NOAA, National Geodetic Survey
HEIGHT MODERNIZATION COORDINATION MEETING
DRAFT NOTES

Date: Thursday, November 8, 2012
Time: 2:00-3:30 pm East Coast time

Attendees:
Call-ins from: CA (John Canas), IL (Sheena Beaverson), MT (Bryce Larson), NGS (Vicki Veilleux, Dan Callahan, Dan Winester), TN (Jim Waters), WA (Dave Steele), WI (David Moyer),

Silver Spring: NGS (Renee Shields, Gilbert Mitchell, Ross Mackay, Michael Dennis, Courtney Lindo, Steve Vogel, Jeremy McHugh, Dave Doyle, Frank Mowry, Jeff Olsen); CO-OPS (Tom Landon)

Advisors/Coordinators: Dave Newcomer (FL), Pam Fromhertz (CO), Dave Zenk (MN), Jim Richardson (NE), Mark Armstrong (OR), Bill Stone (SW region), Cliff Middleton (TX), John Ellingson (WI)

Note:
It is NGS' habit to only capture names of attendees who speak up at the initial roll call or during the meeting. We respect those who may wish to attend anonymously. If you want your name captured in the recorded notes, and you do not see it listed here, email Renee or Christine, or ngs.htmod@noaa.gov.

1. NGS and Height Mod related announcements:

- **Vertical Time Dependent Positioning or VTDP** (Renee Shields):
  While Renee commonly refers to VTDP as if it were a software application or program, it is really a process used internally at NGS and still in its infancy that allows a user to update leveling observations to any given epoch date based on the measured vertical motions at bench marks along the level line. The process was used most recently to complete the Gulf Coast Height Modernization Project (link), made possible by recent leveling completed by the Mississippi Department of Transportation. The next step will be to document how it was used for that project, including how rates are computed and applied to leveling observations, and then internal discussions will continue about future direction of VTDP.

- **Geoid Slope Validation Survey** (Jim Richardson):
  We are going to do some recon in Iowa, recovering bench marks and looking for absolute gravity stations. We may look at a contract with the state DNR to explore borehole gravity sites (that must be pre-existing), but that is not a primary goal. Recon will start in center of the line, and the recon will work out to both ends with a break for Thanksgiving and return to field in December. Length is 200 mi from Cedar Rapids to Denison, Iowa

along Highway 30. The river that runs through Cedar Rapids may present some challenges picking an absolute gravity site on the east end of the line.

- **Height Mod web pages** (Renee Shields):
  Height Mod partners that have state web pages on the NGS Height Mod web page are strongly encouraged to visit your web pages checking links and content. NGS has recently discovered some broken links that we would like to correct. We do not have the resources to regularly and thoroughly review each page, but we will make any corrections or updates we become aware of. If anything needs to be changed, please email Christine.Gallagher@noaa.gov and Vicki.Veilleux@noaa.gov.

2. Other announcements / questions (Open to all callers):

- **Great Lakes Region Height Modernization Consortium Meeting** (Shawn Roy):
  The meeting was held on Oct 31 and Nov 1 with approximately 40 attendees in person and online through a webinar. The meeting was well received, with positive feedback from upper management.

- **Illinois interactive web map** (Sheena Beaverson):
  IL is interested in creating an interactive map online with the control points in the state and is interested in finding other states or agencies that may have already created similar products. IL has looked at the USACE U-SMART tool, but there is a lot of additional state data that they would like to add. We will start with NGS shapefiles and USGS stream gages, but there are a lot of monuments from IL DOT that will be included. IL is looking to find what cartographic symbols etc. are already being used. IL is hoping to have a prototype online before the Illinois Public Land Surveyors meeting in Feb. Here is a list of the state-specific geodetic control map applications mentioned in the discussion today, plus a few more Sheena found quickly.

  o USACE Survey Monument Archival and Retrieval Tool (U-SMART)
    http://www.agc.army.mil/ndsp/usmart.html

  o National Geodetic Survey Data Explorer
    http://www.ngs.noaa.gov/NGSDataExplorer/

  o California Geodetic Control
    http://www.dot.ca.gov/hq/row/landsurveys/geodetic/ControlMaps/control_map.html

  o Florida Land Boundary Information System (LABINS)
    http://data.labins.org
    http://labinsw2010.freac.fsu.edu/LABINS/index.html

  o Minnesota Geodetic Monument Viewer
    http://gisservices.dot.state.mn.us/geocortex/essentials/web/viewer.aspx?site=Geodetic

  o New Hampshire
    http://www.granit.unh.edu/geodetic/datasheet

  o North Carolina Geodetic Stations Map
   http://portal.ncdenr.org/web/lr/geodetic/database

  o Vermont OnLine Geodetic Information System (VOLGIS)
   http://vtransmaps.vermont.gov/VOLGIS/map.htm

  o Wisconsin ControlFinder
   http://www.sco.wisc.edu/controlfinder/controlfinder.html

  o Washington Geodetic Survey Monumentation Map
   http://www.gsow.org/map/

- **IL Height Mod update** (Sheena Beaverson):
IL is finishing up year four of leveling campaign, having gone 700 miles. IL also recently released an RFP for next year's leveling campaign going another 690 miles along western perimeter of the state. The progress map is online, the state perimeter is complete, and in the future east west ladder lines will be completed.

3. Monthly presentation – Results of the Adjustment of NAD 83(2011) Epoch 2010.00

LOCUS
Jeff Olsen, National Geodetic Survey

In June of 2012 NGS released the Leveling Online Computation User Service (LOCUS), an interactive web utility enabling users to submit leveling data to NGS and receive adjusted NAVD 88 orthometric heights. This presentation will demonstrate how users submit data, how the software computes a solution, and possible next steps for LOCUS including the processing of field data files and supporting a fully constrained adjustment.

Jeff Olsen is a Geodesist who has worked for the National Geodetic Survey since 1990, first as the State Geodetic Advisor to Georgia and now in the Operations and Analysis Division at NGS headquarters in Silver Spring. His experience includes processing and adjustment of both leveling and GPS observations.. He was licensed as a professional land surveyor from 1986 to 2012.

Presentation was a live demonstration using the LOCUS. See links to websites below:

LOCUS web page: http://www.ngs.noaa.gov/CORS-Proxy/locus/LOCUS.jsp

Sample files to use: http://www.ngs.noaa.gov/CORS-Proxy/locus/samplefiles.jsp

Resource for information on orthometric corrections: powerpoint file

Key points in the presentation were:
- LOCUS uses the NGS leveling adjustment software for surveys submitted to us.
- LOCUS currently will do minimally and fully constrained adjustments, but the documentation for evaluating the fully constrained adjustment does not yet exist.

- Several kinds of corrections are applied to the leveling observations as part of LOCUS.
- Data submitted has to be in NGS Bluebook format, so Translev and Windesc are steps necessary to prepare files to submit.
- LOCUS may lead to a simpler method for Bluebooking leveling data to be loaded into the NGS Integrated Database for publication, but NGS has a way to go for that to happen. Just as OPUS existed long before OPUS DB, LOCUS is a first step.

Questions and Answers

Q (Dave Doyle): Is there a reason we show one standard deviation in the solution file instead of two standard deviations, in accordance with FGCS standards? Including the FGCS standard in the same output as standard deviation could lead to confusion.
A (Jeff Olsen): It is reflective of the output we have always used at NGS. A problem with the presentation of these statistics would have been found and corrected long ago, but the statistics could be revisited.

Q (Pam Fromhertz): Can we revisit what is displayed in the output files? Can we re-visit the output based on what users need out of this file?
A (Renee Shields): NGS would welcome that feedback, but this was originally created as OPUS for leveling, essentially returning a loosely calculated NAVD 88 height, a field elevation. OPUS output also gives out a lot of additional information. Feedback directly from users would help NGS determine what should be included in the output.

Q (Dave Doyle): Have you gotten feedback on comparing LOCUS to commercially available leveling adjustment software like StarLev or Leica's software or Trimble's software? The results would be interesting.
A (Jeff Olsen): Comparisons could be made, but it is important to note that this is not new software. LOCUS uses the software that is used in house and has been for many years. It is getting more attention now because it is more broadly available to the public.

Q (Marti Ikehara): There is a lot of work to get data formatted correctly so that is can be processed by Windesc and Translev then LOCUS. What is the added value received for this up front effort since there is no hope of having the data published this way?
A (Dave Doyle): Perhaps sometime down the road, this could be combined with OPUS-Projects to provide the best adjusted solution.
A (Jeff Olsen): Ultimately, the functionality of completing constrained adjustments would allow users to submit fully adjusted projects to NGS, just as GPS projects are done now, freeing up internal resources and reducing the wait time to publication.

Q (Tom Landon): This is like OPUS, with nothing going into the database. Therefore, is it correct to assume the value is determining positions when a published elevation does not exist? It will determine a slightly different elevation than the one that is published, so what is done with that new value?
A (Renee Shields): Yes, a different value will be computed. It does not supersede any published values and can be treated as just a computed field value.
A (Jeff Olsen): Looking at the new minus old is a standard part of the Translev processing, and users of LOCUS will still be using Translev.

Q (Dave Doyle): Could the output provide feet in addition to meters?
A (Jeff Olsen): That has not been brought up yet.

Q (John Ellingson): Brian Shaw has created a new toolbox for analyzing vertical adjustments. I don't know how compatible they are, but his tools are very useful in the adjustment file. Has there been talk about connecting these tools?
A (Jeff Olsen): There has not been discussion yet, but as long as Brian's tools still use Asta files as the input, then it should be compatible with LOCUS output.

Q (John Ellingson): Can we use multiple constraints as we did a few years back during the testing/development phase?
A (Jeff Olsen): LOCUS version one is limited to minimally constrained adjustments. The option for a fully constrained adjustment exists but will not be supported by analysis tools and documentation until later versions.

Comment (John Ellingson): I can explain how LOCUS has been a great benefit to Wisconsin DOT. WI-DOT has done large projects with many loops, and we use LOCUS to look at different constraints and analyze loops for quality. This allowed us to determine if we had any bad sections and know right away so we could re-level if needed.

4. Other Business

Important Links: Previous months' meeting notes and a list of future meeting presentations can be found at: http://www.ngs.noaa.gov/heightmod/MeetingNotes.shtml

Next meeting: December 13, 2012
Guest Speaker: Renee Shields will present the Height Modernization National Plan

Recent Past Events

October 8-11, 2012 Albuquerque, NM – Southwest User Group (SWUG) Five-state Annual Conference

October 9-12, 2012, Venice, Italy – International Association of Geodesy (IAG), International Symposium on Gravity, Geoid and Height Systems (GGHS) 2012

October 10-12, Prescott, AZ – Arizona Geographic Information Council (AGIC) Education and Training Symposium

October 16-17, 2012, Naperville, IL - Illinois GIS Association Fall Conference

October 31-Nov 1, 2012, Lansing, MI – Great Lakes Region Height Modernization Consortium Meeting

Upcoming Events

Dec 3-7, 2012, San Francisco, CA – American Geophysical Union Fall Meeting