

01

A CONSTRUCTION MANUAL ON HOW TO BUILD A ROWLOCK BOND HOUSE

RowLock Bond
DESIGN PRINCIPLES



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development
and Cooperation SDC

skat Swiss Resource Centre and
Consultancies for Development

PROECCO PROmoting Employment through
Climate Responsive **CO**nstruction

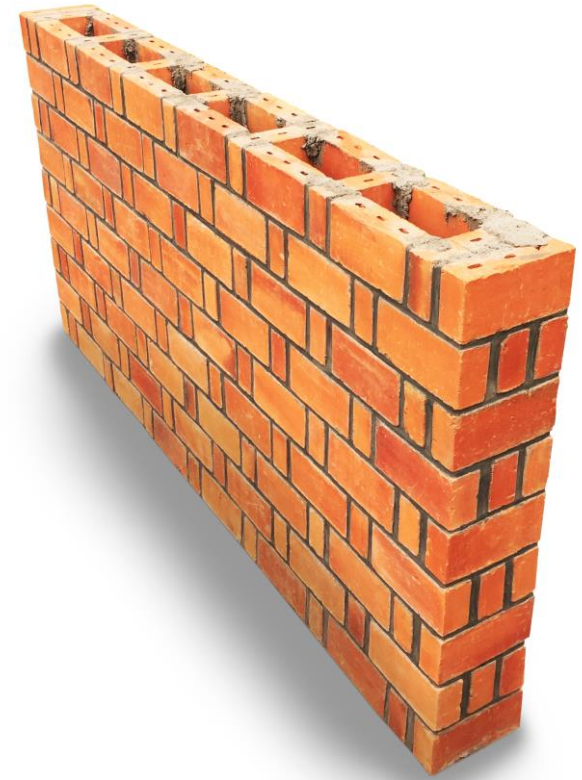
THE ROW LOCK BOND SYSTEM

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



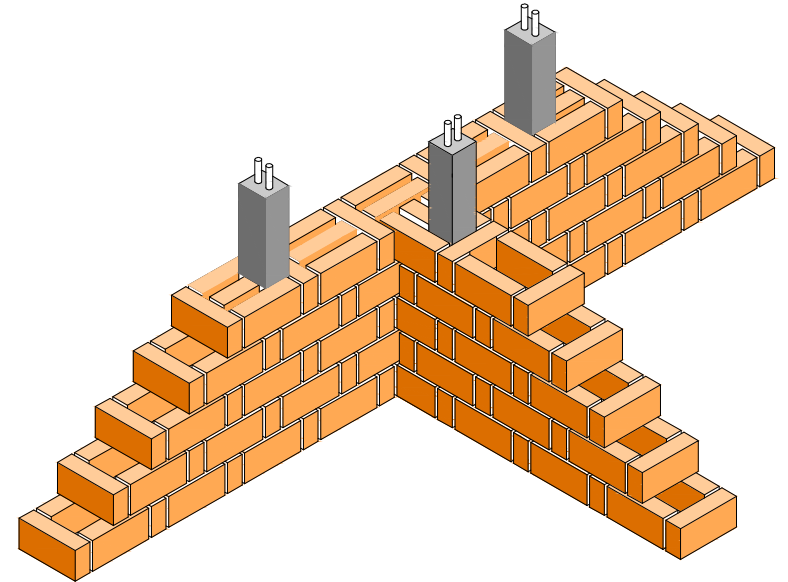
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THE ROW LOCK BOND SYSTEM

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THE ROW LOCK BOND

Historical background



Henlow, UK
1801

THE **ROW LOCK BOND**
Historical background

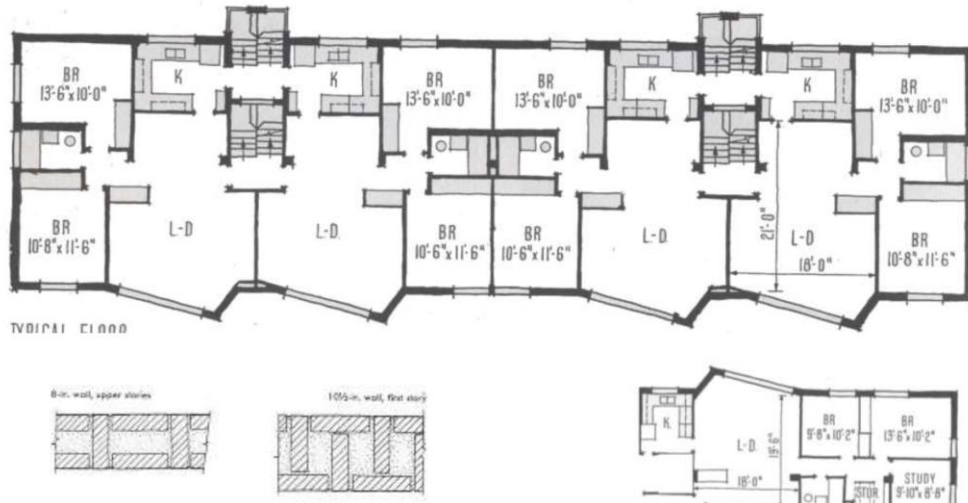


Ontario,
CANADA
1856

THE ROW LOCK BOND

Historical background

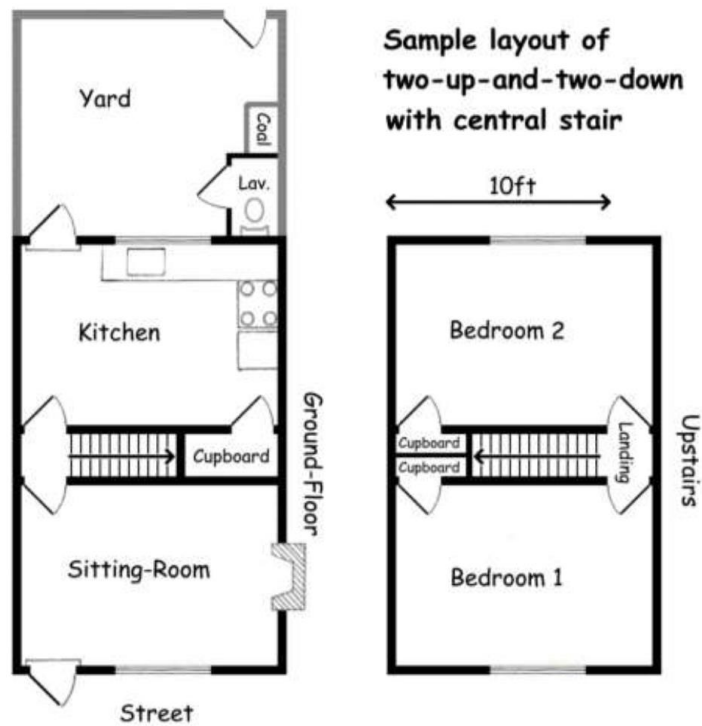
Holsman, Holsman, Klekamp, Taylor,
Chicago, USA
1949



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)

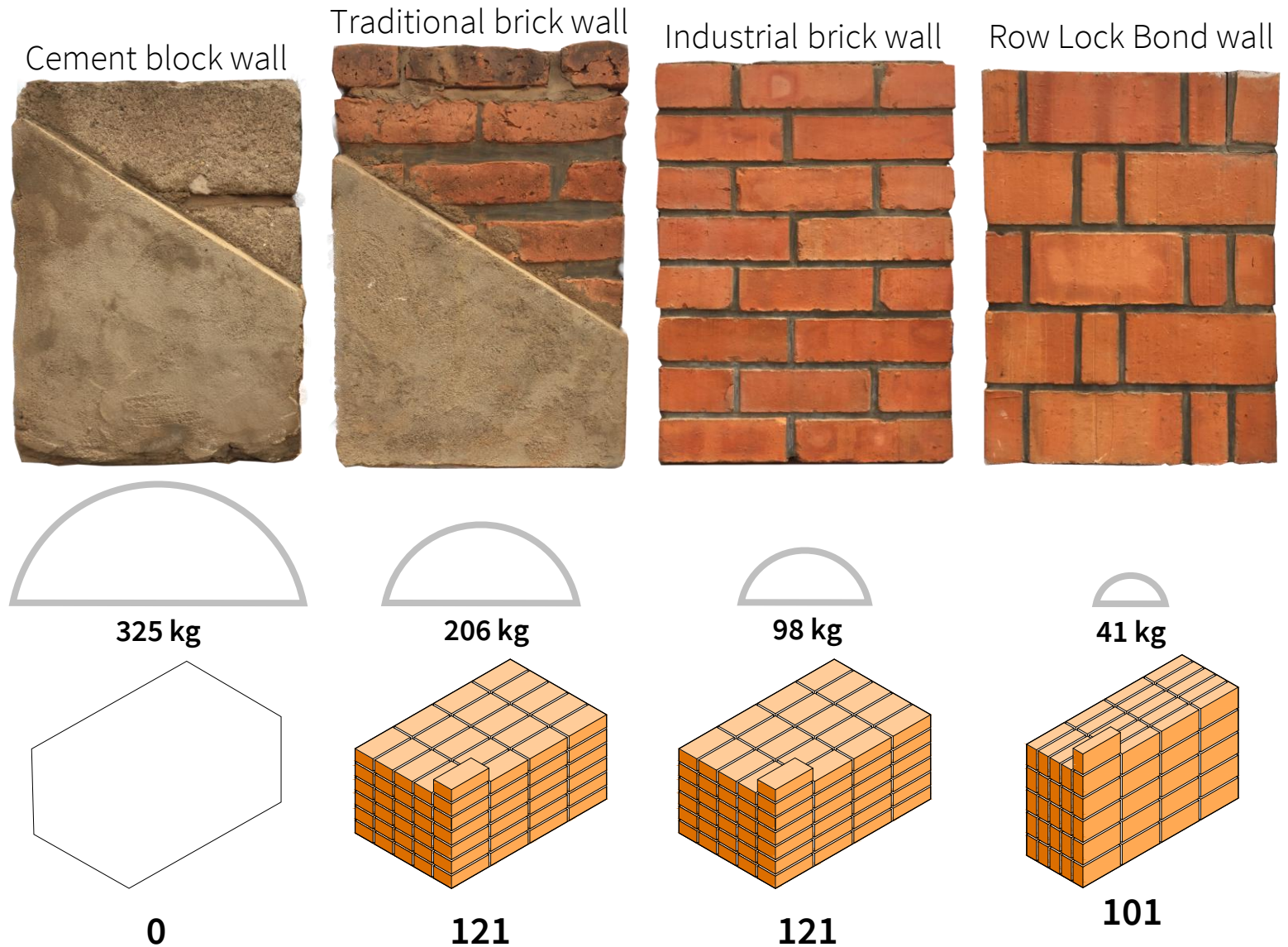
Fuel Consumption*:

Reduced by >75%

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

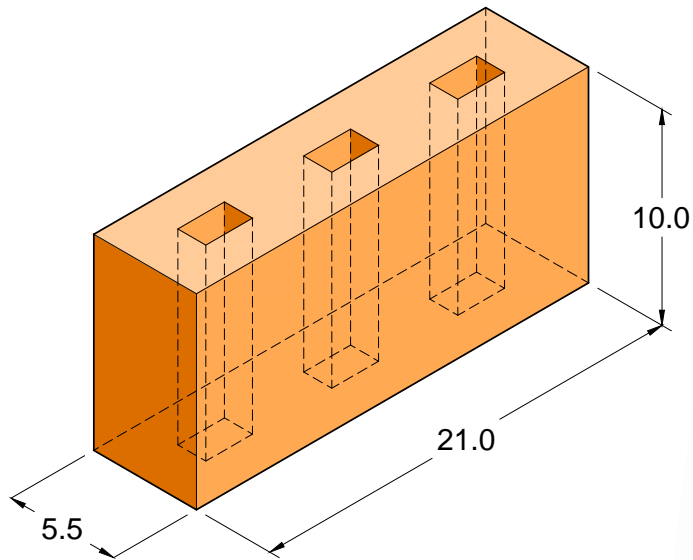
Rwanda made bricks:

80% more local income



THE ROW LOCK BRICK

MAIN FEATURES



10 Mpa

minimum
COMPRESSIVE
STRENGTH

Traditional brick
3/5 MPa



**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

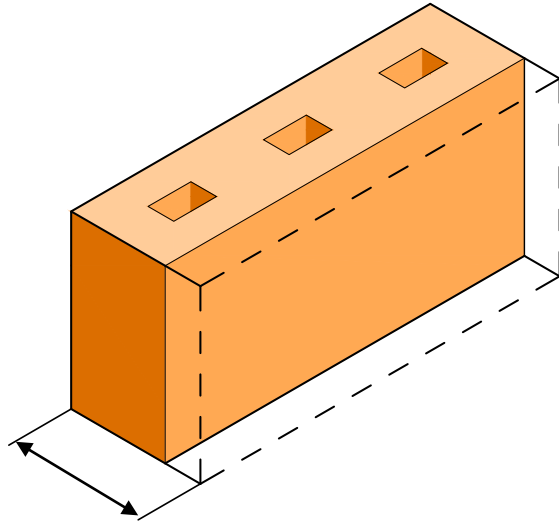
THE **ROW LOCK BRICK**

PRODUCTION FEATURES

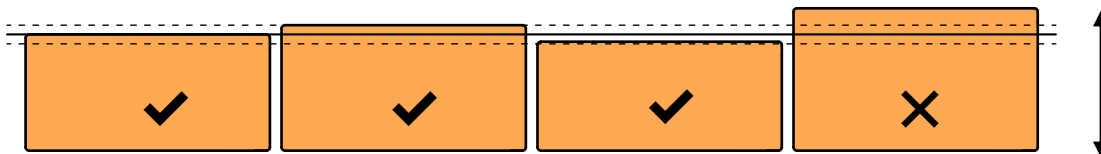


THE ROW LOCK BRICK

SELECTION AND QUALITY CONTROL



Brick size tolerance
 $\pm 4\text{mm}$



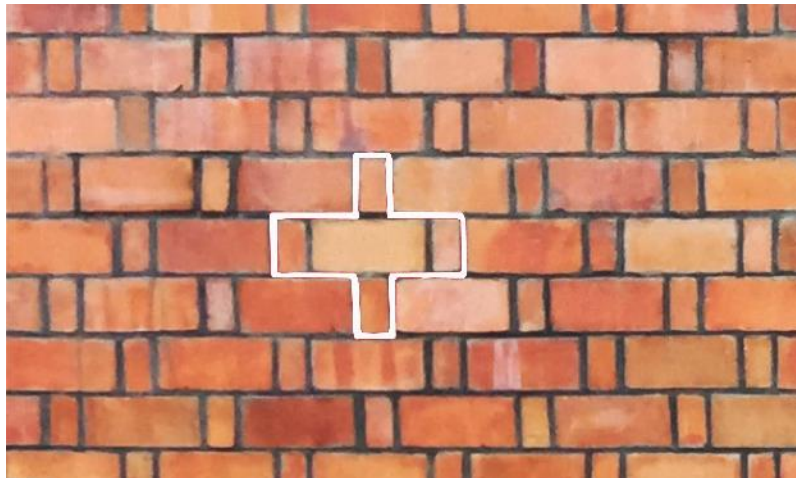
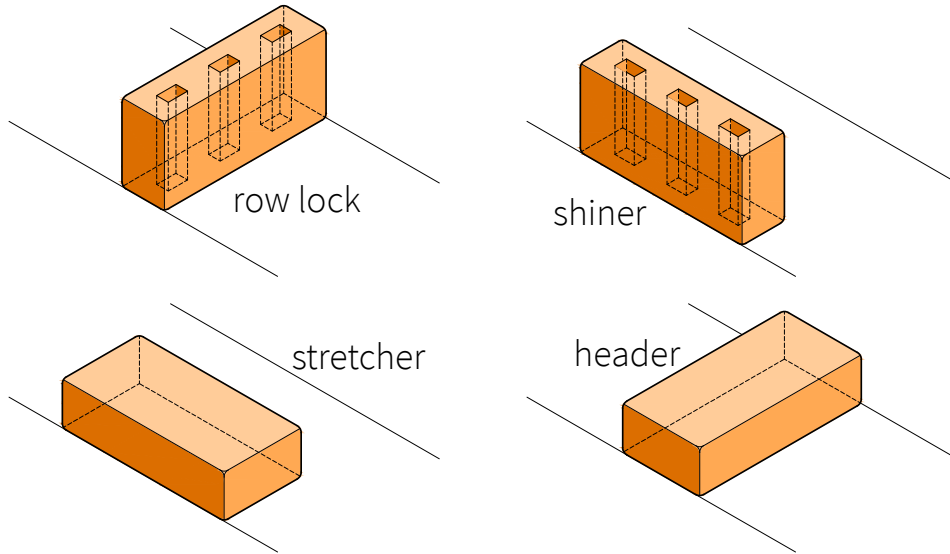
DISCARDED



SELECTED



THE **ROW LOCK BOND** *wall*

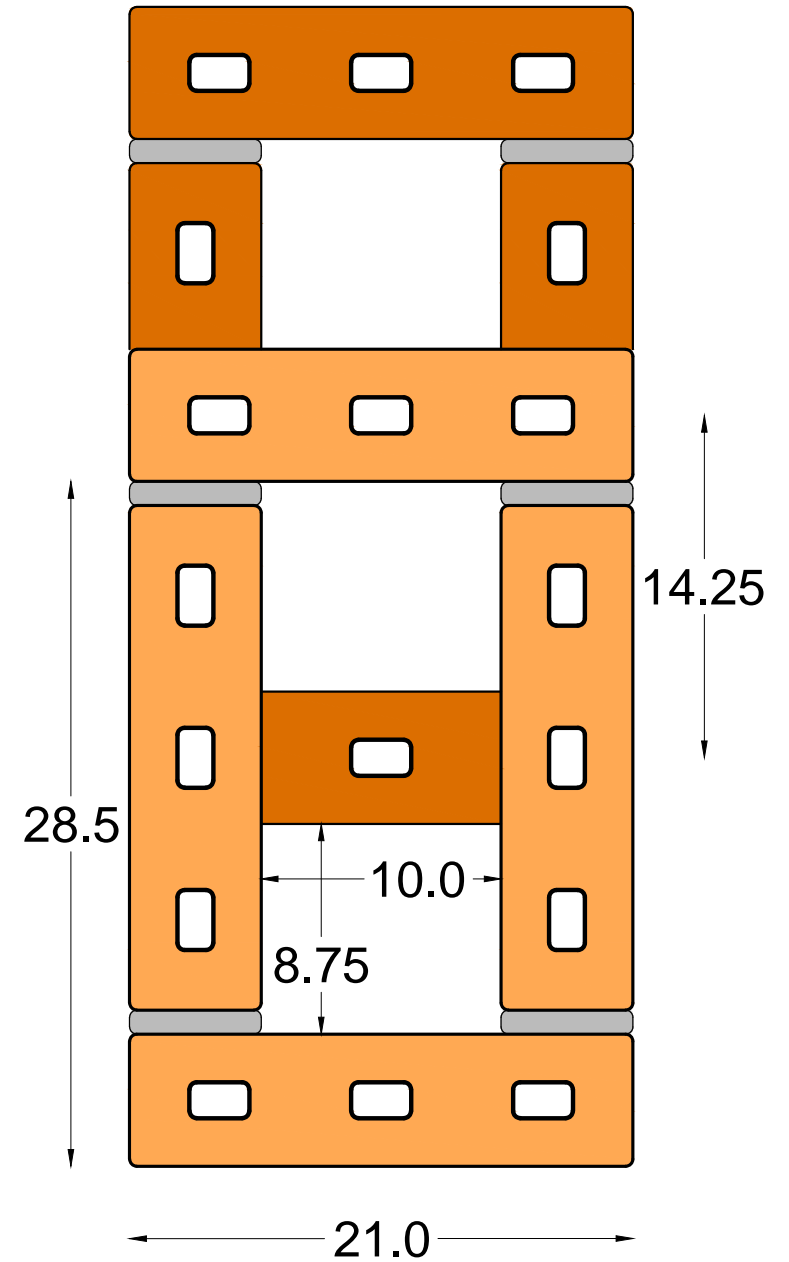
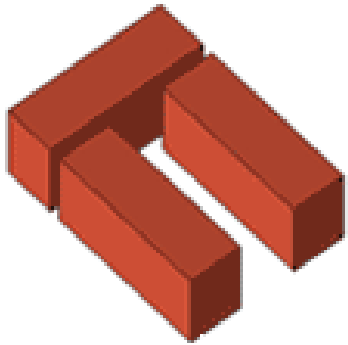


RLB distinctive shiner – row lock – shiner cross



THE ROW LOCK BOND

21cm



RLB VARIATIONS

The planfill block

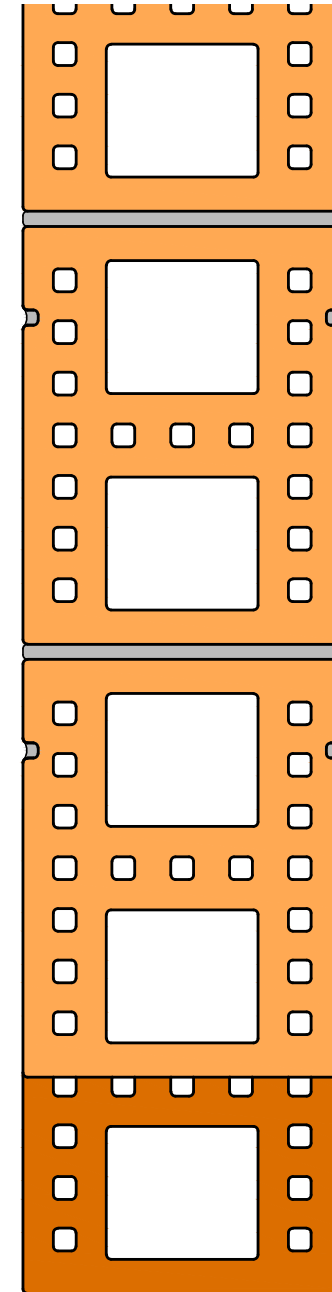


BENEFITS:

Produced industrially >> consistent performance

Faster walling >> cheaper construction

Full integration with a standard RLB wall

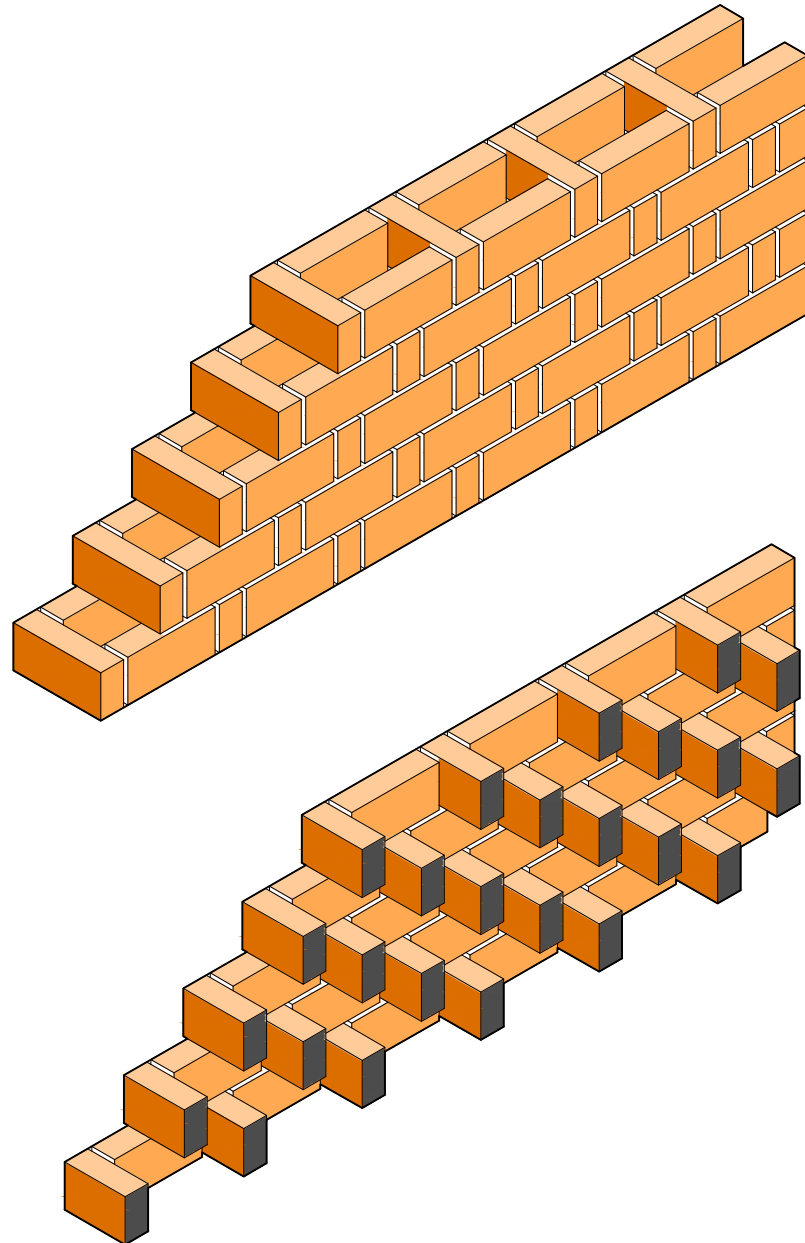


THE **ROW LOCK BOND**

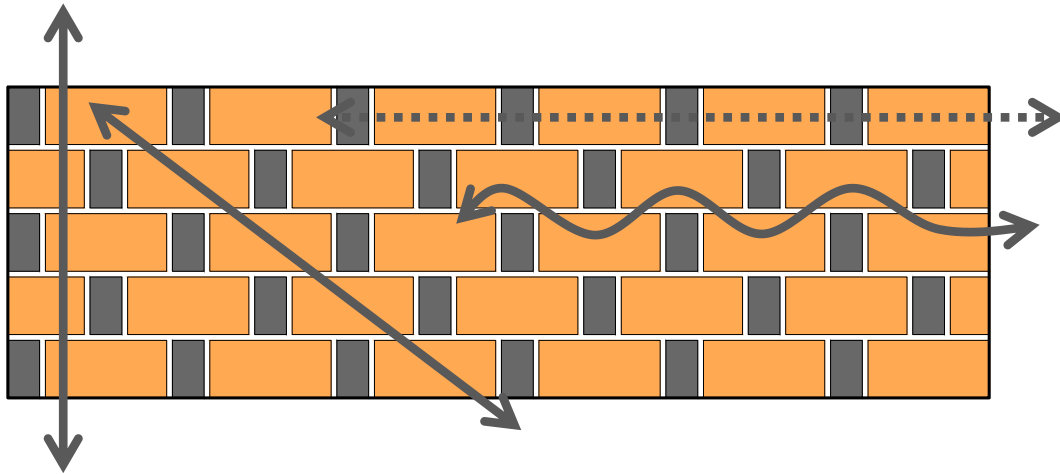
cavity



30% AVERAGE LESS MATERIAL USED
25% FEWER BRICKS USED
40% LESS MORTAR USED

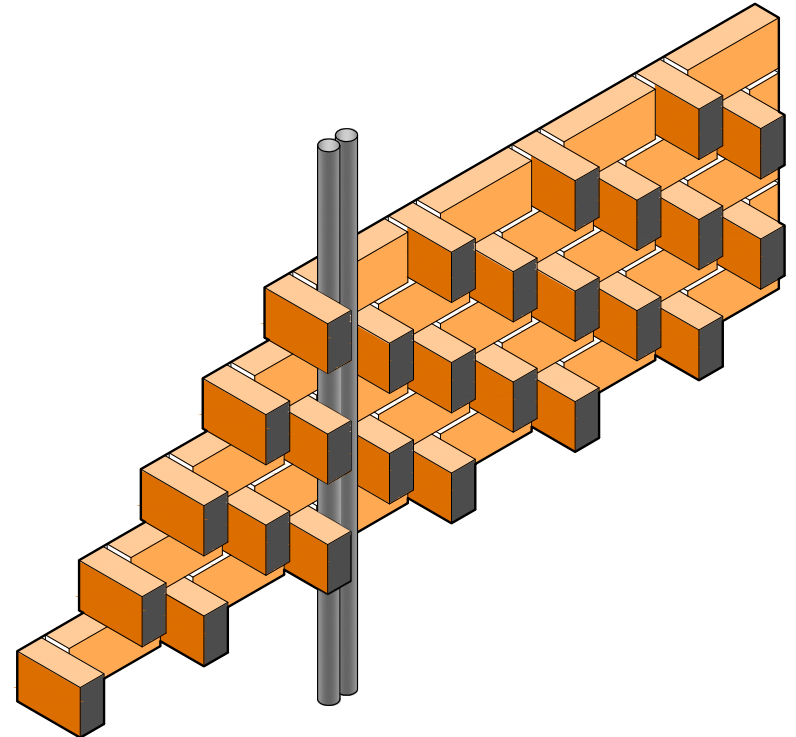
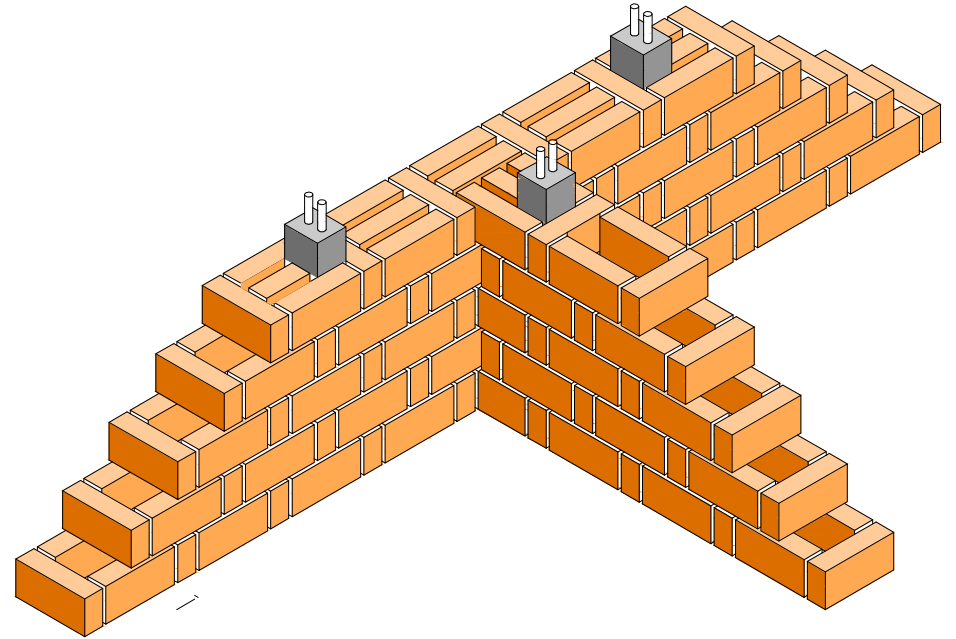


THE ROW LOCK BOND



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?

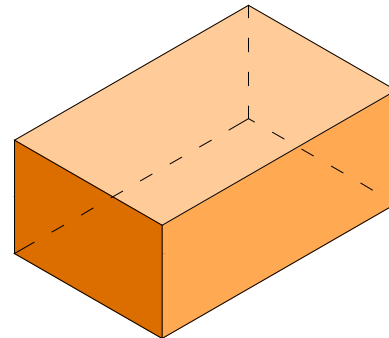
100

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

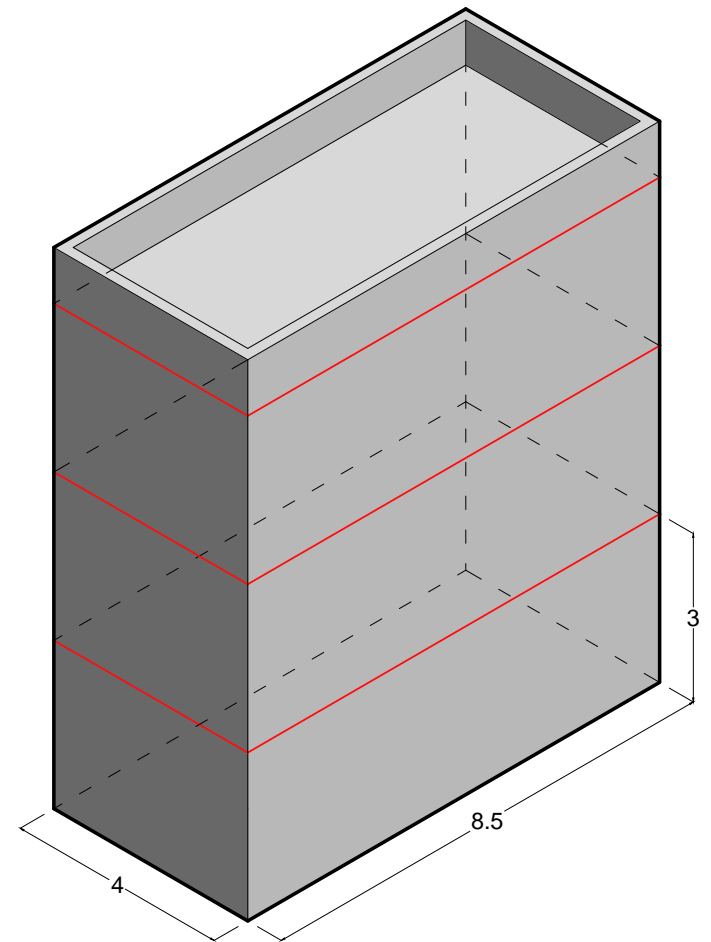
Simple G+2

- > Bricks 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



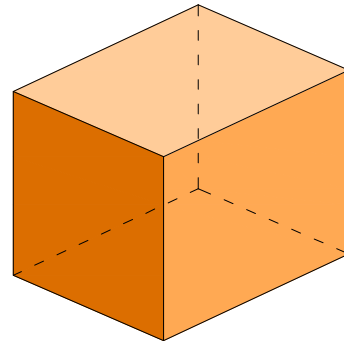
24,750

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

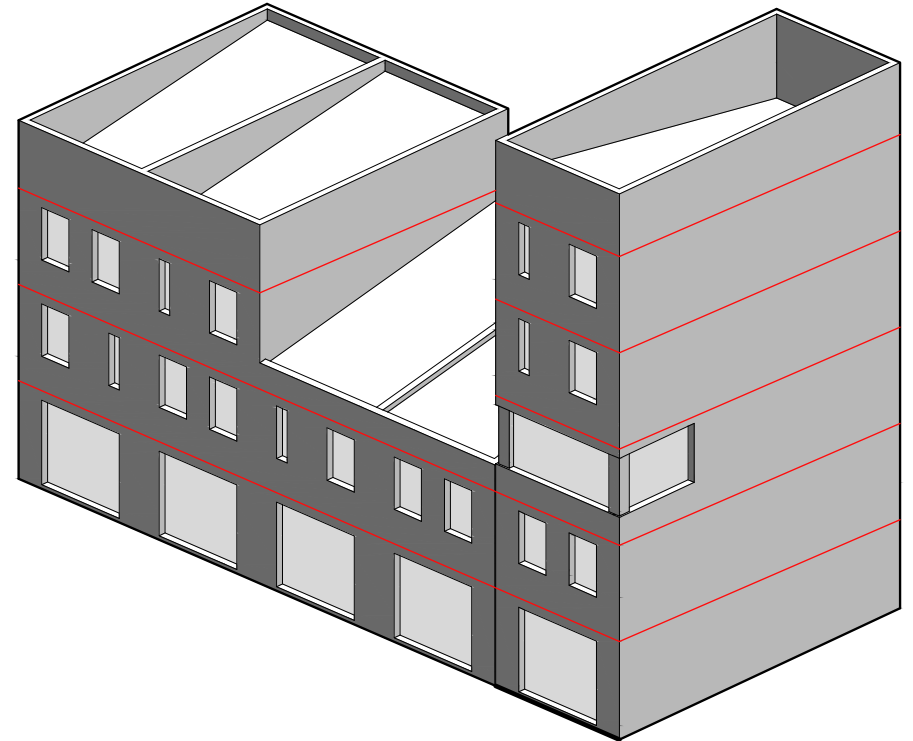
Complex G+3

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

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



112.8 m³

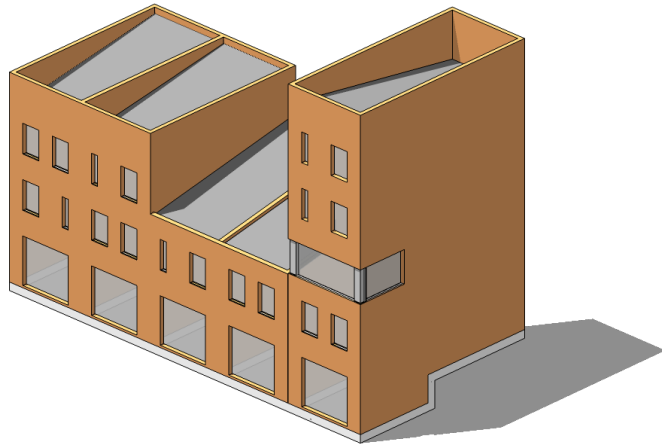


96,690



THE **ROW LOCK BOND REINFORCEMENT**

and its earth quake resistant properties

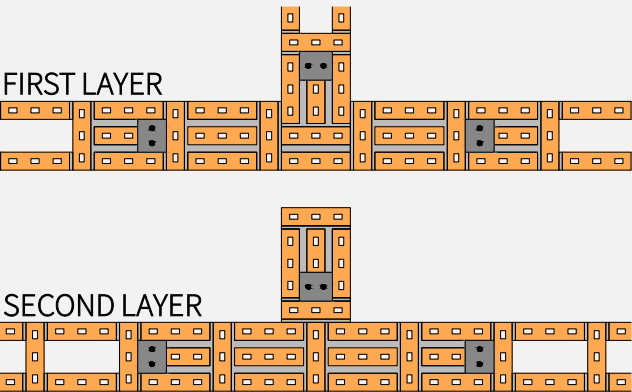
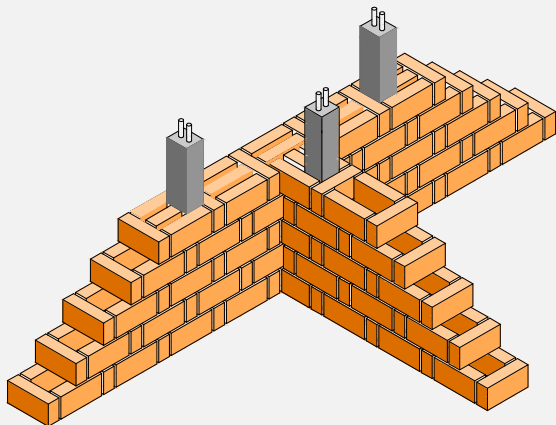
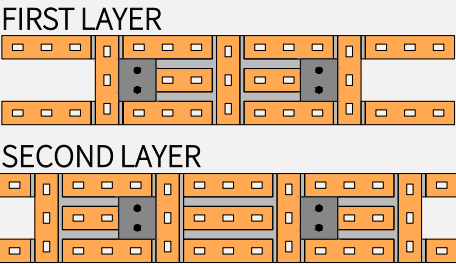
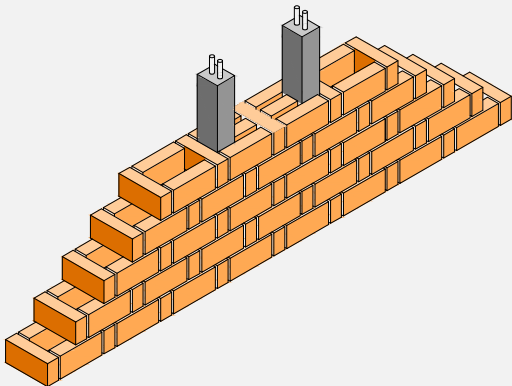
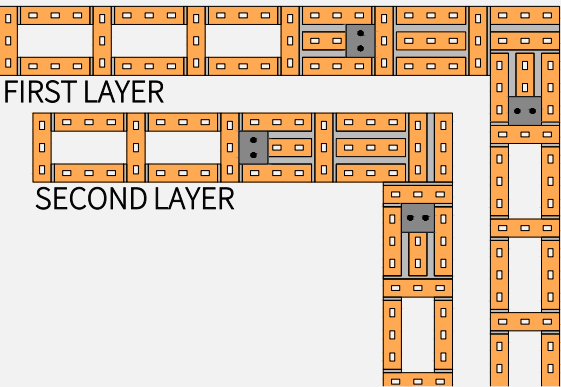
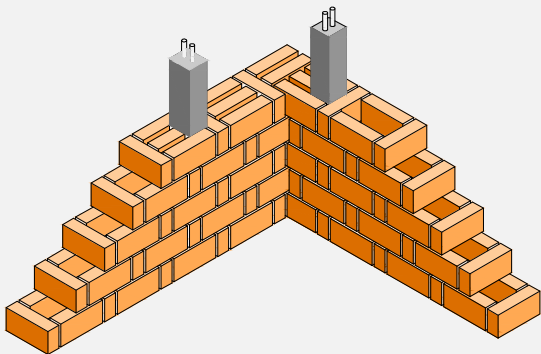


The vertical loads
are supported by
the perimeter walls

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

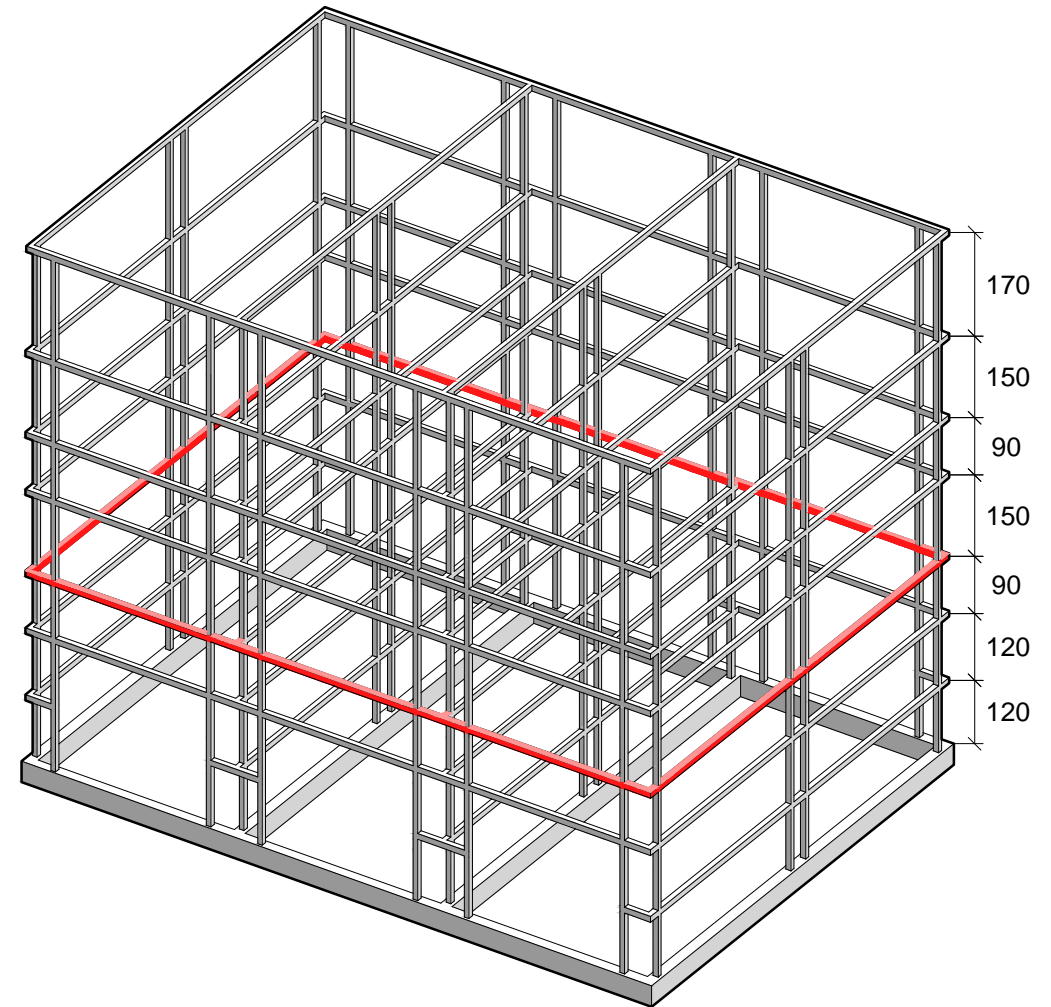
vertical reinforcement



THE **ROW LOCK BOND REINFORCEMENT**

horizontal reinforcement

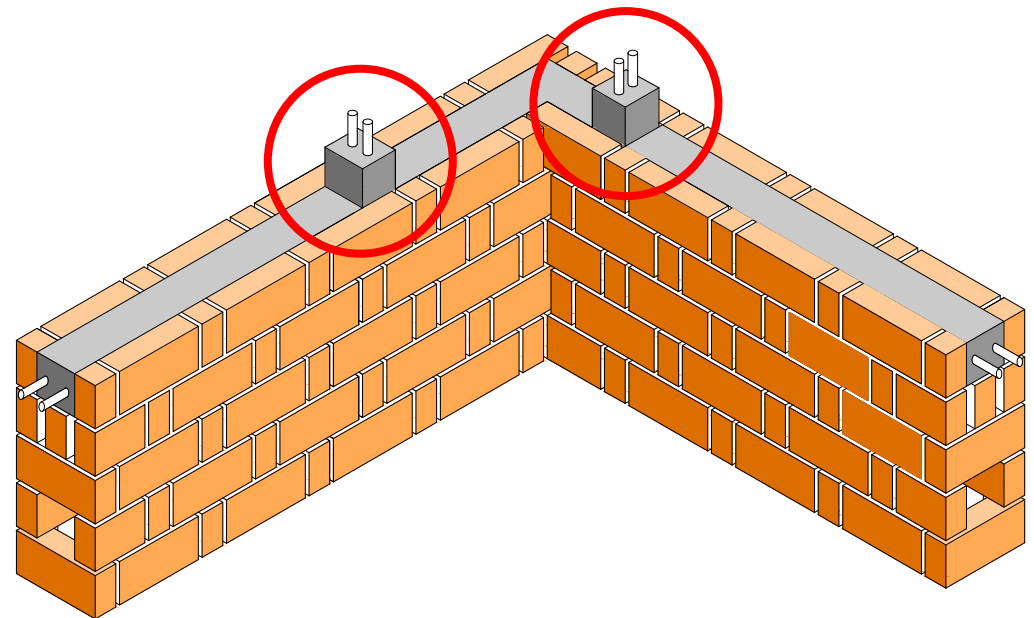
**Tie beams are placed
every 10/13 courses**



THE **ROW LOCK BOND REINFORCEMENT**

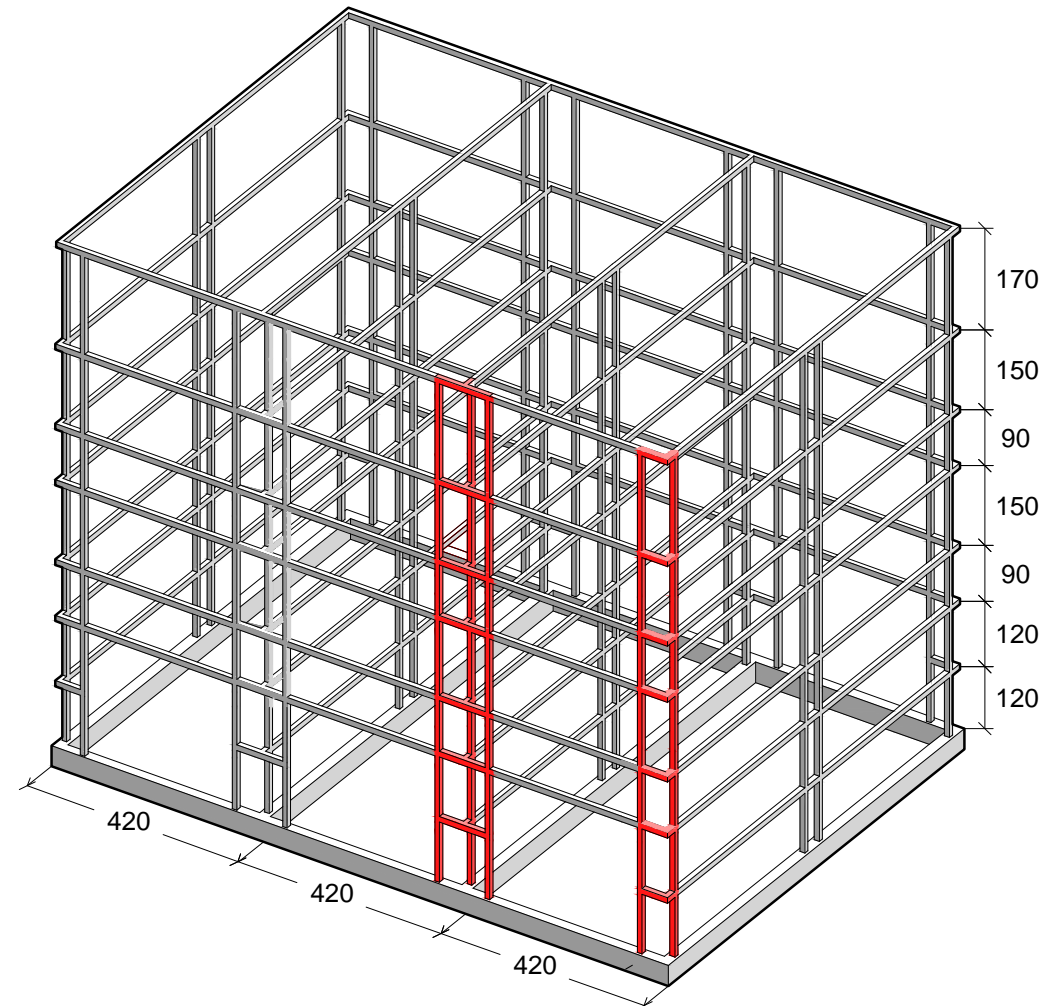
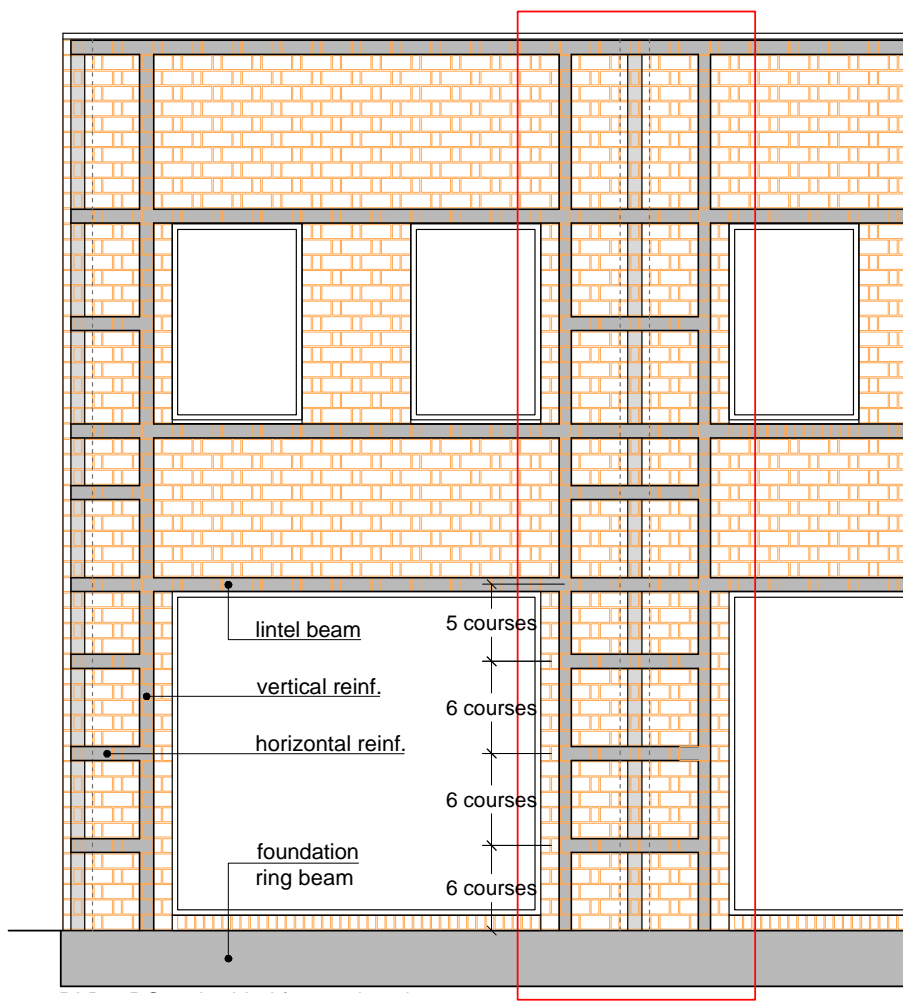
horizontal reinforcement

Tie beams are placed
every 10/13 courses

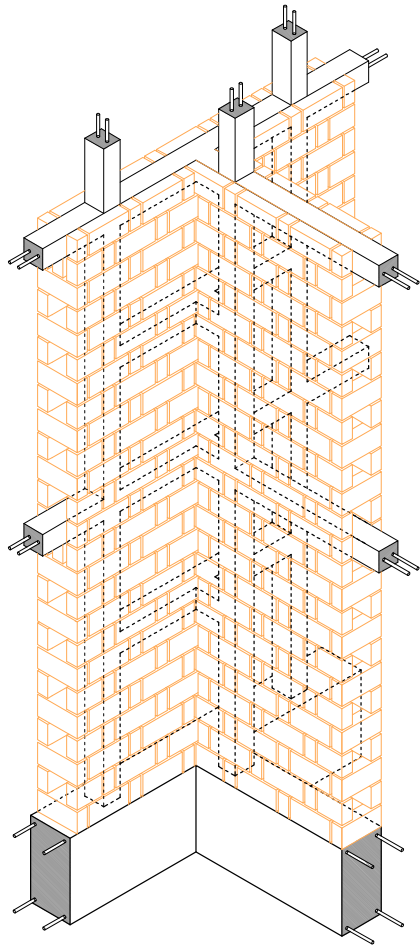


THE **RLB REINFORCEMENT**

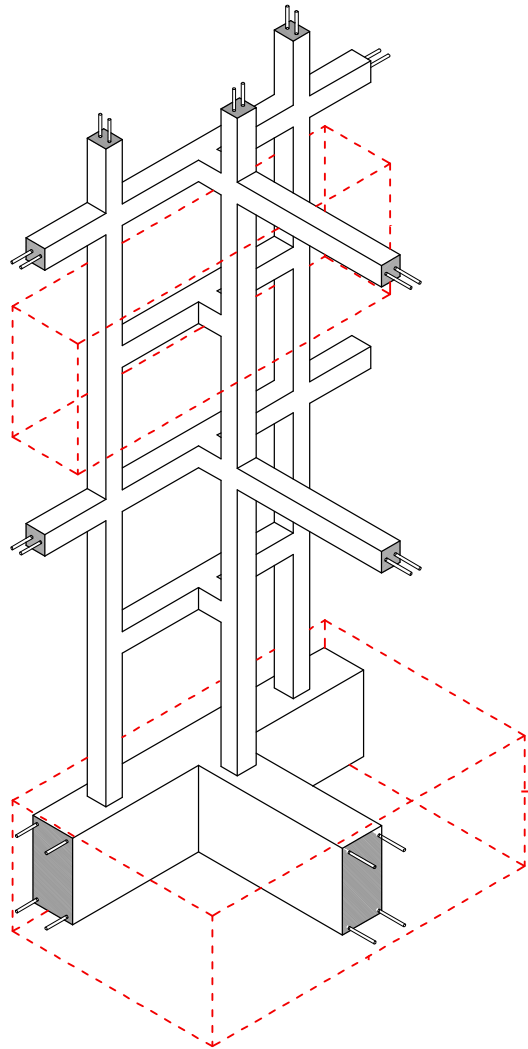
T-shape and corner reinforcement



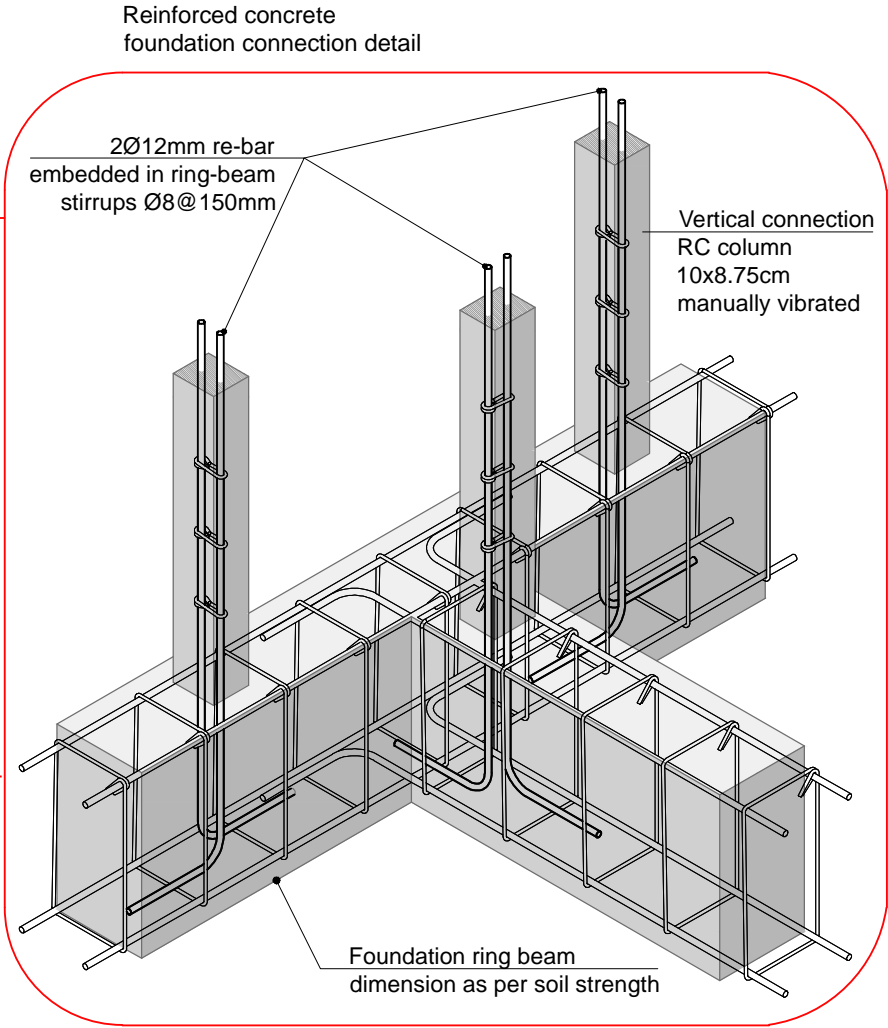
THE ROW LOCK BOND REINFORCEMENT



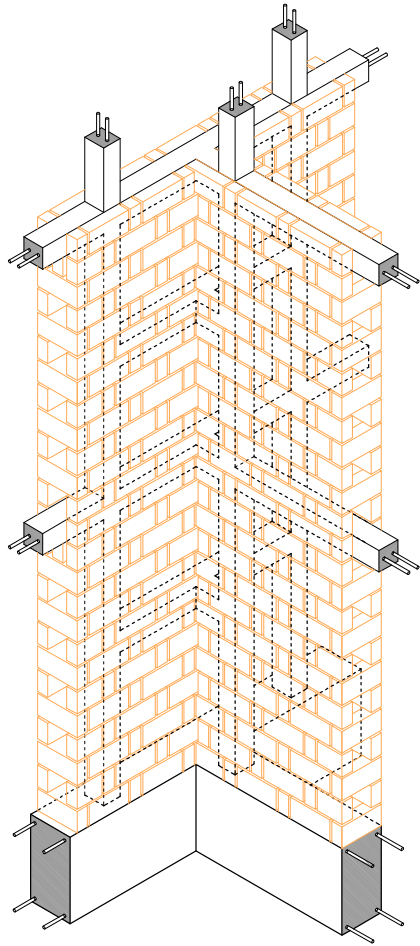
RLB masonry



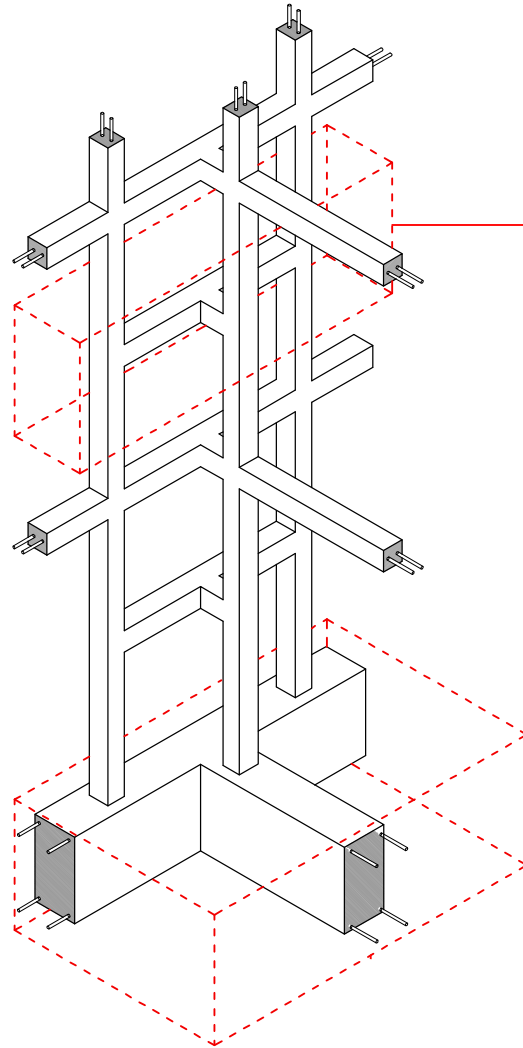
RLB embedded
reinforced concrete frame



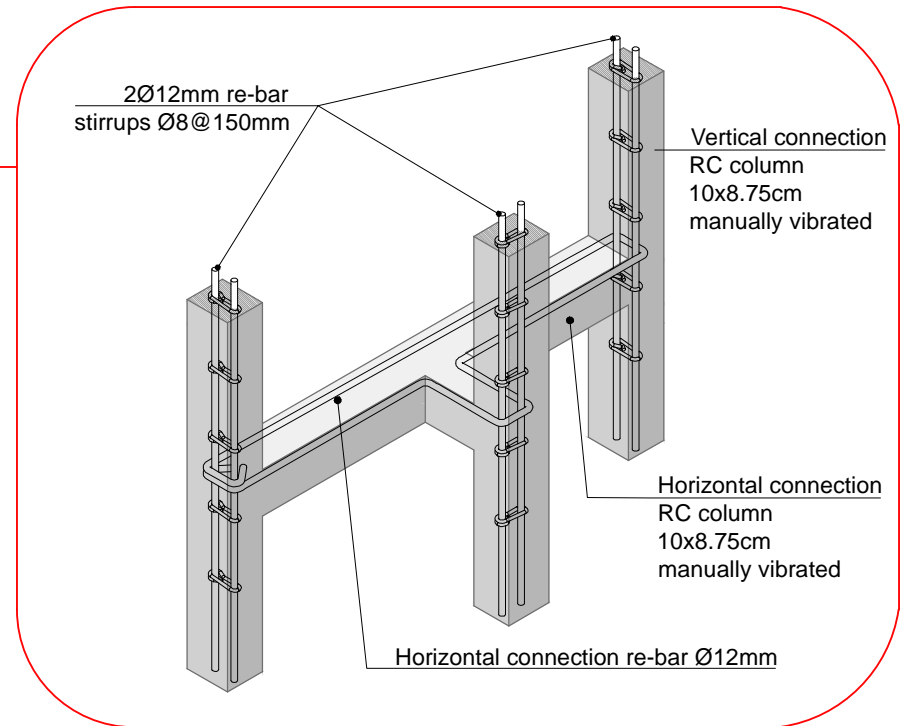
THE ROW LOCK BOND REINFORCEMENT



RLB masonry



RLB embedded
reinforced concrete frame



T-shape reinforced concrete
connection detail

THE **MAXIMUM NUMBER OF STOREYS**

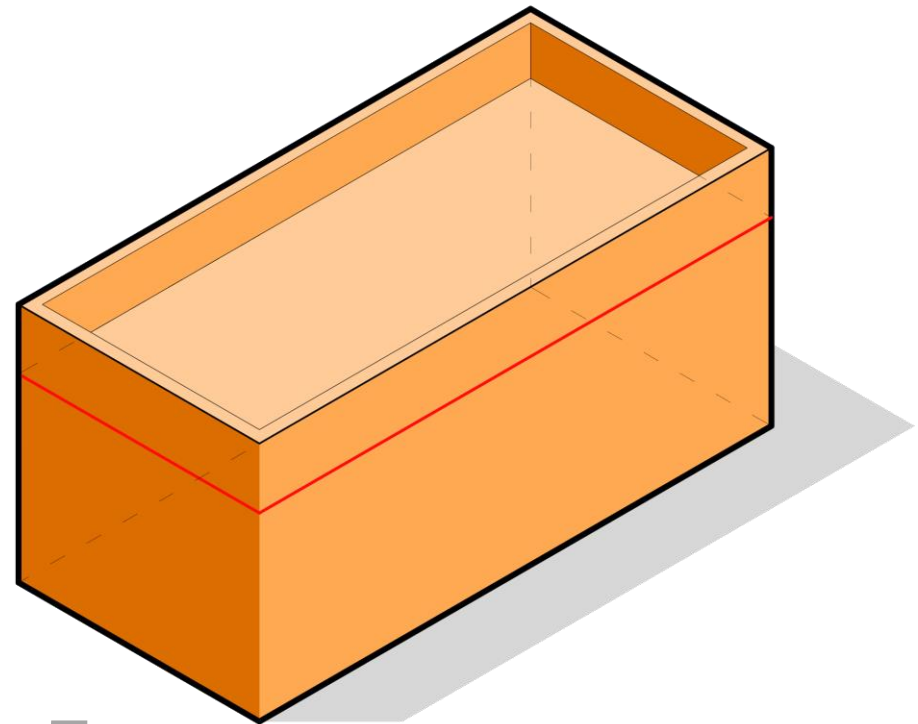
RCC reinforced RLB

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



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