Envirosight

Sewer Zoom Camera Buyer's Guide

Selecting the zoom assessment camera best suited to your sewer maintenance objectives.

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introduction

Unlike crawlers and push cameras, which must enter a sanitary or storm sewer pipe to inspect it, a zoom camera views sewer lines from an adjoining manhole. It also surveys manholes, catch basins and other assets, making comprehensive sewer system assessment quick and affordable.

The quality of information captured during a zoom assessment has a lot to do with the capabilities of the camera. This workbook presents the primary considerations when evaluating zoom camera equipment.

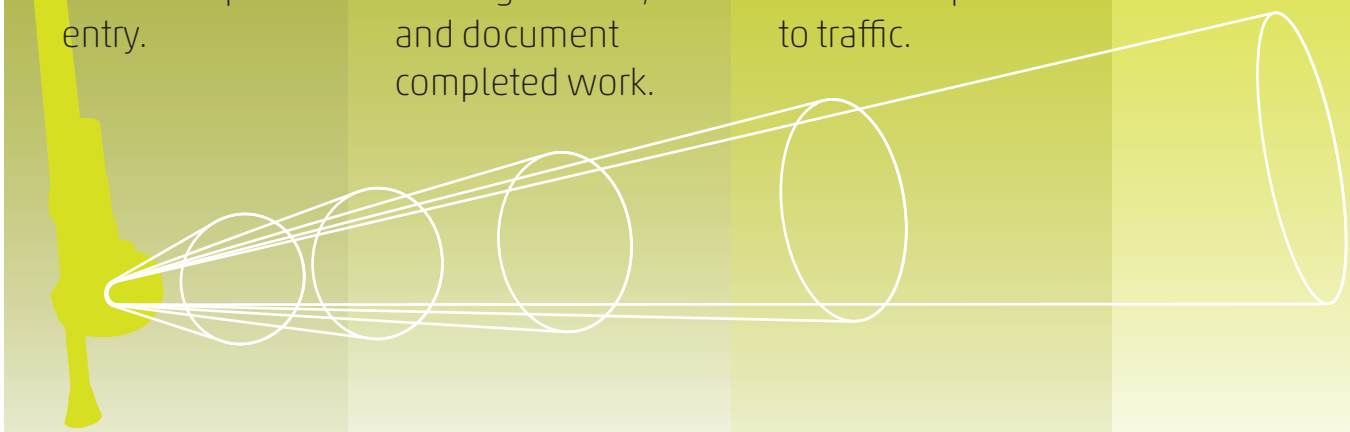
Zoom assessment cameras provide a quick, affordable view into any sewer.

Cities use them to see instantly into any sewer, whether on call-outs, or to verify cleaning, identify repair needs, or avoid confined-space entry.

Contractors use them to perform pipe and manhole inspections, understand condition before bidding services, and document completed work.

DOTs use them to assess culvert and storm pipe condition with minimal exposure to traffic.

Engineers use them to gather data for project planning and feasibility studies.

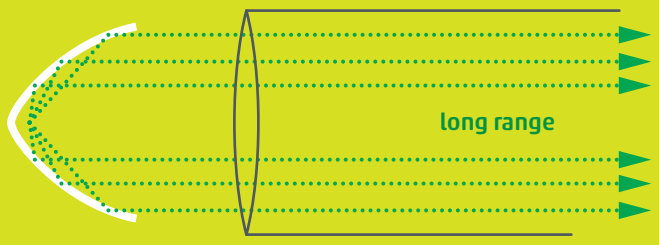


1. illumination

When performing a zoom assessment, you can only see as far as you can illuminate. Projecting illumination several hundred feet down a narrow pipe requires focus, alignment and intensity:

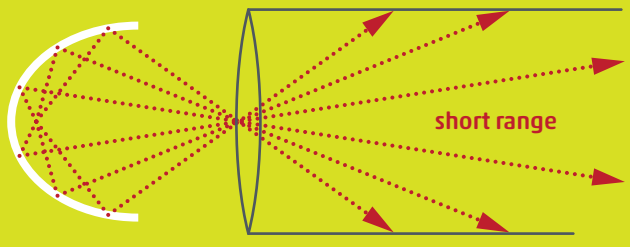
focus Reflectors focus illumination toward a target. For seeing long distances, light should be collimated, which means all rays from the lamp are redirected parallel to each other toward a target. This is accomplished with a parabolic reflector.

To test whether light is sufficiently collimated, aim the light at a wall and observe the pattern directly at varying distances. You should see a tight "ball" of light whose intensity remains fairly constant (and whose size does not increase substantially) at distances of 50', 100' and 200' (15, 30 and 60 m).



focused pattern

☐ *parabolic lamp reflector (collimating)*

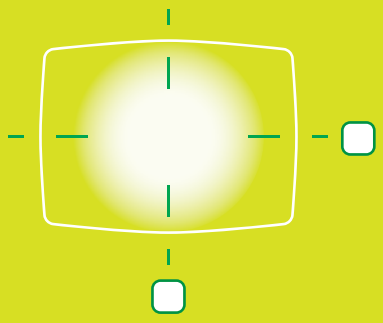


diffuse pattern

☐ *elliptical lamp reflector (non-collimating)*

alignment

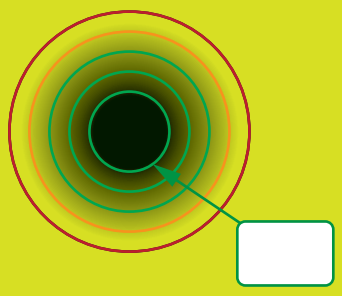
Again with the camera aimed at a wall, view the light pattern, but this time through the system's video display. With the camera set at maximum zoom, the ball of light should be approximately at the center of the screen at distances of 50', 100' and 200' (15, 30 and 60 m). Such alignment is only possible when illumination is circumferential (distributed evenly around the camera), and is essential for uniform sidewall illumination.

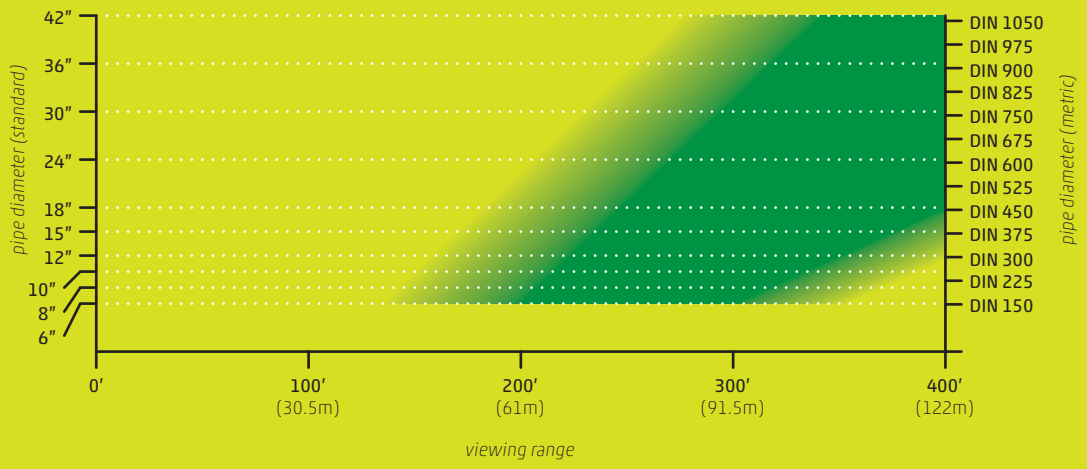


intensity

The usefulness of lamp intensity depends entirely on the system's focus and alignment, as well as the camera's sensitivity. For that reason empirical data (like wattage or luminous flux) means very little. You should instead rely on your perception. See how many segments you can count as you zoom toward the far end to estimate total range.

This graph shows the range you should expect for specific pipe diameters (assuming the pipe is straight and unobstructed):



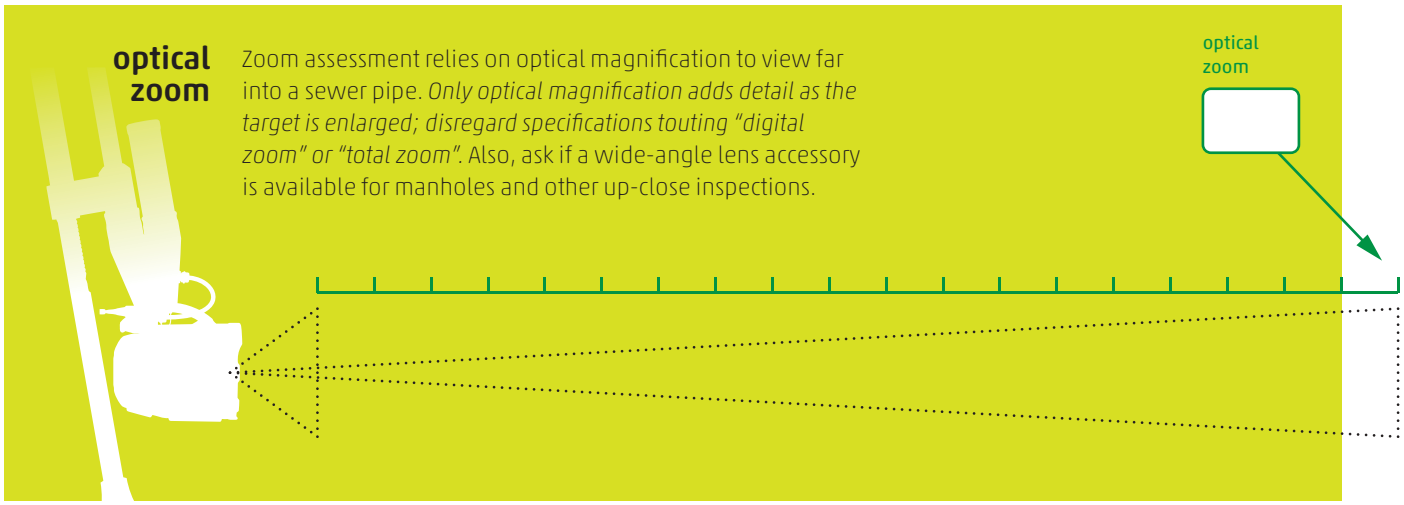


2. detail

Because zoom assessment relies on viewing from a distance, as well as up-close in manholes, detail is crucial. Two factors determine the detail with which a given defect can be viewed:

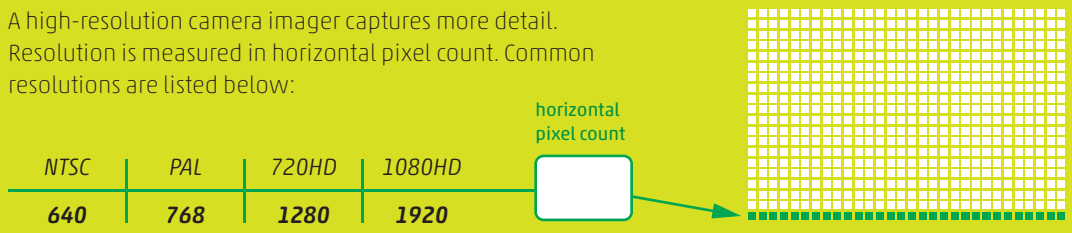
optical zoom

Zoom assessment relies on optical magnification to view far into a sewer pipe. *Only optical magnification adds detail as the target is enlarged; disregard specifications touting "digital zoom" or "total zoom".* Also, ask if a wide-angle lens accessory is available for manholes and other up-close inspections.



camera resolution

A high-resolution camera imager captures more detail. Resolution is measured in horizontal pixel count. Common resolutions are listed below:



To account for both parameters, calculate the system's **combined detail (CD)**:

$$CD = zoom \times resolution/640$$

CD calculator

	poor	fair	good	
	640	768	1280	1920
24×	24.0	28.8	48.0	72.0
30×	30.0	36.0	60.0	90.0
36×	36.0	43.2	72.0	108.0
42×	42.0	50.4	84.0	126.0

3. alignment

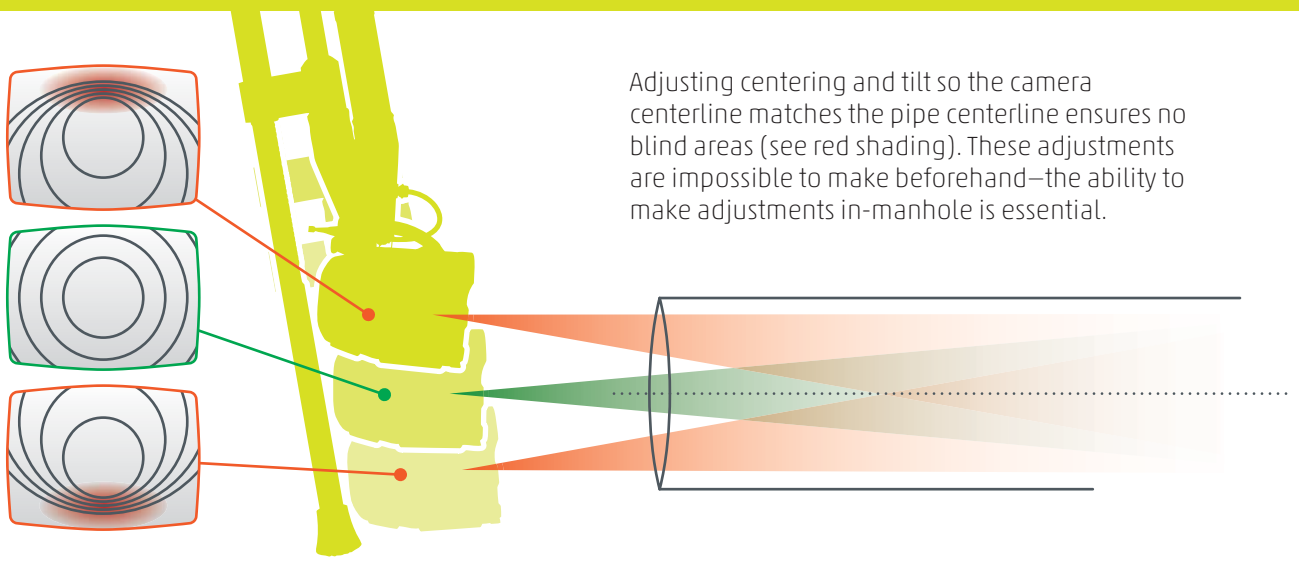
Proper camera alignment ensures side wall illumination and detail are uniform at all clock positions in the pipe. Camera centering and camera tilt work in conjunction to achieve optimum alignment:

centering Centering a camera's view within pipes of different sizes depends on being able to adjust it's height. Note the mechanism for adjusting camera height:

- ☐ ***none***
- ☐ ***manual*** *(performed by hand above ground)*
- ☐ ***dynamic*** *(performed remotely in-manhole)*

tilt Tilt allows you to keep the center of the pipe in the center of the video frame as you zoom:

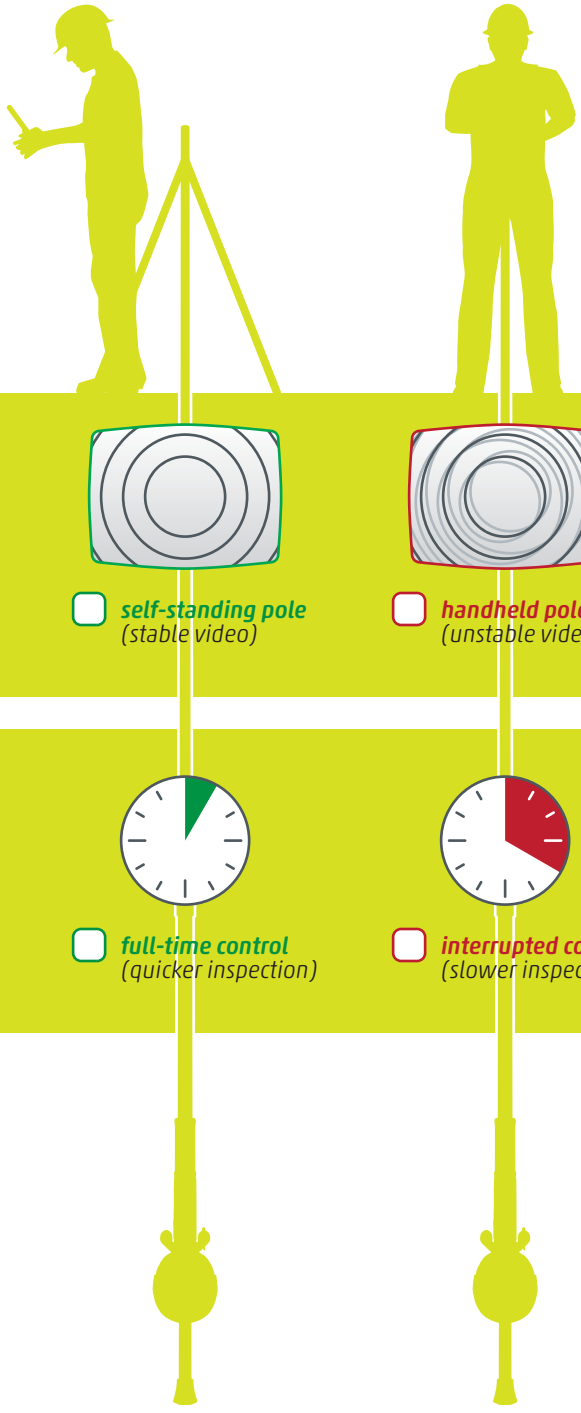
- ☐ ***none***
- ☐ ***manual*** *(performed by hand above ground)*
- ☐ ***dynamic*** *(performed remotely in-manhole)*



Adjusting centering and tilt so the camera centerline matches the pipe centerline ensures no blind areas (see red shading). These adjustments are impossible to make beforehand—the ability to make adjustments in-manhole is essential.

4. stabilization

How the camera pole is held affects the quality and efficiency of zoom assessment:



video quality

Far zoom settings magnify even the smallest movement. A self-standing or tripod-mounted pole produces stable video at high magnifications, whereas a handheld pole cannot.

- ☐ ***self-standing pole*** *(stable video)*
- ☐ ***handheld pole*** *(unstable video)*

ease of operation

A self-standing pole lets the operator dedicate full attention to viewing and control, whereas a handheld pole requires distracted, single-handed control.

- ☐ ***full-time control*** *(quicker inspection)*
- ☐ ***interrupted control*** *(slower inspection)*

5. setup & portability

The efficiency of zoom assessment can easily be diminished by a system that is time-consuming to set up and dismantle, or unwieldy to transport.

What's the smallest vehicle it will fit it? ☐ car ☐ pickup ☐ van or larger

Are cable connections required? ☐ no (wireless) ☐ yes

Are tools required for setup? ☐ no ☐ yes

How how long does battery charge last? ☐ >3 hours ☐ <3 hours

6 . interface

The ease with which an operator can control and view a zoom assessment has a major impact on efficiency and quality of data.

Interface	☐ ***integrated*** *(single device for control, viewing and recording)*	☐ ***fragmented*** *(multiple devices for control, viewing and recording)*
Control type	☐ ***touchscreen*** *(wireless)*	☐ ***analog***
Sharing via email, text or cloud	☐ ***direct***	☐ ***via secondary PC*** *(requires footage be manually downloaded)*
Platform	☐ ***open*** *(low-cost, high-capability consumer tablet with standard OS)*	☐ ***proprietary***
Upgrade-ability	☐ ***yes*** *(new functions deployed automatically via web)*	☐ ***no***