

GNSS Solutions - Customizing the Coordinate List & Geoid09

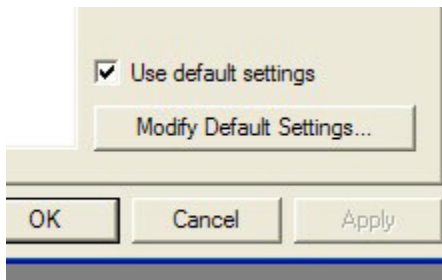
Objectives:

Create useful coordinate system definitions for the place where the work is done.

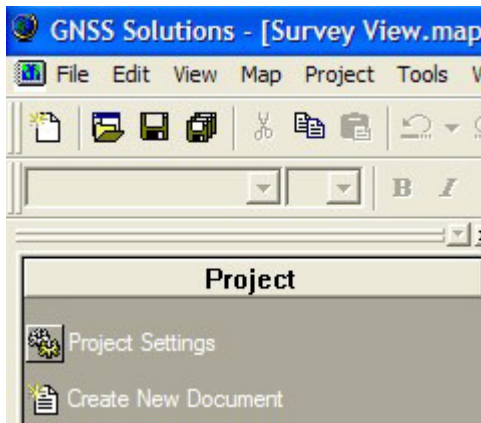
Use the Geoid09 model to compute NAVD88 orthometric heights

Procedures:

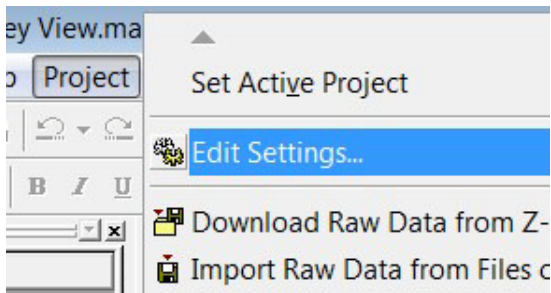
There are several pathways to the dialog boxes that allow customization of the coordinate systems in GNSS Solutions beginning with an opportunity to Modify Default Settings when the project is created.



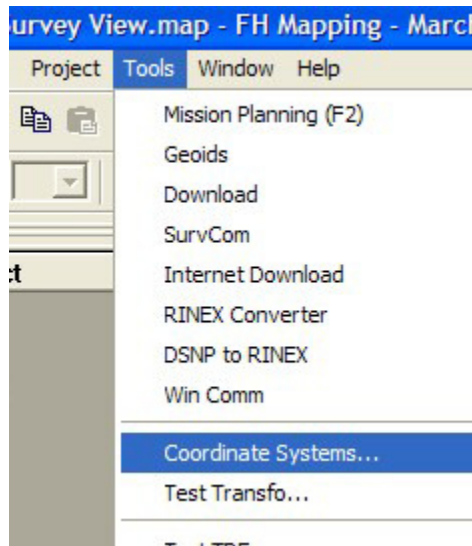
After the project is created there are still some ways to select a different coordinate system or create one. Under Project choose Project Settings.



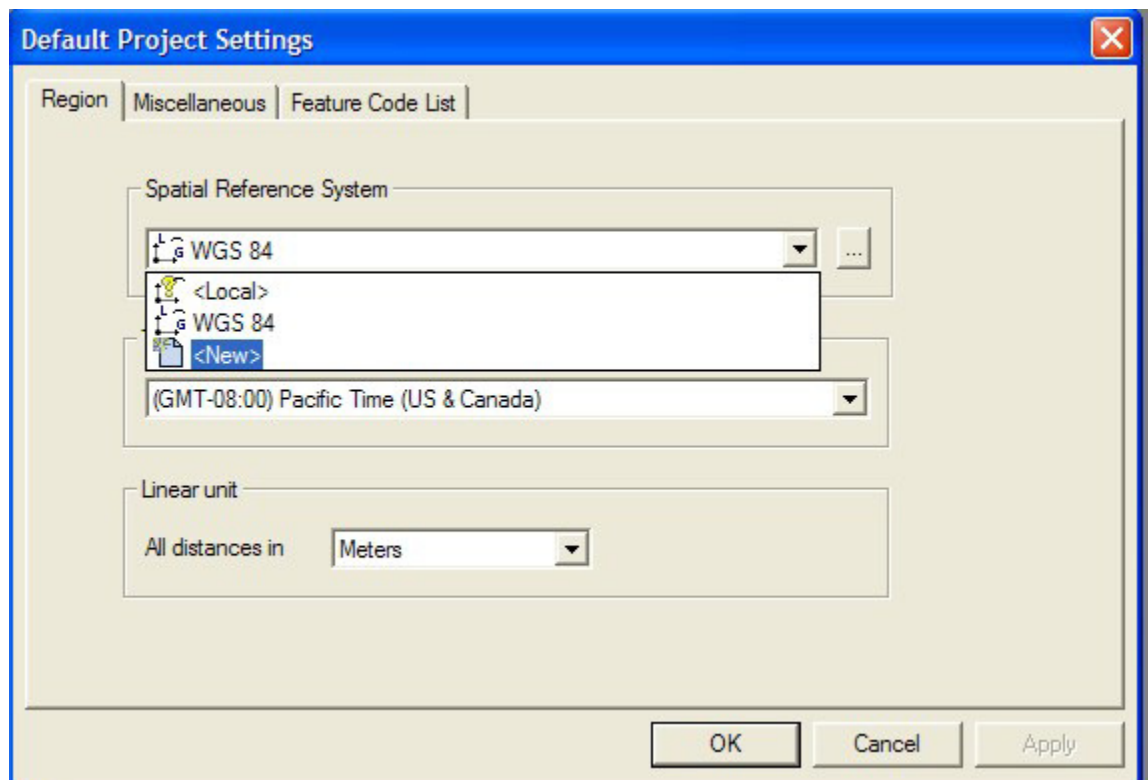
Using the Project pull down menu choose Edit Settings.



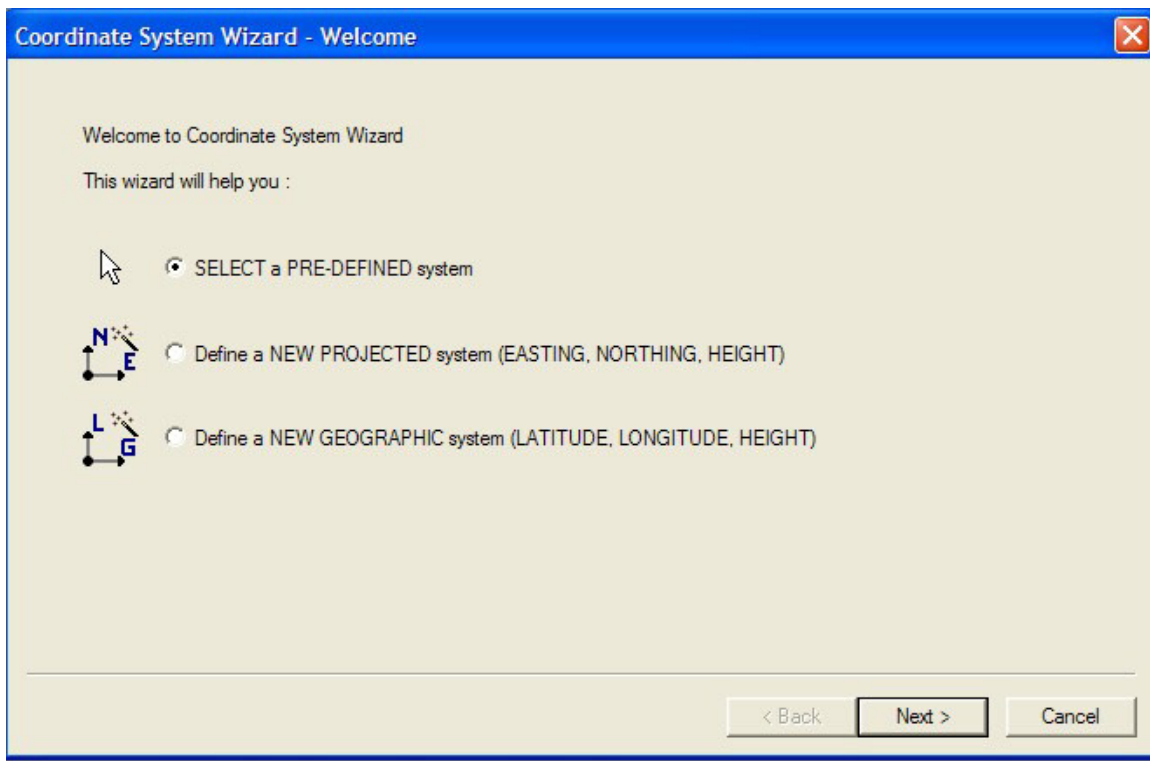
Manage coordinate systems another way using the Coordinate Systems selection under the Tools pull down menu.



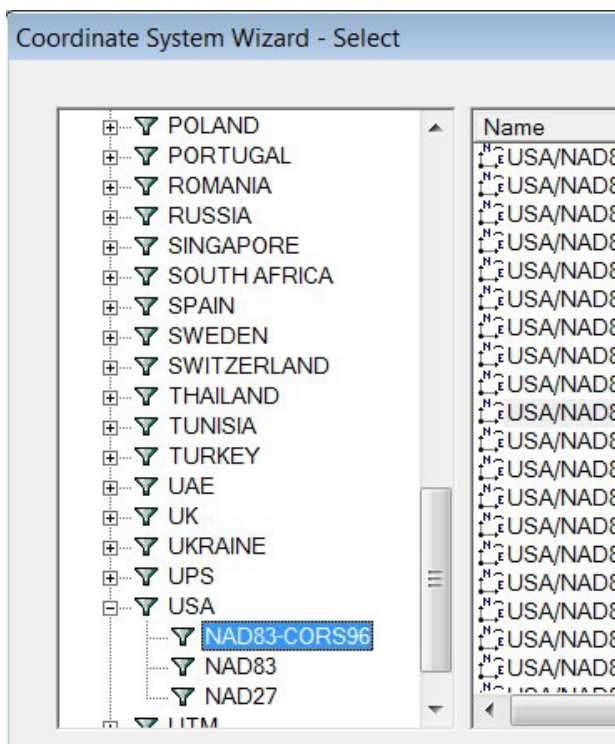
This will illustrate the use of Modify Default Settings at the time the project is created. The Default Project Settings dialog box offers the choice of <New>.



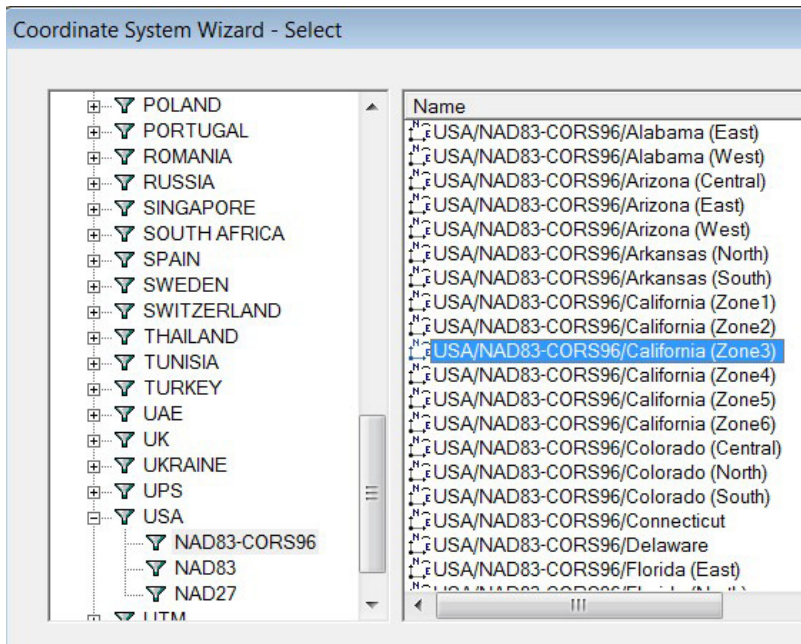
In the Coordinate System Wizard box choose Select a Pre-Defined system and click Next >



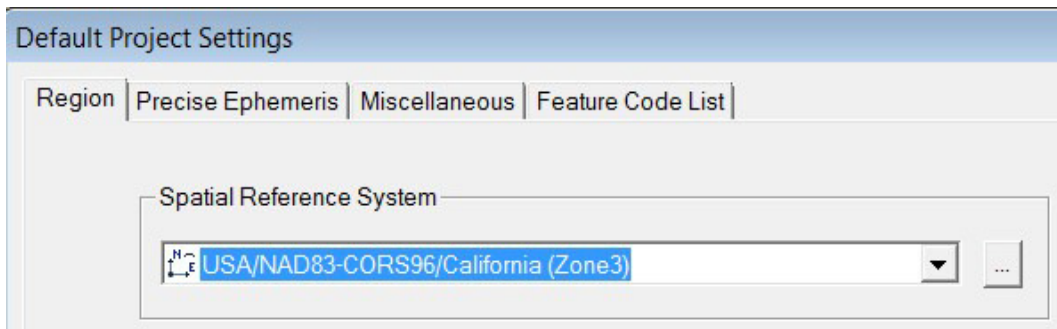
The choice for this project area is NAD83 - CORS96



The state plane coordinate map projection for the work area is USA/NAD83-CORS96/California (Zone3).



A click on the Finish button shows that the coordinate system has been selected but this is not done yet. If elevations are the objective the Geoid09 model needs to be applied to the ellipsoid heights that are the basis of the datum definition. There is a rectangular button with three dots in it to the right of the selected Spatial Reference System. A click on this button reveals choices.



By selecting the Geoid09 model from the vertical datum list the elevations in the project will be related to NAVD88 orthometric heights. Edit the system name to make it meaningful. This is something that can be used on many projects.

Projected System [USA/NAD83-CORS96/California (Zone3)]

Datum | Projection | System

System Name : USA/NAD83-CORS96/California (Zone3)

East →

North ↑

Ellips height ○

Vertical Datum :

- Ellipsoid
- Ellipsoid
- WGS_84
- ICD_200
- 30SJULY
- Alaska06
- Alaska09
- Alaska99
- DVR90
- EGM96
- Geoid03
- Geoid09
- Geoid99
- CGF07

A click on the OK button shows the selected coordinate system and provides an opportunity to choose the units of measure. The US Survey Foot is appropriate for the work in Santa Clara County, California. Another click on the OK button and the project begins.

Default Project Settings

Region | Precise Ephemeris | Miscellaneous | Feature Code List

Spatial Reference System

USA/NAD83-CORS96/California (Zone3) + Geoid09

Time zone

(UTC-08:00) Pacific Time (US & Canada)

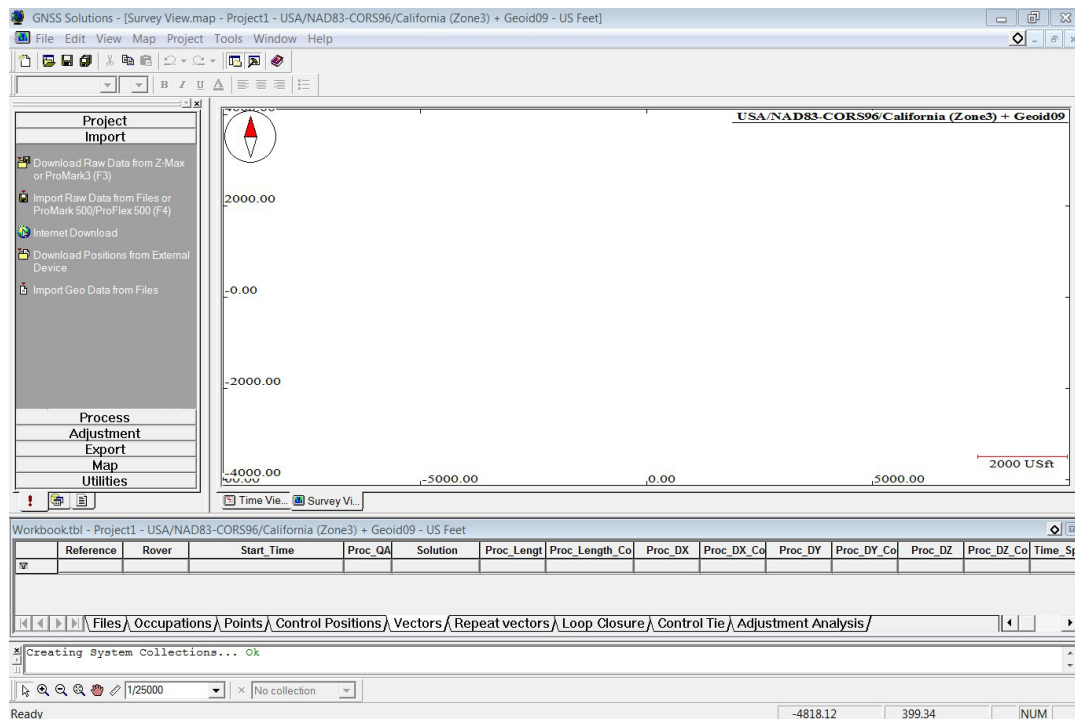
Linear unit

All distances in

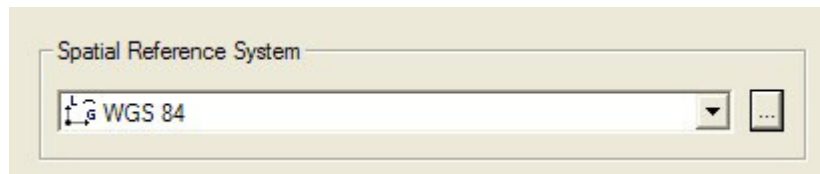
- Meters
- Meters
- US Feet
- Int. Feet

OK Cancel

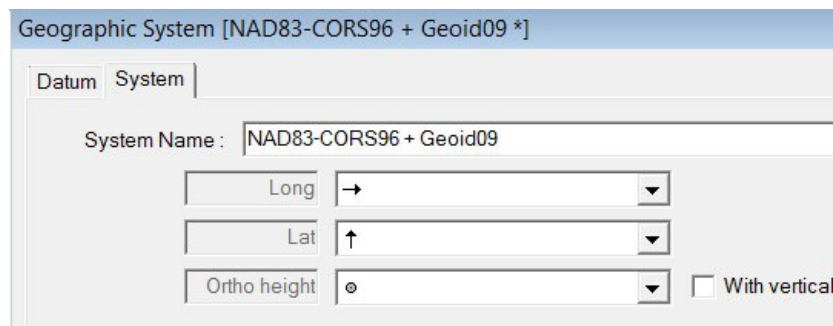
The selected coordinate system name is revealed at the top of the GNSS Solutions window and again in the Survey View and Workbook Table. The meaningful name given to the coordinate system definition matters as work proceeds.



WGS84 is not the appropriate choice for mapping in the project area. Remember the rectangular button with the three dots? Choose WGS84 and make modifications to fit the objective.



What meaningful name will be assigned to the new datum definition?



A click on the datum tab allows the choice of NAD83-CORS96 using the GRS80 ellipsoid.

The screenshot shows the 'Geographic System [NAD83-CORS96 *]' dialog box with the 'Datum' tab selected. The 'Datum Name' is set to '83-CORS96=NAD83_CORS96.2002.HTDF'. The 'Ellipsoid Name' is 'GRS 1980'. The 'Semi-major Axis' is '6378137.000 m' and the 'Inverse Flattening' is '298.257222101'. Below these are fields for transformations to WGS84: 'DX to WGS84' (-1.0040 m), 'DY to WGS84' (1.9097 m), 'DZ to WGS84' (0.5155 m), 'RX to WGS84' (-0.026719"), 'RY to WGS84' (-0.000342"), 'RZ to WGS84' (-0.010987"), and 'ppm to WGS84' (0.001540000000).

Field	Value
Datum Name	83-CORS96=NAD83_CORS96.2002.HTDF
Ellipsoid Name	GRS 1980
Semi-major Axis	6378137.000 m
Inverse Flattening	298.257222101
DX to WGS84	-1.0040 m
DY to WGS84	1.9097 m
DZ to WGS84	0.5155 m
RX to WGS84	-0.026719 "
RY to WGS84	-0.000342 "
RZ to WGS84	-0.010987 "
ppm to WGS84	0.001540000000

Click on the System tab to edit the System Name and choose the Geoid09 model. A click on OK and the new datum is added to the list of coordinate system choices.

The screenshot shows the 'Geographic System [NAD83-CORS96 + Geoid09 *]' dialog box with the 'System' tab selected. The 'System Name' is 'NAD83-CORS96 + Geoid09'. There are three rows of input fields: 'Long' with a right arrow icon, 'Lat' with an up arrow icon, and 'Ortho height' with a circle icon. At the bottom, the 'Vertical Datum' is set to 'Geoid09'.

Field	Value
System Name	NAD83-CORS96 + Geoid09
Long	→
Lat	↑
Ortho height	⊙
Vertical Datum	Geoid09

Hold it! Don't move a muscle! Elevations may not be the objective. Make another definition modification using that little button with the dots to choose NAD83-CORS96 with Ellipsoid Heights. Click on OK to add it to the coordinate system list with the appropriate name assigned.

Geographic System [NAD83-CORS96 + Ellipsoid Height *]

Datum System

System Name : NAD83-CORS96 + Ellipsoid Height

Long →

Lat ↑

Ellips height ○

Vertical Datum : Ellipsoid

Now the coordinate system list includes those basic definitions that will support projects in Santa Clara County, California.

"Project1" Project Settings

Region Precise Ephemeris Miscellaneous Feature Code List

Spatial Reference System

NAD83-CORS96 + Geoid09

<Local>

WGS 84

USA/NAD83-CORS96/California (Zone3) + Geoid09

NAD83-CORS96 + Ellipsoid Height

NAD83-CORS96 + Geoid09

<New>

Linear unit

All distances in US Feet

Internet Resources:

The internet provides resources to expand what we know about datums, coordinate systems, and geoid models. The writer is most familiar with surveying in the USA but has awareness of some other national resources too.

USA

http://www.ngs.noaa.gov/PUBS_LIB/develop_NSRS.html

http://www.ngs.noaa.gov/cgi-bin/spc_zones.prl

http://www.ngs.noaa.gov/PUBS_LIB/ManualNOSNGS5.pdf

http://www.ngs.noaa.gov/PUBS_LIB/FundSPCSys.pdf

<http://www.ngs.noaa.gov/NationalReadjustment/>

<http://www.ngs.noaa.gov/GEOID/>

<http://www.ngs.noaa.gov/TOOLS/>

http://www.ngs.noaa.gov/PC_PROD/WorkShops/

<http://www.ngs.noaa.gov/CORS/>

<http://www.fgdc.gov/>

Canada

http://www.geod.nrcan.gc.ca/index_e.php

http://www.geod.nrcan.gc.ca/publications/index_e.php

http://www.geod.nrcan.gc.ca/software/index_e.php

Mexico

<http://www.inegi.gob.mx/inegi/default.aspx>

Australia

<http://www.ga.gov.au/>

<http://www.ga.gov.au/geodesy/>

Philippines

<http://www.namria.gov.ph/home.asp>

Phil Stevenson
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