IMAGE ANALYSIS PROCEDURES

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Based on *Interior Luminance, Daylight Controls and Occupant Response* Vital Signs Resource Package, Marc Schiler and Shweta Japee, USC, http://arch.ced.berkeley.edu/vitalsigns/

A. AT SITE

1. Take a photograph—**landscape** format.
2. Choose 2 areas in the photo scene (fig.1)—1 bright, 1 dim.
3. Choose these areas as reasonably sized, of constant brightness, meaningful and easily identifiable locations within the image (or use a known-luminance box).
4. Take spot luminance measurements in **footlamberts**.
5. Record these 2 luminance measurements with a sketch or notes on their location within the image.

B. WITHIN PHOTOSHOP SOFTWARE

1. **Import/Scan** the image into Photoshop.
2. Set **Image Size** (fig.2) to 320(w) x 240(h).
3. Convert the image to **Greyscale** mode.
4. Open image **Info** window. Make sure **Mode** is RGB (fig.3); click on the arrow button in the **Info** window (fig.4) to change mode.
5. Move the cursor around the area of each spot luminance measurement in the image (step A4), noting RGB values (all three should each be the same–fig.4).
6. Record representative (average) RGB value 0–255 for both bright and dim measurement locations.
7. **Save** as .RAW image format (Header=0).

   Note. Ignore the warning about losing image data, "such as printer settings..."
8. **Exit** Photoshop.

Figure 1

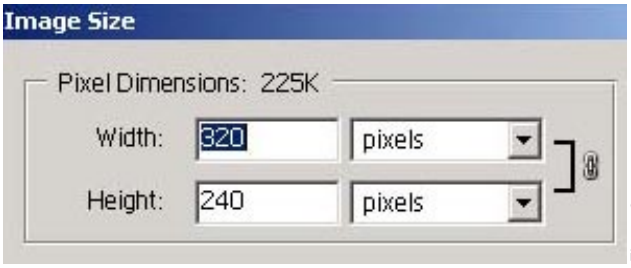

Figure 2

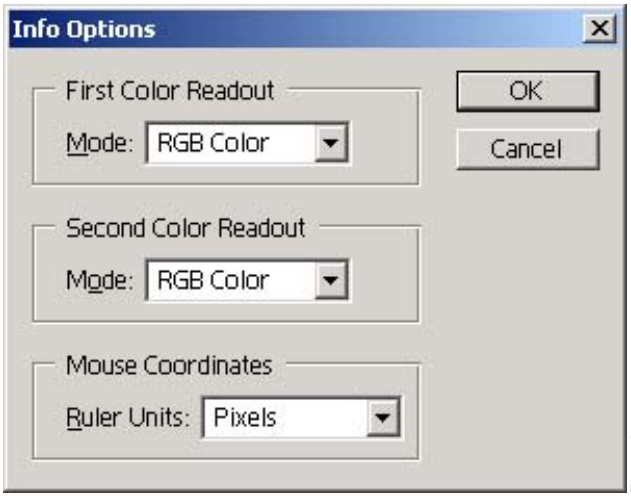

Figure 3

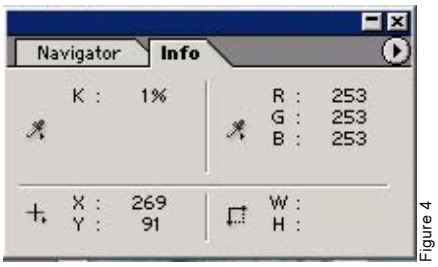

Figure 4

C. WITHIN RASCAL SOFTWARE (fig.5)

1. Locate and **Select** the .RAW source file created in the previous step.
2. Set **Resolution** to 320 * 240.
3. Check **Rotate image** box (DO rotate the image).
4. Set **Sample spread** =1.
5. Set **ASCII delimiter** to **Comma**.
6. Note or edit output filename and location—leave file suffix as ".asc".
7. Click **Convert** button.
8. After processing, **Exit** Rascal.

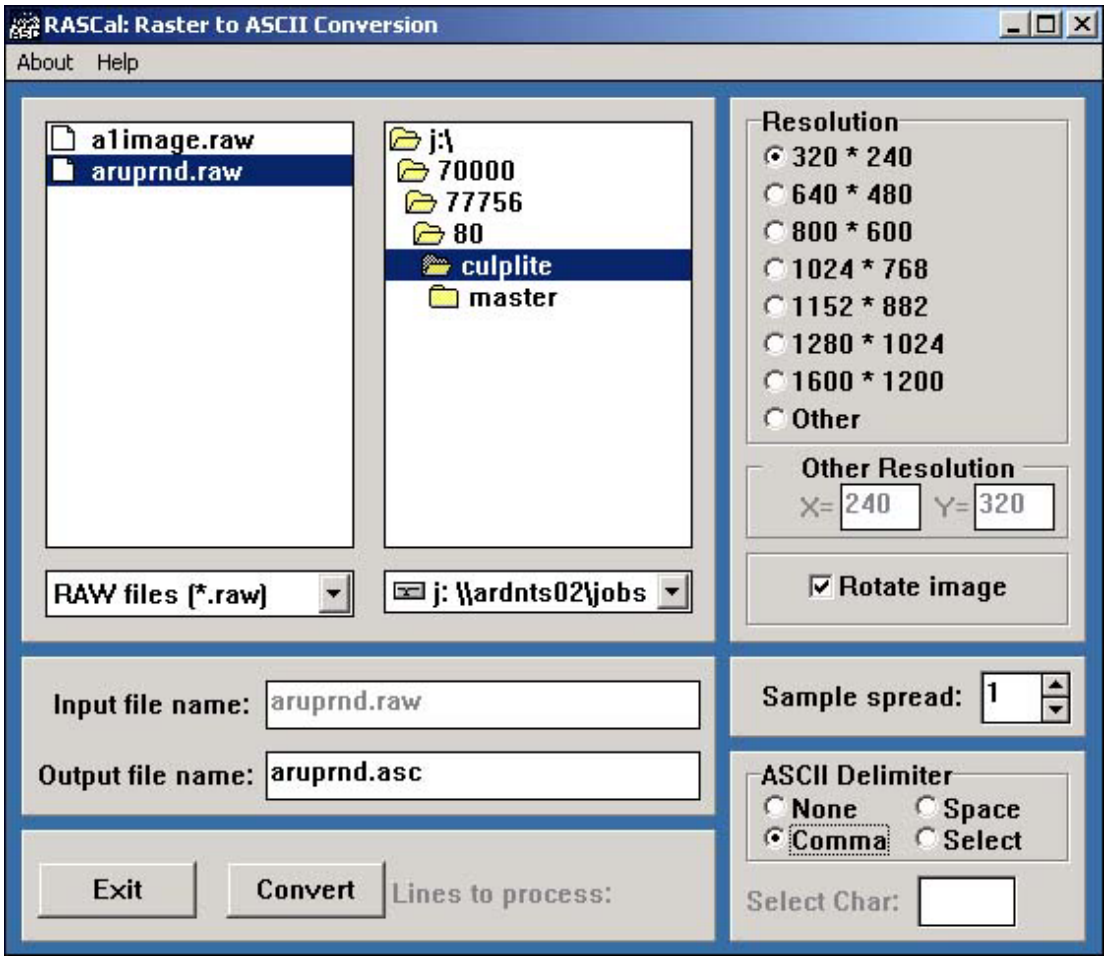

Figure 5

D. WITHIN EXCEL SOFTWARE—Transferring photo data.

1. Always keep an unaltered copy of "culplite.xls" to use as starting point for each new image analyzed.
2. **Open** file culplite.xls.
3. **Select** worksheet tab **asc**.
4. **Open** the .asc file created in Rascal (we call it **a1image.asc** in fig.6) You will need to select filetype as "all files" in the **Open File** dialog window for the filename to display.
5. The Excel Import Wizard will begin to process the file:

   Step 1. Select **Delimited**, then press the **Next** button.

   Step 2. Select **Comma (,)** as delimiter, then press **Finish** button.

6. In the newly created spreadsheet **a1image.asc**, select all [**File, Copy** or **Control A**] or click corner button between row 1 and column A (or somehow select range A1:IF320).
7. **Copy** selection to clipboard.
8. Switch to file culplite.xls (worksheet tab **asc**).
9. Click on cell A1, then press **Enter** key. This move should paste values from clipboard into worksheet tab **asc** cells A1:IF320.

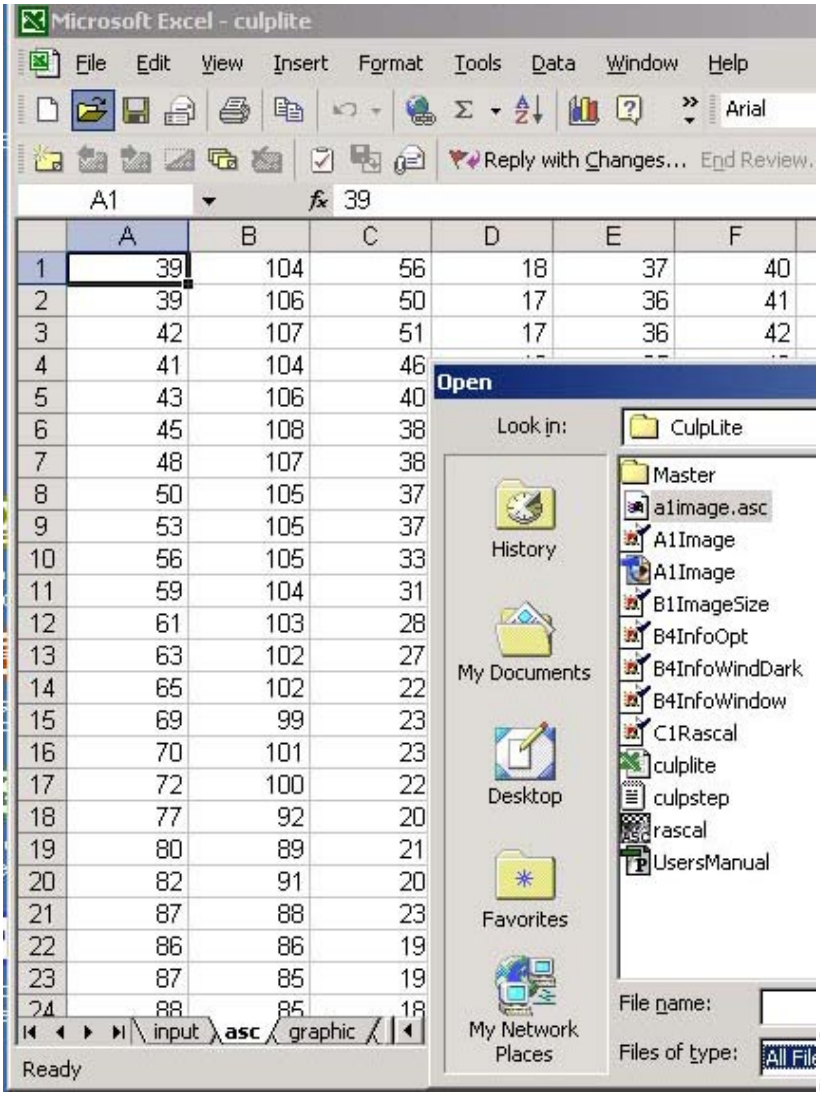

Figure 5

E. WITHIN EXCEL SOFTWARE - Image Analysis.

Note: In file culplite.xls—**red values are user editable.**

1. Go to worksheet tab **input**.
   a. Enter the 2 (high and low) pixel intensity values recorded from photoshop (step B6) into indicated (red) cells in columns F & G.
   b. Enter the corresponding luminance measurements from site (step A5) into indicated (red) cells in columns I & J.
2. Go to worksheet tab **graphic**.
   a. View the image with values indexed to 7 shades of grey (fig.6).
   b. You can edit ranges and colors in the legend at the right of the image to highlight image areas or change image appearance (fig.7).
   c. There are usually moderately long wait times as you edit this image as many calculations must be performed.

   Note. Minor 3-D image problem/bug here. Sometimes image comes up with a small amount of 3-D rotation in elevation. To solve, go to 3-D View sub-menu on Chart and, **using the arrow buttons,** adjust the Elevation setting so that it reads as follows: Elevation: –90 (minus 90). Note that when you first go here the elevation setting will read as correct but you must re-adjust it **with the arrow buttons** to correct the image.

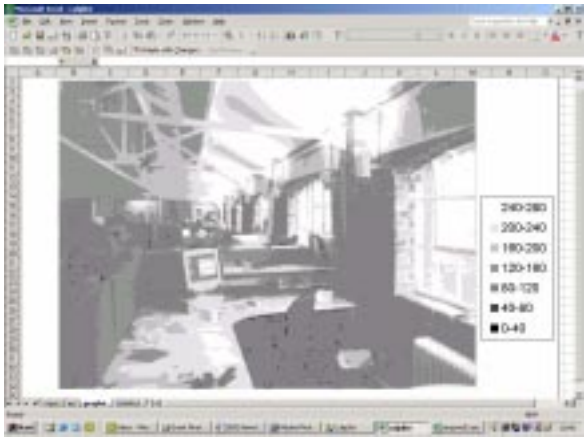

Figure 6

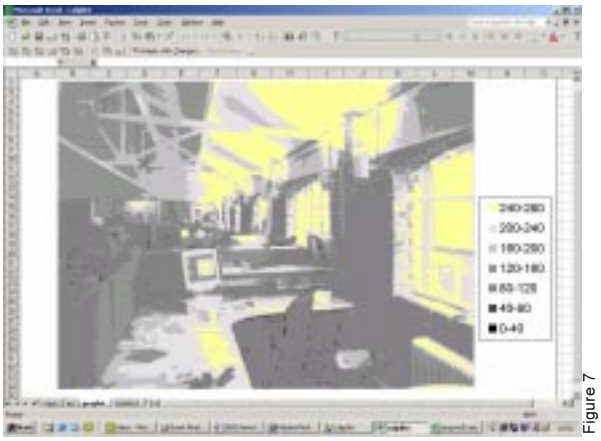

Figure 7

3. Go to worksheet tab **statistics**.
   a. View the image histogram (fig.8).
   b. Below the histogram are some statistical values.
   c. Under **Individual Pixel Value** enter any pixel value 0–255 to see its corresponding luminance value (footlambert) estimate.
   d. Under **Background and Spike** define image background and spike by looking at image and entering high- and low-end pixel values for both bell and spike regions.

   Note. For guidance in setting these values, see Section 7.3.6 of Schiler's *Interior Luminance, Daylight Controls and Occupant Response* Vital Signs package (Lesson 7, page 42).
   e. There is usually a moderately long wait time as these values are edited and many calculations are being performed.

   Note. Calculation indicator, an Excel status bar at the bottom of the window, shows progress.

f. Median values for the background bell and spike are calculated, as are percent of view for background and spike regions.

g. Look at top of histogram (fig.8) to see graphic representation of your **Background** and **Spike** definitions.

i. Black "plus" symbols on the histogram mark the boundaries you defined for **Background** and **Spike** regions.

ii. Red "diamond" symbols on the histogram indicate the median pixel value for each defined region.

h. Look further below to see the ratio of median values (**Spike to Background Ratio**).

i. Look further below to see **Schiler Glare?** indication:

IF median ratio < 2:1 THEN Schiler Glare = NO

IF median ratio >= 2:1 and median ratio < 3:1 THEN Schiler Glare = MAYBE

IF median ratio >= 3:1 THEN Schiler Glare = YES

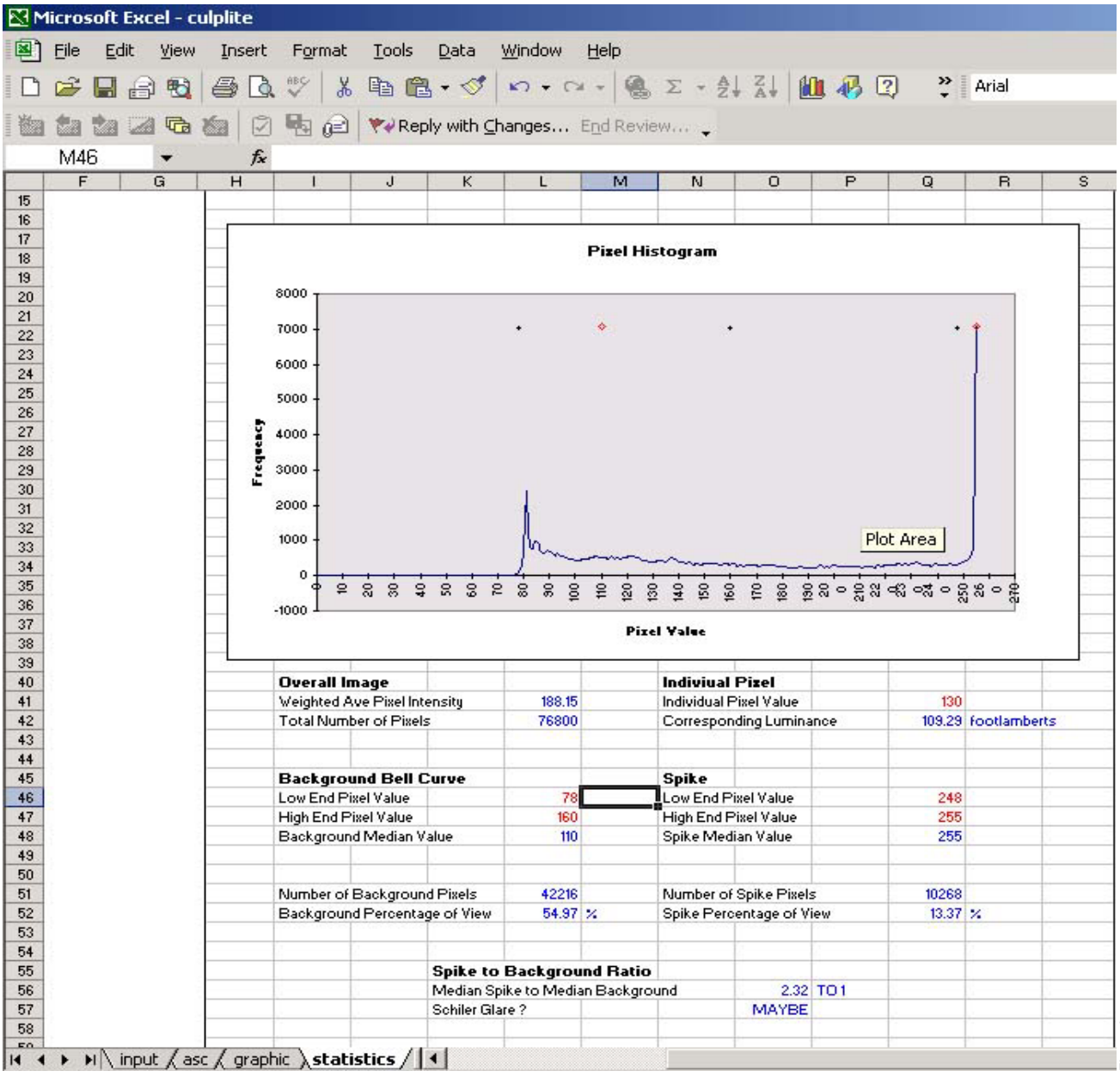

Figure 8