



ICIMOD

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Zig-zag stacking
“bharai” (bojhai)

ZAG-ZAG STACKING BHARAI (BOJHAI)

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- INSIDE CHAMBER
- OUTSIDE CHAMBER (OPENINGS IN WALL)
- CHAMBER SIZE

1. Straight Line Stacking & Zig-Zag Stacking

A. Path of Fire Movement:

- Fire travels in straight path in straight-line stacking pattern
- Fire changes travel direction (zig-zag path) in zigzag stacking pattern



Straight line stacking



Zig-zag stacking

Straight Line Stacking & Zig-Zag Stacking

B. Number of gaps (Jhiris)

- Less Jhiris in zig-zag stacking than in straight line stacking
- For 32 feet dug width:

Straight line = 28 Paya = 29 Jhiris, Zig-Zag = 32 Paya = 17 Jhiris

Number of bricks per unit chamber length- greater in zig-zag than straight line stacking



2.1. ZIG-ZAG STACKING LAYOUT

WHY PAYA LAYOUT?

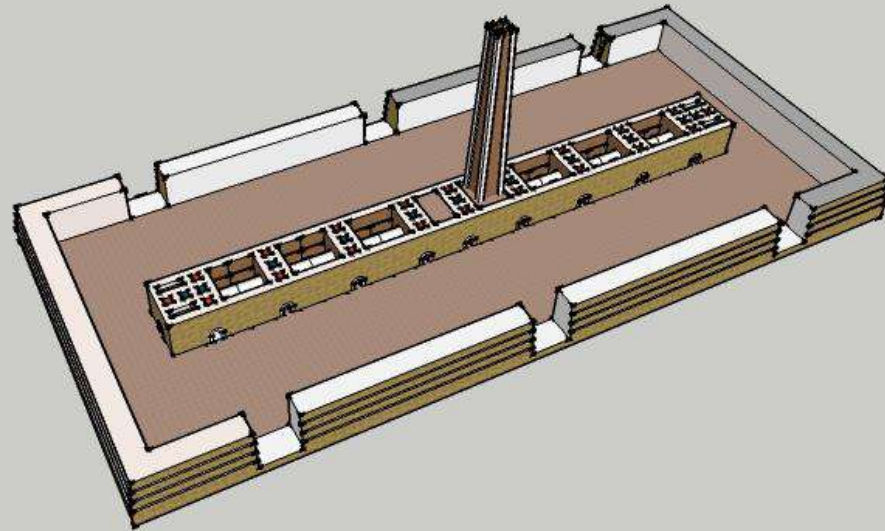
- FEED HOLES (MODI) PLANNING
- TO MAINTAIN EQUAL GAP
- SCIENTIFIC SETTING OF PAYA

PAYA SETTING

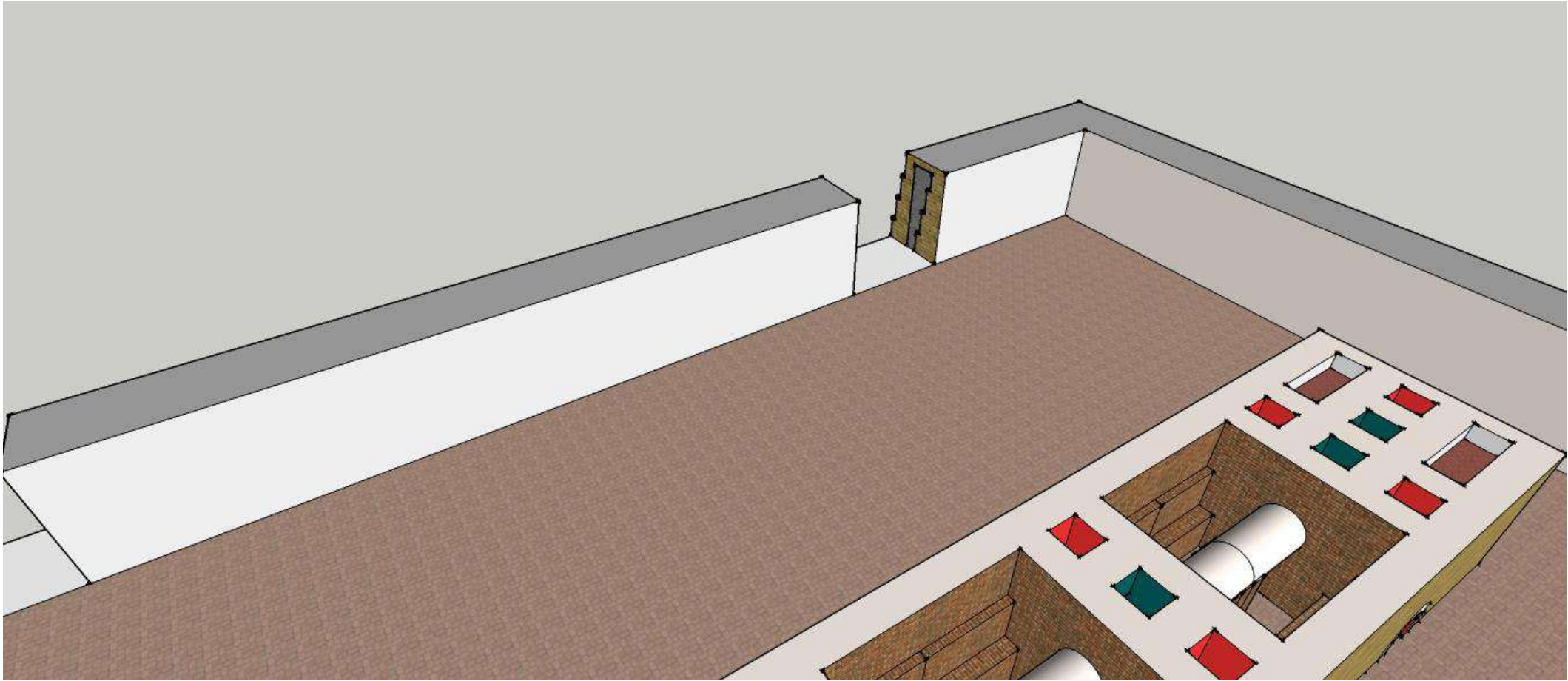
- 1 BRICK PAYA (~10 INCH)
- 2 BRICKS PAYA (~20 INCH)
- 3 BRICKS PAYA (~30 INCH)
- UNIFORM PAYAS



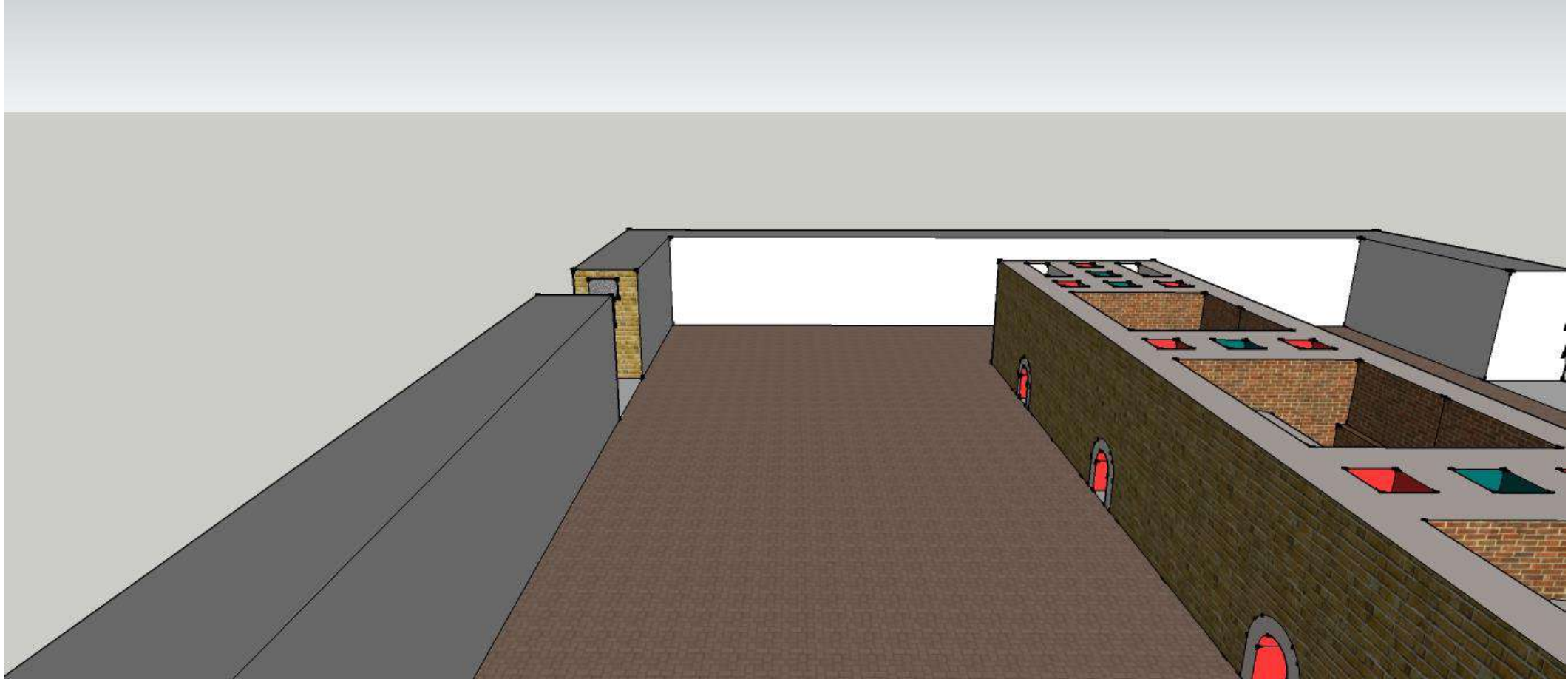
2.1.1 ZIG-ZAG STACKING LAYOUT



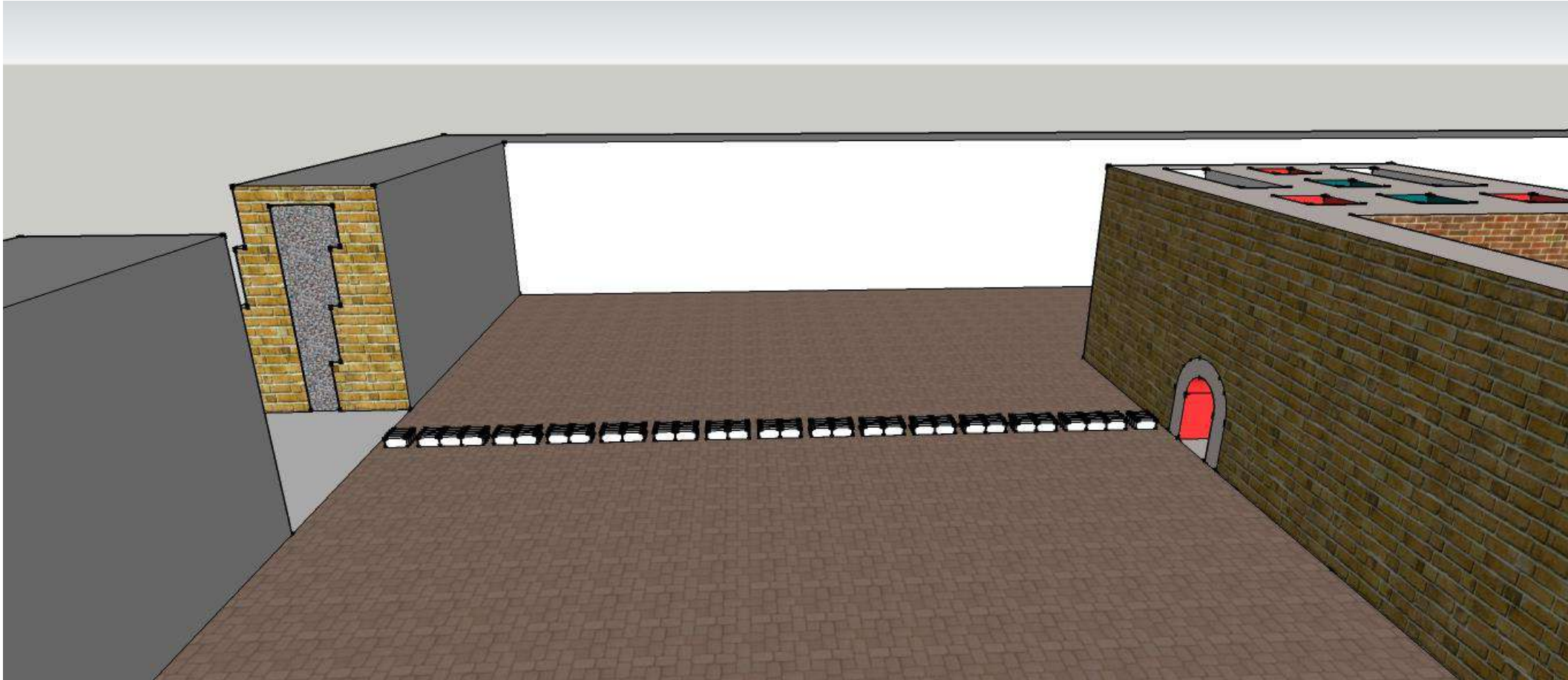
2.1.2 ZIG-ZAG STACKING LAYOUT



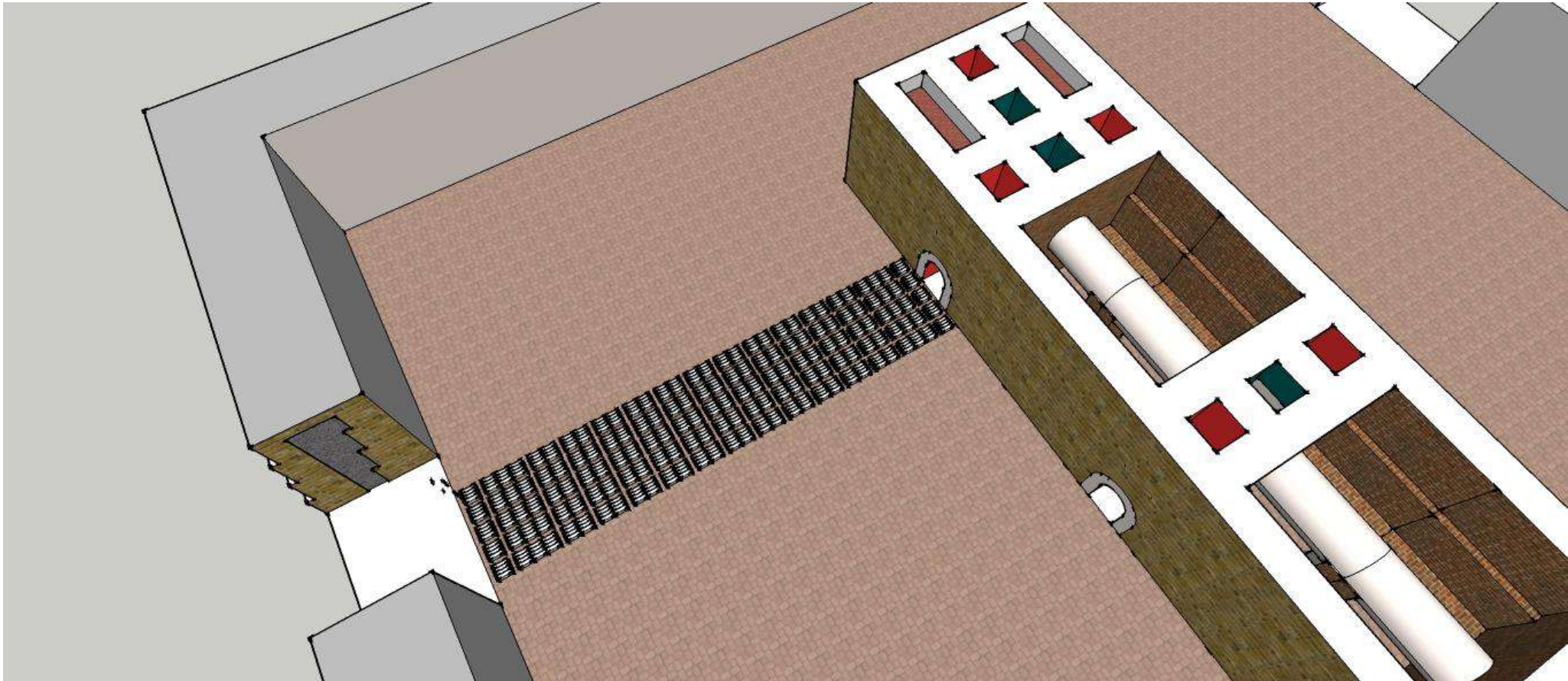
2.1.3 ZIG-ZAG STACKING LAYOUT



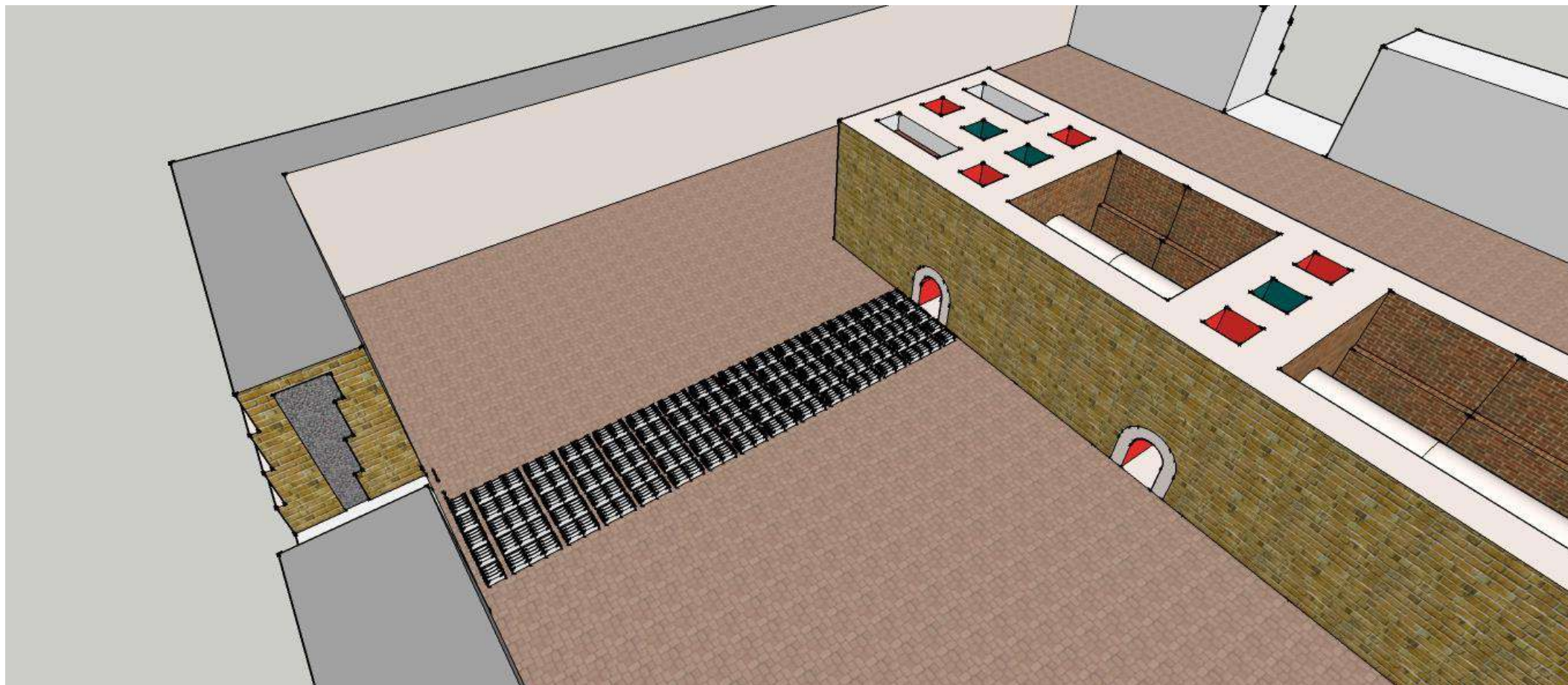
2.1.4 ZIG-ZAG STACKING LAYOUT



2.1.5 ZIG-ZAG STACKING LAYOUT



2.1.6 ZIG-ZAG STACKING LAYOUT



2.1.7 ZIG-ZAG STACKING LAYOUT



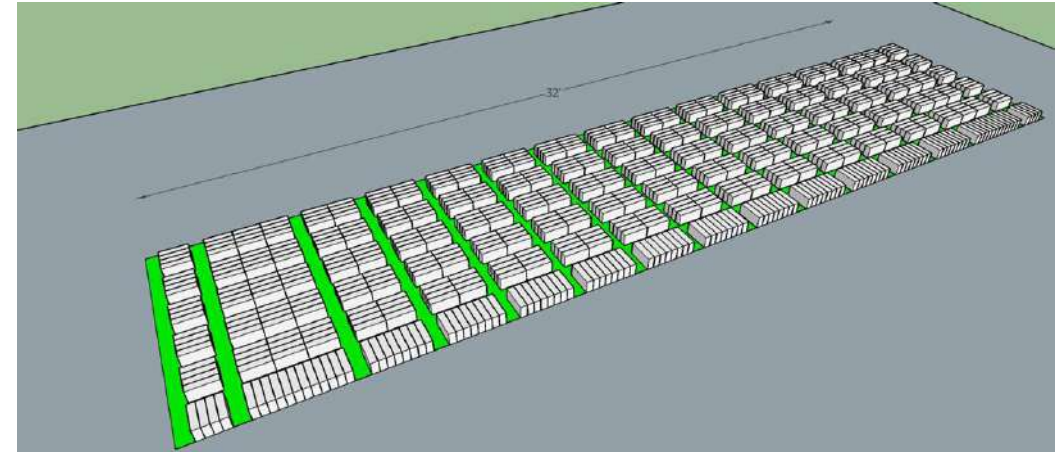
2.1.8 ZIG-ZAG STACKING LAYOUT

PAYA LAYOUT

- 1 BRICK PAYA (~10 INCH)
- 2 BRICKS PAYA (~20 INCH)
- 3 BRICKS PAYA (~30 INCH)
- UNIFORM PAYAS
- Proportion of Payas and Feedholes should be uniform for proper heat balance

FEED HOLES (MODI) PLANNING

- FEED HOLES SHOULD BE UNIFORM IN DISTANCE



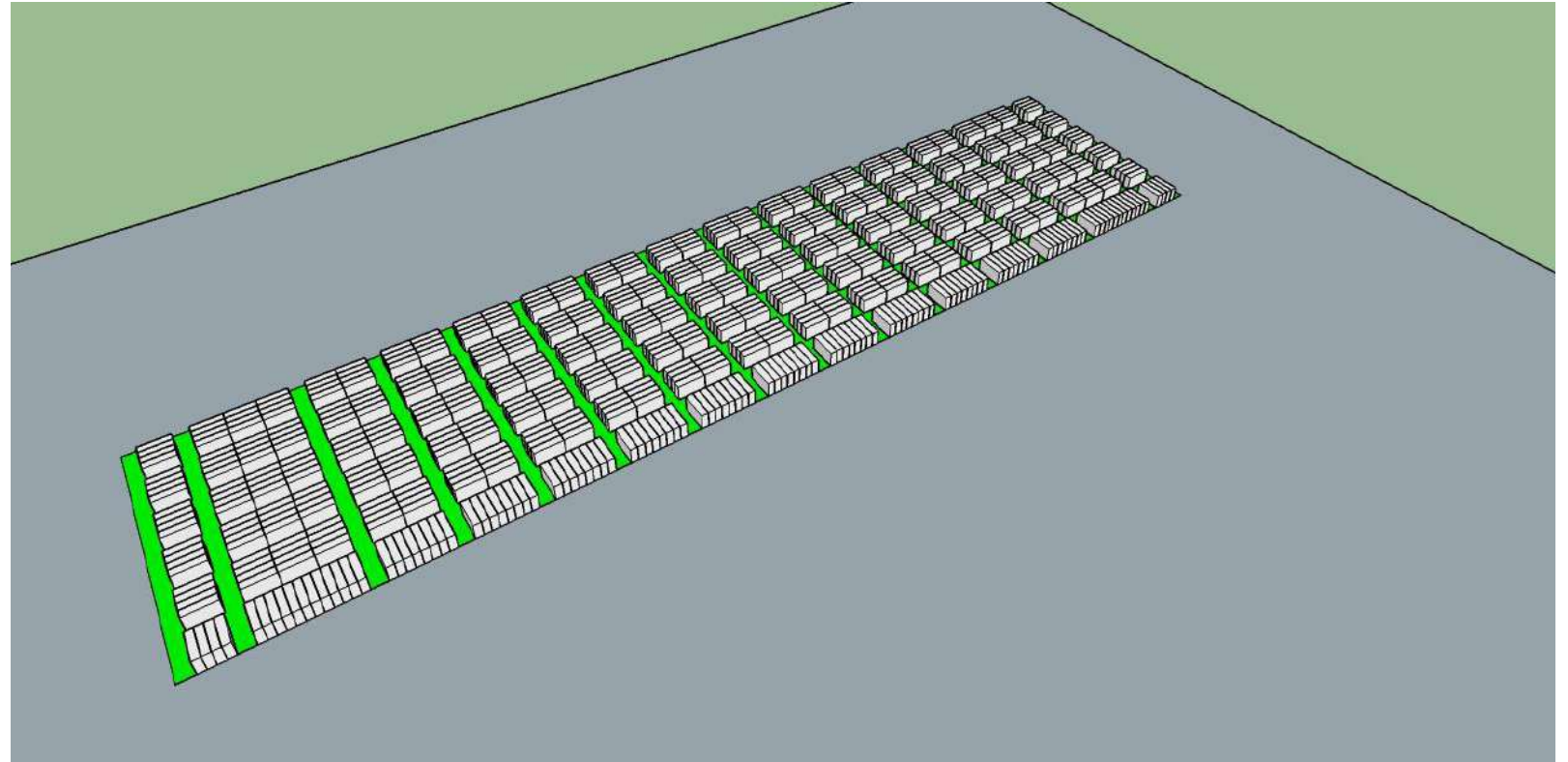
2.2.9 ZIG-ZAG STACKING INSIDE CHAMBER

PAYA

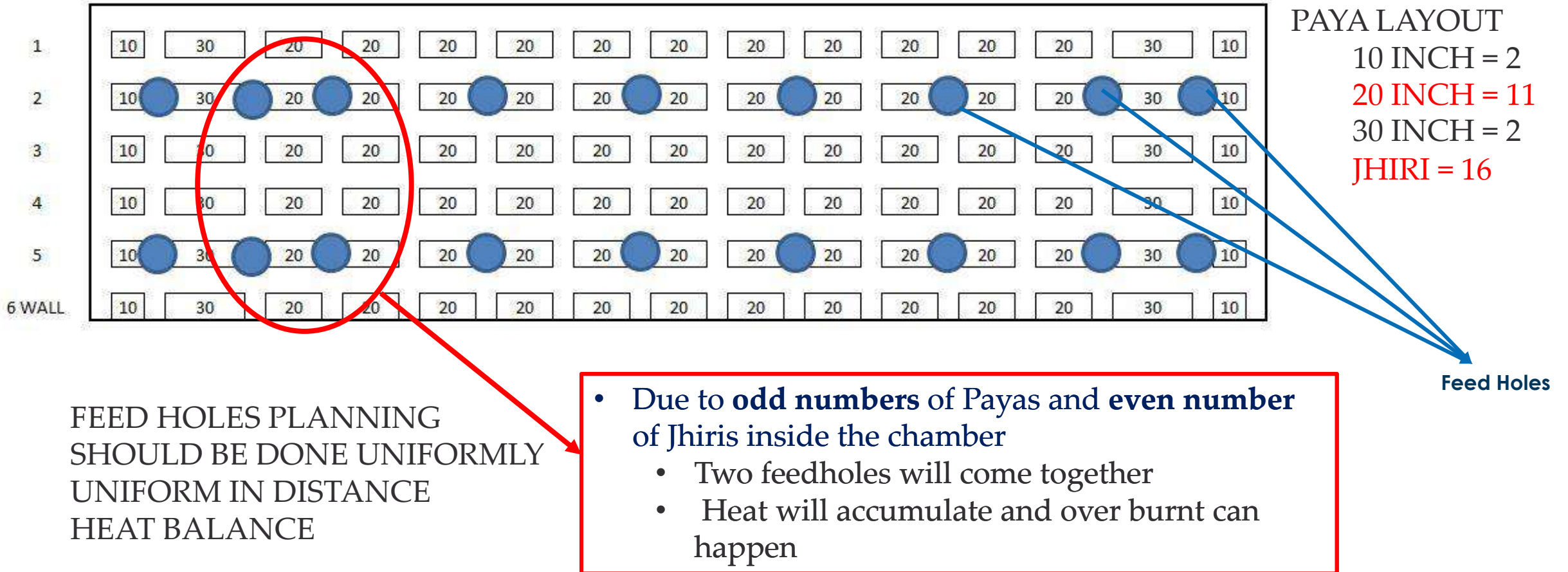
- 10,20,30

JHIRI

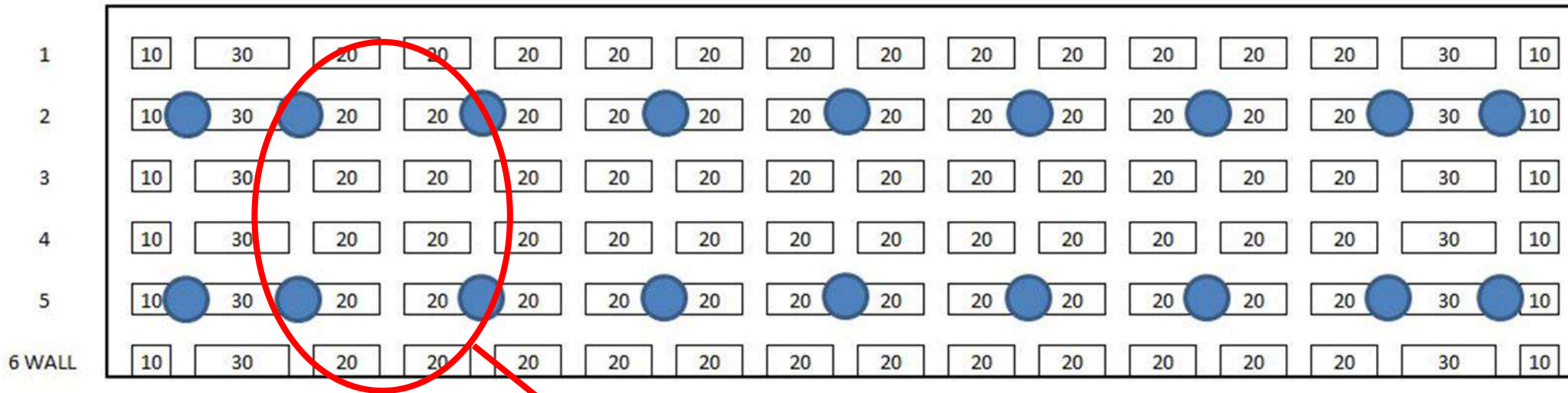
- 4.5" TO 5.5"



2.2.0 ZIG-ZAG STACKING LAYOUT

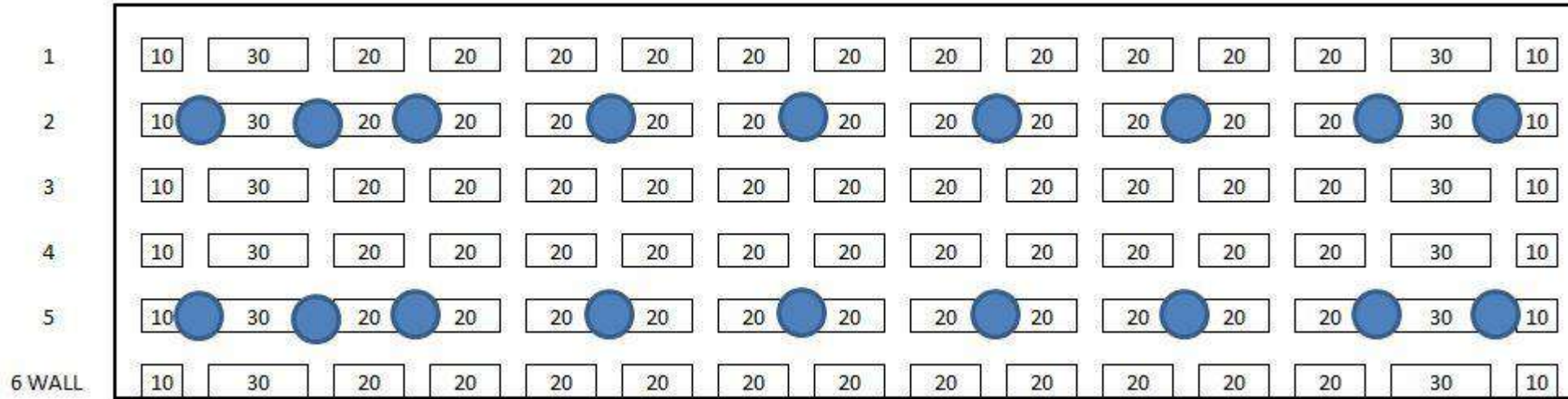


2.2.1 ZIG-ZAG STACKING LAYOUT

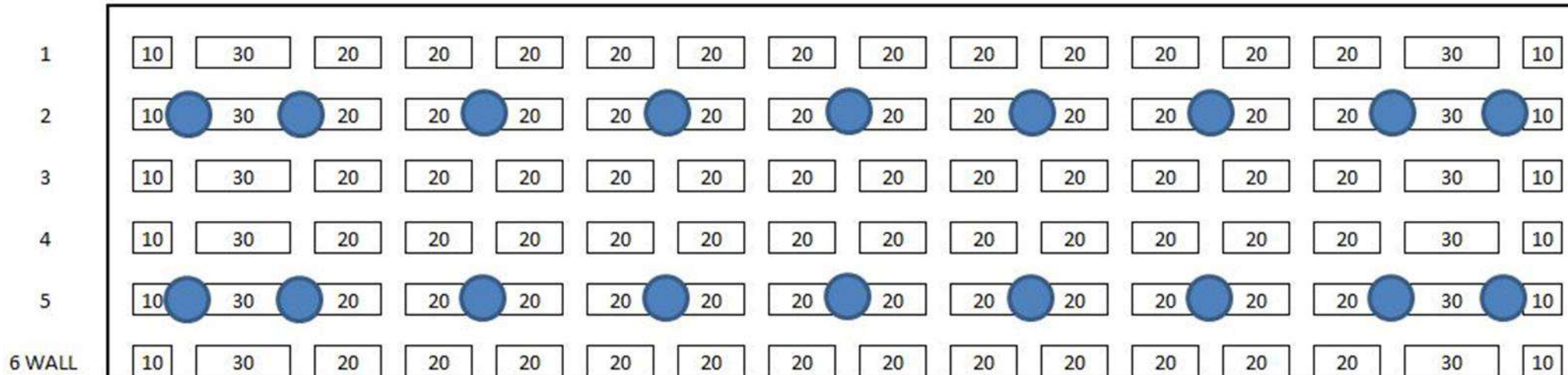


PAYA LAYOUT
10 INCH = 2
20 INCH = 12
30 INCH = 2
JHIRI = 17

2.2.5 ZIG-ZAG STACKING LAYOUT



PAYA LAYOUT
 10 INCH = 2
 20 INCH = 11
 30 INCH = 2
 JHIRI = 16



PAYA LAYOUT
 10 INCH = 2
 20 INCH = 12
 30 INCH = 2
 JHIRI = 17

2.2.3 ZIG-ZAG STACKING INSIDE CHAMBER

PAYA & JHIRI

BANDHAN

4 BANDHAN BEFOR JODI

1 JALI BANDHAN WITH FLAT MODI

JODI

PAYA JODI

JHIRI JODI

POT JODI

PATAN

FEED HOLE



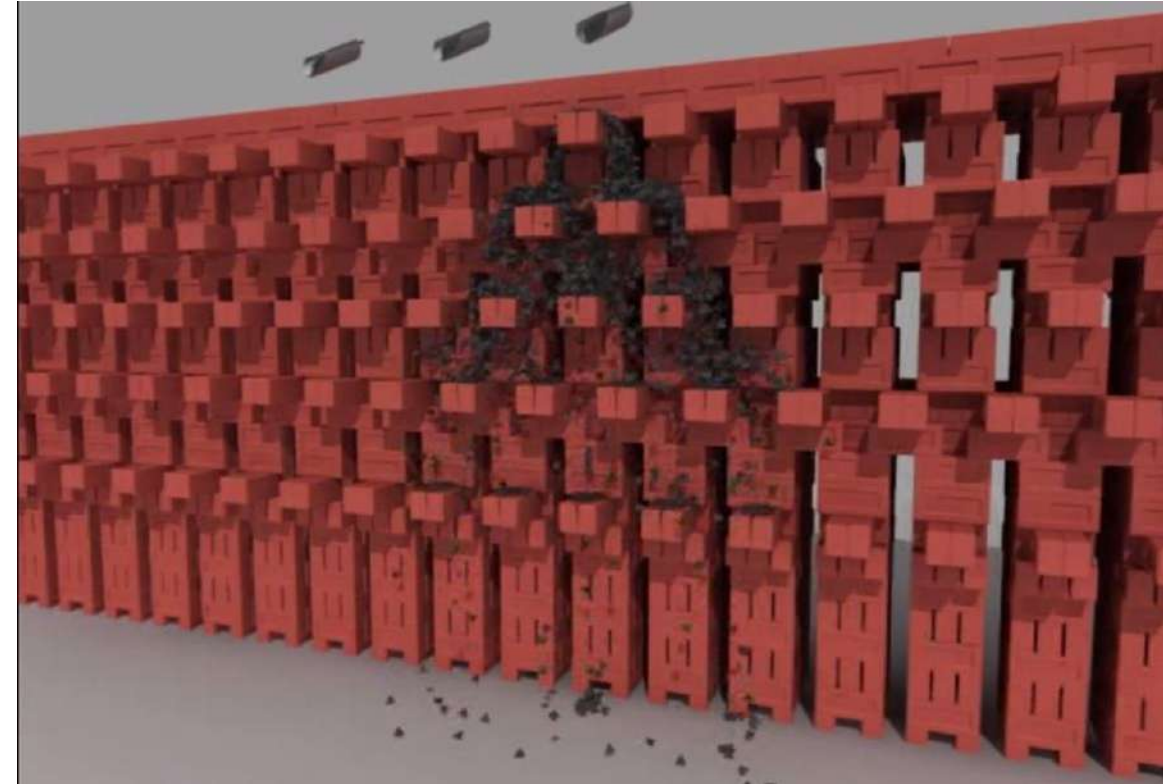
2.2.3 ZIG-ZAG STACKING INSIDE CHAMBER

JODI

- PAYA JODI
- JHIRI JODI
- FLAT (POT) JODI

Points to be Remember

- Usually, 5 *jodis* are kept
- If needed, 6 *jodis* can be incorporated
- Topmost Jodi is 'Flat Jodi' (10"*10")
- 3 *jodis* on *paya* and 2 *jodis* on *jhiri*
- *Paya* and *jhiri jodis* come in alternate way
- The base floor should be visible from Modi (after Raphis/Keri insulation)



2.2.4 ZIG-ZAG STACKING INSIDE CHAMBER

Jodi Design

1. At first, decide the numbers of Radda (Tala)
2. Total five Jodies can be made at 2-3-3-3-3 location of radda from the top flat Modi
For example: if we have total 22 Raddas the position of Jodis will be like as:
22-19-15-11-7

3. If the number of Radds exceed 30 then 6 jodis can be made.

➤ *Jodi* adjustment:

- Done on the basis of brick quality
- Heat balance top to bottom

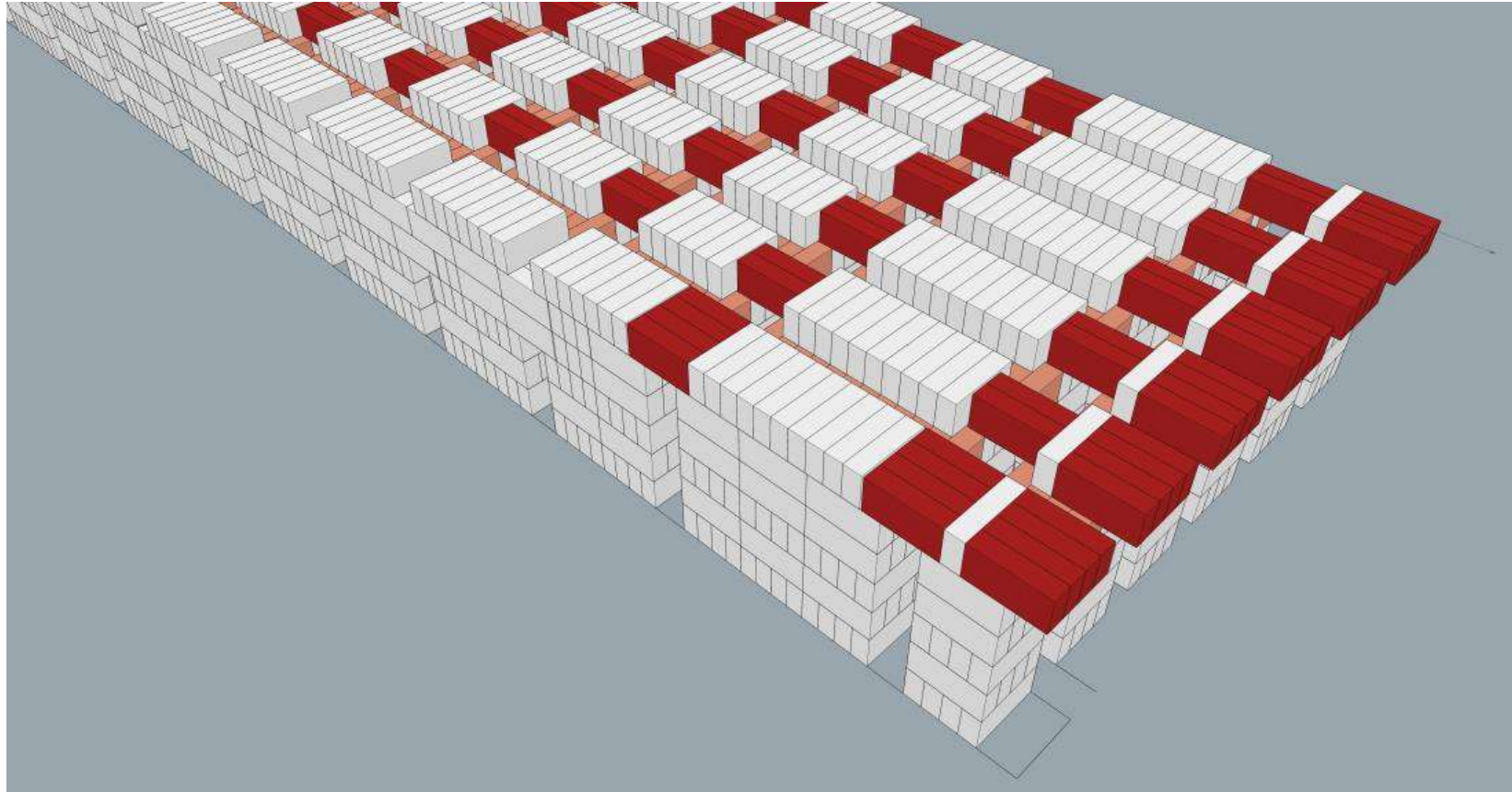
2.2.6 ZIG-ZAG STACKING INSIDE CHAMBER

BANDHAN



2.2.7 ZIG-ZAG STACKING INSIDE CHAMBER

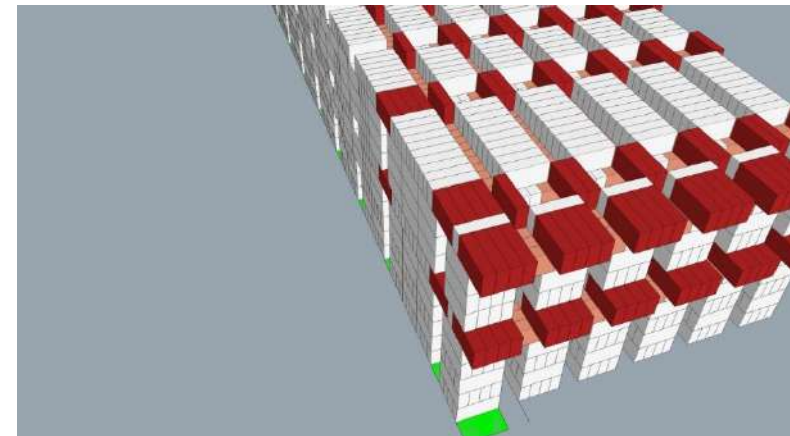
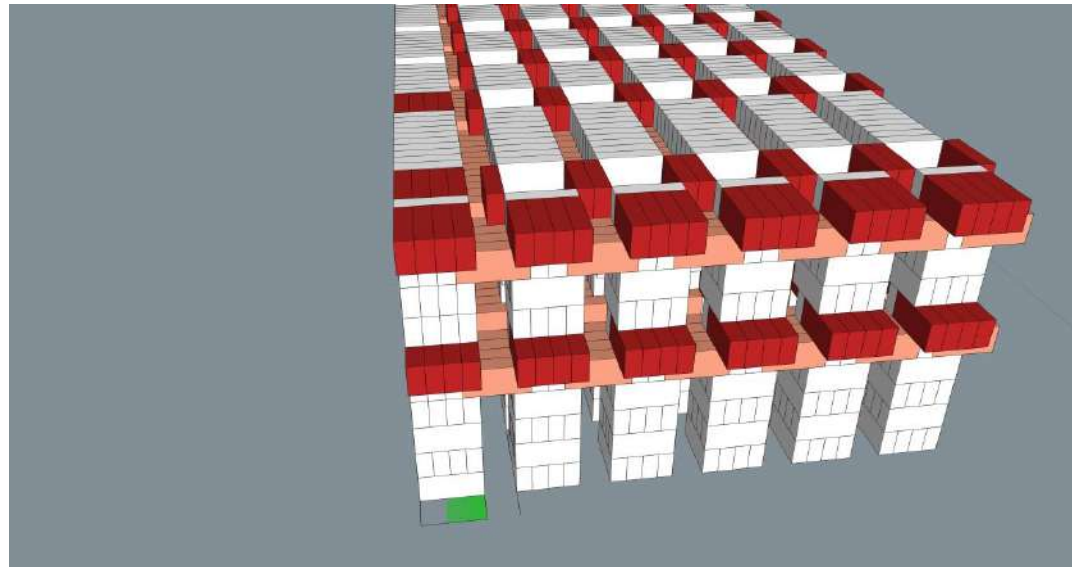
JODI



2.2.8 ZIG-ZAG STACKING INSIDE CHAMBER

JODI

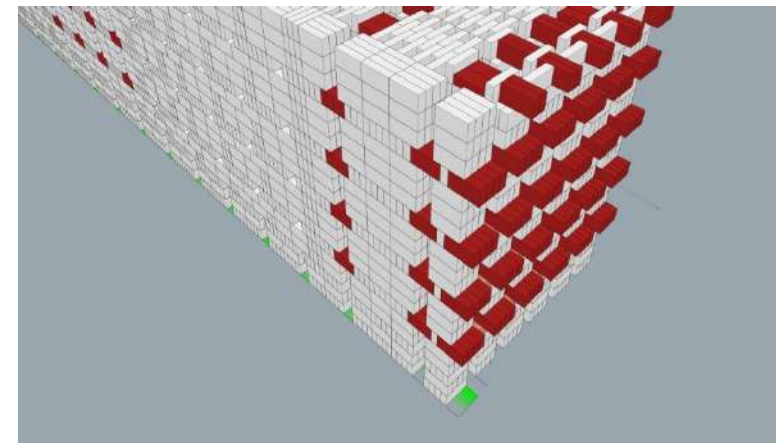
- JHIRI JODI



2.2.9 ZIG-ZAG STACKING INSIDE CHAMBER

JODI

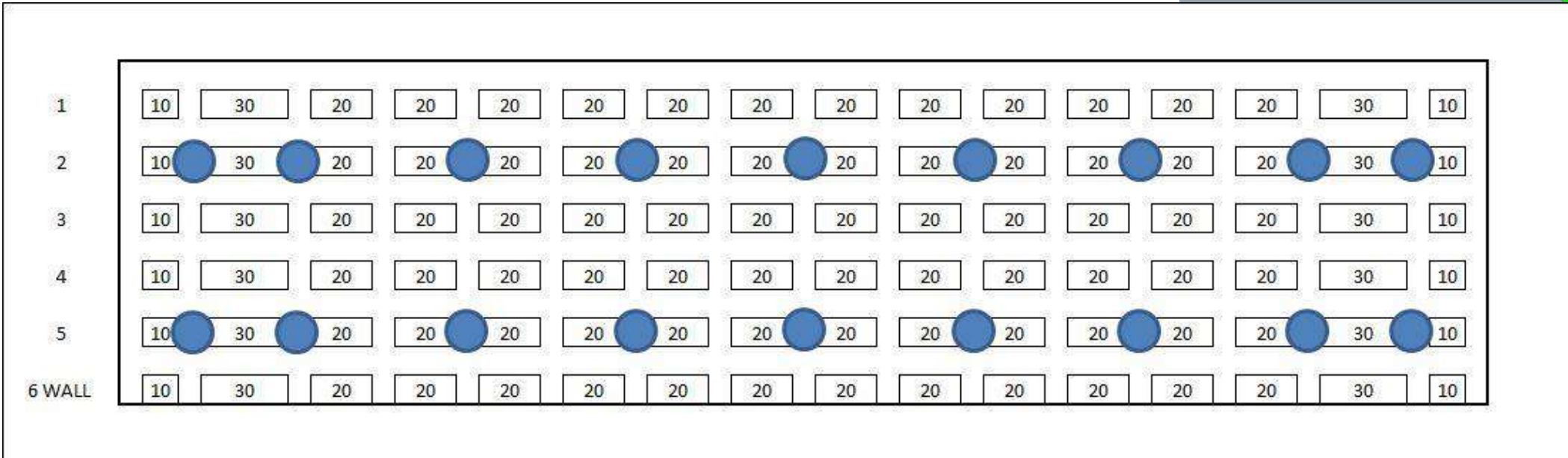
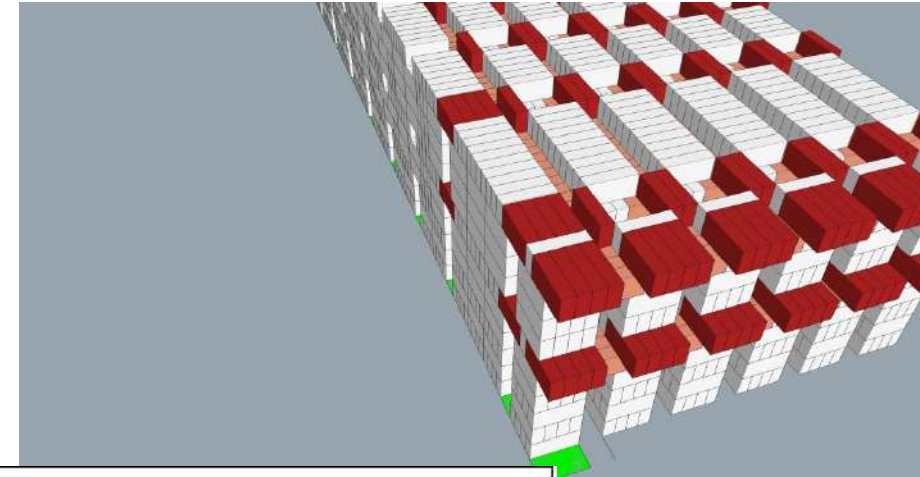
- POT JODI & JALI BANDHAN



BANDHAN

2.2.10 ZIG-ZAG STACKING INSIDE CHAMBER

- PATAN
- FEED HOLE



2.3 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

ZIG-ZAG IS MAINLY DESIGN OF GATE OF WALL

IS REQUIRED GATES DEFINED ?

NO, DEPENDS ON THE PRACTICE

WHY OPENINGS ARE REQUIRED IN THE WALL ?

SMOKE & FIRE TRAVELING PATH WHICH IS STRAIGHT
PORTION & ZIG-ZAG PORTION

2.3.1 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

- TYPES OF ZIG-ZAG
 - SINGLE ZIG-ZAG
 - DOUBLE ZIG-ZAG
 - TRIPPLE ZIG-ZAG



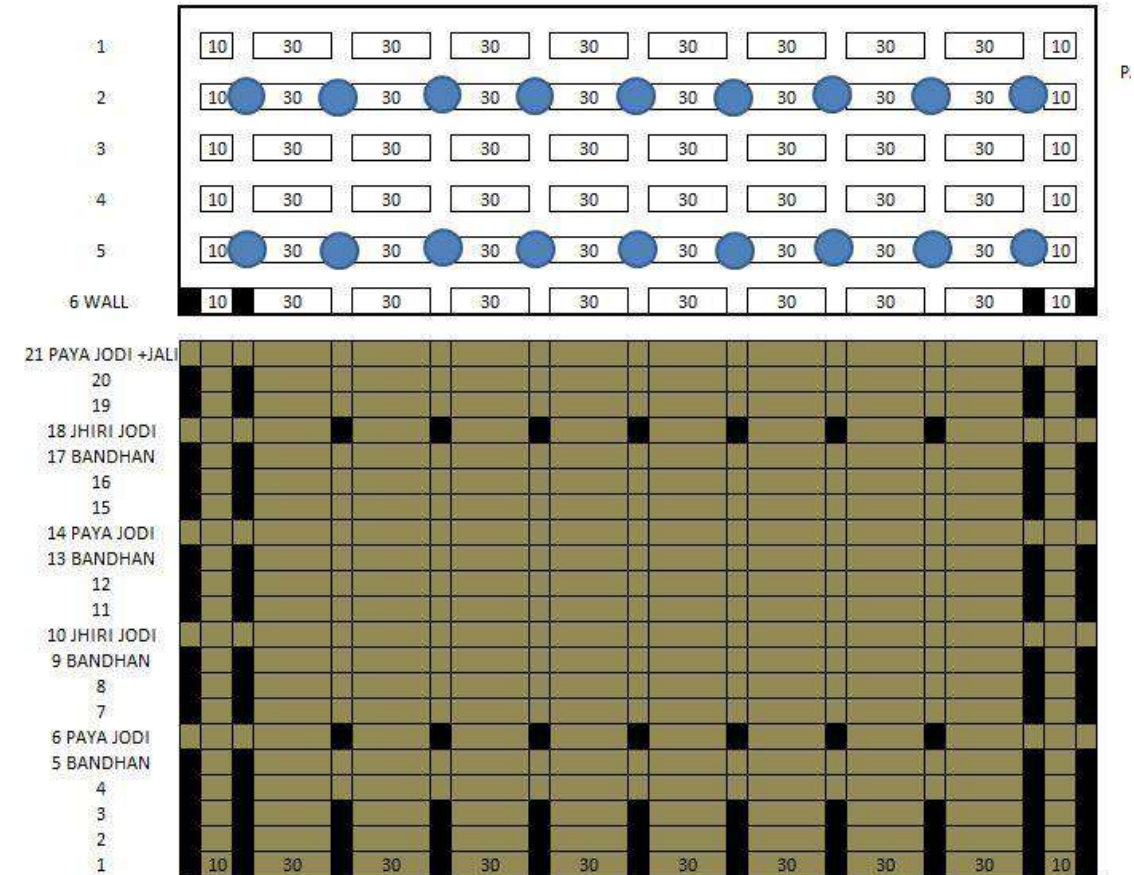
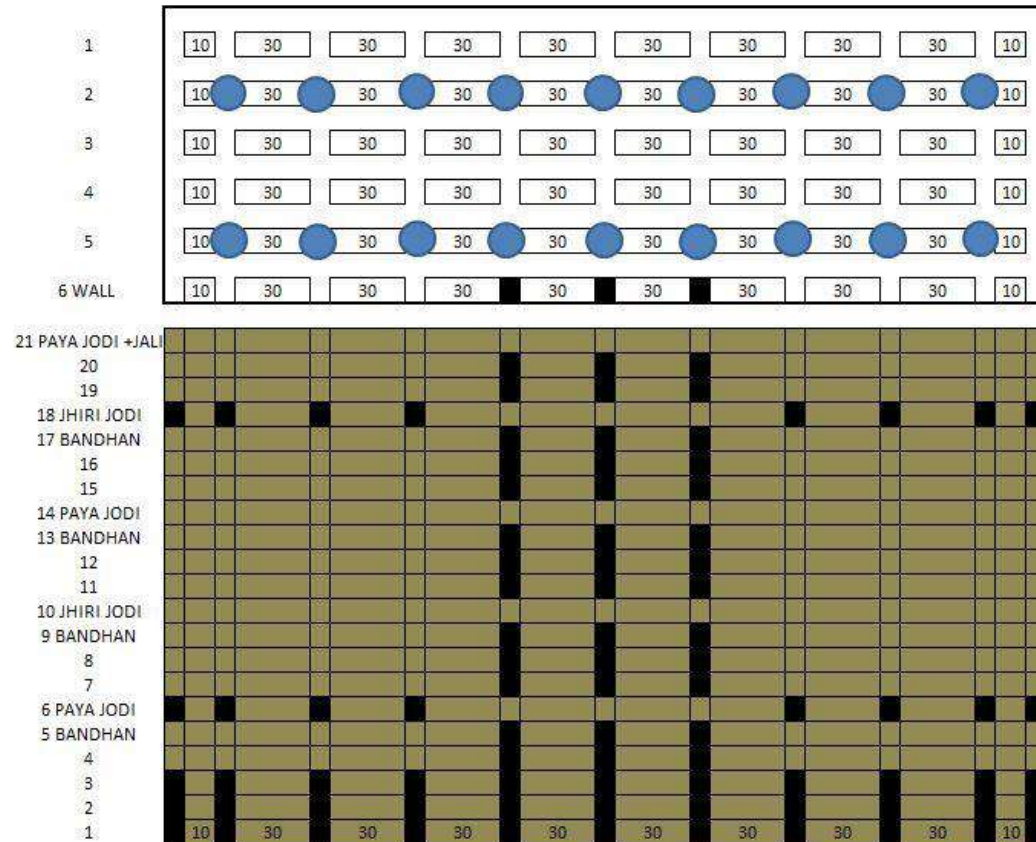
2.3.2 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

- DOUBLE ZIG-ZAG



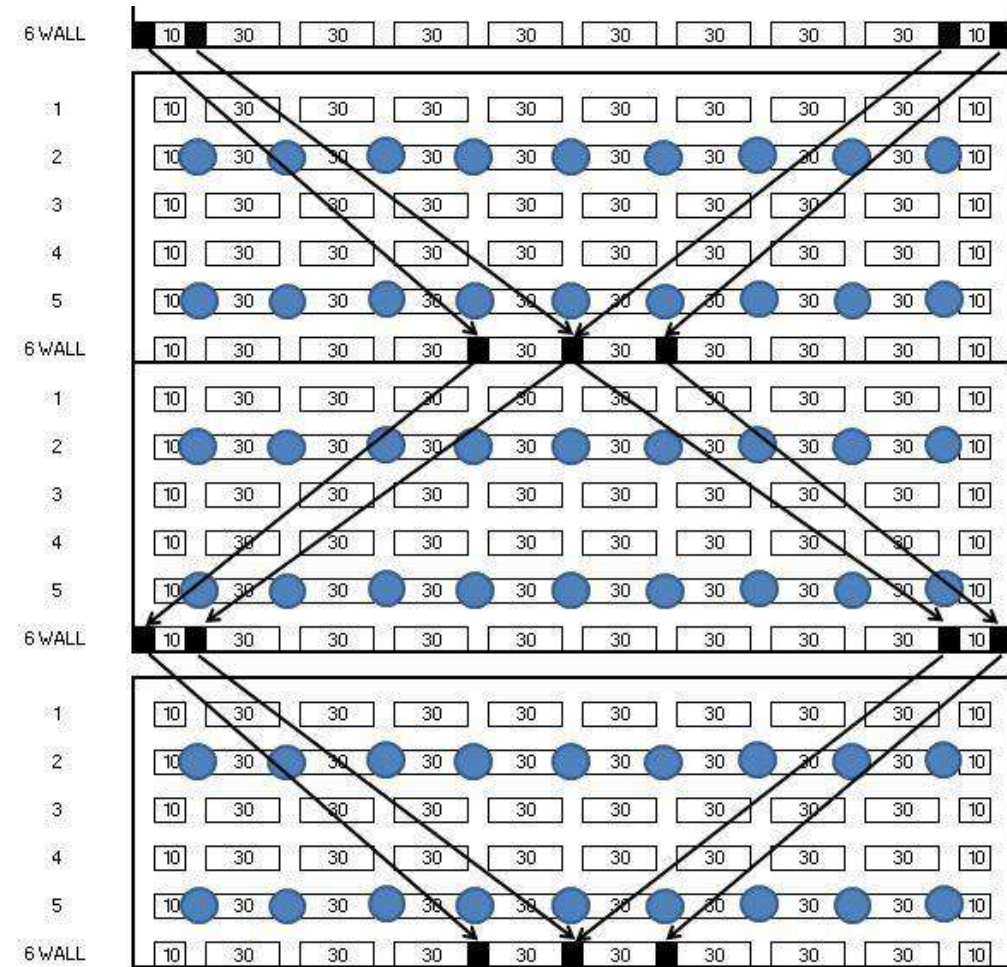
2.3.3 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

ZIG-ZAG_DOUBLE ZIG-ZAG



2.3.4 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL) Analysis

DOUBLE ZIG-ZAG



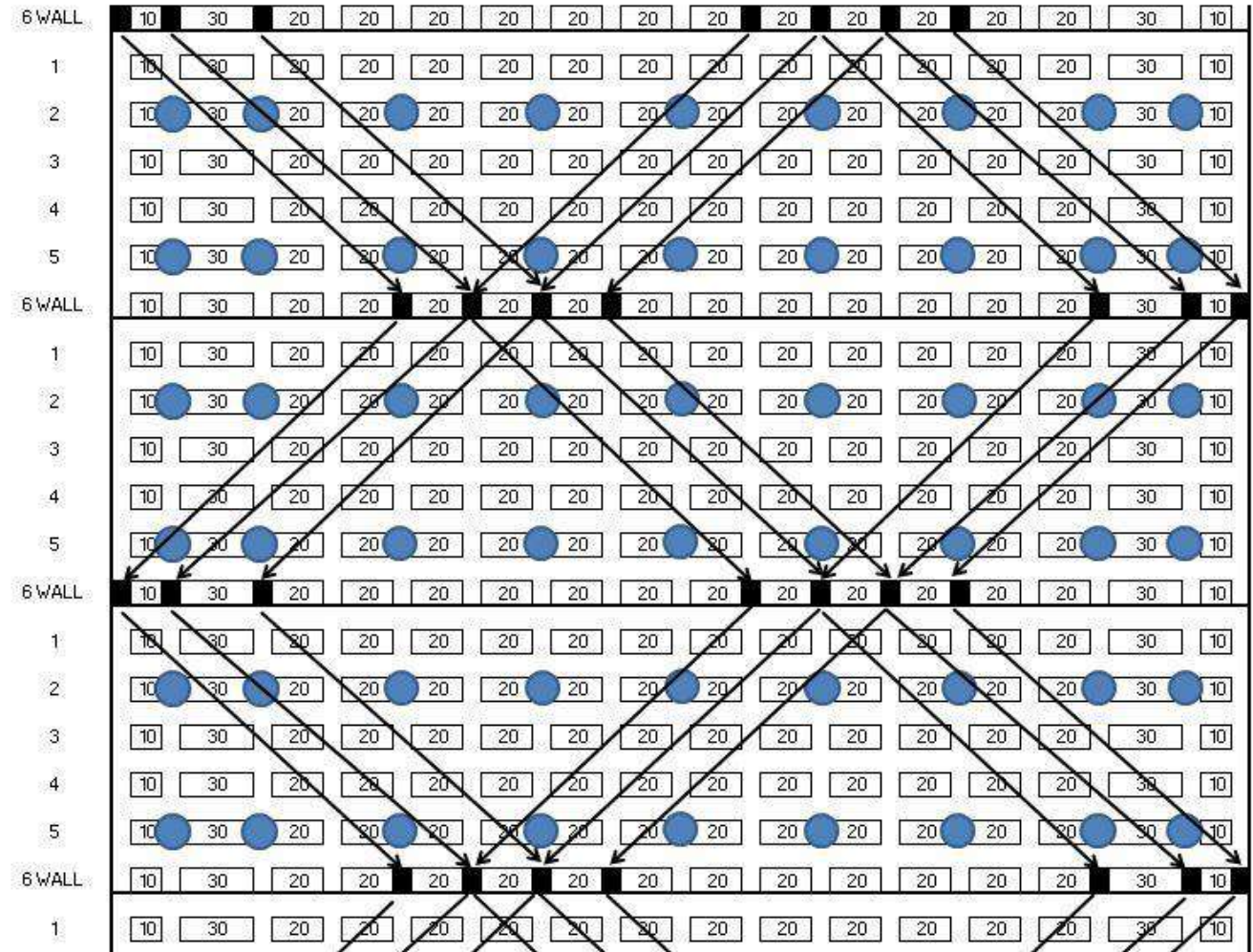
2.3.5 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

TRIPPLE ZIG-ZAG



2.3.7 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

- TRIPPLE ZIG-ZAG



2.3.8 ZIG-ZAG STACKING OUTSIDE CHAMBER (OPENINGS IN WALL)

ZIG-ZAG

- DOUBLE ZIG-ZAG
- TRIPPLE ZIG-ZAG
- STRAIGHT PORTION & ZIG-ZAG PORTION



2.4. ZIG-ZAG STACKING CHAMBER SIZE

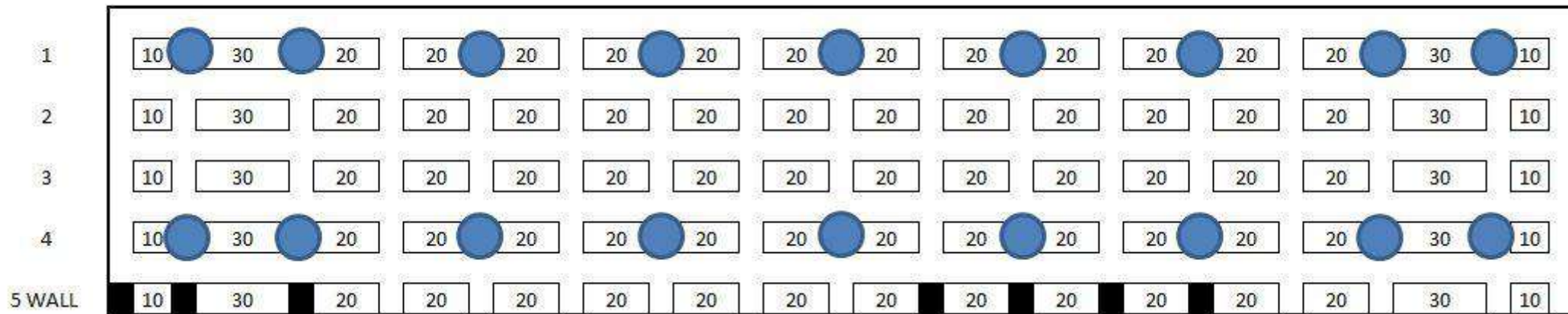
CHAMBER SIZE

- 4 PAYA + WALL = 5'-10" (70") APPROX.
 - 5 PAYA + WALL = 7'-1" (85") APPROX.
 - 7 PAYA + WALL = 9'-7" (115") APPROX.
 - 8 PAYA + WALL = 10'-10" (130") APPROX.
- The chamber size can be adjusted as per our convenience
 - It is recommended that, the **smaller chamber** size favour more efficient production. Because smaller chamber size leads more turbulence of heat with-in the zones, utilization of flue gas temperature and efficient combustion of fuel

2.4.1 ZIG-ZAG STACKING CHAMBER SIZE

CHAMBER SIZE

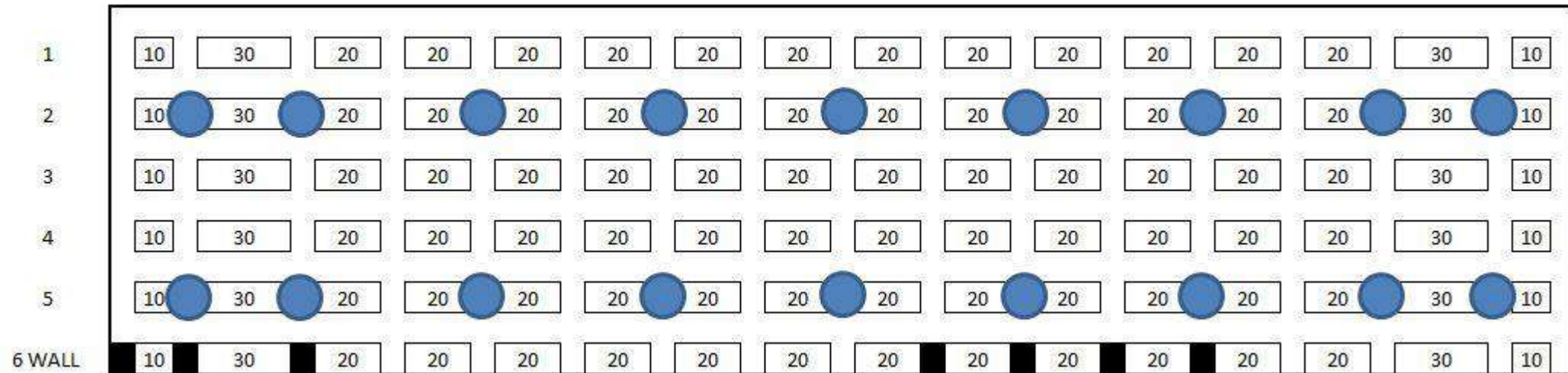
- 4 PAYA + WALL = 5'-10" (70") APPROX.



2.4.2 ZIG-ZAG STACKING CHAMBER SIZE

CHAMBER SIZE

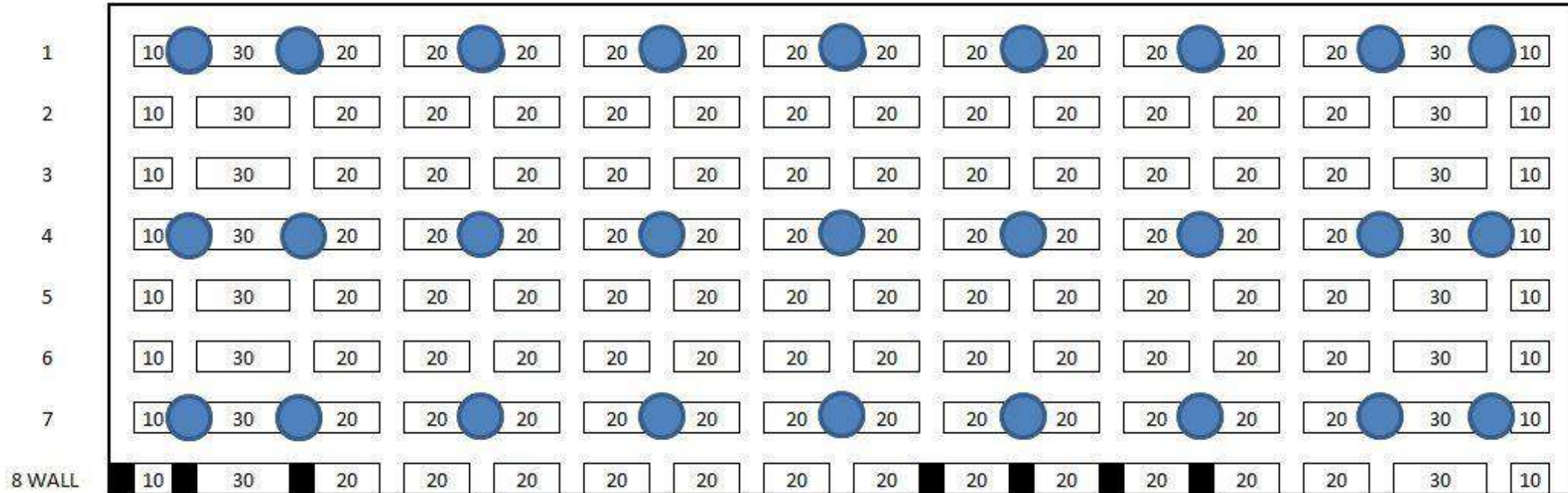
- 5 PAYA + WALL = 7'-1" (85") APPROX.



2.4.3 ZIG-ZAG STACKING CHAMBER SIZE

CHAMBER SIZE

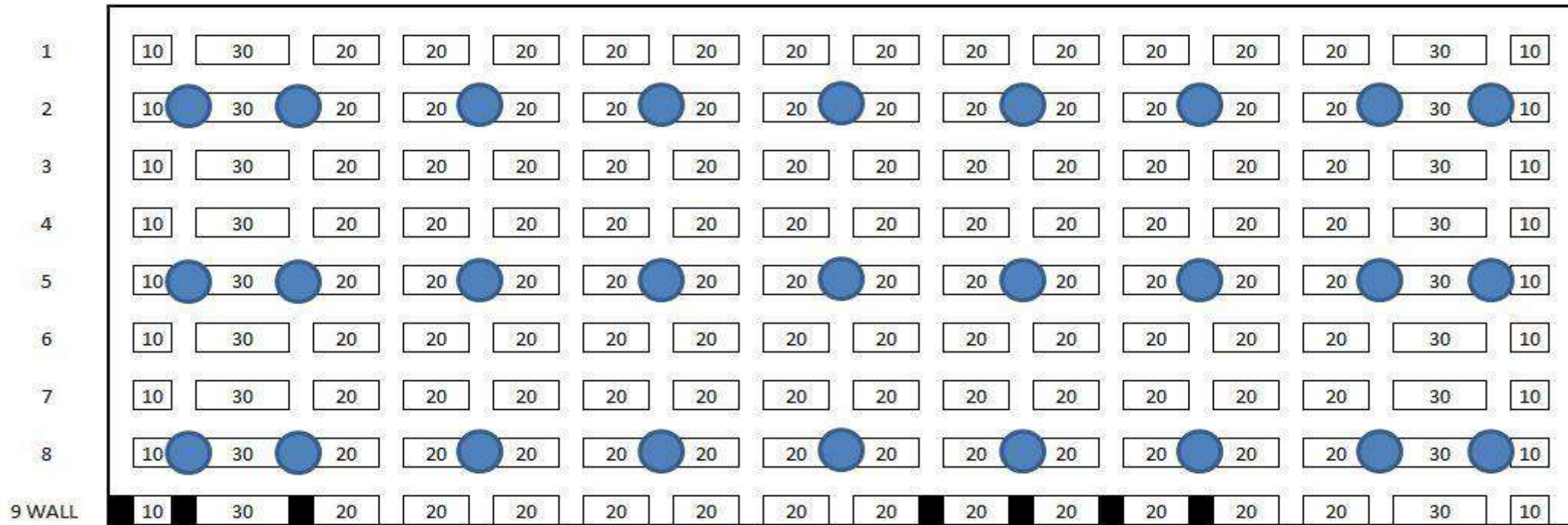
- 7 PAYA + WALL = 9'-7" (115") APPROX.



2.4.4 ZIG-ZAG STACKING CHAMBER SIZE

CHAMBER SIZE

- 8 PAYA + WALL = 10'-10" (130") APPROX.



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Thank you

Let's protect
the pulse.