KML EXPORT & 3D CONSTRUCTION POINT TIP SHEET FOR *iWitness™ V2*

Working with GPS Coordinates

STEP 1. **Conduct the iWitness project** and assure the scale distance used is set in Meters (Metres). NOTE: there is no need to apply the "3-2-1".

NOTE: It is important that one uses GPS Control Points (CPs) with good two-dimensional spatial separation. In this project example, we used six CPs (identified as white labels, in FIGURE 1). We recommend use of at least 6 CP's for the KML export – more CPs are better than less.

STEP 2. **Use the GPS instrument** and record the CPs - (in this example, we used a hand-held Garmin Etrex™ GPS, and set the GPS device on the ground, at the same location as the six iWitness measured photogrammetric markers A,B,S, Q, E, L). The horizontal coordinate readout of the GPS device must be in Degrees & Decimal Minutes, whereas the height must be in Meters.

STEP 3. **Create a text file** (using Microsoft Notepad) of the Step 2, GPS recorded readings. *See FIGURE 2.*

STEP 4. **Use the iWitness "Transformation to Control"** dialog box (*pull-down menu of Photogrammetry + Transformation to control*), using the Step 3 text file. *Mark the CPs in an open image, or the 3D View. See FIGURE 5*.

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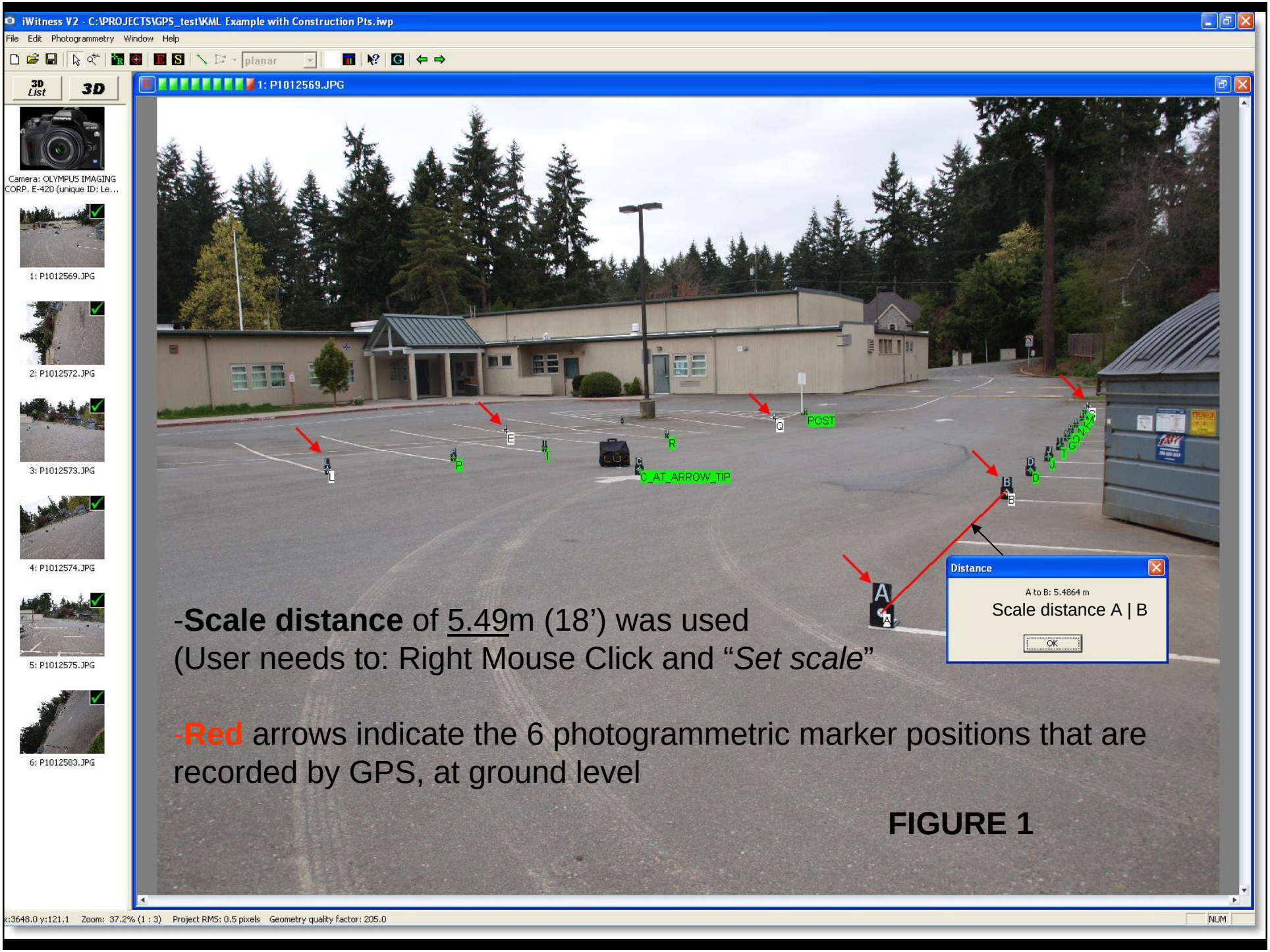
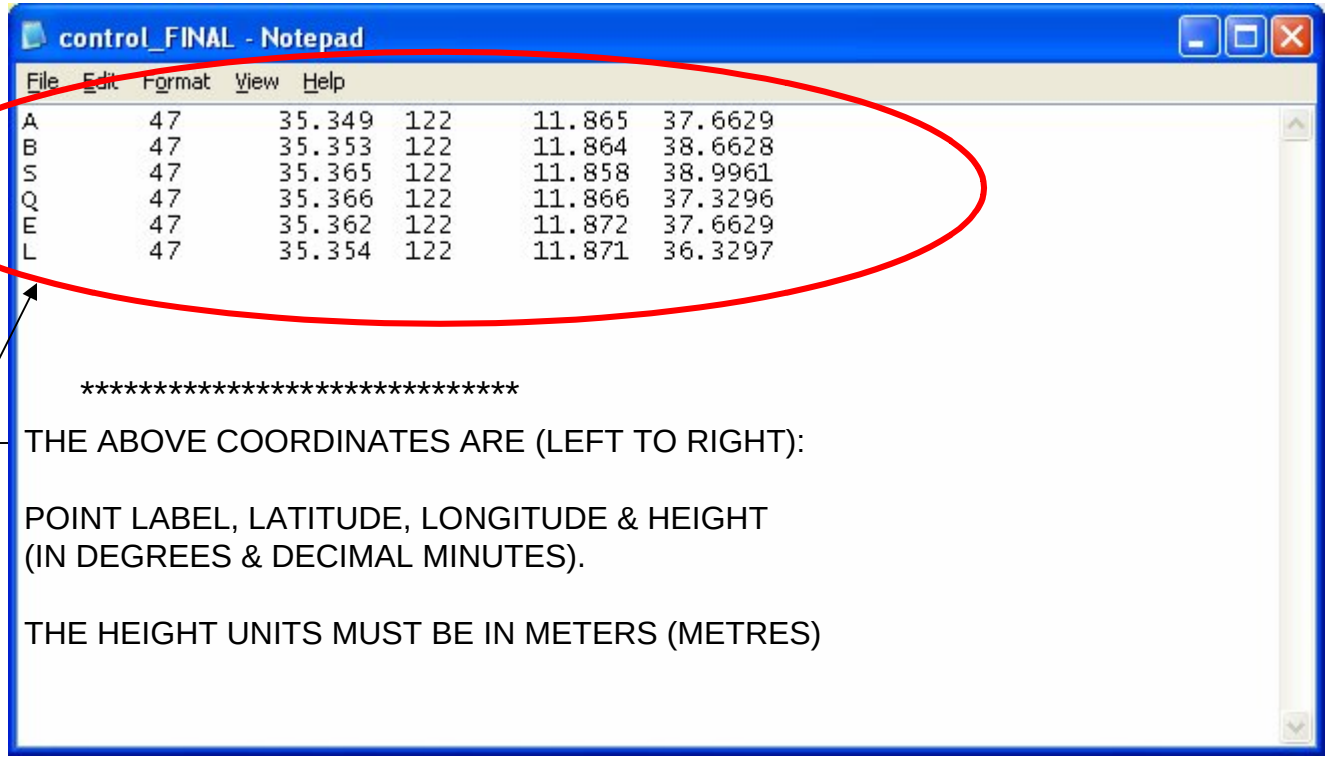
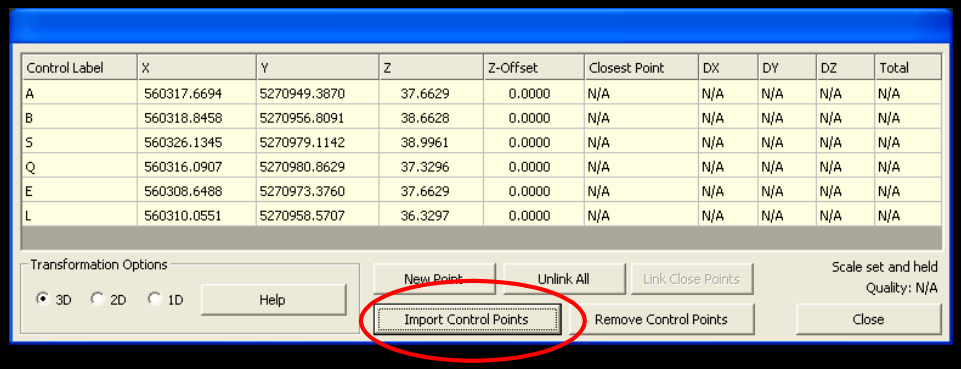

iWitness V2 - C:\PROJECTS\GPS_test\KML Example with Construction Pts.iwp
File Edit Photogrammetry Window Help
planar
3D List
3D
Camera: OLYMPUS IMAGING CORP. E-420 (unique ID: Le...
1: P1012569.JPG
2: P1012572.JPG
3: P1012573.JPG
4: P1012574.JPG
5: P1012575.JPG
6: P1012583.JPG
1: P1012569.JPG
POST
C_AT_ARROW_TIP
Distance
A to B: 5.4864 m
Scale distance A | B
OK
-Scale distance of 5.49m (18') was used
(User needs to: Right Mouse Click and "Set scale"
-Red arrows indicate the 6 photogrammetric marker positions that are recorded by GPS, at ground level
FIGURE 1
x:3648.0 y:121.1 Zoom: 37.2% (1 : 3) Project RMS: 0.5 pixels Geometry quality factor: 205.0
NUM



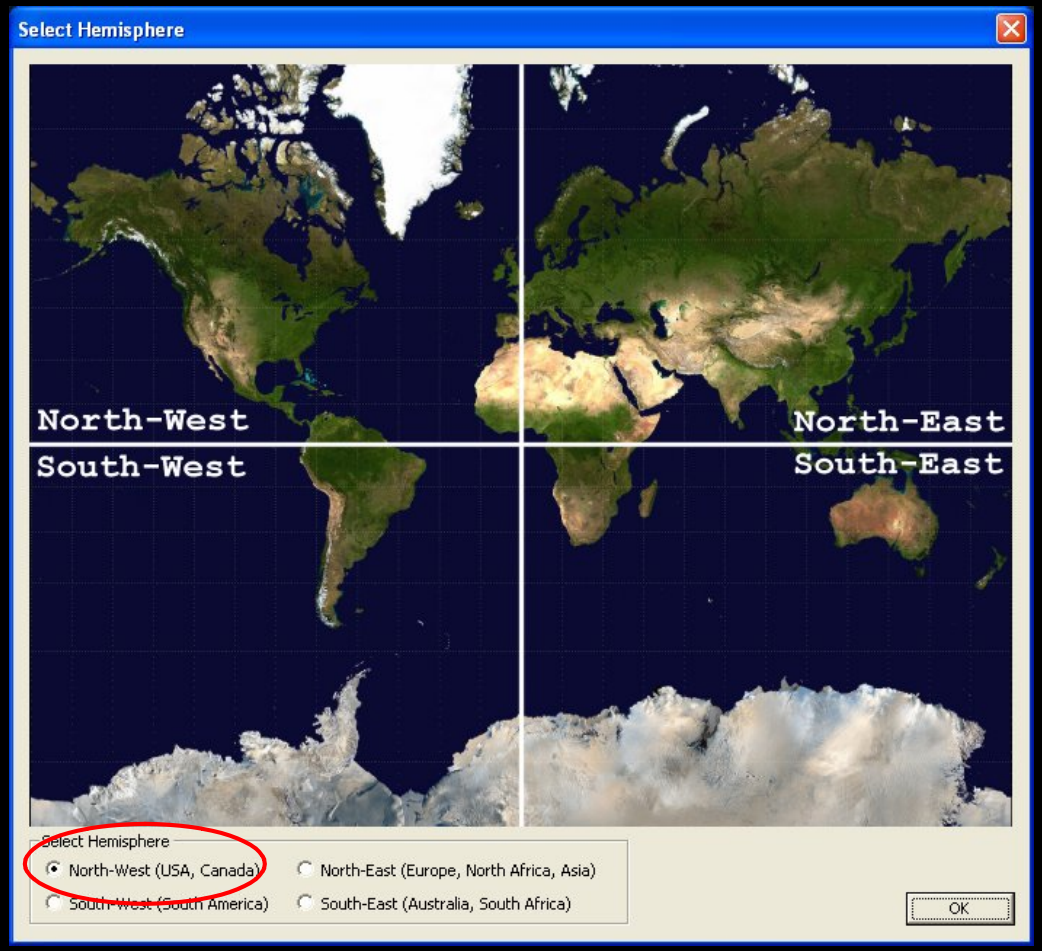
NOTE: *Only* enter the *Point Label, Latitude, Longitude & Height in the "Notepad" Text file. Values must be space or tab delimited.*

FIGURE 2



STEP 5. Click the “Import Control Points”

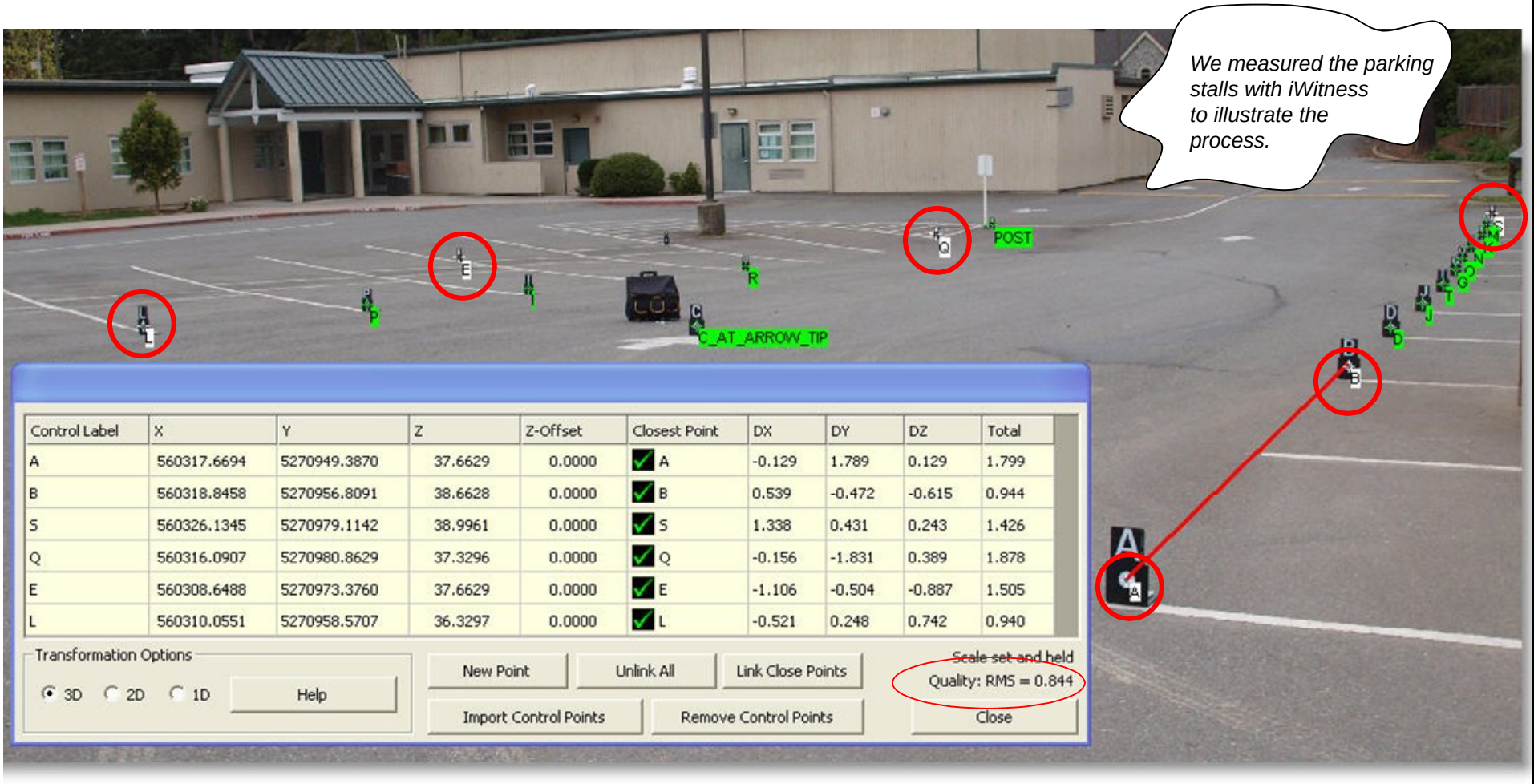
Figure 3



STEP 6. Click the radio button for the proper hemisphere.

Figure 4

3D Transformation to control dialog box presented with Six Control Points Marked



*Note: the RMS fit is about eight-tenths of a meter; this is due to the measurement uncertainty of the hand-held GPS. The generally much higher relative accuracy of 3D points within the iWitness network, scaled using the **A\|B scale distance**, is not affected by the transformation into the GPS coordinate system.*

FIGURE 5

STEP 6. Open the 3D View (3D Button). *NOTE: within the 3D view, you many have to depress the ALT key + Left Mouse Drag around the network of points to "zoom to full extent".*

The iWitness coordinates in the 3D Points (FIGURE 6) are now in the WGS84 Global Coordinate System and can be exported as a KML file to an 'earth viewer" e.g., Google Earth.

However, before exporting, we will now discuss the **KML Export "Shift Parameters"** and the "**3D CONSTRUCTION POINT**" procedures.

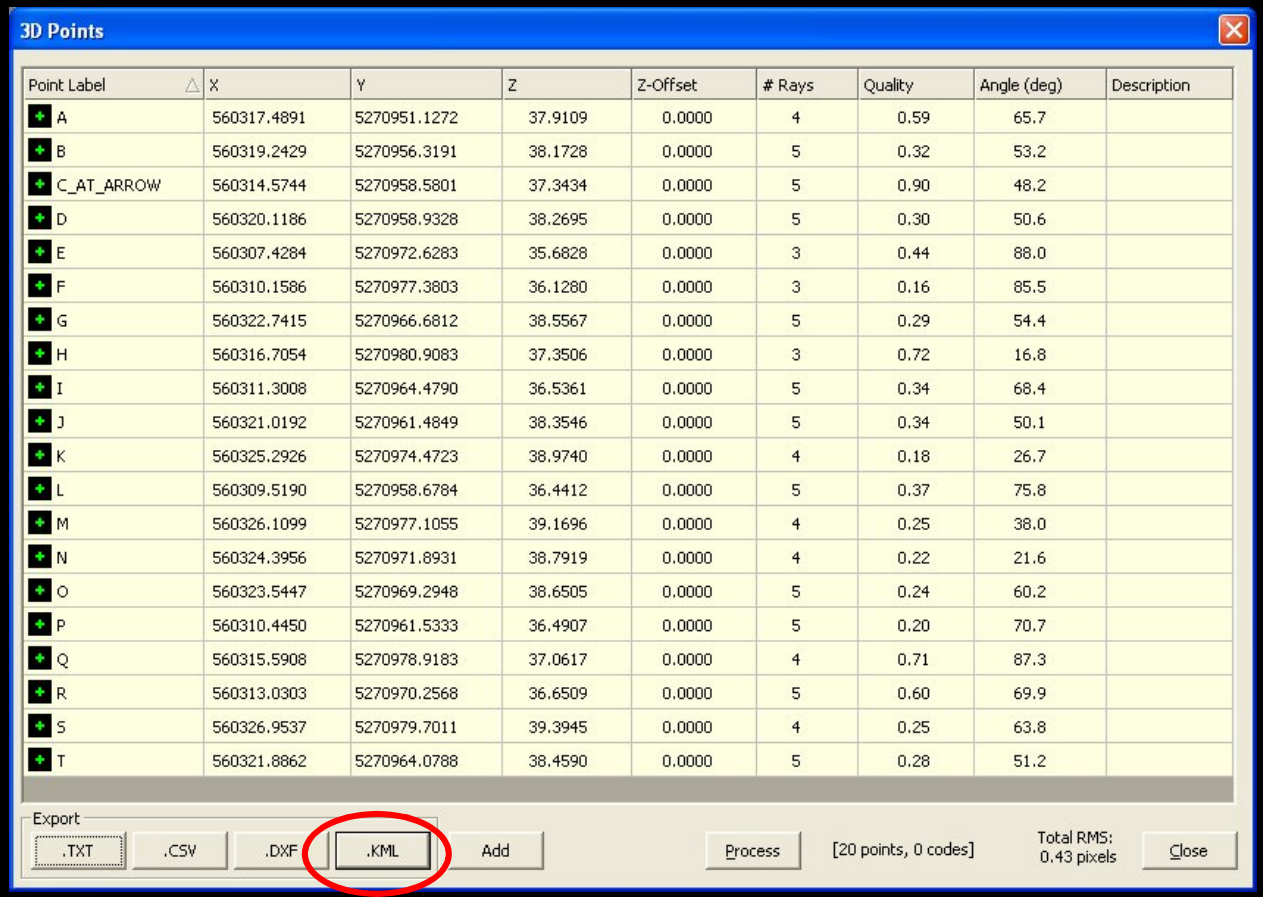
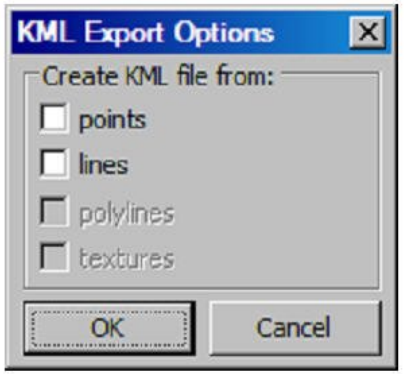
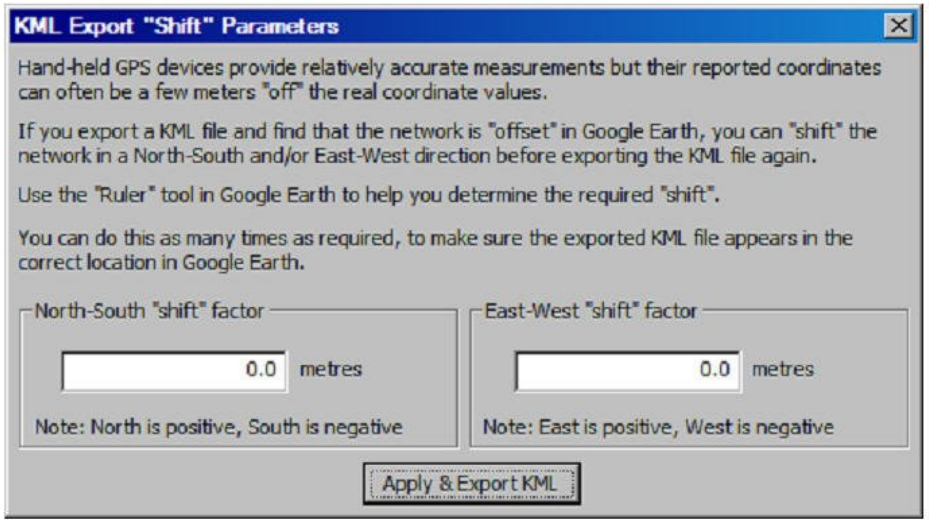


FIGURE 6

KML Export “Shift Parameters”





OVERVIEW:

The positioning accuracy **of both hand-held GPS devices and the imagery in virtual globe viewers** is such that measured GPS positions are **often a few meters removed** from their ‘correct’ positions as depicted in Google Earth. In order to compensate for this offset, the user can specify a ‘**shift**’ factor, to position the *iWitness* points closer to the positions shown in the imagery. The amount of shift required is entered in meters via the KML Export ‘**shift**’ parameters window after the KML Export operation. For the initial export of the KML file, the shift factor should be left at 0.0 meters. Once the saved KML file is opened directly into Google Earth, or other compatible software for viewing, the user can employ a distance measuring tool to determine the required shift of the point array. The shifts can be in both the North/South and/or East/West directions, the signs being positive for North and East, and negative for South and West.

The next slide presents an example: **FIGURE 7**

In **FIGURE 7**, the point labeled **GPSPoint 2**, is incorrectly positioned in Google Earth. The point should in fact be placed at a location 5m North and 2m East of its current position. In this case, a shift factor of +5m in the North/South direction and +2m in the East/West direction would move the point to the position indicated in the underlying image, as well as moving all other points in the network by the same amount. This is an iterative process where the user can export and view the KML file as many times as required to make sure the exported coordinates appear in the correct location.

FIGURE 7

ADDING 3D CONSTRUCTION POINTS

Goal:

This tip sheet will discuss entering **Hand Held GPS coordinates** into the project discussed so far. The example will be **adding a quantity of three Garmin Etrex (GPS) measurements into the *iWitness* project**. In this example, the user wishes to measure three additional points (tens of meters from the *iWitness* network), where the GPS accuracy is not as 'critical' as the *iWitness* measurements.
The *relative accuracy* of the GPS coordinates will typically agree to the *iWitness* measurements to an uncertainty of about 1 meter or so.

NOTE: this process is accomplished *before* doing the KML export.

Background:

3D Constructed Points are 3D points which can be manually added to an oriented *iWitness* network, and displayed within the 3D View. 3D constructed points are not measured photogrammetric points and are therefore not included in the bundle adjustment. 3D Constructed Points can be added to the *iWitness* network using the **Add** button at the base of the 3D Points List. The user can manually input 3D points either in Cartesian coordinates or, where GPS control points are present, in degrees & decimal minutes for horizontal position and in meters for height.

STEP i) Click the “ADD” button in the 3D Points List.

STEP ii) Click the “Enter GPS-style coordinates” (radio button).

STEP iii) Click the “From File…” button

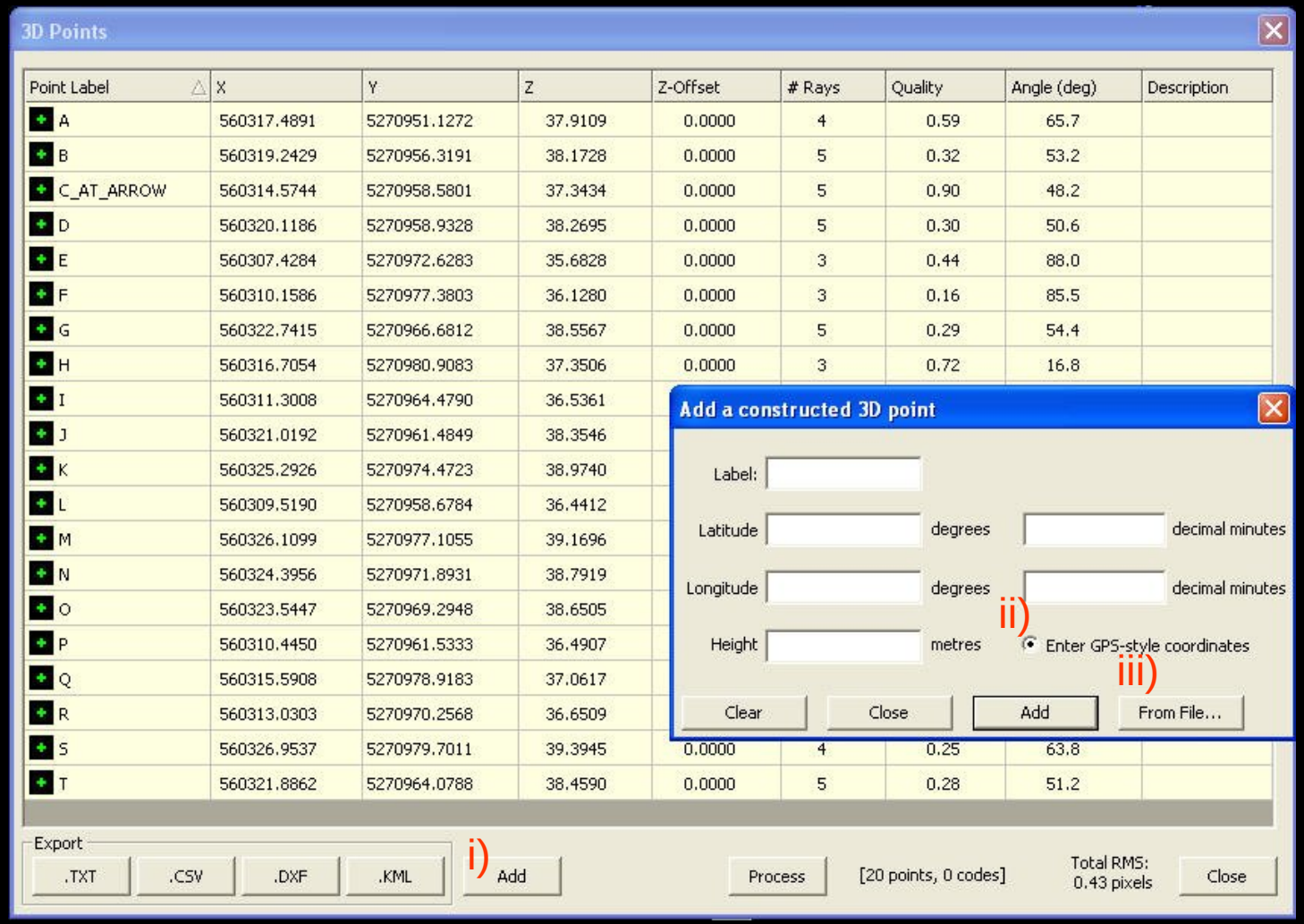


FIGURE 8

STEP iv) Click the name of the control file (in this example we named it "construction GPS points"), and then click Open. The Figure 4 dialog is now displayed; click the proper "hemisphere" radio button.

NOTE: these "*3D construction points*" were recorded on scene and then put into a Microsoft Notepad (txt file) from the Hand Held GPS device. The "txt file" is formatted exactly the same as in Figure 2.

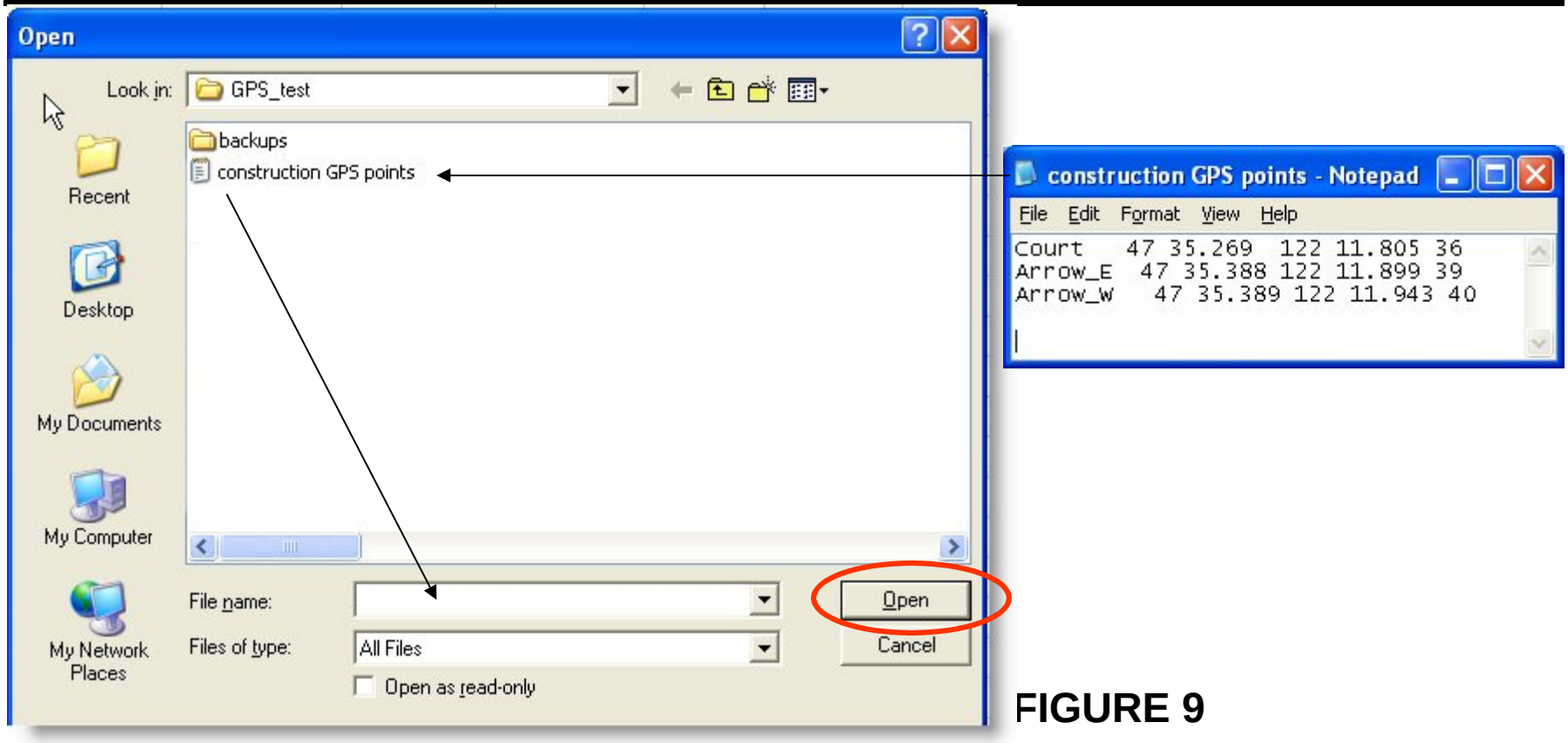


FIGURE 9

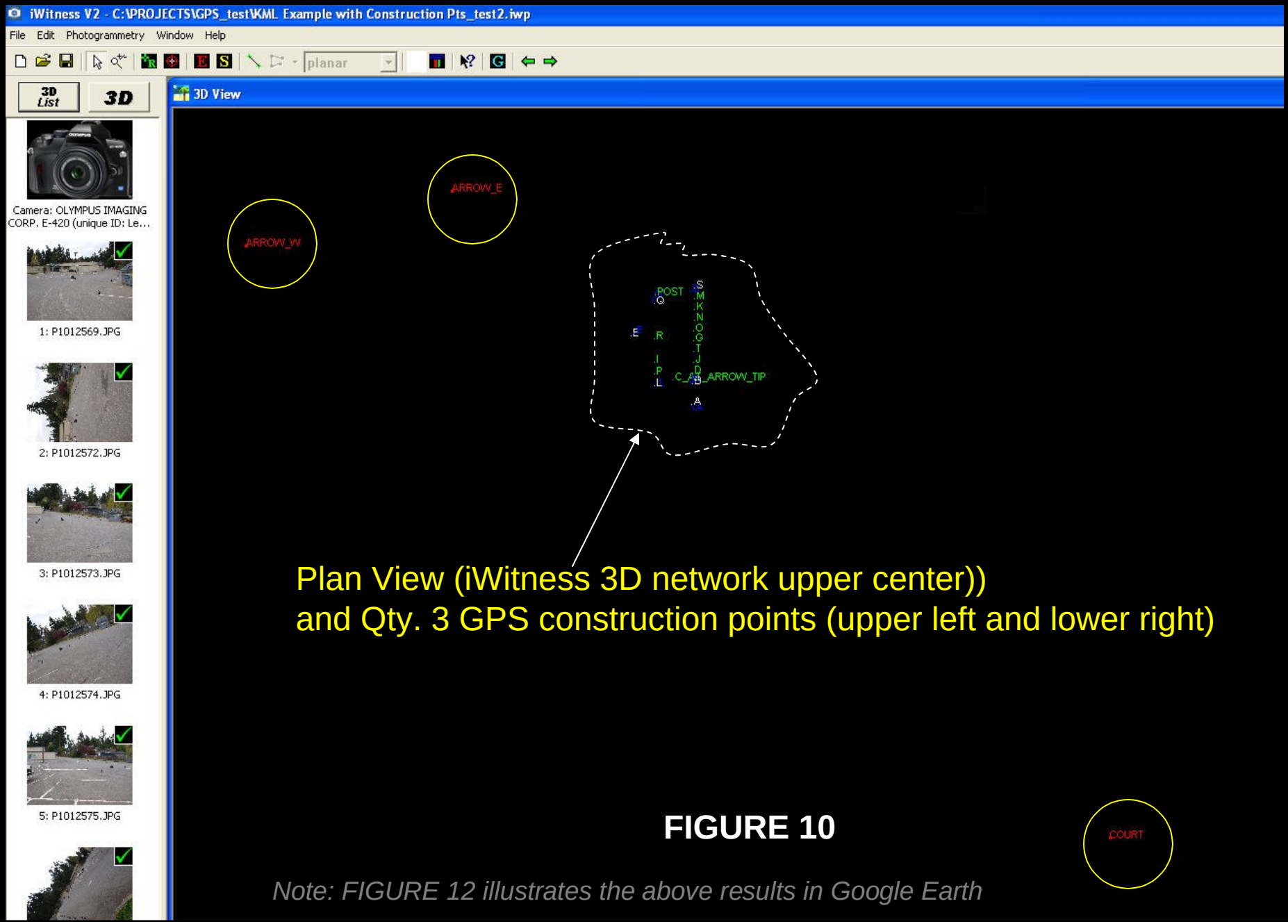


FIGURE 10

Note: FIGURE 12 illustrates the above results in Google Earth

STEP v) Click the .KML and save to your working folder. The .KML can now be “shifted” as indicated in FIGURE 7.

FIGURE 12 is a screen capture of the .KML result in Google Earth.

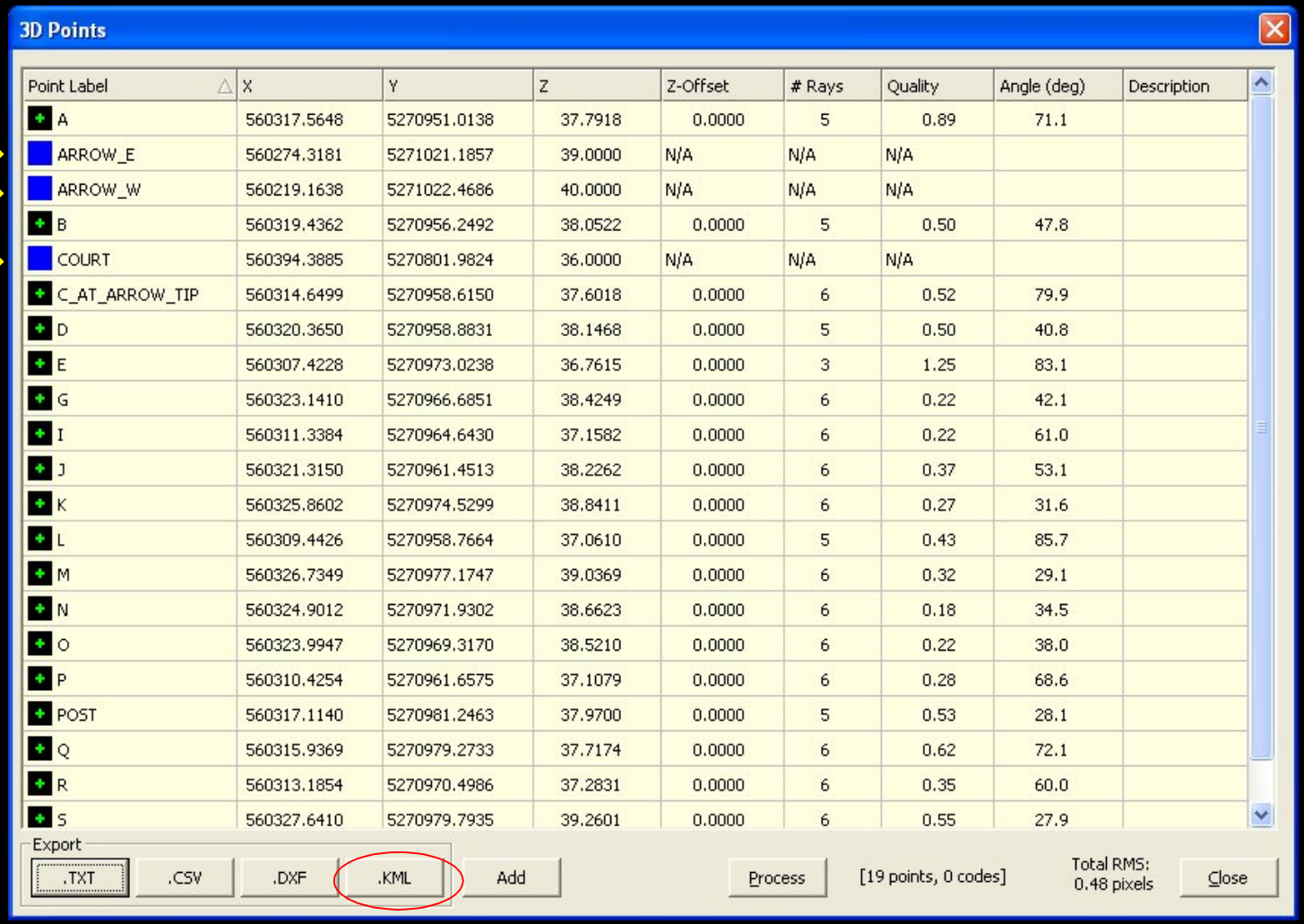
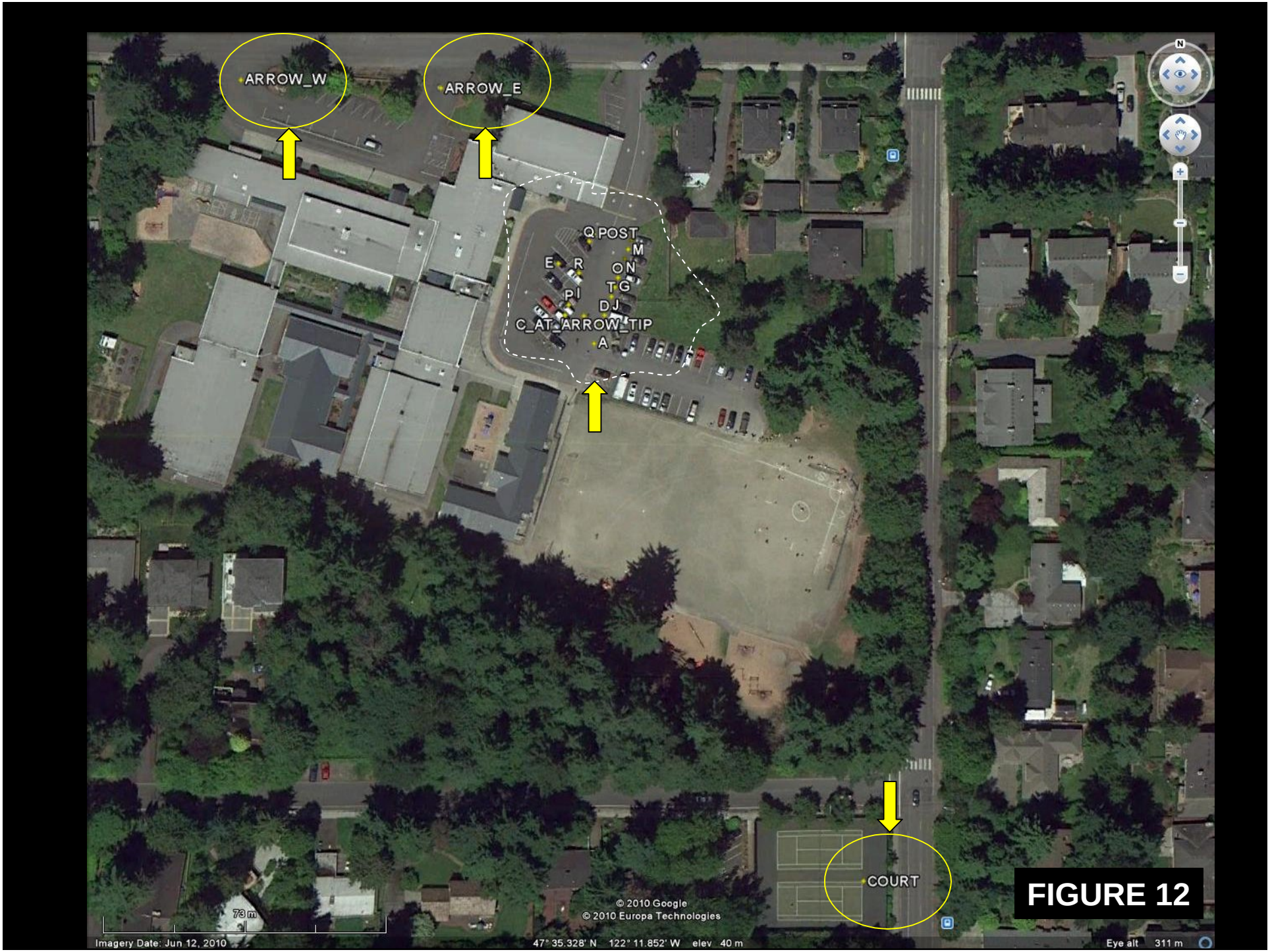


FIGURE 11


ARROW_W
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A
COURT
© 2010 Google
© 2010 Europa Technologies
73 m
Imagery Date: Jun 12, 2010
47° 35.328' N 122° 11.852' W elev 40 m
Eye alt 311 m

FIGURE 12