

“Event Report”

Height Modernization Forums

Las Cruces, New Mexico – May 8, 2007

Albuquerque, New Mexico – May 10, 2007

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The National Geodetic Survey (NGS) of Silver Spring, Maryland, recently presented two forums on Height Modernization in New Mexico. A day-long program was presented at New Mexico State University on May 8, 2007, and a repeat program, with minor changes, was presented at University of New Mexico on May 10, 2007. There were approximately 26 attendees in Las Cruces and 75 in Albuquerque.

Briefly, the goal of Height Modernization is to enhance the vertical component (elevations on benchmarks) of the National Spatial Reference System (NSRS) using the global position system (GPS) and other modern technology. The NSRS is the framework and network of reference points used as the basis of location nationwide by scientists, geophysicists, aerospace engineers, surveyors, mappers, GPS enthusiasts, and ultimately, by anyone using a geographic information system (GIS). Currently, the network of control points is on the ground and includes numerous physical monumented points. With implementation of GPS, the network of horizontal control points was upgraded first but, with continued development of GPS as a 3-D positioning system, GPS is also being used to improve the vertical component. Futuristic speculation is that satellite orbits may eventually replace the land-based reference monuments. That may indeed come to pass but, in the meantime, specific applications and Earth-bound activities (such as establishing reliable flood plain maps referenced to accurate benchmarks) must rely on well documented control points that are readily available to all users. An accurate reliable network of accessible control points is the focus of Height Modernization.

Mr. Bill Stone, the NGS Geodetic Advisor for New Mexico, was the overall moderator and organized both forums which included the following speakers:

Zelda LeCoat, Cartographer from the National Geodetic Survey (NGS)
Rene Shields, NGS Height Modernization Program Manager
Gary Jeffress, Texas A&M University, Corpus Christi, Texas
Paul Hartzheim, Wisconsin Department of Transportation
Dr. Dan Roman, NGS Geodesist responsible for Geoid Modeling
David Minkel, NGS Geodetic Advisor for State of Arizona
Garry Nielsen, New Mexico Department of Transportation
Gilbert Chavez, Las Cruces City Surveyor
Kathy Rogers, Dona Ana County GIS Mapping Specialist
Earl F. Burkholder, Surveying Professor, New Mexico State University

A program note is that Dr. Dan Roman spoke only in Albuquerque while Gilbert Chavez and Kathy Rogers spoke only in Las Cruces.

Both forums included an overview of Height Modernization from the federal perspective by Zelda LeCoat. Renee Shields described implementation of Height Modernization and discussed how GPS is being used by the NGS to establish reliable elevations in support of the NSRS. Zelda and Renee were both here from the NGS home office in Silver Spring, Maryland.

Since Height Modernization is largely a state promoted activity, there were several presentations from the state perspective. Dr. Gary Jeffress, Director of the Conrad Blucher Institute for Surveying & Science, Corpus Christi, Texas, spoke about various facets of Height Modernization including ground subsidence in the Houston area, coastal monitoring, and LIDAR mapping applications. He also discussed the importance of establishing clear goals for a Height Modernization program and of lining up solid political support for Height Modernization.

Mr. Paul Hartzheim from the Wisconsin Department of Transportation described various activities being supported by NGS and the Wisconsin Height Modernization Program (WIHMP). With a well established geodetic survey division within the DOT, a history of excellence in spatial data endeavors, and with support of the Wisconsin congressional delegation, the WIHMP was the largest of 9 Height Modernization Programs in 2006. During 2004, 2005, and 2006, the WIHMP was supported for nearly 3 million dollars a year.

Height Modernization in Arizona is being conducted under the auspices of the State Cartographers Office. Mr. David Minkel, who has enjoyed a long time career within the National Geodetic Survey, including a stint as Deputy Director of the agency, is the Geodetic Advisor in Arizona and gave a summary of Height Modernization activities from yet another perspective. He used Maricopa County, Arizona, as an example and spoke of cost savings beyond the obvious benefits of elevations on benchmarks. He also described how their Height Modernization effort is supporting on-going mapping activities related to infrastructure and economic development. Their motto is, "Height Modernization in Arizona is Map Modernization."

That variety of perspectives is valuable as spatial data users discuss the merits of how a Height Modernization Program should be implemented in New Mexico. Two critical questions to be discussed and ultimately resolved are:

- What is the best "home" for Height Modernization in New Mexico? Regardless of who hosts it, there must be extensive coordination and cooperation between various facets of the spatial data community. Ultimately, success in New Mexico will also depend heavily upon both political visibility and professional integrity.
- Prior to 2007, Height Modernization was funded by Congressional "earmarks." That mode of funding has worked well in the past but earmarks have become a political liability and another funding mechanism is needed. The NGS is promoting a National Height Modernization Program as a possibility but many pieces need to fall into place before that will become a reality. Separately, a press release from Senator Domenici's Office dated

April 20, 2007, includes an item for NSRS Modernization in New Mexico. The press release also notes the dangers of relying on earmark funding.

Some of the technical challenges associated with Height Modernization were addressed in the Albuquerque forum by Dr. Dan Roman, the NGS scientist whose primary efforts are devoted to improving the existing geoid model. In short, NGS needs high quality data having an appropriate geographic dispersion. Those data include first-order NAVD88 benchmark elevations (geodetic leveling), gravity data (sparse in New Mexico), and high quality GPS observations on known NAVD88 benchmarks. A well-designed Height Modernization Program for New Mexico will greatly assist those efforts and will pay huge dividends to on-going infrastructure development and environmental monitoring throughout the state.

The local perspective was presented in Las Cruces by Gilbert Chavez, Kathy Rogers, and Earl F. Burkholder. Mr. Chavez described efforts by the City of Las Cruces to establish a network of continuously operating GPS reference stations (CORS) to support real-time positioning by public and private users alike. Such a network will support local activities on a subscription basis but it can also make significant contributions to (and benefit from) a larger state-wide network of CORS developed under the auspices of a New Mexico Height Modernization Program. Given her work in the Dona Ana County Flood Commission Office and local flooding events during the past year, Kathy Rogers discussed some of the related Flood issues. She also described Dona Ana County's participation to development of the local CORS network and installation of two additional reference base stations. Earl F. Burkholder described some of the history behind the "white paper" he co-authored with Gilbert Chavez (www.globalcogo.com/whitepaper.pdf) that attempts to describe the opportunities and challenges associated with using GPS technology in a variety of modes and applications. He also speculated about what it might take to establish a Height Modernization Program in New Mexico. A list of suggested action items included:

- Summarize consensus of forums.
- Identify "host" for New Mexico.
- Document grant/funding process.
- Solicit additional support among:
 - Fellow professionals, administrators, and local leaders.
 - Congresspersons and legislators.
- Develop an implementation plan.

Mr. Garry Nielsen from the NM DOT moderated the closing discussion in Las Cruces during which various ideas were expressed. Among others, the spatial data centers in other states (Louisiana, Scripps in California, Washington State, Corpus Christi, North Carolina) should be considered in the process of deciding if/how a clearing house for spatial data resources and/or a geospatial data coordinator for the state might be incorporated. The advantages of the NM DOT hosting a New Mexico Height Modernization Program are that DOT is more focused and may offer more program stability. The DOT also has an operational organization already in place and would be able to get things done quicker/sooner. On the other hand, a

university host would have greater flexibility with regard to interaction with the various spatial data disciplines, is better equipped to assist with developing and testing new software and applications, is already in the “education” business, and, as the NM Land Grant University, NMSU serves the entire state through distance education and Extension Services. Opportunities for outreach are numerous.

In Albuquerque, Mr. Nielsen presented information on current DOT activities (especially with regard to CORS) and discussed how the DOT stands to benefit from Height Modernization. He then led an excellent discussion and engaged the audience to help sort out what should be done and how to proceed. Following a fruitful hour-long discussion, a Working Group was formed consisting of (subject to confirmation by all parties):

Garry Nielsen and Earl F. Burkholder; Co-Chairs
Bill Stone, NGS Geodetic Advisor
Gar Clarke, GIT Coordinator, Information Technology Systems Bureau
Larry Brotman, Chair, NM Geospatial Advisory Committee
Kathy Rogers, Dona Ana County GIS Mapping Specialist
Erle Wright, Santa Fe County
Bob Casias, Bureau of Land Management
John Peterson, U.S. CORPS of Engineers

A de-briefing session with NGS personnel included discussion of the newly formed working group, establishing a pilot project, organizing a follow-up meeting, and email bulletin board. Based upon the overall impact of the two forums it is understood that the role of NGS contributes to the success of a Height Modernization Program and includes:

Program Management
Outreach activities
Capacity Building
Training
Overall leadership

The importance of involving the following persons/organizations is acknowledged:

Office of the State Engineer
Office of the Chief Information Officer – Geospatial Coordinator
Professional Surveyors throughout the state
New Mexico Geographic Information Council
New Mexico Geospatial Advisory Committee
Land Planning and Assessors
Emergency Response Managers
Flood Plain Managers
Homeland Security

A web presence has been established by Mr. Larry Brotman and can be accessed at: <http://nmgac.informe.com/index.php>.