Survey Mark Hunting

National Geodetic Survey Satellite Triangualtion Program, illustrating the idea of modeling the Earth. Courtesy NOAA Geodesy

Imagine bridges not meeting in the middle…
Airplanes landing next to runways instead of on them…
Ships frequently running aground…
This is just a glimpse of life without geodesy.

What's geodesy? It's the science of measuring the size and shape of the Earth and accurately locating points on the Earth's surface (and is pronounced "gee - ODD - ess - ee").

READ ON, and find out how geodesy can be a lot of fun!

Another way to think about geodesy is to imagine a world globe with a lot of pins stuck in it. Geodesy is about giving each of those pins its own "address" written as latitude and longitude. Why is this important? Because each of those pins can serve as a starting point for describing the location of any other point on Earth; just like when you want to tell someone how to get to your house, you give them a starting point that they know, like a road or a building. In the United States, these reference points are developed and maintained by NOAA's National Geodetic Survey (NGS).

What You Will Do

Get information on the location and description of survey marks in your geographic area, and find out how to share your survey marking discoveries with the rest of the world!

Hang on, we're almost to the fun stuff!

So where are all those pins stuck in the globe? They are everywhere—more than 1,200,000 in the United States!

Of course, they really aren't pins. Instead, NGS uses permanent marks called "survey marks" (you may hear survey marks called "benchmarks," but benchmarks are only one type of survey mark). Often, survey marks are marked with a metal disk like the photo below, set in concrete or bedrock:

Survey marks can also be stainless steel rods driven into the ground, drill holes in bedrock, bottles, pots, or landmarks visible from a long distance, such as a water tower, a radio mast, or a church steeple.

Courtesy NOAA Geodesy Collection

Now for the fun:
Although the majority of benchmarks are located in plain sight, they are usually ignored by the general public. Many benchmarks haven't actually been visited in a long time, and no one knows whether or not they still exist. So if you find one of these benchmarks, so you may actually be rediscovering long-neglected objects of American history!

Searching for survey marks is called "mark recovery" and is a lot like a treasure hunt (you may hear this activity called "benchmarking" but the correct term is "mark recovery"). Hunting for survey marks can lead to interesting places like high mountain peaks, deep woods, old buildings, bridges, and sometimes, ghost towns! You can enjoy the excitement of being the first to find and document a long-lost survey mark; write a log for your discoveries on the worldwide web; and if you find a survey mark that hasn't been recovered in a long time, you can submit a recovery note, with your name, to the NGS website. Hunting for survey marks can be even more fun if you have a global positioning system (GPS) receiver. With GPS, you can go very close to the exact latitude and longitude of survey marks installed in your area. This is a kind of treasure hunt called "geocaching" (pronounced "GEE - oh - cashing").

Here's how can you find out about survey marks in your area, and try your survey mark hunting skills!

What You Will Need

- ❒ Computer with internet access
- ❒ (Optional) Digital camera for photographing your discoveries
- ❒ (Optional) GPS receiver (this is useful for getting close to a specific survey mark, but the actual "find" is usually done by using very detailed location descriptions from the survey mark's datasheet)

Warnings

1. Mark recovery should ONLY be done with an adult partner!
2. Many survey marks are on private property, and may be in dangerous areas. Be sure to obey local laws!

How to Do It

1. The first step is to find out what survey marks are located in your area. The easiest way to do this is to use the search engine on the geocaching Web site: *http://www.geocaching.com/mark*. This site also has lots of information and "frequently asked questions" about mark recovery. Enter the zip code for the area you want to search in the box on the upper right side of the page, then click on the "GO" button. Soon you should see a page listing benchmarks in the vicinity of this zip code. You can click on the PID number (second column from the left) for a description of a survey mark's location, history, and logs from other hunters.

You can also get information for many survey marks from the NGS Web site. To recover the entire datasheets for survey marks, use the NGS Datasheet Retrieval Page at *http://www.ngs.noaa.gov/*.

a. Click on "Datasheets" at the top of the page. This will open the "NGS Datasheet Page."
b. Click on the "DATASHEETS" button on the left side of the page to open the "NGS DATASHEET RETRIEVAL PAGE."
c. Click on "PID", then enter the PID number (from the geocaching.com Web site) for the survey marks, then click the "Submit" button. This will open a window titled "Station List Results for: ---"
d. Click on the PID number in the white window, then click the "Get Datasheets" button. This opens the complete datasheet for the survey mark you selected.
e. At the bottom of the Datasheet is a section titled "Station Description," which gives very precise instructions for finding the survey mark, starting from easy-to-find landmarks (such as a public building or the intersection of major roads). This description also includes information about things that may make it easier to find the survey mark, such as:
"30 FEET SOUTH OF THE CENTER LINE OF THE ROAD, 23.98 FEET WEST OF

BENCH MARK 33 A (USGS), AND ABOUT 2 FEET LOWER THAN THE ROAD."
or
"8 FEET SOUTHEAST OF A GATE IN AN EAST-AND-WEST FENCE, AND IN THE TOP OF A LAVA ROCK. A UNITED STATES GEOLOGICAL SURVEY STANDARD COPPER NAIL AND WASHER, STAMPED 5240.4."

2. Now see whether you can locate some benchmarks. Read the location descriptions carefully, and try to start in areas that are familiar. BE SURE TO DO THIS ONLY WITH AN ADULT PARTNER!

When you find a benchmark, you can take pictures, but that's all! Never disturb or move a benchmark, even if it appears to have been damaged. Remember that benchmarks are important, they are public property, and are protected by law.

You can also log your find on the geocaching Web site. See *http://www.geocaching.com/mark* for instructions.

If the location for survey marks is described as something like a radio tower, church steeple or smokestack, the top of these structures is usually the survey point (there is not normally a separate disk or other mark). Do not climb these structures! Just log your find, and take the structure's picture (from the ground!) if you have a digital camera.

Members of a 1922 geodetic survey expedition. Until recent advances in satellite technology, namely the creation of the Global Positioning System (GPS), geodetic surveying was an arduous task best suited to individuals with strong constitutions, and a sense of adventure. Courtesy NOAA NOS Geodesy.

Want to Do More?

You can find out more about geodesy at NOAA's National Ocean Service Web site: *http://oceanservice.noaa.gov/education/kits/geodesy/welcome.html*

The official geocaching Web site *http://www.geocaching.com* has lots more about mark recovery and geocaching.