Survey Technical Guidelines
Office Section

Southwest Florida
Water Management District

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1. Introduction

These guidelines, requirements and standards, comprising the Office Section of the Survey Technical Guidelines, set forth the criteria utilized in processing the data for all types of land surveys and reports by and for the Southwest Florida Water Management District (District). They include, but are not limited to: boundary, topographic, location, and hydrographic surveys incorporating modern techniques and processes to analyze, adjust and transform data conforming with the Minimum Technical Standards, as specified in Chapter Number 5J-17.051 of the Florida Administrative Code.

1.1. Workflow of Projects

- In Geomatics Services (formerly Survey Central) a work order is created to document the scope of work, the progression of the order and the results for work done in-house and outsourced.

- The survey coordinator compiles necessary data for field crew(s) and the project manager schedules and oversees field crew(s) and their data collection. The survey technician analyzes and post processes the field data. After a Peer Review, a Final Review is done by the project manager. After all internal reviews are complete the survey technician creates the deliverable.

- For outsourced orders, the project manager schedules and oversees the vendor. The survey technician reviews the deliverable to ensure the survey section guidelines are followed.

2. Geomatics Services Work Order

2.1. Purpose

To clearly document the scope and all work processes used to complete a project. This database is paramount in documenting the communications between all concerned participants and in facilitating access to pertinent and relevant data. Its proper use is imperative in successful project management.

2.2. Concept

A work order is created as soon as a request is made for survey services. It is created either by the requestor via our intranet site or by any member of the survey group. The work order is assigned to the team member that is responsible for the task required, i.e. field work setup, field work, office technician and then the signing surveyor. Each team member is responsible for completing the work order fields as the project progresses.

A review of the Comments, Reference Data, Additional Info and Field Instructions should be performed to become familiar with past actions. The Project emails.pdf and the rest of the contents of the project's Reference folder under L:\Survey\Projects\ should also be reviewed.

The "Comments" section should be used often and regularly to record progress and actions taken throughout the life of the project. Use it as the main means of communication.

The "Date Due:" is very important and every effort should be made to meet this deadline. If the conclusion is made that this requirement cannot be met, notify the Survey Manager and Professional Surveyor and Mapper (PSM) immediately.

Use the ‘Help’ button for an explanation of views and fields as well as the Appendix in this document that contains detail instructions of use.

3. Compile Data for a New Project

- Determine the geographical limits of the site based on the requestors’ project scope.
- Determine the geographical limits based on the horizontal and vertical control that may be used, and download the shapefiles and data sheets from the National Geodetic Survey (NGS) web site.
- Search our work order system and our Survey Drawing Index (SDI) for any previous work done in the area.
- Search our Geographic Information System (GIS) for any district lands in the area.
- Additional research may include, state or county road maps, recorded plats and Certified Corner Records (CCR).
- Create a field folder for the crew containing: an aerial plot showing all compiled data; print outs of all compiled data, the work order, the project scope and any pertaining project emails; a field book.

4. Analyze Field Notes

4.1. Purpose

The field notes are a vital part of the process to convey information from what is observed and measured in the field to the office personnel processing the data. These notes are invaluable and must be preserved in their original, unmodified condition.

4.2. Concept

The field book is turned in upon completion of the field work, to the Project Manager for review. When the project is assigned for processing he/she scans the notes into Field Notes.pdf and places it in the project's Field Notes folder.
Review the notes/sketches and compare them to the digital data collected, the project scope, the work order and the STG - Field Section. Any lack of information or non compliance with the STG guidelines for note keeping or field procedures needs to be documented, so they can be addressed, in a Feedback STG file.

The Field Notes file should be in monochrome format. When revisions are necessary, line through the data that needs revising in red, add the new data and initial/date in red also. Scan these revised pages in color to clearly show that they've been revised. Adding comments and markups to the PDF file is also encouraged to clarify and explain any changes and/or concerns. Add comments to the work order’s Additional Information section to explain any changes and issues. Reduce the PDF file size if it is excessively large. When the field notes consist of various field books and/or different portions of a book, set book marks in the PDF file to clearly identify them. Modify the PDF file's properties to display the bookmarks in the initial view.

5. Historical Survey Data Search

ArcMap: Check for District Interests in ArcMap. Copy the Survey groups' template Survey.mxd from L:\Reference\ArcMap\Base Map to your projects' GIS folder. Open the Survey.mxd and Zoom to the Section, Township, Range (STR) of the location in question using the **SWFWMD Toolbar.** Look for any District Interests in the area by checking the box next to all layers in the **Table of Contents** under the **SWFWMD Interests** group that would indicate District interest of i.e. ownership, agreement and/or easement. Display District parcel numbers by using the **Properties/label**. Make a list of the parcel numbers to use for searching other data sources.

Geomatics Services (Check work orders completed after 10-01-04): Search by STR on the Deliverable Data tab to find all open and closed work orders within the limits of the STR in question. This search can include multiple Sections within the same Township and Range.

SDI (Survey Drawing Index Database) – go to L:\Survey\Reference\SDI and open SDI Database.mdb: This database program contains several types of surveys done by or for the district before physical year 2005 with the capability of searching by County, Drawing Number, Drawing Title, Parcel Number, Plat Book/Page, Project Name, S-T-R, Surveyor Name and Type of Work. If a .dwg file name appears within the CAD files field but the file won't open it means that the file is not available but must have been noted on the pdf.

OSD (Old Survey Database) (work orders completed prior to 10-01-04): This database program contains several years of work orders, drawing numbers and parcel numbers. It can be run by double clicking on the executable file located at L:\SURVEY\Reference\Documents\Pre-FY05 Survey Database\Old Survey Database.ZIP\Old Survey Database\Survey\DBASE\Surv.exe. The file Drawings by STR.txt was created that lists all drawing numbers that were logged in the OSD. Open this file in any text editor (i.e. TextPad) and notice the format of the section, township and range as shown on the first line or see the first listing **1219S19**. Use the find command following this format to locate drawing numbers in a particular section
.
CAD Files (drawings completed prior to 10-01-04) Numerous versions of AutoCAD files created in the past have been copied to Reference\Doc\Pre-Fy05 CAD-CRD-DOC_Only_DWGs.

Because of this duplication it is important that a copy (PDF or Print) be in your possession as a guide for locating the "latest" CAD file. The copy may list the CAD file name in the lower left corner of the drawing. To search this folder, remember, less finds more for most searches. It is not necessary to use the file extension DWG, as all the files in this folder are DWGs. The drawing/parcel number (if used) format, may or may not contain hyphens. Verify with the copy (PDF or Print) that the file you locate matches. This fact should be logged in the Additional Info of your work order. Do not be concerned if external references, fonts or linetypes are missing. Copy the selected CAD file(s) into the appropriate Project subfolder and list under the Additional Information tab in the Work Order following the format listed under STG. Never choose save for an old CAD file that you open or you will alter its original date and time stamp. Also search L:\Survey\Reference\Documents\Pre-FY05 CAD-CRD-DOC\Outsourced.

Land Resources Vault - Contact Carol Daleo, Senior Document Specialist to search these records. Generally, a parcel number is needed. These files contain numerous types of information i.e. deeds (recorded and unrecorded) for lands (fee or easement) acquired or surplused by the District, Management Agreements, and many types of maps including surveys (which may not exist in Survey's records).

6. Post Processing Global Positioning System (GPS) Data from the Garmin 76/60CSx

6.1. Purpose

The files are usually downloaded from the collector by the party chief to the Downloads folder\party chief name\work order number\date. Copy the file to your project folder\GPS\Garmin\date. When GPS data is collected with the Garmin 76/60CSx and downloaded in .gtm format, it must be converted to .txt format to create a shapefile to view in our GIS. This is typically used for Level Circuits. During the course of field collection there may be more than one downloaded file, they may be a continuous collection or they may be independent.

6.2. Convert to a .txt File

Open the GPS TrackMaker program. Setup the GPS TrackMaker program to be in (UTM) Universal Transverse Mercator Coordinates. Go to Tools, Options. Under the Units tab choose Length units Kilometer, Altitude Meter, under the Coordinates tab check at Rectangular Grids and choose (UTM) Universal Trans. Mercator. Go to File, Open File and browse to the location of the .gtm file. Highlight the .gtm file and choose Open. Go to File, Convert Files. Under Origin directory and File Format, browse to the .gtm file.

Under Target Directory and File Format, browse to the same location and for Save as type: GPS TrackMaker Text Format (*.txt). The name of the .txt file will default to be the same as the .gtm file.

Choose Convert, Exit and close program.

Compare the .txt file to the recorded waypoints in the Field Notes. See Appendix for sample of creating .xlsx from this .txt file for shapefile.

7. Post Processing GPS Data from the Garmin 76/60CSx

7.1. Purpose

The files are usually downloaded from the collector by the party chief to the Downloads folder\party chief name\work order number\date. Copy the file to your project folder\GPS\Garmin\date. When GPS data is collected with the Garmin 76/60CSx and downloaded in .gtm format, it must be converted to .txt format to create a shapefile to view in our GIS. This is typically used for Level Circuits. During the course of field collection there may be more than one downloaded file, they may be a continuous collection or they may be independent.

7.2. Convert to a .txt File

Open the GPS TrackMaker program.

Setup the GPS TrackMaker program to be in (UTM) Universal Transverse Mercator Coordinates. Go to Tools, Options. Under the Units tab choose Length units Kilometer, Altitude Meter, under the Coordinates tab check at Rectangular Grids and choose (UTM) Universal Trans. Mercator. Go to File, Open File and browse to the location of the .gtm file. Highlight the .gtm file and choose Open. Go to File, Convert Files. Under Origin directory and File Format, browse to the .gtm file.

Under Target Directory and File Format, browse to the same location and for Save as type: GPS TrackMaker Text Format (*.txt). The name of the .txt file will default to be the same as the .gtm file.

Choose Convert, Exit and close program.

Compare the .txt file to the recorded waypoints in the Field Notes. See Appendix for sample of creating .xlsx from this .txt file for shapefile.

8. Post Processing GPS Data from the GeoXT

8.1. Purpose

When GPS data (point features only) is collected with the GeoXT the raw and shape files are usually downloaded by the party chief to the Downloads folder\party chief name\work order number\date. Copy the files to your project folder\GPS\GeoXT\Raw and Shapefile folders. The shapefile must be spatially referenced and the x and y coordinate values established. The z value will also be established during this process but will not be used since it is too coarse to consider.

8.2. Spatially Referencing the Shapefile

To do this, initiate an ArcCatalog session.

In the ArcCatalog screen, navigate to the folder that contains the shapefile.

Rename the shapefile with a more descriptive name. If a more accurate name is not known at this time, ensure that the shapefile is renamed prior to archiving.

Select the shapefile icon (a green square with 3 dots) displayed in the file structure tree listing (in the window displayed on the left side of the screen).

Right-click on this shapefile icon and select "Properties" from the resulting menu.

Select the "XY Coordinate System" tab from the Shapefile Properties dialog box. The Spatial Reference value, which is unknown, is displayed at the bottom of this field properties listing.

Click on the "Import" button to reveal a "Browse for Coordinate System" dialog box.

Navigate to L:\Survey\Reference\ArcMap\Coordinate Systems\FSPC_REF _W.shp to select the Florida State Plane Coordinate System, West Zone, 902, US Feet and click the "Add" button. Various referencing options are available in this folder. The FSPC_REF_W is the default.

The Details of the Spatial Reference are displayed for review and confirmation.

Click the "OK" buttons to complete the action.

The results are displayed where "unknown" had shown in the shapefile properties dialog box.

Click the "OK" buttons to complete the process.

The shapefile is now spatially referenced.

Confirm that a file with a ".prj" extension has been added to the group of files that make up the shapefile data set by viewing the shape file through a Windows Explorer session.

It should contain the initial three files provided by the GPS device (Point_ge.dbf, Point_ge.shp, Point_ge.shx) and the fourth file added during the spatial referencing process, which should be a Point_ge.prj.

8.3. Add Coordinate Values to Shapefile

Initiate an ArcMap session and open a base map (Survey.mxd), which is located at L:\Survey\Reference\ArcMap\Base Map.

Add the newly created shapefile to this session. Refer to the GIS portion as needed.

Highlight the Shapefile layer in the Table of Contents window by clicking on it.

Select the "XTools Pro" tool bar drop arrow. From the resulting menu, select the "Table Operations" option. From the resulting menu selcet the "Add X,Y,Z Coordinates".

If the "XTools Pro" tool bar options are grayed out and not available for use, go to the "Customize" pull-down menu and select the "Extensions" option and check the box to the left of the XTools Pro option from the resulting menu to activate. This should activate this feature.

The resulting dialog box, called "Add X,Y,Z Coordinates", allows the selection of various settings, such as"Layer"," What point should be taken from" and which coordinate field(s), X, Y, and/or Z should be added and their names.

Click the "OK" button to complete the addition. A progress bar is displayed indicating the execution and completion of this command.

Open the shapefile's attribute table and confirm that the table now contains X,Y,Z fields.

8.4. Mean Coordinates

The points collected should consist of three to four coordinates per location. They need to be analyzed and meaned to determine one set of coordinates per location.

Copy the .dbf file from the shapefile's file set and paste it in to the GPS/GeoXT folder. Rename it Coords.xls.

Arrange the fields in this spreadsheet to separate the various attributes, such as point number, X, Y, Z, description, accuracy reading, logging iterations, operator and date.

Format the cells to display the data only to three decimal places and aligned to the center.

Add a formula to the cell below the X, Y and Z fields to mean (average) the three to four values provided per category.

Use this value in an AutoCad drawing when converting coordinates from a local datum to State Plane Coordinates System or for any other purpose.

9. Post Processing Data Collected with a Ranger or Leica using StarNet

9.1. Purpose

To provide guidelines that enhance the procedure of post processing the conventional data collected with a Ranger or Leica. These files are downloaded by the field crew and can be found in the Projects\Downloads folder.

9.2. Digital Field Files

Copy the most recent digital field files (.job and .raw or .gsi or .lev) from the Downloads folder to the project's Data Collection folder.

9.3. Field Notes

The field notes need to be scanned into Field Notes.pdf and placed in the project's Field Notes folder. Print a copy of these notes to facilitate the review process. When site control is based on adjusted control from another work order, include the pertinent field notes.

9.4. Source Control

The Source Control.pdf should contain only the data sheets of the Vertical and/or Horizontal Control Stations used. A minimum of two are required. This file may be created during the job setup phase but needs to be reviewed/corrected during processing phase.

9.5. Vertical only Data processing with StarNet

Level raw data files are processed with the StarNet-Level Converter, the StarDNA Converter, StarNet and Corpscon programs. The following steps provide a guideline.

9.5.1. Create a StarNet Input File

To convert Topcon level files:

Activate the StarNet-Level Converter to create a .dat file to use in StarNet.

In the "Input Field File" field, select the "Browse" button to navigate to the .raw file in the project's Data Collection folder.

In the "Output Data File" field, select the "Browse" button to navigate the project's Computations folder and name the output data file Original.dat.

Under "Repeated Raw Observation Tolerance Checking" place a check mark in the "Perform Check" box.

In the "Vertical" field, enter "0.006"

In the "Horizontal" field, enter "100" and in the "Units" field, select "FeetUS"

In the "Response to Failed Tolerance" area, select "Error: Do not Generate Output".

Under "StarNet Output File", in the "Unit" field select "FeetUS"

To convert Leica level files:

In the “Input Field File” choose the .gsi or .lvl file in the projects’ Data Collection folder.

In the “Output Data File” select the "Browse" button to navigate the project's Computations folder and name the output data file Original.dat.

Check “Alpha/Numeric”; check “Numeric” and enter 1 to 1000 (or upper limit of point numbers collected).

Check “Change Dash Station Separator to” choose Plus.

Check “Use Word 71 Text” to have descriptions in the raw file appear.

After above settings are chosen:

Click on the "Import" button to initiate the conversion process. This normally takes less that a second to complete and a dialog box indicating the results will be displayed.

An Error Log file is created if the conversion was not successful. If this is the case, review this file, correct the issues identified and attempt the conversion again until a .dat file is created. Do not modify the .raw file. Adjust the settings on the converter and/or seek assistance from the PSM and/or Project/Section Manager.

Once a successful conversion is achieved, the log file will contain a list of the data used to create the Original.dat file. Rename this .log file Raw Conversion-StarNet.log.

Copy the Original.dat file to Modified.dat. This is the file used as the Input source for the StarNet Adjustment process. Do not modify the ORIGINAL.DAT FILE.

9.5.2. Adjustment

Open the MicroSurvey StarNet program, at the “Product Selection” window choose “Pro”. Choose File and New Project to create a .prj file using the Work Order number as the file name. Save it in the Computations folder of your project.

Select "Options", then Projects to open the Project Options window and to establish the settings to use for the calculations.

Select the "Adjustment" tab:

Adjustment Type is Lev and Units/Linear is FeetUS.

Select the "General" tab:

Under Adjustment Solution/ Chi Square Significance Level is 5.000%.

Under Error Propagation, check Perform and set Confidence Level to 95.000%.

In the lnput / Output Coordinate Order section, select North-East and activate the "N" option for the "Label North in Listing as" field.

Select the "Instrument" tab:

Under Leveling, select "Length" as "Sections as:" and "0.050000" as the "Elev Diff:" value.

Select the "Listing File" tab:

In addition to selecting “Coordinate Changes from Entered Provisionals” accept the default options selected unless your project requires other items to be listed.

Select the "Other Files" tab:

Ensure that the "Create Coordinate (PTS) File" option is on and that the "Format" is set to Default.

Under "Default Precisions" section, select three (3) decimal places for both.

Choose “OK” to save and close the "Project Options" dialog box.

Under the ‘Data Input Files (looks like table of contents on the left), click the icon with the red ‘x’ to delete the default .dat file produced. Then in the same group of icons choose the one with the + sign to add the Modified.dat created above. Double click on Modified.dat to see its contents. Under File choose print to help with the review. Compare the data with the field notes and an error report of the .raw file as created with the Survey Link program.

If you change any point names and/or descriptions, document those changes at the top of the file by entering a line that begins with #, your initials, the date and an explanation of the changes ie: #,plw,07-26-11,point KH1=NGS S618. Do not alter the vertical differences or the distances of the observations.

At the bottom of the collected data, enter the published elevations of the Control Stations or the adjusted site control elevations, for example, E KH1 56.38 ! ‘S618.

See Appendix for a sample of a Modified.dat file for a vertical adjustment.

Select the "Run" option from the pull down menu.

Click on the "Adjust Network" option from the resulting menu.

A "Processing Summary" report will be displayed showing the results of the Network Adjustment. A statement of “Chi-Square Test at 5.00% Level Passed” should appear.

If the process is terminated due to errors, a report will detail the causes. To view this report, choose "Output" and Errors.

Review the report and correct the problems in the Modified.dat file and run the adjustment again.

Create a Minimally Constrained Adjustment.pdf where only one control station is fixed and the other(s) are free. Review the .lst file, under the section called “Coordinate Changes from Entered Provisionals” to compare the ‘free’ station to its known value. Print the .lst file as a PDF.

Run a second fully constrained adjustment to determine the final values of the collected data. Go to File, Print, Coordinates and save as Final Adjusted Elevations.pdf.

Review the contents of the .lst file to determine if the expected results at the 95% confidence level are met. The Chi-Square Test should pass. If not, review the Project Options settings, such as, the Elevation Difference setting value of 0.050 feet per mile in the leveling section of the Instrument tab of the Project Options may have to be increased to achieve a passing rating. Contact the PSM and/or the Project Manager for guidance if the results do not meet the expectations.

9.5.3. Use of this data

The deliverable of this data is usually in the form of a certified report. A shapefile is made of the adjusted NAVD88 elevations, their conversion to NGVD29 and the horizontal locations.

9.6. Horizontal 3d Data Processing with StarNet

Raw data files of horizontal field work are processed with the Star*TDS-Horizontal Converter, the CorpsCon Transformation and the StarNet Least Squares Adjustment programs. The following steps provide a guideline.

9.6.1. Create a StarNet Input File

Activate the Star*TDS-Horizontal Converter to create a .dat file to use in StarNet.

In the "Input Field File", select the "Browse" button to navigate to the .raw file in the project's Data Collection folder.

In the "Output Data File" field, select the "Browse" button to navigate the project's Computations folder and name the output data file Original.dat.

In the "Angle Data Station Order" section, select "From-At-To"

The "Output as 2D Data" option should be unchecked since all horizontal data should be collected in 3D.

The "Use Set Readings to Create M lines (RAW Files)" option is checked when needed. If this option is selected, the "Average Shots in Multiple Sets" option will be available.

The "Special Sideshot Handling" option allows the "Creation of M Lines for Redundant Sides shots or for All Sideshots". Select as needed.

The "Include Stakeout Data as Sides shots" option is available

The "Include Field File Notes" option is available but do not ‘check’

The "Change Dash Station Separator to:" option is used only when a change is needed in the separator. The dash is the default separator

Select the "Import" button.

An "Error" warning appears if the conversion is stopped. The "Warning" notifies you that no output data was written and errors are posted. It asks to view the log file.

Review the error log, correct the problems with the input file and re-run the conversion. Repeat this process until an output data file is written. Do not modify the .raw file. Seek assistance, if needed, from the PSM and/or Project/Section Manager to determine how to correct.

Once the data file (Original.dat) is created, make a copy of it, rename it "Modified.dat" and place it in the same folder.

Rename the .log file created by the conversion process under Data Collection to "Raw Conversion-StarNet.log" and move it in the Computations folder.

9.6.2. Adjustment

Open the MicroSurvey StarNet program, at the “Product Selection” window choose “Pro”. Choose File and New Project to create a .prj file using the Work Order number as the file name. Save it in the Computations folder of your project.

Select "Options", then Projects to open the Project Options window and to establish the settings to use for the calculations.

Select the "Adjustment" tab.

Select "3D" as "Adjustment Type" if the input file contains 3D data as it should.

Select "FeetUS" as the "Linear Units".

Under the "Coordinate System" section, select "Local", if the coordinates are assumed.

If the coordinates are in FSPCS, select "Grid" and pick "NAD83" from the menu.

Select the "Press for Zone List" button to select the local zone from a resulting menu when a grid is chosen. We are in 0902 Florida West.

When the "Local" option is used, The "Local Jobs" section is activated and the "Apply an Average Scale Factor" option is the default setting with a value of 1.000000000. Accept this setting for most jobs. These choices are not an option when the "Grid" option is selected.

Select the "General" tab

The "Adjustment Solution" settings should be:

Convergence Limit = 0.010

Maximum Iterations = 10

Chi Square Significance Level = 5.000

Set the "Error Propagation" to "Perform" at a "95.000% Confidence Level".

In the "lnput/Output Coordinate Order" section, select "North-East" and activate the "N" option for the "Label North in Listing as" field.

In the "Angle Data Station Order" section, select the "From-At-To" option.

In the "Distance/Vertical Data Type" section, select the desired format by choosing either the Slope Dist/Zenith or the Horiz Dist/Elev Diff option. Typically choose Slope Dist/Zenith.

In the Earth Radius/Refraction Information section, accept the "Earth Radius of Curvature for local Jobs" value of "6372000.000 meters" and the "Default Coefficient of Refraction" value of "0.070000"

Select the "Instrument" tab

In the "Conventional" section, accept the default settings or set specific values

for:

Distance Constant = 0.030000 FeetUS

Distance PPM =5.000

Angle = 4.000000 Seconds

Direction =3.000000 Seconds

Azimuth/Bearing =4.000000 Seconds

(All) Centering Errors = 0.02000 FeetUS

If the data being processed is 3D, that is, includes vertical values, additional settings are needed, such as:

Zenith =10.000000 Seconds

Elev Diff Constant =0.050000 FeetUS

Elev Diff PPM =5.000

Select the "Listing File" tab

In addition to selecting “Coordinate Changes from Entered Provisionals” accept the default options selected unless your project requires other items to be listed.

Select the "Other Files" tab

Ensure that the "Create Coordinate (PTS) File" option is on and that the "Format" field is comma delimited format.

In the "Default Precisions" section, select three (3) as the number of places that the data is reported.

Close the "Project Options" dialog box

Under the Data Input Files (looks like table of contents on the left), click the icon with the red ‘x’ to delete the default .dat file produced. Then in the same group of icons choose the one with the + sign to add the Modified.dat created above. Double click on Modified.dat to see its contents. Under File choose print to help with the review. Compare the data with the field notes and an error report of the .raw file as created with the Survey Link program.

Remove the pound sign (#) from the front of the ‘C’ lines of the traverse points to be ‘held’ for adjustment. If you change any point names and/or descriptions, document those changes at the top of the file by entering a line that begins with #, your initials, the date and an explanation of the changes ie: #,plw,07-26-11,point KH1=NGS S618. To save your changes, under File choose Save Data File.

See Appendix for a sample of a Modified.dat file for a 3d horizontal adjustment.

Select the "Run" option from the pull down menu

Click on the "Adjust Network" option from the resulting menu

A "Processing Summary" report will be displayed showing the results of the Network Adjustment.

If the process is terminated due to errors, a report will detail the causes. This report can be viewed through the "Output" tab.

Review the report and correct the problems in the Modified.dat file and run the adjustment again.

Continue this process until the adjustment is successful.

Special attention is needed when reviewing the contents of the Processing Summary Report on the Chi-Square Test passing or not. The Conventional settings of the Instrument tab of the Project Options may have to be modified to achieve a passing rating. The PSM and or the Project Manager should be consulted when the data won't adjust or the settings need altered.

Create a Minimally Constrained Adjustment.pdf where only one control station is fixed for elevation and two control stations are fixed for horizontal (or one yx is fixed and a bearing is fixed) and the other(s) are free. Review the .lst file, under the section called “Coordinate Changes from Entered Provisionals” to compare the ‘free’ station to its known value. Print the .lst file as a PDF.

Try to ‘fix’ as many yxz values as possible in the control points and still pass the Chi-Square Test at 5.00%.

Once an adjustment is achieved, the results can be viewed through the "Output" tab.

Run a fully constrained adjustment to determine the final values of the collected data. Under “File”, select “Print”, select “Coordinates” from the column to the left and print as a PDF named “Final Adjusted Coordinates.pdf”.

9.6.3. Use of this data

The deliverable of this data is usually in the form of a spreadsheet that is part of the certified Survey Report.

10. Post Process MFL Riverine 3d Data Collection

The horizontal control was established with RTK and adjusted in the Control work order(s). The level circuit to control point(s) at each transect was collected and adjusted in the Control work order(s), or the vertical results from the RTK collection are used.

Data Collection folder: Copy the latest most complete .raw and .job file(s) from the Downloads folder(s). If more than one raw/job file is needed for the total collected data, make subfolders by party chief or date.

Field Notes folder: Scan and review the Field Book pages for all horizontal and vertical collection for the site, check the work order to ensure all necessary pages have been recorded. Review field notes for completeness.

Computations folder: Create an Original.dat with the MicroSurvey StarNet Horizontal converter for each raw file that was copied to the Data Collection folder for the topo collection, there may only be one. If there is more than one, add the party chief initials or date if only one chief and multiple dates (at the end). Copy the Original.dat and rename as Modified.dat. If there are multiple Original.dat's, combine them into one Modified.dat. Review the Modified.dat vs the field notes and consultants list of flags, if supplied, for any corrections needed for typo's, complete descriptions, HI, HR, etc.

First view the .raw file in Survey Link to review for any points that were overwritten (you will need the ForeSight key in your computer): choose Reports, Error Wizard, under Type of Error check all three, hit OK.

Check that the xy values being held or allowed to be free in the Modified.dat match the adjusted RTK xy values. Check that the adjusted elevation(s) held are from the StarNet level adjustment or from the RTK collection. Process with StarNet.

Open the (work order #).pts file containing the topo collection in an xlsx spreadsheet, add a column before the NAVD elevation column. Delete any rows that are BS's, instrument set up locations, FS's to control. Save it under the Tables folder as NAVD.xlsx. Copy/paste all data into the template MFL Riverine xlsx file that has been copied from L:\SURVEY\Reference\Documents\Forms\Survey Reports\Tables\ to your project Tables folder and named for the project.

In the xlsx file named for the project:

Move our topo descriptions to the Description column and spell out all abbreviations i.e.:(GS is Ground).

If the consultant's flag # is used as a point #, copy it to the Flag Number column.

If consultants set Nails in trees for Hydrologic Indicators and the nail was not located in 3d, copy the xy values for the Ground shots at the Hydrologic Indicator(s)(collected with the topo) to the Hydro Indicator(s) shots on nail in tree (collected in the level loop).

If the eye bolt on both sides of the river were not located with 3d, fill in the elevation for Eye Bolt(s), use the NAVD88 elevations from the StarNet .pts file and the xy from the ground shot at the eye bolt in the topo file. If only a 'tag' was found in field (not an eye bolt) then only a ground shot at that location was collected.

In the first column, 'Point ID', use the same point # as field crew used.

If any consultant flags were not found state it in the Work Order, Additional Information and include that information in the deliverable email, no longer state in the xlsx. Save.

To create NGVD29 elevations: Open the NAVD.xlsx. Remove the blank column before the NAVD elevation and the description column. Save under the Computations folder as NAVD.csv (comma delimited), rename the file extension to .txt.

MAKE Adobe your default printer. Convert in Corpscon(See the How To). The settings are State Plane Feet for input and output, the input elevations are NAVD88, the output elevations are NGVD29. The output file will be saved in the Computations folder and named Data Transformation.txt. Go to File, print to Adobe and save as Data Transformation Report.pdf.

Open the Data Transformation.txt file in excel, copy the NGVD29 elevations from the Data Transformation.txt file into the project xlsx.

Make sure that any 'comments' in cells have been deleted, these are only for production.

Documents folder: Create a Survey Report.docx by copying the template Survey Report - MFL Riverine.docx from L:\SURVEY\Reference\Documents\Forms\Survey Reports.

Shapefile folder: Copy the project xlsx to the Shapefile folder. Open it and remove lines above headers (Point ID etc) and disclaimer. Save as file type csv. and then rename the file extension to .txt. Open the .txt file in Excel and save as file type xlsx. (This will hold the accuracy of the x,y,z's that we show on our spreadsheet.) See the How To to create shapefile from xls. Create a Geospatial Origin.txt file. Review the location and adjusted elevations of the points in ArcMap and note the Section, Township, Range, County, Basin for entering into the work order, report and spreadsheet, as needed.

The QAQC folder: Create a Peer Review.pdf file (a pdf of the report and the xlsx, note that the date, time and size of the xlsx is now in the report, so don't save it when prompted).

To review the cross section results of the 'ground' type locations in the project spreadsheet: In a new TBC project for the work order, import points with Ground type descriptions only as a surface. To create this file to import, copy the .pts file under Computations and remove BS, set up, FS on control named as Points for TBC.pts. Go to Surface/Surface Slicer View and the cross section view appears below the plan view. Click in the From box and with your snap settings set to point and surface, pick a starting point for the cross section in the plan view. Then pick the ending point. Use FullShot to capture the cross section including grid numbered increments of elevation and distance. Copy the image from FullShot and paste into a Word document named Cross sections from TBC.docx in the Computations folder. Make a statement above each image i.e. Upstream side of the Westerly bridge, from north to south, to describe the location of the cross section and the direction of the 'cut', in this example from north to south the first point to the north will appear at distance zero.
After the Peer Review is complete, create a Final Review.pdf. Update the Project Schedule.xlsx, under the Reference folder, with dates of completed processing and Peer Review. Send the work order to the signing surveyor for Final Review and signing.

11. Post Process Well-Gauge-Benchmark Data Collection

The horizontal locations are established with RTK/RTN GPS collection. The vertical data are established with a level circuit using the RTK/RTN GPS derived elevation of a new benchmark constructed on the site, a published elevation of an existing benchmark on the site or a published NGS benchmark nearby.

Data Collection folder: Copy the latest most complete .raw and .job file(s) or the .gsi file(s) from the Downloads folder(s). If more than one raw/job/gsi file is needed for the total collected data, make subfolders by party chief or date.

Field Notes folder: Scan and review the Field Book pages for all horizontal and vertical collection for the site, check the work order to ensure all necessary pages have been recorded. Review field notes for completeness.

GPS\RTK-RTN\Raw folder: Copy the latest most complete .raw, .job and .csv file(s) from the Downloads folder(s). If more than one raw/job/csv file is needed for the total collected data, make subfolders by party chief or date.

GPS\RTK-RTN\TBC folder: if there were no redundant locations of the wells/gauges/benchmarks, copy the .csv file(s) from the \Raw folder, remove all lines except the wells-gauges-benchmarks, save as RTK GPS Report.xlsx and print to Adobe as RTK GPS Report.pdf.

Computations folder: Create an Original.dat with the MicroSurvey StarNet Level converter for each raw file or with the MicroSurvey StarNet DNA converter for each gsi file that was copied to the Data Collection folder for the level circuit(s), there may only be one file. If there is more than one file, add the party chief initials or date if only one chief and multiple dates (at the end). Copy the Original.dat and rename as Modified.dat. If there are multiple Original.dat's, combine them into one Modified.dat. Review the Modified.dat vs the field notes for any corrections needed to Point numbers or descriptions. Enter the z values being held or allowed to be free in the Modified.dat from the published or established benchmarks. Process with StarNet as Vertical only Data.

Tables folder: copy the template for the spreadsheet named Well Measure Points-Ground-Gauge Data Form.xlsx and rename as for the project. Enter the well and/or gauge and ground horizontal and vertical data and complete the table. To obtain the latitude, longitude and NGVD29 values use Corpscon. The Corpscon settings are State Plane Feet for input and Geographic in degrees minutes, seconds for output, the input elevations are NAVD88, the output elevations are NGVD29. The output file will be saved in the Computations folder and named Data Transformation.txt. Go to File, print to Adobe and save as Data Transformation Report.pdf.

Documents folder: copy the template for the Survey Report named Survey Report - Vertical Control - Project.docx and rename as Survey Report.docx. If the project includes the setting of benchmarks, copy the template named Number_BM.docx and rename per the benchmark number.

Shapefile folder: Copy the project spreadsheet to the Shapefile folder. See the How To to create shapefile from a spreadsheet. Create a Geospatial Origin.txt file. Review the location of the points in ArcMap and note the Section, Township, Range, County and Basin for entering into the work order and the Surveyors Report. Create the aerial overlay for the Surveyors Report. If the project includes the setting of benchmarks this aerial overlay well be used in them as well. If the benchmark(s) will require a 'to reach' statement on their form(s), note the roads and measure the mileage to the benchmark.

QAQC folder: Create a Peer Review.pdf file (a pdf of the report and the spreadsheet, note that the date, time and size of the xlsx is now in the report, so don't save it when prompted). Create a pdf of each benchmark form.

After the Peer Review is complete, create a Final Review.pdf and send the work order to the signing surveyor for Final Review and signing.

12. Post Processing GPS Static Data with Trimble Business Center (TBC)

12.1. Mission Planning is very important in planning your session. Use the station editor to add all of the Latitudes, Longitudes and heights of your control points and the estimated Latitudes, Longitudes and heights of all your new control points. Use the Multistation Analysis tool to add all of the points in you sessions, set the time, date, duration and interval to the desired values then view the desired graphs to plan your mission. Before each planning session load, a current almanac file. You can download one from Trimble at http://www.trimble.com/gpsdataresources.shtml you can name the file with the Julian date (day of the year) to track its age; they are good for approximately thirty days.

12.2. Download the Receivers using the **Trimble Data Transfer** program prepare a folder for each of the receivers files under the sessions folder create a date folder in this format month, day, year, Julian date [*May 5 2009 (124)]* inside of this folder create a folder for each unit in this format unit number and station name [*Unit 1 (S13 038)].* You will need a Trimble LIMO to 9 Pin cable hooked up to a comm. Port one on your workstation. Plug this cable into port B on the receiver power on connect and download the files. After you have verified a successful download, delete the files on the receiver.

12.3. Prepare the Project files first by downloading and saving only the control data sheets used from the national geodetic survey as HTML files use the station name as the file name (V 675.html). You can save these to a temporary location, as they will be imported into the project point files. Create a new project in Trimble Business Center then open the project settings and select a coordinate system. We will normally be using U.S. State plane 1983 for the group, FL-W 0902 for the zone and the latest geoid file for the continental United States now save the project. The other setting can be changed at anytime for now leave them as default. Browse to the location of the HTML control files and import them. They will appear as Local points in the project you can assign a control quality to each part of the coordinate now (sometimes this will be done automatically when importing the html file).

12.4. Downloading and Preparing Continuously Operating Reference Stations (CORS) Data. You can augment your GPS project with data from CORS around the project. This data can be downloading from NGS in RINEX format. There a multiple ways to get this data from NGS but, I prefer to use the User Friendly CORS website http://www.ngs.noaa.gov/UFCORS/ . You will need to know the date, start and end times of your sessions in order to download data that is simultaneous with yours. Once you enter the date and time you will be prompted for the station name you will want to set the sample rate the same as what you collected standard is 15 seconds between data points. You can choose to download a coordinate file, a meteorological data file, the data sheet and Orbit file info I would suggest downloading all of these files they will

be included in the zip file you will download. Unzip these files into the appropriate folders (*see* "**Download the Receivers** using the **Trimble Data Transfer"** *above***).**

12.5. Processing the Baseline starts with importing the GPS data files. Select import then browse to the correct location and import the desired receiver files one at a time. After import of each file, the receiver raw data file check in menu pop up. Use this to add the point ID and feature code you can verify start, stop times and durations. You can also verify antenna type, serial number and height, also receiver type and serial number. Two meters measured to the bottom of the antenna mount should always be the height. The point ID should always match **exactly** the name of the imported control point html file. The point ID for each session (multiple sessions) on any point **must match exactly**. When you have checked all the raw data save the project repeat this process for each session file. Now you are ready to run Project computation and import reports, review any errors or flagged items fixing if necessary. Now you are ready to select "**process baselines**" and view the processing results. Make sure you review the results before you save the processed vectors, ensure all the baselines have a fixed solution, good RMS and precision then save the vectors (you can clear the results and process again if needed). Now run a baseline processing report and analyze the results, also run a point derivation report on all of the points and a loop closure report. Look at any flags, most of these are usually for points out of horizontal and or vertical tolerances caused by improper selection of the control quality for points. When everything has been checked and or addressed, you are ready to adjust the Network.

12.6. Select Adjust Network and then project settings you can enter estimated setup height and centering errors, a good default would be 0.0033 US Survey feet. Now select the control point and what components of it you want to fix for the minimally constrained adjustment "2D" fixes the horizontal position, "h" fixes the ellipsoid height and "e" fixes the elevation. When you have fixed control coordinates run the adjustment if any unresolved errors exist a warning will appear, you can ignore or stop and fix them.

A summary of the results will appear in the adjust network dialog box. Run a "**Network Adjustment Report**" check your results for any problems if everything looks good you are ready to apply a weighting strategy.

The network reference factor of the processed vectors is listed on the weighting tab; the goal is to get this factor to 1.00. Select the "*" field of the processed vectors this will compute a new scalar using the last adjustment. This new number will be applied to the initial error estimates for all the processed vectors. Re-compute the minimally constrained adjustment the reference factor will change and the Chi Square should pass now. You are now ready for the "**constrained adjustment**". Generally we want constrain local (2D/h) values first and then constrain Grid (e) NAVD88 values. When you are trying to produce (e) NAVD88 values, only fix the horizontal control as (2D) while fixing the (e) NAVD88 elevation of the benchmarks. Run the network adjustment again and review the adjustment report and the error ellipses. In the report, view the "**adjustment statistics**" this illustrates the fixed values as well as the adjusted grid coordinates. Open the flags dialog box and look for any errors. Run a point derivation report to help track down any tolerance issues if necessary un-fix any values that may be suspect or out of tolerance; if any change were made recomputed the project by selecting compute project. When adjustment is complete generate a point list report

and then export an ASCII file of the points, select export from the project menu then select a format and a location for the file and you are done.

12.7. Static GPS Report

This PDF file should contain a compilation of all the reports generated for a Static job, bookmarking each specific report/file.

Examples:

Baseline Processing Report.pdf: This file is created after the baselines have been processed in the project to capsulate the solution types, precisions, and an acceptance summary for the processed baselines. It should also include detailed reports for each processed session as well.

Export Points List.pdf: This file should be created from the text file (.csv) generated from the "Export" option under "File" of the main menu bar. The format should be P,N,E,Desc Code.

Loop Closure Report.pdf: Contains loop closure analysis of all the baselines in the project that have been processed and saved.

Point List Report.pdf: Contains a simple summary of the coordinates for each point in the project.

Project Computation Report.pdf: This report contains a summary of the errors and warnings that occurred during computation of the data.

Renamed Point List.pdf: Only created if any points are renamed to see a simple summary of the original and new names of points.

Vector List.pdf: This report should contain a review of the solution types and precisions for all the vectors created from processed baselines in your project.

13. Post Processing GPS RTK/RTN Data with Trimble Business Center (TBC)

13.1. Mission Planning

It is very important in planning your session. Use the station editor to add all of the Latitudes, Longitudes and heights of your control points and the estimated Latitudes, Longitudes and heights of all your new control points. Use the Multistation Analysis tool to add all of the points in you sessions, set the time, date, duration and interval to the desired values then view the desired graphs to plan your mission.

Before each planning session load, a current almanac file. You can download from Trimble at http://www.trimble.com/gpsdataresources.shtml you can name the file with the Julian date (day of the year) to track its age; they are good for approximately thirty days.

13.2. Using Trimble Business Center (TBC) to review RTK/RTN data

Step one is to create a project (named as the work order number) using the appropriate settings for your geographic location. Under File, New Project, Blank Template. See Project settings for TBC project template.docx".
Normally the project setting would be as follows:
Coordinate system group = US State Plane 1983

Zone = Florida West 0902

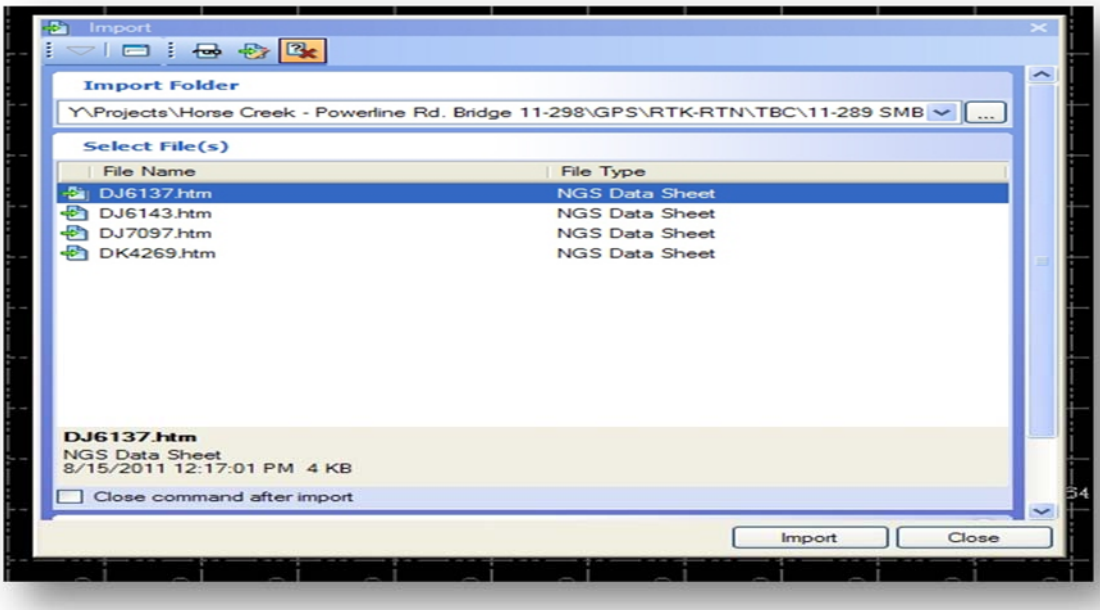
Datum transformation = NAD 1983 (Conus) (Molodensky)

Geoid Model = GEOID09 (Conus)

Under File, Save as Template, use your name as the file name, it will be saved automatically under C:\Documents and Settings\your name\Application Data\Trimble\Trimble Business Center Survey\'numbered file name'\.vct.

Step two is to download the individual datasheets used for control from the National Geodetic Surveys (NGS) website. Save the data sheets to the project folder in HTML format naming the file with the PID. Now select import.

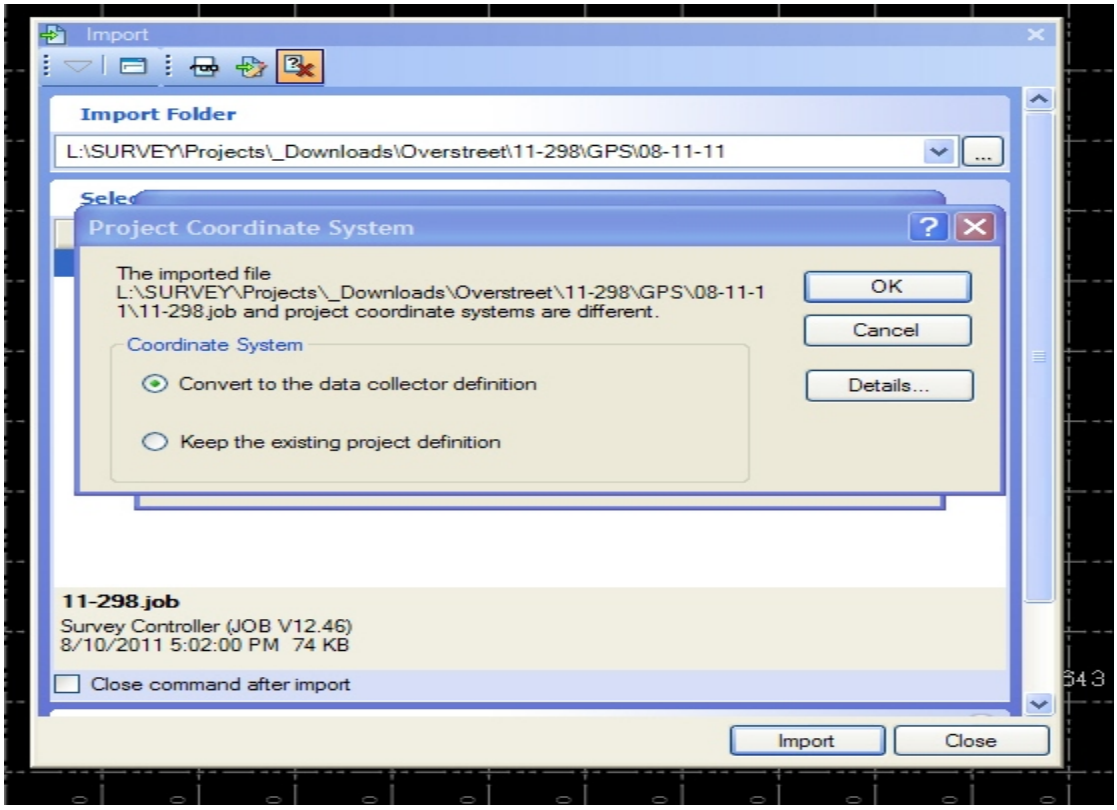
Import can be selected by the icon  or be selecting import from the file menu. Once selected a separate import window will pop up use the browse button to navigate to the location of the files, if the files have already been imported the import icon will appear next to the file name.



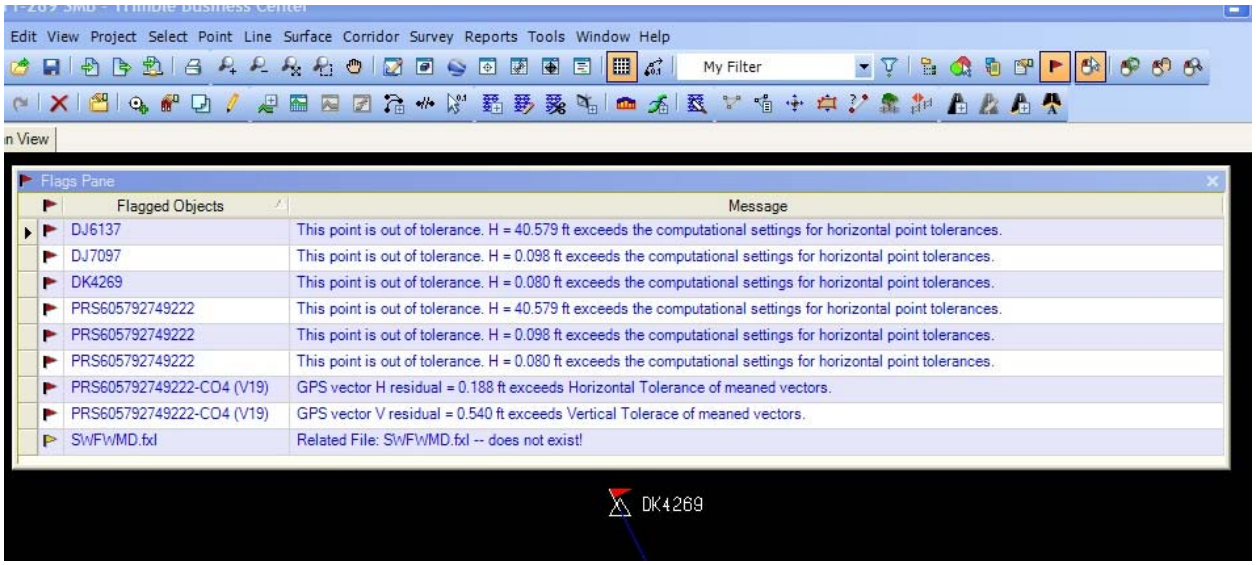
Step Three is to import the job file that was downloaded from the survey controller before this however; you will need to review the field notes and the "*GPS-Averages.txt*" file to verify that point numbers and descriptions are correct. The GPS-Averages file lists the points collected in chronological order making it easy to follow along with the field notes. All of the redundant shots can be verified while paying close attention that all point numbers and descriptions are correct and match the

order in the field book. This file also contains important information about the quality of each point pay close attention to Epochs, Min, SVs and RMS. Make note of any point number and or descriptions that need editing and any points with poor results. Now follow steps outlined to import *job* file.

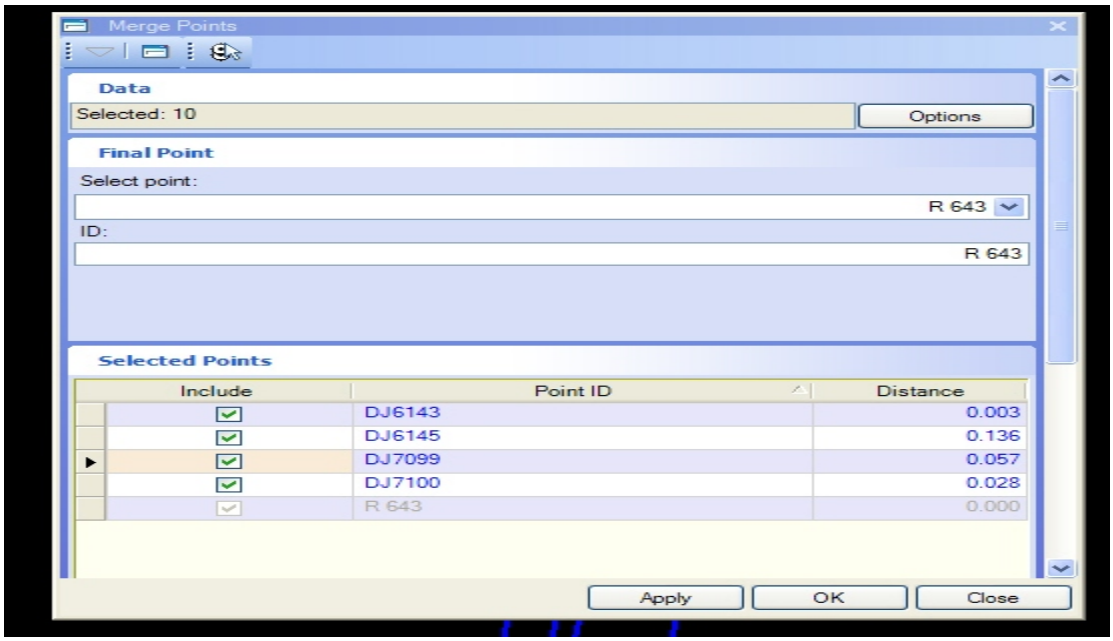
After import you may be prompted to change the project coordinate system. Pick "*Keep the existing project definition*"



After import view the Flags Pane by selecting it from the View menu this will show you any points that are out of tolerance and any other items that may need your attention.



Step Four is to analyze all of the check shots taken on the existing NGS control. This may require you to merge points that were collected on the same physical point but with a different number. Select the points by making a window around them now by select "*Merge Points*" from the points menu. You will be prompted to choose the final point number designation of the selected points this will generally be the station name from the imported html file of the datasheet. In the merge points dialog box all of the points selected will be listed along with the horizontal distance from the published point. You may exclude any obvious outliers by un-checking them however; when analyzing checks to control points leave all shots in the merge so that they can be further studied in the Point Derivation Report that will be prepared in the next step. When you have to merge new control points set by our crews you want to exclude any outliers so that they do not degrade the positional accuracy.



After all of the check shots to the control have been merged you are ready to prepare Point Derivation Reports for each point collected.

Step Five consists of preparing Point Derivation Reports these reports will help determine the positional accuracy of each point collected. When establishing a new point, the software will take the average of the redundant shots and compare those values with the values of each redundant shot. When an existing NGS control point is collected the redundant shot values are compared to the published values. Select all points and under Report, go to Point Derivation Report, save it as Points Derivation Report.pdf.

Step Six, under Reports go to Point List and save it as Adjusted Point List.pdf

14. Post Process GPS RTK Leica Viva collection

Using the full version of Leica Geo Office (LGO) create a project under the LGO folder, this one project will contain all of the sequential daily field data collections. Set the coordinate system to FL W NAD83G12. See STG for file/folder naming.

Import raw data, file type is SmartWorxs.

Choose the Points tab at the bottom, select Local Icon (up top and right of 'boxed number 84'. This will give you a point list in State Plane Feet. Edit the NGS collections for their Latitude, Longitude and Ortho height to match their data sheets.

Under Tools, Compute Geoid Separations.

Export to your LGO folder as ascii (.csv) format, include "SPF and the date of the download" in the file name. For multiple days of collection, choose Settings in this Export window and also choose 'time' to be exported with the default headings. All points will be part of the export, including all/any 'search' points supplied to the field crew.

Select Global (up top) for Latitude/Longitude to be in the export .csv file, include "latlon and the date of the download" in the file name.

To delete a point go to GPS-process tab, right click on the point number, delete, then under Tools, Compute Geoid Separations.

Evaluate each collected point, on the Points tab double click on point #, Mean must have at least 2 bases, review horizontal (posn.diff) and elevation (hgt. Diff). Point class should be Average.

15. Post Processing GPS vectors with MicroSurvey StarNet

15.1. Purpose

The Trimble Business Center (TBC) program is used to create a file that contains the baseline vector's data file in an ascii\text format that is used as an input source for the MicroSurvey StarNet program. The following guideline describes the process.

15.2. Create a Baseline Vector File

Open the TBC program and create a new project. A "New Project" dialog box appears that allows the selection of a Name, Template, Displays details and allows the selection of a folder destination where the project's files will be stored.

Set the project details, coordinate system, units and format, features, reporting and re-compute options at the Project Properties dialog as required based on the project.

Place copies of the .dat files resulting from the sessions, which are stored in the Downloads folder of the party chief who did the work, in a subfolder of the GPS folder named Sessions. The .dat files should be sorted by the session number and the day. Copies of these .dat files should also be placed in the Checkin subfolder of the newly created TGO project files.

Import Data -Add these .dat files to the new project. This is done by selecting the "Import" option from the left side of the TGO screen. A new set of options icons will be displayed. Select the "DA T File" icon by clicking on it once. This action will result in a dialog box opening that displays the "Checkin" subfolder and its contents.

The .dat files that were placed there in an earlier step are now displayed and ready to be selected for import. The .dat file's name is composed of the last four digits of the receiver's serial number, the Julian date and time of the session. Select all of the .dat files needed by clicking on them and then click the OK button.

A "DAT Checkin" dialog box appears displaying the .dat files selected. They are now ready to be added. The "Use" option is selected by default. Edit any of the fields displayed as needed. The "Name" and "Feature Code" fields usually have to be edited to correct inaccurate entries during the collection process and to comply with more logical naming and code conventions. Complete the import process by clicking the "OK" button. The results will be displayed on the screen as grey lines and symbols.

Select the lines on the screen by using a pick window from bottom right to top left. The selected lines will now be displayed in red.

Select the "Process" button from the left side of the screen and three different icons will be displayed.

Select the “Process GPS Baselines" icon. A "GPS Processing" dialog box will display the progress and the baselines being created.

Once completed, it will show the baselines created with various details. Messages generated during processing will be prompted to be seen. Select the "Yes" button on the Prompt to view the messages. The Baseline Processing Log will display for your viewing. Once done, close the html viewing screen and the GPS Processing dialog box is still open.

Select the "Save" button to preserve the processing results. You will be prompted that Re-compute errors messages have been detected do you want to view? Select "Yes" to view as needed. An html view screen will appear with the Re-compute Report details. Once read, close the html screen and return to the main view.

15.3. Export a Baseline Vector File

Select "File" from the pull down menu and then "Export" from the resulting menu. The "Export" dialog box displays many files format options to choose. Scroll down to the second from the bottom and select "Trimble Data Exchange Format" (*.asc). Accept

the Export default of Selection" versus "Whole database". Click the "OK" button to continue.

The "Save as" dialog box allows the naming of the .asc file that will be created and where it is stored. Accept the default storage location, which is the Export subfolder of the TGO project files. The exported file contains the baseline data needed to create the vectors that will be used in the Least Squares Adjustment process using the Star*Net-Pro software.

15.4. Run an Adjustment

Activate the Star*Net-Pro Program. Create a project by selecting "File", then New Project. The "Open New Project" window appears with the StarNet folder selected as the default storage location. Navigate to the location of the current project and store these files in the GPS subfolder named StarNet.

Select "Options" to display the "Project Options" window. Under the Adjustment Tab, set the Adjustment Type as 3D, Units as FeetUS, Angular as OMS, Coordinate System as NAD83 (0902 FL West) and the Grid Jobs Average Geoid Height as 0.00 (Meters) when geoid modeling is performed. When geoid modeling is not performed, the value set here will be applied to all stations in the network.

Under the General Tab, "preference" type settings are established that are very general in nature and seldom need changing during the life of a job. Refer to Chapter 4 of the Star*Net Standard Reference Manual, page 20 for a detailed explanation of the settings.

Under the Instrument Tab, the standard error values set for most types of conventional and leveling observations will not have any relevance in the adjustment since this project has only GPS vectors.

Under the Listing Tab, these settings allow the control of the contents and appearance of the listing file that results from an adjustment. Some sections will be listed only if applicable to a particular kind of run. Refer to Chapter 4 of the Star*Net Standard Reference Manual, page 28 for a detailed explanation of the settings.

Under the Other Files Tab, additional output files are selected to be created during an adjustment. Refer to Chapter 4 of the Star*Net Standard Reference Manual, page 31 for a detailed explanation of the settings.

Under the Special Tab, special features not specifically related to other project options are set. Positional Tolerance Checking and Check Sideshots are the two options. Refer to Chapter 4 of the Star*Net Standard Reference Manual, page 35 for a detailed explanation of the settings.

Under the GPS Tab, settings that control GPS vector weighting, centering errors, transformation solving are established. If the vectors imported have supplied weighting, do not set any standard error defaults nor apply them. Refer to Chapter 3 of the Star*Net-Pro Professional Edition Supplement Reference Manual, page 12 for a detailed explanation of the settings.

Under the Modeling Tab, the Perform Geoid Modeling and Perform Vertical Deflection Modeling options can be selected. When an option is selected, the folder that contains the .ght and/or .vdf file has to be selected. Refer to Chapter 5 of the Star*Net-Pro Professional Edition Supplement Reference Manual, page 35 for a detailed explanation of the settings.

The input file must now be created using the .asc file previously created with TGO. Select the "Input" Option on the pull down menu, and then select the "Import GPS Vectors" on the resulting menu.

The "GPS Vector Importer" dialog box is displayed. Select the "Import" tab.
In the "GPS Baseline Format" field, select Trimble Geomatics Office from the pull down menu options.

In the "Project Folder" field, the path to the project folder is displayed. Modify as needed.

In the "Import Vectors 10" field, enter the number that the vectors identification sequence should begin. This would normally be 1 and the subsequent vector number would increase from here.

Click on the "Select Baseline Files" button.

Navigate to the TGO Export folder that contains the .asc file previously created and select it by clicking on the "Select" button. The selected file will now be displayed in the window.

Select it by clicking on it and then also click on the "Import" button. The .asc file will now be converted into a .gps file that contains the baseline vectors. The progress and results of this conversion will be indicated in the "Files Read" and "Vectors Imported" fields of the "GPS Vector Importer" dialog box.

The resulting .gps file will now be listed in the "Input Data" screen. To view this screen, select "Input" from the pull down menu and then select "Data Files" from the resulting menu.

The control points need to have fixed XYZ stations in order to successfully adjust the data. An additional .dat file may be created and added to the Input Data Files to constrain (Fix) the adjustment where the coordinates and elevations of the NGS control points have fixed XYZ stations. This can be a separate file or the data lines may be added to the existing .gps file that contains the vectors.

Run minimally-constrained adjustment (contains a single fixed station only) first to make sure the observations fit together geometrically before attempting a fully-constrained adjustment.

A fully-constrained network contains at least two fixed horizontal coordinates and at least three fixed elevations. Solving for scale and three rotations of the vectors during the adjustment can usually be performed during a fully-constrained network.

Solving for transformations (scale and three rotations) will "best fit" the vectors to the constrained network stations to compensate for systematic errors or biases that may exist in the vector data.

A Geoid model is needed. The Florida.ght file should have been selected during the setting of the "Modeling" tab in the Project Options dialog box. Ensure that this is done before running the adjustment.

Select the "Run" option from the pull down menu and select "Adjust Network!" from the resulting menu to execute the adjustment.

A report is displayed on the screen indicating the progress. The elapsed time is usually zero. The process is instantaneous.

If the process is terminated due to errors, the details are listed in the error log. If the process is completed, the total number of iterations that the solution converges, a statistical summary and whether the Chi-Square Test passed or exceeded the bounds are displayed. The details of a successful network processing are listed in the Output files.

Review the output listings by selecting the "Output" option from the pull down menu. The resulting menu allows the selection of a listing, a coordinate or a plot file.

When the processing was terminated due to errors, the only file available is the Error Log. Warnings and errors will be identified to allow correction. Run the adjustment again once the issues have been addressed. Continue this process until the data is processed successfully.

The coordinates file shows the applicable, adjusted values (XYZ).

The plot file shows a graphic plot of the network provided XY values are present.

The listing file contains summaries of files used, option settings, unadjusted input observations, adjustment statistical summary, adjusted elevations and error propagation, adjusted observations and residuals.

15. Post Processing Leica Level with Leica Geo Office (LGO)

File, Open projects, (if one appears for your project under Downloads delete it from the Downloads and in LGO under Open projects click on the project, right click and choose ‘unregister’).

To create a project under your project folder, File, New, name per the work order number.

Import, navigate to your project Data Collection folder and click on the .gsi file.
The Assign box opens, choose the project you made above.

Note: if the data does not appear in US feet, go to Tools, Options, Units and set to US feet, also set the linear decimal to 3.

The ‘help’, ‘Level Tour’ is helpful to navigate the tabs, setting the ‘Point Class to Control’ for held points. To change to elevation of the Control points, right click on the ‘cell’ for the elevation and type in the correct number.

Note: there is an eight character limit to the point names, if in the case of a benchmark where ‘SID’ may be included, right click on the point name and type in the BM number without ‘SID’.

Note: the ‘tools’ for level process are across the top.

Click on the ‘Process’ tool, then click on ‘Store’, then export to your Computations folder as .csv format. Then click on Summary in the table of contents, file, .pdf type, save as Level Summary Report.pdf.

16. Data Transformation

16.1. Purpose

To transform data using Corpscon. Data transformation is needed in situations such as: to convert data from Universal Transverse Mercator UTM or geographic coordinates to Florida State Plane Coordinate System FSPCS; to convert elevations from North American Vertical Datum NAVD 88 to National Geodetic Vertical Datum NGVD 29

16.2. Transformation Process - Corpscon

When the horizontal and/or vertical data is collected in one datum and needs to be converted to another datum, use the Corpscon application.

16.3. From the Convert menu choose Setup.

16.4. On the Input/Output tab select the Horizontal Systems, Datum and Units and select the Vertical Datum and Units that describe the data to be converted. For example, the horizontal is geographic and the vertical is NAVD 88 (the input file) and needs to become horizontal in FSPCS and the vertical in NGVD 29 (the output file). Select OK.

16.5. From the Convert Menu choose User Defined Data File.

16.6. In the "Input Filename" field, Create a comma delimited .txt file for all points that will need to appear in the final report/spreadsheet/benchmark form containing Point Number/Name (be sure to include descriptive name with the point i.e. KH15-12356A or CO1-CO1000 RTK) comma Northing comma Easting comma elevation. "Browse" to this comma delimited text file in your project Computations folder, its path and name will be displayed upon selection.

In the "Output Filename" field, "Browse" to your project Computations folder and name the file Data Transformation.txt, its path and name will be displayed upon selection.

Place a "Check mark" in both options to send the results to the "Output Window" and to the "User Defined Output File".

The "Input File Line" displays the first line of the Input File data.

The Input and Output windows display the file formats selected in the Setup screen. Review and ensure that they are correct. The file's 'field' format is also displayed for review and confirmation. Ensure that the Input 'fields' reflect the order of the data within your input text file, for our example above is the Point Name first, then the latitude, then the longitude, then the elevation. Ensure that the Output 'fields' reflect the order of the data that will be within the Data Transformation.txt file. The preferred order of the data in the Data Transformation.txt file is Point Name, Northing, Easting, Elevation.

The 'Geo Coordinate Format' needs to be set to reflect the format of your geographic coordinates, for output this should be Deg-Min-Decimal Seconds.

The delimiter should be set to 'comma' as our standard.

Click Convert.

16.7. Once the Conversion is Complete, the "Output Window" is displayed on the screen. Click on the "OK" button on the "Conversion Complete" message displayed.

16.8. To Create a Report the input and output data, Adobe PDF printer must be set as the default printer on your PC.

Choose File and then Print, option to the "Output Window" into a PDF file. In the "Print" window, navigate to your project's Computations folder and name the file Data Transformation Report.pdf. Click on the "Print" button to complete the process. A preview of the created file will be displayed for your review.

17. Legal Description Review

17.1. Legal Description Review Process

The Survey Section may be requested to review legal descriptions by the Real Estate Section or the Land Use & Protection Section for proposed fee or easement acquisitions, or descriptions for wildlife management areas.

Verify that the description describes the intended area, is properly constructed, mathematically closes, conforms to District interests and the area listed is precise. Also ensure that the description in the title commitment matches the draft description. Complete the review on or before the due date.

Write a work order. In addition to completing all of the pertinent data fields in the work order, include whether the District is the Grantee or Grantor and whether it is a draft or recorded in the "Other" field. If it is recorded, include recording information (ORB, PG).

Search GIS and WMIS to validate reference data provided or to obtain missing essential data as listed above. Search Geomatics Services and SDI for prior or ongoing projects in the area.

Check the Parcel Index files (in K:\Land Resources Dept\Parcel Index) for an existing parcel number. If none exists, contact Cheryl Hill to determine if a parcel number is required. The format for the parcel number is: basin two-digit number, -XXX- (for

Project Code) and three- or four-digit sequence number. Example: 15-228-1111. The requestor will maintain the vault folder. Create the following project folders and files:

Project Emails.pdf (portfolio) file and append the initial email. Describe as project scope. Add all subsequent correspondences here also. Place in the Reference folder.

Legal Description Review.pdf (or Description Review.pdf if the parcel is a Wildlife Management Area) containing a copy of the sketch (or survey) and legal description being reviewed. Add a comment citing the source and date. Bookmark sketch (or survey) and description individually. Set properties to show bookmarks in initial view. Add markups and comments addressing any issues noted. Include an Aerial plot from GIS. Place in the Legal Review folder.

Reference folder – see STG for files and folders to accommodate additional information, i.e. deeds, plats, prior surveys, etc.

Worksheet.dwg containing the closed polyline of the description boundary from the CAD file obtained from the source or as created from mapping the legal description. Include comparative notations and use explanation. Used as source for GIS featureclass. Place in the CAD folder. The requestor usually provides a copy of the CAD file along with the other documentation. If not included, contact the surveyor issuing the sketch (or survey) and description directly and request a courtesy copy. OCR the pdf to copy out the text of the description as a last resort if a CAD file is not available.

Shapefiles folder containing the shapefile fileset, a closed polygon featureclass, named with the parcel number. A Geospatial Origin file included.

GIS folder for the map MXD.

Closures folder – refer to the “Net Deed Plotter” chapter for instructions.
If the CAD file is georeferenced, copy the polyline of the boundary into a GIS session and evaluate its placement related to District parcels, existing conservation easements and county parcels. Determine if the location of the polygon in GIS depicting the proposed parcel is acceptable. It should substantially match. Adjust location as needed. Document adjustment shifts, rotation, common control points, etc. in the Geospatial Origin.docx file and place in the Shapefiles folder.

Create a feature class (closed polygon shapefile) of the description which will be provided to the requestor.

If the CAD is not georeferenced, export a DXF from NDP and use the GIS Georeference Tool to place and align the parcel. The process is detailed in the file named “How To Georeference CAD.docx” located at L:\SURVEY\Reference\Documents\How To's.

Export a map from GIS, in PDF format, to include in the [Legal] Description Review.pdf file. Show the proposed parcel, most recent aerial imagery, District interests, county parcels, roads, and STRs. Set the display transparency at 60percent and the fill color to yellow on the parcel polygon. Label with parcel number.

Add comments and markups to the [Legal] Description Review.pdf file reflecting the findings and conclusions.

Draft an appropriate email response following the format documented in the Survey Technical Guidelines (STG) folder in the Email as Deliverable.docx file. Place in the QAQC folder, and review the results with the project manager.

Once the corrected description is received, continue the review to its conclusion and respond accordingly.

17.2. Regulatory CE Review Process

Regulatory Conservation Easements are those granted as a requirement for a permit handled by the District. The Survey Section is involved in the approval process, reviewing the legal descriptions of the proposed conservation easements.

Requests are received containing Appendix D of IOP/ERP – 081.00 (District Form No. PMO.009.00 (1/10)), draft conservation easement and title certificate. The permit number with revision extension, project name, application ID, parcel number and due date are usually included in the survey review request. Verify that the legal description describes the intended area, is properly constructed, mathematically closes, conforms to District interests and the area listed is precise. Also ensure that the legal description in the title commitment matches the draft conservation easement legal description. Complete the review on or before the due date.

Write a work order. In addition to completing all of the pertinent data fields in the work order, include whether the District is the Grantee or Grantor and whether it is a draft or recorded in the “Other” field. If it is recorded, include recording information (ORB, PG).

Search GIS and WMIS to validate reference data provided or to obtain missing essential data as listed above. Search Geomatics Services and SDI for prior or ongoing projects in the area.

If the easement is to be granted to SWFWMD, check the Parcel Index files (in K:\Land Resources Dept\Parcel Index) and request a parcel number from Land Management Section via email, if one is requested in the IOP form. Point of contact is Cheryl Hill. Provide the permit number with revision extension, project name, and application ID number (usually provided by the requestor and validated in WMIS). The format for the parcel number is: basin two-digit number, -118- (for regulatory) and three-digit sequence number. Example: 10-118-001. Land Resources staff will assign a parcel number and inform records management who will provide a folder to contain the documents related to the conservation easement.

Create the following project folders and files:

Project Emails.pdf (portfolio) file and append the initial email. Describe as project scope. Add all subsequent correspondences here also. Place in the Reference folder.

Legal Description Review.pdf containing a copy of the sketch (or survey) and legal description being reviewed. Add a comment citing the source and date. Bookmark sketch (or survey) and legal description individually. Set properties to show

bookmarks in initial view. Add markups and comments addressing any issues noted. Include an Aerial plot from GIS. Place in the Legal Review folder.
Reg. CE IOP Form.pdf file containing a collection of the IOP form and associated data (e.g. legal description, maps, title certificate, deed, plans, etc.) provided by the requestor, usually Regulatory or SWIM, for review of a Conservation Easement. The documents should be bookmarked and set file properties to show them in the initial view. Place the IOP form as the first item. Comments should be entered for each document indicating its source (e.g. email attachment - from/date). Place in the Reference folder.

Worksheet.dwg containing the closed polyline of the conservation easement boundary from the CAD file obtained from the source. Include comparative notations and use explanation. Used as source for GIS featureclass. Place in the CAD folder. The requestor usually provides a copy of the CAD file along with the other documentation. If not included, contact the surveyor issuing the sketch (or survey) and legal description directly and request a courtesy copy. OCR the pdf to copy out the text of the description as a last resort if a CAD file is not available.

Shapefiles folder containing the shapefile fileset, a closed polygon featureclass, named with the parcel number. A Geospatial Origin file included.

GIS folder for the map MXD.

Closures folder – refer to the “Net Deed Plotter” chapter for instructions.

If the CAD file is georeferenced, copy the polyline of the boundary into a GIS session and evaluate its placement related to District parcels, existing conservation easements and county parcels.

Determine if the location of the polygon in GIS depicting the proposed conservation easement is acceptable. It should substantially match. Adjust location as needed. Document adjustment shifts, rotation, common control points, etc. in the Geospatial Origin.docx file and place in the Shapefiles folder.

Create a feature class (closed polygon shapefile) of the legal description which will be provided to GIS for inclusion in ERP Conservation Easement layer.

If the CAD is not georeferenced, export a DXF from NDP and use the GIS Georeference Tool to place and align the conservation easement. The process is detailed in the file named “How To Georeference CAD.docx” located at L:\SURVEY\Reference\Documents\How To's.

Export a map from GIS, in PDF format, to include in the Legal Description Review.pdf file. Show the proposed conservation easement, most recent aerial imagery, District interests, county parcels, roads, and STRs. Set the display transparency at 60percent and the fill color to yellow on the easement polygon. Label with parcel number.

Add comments and markups to the Legal Description Review.pdf file reflecting the findings and conclusions.

Draft an appropriate email response following the format documented in the Survey Technical Guidelines (STG) folder in the Email Reg CE Review.docx file. Place in the QAQC folder, and review the results with the project manager to conclude.

Once the corrected legal description is received, continue the review to its conclusion and respond accordingly.

After the conservation easement has been recorded in the public records of the respective county, the instrument is routed back to us for review to ensure what was reviewed during the draft stage is what was recorded.

17.3. Net Deed Plotter

Extracting a Legal Description from an AutoCAD drawing: The AutoCAD legal description should be mtext. Double-click on the legal description, right-click and pick Select All, or manually select the portion you need to review. Copy and paste the text into notepad and save this text file in the project's Closure folder. Select the contents of your text file, copy and paste into Net Deed Plotter's Deed Call Editor.

Extracting a Legal Description from a word processing document: Net Deed Plotter is an Add-In for Microsoft Word, but the installation may not be reliable to allow its use. Therefore, it's best to just select the desired text and copy and paste it into Net Deed Plotter's Deed Call Editor. You may need to paste it into a text editor such as Notepad first in order to remove any special characters or formatting.

OCR (Optical Character Recognition) from a pdf file of the legal description:

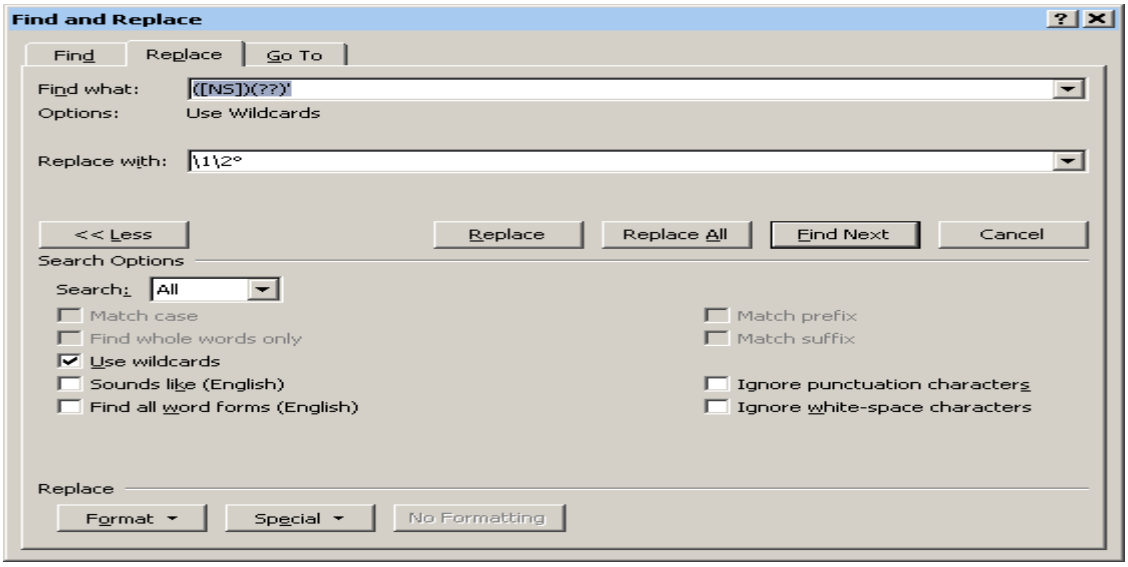
In Acrobat, limit the document to the legal description you will be plotting by cropping. With the crop tool, place a rectangle around the part of the legal that is needed, hit Enter and OK.

Under the Document pull-down menu, choose OCR Text Recognition/Recognize text using OCR.

Select all the recognized text using <Ctrl A>, then use <Ctrl C> to copy it and <Ctrl V> to paste it into a new Word document. Save this Word document in your project's Closure folder.

Open your Word document and compare to the original PDF and correct as needed. Acrobat seems to have a difficult time recognizing a degree symbol, and will often misconstrue the letter "S" in a bearing as 5, or the number "0" as the letter "O". Use the following procedures after text recognition to help resolve these issues:

Some Find and Replace methods:



In the Find what: box, Word is to search for either an “N” or “S” character followed by any two characters and a “°” character (the degree symbol misconstrued as ’). The Replace with: box tells Word to recall variable 1 (\1 – saved as the N or S) and variable 2 (\2 – saved as the two wildcards following the N or S) and replace the “°” symbol with a degree symbol. Click on Replace All and verify that the procedure worked properly.

To correct the instances where Acrobat misconstrued the number 0 as the letter O (usually in bearings) you need to first select all the bearings in the document. Do this by using Find, select Use wildcards, and enter ????°???????? in the Find What box. Then, click on Find in, and select Main Document, which will highlight all the bearings. Next, choose the Replace command, and, in the Replace tab enter the letter O in the Find what box and the number 0 in the Replace With box. Choose Replace All. Word will replace any letter O's it finds in the selection set with number 0's.

Then, it will ask if you want to search the remainder of the document. Click on No, and close the Find and Replace window.

Check for any curve data that need corrections.

To check for any distances with a letter O instead of a number 0, go to the Find window and, using wildcards, search for A DISTANCE OF ???????. Then, in order to temporarily avoid replacing the letter O in the word "OF" with a number 0, replace the word "OF" with "placeholder". Click on Replace All, and pick no, you don't want to search the remainder of the document. Then search for the letter O and replace with the number 0. Any distances with the letter O will be corrected to the number 0. Finally, replace the word placeholder with OF.

Review the legal description for further issues, such as the letter S in a bearing having been misconstrued as a number 5 (search for THENCE 5, for example), and repair if necessary.

Once all corrections are made, select all the text and copy and paste into Net Deed Plotter’s Deed Call Editor.

Using Net Deed Plotter

In the Deed Call Editor window, pick Edit/Legal Description to Deed Calls. Net Deed Plotter will analyze the legal description and convert the courses to Deed Calls for its use.

Place a forward slash (/) in front of each course of the Point of Commencement to the Point of Beginning, if any. Show the POB to POC lines by choosing pull down menu Lines/Show P.O.B. Lines in the Draw Map window.

If possible, determine the best available state plane coordinates of the Point of Commencement. Enter them as the first line in Deed Call Editor as nxxxxxxx.xx(space)exxxxxx.xx. The default is feet (follow each coordinate with an 'm' if your system is in meters). After the coordinates, type a space and a semicolon (used to enter comments in Net Deed Plotter) and enter the source of the starting coordinates. Comments may also be used to label points. A sample of the completed Deed Call Editor window is:

n1320353.24 e431369.81 ;from CAD file
/n61.4936e 38.71
/n55.5747e 63.52 ;POB
n50.3704e 47.52
n42.2920e 16.37

Click the Draw Map menu text. Pick the Map Options pulldown menu, and select Title Box and Border Options. The default selection should be Show Title Box, Border, Tract Data, and Deed Calls. Enter a title for the map and click Accept. If there is an unacceptable closure, review and correct the deed calls in the Deed Call Editor, then click on Draw Map.

Choose Print and print to a PDF named Closure Report.pdf. If a polyline is needed to insert into CAD, choose Advanced, Save as DXF(feet) and save in the projects CAD folder.

Youare now ready to save the .ndp file. The name should be Parcel Number or Job Name [.ndp]. If the legal description is not associated with a parcel number or job name e.g. ingress-egress, etc. then its .ndp file name should be descriptive.

If you have several legal descriptions to run through Net Deed Plotter, name the corresponding files to be descriptive and combine the PDFs into Closure Report.pdf.

18. Geographic Information System (GIS)

18.1. Purpose

GIS is an essential tool to ensure that the data being processed is spatially referenced and encourages the creation of feature classes and shapefiles used during the QAQC process of a project and encourages/promotes data contribution to the District's geodatabases.

18.2. Adding Data to a GIS Session

Data is added in various ways. When a shapefile is needed, data is added to an ArcMap session as an event and exported as a shapefile where it can be preserved and manipulated.

18.3. Using Data in a Spreadsheet: An input data file must be prepared before the data can be added. With ArcMap 10, data can be added from a properly formatted spreadsheet with headers for Point, Northing, Easting, Elevation(s) and Description fields specified. A sample input data file is in the Appendix.

Start an ArcMap session. Open the Survey base map file Survey.mxd located in L:\SURVEY\Reference\ArcMap\Base Map and save it to the project GIS folder.

From the File menu, select Add Data then select Add XY Data.

Browse for the file. Add the file.

Ensure that the X and Y fields are correct.

If your Coordinate System of Input Coordinates is not the same as the .mxd you have the option to choose Edit.

The data is added to the session and displayed as an event in the table of contents.

18.3.1. To Export the Data as a shapefile, right-click on the event layer just added and select Data then select Export Data.

In the "Use the same coordinate system as" option select ‘the data frame’.

In the "Output feature class:" field, browse to the project Shapefile folder and replace the default "Export_Output.shp" with a descriptive name.

Click the OK button to complete the process and answer Yes to the prompt to Add the exported data to the map as a layer.

18.4. Using a Polyline from an AutoCAD File

Start an ArcMap session. Open the Survey base map file Survey.mxd located in L:\SURVEY\Reference\ArcMap\Base Map and save it to the project GIS folder.

18.5. Attribute Table Format

The attribute table fields are determined and populated automatically by the source when the shapefile is created. A text file, a spreadsheet or an AutoCAD drawing will produce many different fields and values. See STG for attribute header names.

The format mentioned pertains to shapefiles that are not provided to the requestor but are part of the QAQC process. When a shapefile is provided to the requestor, the attribute table’s field should match the deliverable data format.

When adding fields to an attribute table, select “text” as the data type for fields that do not require numeric properties, such as description, work order number and waypoint. Determine the length of the field by the number of characters being entered plus five.

When numeric properties are needed in a field for possible math functions, select the "Double" field type, where the ‘precision’ and the ‘scale’ of the values displayed are established. The precision value determines the total number of integers in the number that will be entered into the field while the scale determines the number of integers displayed to the right of the decimal point.

The Long and Short Integer field types are also options when the numeric values can be displayed to the whole.

18.6. Creating a Map

The Layout View of an ArcMap Session is where views are arranged to create maps.

Do not use the Data View. Use the Page and Print Setup option to determine the size. A North arrow, scale statement or graph, title and legend are usually inserted in a typical map.

Text, labels and annotations are also useful.

The symbology and display options of the layers can be also very helpful in creating a map that'll convey the information effectively.

The Export Map option is used to create a .PDF of the map. A map is normally not needed and will not be archived unless it is provided as a courtesy to the requestor.

The .mxd file is normally used during the review process and will not be kept unless special circumstances require it. Usually the shapefile(s) can easily be viewed in a new ArcMap session.

19. Mapping in AutoCAD

19.1. Purpose

To establish guidelines for the preparation of a map during the data processing phase of a job using the AutoCAD application. The data processed needs evaluated and analyzed and a digital drawing enhances this task by visually displaying the data collected and job site details.

19.2. Concept

A Worksheet drawing is created to view, analyze the data and capsulate the project. Points are inserted and sorted into meaningful layers once they have been adjusted. Linework is added along with labels and annotation to depict the layout of a job.

Use large text size mtext note to explain and detail data manipulation, conclusions and decisions. Normally this map will remain in a worksheet status so treat it as such.

Original work is done model space and use layout view for sheets and plotting. Coordinates are moved from a local, assumed datum to reference points in the Florida State Plane Coordinate System.

Closed polylines are used. Linetypes are established to distinguish between features.

When the worksheet drawing is used as the basis of a survey map of parcels and/or easements, the name is changed to contain the parcel number when the job will result in an acquired parcel, Example: 20-503-102.dwg. The name is changed to contain the

work order number when the job results in a map recreating an existing parcel's boundary or to simply document the scope of the work performed. Example: 20-08-477.dwg.

20. Peer Review

20.1. Purpose

Provide guidelines on the process of reviewing a project to ensure that a quality product is the result of the process.

20.2. Process

Once a project is completed and is deemed ready for delivery, a review by the assigned person is requested. A Peer Review.pdf file is created of the deliverable (report & spreadsheet, map) and placed in the project's QAQC folder and the work order is sent to the assigned reviewer.

The reviewer returns the job with the Peer Review.pdf marked-up with revisions and comments. The identified issues are addressed, a reply entered into the note describing what action was taken to correct the matter and another draft of the deliverable is added to the original Peer Review.pdf. Bookmarks are added to the PDF identifying the drafts (i.e. First Review, Second Review, etc.).

The job is sent back to the reviewer to confirm that the issues have been corrected. This process continues until all of the issues identified during the process have been corrected.

This review process also includes a look at the folders, the files and the work order to confirm compliance with the established directives (STG and References).

Once the reviewer has determined that the entire job conforms to the standards, it is returned to the technician with instructions to forward it to the PSM. The PSM will perform a final review and the review process is repeated until he is satisfied that it is ready. He creates a Final Review.pdf file containing his comments and mark-ups. This file is also placed in the QAQC folder. He returns the job to the technician and a hard copy of the deliverable is signed/sealed and scanned. The resulting PDF file is placed in the Deliverable folder. This deliverable file is linked in the work order.

When the deliverable is scanned, the job is sent back to the PSM to forward to the Survey Manager in a TBD status.

Once the Survey Manager has reviewed the job, he will send the job back to the technician with instructions to deliver and archive or to make additional revisions and answer questions. If the latter occurs, then the process that includes the PSM will apply.

21. Peer Review of MFL Riverine/Wells/Gauges

21.1. Review Project Emails.pdf, comments in Geomatics Services under Comments tab, Reference Data tab, Additional Info tab and Field Instructions tab and Description of Work under the Project Scope tab to understand the purpose of the project and what data was expected to be located.

21.2. View the project shapefile(s) in ArcMap: Review for compliance: Geospatial Origin.docx

Attribute headers

STR, county and basin are correct in the work order, report and spreadsheet

Review the Field Notes.pdf for:

What method/equipment/software was used for the collection of horizontal data

What method/equipment/software was used for the collection of vertical data

If horizontal data was collected are the correct file(s) under the project GPS folders?

Are the correct files for vertical/total station collection under the project Data Collection folder?

Under Computations review:
If a .raw file needed to be revised, is it named correctly and is there an explanation at the top (date and initials) of change needed

If a .gsi file needed to be revised, is it explained in the correct file
Minimally Constrained Adjustment.pdf (if one exists)

Modified.dat for correct control held, descriptions per field notes and documentation at the top (with date and initials) of any corrections besides descriptions

Final Adjusted Elevations or Final Adjusted Coordinates.pdf

Data Transformation Report.pdf for input and output settings, is the input data correct based on the calculated horizontal and vertical data, where needed is the output for latitude/longitude in degrees-minutes-seconds

If only a level loop processed with Leica software, review Level Summary Report.pdf

Source Control.pdf should only contain control used for the site and have bookmarks

If horizontal locations were derived from CAD mapping are their xy's stated in Coordinates from CAD mapping .txt. Are the xy's correct when identified in the CAD file

If level loops were not collected digitally are they calculated correctly in Reduce levels NAVD88.xlsx

Under QAQC:

Is all of the data shown on the pdf of the spreadsheet correct, if not comment in the pdf. Has the correct template been used

Is all of the data shown on the pdf of the Survey report correct, if not comment in the pdf. Has the correct template been used

If a benchmark form has been created, is all of the data shown on the pdf correct, does the form correctly follow the template

Review Site Photos.pdf if one was required and exists

Review all file/folder names to comply with the Standard file/folder samples

Review the work order to ensure that all data is entered correctly and completely

If any changes are needed other than the commenting in the pdf's under QAQC, add as a comment in the work order under the Comments tab as a numbered list

22. Delivery Process for MFL Riverine

Once the Survey Report has been signed:

1. Scan the signed-sealed report to the Deliverable folder as Survey Report.pdf and include a PDF of the certified spreadsheet.
2. Create a zip file named the same as the spreadsheet under the Deliverable folder of the shapefile and the certified spreadsheet that will later be copied to the requestor's U drive:
3. Create an email to the requestor [see L:\SURVEY\Reference\STG\Folder-File Naming\Job Name XX-XXX (Active)\Reference\Email as Deliverable.docx for the wording]. Before sending the email save it, it will then go to your Drafts email folder. Open it under the Drafts email folder and save it as Draft Email.pdf under the project QAQC folder:
4. In the work order add links for Draft Email, the .zip created above and the Survey Report.pdf and reassign the work order to the signing Surveyor with Delivery status.
5. Once approved by the signing Surveyor, post the .zip to the requestors U drive, send the email to the requestor (append the sent email to the Project Emails and add the .zip file as an attachment). Send the signed-sealed original Survey Report and a print-out of the certified spreadsheet to the requestor via inter-office mail.
6. Prepare the project for archive.

23. Delivery Process for Benchmarks-Wells-Gauges

Once the Survey Report and/or Benchmark forms have been signed and sealed:
Scan the Survey Report (make sure the seal is seen) to the Deliverable folder as Survey Report.pdf, add a pdf of the project spreadsheet.

Scan each Benchmark form (make sure the seal is seen) to the Deliverable folder. Name them the same as their word document.

Create an email to the requestor (cc the signing surveyor), [see L:\SURVEY\Reference\STG\Folder-File Naming\Job Name XX-XXX (Active)\Reference\Email as Deliverable.docx for the wording]. Attach the Survey Report.pdf and the project Excel spreadsheet file. Before sending the email save it, it will then go to your Drafts email folder. Right click on the email and append it to the projects' Project Email.pdf. In the Project Email.pdf right click on the newly added email and choose "Save file from portfolio" and save it as Draft Email.pdf under the project QAQC folder. Again highlight the newly added email and right click and choose "Delete". This method creates a Draft Email.pdf that contains the attachments and the Project Email.pdf will only contain those emails actually sent.

In the work order link the Draft Email.pdf and send it to the signing Surveyor for approval.

Once approved, deliver the signed and sealed Report and/or Benchmark forms to the requestor via interoffice mail.

Copy the Benchmark PDF files to L:\SURVEY\Control\NAVD88 Benchmarks by SWFWMD Survey\Forms to be published. Fill in the table: L:\SURVEY\Control\NAVD88 Benchmarks by SWFWMD Survey\Tables\ NAVD88 Benchmarks by SWFWMD Survey.xlsx.

Copy the project Excel spreadsheet to L:\SURVEY\Control\Measure Point - Ground Tables by SWFWMD Survey.

In the work order complete the Delivered Date field and state the Benchmark form names under Reference Data.

Prepare for archive

24. Outsourced Review Processes

24.1. QAQC of Outsourced MFL Riverine/Lakes

Copy the SR and SOW that were sent to the vendor to the QAQC folder and combine them into one PDF with bookmarks. If project involves multiple sites (i.e. transects and bridges), create a subfolder under QAQC for each site and put the combined SR and SOW PDF in each subfolder and include the site name in the PDF. Check deliverables against SR and SOW to insure format and requested files and data has been provided.

Review the following:

Field Notes:
File name; legible; all data pertaining to the site; sketches; recorded point numbers match those on the spreadsheet.

Spreadsheet:
File name; file name, file date, file size stated on the first line within the spreadsheet, if provided compare to properties; should not contain site control points; spelling; point numbers vs. Data Collection and Computations; accuracy of xyz shown based on survey report and surface located; worksheet tab name; date of ‘present water level’ vs. field notes.

Bench mark form:
Signed, sealed, dated; ‘date set’, ‘set by’, field book and page notation; xyz vs. Computations; basin name; source bench marks vs. field notes; photo.

Data Collection:
File name; point numbers vs. field notes and spreadsheet; NGS control points.

Computations: Conversion from assumed to SPF (if applicable); conversion for bench mark to NGVD29 and UTM.

Photos:
File name; Bookmarks per descriptions in the field notes, if recorded.

Create Shapefiles in subfolder named “Shapefiles” under the QAQC folder (if multiple sites, put under site subfolder):

From bench mark form: then check file name; description of mark; location; STR; County; sketch.

From site control (if it was included in the spreadsheet for initial review): check location vs. sketch in field notes.

From spreadsheet (don’t include site control if it was included in error):

- Add a column for the vendor’s abbreviated name
- Check location vs. proposed
- If this is a bridge site: distance to upstream and downstream; bridge details per SR requirements; review ‘lowest bottom of bridge’ elevation based on bridge deck and bridge detail in the field notes.
- Label points in order of NAVD88, description, point number; review elevations and descriptions.
- For MFL lakes separate data into separate shapefiles i.e. Hydro, Typo, Low Road, Low Floor, etc.

Survey Report:
Required SR information; signed, sealed, dated.

Included spreadsheet printouts: page numbering pertaining to the pages within the sites’ spreadsheet; on the first line: file name, date, file size vs. the same listed in the report; file name, date, file size appears on each page of the sites’ spreadsheets

Draft Email:
List any review issues to be addressed, if any.

QAQC folder:
Add PDFs of any of the delivered files that have issues to the SR pdf, bookmark, and add comments at the issues (these should be the same comments that appear in the draft email.
Create a Geospatial Origin.txt for the shapefiles created.

25. File Name Definitions (Active)

(Road) RW Maps.pdf: Use this if a few project specific sheets are supplied and include in the Reference Data.zip.

Drawing No. xx-xxx-xxx.pdf: These should be temporary copies of surveys for or by the District of proposed or acquired District lands that are listed under SDI and will be deleted at archive.
The following information as formatted below should be added to the work order Reference Data* section of the work order:

Parcel/Drawing No. XX-XXX-XXX (XXXXXX.dwg or no CAD file); or
Parcel No. XX-XXX-XXX, Drawing No. XX-XXX-XXX (XXXXX.dwg or no CAD file);

If it’s not a boundary survey of a parcel, use title description:

Title description, Drawing No. XX-XXX-XXX (XXXXXX.dwg or no CAD file);

*If there are multiple entries, use a semicolon at the end of each entry.

If these temporary copies of surveys were completed under Survey Central, they should be linked to the archived location from the current work order. They do not need to be listed under the Reference Data section and will be deleted at archive.

B_XXX.pdf: This file will contain all pages (preferably) of a survey 1) by other than the District, 2) District or non-District lands, 3) not surveyed for the District and used as a project reference. One should be created for each such survey.

XXX represents the next available number, number sequentially while project is active. When archiving project, replace with next available number in SDI.

Note: Each survey should be listed under the Reference Data section of the work order and be prefaced by Survey by Others**:** then the surveyor's name (same as given for SDI) and the date (same given for SDI).

Example:
Surveys by Other:
Surveyor's Name, Date of survey

B_XXX.txt: This file is a companion to the same named file with a PDF extension and contains the following data:

Title - identical to the title.
Date of survey - date last revised.
Number of sheets - total of set.
Surveyor's name - Company name, if any, otherwise surveyor's name.
County - list all
Section-Township-Range - all that apply.
Related: (list job name and work order number)

CCR.pdf: This file should include all certified corner records retrieved and be bookmarked.

Closure Report.pdf: This should contain a Net DeedPlotter closure report using the legal description for the boundary to be checked. Use the center and label commands for the graphic display. Save the file with the appropriate name before printing to PDF.

Control Map.pdf: A map of the control and points to be set.

Control.txt: This file should contain the post processed control coordinates that are to be uploaded to the data collector for layout.

County Road XXXX-XXXXXX County.pdf: This applies only to full sets of right-of-way maps.

Data Transformation Report.pdf: This file should contain the HTML output file from Corpscon. Results will contain the input data and the prior datum information. Note: Data transformations made from requestor's tables other than the deliverable (i.e. MFL Riverine

Proposed Transects) will be created and kept while project is active and discarded at archive.

Data Transformation.txt: This file should contain the text output file from Corpscon for use as input to other applications. Minimum fields to be selected are Point Number, X, Y, and/or Elevation.

Descriptive Name.mxd: This map should be derived from the Survey Section base map located on the L drive under the Reference section. It should be created during an active project for analysis of raw, post processed or created data.

Examples:
Development of feature classes or shapefiles
Aerial overlay of collected data for QAQC

When a shapefile is created from requestor's data i.e. CAD, spreadsheet or table, it should be placed in this folder with a readme explaining source, etc. It will not be archived as it can be recreated, if needed. When appropriate, a PDF will be created to memorialize the mapping analysis for future reference. Note: All GIS files including the XXXXXX.mxd will be deleted when the project is archived.

Draft Email.pdf: The file name is self explanatory. If it is "marked up" for changes, it should be placed in the QAQC.zip at archive. If there are no changes, DO NOT SAVE.
NOTE: Make sure to include any attachments.

Drawing No. xx-xx-xxx QAQC.pdf: Add the suffix QAQC to a PDF copy of the drawing file name. This file will be used for mark-ups during the QAQC process. It should contain all review versions in descending order. Do not use bookmarks. This file will be preserved in the QAQC.zip at archive.

Drawing No. XX-XX-XXX.pdf: A plot of the **NON-PARCEL** drawing delivered for this work order, which uses the basin and work order number.

Drawing No. XX-XXX-XXX.pdf: A plot of the **PARCEL** drawing delivered for this work order, which uses the parcel number.

Feedback STG.docx: When noncompliance issues with STG - Field section are discovered by the technician processing the work order, comments are to be created in this document and will reference the applicable portions that were not followed and/or misunderstood as well as the field book and pages. Comments will be dated, initialed and listed in descending order. Responses (in bold/red) will also be dated, initialed and in parenthesis following the issue.
Example: xx-xx-xx initials, issue. **(xx-xx-xx initials, response)**

The Project Surveyor (or Survey Coordinator when PS not available) will review these issues with the appropriate field crew members and document the conversation by adding comments to this document.

This document will be included in the QAQC.zip at archive.

When order is complete and ready for archiving the technician will add a comment to the work order stating **STG Field Noncompliance – Issues** (Resolved or Not Resolved) and ready for archive.

If issues could not be resolved while the project was active the Survey Coordinator will be advised by an email from the technician at archive (include it in the Project Emails).

The subject of the email will contain: STG Feedback – *Job Name Work Order Number*.
The Body of the email will contain:

During the processing of the subject project issues were discovered concerning noncompliance with the STG - Field Section. As the project has been archived, you will need to extract a copy of the Feedback STG.docx located in QAQC.zip and add the appropriate comments after your resolution. Email the revised document to the Survey Manager for archival when complete.

After the above has been completed, the work order status should be changed to TBA and sent to the Survey Manager for archiving.

FEMA.pdf: This file should include all applicable community panels, LOMRs or LOMAs and be bookmarked.

Field Notes.pdf: This file should contain a scan of the field notes (final) produced for THIS work order. Bookmarks are to be added if pages are not continuous and/or multiple books were used. AFTER SCANNING USE REDUCE FILE SIZE UNDER THE PDF FILE MENU.

Field Notes QAQC.pdf: This file should contain the field notes created by survey section staff during the review process of outsourced surveying. Note: This file should be added to the QAQC.zip

Final Adjusted Coordinates.pdf: This should be a printout of the FINAL least square adjustment results using StarNET select from the pull-down menu 'Output' then 'Coordinates'.

Final Adjusted Elevations.pdf: This should be a printout of the FINAL least square adjustment results using StarNET select from the pull-down menu 'Output' then 'Listing'.

Final Review.pdf: This file is for work orders processed "IN-HOUSE" and should contain all "check prints" that were made FOR THE PSM during th**e review process and that HAVE MARK-UPS WITH COMMENTS.**

Garmin76, 72 or 60CSx.gtm: This should be the native GPS Trackmaker file. The name of this file should be the Garmin unit used in the field.

Garmin76, 72 or 60CSx.txt: This file should contain all downloaded waypoints from the Garmin unit and be in comma delimited format. The name of this file should be the Garmin unit used in the field.

Geospatial Origin.docx: This should explain the process of orienting the shapefile and will be included in Shapefile.zip at archive, but **will not** be provided to the requestor. Describe the following:

Control Points and Rotation (if applicable)
Source and datum of existing coordinate system for the data.

If the source is CAD, name the file (include date, time, bytes) and list the layer(s) that were used.

Note: If there are multiple shapefiles, each will have a geospatial origin file. In which case, append shapefile name, example: Geospatial Origin (Shapefile Name).docx

GLO.pdf: This file should include all government land office township plats, field notes and be bookmarked.

Job Name XX-XXX.xlsx: If the XLSX (table) is referenced in the Survey Report, use this file name.

Legal Description Review.pdf: This file should be bookmarked and contain the legal description (and sketch if available) with a comment(s) inserted listing the original file name and source (e.g. Project Emails, from, date and name of file). Comments concerning errors and/or omissions from the review should be inserted where applicable. Also include a plot of the shapefile created for the review parcel with aerial background showing STRs, streets, District parcels and/or PA boundaries, as applicable.

Legal Description XX-XXX-XXX.docx: Using the form located at L:\SURVEY\Reference\Documents\Forms\Legal Description, this should contain legal description(s) created or reviewed and approved. If there is more than one legal description, for example when there is both a temporary and permanent interest (i.e. well site) to be granted by the District, create two documents and add a suffix in parenthesis to the file name to indicate which type i.e. Legal Description XX-XXX-XXX (Permanent).docx or Legal Description XX-XXX-XXX (Temporary).docx. Note: Do not use SWF prefix for parcel number. DO NOT LIST AREAS AT THE END OF THE LEGAL DESCRIPTION.

Level_Circuit.[all shapefile extensions]: This shapefile is for projects involving leveling where Garmin is used for horizontal location and contain these attributes in the following order:

WO_Num (work order number)
Waypoint (if applicable)

MHWL.pdf: This file should contain a scan of all data pertaining to the determination of the Mean High Water Line (MHWL) as directed by the Florida Department of Environmental Protection (FDEP) or the Tampa Port Authority (for water bodies in Hillsborough County).

Minimally Constrained Adjustment.pdf: .LST report, holding a maximum of one fixed control point.

Modified.dat: Dat file with required edits in order to post process.

Name of Road - PB XX, PG XX - XXXX County.pdf: This applies only to full sets of right-of-way maps. Use for maintained right-of-way maps.

NGS_Control.[all shapefile extensions]: Downloaded shapefiles of NGS control should include a projection.

Observations Report.txt: Generated from the controller. This file contains a report of the points in the job that provides the point name, grid coordinates, point code, horizontal and vertical precisions, PDOP and number of satellites.

OHWL.pdf: This file should contain a scan of all data pertaining to the determination of Safe Upland Line (SUL), Safe Upland Elevation Line (SUEL), Ordinary High Water Line (OHWL) as directed by the Florida Department of Environmental Protection (FDEP) or the Tampa Port Authority (for water bodies in Hillsborough County).

Original.dat: First attempt to process raw file without changes.

Original.err: If applicable.

P_XXX.pdf: This file will contain all pages of a plat used as a project reference. One should be created for each such plat and remain at archive. These should be named as follows: P_xx1, P_xx2, etc. Note: Each plat (format: **Plat Name, PB XX, Pg XX;**) should be listed (single line) under the Reference Data section of the work order.

P_XXX.txt: This file is a companion to **P_XXX.pdf** and contains the following data:

Plat Name - identical to the title.
Date of Recording
Plat Book number/Page number - first sheet in set.
Comments: state here if a Condominium or Road Plat
Number of sheets - total of set.
Surveyor's name - Company name, if any. Otherwise surveyor's name.
County - list all
Section-Township-Range - all that apply.
Related: (list job name and work order number)

Parcel Number or Job Name.ndp: This file is created by the program Net DeedPlotter of the input data. If the legal description is associated with the parcel or job e.g. ingress-egress, etc. then its file name should be descriptive.

Peer Review.pdf: This file will be compiled by the reviewing technician and contain the final deliverables. Mark-ups, corrections and/or comments will be added as necessary. Peer review should be an objective look and include all aspects of the project, including folder structure, work order completion, etc. This file will be included in the QAQC.zip at archive.

Peg Test.pdf: When a peg test is performed, the process is recorded in a digital file called "Peg Test.job" in the data collector. This file is downloaded and placed in the party chief's folder by date and project number. Export a Raw Data Report select Generate a report with all fields in columns and check include note records. Print this report to a PDF named Peg Test.pdf and store in the project Computations subfolder.

Points.csv: Generated from the controller. This file is a report of the points in the job and includes the point code plus any features and attributes assigned to the points as well as the point name and coordinates. Each attribute value included with a point is preceded by the attribute name (prefixed with the feature name and a colon). If the points have any descriptions assigned to them these will follow the attributes.

Project Emails.pdf: This file should contain all emails received and sent relating to a work order. "Project Scope" should normally be the first email and labeled as such in the "Description" field. This is normally the requestors email, survey web site request form or scan of hard copy.If scanned, name Project Scope.pdf and add to portfolio. Add description for "Initial Deliverables", "Final Deliverables" and/or intermediate deliverables. Use the "Description" field to identify key emails that will allow easier location.

Project Review.pdf: This file will contain emails sent to team members concerning procedural issues discovered at archival by the Survey Manager.

Raw Conversion-StarNet.log: This should contain the log generated when using the StarNet utility for converting the TDS RAW file to a StarNet Dat (input) file.

Reference Deeds.pdf: This file should contain any deeds that were part of the project processing. When there are multiple deeds, make bookmarks using the ORB xxxx, Pg xx and Parcel No. xx-xx-xx (if applicable).

Reference Field Notes.pdf: This file should contain a compilation of Historical Field Notes. The book and page numbers from this file are to be listed under the reference-data section of the work order. It is to be created by the person gathering historical survey data for a current project as a pre-requisite to sending crews to the field. If more than one field book or if there are non-sequential pages bookmarks will be added listing the book number and pages i.e. FB 20/145, Pgs 12-52.

All historical field notes are located at: L:\SURVEY\Reference\Field Books\Scanned. Note: When the project is complete, this file will be deleted.

Reg. CE IOP Form.pdf: This file should contain a collection of the IOP form and associated data (e.g. legal description, maps, title certificate, deed, plans, etc.) provided by Regulatory for review of a Conservation Easement. The documents should be bookmarked (set to open) with the IOP form as the first item. Comments should be entered for each document indicating its source (e.g. email attachment - from/date).The file will be saved and included in the Reference Data.zip at archive.

RTK GPS Report.pdf: This file should contain a compilation of all the reports generated for a RTK job, bookmarking each specific report/file.

Examples: Export Points List.pdf - his file should be created from the text file (.csv) generated from the "Export" option under "File" of the main menu bar. The format should be P,N,E,Desc Code. Point List Report.pdf - Contains a simple summary of the coordinates for each point in the project. Renamed Point List.pdf - Only created if any points are renamed in a static session to see a simple summary of the original and new names of points.

Site Location Map.pdf: This map should be created and printed for the field crew during initial setup to show the scope of work and/or control and will be DELETED AT ARCHIVE.

Site Photos.pdf: All site pictures should be inserted in this PDF and have comments to identify date, position, direction, subject, etc.
Source Control.pdf: This file should contain the datasheets of control stations used for the project. Although several source control stations may be included at the onset of the project, when the project is archived, only include the stations referenced in the survey report. This

PDF will contain the horizontal and vertical data sheets separated by bookmarked categories. If the NGS station(s) is both horizontal and vertical it would be under its own bookmark category. For example:

Horizontal
XXXXXX XXXX, [PID Designation]
Vertical
XXXXXX XXXX, [PID Designation]
Horizontal-Vertical
XXXXXX XXXX, [PID Designation]

StarNet Post Process.zip: This should contain all of the files created by StarNet during post processing, e.g.*.lst, *.prj, *.pts, *.sbf.

State Road XXX - XXXXXX County.pdf: This applies only to full sets of right-of-way maps.

Static GPS Report.pdf: This file should contain a compilation of all the reports generated for a Static job, bookmarking each specific report/file.

Examples: Baseline Processing Report.pdf: This file is created after the baselines have been processed in the project to capsulate the solution types, precisions, and an acceptance summary for the processed baselines. It should also include detailed reports for each processed session as well. Export Points List.pdf: This file should be created from the text file (.csv) generated from the "Export" option under "File" of the main menu bar. The format should be P,N,E,Desc Code. Loop Closure Report.pdf: Contains loop closure analysis of all the baselines in the project that have been processed and saved. Point List Report.pdf: Contains a simple summary of the coordinates for each point in the project. Project Computation Report.pdf: This report contains a summary of the errors and warnings that occurred during computation of the data. Renamed Point List.pdf: Only created if any points are renamed to see a simple summary of the original and new names of points. Vector List.pdf: This report should contain a review of the solution types and precisions for all the vectors created from processed baselines in your project.

Survey Report QAQC.pdf: Add the suffix QAQC to a PDF copy of the report file name. This file will be used for mark-ups during the QAQC process. It should contain all review versions in descending order. Do not use bookmarks. This file will be preserved in the QAQC.zip at archive.

Survey Report.docx: This file should contain the final Word document of the Surveyor's Report created from the most recent form template. (See L:\SURVEY\Reference\Documents\Forms\Survey Reports). When a report with a table becomes too large for one page and is continued on the next, do not split the table between pages. Instead, space the report to begin the table on the second page.When a blank area is left on the first page, insert the following statement, centered in the blank area: "-continued on next page -" (do not include quotes). For those situations when the table will fill more than one page and therefore will be split between pages, the second and subsequent page(s) of the table must have headers added.
Survey Report.pdf: This file should contain both a scan of the signed and sealed (highlight seal) report AND a PDF of the Excel file (XLS) if one was certified in the report.

Tax Map.pdf: This should be downloaded from the County's Property Appraiser web site. At archive this file is to be included in Reference Data.zip.

Title Commitment.pdf: If an update is provided it should be inserted above the original and both bookmarked. At archive this file is to be included in Reference Data.zip.

Worksheet Field.pdf: This file should be to illustrate corner setting or layout and plotted from Worksheet.dwg.

Worksheet.dwg: A worksheet is required for all survey work to graphically represent the raw survey data analysis and solutions. It should include data collected in the field and/or a composite of existing geometric data for historical reference. The worksheet shall clearly show and label all relevant features, lines, geometry and contain concise explanatory notes concerning existing conditions and solutions. If other CAD files are incorporated (or parts thereof), their layer name will include the source CAD file name as a suffix. Worksheets will contain appropriately named layers that can be manipulated through the use layer management. Note: All survey maps to be delivered as the final product will contain a worksheet.

Worksheet.pdf: This file should be created for illustrating the relative relationship of the subject review parcel with the District survey(s), **where no CAD file can be located** and for performing geometric analysis. Note: **When CAD is available** for the District survey, a worksheet.dwg will be prepared.

XX-XXX.raw: During the processing of the project this file should be the most recent file from Downloads.

XX-XXXR.raw: File name should use work order number and the letter R e.g. 09-999R.raw. This file should only be created when it is NECESSARY to make edits (use Forsight DXM) to the RAW (horizontal) data collection file. These changes/revisions will be documented (use Note command) in the file, including your initials and date. NORMALLY, CHANGES IN THE RAW DATA WILL BE MADE TO THE DAT FILE.

XX-XX-XXX.dwg: Original of the **NON-PARCEL** drawing delivered for this work order, which uses the basin and work order number.

XX-XXX-XXX.dwg: Original of the **PARCEL** drawing delivered for this work order, which uses the parcel number.

26. File Name Definitions (Archive)

B_XXX.pdf: This file will contain all pages (preferably) of a survey 1) by other than the District, 2) District or non-District lands, 3) not surveyed for the District and used as a project reference. One should be created for each such survey. XXX represents the next available number, number sequentially while project is active. When archiving project, replace with next available number in SDI. Note: Each survey should be listed under the Reference Data section of the work order and be prefaced by **Survey by Others:** then the **surveyor's name** (same as given for SDI) and the **date** (same given for SDI).

Example:
Surveys by Other:
Surveyor's Name, Date of survey

B_XXX.txt: This file is a companion to the same named file with a PDF extension and contains the following data:

Title - identical to the title.
Date of survey - date last revised.
Number of sheets - total of set.
Surveyor's name - Company name, if any. Otherwise surveyor's name.
County - list all
Section-Township-Range - all that apply.
Related: (list job name and work order number)

CAD.zip: All AutoCAD drawing files created should be contained in this file at archive. This would include Worksheet.dwg, Drawing No. xx-xxx-xxx.dwg and Drawing No. xx-xxx.dwg.

Closure(s).zip: This should contain all of the NDP and PDF files in the Project subfolder Closures. Do not include temporary TXT or DOCX files.

Computations.zip: This file is to contain all of the files in this folder when the project is archived.

County Road XXXX - XXXXXX County.pdf: This applies only to full sets of right-of-way maps.

Data Collection QAQC.zip: This file should contain data collection files created by survey section staff during the review process of outsourced surveying. Note: This file should be added to the QAQC.zip

Data Collection.zip: The technician responsible for the project archival will ZIP the Party chief's work order downloads folder and the dated sub folders. The Zip file will be named Data Collection.zip and placed in the Project Data Collection subfolder. After which the Party Chief's files for the work order, under _Downloads are to be deleted.
TIP: Highlight the work order numbered folder to be zipped (under the Party chief), right click and select "add to new archive" name the zip file "Data Collection.zip". The zip file will be located under the party chief's name, move it to the appropriate project Sub folder.

Documents.zip: All Word documents created should be contained in this file at archive. This would include Legal Description XX-XXX-XXX.docx and Survey Report.docx.

Drawing No. XX-XX-XXX.pdf: A plot of the **NON-PARCEL** drawing delivered for this work order, which uses the basin and work order number.

Drawing No. XX-XXX-XXX.pdf: A plot of the **PARCEL** drawing delivered for this work order, which uses the parcel number.

Field Notes QAQC.pdf: This file should contain the field notes created by survey section staff during the review process of outsourced surveying. Note: This file should be added to the QAQC.zip
Field Notes.pdf: This file should contain a scan of the field notes (final) produced for THIS work order. Bookmarks are to be added if pages are not continuous and/or multiple books were used. AFTER SCANNING USE REDUCE FILE SIZE UNDER THE PDF FILE MENU

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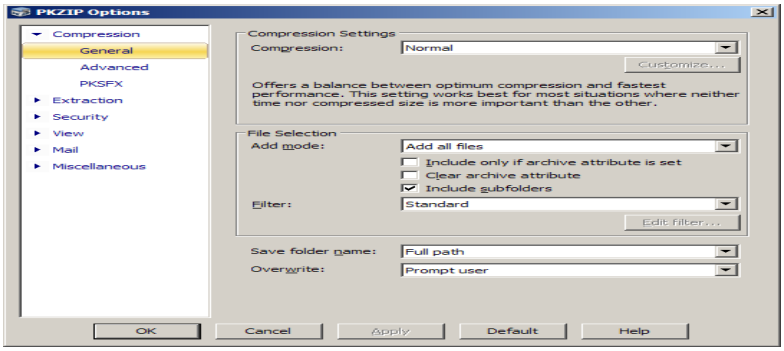
GPS Data QAQC.zip: This file should contain GPS post processing files created by survey section staff during the review process of outsourced surveying. Note: This file should be added to the QAQC.zip

GPS Data.zip: This file should be created at archive by highlighting the GPS folder, right clicking and selecting PKZIP, then “Add to New Archive...”

Note: Be sure to check your settings in PKZIP match below:



Legal Description Review.pdf: This file should be bookmarked and contain the legal description (and sketch if available) with a comment(s) inserted listing the original file name and source (e.g. Project Emails, from, date and name of file). Comments concerning errors and/or omissions from the review should be inserted where applicable. Also include a plot of the shapefile created for the review parcel with aerial background showing STRs, streets, District parcels and/or PA boundaries, as applicable.

Name of Road - PB XX, PG XX - XXXX County.pdf: This applies only to full sets of right-of-way maps. Use for maintained right-of-way maps.

P_XXX.pdf: This file will contain all pages of a plat used as a project reference. One should be created for each such plat and remain at archive.

These should be named as follows: P_xx1, P_xx2, etc.

Note: Each plat (format: **Plat Name, PB XX, Pg XX;**) should be listed (single line) under the Reference Data section of the work order.

P_XXX.txt: This file is a companion to **P_XXX.pdf** and contains the following data:

Plat Name - identical to the title.
Date of Recording
Plat Book number/Page number - first sheet in set.
Comments: state here if a Condominium or Road Plat
Number of sheets - total of set.
Surveyor’s name - Company name, if any. Otherwise surveyor’s name.
County - list all
Section-Township-Range - all that apply.
Related: (list job name and work order number)

Project Emails.pdf: This file should contain all emails received and sent relating to a work order.

QAQC.zip: When the job is archived, all files in the QAQC folder should be included in this file.

Peer Review.pdf
Final Review.pdf
Project Review.pdf
Draft email.pdf (save only if there were changes needed)
Feedback STG.pdf
Data Collection QAQC.zip
GPS Data QAQC.zip
Field Notes QAQC.zip
Drawing No. xx-xx-xxx QAQC.pdf
Survey Report QAQC.pdf

Reference Data.zip: This file should be created at archive and contain the following:

Reference Deeds.pdf
CCR.pdf
Title Commitment.pdf
Tax Map.pdf
FEMA.pdf
R-W Maps
GLO.pdf
Reg. CE IOP Form.pdf
MHWL.pdf
OHWL.pdf

Shapefile.zip: This file should contain the shapefile created from the final processed data and the Geospatial Origin.txt file.

Site Photos.pdf: All site pictures should be inserted in this PDF and have comments to identify date, position, direction, subject, etc.

State Road XXX - XXXXXXX County.pdf: This applies only to full sets of right-of-way maps.

Survey Report Table.zip: When an XLSX is certified in a Survey Report (i.e. Job Name XX-XXX.xlsx) it will be included in this file.

Survey Report.pdf: This file should contain both a scan of the signed and sealed (highlight seal) report AND a PDF of the Excel file (XLS) if one was certified in the report.

Tables.zip: All XLSX files (tables) will be included in this file at archive, **except** Survey Report Table.zip.

Appendix A: GEOID12 FOR LGO

INTRODUCTION**:**

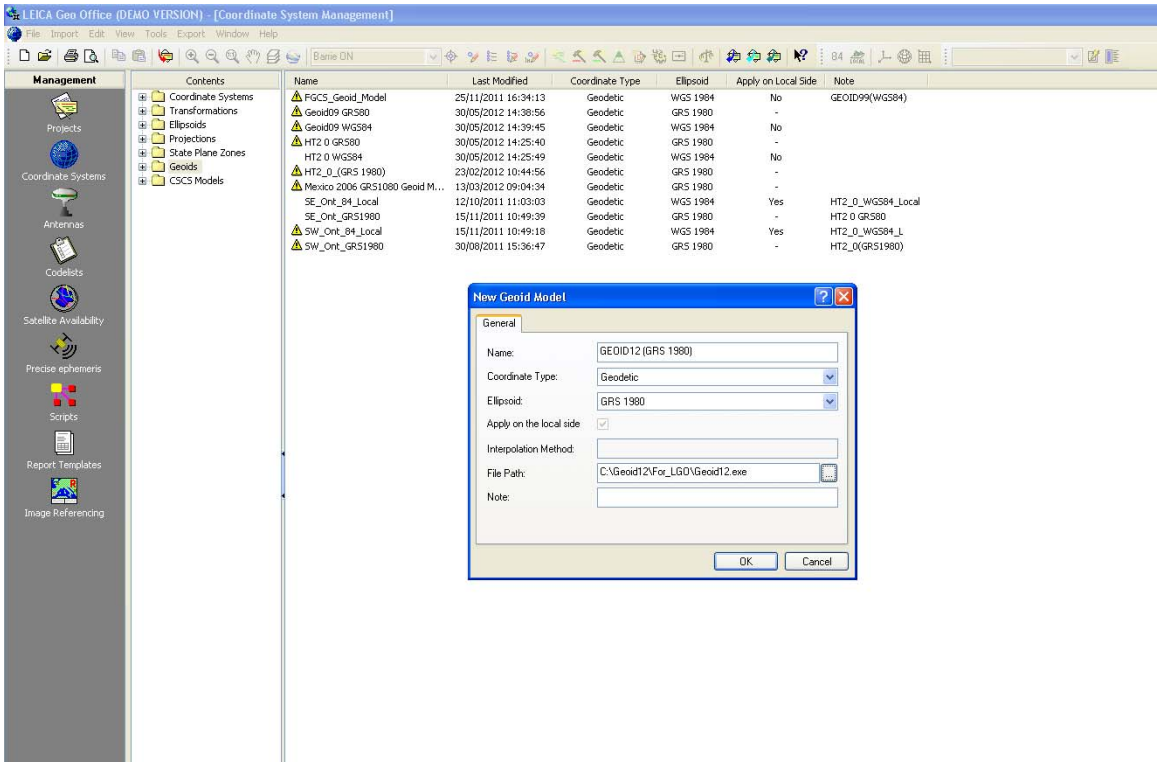
The GEOID12 model can be used in LGO for geoid undulation calculations based on NAD83 Latitudes and Longitudes. The GEOID12 model consists of a single program named GEOID12.EXE (provided by Leica Geosystems), with one or more grid coefficient file(s), named g2012*.bin provided by NGS for Little Endian Data Binary structure. The g2012u00.bin file covers the entire USA Continental CONUS) region, whereas the g2012a00.bin file covers the entire Alaska region. Binary (bin) files named: g2012h00, g2012p00, g2012s00, g2012g00 bin cover areas for Hawaii, Puerto-Rico/US Virgin Islands, American Samoa, Guam and Northern Mariana Island territories respectively. Position limits of the different GEOID12 areas are listed below:

g2012u00.bin	GEOID12 grid #1 for CONUS (24-58N, 060-130W)
g2012a00.bin	GEOID12 grid #1 for Alaska(49-72N, 126-188W)
g2012h00.bin	GEOID12 grid #1 for Hawaii(18-24N, 154-161W)
g2012p00.bin	GEOID12 grid #1 for P-R/VI(15-21N, 064-069W)
g2012s00.bin	GEOID12 grid #1 for Samoa (17-11S, 168-174W)
g2012g00.bin	GEOID12 grid #1 for Guam (11-18N, 143-146E)

It is under the user's responsibility to obtain the right number and the adequate Geoid2012 Grid coefficient (g2012*.bin) file(s). The g2012*.bin files must be the ones supplied by LEICA or must be obtained from NGS for Intel Binary (Windows) format as Little Endian Binary Structure. It is expected that some of the Geoid2012 grid coefficient files could be updated from time to time. Additional information about GEOID12 model can be found on the NGS web site.

INSTALLATION and OPERATION in LGO:

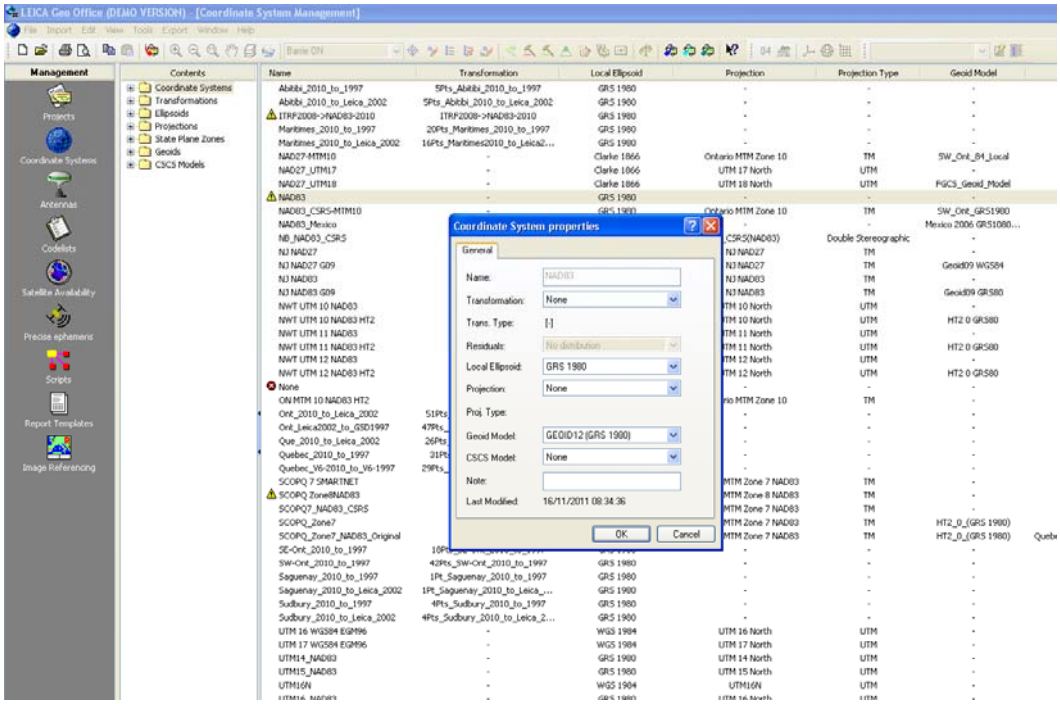
Copy or pkunzip the GEOID12 files in any subdirectory existing on the current hard disk drive where LGO resides (\LGO\Geoids\GEOID12 as an example). The GEOID12 files should contain the following files: GEOID12.EXE, GEOID12.DOC, with one or more GEOID12 Grid Coefficient (g2012*.bin) files as provided by LEICA or correctly converted the little endian format from NGS web site. Make sure that there is at least ONE Grid Coefficient file (g2012*.bin) in that same subdirectory corresponding to your area. Set up LGO for GEOID12 undulation calculations by creating a new GEOID Model from the Geoid Models folder in LGO Coordinate Systems. Insert appropriate information in the parameter table as shown in the following Display Panel 1.



Display Panel 1: Definition of GEOID12 Model in LGO Coordinate Systems Geoids Folder.

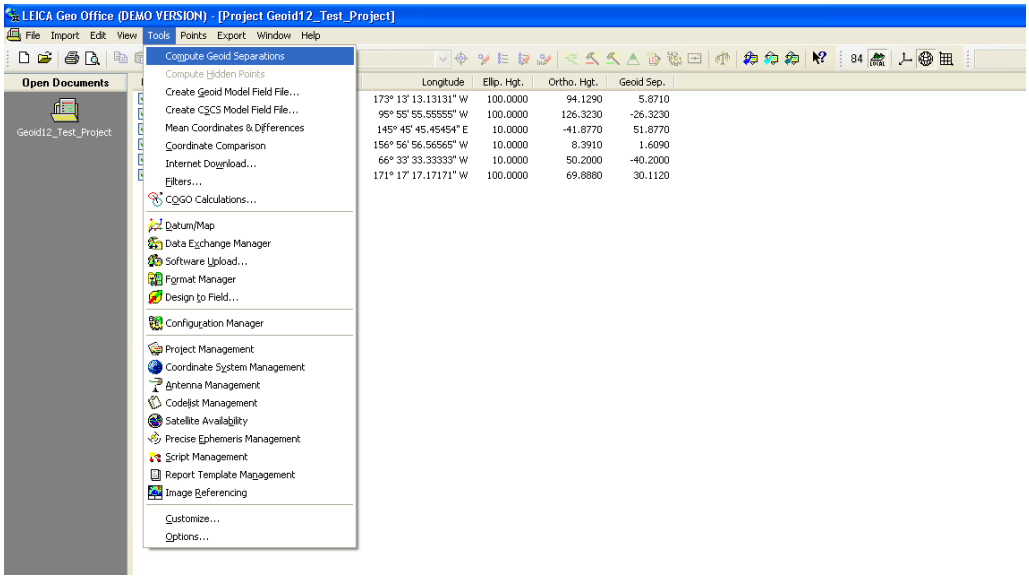
The GEOID12 Model must be assigned to either a new or an existing Coordinate System as per the following Display Panel 2.

The reference ellipsoid for the GEOID12 model should be GRS 1980 since it is related to the NAD83 (Local) Coordinate System. This is critical when 3-D Classical Transformation is used to convert GNSS (WGS84) to Local coordinates for proper Orthometric Height conversion. The WGS84 ellipsoid can also be used as the reference ellipsoid for the GEOID12 Model. In the latter case, Orthometric Heights will be directly derived from the GNSS (WGS84) Ellipsoid Heights bypassing any vertical transformations between the GNSS (WGS84) and the Local Coordinate System when applied to the Global Side (Apply to Local unchecked). A WGS84 Geoid Model can be applied to the Local Side (Apply to Local checked) in order to be used in 1-Step or 2-Step Transformation types.



Display Panel 2: Assignment of GEOID12 Model to a Coordinate System in LGO.

Once the GEOID12 Model is attached to a Coordinate System, the GEOID12 undulation calculations must be conducted in a Project opened with the appropriate Coordinate System. Geoid undulation calculations are initiated by selecting Compute Geoid Separations from the Tools pull down menu as shown on Display Panel 3.



Display Panel 3: Calculation of GEOID12 undulations in a LGO Project.

A confirmation of the Geoid Calculations is presented with Orthometric Heights and Geoid Undulations for each point coordinates in the Local Coordinate System.

If one of the point coordinate falls outside any given grid limits, an error will be reported which indicates wrong coordinate inputs. Please make sure that the GEOID12.EXE and the correct grid coefficient file(s) (g2012*.bin) are in the Geoid subdirectory.

In case of Geoid model calculation problems in a given computer, a *.gem file can be used to define a New Geoid Model in LGO without using the EXE program.

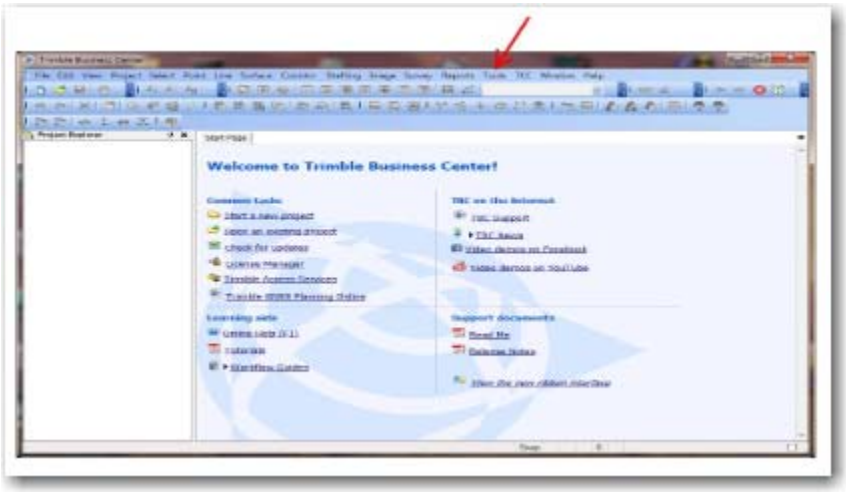
Appendix B: GEOID12 FOR TBC

Save your new geoid model under common files at C:\Program Files (x86)\Common Files\Trimble\Geodata

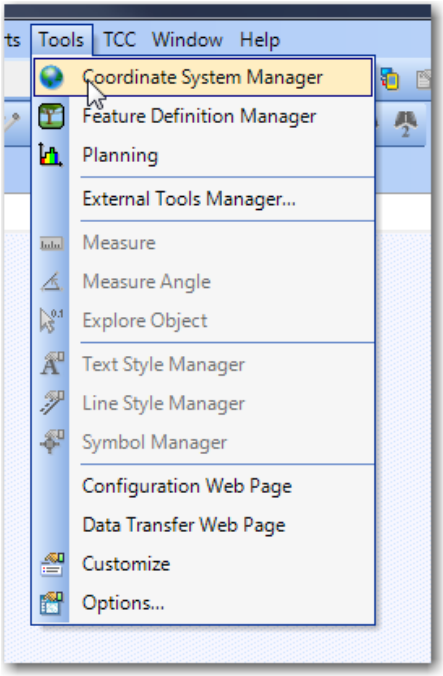
Save your new geoid model from L:\SURVEY\Reference\GPS\Geoid Data\Trimble\G12AUS to common files at C:\Program Files (x86)\Common Files\Trimble\Geodata

Start a TBC (Trimble Business Center) project.

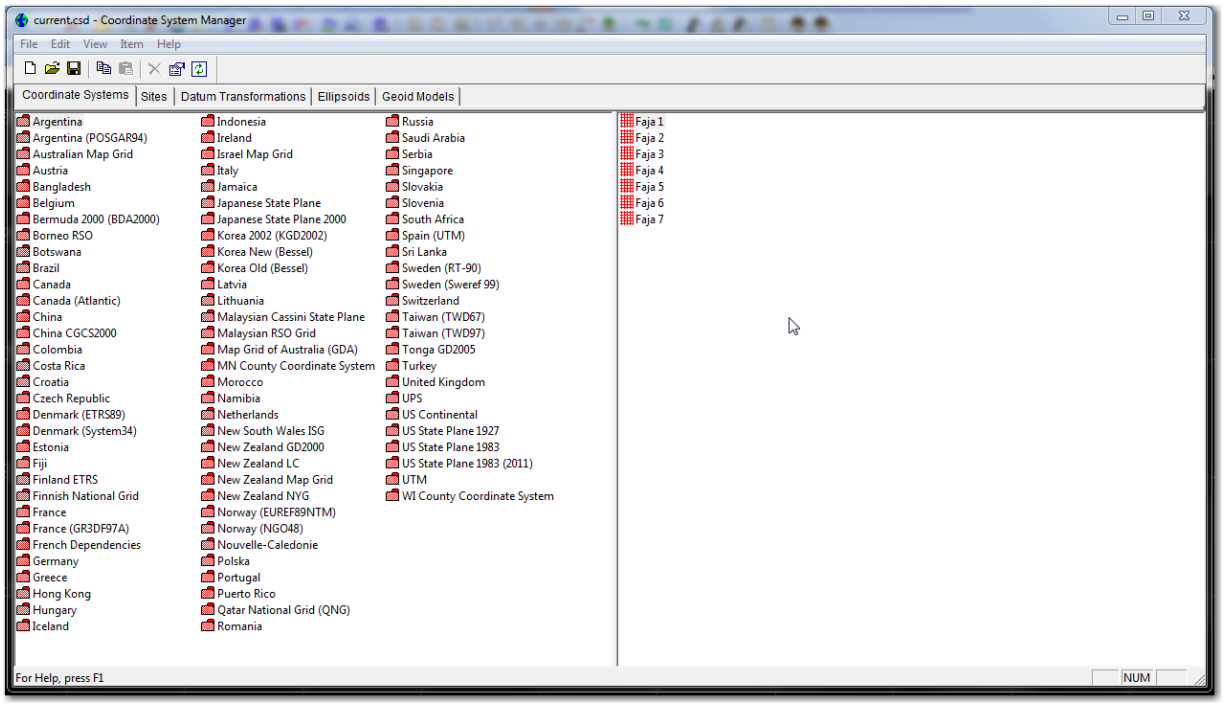
Select “Tools”



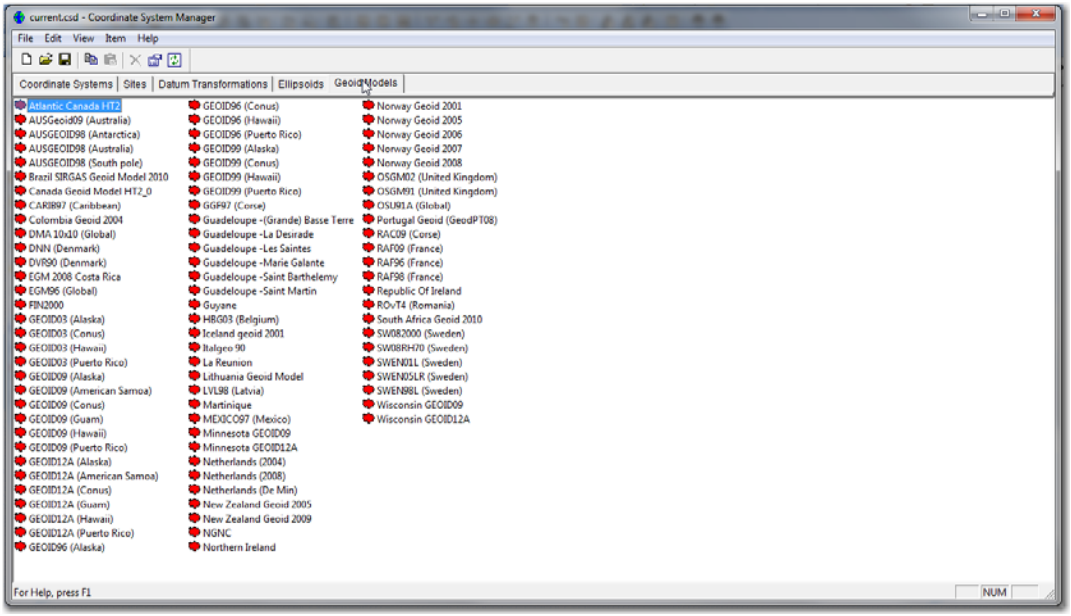
Now select “Coordinate System Manager”



The “current.csd – Coordinate System Manager” window now appears.

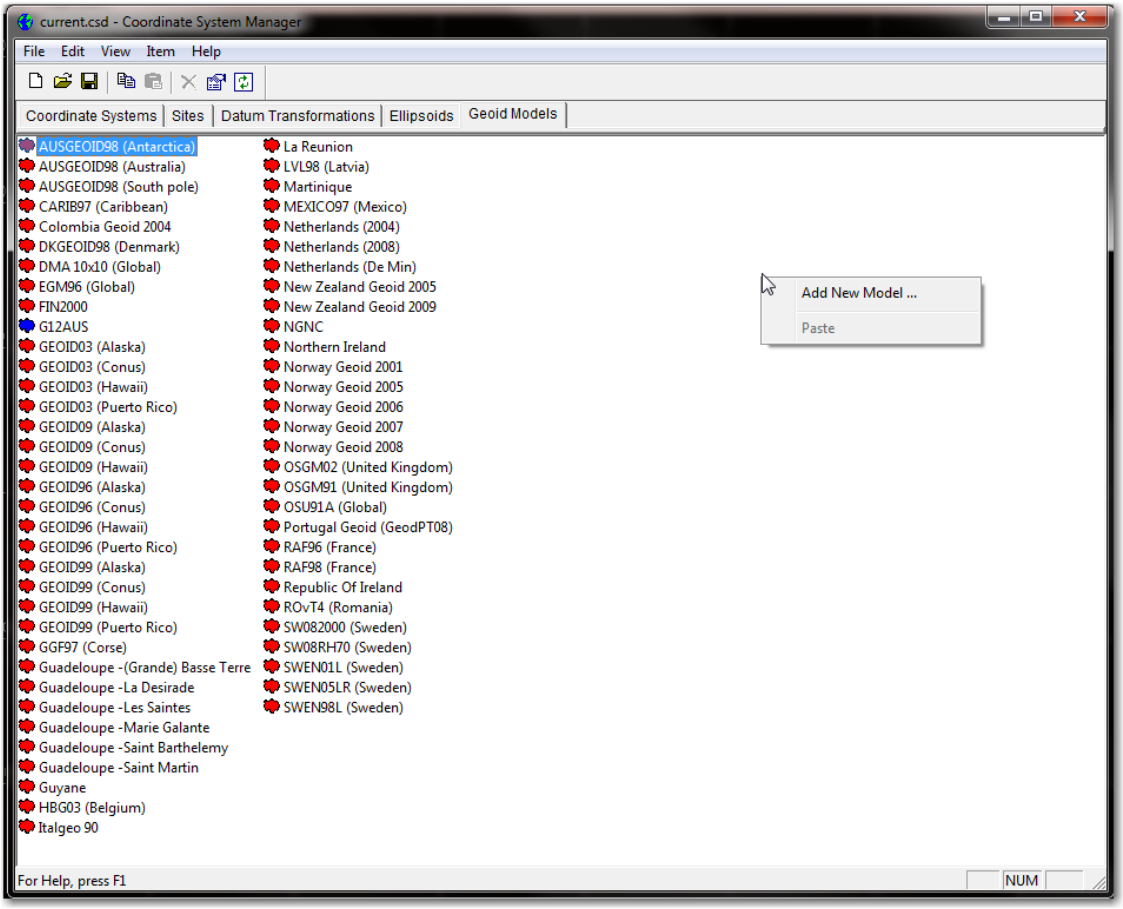


Select the Geoid Model tab, you should now be able to see the new geiod model “GEOID12A (Conus)”, if not visible see “LOADING GEOID MODEL” below.

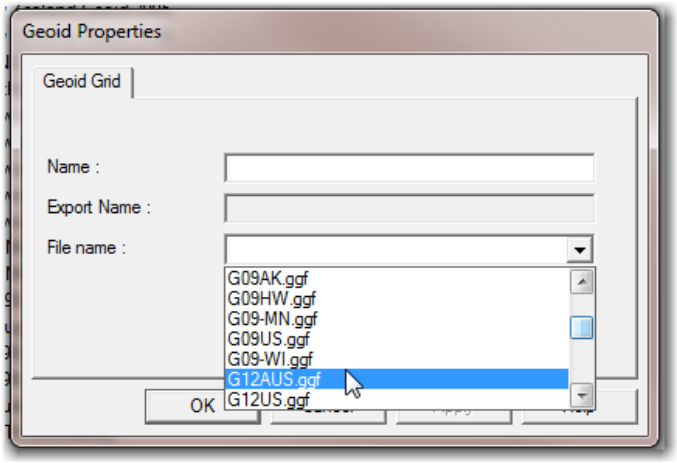


LOADING GEOID MODEL

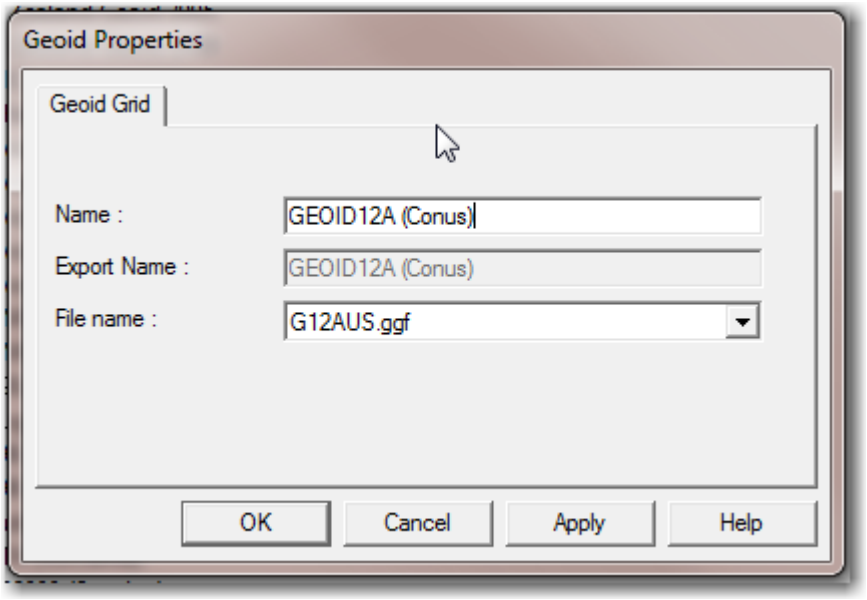
If your new Geoid model is not available right click in the “Geoid Models” file window a pop up will appear, now select “Add New Model”



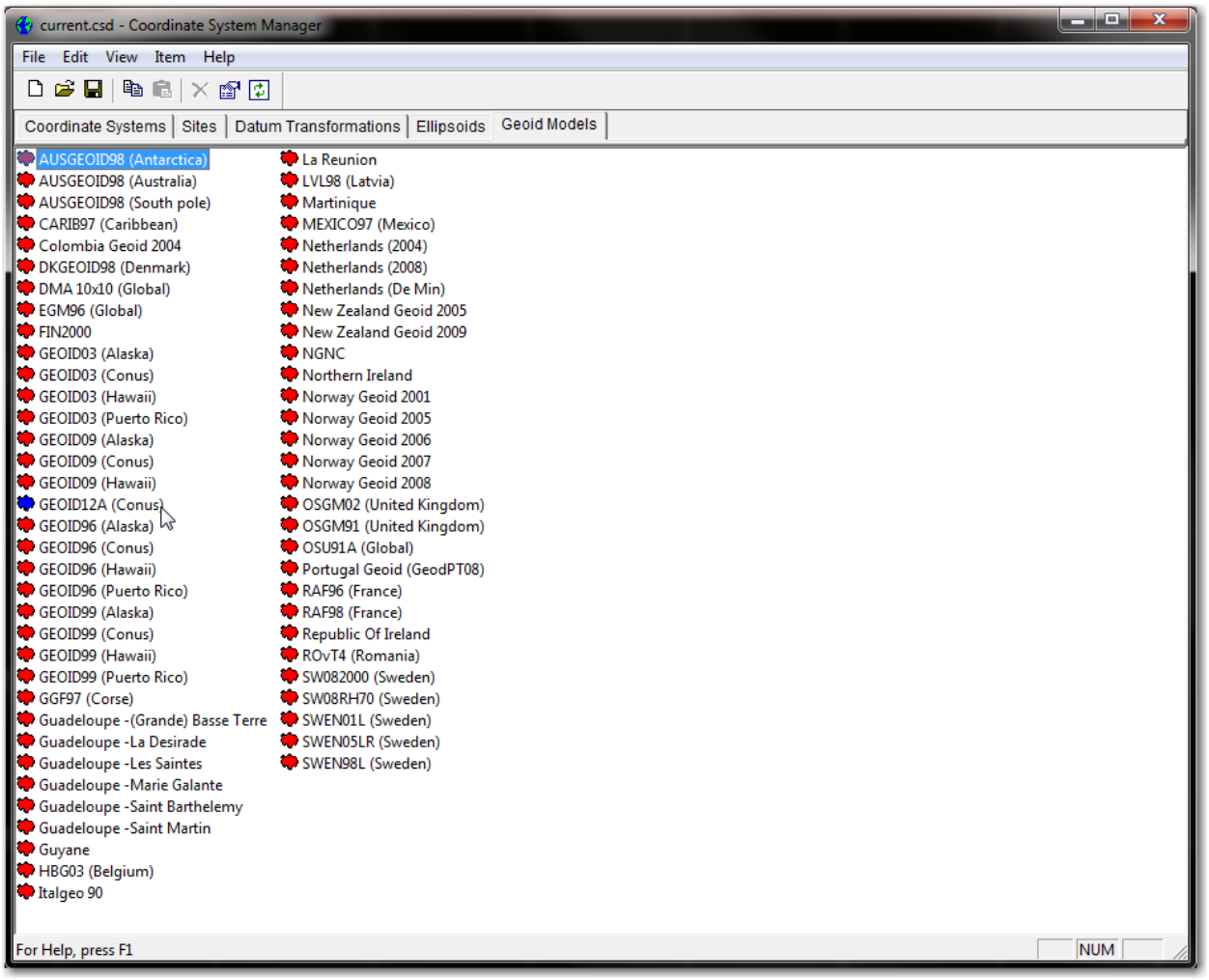
Select the pull down arrow and scroll to find your new Geoid model.



Assign it the same name as the export name.



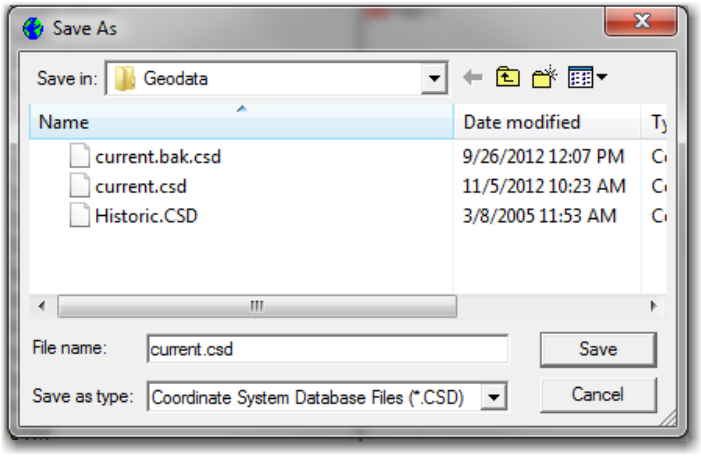
Select Apply, it should now show up in the Geoid Models tab highlighted in blue.



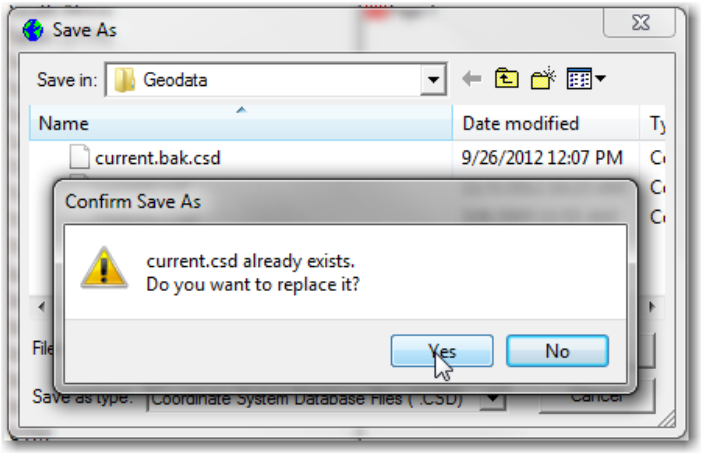
NOW RETURN TO “SAVING NEW CSD FILE” ABOVE.

SAVING NEW CSD FILE

At the upper left corner in the “current.csd-Coordinate System Manager” window select “File” and select “Save As”.

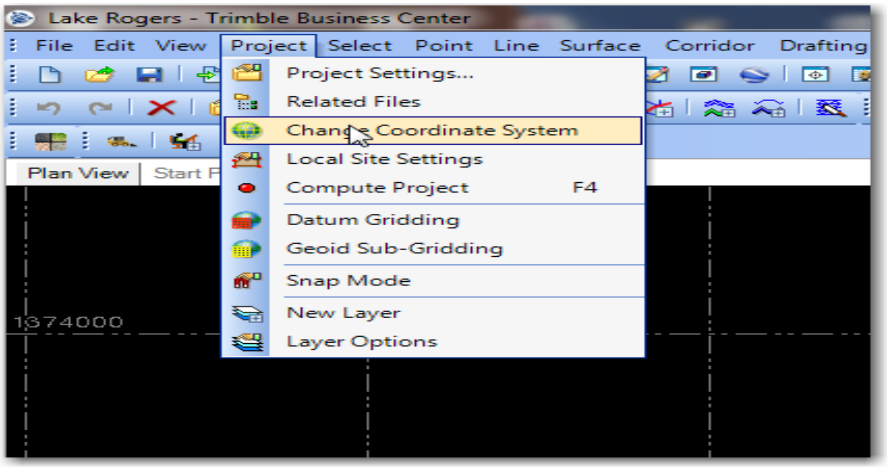


When prompted with “current.csd already exists. Do you want to replace it” select “Yes”.

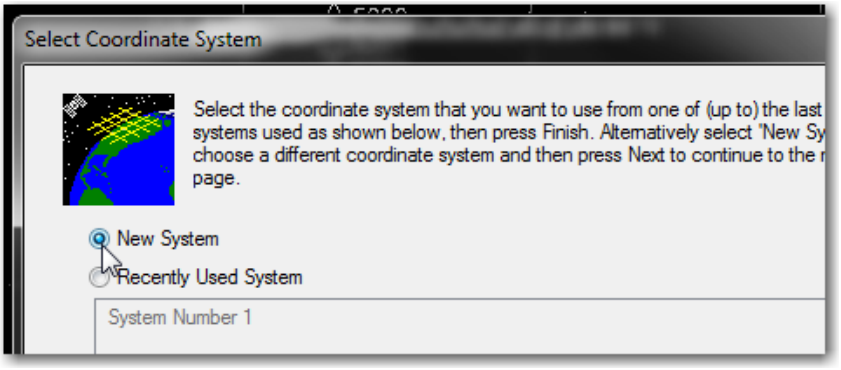


Your new geoid model should now be available for use under the “Project” menu “Change Coordinate System” see “CHANGING COORDINATE SYSTEM” below.

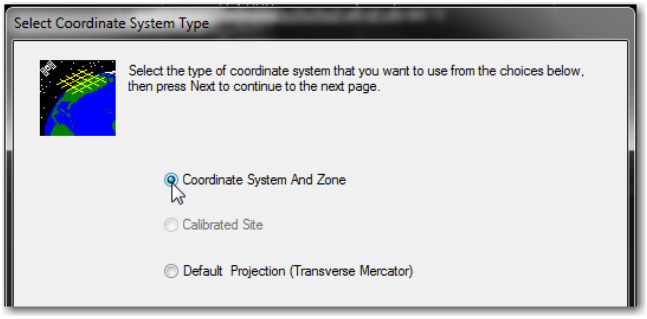
CHANGING COORDINATE SYSTEM



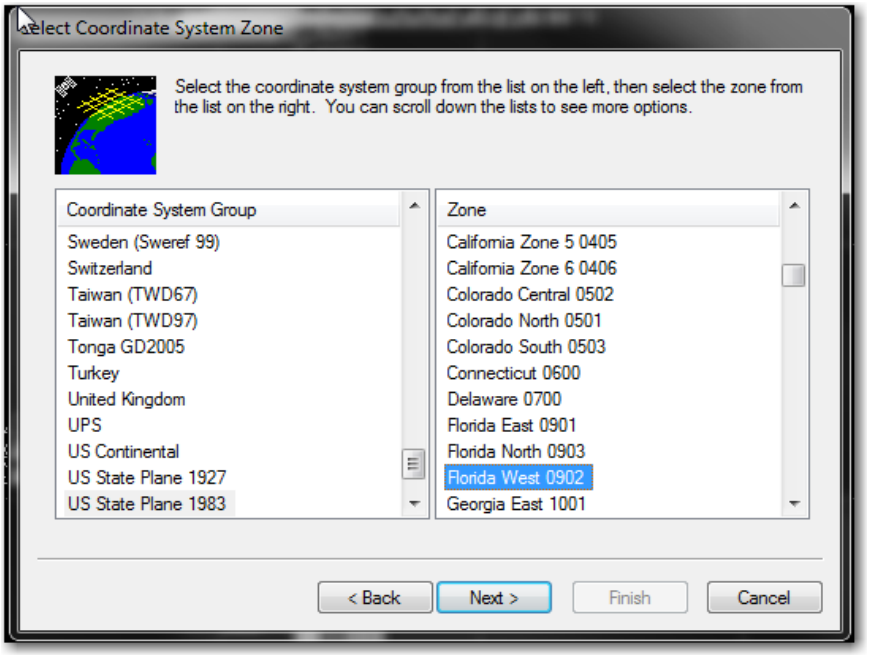
Select “New System” and hit next.



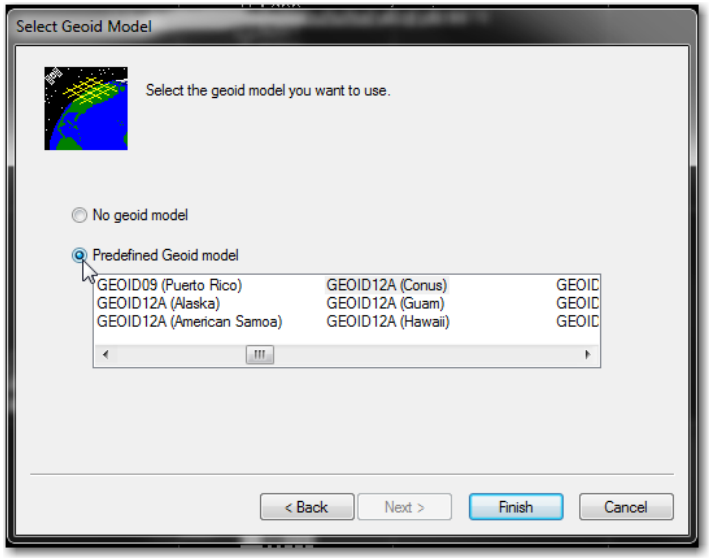
Select “Coordinate System And Zone” and hit next.



Select the correct coordinate system group and “Florida West Zone 0902”

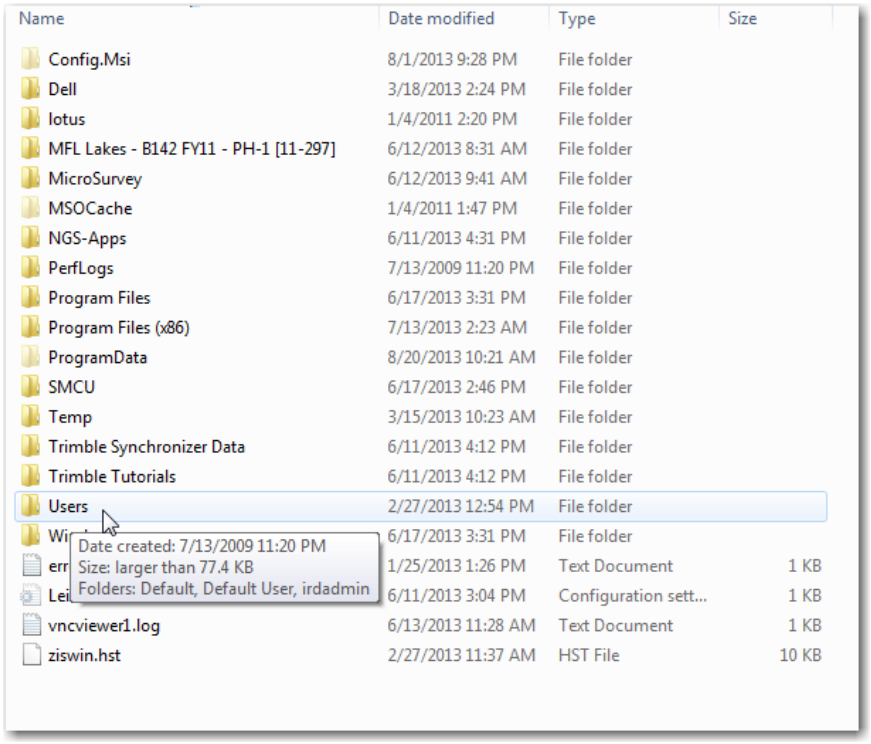


Select “Predefined Geoid model” and select your newly loaded geoid model.

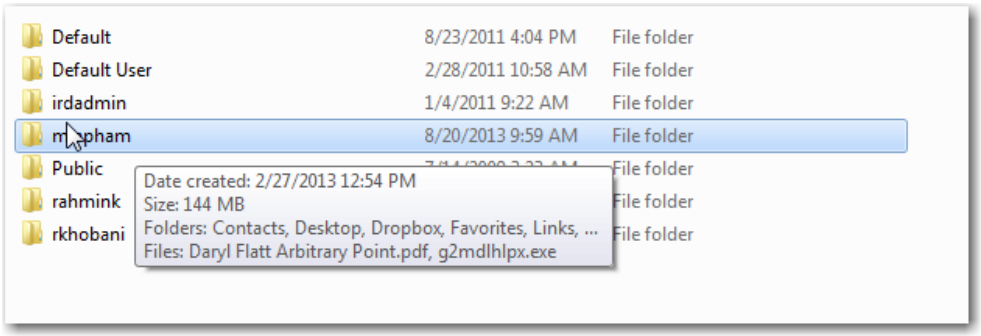


Select “Finish”. If GEOID12A (Conus) is not found you will need to update your current.csd file. To do this, go to windows explorer and select C: drive

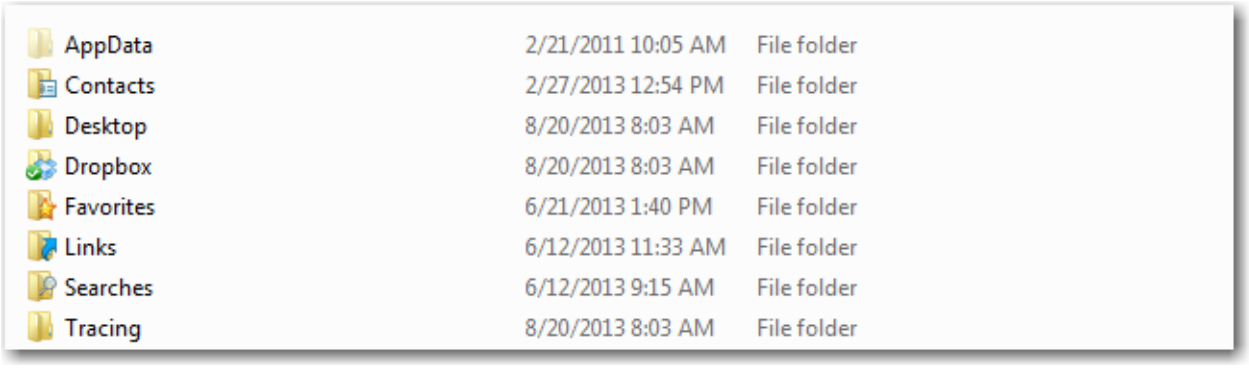
Select “Users”



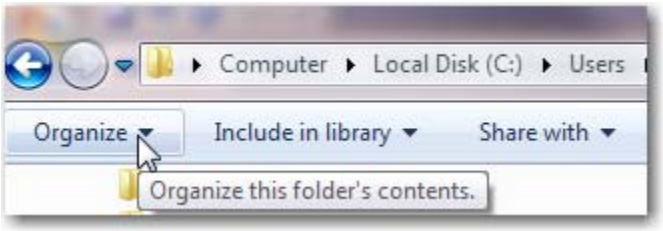
Select your name:



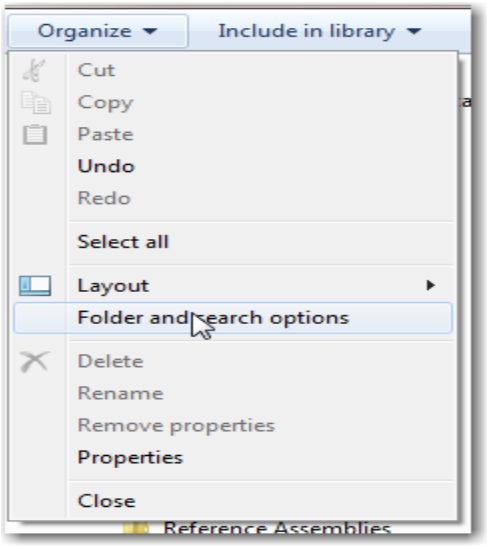
You should now see a list of files similar to below:



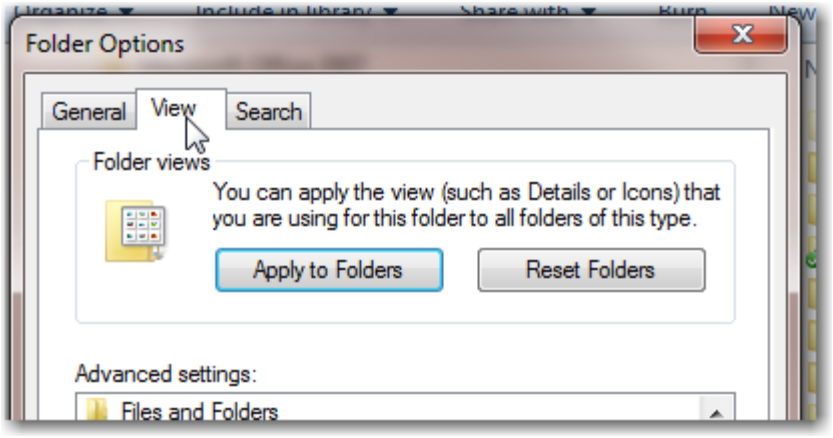
Select "AppData", if "AppData" is not available go to the Organize pull down in the upper left corner



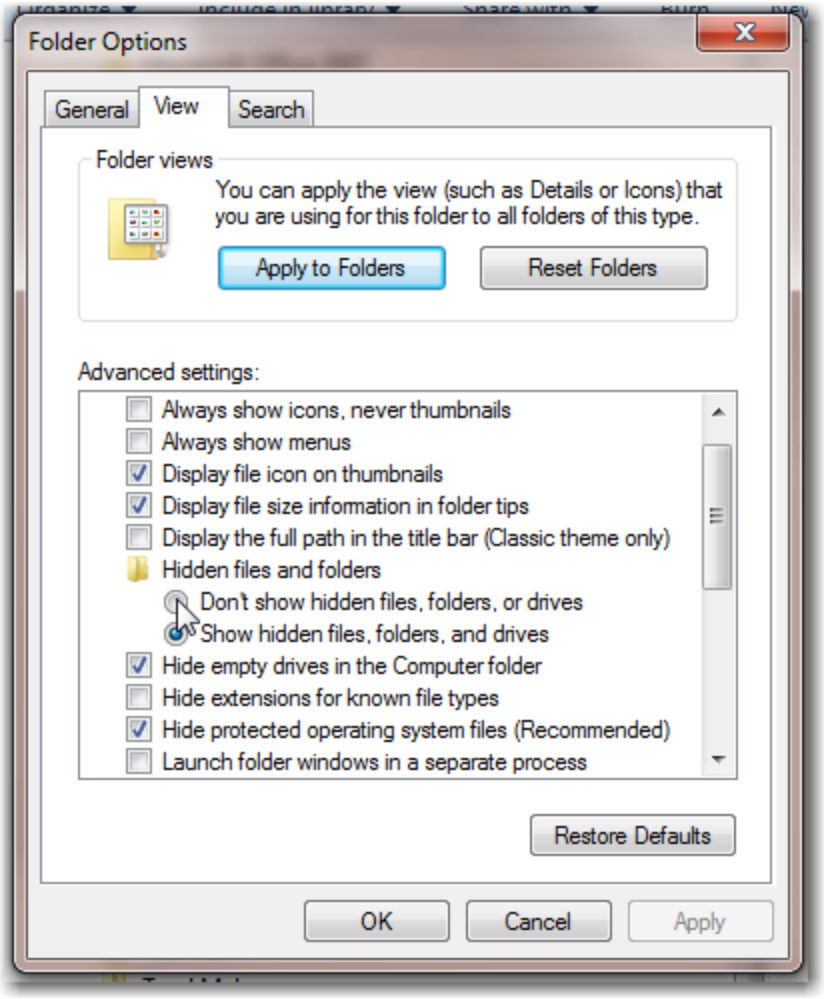
Select "Folder and search options"



Select “View”



Uncheck the button next to “Don’t show hidden files, folders, or drives”

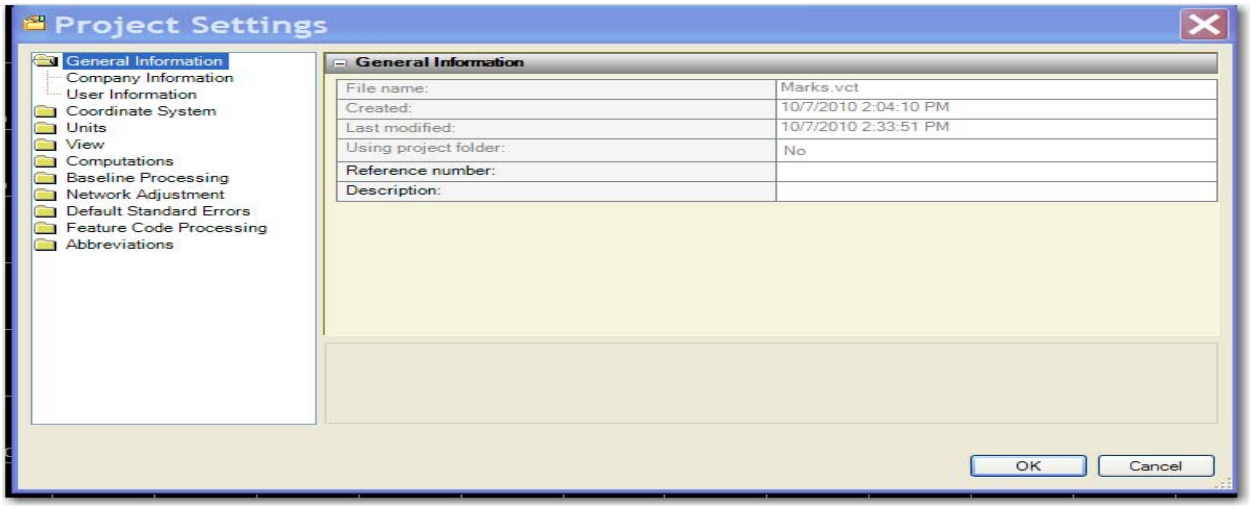


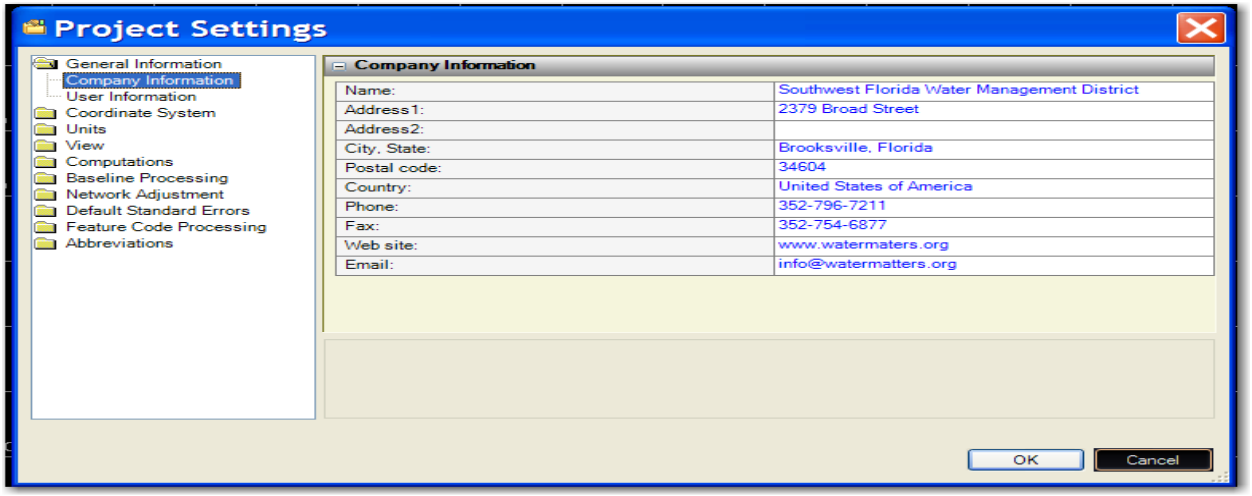
Select “Apply” and now AppData should be available.

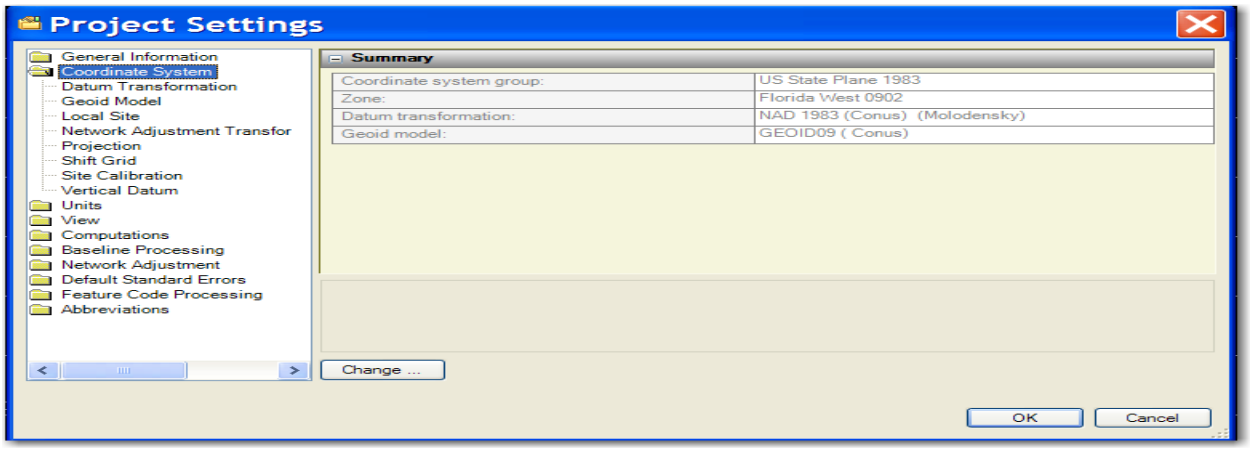
Select AppData and navigate to the following:
C:\Users\YOURNAME\AppData\Local\VirtualStore\Program Files (x86)\Common Files\Trimble\Geodata. Here you find a file named “current.csd” highlight, right click and copy. Navigate to C:\Program Files (x86)\Common Files\Trimble\Geodata and paste and overwrite the updated “current.csd” file here.

Return to loading Geoid model in Trimble Business Center, the new Geoid should be available as Geoid12A (Conus).

Appendix C: Project settings for TBC

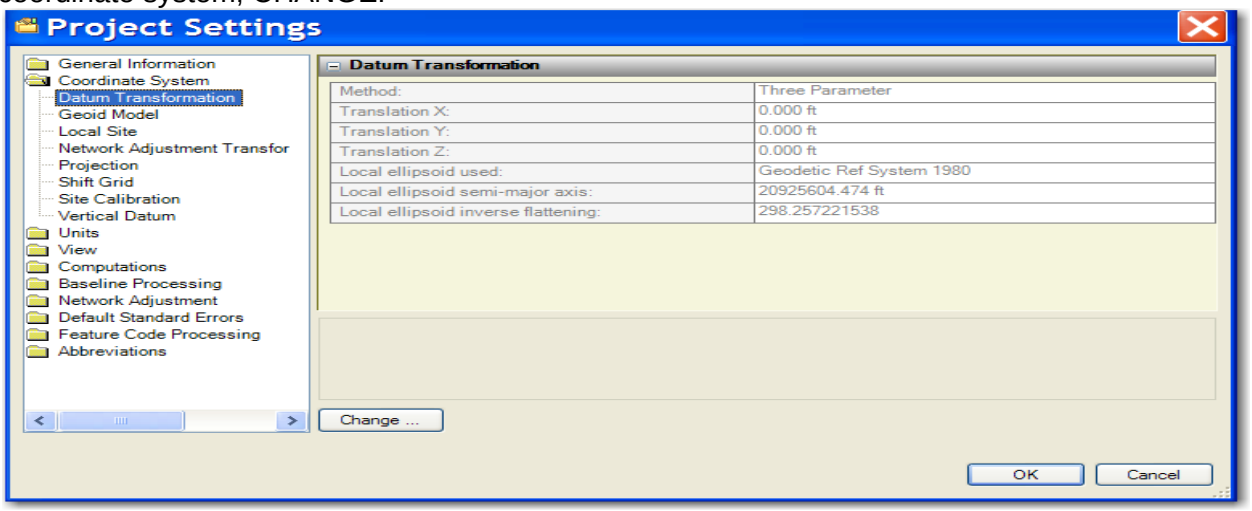


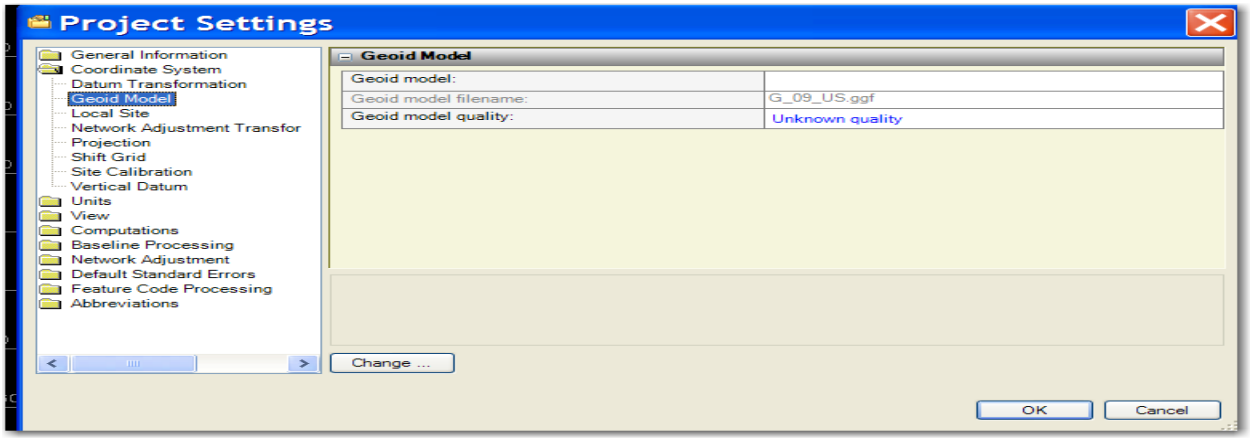


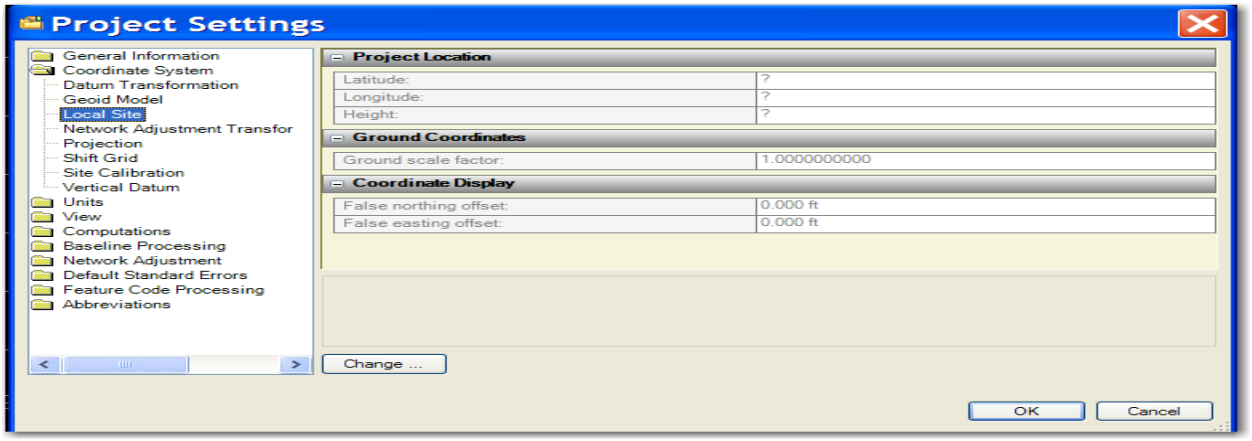


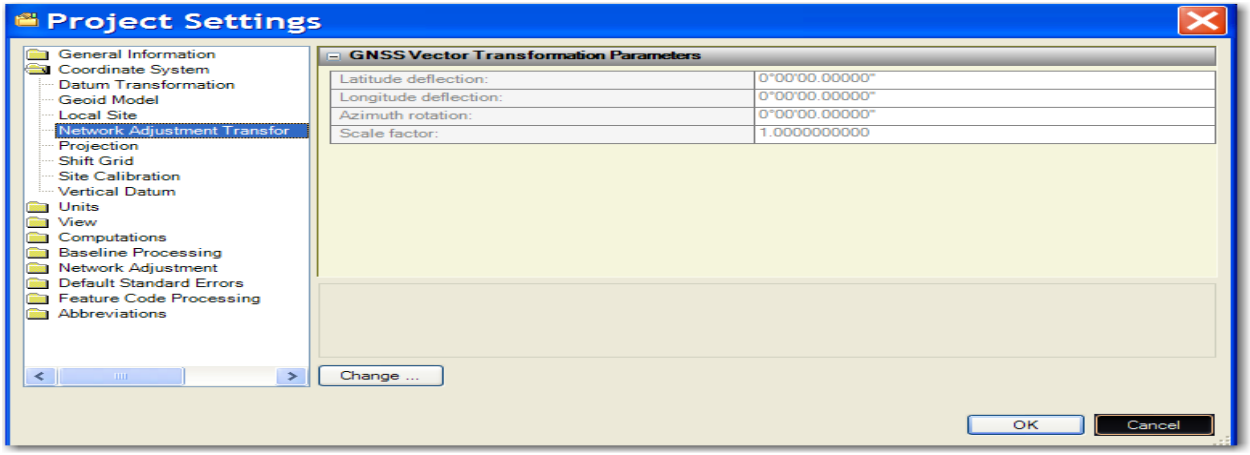
For Win XP: The Geoid .ggf file is stored in C:\Program Files\Common files\Trimble\Geodata. To change: go to Tools, Coordinate System Manager, choose Geoid Models tab, if the geoid does not appear in the list, go to Edit, Add Geoid Model.

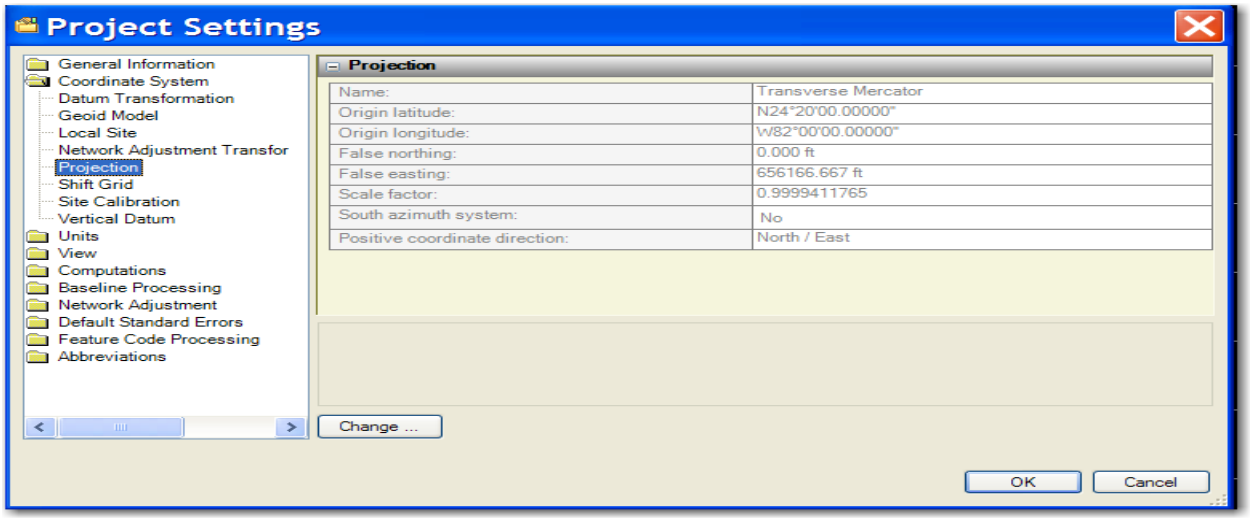
Use the drop down at File Name: search for the .ggf file and enter the geoid name (yr) in the Name: field, apply, ok, then your geoid will be available to choose in the Project Settings, coordinate system, CHANGE.

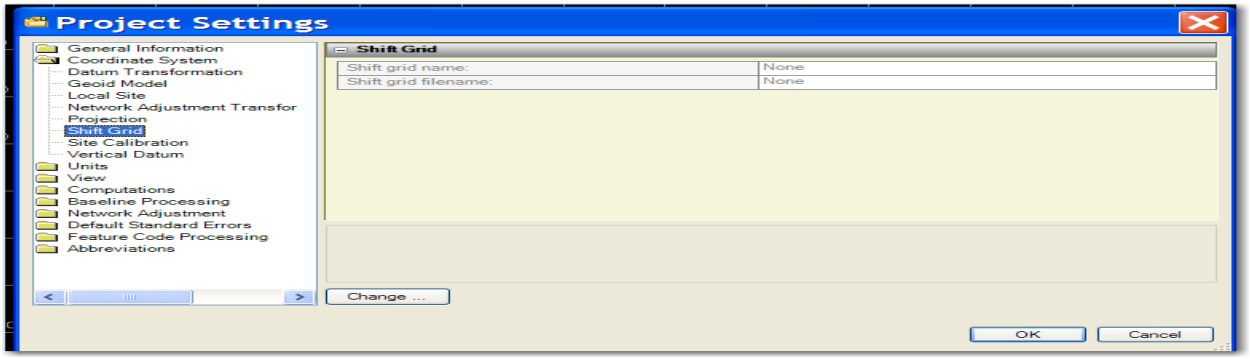







Project Settings
General Information
Coordinate System
Datum Transformation
Geoid Model
Local Site
Network Adjustment Transfor
Projection
Shift Grid
Site Calibration
Vertical Datum
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
GNSS Vector Transformation Parameters
Latitude deflection: 0°00'00.00000"
Longitude deflection: 0°00'00.00000"
Azimuth rotation: 0°00'00.00000"
Scale factor: 1.0000000000
Change ...
OK
Cancel


Project Settings
General Information
Coordinate System
Datum Transformation
Geoid Model
Local Site
Network Adjustment Transfor
Projection
Shift Grid
Site Calibration
Vertical Datum
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Projection
Name: Transverse Mercator
Origin latitude: N24°20'00.00000"
Origin longitude: W82°00'00.00000"
False northing: 0.000 ft
False easting: 656166.667 ft
Scale factor: 0.9999411765
South azimuth system: No
Positive coordinate direction: North / East
Change ...
OK
Cancel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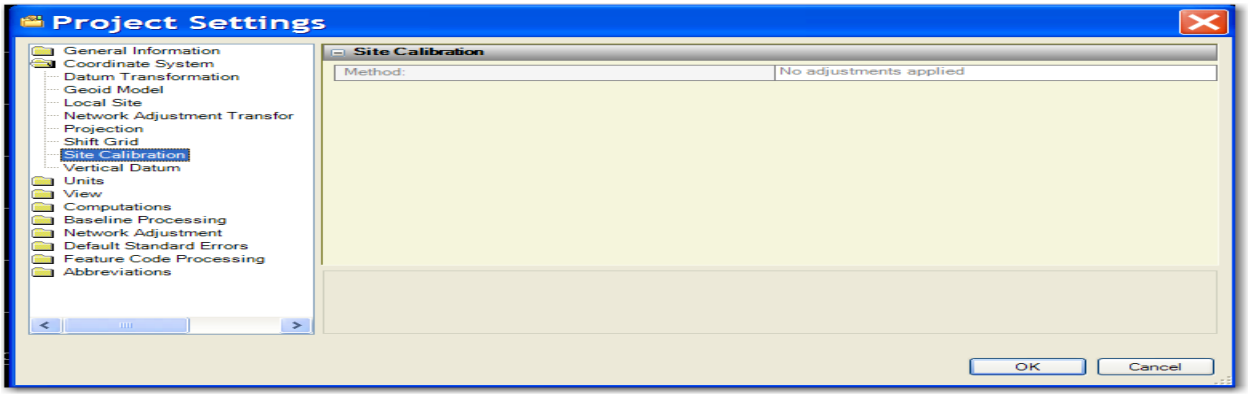
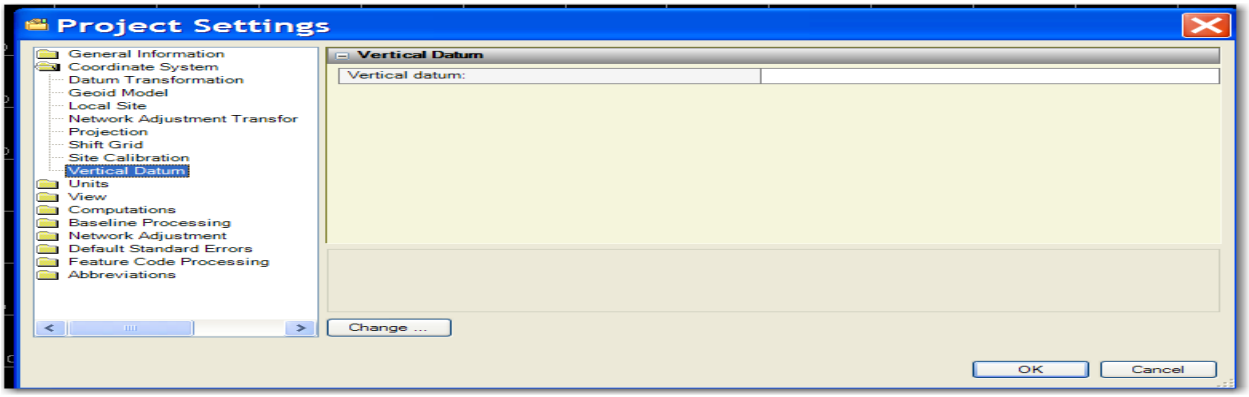
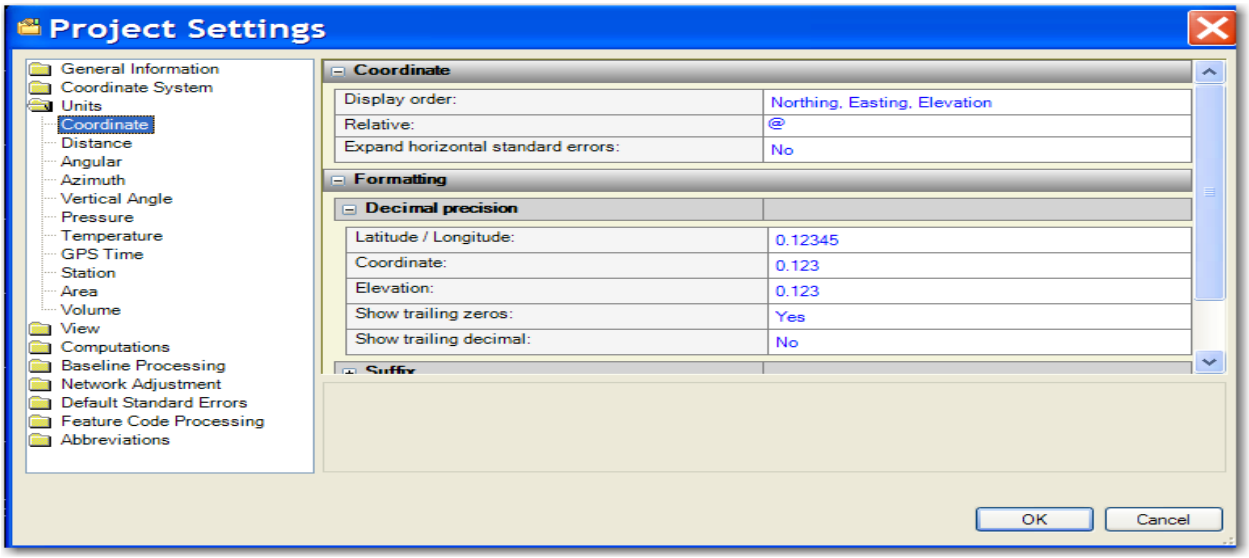
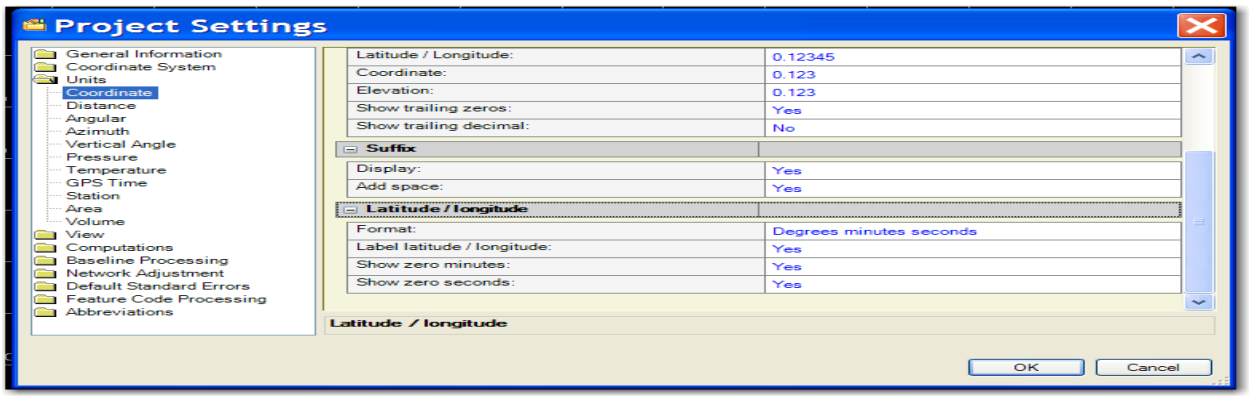
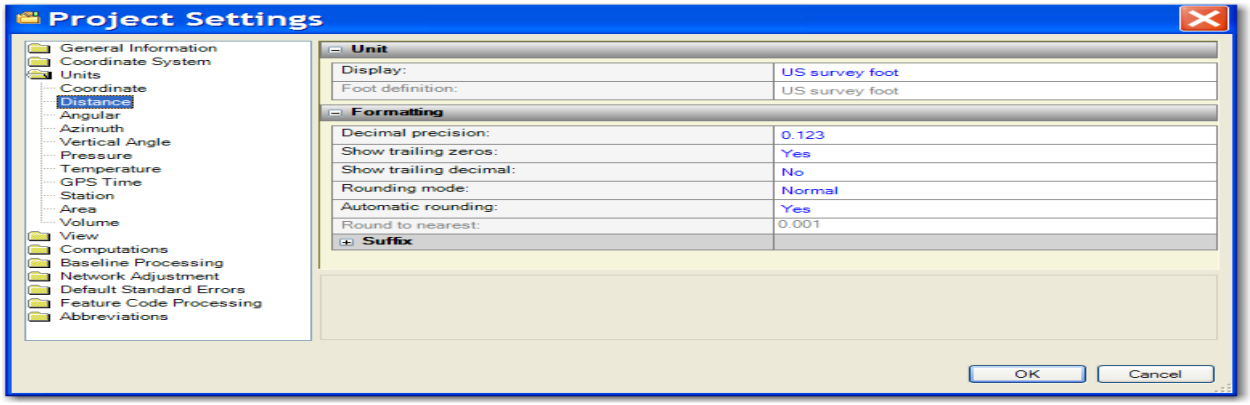
Coordinate System
Datum Transformation
Geoid Model
Local Site
Network Adjustment Transfor
Projection
Shift Grid
Site Calibration
Vertical Datum
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Shift Grid
Shift grid name: None
Shift grid filename: None
Change ...
OK
Cancel

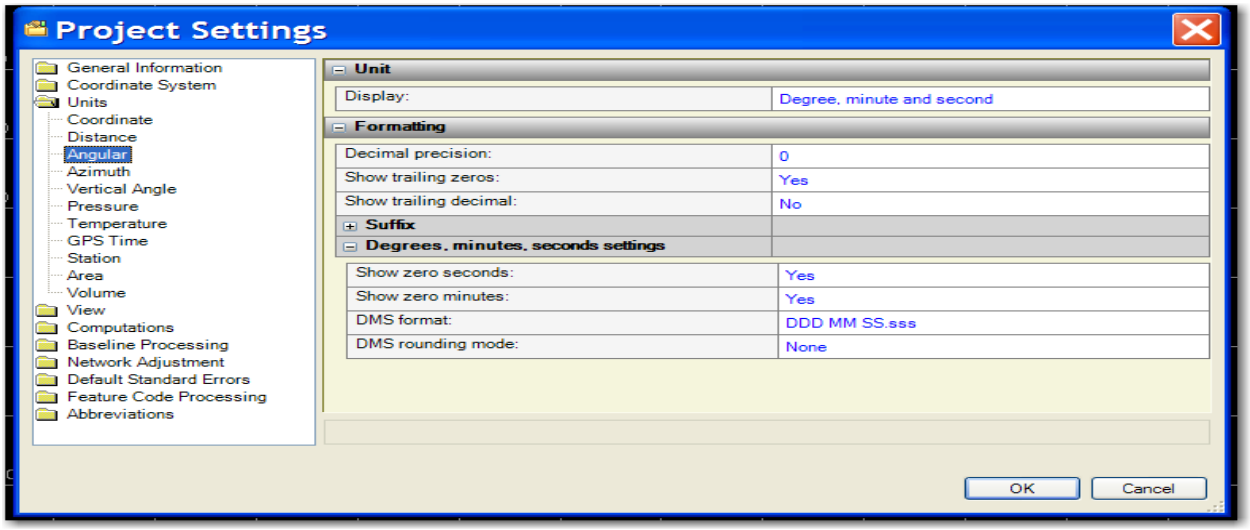

Project Settings
General Information
Coordinate System
Datum Transformation
Geoid Model
Local Site
Network Adjustment Transfor
Projection
Shift Grid
Site Calibration
Vertical Datum
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Site Calibration
Method:
No adjustments applied
OK
Cancel

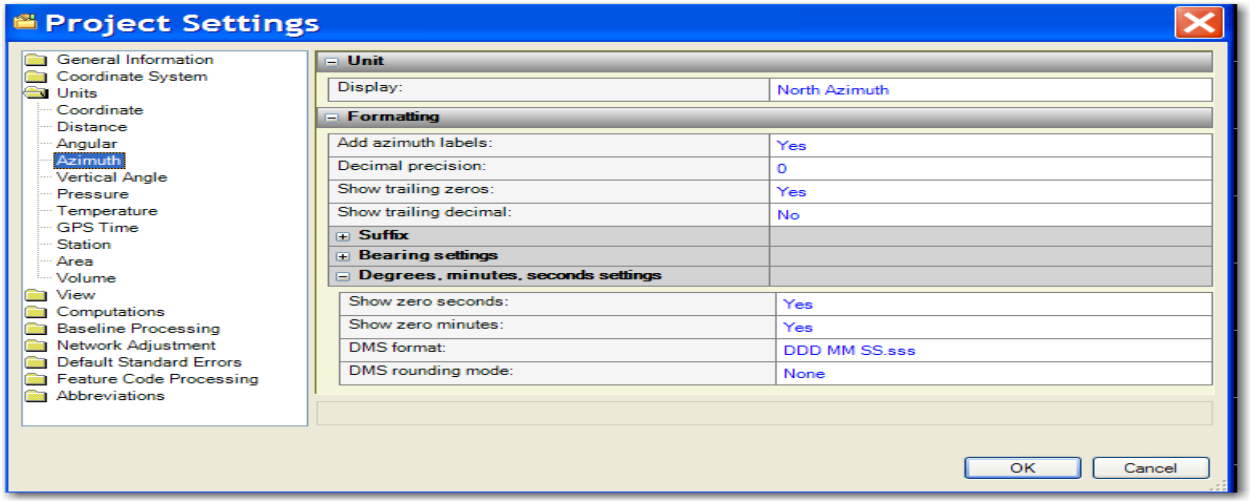

Project Settings
General Information
Coordinate System
Datum Transformation
Geoid Model
Local Site
Network Adjustment Transfor
Projection
Shift Grid
Site Calibration
Vertical Datum
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Vertical Datum
Vertical datum:
Change ...
OK
Cancel

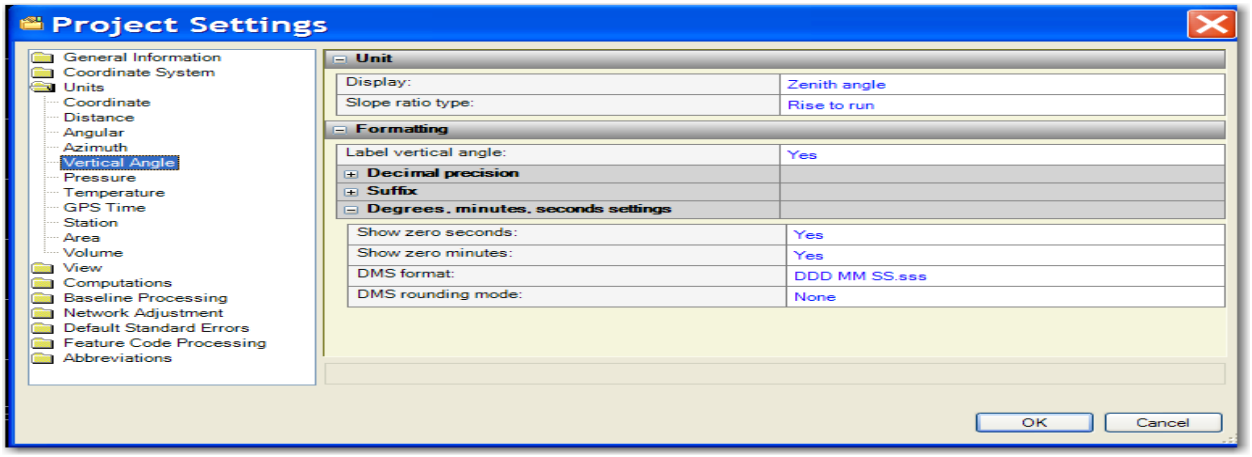

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Coordinate
Display order:
Northing, Easting, Elevation
Relative:
@
Expand horizontal standard errors:
No
Formatting
Decimal precision
Latitude / Longitude:
0.12345
Coordinate:
0.123
Elevation:
0.123
Show trailing zeros:
Yes
Show trailing decimal:
No
Suffix
OK
Cancel

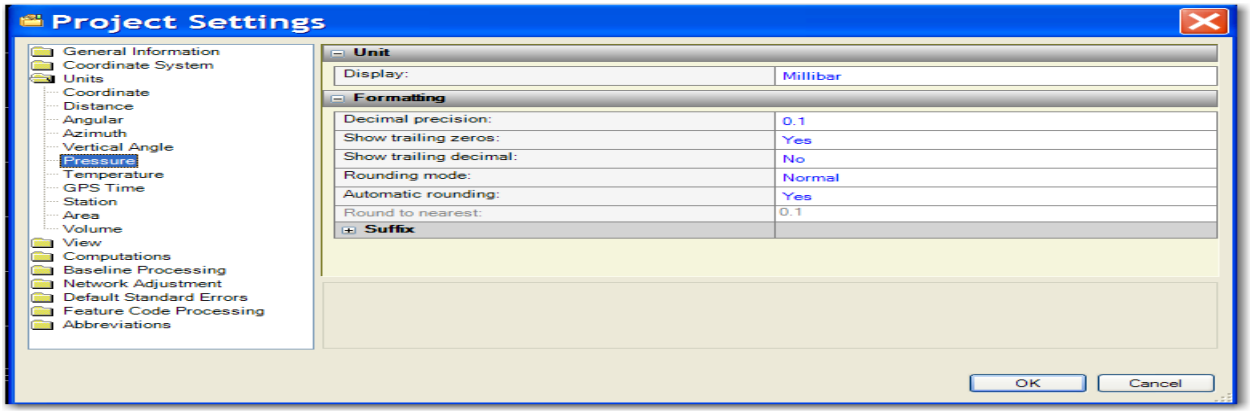

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Latitude / Longitude: 0.12345
Coordinate: 0.123
Elevation: 0.123
Show trailing zeros: Yes
Show trailing decimal: No
Suffix
Display: Yes
Add space: Yes
Latitude / longitude
Format: Degrees minutes seconds
Label latitude / longitude: Yes
Show zero minutes: Yes
Show zero seconds: Yes
Latitude / longitude
OK
Cancel

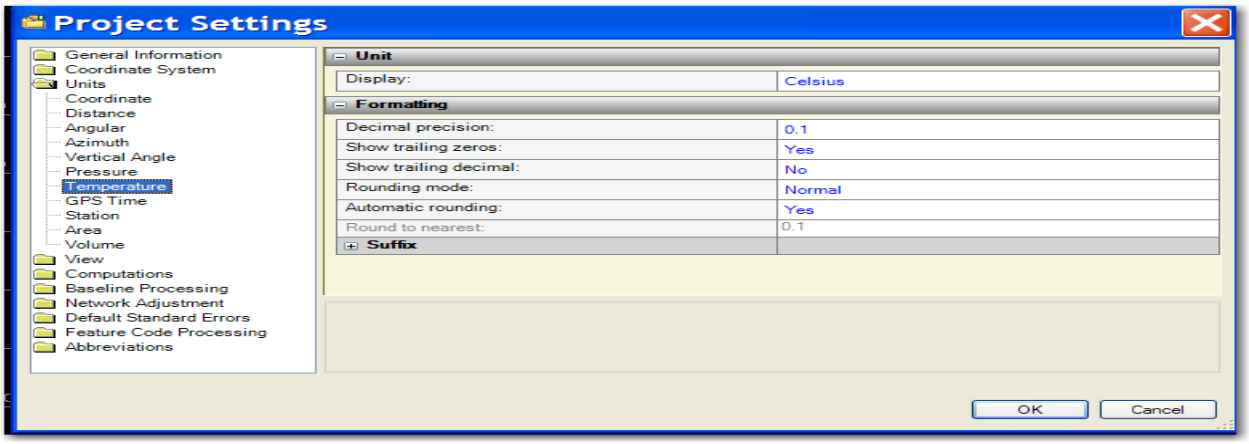

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: US survey foot
Foot definition: US survey foot
Formatting
Decimal precision: 0.123
Show trailing zeros: Yes
Show trailing decimal: No
Rounding mode: Normal
Automatic rounding: Yes
Round to nearest: 0.001
Suffix
OK
Cancel

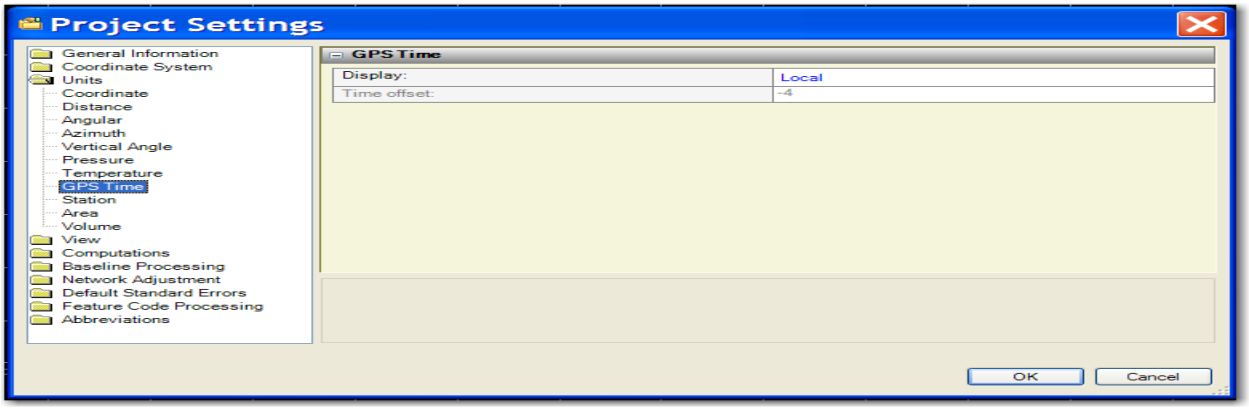

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: Degree, minute and second
Formatting
Decimal precision: 0
Show trailing zeros: Yes
Show trailing decimal: No
Suffix
Degrees, minutes, seconds settings
Show zero seconds: Yes
Show zero minutes: Yes
DMS format: DDD MM SS.sss
DMS rounding mode: None
OK
Cancel

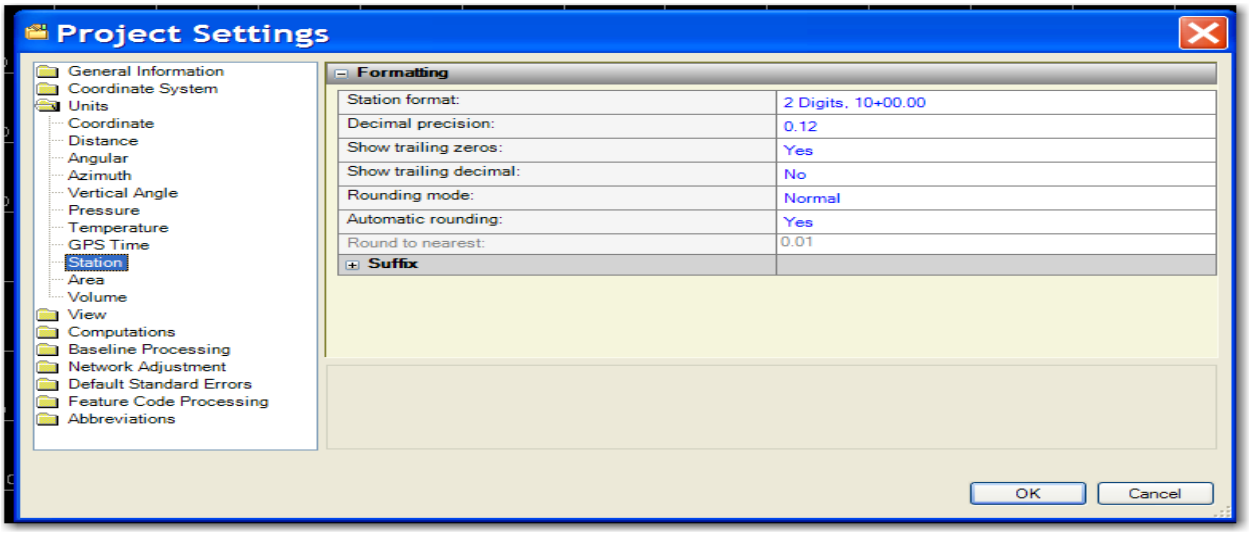

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: North Azimuth
Formatting
Add azimuth labels: Yes
Decimal precision: 0
Show trailing zeros: Yes
Show trailing decimal: No
Suffix
Bearing settings
Degrees, minutes, seconds settings
Show zero seconds: Yes
Show zero minutes: Yes
DMS format: DDD MM SS.sss
DMS rounding mode: None
OK
Cancel

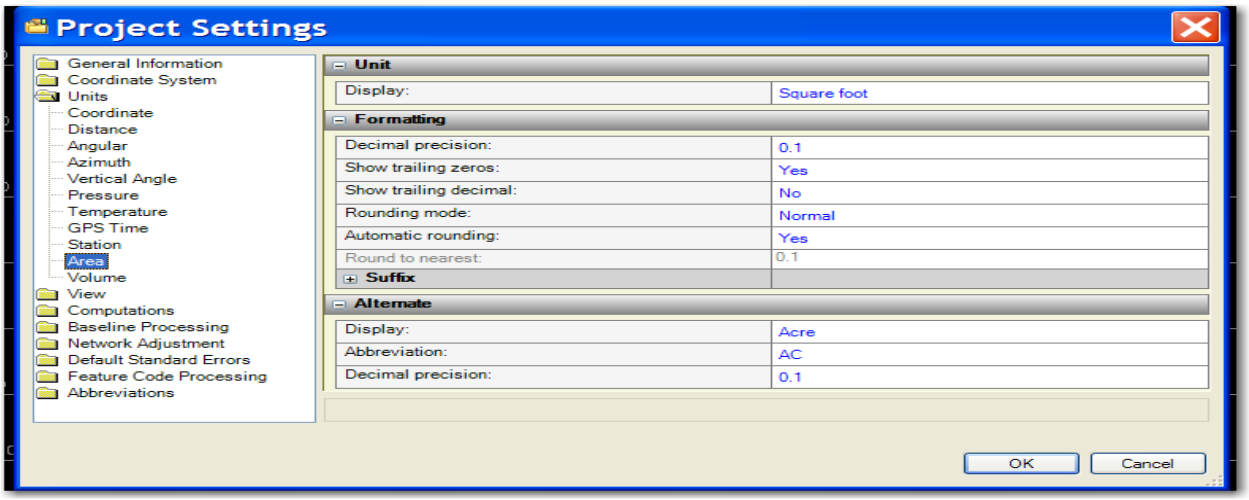

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: Zenith angle
Slope ratio type: Rise to run
Formatting
Label vertical angle: Yes
Decimal precision
Suffix
Degrees, minutes, seconds settings
Show zero seconds: Yes
Show zero minutes: Yes
DMS format: DDD MM SS.sss
DMS rounding mode: None
OK
Cancel

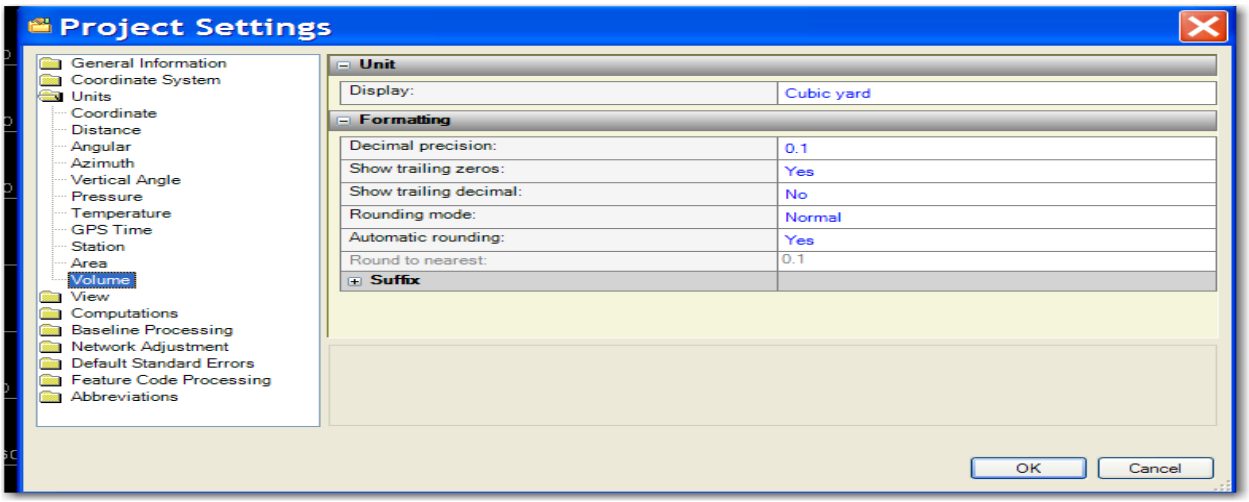

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: Millibar
Formatting
Decimal precision: 0.1
Show trailing zeros: Yes
Show trailing decimal: No
Rounding mode: Normal
Automatic rounding: Yes
Round to nearest: 0.1
Suffix
OK
Cancel

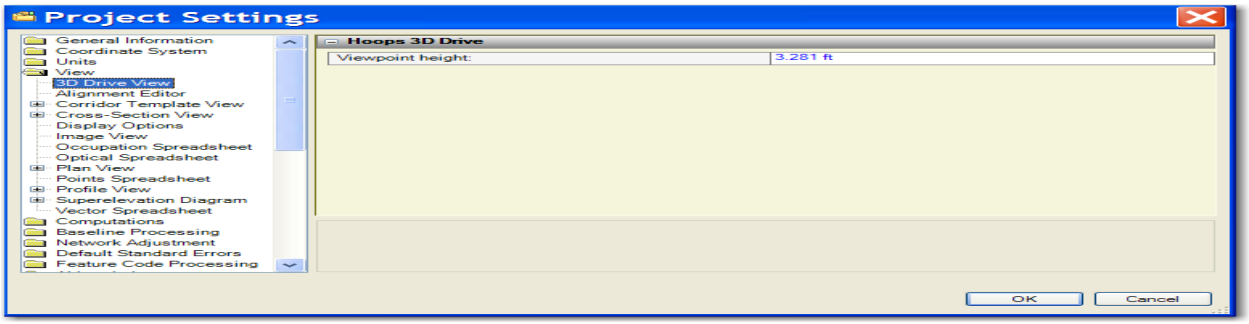

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: Celsius
Formatting
Decimal precision: 0.1
Show trailing zeros: Yes
Show trailing decimal: No
Rounding mode: Normal
Automatic rounding: Yes
Round to nearest: 0.1
Suffix
OK
Cancel

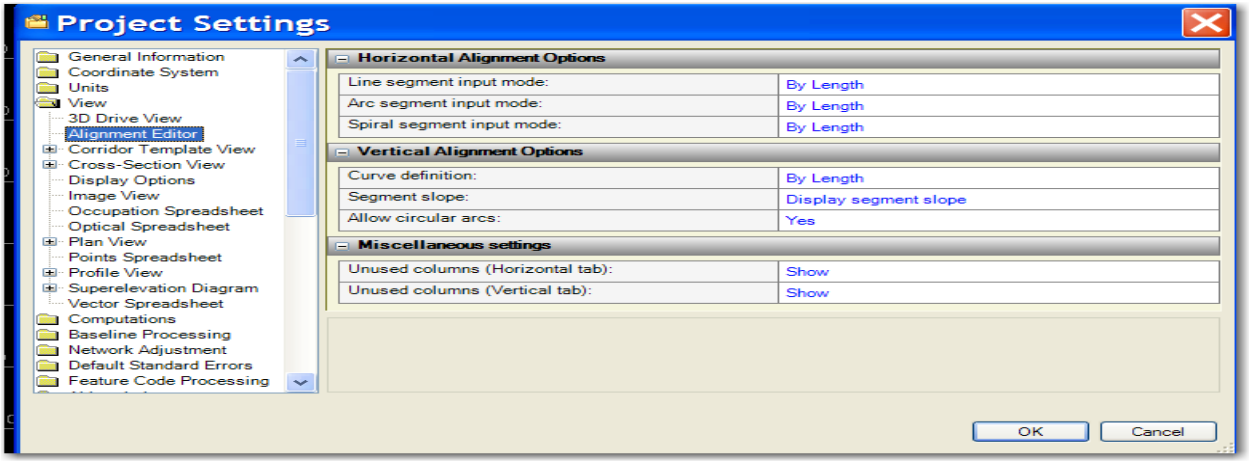

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
GPS Time
Display: Local
Time offset: -4
OK
Cancel

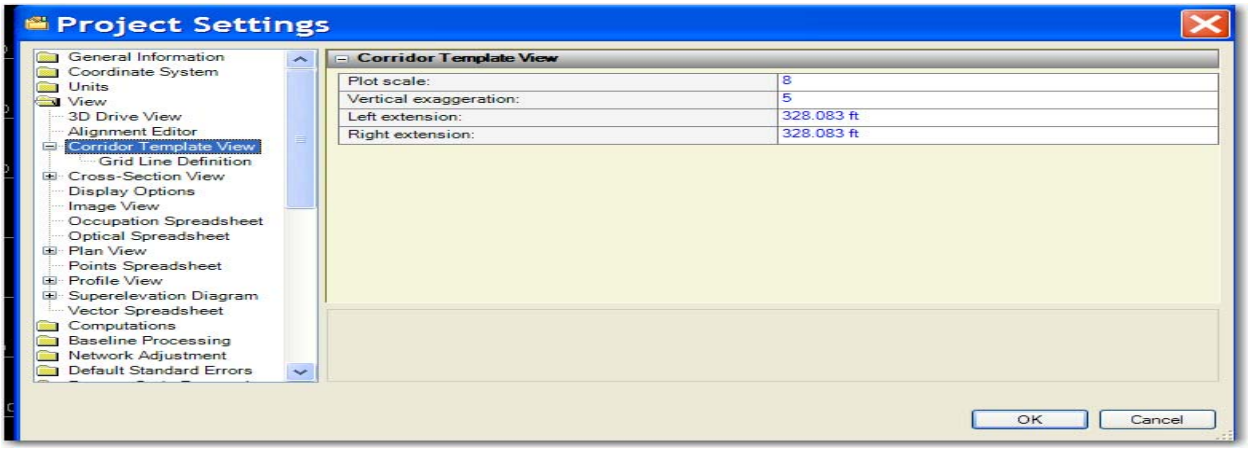

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Formatting
Station format: 2 Digits, 10+00.00
Decimal precision: 0.12
Show trailing zeros: Yes
Show trailing decimal: No
Rounding mode: Normal
Automatic rounding: Yes
Round to nearest: 0.01
Suffix
OK
Cancel

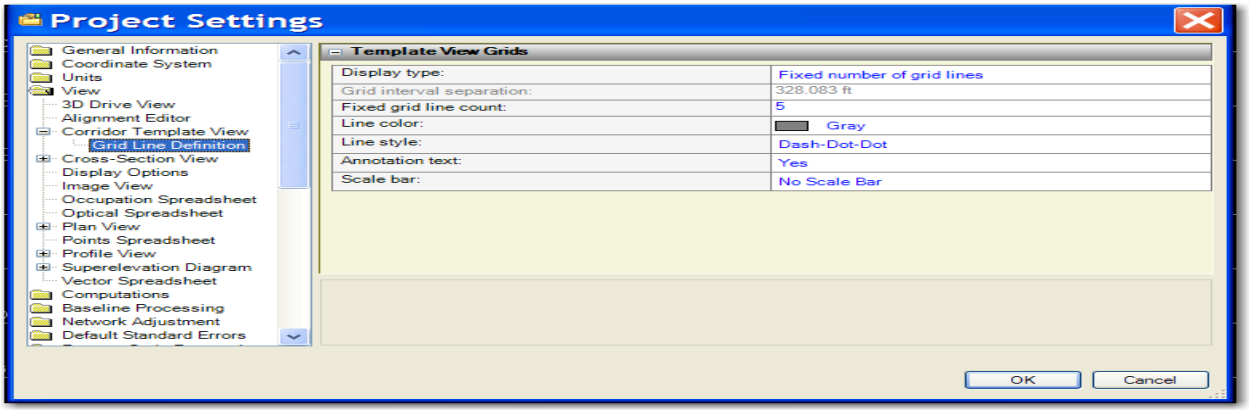

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: Square foot
Formatting
Decimal precision: 0.1
Show trailing zeros: Yes
Show trailing decimal: No
Rounding mode: Normal
Automatic rounding: Yes
Round to nearest: 0.1
Suffix
Alternate
Display: Acre
Abbreviation: AC
Decimal precision: 0.1
OK
Cancel

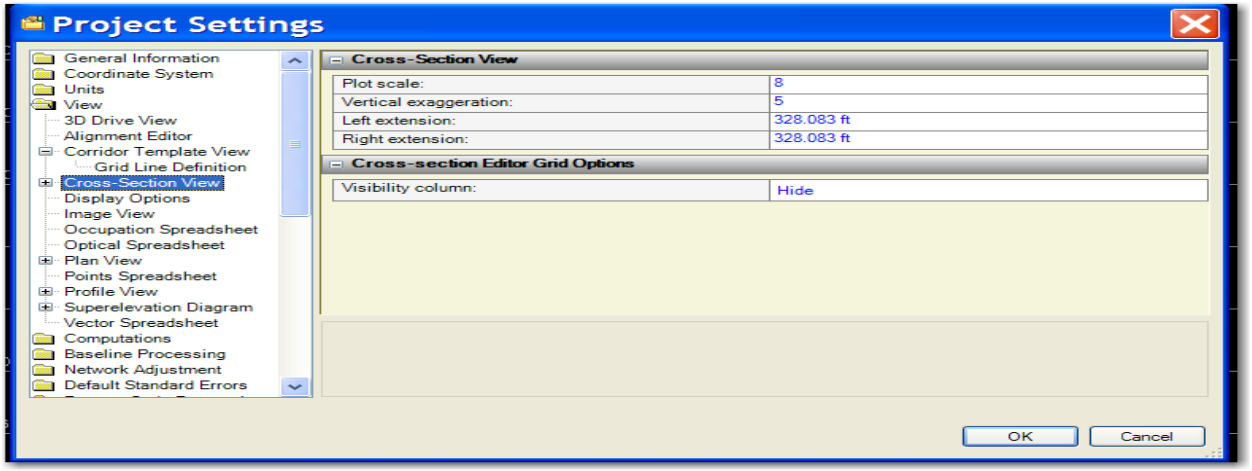

Project Settings
General Information
Coordinate System
Units
Coordinate
Distance
Angular
Azimuth
Vertical Angle
Pressure
Temperature
GPS Time
Station
Area
Volume
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Unit
Display: Cubic yard
Formatting
Decimal precision: 0.1
Show trailing zeros: Yes
Show trailing decimal: No
Rounding mode: Normal
Automatic rounding: Yes
Round to nearest: 0.1
Suffix
OK
Cancel

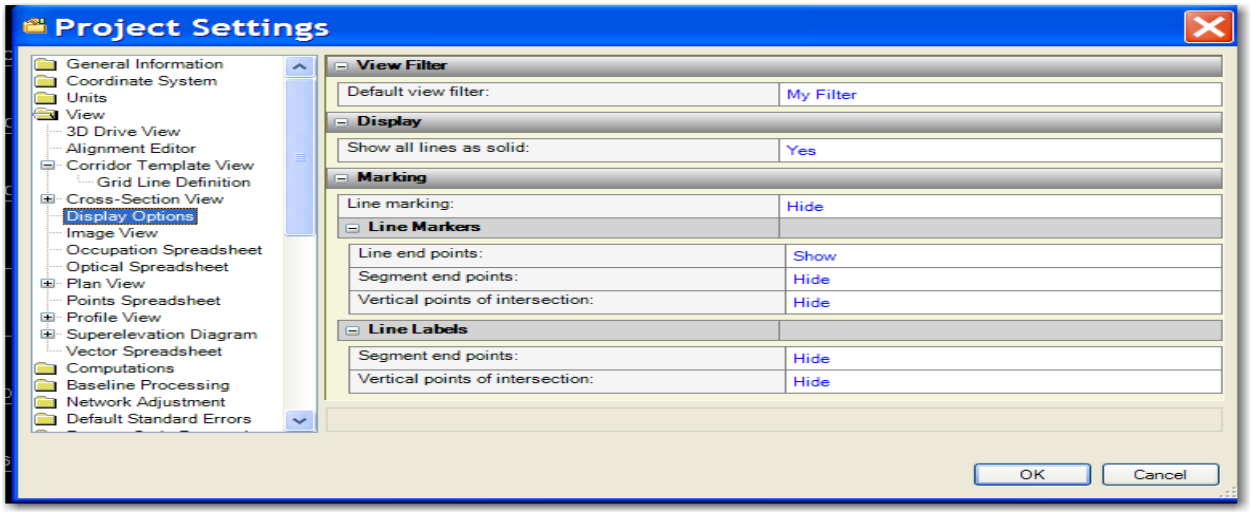

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Hoops 3D Drive
Viewpoint height: 3.281 ft
OK
Cancel

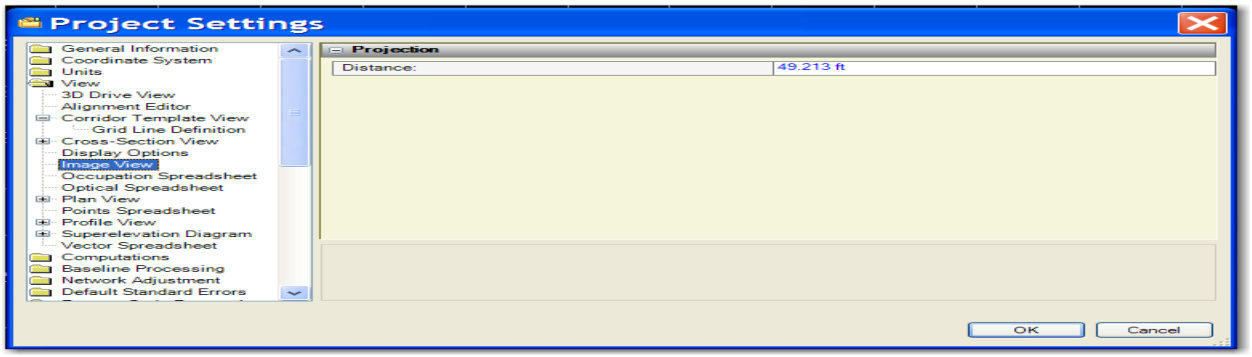

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Horizontal Alignment Options
Line segment input mode: By Length
Arc segment input mode: By Length
Spiral segment input mode: By Length
Vertical Alignment Options
Curve definition: By Length
Segment slope: Display segment slope
Allow circular arcs: Yes
Miscellaneous settings
Unused columns (Horizontal tab): Show
Unused columns (Vertical tab): Show
OK
Cancel

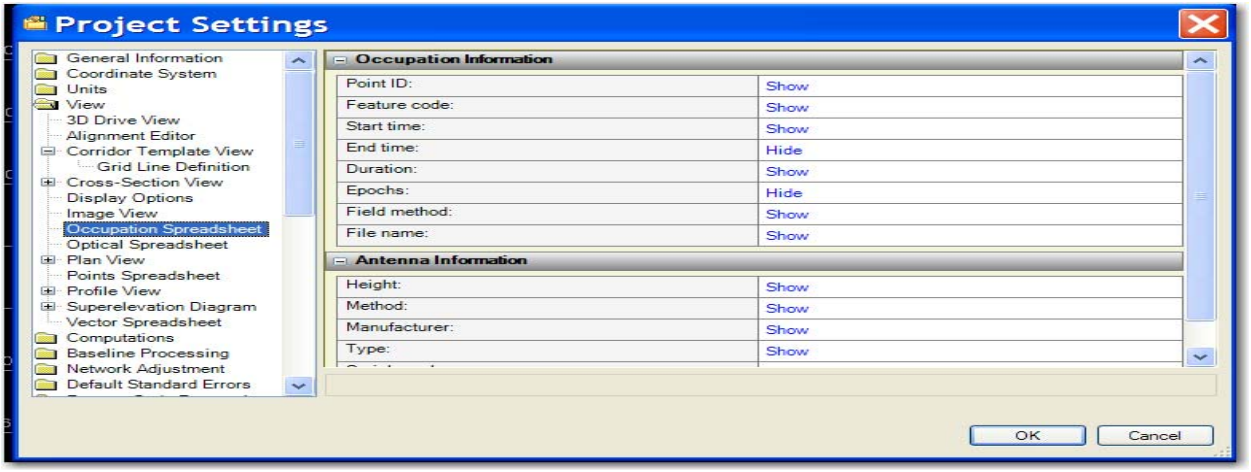

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Corridor Template View
Plot scale: 8
Vertical exaggeration: 5
Left extension: 328.083 ft
Right extension: 328.083 ft
OK
Cancel

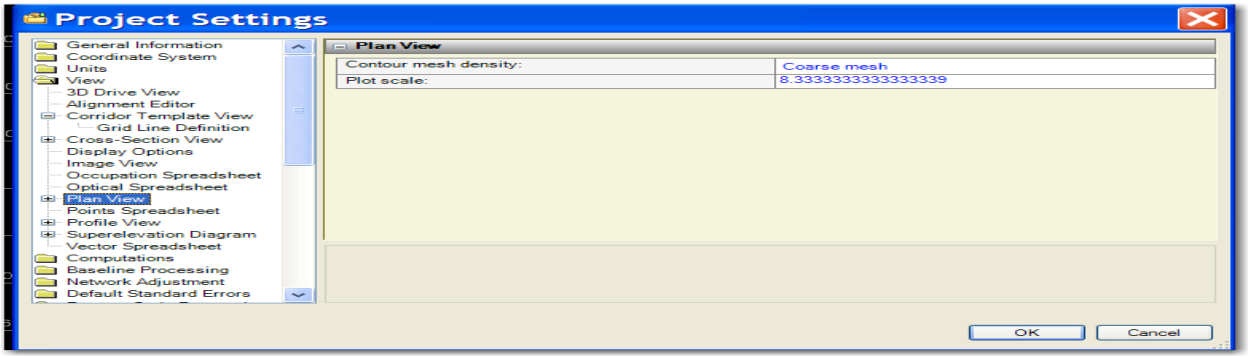

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Template View Grids
Display type: Fixed number of grid lines
Grid interval separation: 328.083 ft
Fixed grid line count: 5
Line color: Gray
Line style: Dash-Dot-Dot
Annotation text: Yes
Scale bar: No Scale Bar
OK
Cancel

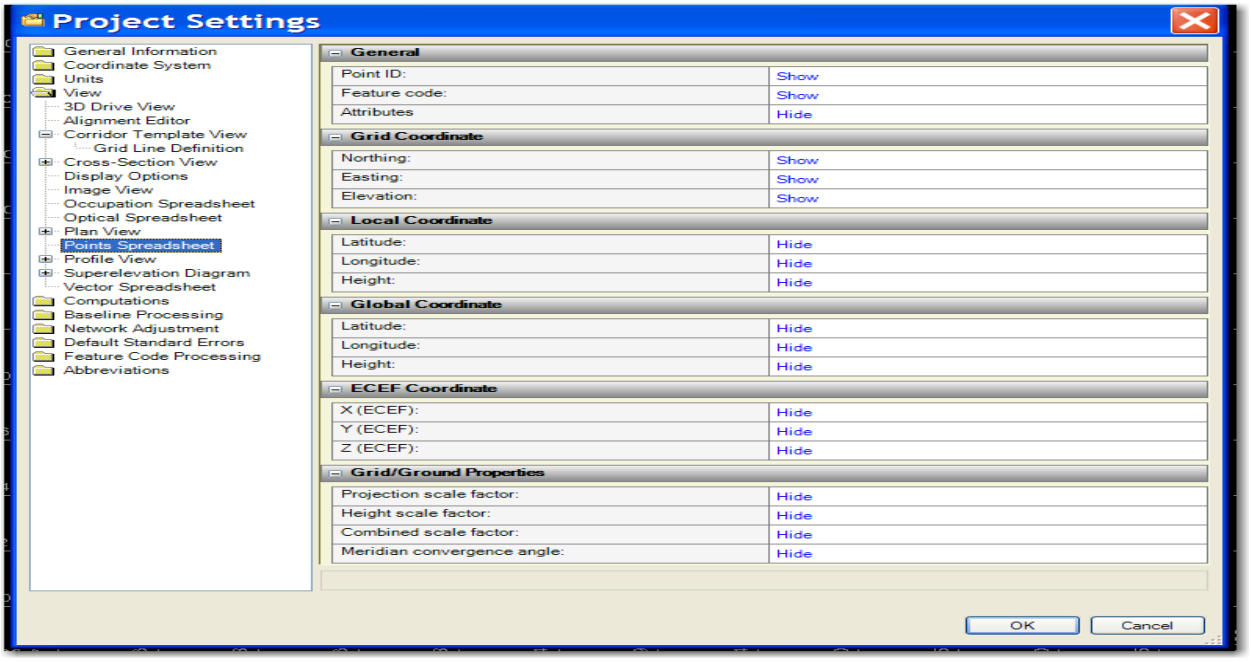

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Cross-Section View
Plot scale: 8
Vertical exaggeration: 5
Left extension: 328.083 ft
Right extension: 328.083 ft
Cross-section Editor Grid Options
Visibility column: Hide
OK
Cancel

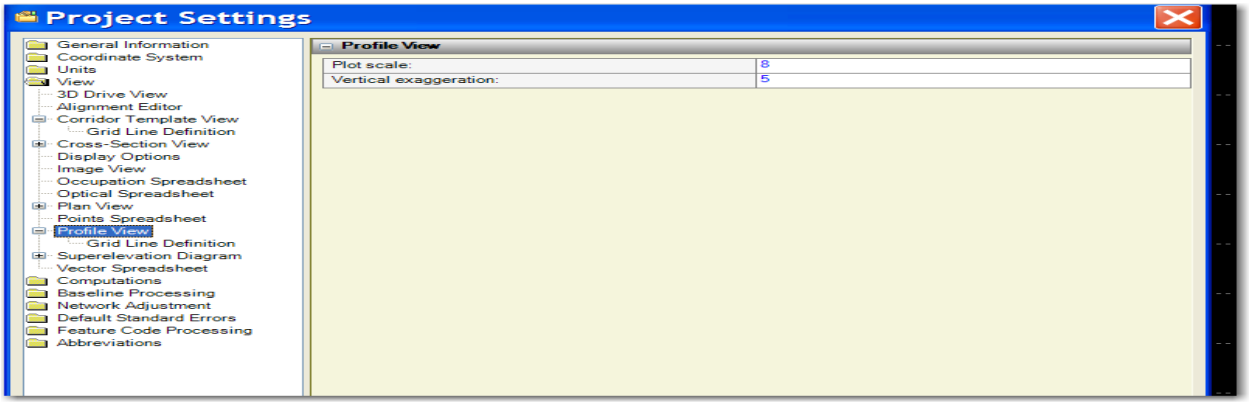

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
View Filter
Default view filter: My Filter
Display
Show all lines as solid: Yes
Marking
Line marking: Hide
Line Markers
Line end points: Show
Segment end points: Hide
Vertical points of intersection: Hide
Line Labels
Segment end points: Hide
Vertical points of intersection: Hide
OK
Cancel

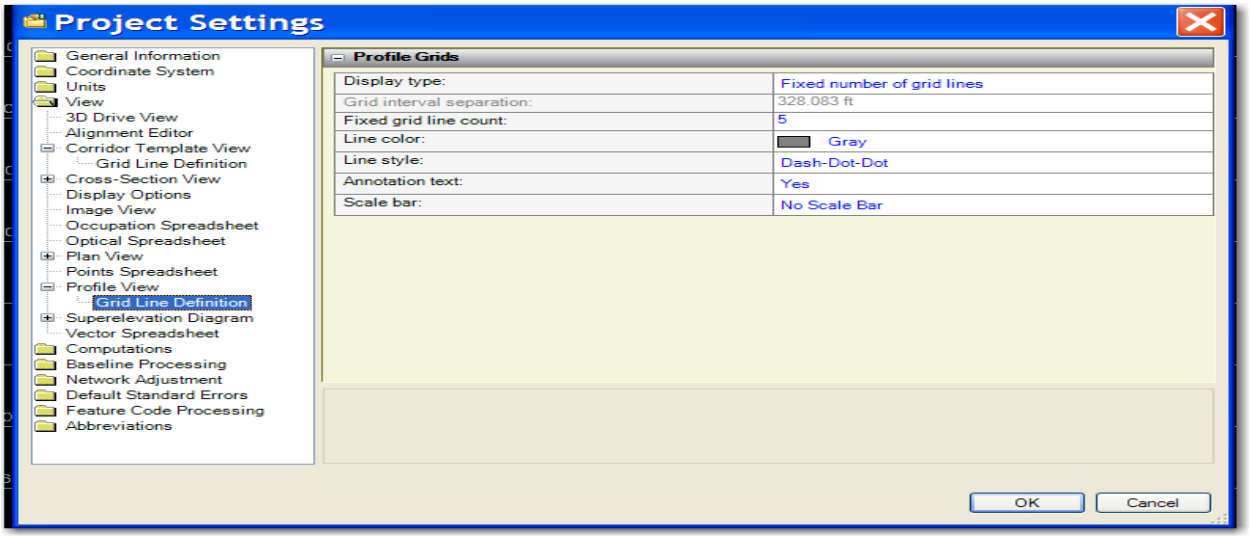

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Projection
Distance: 49.213 ft
OK
Cancel

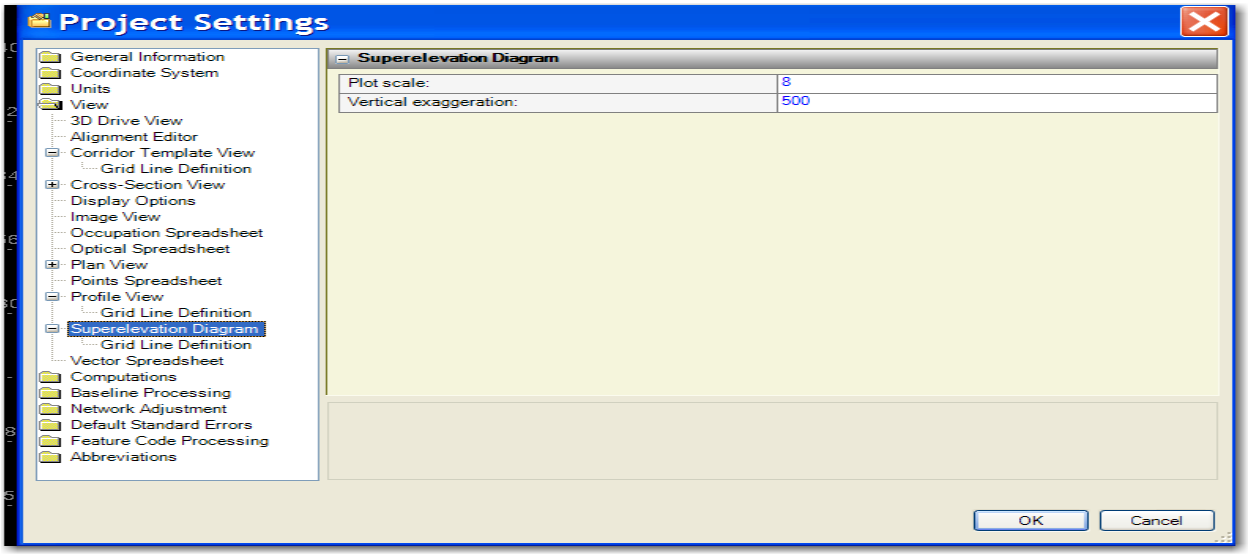

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Occupation Information
Point ID: Show
Feature code: Show
Start time: Show
End time: Hide
Duration: Show
Epochs: Hide
Field method: Show
File name: Show
Antenna Information
Height: Show
Method: Show
Manufacturer: Show
Type: Show
OK
Cancel

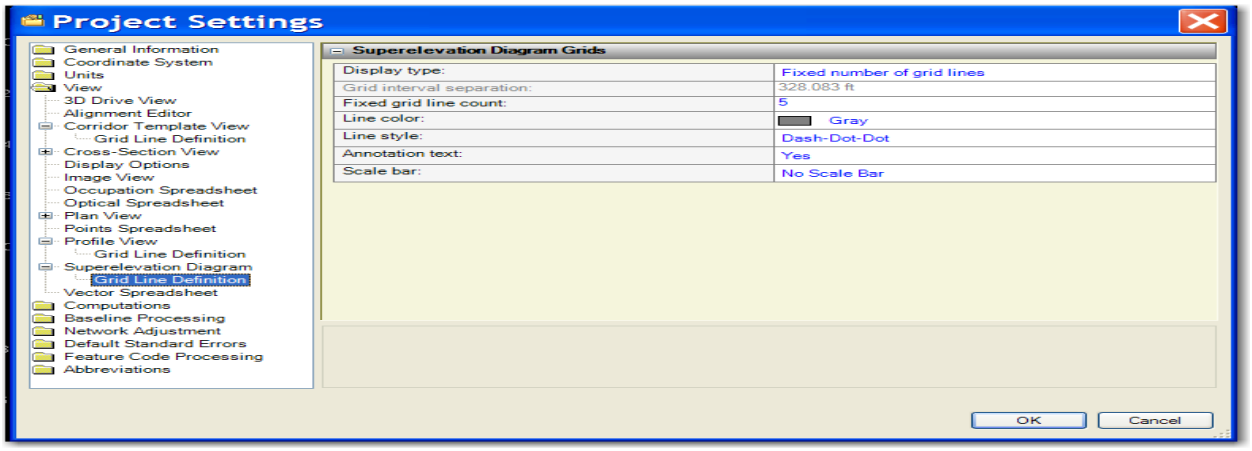

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Plan View
Contour mesh density: Coarse mesh
Plot scale: 8.3333333333333339
OK
Cancel

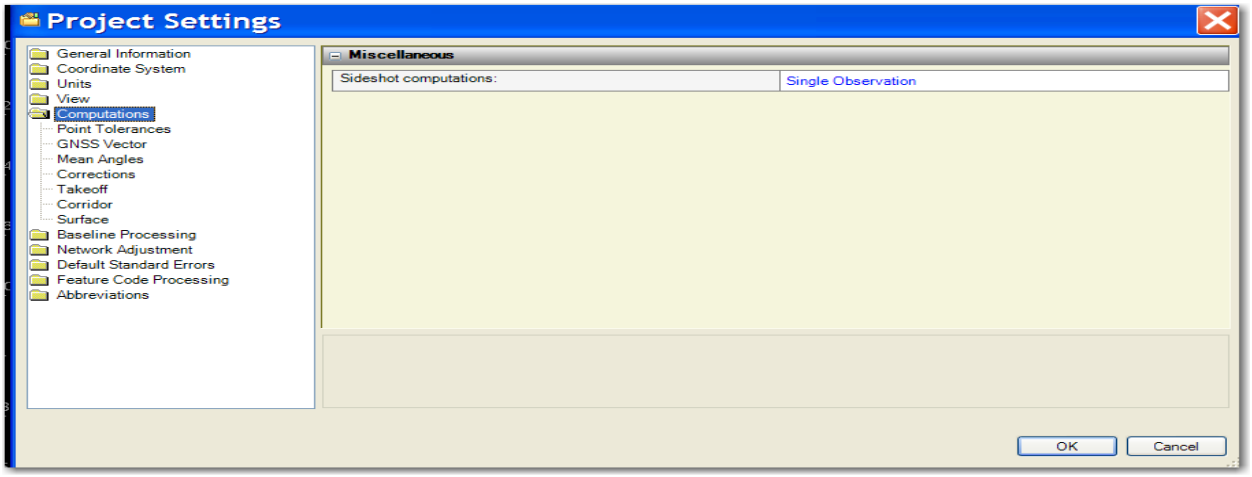

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
General
Point ID: Show
Feature code: Show
Attributes Hide
Grid Coordinate
Northing: Show
Easting: Show
Elevation: Show
Local Coordinate
Latitude: Hide
Longitude: Hide
Height: Hide
Global Coordinate
Latitude: Hide
Longitude: Hide
Height: Hide
ECEF Coordinate
X (ECEF): Hide
Y (ECEF): Hide
Z (ECEF): Hide
Grid/Ground Properties
Projection scale factor: Hide
Height scale factor: Hide
Combined scale factor: Hide
Meridian convergence angle: Hide
OK
Cancel

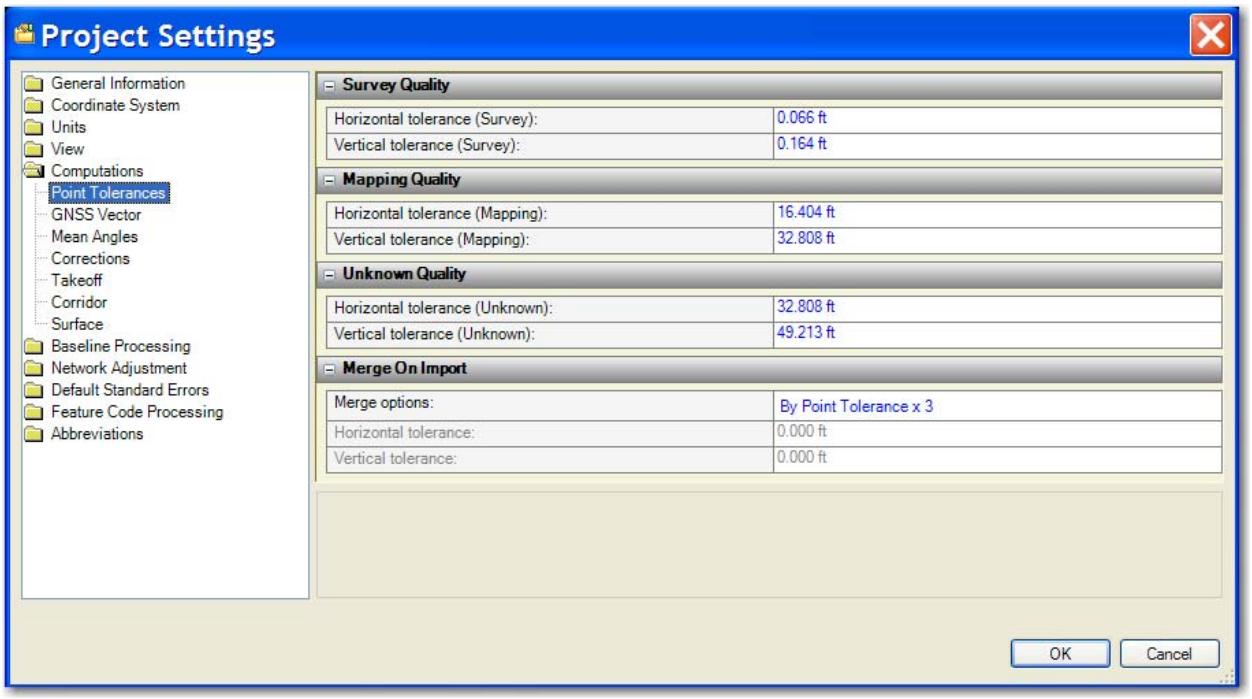

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Grid Line Definition
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Profile View
Plot scale: 8
Vertical exaggeration: 5

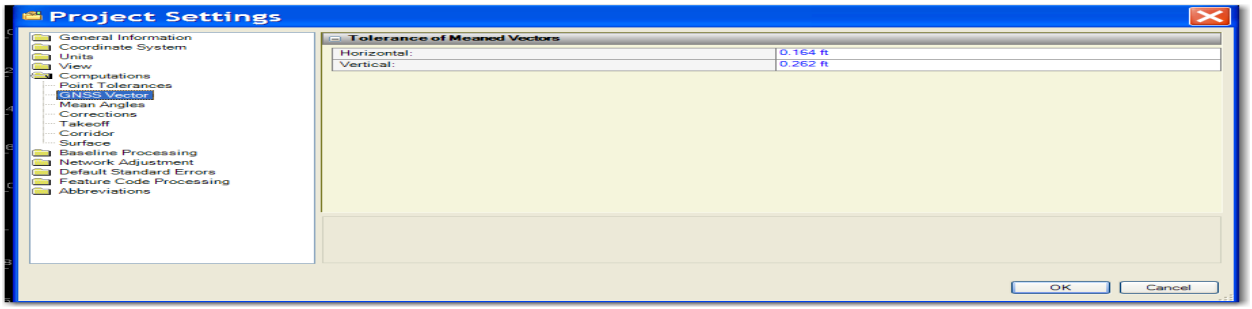

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Grid Line Definition
Superelevation Diagram
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Profile Grids
Display type: Fixed number of grid lines
Grid interval separation: 328.083 ft
Fixed grid line count: 5
Line color: Gray
Line style: Dash-Dot-Dot
Annotation text: Yes
Scale bar: No Scale Bar
OK
Cancel

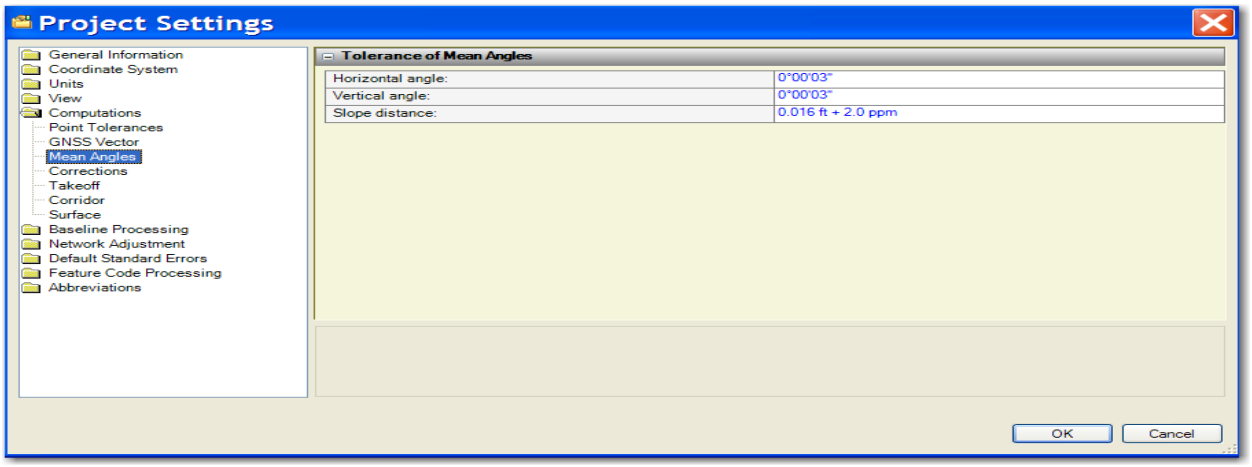

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Grid Line Definition
Superelevation Diagram
Grid Line Definition
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Superelevation Diagram
Plot scale: 8
Vertical exaggeration: 500
OK
Cancel

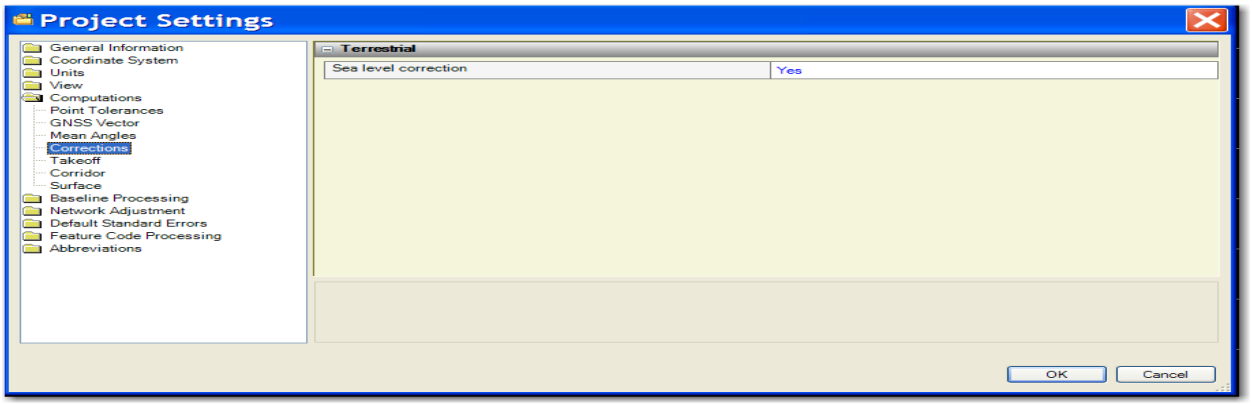

Project Settings
General Information
Coordinate System
Units
View
3D Drive View
Alignment Editor
Corridor Template View
Grid Line Definition
Cross-Section View
Display Options
Image View
Occupation Spreadsheet
Optical Spreadsheet
Plan View
Points Spreadsheet
Profile View
Grid Line Definition
Superelevation Diagram
Grid Line Definition
Vector Spreadsheet
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Superelevation Diagram Grids
Display type: Fixed number of grid lines
Grid interval separation: 328.083 ft
Fixed grid line count: 5
Line color: Gray
Line style: Dash-Dot-Dot
Annotation text: Yes
Scale bar: No Scale Bar
OK
Cancel

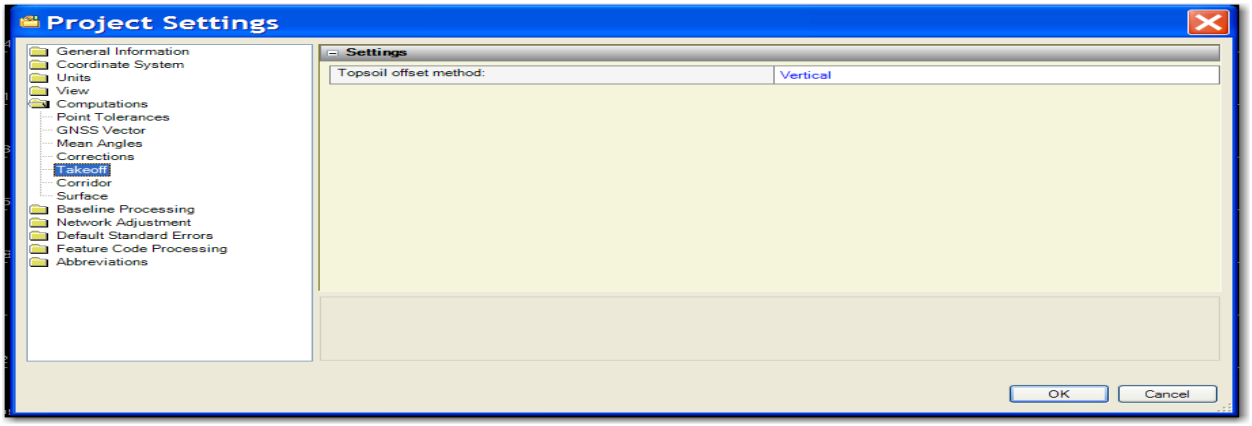

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Miscellaneous
Sideshot computations: Single Observation
OK
Cancel

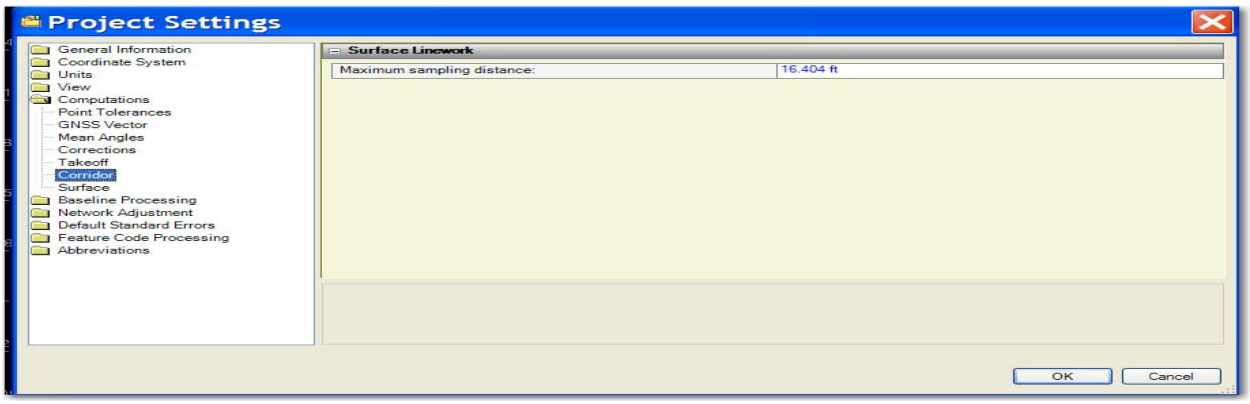

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Survey Quality
Horizontal tolerance (Survey): 0.066 ft
Vertical tolerance (Survey): 0.164 ft
Mapping Quality
Horizontal tolerance (Mapping): 16.404 ft
Vertical tolerance (Mapping): 32.808 ft
Unknown Quality
Horizontal tolerance (Unknown): 32.808 ft
Vertical tolerance (Unknown): 49.213 ft
Merge On Import
Merge options: By Point Tolerance x 3
Horizontal tolerance: 0.000 ft
Vertical tolerance: 0.000 ft
OK
Cancel

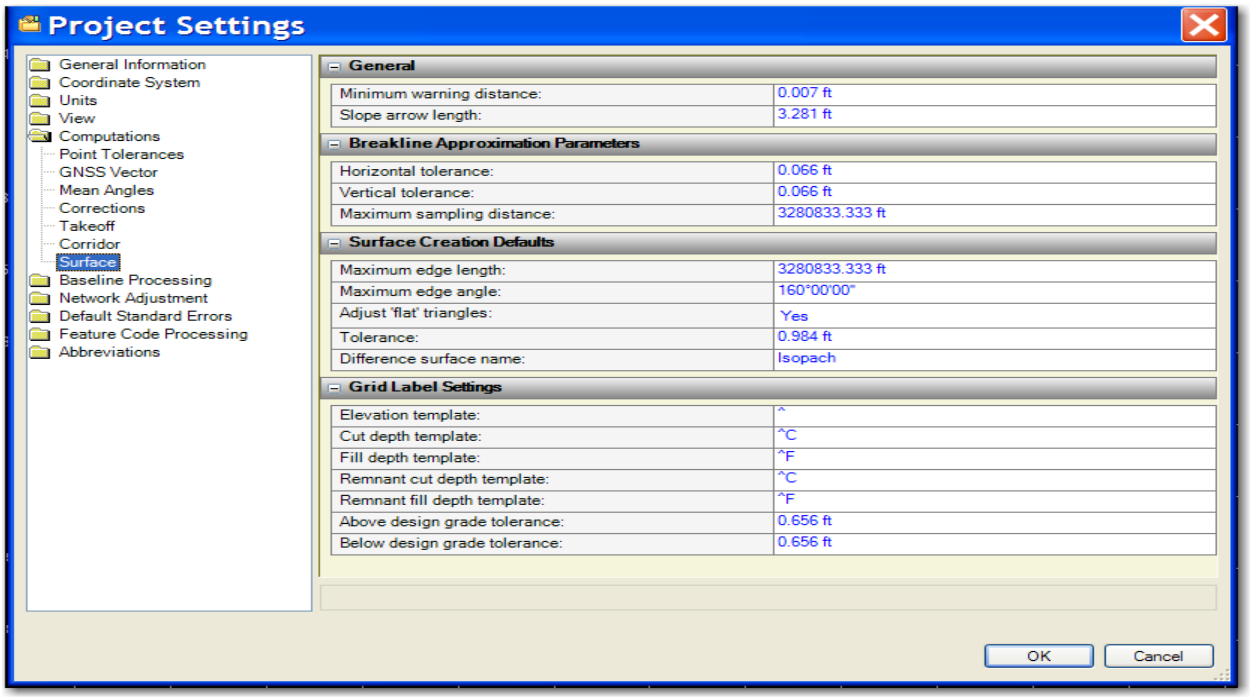

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Tolerance of Meaned Vectors
Horizontal:
0.164 ft
Vertical:
0.262 ft
OK
Cancel

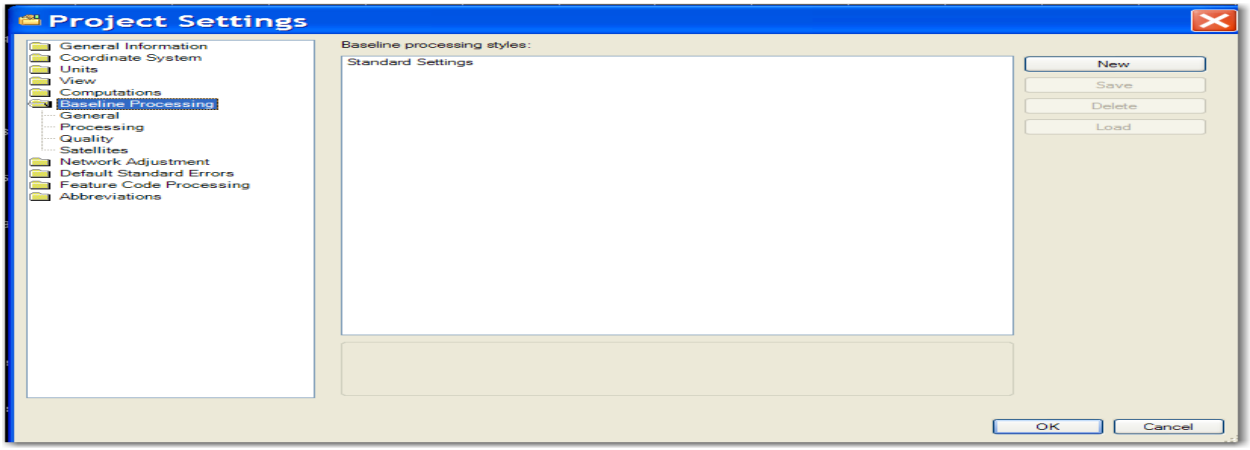

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Tolerance of Mean Angles
Horizontal angle:
0°00'03"
Vertical angle:
0°00'03"
Slope distance:
0.016 ft + 2.0 ppm
OK
Cancel

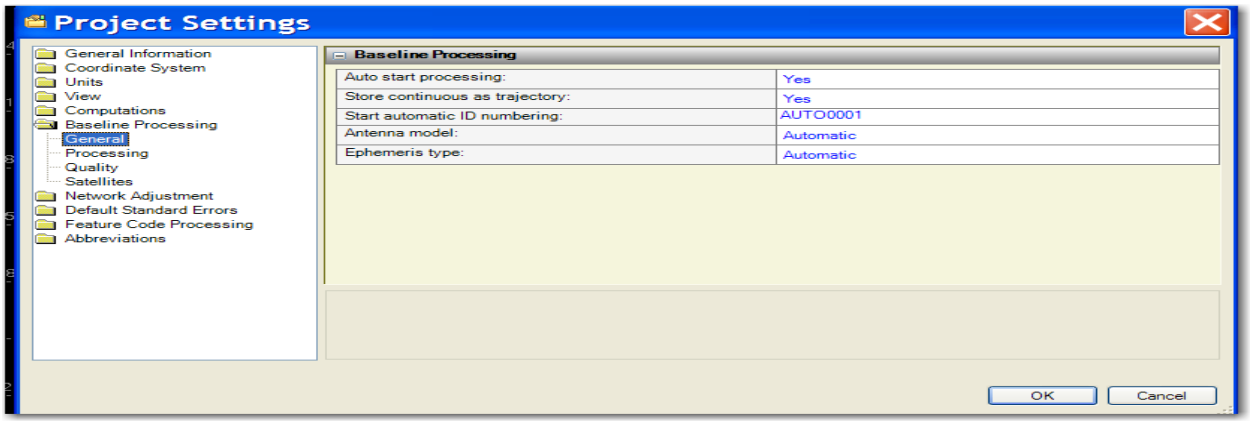

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Terrestrial
Sea level correction
Yes
OK
Cancel

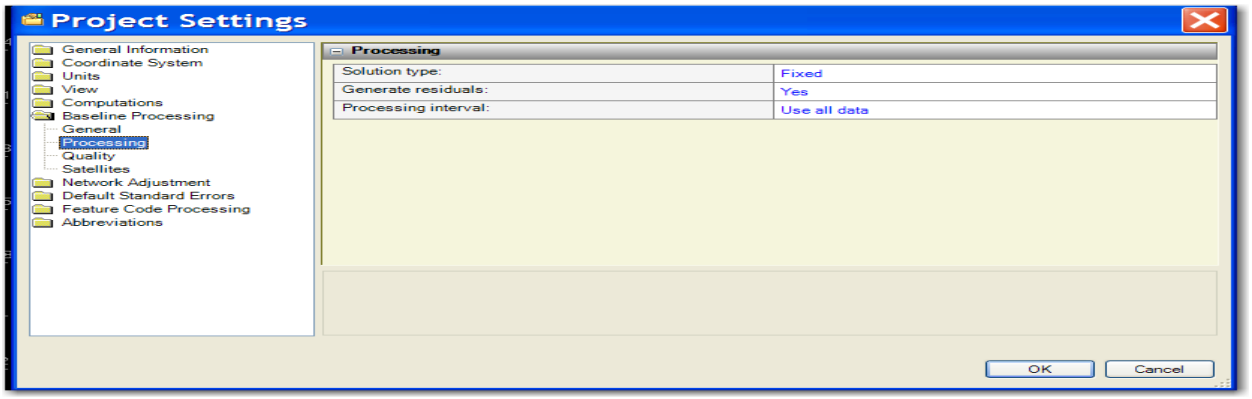

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Settings
Topsoil offset method:
Vertical
OK
Cancel

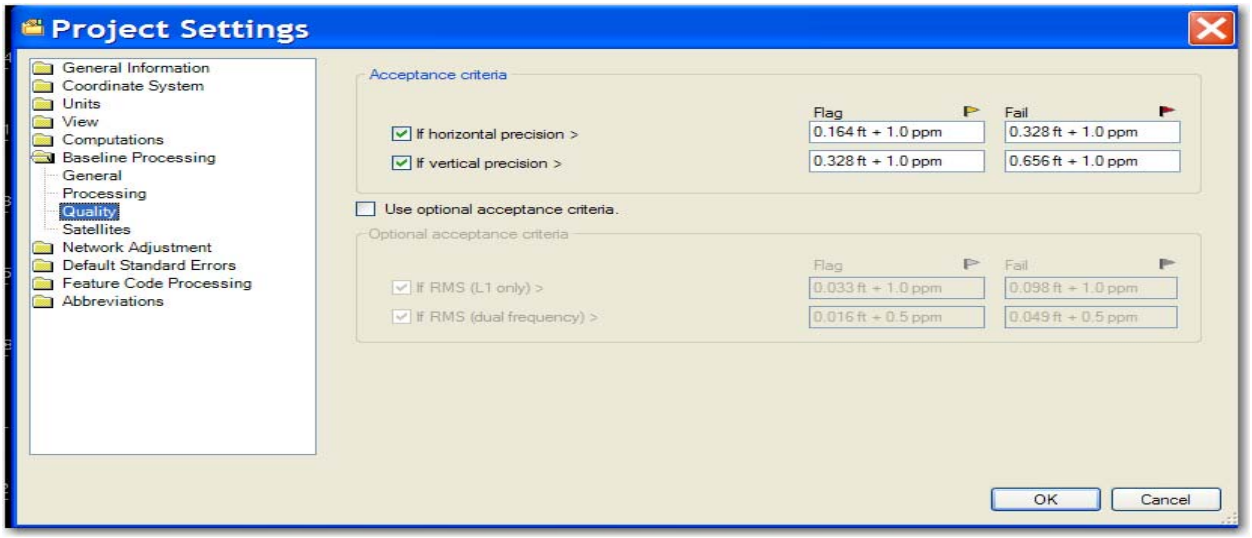

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Surface Linework
Maximum sampling distance: 16.404 ft
OK
Cancel

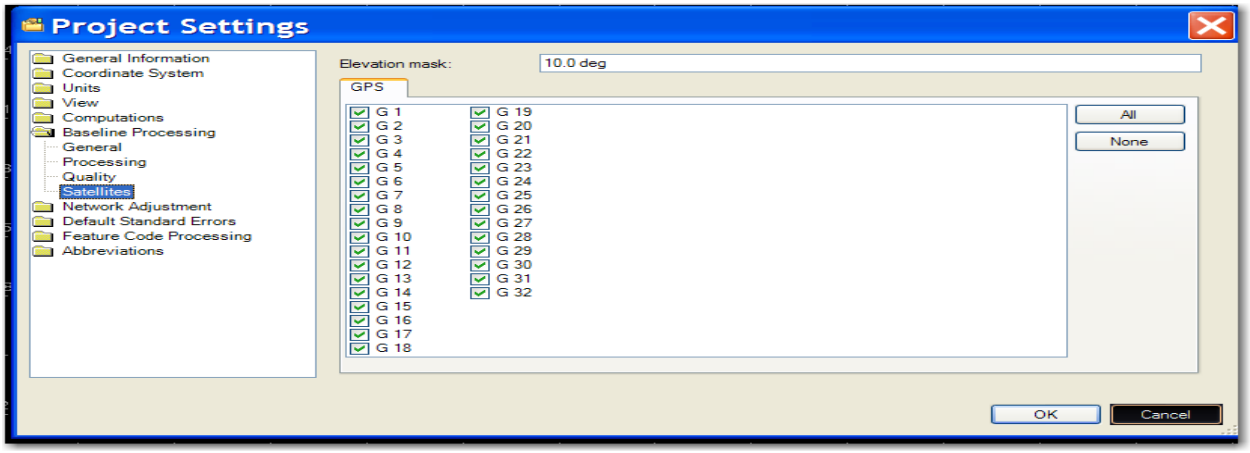

Project Settings
General Information
Coordinate System
Units
View
Computations
Point Tolerances
GNSS Vector
Mean Angles
Corrections
Takeoff
Corridor
Surface
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
General
Minimum warning distance: 0.007 ft
Slope arrow length: 3.281 ft
Breakline Approximation Parameters
Horizontal tolerance: 0.066 ft
Vertical tolerance: 0.066 ft
Maximum sampling distance: 3280833.333 ft
Surface Creation Defaults
Maximum edge length: 3280833.333 ft
Maximum edge angle: 160°00'00"
Adjust 'flat' triangles: Yes
Tolerance: 0.984 ft
Difference surface name: Isopach
Grid Label Settings
Elevation template: ^
Cut depth template: ^C
Fill depth template: ^F
Remnant cut depth template: ^C
Remnant fill depth template: ^F
Above design grade tolerance: 0.656 ft
Below design grade tolerance: 0.656 ft
OK
Cancel

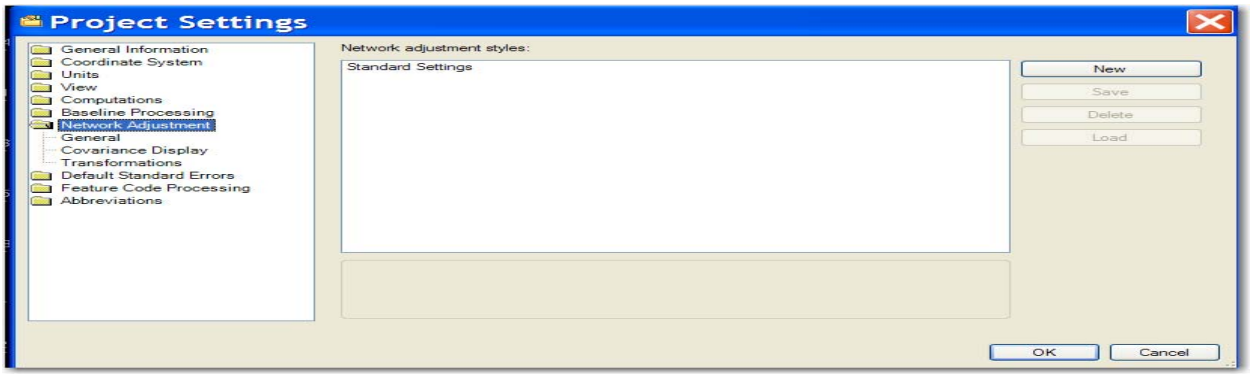

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
General
Processing
Quality
Satellites
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Baseline processing styles:
Standard Settings
New
Save
Delete
Load
OK
Cancel

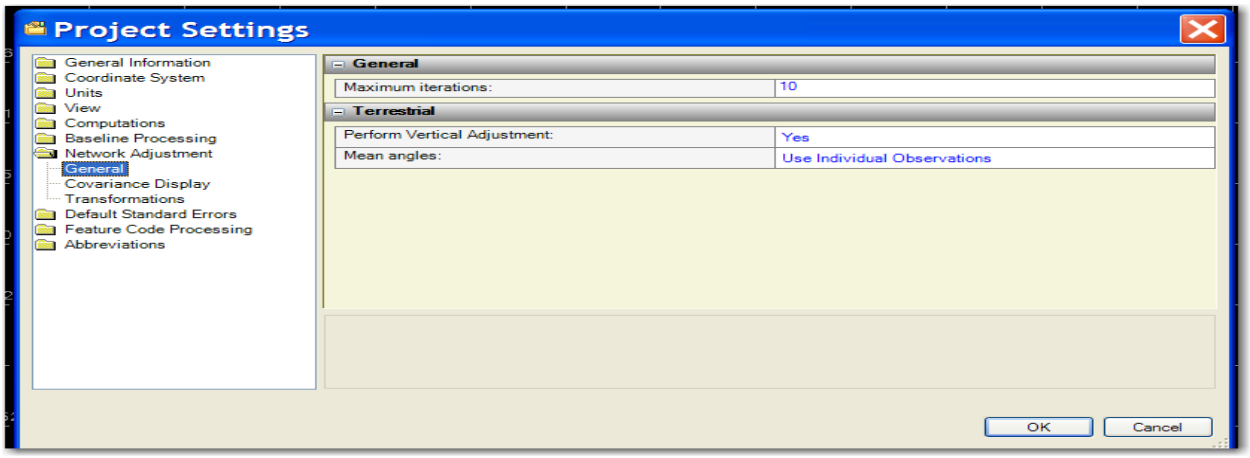

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
General
Processing
Quality
Satellites
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Baseline Processing
Auto start processing: Yes
Store continuous as trajectory: Yes
Start automatic ID numbering: AUTO0001
Antenna model: Automatic
Ephemeris type: Automatic
OK
Cancel

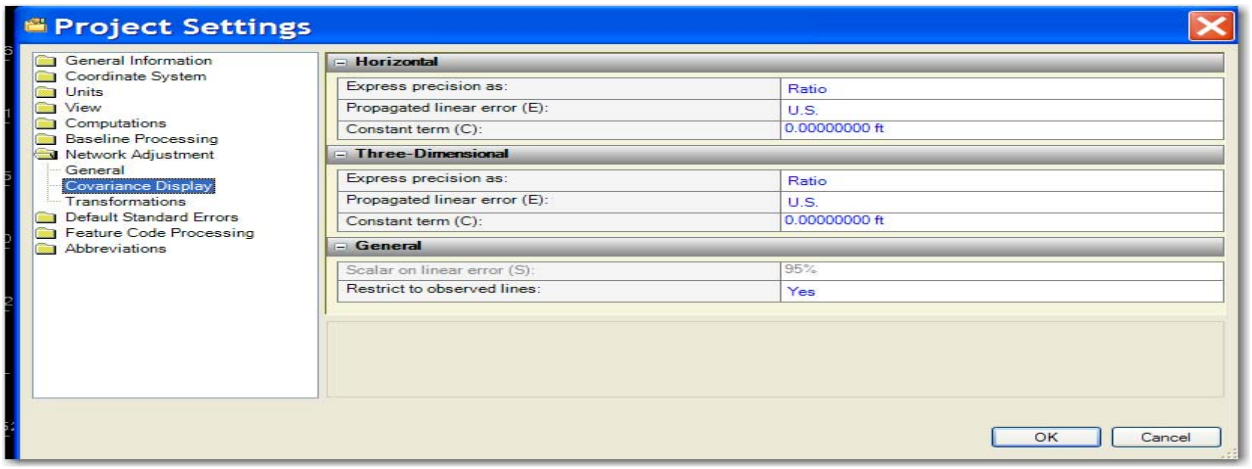

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
General
Processing
Quality
Satellites
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Processing
Solution type: Fixed
Generate residuals: Yes
Processing interval: Use all data
OK
Cancel

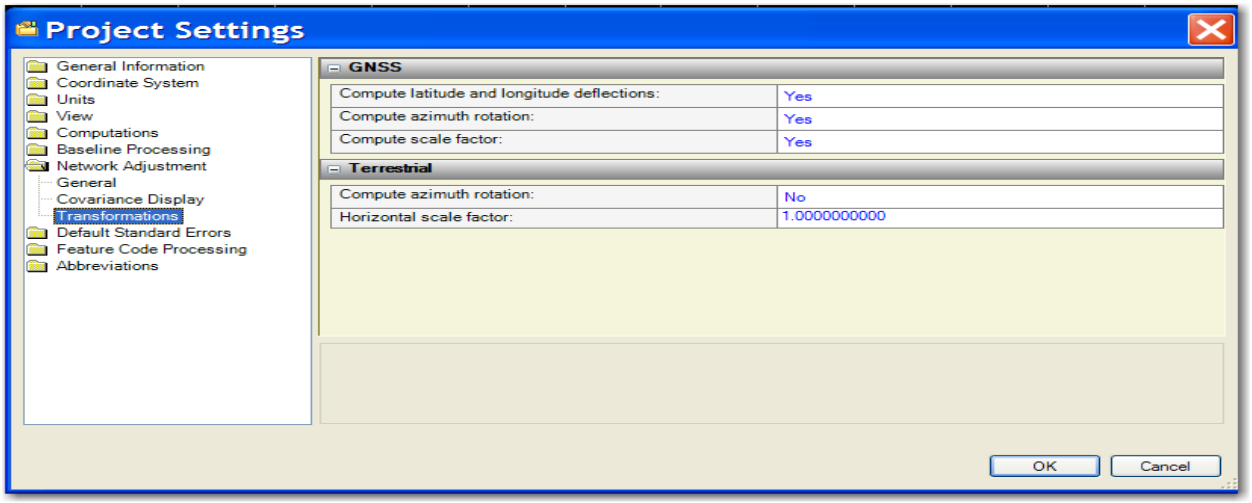

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
General
Processing
Quality
Satellites
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Acceptance criteria
Flag
Fail
If horizontal precision > 0.164 ft + 1.0 ppm 0.328 ft + 1.0 ppm
If vertical precision > 0.328 ft + 1.0 ppm 0.656 ft + 1.0 ppm
Use optional acceptance criteria.
Optional acceptance criteria
Flag
Fail
If RMS (L1 only) > 0.033 ft + 1.0 ppm 0.098 ft + 1.0 ppm
If RMS (dual frequency) > 0.016 ft + 0.5 ppm 0.049 ft + 0.5 ppm
OK
Cancel

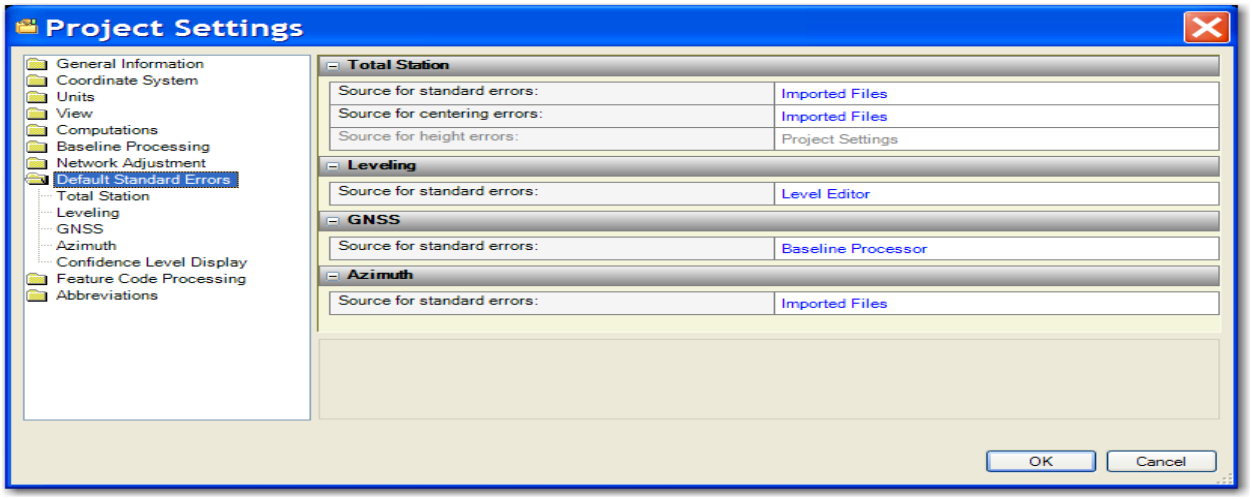

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
General
Processing
Quality
Satellites
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Elevation mask:
10.0 deg
GPS
G 1
G 2
G 3
G 4
G 5
G 6
G 7
G 8
G 9
G 10
G 11
G 12
G 13
G 14
G 15
G 16
G 17
G 18
G 19
G 20
G 21
G 22
G 23
G 24
G 25
G 26
G 27
G 28
G 29
G 30
G 31
G 32
All
None
OK
Cancel

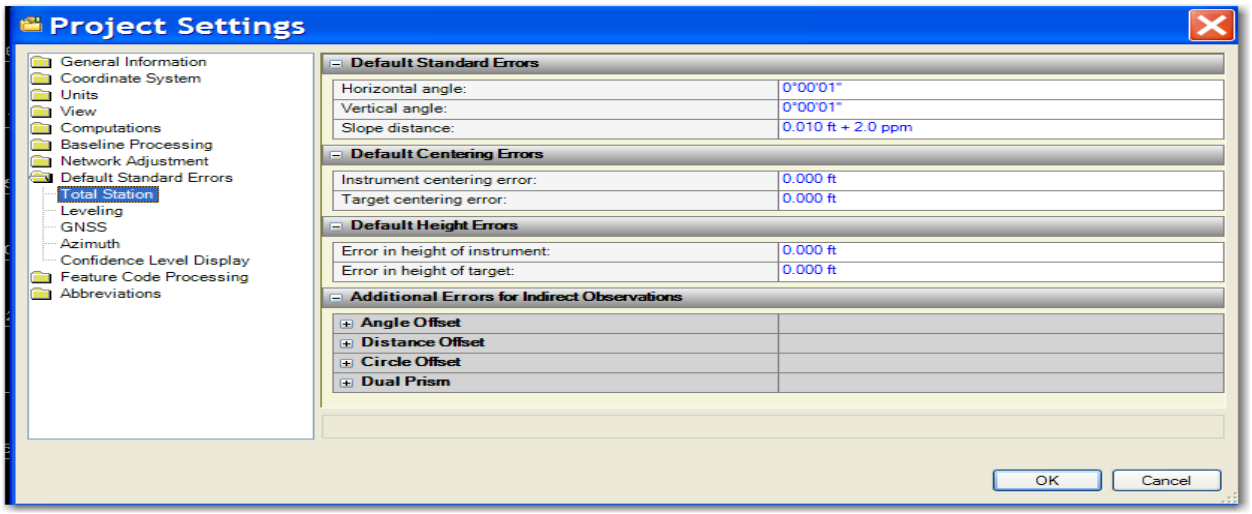

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
General
Covariance Display
Transformations
Default Standard Errors
Feature Code Processing
Abbreviations
Network adjustment styles:
Standard Settings
New
Save
Delete
Load
OK
Cancel

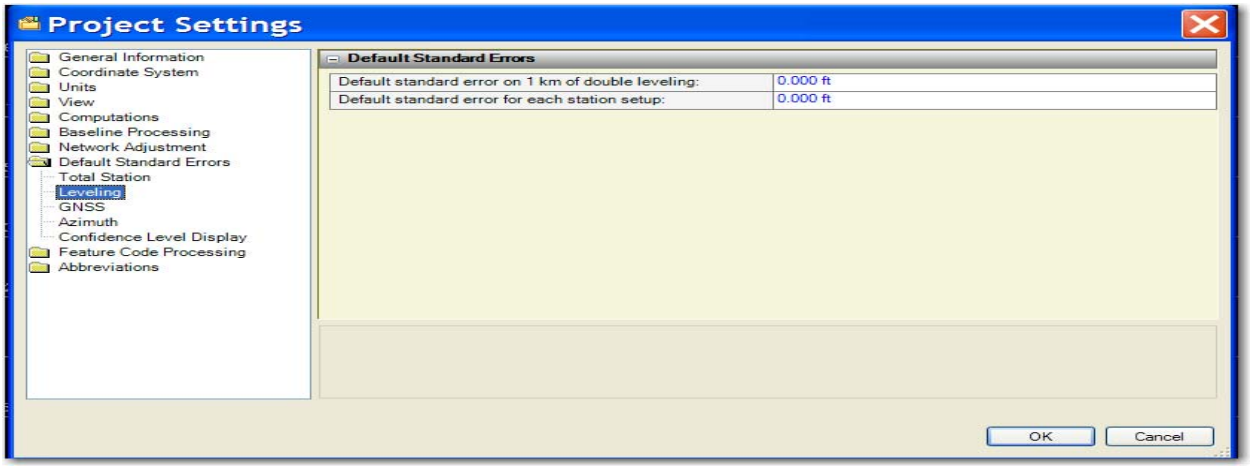

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
General
Covariance Display
Transformations
Default Standard Errors
Feature Code Processing
Abbreviations
General
Maximum iterations:
10
Terrestrial
Perform Vertical Adjustment:
Yes
Mean angles:
Use Individual Observations
OK
Cancel

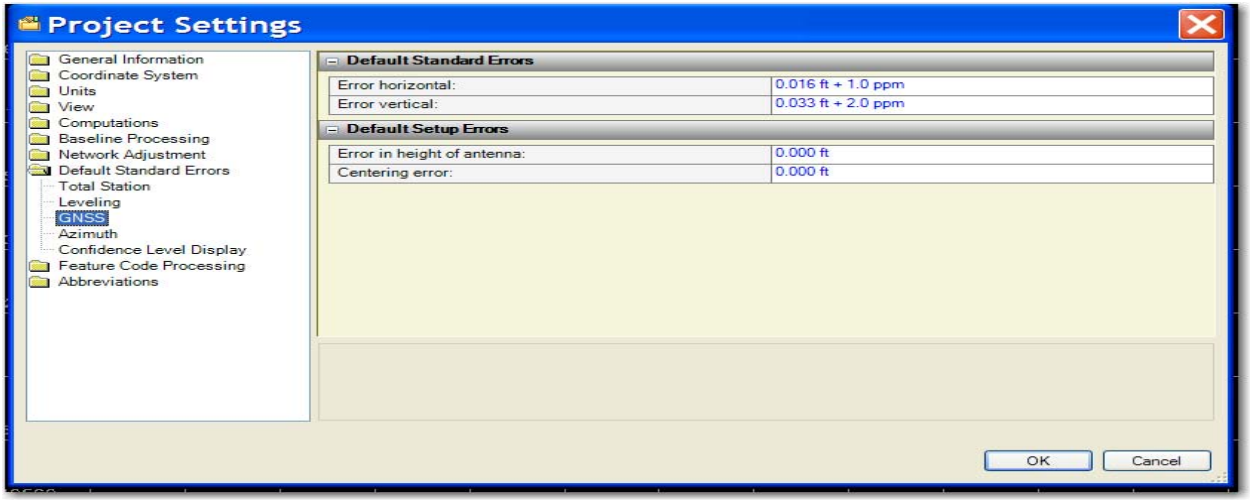

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
General
Covariance Display
Transformations
Default Standard Errors
Feature Code Processing
Abbreviations
Horizontal
Express precision as: Ratio
Propagated linear error (E): U.S.
Constant term (C): 0.00000000 ft
Three-Dimensional
Express precision as: Ratio
Propagated linear error (E): U.S.
Constant term (C): 0.00000000 ft
General
Scalar on linear error (S): 95%
Restrict to observed lines: Yes
OK
Cancel

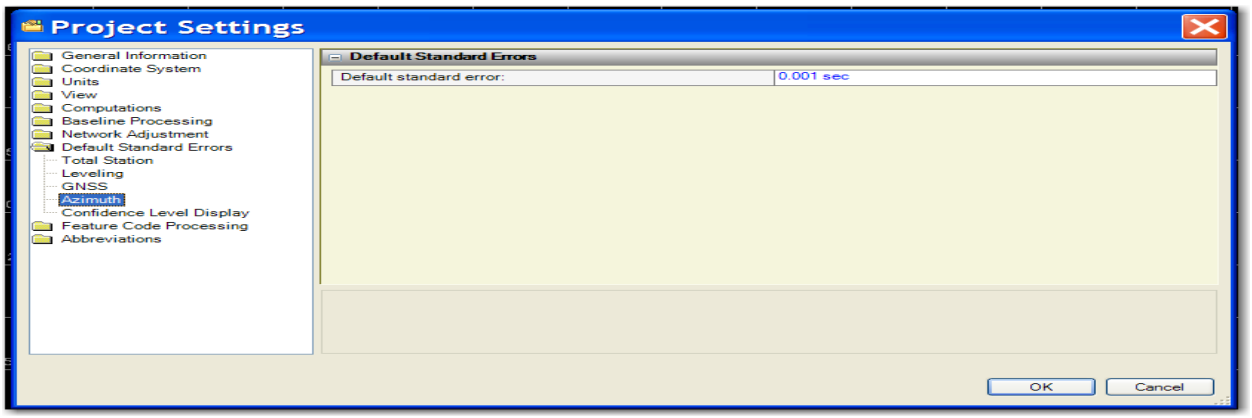

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
General
Covariance Display
Transformations
Default Standard Errors
Feature Code Processing
Abbreviations
GNSS
Compute latitude and longitude deflections: Yes
Compute azimuth rotation: Yes
Compute scale factor: Yes
Terrestrial
Compute azimuth rotation: No
Horizontal scale factor: 1.0000000000
OK
Cancel

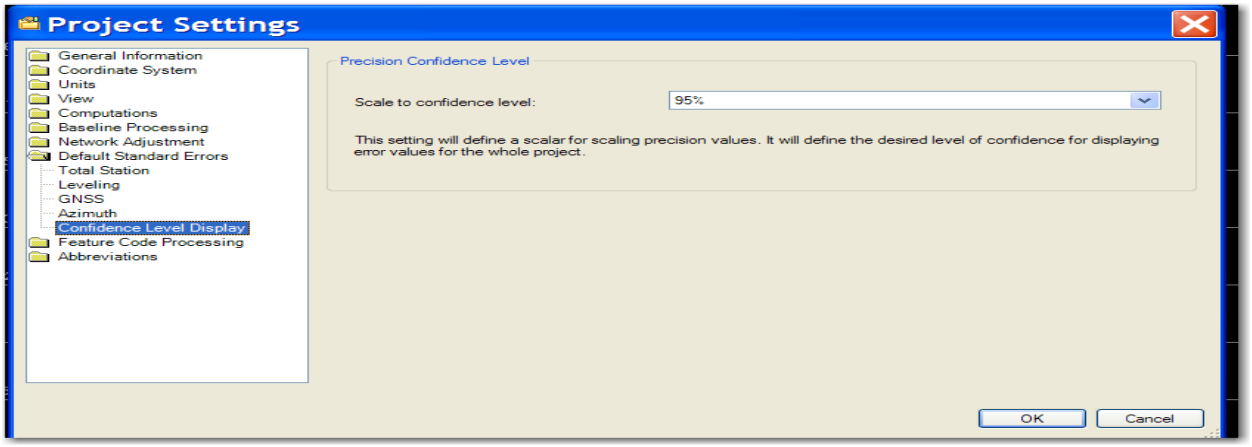

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Total Station
Leveling
GNSS
Azimuth
Confidence Level Display
Feature Code Processing
Abbreviations
Total Station
Source for standard errors: Imported Files
Source for centering errors: Imported Files
Source for height errors: Project Settings
Leveling
Source for standard errors: Level Editor
GNSS
Source for standard errors: Baseline Processor
Azimuth
Source for standard errors: Imported Files
OK
Cancel

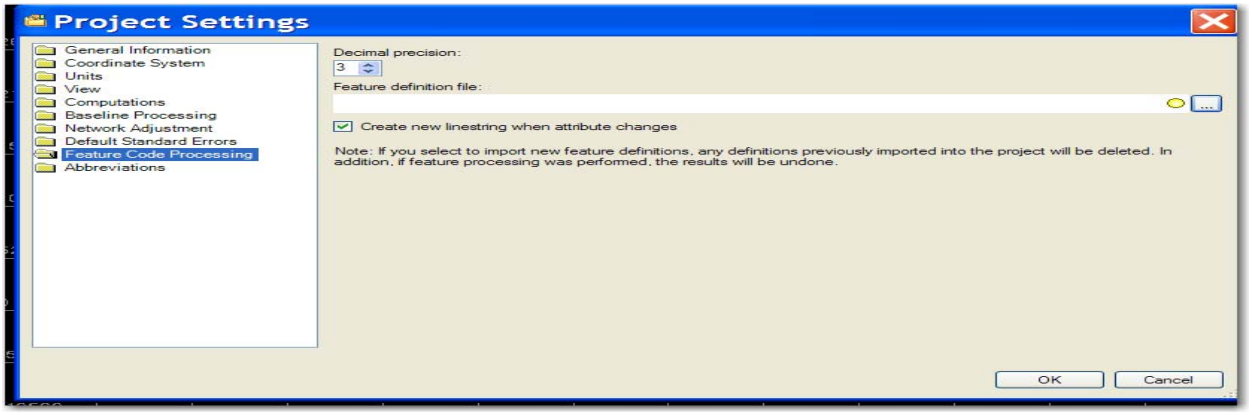

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Total Station
Leveling
GNSS
Azimuth
Confidence Level Display
Feature Code Processing
Abbreviations
Default Standard Errors
Horizontal angle: 0°00'01"
Vertical angle: 0°00'01"
Slope distance: 0.010 ft + 2.0 ppm
Default Centering Errors
Instrument centering error: 0.000 ft
Target centering error: 0.000 ft
Default Height Errors
Error in height of instrument: 0.000 ft
Error in height of target: 0.000 ft
Additional Errors for Indirect Observations
Angle Offset
Distance Offset
Circle Offset
Dual Prism
OK
Cancel

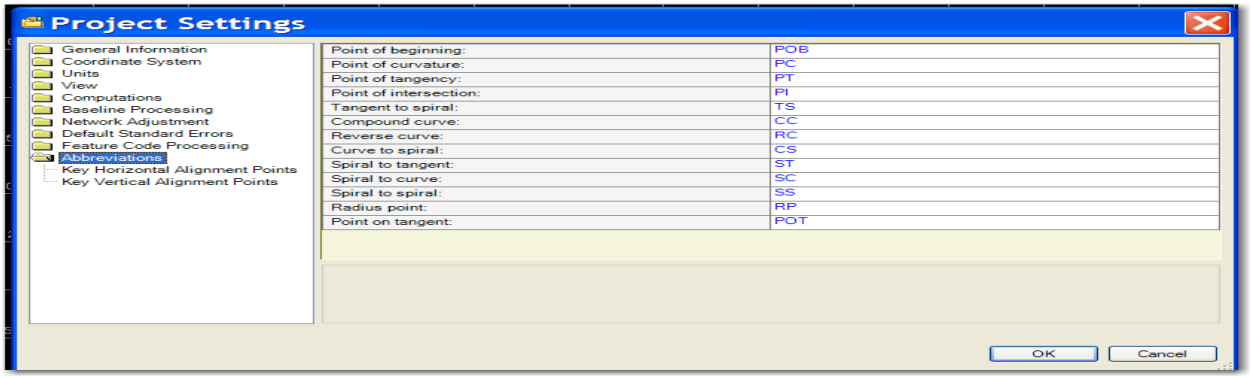

Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Total Station
Leveling
GNSS
Azimuth
Confidence Level Display
Feature Code Processing
Abbreviations
Default Standard Errors
Default standard error on 1 km of double leveling: 0.000 ft
Default standard error for each station setup: 0.000 ft
OK
Cancel


Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Total Station
Leveling
GNSS
Azimuth
Confidence Level Display
Feature Code Processing
Abbreviations
Default Standard Errors
Error horizontal: 0.016 ft + 1.0 ppm
Error vertical: 0.033 ft + 2.0 ppm
Default Setup Errors
Error in height of antenna: 0.000 ft
Centering error: 0.000 ft
OK
Cancel


Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Total Station
Leveling
GNSS
Azimuth
Confidence Level Display
Feature Code Processing
Abbreviations
Default Standard Errors
Default standard error:
0.001 sec
OK
Cancel


Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Total Station
Leveling
GNSS
Azimuth
Confidence Level Display
Feature Code Processing
Abbreviations
Precision Confidence Level
Scale to confidence level:
95%
This setting will define a scalar for scaling precision values. It will define the desired level of confidence for displaying error values for the whole project.
OK
Cancel


Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Decimal precision:
3
Feature definition file:
Create new linestring when attribute changes
Note: If you select to import new feature definitions, any definitions previously imported into the project will be deleted. In addition, if feature processing was performed, the results will be undone.
OK
Cancel


Project Settings
General Information
Coordinate System
Units
View
Computations
Baseline Processing
Network Adjustment
Default Standard Errors
Feature Code Processing
Abbreviations
Key Horizontal Alignment Points
Key Vertical Alignment Points
Point of beginning: POB
Point of curvature: PC
Point of tangency: PT
Point of intersection: PI
Tangent to spiral: TS
Compound curve: CC
Reverse curve: RC
Curve to spiral: CS
Spiral to tangent: ST
Spiral to curve: SC
Spiral to spiral: SS
Radius point: RP
Point on tangent: POT
OK
Cancel

Appendix D: Survey Requirements (SR) Boundary & Topographic Surveys

Scope of Work

- All interior improvements must be shown (including wells, septic tanks, interior fencing, gates, and utilities). Visible evidence of underground installations or apparent cross rights uses will be located and noted.

- The survey will be certified to the 1) Southwest Florida Water Management District, 2) current owners, 3) Title Insurance agency and 4) Title Insurance underwriter.

- The following certification will appear on the survey map:

THIS _____ SURVEY IS CERTIFIED TO THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT AS MEETING OR EXCEEDING, IN QUALITY AND PRECISION, THE STANDARDS APPLICABLE FOR THIS WORK, AS SET FORTH IN CHAPTER 5J-17, FLORIDA ADMINISTRATIVE CODE.

- Title Commitment exceptions must be addressed on the survey *(see Mapping section below).* The survey will be based on the Florida State Plane Coordinate System (West Zone), North American Datum of 1983/Current Adjustment.

- When applicable, the existence of Sovereign Boundaries will be determined by coordinating with the Bureau of Survey and Mapping, Florida Department of Environmental Protection. The demarcation will be a part of this scope.

- Show all Federal Emergency Management Agency (FEMA) Flood Zones and/or Floodways. Search FEMA and local community for letter of map amendment (LOMA) and/or letter of map revision (LOMR) and show changes, if any. Reference Community Panel(s) and dates.

Geospatial

- All elevation data will be provided in both National Geodetic Vertical Datum of 1929 (NGVD 29) and North American Vertical Datum of 1988 (NAVD 88), all units in U.S. Feet. Ground elevations will be reported to the tenth and hard surfaces to the hundredth.

- All elevations will be derived from direct ties to published National Geodetic Survey 1st or 2nd order vertical control and referenced in the Survey Report.

- All horizontal positions will be provided in Florida State Plane Coordinates, NAD 83 HARN, all units in U.S. Feet.

- All data will be delivered with X, Y, Z coordinate values in tabular format using point numbers as unique identifiers, and descriptors containing comments or descriptive data for each point. Point numbers will be indicated in the field notes. This data will be delivered digitally in a Microsoft Excel file (XLSX) and certified in a Survey Report which references the digital filename, date, time and byte size.

- Sub foot horizontal accuracy of terrestrial points will be required for this work.

- Vertical feature accuracy will comply with M.T.S. 5J-17 Florida Administrative Code.

Mapping

- Drawing size will be 24" x 36" drawn at an appropriate scale for the details being shown (for large areas, preferred scale 1"=200' or larger, e.g. 1"=100'). If multiple sheets are used, sheet one of the set will be the key sheet, which will show the entire boundary of the parcel, street names and linework for the improvements and easements. Each subsequent sheet in the set will show the adjoining sheet number at the edge of the parcel, where applicable. All sheets will contain details, as needed, for clarity of improvements or encroachments.

- The following information will be prominently displayed in drawing title block, together with the District's logo:

Southwest Florida Water Management District *Survey Section* *2379 Broad Street U.S. Hwy. 41 South* *Brooksville, Fl. 34604* *(352) 796-7211 (800) 423-1476*	*Basin Name: (e.g. Green Swamp)* *Project Name: xxxxxxxxxxxxxxxxxx* *Parcel Number: (e.g. 10-100-100)* *Parcel Name: xxxxxxxxxxxxxxxxxx*

- Drawing orientation will have north to the top of the sheet (preferred) or to the right.

- When north is rotated to the right on a sheet, all annotation will be oriented to read normally when the user views the map with north towards the top of the page.

- The legal description of the survey will be shown with a header of "Legal Description".

- List area in acres to the hundredth (e.g.123.45 acres) and label within the parcel boundaries and below the legal description.

- Prominently label the parcel number within the boundaries of the parcel.

- When listing area in acres, do not state "more or less" except when combining with square footage (e.g. containing 97,123 square feet or 2.23 acres more or less).

- List the title exceptions under Survey Notes:
  Easements listed as items X, X, X, etc. under Schedule B – Section 2 of (Title Insurance Company Name)'s commitment number: XXXXXX (and if applicable) reference number XXXXXXX effective date: XXXXXX XX, XXXX at XX:XX (a.m./p.m.) have been shown or noted hereon.

- Drawing No. XX-XXX-XXX (xx-xxx-xxx = parcel number) will be placed outside the bottom border on the right side.

- Any line or curve tables will be labeled and numbered in ascending order.
- Do not show owner(s) names or tax parcel identifiers from the property appraiser's data.
- When multiple sheets are used, the FEMA flood zone boundaries will be shown only in the last sheet of the set. This sheet will depict the entire parcel boundary, show sufficient features for orientation and be drawn at a reasonable scale.
- Only applicable items and/or abbreviations will be shown in the legend.
- A simple line diagram, vicinity or location map is required and will show the subject survey relative to clearly labeled major roadways. Do not copy in or externally reference other map sources i.e. aerial photography, scanned maps, web services.
- Drawing date (drawing started) will appear in the title box.
- No revision date will appear unless signed and sealed prints have previously been issued.
- Each sheet that depicts the survey boundaries will show the applicable Section(s), Township(s) and Range(s) and County(s) inside the upper right border.
- List geodetic control stations in notes (minimum of two), include designation and P.I.D.
- All monumentation recovered outside the boundaries of the subject survey that was included in the analysis and resolution of the survey will be shown and dimensioned.

CAD Standards

- CAD file name will normally be the District parcel number (i.e. XX-XXX-XXX.dwg).
- Save file in 2007 or newer format.
- CAD file will be purged *(see note below)*, layer set to 0, left in appropriate space for plotting (model or paper) and zoomed extents.
- Any custom fonts, shapes, line types, plot style tables, hatching will be provided. (*Using eTransmit can assist with identifying custom files.)*
    - CAD file will contain No annotative objects, if annotative objects were created as a part of normal work flow then the “flatten” command will be utilized to remove such formatting.
- If multiple sheets are needed, use of paper space is required.
- CAD file will have all external references removed. *(Use the XREF command to confirm.)*
- No entities will be contained in layer 0, which color will be white and linetype continuous.

- Layers will be set to the proper state for plotting.

- All entities will be created By-Layer, e.g. color, linetype or lineweight.

- Do not utilize aerial images as background or an overlay.

- Provide a layer named “SWFWMD-Boundary” containing a closed polyline of the subject survey. This layer should be frozen and not printed.

- Provide a separate layer named “SWFWMD-Easemen

- t-ORBXXXXX-PGXX” containing a closed polyline for each easement listed in the title commitment exceptions. This layer should be frozen and not printed.

- All entities will be separated into appropriate layers. Using the Layer Properties Manager, add a Description for any abbreviated layer names that may not be easily understood.

- The body of the legal description, including the caption, but not the header, will be an mtext entity and will be created using a text editor to insure no special formatting. *(Do not copy and paste from a Word doc.)*

Note: *It has been discovered that the table style “Legend” that also has a text style “Legend” associated with it cannot be purged, even if there are no entities in the drawing. This is a bug in Version 2009 and prior versions of AutoCAD.*

Solution: *Execute the Rename command and rename table style “Legend” to another name. It will then allow you to purge the table style and text style “Legend”.*

Initial Deliverables

This is not a preliminary or in progress submittal, it should be complete and ready to seal.

A PDF plot of the survey printed at the same size as the hard copy *(filename: Drawing No. XX-XXX-XXX.pdf, where XX-XXX-XXX is the parcel number)*

Provide an AutoCAD drawing file of the survey *(filename: XX-XXX-XXX.DWG, where XX-XXX-XXX is the parcel number. The date of this file will not be later than the PDF plot)*.

A zip file containing all custom font, line types, plot styles, color tables, etc. *(filename: CAD Support Files.zip, this will not contain the DWG file)*.

Pictures of all boundary markers, control, encroachments, and general site conditions will be provided. *(filename: Site Photos.pdf)*

Provide copies of all field notes scanned into PDF format. The beginning page of notes will list the company name, address and telephone number. All pages will contain field book-page numbers and identify the crew persons and dates of work *(filename: Field Notes.pdf)*.

- Provide all supporting computations and analysis of measurements including:

- Adjustment, translation, rotation, balancing, etc; use bookmarks to organize and annotate to allow for review *(filename: **Analysis.pdf)***.

- Export all Data Collection, e.g. conventional, GPS, leveling to an ASCII file format *(filename: **(type of) Data Collection.txt)***.

- NGS Control Datasheets – minimum of two (*filename: **Source Control.pdf***)
  Note: The Source Control.pdf will contain the horizontal and vertical data sheets separated by bookmarked categories. If the NGS station(s) is both horizontal and vertical it would be under its own bookmark category.

  For example: Horizontal

  XXXXXX XXXX, [PID Designation]

  Vertical

  XXXXXX XXXX, [PID Designation]

  Horizontal-Vertical

  XXXXXX XXXX, [PID Designation]

Note: Compile these data in a zip file *(filename: **Computations.zip**)*.

- Copies of any reference maps will be provided in PDF format:

  - Right-of-Way including maintained, proposed or existing *(filename: **Name of Road – County –Type.pdf**)*

  - Surveys by others *(filename: **Surveys by Others.pdf** - if more than one include in same PDF with bookmarks)*

  - FEMA Flood Map *(filename: **FEMA Flood Map - community panel number.pdf**)*

  - Existing Certified Corner Records *(filename: **CCR – Sec-Twp-RGE-Cor.pdf**)*

Note: These data will be compiled in zip file *(filename: **Reference Data.zip**)*.

- ❑ When the question or establishment of mean high water, safe upland elevation or ordinary high water lines is required, a scanned copy of the signed letter from DEP will be provided in PDF format *(filename: **DEP Sovereign Letter.pdf**)*.

Initial deliverables will be provided in one zip file named with your company initials and current date with no spaces e.g. YCI_03-17-10.zip. If the size of the zip file is below 10MB, send it as an email attachment. If it is above 10MB, place it on our FTP site (ftp.swfwmd.state.fl.us) in the \public\incoming folder and send us an email. Files placed on the FTP site are deleted in seven days.

PDF Format Requirements

- Edit the PDF and rotate pages for reading or viewing *(Use the Rotate command in the Pages tab)*.
- When scanning field book pages position in the same orientation and location.
- Convert bit-mapped images (e.g. site photos) to PDF and reduce to letter size.
- Combine same types of documents into one PDF and create bookmarks for each type. *(For example Field Notes from different books or types of data collected. Also computations from different sources or types i.e. closures, GPS processing, adjustments. Site photos of different locations.)*
- Use the optimize function to reduce the size of large PDF files, when scanning documents to PDF format do not use a resolution greater than 300 dpi.

Final Deliverables

Resubmit any initial deliverable files that required changes.

- ❑ Provide six (6) signed-sealed prints of the final boundary survey.
- ❑ If a separate Surveyor's Report is provided, after signing and sealing, the document will be scanned into PDF format and named *(filename: **Survey Report.pdf**).*

The following data should have been provided with the RFP:

Basin Name	Title Commitment
Project Name	District Survey data
Parcel Number	District Logo (AutoCAD format)*
Parcel Name	*available upon request

Addendum for Well Site Surveys

- All scope of work, mapping, CAD standards and deliverables detailed in the requirements above are applicable to this addendum, unless noted otherwise below.

- These surveys usually consist of three areas identified as follows:

  Proposed Well Site Area – normally a 10 foot by 10 foot *(see exception map for site requirements)*.

  Proposed Access Area – normally 10 foot in width from public right of way to proposed well site area *(see exception map for site requirements)*.

  Proposed Temporary Construction Area – normally 100 foot by 100 foot surrounding the proposed well site area *(see exception map for site requirements)*.

- One parcel number represents all three areas. Instead of labeling parcel number within the boundaries, label the type i.e. Proposed Well Site Area, leaders may be used.

- Boundary corners are to be set for all three parcels.

- Locate trees 4" DBH (Diameter at Breast Height) within the Access and Well site Areas.

- Title commitment provided will cover the parent tract, not the parcel areas.

- Legal descriptions are to be written for each area surveyed.

- When describing curve direction in a legal description use the phrase "…curve to the left..." or "…curve to the right…" <u>not</u> "…curve concave to the east (etc.)…"

- Legal description will be written and boundaries dimensioned in a clockwise direction.

- Legal descriptions will use "<u>for</u> the point of beginning" at the first instance and "<u>to</u> the point of beginning" on return.

- The legal description header for each boundary will contain a hyphen and area name. For example: Legal Description – Proposed Well Site Area.

- There will be only one survey drawing which will depict all three areas and contain their legal descriptions.

- Temporary Construction Area boundaries will be drawn using a dashed linetype.

- FEMA Flood Zone Data is <u>not</u> required for Well Site Surveys.

- The scale of the drawing will be increased to focus on the surveyed areas, not the parent tract.

Note: Four wooded stakes have been placed at the proposed well site area location, as well as an iron rod at its center. These points were placed by others representing its approximate location to the land owner. If existing at the time of survey, they will be located and placed on a frozen layer named SWFWMD-Field Points in the provided CAD file.

When practical the well site area should be placed at these points. However, appropriate boundaries (i.e. parallel or perpendicular with the parent boundaries, where applicable) will be created and conform to the parameters shown on the exception map provided. If unforeseen circumstances are encountered making the aforementioned impractical, contact the District for further direction.

Appendix E: Survey Requirements (SR) Boundary Surveys

Scope of Work

- All interior improvements must be shown (including wells, septic tanks, interior fencing, gates, and utilities). Visible evidence of underground installations or apparent cross rights uses will be located and noted.

- The survey will be certified to the 1) Southwest Florida Water Management District, 2) current owners, 3) Title Insurance agency and 4) Title Insurance underwriter.

- The following certification will appear on the survey map:

  THIS _____ SURVEY IS CERTIFIED TO THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT AS MEETING OR EXCEEDING, IN QUALITY AND PRECISION, THE STANDARDS APPLICABLE FOR THIS WORK, AS SET FORTH IN CHAPTER 5J-17, FLORIDA ADMINISTRATIVE CODE.

- Title Commitment exceptions must be addressed on the survey *(see Mapping section below).*

- The survey will be based on the Florida State Plane Coordinate System (West Zone), North American Datum of 1983/Current Adjustment.

- When applicable, the existence of Sovereign Boundaries will be determined by coordinating with the Bureau of Survey and Mapping, Florida Department of Environmental Protection. The demarcation will be a part of this scope.

- Show all Federal Emergency Management Agency (FEMA) Flood Zones and/or Floodways. Search FEMA and local community for letter of map amendment (LOMA) and/or letter of map revision (LOMR) and show changes, if any. Reference Community Panel(s) and dates.

Mapping

- Drawing size will be 24" x 36" drawn at an appropriate scale for the details being shown (<u>for large areas</u>, preferred scale 1"=200’ or larger, e.g. 1”=100’). If multiple sheets are used, sheet one of the set will be the key sheet, which will show the entire boundary of the parcel, street names and linework for the improvements and easements. Each subsequent sheet in the set will show the adjoining sheet number at the edge of the parcel, where applicable. All sheets will contain details, as needed, for clarity of improvements or encroachments.

- The following information will be prominently displayed in drawing title block, together with the District's logo:

Southwest Florida Water Management District *Survey Section* *2379 Broad Street U.S. Hwy. 41 South* *Brooksville, Fl. 34604* *(352) 796-7211 (800) 423-1476*	*Basin Name: (e.g. Green Swamp)* *Project Name: xxxxxxxxxxxxxxxxxx* *Parcel Number: (e.g. 10-100-100)* *Parcel Name: xxxxxxxxxxxxxxxxxx*

- Drawing orientation will have north to the top of the sheet (preferred) or to the right.
- When north is rotated to the right on a sheet, all annotation will be oriented to read normally when the user views the map with north towards the top of the page.
- The legal description of the survey will be shown with a header of "Legal Description".
- List area in acres to the hundredth (e.g.123.45 acres) and label within the parcel boundaries and below the legal description.
- Prominently label the parcel number within the boundaries of the parcel.
- When listing area in acres, do not state "more or less" except when combining with square footage (e.g. containing 97,123 square feet or 2.23 acres more or less).
- List the title exceptions under Survey Notes:
  Easements listed as items X, X, X, etc. under Schedule B – Section 2 of (Title Insurance Company Name)'s commitment number: XXXXXX (and if applicable) reference number XXXXXXX effective date: XXXXXX XX, XXXX at XX:XX (a.m./p.m.) have been shown or noted hereon.
- Drawing No. XX-XXX-XXX (xx-xxx-xxx = parcel number) will be placed outside the bottom border on the right side.
- Any line or curve tables will be labeled and numbered in ascending order.
- Do not show owner(s) names or tax parcel identifiers from the property appraiser's data.
- When multiple sheets are used, the FEMA flood zone boundaries will be shown only in the last sheet of the set. This sheet will depict the entire parcel boundary, show sufficient features for orientation and be drawn at a reasonable scale.
- Only applicable items and/or abbreviations will be shown in the legend.
- A simple line diagram, vicinity or location map is required and will show the subject survey relative to clearly labeled major roadways. Do not copy in or externally reference other map sources i.e. aerial photography, scanned maps, web services.

- Drawing date (drawing started) will appear in the title box.
- No revision date will appear unless signed and sealed prints have previously been issued.
- Each sheet that depicts the survey boundaries will show the applicable Section(s), Township(s) and Range(s) and County(s) inside the upper right border.
- List geodetic control stations in notes (minimum of two), include designation and P.I.D.
- All monumentation recovered outside the boundaries of the subject survey that was included in the analysis and resolution of the survey will be shown and dimensioned.

CAD Standards

- CAD file name will normally be the District parcel number (i.e. XX-XXX-XXX.dwg).
- Save file in 2007 or newer format.
- CAD file will be purged *(see note below)*, layer set to 0, left in appropriate space for plotting (model or paper) and zoomed extents.
- Any custom fonts, shapes, line types, plot style tables, hatching will be provided. (*Using eTransmit can assist with identifying custom files.)*
    - CAD file will contain No annotative objects, if annotative objects were created as a part of normal work flow then the "flatten" command will be utilized to remove such formatting.
- If multiple sheets are needed, use of paper space is required.
- CAD file will have all external references removed. *(Use the XREF command to confirm.)*
- No entities will be contained in layer 0, which color will be white and linetype continuous.
- Layers will be set to the proper state for plotting.
- All entities will be created By-Layer, e.g. color, linetype or lineweight.
- Do not utilize aerial images as background or an overlay.
- Provide a layer named "SWFWMD-Boundary" containing a closed polyline of the subject survey. This layer should be frozen and not printed.
- Provide a separate layer named "SWFWMD-Easement-ORBXXXXX-PGXX" containing a closed polyline for each easement listed in the title commitment exceptions. This layer should be frozen and not printed.

- All entities will be separated into appropriate layers. Using the Layer Properties Manager, add a Description for any abbreviated layer names that may not be easily understood.

- The body of the legal description, including the caption, but not the header, will be an mtext entity and will be created using a text editor to insure no special formatting. *(Do not copy and paste from a Word doc.)*

Note: *It has been discovered that the table style "Legend" that also has a text style "Legend" associated with it cannot be purged, even if there are no entities in the drawing. This is a bug in Version 2009 and prior versions of AutoCAD.*

Solution: *Execute the Rename command and rename table style "Legend" to another name. It will then allow you to purge the table style and text style "Legend".*

Initial Deliverables

This is not a preliminary or in progress submittal, it should be complete and ready to seal.

A PDF plot of the survey printed at the same size as the hard copy (filename: Drawing No. XX-XXX-XXX.pdf, where XX-XXX-XXX is the parcel number)

Provide an AutoCAD drawing file of the survey (filename: XX-XXX-XXX.DWG, where XX-XXX-XXX is the parcel number. The date of this file will not be later than the PDF plot).

- A zip file containing all custom font, line types, plot styles, color tables, etc. *(filename: **CAD Support Files.zip**, this will not contain the DWG file)*.

Pictures of all boundary markers, control, encroachments, and general site conditions will be provided. *(filename: Site Photos.pdf)*

Provide copies of all field notes scanned into PDF format. The beginning page of notes will list the company name, address and telephone number. All pages will contain field book-page numbers and identify the crew persons and dates of work *(filename: Field Notes.pdf)*.

- Provide all supporting computations and analysis of measurements including:

    - Adjustment, translation, rotation, balancing, etc; use bookmarks to organize and annotate to allow for review *(filename: **Analysis.pdf)***.

    - Export all Data Collection, e.g. conventional, GPS, leveling to an ASCII file format *(filename: **(type of) Data Collection.txt)***.

    - NGS Control Datasheets – minimum of two (*filename: **Source Control.pdf***)

      Note: The Source Control.pdf will contain the horizontal and vertical data sheets separated by bookmarked categories. If the NGS station(s) is both horizontal and vertical it would be under its own bookmark category.

For example: *Horizontal*

XXXXXX XXXX, [PID Designation]

Vertical

XXXXXX XXXX, [PID Designation]

Horizontal-Vertical

XXXXXX XXXX, [PID Designation]

Note: Compile these data in a zip file *(filename: **Computations.zip**)*.

- Copies of any reference maps will be provided in PDF format:
  - Right-of-Way including maintained, proposed or existing *(filename: **Name of Road – County –Type.pdf**)*
  - Surveys by others *(filename: **Surveys by Others.pdf** - if more than one include in same PDF with bookmarks)*
  - FEMA Flood Map *(filename: **FEMA Flood Map - community panel number.pdf**)*
  - Existing Certified Corner Records *(filename: **CCR – Sec-Twp-RGE-Cor.pdf**)*

  Note: These data will be compiled in zip file *(filename: **Reference Data.zip**)*.

- When the question or establishment of mean high water, safe upland elevation or ordinary high water lines is required, a scanned copy of the signed letter from DEP will be provided in PDF format *(filename: **DEP Sovereign Letter.pdf**)*.

Initial deliverables will be provided in one zip file named with your company initials and current date with no spaces e.g. YCI_03-17-10.zip. If the size of the zip file is below 10MB, send it as an email attachment. If it is above 10MB, place it on our FTP site (ftp.swfwmd.state.fl.us) in the \public\incoming folder and send us an email. Files placed on the FTP site are deleted in seven days.

PDF Format Requirements

- Edit the PDF and rotate pages for reading or viewing *(Use the Rotate command in the Pages tab)*.

- When scanning field book pages position in the same orientation and location.

- Convert bit-mapped images (e.g. site photos) to PDF and reduce to letter size.

- Combine same types of documents into one PDF and create bookmarks for each type. *(For example Field Notes from different books or types of data collected. Also computations from different sources or types i.e. closures, GPS processing, adjustments. Site photos of different locations.)*

- Use the optimize function to reduce the size of large PDF files, when scanning documents to PDF format do not use a resolution greater than 300 dpi.

Final Deliverables
Resubmit any initial deliverable files that required changes.

- ❑ Provide six (6) signed-sealed prints of the final boundary survey.
- ❑ If a separate Surveyor's Report is provided, after signing and sealing, the document will be scanned into PDF format and named *(filename: **Survey Report.pdf**).*

The following data should have been provided with the RFP:

Basin Name	Title Commitment
Project Name	District Survey data
Parcel Number	District Logo (AutoCAD format)*
Parcel Name	*available upon request

Addendum for Well Site Surveys

- ❑ All scope of work, mapping, CAD standards and deliverables detailed in the requirements above are applicable to this addendum, unless noted otherwise below.

- ❑ These surveys usually consist of three areas identified as follows:

  Proposed Well Site Area – normally a 10 foot by 10 foot *(see exception map for site requirements)*.

  Proposed Access Area – normally 10 foot in width from public right of way to proposed well site area *(see exception map for site requirements)*.

  Proposed Temporary Construction Area – normally 100 foot by 100 foot surrounding the proposed well site area *(see exception map for site requirements)*.

- One parcel number represents all three areas. Instead of labeling parcel number within the boundaries, label the type i.e. Proposed Well Site Area, leaders may be used.
- Boundary corners are to be set for all three parcels.
- Locate trees 4” DBH (Diameter at Breast Height) within the Access and Well site Areas.
- Title commitment provided will cover the parent tract, not the parcel areas.
- Legal descriptions are to be written for each area surveyed.
- When describing curve direction in a legal description use the phrase "…curve to the left..." or "…curve to the right…" not "…curve concave to the east (etc.)…"
- Legal description will be written and boundaries dimensioned in a clockwise direction.
- Legal descriptions will use “for the point of beginning” at the first instance and “to the point of beginning” on return.
- The legal description header for each boundary will contain a hyphen and area name. For example: Legal Description – Proposed Well Site Area.
- There will be only one survey drawing which will depict all three areas and contain their legal descriptions.
- Temporary Construction Area boundaries will be drawn using a dashed linetype.
- FEMA Flood Zone Data is not required for Well Site Surveys.
- The scale of the drawing will be increased to focus on the surveyed areas, not the parent tract.

Note: Four wooded stakes have been placed at the proposed well site area location, as well as an iron rod at its center. These points were placed by others representing its approximate location to the land owner. If existing at the time of survey, they will be located and placed on a frozen layer named SWFWMD-Field Points in the provided CAD file. When practical the well site area should be placed at these points. However, appropriate boundaries (i.e. parallel or perpendicular with the parent boundaries, where applicable) will be created and conform with the parameters shown on the exception map provided. If unforeseen circumstances are encountered making the aforementioned impractical, contact the District for further direction.

Appendix F: Survey Requirements (SR) Hydrographic-Topographic MFL – Lakes

Geospatial

Elevation data will be provided in U.S. survey feet and reference the North American Vertical Datum of 1988 (NAVD 88) and National Geodetic Vertical Datum of 1929 (NGVD 29).

All elevations will be derived from direct ties to published National Geodetic Survey 1st or 2nd order vertical control (except where SWFWMD NAVD 88 bench marks exist) and will be referenced in the Survey Report. Other bench marks published on the Land Boundary Information System (LABINS) may be used with prior approval of the District.

All horizontal positions will be provided in Florida State Plane Coordinates, NAD 83 (current adjustment), all units in U.S. survey feet.

Format

All data will be delivered with X, Y, Z coordinate values in tabular format using point numbers as unique identifiers, and descriptors containing comments or descriptive data for each point. The number of significant digits for the dataset coordinates shall be consistent with the accuracy of the values. Point numbers will be indicated in the field notes. This data will be delivered digitally in a Microsoft Excel file (XLSX) and certified in a Survey Report which references the digital filename, date, and time and byte size[1]. When multiple attributes are described for points, an additional column will be added to the spreadsheet and attribute descriptions separated into the separate columns e.g. low point/back of curb.

[1] Use the properties command and select the size not size on disk.

Positioning

Horizontal: Positioning for terrestrial points will be stated in the report as having an expected accuracy of sub-foot; hydrographic points will be stated in the report as having an expected accuracy of sub-meter.

Vertical: Elevations for “hard” surfaces, e.g. asphalt, concrete, wood, metal, plastic, will be stated in the report as having an expected accuracy of 0.06’. Terrestrial “soft” surfaces, e.g. dirt, limestone, sand, will be stated in the report as having an expected accuracy of 0.1’. Hydrographic surfaces, e.g. lake bottoms, creek, stream or river beds, will be stated in the report as having an expected accuracy of 0.5’. Applicable accuracies will be stated in the survey report.

Methodology

- Horizontal: Positions will be based on ties to a minimum of two (2) National Geodetic Survey 1st or 2nd order horizontal control stations utilizing the Global Navigation Satellite System (GNSS).

- Vertical: Positions for “hard” surfaces (see Positioning above) will be established by conventional differential leveling or by utilizing the Global Navigation Satellite System (GNSS). Methodologies to including one of the following: GPS Real Time Kinematic (RTK) with at least two (2) redundant measurements of one hundred and eighty (180)

epochs each from two (2) Different base positions, or, Real Time Network (RTN) with at least four (4) redundant measurements of one hundred and eighty (180) epochs each.

- Lake bottom elevations will be determined using a differential GPS system linked to a single beam fathometer with a 200 kHz transducer or alternate methods with equivalent or higher degrees of accuracy.

- Typically Hydrographic data will be collected in a series of cross-section lines, the interval of data points and the distance between cross-section lines will be dependent on lake size and configuration which will be included in the "Scope of Work".

- Calibration techniques for equipment utilized will be included in the survey report. This data will be based on calibrations performed in the field and recorded in the field notes prior to beginning each day's field efforts.

- Hydrographic surveys performed manually will utilize applicable techniques as outlined in *Chapter 8 of the Army Corp of Engineers publication EM 1110-2-1003, Titled: Engineering and Design – Hydrographic Surveying, Publication Date: 01 Jan 02*[2].

- Hydrographic surveys performed using digital fathometers will utilize applicable techniques and procedures as outlined in *Chapter 9 of the Army Corp of Engineers publication EM 1110-2-1003, Titled: Engineering and Design – Hydrographic Surveying, Publication Date: 01 Jan 02*[2].

- Cross sectional ties will be performed and data will be collected with a direct measuring rod. Locations will be dependent on lake size and configuration and will be included in the Scope of Work. These data will support an overlap of adjoining existing topographic data.

[2]The hydrographic survey outlined herein does not fit into any one particular classification of hydrographic survey as defined in the above referenced Army Corp manual. However, it should be understood that the techniques utilized will result in the stated expected accuracies for this project.

Deliverables

- Hard copy signed and sealed of Survey Report, attach a print out of the tabular data certified, but do not include as a part of the report (e.g. page numbering). *(Include a scanned copy of the signed sealed report with the tabular data inserted after in a PDF file named Survey Report.pdf).*

- Microsoft Excel spreadsheet containing all data to be certified (Do not include site bench marks). Columns will include Point number, Northing coordinate, Easting coordinate, Elevation and Description. Where appropriate add additional fields, do not combine different types of data (dual description items). This file will not include point data collected for quality assurance. File name: Job name_work order number.xlsx. This file will be placed in a zip file named Survey Report Table.zip.

- For sonar derived points ONLY - Microsoft Excel spreadsheet containing all hydrologic quality assurance data. Columns will include Point number, Northing coordinate, Easting coordinate, Elevation Sonar, Elevation Manual (manually measured) and Description. File name: Comparative Analysis.xlsx. This file will be placed in a zip file named Computations.zip.

- All NGS data sheets etc. used for horizontal and vertical control validation. these data will be delivered in a PDF file named Source Control.pdf and placed in the zip file named Computations.zip.

- Scanned copies of all field notes which should include company name and address. These data will be delivered in a PDF file named Field Notes.pdf.

- Data collection file(s) output to ASCII (.txt) format. This file will be placed in a zip file named Data Collection.zip.

- All adjustment data or analysis reports in PDF format. These data will be placed in a zip file named Computations.zip.

- Hard copy of certified bench mark forms signed and in a PDF file. The file name will use the following format Township Range Section hyphen **BM** hyphen work order number and sequentially numbered for each section. For example: 2816S03-BM-08-999-01. Included pictures should be limited to letter size.

- Site pictures will be included in a PDF file named Site Photos.pdf and will include bookmarks identifying location and direction.

- All digital data above will be delivered as an email attachment (10MB max.) or posted to our FTP site ftp.swfwmd.state.fl.us (use company initials and date with no spaces i.e. YCN_01-01-11.)

Survey Report Minimum Content

At a minimum the following format and content will be included in the surveyor's report.

Continued next page

Surveyor's Report

Company Name

Company Address

Company Phone

Company Fax:

Date:

Project Name:

Survey Type(s):

Basin Name:

(*Continued)*

Lake Name:

Section, Township and Range:

Date of Field Work:

Site Location:

A brief description of the subject site and from where access is gained will be reported.

Methodology:

Methods and types of equipment utilized to acquire survey data, explanation of QA/QC utilized and results, as well as calibration techniques.

Surveyor's Notes:

1. *State datum for horizontal and vertical values. Cite control (NGS stations to include PID) together with accuracies achieved for data, e.g. control points, terrestrial points and lake bottom points.*

2. *State water elevation and staff gauge reading with time and date.*

3. *State other miscellaneous items the surveyor of record deems necessary for this report.*

4. *The deliverable data for this report is contained in a file named: Job_Name_WO_num.xlsx, dated: xx-xx-xx, time: xx:xx xm, size: xx,xxx bytes.*

Appendix G: Detail use of Geomatics Services

Home Screen

This will be the first screen a user will see once the application is opened. See **Figure 1**. Select the “Help” button for a general overview.

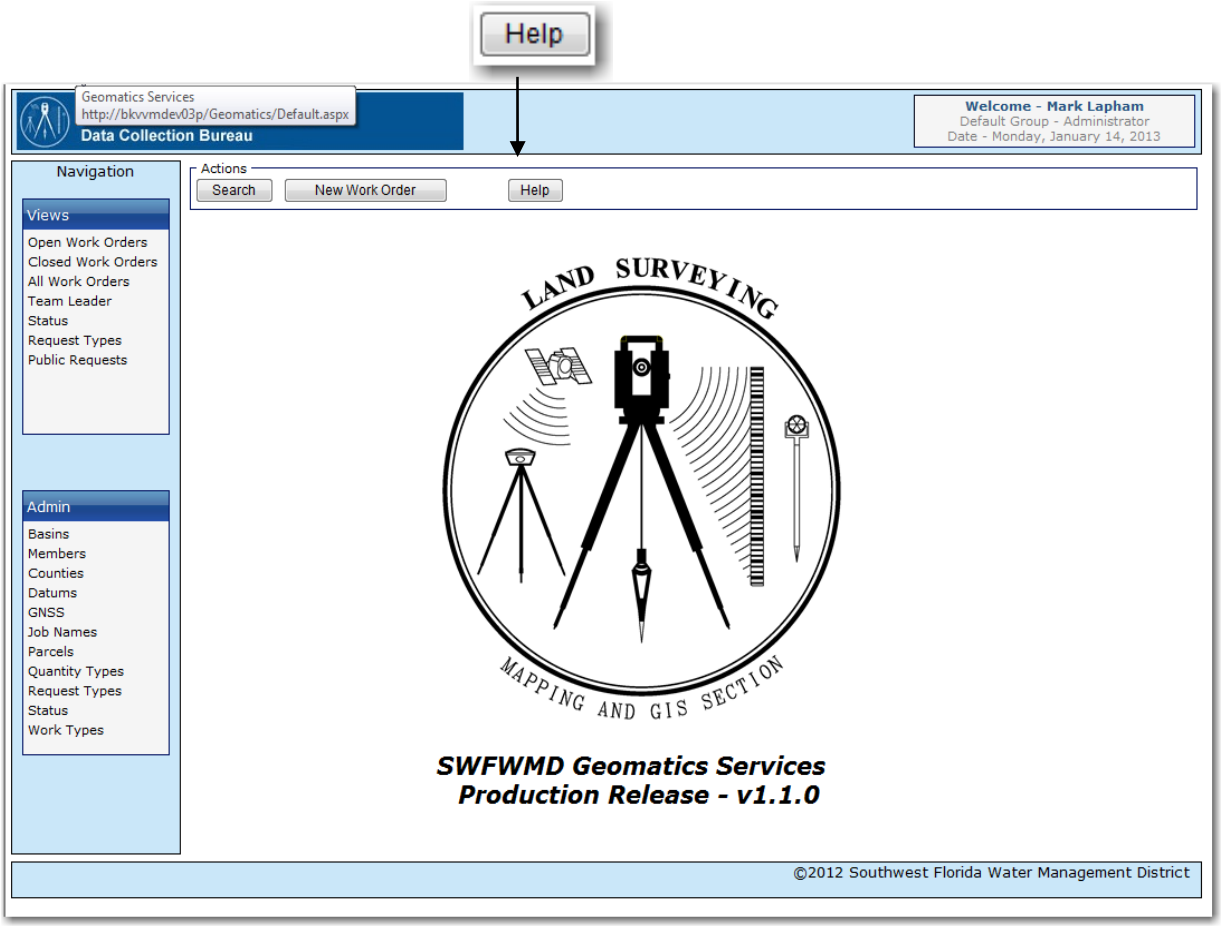


Figure 1

Navigation:

Views

The views window is a way for the user to see work orders broken down into various categories.

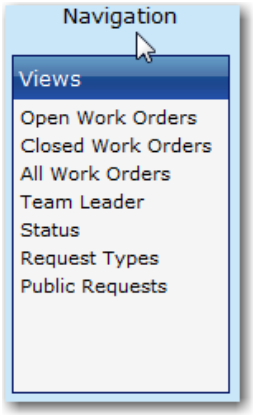


Figure 2

By selecting "**Open Work Orders**" one will see all work orders that are currently active. At the upper left corner one can see the total "Number of Open Work Orders:" current count is 49. See **Figure 3**

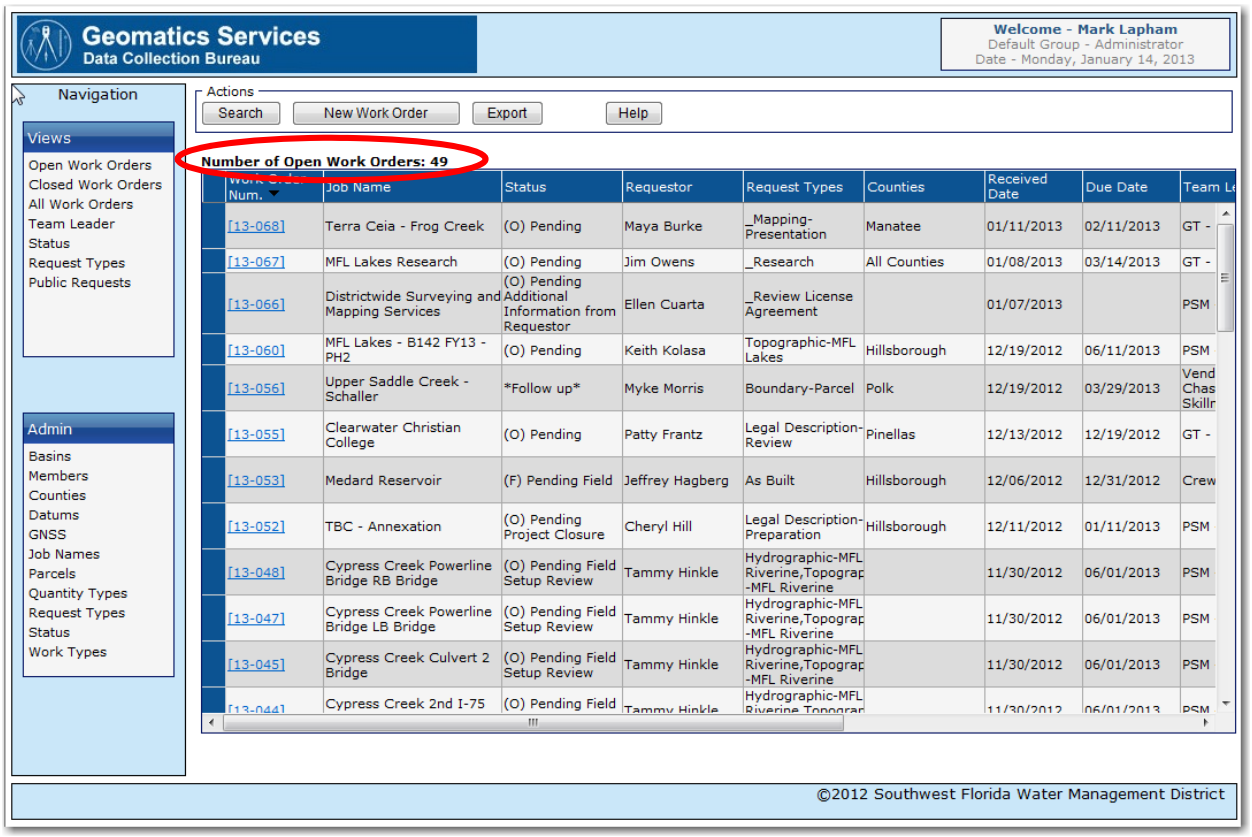


Figure 3

By selecting **"Closed Work Orders"** one will see all work orders that have been completed since the inception of "Survey Central", predecessor to "Geomatics Services" from mid 2003 to present day. This is quite an extensive list (notice in **Figure 4** below the "Number of Closed Work Orders: 3023"). It is recommended that one use the search function if there is a specific work order/criteria the user wishes to see. (See "Search Function" below.)

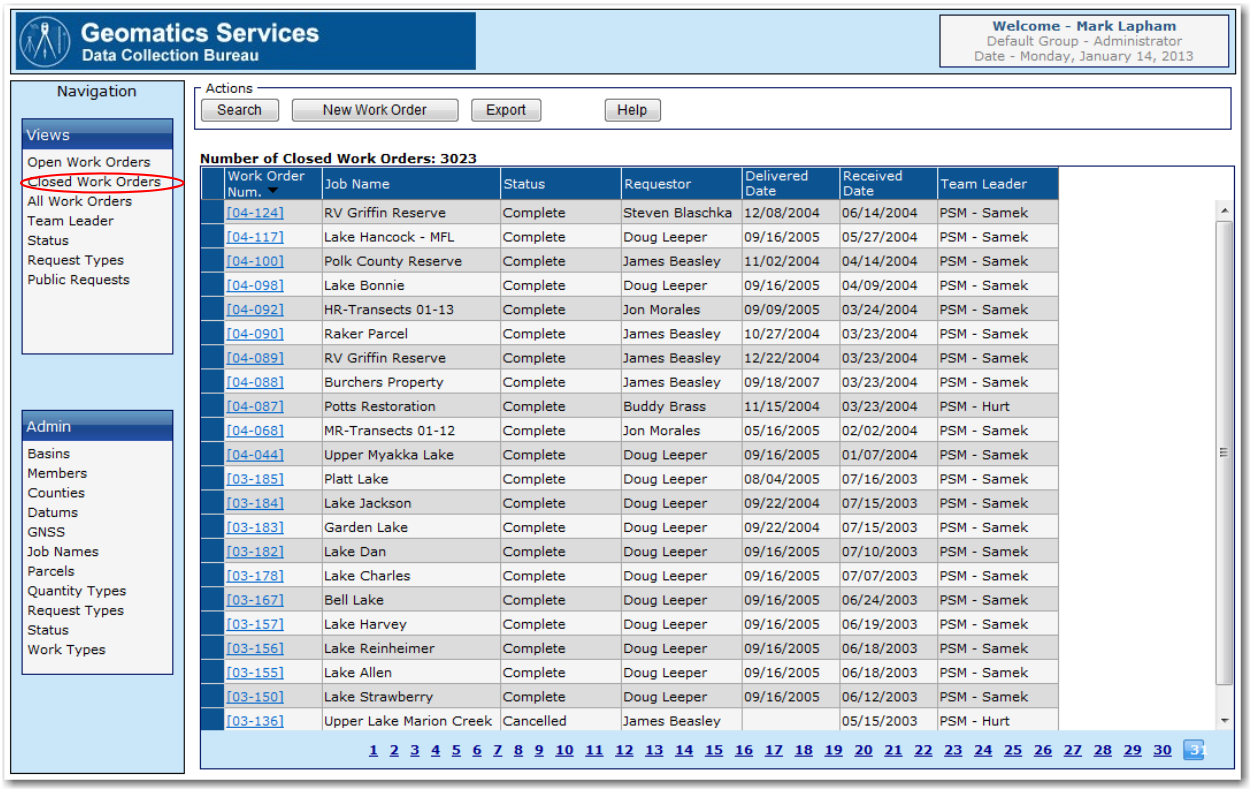


Figure 4

By selecting **"All Work Orders"** the user will see all work orders open or closed. (Once again, this is quite an extensive list; it is recommended to use the search function.) See Figure 5.

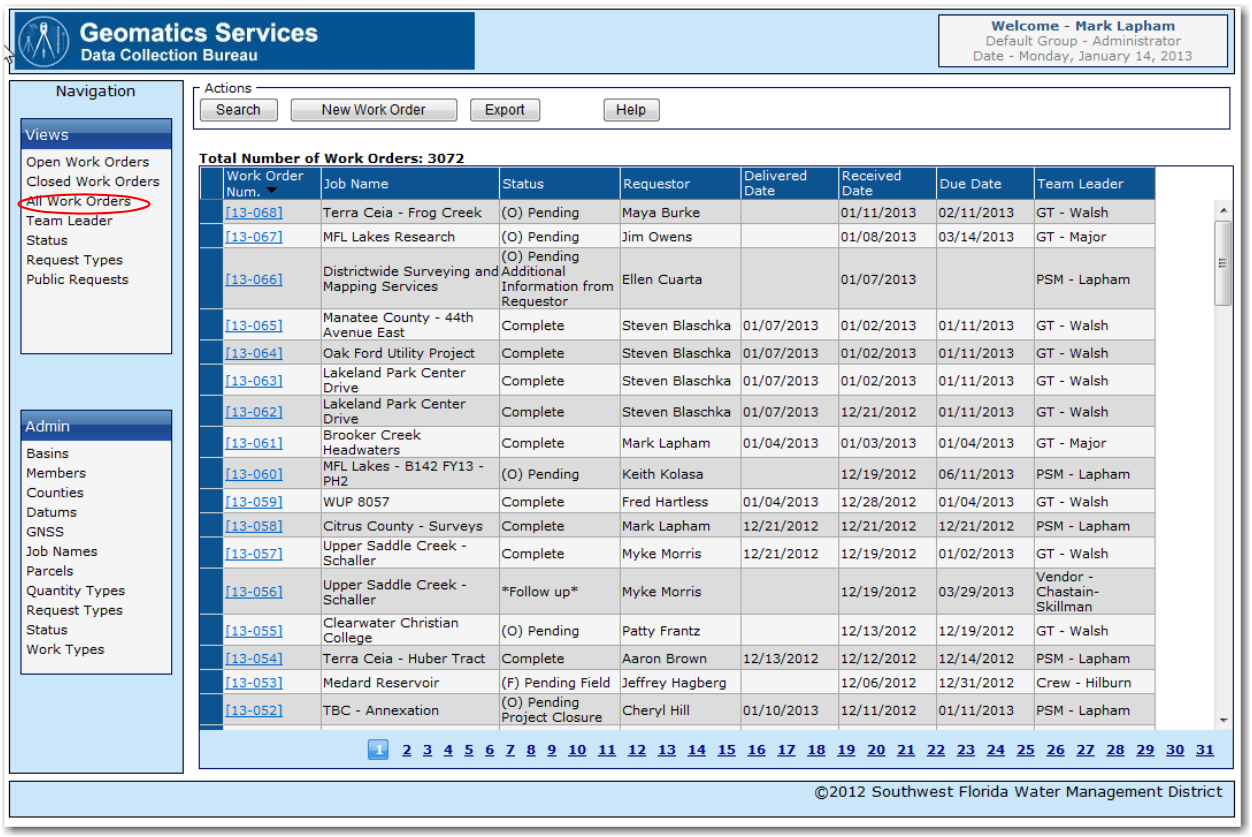


Figure 5

By selecting **"Team Leader"** you will see a list of survey group staff members. See Figure 6.

Team leader: A team leader is a person currently assigned a work task item within a work order. Until their task is completed/reassigned, they will be listed as "Team Leader".
You can see in Figure 6 below a list of team leaders, i.e. "Team Leader : GT – Doe (12)". The first item after the colon is the abbreviated job title of the team leader followed by the dash and last name of the team leader. The number in parenthesis (#) is the current number of work orders the team member has been assigned.

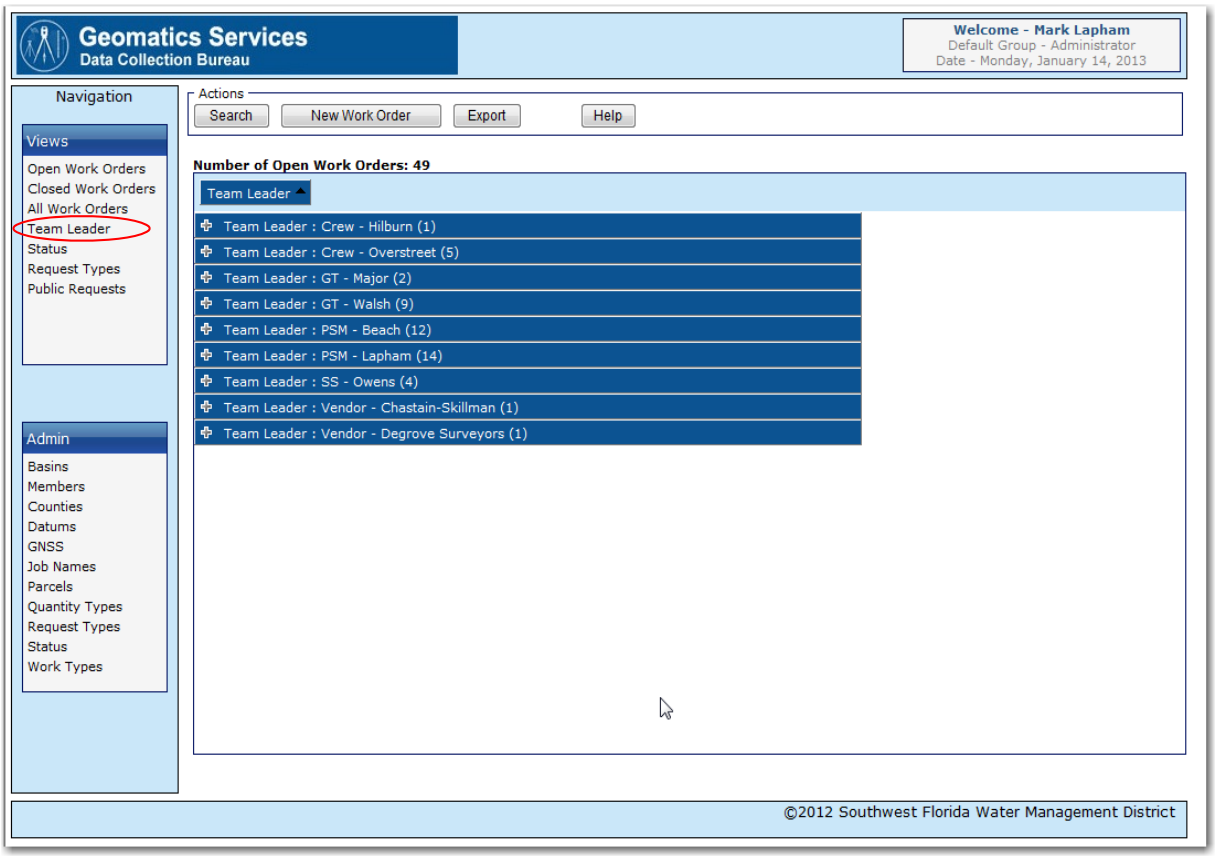


Figure 6

By selecting "**Status**" the user will see a listing of the current status for all open work orders. See **Figure 7**

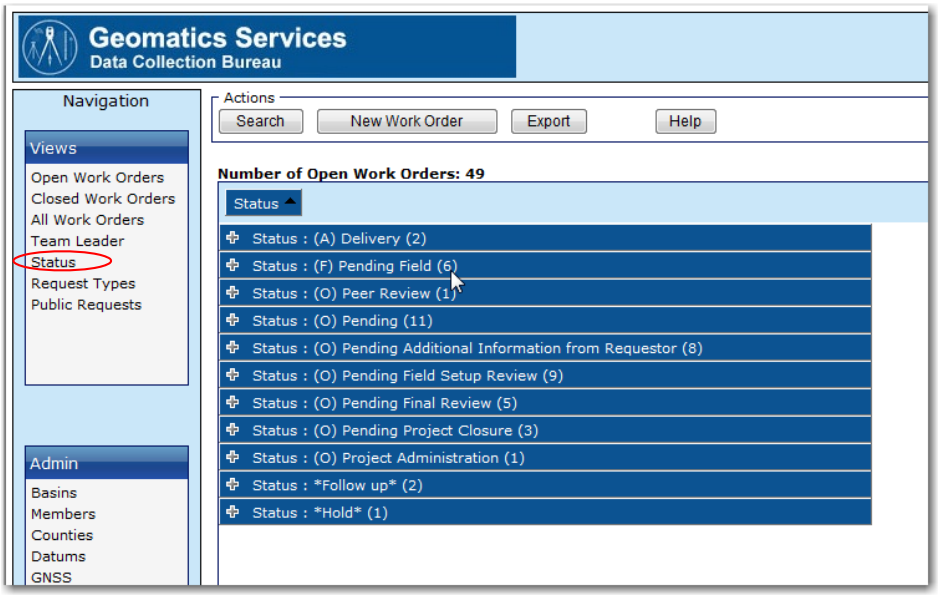


Figure 7

The alpha codes in parenthesis have the following designations:

(A) Administration

(F) Field

(O) Office

- ### - represent Supervisor status items:

-TBA- = To Be Archived

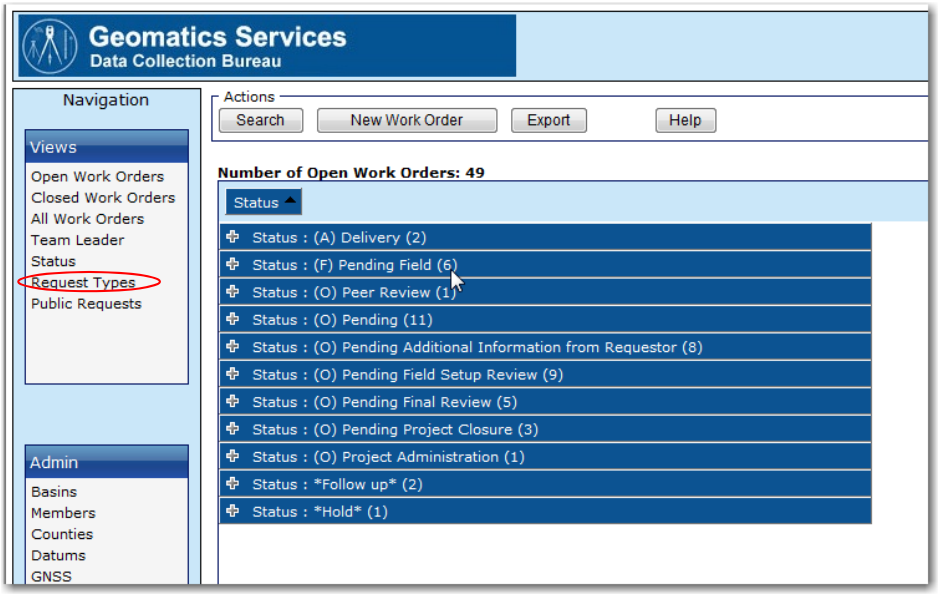
-TBC- = To Be Closed

- TBD- = To Be Delivered

-TBR- = To Be Reviewed

????? represents a status that is neither office or field, it is used for outsourced projects when they are assigned to a consultant.

By selecting "**Request Types**" from the views window, the user will now see a list of all the request types used for open and closed work orders, the number in parenthesis indicates the number of work orders having that type of request.



Once “Request Type” is selected your screen will look similar to the screen in Figure 8 below. The numbers in parenthesis are the total number of work orders for that request type.

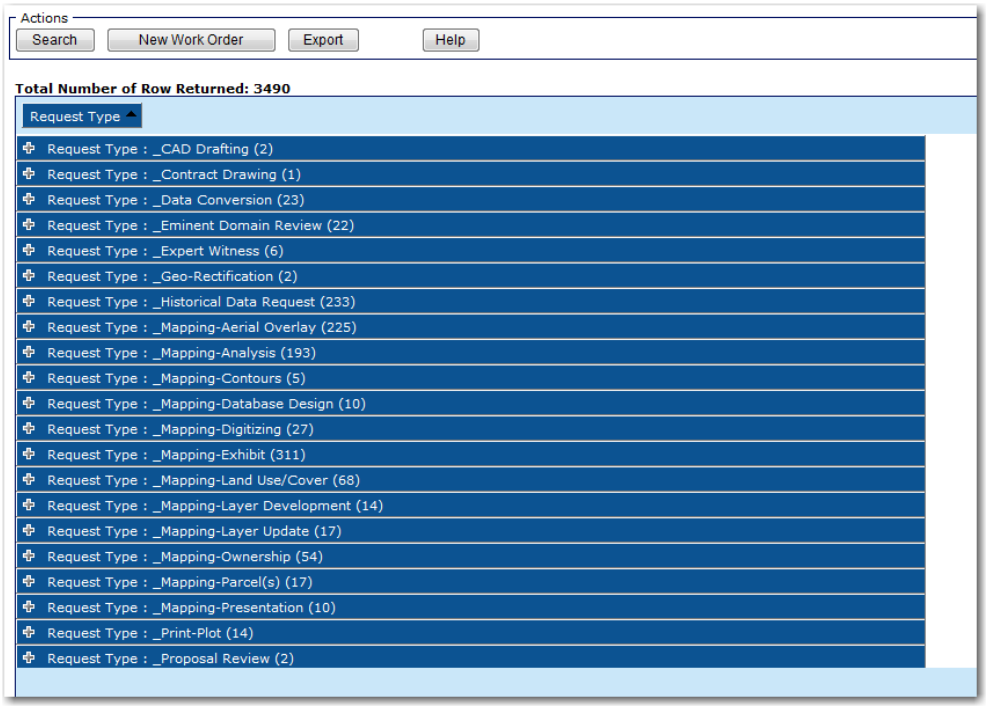


Figure 8

By selecting “**Public Requests**” the user will see a list of work orders that were performed as public requests. See **Figure 9**

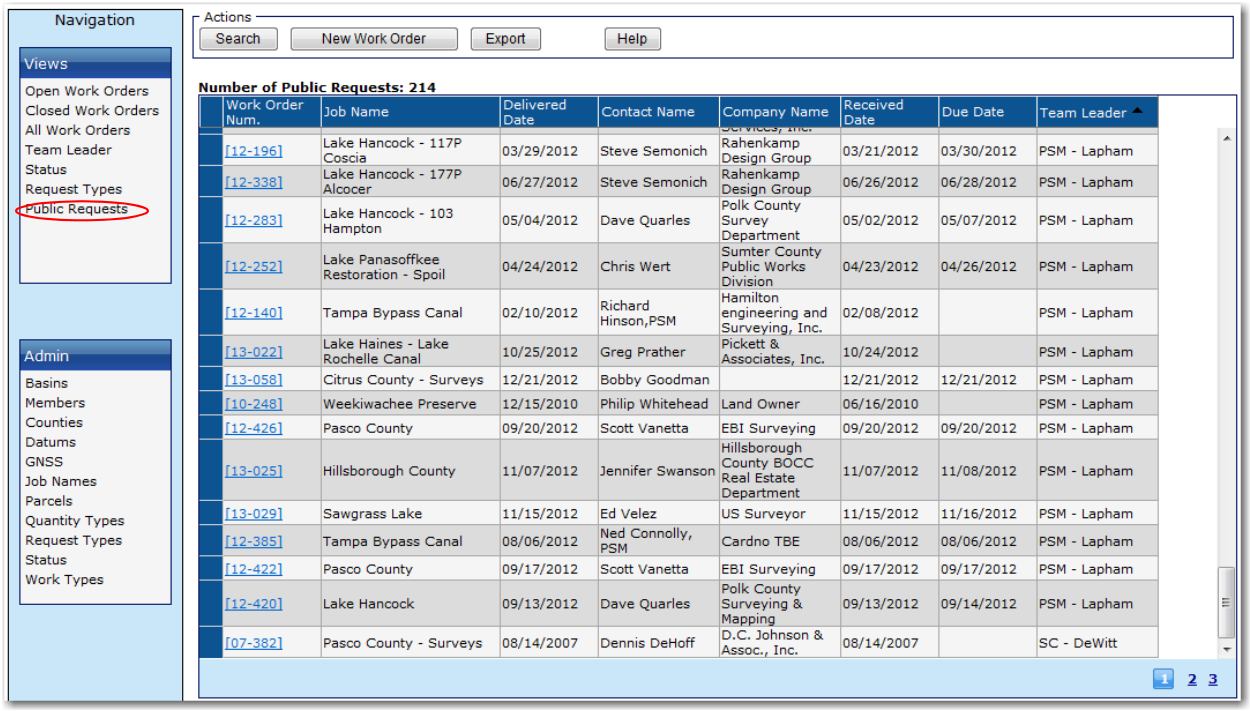


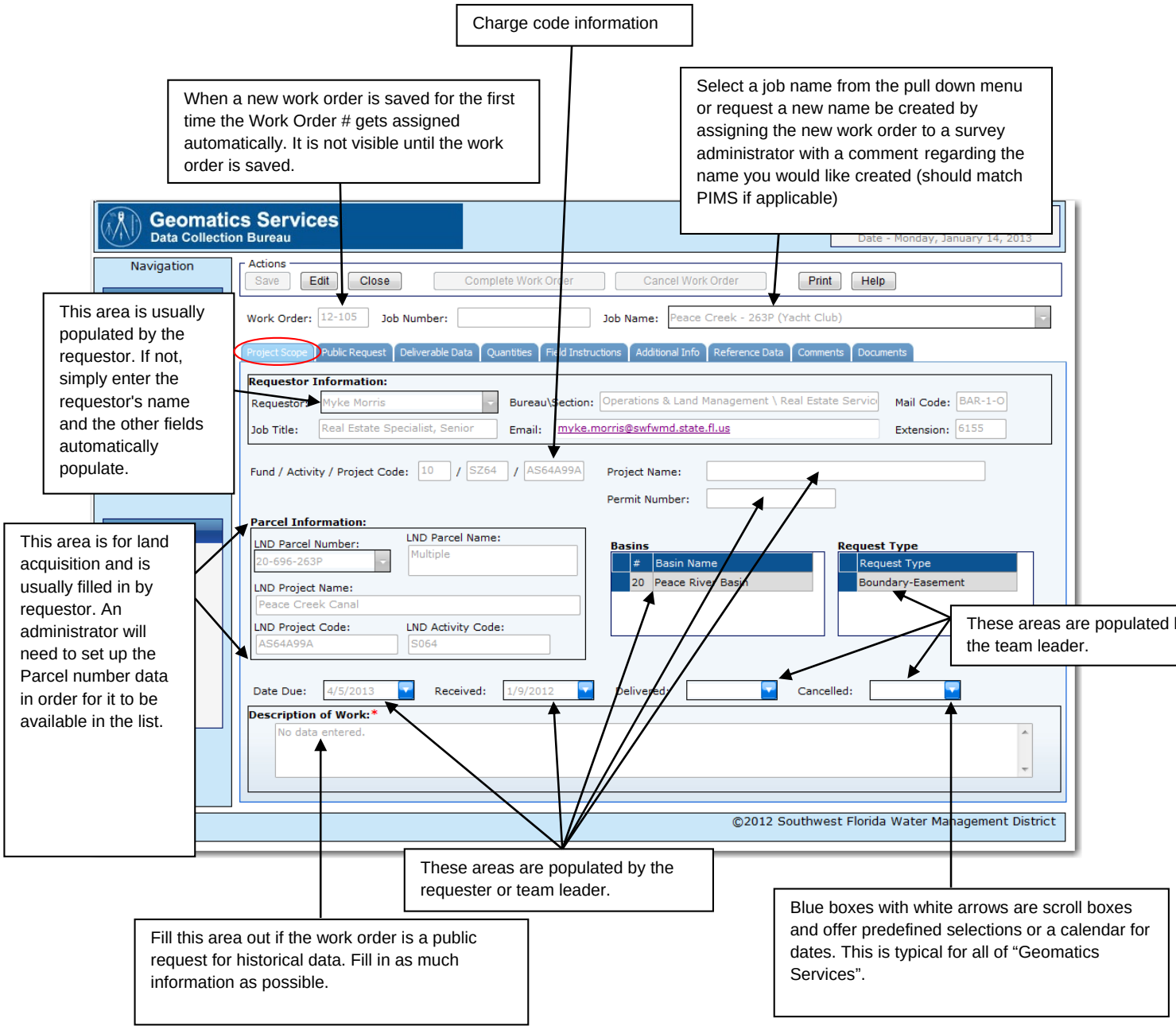
Figure 9

The Admin section of the Home Screen is only used by authorized individuals to add new Members, Job Names, Parcel information and other data to the program to make it available during work order entry.

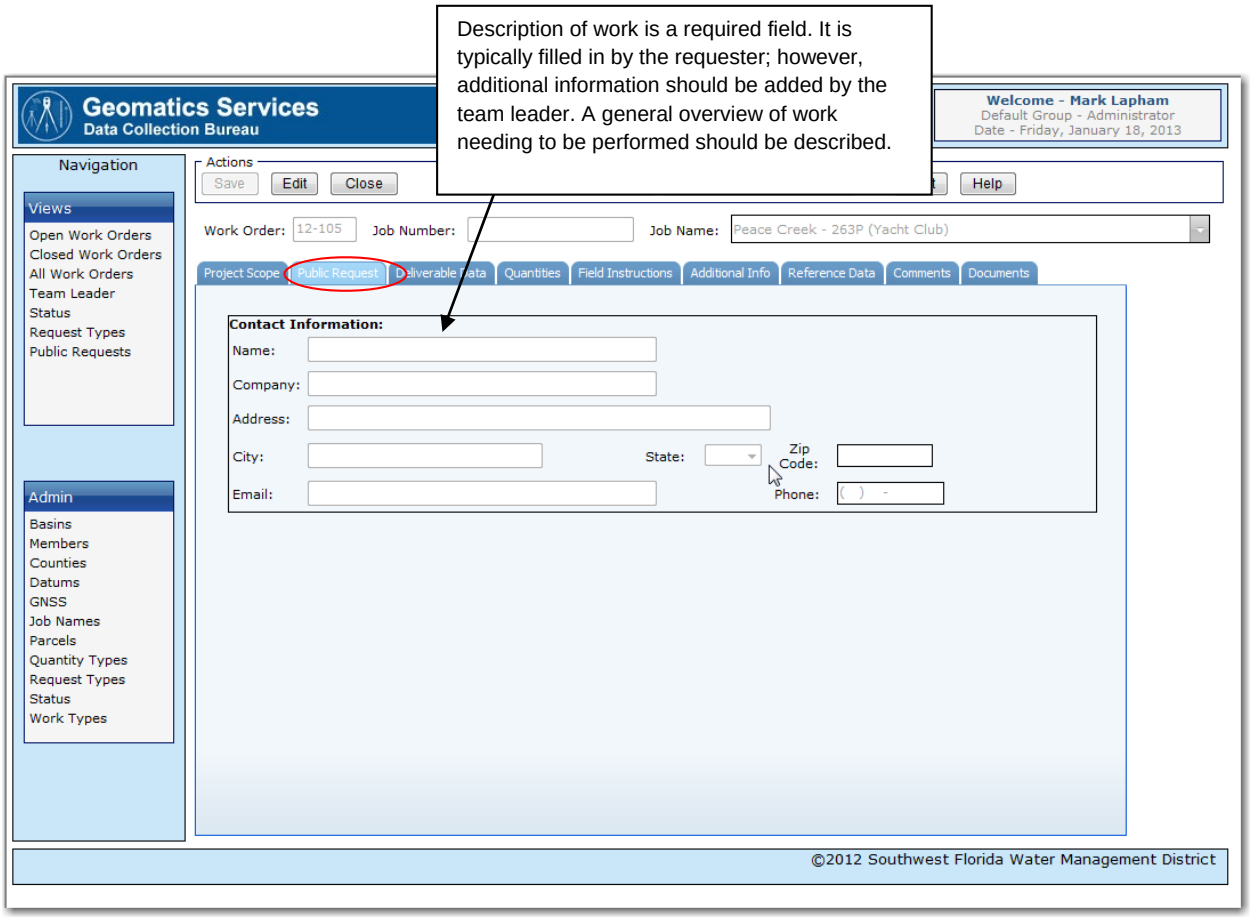
Work Order

The following will illustrate the different tabs and functions within any given work order in "Geomatics Services"

Project Scope Tab



Public Request Tab



Deliverable Data Tab

(A) = Administration status

(F) = Field status

(O) = Office status

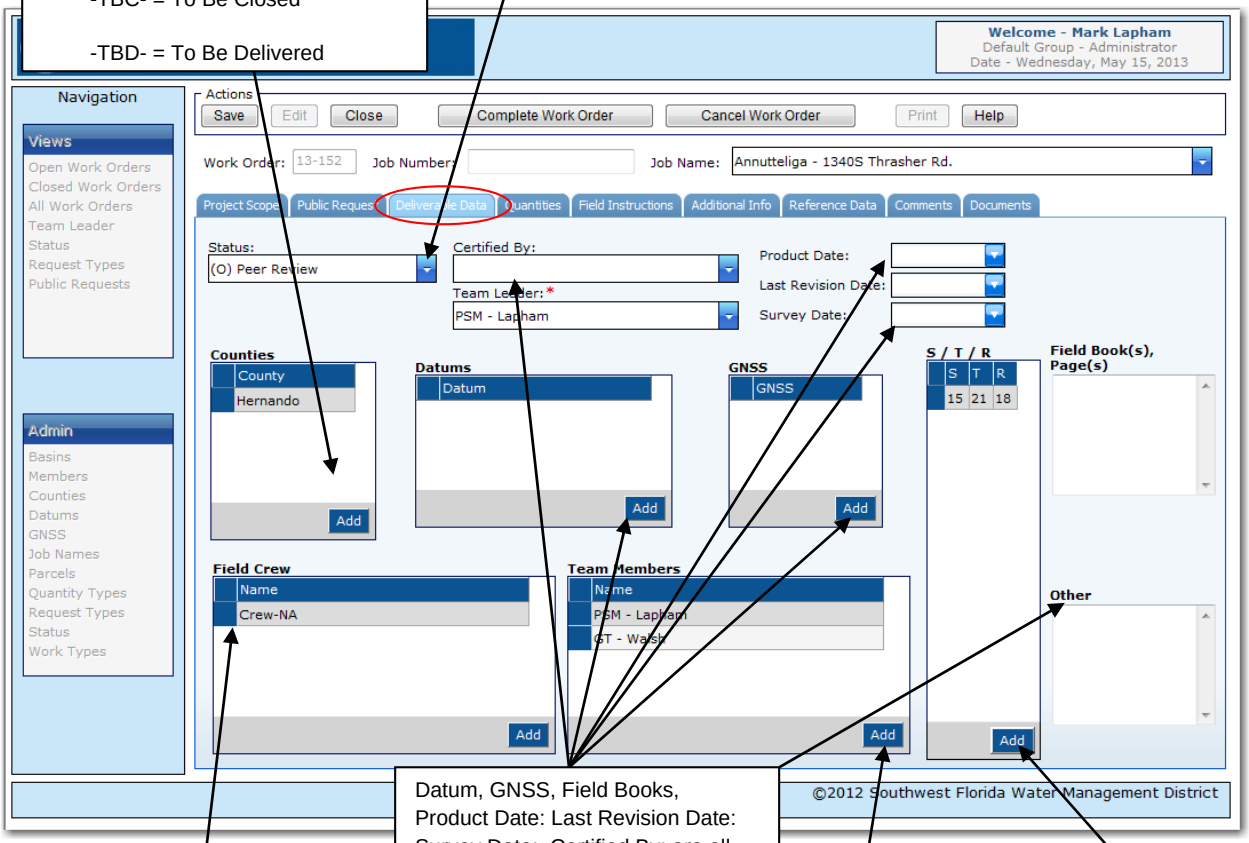
-X- = to be used when sending to supervisor for an action:

-TBA- = To Be Archived

-TBC- = To Be Closed

-TBD- = To Be Delivered

Scroll through and select a status that best describes the work order's current status. If you are not working on a work order its status should be set to a “Pending” type.



Counties: these should be selected and entered when the work order is first created. Select all that apply.

Datum, GNSS, Field Books, Product Date: Last Revision Date: Survey Date:, Certified By: are all filled out prior to peer review. Scroll down and select all that apply.

Field Books: will use the following format: book no./pages (i.e. 19-200/15-35). This does not apply to outsourced vendor field books, simply type ”vendor” if that is the case.

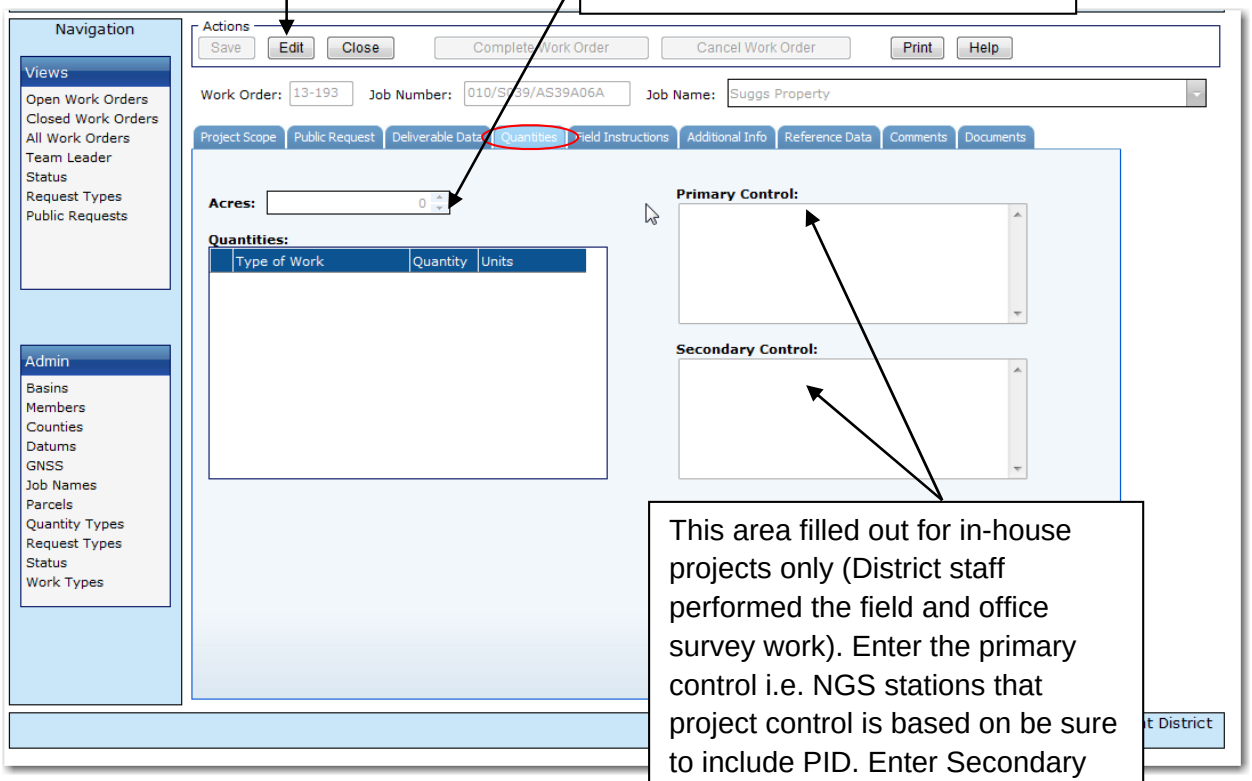
Section Township and Range should be filled out when work order is first created and double checked prior to peer review. Select all that apply.

Team Members: be sure to add your name here when a work order is assigned to you. This is important to keep track of the work orders you have worked on at review time.

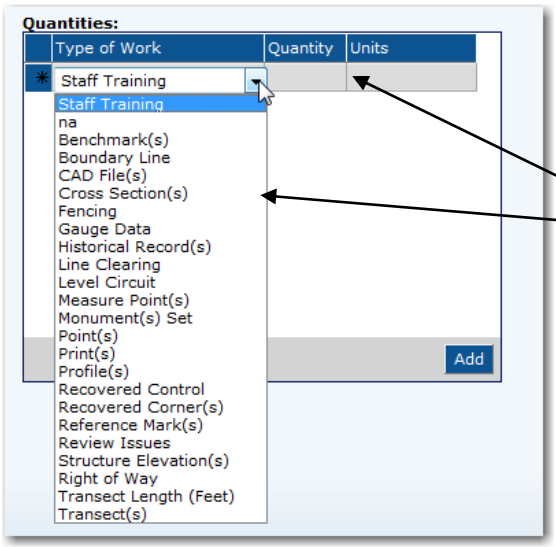
Quantities Tab

Once edit is selected one can populate the following fields with the appropriate data

Acres: enter known acreage total for boundaries of acquired/surplused lands easements etc.



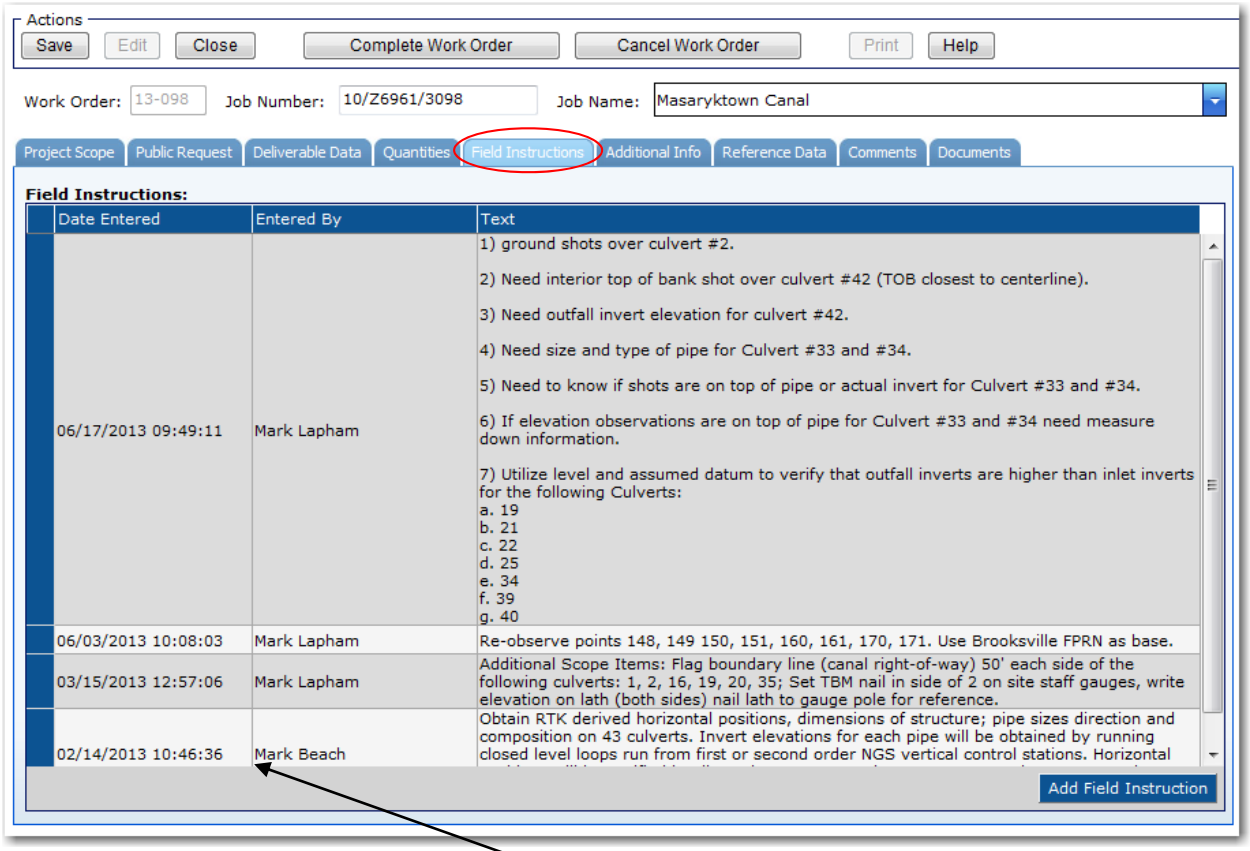
This area filled out for in-house projects only (District staff performed the field and office survey work). Enter the primary control i.e. NGS stations that project control is based on be sure to include PID. Enter Secondary control i.e. local municipality, county control stations.

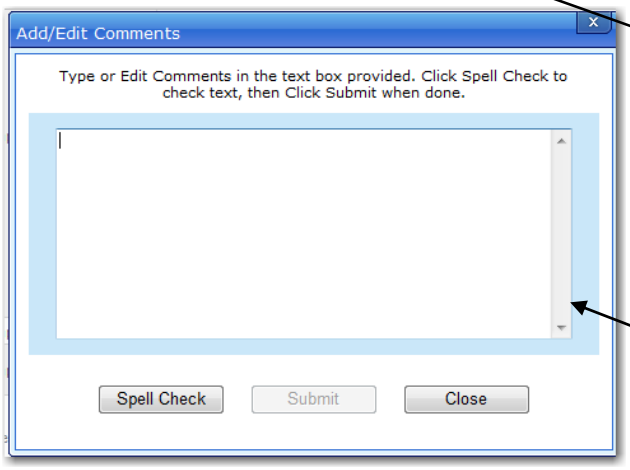


Select the appropriate quantities item and input a number for quantity or units which ever applies.

Field Instructions Tab

Select edit and then select “Add Field Instructions” button, this will bring up a text editor box, field instructions should be a detailed outline of the survey field items needed. This area will be filled in by the project surveyor. Instructions should be clear and concise.

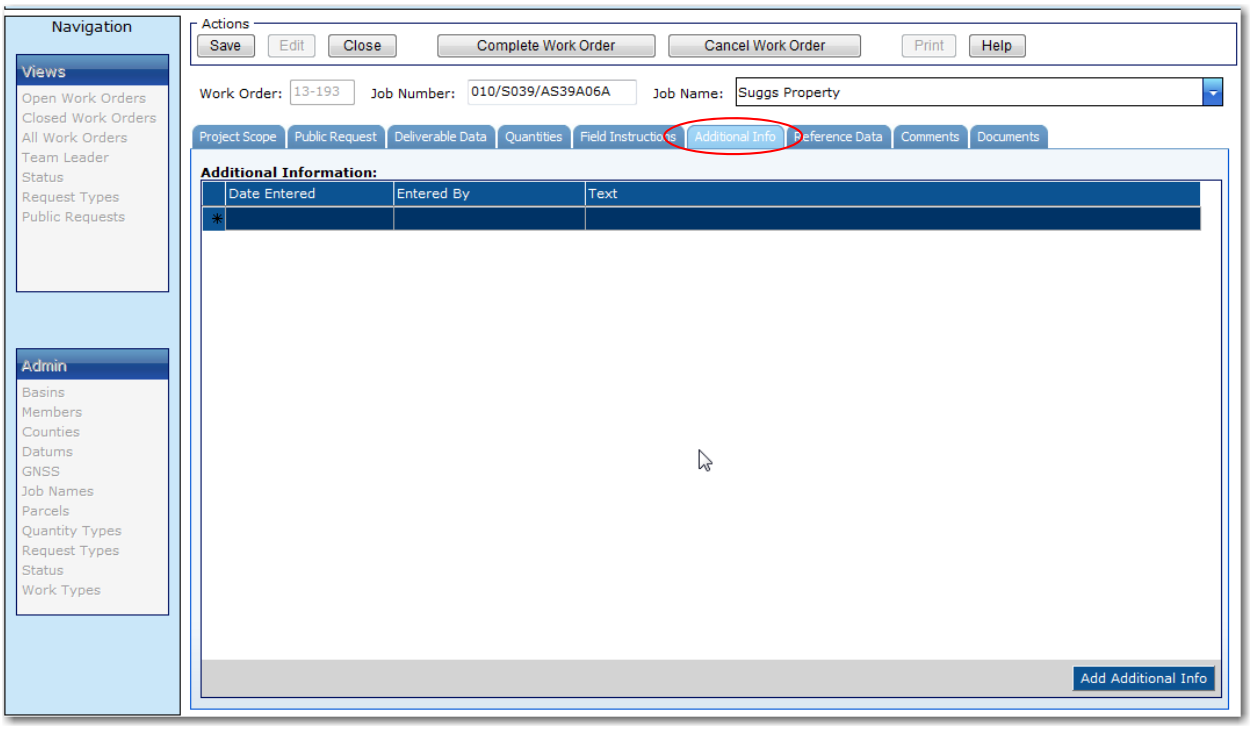




Once the work order is saved geomatics will date stamp the entry and the author’s name will appear as seen above.

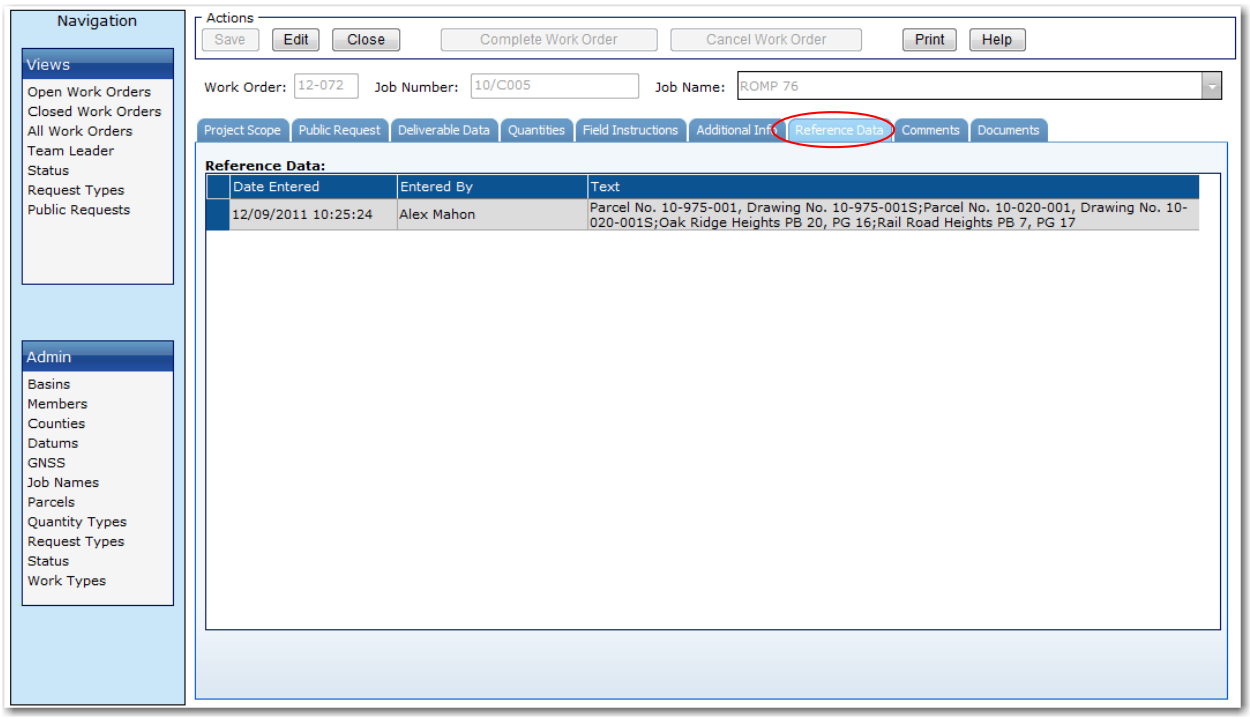
This is the text box for entering field instructions.

Additional Info Tab



The “Additional Info” tab works similar to the “Field Instructions” tab, once edit is selected a text box appears, the user can then add additional information about the project that does not fit other tabs or formats, such as purchase order number for outsourced projects.

Reference Data Tab



The reference data tab works similar to the previous two tabs in that once you select “Edit” the user can enter the reference data into a text box. For reports, maps etc. found in other work orders simply state “see work order XX-XXX” for previous survey etc. For surveys found in SDI the user would enter the data as follows:

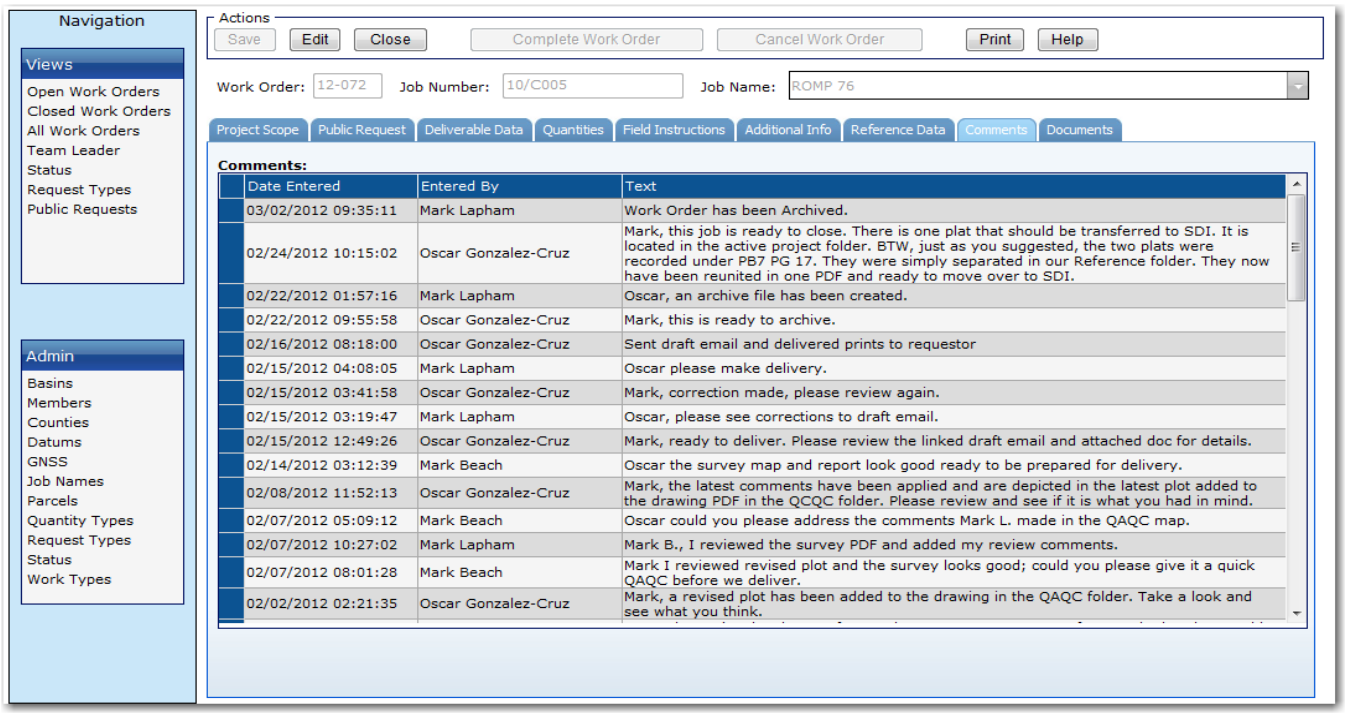
Parcel/Drawing No. XX-XXX-XXX (XXXXXX.dwg or no CAD file); or

Parcel No. XX-XXX-XXX, Drawing No. XX-XXX-XXX (XXXXX.dwg or no CAD file);
If it’s not a boundary survey of a parcel, use title description:

Title description Drawing No. XX-XXX-XXX (XXXXXX.dwg or no CAD file);

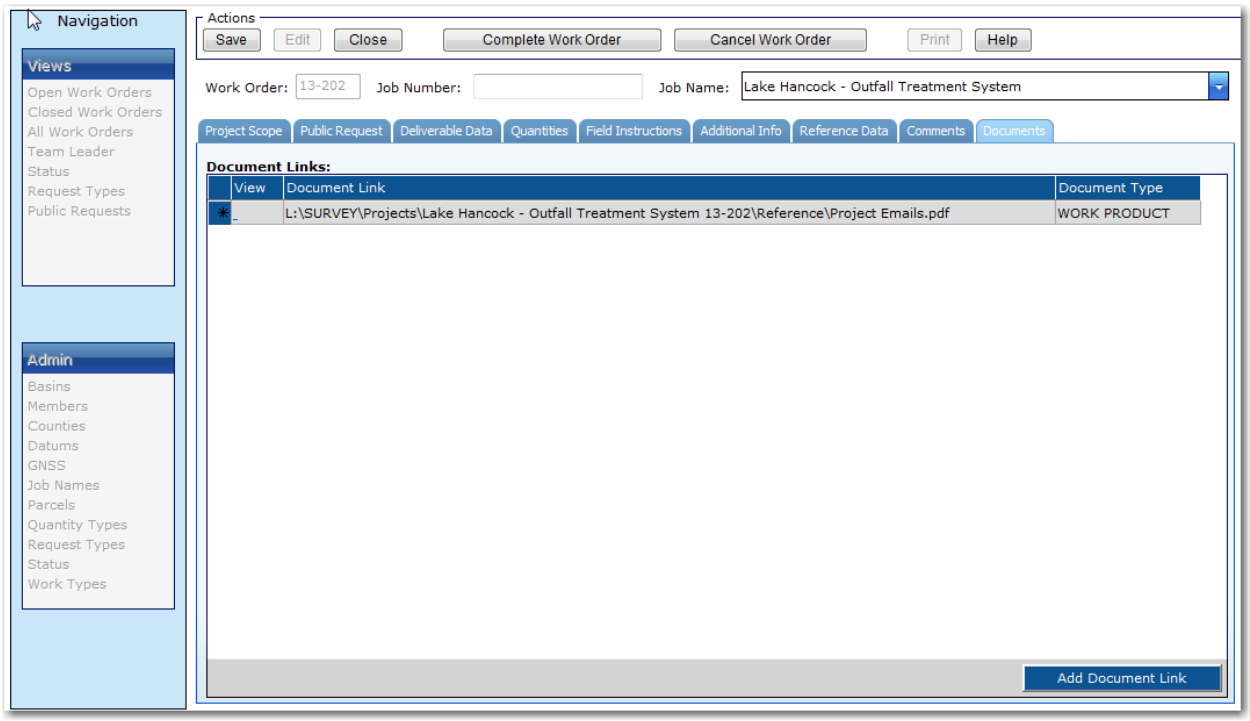
*If there are multiple entries, use a semicolon at the end of each entry.

Comments Tab

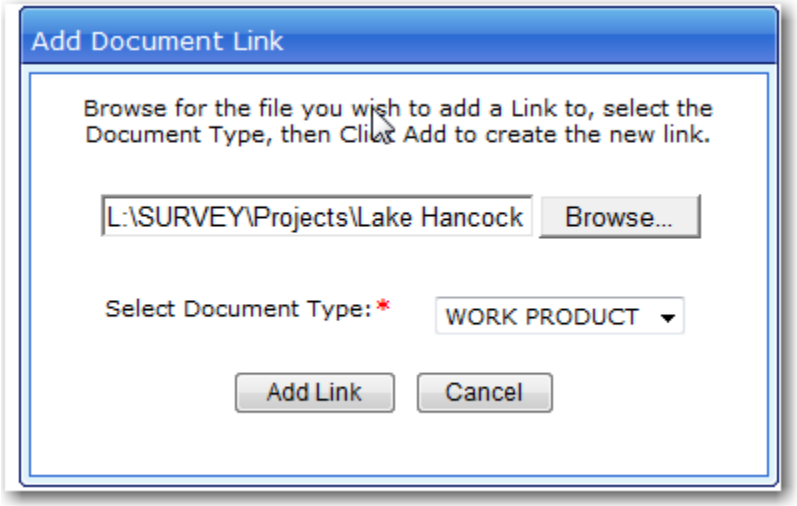


As with the previous three tabs the comments tab works once the “Edit” button is selected, the text editor is used to enter daily/weekly comments regarding the projects progress and important information/changes that may have occurred in scope, conversations had with requester, consultant etc and task instructions for office staff.

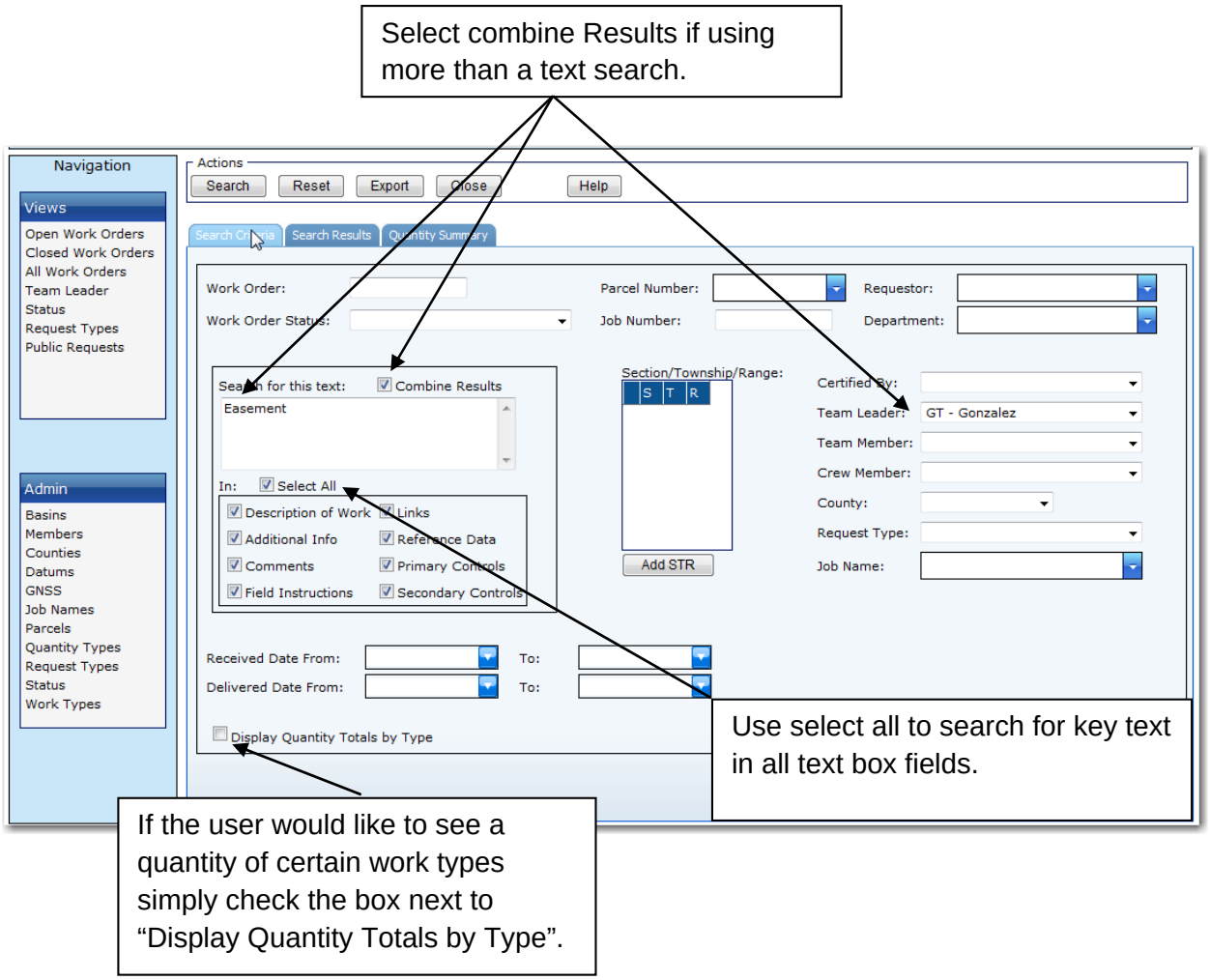
Documents Tab



The documents tab allows for linking of project files that are important to a project, Project Email should always be linked first, also commonly linked are title commitments, PDF files, Word Documents, anything that needs to be reviewed should be linked here, at archive certain files are linked back in (see STG in the Reference folder for archival linking instructions). Again in “edit mode” the user then selects “Add Document Link” which will open the window below, simply browse to the files location and select “Add Link”.

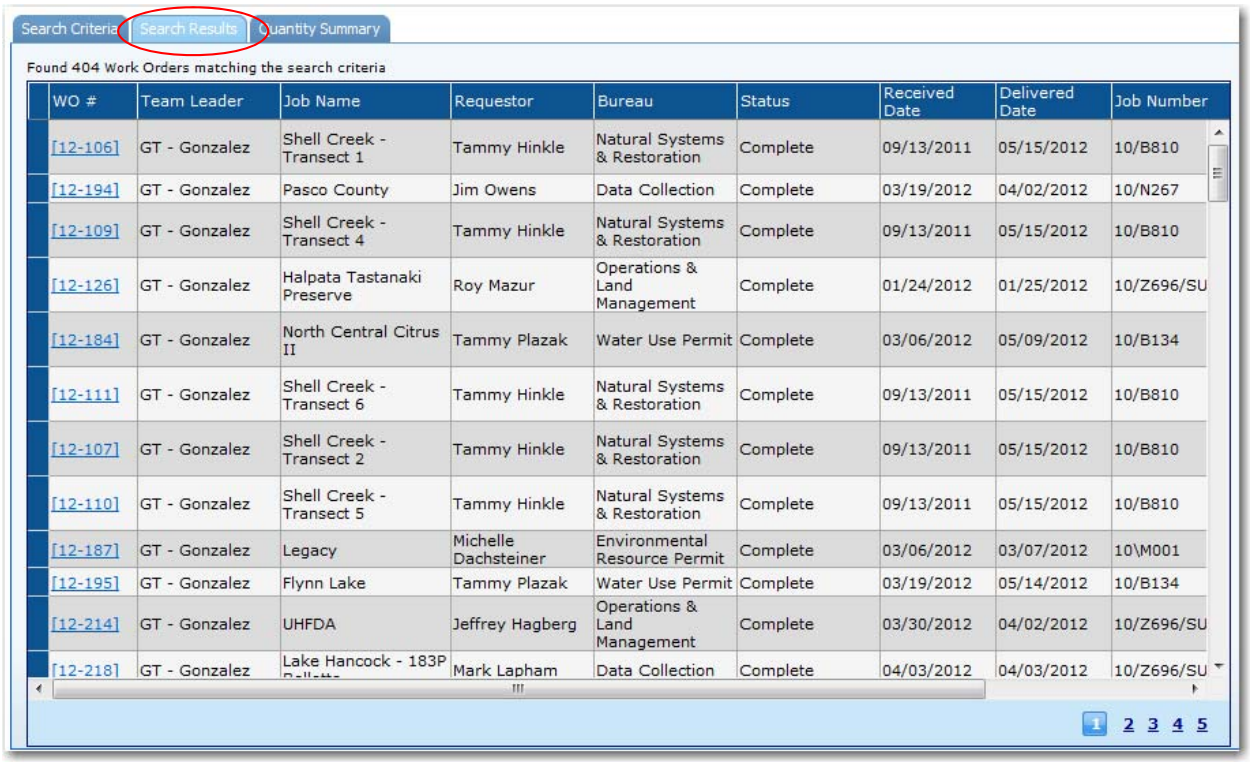


Search Function



The search function is very intuitive, as you can see there are many search options. Most are self explanatory and will not be covered here. If a user knows a little or a lot about a project he or she wants to find, simply fill in as much information as you know, this will narrow the search results. The user may only know a little bit about what he or she is looking for so the “search for this text:” is a good option, if you use this feature and have also entered an item or items in other fields i.e. “Team Leader” etc. be sure to select “Combine Results” otherwise the return results will be zero.

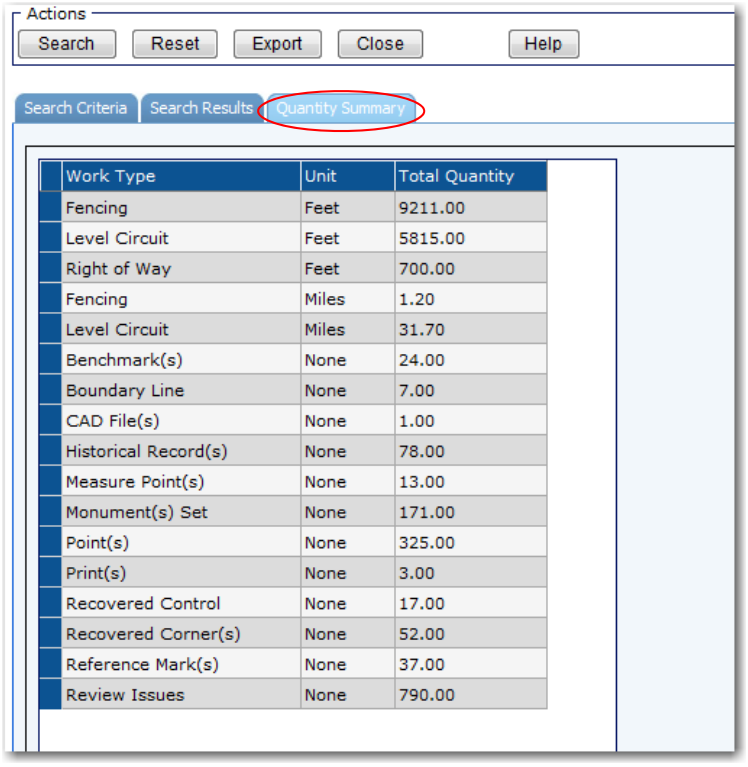
Below are the results for the search criteria entered above:



WO #	Team Leader	Job Name	Requestor	Bureau	Status	Received Date	Delivered Date	Job Number
[12-106]	GT - Gonzalez	Shell Creek - Transect 1	Tammy Hinkle	Natural Systems & Restoration	Complete	09/13/2011	05/15/2012	10/B810
[12-194]	GT - Gonzalez	Pasco County	Jim Owens	Data Collection	Complete	03/19/2012	04/02/2012	10/N267
[12-109]	GT - Gonzalez	Shell Creek - Transect 4	Tammy Hinkle	Natural Systems & Restoration	Complete	09/13/2011	05/15/2012	10/B810
[12-126]	GT - Gonzalez	Halpata Tastanaki Preserve	Roy Mazur	Operations & Land Management	Complete	01/24/2012	01/25/2012	10/Z696/SU
[12-184]	GT - Gonzalez	North Central Citrus II	Tammy Plazak	Water Use Permit	Complete	03/06/2012	05/09/2012	10/B134
[12-111]	GT - Gonzalez	Shell Creek - Transect 6	Tammy Hinkle	Natural Systems & Restoration	Complete	09/13/2011	05/15/2012	10/B810
[12-107]	GT - Gonzalez	Shell Creek - Transect 2	Tammy Hinkle	Natural Systems & Restoration	Complete	09/13/2011	05/15/2012	10/B810
[12-110]	GT - Gonzalez	Shell Creek - Transect 5	Tammy Hinkle	Natural Systems & Restoration	Complete	09/13/2011	05/15/2012	10/B810
[12-187]	GT - Gonzalez	Legacy	Michelle Dachsteiner	Environmental Resource Permit	Complete	03/06/2012	03/07/2012	10\M001
[12-195]	GT - Gonzalez	Flynn Lake	Tammy Plazak	Water Use Permit	Complete	03/19/2012	05/14/2012	10/B134
[12-214]	GT - Gonzalez	UHFDA	Jeffrey Hagberg	Operations & Land Management	Complete	03/30/2012	04/02/2012	10/Z696/SU
[12-218]	GT - Gonzalez	Lake Hancock - 183P	Mark Lapham	Data Collection	Complete	04/03/2012	04/03/2012	10/Z696/SU

1 2 3 4 5

Below are the results for the quantity summary:



Work Type	Unit	Total Quantity
Fencing	Feet	9211.00
Level Circuit	Feet	5815.00
Right of Way	Feet	700.00
Fencing	Miles	1.20
Level Circuit	Miles	31.70
Benchmark(s)	None	24.00
Boundary Line	None	7.00
CAD File(s)	None	1.00
Historical Record(s)	None	78.00
Measure Point(s)	None	13.00
Monument(s) Set	None	171.00
Point(s)	None	325.00
Print(s)	None	3.00
Recovered Control	None	17.00
Recovered Corner(s)	None	52.00
Reference Mark(s)	None	37.00
Review Issues	None	790.00