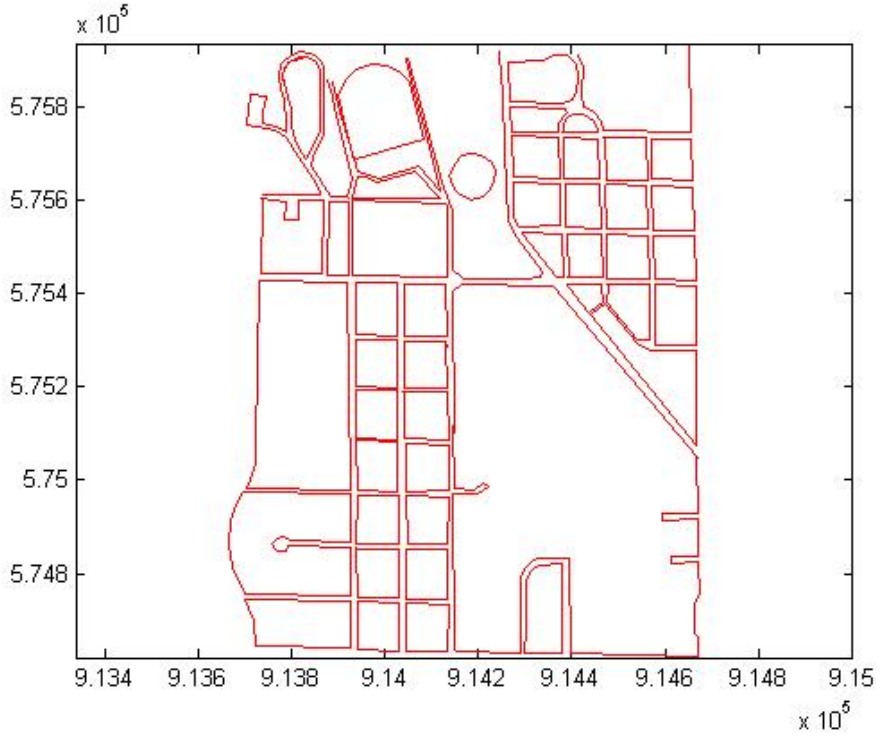
Photo1-09, Homework 2, Assigned 18-Sep-09, Due 25-Sep-09

1. Get file pdat.mat from ftp.ecn.purdue.edu/bethel consisting of 51 "polyline" features defining some road vectors around the Purdue Campus (see right). Access the jth vertex coordinate of the ith point by c(i).X(j) and c(i).Y(j). Import the file into matlab via "load" command. Plot the vectors on a simulated frame photograph taken at location (913448,574562,700). Determine the rotation matrix in Z-X order knowing (a) view is from southwest, (b) depression angle of camera view is 26.5 degrees. (x0,y0,f) = (0,0,152.4). Use the command plot(x,y) where x and y are vectors of your computed image coordinates for each feature. After the first plot command, issue a "hold on" command to retain all drawn vectors. Be sure to use "axis equal" at the end. The data structure was created by "shaperead('xxx.shp')" command for importing ESRI data. Given Coordinates are ISP-W, meters, Z=200 everywhere. Use size(c(i).X) to get the number of vertices per feature, then subtract 1, there is a terminating "NaN".



2. Determine omega, phi, and kappa from the rotation matrix given below. Assume that the order of rotations is the conventional M=M(kappa)*M(phi)*M(omega)=Mz*My*Mx.

$$\begin{bmatrix} 0.951251 & 0.272453 & -0.144535 \\ -0.254887 & 0.958333 & 0.128958 \\ 0.173648 & -0.085832 & 0.981060 \end{bmatrix}$$

3. Using the exposure station from problem 1, the (x0,y0,f) from problem 1, and the rotation matrix from problem 2, find the ground point X & Y (at elevation Z=200) for the image point (90,-20).