INTRODUCTION TO NAD83

Introduction

This fact sheet reviews the status of the North American Datum of 1983 (NAD83) project, and the NAD83 readjustment in Alberta. The intended audience for this fact sheet includes all users of Alberta survey control information.

The NAD83 Project

Actually, NAD83 is both a datum and a project. The NAD83 project includes three specific tasks: define the parameters of a new North American horizontal datum; where necessary, strengthen existing control networks with additional observations; and readjust these networks and compute coordinates of control markers on the new datum. In Canada, the need for the NAD83 project became apparent after several regional control networks in eastern Canada and the Arctic were readjusted on the North American Datum 1927 (NAD27) in the late 1960s and early 1970s. These test readjustments revealed that a significant amount of distortion had accumulated in the NAD27 control coordinates, and that a national readjustment was required. The same conclusion was reached by government agencies in the U.S. and Mexico. By 1980, Canada, the U.S., Denmark, and Mexico and other Central American countries agreed to participate in the project.

NAD27 Datum Parameters

The first readjustment of the continental control networks was completed in 1932. The coordinates from this readjustment were computed using the parameters of the ellipsoid defined in 1866 by British geodesist A.R. Clarke, and the astronomically derived coordinates of a point in Kansas. At the time, Clarke's ellipsoid appeared to best approximate the size and shape of the earth throughout North America.

NAD83 Datum Parameters

The reference ellipsoid chosen for NAD83 is known as the Geodetic Reference System 1980 (GRS80). This ellipsoid is intended to be a global or international geometric model of the earth. The parameters that define GRS80 were adopted at a meeting of the International Association of Geodesy in 1979. Unlike the NAD27 datum, the origin of the NAD83 coordinate system is the earth's centre of mass. This "geocentric" origin was chosen for NAD83 for compatibility with navigation systems that use orbiting satellites. The orientation of the NAD83 coordinate system is consistent with international definitions of the earth's mean pole and zero degrees longitude.

Canadian Readjustment

In Canada, survey control observations have been readjusted on NAD83 in successive phases:

1986: simultaneous readjustment of Canadian primary and U.S. primary and secondary networks
1989: integration of eastern Canada secondary networks into the Canadian primary network
1990: integration of western and northern Canada secondary networks into the Canadian primary network.
1993: integration of additional networks in western and northern Canada.

In each of the last three phases, observations were added to those originally readjusted in 1986, and the coordinates of a minimum number of markers were constrained to values computed in an earlier phase. Observations managed by provincial agencies in western Canada were included in the last phase of the Canadian readjustment. This last phase is known as the Network Maintenance Integration Project (NMIP).

Alberta Refresh Readjustment

Although the NMIP readjustment was completed in 1993, only observations validated before November 1991 were included from Alberta. Observations validated after November 1991 were included in a subsequent Alberta "refresh" readjustment. In this readjustment, NAD83 coordinates computed in the NMIP for specific control markers along the provincial boundary were held fixed. The Alberta refresh readjustment was completed in March 1994. The NAD83 coordinates of Alberta survey control markers included in this readjustment was adopted as final and made available by the Resource Information Management Branch on June 6, 1994.

More Information

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