

NMSU CORS Station Installation

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The continuously operating reference station (CORS) at NMSU is now a fact. The final components were installed and connected in August 2010. Initial data have been tested by the National Geodetic Survey (NGS) and found to be “very good.” Upon completion of their formal qualifying process, daily solutions will be developed and the NMSU CORS will be available as part of the NGS CORS network. The NMSU CORS was established as part of a joint proposal with the Texas Spatial Reference Center and a Height Modernization Program grant funded by the NGS of Silver Spring, Maryland. Type “NMSU” in box on upper left for site ID at <http://www.ngs.noaa.gov/CORS/>

NGS criteria (http://www.ngs.noaa.gov/PUBS_LIB/CORS_guidelines.pdf) for locating a CORS antenna include, but are not limited to:

- Stability. The antenna must be located such that there is reasonable expectation that it will not move.
- Permanence. The location of a CORS antenna should reasonably be expected to remain valid for at least 15 years.
- Sky visibility. – lack of obstacles is important for eliminating the possibility of signal multi-path as received from the GPS satellites.
- Radio frequency interference. While the GPS signal is robust, it is not a strong signal. Other radio frequency sources in the immediate area are to be avoided.
- One story masonry structure. If a building mount (as opposed to a ground-based monument) is used, buildings with steel frames, metal roofs, and two or more stories are to be avoided.
- Reliable power and internet access.

Several pictures accompany this article. Picture 1 shows the antenna and mast with the Organ Mountains in the far background. “A” Mountain appears in the near background with a communications tower on the crest. NGS station “Tortugas” is an NGS 3-D control point on top of A Mountain and lies just to the left of the tower. North orientation of the antenna for the NMSU CORS Station was based upon a solar-derived azimuth to the tower. The angle between “Tortugas” and the tower was also measured and, once reduced to geodetic azimuths, the two were consistent within 40 seconds of arc.

Picture 2 shows the mast bolted to the side of the Wind Tunnel Research building on the NMSU campus. The building has been there over 20 years and the walls are solid concrete. The antenna mast is bolted directly to the east face of the building and does not affect any part of the actual building roof. The parapet rises above the non-metal roof about 30 inches. No multipath obstructions or RF interference have been detected.

Picture 3 shows persons gathered on the roof of the Wind Tunnel Research Building on December 11, 2009 for the purpose of confirming selection of the site. The photo was taken with Burkholder's camera by Kim Parkey, shop supervisor for fabrication of the mast.

Installation of the equipment took longer than expected due to the efforts needed to find an acceptable site (a preferred location on central campus was deemed not acceptable), obtaining permission to use the Wind Tunnel Research Building site, fabricating the mast, purchasing auxiliary equipment (antenna mount, interruptible power supply, lightning arrestor, etc), getting an internet connection installed, and coordinating with NMSU facilities for mounting the mast, routing the cable through the wall, building a cabinet to house the receiver inside the Wind Tunnel Building, and grounding the lightning arrestor. But, we are happy that the initial data look very good and we expect the NMSU CORS to collect reliable data for many years.

On 19 August 2010, the NMSU CORS started collecting data using preliminary configuration settings. The data file for each hour contains about 40 Kb. On 26 August 2010 we changed the configuration to (among other things) record 1 second data. Since then each hourly file contains about 400-500 Kb of data. Twenty four separate files are stored each day in a separate directory for each month. The receiver has internal capacity for about 876 Mb which means the receiver will hold about 73 days worth of data. The NGS requires us to store data locally for at least 30 days – no problem. Once the NMSU CORS goes “on-line,” the data files will be available through the NGS web site.

What about back-up? Currently no formal back-up plan exists. However, as site operator, I can download the files via an ftp connection. For now, I have downloaded the files for August and September 2010 onto my desktop computer. On November 1, 2010, I will delete the files for August 2010 from the receiver. On December 1, 2010, the files for September 2010 will be deleted. Eventually, the file-delete operation will be automated. Until we get a formal back-up plan in place and the file-delete operation automated, the files will continue to be backed up manually.

A more formal back-up option will be to store archive files at NMSU. The data files will be available primarily for student use and processing but other users could have access to the data as well. Such details will be shared once they are available. In the meantime, anyone needing those archived files can request them from me (Earl F. Burkholder) at (eburk@globalcogo.com). For now, the NMSU CORS data are being collected by the receiver and downloaded directly to NGS. Once the position is computed and published and daily solutions generated, the NMSU CORS will become a formal part of the NGS CORS network.