

Station BROMILOW reset – Is it in same position?

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Station BROMILOW is an aluminum survey tablet set in the concrete sidewalk on the NMSU campus between Goddard Hall and Jett Hall. Coordinates for the station were established based on GPS vectors between HARN stations CRUCESAIR and REILLY. That GPS survey was first computed on NAD 83 (1992) and is documented on the Global COGO web site at <http://www.globalcogo.com/nmsunet1.pdf>. Those same GPS vectors were used in a subsequent re-adjustment holding the NGS published NAD 83 (2011) values for the two control stations. The NAD 83 (2011) NMSU GPS Network values shown below are included in the 2nd edition of “The 3-D Global Spatial Data Model.”

On April 1, 2008 (April Fools’ Day) a student came into my office to report, “They have destroyed station BROMILOW.” I had to see for myself that it was true – the NMSU facilities personnel were re-pouring the concrete sidewalk block that contained station BROMILOW and the tablet was gone. Upon expressing my righteous indignation, the crew boss called in a construction manager who reassured me, “We pulled references before we removed the tablet and we will replace it exactly where it was.” Although I expressed my skepticism, he challenged me to prove them wrong once the aluminum tablet was replaced.

Station BROMILOW was resurveyed and the position was recomputed on NAD 83 (2011). Following are the NAD 83 (2011) position and covariance values of the position of BROMILOW as described in the original survey along with the NAD 83 (2011) “reset” position and covariance values. As an exercise in hypothesis testing, readers are invited to consider, discuss, and answer one or both of the following questions.

- Does the evidence support the claim that station Bromilow was not replaced in the former location?
- Does the evidence support the statement that the tablet was re-positioned correctly?

<u>Original location</u>	<u>Resurveyed location</u>	<u>Change: Reset - Original</u>	
NAD 83 (2011)	NAD 83 (2011)	ECEF-X/Y/Z	local-e/n/u
X = -1,556,209.7298 m	X = -1,556,209.7251 m	0.0047 m	0.0049 m Δe
Y = -5,169,286.4601 m	Y = -5,169,286.4616 m	-0.0015 m	0.0101 m Δn
Z = 3,387,457.5231 m	Z = 3,387,457.5351 m	0.0120 m	0.0065 m Δu

<u>Covariance values of point</u>	<u>Covariance values of point</u>
$\sigma_X^2 = 4.5195E-6$	$\sigma_X^2 = 1.83160E-6$
$\sigma_Y^2 = 1.1651E-5$	$\sigma_Y^2 = 1.18892E-6$
$\sigma_Z^2 = 9.8355E-6$	$\sigma_Z^2 = 3.00070E-6$

$\sigma_{XY} = 4.8554E-6$	$\sigma_{XY} = 1.38640E-6$
$\sigma_{XZ} = -3.6316E-6$	$\sigma_{XZ} = -7.42232E-7$
$\sigma_{YZ} = -7.4121E-6$	$\sigma_{YZ} = -3.67770E-6$

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SEE ALSO TABLE 15.2 IN
CH. 15 OF 2ND EDITION
“THE 3-D GLOBAL SPATIAL
DATA MODEL”