

# GPS antenna monuments and mounts supported by UNAVCO: Options and Effectiveness (poster for Fall AGU, 2008)

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## GPS antenna monuments and mounts supported by UNAVCO: Options and Effectiveness

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### Abstract

Many different monumentation types and antenna mounts have been used in UNAVCO-supported projects for campaign, semi-permanent and long-term continuous GPS sites. We summarize nine monuments and mounts currently in popular use in UNAVCO-supported projects as options to the greater scientific community. 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. In many places outside the US, logistical, economical, and material restraints 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.



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Monuments				Antenna Mounts		Custom monumentation and mounts	
<p><b>Deep drilled braced</b></p> <ul style="list-style-type: none"> <li>A 3" diameter steel pipe in a 6" hole configuration drilled into the bedrock to a depth of about 60 feet. "Rebar" together at the top.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Concrete pillar</b></p> <ul style="list-style-type: none"> <li>3" diameter steel pipe, fast-tight, consisting of reinforced concrete and a steel antenna mount. The mounting pipe and cap are attached to the top of the pipe.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Polar mast</b></p> <ul style="list-style-type: none"> <li>Vertical single mast mounted into bedrock. Mast about 1.5 to 2 meters tall.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>SCIGN mount</b></p> <ul style="list-style-type: none"> <li>Custom design. Steel antenna cap using a SCIGN design. Steel antenna mount. Steel antenna cap and antenna mount.</li> </ul>	<p><b>SECO 2072-series stainless steel adapter</b></p> <ul style="list-style-type: none"> <li>Steel antenna cap using a SECO design. Steel antenna mount. Steel antenna cap and antenna mount.</li> </ul>	<p><b>Cup and brass adapter</b></p> <ul style="list-style-type: none"> <li>Supports fast mounting onto a hole in the bedrock. Steel antenna cap and antenna mount.</li> </ul>	<p><b>Custom monumentation and mounts</b></p> <p>UNAVCO can provide support with design, engineering, and construction of custom monumentation and mounts. Custom design and construction. Custom design and construction. Custom design and construction.</p>	
<p><b>Shallow drilled braced</b></p> <ul style="list-style-type: none"> <li>A 3" diameter steel pipe in a 6" hole configuration drilled into the bedrock to a depth of about 10 feet. "Rebar" together at the top.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Shallow foundation mast</b></p> <ul style="list-style-type: none"> <li>3" diameter steel pipe, fast-tight, consisting of reinforced concrete and a steel antenna mount. The mounting pipe and cap are attached to the top of the pipe.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>5/8" all-thread</b></p> <ul style="list-style-type: none"> <li>5/8" diameter steel pipe, fast-tight, consisting of reinforced concrete and a steel antenna mount. The mounting pipe and cap are attached to the top of the pipe.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Tech 2000 (for campaign use)</b></p> <ul style="list-style-type: none"> <li>A large, reinforced aluminum mast with a plate on the end that fits into a hole drilled into the bedrock. The mast is attached to the hole by a steel antenna cap and antenna mount.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Things to consider</b></p> <ul style="list-style-type: none"> <li>When choosing a monument and mount, consider:                     <ul style="list-style-type: none"> <li>Quality needed (precision needed)</li> <li>Cost</li> <li>Time available for installation</li> <li>Site availability</li> <li>Material availability (esp. international work)</li> <li>Site accessibility</li> <li>Site security</li> </ul> </li> </ul>	<p><b>Requesting support from UNAVCO</b></p> <p>UNAVCO can provide support with design, engineering, and construction of custom monumentation and mounts. Custom design and construction. Custom design and construction. Custom design and construction.</p> <p>To request support from UNAVCO, fill out a support request form at <a href="http://www.unavco.org">http://www.unavco.org</a>. For questions, contact <a href="mailto:support@unavco.org">support@unavco.org</a>.</p>		
<p><b>Shallow braced (non-drilled)</b></p> <ul style="list-style-type: none"> <li>A 3" diameter steel pipe in a 6" hole configuration drilled into the bedrock to a depth of about 10 feet. "Rebar" together at the top.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Stainless steel mast</b></p> <ul style="list-style-type: none"> <li>3" diameter steel pipe, fast-tight, consisting of reinforced concrete and a steel antenna mount. The mounting pipe and cap are attached to the top of the pipe.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Tech 2000 (for campaign use)</b></p> <ul style="list-style-type: none"> <li>A large, reinforced aluminum mast with a plate on the end that fits into a hole drilled into the bedrock. The mast is attached to the hole by a steel antenna cap and antenna mount.</li> <li>Steel antenna</li> <li>Steel antenna cap</li> <li>Steel antenna cap and antenna mount</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> <li>Steel antenna cap and antenna mount in a permanent hole drilled into the bedrock</li> </ul> <p>Used in the High-Resolution Earthquake System (HRES) stations in California and Nevada.</p>	<p><b>Requesting support from UNAVCO</b></p> <p>UNAVCO can provide support with design, engineering, and construction of custom monumentation and mounts. Custom design and construction. Custom design and construction. Custom design and construction.</p> <p>To request support from UNAVCO, fill out a support request form at <a href="http://www.unavco.org">http://www.unavco.org</a>. For questions, contact <a href="mailto:support@unavco.org">support@unavco.org</a>.</p>				

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