



NCDOT

Location and Surveys

TGO Network Adjustment Minimally Constrained Adjustment

- 1.) ADJUSTMENT / DATUM (default is WGS-84)
- 2.) ADJUSTMENT / STYLES – pick 95% Confidence Limits

Edit to check defaults

General Tab – Sigma Scalars	Univariate	1.960	
	Bivariate	2.447	
Covariance Display	1.96 Horizontal		
	1.96 3 – Dimensional		
Set-Up Errors	Error in Height of Antenna		= 0.002 m
	Centering Error		= 0.003 m

(You will need to add the Set-Up Error values the first time)

- 3.) Constraining One Control Point
 - a) ADJUSTMENT / POINTS -- from the Points dialog box choose one of the control points to be held 2D by highlighting the control point and checking the 2D box to the right
 - b) ADJUST NETWORK -- Select ADJUSTMENT / ADJUST
-- Choose the ADJUST icon from the project bar (on left)
 - c) Review and Evaluate Minimally Constrained Results
 - REPORTS / NETWORK ADJUSTMENT REPORT
 - Statistical summary – global statistics – FAIL?
 - Adjusted observations
 - Histogram of standardized residuals --OUTLIERS?
 - Point error ellipses
 - d) Do we have any OUTLIERS? If YES, make note of the baseline number and continue to Step 4
If NO, go to Step 7.
- 4.) ADJUSTMENT / OBSERVATIONS (uncheck baseline # of the outlier)
- 5.) ADJUST NETWORK (See 3b above)

6.) Do we have OUTLIERS? If yes, go to Step 4, if no, go to Step 7

7.) DOES NETWORK PASS CHI-SQUARE TEST?

Review and Evaluate Minimally Constrained Results (See 3c)

If YES, go to Step 13

If NO, go to Step 8

8.) ADJUSTMENT / WEIGHTING STRATEGIES /GPS TAB

Set scalar type to ALTERNATIVE

9.) ADJUST NETWORK (See 3b above)

Repeat Steps 7 and 9 until network passes CHI-SQUARE TEST, then go to Step 10.

10.) REPORTS/ NETWORK ADJUSTMENT REPORT/ STATISTICAL SUMMARY/ WEIGHTING/ STRATEGIES / GPS OBSERVATIONS

Check to see what scalar was applied in order for the Network to pass the CHI-SQUARE TEST

11.) ADJUSTMENT / WEIGHTING STRATEGIES / Change scalar type to USER DEFINED

Take the scalar that was applied in the Network Adjustment Report and round up to the nearest tenth.

Example: If the scalar was 3.71, Use 3.80

12.) ADJUST NETWORK (SEE 3b)

13.) LOAD THE GEOID MODEL --- ADJUSTMENT / OBSERVATIONS / Geoid Tab / LOAD

14.) ADJUSTMENT / OBSERVATIONS / POINTS

Make sure the original control point is highlighted, Check the Elev. Box to the right. You are now holding this control point horizontally and vertically

15.) ADJUST NETWORK (SEE 3b)

16.) ADJUSTMENT/CALIBRATION COORDINATES/ Save... ***See Note**

Use the second option "New points with suffix". Leave suffix as _GPS.

This will create New points inside your Project to be used in the calibration that have a _GPS suffix.

***Note – When controlling Preliminary mapping this step can be omitted**

Fully Constrained Adjustment

At this time, decisions have to be made in whether this control can be used or if there is any control that does not agree as good as the remainder. It would be impossible to outline how this would be accomplished on every occasion. The majority of the time, you can fix the station that agrees the best in horizontal and then adjust the network. At this time you can see how this affects the network and see if it pulls the control closer, you can then continue to fix the control stations one at a time and adjust in the order of the precision. The same holds true for the vertical. The adjustment is now complete, although there are a few checks yet to do.

17.) CHANGE DATUMS -- ADJUSTMENT / DATUM – Select NAD 83

18.) Make sure to CHECK --- REPORTS / NETWORK ADJUSTMENT REPORT

Does network pass CHI-SQUARE TEST? If NO, you may have to go back to ADJUSTMENT / WEIGHTING STRATEGIES / SCALAR type and change to ALTERNATIVE and ADJUST NETWORK until your network passes the CHI-SQUARE TEST. If YES, check REPORTS / NETWORK ADJUSTMENT REPORT / ADJUSTED OBSERVATIONS to see what kind of value you have for the deflection in longitude (a value over 10 seconds may indicate a problem in vertical)

19.) Localize Project – FILE/ Project Properties *See Note

Select the Coordinate System Tab
Select [Change...] for Local site settings
Input Coordinate for Localization Point
Toggle to use ground coordinates
Enter Scale Factor*
* Take Note that the Scale Factor is the inverse of the Combined Grid Factor used to localize the Project Press [OK].
Project has now been Localized.

*Note – When controlling Preliminary mapping this step can be omitted

20.) SURVEY/ GPS SITE CALIBRATION *See Note

- a.) Check Horizontal and Vertical Adjustment
- b.) Point List...
Complete Point List using the Points w/ the _GPS suffix as the GPS Point and the points without the suffix as the Grid Point. **Don't confuse Grid Point with NC Grid.** TGO is aware that you now have Local values. Note the calibration will remove the Network Adjustment. However copies of the Network Adjustment reports are in the Reports/NetAdjust folder.
- c.) Compute
Check Computation summary
Horizontal adjustment scale factor should be near 1
Max horizontal and vertical residuals should be reasonable
- d.) Report...
This will produce a GPS Calibration Report that can be used at a later date for the Survey Control Sheets.

*Note – When controlling Preliminary mapping this step can be omitted

21.) CREATING *.dc file for field data collection and Master *.ctl file

Select the points without the suffix that will be used on the job site as your primary control points and then export a *.dc file and a *.ctl file. Once the *.dc file is loaded to the TSCe, ALL settings on Survey controller will be set appropriately and they are ready “to hit the ground running”. If all geopak processing will reference the Master *.ctl which is created from TGO there should be no errors due to the control.

*Note – If a GPS job is processed in Metric and the surveys are to be in English then the settings in Project Properties should be toggled to US Survey Foot.