Height Reference System Modernization - 2013

Background:

In the 1990s, Canada and all provinces adopted a new horizontal reference system known as NAD83 CSRS (North American Datum of 1983 referenced to the Canadian Spatial Reference System). This allowed people to use GPS and GIS to better position information on the earth's surface and to produce more accurate mapping systems.

Similarly, in the early 2000s, Geodetic Survey Division (GSD) of Natural Resources Canada (NRCan) in partnership with the ten provincial and territorial geodetic agencies initiated a project for the modernization of Height Reference Systems across the country.

Traditionally, the vertical datum was defined as mean sea level based on tide gauges located on the East and West coasts of the country and propagated in land using leveling measurements and benchmarks anchored to the ground or buildings.

As part of the Height Reference System Modernization, the new datum will be defined by an equipotential surface that is realized by integrating gravity data and accessible through a geoid model for better integration with GPS technology. Elevation data from the new datum will be made available differently and users will have to manipulate the elevation data in a different way.

Initial Consultation:

In 2004, the services of Hickling Arthurs Low (HAL) were retained to obtain the views of stakeholders through interviews and surveys which were conducted between December 2005 and February 2006. Interviewees were chosen across various sectors; mainly academic; federal, provincial, and municipal governments; user industries; geomatics industry; international bodies, and application areas such as research, agriculture, transportation, oceans, urban development, surveying, emergency preparedness, environment monitoring, water surveys, energy, forestry, insurance, and mining, were consulted. It was also recognized that some provincial legislation would have to be amended due to this new datum.

A final report was produced in the fall of 2006, known as "Stakeholders Consultation for the Development of the Canadian Height Reference System Modernization Implementation Plan" and recommendations were to proceed with the concept. At the time, the target date was for the fall of 2010, but with delays in the US gravity satellite projects, which were crucial for a higher accuracy determination, the project was delayed until the fall of 2013. For a copy of the report go to the following url:
https://www.pxw1.snb.ca/snb7001/e/PDF/hm_e.pdf

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Federal Initiative:

NR Can will release a new vertical reference system for Canada in November 2013. It will be known as the "Canadian Geodetic Vertical Datum of 2013" (CGVD2013). This new datum is superseding the Canadian Geodetic Vertical datum of 1928 (CGVD28), which was adopted by an Order in Council in 1935.

The main fields affected are more particularly, but not limited to, the following where information is based on a height above sea level:

- *Water level management*
- *Flood zone definition*
- *Topographic data and mapping*
- *Construction and municipal underground infrastructure*
- *Legal surveys involving limits based on certain elevations*

GSD plans to have all former First Order Benchmarks adjusted and published by October of this year.

New Brunswick Initiative:

Similarly, Service New Brunswick, being responsible for our provincial coordinate infrastructure, plans to transform all its NBHPN CGVD28 data to CGVD2013 by the end of December 2013. SNB will present seminars in various locations of the province in the spring of 2014 to promote the tools and processes to convert your own information as required. This does not mean that all your former projects have to be converted, however some will, on an as required basis and you will have access to the proper tools, at no cost, to do these transformations.

The estimated difference between the CGVD28 and CGVD2013 zero reference mark for sea level is -54 cm for the Fredericton area. In other words any information with a current height above sea level based on CGVD28 will be higher by 54 cm compared to any leveling done in the new datum, see Figure 1 below.

Additional Information:

NRCan has already presented a few iterations of a webinar on the subject entitled "Height Modernization and YOU". Power Point presentations in both languages, including speaking notes for each slide in PDF format are available for viewing or downloading at the url below:

ftp://ftp.geod.nrcan.gc.ca/pub/GSD/marc/presentations/

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Notes: The files are quite large to download so it should be done through an Internet connection and not through your cell phone. Mac users will probably be asked to identify themselves with a user name/password. Just click on "Guest" to access.

You can find more information on this Height Modernization Project on the NRCan website http://www.nrcan.gc.ca/earth-sciences/geography-boundary/spatial-referencing/height-reference-system/help-support/5390

As the timetable for seminars develops, Service New Brunswick will keep you posted as for the place, date and time they will occur. All your technical people should be made aware of this new datum so that they can take advantage of the seminars.

Note: *Users of private RTK distribution networks like LEICA, CANSEL, TOPCON or others, should check with their supplier with respect to their timeline to adopt the new vertical datum, as they have committed to integrate their GPS base stations to CGVD2013. Since the heights will be considerably different for real time collection or positioning, it will be important for you to know when the corrections for new elevations will be distributed.*

Figure 1