



ANPR Camera Selection Guide

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1 Introduction

This guide pertains to the camera and lens specifications and **not** specific camera manufacturers or models. It is up to the installer/user to decide which cameras meet these recommended requirements for their specific installation.

Note: Every ANPR installation is unique, with its own combination of environmental, positioning and application requirements. As such this document serves only as a general guide in selecting an ANPR suitable IP camera.

When considering an ANPR camera, the following criteria are the most important:

- Resolution,
- Visible light or Infra-Red (IR) images,
- Camera Lens – variable focus ability with IR corrective for day/night use if IR detection is required.

The next sections deal with each of these criteria.

2 Resolution

a. Resolution Recommendation

The recommended camera resolution is in the range 1MP to 2MP

Lower resolutions don't provide sufficient image clarity or pixel density of the license plate characters. This is more evident with more detailed licences plates, and especially with unique language character sets. A character height of 20 pixels is the recommend minimum requirement.

Higher resolutions require more processing and place a higher load on the CPU, resulting in slower licence plate detection times and possible missed detections.

b. Shutter Speed

A shutter speed capability of 1/250 and 1/500 is recommended with a preferred sensor size of 1/3. The faster the vehicles are moving the quicker the shutter speed requirement. This increase in shutter speed results in a reduction in the light entering the sensor.

3 Infra-Red Images/ Visible-Light

a. Infra-Red Images

If only license plate recognition is required, without the need for visible images of the vehicle, then an infra-red (IR) camera with suitable IR illumination (usually 850nm) is sufficient for day and night use in any conditions.

Note: There will be no ability to identify the vehicle or any colours on the license plate or vehicle. It is advisable to have an external IR illuminator mounted close to the camera for longer detection distances.

b. Visible Light

If the colour of the license plate and vehicle is required then a visible light camera must be chosen. Controlled lighting such as white LED floodlights will then be required for poor light conditions during the day and for night use. A low-light camera would be advisable to cover light variations.

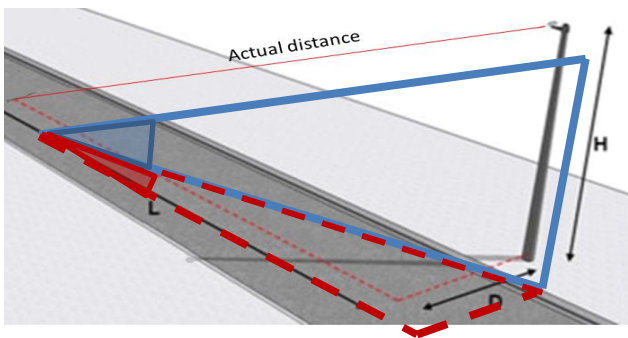
4 Camera Lens

a. Zoom Lens Size

A minimum character pixel height of 20 pixels is required to be able to recognise the license plate characters. The distance therefore from the camera to the license plate at the entry and exit points of the detection/capture zone will directly influence the choice of zoom lens required for the camera to achieve this character height of 20 pixels.

The following tables provide a guide to the selection of a suitable lens to read a 70mm high license plate font to give 20 pixels height. The zoom values are rounded-up to the nearest standard lens size. Sensor size and actual distance between the license plate and camera are the input parameters.

Note: The tables below do not take into consideration mounting angles. Actual distance is the absolute distance between the camera and the license plate as indicated in the diagram below.



Standard 1 Mega Pixel camera 1280 x 720

		Actual Distance to Camera						
		6M	15M	20M	25M	30M	40M	50M
Sensor Size	1/4	8mm	15mm	20mm	20mm	25mm	35mm	40mm
	1/3	8mm	20mm	25mm	30mm	40mm	50mm	60mm
	1/2	12mm	25mm	35mm	40mm	50mm	60mm	80mm
	1	20mm	50mm	60mm	80mm			

Standard 1.3 Mega Pixel camera 1280 x 1024

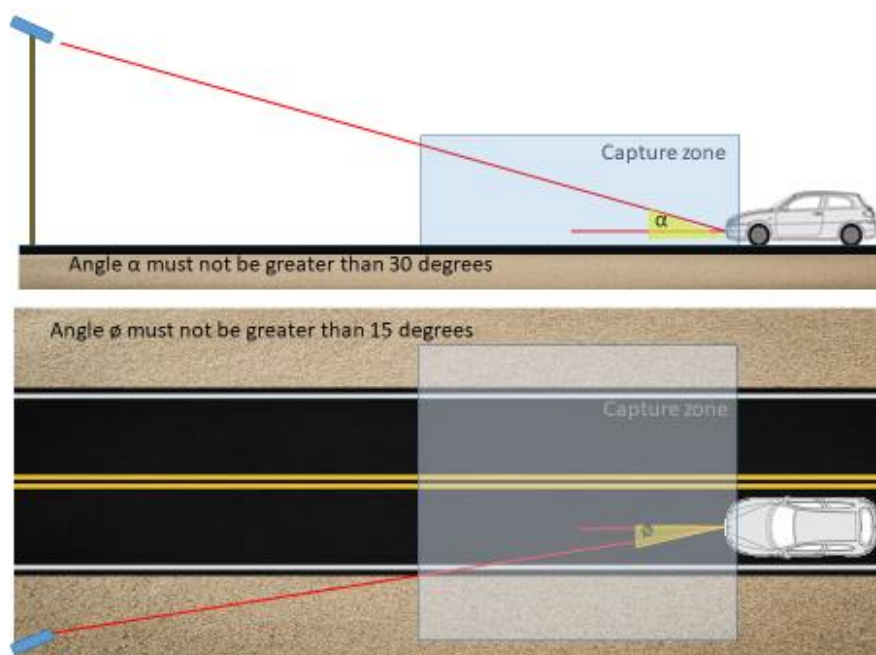
		Actual Distance to Camera						
		6M	15M	20M	25M	30M	40M	50M
Sensor Size	1/4	6mm	12mm	15mm	18mm	20mm	25mm	35mm
	1/3	6mm	15mm	20mm	25mm	30mm	40mm	50mm
	1/2	8mm	20mm	30mm	35mm	40mm	55mm	70mm
	1	16mm	40mm	55mm	70mm	80mm		

Standard 2 Mega Pixel camera 1920 x 1080

		Actual Distance to Camera						
		6M	15M	20M	25M	30M	40M	50M
Sensor Size	1/4	3.5mm	10mm	13mm	15mm	20mm	25mm	30mm
	1/3	6mm	15mm	20mm	25mm	30mm	40mm	50mm
	1/2	8mm	20mm	25mm	35mm	40mm	50mm	65mm
	1	16mm	40mm	50mm	65mm	80mm		

b. Camera Placement

Ideally the camera should be mounted as close as possible to the road, else with a maximum horizontal angle of 15 degrees to the license plate in the detection/capture zone. The vertical angle should also not exceed 30 degrees to the license plate in the detection/capture zone. The camera mounting height should be 1.5m- 4m above the ground – avoid direct vehicle headlights and sunlight shining into the camera lens.



c. Detection/Capture Zone Size

The size of the ANPR detection/capture zone will be determined by the speed of the vehicle passing through it. Consider the example below.

If an average detection time is 1 second then for a vehicle speed of 20km/h, the distance travelled in 1 second by the vehicle is 5.55 meters. Compared to the distance travelled for a vehicle speed of 120km/h, the resulting distance travelled is 6 times greater at 33.34 meters. This means that the detection/capture zone must be 6 times longer for the higher speed vehicles.

Note: License plate detection time is dependent on the specific site environment and hardware as well as the character set of the license plate.

d. Example: Varifocal Lens Selection

If a 2MP camera with a 1/3 sensor is used and the actual distance between the camera and entry to the capture zone is 25M and to the zone exit 15M (i.e. vehicle moving towards the camera), then a lens that will provide adjustment between 15mm and 25mm is suitable (using the 2MP table above).

Thus, a standard varifocal lens of 9-40mm would then be suitable for the site ANPR application.