Canon

Optimizing Performance Guide

Crowd People Counter

Introduction

About this guide

This guide describes how to install and set the camera to use effectively Crowd People Counter (software listed below).

Software:
- Crowd People Counter
- Crowd People Counter for Milestone XProtect

The counting accuracy of the software depends on how the people are captured in the video. Upon understanding of this guide, it is possible to optimize the performance of the software by choosing the best location and the angle of view for the camera's installation.

The installation and the settings made according to this guide do not necessarily guarantee the improvement of the accuracy for all environments. It is recommended to perform the test in the actual environment before starting the operation.

For the operation of the software, refer to the user manual.

Notes

1. Any unauthorized reproduction of this guide is prohibited.
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Table of Contents

Input Video Requirements

Image size

5472×3648

or less

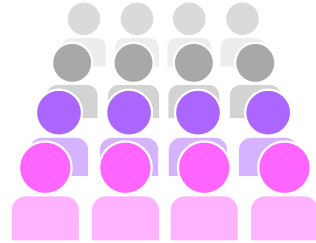
People in a video

Persons' heads are visible in the picture.

Larger toward the bottom (near),
smaller toward the top (far) of the image.

More or less the same size lined side by side.

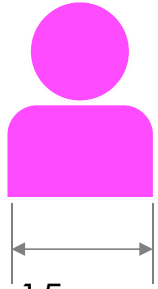
(For details, refer to p. 6.)



Size of the person in the image

Width 15 pixels or more

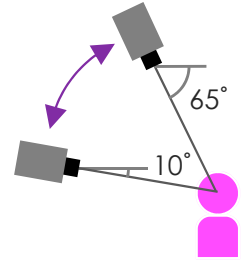
(For details, refer to p. 5.)



Angle looking downward on people (Angle of depression)

10°- 65°

Image of the human body (pink) looking down at 10°



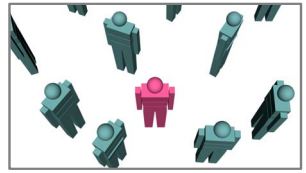


Image of the human body (pink) looking down at 65°

Resolution

Number of pixels

Number of pixels necessary for detecting a person: width 15 pixels or more

Shoulder width of an ordinary person: approx. 40 cm

→ approx. 37.5 pixles/m is necessary

Number of pixels / 37.5

The distance that fits within the width of an image can be obtained by "number of pixels of the width of the image/37.5".

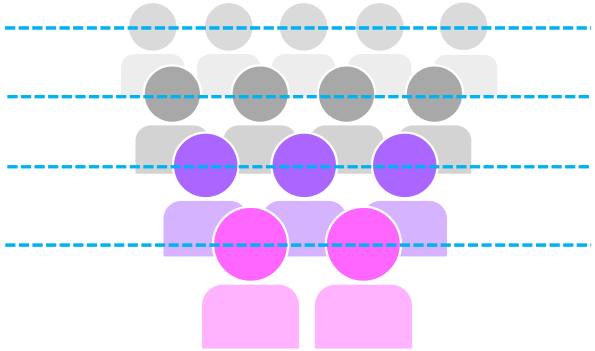
The examples of representative image sizes are shown below.

Image size	Distance within the width of image	Examples of camera models
5472 × 3648	Approx. 145 m or less	AXIS Q1659
3840 × 2160	Approx. 102 m or less	AXIS P1448-LE, AXIS P1368-E etc.
1920 × 1080	Approx. 51 m or less	AXIS P1445-LE, Canon VB-H651V etc.

Human Body Size in the Image

Good Bad

Appropriate human body size and appearance

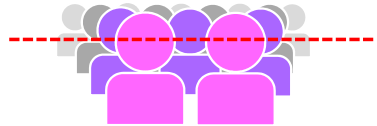


Persons' heads are visible in the picture.

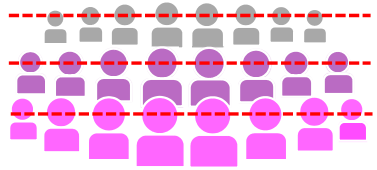
Larger toward the bottom (near),
smaller toward the top (far) of the image.

More or less the same size lined side by side.

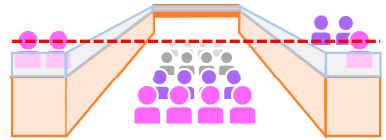
Human bodies largely differ in size and are in line horizontally in the video.
The size of the faces vary irregularly in the vertical direction of the video.



Distance between the people in front and people in the back is large, and the angle of depression is shallow.



Fisheye image, distortion of the peripheral part of the video, etc.



Different levels
(such as atrium areas etc.)

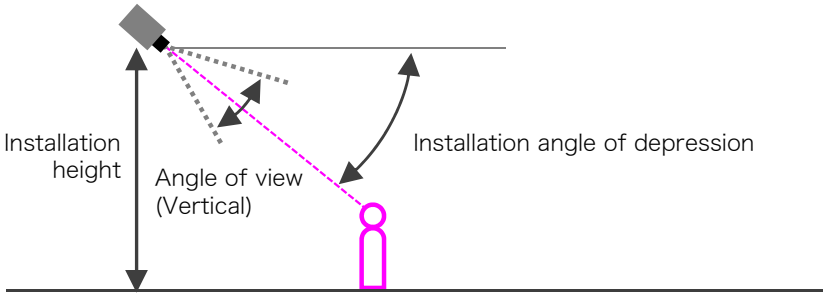
(For avoiding, refer to p.16.)

Relation Between Countable Area and Accuracy

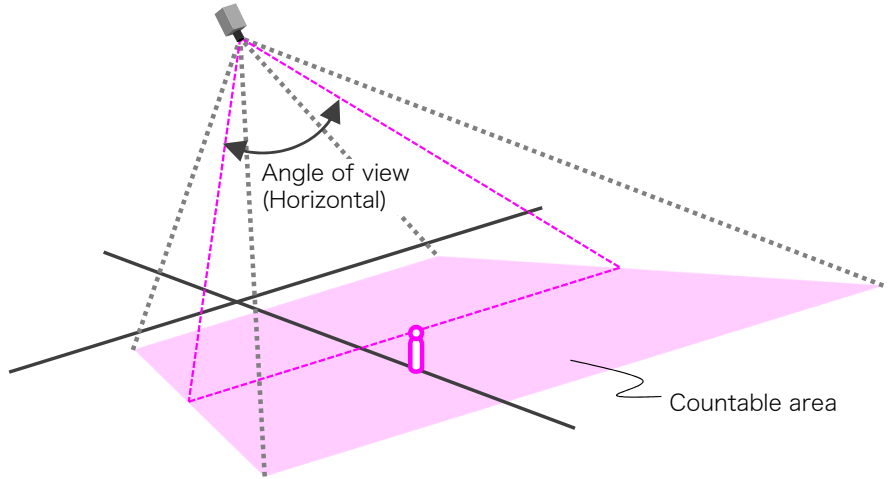
Factors in the countable area and accuracy

- Installation height: Refer to p. 8.
- Installation angle of depression: Refer to p. 9.
- Angle of view: Refer to p. 10.
- Video size (The larger, the better.)

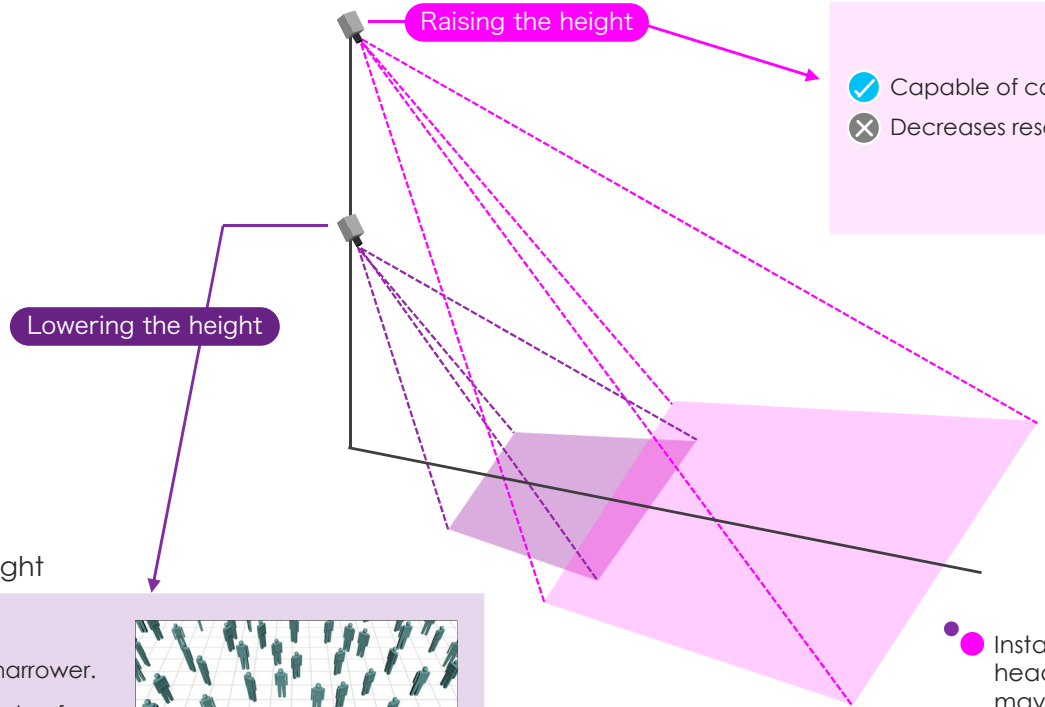
Side view



Aerial view



Installation Height

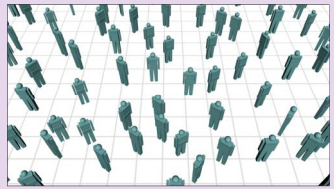


Raising the camera's height

- Capable of capturing a wide area.
- Decreases resolution (pixel/m).

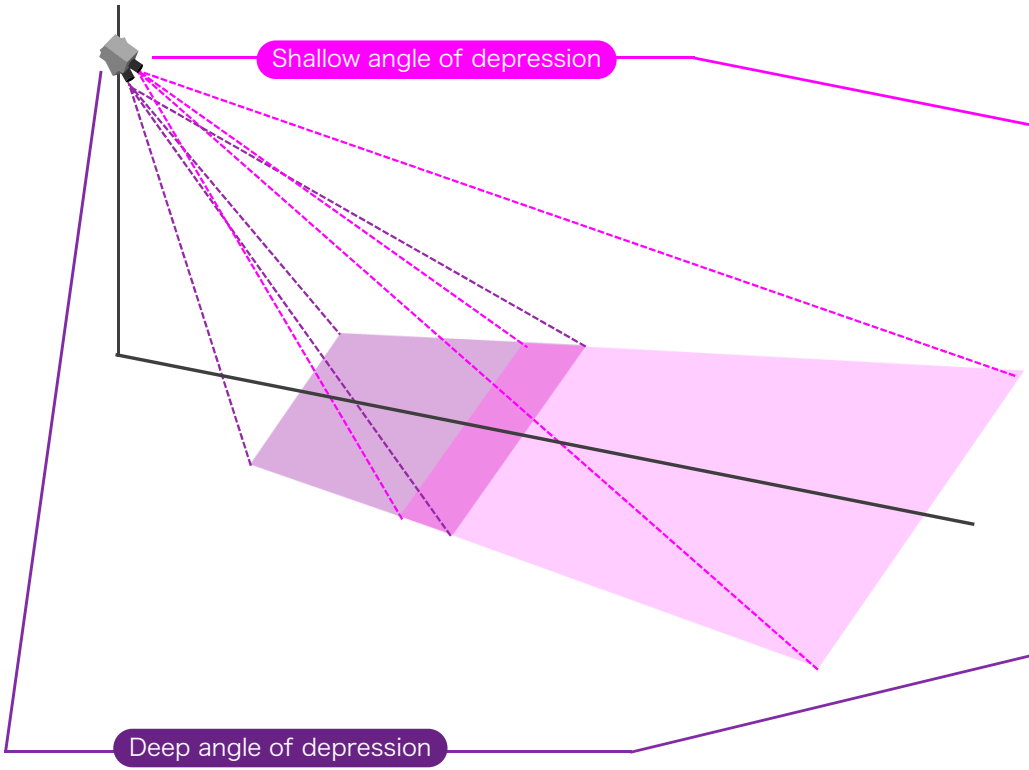
Lowering the camera's height

- Capturing area becomes narrower.
- Demerits due to shallow angle of depression could occur (p. 9).



- Install the camera 1.5 m higher or more than the average head height. If the installation height is low, the accuracy may be reduced for the following reasons:
  - People in line horizontally may be captured in a largely different size.
  - People at the bottom of the screen is too close to the camera and may appear too large in the video.

Installation Angle of Depression



If the installation angle of depression is decreased...

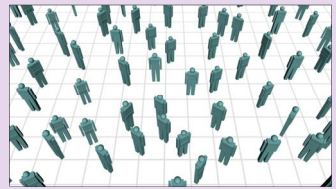
- ✓ Capable of capturing a wide area.
- ✗ When it gets crowded, it is difficult to detect a person behind other people.
- ✗ Could become less accurate when there are more people.

* Countable up to the congestion of approx. 1.3 people/m^2 at the smallest angle of looking down on a human body of 10 °

- ✗ People largely differ in size are in line horizontally in the video (p. 6).
- ✗ Difficult to set the clear definition of counting area since subjects in the far end are unnecessarily captured.

If the installation angle of depression is increased...

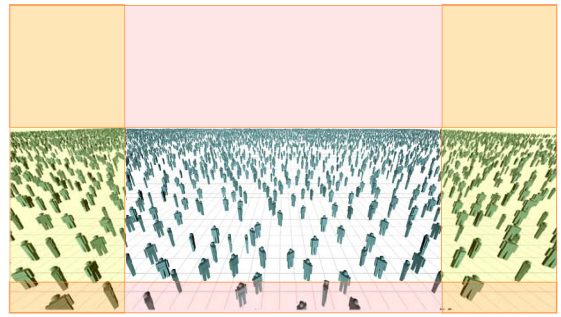
- ✓ Less people overlap in crowded situations.
- ✗ Capturing area becomes narrower.
- ✗ Incorrect count of hands, shadows, or belongings etc. in especially sparsely situation may reduce accuracy.



Angle of View

Increasing the angle of view...

- Capable of capturing a wide area.
- Distortion of the right and left edges of the image may reduce the accuracy.
- Increases the area where the accuracy of counting is degraded for areas outside the angle looking downward on people (10° - 65°).

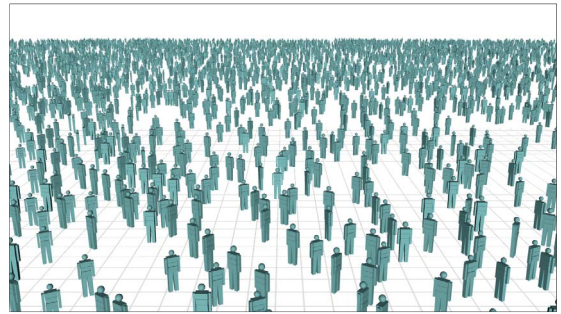


Accuracy degradation due to distortion is concerned.

Accuracy degradation outside the specified angle looking downward on people is concerned.

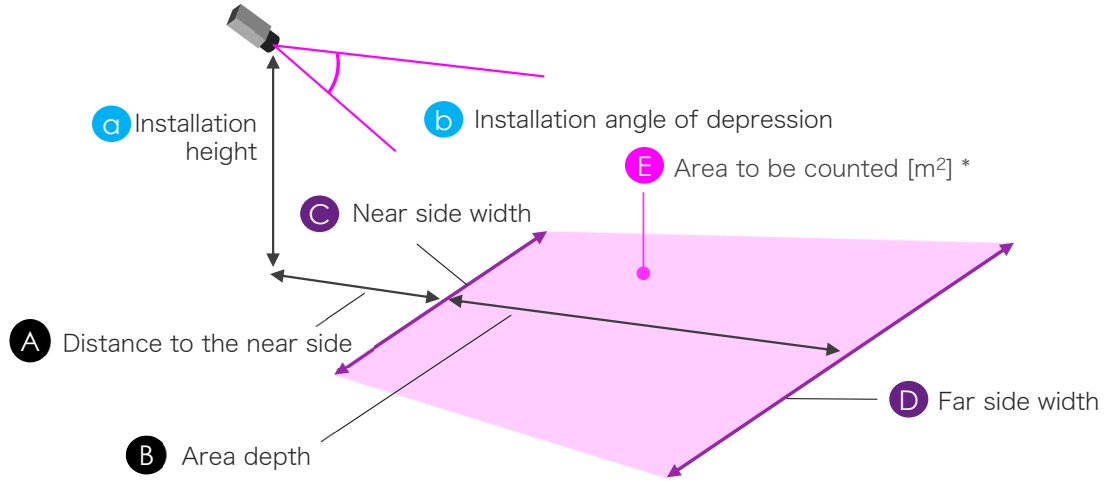
Decreasing the angle of view (Set to the telephoto side)...

- Reduces distortion.
- Capturing area becomes narrower.



Example of Installation

The relation between the countable area (area to be counted) and image size, horizontal angle of view, installation height, and installation angle of depression, is listed in the chart below, regarding the cameras (1) Q1659 + 24mm f/2.8, (2) P1448-LE, and (3) VB-H651V. The relation between the size of the area to be counted and the position of the camera is shown as the image on the plane, on p. 12 to p. 14.



◆ Image size ◇ Horizontal angle of view (˚)

Model	(1) Q1659 + 24mm f/2.8 (p. 12)									(2) P1448-LE (p. 13)																		(3) VB-H651V (p. 14)											
◆	5472 x 3648									3840 x 2160																		1920 x 1080											
◇	50.1									Approx. 50									Approx. 70									Approx. 50						Approx. 70					
a	10			20			30			10			20			30			10			20			30			10			20			30			10			20			30		
b	40	30	15	40	30	15	40	30	15	40	30	15	40	30	15	40	30	15	40	30	15	40	30	15	40	30	15	40	30	15	40	30	40	30	15	40	30	15	40	30
A	5	8	13	12	17	30	18	25	45	6	9	15	13	19	30	20	30	50	5	7	11	10	15	25	15	25	40	6	9	15	13	19	30	20	30	5	7	11	10	15	25	15	25
B	15	30	35	30	65	75	50	100	110	12	20	35	25	50	70	40	75	55	20	40	35	45	60	45	55	45	30	12	20	35	25	35	19	30	18	20	30	25	20	17	8	8	3
C	9	10	14	20	20	30	30	35	50	9	11	15	20	25	35	30	35	50	13	14	19	25	30	40	40	45	60	9	11	15	20	25	35	30	35	13	14	19	25	30	40	40	45
D	20	35	45	45	75	100	65	120	150	18	30	45	40	65	100	60	95	100	35	65	70	75	100	100	100	100	100	18	30	45	40	50	50	50	50	35	50	50	50	50	50	50	50
E *	218	675	1033	975	3088	4875	2375	7750	11000	162	410	1050	750	2250	4725	1800	4875	4125	480	1580	1558	2250	3900	3150	3850	3263	2400	162	410	1050	750	1313	808	1200	765	480	960	863	750	680	360	360	143

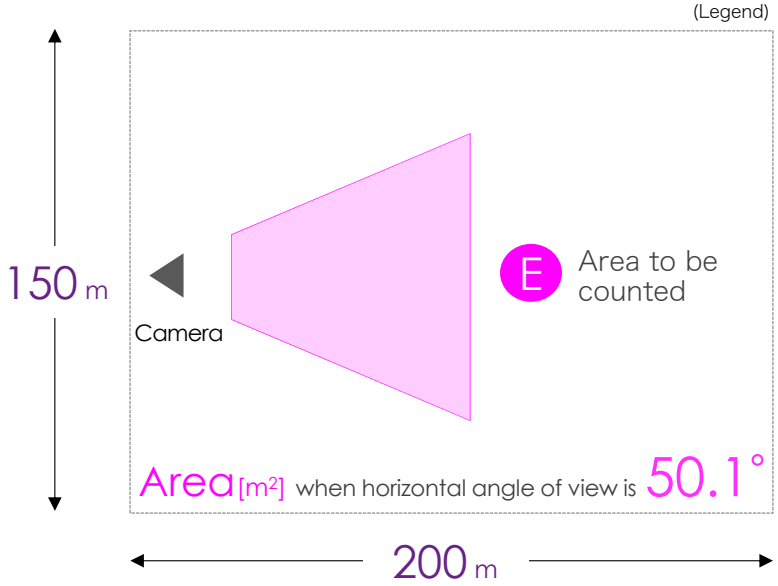
a A B C D (m) b (˚)

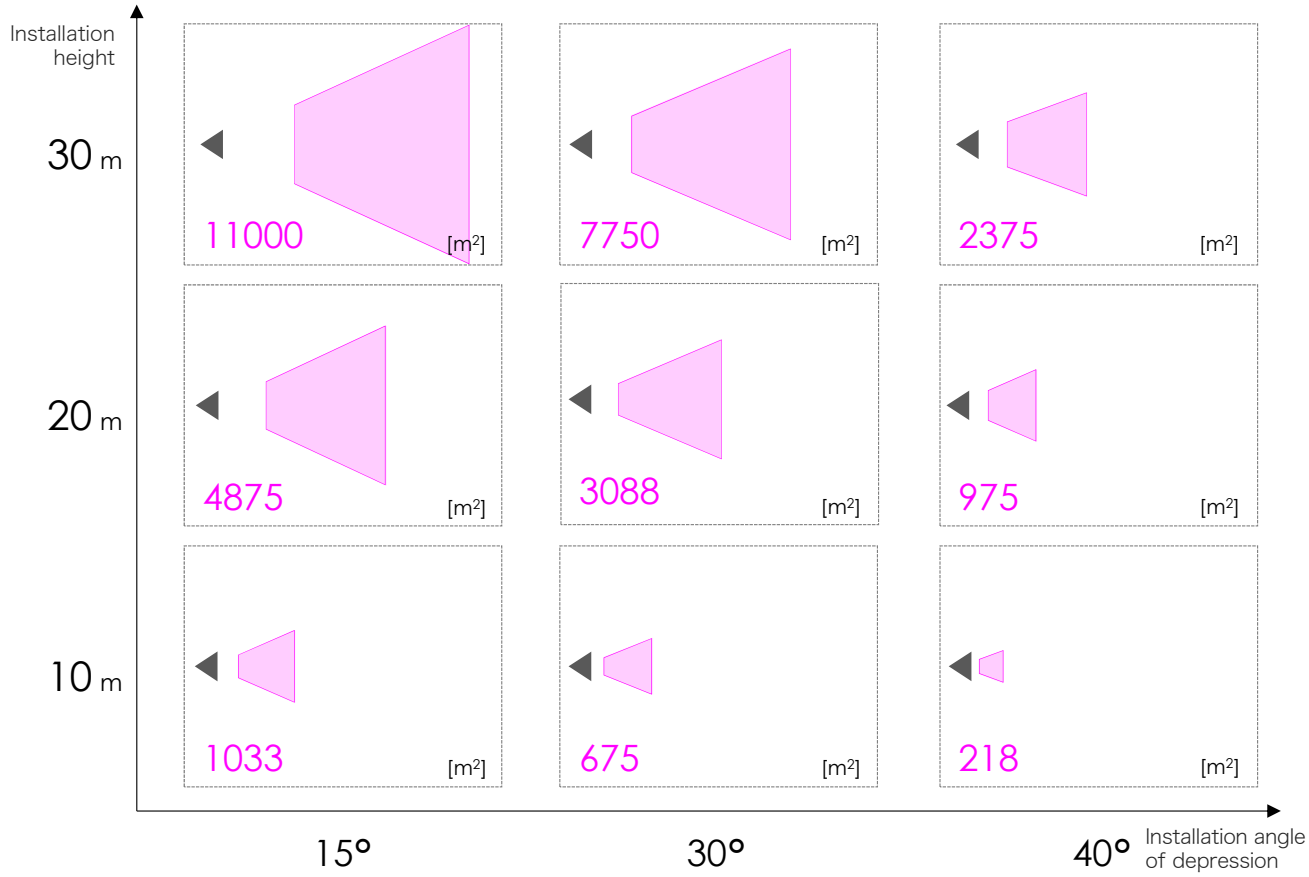
* Area to be counted is the area calculated by approximating a trapezoid.

Example of Installation (1) AXIS Q1659 + 24mm f/2.8

Camera Features:

High resolution (20MP) enables to cover a wide area with one camera.
Lenses can be chosen according to the necessary angle of view.

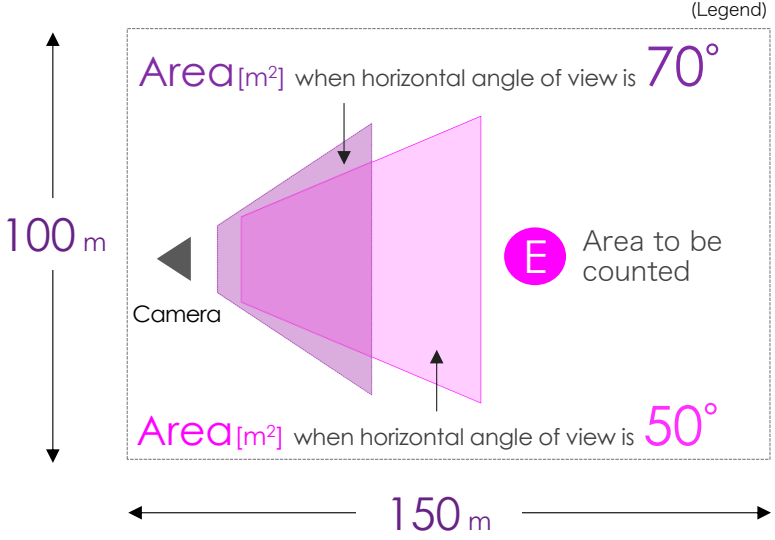


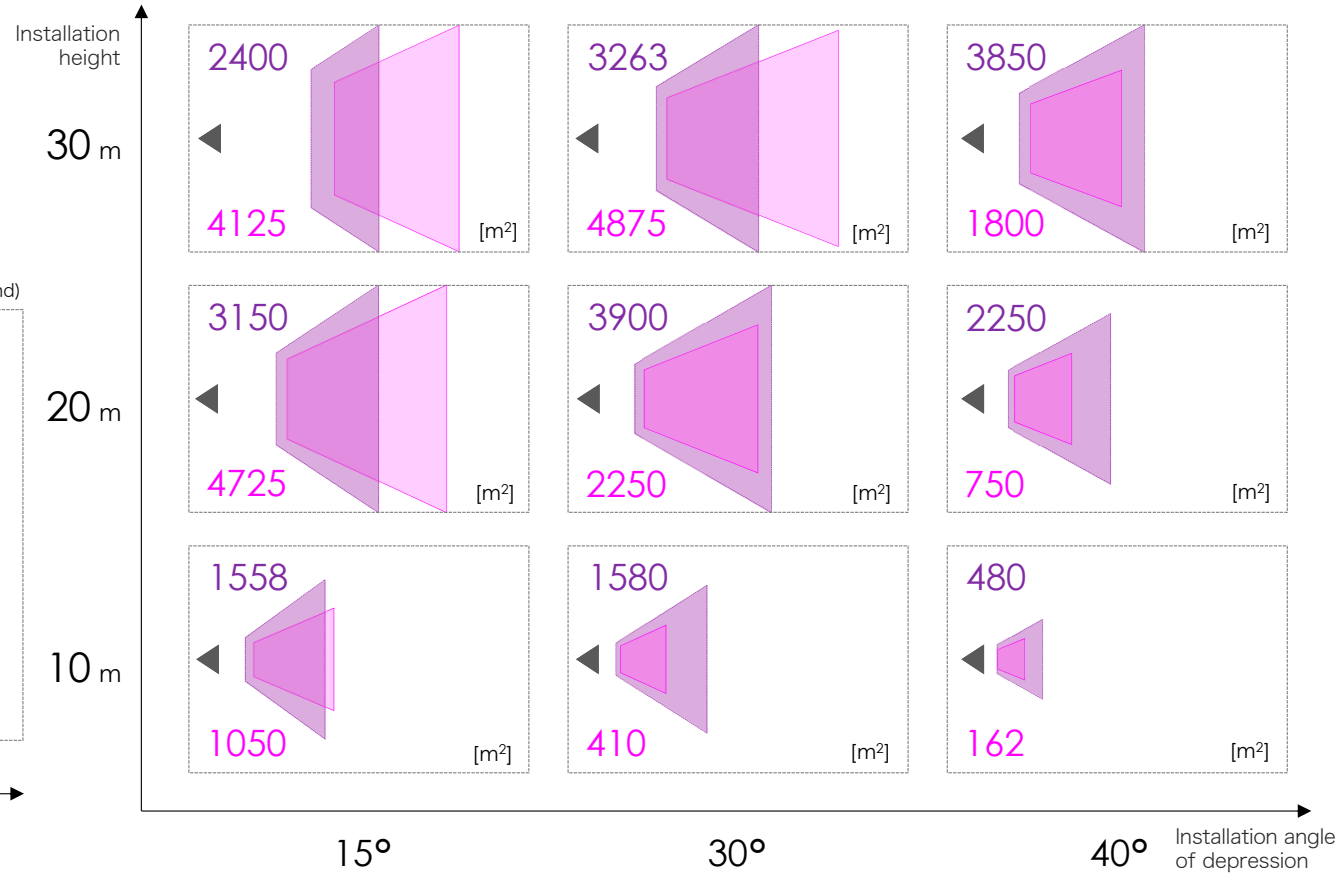


Example of Installation (2) AXIS P1448-LE

Camera Features:

High resolution (8MP (4K)) enables to cover a wide area with one camera. Angle of view can be adjusted (109° - 37°) with remote zoom.

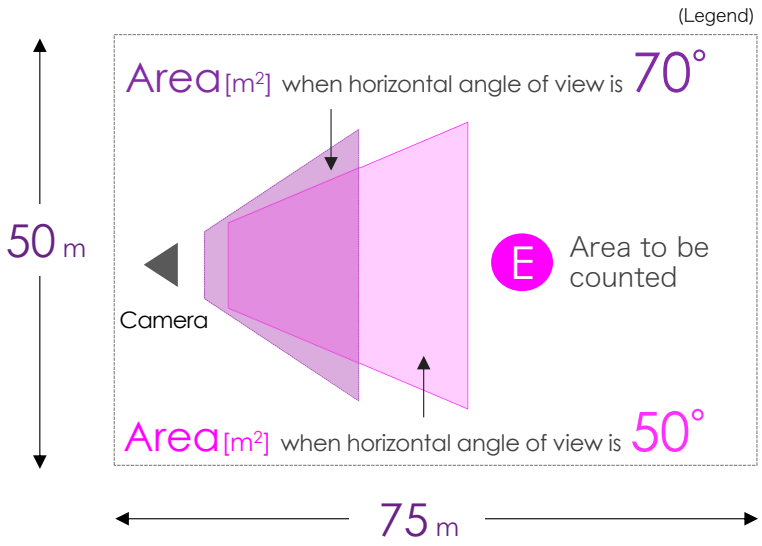


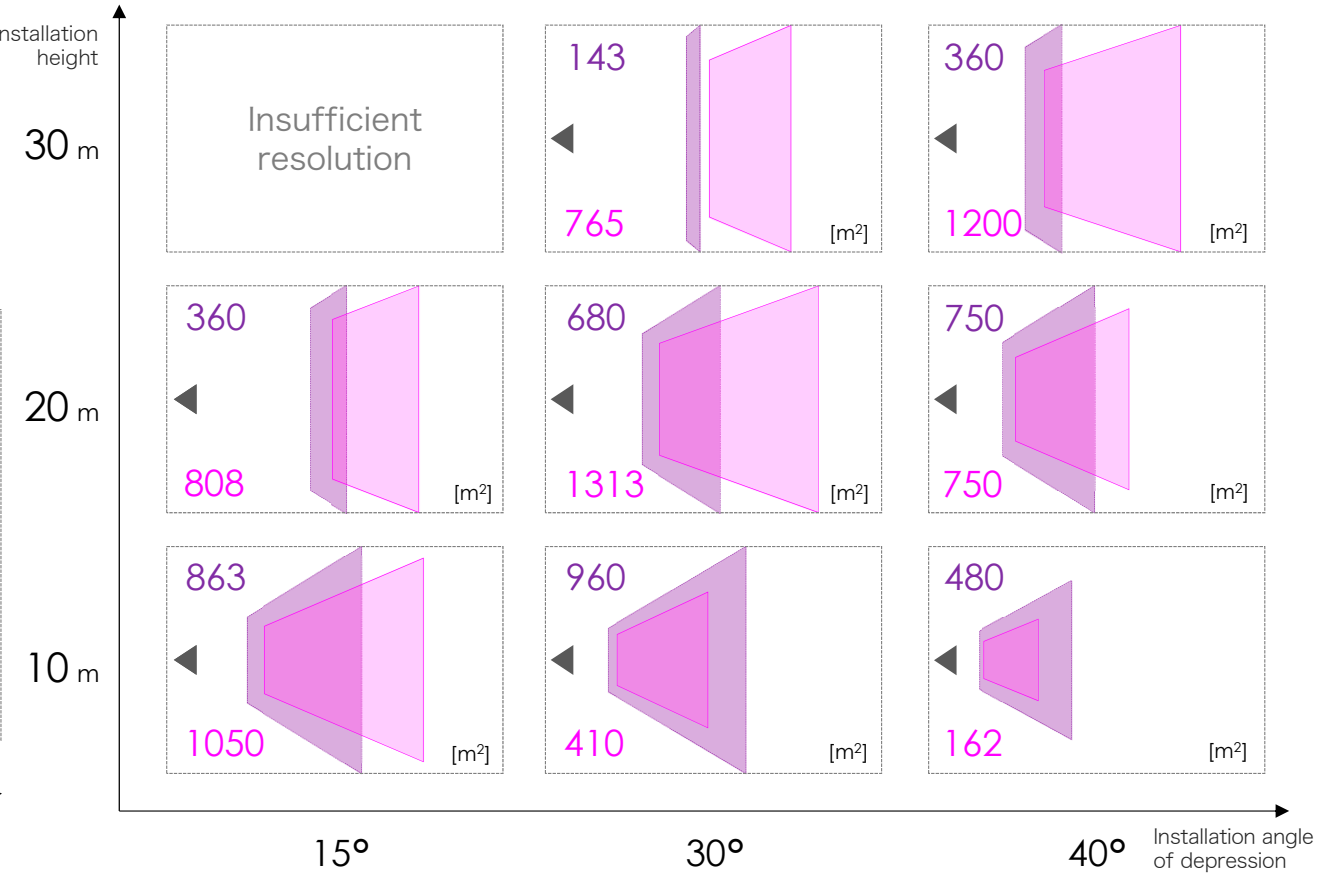


Example of Installation (3) Canon VB-H651V

Camera Features:

Installation PTRZ function makes it easy to adjust the angle of view (122.1° - 50.1°) when installing the camera.

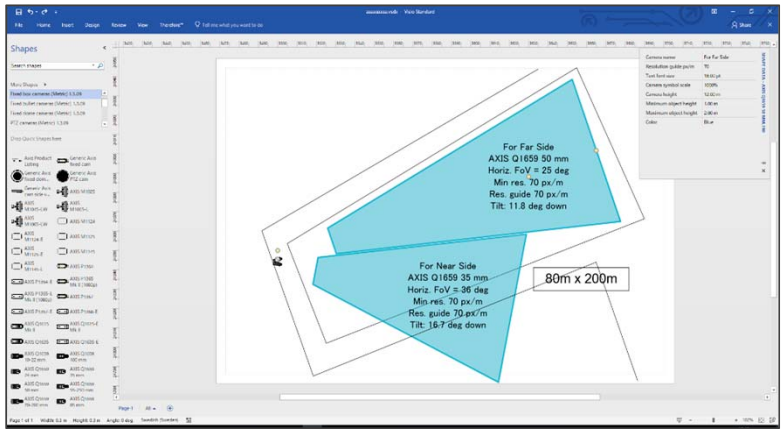




Introduction of Design Tools

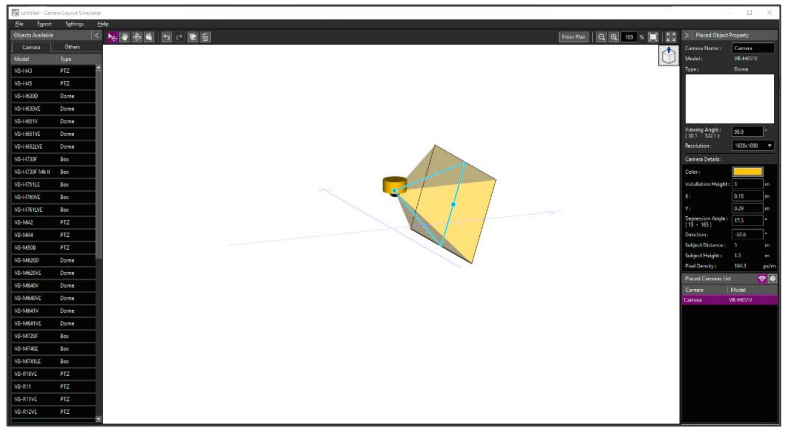
- It is possible to visually check the relation between camera's installation height, installation angle of depression, angle of view, image size, and the capturing area.

Axis



Axis Coverage Shapes for Microsoft Visio
https://www.axis.com/en-gb/tools/axis-coverage-shapes

Canon

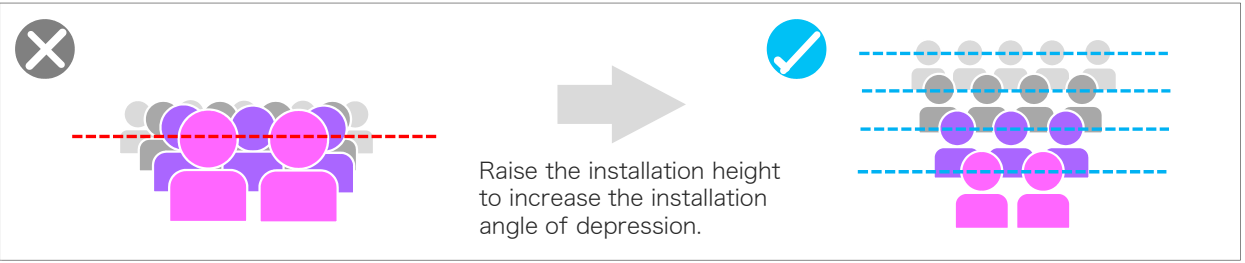


Canon Camera Layout Simulator
https://global.canon/en/wview/layout/130/index.html

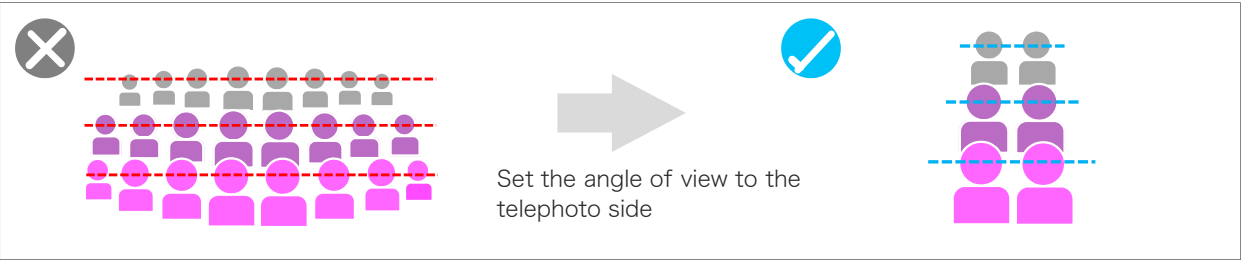
Settings to Optimize Accuracy

Conditions that may decrease the detection rate of people appearing in the video

Distance between the people in front and people in the back is large, and the angle of depression is shallow.



Fisheye image, distortion of the peripheral part of the video, etc.



Different levels (such as atrium areas etc.)

Settings to Optimize Accuracy

- The accuracy is improved by specifying detection areas and non-detection areas in the software and excluding those that are prone to false detection.

  It is recommended that the detection area be set to include the head of the persons in the area to be counted.

- The following objects in certain scenes tend to be mistaken for people

  - Object composed of shape/color/size similar to human body or head
  - Reflection in water/mirror/glass etc.
  - Image of a person appearing on the screen
  - Hands, devices held in hands, shoulders etc.
  - Text on signs
  - Animal heads
  - Images/illustrations such as posters
  - Shadows
  - Bricks, tiles, stonewalls, cobblestones
  - Shadows on the ground and bushes etc.
  - Miscellaneous objects (counter-top items in a cafe etc.)