

Localization – Add Method 2 for SBAS (WAAS) corrections

Defining the problem: WAAS corrections seem to be related to the ITRF00 latitude, longitude, and ellipsoid height with the end result that setting FAST Survey to a state plane coordinate system yields positions that may not match points that have been surveyed and mapped relative to NAD83.

This will describe a method for obtaining improved horizontal and vertical accuracy when using FAST Survey with the internal GPS receiver in the MobileMapper CE and DGPS corrections from the WAAS.

The method described here includes a need to use an appropriate geoid separation file as described on page 43 in the FAST Survey Reference Manual and an application note named Getting Elevations from FAST Survey that can be found on the ftp server at

<ftp://ftp.magellangps.com>

in the folder at Land Survey → FAST Survey → Application Notes

Please become familiar with the Localization Add Method 2 as it is described on pages 129 through 130 in the FAST Survey Reference Manual and with the Localization procedure in general terms.

The job file in FAST Survey will be set up for NAD83, California Zone 3 state plane coordinates using the US Survey Foot.

The first objective is to find a point that has been surveyed relative to both the ITRF00 and NAD83(CORS96) datums. For the purposes of this example the coordinates will come from an OPUS report for a point called BASE. Conversions to the US Survey Foot are computed using the fraction 39.37/12.

ITRF00 for BASE

Latitude: 37°21'04.93309"N Longitude: 121°56'05.00160"W

Ellipsoid Height: -42.251 feet

The geoid height for this point was computed from this latitude and longitude using the geodetic toolkit at the NGS web page.

http://www.ngs.noaa.gov/cgi-bin/GEOID_STUFF/geoid03_prompt1.prl

It was converted to US Survey Feet.

Geoid Height: -106.955 feet

Orthometric height is computed by subtracting the geoid height from the ITRF00 ellipsoid height. This is not a good NAVD88 height because the Geoid03 model is not related to the ITRF00 ellipsoid height but this is a method for obtaining the transformation from the ITRF00 to NAD83(CORS96) state plane coordinates with NAVD88 orthometric heights.

Orthometric Height relative to the ITRF00 ellipsoid height: 64.704 feet

As a basis for comparison the following coordinates are the NAD83(CORS96) geodetic coordinates from the OPUS report.

Latitude: 37°21'04.91661"N Longitude: 121°56'04.94587"W

Ellipsoid Height: -40.456 feet Ortho Height: 66.499 feet

The job file will be set for NAD83 state plane coordinates California Zone 3 using the US Survey Foot. The first point will be entered manually using the File Menu → List Points → Add.

The state plane coordinates and elevation computed from the OPUS report are:

N 1,953,603.642 feet E 6,144,657.163 feet Elevation 66.499 feet

Go to the Equipment menu and choose localization. Follow the instructions in the manual for Add Method 2. Use the ITRF00 latitude and longitude and the elevation computed using the ITRF00 ellipsoid height and the geoid height.

Latitude: 37.210493309 N

Longitude: 121.560500160 W

Elevation: 64.704 feet

Use the instructions in the FAST Survey manual for saving the localization file to the SD card in the MobileMapper CE so it can be used for other job files in this same area. Load the localization file into jobs that need the localization you have defined using the localization instructions in the manual.

Map several points where you know the correct coordinates to verify that your transformation is providing the desired accuracy.

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