PELCO
a Motorola Solutions Company

Designing a Site with

Pelco Smart Analytics

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Introduction

Pelco video analytics cameras and appliances are easy to install and can achieve positive analytics results without ongoing software adjustments. Pelco's patented video analytics are designed to automatically adjust to the camera's field of view without configuration or adjustment.

Objects are classified as person or vehicle. You can set up rules and alarms based on this detection in the MSI Camera Configuration Tool (CCT) software.

For video analytics to perform effectively, the analytics cameras must be installed correctly.

Video analytics enabled cameras must be installed:

- Within the height and angle guidelines.
- Within sight of the area of interest.
- Where there is sufficient light in the area of interest.
- Where there is sufficient contrast to detect foreground motion.
  For example, a person walking in white clothes in a snow-covered field of view may provide poor results.

The following information provides a basic set of installation parameters. Read through the entire document before installing cameras.

For site configurations that differ from the listed recommendations, or when in doubt, consult a Pelco representative before installing the cameras.

Classified Object Detection

Design your site with the following guidelines to use video analytics for Object Classification.

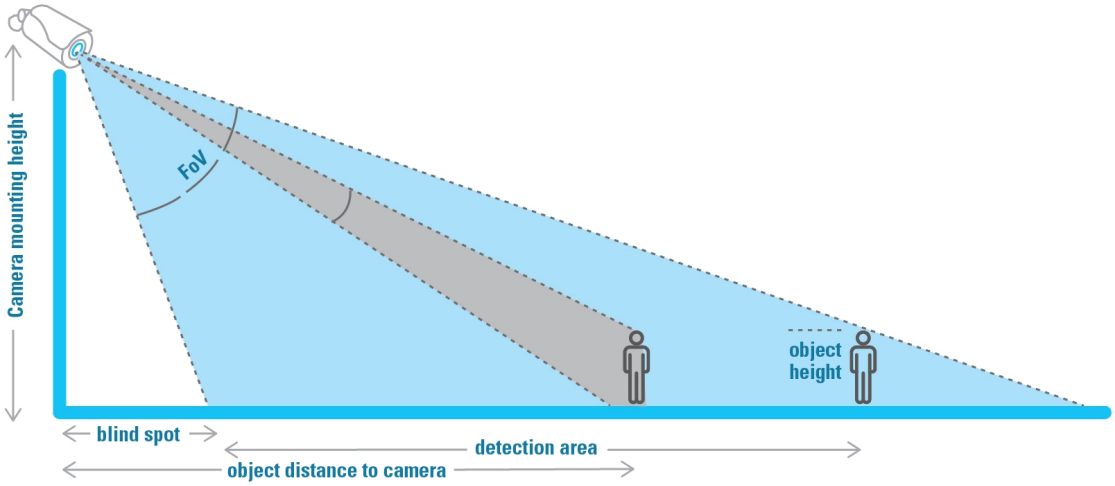
General Guidelines

In general, cameras should be installed according to the following guidelines to achieve optimal analytics performance.

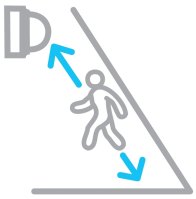
Mounting Height and Angle

- Cameras should be mounted at a minimum of 2.8 m (9 ft) level to the horizon and ground plane (for outdoor or large indoor areas).
- Cameras can be tilted within 30° from the horizontal for optimal object classification.
  - Increasing the tilt angle can help in detecting targets that are directly approaching the camera.
  - The camera should be tilted no more than 45° from the horizontal.
- Cameras should be mounted to a stable surface to minimize vibration and movement.

- Select a lens, mounting height and tilt angle to capture the required level of detail for Classified Object detection within the scene.



Field of View



- Camera field of view must be level with the horizon.
- People in the field of view should be walking upright.
- People and cars moving parallel to the field of view provide better results than objects moving to or from the camera.

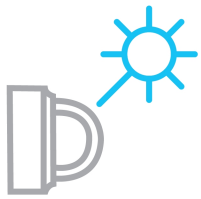
Object Speed

≥ 00:00:02

- Position cameras so that they can capture moving objects in the field of view for at least 2 seconds.

  - Pelco cameras are designed to detect stationary and moving objects immediately, although there may be a slight delay in some scenes. However, CCT analytics event configuration requires a 2 second minimum threshold to reduce false alarms.
  - Pelco cameras are designed to detect moving objects that are in the field of view for at least 2 seconds. Objects that enter the field of view from behind the camera may take up to 4 seconds to be classified.
- If fast, lateral-moving vehicles are expected, use a wider field of view to increase the available observation time.

Reflected Light



- Avoid direct light sources.
  - The camera may be temporarily blinded if bright light sources shine directly at the camera.
- Position the camera so that the sun, headlights, or other light sources do not shine directly into the lens.
- Avoid installing the camera in areas with drastic changes in lighting throughout the day. For example, avoid installing the camera in an indoor space with direct sunlight through a skylight or large windows.
  - Significant changes in lighting cause large shadows and different coloring in the space. Such changes may generate inconsistent detection results.
- Be conscious of indirect light sources, including reflections from built-in or external IR illuminators, to avoid lens flares and loss of contrast in the image.
  - Cameras with wide dynamic range (WDR) may be able to overcome this issue in some instances.
- Avoid mirrors and other reflective surfaces (like shiny floors and ceilings). Reflections may cause additional false detections.

Headlights

Headlights can pose a challenge to video analytics, combining low-light conditions with extreme differences in lighting.

Headlights can interfere with video analytics when:

- The light shines directly into the camera.
- The surrounding environment is too dark.

- The light reflects on wet, snowy, or icy roads.
  - This happens mainly at night, but can also occur during the day when headlights are reflected into the camera from wet pavement.
- The light is reflected back at the camera from an enclosed environment, such as a tunnel.

Camera positioning and testing prior to installation are important to minimize reflected light.

- Position the camera so objects are viewed from the side and not from the front.
- Add additional illumination (IR or white light) to help balance extreme lighting contrasts.

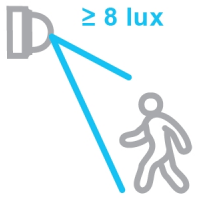
Contact your Pelco representative for advice on installing cameras when headlights are present in the field of view.

Adaptive IR

Adaptive infrared (IR) functions by adjusting the IR output dynamically to prevent oversaturation in the scene as the light changes throughout the night.

- Cameras using only built-in IR for illumination at night detect targets at a much shorter distance. Additional illumination is required to consistently detect targets.
- Be aware that IR may also blur the outline of objects and negatively impact the accuracy of the video analytics.
  - You can disable adaptive IR to help improve Classified Object detection in the scene.

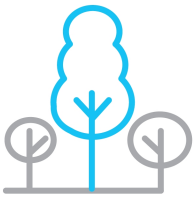
Lux on Target



- The recommended minimum illumination is 8 lux on target for analytic cameras.
- For illuminating distances, it is important to account for lighting, weather, contrast and camera stability conditions.
  - In bad weather with low visibility, analytics should be combined with other detection methods to ensure a secure system.

Contact your Pelco representative for advice on installations in challenging lighting situations.

Obstructions



To identify objects accurately, the scene must be clear.

- For outdoor applications, avoid placing a camera where the field of view includes foliage, terrain or large objects that occlude the subjects of interest.
  - Also pay attention to obstructions that can reflect infrared (IR) illumination back to the camera and cause reduced contrast or overexposed video at night. This can be corrected by any of the following:
    - Separating the IR illuminators.
    - Adjusting the camera placement.
    - Correcting the aim of the IR illuminators or the camera.
- For indoor applications, a person may be detected as long as their upper body, including head and shoulders, is visible.
  - It is recommended that a person's full body be visible for the best results.
- Try to minimize the use of analytics in crowded areas as people are more likely to overlap and block each other from the field of view. This may cause the system to miss some of the potential results.

Analytics Scene Mode

In the MSI Camera Configuration Tool, set the camera to use the Analytics Scene Mode that best describes the scene:

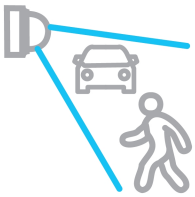
- **Outdoor** — suitable for most outdoor environments. This setting optimizes the camera to identify vehicles and people.
- **Large Indoor Area** — only detects people and is optimized to detect people around obstructions, like chairs and desks, if the head and torso are visible.
- **Indoor Close-up** — optimized for scenarios where the camera is mounted at 4-7 ft (1.2-2.1 m) high and where a person occupies most of the camera’s field of view and where the full view of the person from head-to-foot is not visible. Examples are ATM installations or cameras mounted in height strips. This mode only detects people and not vehicles, has self-learning disabled and does not support Object Crosses Beam or Direction Violated rules. Only available on Pelco Modular Camera.

  "Indoor Close-up mode is only supported on ACC 7.14.10 and later. If using ACC version prior to 7.14.10 and the camera is mounted between 4-7 ft height, ensure "Large indoor Area" mode is selected and Self-Learning is disabled."

Minimum Camera Image Rate

For Pelco analytic cameras, there is no minimum image rate for Classified Object video analytics. The analytics are performed independently of the encoded image rate.

Detection Range



- For Pelco cameras, install the camera in a location where each object appears in the field of view for at least 2 seconds. Pelco cameras are designed to detect objects within fractions of a second. The exact time depends on the scene. To be conservative, use 2 seconds or test within your scene.
    - If an analytic rule or alarm uses a region of interest (ROI) or beam crossing to trigger an event, make sure objects are detected in the camera field of view for at least 2 seconds before entering the ROI or crossing a beam.
- Please be aware that maximum video analytics detection range can change based on the chosen video aspect ratio, the camera perspective, the focal length and on light and weather conditions. Further testing in your environment is always recommended.
- Detection range varies by camera and is dependent on the amount of processing available to the analytics on each camera, and the use case they were designed for. Pelco cameras with less processing power have a shorter range of detection than those with more processing power.

Advanced users can use the following as guidelines for reliable detection:

- Pelco ExSiteEnhanced 2 Series - the height of a person should be at least 5% of the height of the vertical FOV
- Pelco Corner Camera - the height of a person should be at least 8-15% of the height of the vertical FOV

Your Pelco representative is also a good source for information.

Outdoor Areas

Be careful not to select a coverage area that is too large, as objects may become obscured by rain or fog even when there is enough lighting and contrast.

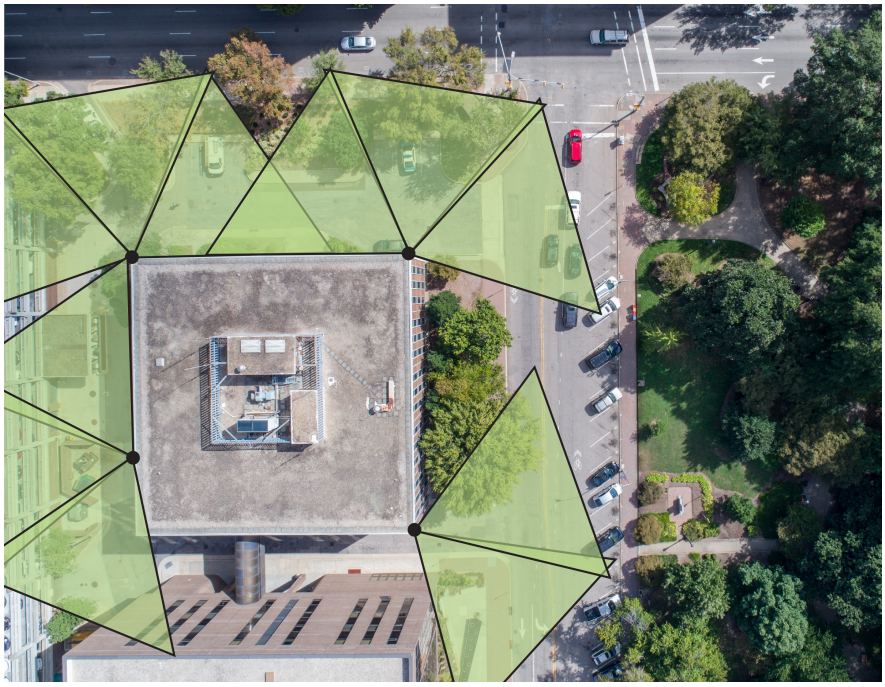


Figure 1: Example of overlapping fields of view for coverage of a building's perimeter.

For perimeter installations:

- Make sure the camera field of view overlaps to ensure adequate coverage in the blind spot immediately below a camera.
- Mount cameras on a central building or structure looking out towards the perimeter.
- Exceptions:
  - Mount cameras on the perimeter if covering exceptionally large areas.
  - Do not mount on the central building if there is no suitable mounting location, or if there are obstructions in important areas of the field of view.

Figure 2: Example of overlapping fields of view to provide continuous analytics coverage of an extended area of interest.

Indoor Areas

Make sure the indoor coverage area is not too small. Low ceilings or confined spaces (such as a man-trap area between secured doors) may pose problems with establishing a scene that fits the recommended criteria.

Self-Learning

Pelco cameras can use Self-Learning algorithms to reduce false detection and alarm rates.

Self-Learning is enabled by default. It allows cameras to actively learn when there is movement in the scene.

The learning progress requires approximately 200 high-confidence detections throughout the entire field of view. The time needed to complete the learning progress varies from scene to scene, depending on the activity in the scene. The algorithm only learns during the day and does not learn if the scene has low-confidence human activity or low illumination.

In some cases, the Self-Learning Progress Bar may not reach 100%. There may be more false detections, but true detections will not be affected.

Enable Self-Learning for all video analytics devices, except if:

- The scene contains objects moving at different heights. For example, an overhead pedestrian bridges in the background with smaller human activity, compared to larger human activity in the foreground. Other examples of scenes with objects at different heights are train platforms, mall stairs and escalators, balconies, hills, and underpasses.

Self-learning can be disabled from the CCT software.

Resetting the Learning Progress

Always reset Self-Learning after a camera is physically moved or adjusted, and if the focus or zoom level is changed. The change in the camera's field of view affects the video analytic results.

Reset the Self-Learning progress once the camera is stable after initial configuration. During installation, a camera is frequently adjusted, so any Self-Learning during that time becomes invalid.

You should reset The Self-Learning progress if there are lighting changes.

Self-Learning can be reset from the CCT software.

Additional Camera-Specific Guidelines

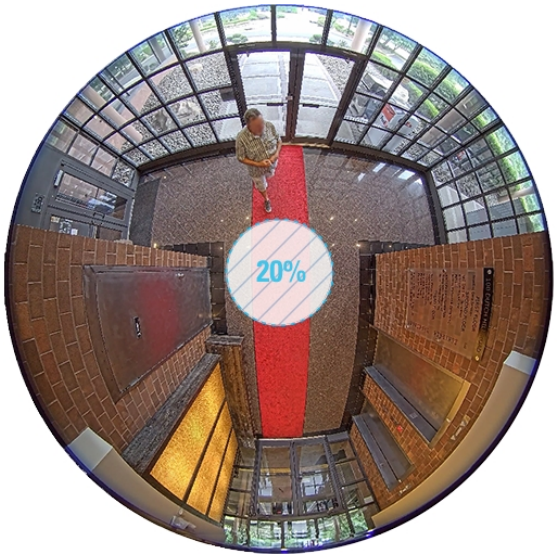
Pelco Fisheye camera

- Only people are detected as classified objects. Vehicles and vehicle sub-classes will not be detected on the fisheye camera.
- Pelco Fisheye cameras do not support Self-Learning
- Fisheye cameras should be mounted up to a maximum height of 4.5 m (15 ft).
- To use analytics on the Pelco Fisheye camera, it must be mounted to a flat ceiling parallel to the floor, and look down on the scene. The camera must be set to Ceiling Orientation Mode.

  Analytics are not currently supported on Pelco Fisheye cameras that are mounted to a wall or similar mounting surface and are set to Wall Orientation Mode.
- The Pelco Fisheye camera has an analytics blind spot in the middle 20% of the field of view. Objects will be detected moving into and out of the blind spot, but will not be detected when they are inside the blind spot.

  Tip: When positioning the camera during installation, try not to install the camera directly above

an area where people often stop to congregate.



Pelco Sarix Corner camera

- Due to the steep angle of the camera lens, there is a detection dead zone directly underneath the camera for approximately 1.6 ft.

Pelco ExSite PTZ camera

- Analytics are only supported at the home position on the PTZ variant.

For More Information

If after reading this document you discover that your site requirements deviate from the recommendations in this document, consult an Pelco representative before installing the cameras. We may not be able to help you troubleshoot potential issues with Classified Object detection if you do not follow our recommendations or seek assistance before installing cameras.

To contact a Pelco representative in your area, see: pelco.com/contact-us/.

Pelco Troubleshooting Contact Information

For further assistance, contact Pelco Product Support at 1-800-289-9100 (USA and Canada) or +1-559-292-1981 (international).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