Using New Technologies for Plot Maps

❖ Smart Phone GPS

❖ Using Google Earth

❖ Integrating Phone-GPS & Google Earth into spiffy plot maps

    ❖ 1st, verify permanent marker

    ❖ 2nd, making cool maps

❖ What's a smart phone?

    ❖ Handheld computer

    ❖ Camera

    ❖ GPS

    ❖ Oh yeah… and a phone

❖ What's an app?

    ❖ e.g. GPS essentials, Free GPS, etc.

2013
SAMSUNG GALAXY S4
A high end Android phone sporting a 13 MP rear camera.

2007
APPLE IPHONE
First smartphone to be tagged as a powerful pocket computer.

1998
NOKIA 8810
First phone with no external antenna

1993
IBM SIMON
The first phone to be called a smartphone.

1973
DR. MARTIN COOPER
Made the first mobile phone call.

2010
LG OPTIMUS 2X
The first mobile phone to feature a dual-core processor.

2004
MOTOROLA RAZR
First fashion phone that sold over 50 million units in 2 years

1996
MOVA N103 HYPER
The first phone with customizable ringtones.

1989
MOTOROLA TAC8000X
The lightest and the smallest mobile phone then.

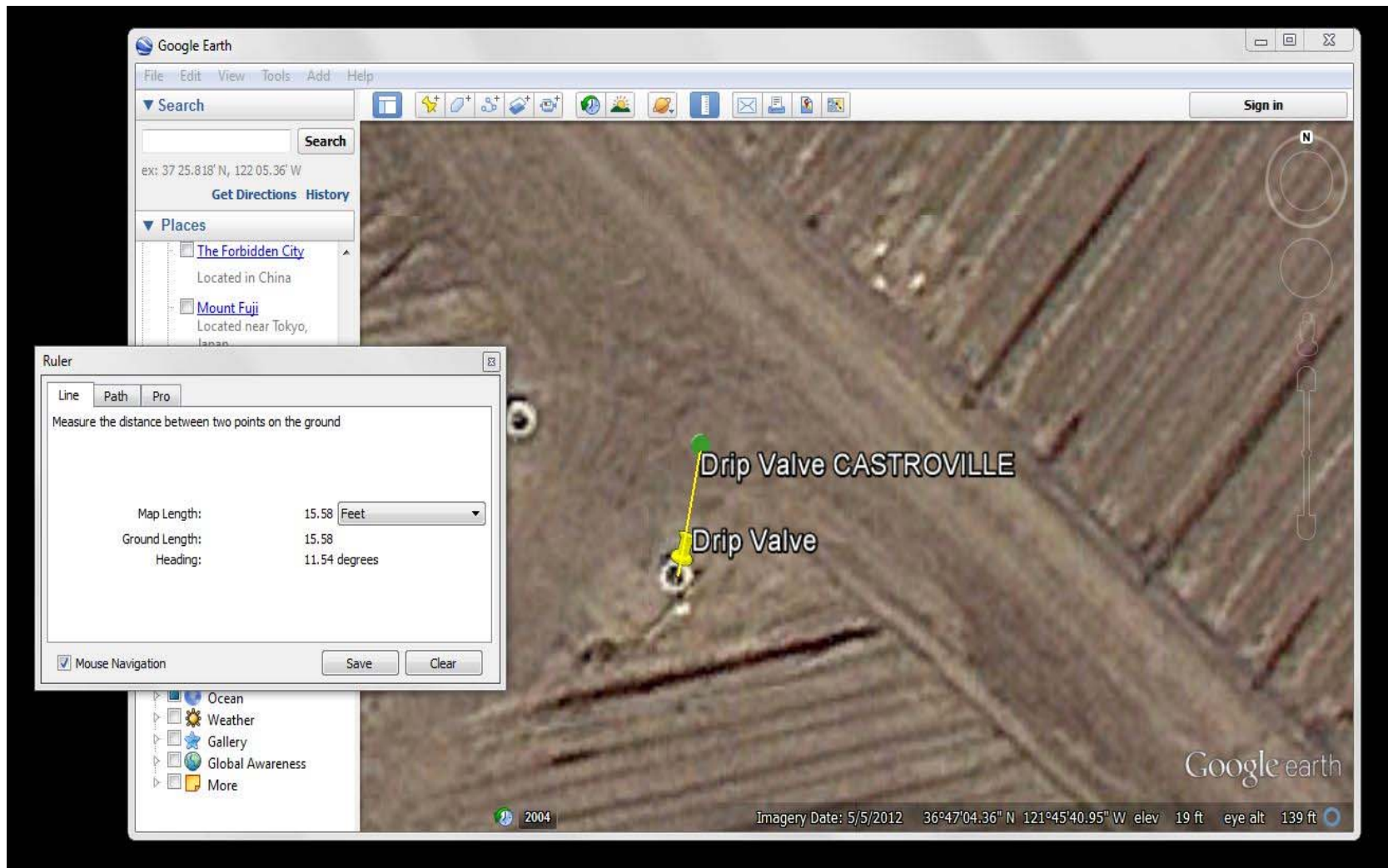**Remember your first phone? Cost? Features?**

Mika's iPhone vs. Stephen's Android

Examples of where we're headed

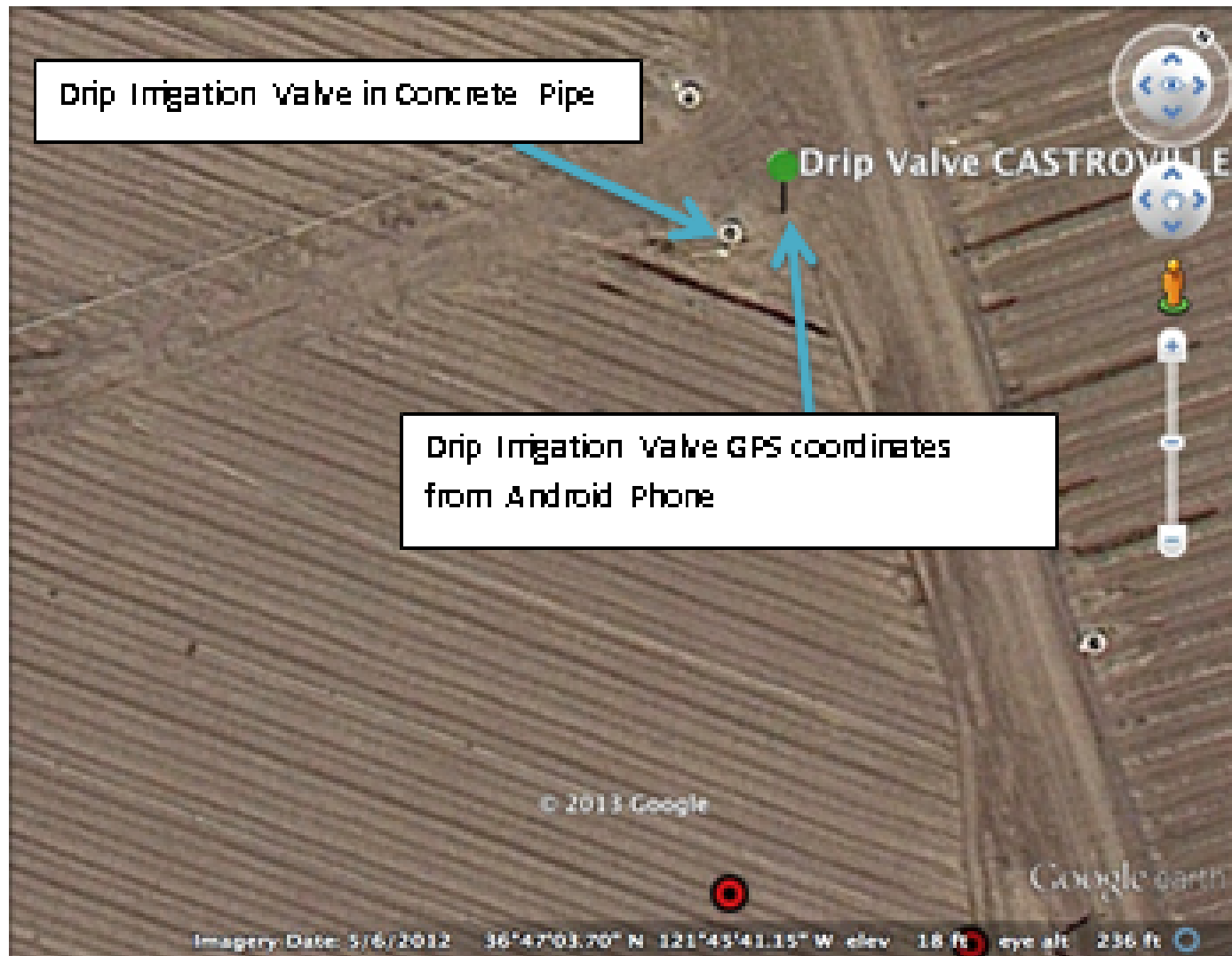**2005: Using known benchmark to verify GPS**

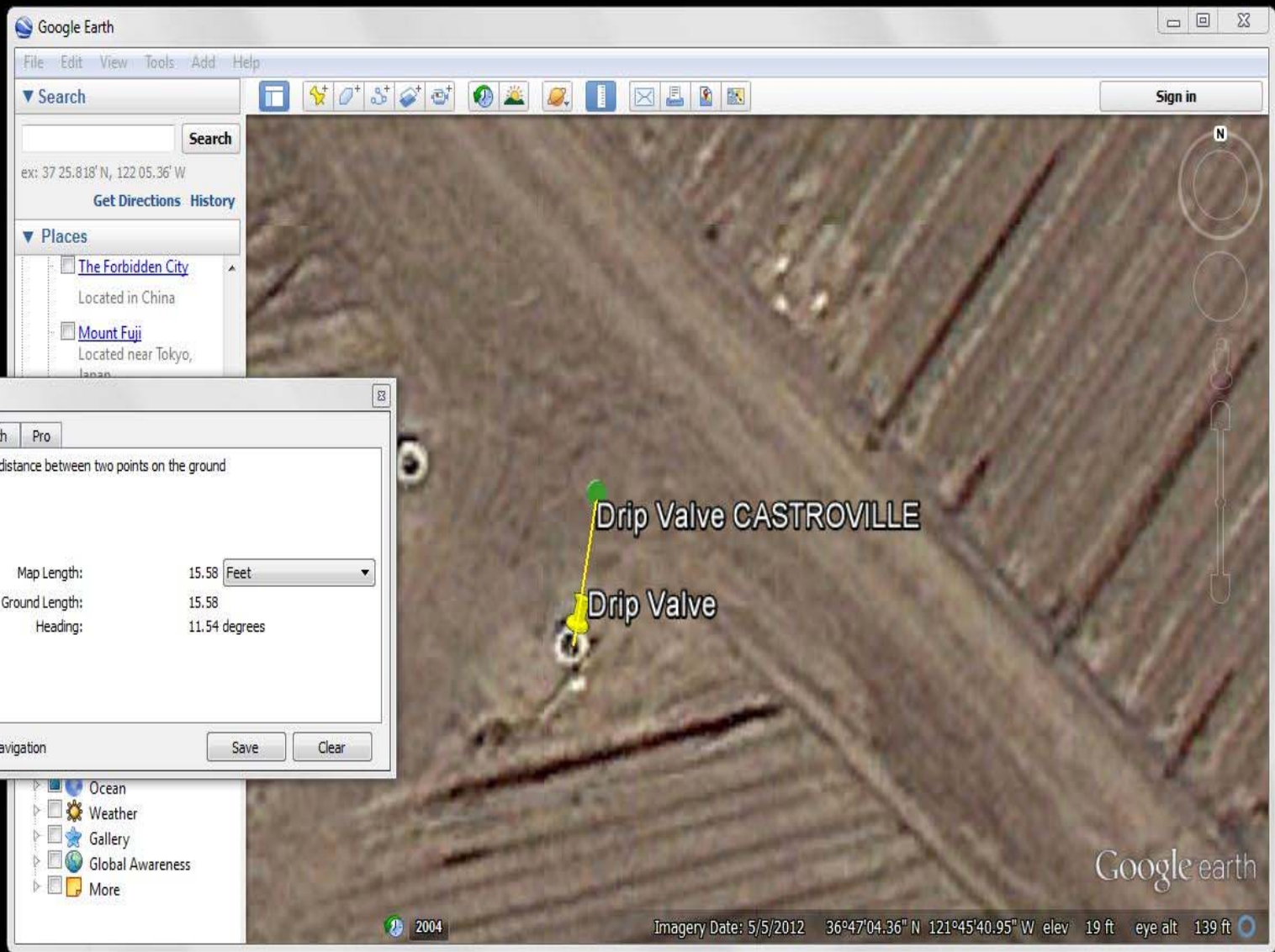**2013: Using visible landmark to verify GPS**

Permanent Marker verification w/ Smart Phone

- ❖ Download GPS app
    - ❖ Android: GPS Essentials
    - ❖ iOS: Free GPS (by CodeBurners)
- ❖ Download Google Earth
  http://www.google.com/earth/download/ge/agree.html
- ❖ Turn on Phone's GPS function (Android) or Location Services (iPhone)
- ❖ Record point @ permanent marker
- ❖ Send GPS data (waypoint) to GE
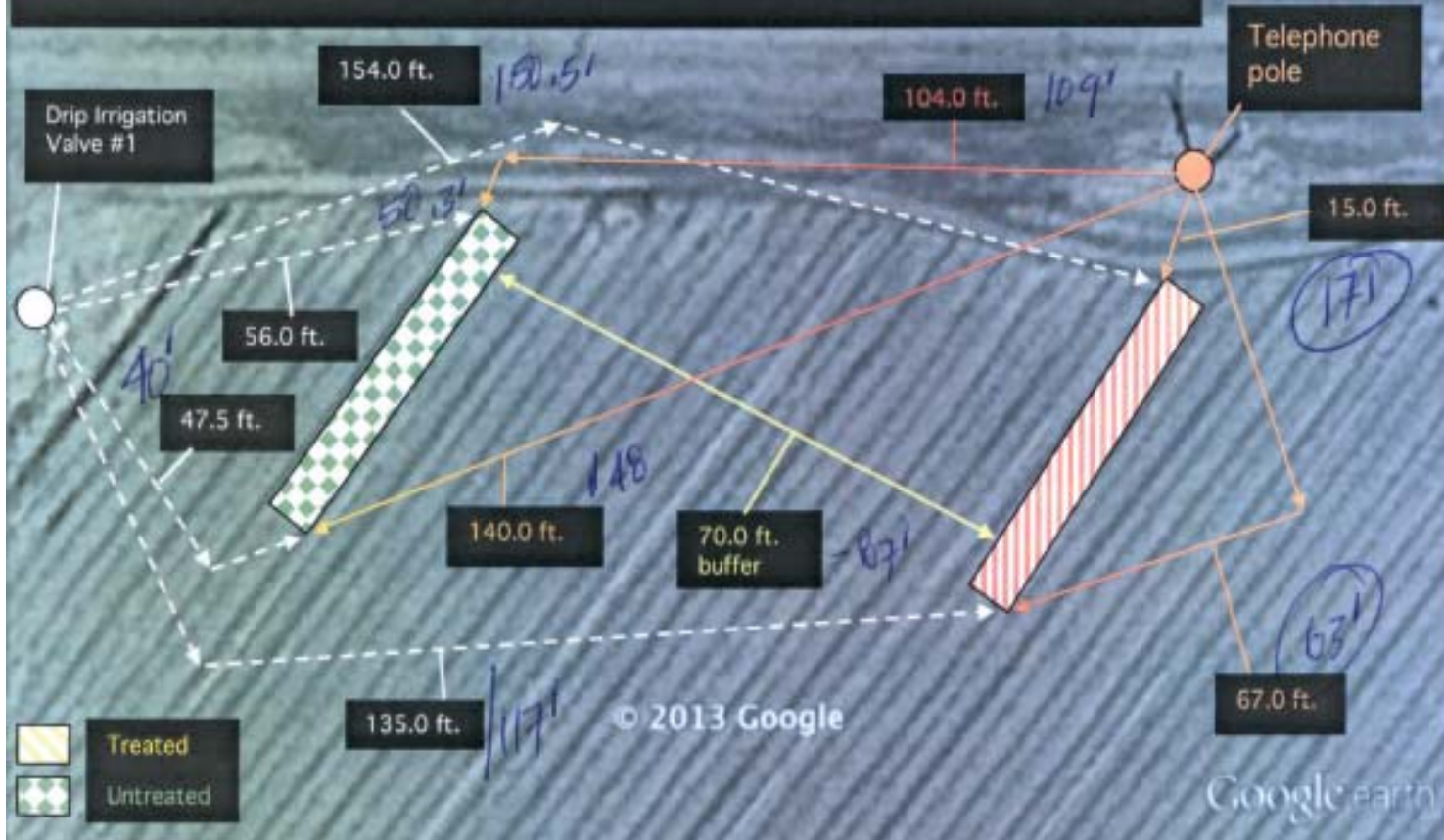- ❖ Use GE ruler tool to compare accuracy

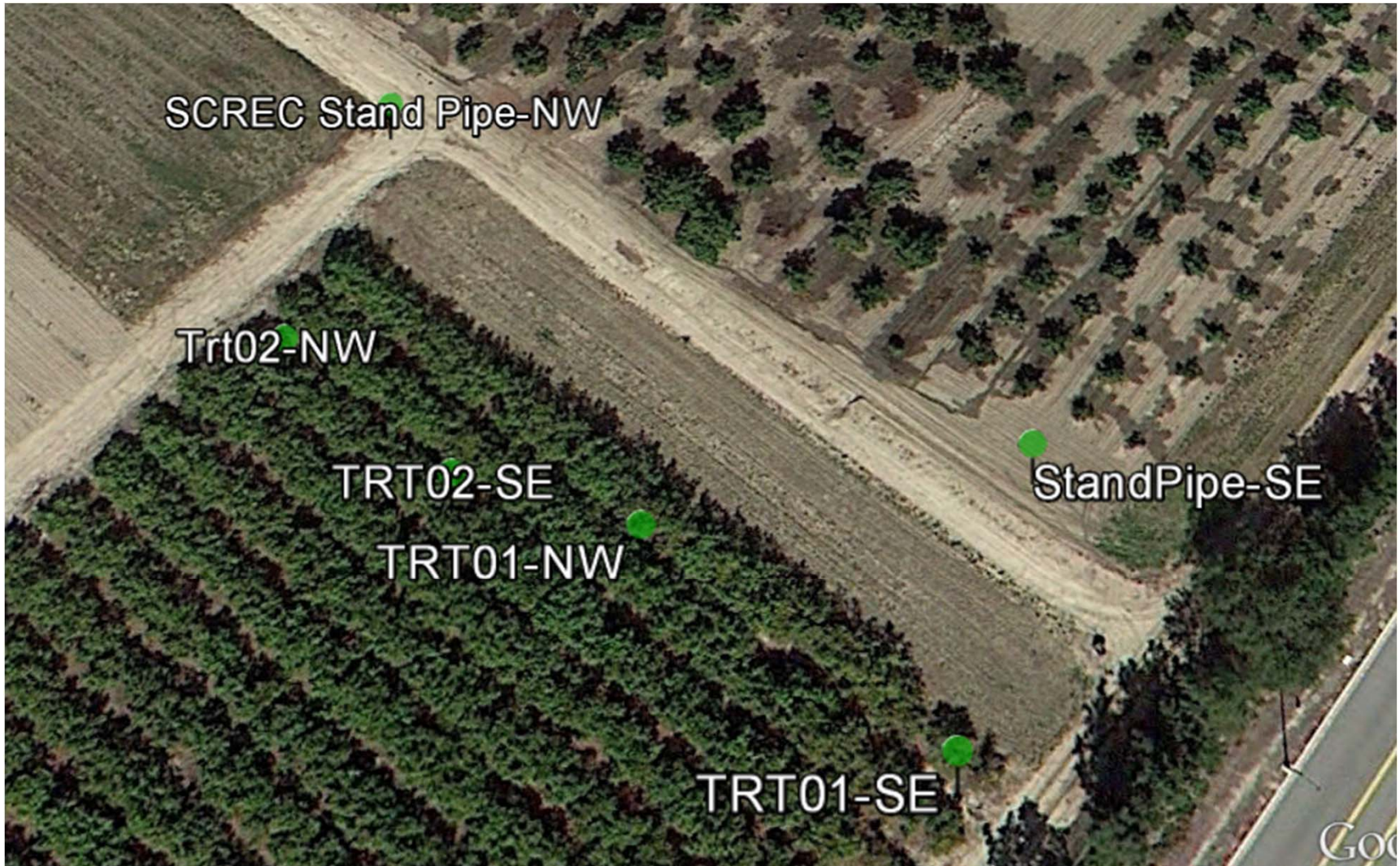Coordinates of Valve from Google Earth: 36' 47' 4.24" Latt x 121' 45' 41.26" Long

Coordinates of Valve from Samsung Phone: 36' 47' 3.36" Latt x 121' 45' 39.63" Long
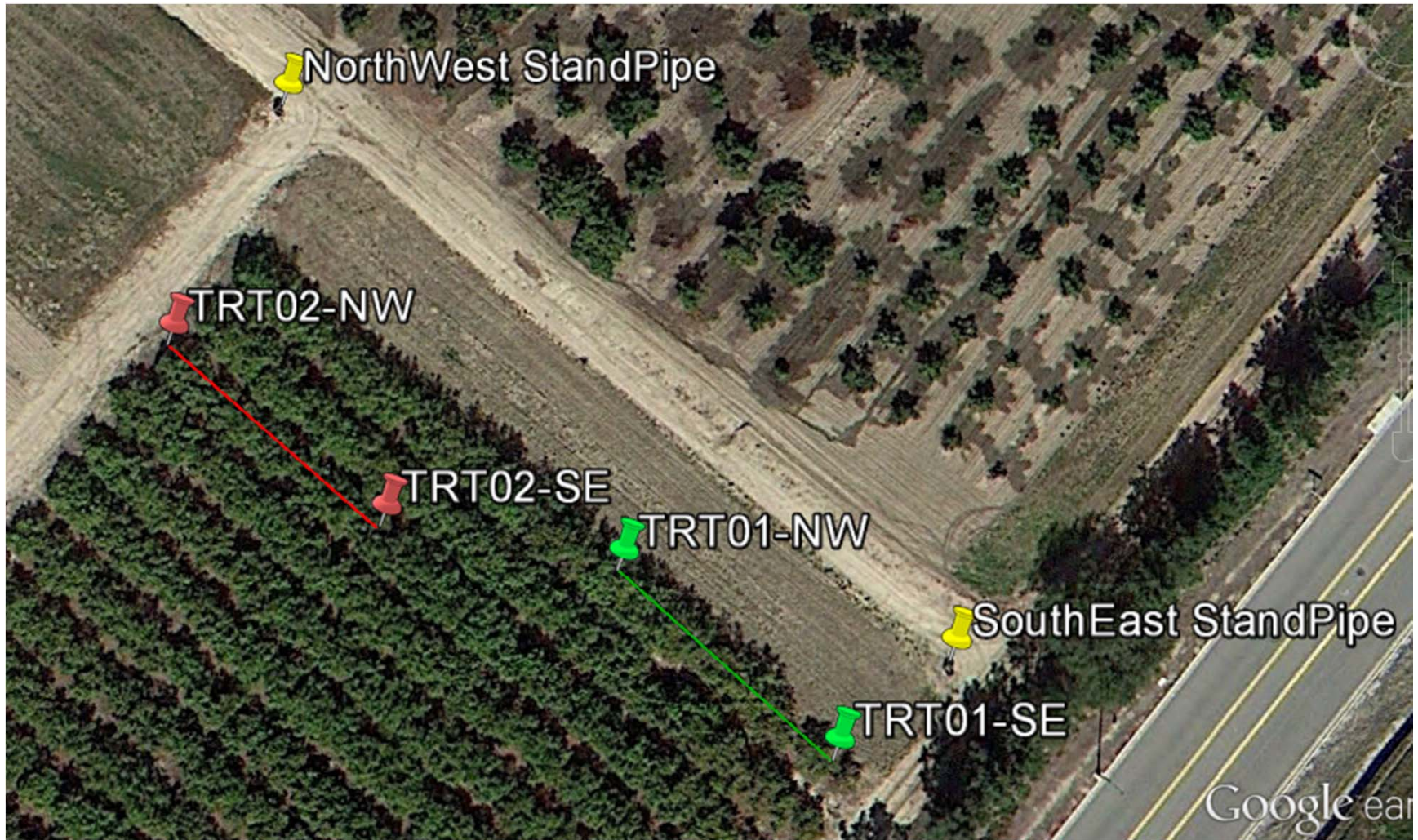
The untreated plot starts at the 5th row from Drip Irrigation Valve #1 in the north corner of Lot 14. Untreated and treated plots each contain 1 row (50.0 ft. long). Rows are on 6.67 ft. centers making each plot 50.0 ft. by 6.67 ft.. There is a 70.0 ft. buffer between treated and untreated plots. The treated plot starts at the 12th row SSE of the untreated plot. The plots are situated on level ground with the rows running NE/SW.

N

Telephone pole

154.0 ft.   150.5'

104.0 ft.   109'

Drip Irrigation Valve #1

50.3'

15.0 ft.   17'

56.0 ft.

47.5 ft.

40'

48

140.0 ft.

70.0 ft. buffer   ~87'

63'

135.0 ft.   117'   © 2013 Google

67.0 ft.

Treated

Untreated

Google earth

Map drawn by sight on GE, handwritten distances=compared to GPS readings
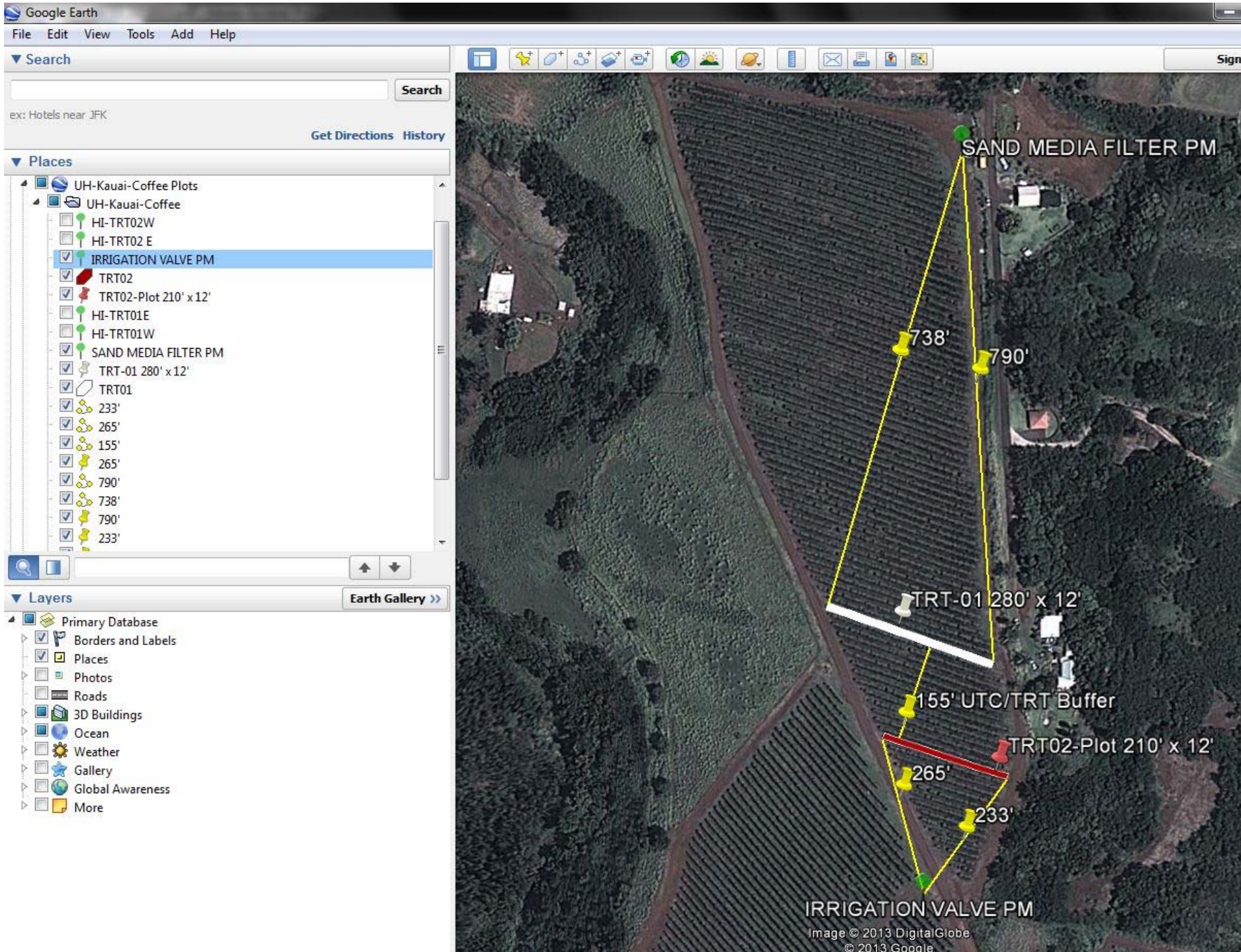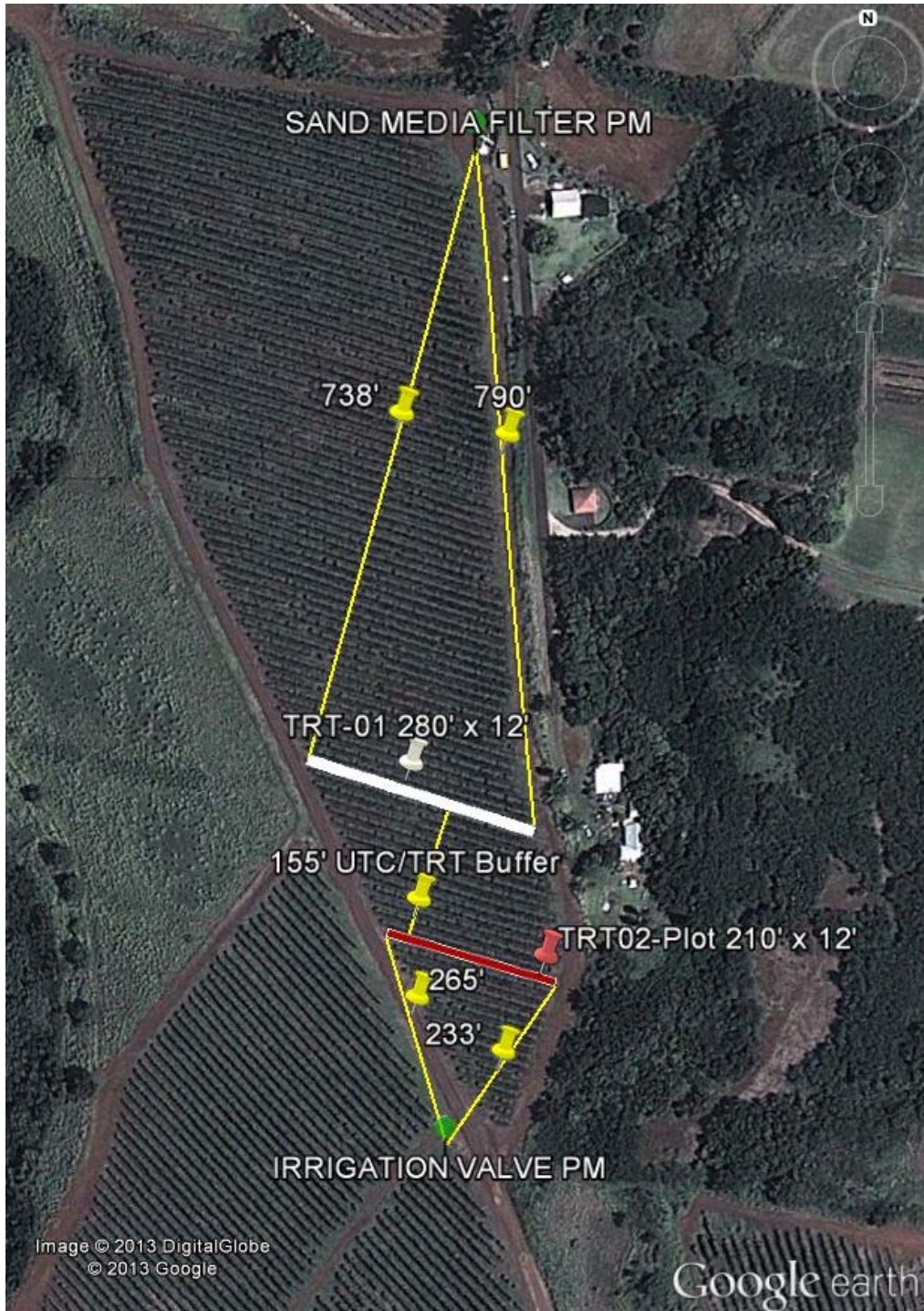
Raw GPS Waypoints
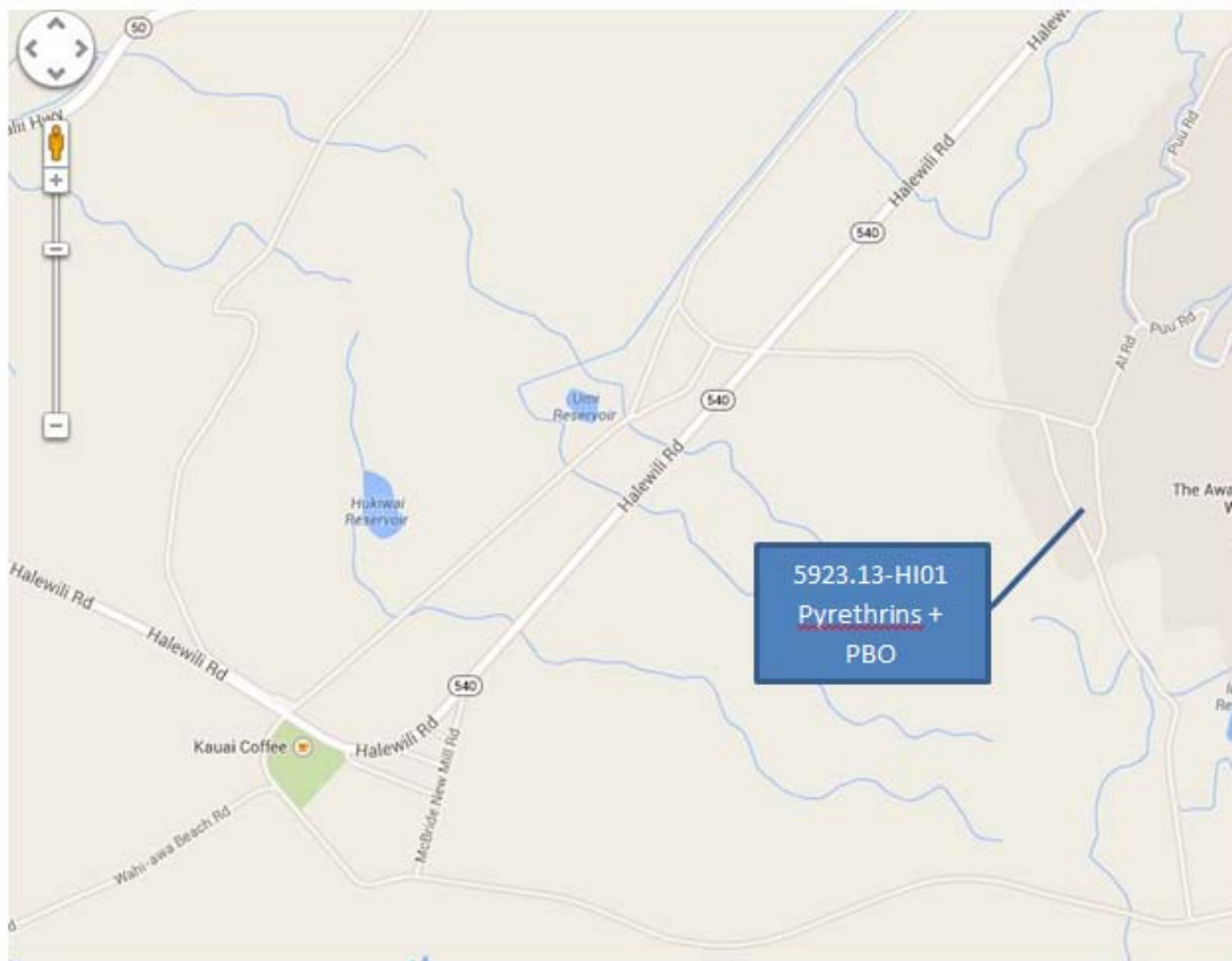
Corrected Plot & Permanent Marker Waypoints

Raw Phone GPS
data points imported
into Google Earth

Finished Plot map using Google Earth drawing tools & ruler tool

Vicinity Map of Kauai Coffee Plot:

Permanent Marker/GPS Verification Log

Log showing accuracy on multiple days

Date	Initials	# Satts	Greenhouse (ft)	# Satts	Blueberry (ft)
11/4/13		15	30'	17	26'
11/11/13		15	31'	15	30'
11/12/13		14	35'	13	32'

Smart Phone/GPS Summary

❖ Update SOPs

❖ Verify Accuracy of GPS unit

❖ Use GPS waypoints or visible features to draw an accurate map

❖ Don't lose sight of map's purpose, i.e. that a reviewer (EPA) could reasonsably relocate your plot.

❖ Check out the resources page for more details on these tools