

01

A
CONSTRUCTION
MANUAL ON HOW
TO BUILD
A **ROWLOCK** BOND
HOUSE

RowLock Bond
DESIGN PRINCIPLES

THE ROW LOCK BOND SYSTEM

1 The Row Lock Bond Brick

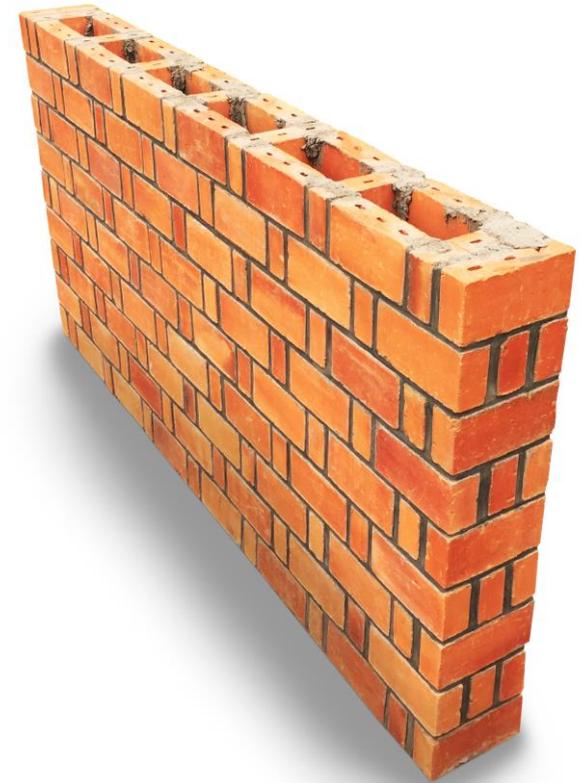
2 The Row Lock Bond wall

3 Load bearing wall and anti-seismic reinforcement



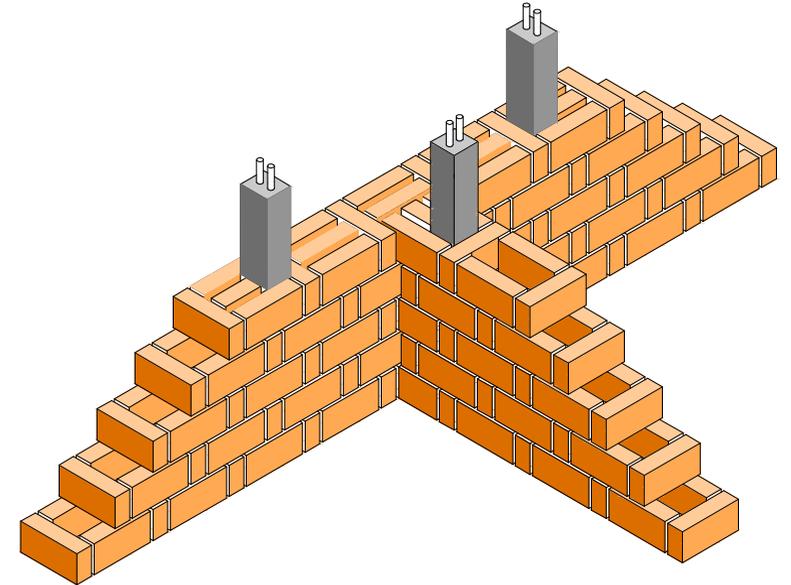
THE ROW LOCK BOND SYSTEM

- 1 The Row Lock Bond Brick
- 2 The Row Lock Bond wall
- 3 Load bearing wall and anti-seismic reinforcement



THE ROW LOCK BOND SYSTEM

- 1 The Row Lock Bond Brick
- 2 The Row Lock Bond wall
- 3 Load bearing wall and anti-seismic reinforcement



THE **ROW LOCK BOND**
Historical background



Henlow, UK
1801

THE **ROW LOCK BOND**
Historical background

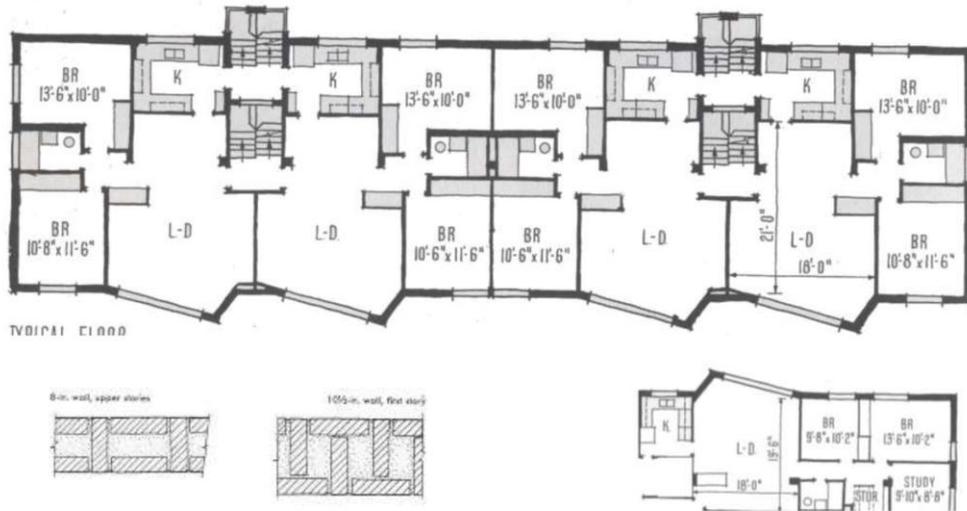
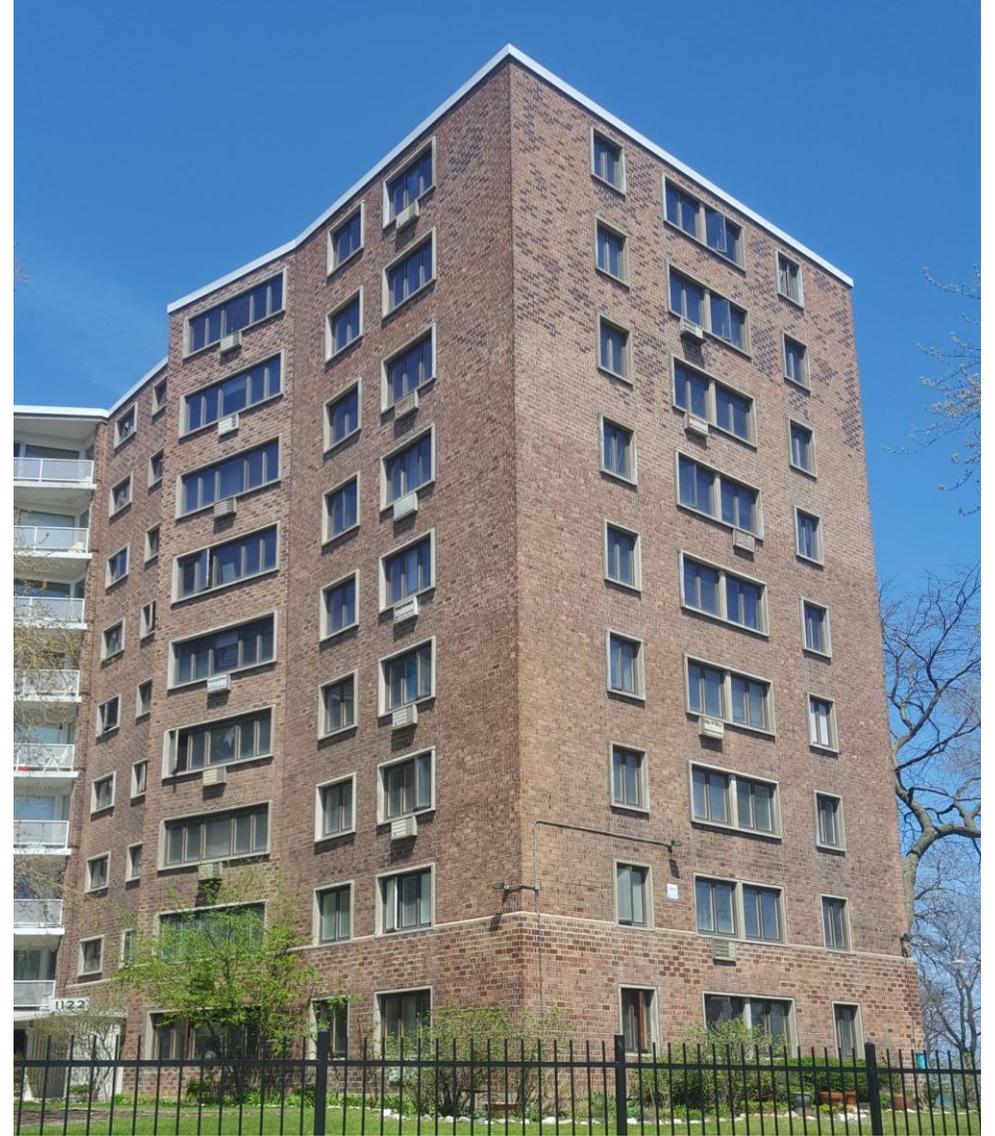


Ontario,
CANADA
1856

THE ROW LOCK BOND

Historical background

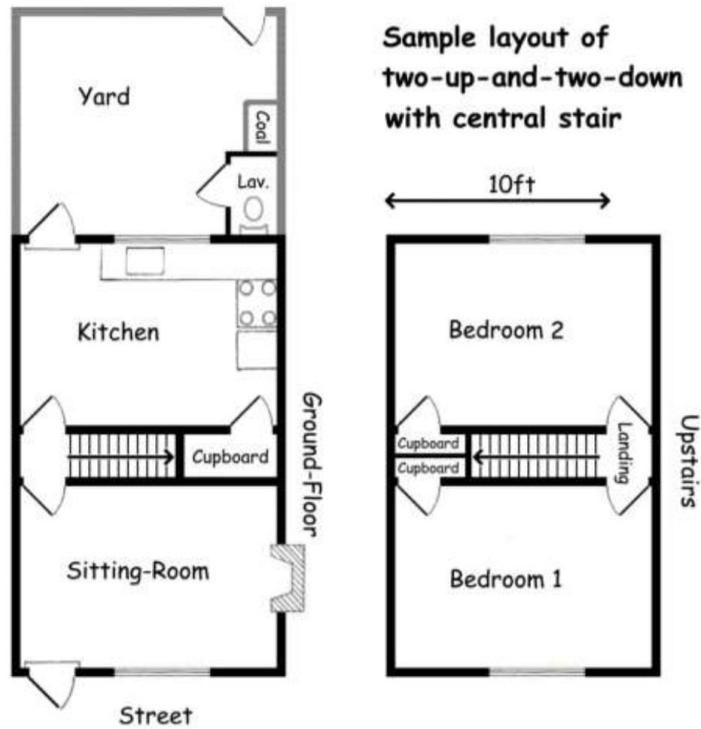
Holsman, Holsman, Klekamp, Taylor,
Chicago, USA
1949



THE ROW LOCK BOND

Historical background

Skat, Katmandu, NEPAL
2011



THE **ROW LOCK BOND**
Historical background

Skat, Rusizi, Rwanda
2016



THE **ROW LOCK BOND**
Historical background

Verduzco Villegas, San Luis Río Colorado, MEXICO

2016



THE **ROW LOCK BOND**

Historical background



ActiveSocialArchitecture
Kibungo, Rwanda, **2022**



THE ROW LOCK BOND

cost advantages

Walling material cost:

30-50% lower

Cement mortar*:

Reduced by 70%

*Cement for mortar and blocks is mostly imported, due to the limited production capacities of the local cement factory and the limits of locally available raw material (lime)

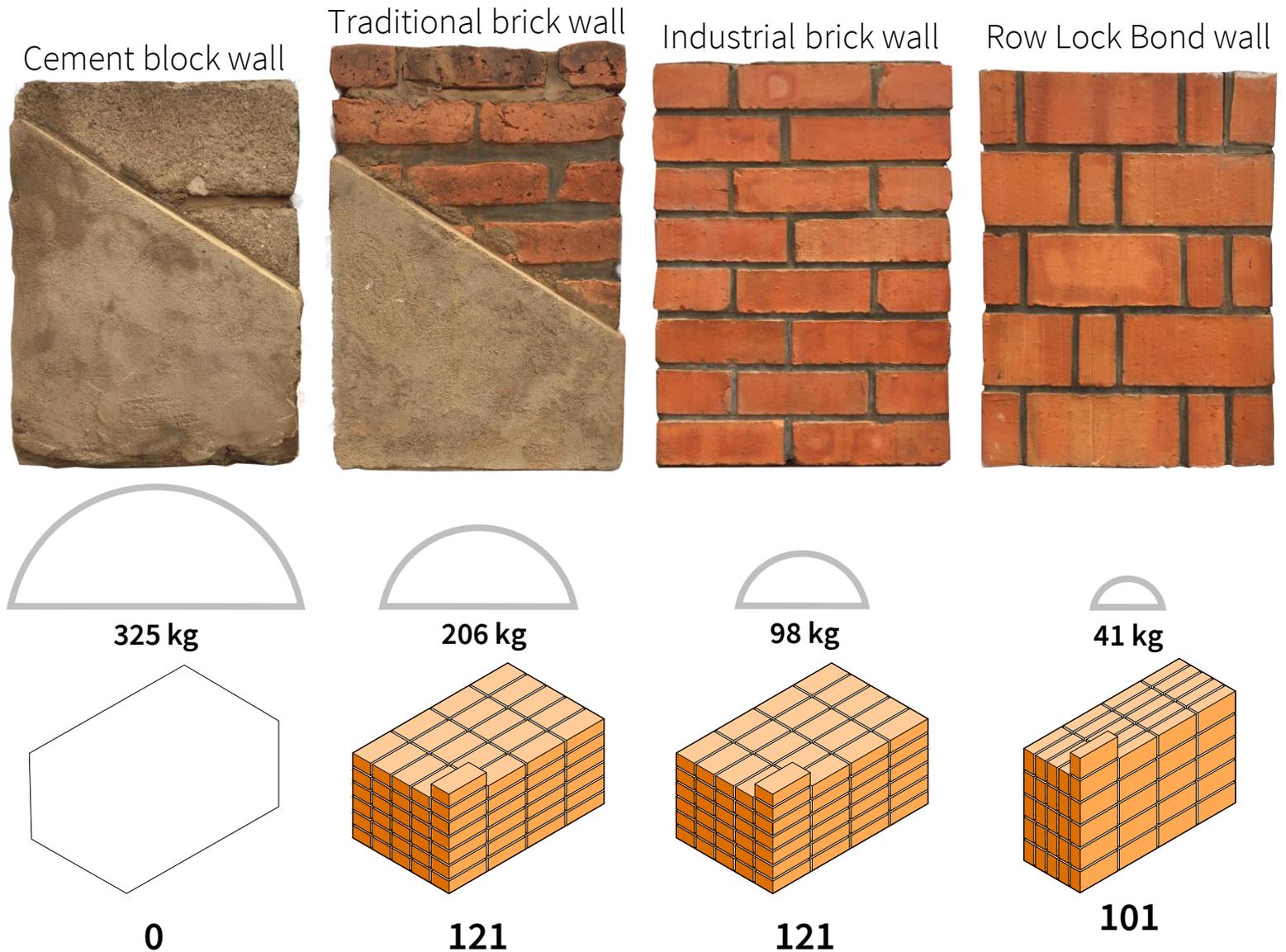
Fuel Consumption*:

Reduced by >75%

*for the brick firing alone, not yet taking into account the cement related reduction of embodied energy and CO2 emissions

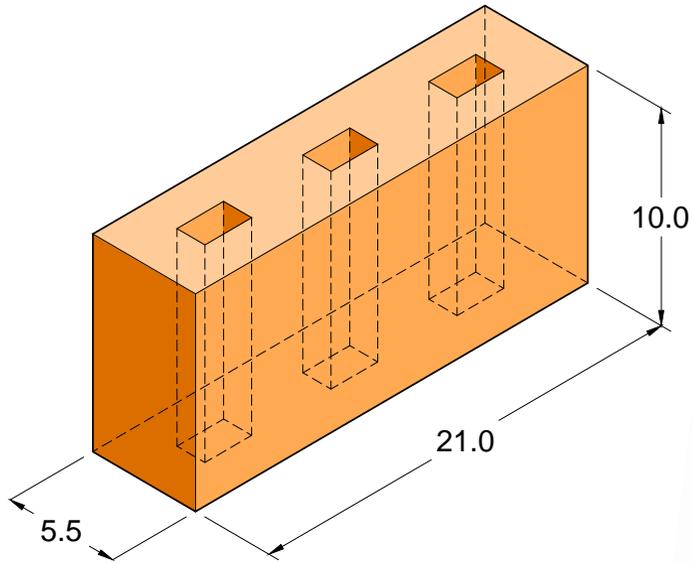
Rwanda made bricks:

80% more local income



THE ROW LOCK BRICK

MAIN FEATURES



**PRODUCED INDUSTRIALLY
or SEMI-INDUSTRIALLY**

EXTRUDED

PRECISE
DIMENSIONS

PERFORATED

EVENLY FIRED

**RELIABLE
PERFORMANCE**

Smart Brick Houses
require up to
6-8 times less energy
for brick firing than a
traditional brick wall

10 Mpa

minimum
COMPRESSIVE
STRENGTH

Traditional brick
3/5 MPa

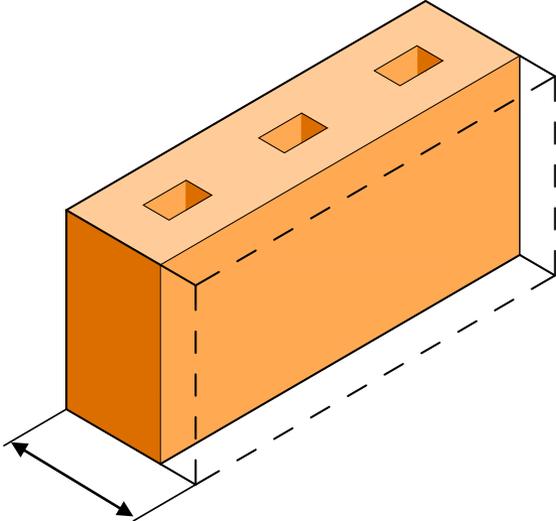
THE ROW LOCK BRICK

PRODUCTION FEATURES

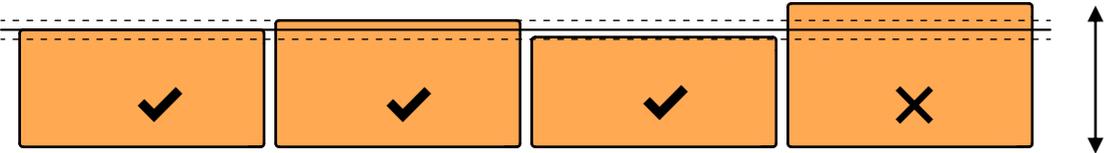


THE ROW LOCK BRICK

SELECTION AND QUALITY CONTROL



Brick size tolerance
+/-4mm



DISCARDED

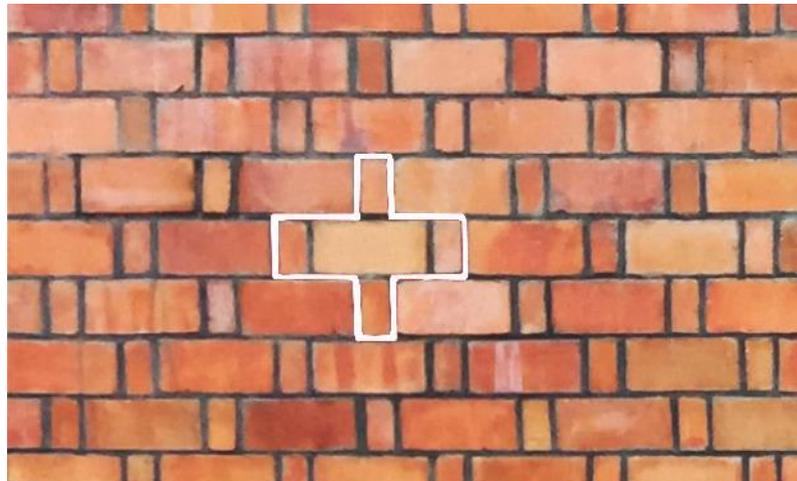
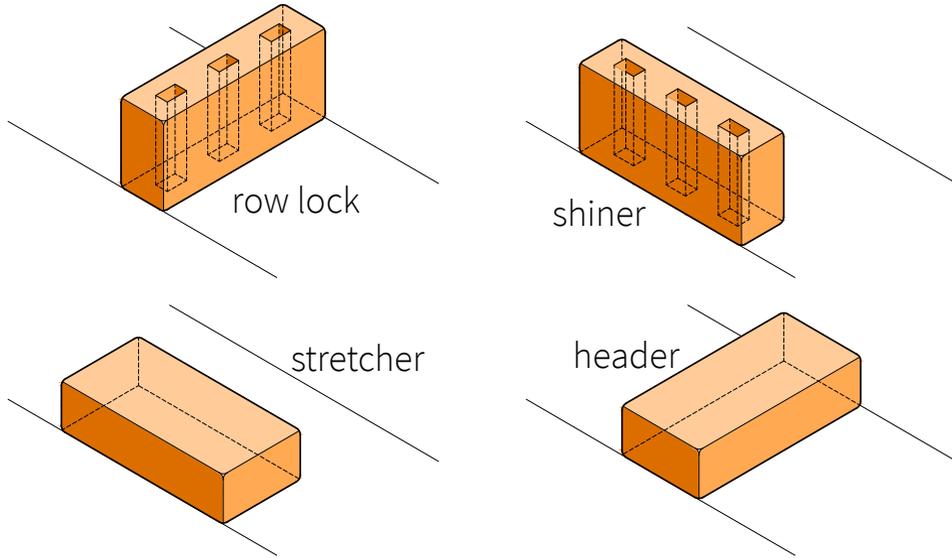


SELECTED



THE ROW LOCK BOND

wall

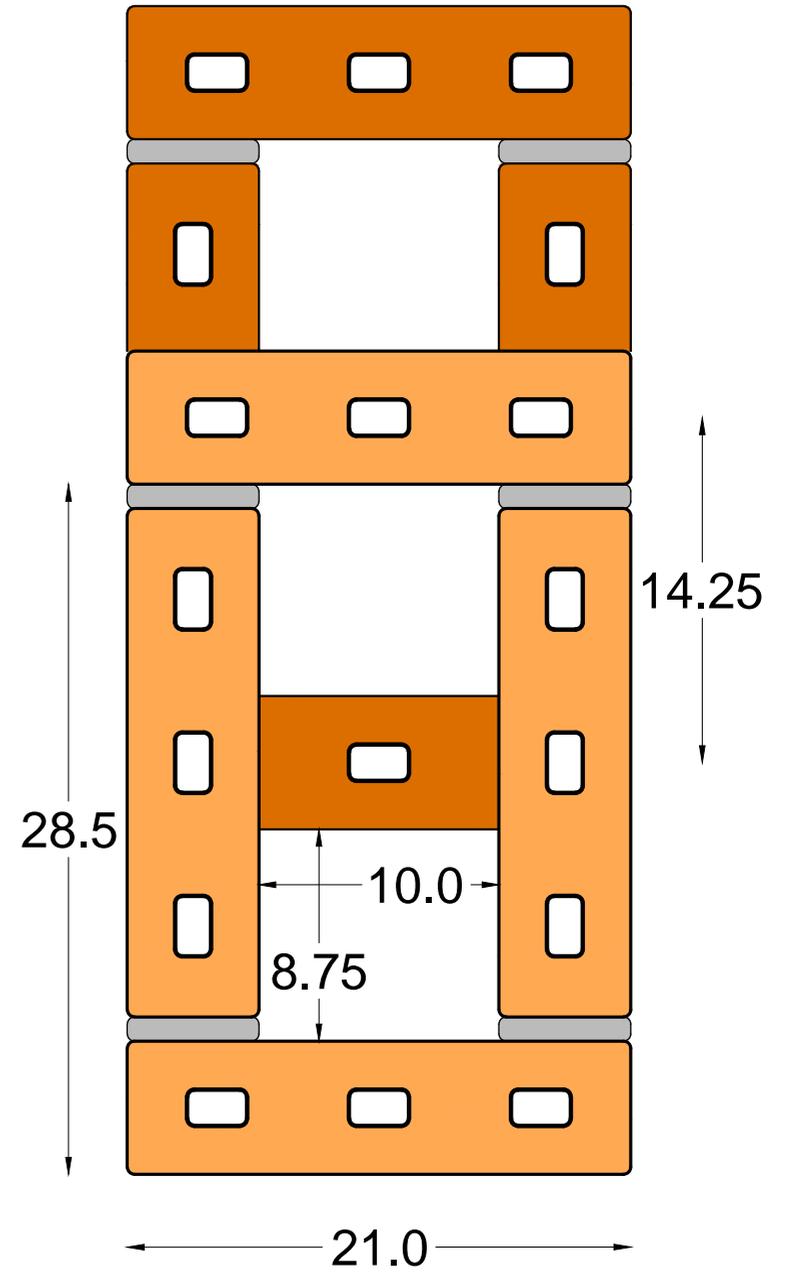
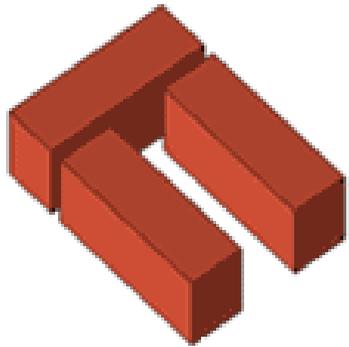


RLB distinctive shiner - row lock - shiner cross



THE ROW LOCK BOND

21cm



RLB VARIATIONS

The planfill block

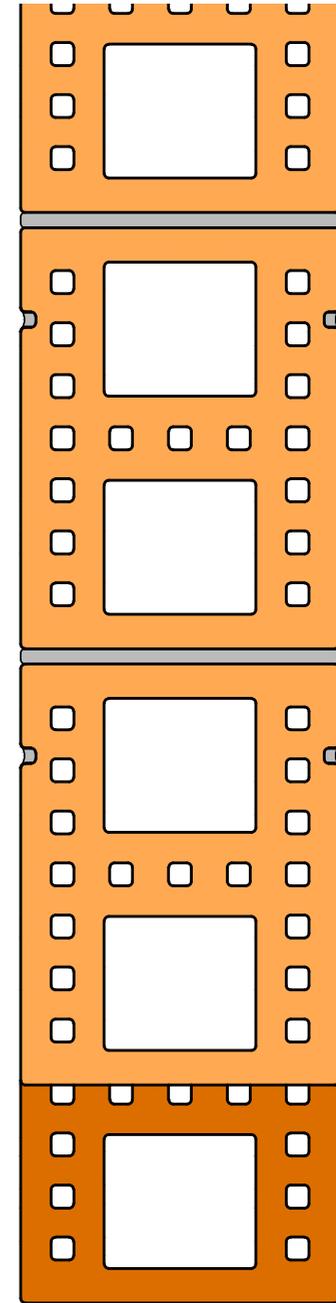


BENEFITS:

Produced industrially >> consistent performance

Faster walling >> cheaper construction

Full integration with a standard RLB wall



THE ROW LOCK BOND

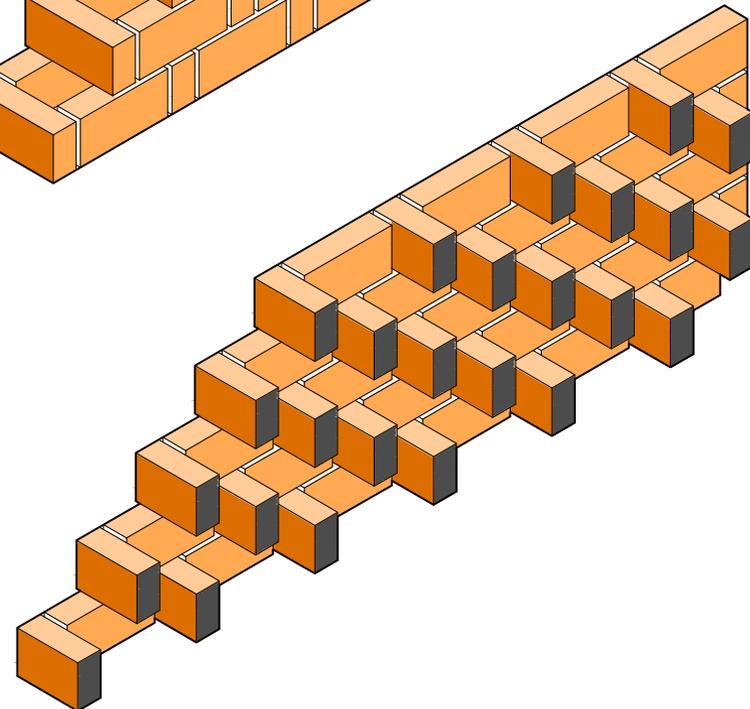
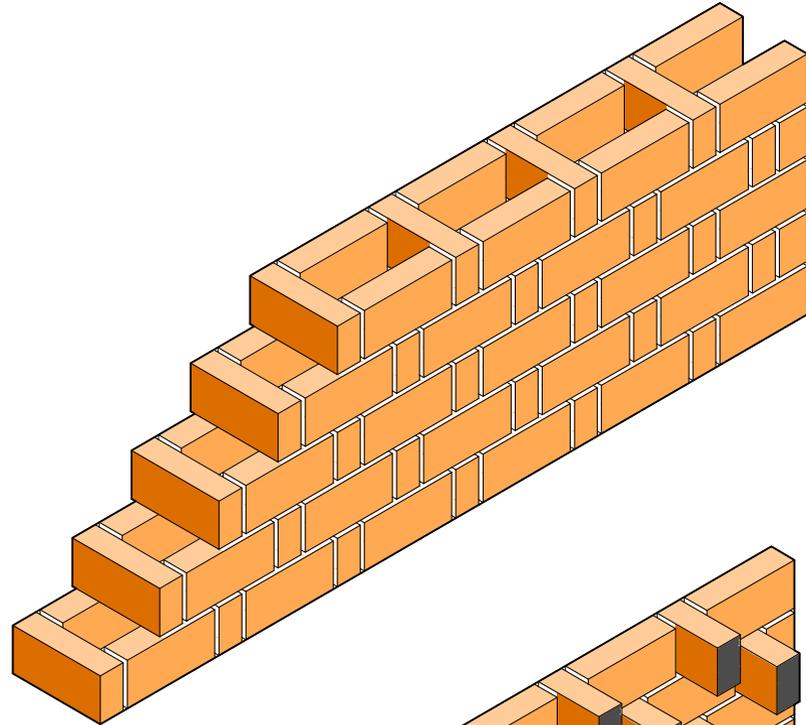
cavity



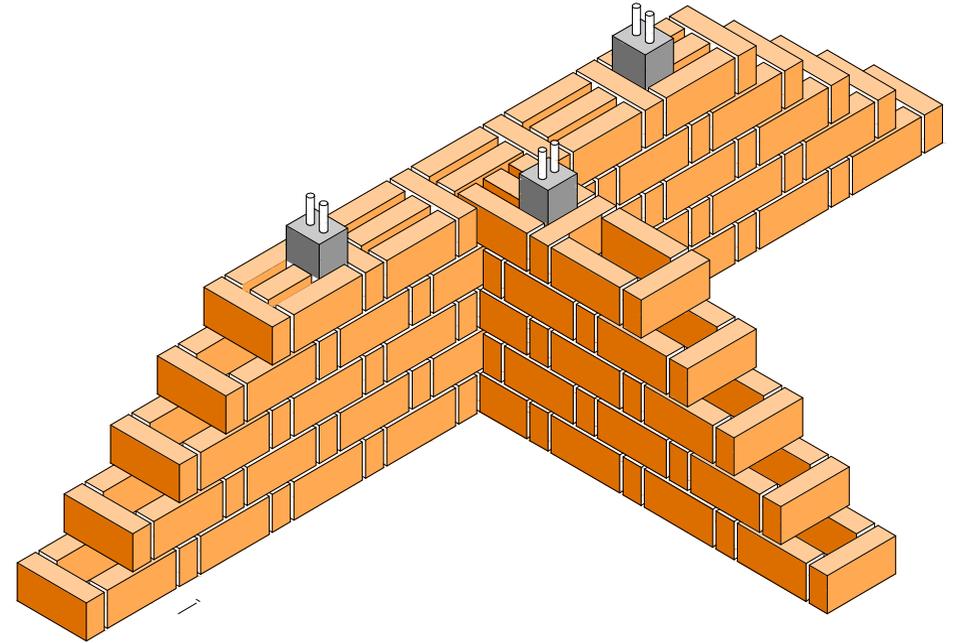
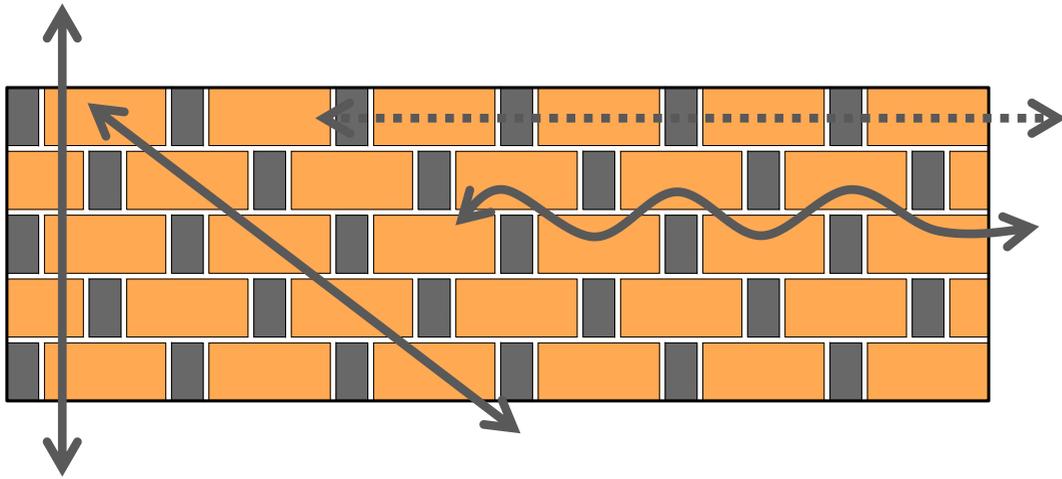
30% AVERAGE LESS MATERIAL USED

25% FEWER BRICKS USED

40% LESS MORTAR USED

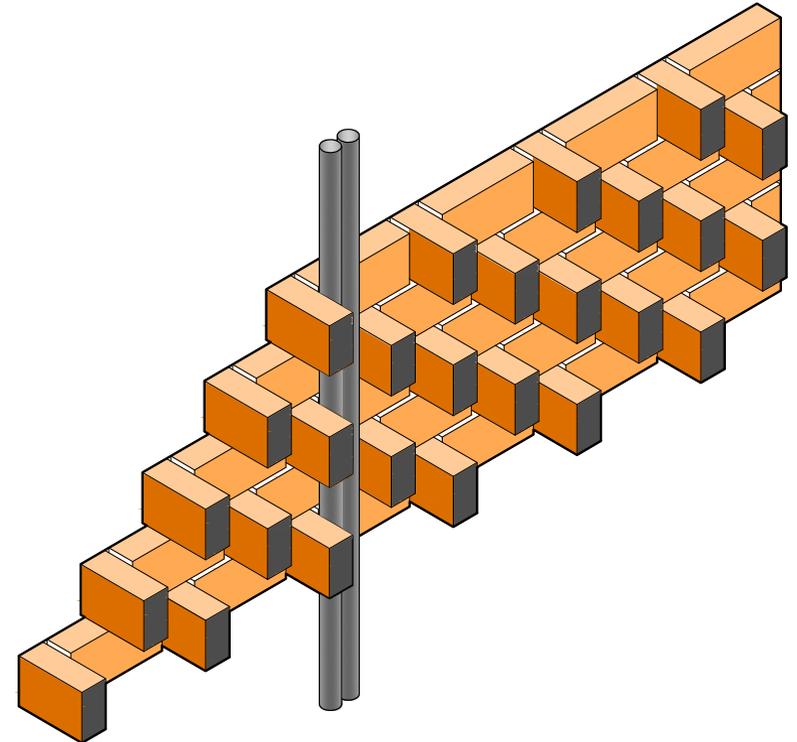


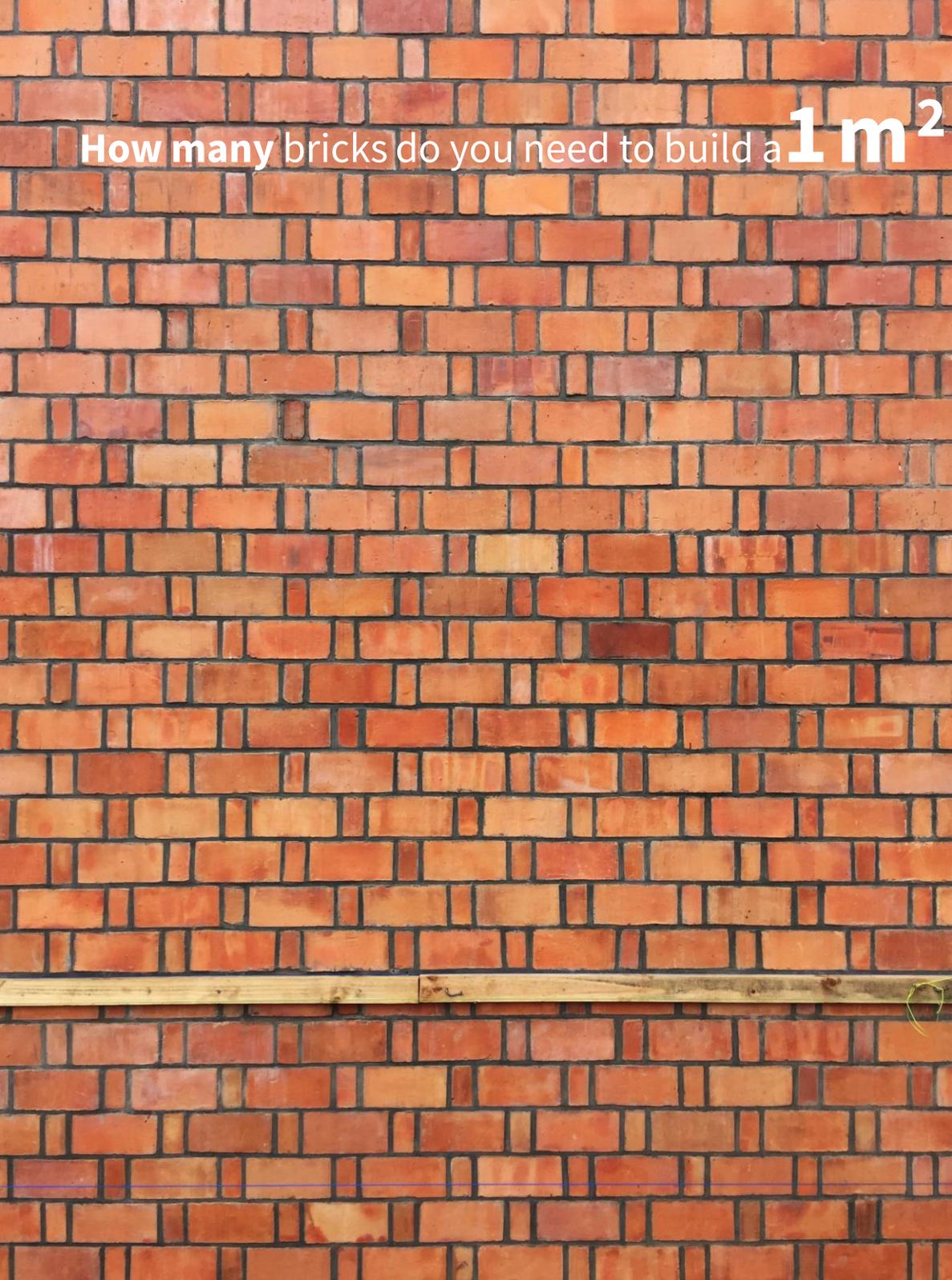
THE ROW LOCK BOND



POSSIBLE VERTICAL AND HORIZONTAL
STRUCTURAL INTEGRATION

POSSIBLE VERTICAL, HORIZONTAL AND
DIAGONAL
MEP CONNECTIONS





How many bricks do you need to build a 1m^2 wall?

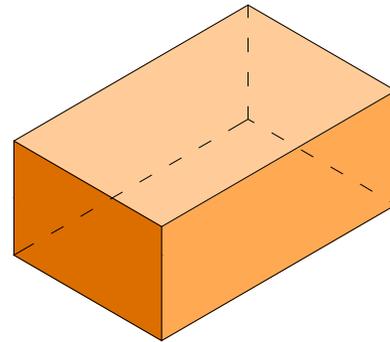
100

And **how many** bricks do you need for a whole building?

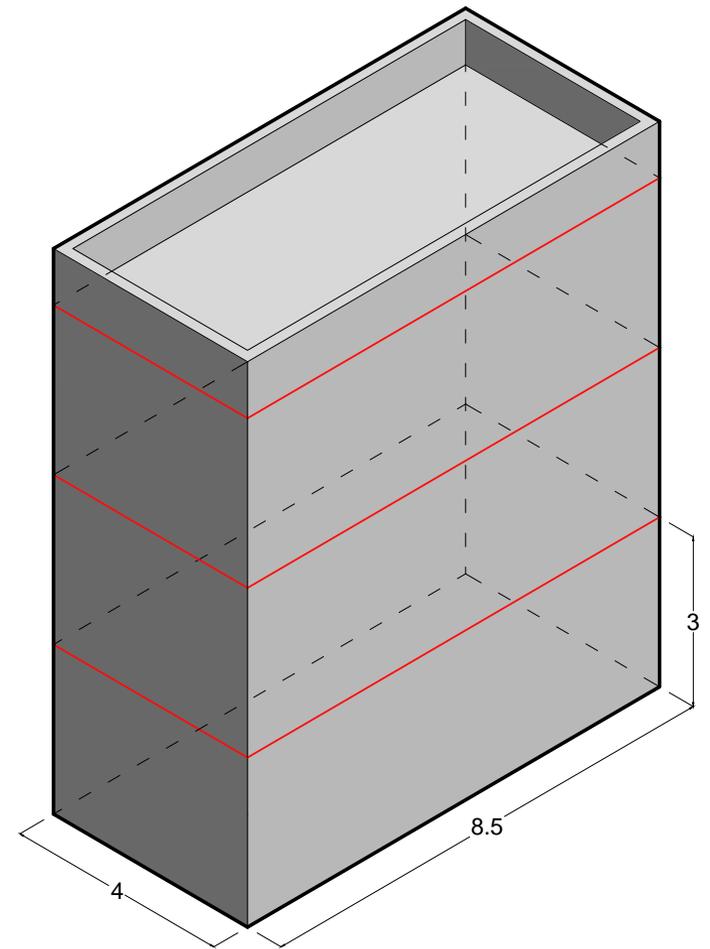
Simple G+2

- > Brics per m² 100
- > Perimeter 25m
- > Floor height 3m
- > N. of floors 3
- > Extra 10%

$$25 \times 3 \times 3 \times 1.1 \times 100 =$$



28.6 m³



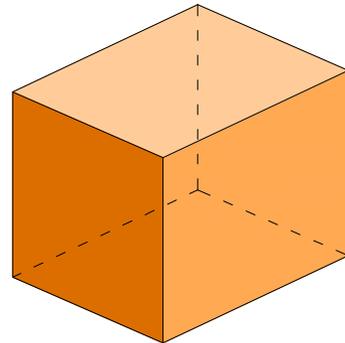
24,750

And **how many** bricks do you need for a whole building?

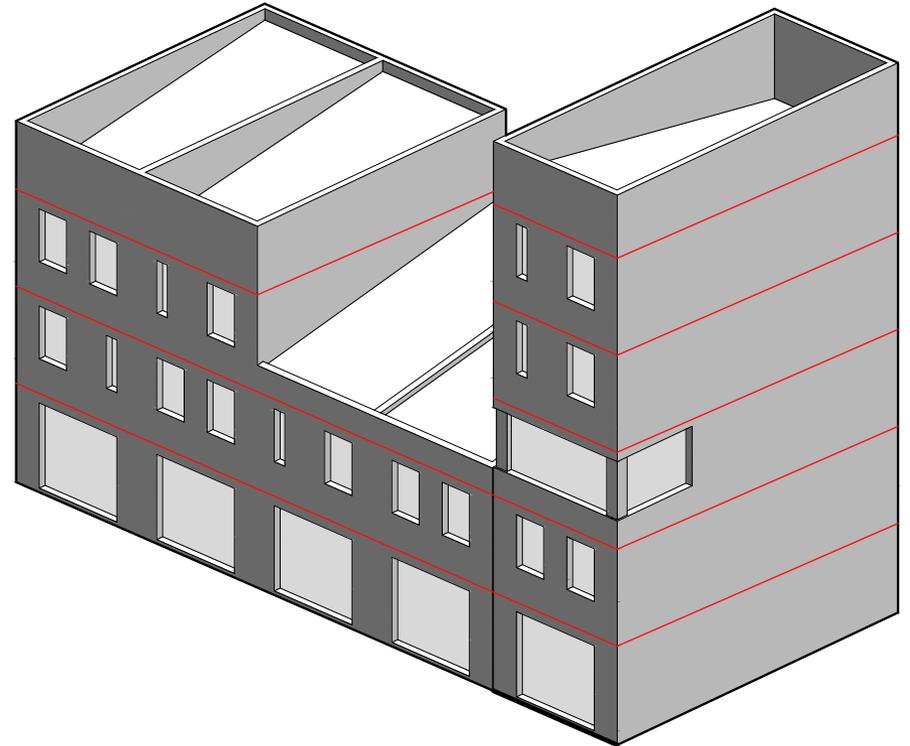
Complex G+3

- > Brics per m² 100
- > Perimeter 103m
- > Floor height 2.64m
- > N. of floors 3/2/5
- > Extra 10%

$$879 \times 1.1 \times 100 =$$



112.8 m³

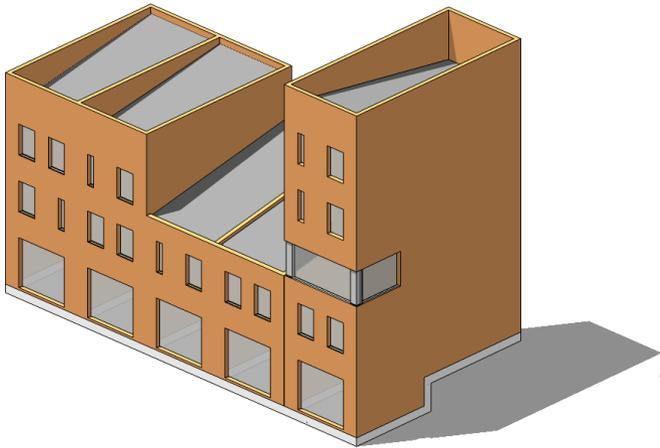


96,690



THE **ROW LOCK BOND REINFORCEMENT**

and its earth quake resistant properties

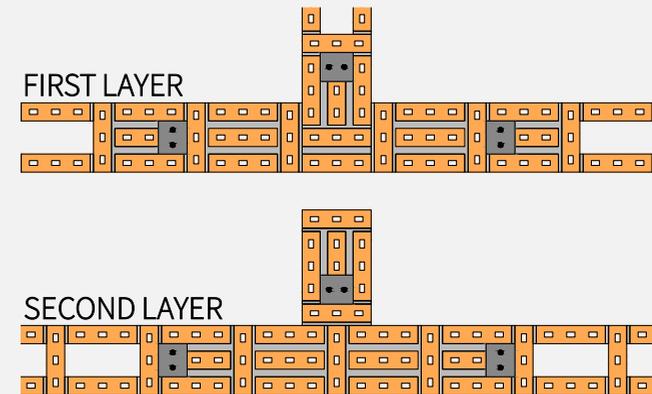
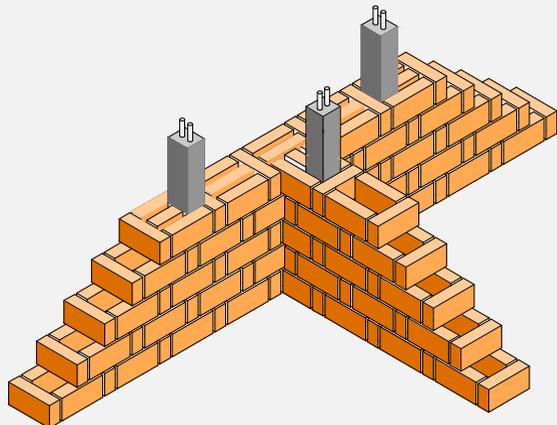
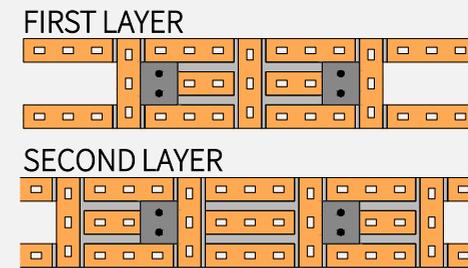
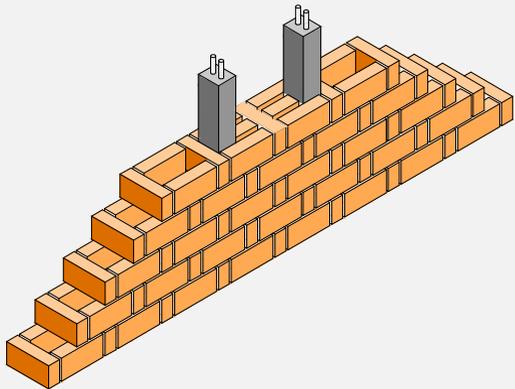
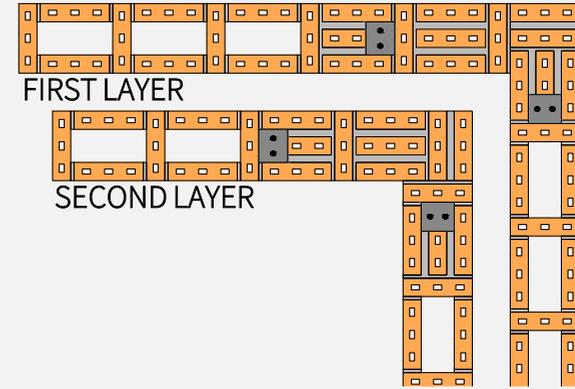
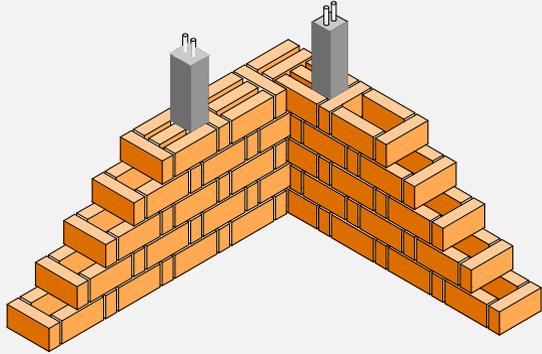


**The vertical loads
are supported by
the perimeter walls**

**The combination of horizontal
and vertical RC reinforcements
within the walls work to brace
the masonry in order to resist to
the shear forces of an earthquake**

THE ROW LOCK BOND

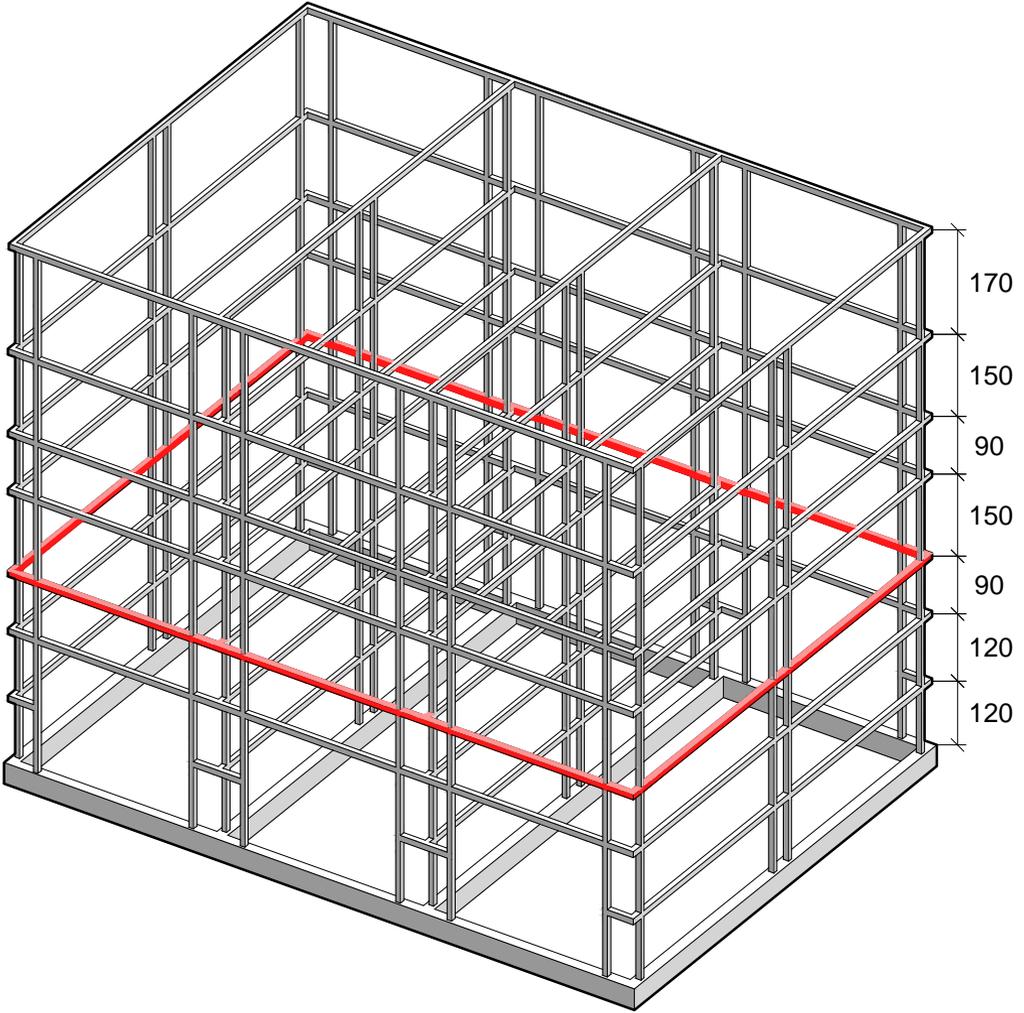
vertical reinforcement



THE ROW LOCK BOND REINFORCEMENT

horizontal reinforcement

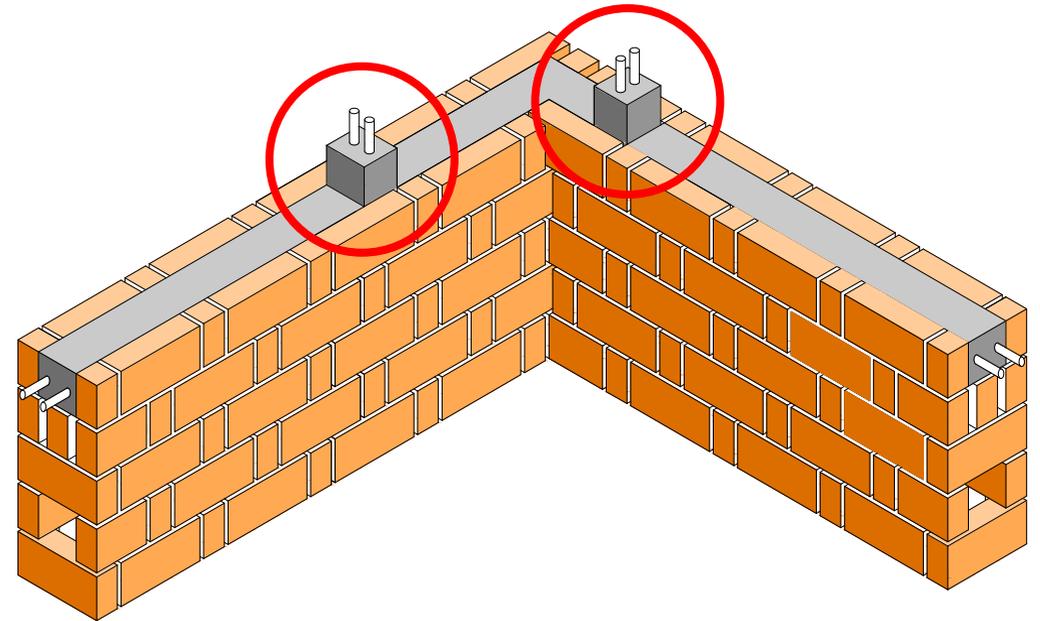
Tie beams are placed every 10/13 courses



THE ROW LOCK BOND REINFORCEMENT

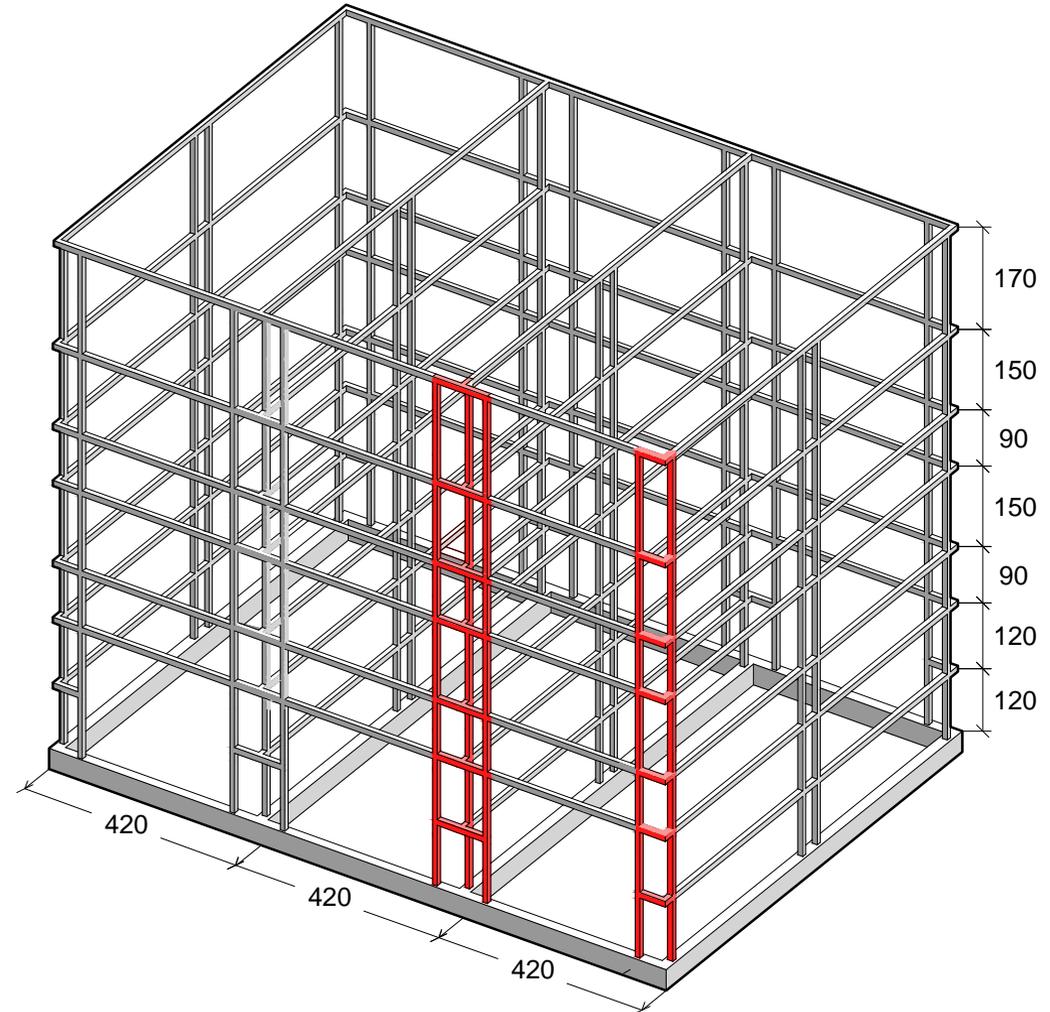
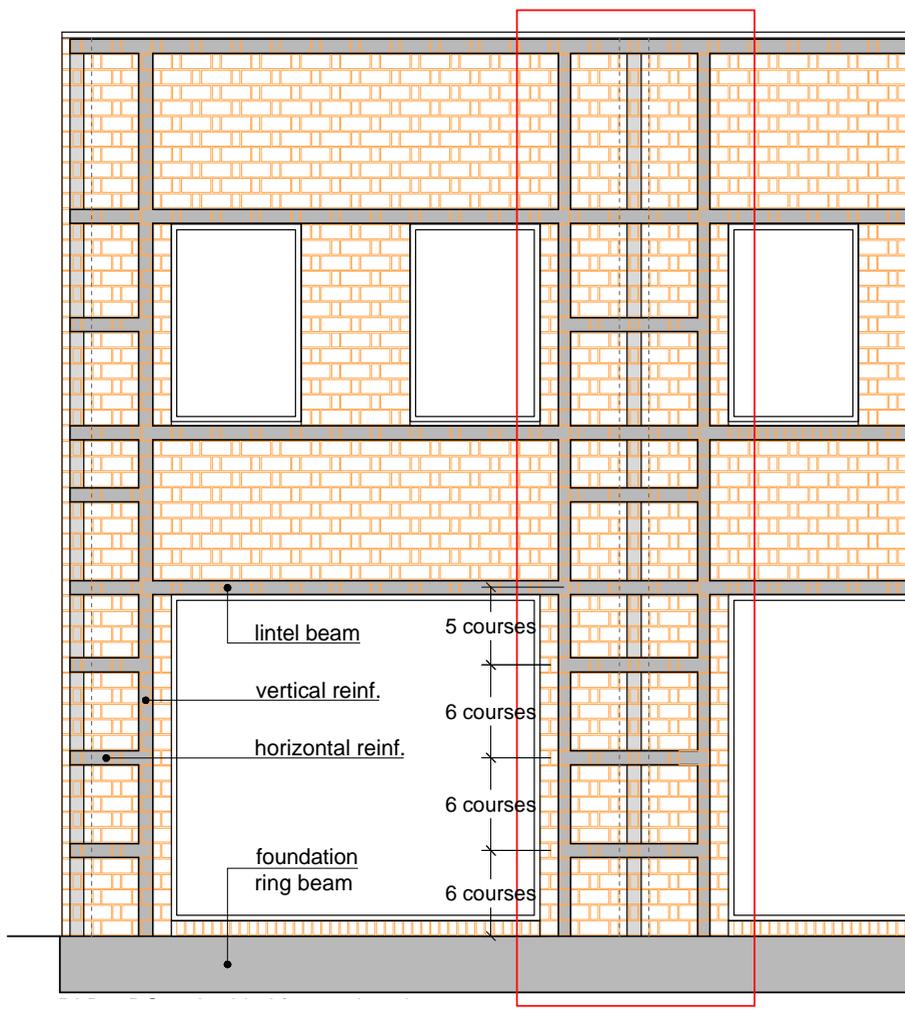
horizontal reinforcement

Tie beams are placed every 10/13 courses

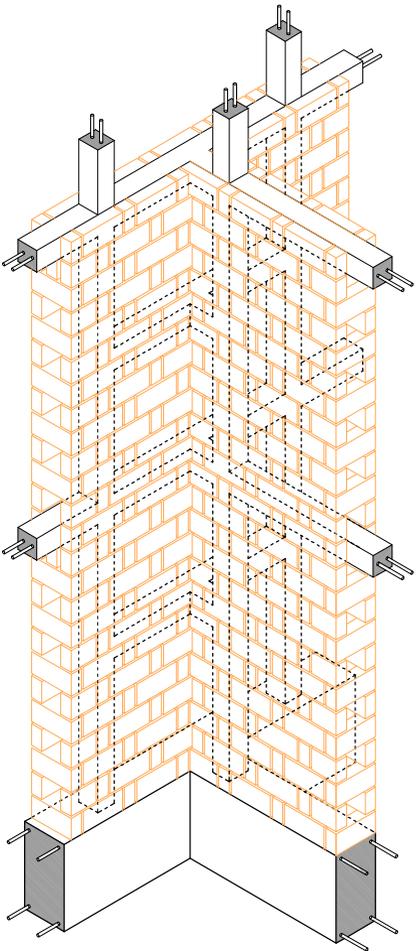


THE RLB REINFORCEMENT

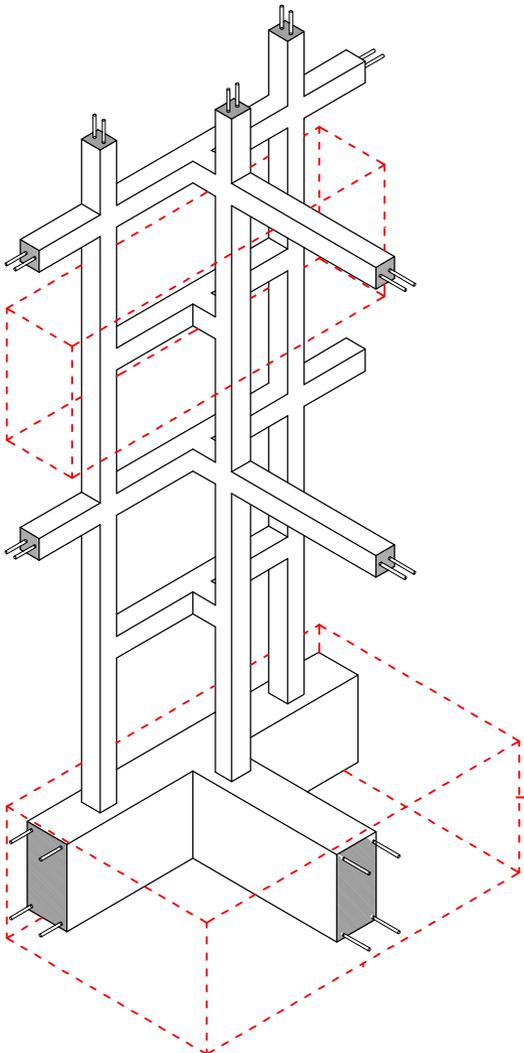
T-shape and corner reinforcement



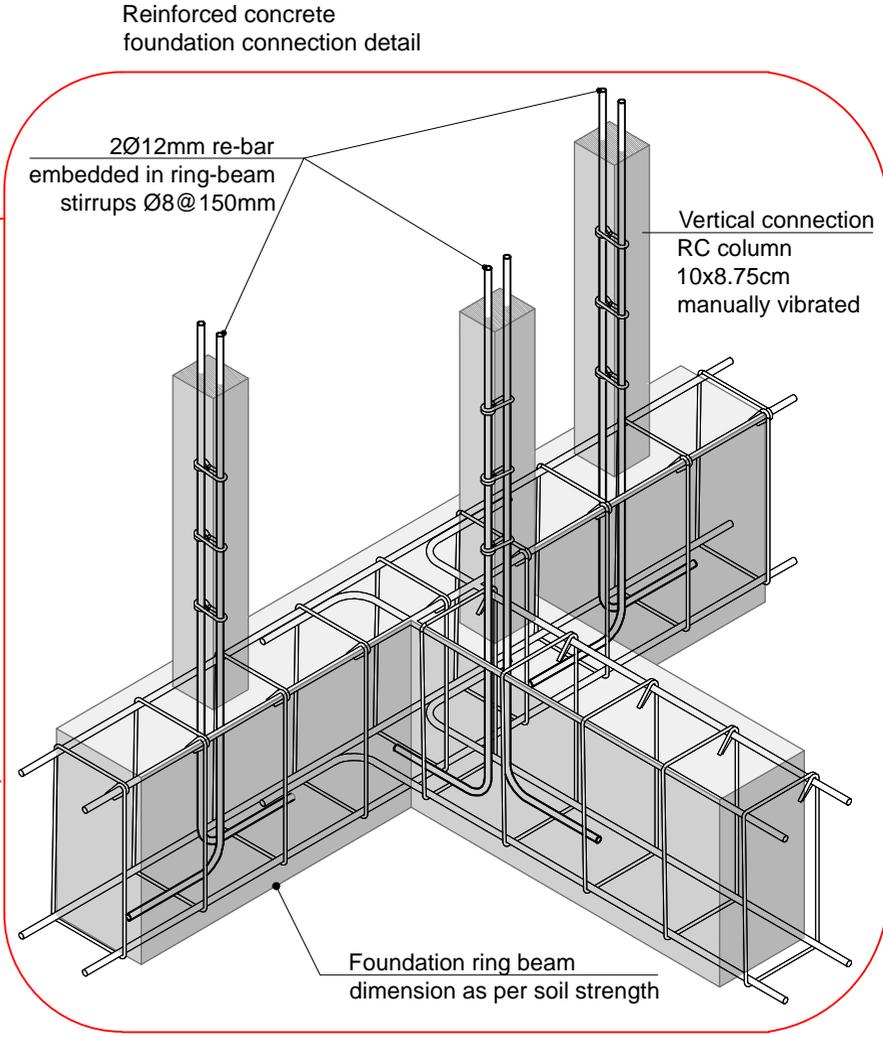
THE ROW LOCK BOND REINFORCEMENT



RLB masonry



RLB embedded reinforced concrete frame



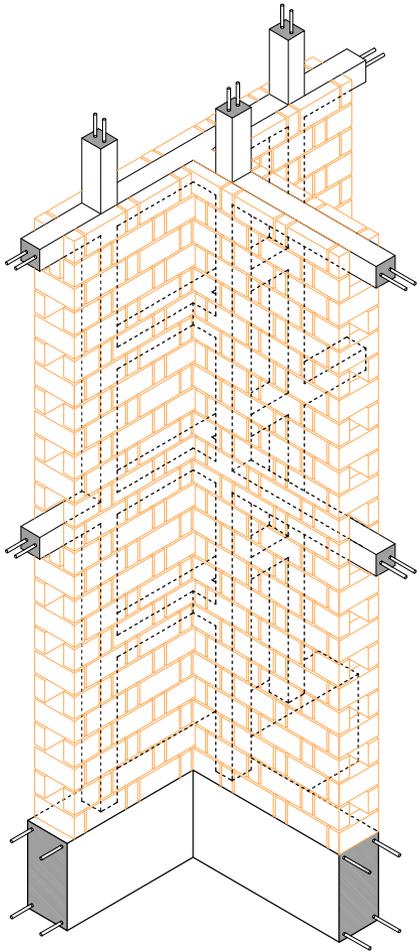
Reinforced concrete foundation connection detail

2Ø12mm re-bar embedded in ring-beam stirrups Ø8@150mm

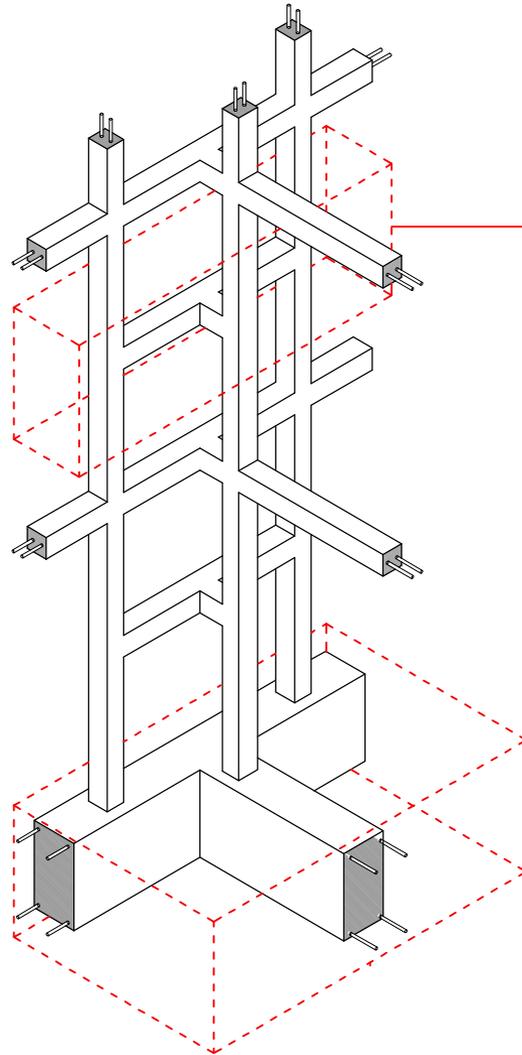
Vertical connection RC column 10x8.75cm manually vibrated

Foundation ring beam dimension as per soil strength

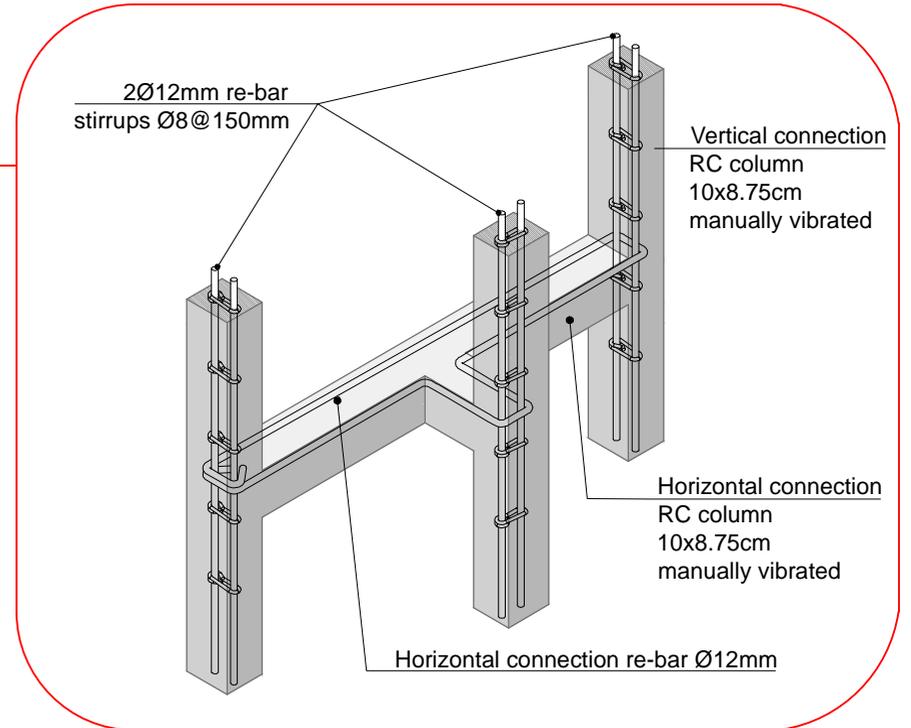
THE ROW LOCK BOND REINFORCEMENT



RLB masonry



RLB embedded reinforced concrete frame



T-shape reinforced concrete connection detail

THE **MAXIMUM NUMBER OF STOREYS**

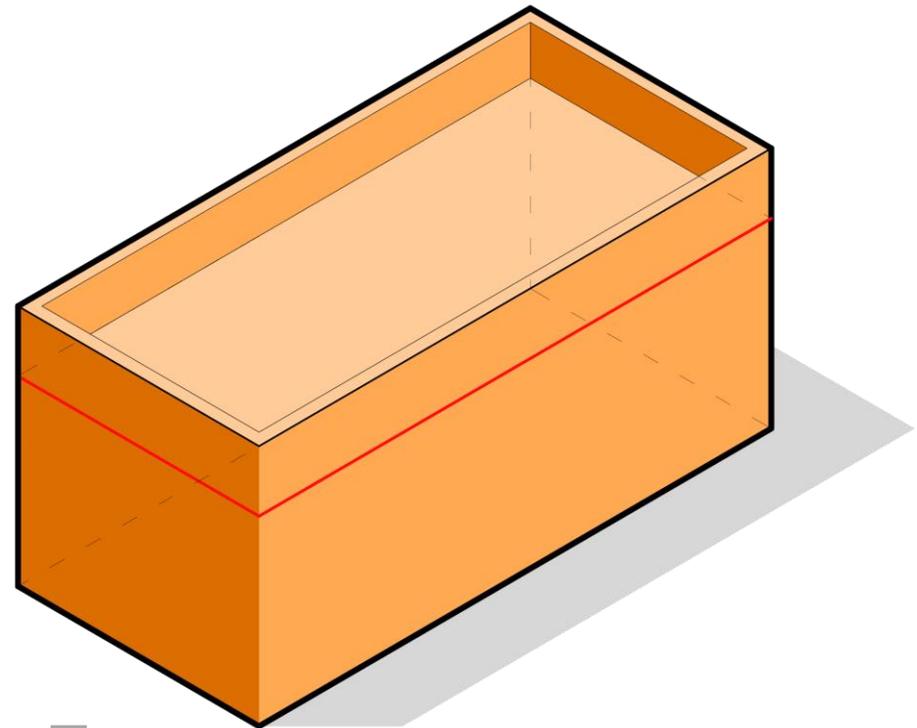
RCC reinforced RLB

The maximum number of storeys built with the **REINFORCED RLB** wall system: **3***

DETERMINING FACTORS:

the strength of the bricks

the footprint



* Using **PLANFILL blocks** the maximum storeys number may increase to **5**
**to be verified by a structural engineer*

THE **RLB DESIGN PRINCIPLES**

Resources website

www.madeingreatlakes.com



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development
and Cooperation SDC

skat

Swiss Resource Centre and
Consultancies for Development

PROECCO **PRO**moting **E**mployment through
Climate Responsive COnstruction