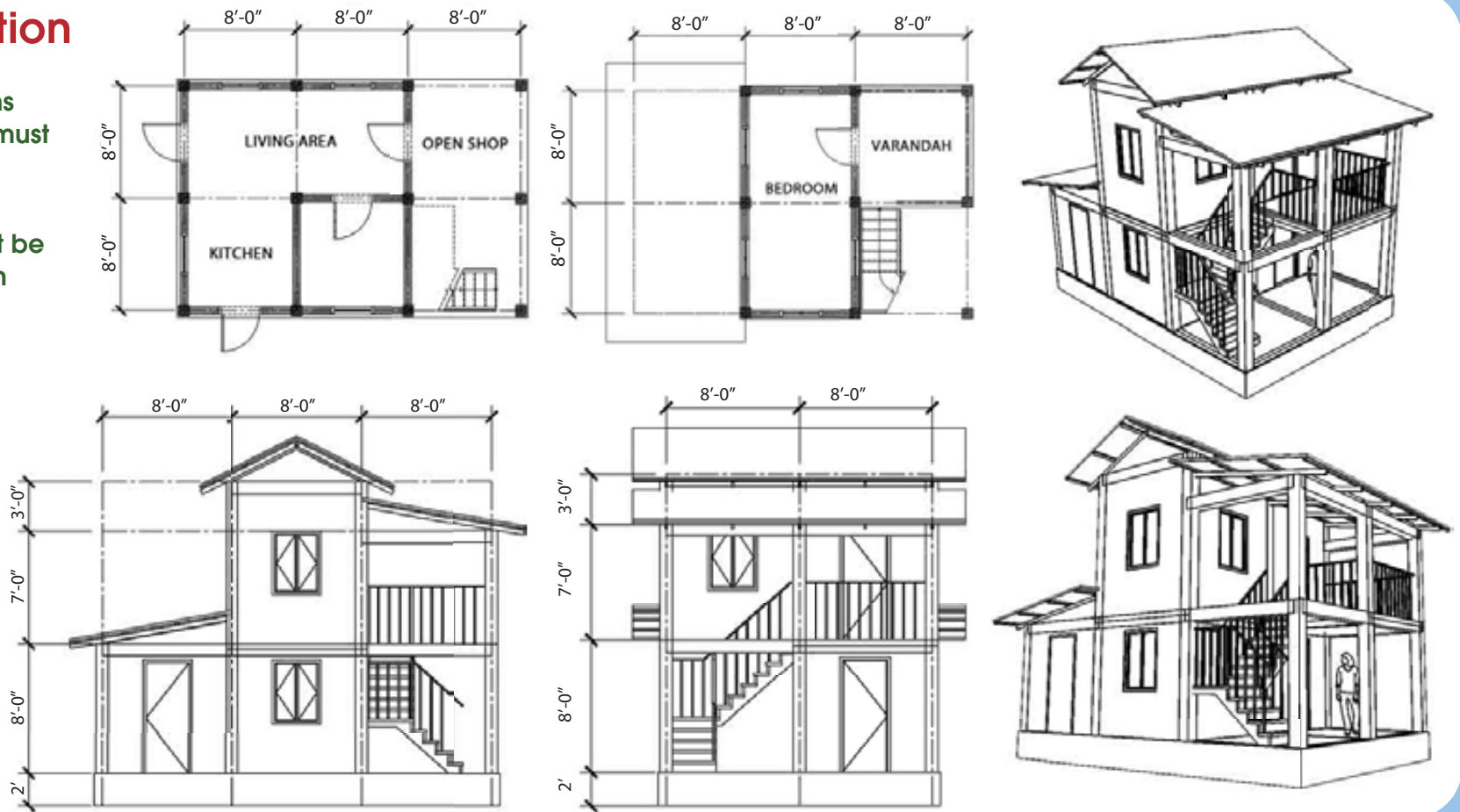


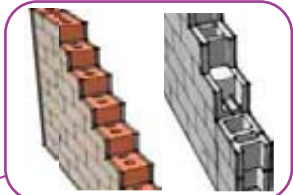
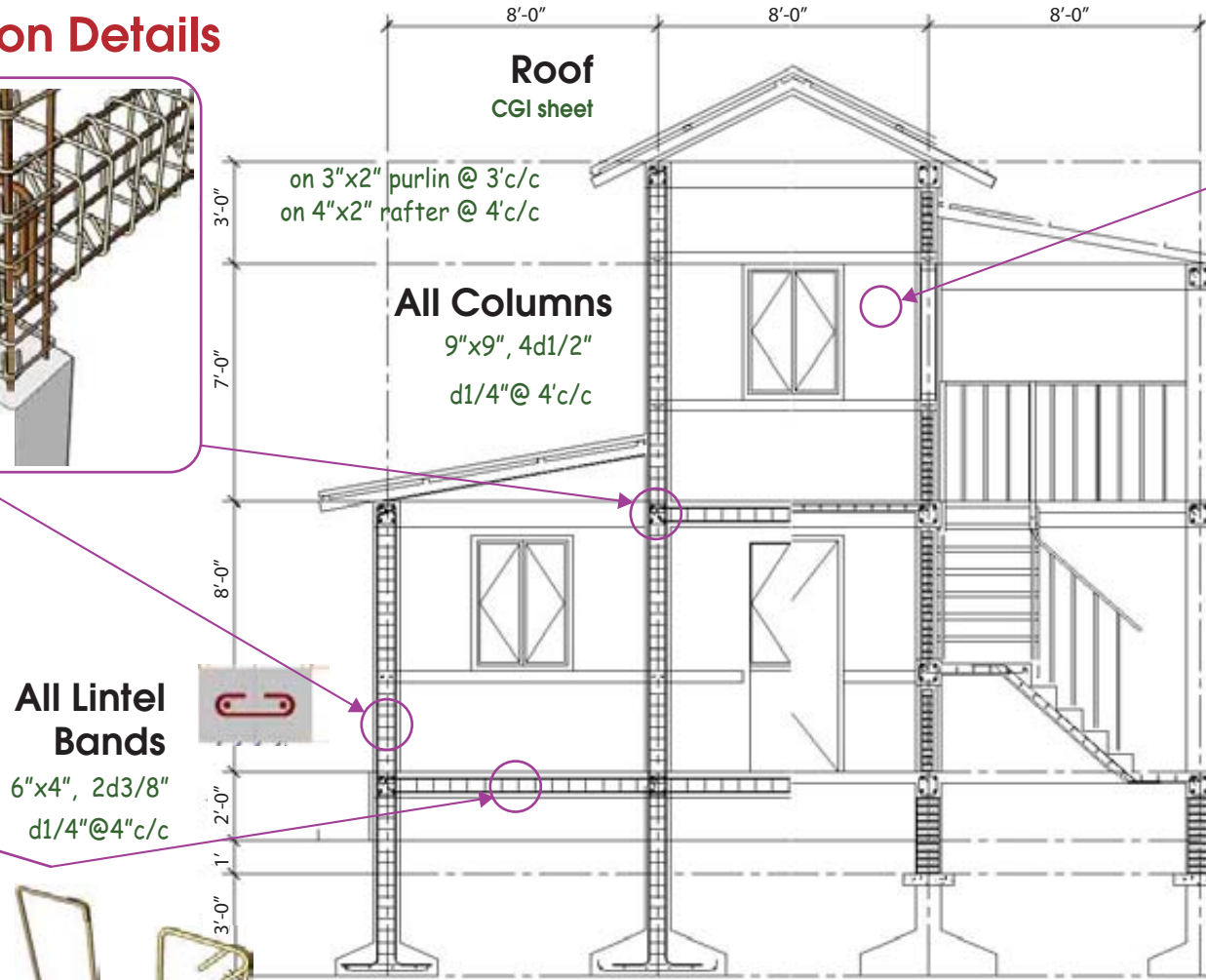
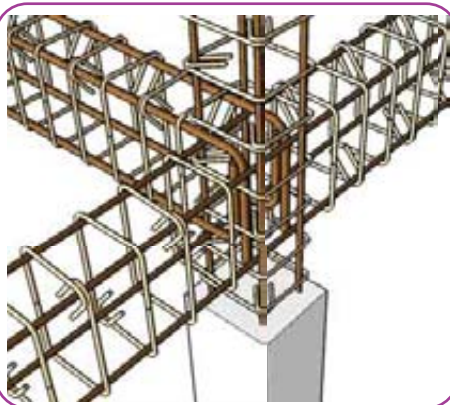
# BUILDING BACK SAFER - CONCRETE SHELTER

## Configuration

- Frame – beams and columns must be reinforced concrete
- Concrete must be reinforced with steel
- Proper connections are essential
- Main steel must be at least  $d1/2'$
- All columns must be tied
- Minimum column size shall be 9" x 9" at least



## Construction Details



### Brick

Brick must be at least 4" thick

### Slab

4" thick,  $D3/8''@6''c/c$   
Both ways, top & bot

### Stair

4" thick,  $D3/8''@6''c/c$   
Both ways, top & bot

### Retaining Wall

At least 8" thick  
On 18"x4" 1:3:6 concrete

### Note

- Bend stirrups 135 degrees
- Lapping must 40d minimum
- Do not use thin blocks

### All Beams

9"x9", 2d1/2" top & bot  
d1/4" @ 4" c/c

### All Lintel Bands

6"x4", 2d3/8"  
d1/4" @ 4" c/c

- Do not use 90° bend
- Use 135° bend

### Footing 3' x 3'

3'x3'x6"+6"  
d3/8" @ 8"#

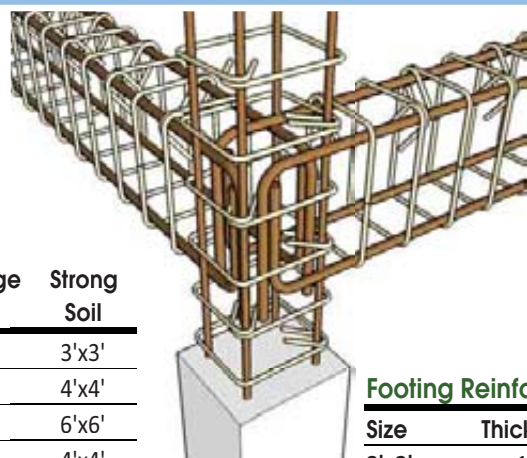
### Footing 4' x 4'

4'x4'x8"+8"  
d3/8" @ 8"#

## Member Sizes

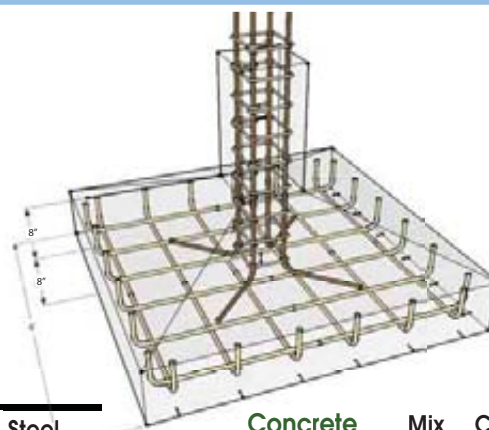
Footing Size	Soft Soil		Average Soil		Strong Soil	
	Span	Soil	Average Soil	Strong Soil	Span	Soil
1	8'	6'x6'	4'x4'	3'x3'		
	10'	8'x8'	6'x6'	4'x4'		
	12'	9'x9'	6'x6'	6'x6'		
2	8'	8'x8'	6'x6'	4'x4'		
	10'	9'x9'	8'x8'	6'x6'		
	12'	10'x10'	9'x9'	6'x6'		

Footing depth = max. footing size



### Footing Reinforcement

Size	Thickness	Steel
3'x3'	12"	d3/8" @ 8"
4'x4'	16"	d3/8" @ 8"
6'x6'	24"	d1/2" @ 8"
8'x8'	32"	d5/8" @ 8"



### Beam

Span	Size	Main	Stirrup
8'	9"x9"	2d1/2" T&B	d1/4" @ 4"
10'	9"x12"	3d1/2" T&B	d1/4" @ 4"
12'	9"x12"	3d5/8" T&B	d1/4" @ 6"

### Column

Span	Size	Main	Stirrup
8'	9"x9"	4d1/2"	d1/4" @ 4"
10'	10"x10"	8d1/2"	d1/4" @ 4"
12'	12"x12"	8d5/8"	d1/4" @ 6"

Concrete	Mix	Cement	Sand	Stone	Water
with steel	1:2:4	△	△△	△△△△	▽
without steel	1:3:6	△	△△△	△△△△△△	▽
Mortar	1:4	△	△△△△		▽

Note: Ratio of water to cement is always 0.75 by volume