

## Edges Report #162

### Ground plane for Edges-3 and Inner base plate design

Titu Samson

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#### Objectives

- Upgradation of existing 30 X 30-meter ground mesh of low-2 to 48.8 X 50 meter
- Installation of 48.8 X 50-meter ground mesh for Edges-3
- Design of 2.4 X 2.4-meter inner base plate for placing Edges-3 receiver
- Add a provision to the base plate for taking observation by placing Edges-3 receiver in orthogonal directions.

Edges-3 receiver is planned to install with a 48.8 X 50-meter welded mesh ground plane. Alan and Niveditha had done simulation analysis on different mesh size and shape of the ground plane. From the simulation results and availability of mesh, it was concluded to go with the mesh size of 5 cm X 5 cm X 3.15mm with perforated edges as shown in the figure1

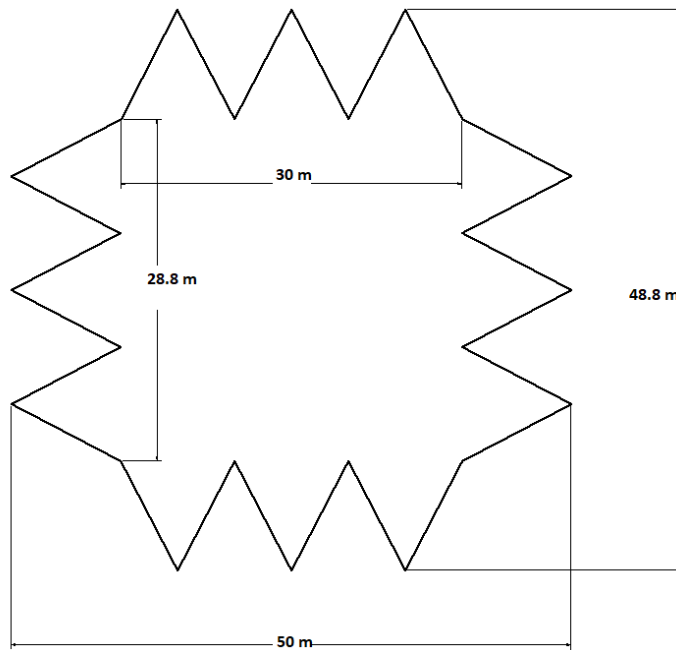


Figure 1. Perforated edge mesh ground

48.8 X 50-meter ground plane is made with standard mesh panels size of 5x2.4m. Each sawtooth triangle along the edge is be made by cutting two of 5 X 2.4-meter mesh panels diagonally to result in four triangular pieces for the sides and using two full panels in the

interior of each triangle. The inner square is made of 72 mesh panels in a grid of 6 x 12. The total number of mesh panels required is 120.

The low-2 ground plane will be extended so it is similar to Edges-3. To do so, the sawtooth triangles from the existing low-2 ground plane will be removed and discarded. The inner square will be extended with new mesh panels and new sawtooth triangles will be added around the edge.

### **Inner base plate design and assembly**

Edges-3 receiver is placed on a square aluminum sheet of 2.4 m X 2.4 m X 5 mm. The standard aluminum sheet dimension is 1.2 m X 2.4 m X 5 mm. The base plate is made with two sheets and screwed to the frame, a door is made at the center for the air circulation pipe and cable connectivity.

### **Inner base plate assembly**

#### **1. Structure**

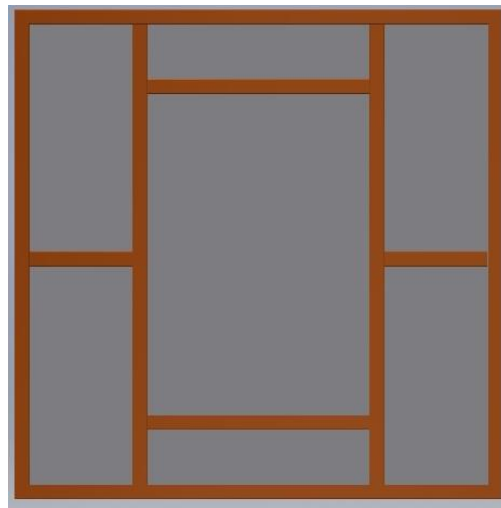


Figure 2. Steel frame structure

Figure 2. shows the steel frame structure. The frame is made with a hollow steel section of dimension 75 mm X 25mm X 2.5mm. The dimension of the structure is given in drawing\_1. All measurements in the drawing are in inches.

## 2. Baseplate

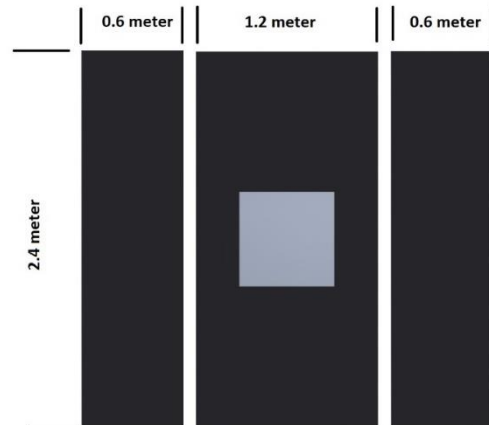


Figure 3. Aluminum base plate design

The base plate is made of aluminum sheet 2.4 meter X 2.4 meter X 5 mm with a 28 X 28 inch square cutting at the center. This is made with two standard sheets with dimension 1.2 meter X 2.4 meter X 5 mm as shown in figure 3. The dimension of the sheet is given in drawing\_2. All measurements in the drawing\_2 are in inches.

## 3. Bolt pattern

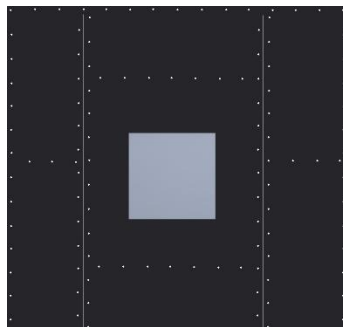


Figure 3 Screwing pattern of base plate

The sheet must be screwed to the frame at every 15 cm. The white dots in figure 3 represent the pattern of screwing. It is better to have threads in the frame and holes in the aluminum sheet, which gives a small level of tolerance.

## 4. Edge Clearance

When the Aluminum sheet is placed on the frame, there should be a minimum clearance of 3 cm from the edge of the frame on all sides as shown in figure 4. The ground mesh can be welded to the frame.

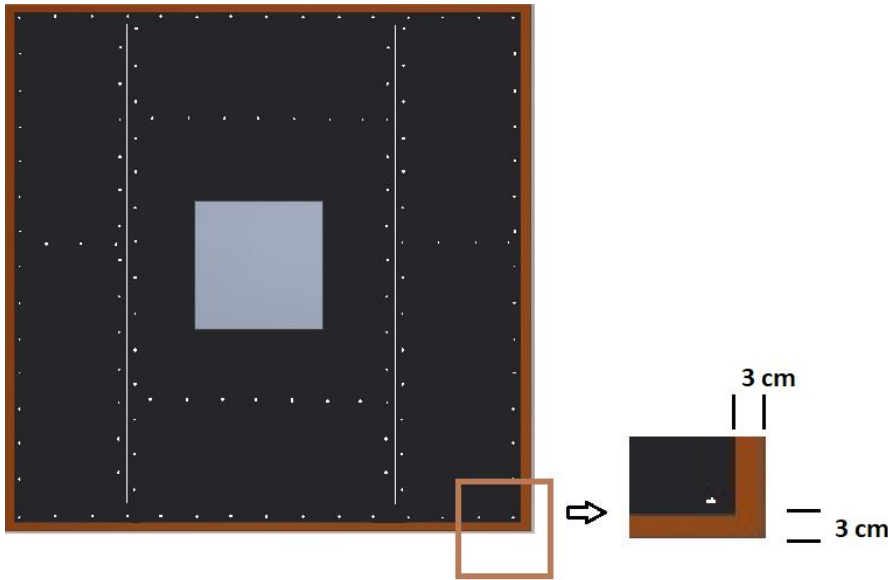


Figure 4. Clearance of the aluminum sheet from the edges of frame

## 5. Central covering

The central covering is made with two separate sections, one section with holes for the pipe and another section as an opening to access the pit box while the antenna is placed on the base plate. This is made out of the cutout section from the aluminum sheet. The screws are placed symmetrically to both the X and Y axis as shown in figure 5-a, so that the antenna can be aligned in orthogonal directions. Small rectangular aluminum strips of 2 inch X 25 inch are attached at the bottom of the aluminum sheet for holding the cover as shown in figure 5-b.

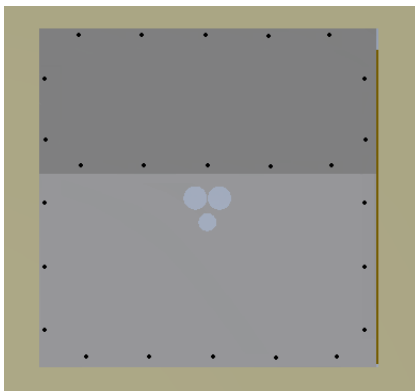


Figure 5-a Five screws on each side which is symmetric to both axis(Top view)

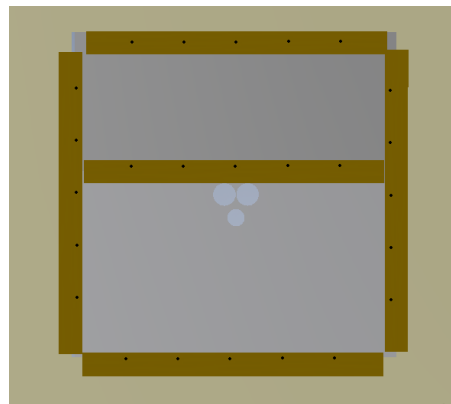


Figure 5-b 2 inch X 25 inch aluminum strip attached(Bottom view)

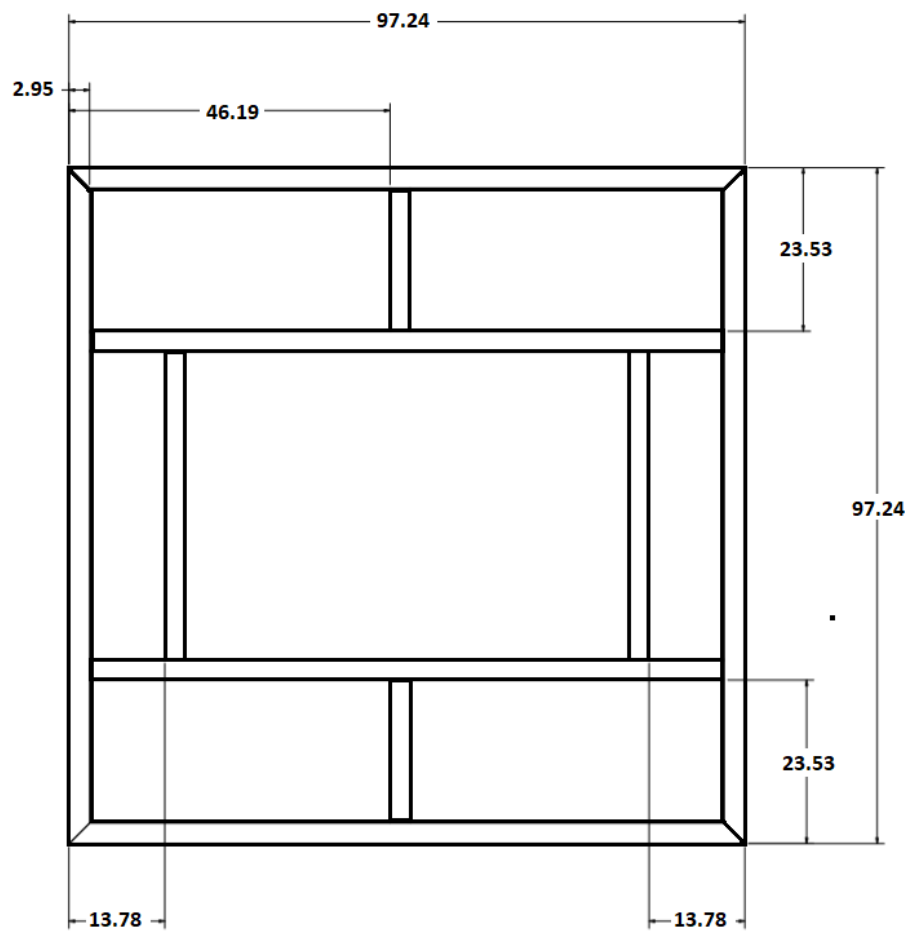
## Annexure

**Location of drawings :-** /data5/edges/data/Edges\_3\_CAD\_drawings/

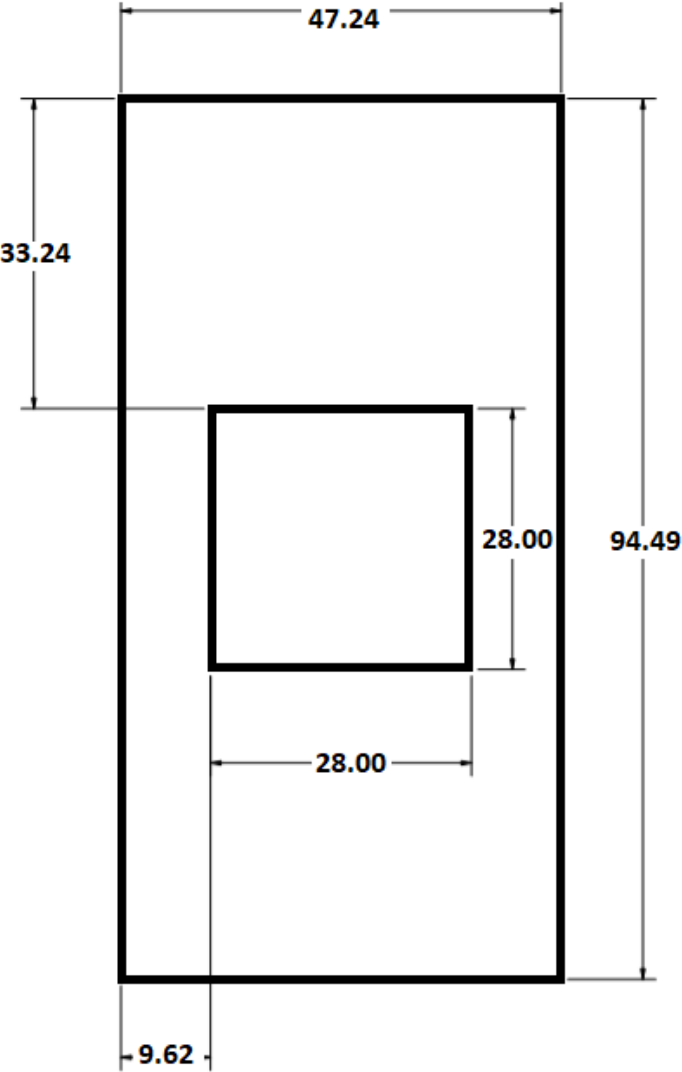
**Assembly instruction to vendor :-**

/data5/edges/data/Edges\_3\_CAD\_drawings/Inner Base Plate assembly instructions.pdf

### Drawing\_1



Drawing\_2



# Instruction to vendor

## 1. Frame Assembly (Part\_1)

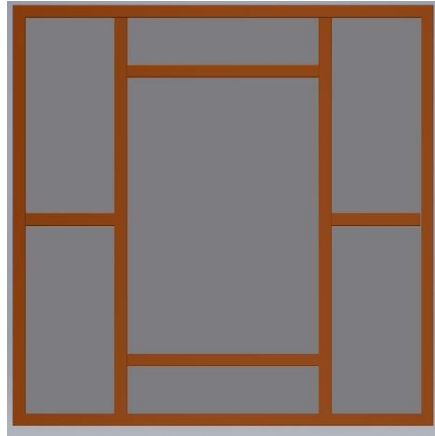


Figure 1

- Structure made with hollow steel frame of 75mm X 25 mm X 2.5 mm as shown in figure 1 (Will 2.5 mm thickness is good for screwing the base plate?)
- For measurements please find drawing \_1
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## 2. Aluminum Sheet (Part\_2, Part\_3, Part\_4)

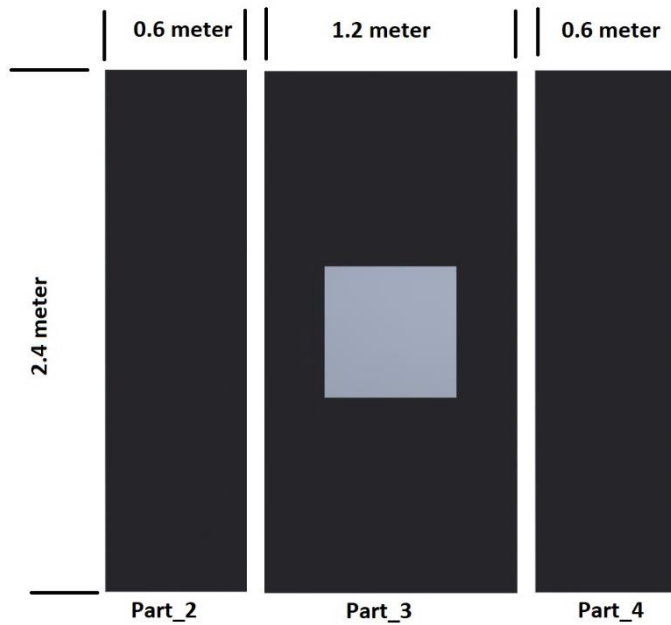


Figure 2

- Two standard Aluminum sheets of 1.2 m X 2.4 m X 5 mm is required.
- Cut one sheet in half to make Part\_2 and Part\_4 as shown in figure 2.
- Cut a square of 71 cm X 71 cm from the second sheet to form the part\_3.
- For measurement, find drawing\_2.
- Cut out section is used to make the part\_5 and part\_6.

### 3. Cover at the center (Part\_5, Part\_6)

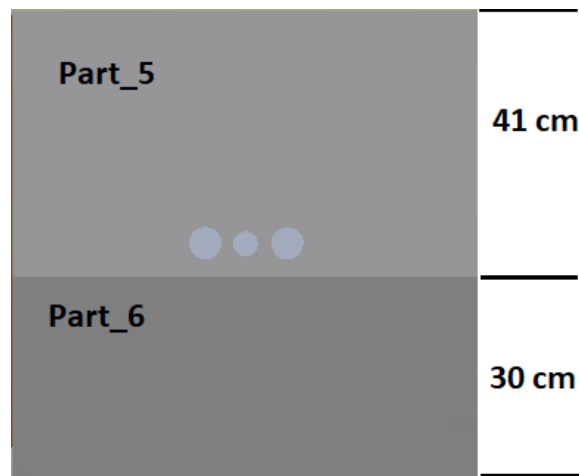


Figure 3

- From the cutout piece of 71 cm X 71 cm make three holes and cut into two pieces (part\_5 and Part\_6) as shown in the figure
- Dimension and location of holes will be updated shortly

### 4. Strips for holding the cover (Part\_7)

- 5 numbers of aluminum strips of dimension 5 cm X 63.5 cm X 5 mm is required



### Assembly instructions

- In part\_3 attach 4 strips as shown in the figure 4. Each black dot represents a nut, bolt, and washer
- Total 5 nut bolt in each side

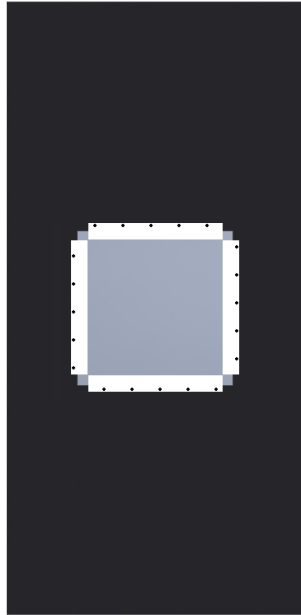


Figure 4

- In part\_5 attach a strip, as shown in figure 5 each black dot represents a nut bolt and washer.

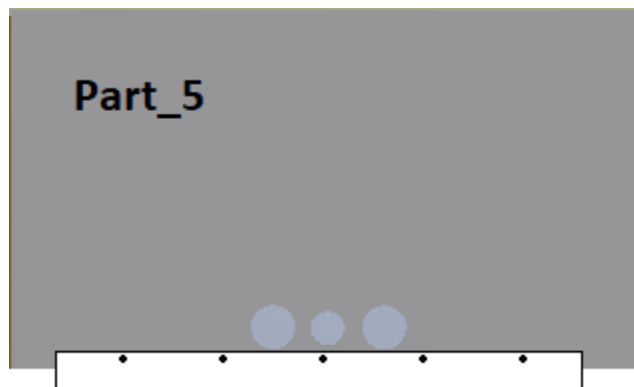


Figure 5

## Base plate screwing instructions

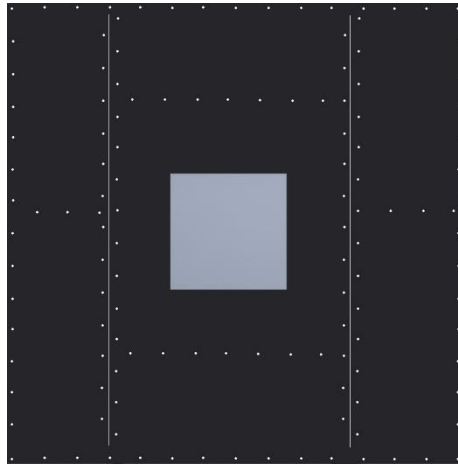


Figure 6

- Figure 6 shows the screwing pattern
- Part\_2, Part\_3 and Part\_4 is screwed on top of Part\_1
- Screws have to be placed every 15 cm
- It is better to have tread on the frame (Part\_1) and holes on the sheets (Part\_2 to Part\_4), which gives a small level of tolerance

## Part\_5 and Part\_6 screwing instructions

- 5 screws have to be placed symmetrically to both the X and Y-axis.
- The part\_5 and part\_6 has to be aligned in orthogonal direction with the same holes and screws as shown in figure 7
- In the future, we have to replace part\_5 and Part\_6 with the new design so extra care has to be given to aligning the screws

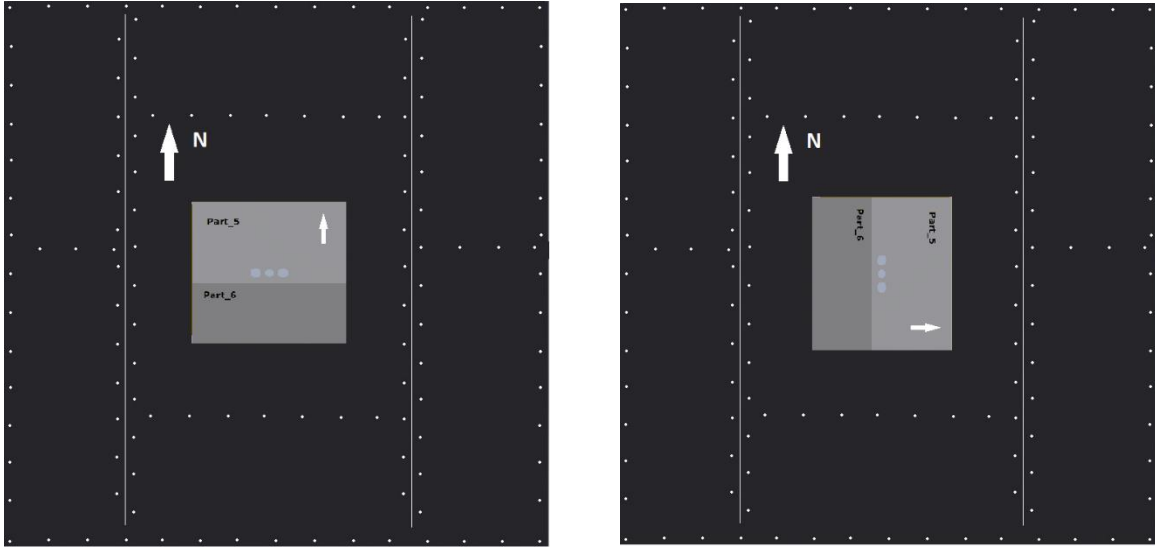


Figure 7

### Clearance from the edge

When the Aluminum sheet(Part\_2 to Part\_4) is placed on the frame(Part\_1), there should be a minimum clearance of 3 cm from the edge of the frame on all sides as shown in the figure 8.

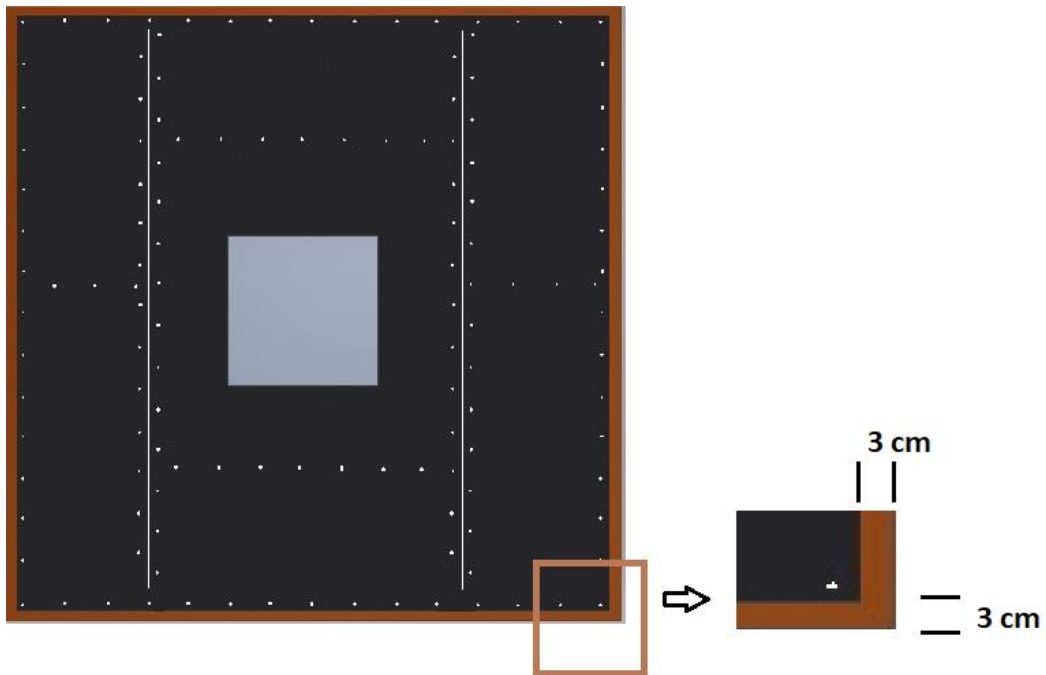


Figure 8