



User guide for license plate recognition (LPR)



Overview

Verkada's license plate recognition (LPR) is a powerful feature that utilizes artificial intelligence and computer vision technology to identify and record license plate images in near real time, even at high vehicle speeds or in poor lighting conditions. Organizations can search for detected license plates based on partial or exact character matches and set up proactive alerts to notify specific users when license plates of interest are detected.

To ensure optimal performance and security, Verkada's LPR uses edge-based processing, with all computation taking place on the cameras themselves. This minimizes the feature's impact on bandwidth and ensures that all data, including video, images, and license plate information can be encrypted both in transit and at rest.¹

To use LPR, no additional hardware or software licenses are required. This guide will provide an overview of key features and use cases, the user interface, and installation best practices to optimize system performance.

Responsible use

License plate recognition (LPR) technologies are used to automatically identify and record the license plate numbers of vehicles. These technologies can be used to observe the movements of individual vehicles and the people driving them, so it's important that you check with any laws and regulations that apply to your use of the technology to make sure you comply with those laws.

Compatible cameras

Bullet series and remote series cameras are the only models that support license plate recognition (LPR). Telephoto models are specifically designed for capturing license plates at longer distances, while wide-angle cameras can also support LPR but only at shorter distances. The CR63-E is capable of capturing plates at standard distances with zoom capabilities that fall between those of wide-angle and telephoto bullets.

Note that in most cases, people and vehicle analytics are disabled when a camera is in LPR mode. Additionally, because of the angle and optical zoom required for successful LPR deployments, cameras capturing license plates may struggle to effectively monitor a wide area. Organizations have the option to pair a context camera with a camera in LPR mode to capture the entire vehicle and its surroundings.

1. Data on device is encrypted at rest using AES-128. Data in the cloud is encrypted at rest using AES-256. Data in transit to the cloud is encrypted using TLS 1.2 or greater.

Verkada does not pool customer video and license plate data into a shared, searchable network. Customers own and control their data, which remains isolated in dedicated, tenant-isolated cloud environments, with LPR searches limited to footage within their own organization. Plus, video and license plate data is protected with encryption in transit and at rest, role-based access controls, and immutable audit logs that capture who accessed data and why. Sensitive capabilities such as facial recognition are off by default, while granular permissions give organizations control over how data is accessed, used, and shared. Learn more here: <https://www.verkada.com/trust/privacy/>.

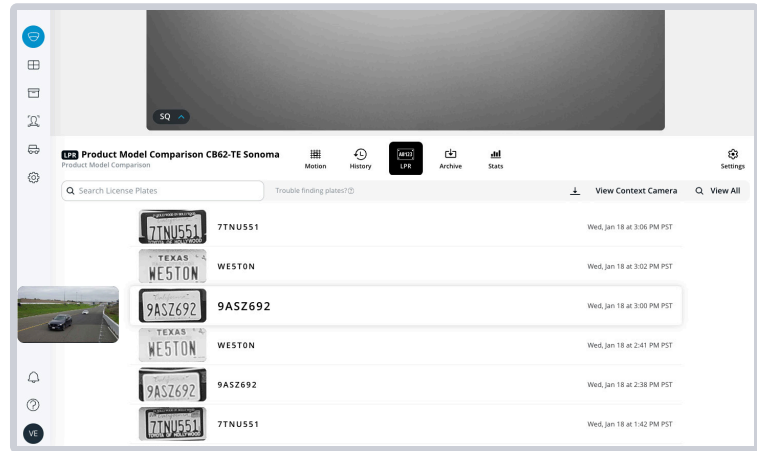




Key features

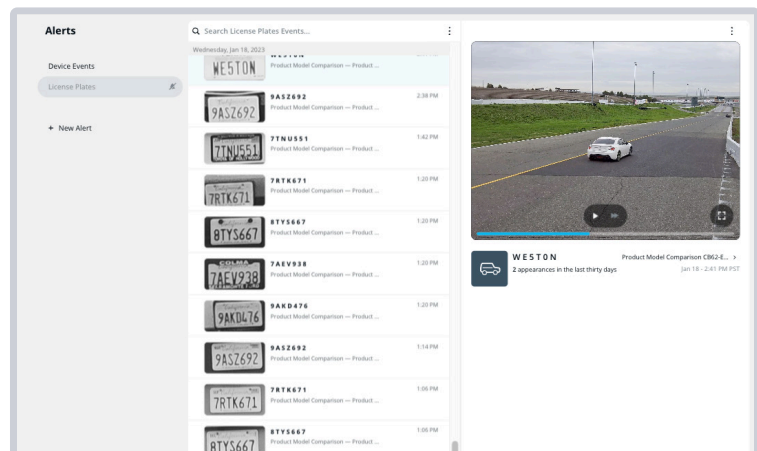
Search for specific vehicles

LPR can be used to search for historical appearances of a license plate. Quickly identify vehicles of interest and gain insights into historical movements.



Receive alerts for license plates of interest

Upload a list of known vehicles or add license plates of interest one by one. Designate specific recipients to receive notifications any time a designated plate is seen on camera.



Use APIs to import and export data

Integrate with third-party systems using Verkada's API. Automatically import vehicle hotlists or export reports of vehicles entering and exiting a parking lot.





Key use cases

Verkada's LPR solution has been designed to recognize license plates accurately and reliably, even on vehicles traveling at high speeds of up to 80 mph / 128 kph and across multiple lanes.

Access control vehicle gates

Combine LPR functionality with Verkada's access control solution to provide seamless entry to known vehicles – no badge or PIN code required.



Identify stolen or wanted vehicles

Upload hotlists and receive proactive notifications when a vehicle of interest is spotted. Protect facilities from stolen vehicles, wanted criminals, and known shoplifters.



Protect your parking lots

Keep track of vehicles entering and exiting parking lots. Respond more effectively to hit-and-run incidents and car burglaries.





Frequently asked questions

Will first-generation bullet cameras provide the same level of license plate recognition (LPR) performance as newer models?

No, the second-generation and third-generation bullet cameras are equipped with a more advanced system on a chip (SOC) and a dedicated computer vision co-processor that supports an improved LPR algorithm, resulting in better license plate character detection. Second and third-generation bullet cameras can capture license plates on vehicles traveling at speeds of up to 80 mph / 128 kph, compared to the 25 mph / 40 kph capability of first-generation models. Additionally, second and third-generation bullet cameras can support LPR across up to three lanes, while the first-generation models can only support a single lane.

Is it possible to use cameras in LPR mode for video security beyond just license plate recognition?

Yes, cameras in LPR mode also operate as regular Verkada security cameras. Cameras in LPR mode are still recording footage 24/7 in adaptive quality. This allows customers to review history, perform motion searches, and create archives. Both security footage and captured license plates will be available for the retention period of the camera.

However, it's worth noting that Verkada's people and vehicle analytics features are disabled when the camera is in LPR mode.

Is it necessary to use a bullet or remote camera as the context camera in a dual-camera LPR setup?

No, any camera in Command can be used as a context camera as long as it is not in LPR mode. You have the flexibility to choose the camera that best suits your needs and preferences.

What is the function of a context camera and when is it necessary to use one?

When using LPR, it is recommended to focus on 1-3 lanes so that passing vehicles take up most of the frame as they pass through the scene. LPR cameras also operate in the infrared range of the light spectrum instead of visible range. This is because license plates are highly reflective for infrared light and are designed to be read in that spectrum.

A customer may want to also monitor the scene while using LPR cameras. In this case, a context camera can be used to provide a broader view without compromising the LPR's performance. Context cameras are also useful for general security purposes and capturing balanced contrast color footage to better investigate observed vehicles.

When is it necessary to use an external IR illuminator for capturing license plates?

If the location where license plates will be captured is in a low-light or distant area, it is highly recommended to use an external IR illuminator to enhance the visibility of the license plates. Verkada offers an IR illuminator that can attach directly to the CB63-E and CB63-TE models and be managed directly within Command.

Is it possible to integrate a Verkada LPR camera into an external system?

Yes, Verkada offers APIs for accessing license plate data. If you would like to integrate a Verkada LPR camera with an external system, please reach out to our solutions engineering team to see if we can support your specific use case.

What types of license plates are incompatible with Verkada's LPR technology?

Our LPR system does not support license plates with three or fewer characters.



Using Command, Verkada's web-based management platform, users can access their LPR cameras and view real-time and historical footage of vehicles.



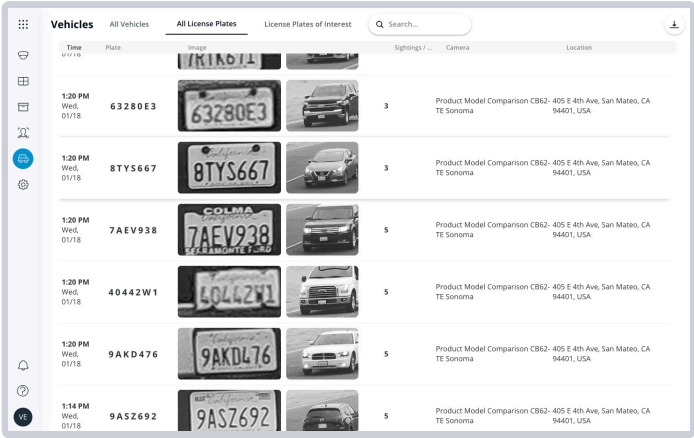
E
License plate search

F

CSV export

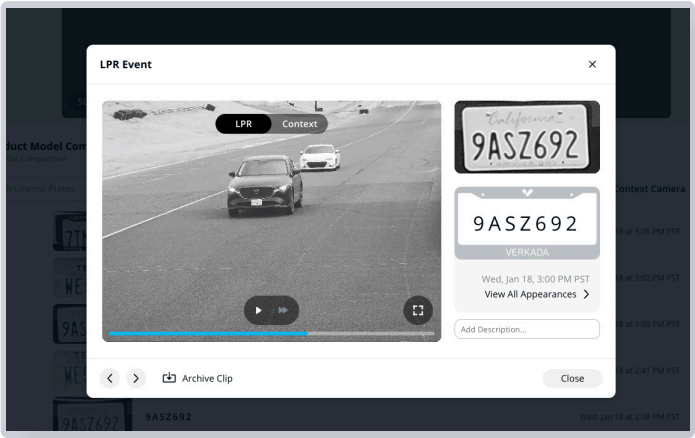


User experience



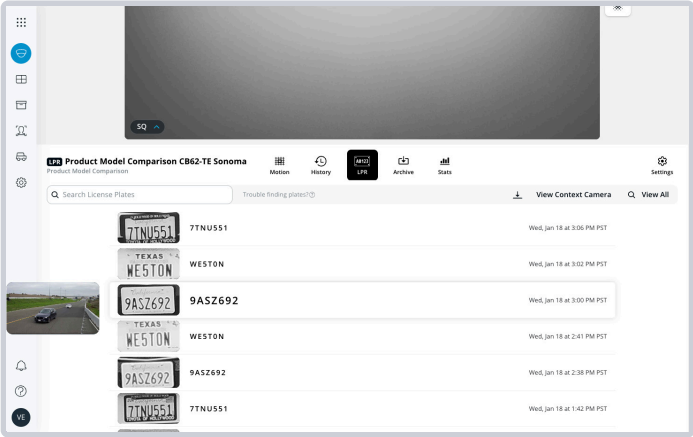
Monitor in real time

View live plate detection across your organization from the LPR page in Command



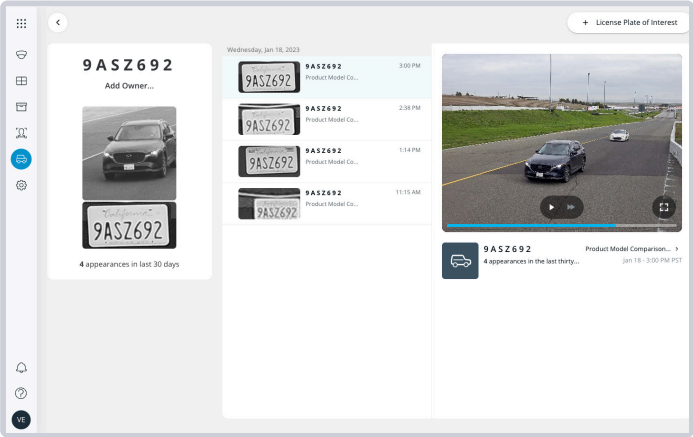
Switch viewing modes

Toggle between LPR and context views



Search plates

LPR Cameras detect and read plates, making them searchable

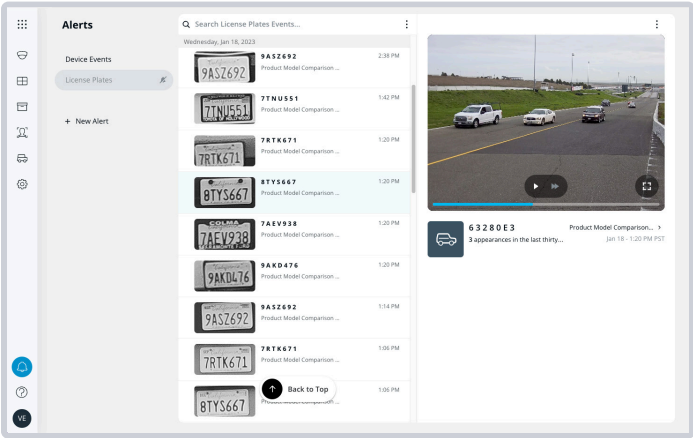


Investigate events

See how events unfold and access archived footage from the LPR page

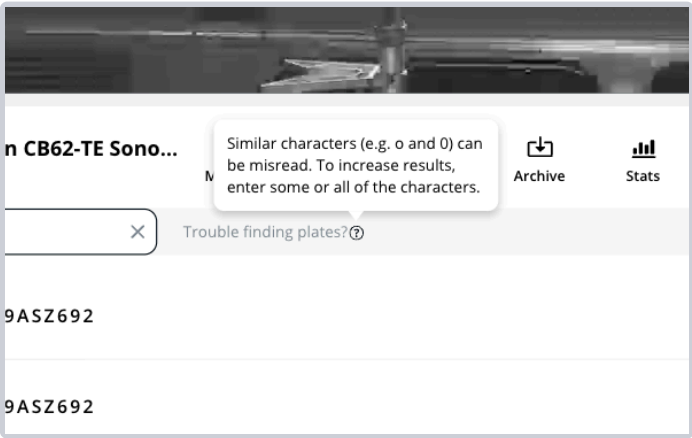


User experience



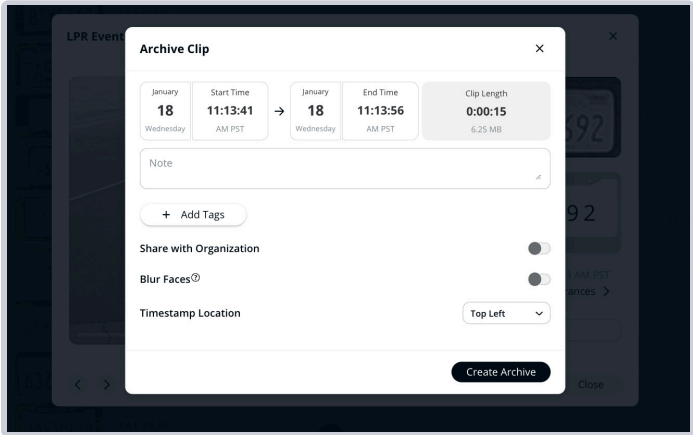
Get alerts

Get notified when a specific plate is detected at any of your locations



Expand results

Get more comprehensive search results through approximate license plate matches



Archive footage

Archive clips, add descriptions and view all appearances of the plate

1/18/2023 1:20:24 PM	7AEV938		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:20:23 PM	40442W1		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:20:23 PM	9AKD476		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:14:48 PM	9ASZ692		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:06:28 PM	7RTK671		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:06:26 PM	8TYS667		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:06:24 PM	7AEV938		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:06:24 PM	9AKD476		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 1:06:24 PM	40442W1		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:58:07 PM	7RTK671		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:58:04 PM	8TYS667		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:58:03 PM	40442W1		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:58:02 PM	7AEV938		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:58:02 PM	9AKD476		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:46:26 PM	40442W1		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:46:22 PM	9AKD476		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:46:21 PM	7AEV938		Product Model Comparison	Product Model Comparison CB62-TE Sonon
1/18/2023 12:42:29 PM	40442W1		Product Model Comparison	Product Model Comparison CB62-TE Sonon

Export results

Create custom reports or integrate with other security systems using Verkada’s API



Installation guidance

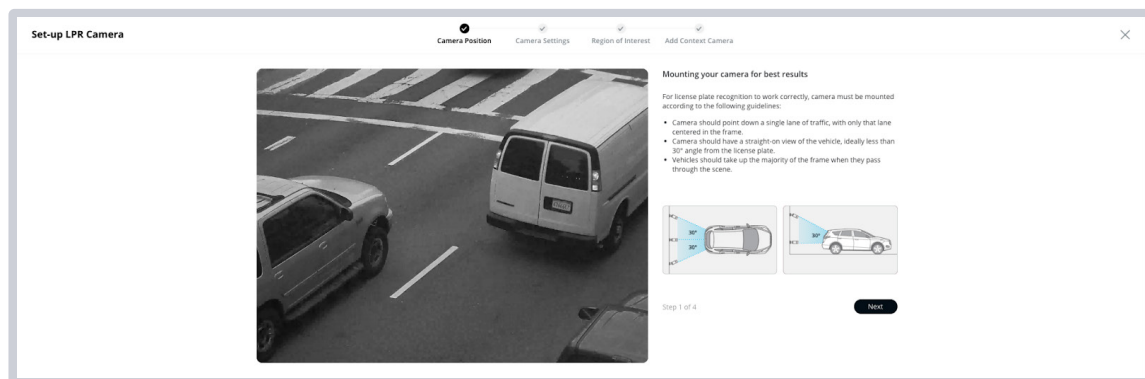
Before installing your LPR Camera, consider the following:

- To ensure optimal license plate detection with wide-angle LPR cameras (including the CB52-E, CB62-E, CB53-E, CB63-E, and CR63-E cameras), it is recommended that vehicles be within 14m / 46ft of the camera. However, it is possible to detect license plate details from up to 20m / 66ft away or further.
- To ensure optimal license plate detection with telephoto LPR cameras (including the CB52-TE, CB62-TE, CB53-TE, CB63-TE, and CR63-TE cameras), it is recommended that vehicles be within 35m / 115ft of the camera. However, it is possible to detect license plate details from up to 50m / 164ft away or further.
- If the area where license plates will be captured is far away and not well lit, it is strongly recommended to use an external IR illuminator to improve the visibility of the license plates. Verkada offers an external IR illuminator that can be attached to the CB63-E and CB63-TE models and managed within Command.

To install your LPR camera, follow these steps:

1. Position the camera

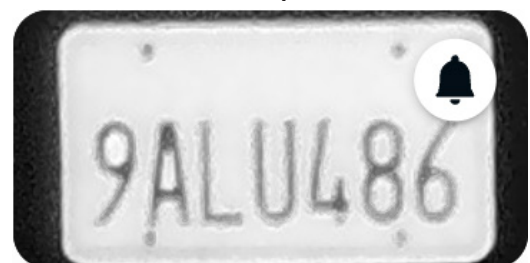
- Ensure the camera is upright and is not rotated at 90°, 180°, or 270°.
- Aim the camera towards the desired traffic area, such as a garage entrance or drive-through lane. 2nd and 3rd generation bullet cameras and the CR63-TE have the ability to monitor up to three lanes. The CR63-E is capable of monitoring up to two lanes. 1st generation bullet cameras can monitor one lane.
- For optimal results, position the camera so that it has a direct, unobstructed view of the vehicle with an angle of less than 30° vertically or horizontally from the license plate. It is acceptable to have a larger angle for lower speeds (e.g. 45° for parking lot deployments) and recommended to have a smaller angle for fast speeds (e.g. 15° for highway deployments). The camera may still be able to capture adequate images outside of these angles, but with a lesser degree of accuracy.
- Avoid installing the camera at a parallel angle to the horizon facing east or west, as the glare of a sunrise or sunset may obstruct the ability to capture license plate details.
- If changing lighting conditions cause overexposure of the license plate, use the exposure slider to fix it. Overexposure may impact the camera's ability to accurately capture license plate details.



Balanced exposure



Overexposure

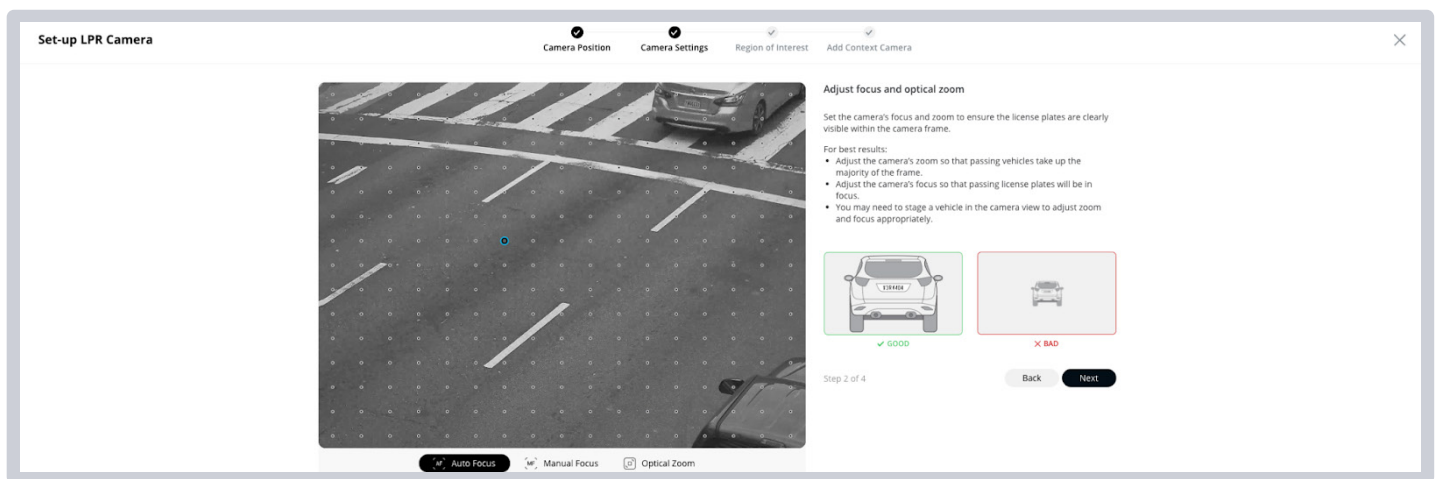




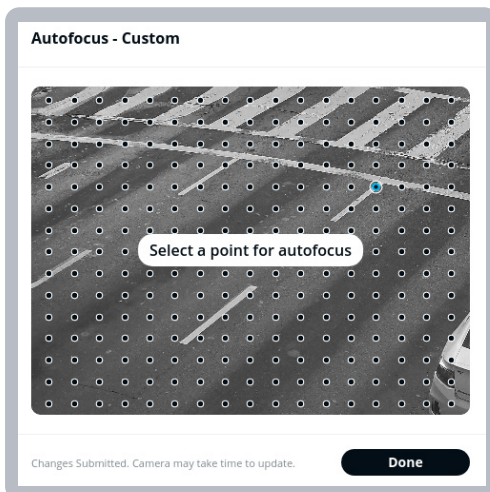
Installation guidance

2. Adjust the focus and zoom

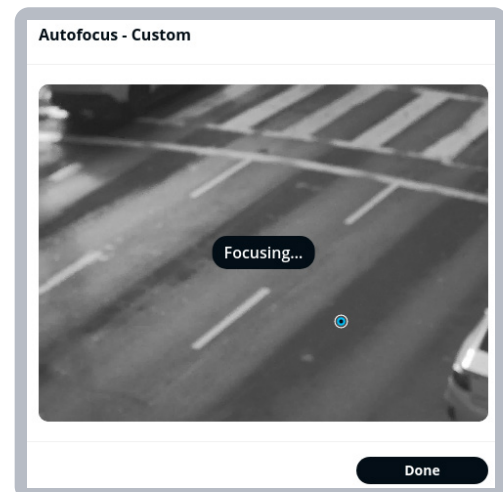
- Use the built-in focus and optical zoom features to adjust the camera's field of view so that passing vehicles take up most of the frame as they pass through the scene.
- Ensure that the license plates of passing vehicles are in focus as they move into the scene.
- To get the best focus when using autofocus, consider these tips:
 - a. Choose a point in the frame with high contrast. Edges of objects or lines usually have pronounced light and dark areas, which can help achieve a sharper image.
 - b. Make sure the focus point is at an appropriate distance, such as the distance at which you will be capturing license plate details.



Good focus point



Poor focus point





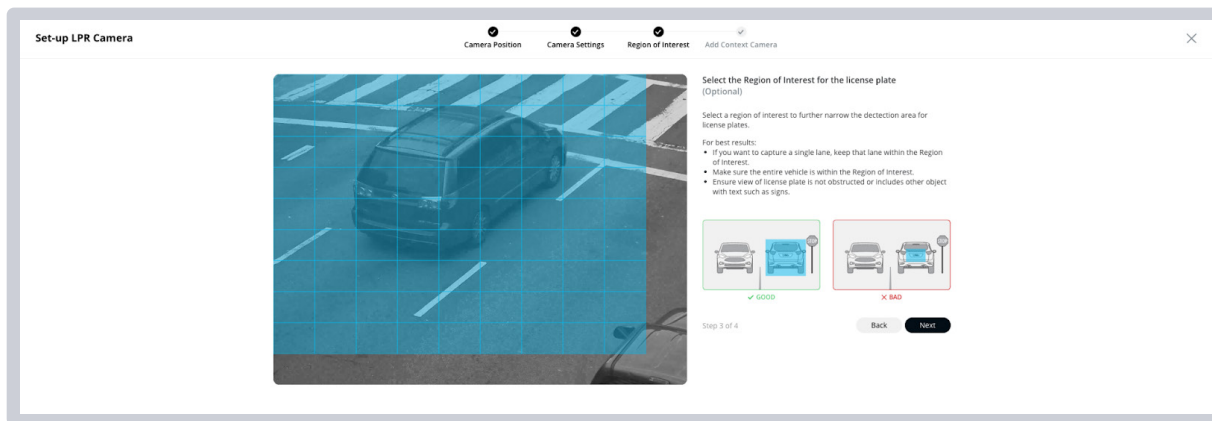
Installation guidance

3. Optional step: select the region of interest for the license plate

- Using the grid, highlight the area where license plates are most likely to pass.
- The highlighted area should be as large as possible and should not be obstructed or include other objects with text, such as road signs or construction signs. If the highlighted area includes road signs, use the [privacy regions](#) feature to block them out.

This step is necessary in the following situations:

1. The user wants to only perform LPR on certain lanes or regions.
2. The user wants to remove distractions such as the footpath, but does not want to use the privacy region feature.
3. The camera is installed at an almost parallel angle to the horizon, and the user wants to focus on license plates that are closer to the camera rather than those further away.

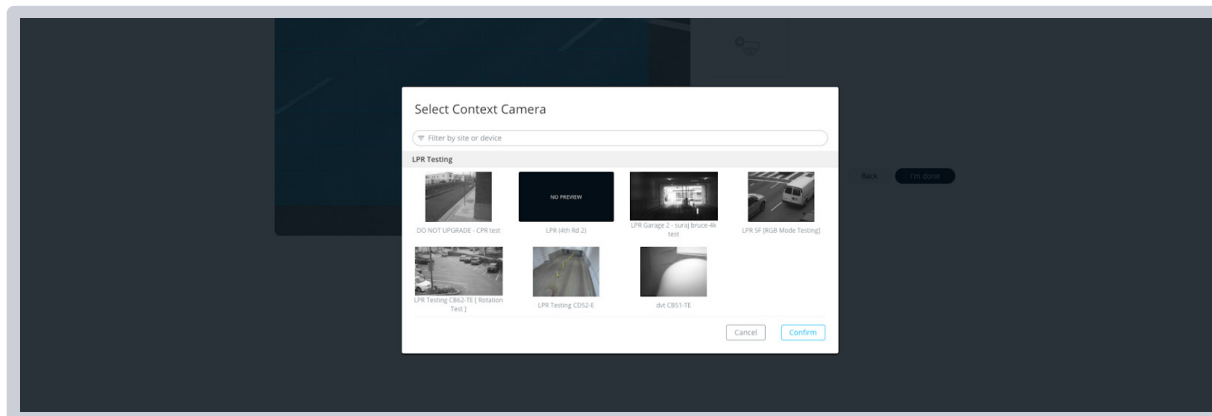


4. Optional step: add a context camera

- Select a nearby context camera to capture a wider field of view and provide more detail around vehicle events. The context camera should be looking at the same region as the LPR camera, so that the footage for both cameras can be synced.

This step is necessary in the following situations:

1. The user wants to use vehicle analytics features.
2. The user wants to capture a wider view and color footage of the area being observed by the LPR camera.



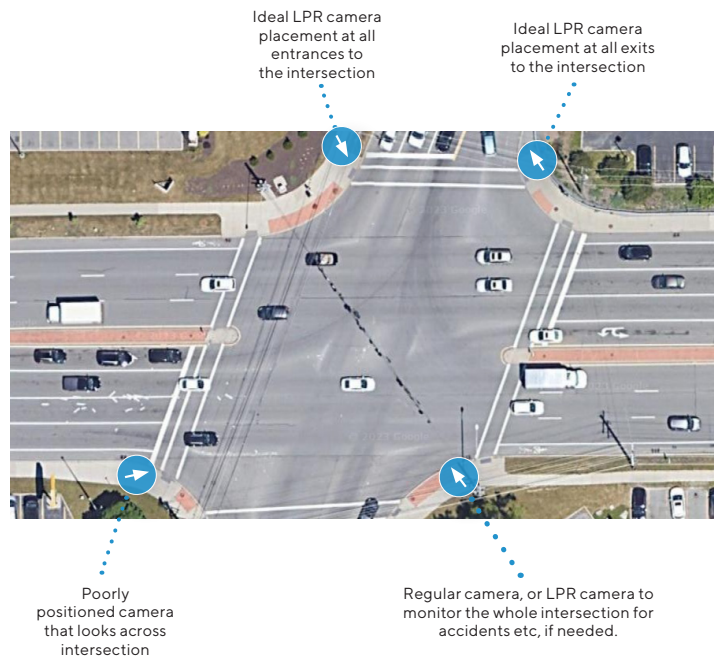
Note that even if Verkada LPR cameras are not installed in the best way, they may still be able to capture license plate details accurately. While these installation instructions are intended to help you get the most comprehensive and clear results, it is still possible to achieve high-quality results even if you are unable to follow these recommendations exactly.



Use case-specific considerations

Intersections

- Place LPR cameras at all entrances or exits to the intersection. Position the cameras to observe the lanes near the corner where the camera is installed, rather than across the intersection to capture plates on the opposite side.
- It is recommended to point the cameras towards the back license plates, as some jurisdictions do not require vehicles to have front plates.
- Verkada's solution only requires four LPR cameras per intersection, as they can cover up to three lanes. Other solutions may require one camera per lane, potentially requiring up to 12 or more cameras.



Highways

- To get the most accurate results for high-speed vehicle observations (e.g. 80-128 km/h or 50-80 mph), it is best to have head-on shots of the license plates. To achieve this, it is recommended to install the camera at a smaller angle (e.g. 15°) that is more parallel to the road.
- For the best results, mount the camera at a point where the license plates are unlikely to be occluded by other vehicles or details in the scene. For example, a camera mounted on an overpass or highway sign should have clear visibility across all lanes. A camera mounted on the side of the highway at a low angle may occasionally miss a vehicle if another vehicle in a closer lane causes occlusion.



Parking lots

- If you expect a lot of parked cars in the scene and cannot zoom in further, set the region of interest along the driving paths and try to exclude the parking spots where cars remain stationary.





Enabling LPR mode

To enable LPR on your compatible Verkada camera, follow these steps:

- 1. Navigate to the device settings page.
- 2. Click on or scroll down to the “Analytics” section.
- 3. Locate the “License Plate Recognition (LPR) Mode” setting.
- 4. Click “Enable.”
- 5. Follow the setup steps outlined.

Please note that enabling LPR mode will initiate a firmware update that could take up to five minutes to complete.

Examples of good LPR results

7TNU551			9AKD476		
WESTON			40442W1		
9ASZ692 Nascar Driver			7RTK671		
WESTON			8TYS667		
9ASZ692 Nascar Driver			63280E3		

Availability by country

Verkada’s LPR solution has been tested and is currently recommended for use in the following countries:

Jurisdiction	License plate recognition	License plate of interest alerts
United States	✓	✓
United Kingdom	✓	✓
Australia	✓	✓
European Union	✓	✓
Japan	✓	✓
South Korea	✓	✓
Thailand	✓	✓