

GEOREFERENCING - BACKGROUND INFORMATION

Orienteering maps conventionally are oriented to magnetic north. Until recently all positioning of features was just relative to other features on the map. Coordinate systems were not defined. The area of an orienteering map is so small that any effects of earth curvature are negligible.

However, for convenience in using GPS to locate features on an orienteering map, we must set up the real world coordinate system for our map. GPS receivers display coordinates in terms of latitude, longitude and height, or as easting, northing and height. Any coordinate system for navigation over long distances must take into account the curved surface of the earth.

Also, much of the information that we can use, such as city and provincial base maps, is set up in UTM or 3TM coordinates.

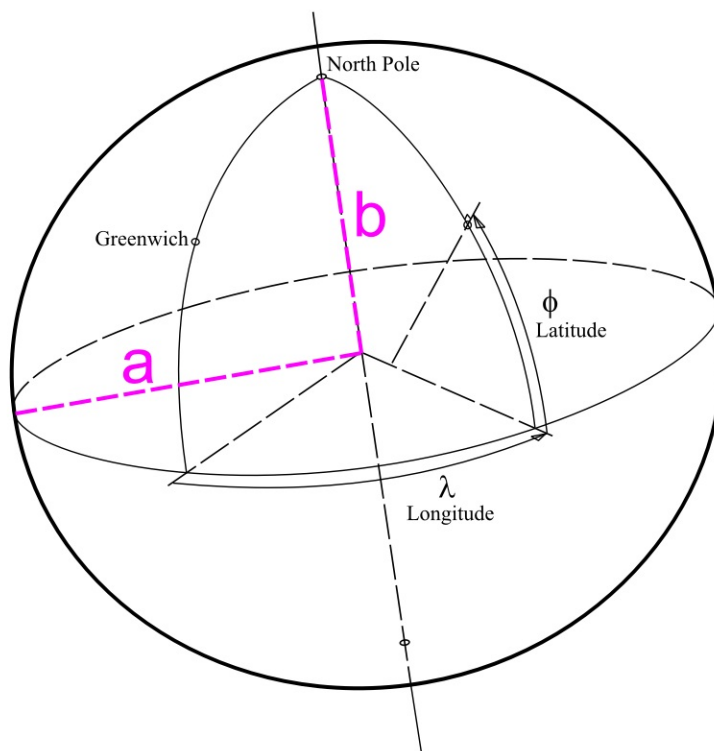
UTM = Universal Transverse Mercator map projection

3TM = 3 Degree Transverse Mercator map projection

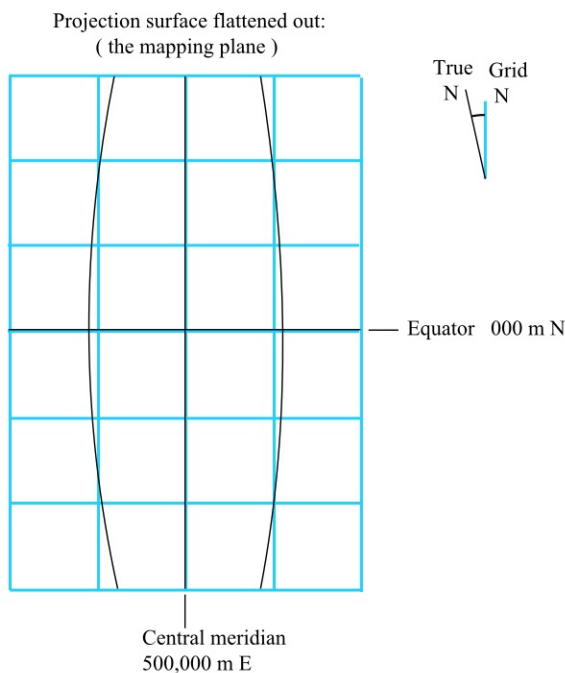
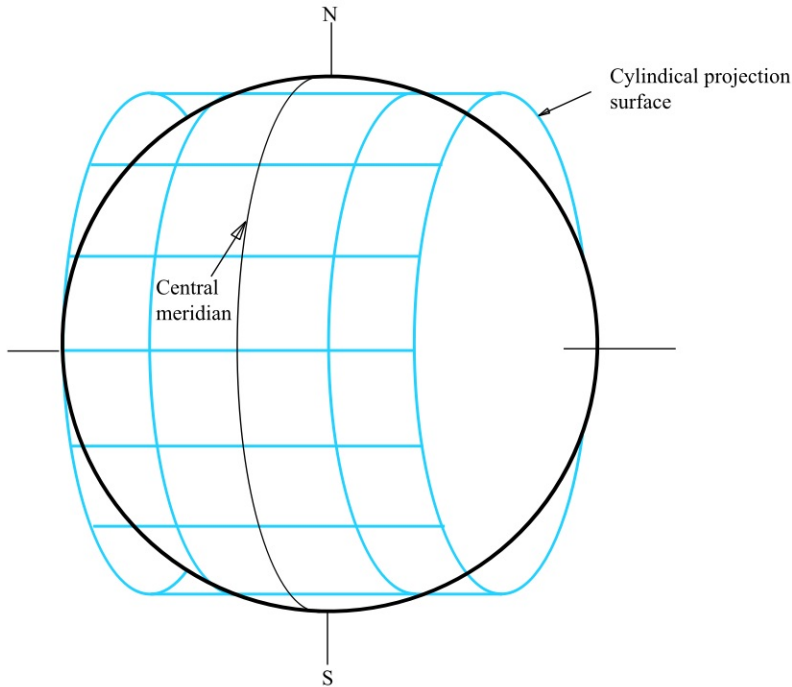
Geodesists approximate the shape of the earth by an ellipsoid.

Parameters for the WGS84 ellipsoid model are:

- semi-major axis $a = 6,378,137$ m
- semi-minor axis $b = 6,356,752.3142$ m



Mathematicians have developed numerous map projection methods for representing the curved earth on a flat piece of paper. The Universal Transverse Mercator projection is commonly used with topographic maps.



Meridian convergence (the angle of grid north relative to true north) is a function of both latitude and longitude.

UTM zones are 6 degrees wide in longitude.

Alberta is partly in Zone 11 and partly in Zone 12.

Zone 11

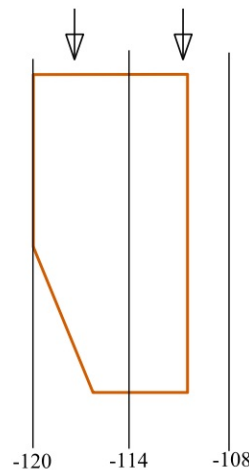
-120 to -114 degrees longitude

Central meridian -117 degrees

Zone 12

-114 to -108 degrees longitude

Central meridian -111 degrees



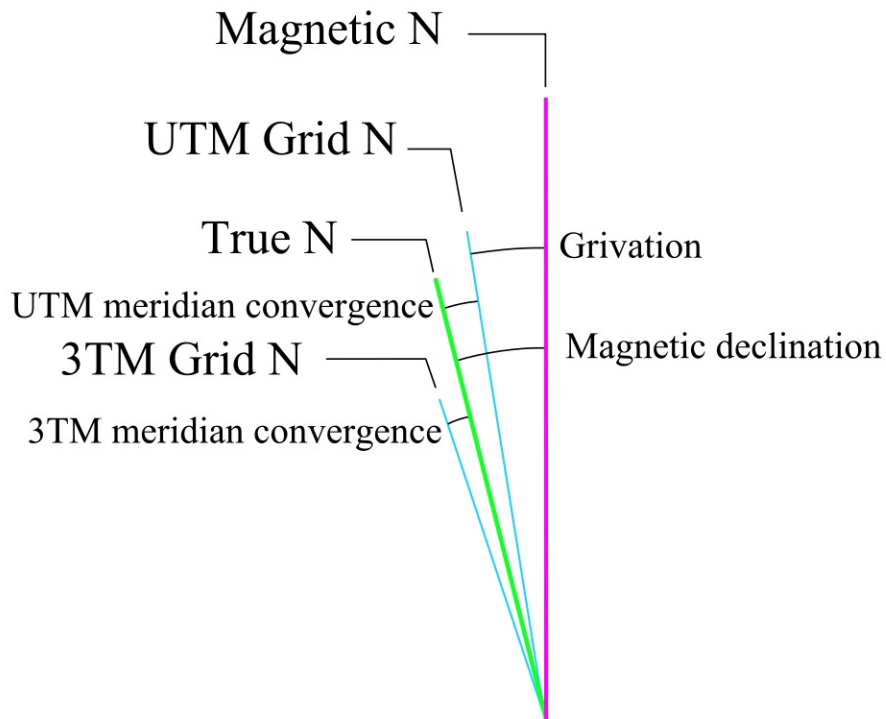
The grid of blue lines on 1:50,000 NTS topo maps represent UTM coordinates.

GPS receivers commonly present waypoint and track coordinates in the UTM system, although they can also display latitude and longitude and other coordinate systems.

3TM zones are 3 degrees wide in longitude.

City of Calgary topographic maps use a 3TM coordinate system with the central meridian defined as -114 degrees longitude.

Four kinds of North:



Magnetic N is the direction of the local magnetic field vector horizontal component.

True N is the direction to the North Pole (the direction of a meridian of longitude).

Magnetic declination is the angle of Magnetic N relative to True N. Magnetic declination varies according to location and changes over time. See the Natural Resources Canada magnetic declination calculator at:
<http://geomag.nrcan.gc.ca/calc/mdcal-eng.php>

ALBERTA SURVEY CONTROL MARKERS



Use the published coordinates of survey control markers:

- as known start or finish points for a traverse
- as control points for aerial photography
- to check the accuracy of a GPS receiver
- to position a background map in OCAD or OOM

Do a web search on "ASCM index maps".

Download an index map for your area.

Then find the Alberta SPIN 2 site to obtain information cards about each control marker in your area.

Sign in as a guest.

Search for Alberta Survey Control Markers.

Check the button for UTM or 3TM coordinates as required.

Search by ASCM number (numbers are shown on the index maps).

Check the Add to Cart buttons.

When you have finished finding ASCM cards, go to Shopping Cart.

Then Checkout.

Review Information, Finalize Checkout.

It's free ...

There is a slight pause while the download file is assembled.

Click on the download link when it is ready.

The file is in PDF format with one page per control marker.



SURVEYING AND MAPPING DIVISION
 Alberta Survey Control Marker (ASCM) Information
 MASCOT DSS-1

Horz Datum NAD83 Updated: 1998-11-18
 Latitude 51 06 33.24730 dms
 Longitude 114 05 01.82096 dms
 Horz Class INTEGRATED , ORDER 1

Marker Installed 97-01
 Date Printed 2020-02-22
 Last Updated 2014-06-18

ASCM 349787

Tablet Markings 349787
 Mapsheet Name CALGARY G
 Mapsheet Number 5661 - 004

Vert Datum CVD28 Updated: 1998-11-18
 Elevation 1137.943 m
 Vert Class INTEGRATED , SPIRIT LEVELS

For current information call Geodetic Survey
 (780) 427-3143 FAX: (780) 427-1493

Marker Condition GOOD 99-02-06

UTM COORDINATES

ADJACENT MARKERS (calculated) Updated: 2014-06-18

Scale Factor 0.999600 At Ref Mer 117

Northing 5666017.197 m
 Easting 704126.384 m
 Convergence 2 16 14.00 dms

ASCM Tablet To Markings	Horizontal Distance (m)	Std Dev (cm)	PPM/ Grid/ Grnd Order Factor	Grid Bearing (dms)	Std Dev (s)	T-t Corr (s)
391169 391169	869.775	1	13/1 0.999942	91 52 58.33	1.1	-0.01
5314 636012	1581.950	1	6/1 0.999926	234 12 47.91	0.5	-0.48
391110 391110	1676.540	1	8/1 0.999943	144 58 17.37	0.5	-0.71
393728 393728	2083.740	1	7/1 0.999940	22 21 25.31	0.4	1.00
360891 360891	2142.626	1	6/1 0.999945	132 45 58.51	0.5	-0.75
350553 350553	2238.598	1	5/1 0.999935	196 41 56.75	0.3	-1.11

Station Ellipsoid Factor 0.999824
 Station Combined Factor 0.999936

GEOID DATA (GSD95) Updated: 98-11-19

Component	Magnitude	Std Dev
Meridian Defl, XI(+N)	2.3 s	2 s
Prime Vert Defl, ETA(+E)	6.0 s	2 s
Geoid_Ellip Separation	-16.26 m	1 m

MARKER TYPE Updated: 1998-11-04

HPN BRASS DATUM POINT SET ON A GROUND ROD WITH STABILIZER PLATE, IN MANHOLE.
 15 CM BGL.

COORDINATE HISTORY HORZ VERT

Originating Project	Published	HORZ	VERT
96005	96005	98-11-18	98-11-18
Revising Project Published			
Revising Project Published			
Revising Project Published			

MARKER LOCATION Updated: 1998-11-04

Located in concrete median at the entrance to Nose Hill parking lot at, 14 St. and 64 Ave. N.W.; 1.5m. S. of the N. l.o.g. of island; 17.5m. W. of the W. l.o.g. of 14 St. prod. S.; 9.3m. E. of the W. tip of bullnose of island.

NON COORDINATE REVISIONS

Date	Description
1998-11-04	FIRST MARKER LOCATION DESCRIPTION ENTERED
2003-03-12	"MAPSHEET NAME" AND/OR "MAPSHEET NO" CHANGED
1998-11-04	INSTALLATION DATE AND TABLET MARKINGS ENTERED

MARKER CONDITION COMMENTS Inspected Updated

MARKER REPORTED IN GOOD CONDITION 1999-02-06 1999-11-23

Key Items on an Alberta Survey Control Marker Information Card