

## Construction and Usage Guide for Greenhouse

1. Covering materials of the greenhouse is flammable materials so please take care of fire prevention during the usage. During the construction, the site should be equipped with fire extinguishers.
2. Please avoid any collision on every parts of the greenhouse.
3. Please do not change the greenhouse structure. When add hanging equipment, please follow the recommended plan. Otherwise it will harm the greenhouse and greenhouse equipment practicality and safety.
4. If the client do not equip computer auto-control system, please pay attention to the strong wind and heavy rain. Under these kinds of bad weather, please close the roof window and side window to avoid damage on the windows and plants.
5. The greenhouse gear motor adopts grease lubrication and it can not work for long-term. So please avoid turn on/off too frequently, which may cause damage.
6. Storage or usage of acid and alkaline (corrosion on the greenhouse structure) or other environment-polluted chemicals is prohibited.
7. Client can set the usage temperature according to his demand but please keep the winter indoor temperature no less than 4 degree Celsius, otherwise the indoor equipment may be damaged by low temperature.
8. Please add butter on the gear, rack and main shaft of the roof window and side window and the connectors of the supports regularly, otherwise the rust or abrasion will damage the transmission system.

9. Please cleanse the snow timely in winter and please do not use blunt which will damage the covering material.

10. To keep the transparency of the greenhouse, you can use tap or high pressure water gun to wash the roof cover.

11. When install the greenhouse, we use sealing tapes on the gutter connectors to avoid water leaking. After long term usage, there may be leaking problem because of the sealing tapes aging problem. To solve this problem, please cleanse the leaking place and seal it with glass glue.

## **Construction process and precautions**

Before install the main structure, please check the location and elevation of every embedded parts and adjust the error to allowable range.

Construction process: 1. Foundation (embedded parts) 2. Main column 3. Gutter 4. Auxiliary column 5. Truss ( or inside horizontal beam) 6. Arch pipe 7. Purlin 8. Shading system 9. Lock channel (covering material fixing) 10. Covering materials 11. Roof and sides ventilation 12. Install and debug the electric system 13. Overall inspection and perfection 14. Project finished

A. Before install the main column please adjust the slope. Two ways to adjust the slope: foundation slope adjustment and column slope adjustment. Column installation process: install corner columns at first, next is to install the south-north end wall columns, then to install east-west walls columns and middle columns. Install the main columns at first and then install the auxiliary columns.

B. Install the truss (or horizontal beam): install from the middle to the sides. If there are column distance difference, please adjust it with base plate. Two kinds of truss should be combined to install and fixed with truss bolt in the end. If there is deformation and distortion, please adjust it then install.

C. Install the gutter: after installation of column and truss, please install the gutter according to the structural drawing.

D. Please clarify the types of horizontal beam when install the four side horizontal beam. Fix them to the column welding angle steel with bolts. If there is deformation and distortion, please adjust it then install.

E. Install the roof pipe and purlin.

F. When install the aluminum parts (lock channel) please clarify the pros and cons of the blank space to avoid extra cost on covering installation.

Necessary tools for the construction and installation

Electric hand drill + electric wrench + electric welding machine/welding rod + aluminum cutting machine + steel cutting machine

Necessary staff for the project:

Technician (1) + Welding staff (2) + Installation staff (6) + handy-man ( 6) + electrician (1)

# Architectural Design Description

## Design basis

1. Project related materials provided by Party A.
2. Design plan confirmed by Party A.
3. Current national codes, regulations and regulations concerning architectural design.

## Project overview

1. Project name: Multi-span Plastic greenhouse.
2. Construction area: 1900 square meters
3. Structure type: light steel structure.
4. Number of building floors: Single floor.
5. Building height: Shoulder height 3m; Ridge height 5m.
6. Fire resistance grade: 3.
7. Designed service life: 20 years

## Design elevation

The design elevation of the floor of the indoor walkway in this project is  $\pm 0.000$ . The corresponding absolute elevation number is determined on site, and the difference between indoor and outdoor elevation is 0.15m.

## Engineering practices

1. Wall:
  - 1.1 The thickness of the wall around the building is 240mm.
  - 1.2 Cement bricks are used in the underground and above-ground parts of the building walls. The brick labels and mortar labels used in the walls are shown in the structural construction instructions.
2. Structure and covering
  - 2.1 Galvanized light steel framework is adopted in this project. The structural connection above the foundation low wall is detailed in the framework construction drawing.
  - 2.2 The top and sides of the greenhouse of this project are covered with 200 micron films.
  - 2.3 Greenhouse roof gutter drainage, discharged to both sides of the greenhouse through  $\phi 110$  UPVC pipes
3. Door:

Please refer to the remarks of "Door Table" for the door selection.

## 4. Exterior decoration:

4.1 The index of exterior decoration design and practice is shown in the basic embedded parts diagram.

## 5. Construction Equipment:

5.1 The greenhouse is equipped with internal shading system, four sides manual film rolling system and electric control system. See the equipment construction drawings for details.

5.2 For details about the installation of the device, see the construction drawing of the device.

## 6. Others

6.1 The construction shall be carried out in strict accordance with the drawings. Embedded parts and openings shall be timely reserved in accordance with the requirements of professional drawings such as equipment, and the accuracy of location and elevation shall be ensured to avoid chiseling later.

6.2 In the construction process, damage to the galvanized layer of the structure should be avoided as far as possible.

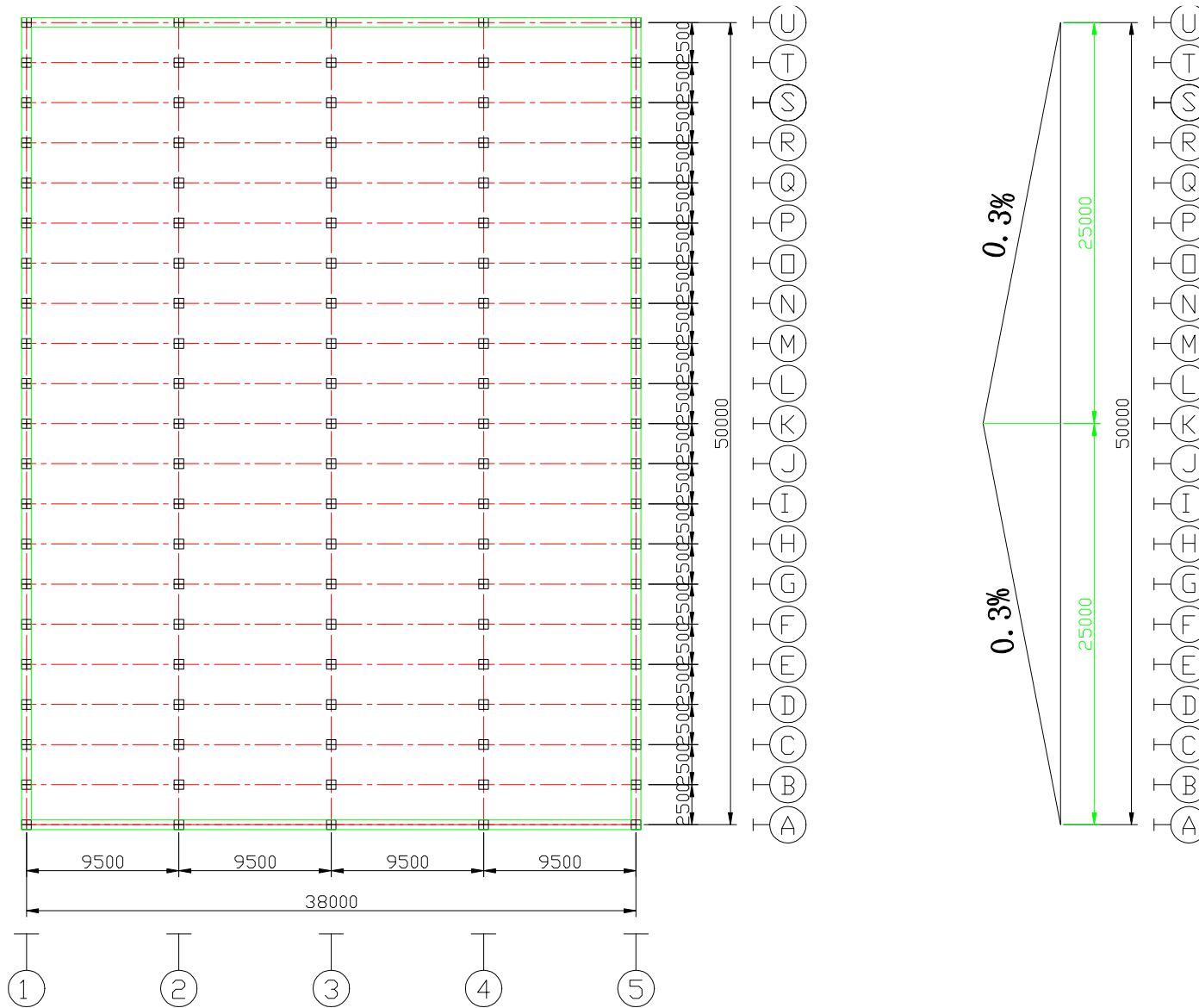
6.3 If you have any questions during the construction, please contact the design unit in time.

6.4 National construction quality acceptance standards shall be strictly implemented during construction.

Building practice table

Category	Name	No.	Application	Remark
interior wall	Cement mortar wall		All	
External wall	Cement mortar		All external walls	

# Foundation Layout



## Instruction:

1. Middle independent foundation, specification of embedded parts 200 \* 200
2. Four side ring beam foundation, specification of embedded parts 200 \* 200

# Middle Independent Foundation

Independent foundation: poured concrete structure, and the bottom of the column embedded 10mm steel plate, and fixed with  $\Phi 14$ mm steel bar, size: 800mm $\times$ 800mm $\times$ 1000mm

After the pit is dug, laying the bedding layer 100mm first, then the concrete is poured, and the embedded parts are put in. The pouring stops after the remaining embedded parts are about 100mm (as shown in Figure 1). After the concrete is cooled and dried and hardened and the installation of the steel structure is ready, the columns are welded on the embedded iron, as shown in Figure 2. The height of the foundation can be adjusted by the bottom plate. After the installation of the structure, the height of the foundation is fixed, and then secondary casting (as shown in Figure 3) is carried out to fix the position of the embedded iron in the foundation

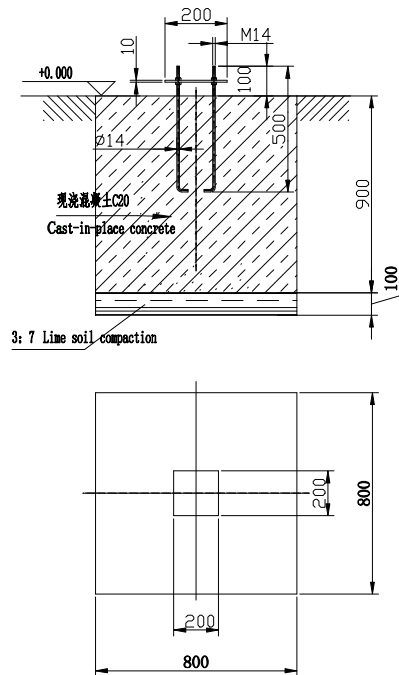


Figure 1

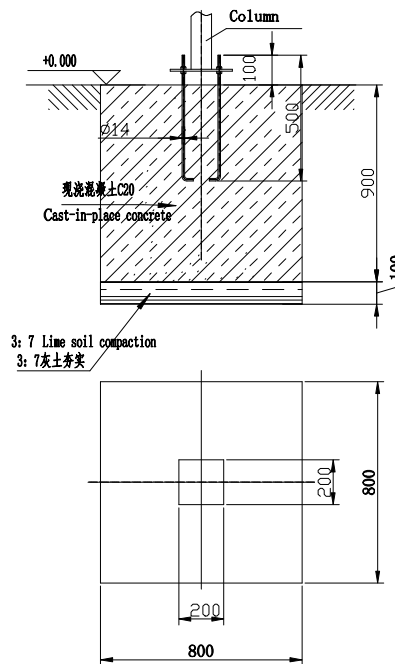


Figure 2

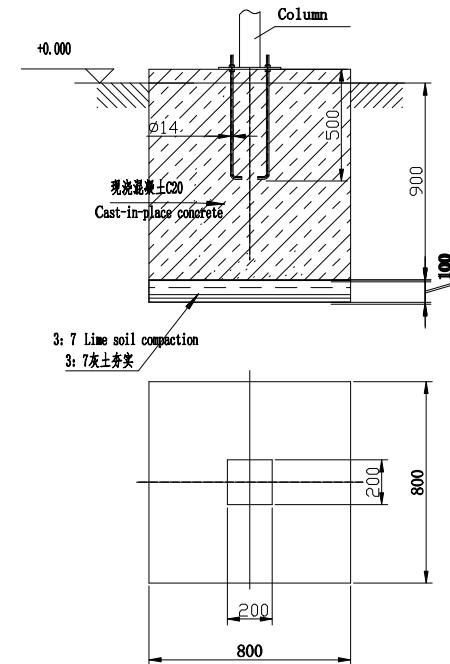


Figure 3

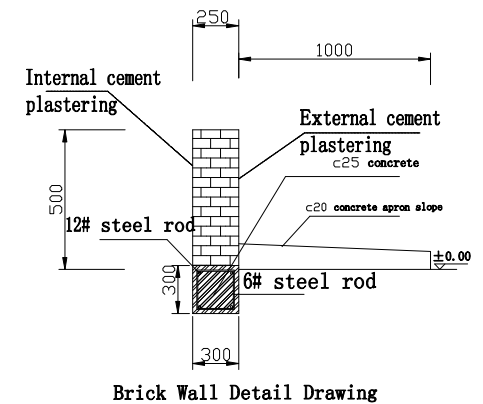
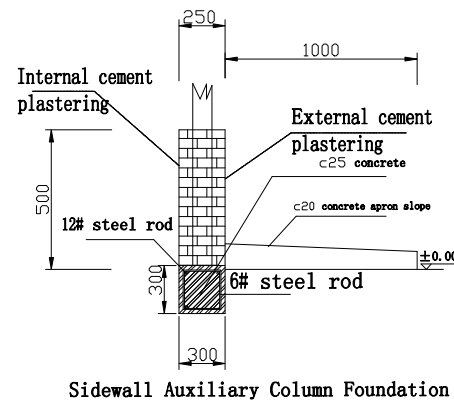
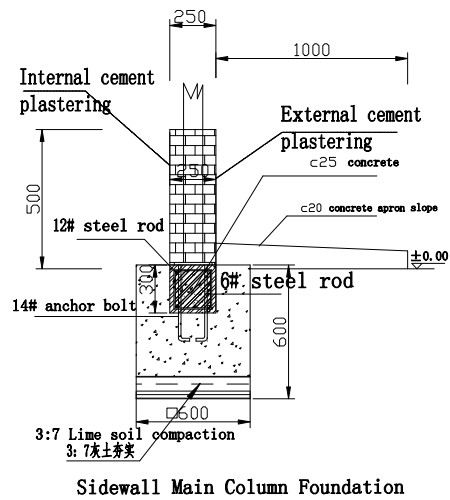


# Four Sides Ring Beam Foundation

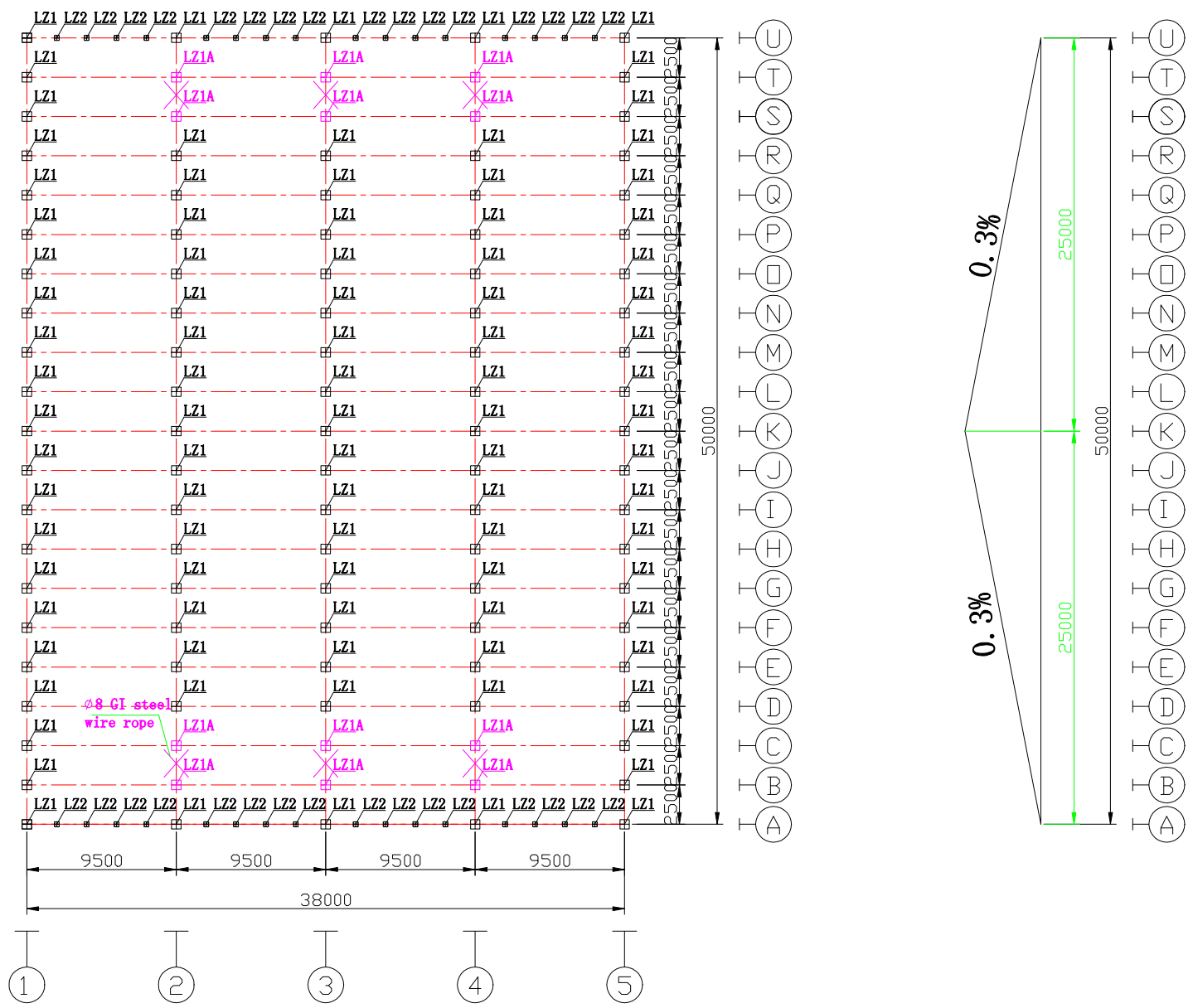
Strip foundation around the greenhouse: (poured twice as the independent foundation), 250mm, reinforcement, C25 concrete pouring, brick plastering above the ring beam (see the foundation drawing)

Apron slope: 80mm thick C20 concrete apron slope outside the greenhouse, width: 1000mm, surface layer: cement plastering.

Method: 3:7 lime soil, compacted, 80mm thick c20 concrete, brick masonry on both sides, cement plastering



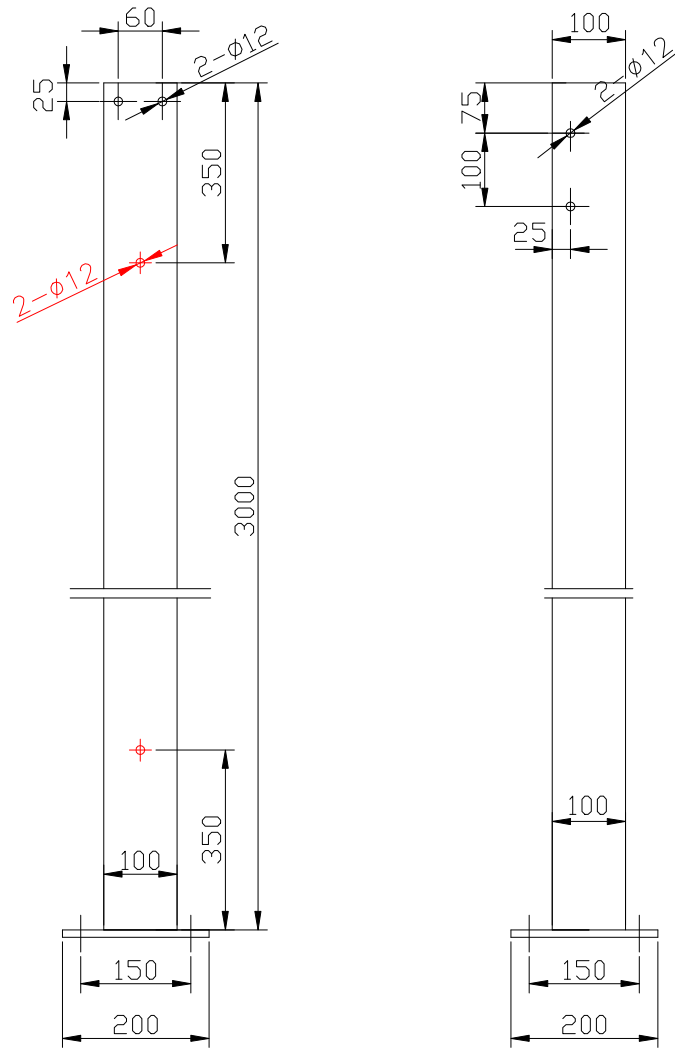
# Column Layout



LZ1	Main column	100*100*3.0	Hot-dip galvanized steel
LZ1A	Main column	100*100*3.0	Hot-dip galvanized steel
LZ2	End auxiliary column	50*50*2.0	Hot-dip galvanized steel
LZ3	Side auxiliary column	50*50*2.0	Hot-dip galvanized steel

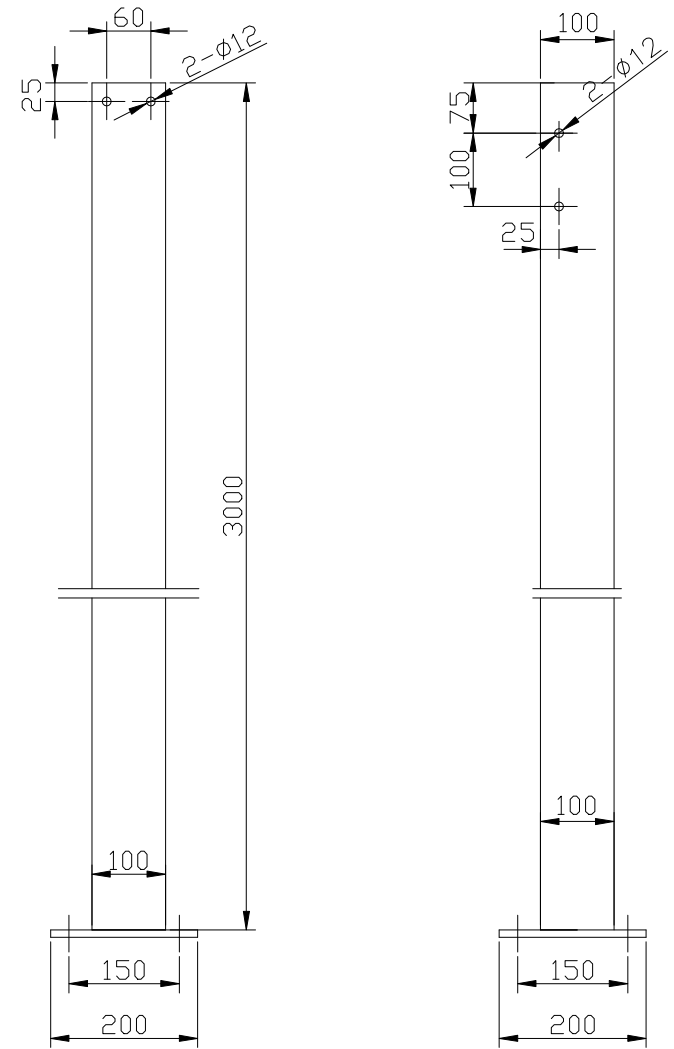


## Main Column 1



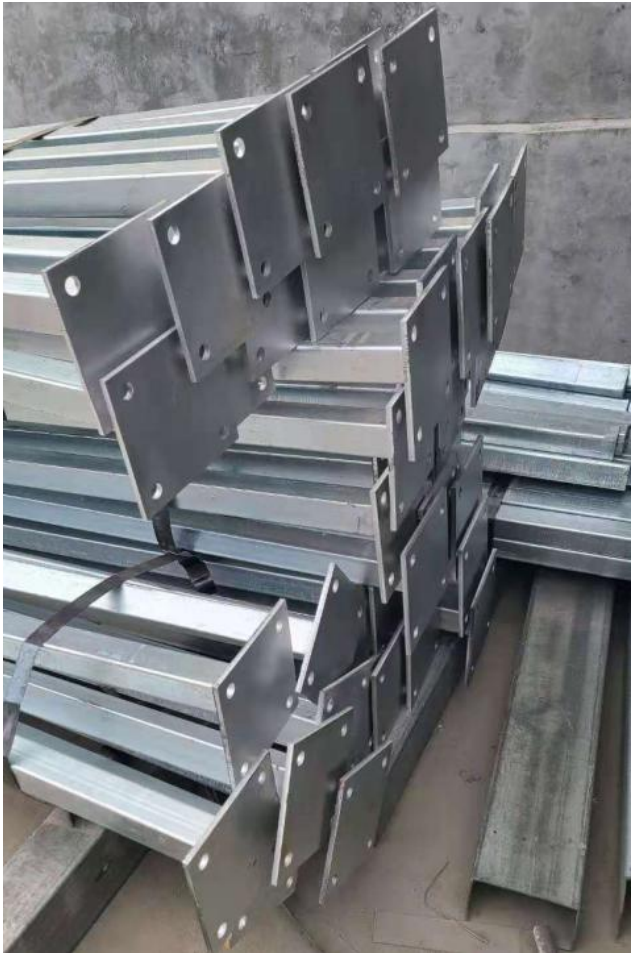
The column is anticorrosive after welding with galvanized pipe and bottom plate

## Main Column 2



The column is anticorrosive after welding with galvanized pipe and bottom plate

The column welded with bottom plate

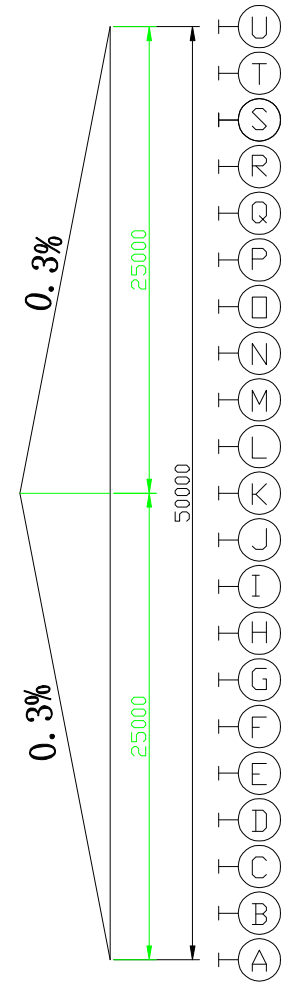
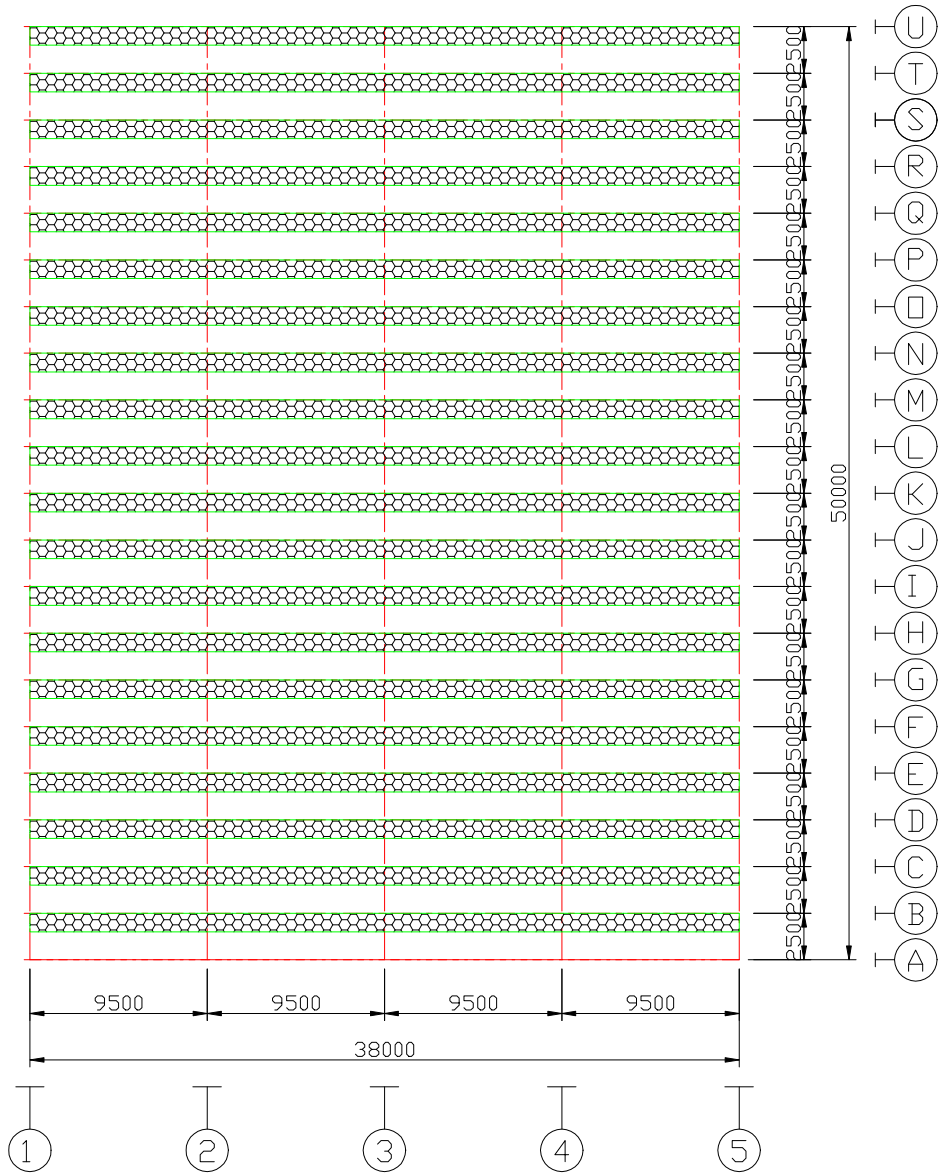




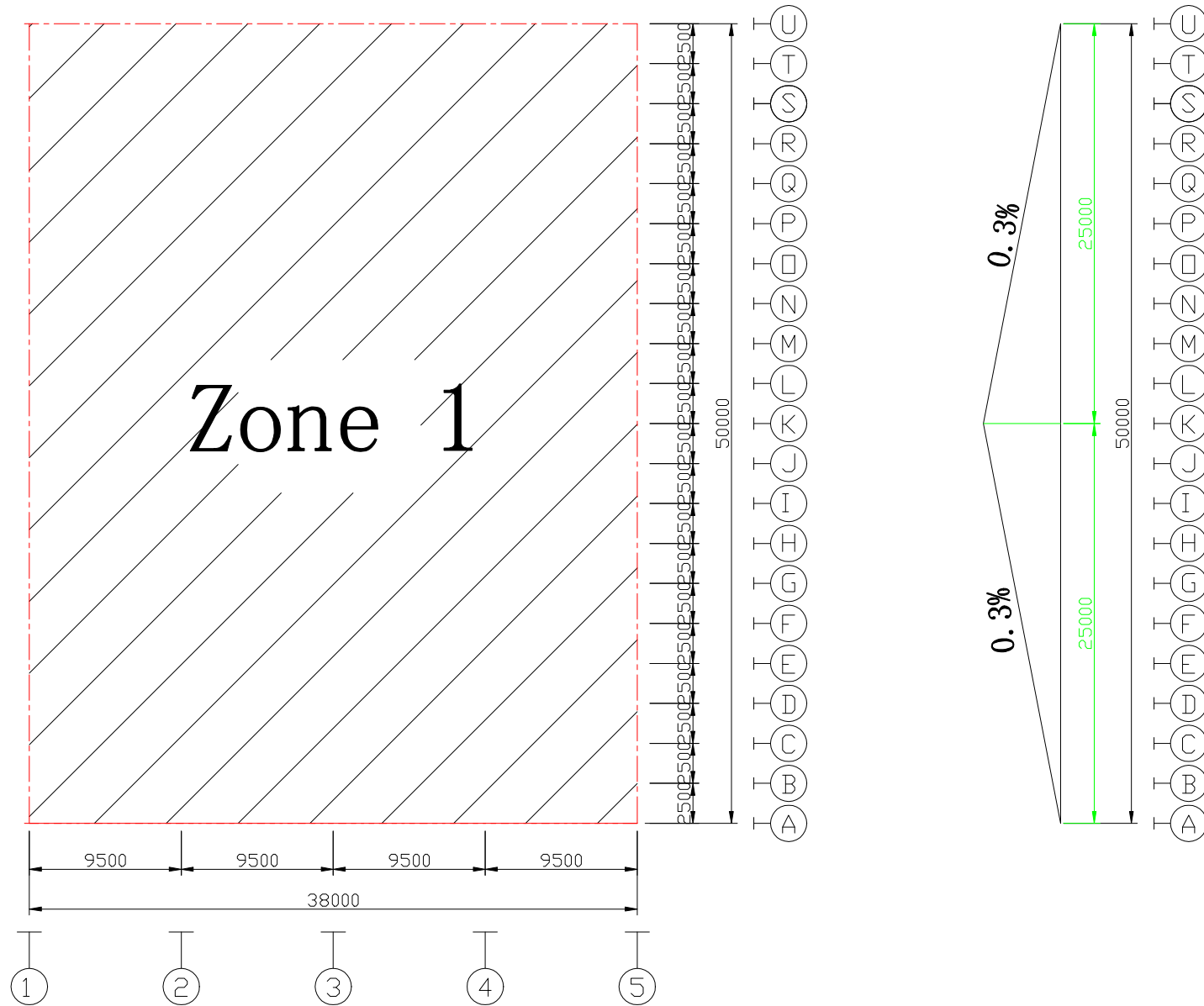
The columns fixed with steel wire rope



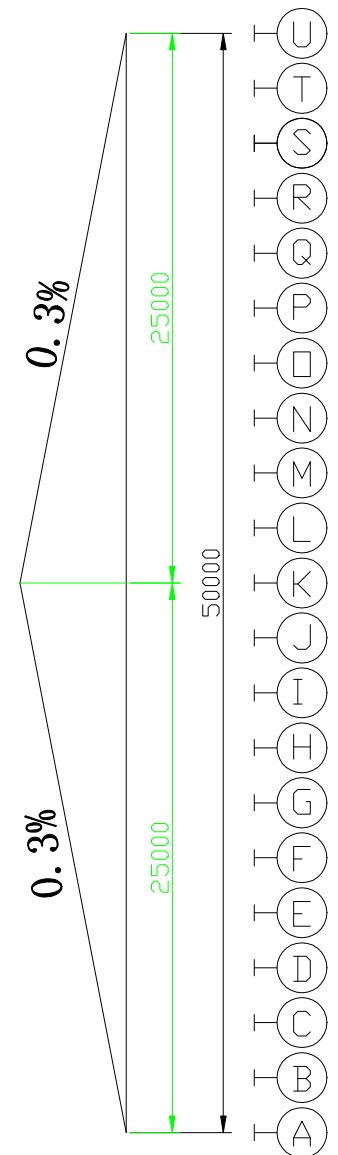
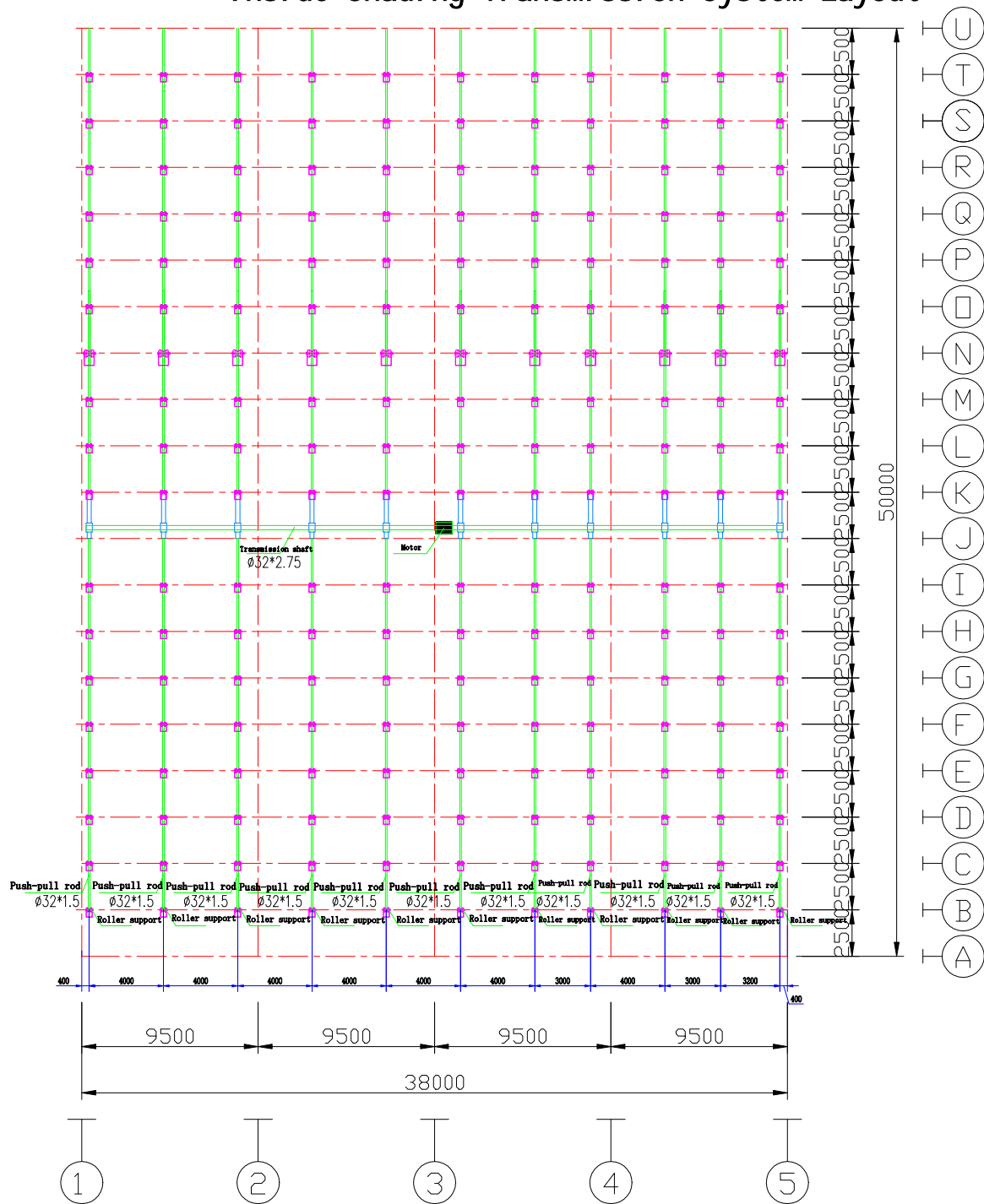
# Inside Shading Layout



# Inside Shading Zoning Layout

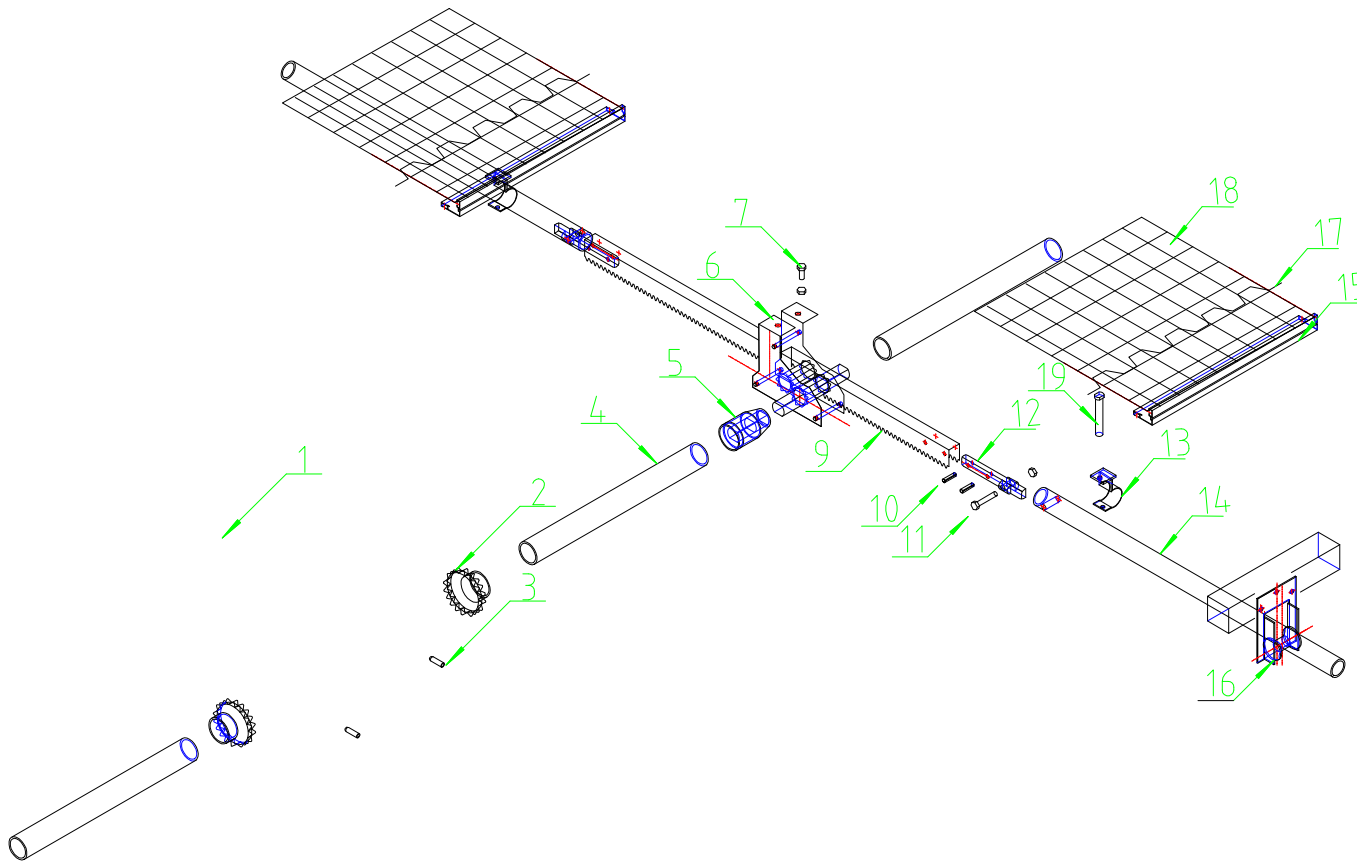


# Inside Shading Transmission System Layout



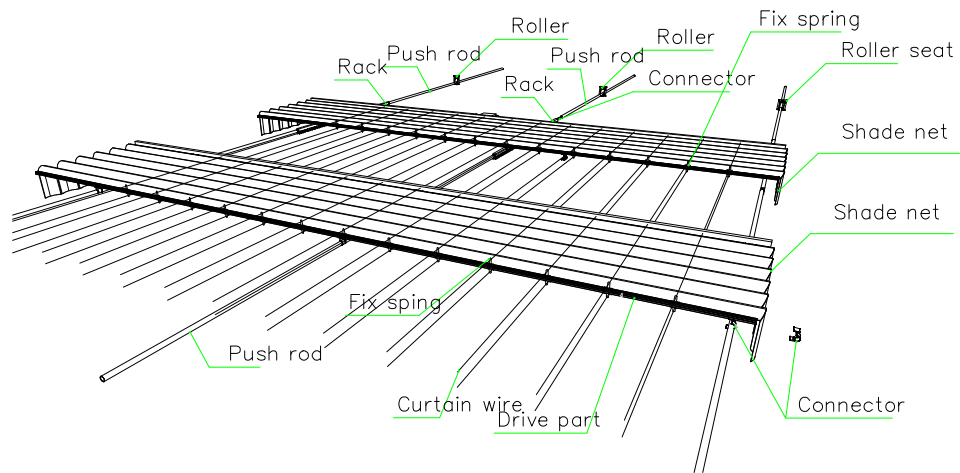
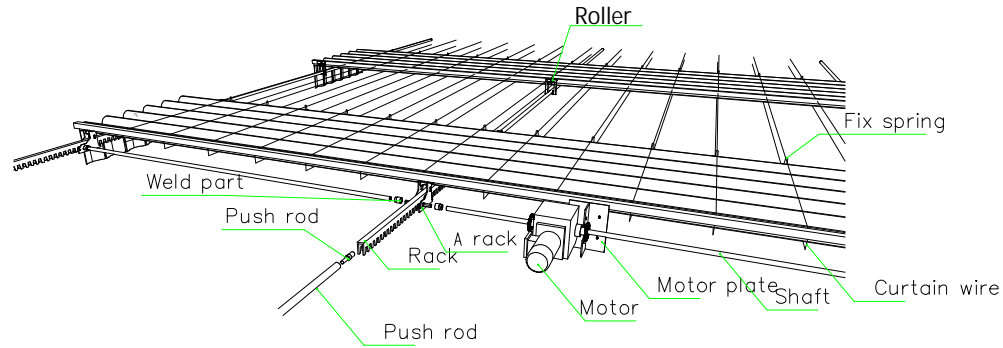


# Inside Shading Transmission System Installation



19	T bolt
18	Inside shading net
17	Lock wire
16	Seat
15	Side part
14	Push-pull rod
13	Connector
12	Connector
11	Bolt
10	Shaft
9	Rack
8	A seat
7	Bolt
6	A pinion
5	Welding part
4	Transmission shaft
3	Roof bolt
2	Connector
1	Motor
	Item

# Inside shade transmission



Curtain wire  $\phi 2.2$   
Curtain wire : transparent  
Space : roof 1m , bottom 0.5m

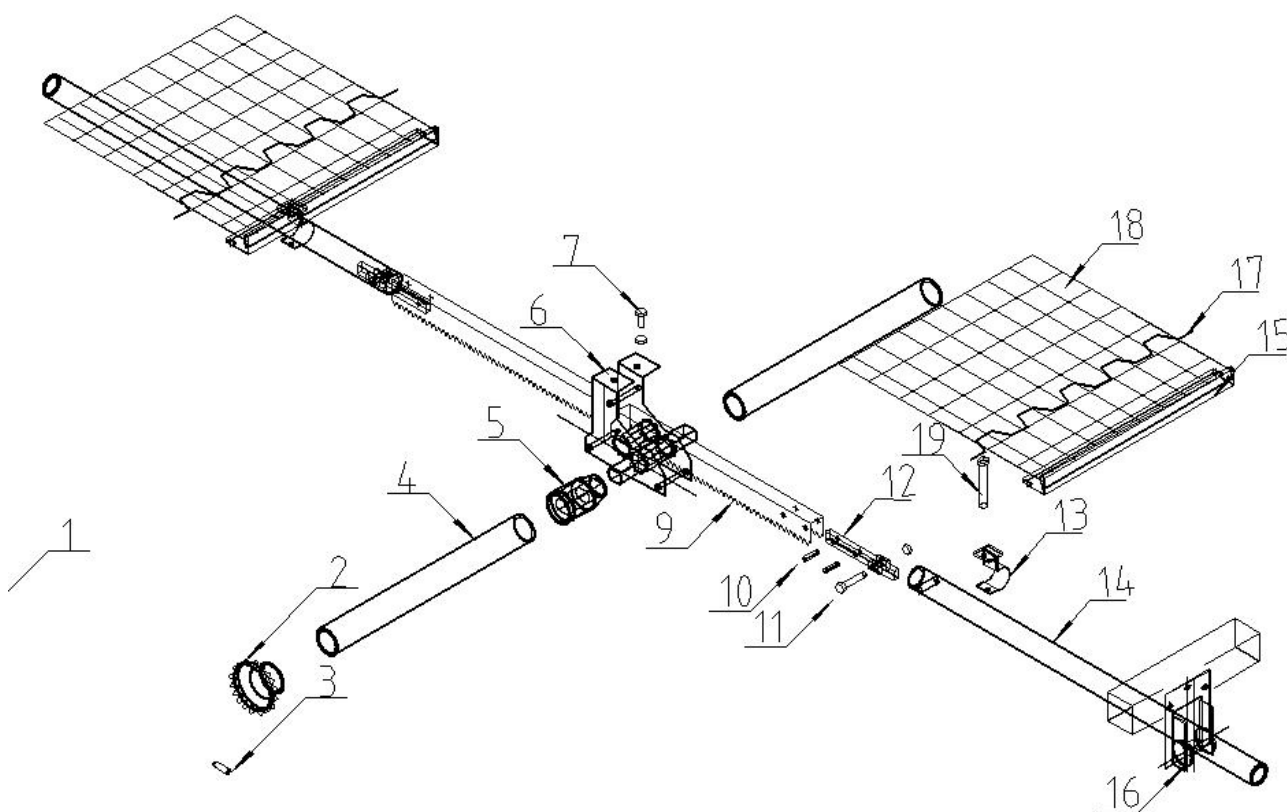
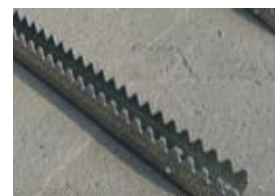
## Inside shade



# Installer

## 一、Shading system

- 1) Install the roller seat according to the drawing position
- 2) Install A-type sunshade rack holder according to the position of the drawing
- 3) Connect the push-pull rod  $\phi 32 \times 2.0 \times 6\text{m}$  on the ground, let the rack position open, and the rack penetrates the gear,





4) Install aluminum curtain rod



5) Curtain line, upper line 1m/track, lower line 0.5m/track, tied at both ends, simple fixed in the middle

6) The sunshade net, one end of the sunshade net is fixed to the aluminum curtain rod with a circlip, and the other end is tied to the beam with a binding wire and a curtain wire.

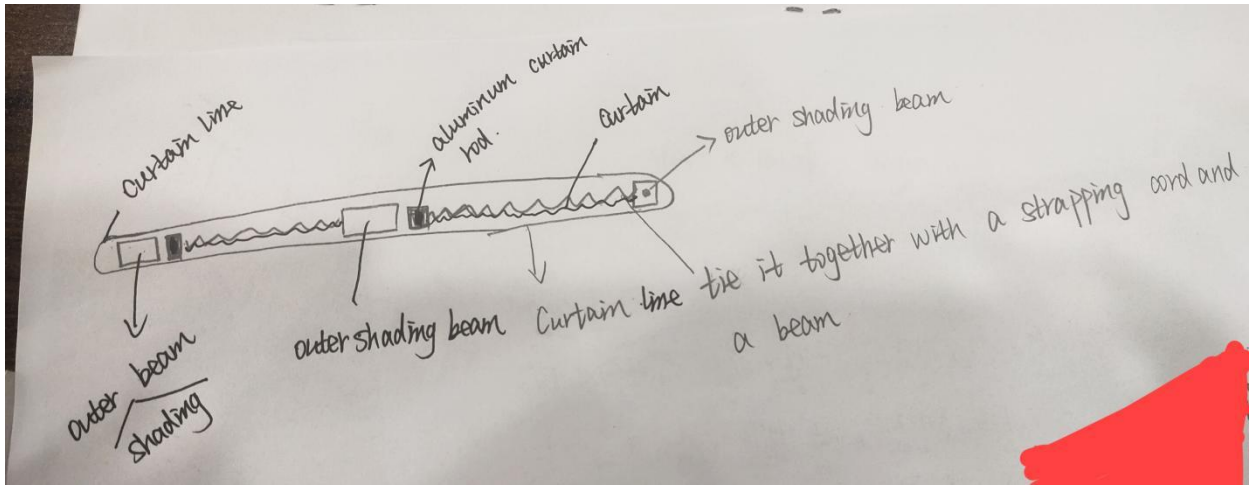
(7) Installation transmission shaft ,welded motor (as picture)



3)



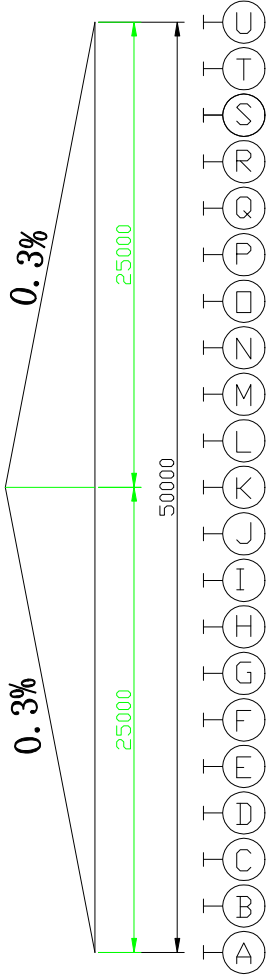
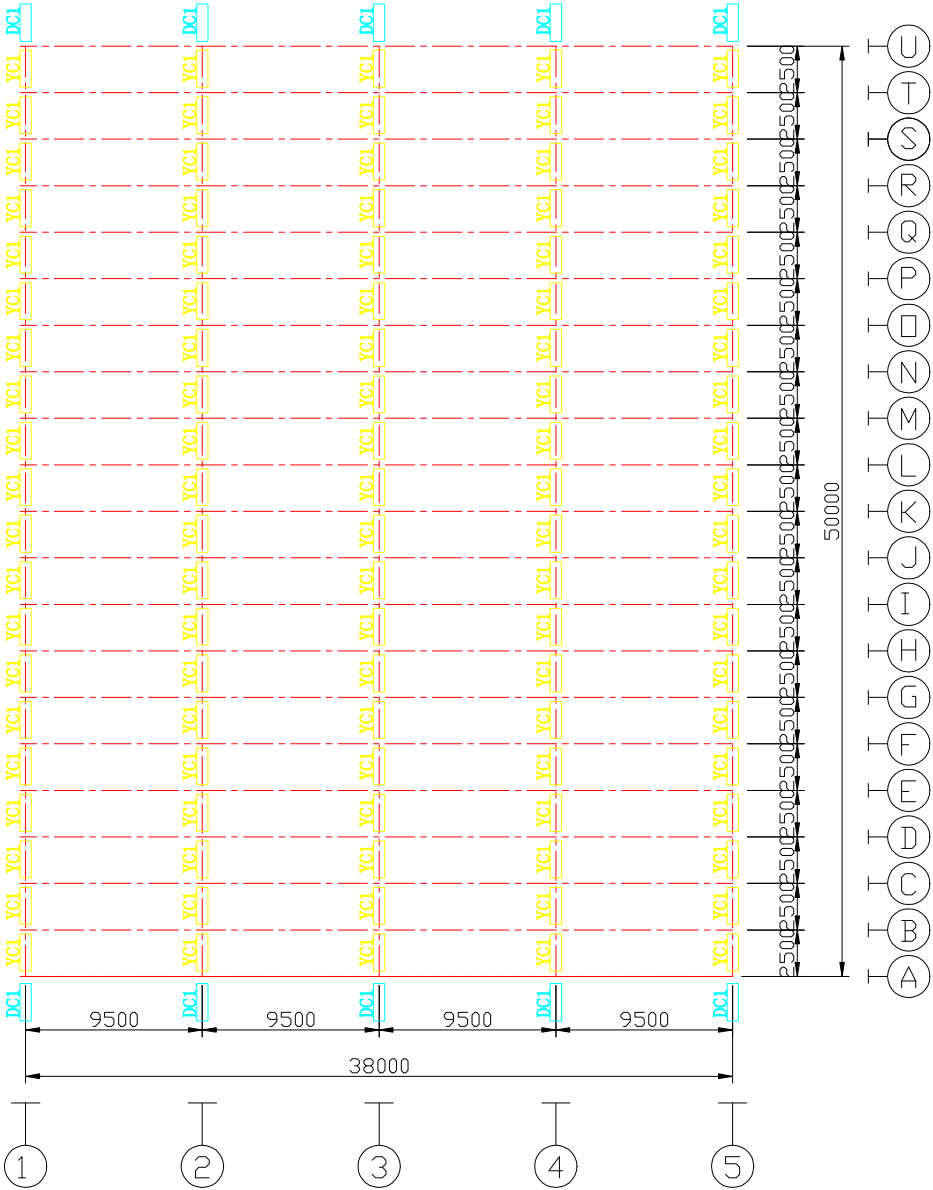




- (4) Fix the sunshade net, use curtain hooks to fix the two sides of the sunshade net
- 5) Motor wiring debugging (this can only be done by a technician)



# Gutter Layout



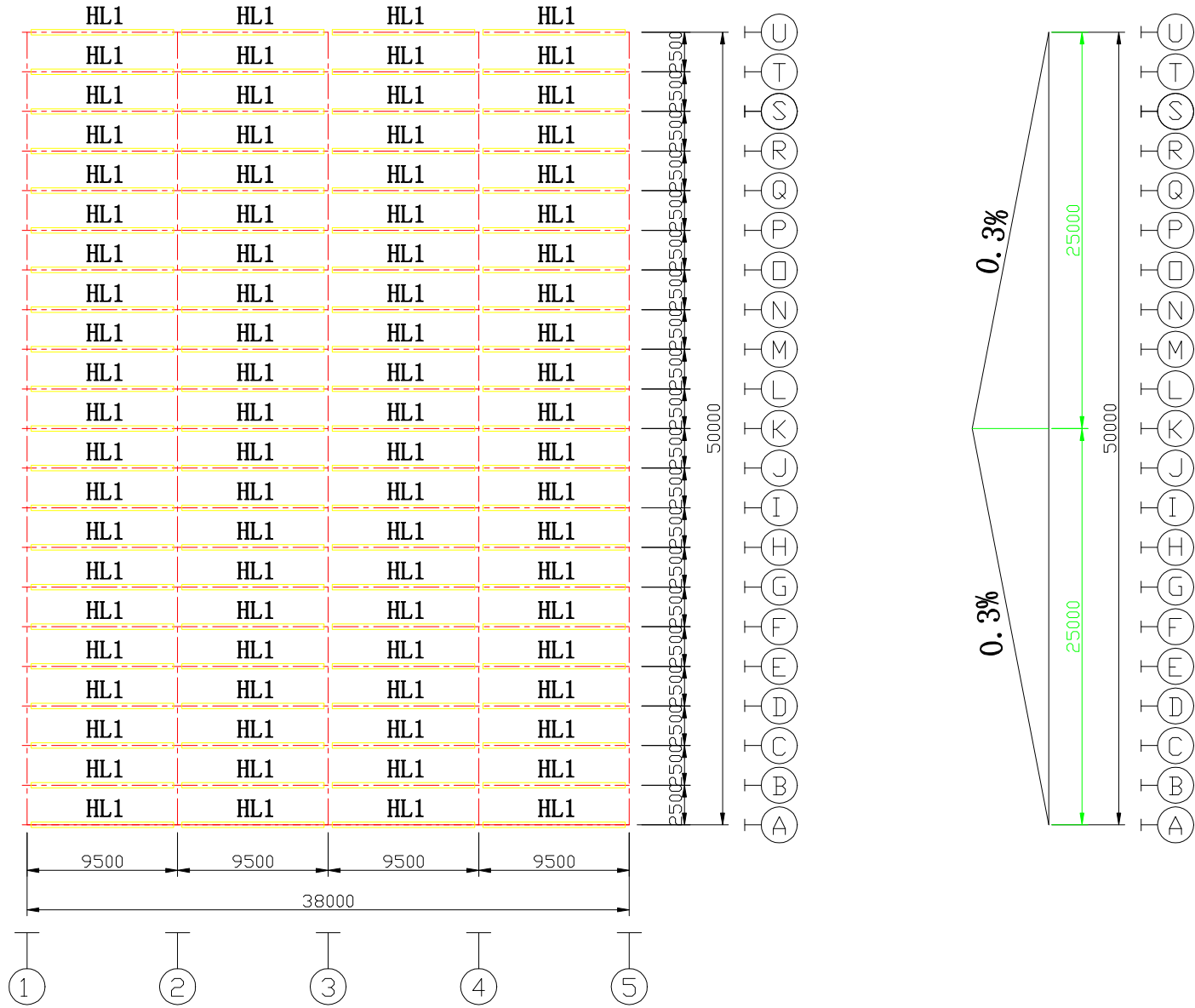
YC1 Middle gutter  
 DC1 Middle gutter plug



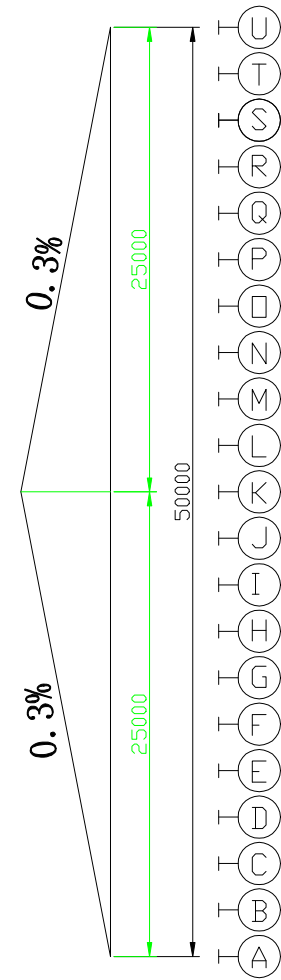
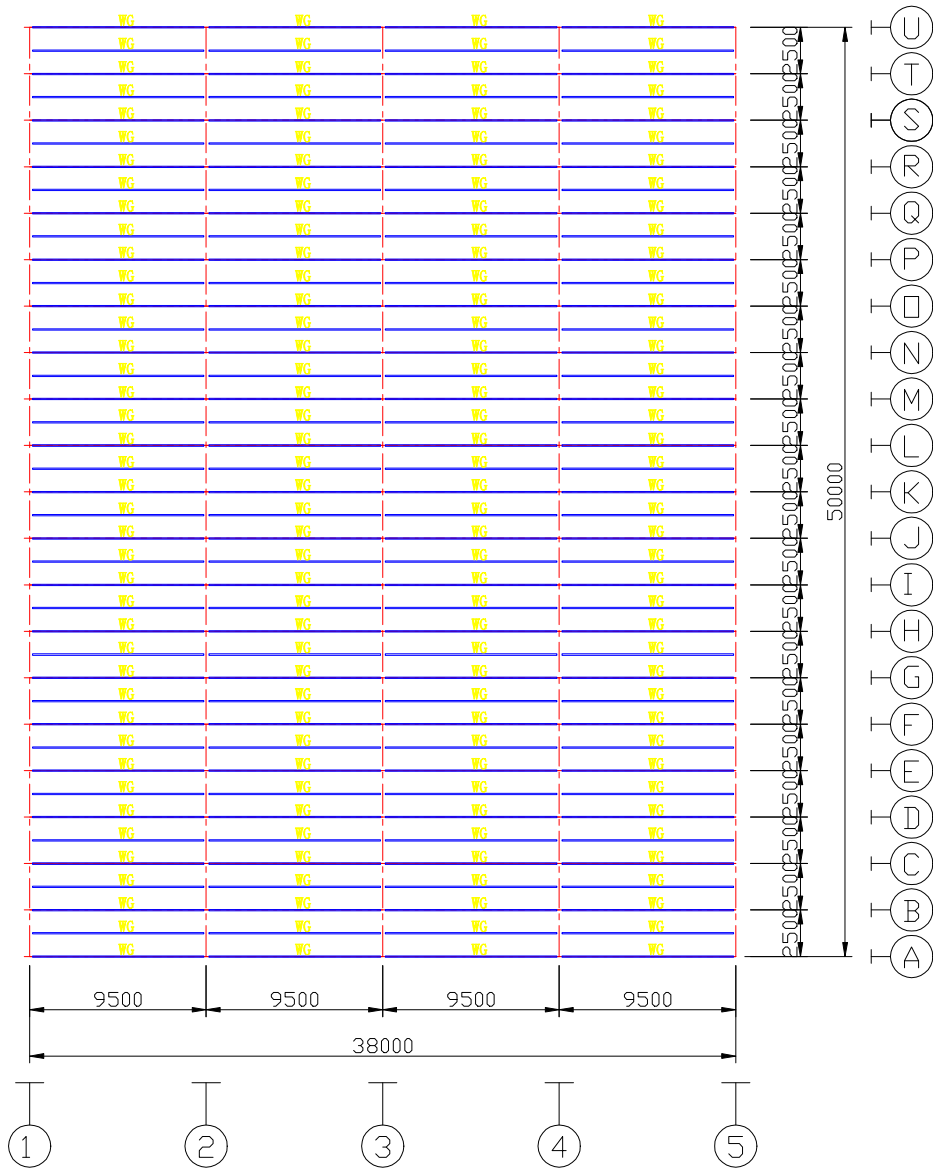
# Gutter Installation



# Horizontal Beam Layout

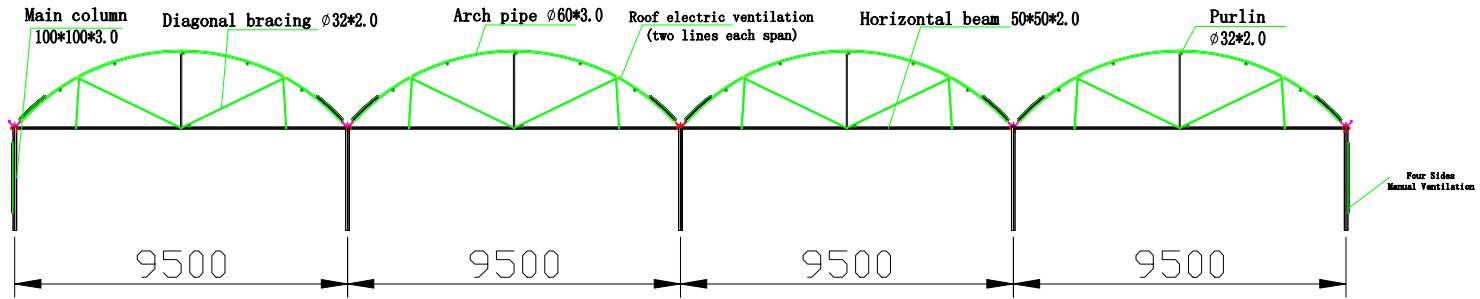




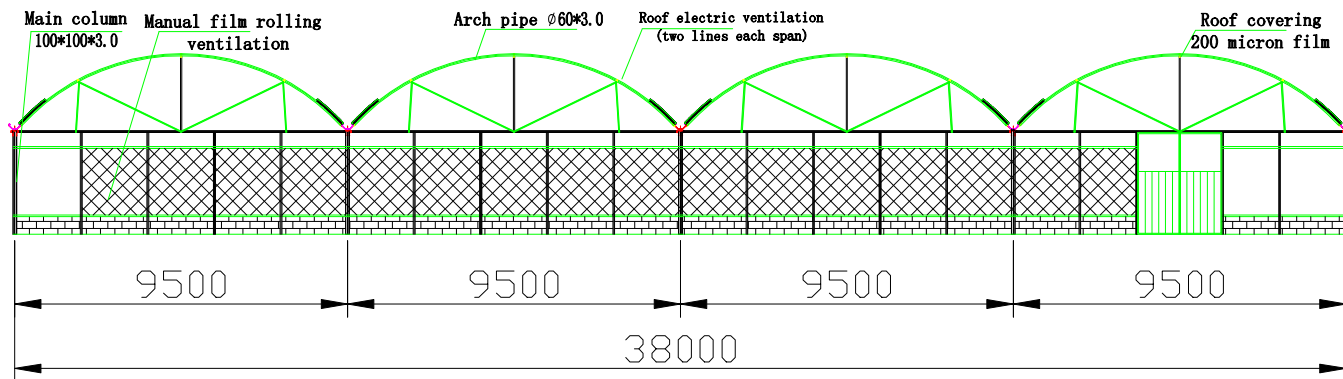


Arch Layout  
Arch  $\varnothing 60 \times 3.0$  round pipe

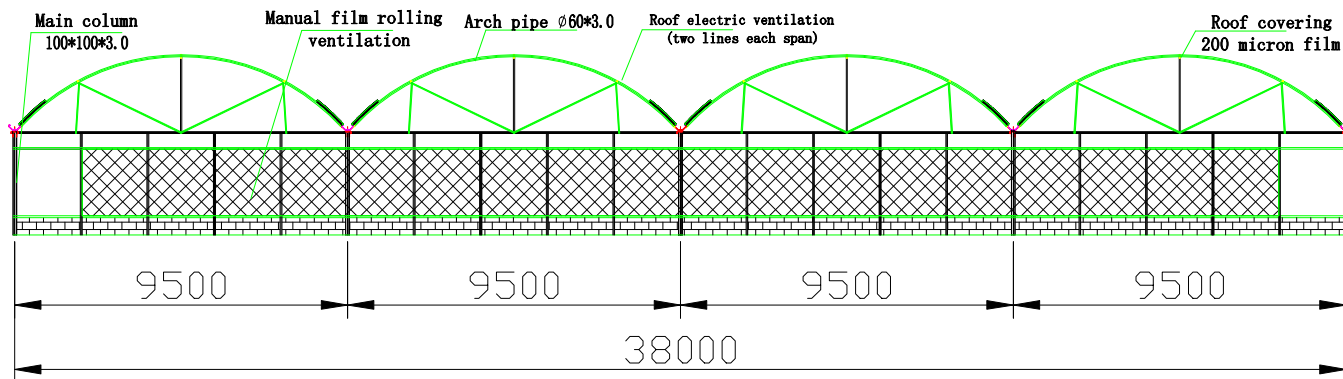
# Greenhouse Section and End View



Section View

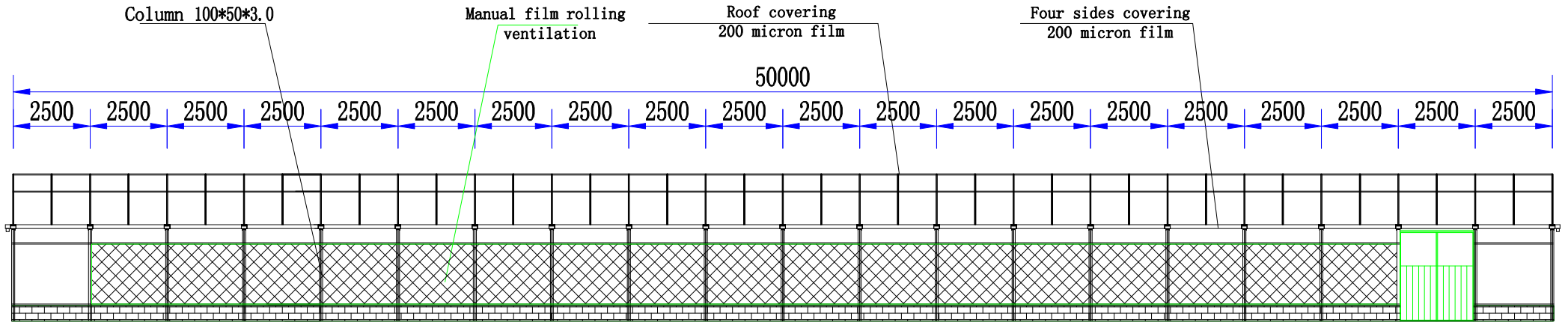


South End View

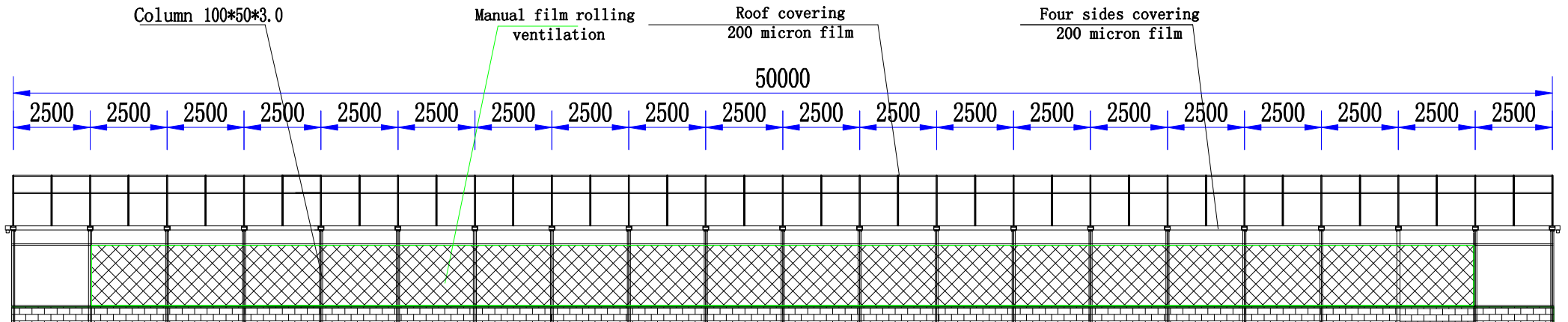


North End View

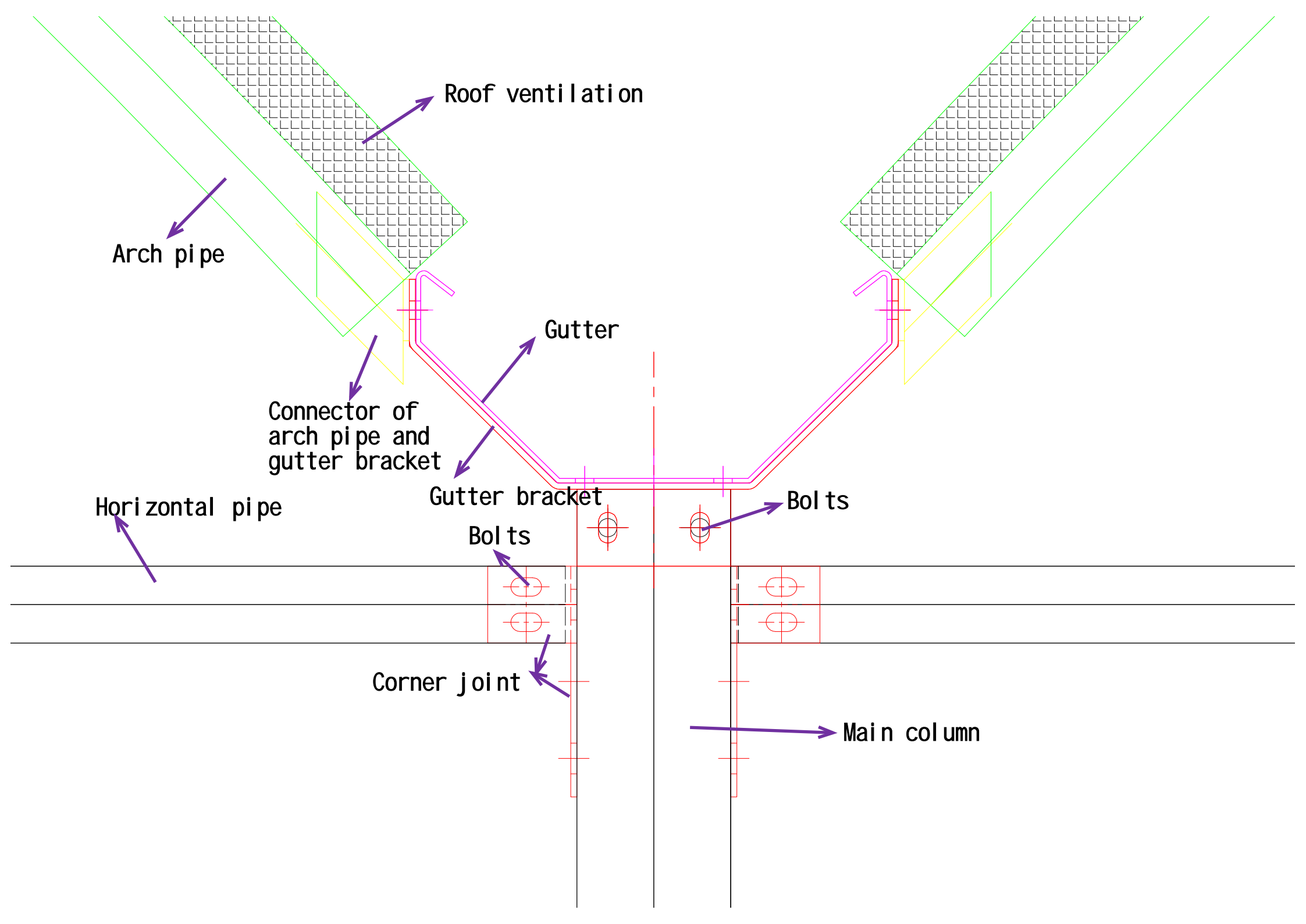
# Greenhouse Side View

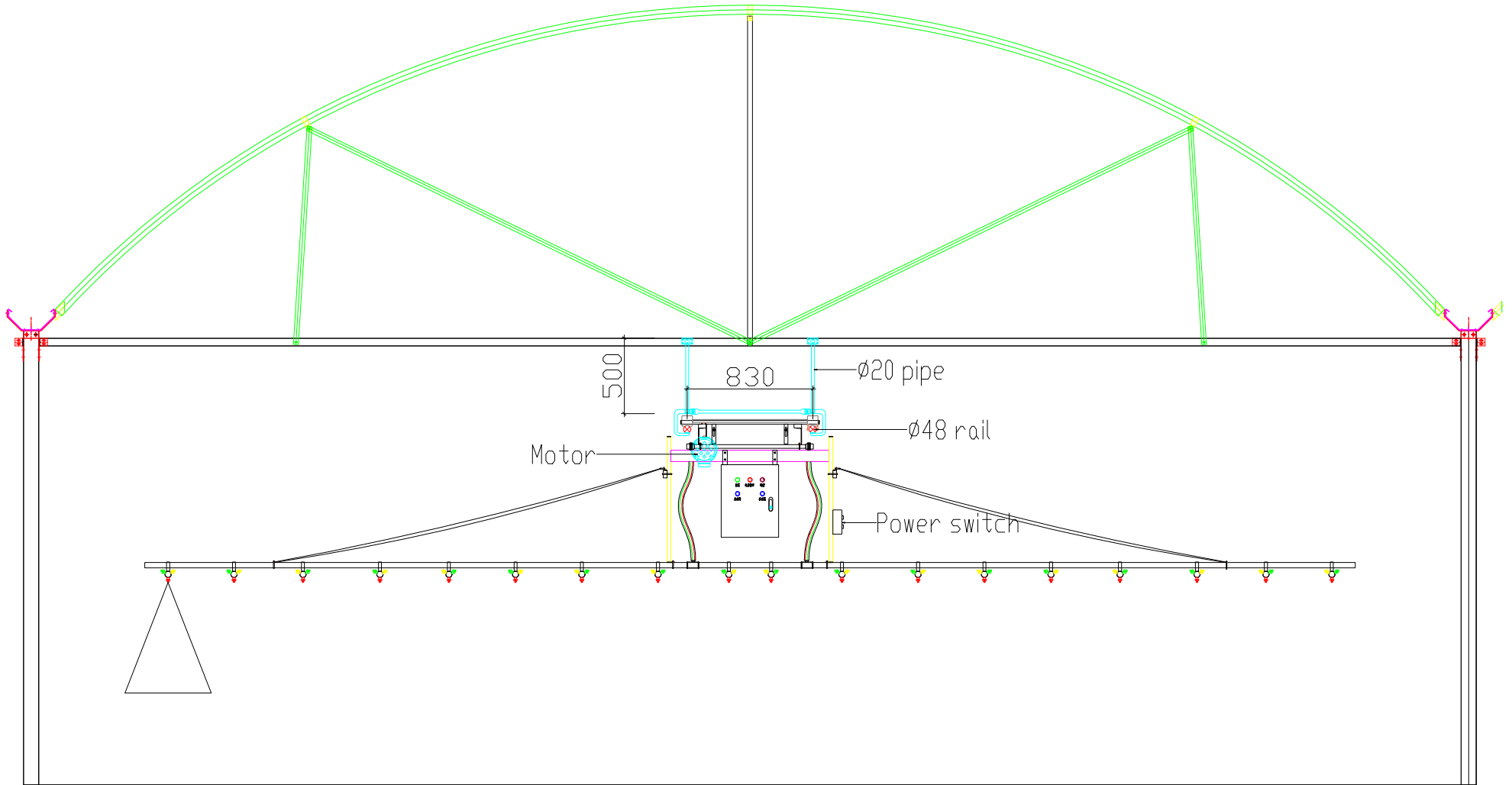


West Side View

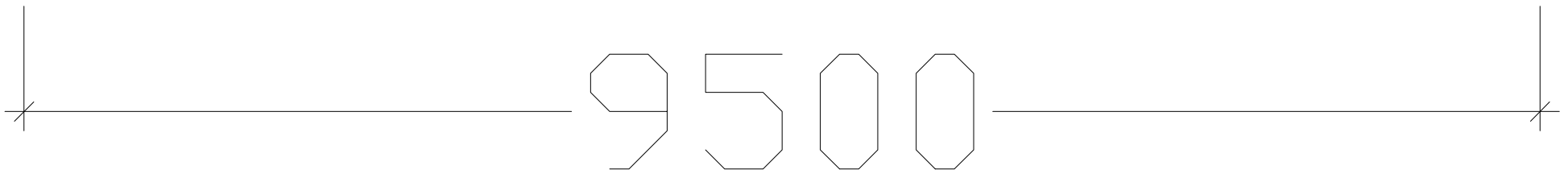


East Side View



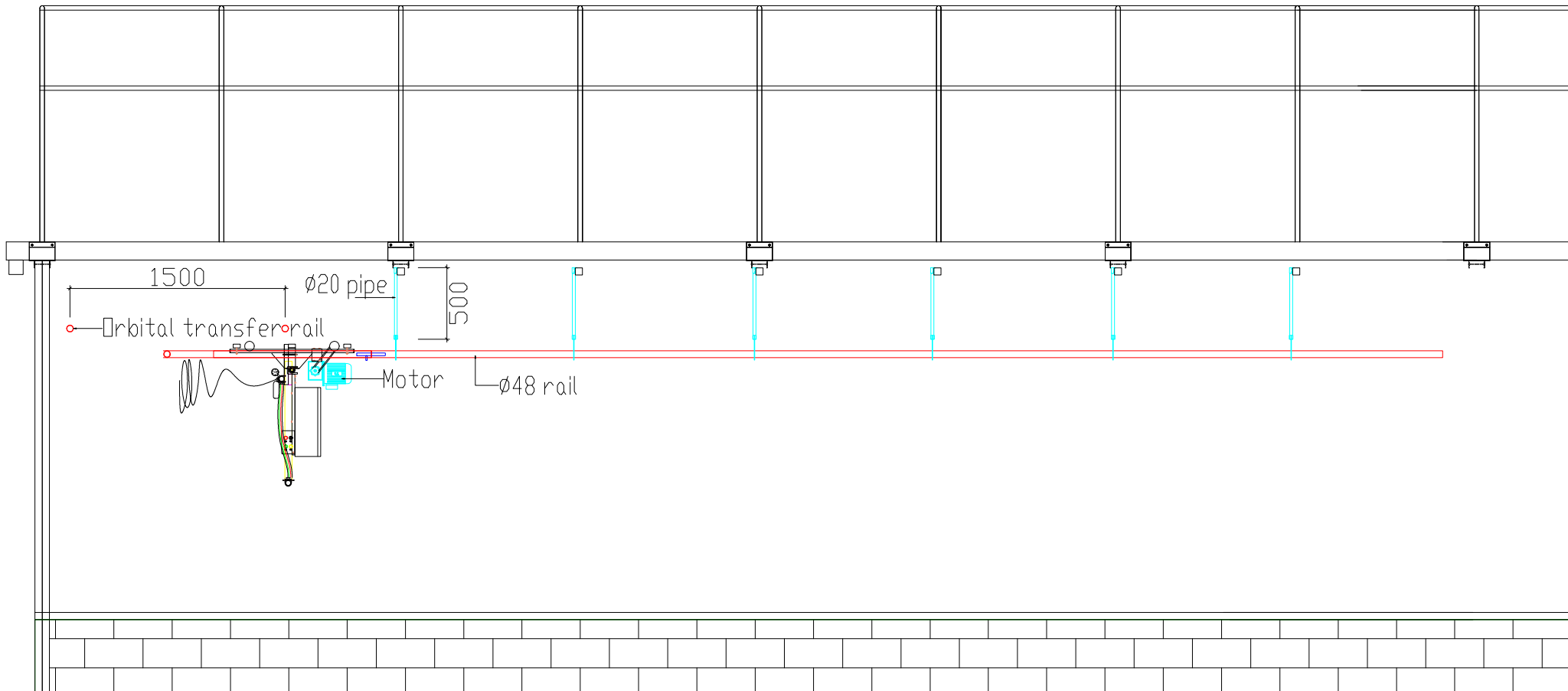


Movable Booming Sprinkler System Installation









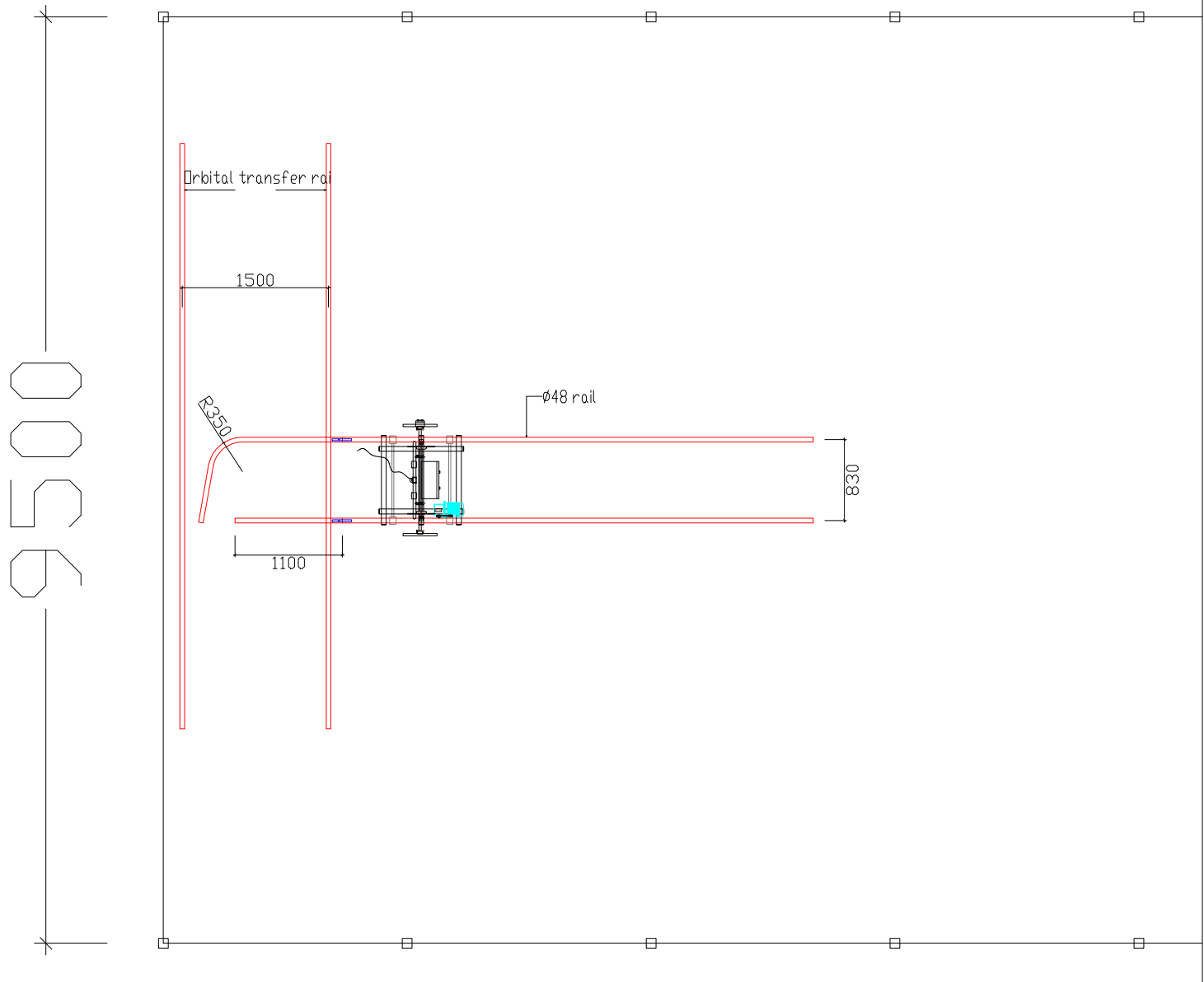
## Movable Booming Sprinkler System Installation



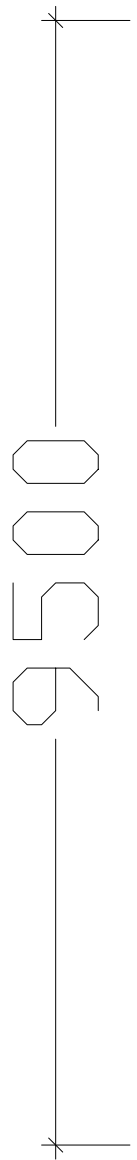








Movable Booming Sprinkler System Installation



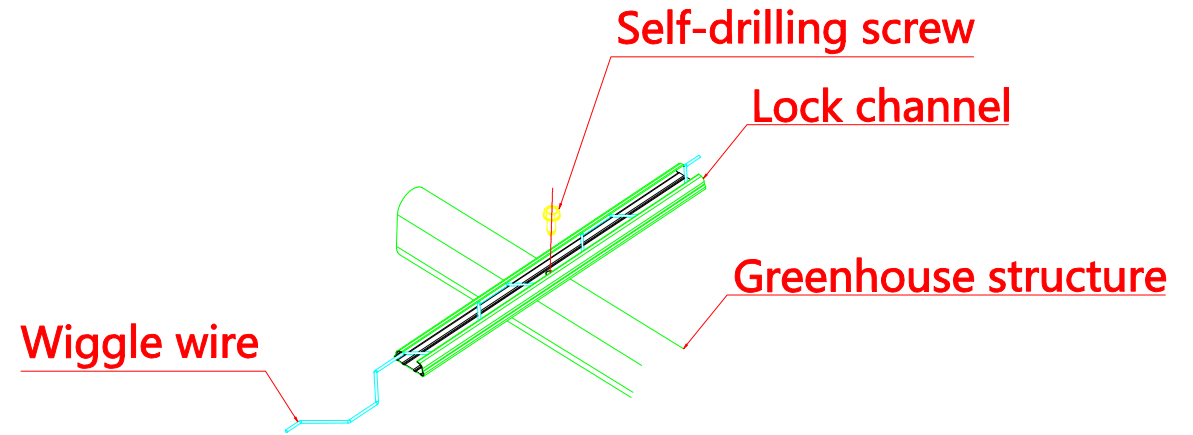




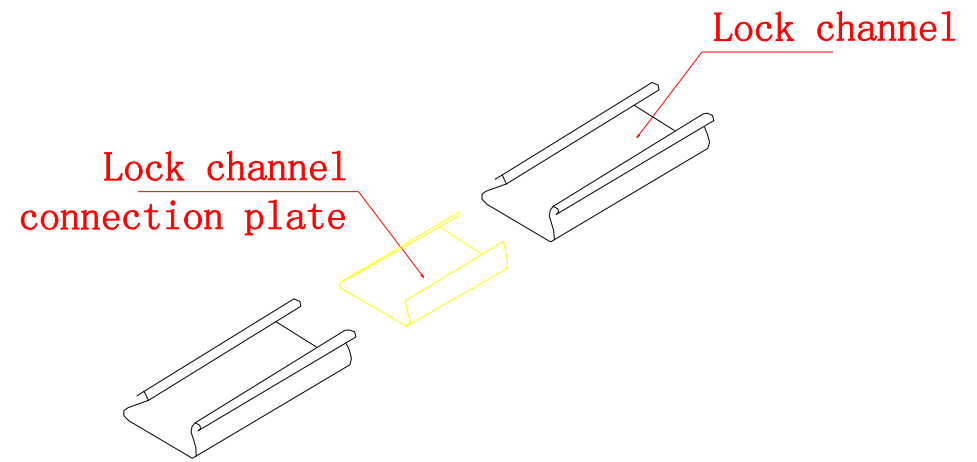
## Covering material Installation

1. The covering film must be stored in a dry place before installation, avoiding sunlight and rain. If it is installed in winter, it is best to place it at room temperature before installation to prevent accelerated aging of film.
2. The installation of the film is chosen in windless weather. Because the film needs to rely on manual pulling installation, if the wind is too large manpower can not pull.
3. The roof and side covering film have been cutted to suitable sizes. During installation, the film is manually pulled and tightened, and then fixed on the greenhouse structure with lock channel, wiggle wire and self-drilling screws.





**Connection of Lock Channel and Greenhouse Structure**



**Lock Channel Connection**