GOOGLE EARTH MOBILE

By Nancy O. Metzger[1], PE and Thomas G. Davis[2], PhD, PE, PLS

INTRODUCTION

With the advent of accessible, Internet-connected, hand-held computing devices, the opportunity for using such devices to support fieldwork became a reality. Metzger + Willard, Inc. (MWI) began using smartphones in 2010 to bring construction drawings and survey control data to the field, search record drawing data, and locate utility infrastructure. In 2011, we migrated to the use of tablets and have continued to build on the technology by creating applications to facilitate viewing and manipulating construction drawing and mapping data. We are currently focused on equipping all of our construction inspectors and survey party chiefs with tablets, allowing them easy access to online services as well as local documents and data. In addition, the tablet has greatly enhanced our surveyors' and inspectors' ability to communicate quickly with our office surveyors and engineers. When faced with unexpected field conditions, our MWI inspectors and surveyors can immediately send photographs or video of the problem area to the office where the Project Engineer or Surveyor can make an instant determination about the appropriate course of action. This timesaving method allows construction and land surveys to proceed unimpeded. Our most recent mobile software development is a suite of land surveying tools.

EARTH SURVEY MOBILE

Earth Survey Mobile (ESMobile) is a collection of tools that run in Google Earth 6.2+ on an Android device with OS 2.1+ or an Apple iDevice. A WiFi or 4G Internet connection is recommended. Earth Survey applications that were written for the desktop will not run on a mobile device because of user interface, feature, and style differences. The tools listed here are components from HCBM, NGSCS, PLSGE, and QUADS that have been modified to run on a tablet or smartphone.

Unlike Android or iDevice apps, ESMobile tools are not installed. For best results, open Google Earth and navigate to your area of interest first. Then open the ESMobile webpage (http://www.metzgerwillard.us/mobile/) in a browser, tap the tool name, and choose to open the file in Google Earth. If your browser does not offer a choice of apps, but instead opens the file in another window, then long press the tool name, save the file on your device, and open it with a KML-aware file manager.

While City of Tampa and Hillsborough County Benchmarks will be of interest primarily to Central Florida surveyors, those who are planning similar applications may also be interested in comparing the different delivery methods: City of Tampa benchmark data is contained in the station balloon; Hillsborough County benchmark data is retrieved from the Internet via a link in the station balloon.

---

[1] Metzger + Willard, Inc., 8600 Hidden River Parkway, Suite 550, Tampa, FL 33637. Email: nmetzger@metzgerwillard.com

[2] Metzger + Willard, Inc., 8600 Hidden River Parkway, Suite 550, Tampa, FL 33637. Email: tdavis@metzgerwillard.com

City of Tampa Benchmarks

City of Tampa Benchmarks (COTBM-m) is a KML document that plots the approximate location of City of Tampa benchmarks. Station balloons contain all information supplied by the City of Tampa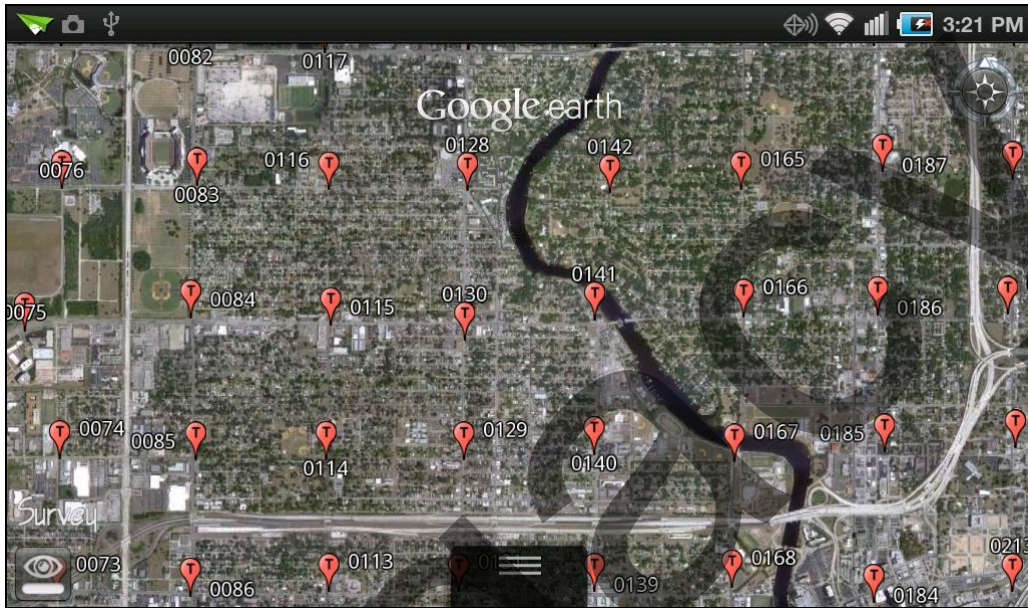 Survey Section source document.   See the HCBM webpage (http://www.metzgerwillard.us/hcbm/) to learn more about this layer.

Figure 1A. City of Tampa Benchmarks on an Android
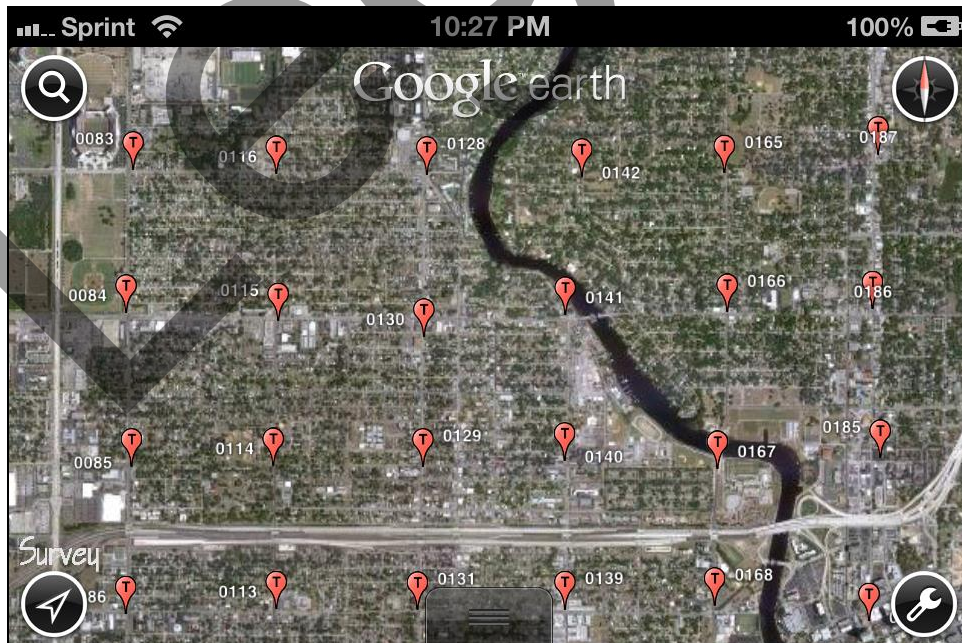
Figure 1B. City of Tampa Benchmarks on an iPhone

Hillsborough County Benchmarks

Hillsborough County Benchmarks (HCBM-m) is a KML document that plots the approximate location of Hillsborough County benchmarks from the LABINS database. All station balloons have links to the corresponding LABINS datasheet, and stations with an NGS PID als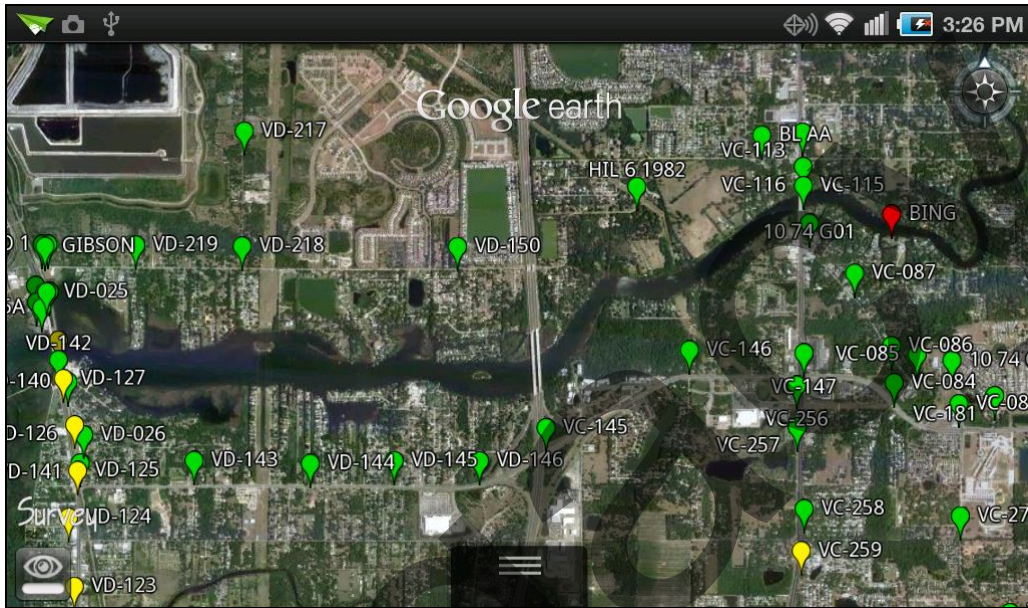o have links to the NGS database. See the HCBM webpage (http://www.metzgerwillard.us/hcbm/) to learn more about this layer.

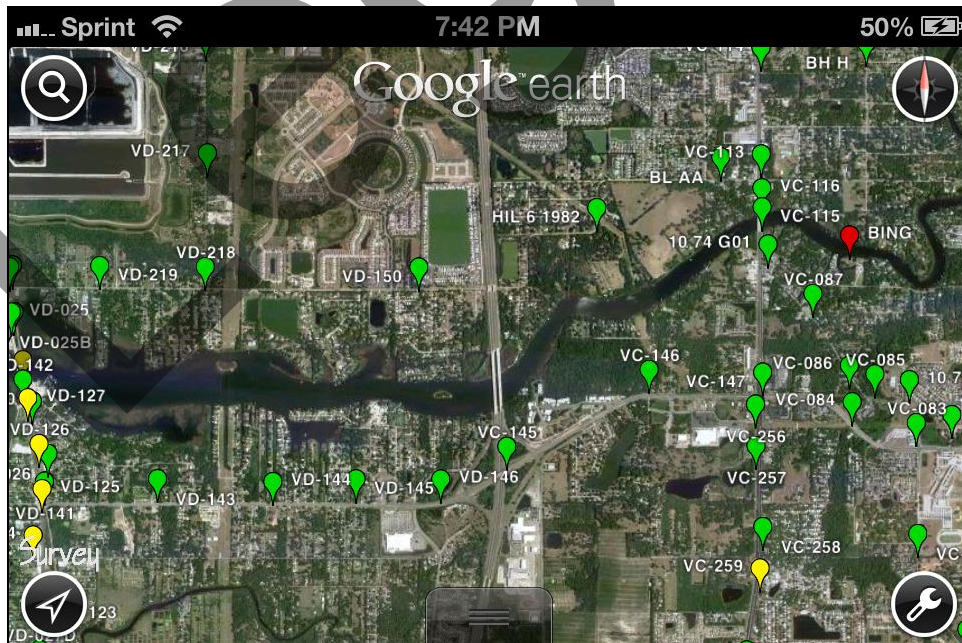**Figure 2A.** Hillsborough County Benchmarks on an Android

Figure 2B. Hillsborough County Benchmarks on an iPhone

National Hydrography Dataset

National Hydrography Dataset (HYDRO-m) is a KML network link that plots multiresolution images of the National Hydrography Dataset (NHD) from the EPA Office of Water NHDPlus v2.1. The service includes NHD point, line, and area features with labeled flowlines and waterbodies. See the QUADS webpage (http://www.metzgerwillard.us/quads/) to learn more about this layer.
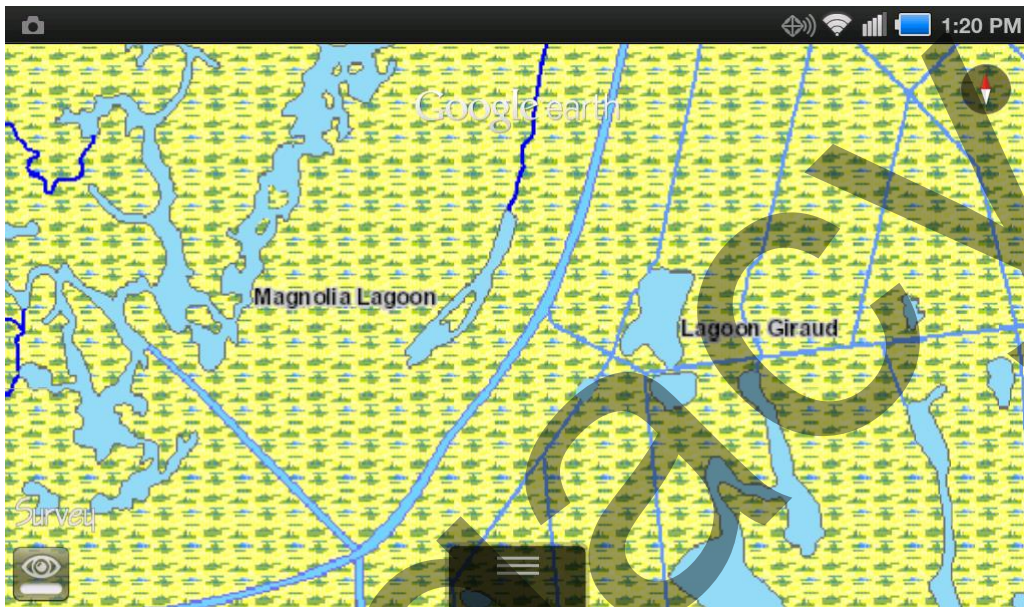

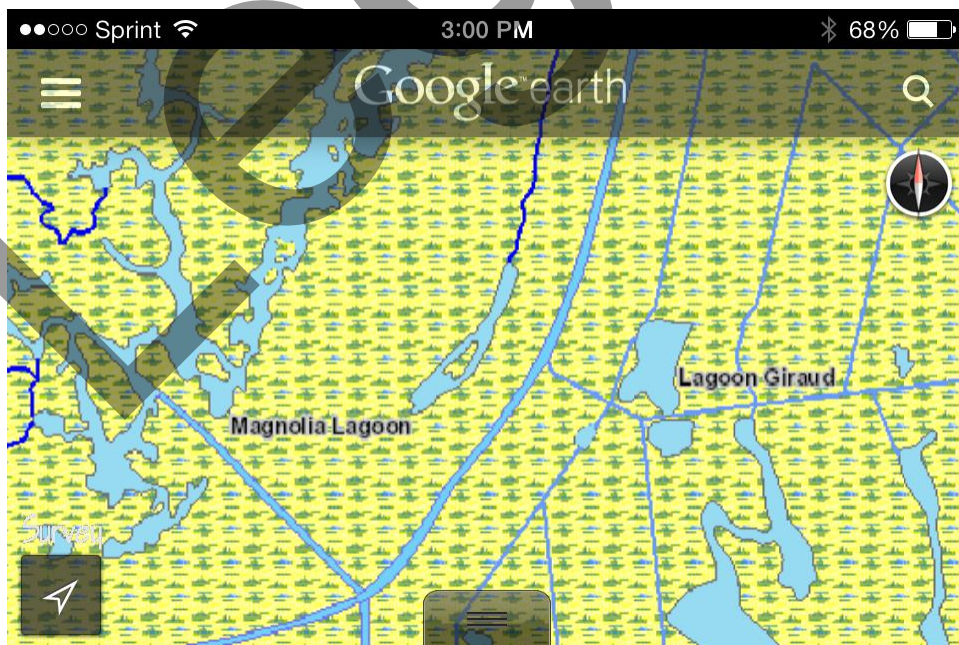**Figure 3A.** National Hydrography Dataset on an Android

Figure 3B. National Hydrography Dataset on an iPhone

NGS Control Stations

NGS Control Stations (NGSCS-m) is a KML network link that plots the approximate location of NGS control stations within the viewer bounding box (Rectangular Search). Areas up to 5' x 5' (arc minutes) are permitted. Station balloons contain all information supplied by the NGS station list server and a link to the full NGS datasheet. See the NGSCS webpage (http://www.metzgerwillard.us/ngscs/) to learn more about this layer.

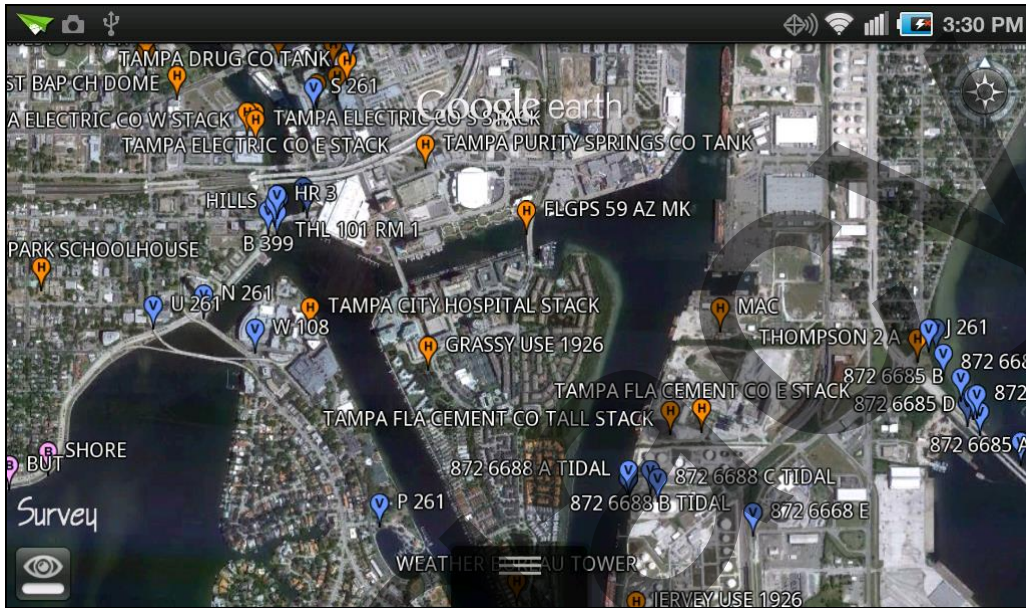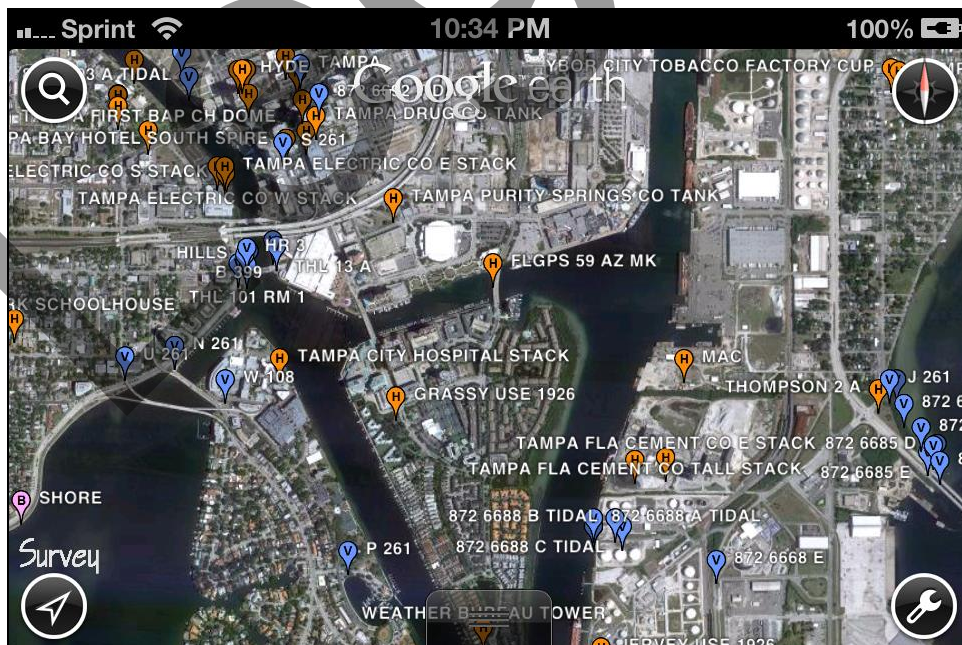**Figure 4A.** NGS Control Stations on an Android

Figure 4B. NGS Control Stations on an iPhone

Public Land Survey System

Public Land Survey System (PLSS-m) is a KML network link that plots multiresolution images of the Public Land Survey System from the BLM GeoCommunicator map service. See the PLSGE webpage (http://www.metzgerwillard.us/plss/) to learn more about this layer.
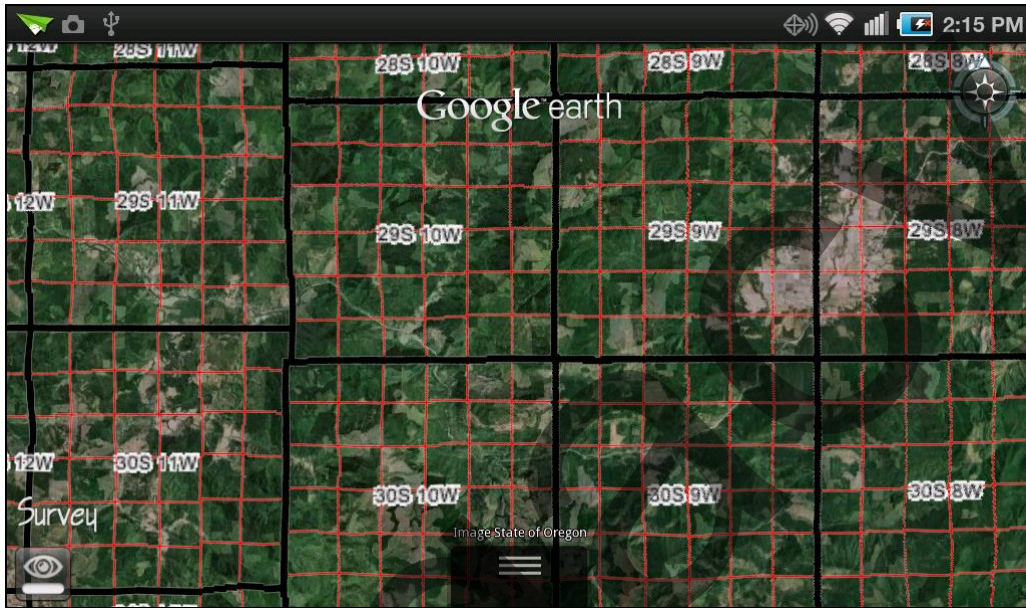

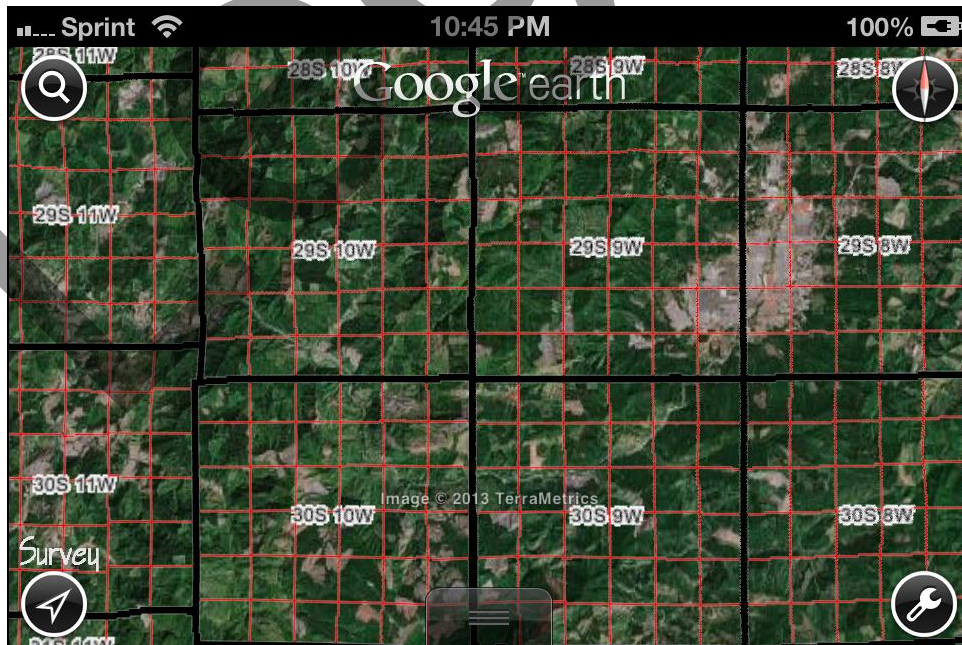**Figure 5A.** Public Land Survey System on an Android

Figure 5B. Public Land Survey System on an iPhone

USGS Quadrangle Index

USGS Quadrangle Index (QUADS-m) is a KML network link that plots approximate USGS quadrangle boundaries and provides direct access to more than 125,000 GeoPDF maps, including scans of the last historical paper map at all available scales. All quadrangle balloons contain name, state, extent, date, and file size information with a link to the corresponding GeoPDF map. See the QUADS webpage (http://www. metzgerwillard.us/quads/) to learn more about this layer.
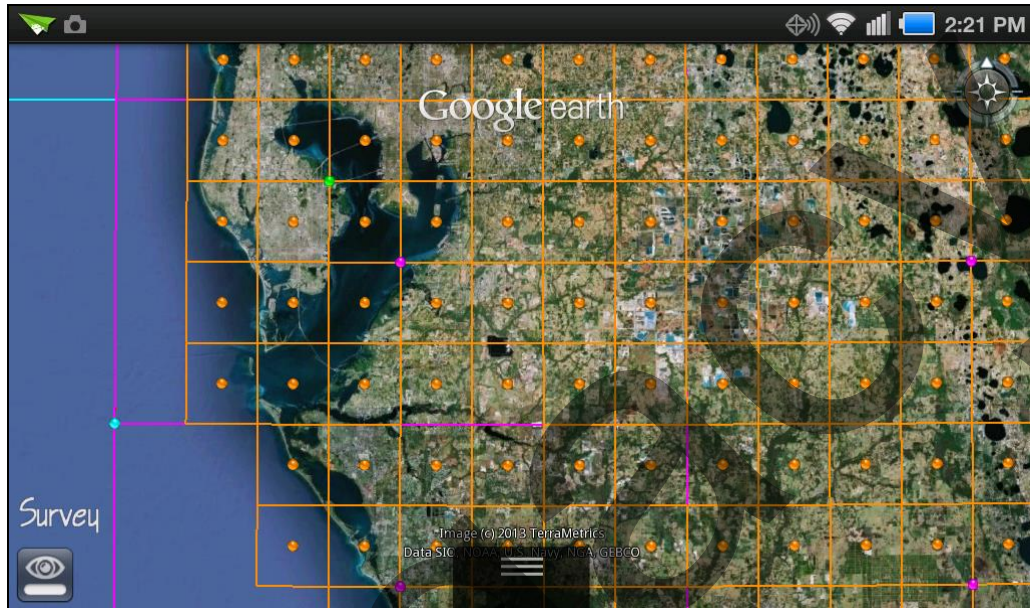

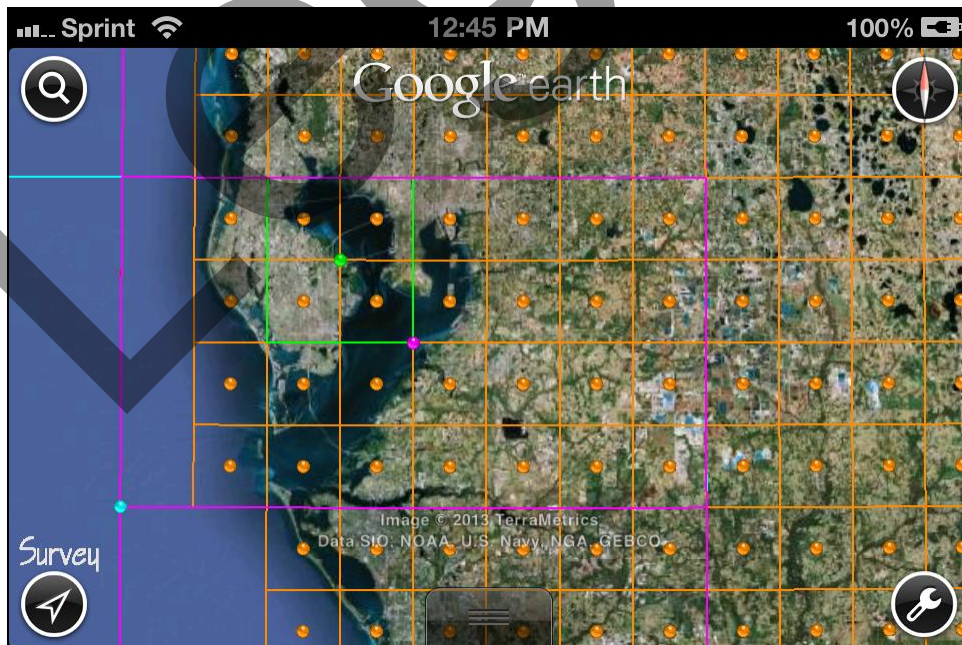**Figure 6A.** USGS Quadrangle Index on an Android

Figure 6B. USGS Quadrangle Index on an iPhone

USGS Topo Maps

USGS Topo Maps (TOPO-m) is a KML network link that plots multiresolution images of USGS topographic-bathymetric quadrangle maps from the National Geographic TOPO! series. See the QUADS webpage (http://www.metzgerwillard.us/quads/) to learn more about this layer.
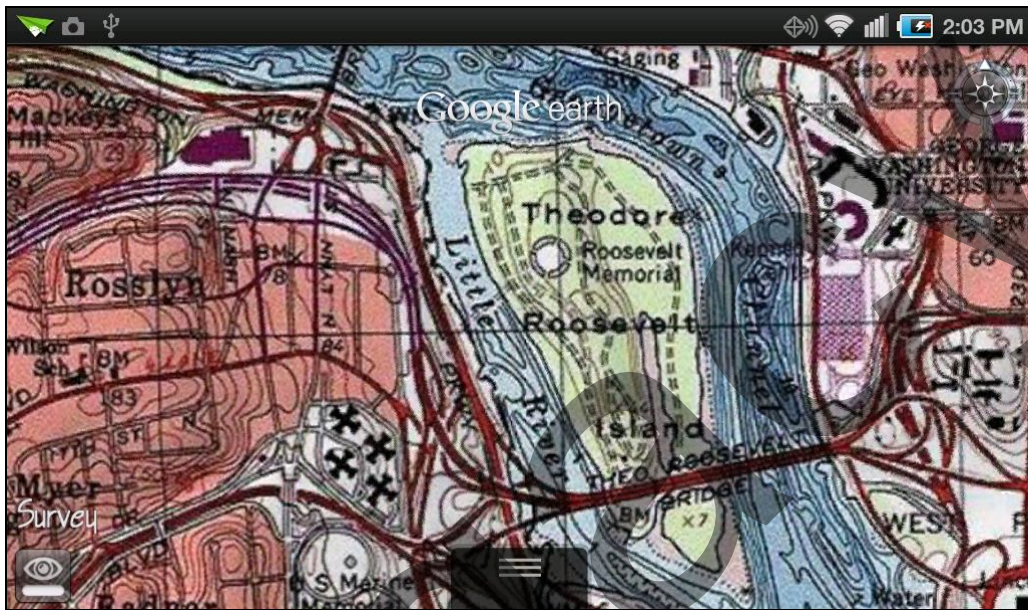

Figure 7A. USGS Topo Maps on an Android
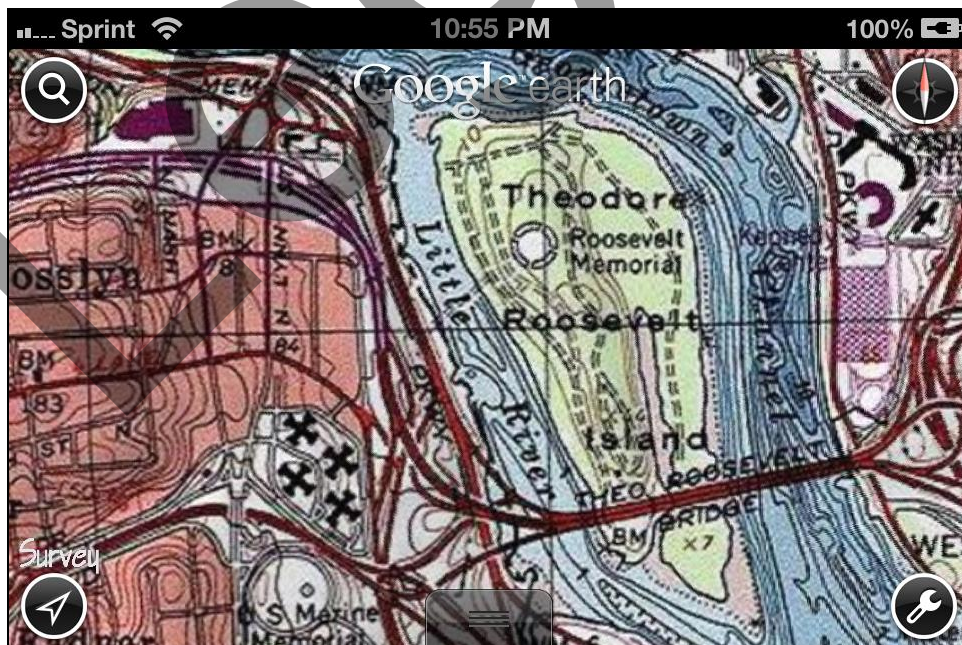

Figure 7B. USGS Topo Maps on an iPhone

PLATFORM AND USAGE NOTES

Some devices will reopen Google Earth when a KML file is opened from the browser or file manager, making it impossible to pre-position the view. If this happens, just navigate to your area of interest and wait for the network link to refresh. It should not be necessary to reload the tool.

If your browser does not offer to open an ESMobile tool in Google Earth, or you simply want to download the file for easy access, you can long press the tool name and choose to save the file. You must then use a file manager that understands the KML MIME type to open the file in Google Earth.

Android devices appear to be highly variable in their ability to consume KML, across both hardware manufacturers and operating system versions. Android browsers will generally, but not always, open KML files on the Internet, and ASTRO File Manager and FX File Explorer will open local KML files. ThinkFree Office and Documents To Go will open files with kml and kmz extensions, but not KML or KMZ, and X-plore can be trained to open KML files. KMLZ to Earth Explorer will also open KML files but may not be the best option because it creates an unnecessary localhost. Some file managers work in one version of the operating system, but not others. Try your favorite file manager; it may work.

Variation in text and icon size is more pronounced in iDevices than Android devices, and unlike Android devices, iDevices do not have a text and icon size setting. The variation is caused largely by different pixel densities. Figures 1-7 are screen shots from an iPhone and an Android tablet, each with an identical number of pixels, and each rendered at the same scale. Although the figures have similar text and icon sizes, the physical screen images are very different, with the iPhone having a pixel density of 128 pixels per cm (ppcm) and the tablet having a density of only 67 ppcm.

Because Google Earth mobile does not support driving directions, point-based tools (COTBM-m, HCBM-m, and NGSCS-m) include an option to view a location in Google Maps, where directions may be easily obtained. If the Google Maps app is installed on your device, you may be able to choose between viewing Maps on the web or in the app.

On an Android device, placemarks with MultiGeometry elements have repeated balloons. On an iDevice, placemarks with coincident icons and the same name yield just one balloon. Both of these issues affect QUADS-m.

A WiFi-only or 3G device can be very effectively used in the field by tethering the device to a 4G phone with a physical USB, WiFi, or Bluetooth connection.

CONCLUSION

ESMobile provides user-friendly, mobile access to a wealth of publicly available geospatial information maintained by the BLM, NGS, USGS, and LABINS. Metzger + Willard, Inc. is pleased to make ESMobile freely available to anyone having Google Earth installed on a mobile device with an Internet connection.