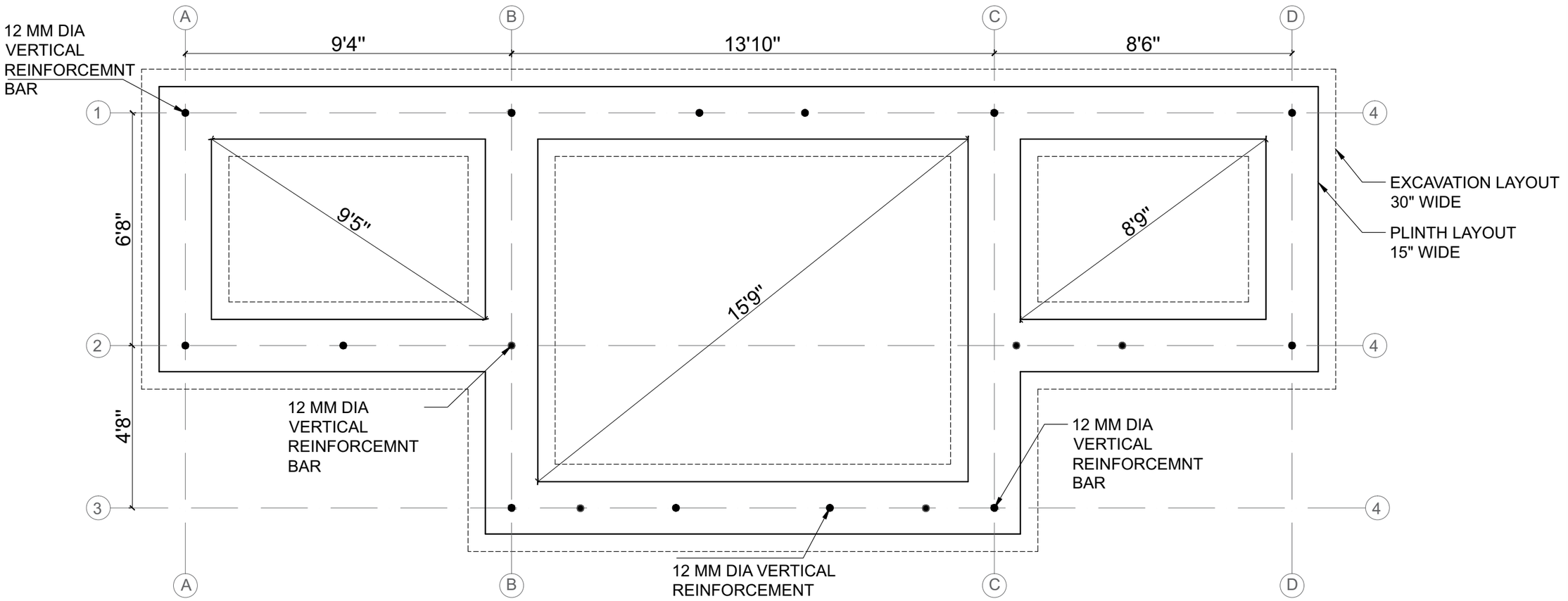
Under the project:
Delivery of Eco-friendly Multi-Hazard Resistant Construction Technologies and Habitat Solutions in Mountain States

Supported by:
Department of Science and Technology, Government of India
Programme: TIME-LEARN

सत्यमेव जयते
Government of India
Department of Science & Technology
Ministry of Science & Technology

Development Alternatives

Construction and Structural Drawings



SHEET-2

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
PLINTH AND EXCAVATION LAYOUT

REV DATE-

07/07/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		12mm	From foundation till Lintel Band
WINDOW		12mm	From Sill band till Lintel Band
CORNERS& T-JUNCTIONS		12mm	From foundation till Roof Band

PROJECT NAME-
DST TIME LEARN
DRAWING-
PLINTH & EXCAVATION LAYOUT

SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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INDIA

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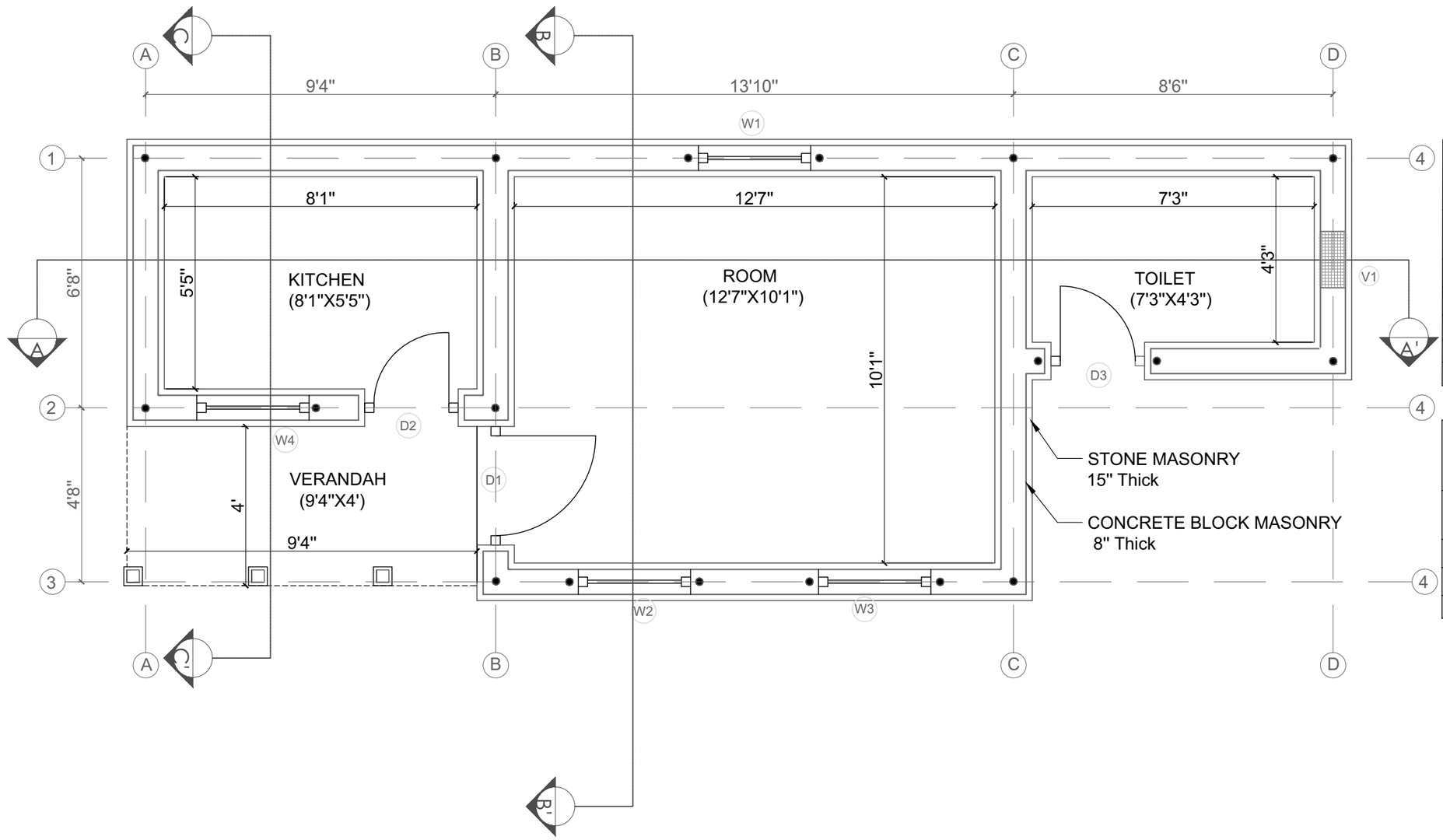

GROUND FLOOR PLAN

SCHEDULE OF OPENINGS: WINDOWS	
NAME	SIZE
W1	3' X 4'-3"
W2	3' X 4'-3"
W3	3' X 4'-3"
W4	3' X 4'-3"
V-I	1'6" X 1'-6"

SCHEDULE OF OPENINGS: DOORS	
NAME	SIZE
D1	3'-2" X 6'-9"
D2	2'-6" X 6'-9"
D3	2'-6" X 6'-9"

SHEET-3

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
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4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
GROUND FLOOR PLAN
REV DATE-

07/07/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
GROUND FLOOR PLAN

SCALE-1:75

ARCHITECT-

DEALT-
DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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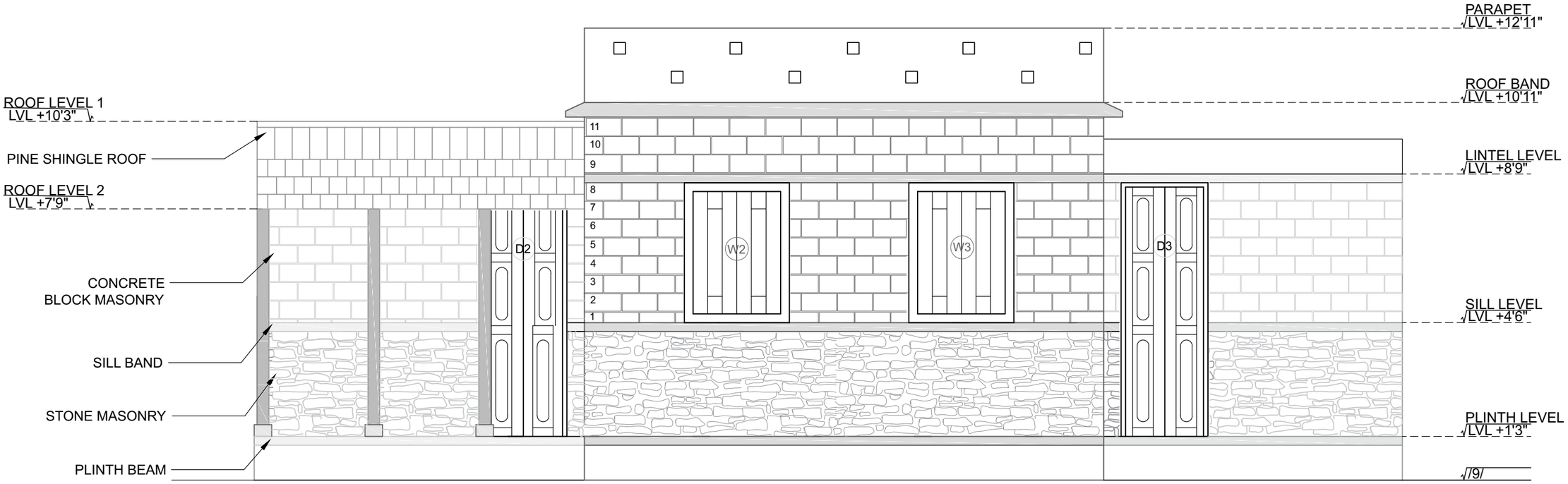
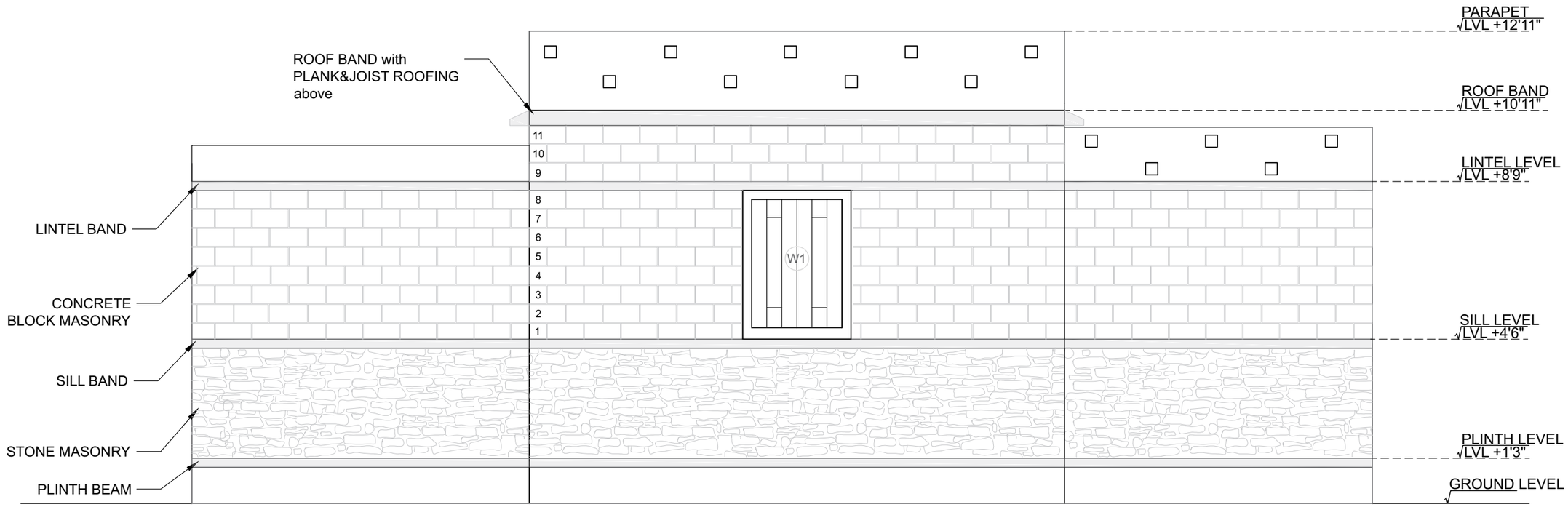


NORTH ELEVATION

SHEET-4

NOTE: 1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE 2-ALL MEASUREMENTS IN FEET AND INCHES 3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED 4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.	DWG- NORTH ELEVATION REV DATE- 05/08/2020		PROJECT NAME- DST TIME LEARN DRAWING- NORTH ELEVATION SCALE-1:75 ARCHITECT- DEALT- DATE-	N	**Development alternatives,** **B-32 Tara crescent marg** **Qutumb institutional area** **New Delhi 110016** **INDIA** **Ph.01126544100** **email-www.devalt.org**



SOUTH ELEVATION

SHEET-5

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
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DWG-
SOUTH ELEVATION

REV DATE-
05/08/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
SOUTH ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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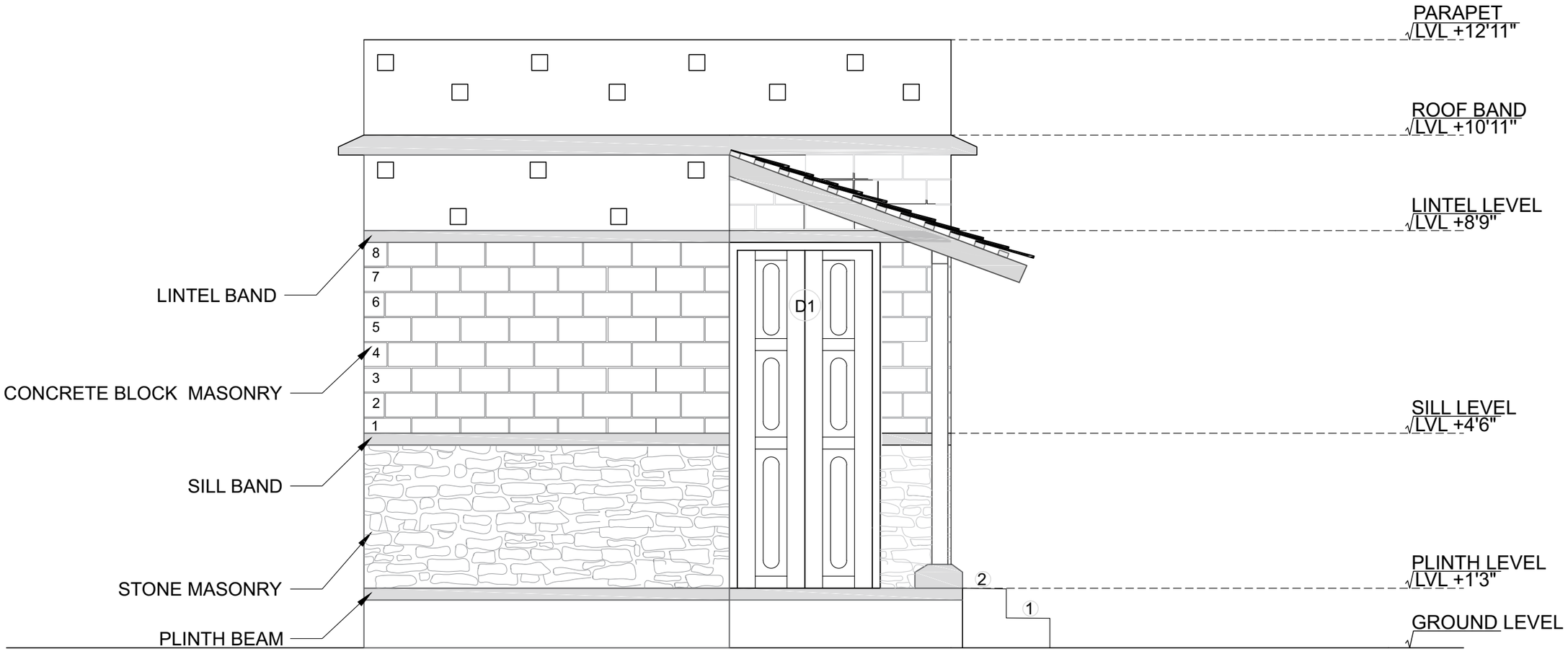

EAST ELEVATION

SHEET-6

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
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DWG-
EAST ELEVATION

REV DATE-
05/08/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
EAST ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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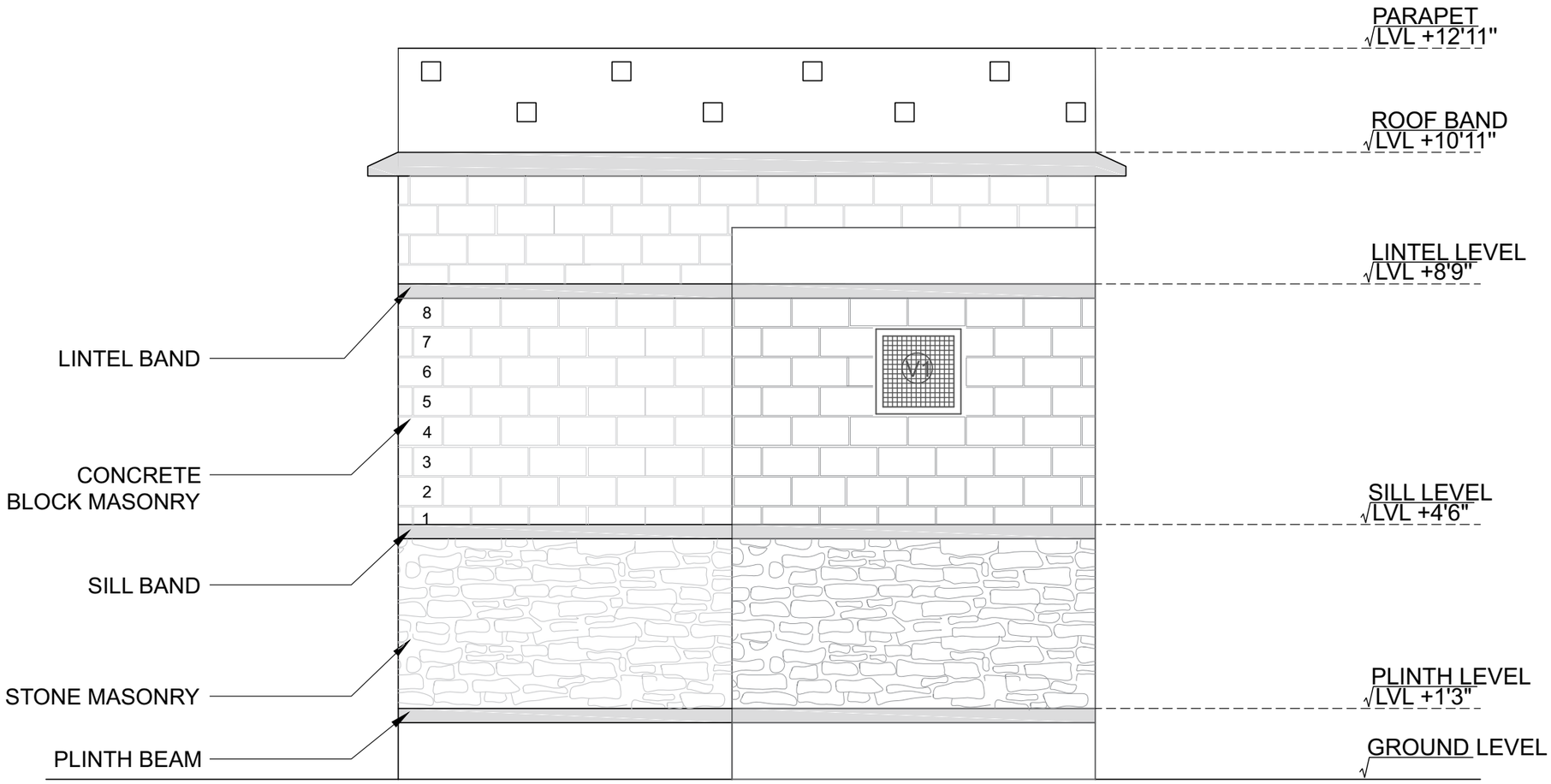

WEST ELEVATION

SHEET-7

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
WEST ELEVATION

REV DATE-
05/08/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
WEST ELEVATION
SCALE-1:75

ARCHITECT-

DEALT-

DATE-

N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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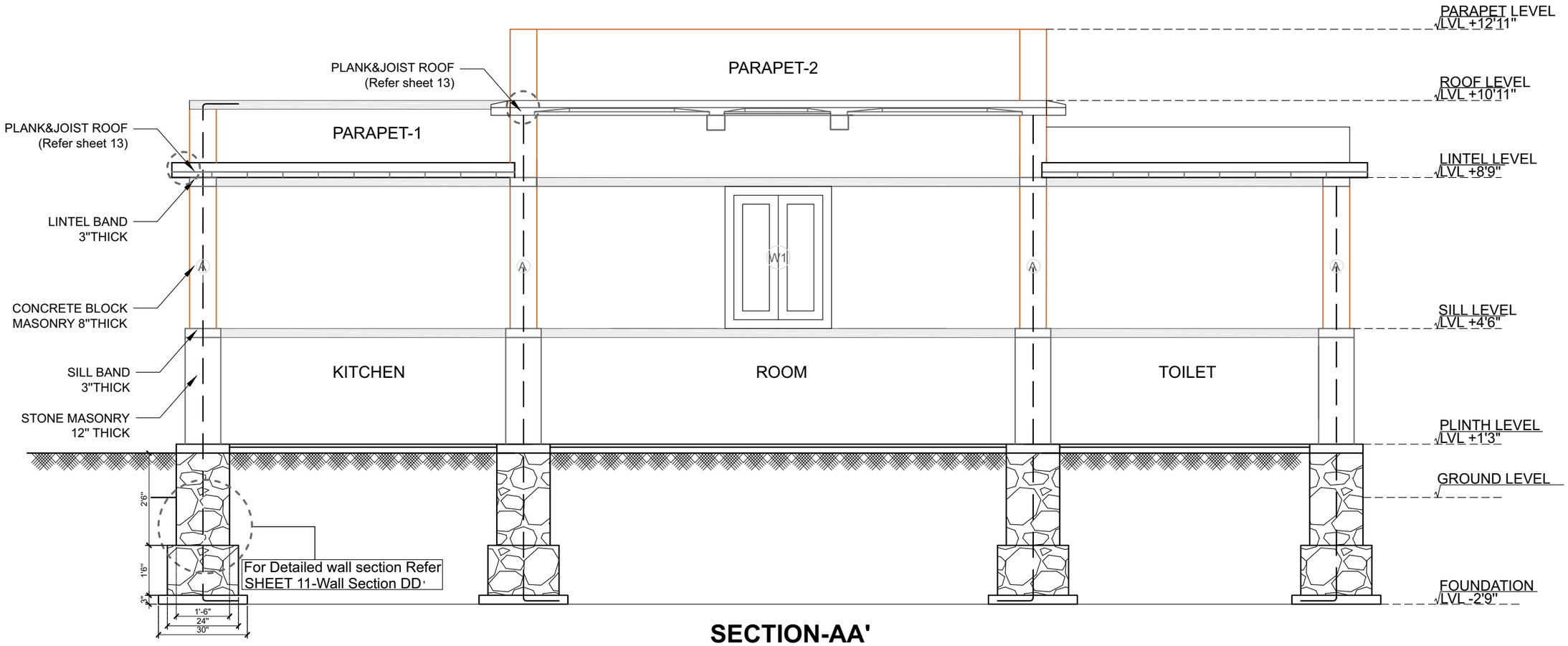

SECTION-AA'

SHEET-8

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SECTION- AA'

REV DATE-

05/08/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		12mm	From foundation till Lintel Band
WINDOW		12mm	From Sill band till Lintel Band
CORNERS& T-JUNCTIONS	A	12mm	From foundation till Roof Band

PROJECT NAME-
DST TIME LEARN
DRAWING-
PLINTH & EXCAVATION LAYOUT
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area

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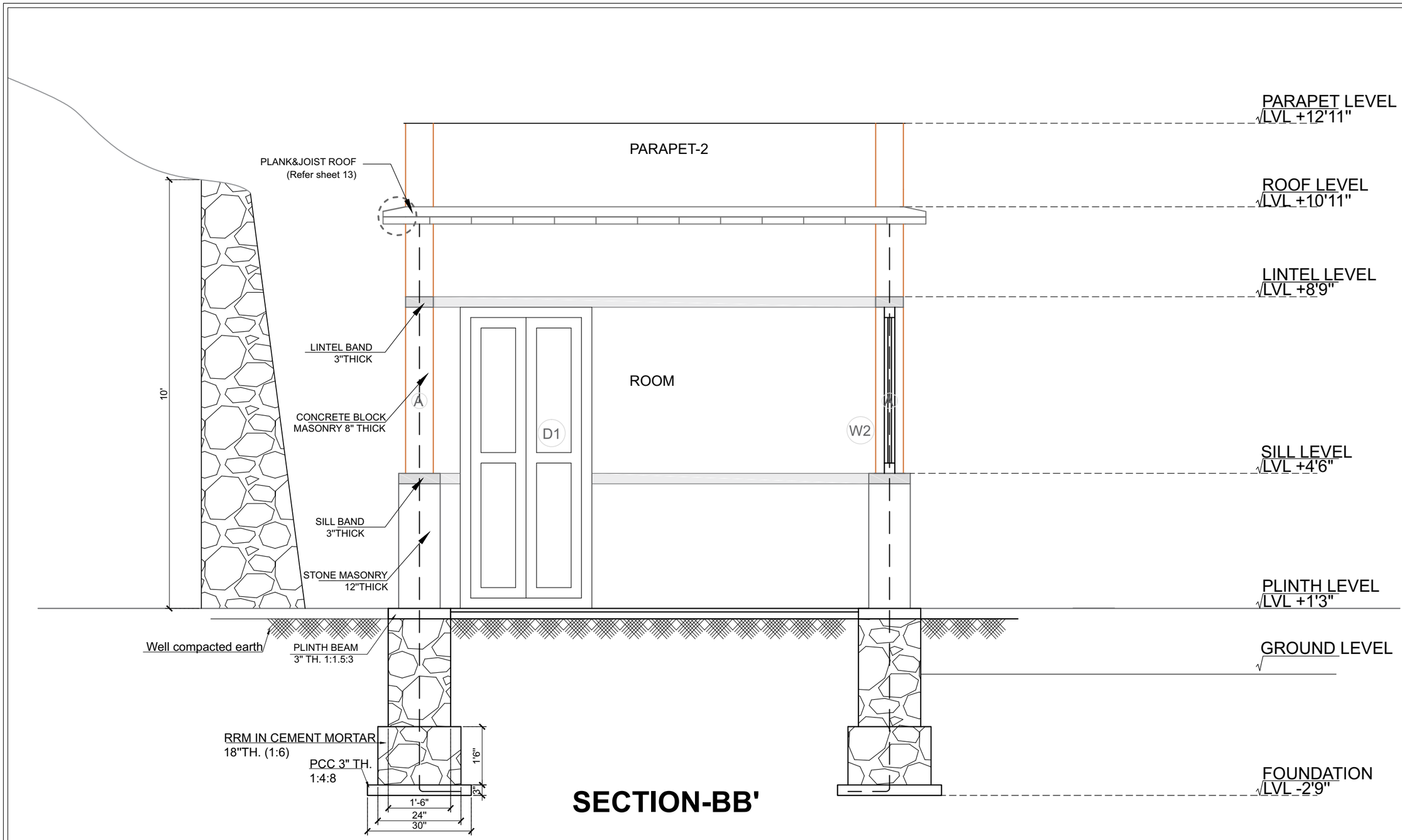

SECTION-BB'

SHEET-9

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SECTION- BB'

REV DATE-

05/08/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		12mm	From foundation till Lintel Band
WINDOW		12mm	From Sill band till Lintel Band
CORNERS& T-JUNCTIONS	Ⓐ	12mm	From foundation till Roof Band

PROJECT NAME-
DST TIME LEARN
DRAWING-
SECTION-BB'
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

Development alternatives,
B-32 Tara crescent marg
Qutumb institutional area
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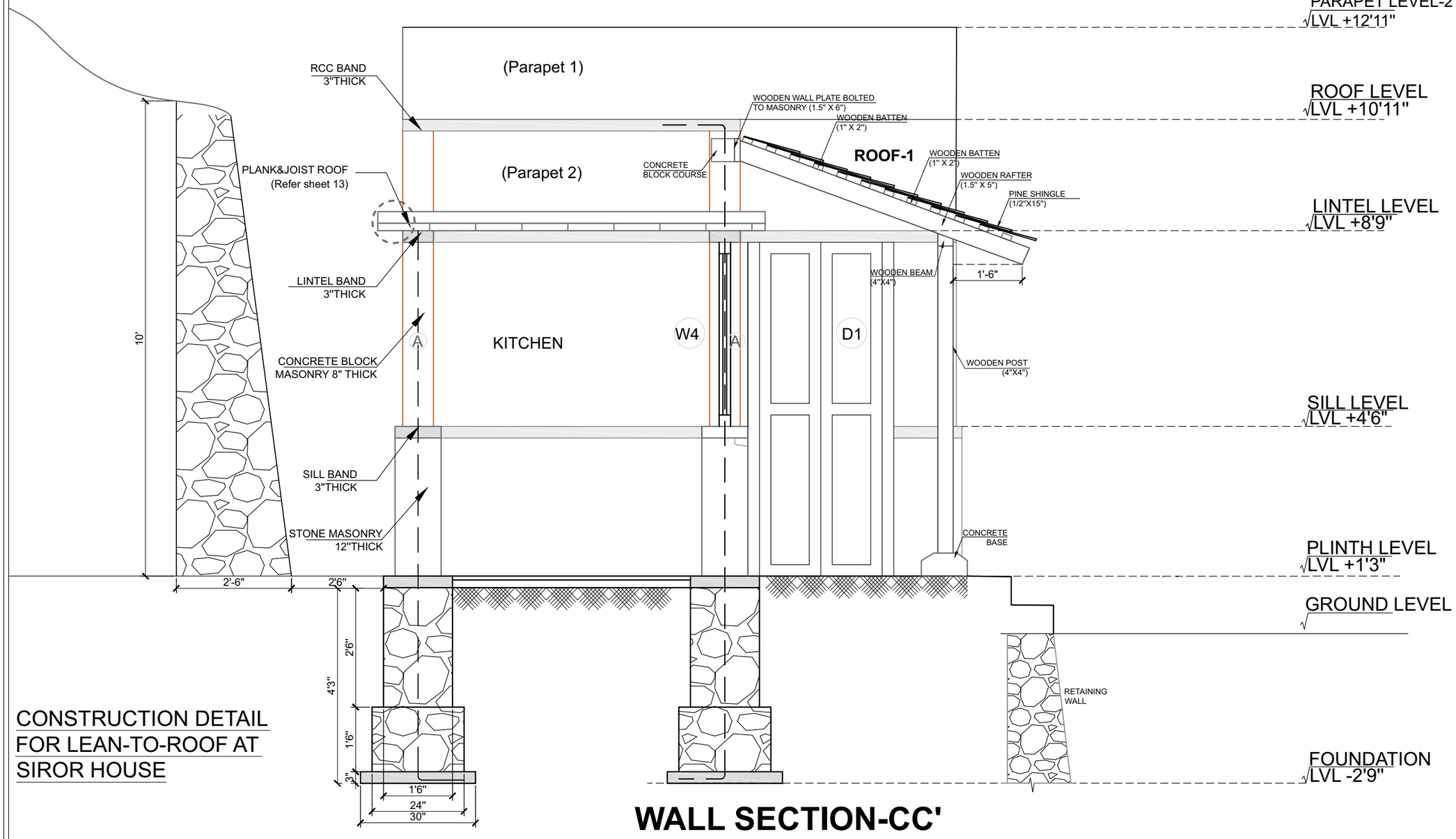

CONSTRUCTION DETAIL FOR LEAN-TO-ROOF AT SIROR HOUSE

WALL SECTION-CC'

SHEET-10

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
SECTION- CC'

REV DATE-

05/08/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR		12mm	From foundation till Lintel Band
WINDOW		12mm	From Sill band till Lintel Band
CORNERS& T-JUNCTIONS	Ⓐ	12mm	From foundation till Roof Band

PROJECT NAME-
DST TIME LEARN
DRAWING-
WALL SECTION-CC'

SCALE-1:75

ARCHITECT-

DEALT-
DATE-

N

Development alternatives,
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INDIA

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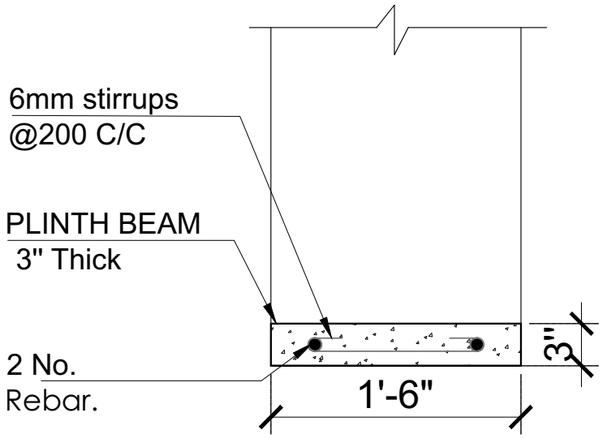
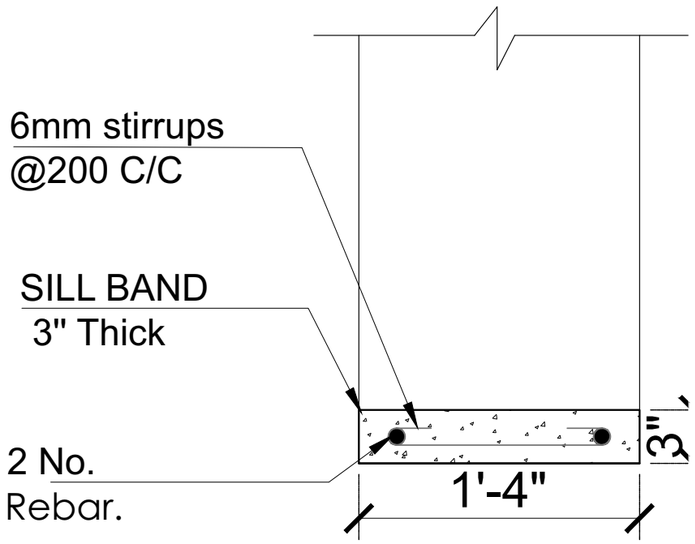
DETAIL -A



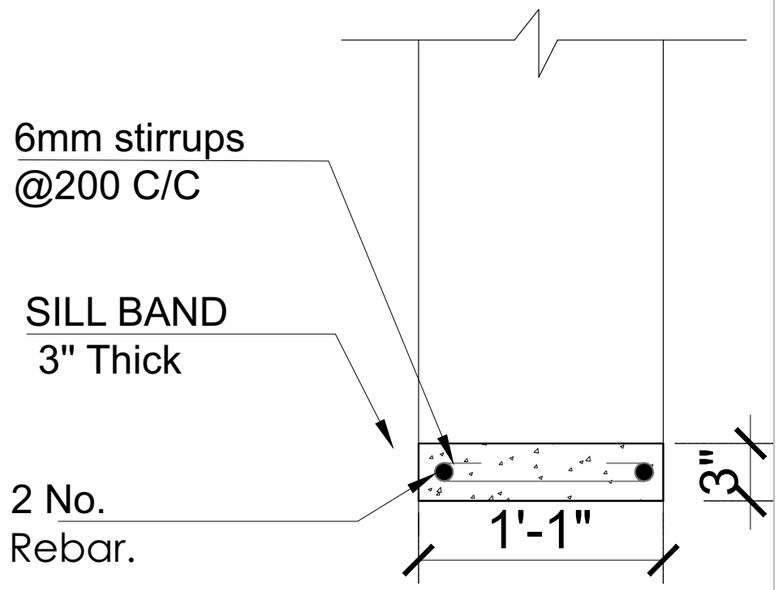
PLINTH BEAM

DETAIL -B



SILL BAND

DETAIL- C



LINTEL BAND

CONSTRUCTION DETAILS- PLINTH, SILL AND LINTEL BAND

SHEET-12

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONSTRUCTION DETAILS-WALL BANDS

REV DATE-
05/08/2020

TABLE:
VERTICAL REINFORCEMENT DETAILS

DOOR	10mm	From foundation PCC to Lintel Band
WINDOW	10mm	From Sill band to Lintel Band
CORNERS& T-JUNCTIONS	10mm	From foundation PCC to Roof Band
	12mm	From foundation PCC to Roof Band

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONSTRUCTION DETAILS
SCALE-1:75
ARCHITECT-
DEALT-
DATE-
N

Development alternatives,
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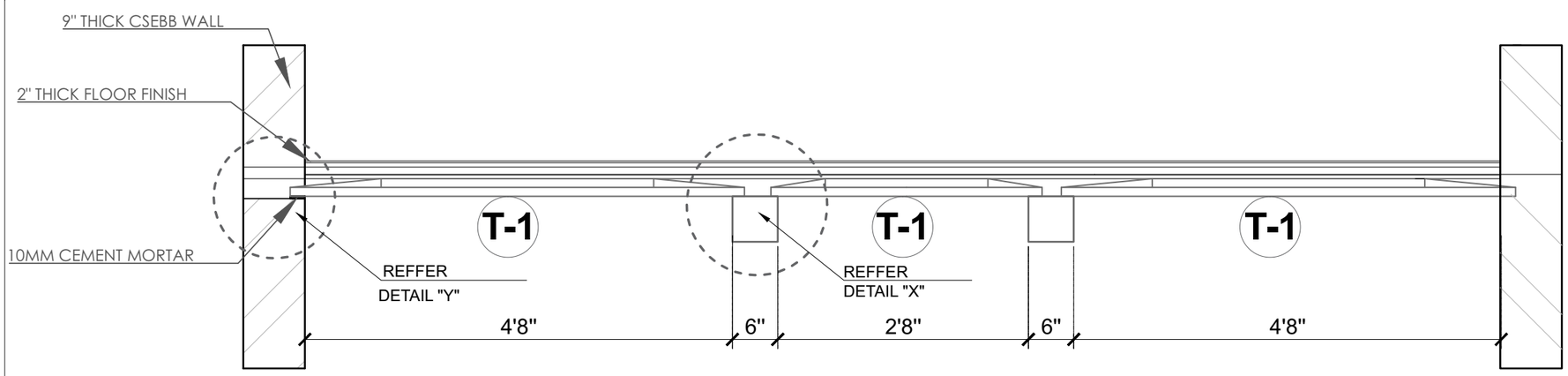
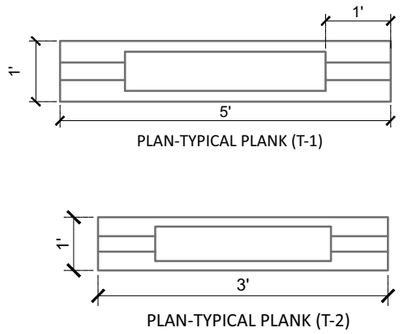
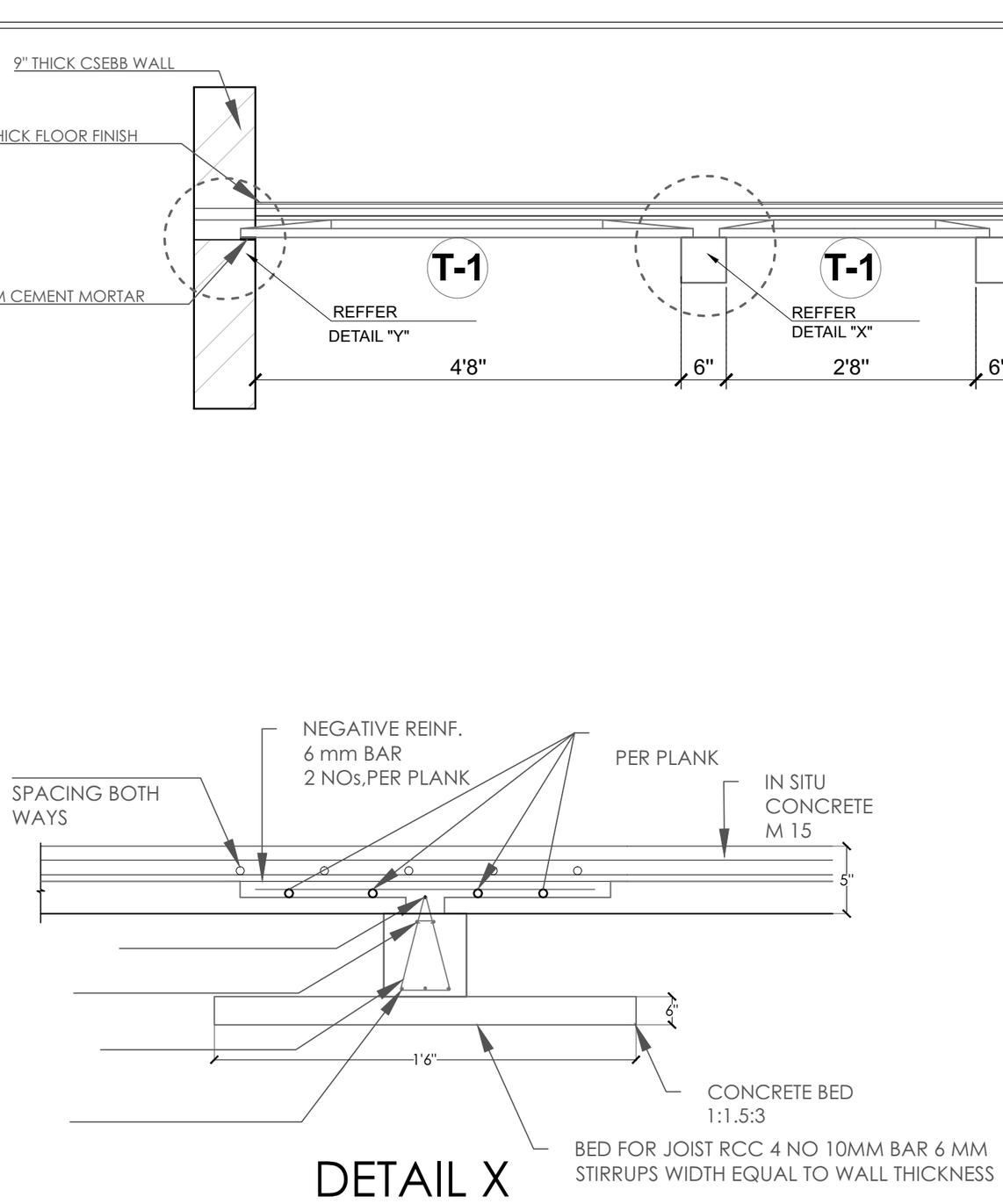
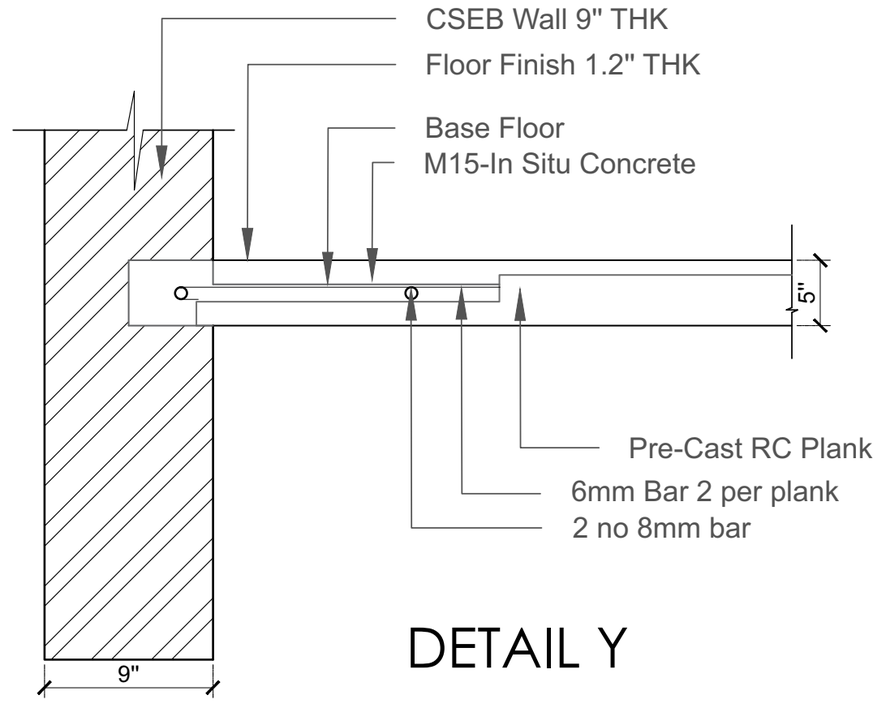






DETAIL X



DETAIL Y

SHEET-13

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONSTRUCTION DETAILS-Plank&Joist Roof

REV DATE-
23/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONSTRUCTION DETAILS
SCALE-1:75
ARCHITECT-
DEALT-
DATE-

N

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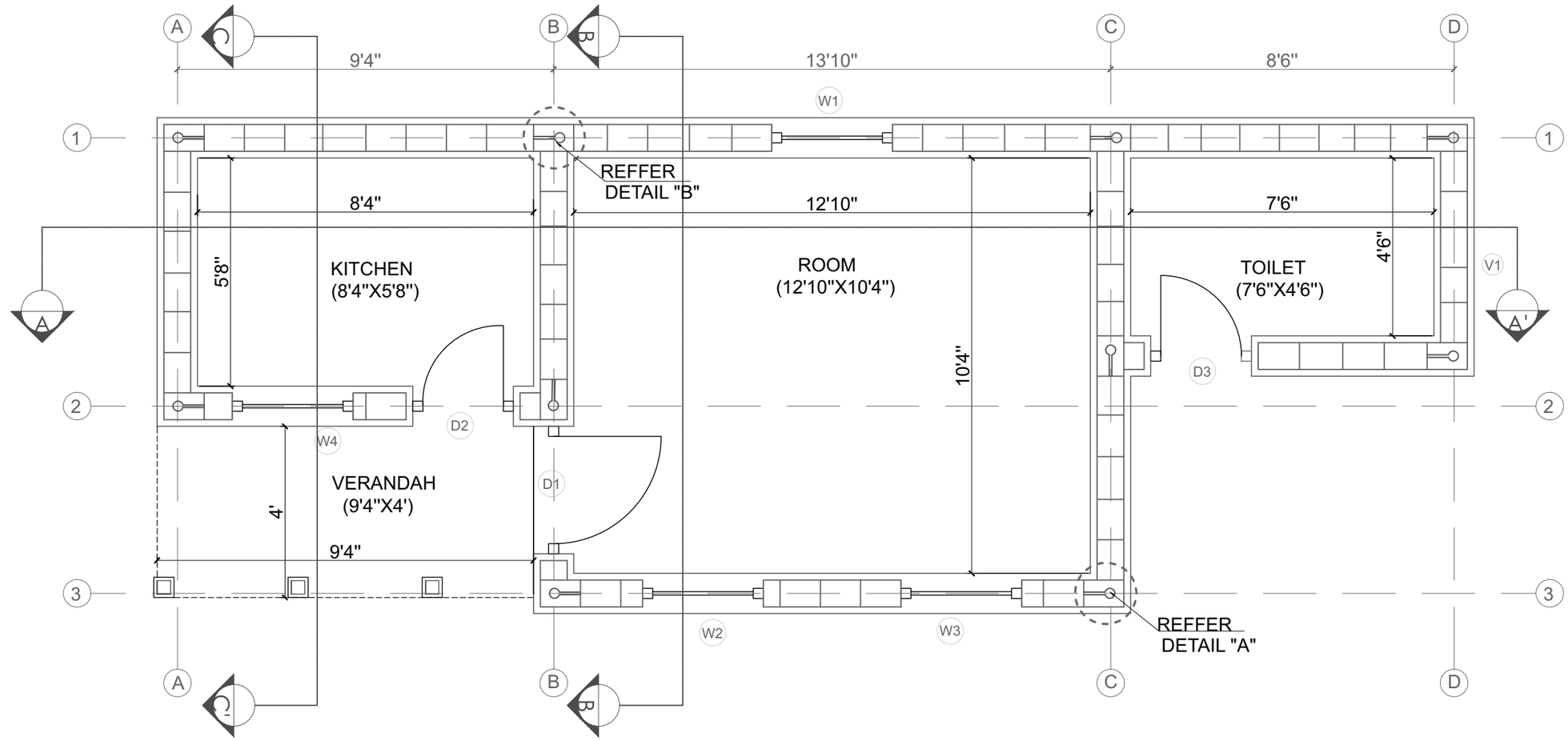
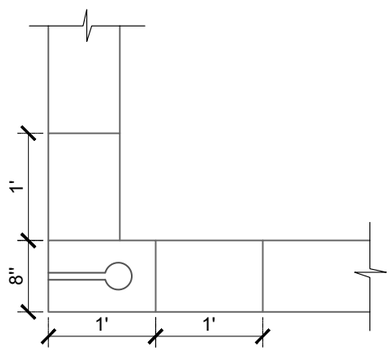
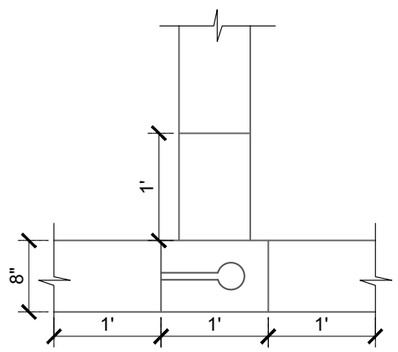
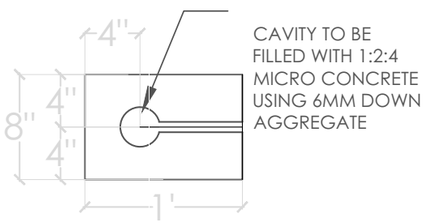




DETAIL A-Course 2,4,6



DETAIL B-Course 2,4,6



DETAIL A

COURSE PLAN- CONCRETE BLOCK

SHEET-15

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONCRETE BLOCK
COURSE LAYOUT-Even

REV DATE-
23/06/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONCRETE BLOCK
COURSE LAYOUT-EVEN
SCALE-1:75

ARCHITECT-

DATE-

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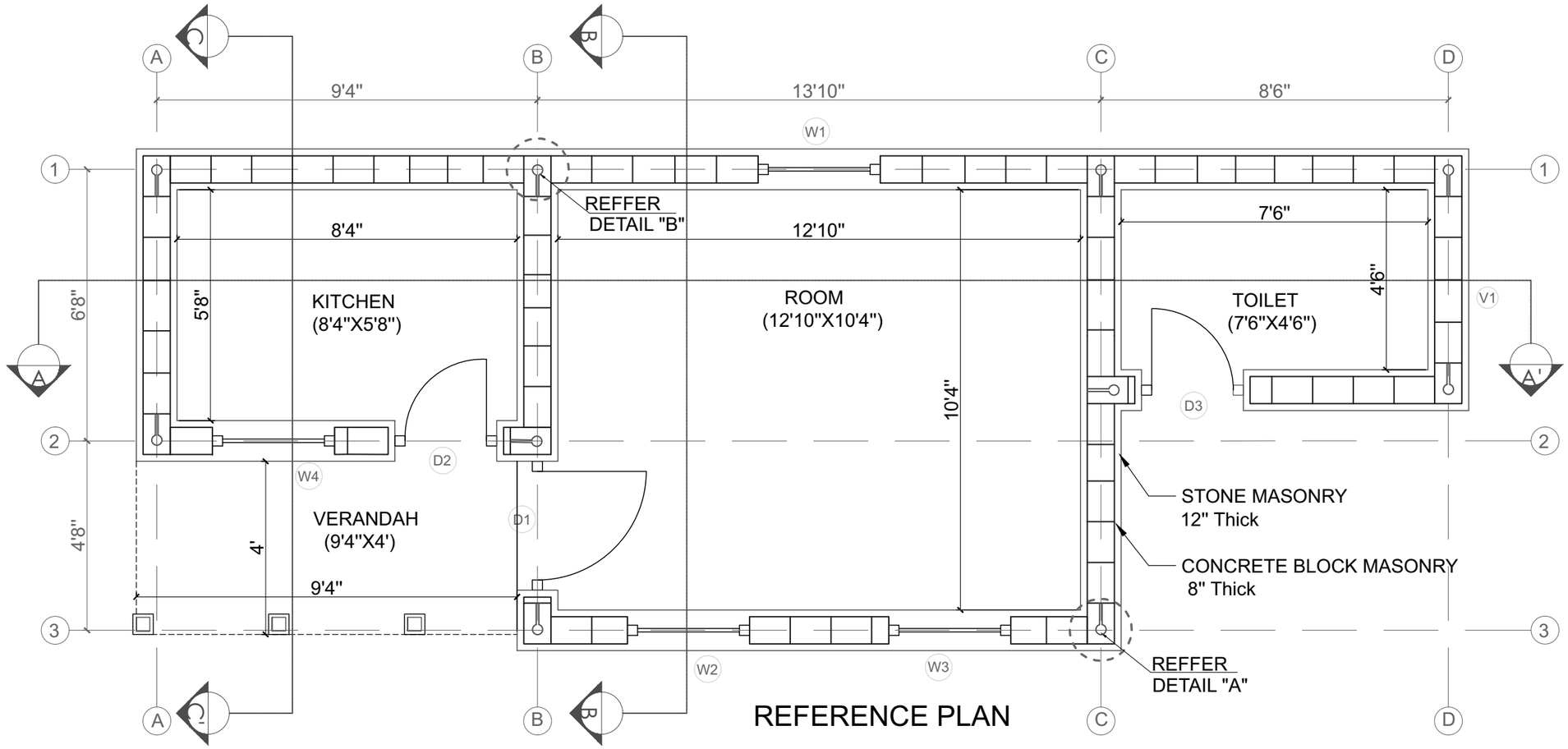
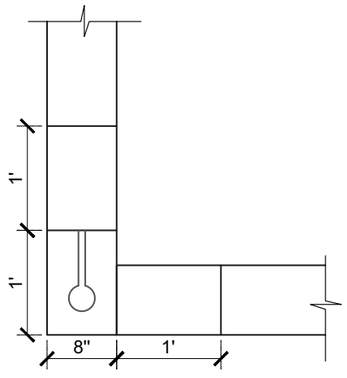
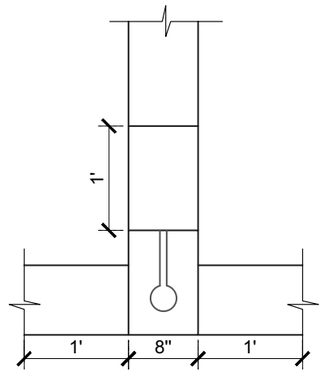


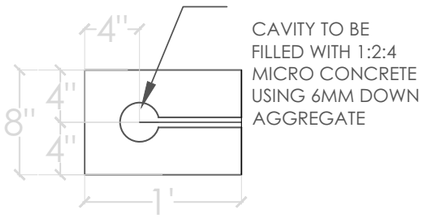
REFERENCE PLAN



DETAIL A-Course 1,3,5



DETAIL B-Course 1,3,5



DETAIL A

SHEET-14

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
CONCRETE BLOCK
COURSE LAYOUT-Odd

REV DATE-
05/08/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
CONCRETE BLOCK
COURSE LAYOUT-ODD
SCALE-1:75

ARCHITECT-

DATE-

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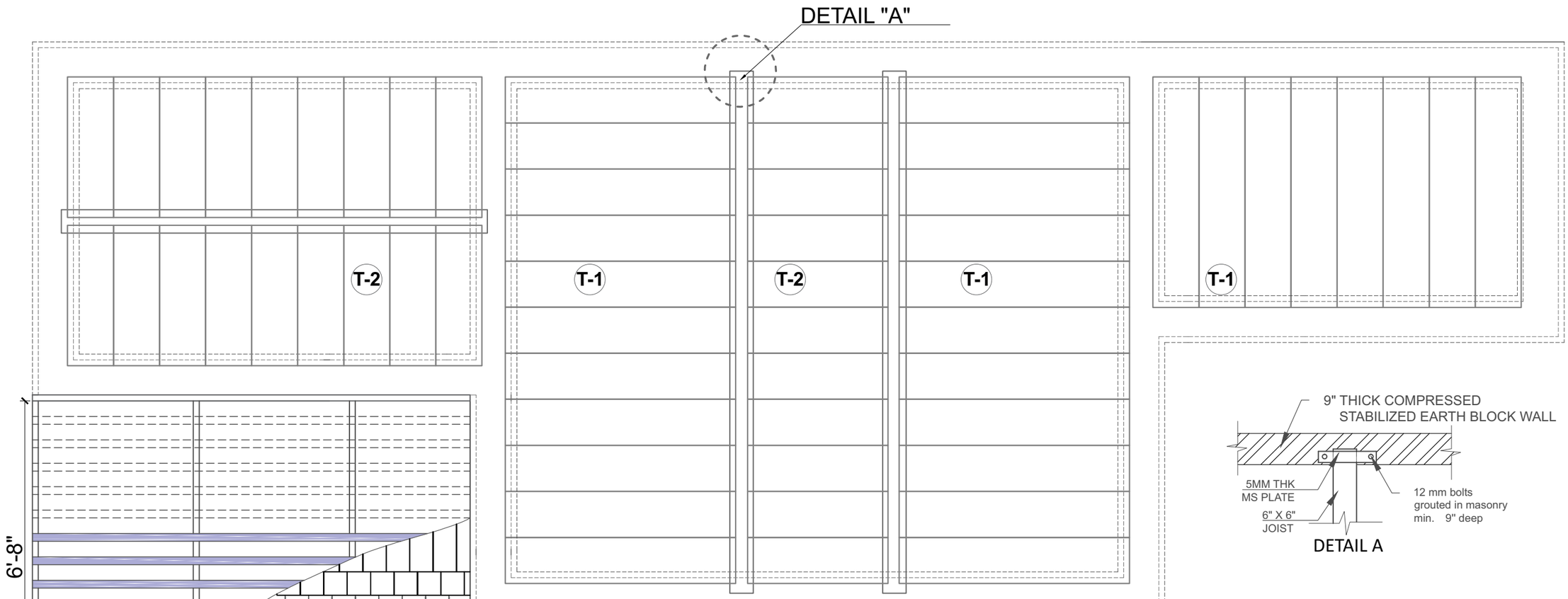

Roof Plan For Lean To Roof and Plank&Joist Roof

DETAIL A

SHEET-17

NOTE:
1-TO RETAIN AND CONSERVE ALL THE TREES ON SITE
2-ALL MEASUREMENTS IN FEET AND INCHES
3-ALL LEVEL AT FINISH FLOOR LEVEL UNLESS OTHERWISE MENTIONED
4-ANY DESCREPENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AN ARCHITECT.

DWG-
ROOF PLAN-Pine Shingle and Plank &Joist

REV DATE-

05/08/2020

PROJECT NAME-
DST TIME LEARN
DRAWING-
ROOF PLAN
Building-3BSCALE-1:75

ARCHITECT-
DEALT-

DATE-07/04/2020

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Specifications and Bill of Quantities

S. No.	ITEM	QTY	UNIT
A	**FOUNDATION**		
A.1	**EXCAVATION**		
A.1.1	Total Earth work inl excavation for trench (2.5' wide and 2.9' deep) in room, kitchen and toilet and (2' wide and 1' deep in verandah)	680.40	cuft
A.2	**PCC BED AT TRENCH**		
A.2.1	Total P.C.C in foundation 3" thick and 2.5' wide with 1:4:8 running over the excavation in room, kitchen and toilet.	50.40	cuft
A.3	**VERTICAL REINFORCEMENTS**		
A.3.1	Laying of vertical reinforcement (6, 12mm bars) in Room	87.00	ft
A.3.2	Laying of vertical reinforcement (6, 12mm bars) in Kitchen and Toilet	50.00	ft
A.3.3	Laying vertical reinforcements (12, 12mm bars) from sill level to lintel level	66.00	ft
A.4	**RRM IN FOUNDATION**		
A.4.1	Total RRM in foundation in room, kitche and toilet, Step -1 - 1:6 mortar (2' wide and 1'6" deep). 1:6 mortar	302.40	cuft
A.4.2	Total RRM in foundation in room, kitchen and toilet, Step -2 - 1:6 mortar (1.5' wide and 2' deep). 1.6 mortar	302.40	cuft
A.5	**PLINTH BAND**		
A.5.1	Plinth band horizontal reinforcement (2, 12mm bars)	197.80	ft
A.5.2	Stirups tie for horizontal reinforcement @200mm spacing, 6mm bars	119.40	ft
A.5.3	Plinth band in concrete 1:1.5:3 ratio - 3" deep and 2' wide in room, kitchen and toilet	49.45	cuft
B	**SUPER STRUCTURE- GROUND FLOOR**		
B.1	**RANDOM RUBBLE STONE MASONARY**		
B.1.1	Total RRM till sill level 1:6 mortar (1.5' wide and 2.5' deep)	429.30	cuft
B.2	**SILL BAND**		
B.2.1	Sill band horizontal reinforcement (2, 12mm bars)	197.80	ft
B.2.2	Stirups tie for horizontal reinforcement @200mm spacing, 8mm bars	119.40	ft
B.2.3	Sill band in concrete 1:1.5:3 ratio - 3" deep and 1.5' wide in room, kitchen and toilet	37.09	cuft
B.3	**DOOR WINDOW FRAMES**		
B.3.1	Installation of precast RCC door frames in room, kitchen and toilet (Total 3 nos. doors, one in each)	51.30	ft
B.3.2	Installation of precast RCC window frames in room, kitchen and toilet (Total 4 nos. windows, two in kitchen and two in room)	58.00	ft
B.4	**INSTALLATION OF DOORS AND WINDOWS**		
B.4.1	Installation of three doors, one each in room, kitchen and toilet. Two doors size - 2.5 ft x 7.2 ft and one door size 3.1 ft x 7.2 ft	3.00	Nos.
B.4.2	Installation of four windows, two in room and two in kitchen and toilet, window sizes - 3ft x 4 ft (3 Nos.) , 4 ft x 4 ft (1 Nos.)	4.00	Nos.
B.4.3	Installation of MS ventilator in toilet, size - 1.5 ft x 1.5 ft	1.00	Nos.
B.5	**CONCRETE BLOCK MASONRY**		
B.5.1	Solid concrete block	915.00	Nos.
B.5.2	Hollow concrete block	135.00	Nos.
B.5.3	Hollow concrete block	180.00	Nos.
B.5.4	Concrete block Masonry in mortar 1:6 ratio	314.71	cuft

S. No.	ITEM	QTY	UNIT
B.6	**LINTEL BAND**		
B.6.1	Lintel band horizontal reinforcement (2, 12mm bars)	98.90	ft
B.6.2	Stirups tie for horizontal reinforcement @200mm spacing, 6mm bars	119.40	ft
B.6.3	Lintel band in concrete 1:1.5:3 ratio - 3" deep and 9" wide in room, kitchen and toilet	18.54	cuft
B.7	**ROOF BAND**		
B.7.1	Roof band horizontal reinforcement (2, 12mm bars)	104.40	ft
B.7.2	Stirups tie for horizontal reinforcement @200mm spacing, 8mm bars	63.45	ft
B.7.3	Roof band in concrete 1:1.5:3 ratio - 3" deep and 9" wide in room	9.79	cuft
C	**ROOF- PLANK AND JOIST**		
C.1.1	Installation of planks at roof of Room	30.00	Nos.
C.1.2	Installation of planks at roof of kitchen and toilet	29.00	Nos.
C.1.3	Installation of joist at roof of Room, kitchen and toilet, 3 nos.	32.50	cuft
C.1.4	Laying of 6mm horizontal steel bars with 6mm stirrups in 4" thick cement concrete for screeding over plank and joist roof in 1:1.5:3 ratio	59.15	ft
D	**ROOF- TIMBER TRUSS**		
D.1.1	Laying of Chir Pine Shingles over timber understructure	250.00	Nos.
D.1.2	Installation of Purlin, battons, wooden beam, wooden post and wooden plate for roofing over verandah	9.00	cuft
E	**FINISHING**		
E.1.1	IPS Flooring in room, verandah and toilet		sqft
E.1.2	Mud plastering on interiors of room and toilet from sill level to roof level		sq.ft
E.1.3	Cement plastering in interiors of room and toilet till sill level		sq.ft
E.1.4	Cement plastering on plank and joist roof in room, toilet and verandah		sq.ft
E.1.5	Paint work over plastering till sill level and roof of room, toilet and verandah		sq.ft
F	**PLUMBING**		
F.1.1	Sanitary fittings (WC, Washbasin, Taps)		
F.1.2	Plumbing connection from toilet to soak pit with pipes and fitting complete		
F.1.3	Water pipeline connection from JAL nigam main pipeline to kitchen and toilet		
G	**ELECTRICAL**		
G.1.1	1 tubelight in room, 1 bulb in toilet and 2 bulb in verandah fitting with wiring and switches complete		

Structural validation of community building at Kamad village, Uttarkashi-Uttarakhand

under DST-TIME LEARN Programme

Process for structural validation

The community building in Kamad village has been constructed as a model for disaster resistant construction in the mountainous district of Uttarkashi. As such, structural safety of the given building technologies was essential pre-requisite for architectural design. The design of the building was based on structural guidelines which have been developed for earthquake resistant construction in the country, with focus on non-engineered construction in rural areas, such as the Kamad village in Uttarkashi.

Following documents were consulted at the design stage for structural integrity of building –

- Guidelines for Earthquake resistant non-engineered construction – IAEE and NICEE (National Information Centre of Earthquake Engineering)
- Manual on Hazard Resistant Construction in India – developed under GOI-UNDP-DRM Programme

The draft designs prepared on the basis of above guidelines were submitted to NCPDP-CEDAP for Structural Validation of the design. The basis for validating the drawings are provisions of IS **4326: Design and construction of earthquake resistant buildings** and **IS 1 |** Page **13828: Improving Earthquake resistance of low strength masonry buildings-Guidelines.** As per IS 4326 this building being a community centre is considered as Category E building. Design aspects were identified based on the prescriptive recommendations of IS 13828 only that would induce major seismic vulnerabilities in the building. The design and construction details went through two stages of check and modifications to satisfy requirements for structural safety as specified by NDPDP-CEDAP.

Summary of design features for structural compliance with codal provisions for earthquake resistant construction

Structural requirement as specified by NCPDP-CEDAP	Compliance in building design and detail – based on recommendations of NCPDP-CEDAP
Building Shape and Size	
Vertical regularity In case of buildings with a floor above, there must be no vertical irregularity due to the respective designs of both floors- this could be a small room on the upper floor which causes asymmetry in the structure. This will result in torsion under seismic conditions, which is not permitted in Category E buildings, unless a static analysis for seismic forces is carried out.	**Structural separation of the ground floor and the double storeyed section of the community building. This satisfies requirements of both vertical and plan irregularity.** Functional requirements dictated accessibility of terrace area and connection between the two sections of the building. This was achieved by a connecting corridor which serves as landing for staircase. The corridor is connected with the ground floor section of the building and is simply supported on brackets provided in the double-storied section. This will ensure that torsion caused by asymmetric
Plan regularity	

In case of plan irregularity, such as in the case of L-shape plan, the projecting section should not be more than 15% of the dimension of the structure.	constraint to lateral forces will not arise in case of earthquake.
Foundation	
Provision of strip footing under all load bearing walls and exclusion of any eccentric foundation Mortar ratio – cement: sand 1:6	**Strip footing has been provided under all load bearing walls.** The depth of the footing is till a strata with sufficient bearing capacity – this is as per existing conditions of rocky strata at shallow depths which is found throughout the region. A 150mm deep RCC beam is provided under the veranda columns and supported by 450mm thick stone masonry till 450mm depth
Veranda – For veranda with columns to support the overhead slab, the columns should be tied with a beam at the plinth level and adequately supported by masonry below	
Seismic bands	
Continuous RCC bands on all walls of building – both external as well as internal walls - at plinth, sill, lintel and roof level.	**Continuous RCC bands of 75mm thickness were provided in all walls of the building.** These are reinforced in accordance with guidelines for earthquake resistant construction.
Vertical Reinforcement	
Single rod vertical reinforcement should be provided at all corner, T-junctions and on both sides of all openings to impart ductility to the masonry walls – Single storey – 12mm bar Double storied – 16mm in ground floor and 12mm in upper floor The vertical reinforcement must extend from the foundation as continuous with adequate overlap	**All corners, T-junctions and sides of door-window openings are re-inforced with single bar, as specified.** All reinforcement, except for openings extends from foundation PCC to the roof band. Reinforcement for doors extends form plinth beam to lintel band and for windows, extends from sill band to lintel band. For SCEB wall, the proper masonry bond was followed for creating cavity in the wall for vertical reinforcement. For concrete blocks, a keyhole-type cavity of 120mm dia was introduced in the block to allow for vertical bar to be inserted.
Masonry	
All masonry should be constructed in 1:4 cement: sand mortar In case of seismic stresses, the partition walls should behave as shear walls. Pilasters in masonry should have thickness equal to masonry thickness In veranda, masonry columns should be reinforced.	Partition walls are 200mm thick. Masonry columns in the verandah are reinforced with 3 No, 8mm deformed bars with stirrups at 135 degrees. The gable area of the walls in case of sloping roof has been kept lightweight. Gable masonry has been replaced by timber truss and in-fill timber planks.

Gable should be kept lightweight and flexible to minimize seismic hazard	
Material regularity – Different masonry materials should not be combined at the same level for seismic considerations – they will behave differently, which will result in asymmetry and, hence torsion.	The building divides two different materials into two separate layers – RRM till sill and CSEB or concrete blocks above sill. Also, CSEB and concrete block masonry is physically separated to avoid joining two different materials at the same level.
Roof	
Plank and Joist roof slab The slab should be designed to behave as Rigid diaphragm, which is necessary for transferring shear forces to the shear walls. Bearing for RCC joists should extend to the full thickness of walls. The 7'6" long joist for the verandah will have a minimum bearing of 4" on masonry.	A screed concrete 40mm thick is provided over the planks with 6mm bars @ 6" spacing both ways. Triangular rings project out of joist for shear connection with the screed concrete. 100mm thick concrete bed, extending 150mm on both sides of joist has been provided for bearing the joists. MS angles 25x25mm project out of the bed concrete for additional anchorage of joists to the masonry through 12mm dia bolted connection.
Door window openings	
All openings should be at a distance of at least 450mm from the inside corner of rooms and must be at least 600mm apart The cumulative width of openings should not be more than 50% of the total length of the unsupported wall.	All openings are at least 450mm from inside corner of rooms. Cumulative width of all openings is more than 40% of the total wall length.

Further suggestions by NCPDP-CEDAP

- It is advisable to inform people about the seismic safety implications of the light weight flexible gable walls
- In drawings, the same information should not be repeated on different sheets
- In drawings, Cross references to specific details should be made.

Note: The above-mentioned information has been derived originally from the structural validation report approved by Rajendre Desai, NCPDP. Based on the review of the drawings and information provided by DA to NCPDP, the design is in compliance with the relevant building codes, and hence, could be considered Earthquake Resistant

About Development Alternatives Group

Development Alternatives (DA) is a premier social enterprise with a global presence in the fields of green economic development, social equity and environmental management. It is credited with numerous technology and delivery system innovations that help create sustainable livelihoods in the developing world. DA focuses on empowering communities through strengthening people's institutions and facilitating their access to basic needs; enabling economic opportunities through skill development for green jobs and enterprise creation; and promoting low carbon pathways for development through natural resource management models and clean technology solutions.

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