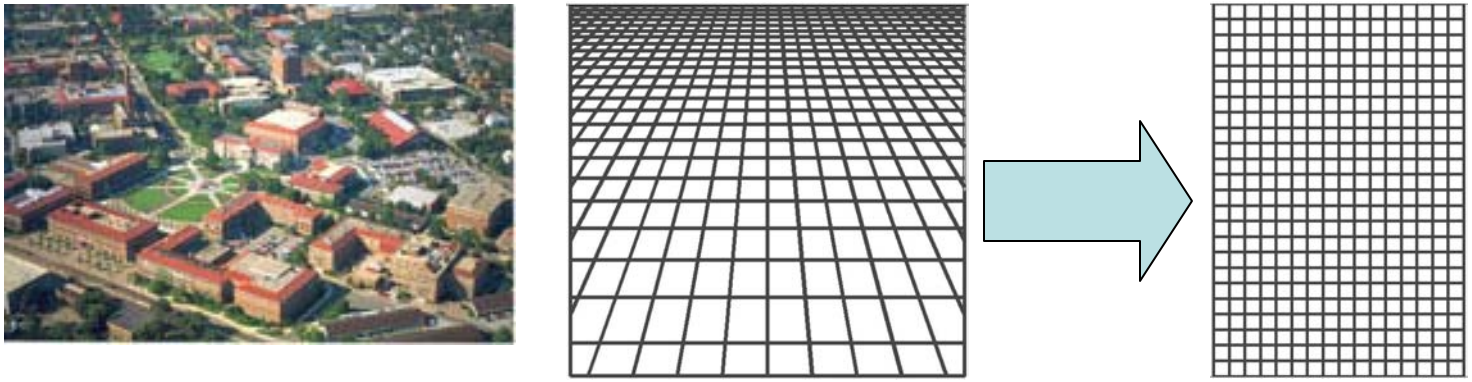
CE 503 Photogrammetry I – Homework 2
Assigned Tuesday 7 September, due Friday, 17 September

We want to rectifiy the photograph shown here, and integrate with a coordinate grid and some feature vectors. The product will be in Indiana State Plane West coordinate system, GSD = 0.5m, lower left corner: E 913800m, N 574300m, upper right corner: E 914700m, N 575500m. We will make the *assumption* that the object surface is a plane, and therefore we use the 8-parameter transformation as the geometric sensor model.



Data

- The oblique image file: postcrd1a.jpg can be found in the ce503 directory of the \\geomatics drive. In case you are having a problem with access you can also find it by anonymous ftp to ftp.ecn.purdue.edu, login with *anonymous* and use email address for password, *cd bethel,* and *get* the file.
- The geo-referenced Tippecanoe County GIS ortho-image is in two .tif files with associated .tfw world files. Find c2985865.tif and c2985885.tif in the ce603 directory of \\geomatics or in the ftp site.
- The feature vector overlay file(s) are in road1.shp,shx,dbf. Find these in the ce503 folder or on the ftp site.

1. Locate a number of "control points" that you can find in the image and also in the county ortho image. Read the the image coordinates in photoshop (units = pixels), bring up the county data in ArcView and read the XY coordinates (no Z). Try to distribute the points over the image.
2. See the reference material in the text (4.1.4), class notes, and on the class web site about the 8-parameter transformation. Normalize the coordinates, and solve for the 8 parameters. Your image residuals in pixels should be in "small" single digits.
3. Make a matlab program to (a) open the image file, and (b) initialize an output array.
4. Step / loop through all pixels in the output array, generate the XY-coordinate, normalize it, apply the 8-parameters, get normalized image coordinates, undo normalization to obtain "real" image coordinates, interpolate 3 times for R,G,B, (make 2 outputs, nearest neighbor and bilinear), store in the output array. When done write out as a .tif file.
5. Create an ESRI world file (ascii text: GSD,0,0,-GSD,UpLeftX,UpLeftY) with extension .tfw.
6. Bring it up in ArcView and import the Road1 vector file.
7. Add a map grid, coordinate annotation, north arrow, title, etc.
8. Evaluate the accuracy of the rectification by comparing vector features with corresponding image features. Make an error tabulation and histogram for X and Y. Show RMS for X and Y. What are the sources of any discrepancies here?
9. Hand in hardcopy report, and digital version of the final map (email or cd)