

Permanent station GPS/GNSS antenna monuments and mounts supported by UNAVCO (poster for UNAVCO Science Meeting, 2010)

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Permanent station GPS/GNSS antenna monuments and mounts supported by UNAVCO

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Abstract

We compare eight long-term monuments and mounts currently in use in UNAVCO-supported projects. The designs range in height from 0 to 3 meters; substrates into which they are installed include soil, bedrock, and concrete; and costs range from approximately \$30 to \$15000. The more expensive options may be considered more stable, but in many places outside the US, logistical, economical, and material constraints make installation of deep- and shallow-drilled braced monuments at best difficult and at worst impossible. Simpler single-mast or concrete monuments offer less expensive, more portable installation options with acceptable stability.



Summary

The common goal of the monuments and mounts currently in use is to provide a stable, long-term reference point for geodesy and geodynamics. The monuments and mounts are designed to be stable over time and to provide a stable reference point for geodesy and geodynamics. The monuments and mounts are designed to be stable over time and to provide a stable reference point for geodesy and geodynamics.

When choosing a monument and mount, consider:

- Stability (motion, precision, load)
- Life expectancy
- Time required for installation
- Site availability
- Materials available (e.g., international work)
- Site accessibility
- Site location

Requesting support from UNAVCO

UNAVCO is a non-profit, membership governed consortium that supports and provides Earth science geodesy, high-precision techniques for the measurement and understanding of Earth's shape.

UNAVCO can provide assistance with design, availability, and construction of permanent monuments to GPS and GNSS total stations.

To request support from UNAVCO, fill out a support request form at <http://www.unavco.org>. For questions, contact unavco@unavco.org. For more information on monuments and mounts, check out www.unavco.org.

Monument	Deep drilled braced	Shallow braced	Concrete pillar	Thermopile	Polar mast	Shallow foundation mast	Stainless steel pin or mast	5/8" all-thread	Custom	
Description	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" x 4" aluminum structure is mounted on a 1/2" diameter steel pipe that is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	A 4" diameter steel pipe is drilled 10' to 20' into bedrock. The pipe is braced with 2" x 4" wooden beams. The monument is mounted on a 1/2" diameter steel pipe that is welded to the bottom of the hole.	UNAVCO works with customers to design and build custom monuments and mounts. We offer a wide range of options for different sites and environments. We can also provide training and support for the installation and maintenance of the monuments and mounts.
Substrate	Bedrock, unconsolidated	Bedrock (drilled), unconsolidated (grounded)	Bedrock, unconsolidated	Permafrost	Bedrock, concrete	Bedrock	Bedrock, concrete	Bedrock, concrete		
Stability	High	High	High	High	High	High	High	High		
Install Time	1-2 days	1-2 days	1-2 days	1-2 days	1-2 days	1-2 days	1-2 days	1-2 days		
Labor	2-3 people, 1-2 day	2-3 people	2-3 people	1 person, 1-2 day	1 person	1-2 people	1 person	1 person		
Cost	\$1,000 - \$10,000 (see listing)	\$500	\$500 - \$1,000	\$1,000 - \$10,000 (see listing)	\$500	\$500	\$500	\$500		
Site Impact	High	Medium	Medium	High	Low	Low	Low	Low		
Drilling Requirements	Power Drilling (Rotary Drill, Core Drill)	Power Drilling (Rotary Drill, Core Drill, Rock Bits, etc.)	Power Drill (SDS)	Power Drilling (Rotary Drill)	Hand Drill	Power Drill (SDS)	Power Drill (SDS)	Power Drill (SDS)		
Where Used	Flow Boundary (Geophysics, SURFACE THERM, Core Drill)	Flow Boundary (Geophysics, SURFACE THERM, Core Drill, Rock Bits, etc.)	Nonurban and GNSS	Flow Boundary (Geophysics)	TARANTULA POINT, Mount Lee	Flow Boundary (GNSS)	Flow Boundary (GNSS)	Galaxy (GNSS, Geophysics, Core Drill, Rock Bits, etc.)		

Antenna Mounts



SOGN mount
 2 mounting holes. One needed for antenna. SOGN is available through our partner, University of Wyoming. www.unavco.org



SICO JN7 series stainless steel adapter
 Low expansion and also proven used in the US National Geodetic Survey's CORS network. SOGN is available from www.sicomount.com.



Cup and brass adapter
 Inexpensive but no leveling ability, unless the antenna is in alignment with the cup. SOGN is available from www.unavco.org.



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