

# HILLSBOROUGH COUNTY BENCHMARKS IN GOOGLE EARTH

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## INTRODUCTION

HCBM (<http://www.metzgerwillard.us/hcbm/>) is a web-based service for visualizing Hillsborough County benchmarks (Fig. 1) in Google Earth that provides an easy-to-use framework for retrieving LABINS and NGS datasheets.

HCBM also includes multi-resolution images of the original Hillsborough County benchmark maps (Fig. 2), a network link that plots NGS benchmarks (Fig. 3), and hyperlinks to benchmark-related, online resources.

## HCBM

The principal component of HCBM is a Google Earth KML (Google 2009) document that plots the approximate location of Hillsborough County benchmarks from the LABINS database (FDEP 2003). All station balloons have links to the corresponding LABINS datasheet, and stations with an NGS PID also have links to the NGS database. Station balloons contain corrective remarks for stations with errors or omissions in the LABINS database.

Marks are collected in three folders that are categorized by status and elevation from LABINS datasheets:

- Poor (red) = Destroyed, Could Not Find, or no elevation
- Fair (yellow) = NGVD 29 elevation only
- Good (green) = Both NGVD 29 and NAVD 88 elevations

Only red marks will initially be visible. Zoom in to see yellow marks; zoom in more to see green marks.

HCBM comprises 2118 stations from the original PDF maps and an additional 98 stations from the LABINS database. Stations depicted on the PDF maps are a subset of the 2572 stations in the LABINS database. Of the 454 stations in the LABINS database that are not on the PDF maps, 356 fall in the Poor category and are not included in HCBM. Of the 2216 stations composing HCBM, 2146 stations have horizontal coordinates that were provided by NGS datasheets or the Hillsborough County Surveying Division; the remaining 70 stations have locations that were scaled with reference to LABINS datasheets.

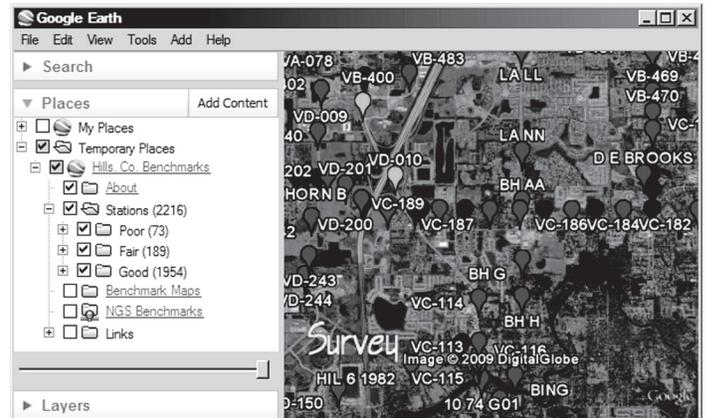


Figure 1. County Benchmarks

## County Benchmark Maps

Original PDF benchmark maps were converted to 300-dpi JPEG files, georeferenced using the County PLSS shapefile, and then converted into 352 tiles that are delivered by the HCBM server via region-based network links (superoverlay).

Seams are located on the W line of Range 20 E and the N line of Township 30 S, all four original maps having a common point at the NW corner of Section 6, Township 30 S, Range 20 E.

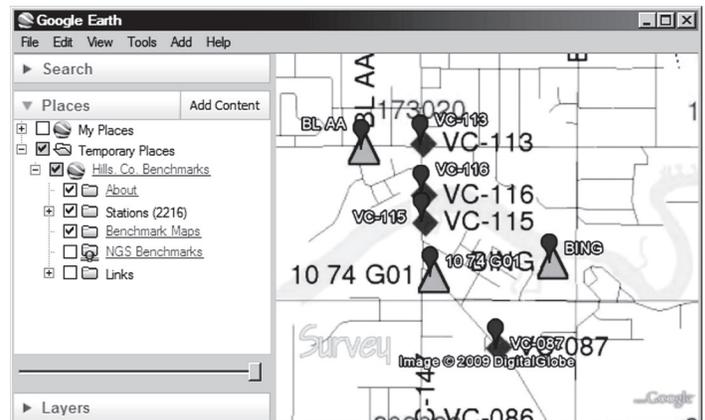


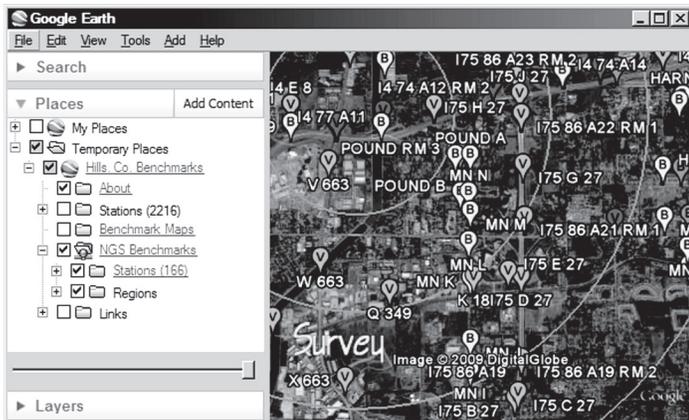
Figure 2. County Benchmark Maps

## NGS Benchmarks

The NGS Benchmarks network link is an implementation of NGSCS (Davis and Turner 2008) that plots the approximate location of NGS benchmarks within four miles of the view center. Station balloons contain all information supplied by the NGS station list server (NGS 2009) and a hyperlink to the full NGS datasheet.

1. Position the point of interest (POI) in the center of the view. One way to do this is to double-click an unmarked location; another is to edit the properties of a placemark and reset the view.
2. Check the box beside the network link (NGS Benchmarks folder). Range rings and station markers should appear within two minutes.
  - V (blue) = Vertical only
  - B (pink) = Both horizontal and vertical
3. On subsequent uses, reposition the POI and ensure that the network link is checked and selected. Then choose Refresh from the Edit menu, or right-click and select Refresh in the context menu.

Range rings are drawn at one-mile increments from the POI and collected in the Regions folder.



**Figure 3.** NGS Benchmarks

NGS benchmarks are plotted at full-precision datasheet coordinates. Benchmarks that are also horizontal control stations typically have precise geodetic coordinates with five decimal digits of seconds, while vertical-only marks are usually scaled to whole seconds.

## CONCLUSION

Considerable attention was given to the accurate location of Hillsborough County benchmarks and the correct attribution of NGS PIDs, but it is likely that errors remain. Interested users are encouraged to contact the principal author with corrections.

It is probable that LABINS and the NGS will someday serve KML-formatted output directly to the client. In the meantime, Metzger & Willard, Inc. and George F. Young, Inc. are pleased to provide HCBM to the land surveying community and others who may wish to visualize Hillsborough County benchmarks in Google Earth.

## ACKNOWLEDGMENTS

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