Homework 5 (Revised 14-April)

- Select a minimum of 3, from the 6, close-range terrestrial photos of the north end of the chemical engineering building.
- Select pass-points and control points
- Measure all image coordinate data
- Determine initial approximations for the elements of exterior orientation
- Format data for the bundle program that we used earlier in the term
- Begin with fixed interior parameters – later try to refine these (either manually or with the program)
- Get a “good” block adjustment
- Determine: either or both of (a) 3D distance from top of (narrow) north vent pipe on the roof to upper right corner of east face air conditioner, and (b) 3D distance from top of the same vent pipe to upper left corner of middle (lower) window on the north side of building. Show uncertainty of these values.
- Due ~2 weeks.

•Find the photos cme1.jpg – cme6.jpg on \\geomatics\bethel\ce603\terrestrial

•All image sizes are 1600x1200 pixels, assume 0.0033mm/pix

•Initial assumption: principal point at image center

•Focal length range: 6-18mm (3x zoom), all pictures taken at zoom-out position (6mm)

•So, for units, either use

  •Pixels, with f=1700, or

  •Millimeters, with f=6mm

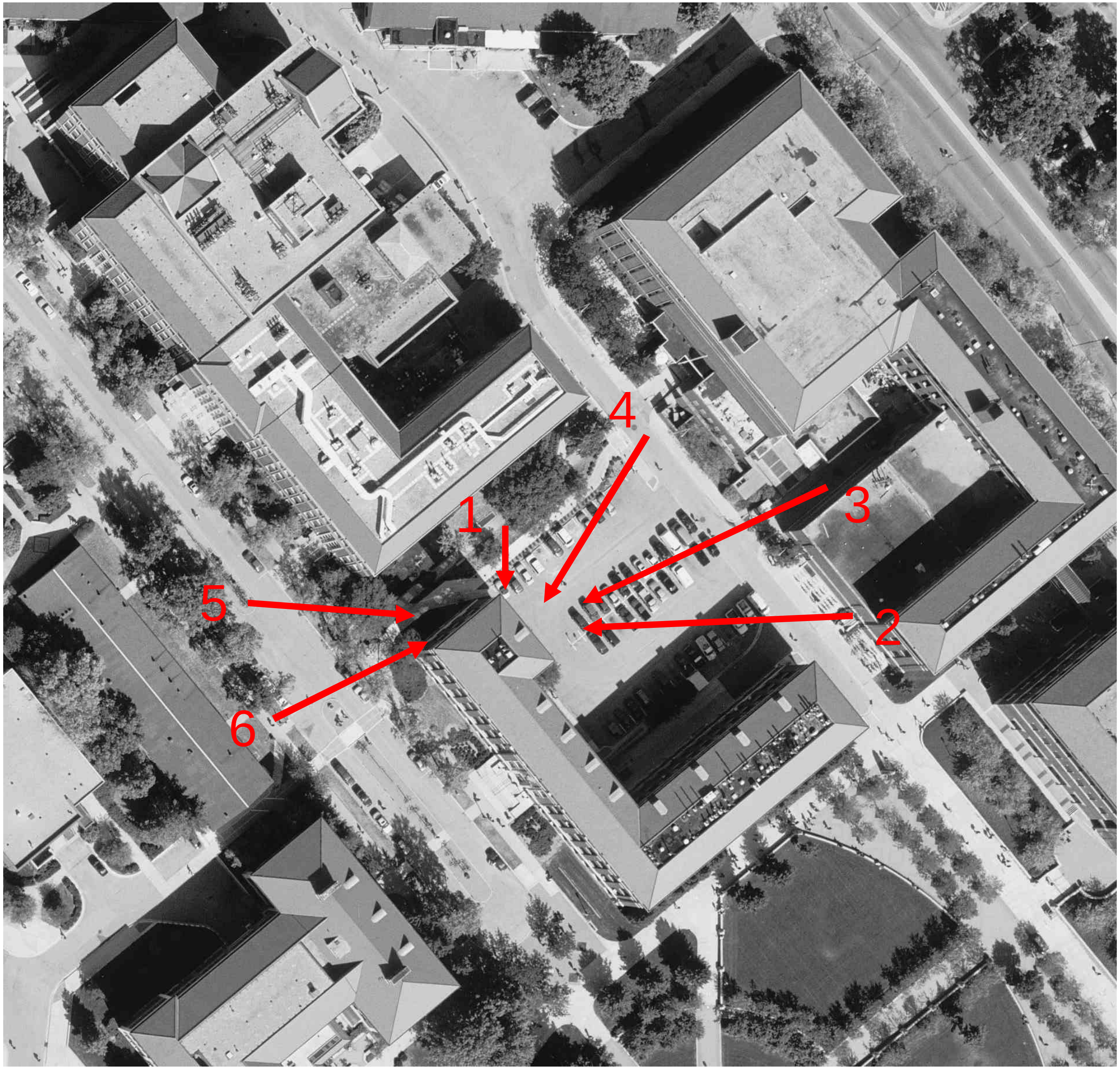
•For approximate exposure station coordinates, see cmeref2.tif & .tfw for use in esri/arcview. They are in a .zip file in the above data directory. Use 190m as approximate ground elevation around the Chem. Engr. Building.

•See next slide for approx. location and direction of images.

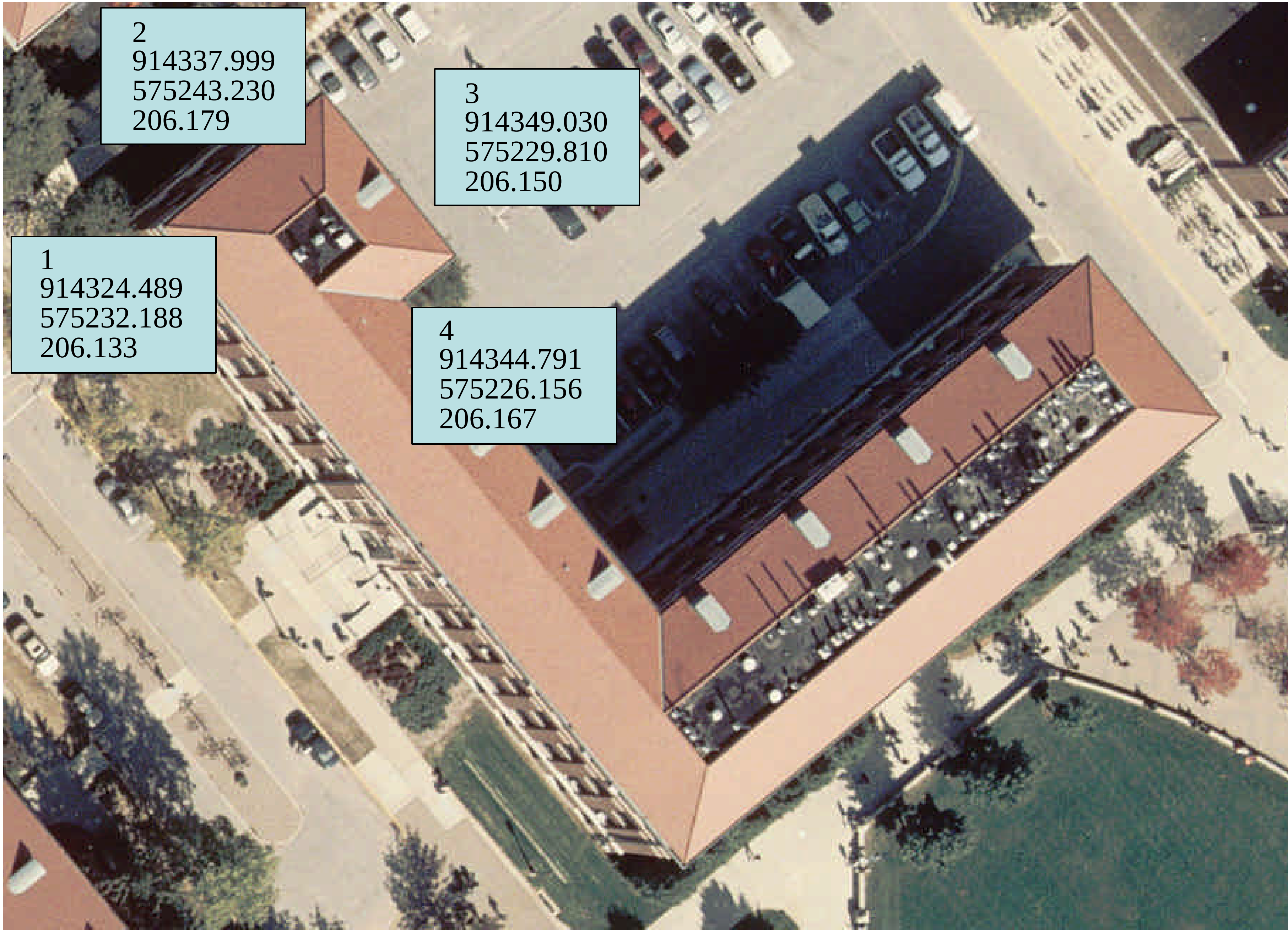
•Terrestrial photogrammetry offers many opportunities to discover singularities of the rotation parameters and of the collinearity equations themselves. A revised version of pba.m has been produced, as described next.

- See pba2.zip in the data directory with revised code that is more robust for the terrestrial case. Changes include:
  - Order of rotations is now: kappa (primary), phi (secondary), and omega (tertiary), M=Mw*Mp*Mk. *This impacts the initial values that you must provide*. In effect, kappa is like an azimuth, phi is near zero, and omega is approximately 90 degrees plus an elevation angle. Changes made in collin.m, and int_leq2.m
  - Added variable frmsz (=800) to collin.m assuming pixel units. This is to scale the coefficients for the lens distortion.
  - Prior focal length recommendation (566 pix) was not helpful – use the revised one: 1700 pix. (reverse engineering is an art and a science)
  - Int_leq2.m : modified initial intersection for pass points to check for largest coordinate component and use that one for the divisor, this prevents numerical problems in case of dZ=0 or small. Now int_leq2.m returns matrices instead of elements
  - Changed pba2.m to call int_leq2.m with revised arguments.
  - Made output prettier and more informative

- Once you have a solution, you may refine it by manually bracketing the nominal values (f,xo,yo, etc.) and observing the fit. Or, you may “loosen” up the variances on the parameters in cam.dat and let the program do it.
- As in the aerial block you must prepare the following input files: phofiles.dat, pho.dat, cp.dat, cam.dat, sig.dat, delta.dat.
- I got residuals mostly less than a pixel.



Approximate location and direction of six terrestrial images


2
914337.999
575243.230
206.179
3
914349.030
575229.810
206.150
1
914324.489
575232.188
206.133
4
914344.791
575226.156
206.167

1

2


R.H.
MARLIN

3


CAUTION
FOR YOUR SAFETY PLEASE STAY OUT
DANGER
HARD HAT
PROJECT

4

5

6