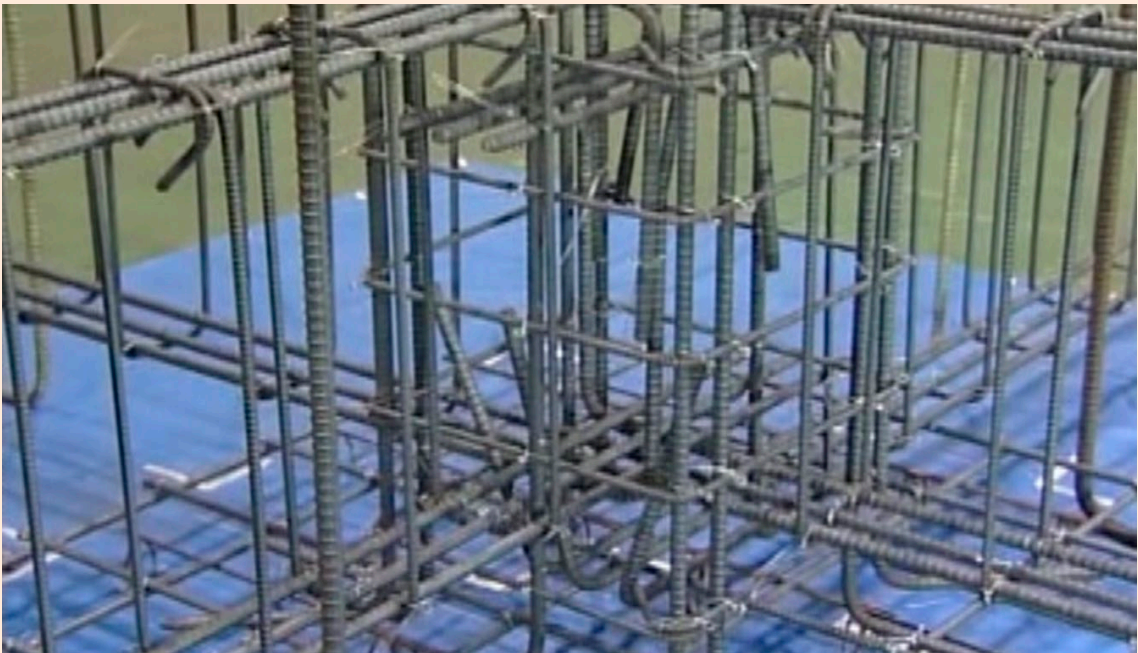


Basic Skills Required for Rebar Construction Workers

---

# Rebar Construction

---



# Table of Contents

1. Reinforced Concrete Construction Method	P.2
2. Rebar construction	P.8



# 1. Reinforced concrete construction method

1.1 Reinforced concrete construction method	P.3
1.2 Steel materials used in construction	P.4
1.3 Instruments and tools used in construction	P.5
1.4 Basic placement sequence	P.7

## 1.1 Reinforced concrete construction method

Reinforced concrete construction is a construction method in which reinforcing steel bars are assembled on site, plywood formwork is installed, and concrete is poured to create the frame.

It is also called Rahmen construction or RC construction (Reinforced Concrete Construction).



Rebar has excellent tensile strength, but is prone to rust and has poor fire resistance at high temperatures. Concrete is strong against compressive force, but conversely it has weak tensile strength. By combining the two, they can mutually compensate for each other's weaknesses and produce a construction method that is resistant to deformation and highly durable. This construction method is also highly adaptable to unevenly shaped sites, as any design can be created depending on the shape of the formwork. However, because the frame is heavy, considerable reinforcement is required if the ground is soft.

### Steel Reinforced Concrete Construction (SRC)

A construction method in which a steel frame is assembled by bolting or welding H-beam and other steel beams together, steel bars are placed around the steel frame, and concrete is poured. It combines the flexibility of a steel frame with the durability of RC construction.

## 1.2 Steel materials used in construction

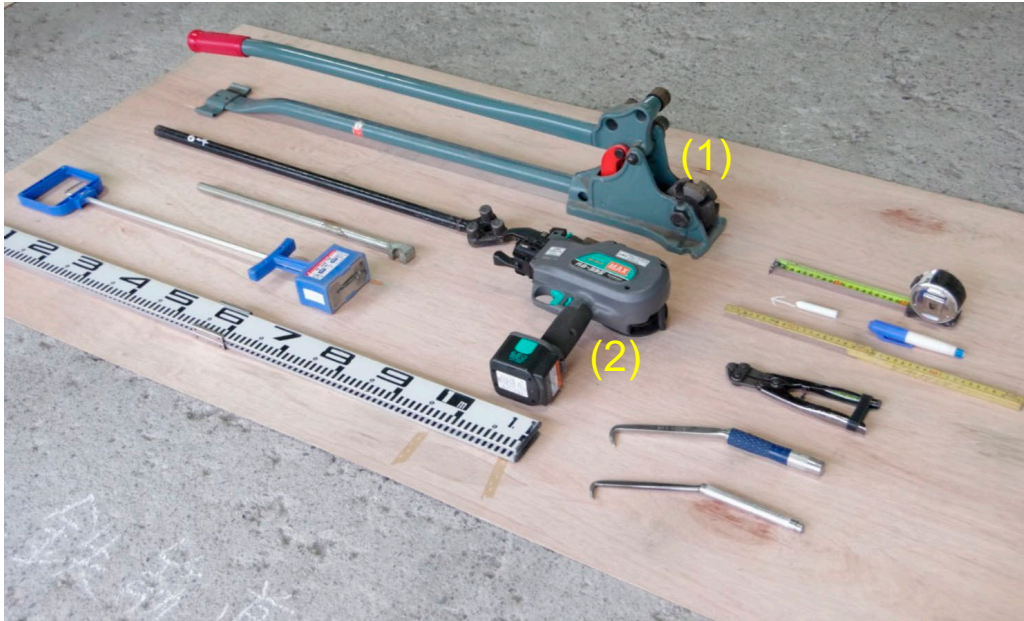
Rebar construction generally uses steel materials known as **deformed bars**.



Deformed bars have uneven knots or ribs on their surfaces to improve adhesion to concrete or mortar and to increase resistance to pull-out forces.

## 1.3 Instruments and tools used in construction

Instruments and tools for cutting, bending, and tying deformed bars are important in the installation of rebar.



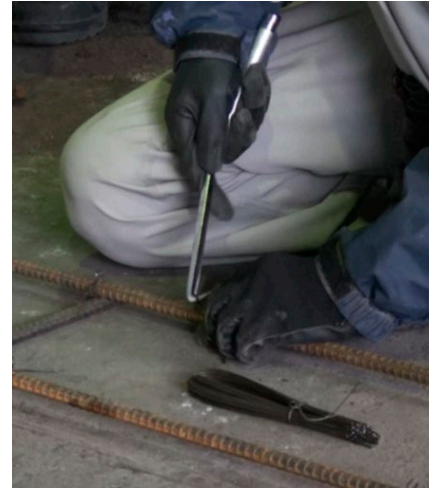
(1) is a tool called a cut bender, which uses the principle of leverage to cut and bend deformed steel bars. There are two types of cut benders: one type where a lever is lifted from below to bend the deformed bar, and the other where a lever is pushed down from above to bend the deformed bar.



(2) is an electric binding machine for binding rebars.

## 1.3 Instruments and tools used in construction

A binding hacker is an indispensable hand tool for rebar construction.



To prevent the binding wire from loosening or being overtightened, deformed bars are bound closely together as if they were held together with rubber bands.

Use binding wires turned to the top and to the bottom precisely to prevent the rebar from shifting.

## 1.4 Basic placement sequence

Generally, rebar placement is done in the following order.

### Foundation part

- (1) Foundation
- (2) Columns (foundation part)
- (3) Foundation beams in the direction between beams
- (4) Foundation beams in the direction of the girders

### General floors

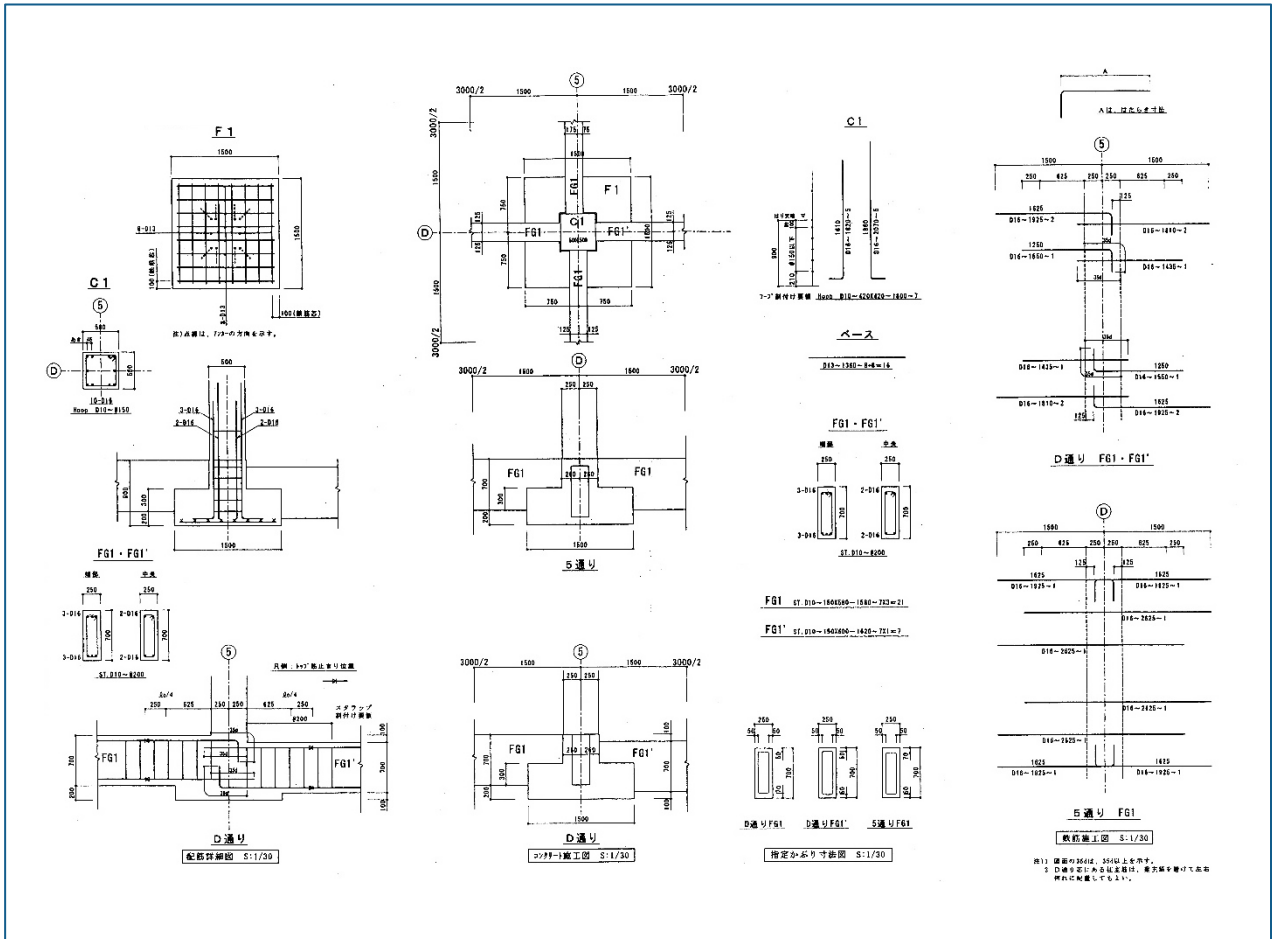
- (5) The foundation part of the columns is joined and the columns built up
- (6) Wall placement
- (7) Large beams in the direction between beams
- (8) Large beams in the direction of the girders
- (9) Small beams
- (10) Slab placement
- (11) Others, such as stairs

# 2. Rebar construction

2.1 Construction drawings covered in this text	P.9
2.2 Flow of construction	P.12
2.3 Key points of construction	P.13

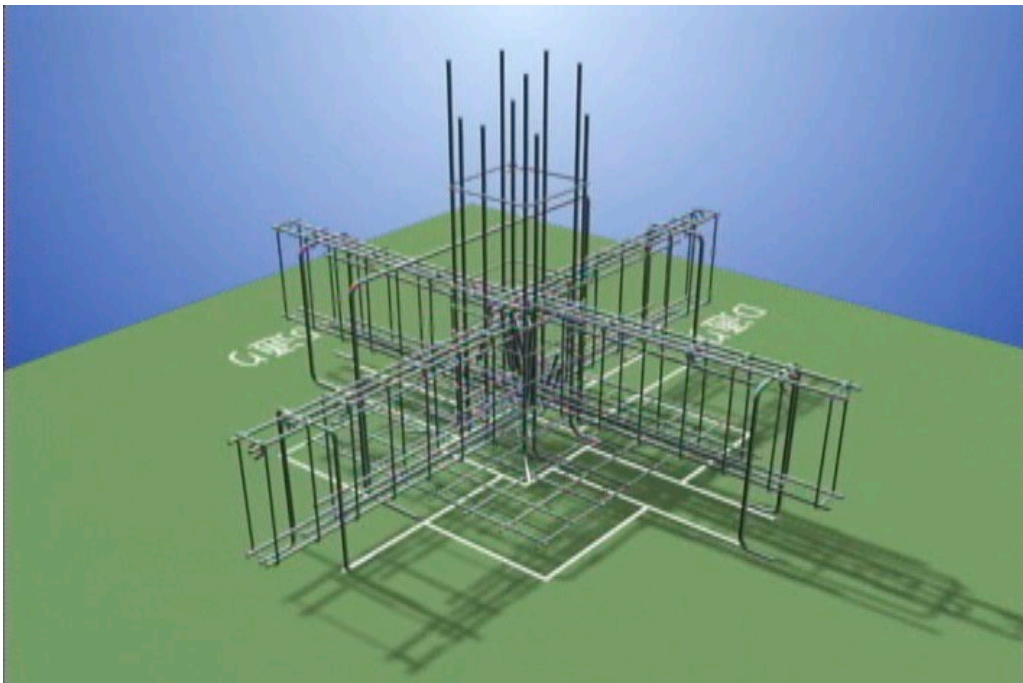
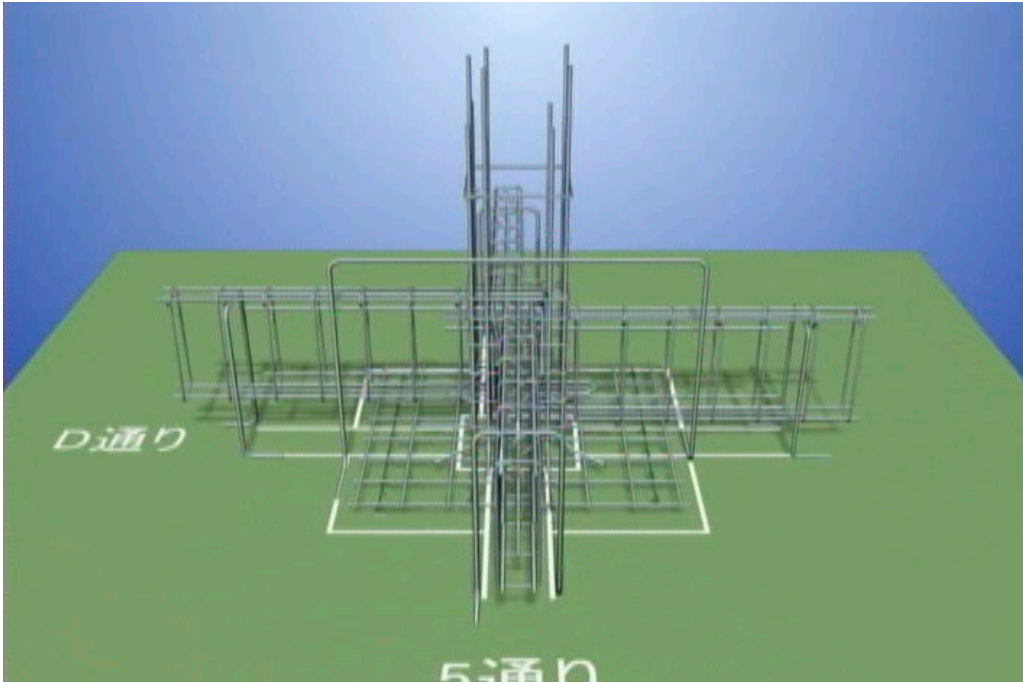
# 2.1 Construction drawings covered in this text

This text explains the assembly of the construction drawings below.

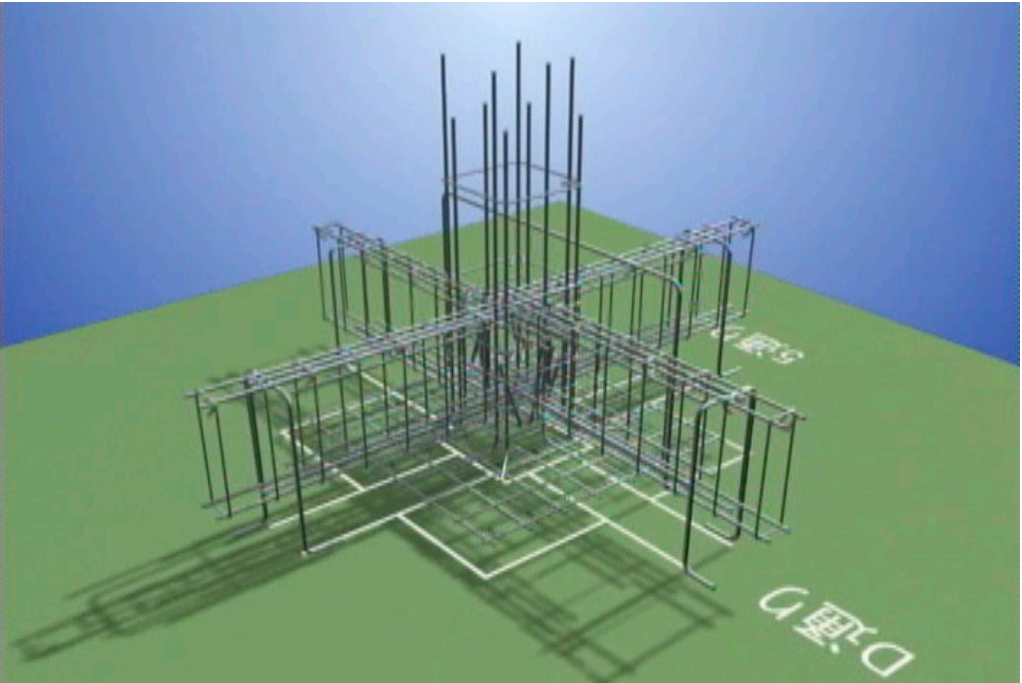
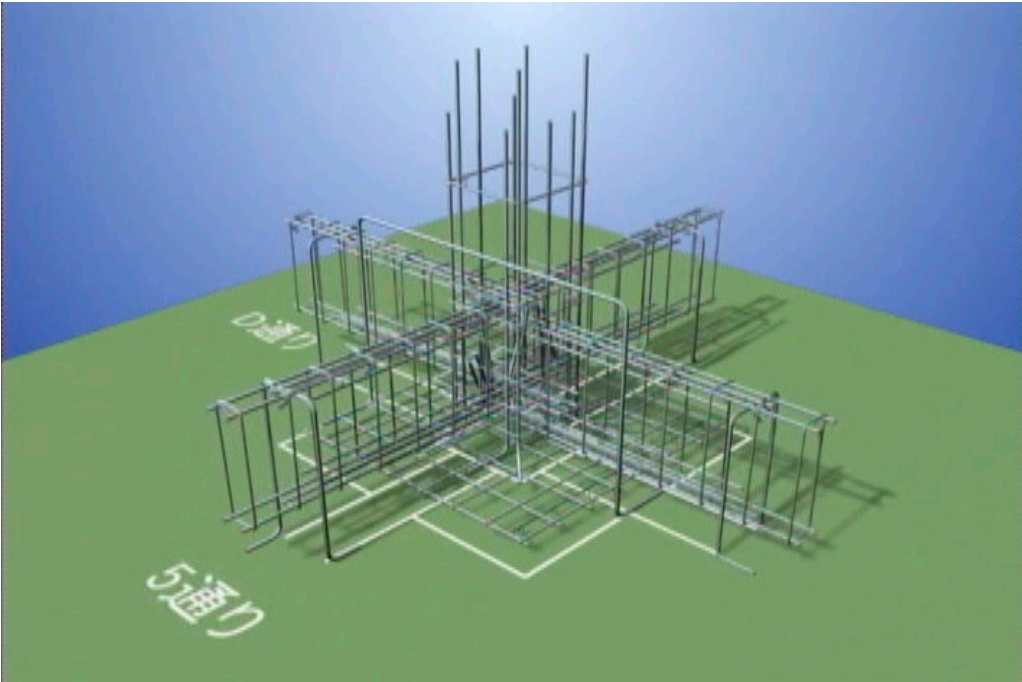


## 2.1 Construction drawings covered in this text

The photographs below show the rebar that has been assembled according to the construction drawings.

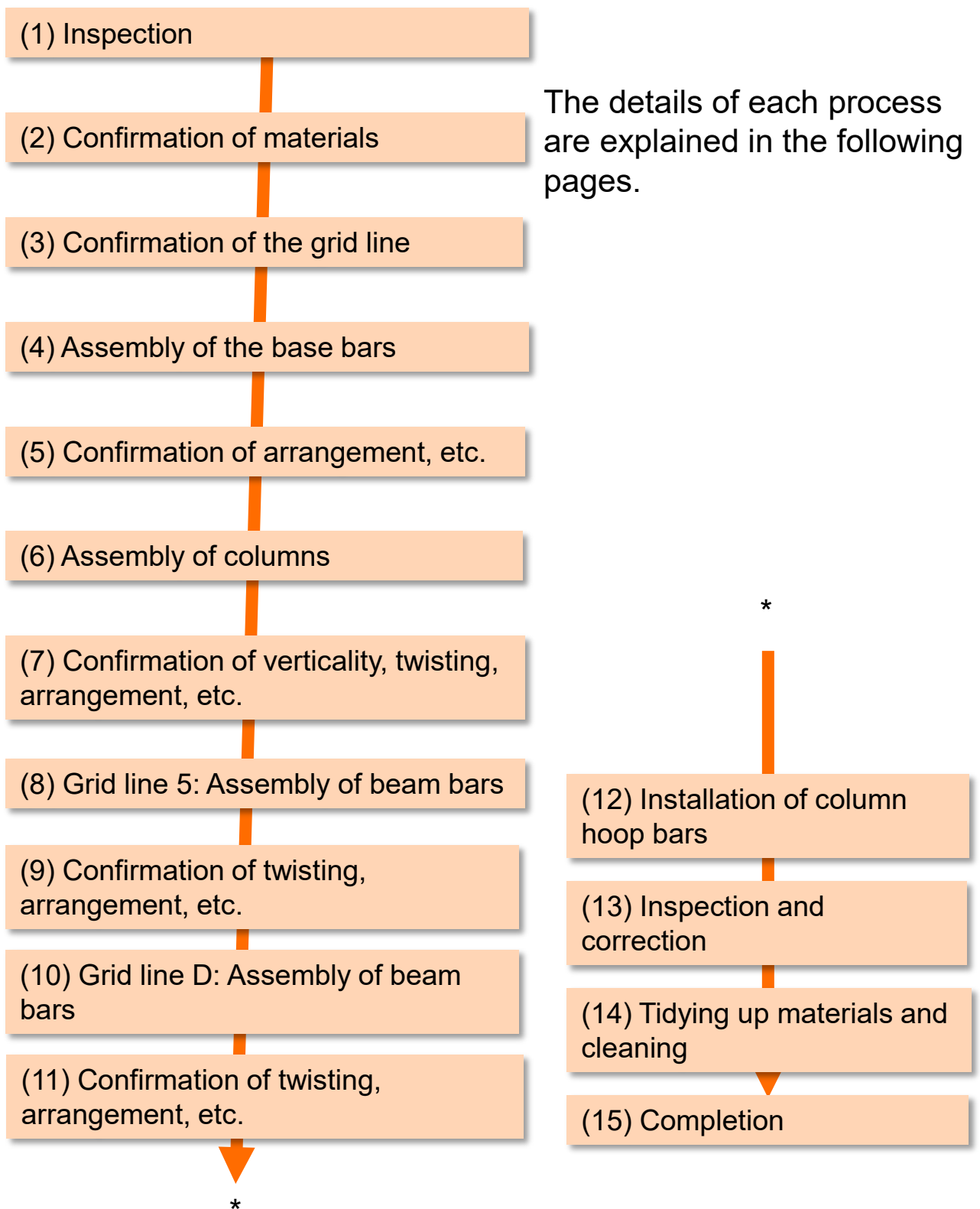


# 2.1 Construction drawings covered in this text



## 2.2 Flow of construction

The construction is performed according to the following steps.



## 2.3 Key points of construction

### (1) Inspection

Inspect the tools to be used and the work clothes and protective equipment (helmet, safety belt, safety shoes, etc.) necessary for the work.



## 2.3 Key points of construction

### (2) Confirmation of materials

Confirm the names, quantities, etc. of the materials to be used in the construction.

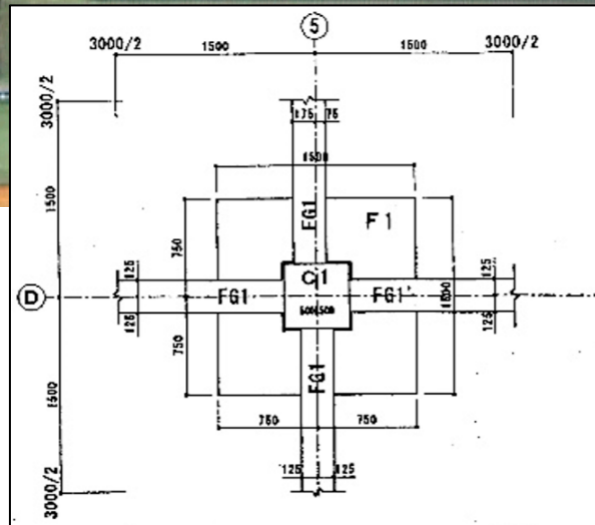
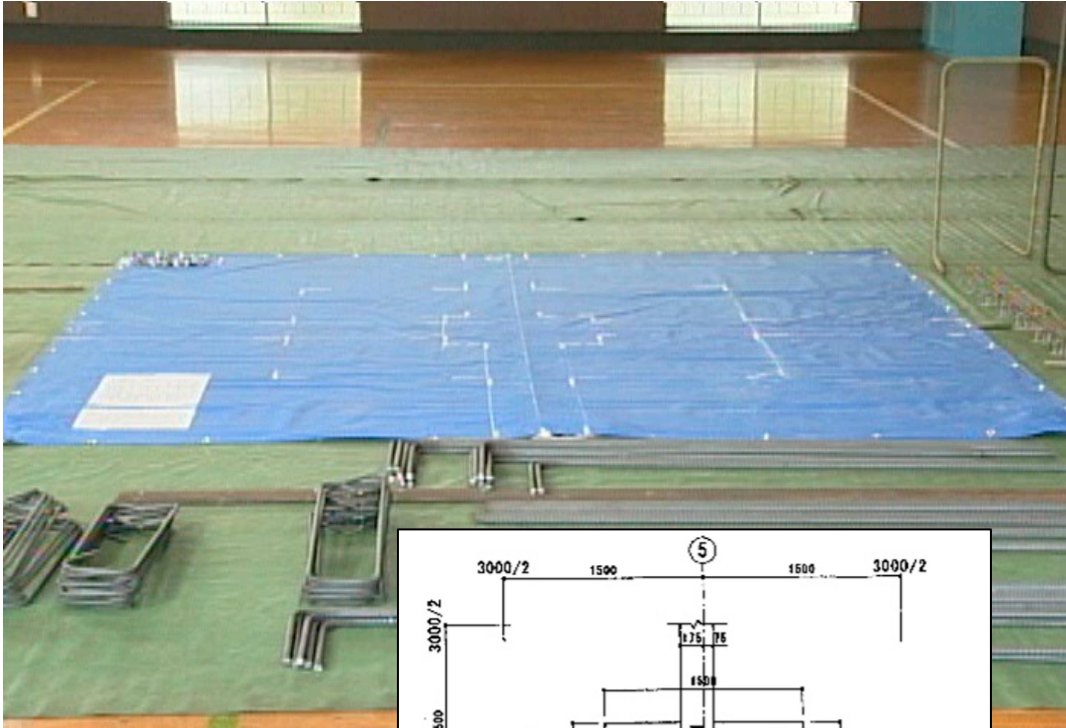
品名	寸法又は規格	数量	摘要
柱筋	SD295A D 16 - 2070 mm	5本	
〃	〃 D 16 - 1820 mm	5〃	
はり筋	〃 D 16 - 2625 mm	4〃	
〃	〃 D 16 - 1925 mm	8〃	
〃	〃 D 16 - 1810 mm	4〃	
〃	〃 D 16 - 1550 mm	2〃	
〃	〃 D 16 - 1435 mm	2〃	
ベース筋	〃 D 13 - 1360 mm	16〃	
フープ	〃 D 10 - 1800 mm	7〃	420 × 420
スターラップ	〃 D 10 - 1620 mm	7〃	150 × 600
〃	〃 D 10 - 1580 mm	21〃	150 × 580
結束線	なまし鉄線	必要数	
柱組立て用うま	高さ 1100 mm	1台	
はり組立て用うま	高さ 820 mm - 3・19φ, 720 mm - 1・13φ	4〃	
スペーサー	高さ 70 mm 長さ 1300 mm 鋼線製	4〃	ベース下端用
チャーク		1本	



## 2.3 Key points of construction

### (3) Confirmation of the grid line

Confirm the location of the grid line and the "grid line 5" and "grid line D" by comparing the ground marks with the drawings.



## 2.3 Key points of construction

### (4) Assembly of the base bars (1/3)

#### Placement of members

Place the members, separating the primary\* and secondary bars.

\* Primary bars: Rebar to be placed on the lower side first



#### Pitch marking

Mark with chalk at 185 mm spacing, starting from the center.



#### Spacer placement

Place the separators, separating the primary and secondary bars.



## 2.3 Key points of construction

### (4) Assembly of the base bars (2/3)

#### Placement of primary bars

Place six bars at approximate intervals. Place the rebars marked with the pitch markings at both ends.



#### Binding of corner parts

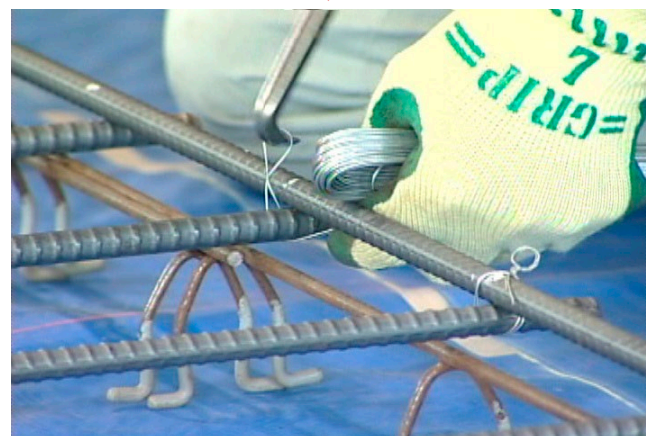
Align the chalk marks and tie them together with a **single bind**\*

“Single bind: A method of binding in which a bind is placed diagonally at a single point.



#### Binding of primary bar ends

Align the center of the rebars with the marking, and bind the rebars with a uniform length of projection.



## 2.3 Key points of construction

### (4) Assembly of the base bars (3/3)

#### Alignment

Pay attention to the covering at the corners and make adjustments so that there are no deviations from the ground marks.



#### Placement of secondary bars

Place according to the markings on the primary bars.



#### Complete binding

Bind the bars at all of the remaining unbound areas.



## 2.3 Key points of construction

### (5) Confirmation of arrangement, etc.

After the assembly of the base bars is complete, pay attention to the covering at the corners, confirm there are no deviations from the ground marks, and make adjustments if there are any problems.

↓ Video of the base bar assembly process ↓



Scan the QR code or click the image to watch the video.



## 2.3 Key points of construction

### (6) Assembly of columns (1/3)

#### Placement of column hoop bars (6 bars)

Using the beam members, temporarily place the hoop bars on top of them. Turn the position of the hooks so that they do not go in the same direction.



#### Mark the position of the hoop bars on the column bars.

Place marks on two long and two short hoop bars. Follow the instructions on the drawings for the position of the hoop bars.



#### Installation of trestle for column assembly

Install the **trestle\*** parallel to the grid line D.

Trestle: A platform created to secure the rebar in place.



## 2.3 Key points of construction

### (6) Assembly of columns (2/3)

#### Installation of 2 column bars for corners

Install the column bars for corners perpendicular to the trestle. Pass the column anchors through the inside of the hooks of the hoop bars. Be careful not to make a mistake with the long or short bars.



#### Binding of hoop bars at top side of beam

Bind the bars in two places according to the markings on the column bars. Bind the corners using **double binding**\*.

Double binding: A binding method in which the bars are bound together on both sides with a single binding wire.



#### Installation of remaining column bars for corners

Place and bind the remaining corner column bars. Bind the bars according to the markings on the column bars.



## 2.3 Key points of construction

### (6) Assembly of columns (3/3)

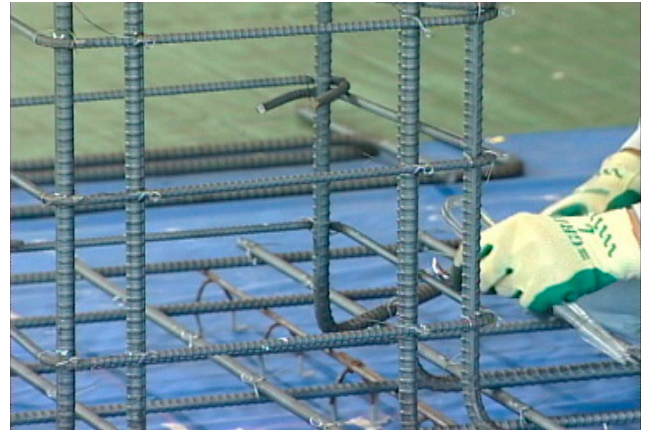
Mark the position of the column bars on the hoop bars.

Mark the location of the column bars on the hoop bars according to the instructions on the drawings.

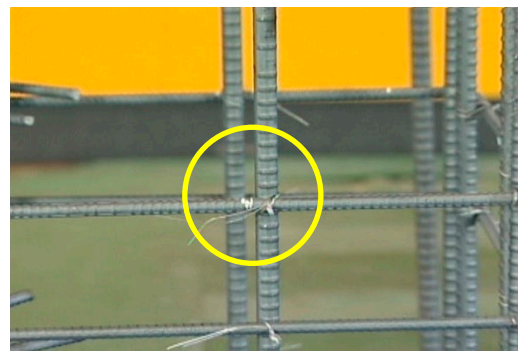


Bind the remaining column bars

Bind the bars vertically in line with the markings on the hoop bars, making sure not to make a mistake with the long and short bars.



Because the grid line D is in contact with the rebar in the center of the beam, place the binding one bar to the side.



## 2.3 Key points of construction

### (7) Confirmation of verticality, twisting, arrangement, etc.

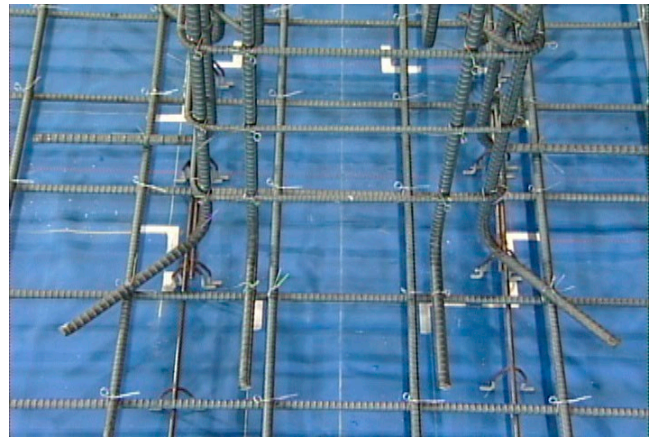
#### Confirm verticality and twisting

Check the verticality and twisting in comparison with the window frame and other frames of the building, and adjust if there are any defects.



#### Confirm corner main bar and hoop bars

Confirm the bars are securely fastened where they intersect with the base bars. Also confirm the spacing of the hoop bars, hook position, levelness, twisting, and condition of the binding.



Installation of frame for placement of hoop bars  
(Use beam members)

← Video of column assembly

Scan the QR code or click the image to watch the video.



## 2.3 Key points of construction

### (8) Assembly of beam bars (1/5)

#### Placement of trestle for beam assembly

Confirm the height of the trestle and place it.



#### Placement of beam top bars

Place the beam top bars on the fifth column hoop bar from the bottom and the trestle.



#### Stirrup marking

Measure 1300 mm from the outside surface of the column main bar and mark it with chalk at the specified dimensions. Follow the instructions on the drawings for the position of the stirrups\*.



Stirrups: Rebar generally used as shear reinforcement in beam members, which are placed at right angles to the beam bars.

## 2.3 Key points of construction

### (8) Assembly of beam bars (2/5)

#### Placement of anchor bars on the grid line D

Place the bars first for convenience in subsequent processes.



#### Placement of stirrups

Place so that the hooks are in alternating positions.



#### Placement of lower anchor bar

Place the lower anchor bars through the stirrups.



## 2.3 Key points of construction

### (8) Assembly of beam bars (3/5)

#### Binding of stirrups

Bind the bars according to the markings using double binding.



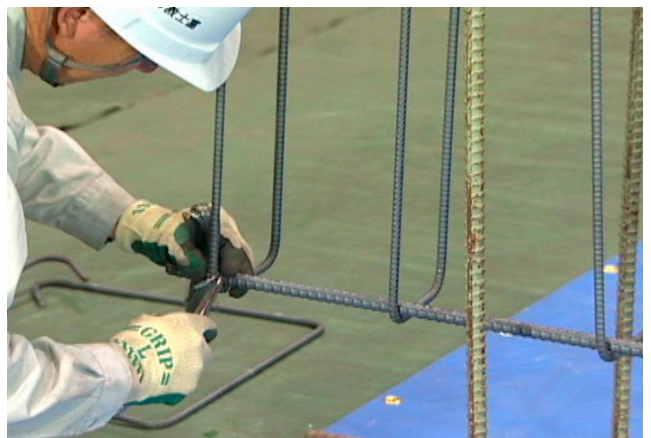
#### Binding of anchor bars in columns

Bind the anchor bars vertically to stabilize them.



#### Binding of corner parts at bottom of stirrups

Bind the bars using double binding while taking care that they are perpendicular.



## 2.3 Key points of construction

### (8) Assembly of beam bars (4/5)

#### Stirrup placement on the opposite side

Place the bars following the same procedure.



#### Placement of beam bottom bars

Place the bottom bars in the position according to the instructions on the drawings.



#### Binding of corner parts at bottom of stirrups

Bind the bars using double binding while taking care that they are perpendicular.



## 2.3 Key points of construction

### (8) Assembly of beam bars (5/5)

#### Binding of stirrups

In places other than the corners, bind using single binding.



## 2.3 Key points of construction

### (9) Confirmation of twisting, arrangement, etc.

Check the twisting and arrangement in comparison with the window frame and other frames of the building, and adjust if there are any defects.

↓ Video of beam bar assembly ↓



**Installation of the “trestle” on “grid line 5”  
for beam bar assembly  
(Confirm the height and place in the specified position)**

Scan the QR code or click the image to watch the video.



## 2.3 Key points of construction

### (10) Grid line D: Assembly of beam bars

#### Stirrup marking on upper anchor bars

Measure 1300 mm from the outside surface of the column main bar and mark it with chalk at the specified dimensions. Follow the instructions on the drawings for the position of the stirrups.



#### Confirmation of stirrup dimensions

Confirm the dimensions of the stirrups to be used.



#### Placement of stirrups

Place according to the marks. Place so that the hooks are in alternating positions.



## 2.3 Key points of construction

### (10) Grid line D: Assembly of beam bars

#### Placement of beam bottom bars

Place the bottom bars in the position according to the instructions on the drawings.



#### Decide the position of the bottom bars

Measure 1300 mm from the outside surface of the column main bar and decide the location of the bottom bars.



#### Binding of corner parts at bottom of stirrups

Bind the bars using double binding while taking care that they are perpendicular.



## 2.3 Key points of construction

### (10) Grid line D: Assembly of beam bars

#### Installation of trestle for beam assembly

Place the trestle, giving consideration to efficiency.



#### Mark the location of the beam top bars

Measure the predetermined height from the ground and mark the location of the beam top bars with chalk. Follow the instructions on the drawings for the position of the top bars.



#### Placement of beam lower anchor bar

The anchor position should overlap with the beam bottom bar on the opposite side, so be sure to check the anchor position carefully when placing.



## 2.3 Key points of construction

### (10) Grid line D: Assembly of beam bars

#### Placement of beam top bars

Place the beam top bars.



#### Stirrup marking

Measure 1300 mm from the outside surface of the column main bar and mark it with chalk at the specified dimensions. Follow the instructions on the drawings for the position of the stirrups.



#### Prepare for placement of stirrups

Prepare using the remaining column hoop bars to float the lower anchor bars for easier placement of the stirrups.



## 2.3 Key points of construction

### (10) Grid line D: Assembly of beam bars

#### Placement of stirrups

Place the stirrups according to the marks. Place so that the hooks are in alternating positions.



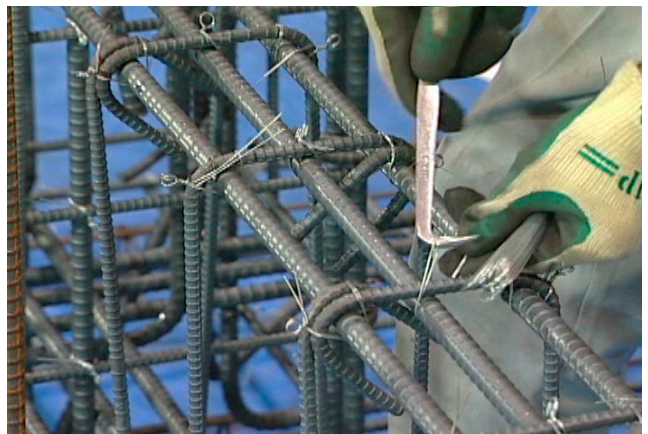
#### Processing of beam top bars

Attach binding wire to the column hoop bars and hang them to make the beam top bars level.



#### Binding of stirrups

Bind the stirrups according to the marks. In places other than the corners, bind using single binding.



## 2.3 Key points of construction

### (10) Grid line D: Assembly of beam bars

#### Confirmation of arrangement of lower anchor bars

Remove the column hoop bars that were placed in the previous step, put the lower anchor bars back in place, and confirm the arrangement.



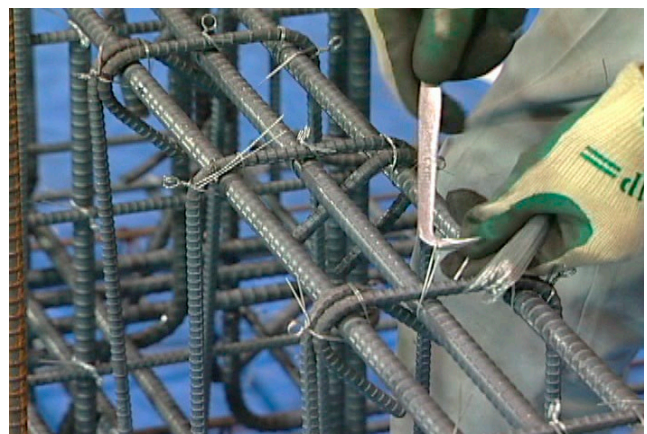
#### Binding of corner parts at bottom of stirrups

Attach binding wire to the column hoop bars and hang them to make the beam top bars level.



#### Binding of stirrups

Bind the stirrups, taking care that they are perpendicular. In places other than the corners, bind using single binding.



## 2.3 Key points of construction

### (11) Confirmation of twisting, arrangement, etc.

Check the twisting and arrangement in comparison with the window frame and other frames of the building, and adjust if there are any defects.

↓ Video of beam bar assembly on grid line D ↓



Scan the QR code or click the image to watch the video.



## 2.3 Key points of construction

### (12) Installation of column hoop bars

Install the column hoop bars at eye level.

↓ Video of column hoop bar installation ↓



Scan the QR code or click the image to watch the video.



## 2.3 Key points of construction

### (13) Inspection and correction

Confirm the verticalness and horizontalness from as far away as possible.



Check every location for unbound areas, etc., and correct any defects.

## 2.3 Key points of construction

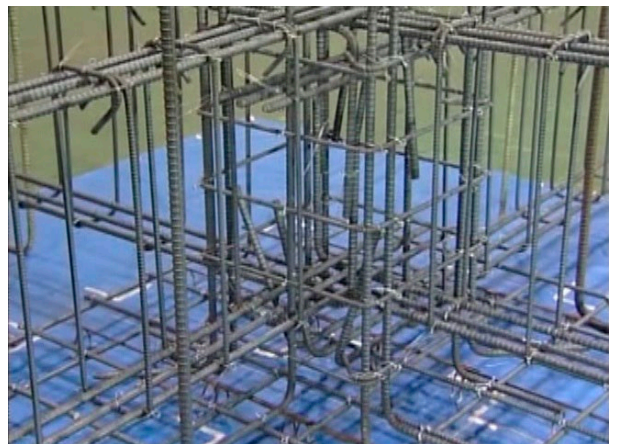
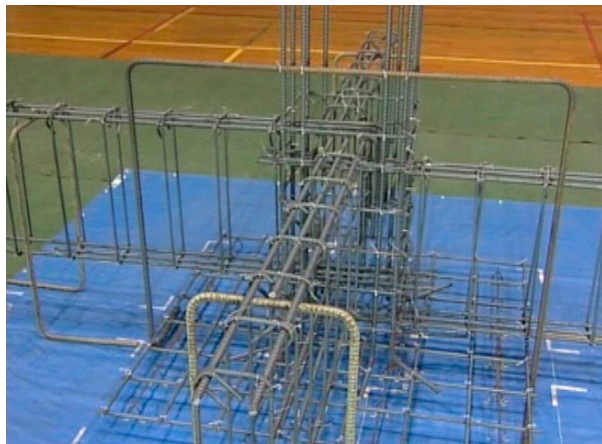
### (14) Tidying up materials and cleaning

Clean up dropped binding wire, etc., being careful not only in the work area but also within the rebar that has been installed.



## 2.3 Key points of construction

### (15) Completion



# Production

National Association for Construction Industry Education and Training

# Cooperation

Japan Reinforcement Contractors Association

Kansai Rebar Industry Cooperative Association

Iijima Rebar Industry Co., Ltd.

Joto Rebar Co., Ltd.

Solution Gate Ltd.

Kenchiku Shiryo Kenkyusha Co., Ltd.

Japan Multimedia Equipment, Inc.

March 30, 2018

「建設技能トレーニングプログラム」ホームページ

建トレ

