



“Joy of Geodetics”



Part II

NGS Registry and Types of Marks

Stf/C Greg Shay, JN-ACN

United States Power Squadrons / America's Boating Club

Sponsor: USPS Cooperative Charting Committee

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Part II - Topics Outline

1. NGS Mark Registry
2. PID and Designation
3. Why the PID is Important
4. Physical Types of Markers

Mark Registry in the National Geodetic Survey (NGS) Database

- NGS is where geodetic markers are registered
- Marks must meet certain criteria to be registered
- Each mark has a unique Permanent Identifier (PID)
- The PID consists of 2 letters + 4 digits – e.g. XY1234.
- The PID does not appear on the marker – only in the NGS database
- Each mark also has a Designation (Name) which may or may not be unique – it is usually the name of a person, place, thing, or an alpha numeric.
- If the mark is a disk, there a Stamping on the disk that includes the Designation and usually the date of installation

Mark Registry in NGS

PID (Permanent Identifier) – all marks have a unique PID consisting of 2 letters + 4 digits. The PID does not appear on the disk.

Designation (Name) – All marks also have a Designation that may or may not be unique. The Designation appears on the disk.

Stamping – includes the Designation and usually the date of installation



Example:

PID = HV2896

Designation = J 465

Stamping =
Designation (J 465) +
Date (1971)

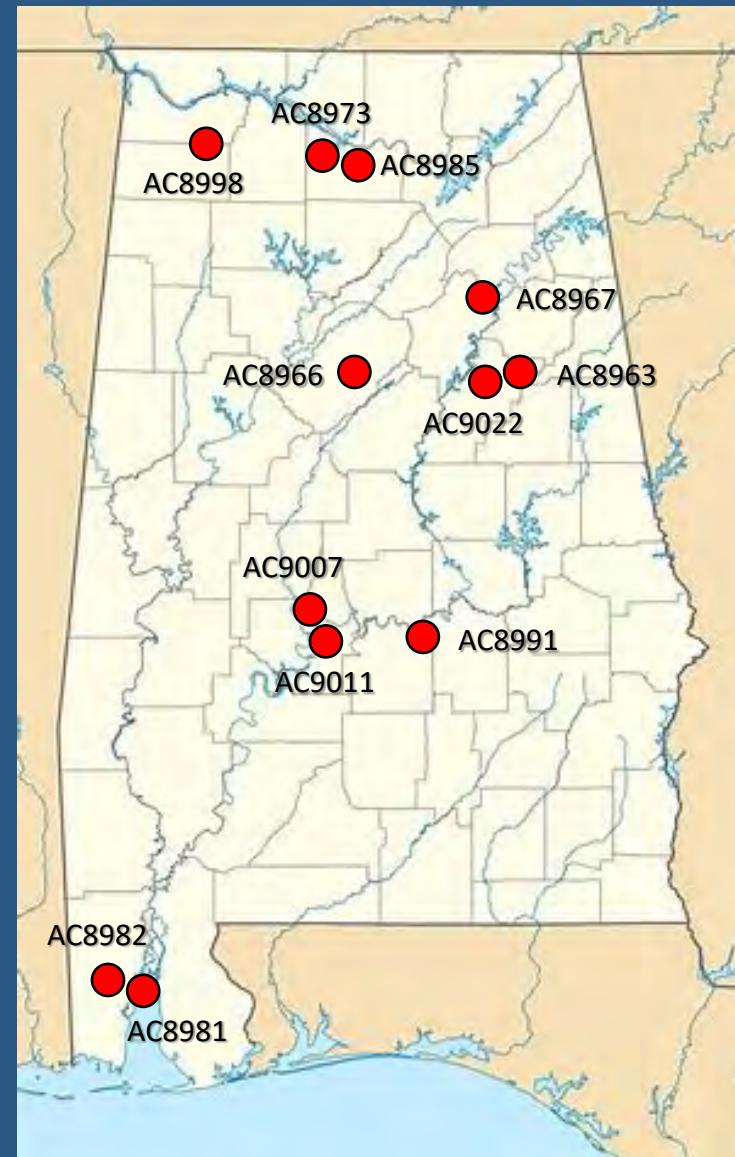
Why is the PID Important?

Many marks around the country can have the same Name (same Designation)

For Example: In Alabama, there are twelve different station Marks with the same name “AIRPORT BEACON”

However, each of those marks has a unique Permanent Identifier (PID)

The PID is the Key to the NGS Database!



Physical Types of Markers in the Field

- **Disks** - in concrete, rock or masonry
- **Pipe Caps** – pipe driven into ground with cap
- **Rods** – long rods driven into sand or soil
- **Rivets** – short rods in rock or concrete
- **Nails** - in rock, concrete or other
- **Spikes** - in rock, concrete or other
- **Bolts** - in rock, concrete or other
- **Pillars** – concrete or granite monuments
- **Unconventional** - various
- **CORS** – GPS sites

Disk Marks

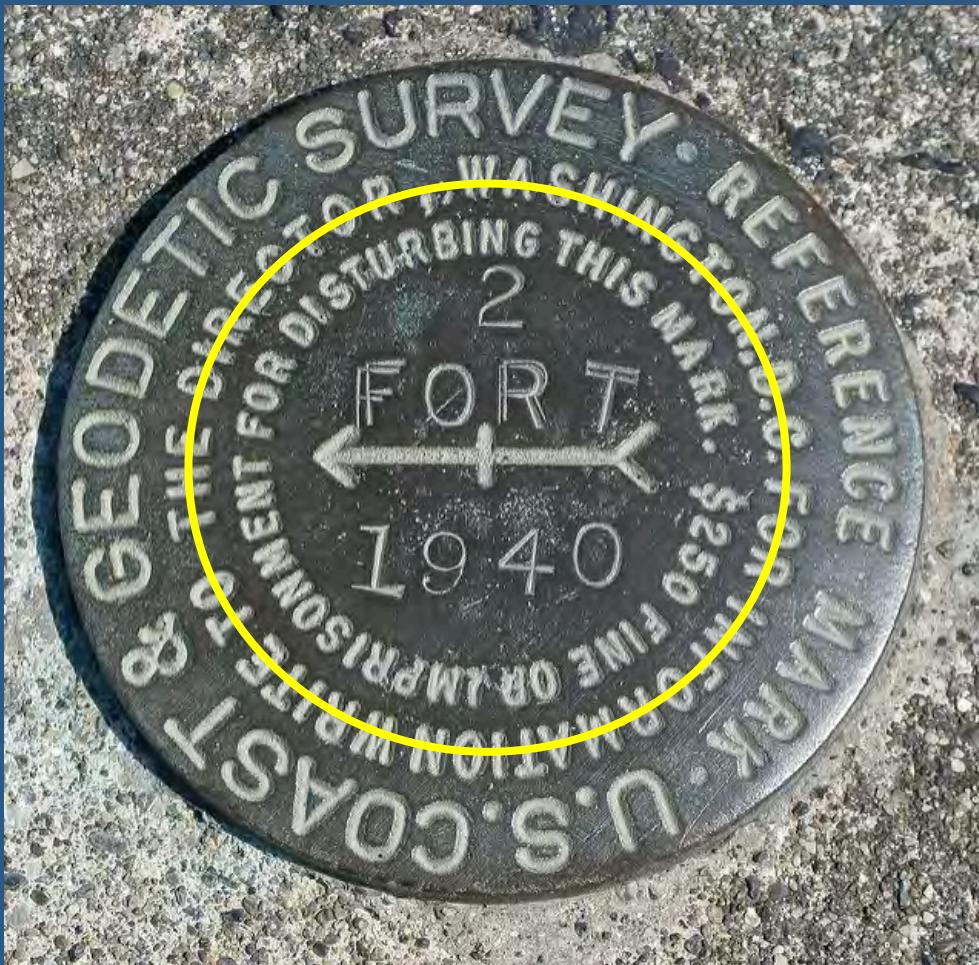
(The Most Common Type of Mark)

Most geodetic marks are round metal disks (bronze, brass, stainless steel, or aluminum) roughly 3 inches in diameter, firmly imbedded in concrete, building stone, bedrock, or on top of a long rod driven into the ground. These marks can be horizontal and/or vertical controls.



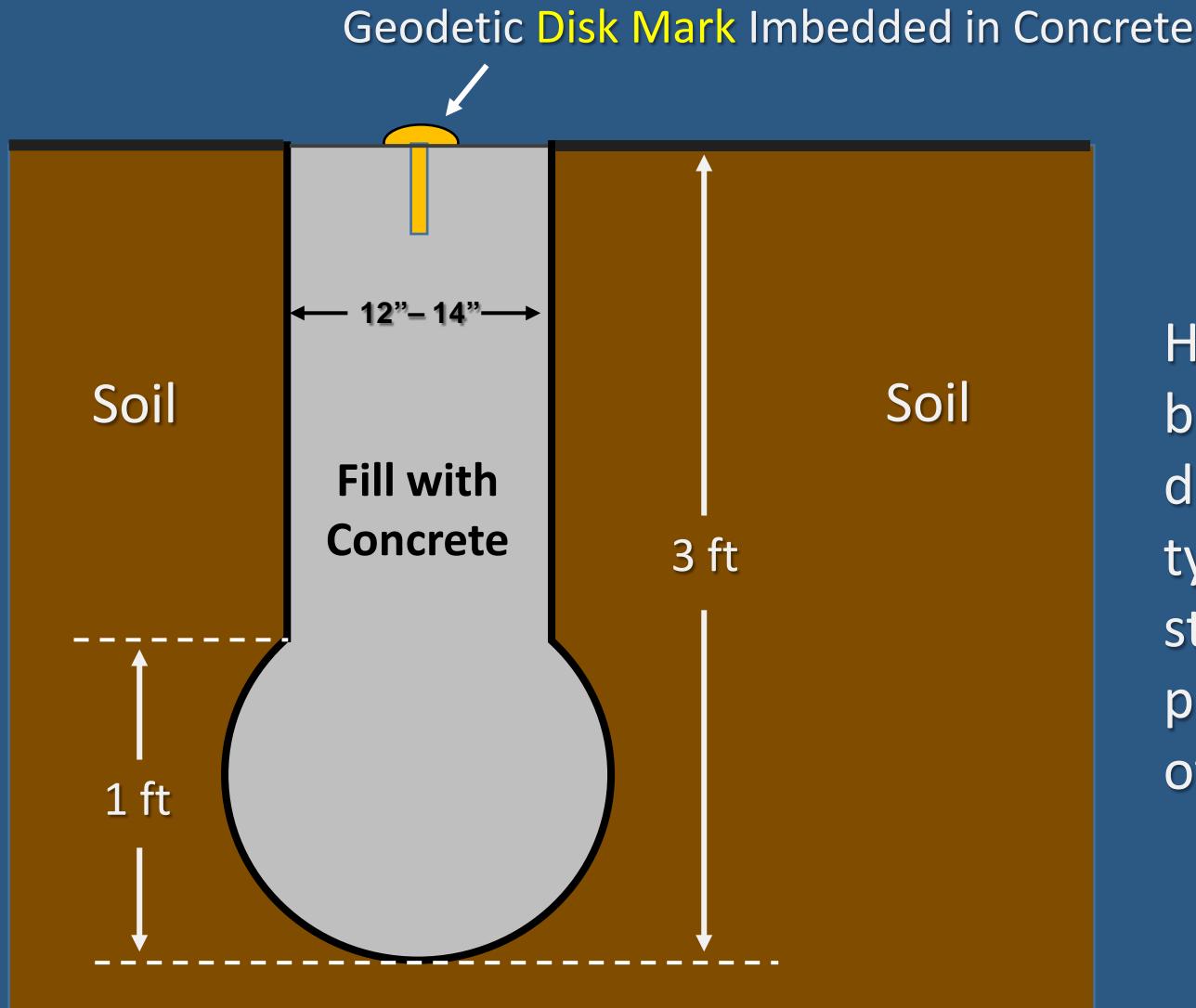
FB0323 (V 56) –
Hendersonville, VA (CSB)

Penalty for willfully destroying, defacing, changing, moving, or removing a Disk Mark



- 1896 Statute – “\$250 * Fine or Imprisonment”
 - 1909 & 1948 Statutes – “fined not more than \$250, or imprisonment not more than 6 months, or both”
 - 1994 Statute revision – “fined under this title, or imprisonment not more than 6 months or both”
- * 1896 \$250 Fine
more than \$6000 in todays dollars!

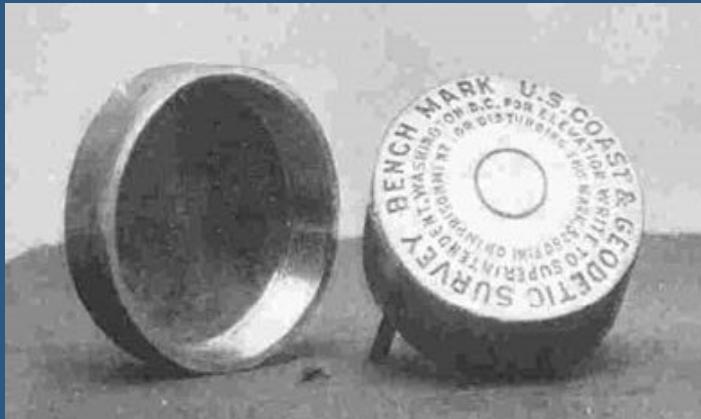
Standard NGS Concrete “Monument”



Hole depth can be up to 8' deep depending on type of soil, soil stability, permafrost, and other conditions.

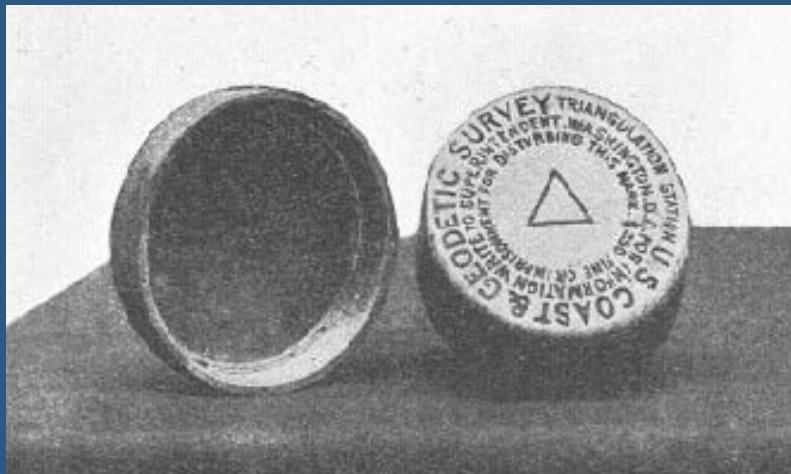
Cross Section of Concrete Monument

Pipe Cap Marks



Metal Pipe driven into ground with a Cap Mark

Early Pipe Cap marks ca. 1907-1920 (left) were designed to fit over a 3" pipe that had been driven into the ground. Some caps had threads to screw on to the pipe and others used bolts or rivets for attachment (Ref. 3).



Ref. 3



Pipe Cap Marks – Modern Caps

Metal Pipe driven into ground with a Cap Mark



Pipe Cap Marks – Other Types



EY0044 (PIPE STATION F
2) - Columbia NC (GDS)

Metal Pipe driven into
ground with a Cap Mark



EU0211 (20 H) – Rice, CA
(RJS)

Anchors for Disk & Pipe Cap Marks



Ref. 7

Rod Marks

Some geodetic marks are simply **rods** (no disk on top) – top center of the rod is the mark – rod marks are often Vertical Controls

Access Cover Closed



Access Cover Open



Designation Location for Rod Marks



PID = ET0761

Designation = R480

Date = 1981

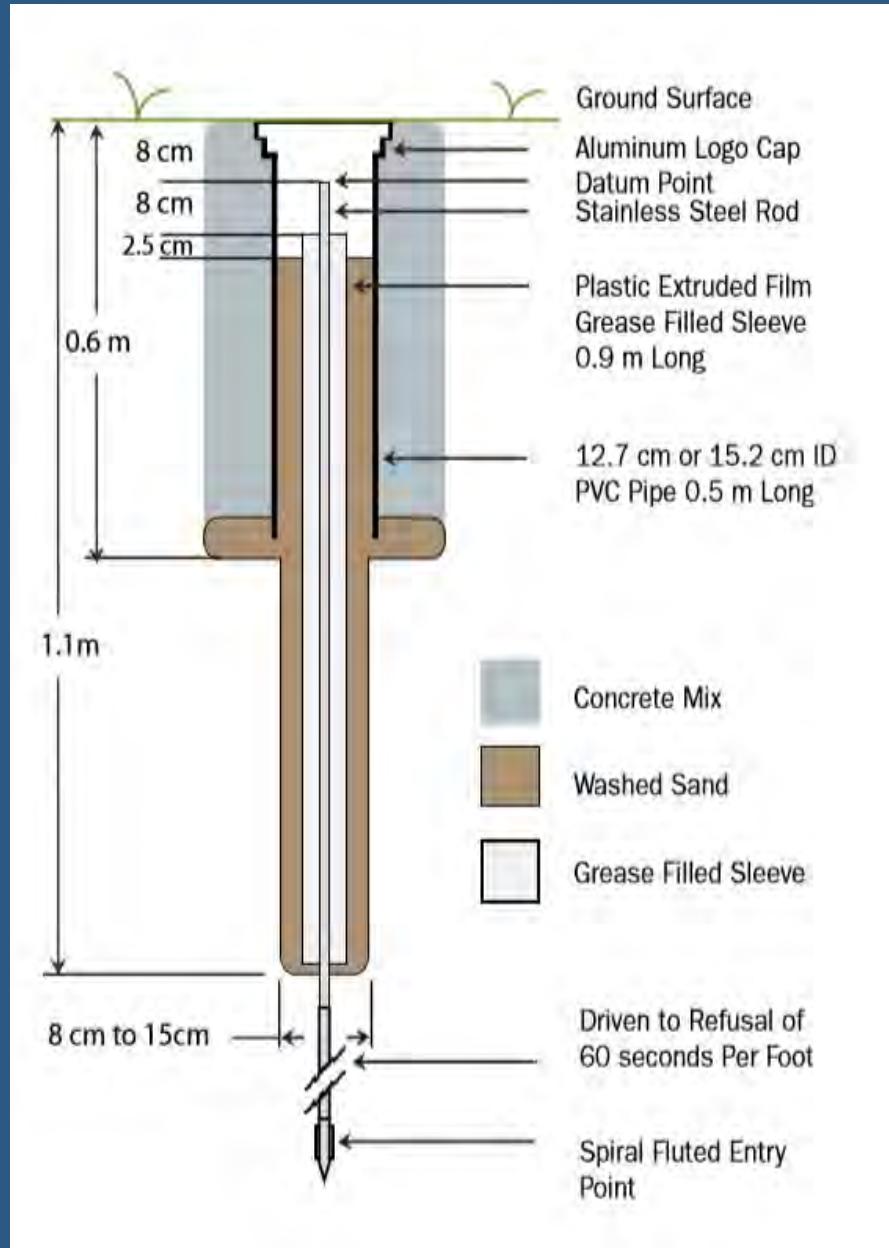
Stamping =
Designation + Date

Photo (WAJ)

Rod Mark Installation



For stability in soil or sand, control rods are driven to depth of up to 30 ft or more – “Driven to Refusal”.



Ref. 7 All

Rivet Marks



Rivet



EZ0746 (PAYTON) -
Garner, NC (GDS)

Short Rods imbedded in masonry
or rock are called Rivets

Rivet Marks – Cont.



EZ0030 (513) -
Garner, NC (GDS)

Rivet Marks – Cont.



Closeup of 3/4 Inch Diam. Copper Rod



EZ0708 (N MAGNETIC AZ MK) – NCSU Campus, Raleigh, NC (GDS)

Rivets are short Rods imbedded in masonry or rock

Nail Marks



Nails
with
Washers



Copper
Nail

Ref. 3 (Pics 1,2,4)

Spike Marks



Ref. 7 (All)



Bolt Marks



MZ0475 (1038.0=CHURCH) –
Pittsfield, MA (DAF)

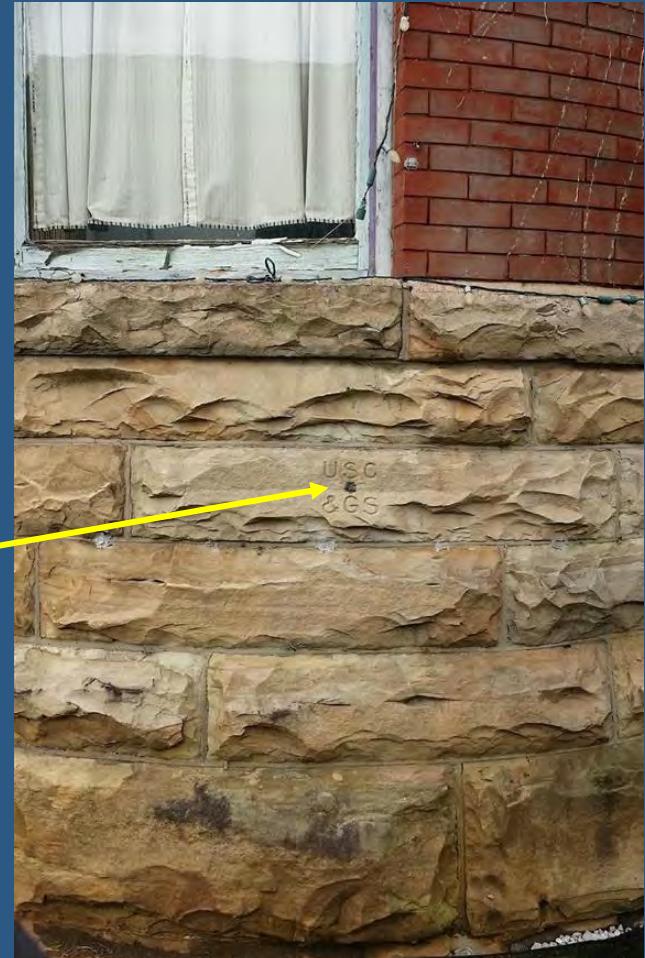


PN0087 (908 7078 COAL A) –
Green Bay, WI (OB)

Bolt Marks



FC0836 (C 2) Harriman, TN (DAF)



Monumented 1900
Bolt and Chiseled
USC&GS

Pillar Marks

Chiseled Stone



FY0295 (NORTH MERIDIAN) –
Louisburg, NC (GDS)
Stamping = NCGS / USCS / 1898



Pillar Marks

North Carolina “NC” Side



South Carolina “SC” Side



**EC1655 (BDRY MON OLD NORTH CORNER NC SC) – NC/SC
Corner Bounder Marker south of Waxhaw, NC (CRI)**

Unconventional Marks

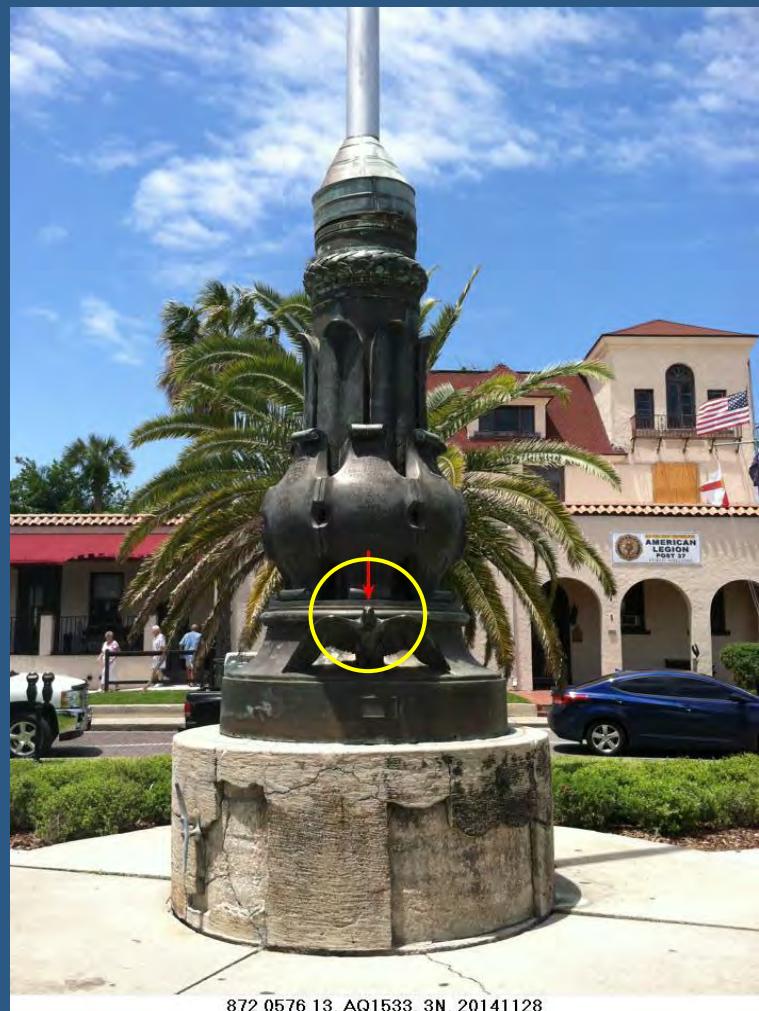


Some geodetic marks are **unconventional** – e.g. chiseled mark in stone/concrete, or ornamental etc.

AQ1544 (872 0576 6 RESET)
St. Augustine, FL (GDS)

Unconventional Marks – Cont.

Mark Center is Top of Eagles Head



872 0576 13, AQ1533, 3N, 20141128

AQ1533 (872 0576 13) – Saint Augustine, FL (TJH)

CORS Marks (GPS) “Continuously Operating Reference Stations”

- CORS are part of the National Spatial Reference System
- Approx. 2000 CORS Stations were installed and operating by 2015 and their numbers are growing



Ref. 7

CORS Site Examples



DL3891 (JORDAN LAKE CORS ARP) at
Forest Service Headquarters, Jordan
Lake NC (GDS)



DK6525 (SMITHFIELD CORS ARP)
at NCDOC Maintenance Center near
Wilson's Mills, NC (GDS)