The Continuously Operating Reference Station (CORS)
At New Mexico State University (NMSU)
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The GPS receiver collecting CORS data at NMSU went off-line in April 2020. That receiver has now been replaced by a newer GNSS receiver and GNSS antenna. The data stream to NGS was re-started on February 19, 2022. Persons participating in the upgrade include Virginia Beck, Bob Green, David Acosta, Earl F. Burkholder, Stephen Johnson, Anthony Gutierrez, Analys Negron, Karl Dykman, Jianqiang Jiao, and Fangjun Shu. Additionally, the CORS team at NGS and Lynda Bell, the NGS New Mexico Geodetic Advisor, were very helpful. The upgrade would not have been successful without their input.

Virginia Beck and GNSS Receiver

Earl F. Burkholder and GNSS Antenna

Initial installation of the NMSU CORS is described in the November 2010 issue of Benchmarks – see http://nmps.org/wp-content/uploads/2015/07/BENCHMARKSNovember2010.pdf. Additional information about the NMSU CORS is also available from the NGS website - https://geodesy.noaa.gov/. When visiting the NGS website, click on the icon for the "NOAA CORS Network," then enter "NMSU" in the box for station ID. Various options are listed along the left margin of the subsequent web page. Two options of particular interest include "data availability" and "Google Map of all CORS." Using the "zoom" feature on the Google map of the entire USA enables one to highlight any desired area of interest. The "data availability" link provides access to the NGS archives of CORS data for the station.

The NMSU CORS station had its origins in the NGS Height Modernization Program of 15 years ago. NMSU Professor Earl F. Burkholder was an avid supporter of height modernization and named Principal Investigator for a grant funded by NGS and administered under the umbrella of the Geomatics Program at the University of Texas - Corpus Christi. Selecting a stable secure site for the antenna which had clear sky visibility and access to the internet was a challenge. Of the locations considered, the east wall of the NMSU Wind Tunnel Building emerged as the best candidate. A massive iron mast was securely bolted to the jointless concrete wall and a cabinet to house the receiver along with a backup power supply were

mounted inside the building. An internet connection was extended from the existing network within the building. Pictures of the 2010 installation are posted on the NGS website.

Questions were raised in 2010 about the possibility of a nearby tree creating interference with satellite signal reception. No interference to the satellite signals has been detected since 2010 and, although the tree has grown a bit since then, no interference is anticipated in the near future – see comparison in photos. Hopefully no environmental impact statement will be needed if and when it becomes necessary to trim the tree to prevent signal interference.

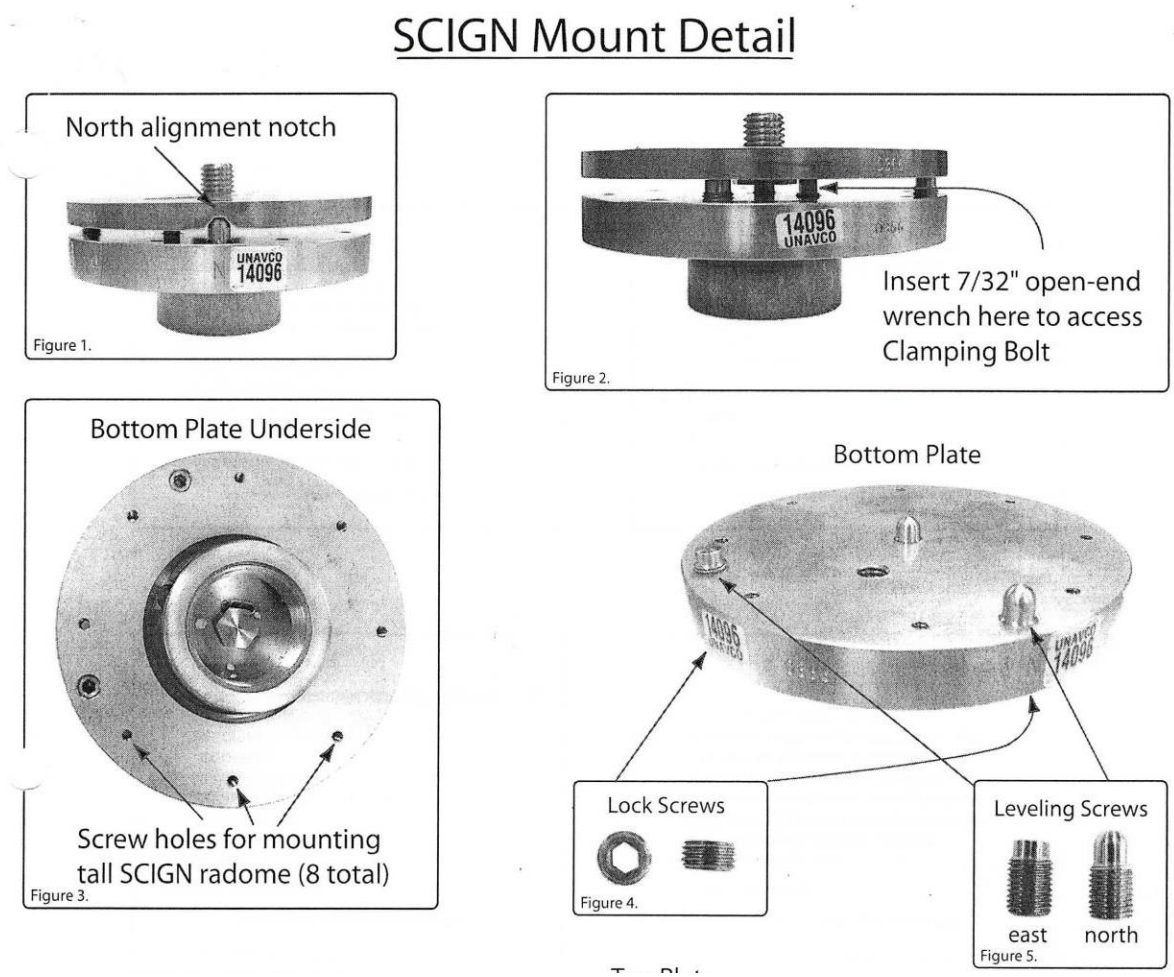
Tree as a possible obstacle in 2010

Same tree in 2022 – not yet an obstacle

The following is not really necessary except to explain a glitch encountered during installation of the GNSS antenna. When replacing a CORS antenna, it is critical that the antenna reference point (ARP) is not disturbed. No problem! However, when the GPS antenna was removed (uncrewed) and the GNSS antenna screwed on in its place, the rotation of the GNSS antenna went about 60° beyond true north. Orientation of the antenna to true north is also critical. A hard plastic shim 0.45 mm thick inserted under the GNSS antenna solved the problem. When the GNSS antenna was screwed on "tight," the antenna was correctly oriented to true north. However, that solution was NOT ACCEPTABLE to NGS.

A conventional tribrach used in surveying changes the "height of instrument" during the leveling process. The SCIGN mounting device used in the initial installation allows the antenna to be leveled without changing the height above the ARP. But the SCIGN mount is a bit tricky to use. It was much easier just to insert a thin shim. Does changing the "height of instrument" by 0.45 mm really matter? As it turns out, "yes." After all, the SCIGN mount was designed to be vandal proof and to accommodate antenna swaps without changing the "height of instrument." NGS personnel graciously demonstrated proper use of the SCIGN mount during a Zoom session and the GNSS antenna was handily installed in compliance with NGS specifications.

Antenna screwed onto SCIGN mount and oriented to true north.



The graphic above shows details of the SCIGN Mount. The antenna reference point (ARP) is centered on the bottom plate which is welded permanently to the supporting mast. The upper plate has a standard 5/8” screw for mounting surveying equipment. The top plate rests on (maintains contact with) the ARP but can be leveled east/west and north/south with the leveling screws shown on the bottom plate. The tricky part is getting a small wrench into the slot between the top and bottom plates to manipulate the clamping bolt. The design is really rather ingenious.