



3x3 Rules for Simple Photogrammetric Documentation of Architecture

The following text is taken from a paper, which was presented by [Peter Waldhäusl](#), University of Technology, Vienna, Austria and [Cliff Ogleby](#), Department of Geomatics, University of Melbourne, Australia, at the Symposium of the ISPRS Commission V "Close Range Techniques and Machine Vision" in Melbourne, Australia, 1-4 March 1994:

"Simple rules which are to be observed for photography with non-metric cameras have been written, tested and published already on the occasion of the CIPA-Symposium in Sofia in 1988. It was a first edition of such rules, and possibly some amendments are necessary...

... I called these rules for my students the "3x3-Rules", because they are structured in three items, with three sub-items each. There are

- 3 geometric
- 3 photographic, and
- 3 organizational

matters treated. In detail, the rules read as follows:

1 - The 3 geometrical rules

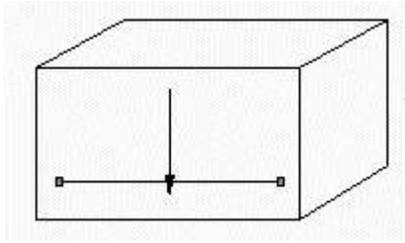
1.1 - Prepare control information: (Fig. 1)

- Some long distance between well defined points, eventually targets.
- Some plumb-lines,
 - Defined ("This is a plumb-line"), or
 - Made by plumbing down e.g. a roof corner and by targeting of the foot.
 - Do that on several sides of the building for control.

Figure 1:

Minimum metric information

- one distance
- one plumb-line



1.2 - Multiple photographic all-around coverage: (Fig. 2)

- Take a "ring" of pictures all around the object, overlapping each other more than 50%.
- Take shots from half the object's height, if possible.
- Include parts of the neighbourhood.
- Add diagonal shots combining two sides of the object.
- Add traversing shots combining the neighbouring photographs.
- Include also the roof, if of interest.
- Check multiple coverage carefully.
- Add orthogonal full facade shots for overview and rectification.

1.3 - Take stereopartners for stereo-restitution: (Fig. 2)

- Stereopartners are taken as
 - normal case (base-distance-ratio 1:4 to 1: 15), or
 - convergent case (base-distance-ratio 1:10 to 1: 15).
- Avoid divergent case.
- Add close-up stereopairs for valuable details and measure additional control distances for them or add a rod to the object.
- Check stereo-coverage carefully.
- In case of doubt, add more shots and measures "by hand" whatever remains invisible.

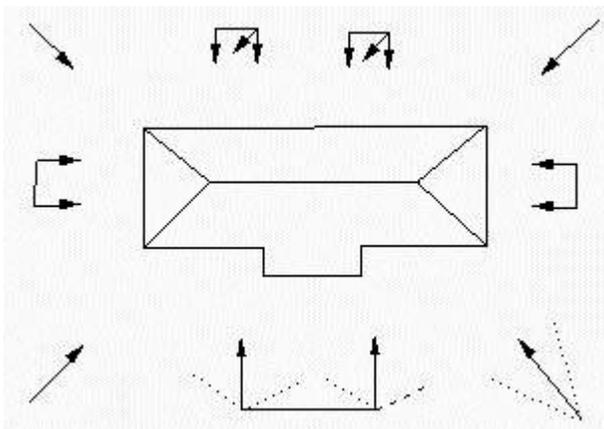


Figure 2:
Ground plan of a stable
bundle block arrangement
all around a building

2 - The 3 photographic rules

2.1 - The inner geometry of the camera has to be kept constant:

- No zooming! Use end position, or avoid zoom optics at all, or fix focus of optics by adhesive tape.
- No shift optics.
- No distance changes. Fix to indefinite, or mean distance by adhesive tape, but use only
 - one distance for "ring"-photography
 - one distance for close-ups.
- Image format frame of camera must be sharply visible on the images with good contrast.
- Don't cut into format when cutting the original film (=document!).
- The true documents are the original negatives. Treat and keep them carefully.

2.2 - Select homogenous illumination:

- Plan the best time of day.
- Use tripod and cable release for sharp images.
- Any film may be used. Black-and-white is sufficient, colour provides advantages for interpretation and documents also the colours. From slides it is more costly to make enlargements.

2.3 - Select most stable and largest format camera available:

- Wide angle is better than narrow angle for all-around photography.
- Medium format is better than small format.
- Calibrated (or metric) cameras are better than non-metric.
- Film sucked flat, or kept flat behind a resau glass plate, is better than film with varying bending as in normal cameras.

3 - The 3 organizational rules

3.1 - Make proper sketches:

- Ground plan and
- Elevation of each side (1:100 - 1: 500).
- Note object, owner, address.
- Mark north direction and
- Photo standpoints (with film and negative number) and photo

directions.

- Mark single photo coverages and stereo coverages.
- Show control distances and plumb-lines.

3.2 - Write proper protocols:

- Object, owner, address.
- Date.
- Camera, optics, focus and distance settings.
- Calibration report, if available.
- Description of place, object, history.
- Bibliography.
- Specials, artists, architects, permissions, obligations, etc.

3.3 - Don't forget the final check:

- Write down everything immediately.
- Check completeness and correctness before leaving the site.
- Conclude the reports while you remember all details.
- Check the results at home together with an authority for monuments and sites.
- Plan next project bearing in mind any mistake made previously. Learn."

Reference:

WALDHÄUSL, P., OGLEBY, C.: *3-by-3- Rules for Simple Photogrammetric Documentation of Architecture*. In: J.G.Fryer (Editor): *Close Range Techniques and Machine Vision. Proceedings of the Symposium of Commission V of ISPRS in Melbourne, Australia, 1-4 March 1994*. IAPRS XXX/5, 1994, 426.

