Taking a Fisheye Photograph with the Nikon CoolPix Camera

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***Figure 1**: 183° fisheye photo*

***Figure 2:** Composite image*

The digital photograph in ***Figure 1*** was taken with a digital camera using a 183° fisheye lens. It shows the sky and surrounding buildings and landscape elements around the perimeter. The PEC's SunPath software program imports this type of fisheye image, superimposes a sunpath diagram and exports a new composite image (***Figure 2***). The composite image indicates the times of day and year that the point from which the photograph was taken will be in direct sun or in shade. Information from the composite image is used to evaluate possible locations for photovoltaic (PV) or solar hot water panels. This application note outlines the steps for taking a fisheye photograph to be used in this type of solar site analysis.

Tools Needed: Nikon CoolPix digital camera, fisheye lens, tripod, line level, and compass

Taking a Fisheye Photograph

1. **Choose the location(s) on the site for studying the impact of horizon shading.** Take photographs at proposed locations for windows and skylights or at the perimeter corners of a proposed building. The shading impact at other locations within the building can be interpolated from these perimeter points.
2. **Place the tripod at the first location and adjust the height.** For windows, place the top of the camera at the height of the windowsill. For skylights, place the camera as close to the height of the proposed roof plane as possible.
3. **Mount and align camera on tripod.** Remove the mounting plate (***Figure 3***) from the tripod. Thread the camera onto the mounting plate (***Figure 4***). Snap the plate and camera in place. Do not release the camera until it is securely attached to the tripod. Place the camera on the tripod and rotate it until aligned with the tripod adjustment handles.

***Figure 3**: Attach mounting plate to base*

***Figure 4**: Attach camera to tripod*

4. **Screw fisheye lens onto camera.**
   DO NOT HOLD LENS BY THE CAP!
   The cap is NOT threaded and easily slips off the lens. The lens should be pointing up after it is attached to the camera.

***Figure 5**: Attaching lens to camera*

5. **Level the fisheye lens.** Place the line level on the lens cap and align it parallel to the camera body (***Figure 5***). Use the tripod adjustment handle to level the camera in the plane of the level. Turn the line level 90 degrees and level the camera with the other adjustment handle. Place the level in its original position and verify that it is still level. Lock the remaining tripod adjustments and be careful not to bump the tripod after this point.

***Figure 6:** Leveling the camera parallel and perpendicular to camera body*

6. **Turn camera on.** Rotate the knob on the top of the camera to *A-mode* (Automatic). Zoom out as wide as possible using the "W" button on the back of the camera. When zoomed out, a circular image will appear in the preview monitor. Brighten the image as much as possible by holding down the "Function 2" button on the top of the camera and turning the dial on the top of the camera clockwise. The sky in the image should appear white and the horizon obstructions should be identifiable.

***Figure 7**: Camera back*

7. **Duck below lens and take a picture by pressing the button on the top of camera.**

***Figure 8:** Ducking below lens to take picture*

8. **Find a prominent vertical object in the photo and site with a compass.** (***Figure 9***) The object should be easily spotted in the preview pane of the camera. With a compass, site the object through the top center of the lens for the magnetic bearing. Record a detail description of sited object and its magnetic bearing. Add 15° for a True North bearing.

This information will be used with the SunPath software to properly superimpose a sunpath diagram over the fisheye image. See the Hand Bearing Compass application note for more information on using the compass. Visit one of the websites below for the magnetic deviation for other locations.

Easy form with detailed calculation:
http://www.ngdc.noaa.gov/seg/geomag/jsp/Declination.jsp

Simple calculator:
http://www.gsc.nrcan.gc.ca/geomag/field/mdcalc_e.php

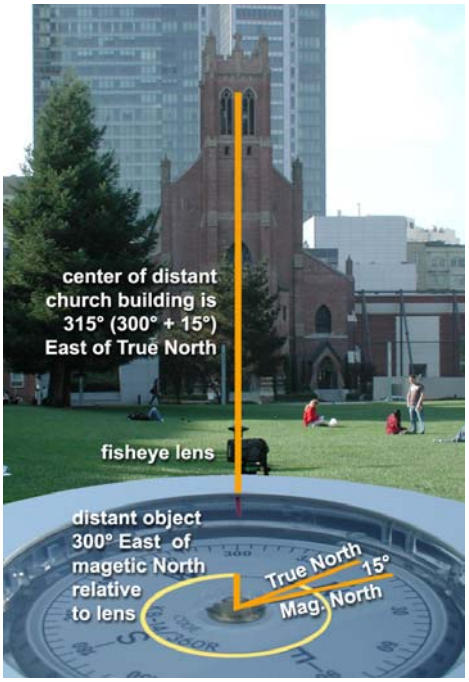

Figure 9: *In this image, the compass indicates that the line connecting the center of the distant building and the fisheye lens points 300° East of magnetic North. The magnetic deviation for that site is 15° East of True North, thus the distant object is 315° East of True North*

9. **Take note of vegetation and existing structures that will be removed during construction.** This type of information is important when analyzing the composite image.
10. **Keep a log of the location, time picture was taken, and bearing angle of vertical element for each picture.** The time will help verify the accuracy of the image. The sun's location on the overlaid sun path should match the date and time the photo was taken.
11. **Repeat these steps at other proposed window / skylight locations or building corners.**
12. **Download the images from the camera to a computer**; the software and cable is provided with the camera loan.
13. **Read the "Using the SunPath Software" application note** to generate a composite image with a sunpath diagram (***Figure 10***).

Figure 10: *A composite image created with the SunPath software*