ForeSight DXM

User's Manual

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TRADEMARKS

Contents

Introduction

Welcome to ForeSight DXM

Congratulations on your decision to purchase a Tripod Data Systems product. TDS is serious about providing the best possible products to our customers and know that you are serious about your tools. We are proud to welcome you to the TDS family.

The TDS ForeSight DXM team is continually improving and updating ForeSight DXM. Please take a few minutes to register your copy so that you will be eligible for upgrades. You can do this either by completing and returning the product registration card or by visiting our Website (www.tdsway.com).

Overview

The ForeSight DXM User's Manual is a general reference and tutorial. Each section covers a specific topic or task using specific project files. The tasks do not necessarily build on each other so you can start wherever you like in the manual. However, the Navigating the Program Section should be read first to get a general understanding of the interface.

Scope

This manual covers the use of the ForeSight DXM program. A basic understanding of personal computers and Windows is assumed.

This manual assumes that you have a working knowledge of basic surveying tasks and terminology. In cases where terminology describes multiple concepts, we provide specific definitions of ForeSight DXM's capabilities to insure that you will understand exactly what the program is doing.

Conventions used in this Manual

- The program ForeSight DXM will be referred to as simply “ForeSight DXM” throughout the manual.
- Text, which you need to look for on the screen, such as menu-bar titles, panel titles and button labels, is typed in ***bold italic***. For example “Select the ***View*** menu to...” means that you select the ***View*** pull-down menu from the menu bar.
- We use “command shorthand” for some sequences of actions where you must perform a series of clicks with the mouse. For example, “Select ***Map*** | ***Add / Edit Polyline...*** | ***Edit Existing*** means to click on the ***Map*** pull-down menu; select the ***Add / Edit Polyline*** option then click the ***Edit Existing*** button from within the Add/Edit Polyline dialog box.

System Requirements

Component	Minimum	Recommended
Display	800x600 with 256 colors	1024x768 with 256 colors
CPU	Pentium	Pentium 200 or higher
RAM	Dependent on OS	256 megabytes or more
Free Disk Space	100 megabytes	200 megabytes or more
CD-ROM	Required for installation	Required for installation
Parallel or USB Port	Required for key	Required for key
OS (see note below)	Windows 98, ME or NT	Windows 2000 or XP

Windows (all versions): Installation of Microsoft Internet Explorer or later.

Windows NT 4.0: Installation of Service Pack 6 or later.

Installing ForeSight DXM

Installing ForeSight DXM is a simple procedure that can be done by following the instructions in the Installation dialog boxes. To get the installation program running, follow the steps below.

1. Insert the TDS Survey Works CD into your CD-ROM drive.
2. If your computer's auto-run capability is turned on the installation process will automatically start. Follow the instructions on the screen to install ForeSight DXM.
3. If your computer's auto-run capability is disabled, you will need to launch the installation program manually.
    a. From Windows, select the ***Start*** menu, then ***Settings*** and then ***Control Panel***. In the ***Control Panel***, select ***Add/Remove Programs***.
    b. The ***Add/Remove Programs*** wizard will open. Select ***Install New Program*** at the top of the dialog box. Follow the instructions on the screen.
    c. The ***Add/Remove Programs*** wizard will search your floppy drives and then your CD-ROM drive. It will select `Setup.exe` from your CD-ROM drive. Click on the ***Finish*** button.
4. Follow the instructions on the screen.
5. In addition, you will need to install the hardware lock driver. This is a separate installation from the software. Without the driver, ForeSight DXM will run in demo mode or present you with a message saying your demo time has expired. The hardware lock driver is available on your TDS Survey Works CD, as well as the TDS website. Go to www.tdsway.com for the latest driver.

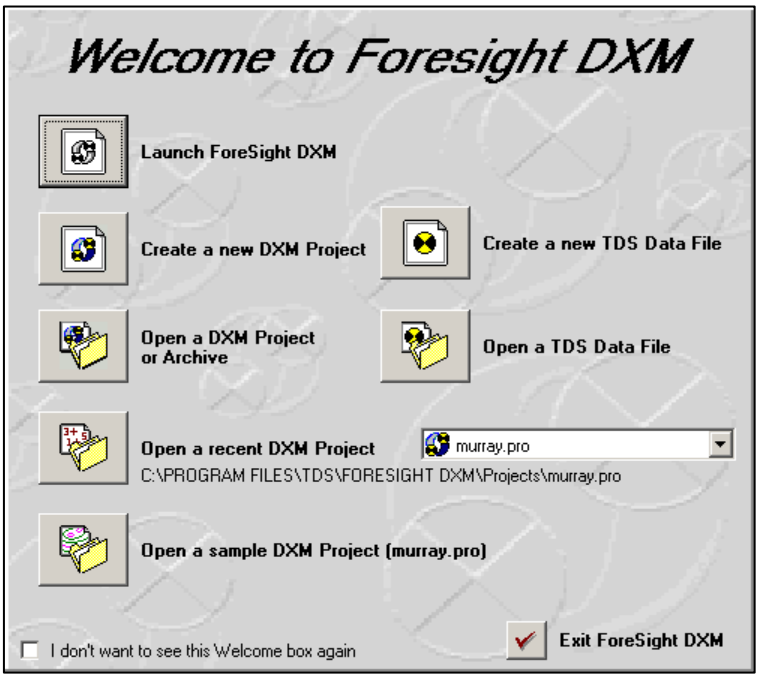
Navigating the Program

Overview

This section is intended to give you a basic understanding of the layout and interface conventions used in ForeSight DXM. This section should be read and understood prior to trying to work any of the examples provided in the manual.

To see the portions of the program that are discussed in this section, you must first open or create a project. We suggest that you open the `murray.pro` file in the ForeSight DXM Projects directory. See the information on the ***Welcome to ForeSight DXM*** dialog box below for an easy method of opening the `murray.pro` project file.

Running the Program



To launch ForeSight DXM, select ***Start*** | ***Programs*** | ***TDS Survey Works*** | ***ForeSight DXM***.

When ForeSight DXM is first started, the ***Welcome to ForeSight DXM*** dialog box will open where you are provided with options of creating a new project or opening an existing project of different types.

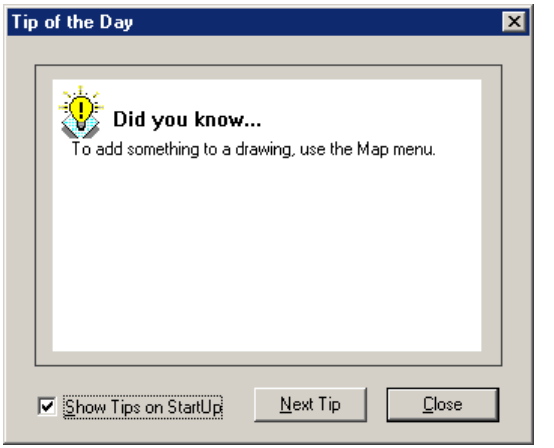
The checkbox at the bottom can be used to disable the ***Welcome Box***. ForeSight DXM will then start with no project initially loaded.

You can re-enable the welcome box after it is disabled by selecting ***File*** |

Welcome Box...

Note: ForeSight DXM is optimized for 1024 x 768 and higher screen resolutions. It will run in 800x600 resolution but you may need to turn some dialogs and tool bars off in order to make room for the features that you actually need.

After creating a new project or opening an existing project, the Tip of the Day dialog will open containing a different tip each time the program loads. Un-checking the ***Show Tips on StartUp*** checkbox will keep this from loading again. To access the Tip of the Day after it has been disabled, select ***Help*** | ***Tip of the Day...***



Projects and the Project Navigator

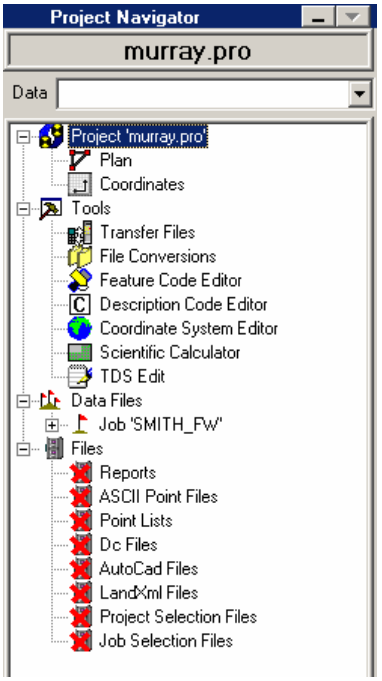
The native file format used in ForeSight DXM is called a project file (*.PRO). A project file is the only file format that can contain all of the data that ForeSight DXM is capable of creating. The project file also stores general information about the files that are linked to the project. For example, you can open a CAD file and merge the data into the project file. If you need to take some of this data to the field for staking, you can create a data collector file using some of the data in the project and link the data collector file to the project. (See *Linking, Importing, and Merging Data* on Page 10.) That data collector file can then be sent to the data collector using ForeSight DXM's transfer utility. ForeSight DXM can also edit data collector files by themselves – without a project, but the features and capabilities for editing these files differ from those used with project files.

Using the project in conjunction with linked data collector files is an excellent way to organize and manage projects. Data from multiple data collector files can be moved into the project file and then exported to CAD or used to provide final reports and

results for the project. Alternatively, CAD files can be imported, edited and prepared to move into a smaller and more easily worked-with form for use on a data collector.

All the data for a project must be stored in the same folder on your computer. (See *File Management* on Page 25.) This insures that links are maintained and that the full functionality of the project is available. Any data collector file that is linked to the project will be moved or copied to the project folder. There is a lot of flexibility designed into how ForeSight DXM is used so that each individual can design a system of file management that suites their needs.

The Project Navigator



Once a project is opened you will see the ***Project Navigator*** on the left side of the screen. The ***Project Navigator*** can be used to select the different views and files associated with the project. By clicking on any of the icons in the ***Project Navigator*** you can change to different views or edit different files.

The ***Tools*** area provides quick access to the file transfer, file conversion and feature editing utilities.

Any files associated with the project can be selected in the ***Files*** area of the ***Project Navigator***.

Almost all the dialog boxes that ForeSight DXM uses will appear over the ***Project Navigator***. This means that you will never have to move a dialog box to click on an object in your drawing. You can hide the ***Project Navigator*** by clicking the button on the ***Project Navigator's*** title bar. To make it return, pull down the ***View*** menu and click ***Project Navigator***.

When there are no dialog boxes open, your drawing will fill the window if the ***Project Navigator*** is turned off. Try double clicking on each item described below.

Note: A red X through an icon indicates that there are currently no files of that type associated with the project. When a file is created and saved in the project directory, the red X disappears.

Plan
The ***Plan View*** is where you will do the majority of your work. It is where the map is displayed and where most of the drawing, COGO and adjustments are done. The ***Plan View*** displays data using northing and easting values.

Coordinates
This allows access to the Coordinate Editor.

Transfer Files
Opens the Transfer Settings dialog where the transfer settings can be configured, followed by a Transfer dialog where file transfers between a PC and data collector can take place.

File Conversions
Opens the File Conversions dialog box where a variety of file types can be converted to another format.

Feature Code Editor
Opens the Feature Code Editor where a feature code file can be edited or created.

Coordinate System Editor
Opens the Coordinate System Editor where coordinate system database files can be edited or created.

Scientific Calculator
Opens the Scientific Calculator where various calculations can be made.

TDSEdit
Opens TDSEdit, a basic word processor that can be used to generate a document from within ForeSight DXM.

Data Files
Any data files opened while the current project is open are linked to the current project and listed here. Part or all of the data from any of the data files can be merged into the current project.

Files

Any files opened or created while the current project is open, can be viewed from this area. You can also change views by clicking the various tabs along the bottom of the project window.

Reports

Any report files created or opened while the current project is open are linked to the current project and listed here.

ASCII Point Files

Any ASCII point files created while the current project is open are linked to the current project and listed here.

Point Lists

Any report files created while the current project is open are linked to the current project and listed here.

DC Files

Any DC files created while the current project is open are linked to the current project and listed here.

AutoCAD Files

Any AutoCAD files created while the current project is open are linked to the current project and listed here.

LandXML Files

Any LandXML files created while the current project is open are linked to the current project and listed here.

Project Selection Files

Any project selection files saved while the current project is open are linked to the current project or job and listed here.

Job Selection Files

Any job selection files saved while the current project is open are linked to the current project or job and listed here.

Creating Projects

If ForeSight DXM is started without opening an existing project, a blank project will automatically be created where you can then link or import data from other sources. You can also create a new project by selecting ***File*** | ***New Project...***

Although a Project file is the only type of file that supports all the data that ForeSight DXM is capable of creating, you are not required to initially open or work with a ForeSight DXM project – you can also open other TDS data files in their native format and edit them. The main difference is the type of data file that is open limits the editing capability of ForeSight DXM and the type of data that can be saved in the data file. (See *Working With Data Files* on Page 24.)

Linking, Importing, and Merging Data

When data is linked to a project, the linked data appears as if it is part of the current project, but it is not actually stored in the project database. The link to the file is saved so the next time you open the project, that file will still be linked and ready for use with the project, but the data inside the linked file is not part of the project. If the linked file is later unlinked, it is closed and all of the data it contained is not available from the project.

You can make all or part of the data in a linked file part of the current project by merging the data. When linked data is merged to a project, that data becomes part of the project.

When you want to merge data from a linked file into the project, you can select to merge all or just part of the data.

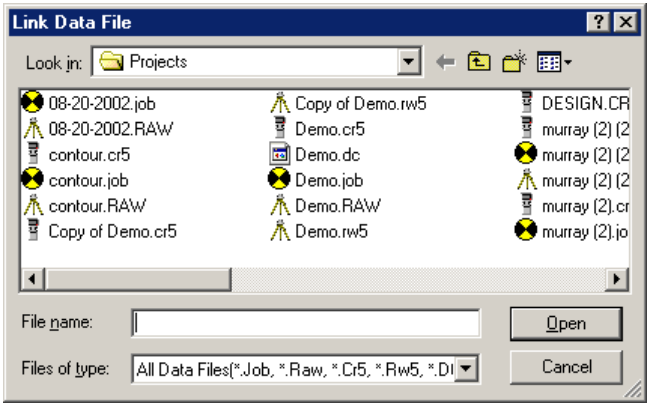
To unlink a job, expand the ***Jobs*** icon from the ***Project Navigator***, right-click on the job to unlink, and select ***Unlink From Project***.

To merge linked data to the current project, select ***Job*** | ***Manage Data*** or right-click on the linked file in the ***Data Files*** section of the ***Project Navigator*** and select ***Manage Data***. Select the data you want to merge from the ***Job*** view and click [***Finish***].

Importing data into the current project is similar to merging data from a linked file in that the imported data becomes part of the project. The only difference is the imported data was not first linked to the project.

Linking Data Files

Data from a TDS *.JOB, *.CR5, *.RW5, or *.RAW file, as well as a Trimble *.DC and Nikon *.Nik and *Nrd files can be linked to a project.



Select ***File*** | ***Link TDS Data File...***. to open the ***Link Data File*** dialog box.

Navigate to the folder where the desired file is stored and double-click on it.

Depending on the type of file being opened, the ***Distance Unit*** dialog box may open where you must specify the distance units that were used in the file being opened.

Once the distance units are selected for a data file, they will not have to be selected again if the same data file is re-opened later.

If the file is a raw data type, then the raw data will be reduced and points produced. The ***Raw Data Regeneration Options*** dialog box will open first to allow changes to the settings if necessary.

Note: Files that are linked are actually copied from their original folder into the Project folder.

Note: DC files are not linked. Instead a job file is generated that is linked. However, the DC file will not be displayed in the job file list but under the DC file list.

Import Control Points

Job | Import Control Points

Control points are a set of known points that are stored in a separate file, but are used in multiple jobs, which are in the same area. You can import control points from another .Job, .Cr5, or .Nik file. To import a set of control points, select ***Import Control Points*** from the ***Job*** menu. Locate and select the file from which you would like to import the points. Click on the [***Open***] button. DXM uses a CONTROL layer to specify control points. The Import Control Points function will create, if necessary, a CONTROL layer and import the points to that layer, within the currently active job. The point names must be unique. There is no renaming or overwriting. A small dialog will appear asking you if you want to see a report on the imported points. Click [***Yes***] to generate a report or [***No***] for no report.

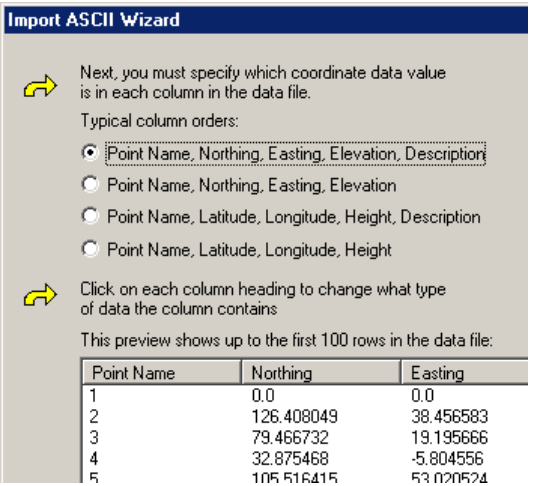
Importing Data

You can import data from an ASCII file, an AutoCAD *.DXF file or a LandXML *.XML file to any TDS file including projects, coordinate files, or job files. The type of data that can be imported depends on the type of TDS data file that is currently open.

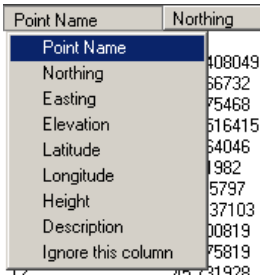
Importing from an ASCII Text File

ASCII files containing coordinate data can be imported into an existing project. Since the format of the data in the ASCII file can vary, the ASCII Import wizard is used to help define the format. The procedure for importing an ASCII file is as follows:

1. Select ***File*** | ***Import*** | ***ASCII (.TXT, etc.)...***
2. Specify how each column in the text file is separated by selecting the appropriate radio button and click [***Next >***]



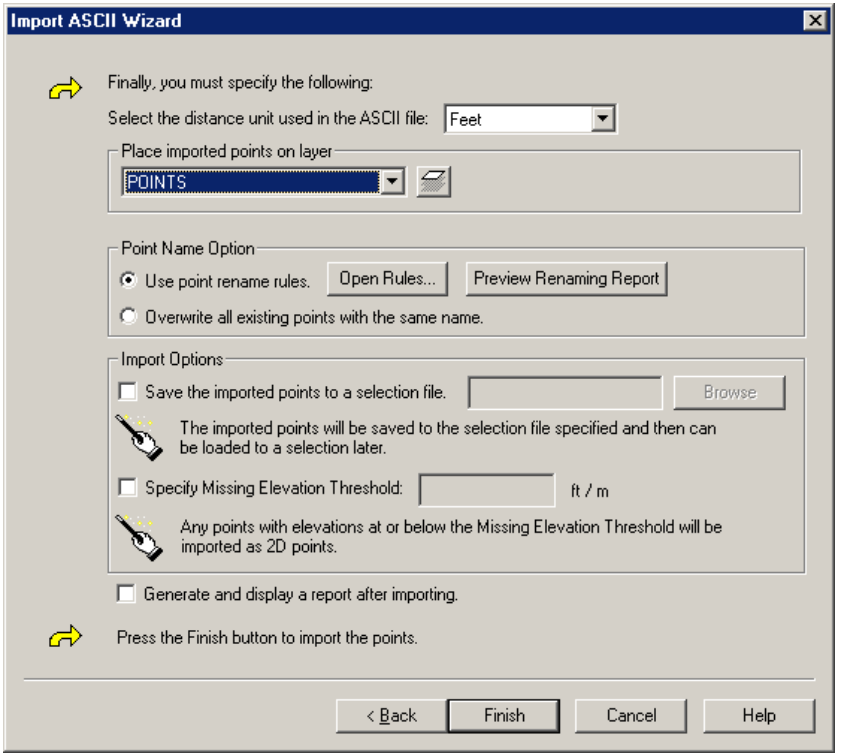
3. Select the order of the columns by clicking the appropriate radio button. You can also define each column independently by clicking on any column heading and selecting the appropriate title. When the dialog box is configured correctly, click [***Next >***].



4. The final dialog gives you various options on how the data will be imported. You can select which layer you want the new data stored to from the ***Place Imported Points on layer*** drop-down list.

   Under the ***Point Name Option***, you can select the ***Use point rename rules*** to use the default rules for any points being imported that have duplicate names to those in the current project. The default rename rules are specified in the ***File*** | ***Preferences*** | ***Rename Rules*** screen, which can be quickly accessed with the [***Open Rules...***] button. If ***Overwrite all existing points with the same name*** is selected, any existing points with duplicate point names will be overwritten with the new imported points.

   If ***Save the imported points to a selection file*** is selected, a list of all the imported points will also be written to the file specified in the corresponding field. This file can then be used to later select the imported points via the Selection Editor (Page 54).



If the ***Specify Missing Elevation Threshold*** option is checked, a minimum elevation must then be specified in the corresponding field. If any imported points have elevations that fall below the elevation specified, they will be imported as 2D points without elevations.

Check the last option, ***Generate and display a report after importing***, if you want to generate a report that lists the details of the import routine.

Click [***Finish***] to complete the ASCII import routine.

Importing AutoCAD DXF or LandXML XML

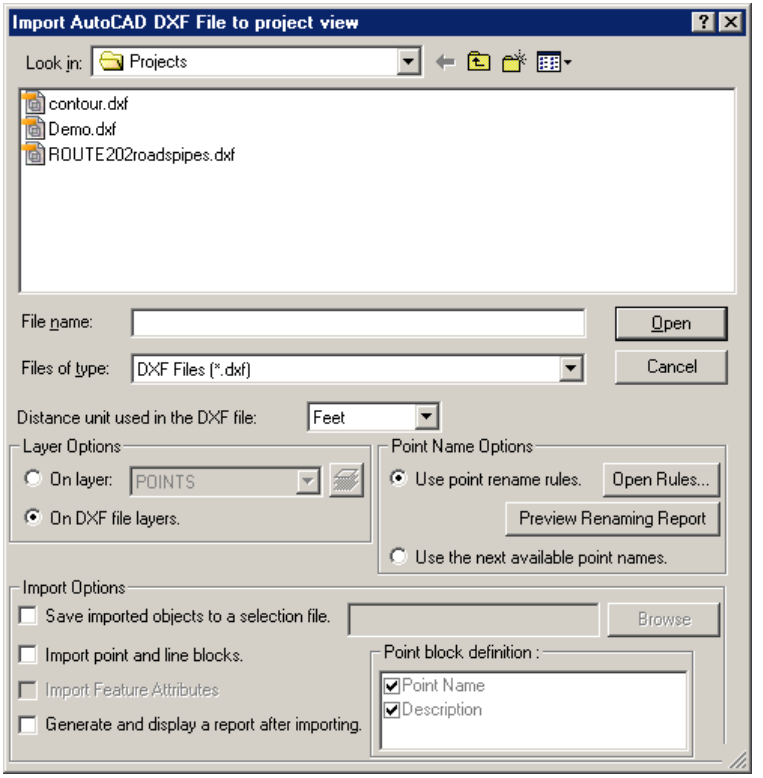
The procedure to import data into an existing project using an AutoCAD *.DXF file or a LandXML *.XML file is nearly identical.

Select ***File*** | ***Import***, select the appropriate file type.

From the ***Look in*** field, navigate to, and select the file.

The Import dialog box will open where you define how the file is to be imported.

Select the distance units used in the DXF file in the ***Distance unit used in the DXF file*** field. (This is not available when opening a *.XML file.)



Layer Options

Selecting the ***On Layer*** radio button will import the data to the selected layer. Selecting the ***On DXF file layers*** radio button will import the data to the same layer names where they are stored in the source file.

In LandXML imports, Group names of <CgPoints>, <Alignments> and <Parcels> will be considered as XML layers. If a group name is not a valid layer name (e.g., it is empty or contains invalid characters), the active layer will be used as the XML layer of the objects in that group.

Point Name Options

ForeSight DXM uses a set of rules to determine how to name points. The [***Open Rules...***] button opens the rules for renaming. These settings are remembered and will be the same for every project you work with on the same computer.

The [***Preview Renaming Report***] button activates a report that details how the new points will be named or if there are any irresolvable conflicts.

Import Options

When the ***Save imported objects to a selection file*** check box is checked, the objects imported will also be written to the specified *.SEL selection file, which can be used later with the Selection Editor (Page 54) to quickly select all the items that were imported.

When ***Import points and line blocks*** is checked, point and lines are imported. This option is a method of transferring point names and feature codes along with DXF points and lines.

In LandXML imports, <Alignment> will be imported as point-based polylines if an imported point can be found at the location of each of its nodes or the node refers to a valid point, and it has no <Spiral> and <IrregularLine>, otherwise it will be imported as an alignment. Point-based polylines will have no vertical curve segments.

In addition, an XML <Parcel> will be imported as a point-based polyline if an imported point can be found at the location of each of its nodes or the node refers to a valid point, otherwise, it will be imported as an alignment. <Spiral> objects used in <Parcel> will be converted to line segments.

Import Feature Attributes is only available when ***Import points and line blocks*** is also checked. When checked, feature attributes will also be imported. If this box, and the box above are unchecked, all data that can be imported will be imported.

In LandXML, <Feature> will be imported as feature attributes if it contains TDS feature attributes.

The ***Generate and display a report after importing*** check box is checked by default. The report will show all the points that were imported.

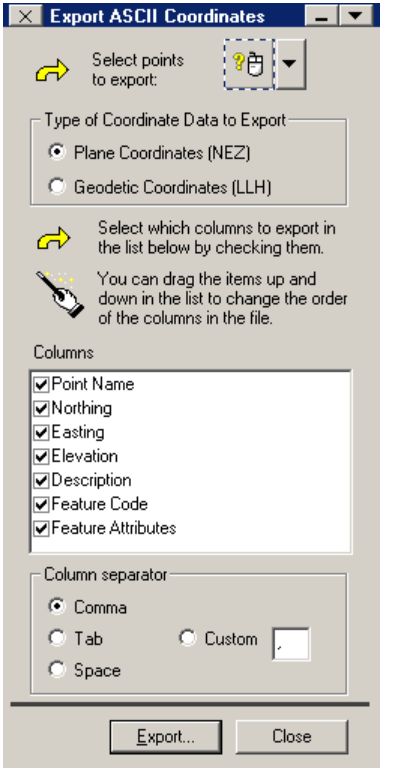
Exporting Data

In the same way that data can be imported, data can also be exported from any open TDS data file, including Projects, Coordinate files, and Job files. The data can be exported to an ASCII text file, a Trimble DC file, an AutoCAD DXF file, or a LandXML XML file.

The exporting procedure is the same no matter what source file you currently have open. The only difference is you might be given options to export data that the source file cannot contain.

The ***New Job*** routine is used to export data from the current job or project to a TDS data file. See *Exporting to a TDS Data* File on Page 22 for more information on exporting to a TDS data file.

Exporting to an ASCII File



1. Select ***File*** | ***Export*** | ***ASCII (.TXT, etc)...*** This will open the ***Export ASCII Coordinates*** dialog box.

2. Click the button and drag a box around the points from the project/map view, or use the button to open a variety of other methods to select the items to export.

3. Select ***Plane Coordinates (NEZ)*** if you are exporting conventional coordinates. Select ***Geodetic Coordinates (LLH)*** if you are exporting geodetic coordinates.

4. In the ***Columns*** section, select the checkboxes for the types of data that you want to export and then drag each data type in the list so that they are listed in the order that you want them written in the ASCII file. Each item in the resulting list will be written to columns in the ASCII file in the same order that they are listed here.

5. In the ***Column separator*** section, select the type of character you want to use to separate each column in the resulting ASCII file.

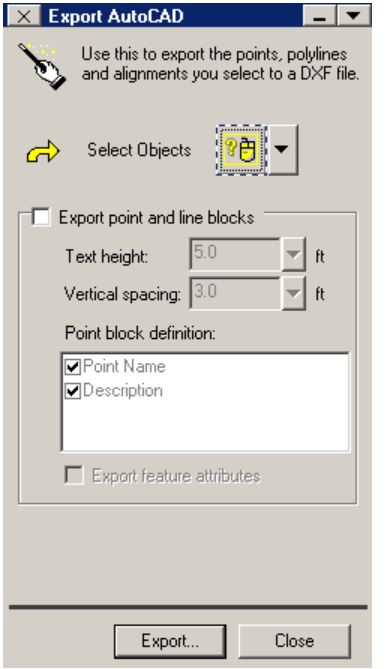
6. Click the [***Export***] button. A dialog box will open asking you for a file name. Enter a name, along with the desired extension, then click [***Save***]. Common extensions are .TXT and .ASC.

Exporting to a Trimble DC File

1. Select ***File*** | ***Export*** | ***Trimble (.DC)...*** This will open the ***Export Trimble DC File*** dialog box.
2. Click the button and drag a box around the points from the project/map view, or use the button to open a variety of other methods to select the items to export.
3. Click the [***Export***] button. A dialog box will open asking you for a file name. Enter a name and click [***Save***].

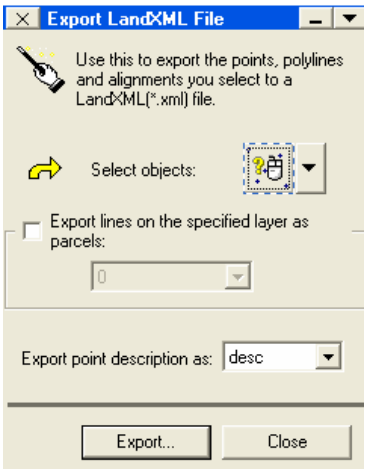
Exporting to an AutoCAD DXF File

1. Select ***File*** | ***Export*** | ***AutoCAD (.DXF)...*** This will open the ***Export AutoCAD*** dialog box.
2. Click the  button and drag a box around the points from the project/map view, or use the  button to open a variety of other methods to select the items to export.
3. Selecting Export point and line blocks is a method of transferring point names, descriptions, and feature codes along with DXF points and lines. Not all AutoCAD applications can work with this information.
4. Click the [***Export***] button. A dialog box will open asking you for a file name. Enter a name and click [***Save***].



Exporting to a LandXML File

1. Select ***File*** | ***Export*** | ***LandXML (.XML)...*** This will open the ***Export LandXML File*** dialog box.



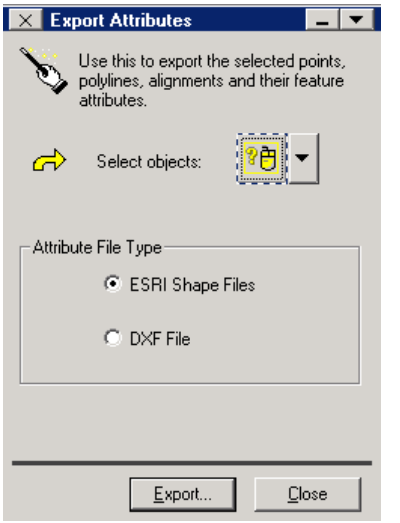
2. Select the desired objects for export by drawing a box around them, or use the drop down arrow to open a variety of other selection methods.
3. Select from the export options for lines and point descriptions.
4. Click the [***Export***] button. A dialog box will open asking you for a file name. Enter a name and click [***Save***].

The following objects will be exported in the manner described.

- Points will be exported as <CgPoint>
- Polylines and alignments will be exported as <Alignment>.
- Objects will be grouped according to their layers. <CgPoints> and <Alignments> will use layer names as their group names.
- Feature attributes will be exported as <TDS_FeatureAttribute> embedded in <Feature>

Exporting Attributes

1. Select ***File*** | ***Export*** | ***Attributes (.DXF, .SHP & .SHX & .DBF)...*** This will open the ***Export Attributes*** dialog box.
2. Click the  button and drag a box around the points from the project/map view, or use the  button to open a variety of other methods to select the items to export.
3. Select the ***Attribute File Type***.
4. Click the [***Export***] button. A dialog box will open asking you for a file name if the file is in the DXF format. If it is an ERSI Shape file, you will only be prompted for a directory location since the naming of Shape files is automatic. Click [***Save***] to continue.



Exporting to a TDS Data File

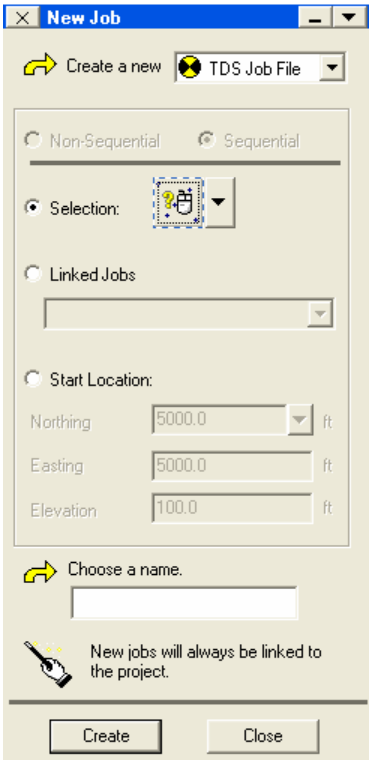
The Export routine described above is *not* used to export to a TDS Data file. Instead, you use the ***New Job*** routine to export data from the currently opened project or job to a new TDS *.JOB or *.CR5 file, or a Nikon *.NIK file. You can also use this routine to create a new data file with a single specified point, where no data is exported from the current project.

The behavior of this routine will differ depending on if you are exporting from another TDS data file such as a *.JOB or*.CR5, or a Nikon *.NIK file, or if you are exporting from a Project file.

You can export all of the data that is compatible with the type of data file you are exporting to from a project, or you can choose to export only some of the data. You can also export all the data from a data file that is linked to the current project.

Once the data from a Project or linked data file is exported to a new data file, that new file is automatically saved and linked to the current project.

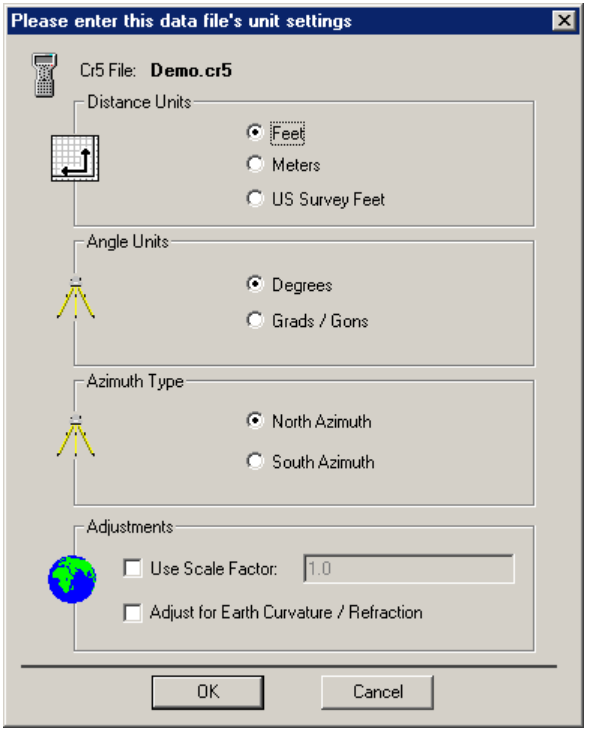
When exporting from a data file that is open in its native format, you can export all or part of the data in the exact same way as when exporting from a Project file, but once the new file is created, the previous data file is closed and the new file becomes the current data file.



1. Select ***File*** | ***New Job*** to open the ***New Job*** dialog box.
2. In the top portion of the dialog, select if you are exporting to a ***TDS Job File, TDS CR5 File,*** or ***Nikon Data File***.
3. If exporting to a CR5 file, select if you want the points to be stored in ***Non-Sequential*** or ***Sequential format*** (the HP48 can only work with sequential files).
4. Select the data to export.
    a. To select data from the current project or data file, select the ***Selection*** radio button and click the  button and drag a box around the points from the project/map view, or use the  button to open a variety of other methods to select the items to export.
    b. To select data from a linked data file, select the ***Linked Jobs*** radio button and select the data file that you want to export from using the corresponding drop-down list.
5. If you do not want to export any data and simply want to create a new TDS data file containing a single starting point, select the ***Start Location*** radio button and specify the coordinates for the point.
6. In the ***Choose a name*** field, enter a valid name for the new file. Keep in mind that the HP48 and all DOS-based data collectors can only work with job names that have no more than 8 alphanumeric characters. The appropriate 3-character extension will be added automatically.
7. Click the [***Create***] button to create the new TDS data file.

Working with Data Files

You can import, link, and merge TDS and Nikon data files into the current project, or you can open a TDS or Nikon data file by itself and view and edit the data in its native format. TDS data files include Coordinate files (*.CR5), Job files (*.JOB), and Raw Data files (*.RW5 and *.RAW). Nikon data files include coordinate files (*.NIK) and raw data files (*.NRD). ForeSight DXM supports both two-dimensional (***2D***) and three-dimensional (***3D***) surveys.



There are some limitations that must be considered when editing and saving a data file.

When you open a particular data file for the first time, you will be prompted to specify the units used in it because this information is not stored within the file. If you open the same data file in the future, you will not be prompted for this information again since the previous selections are saved in the Project file.

Once a data file is opened, a ***Job*** pull-down menu will be available, which contains routines that are specific to the type of file opened.

When working with a CR5 file in its native format, layers and polylines can be created and edited using ForeSight DXM, but this information cannot be saved to the file since a CR5 does not support this type of data. If polylines are added, they can be saved by themselves to a PL5 file using the ***CR5*** | ***Write PL5 from Polyline*** routine.

File Management

When ForeSight DXM opens, one of two things will happen depending on your settings. First the ***Welcome*** dialog box will open giving the option of opening an existing file, or creating a new project.

If the Welcome dialog box option is turned off, ForeSight DXM will open directly and create a new empty project with the name "Untitled". To open an existing project or TDS data file, pull down the ***File*** menu and select either ***Open Project*** or ***Open Job***, or select from the list of recent files opened near the bottom of the menu.

The empty, untitled project can be used for file transfer operations and file conversions. You can also import, link, and merge data from other files. However, it is strongly recommended that you save the project to your desired working folder prior to linking or importing any files since linked and imported files will be moved to the folder where the project is and the current location may not be where you would want the files saved. ForeSight DXM will always copy linked files to the new folder when you save while using the Untitled project or any time you use the ***File*** | ***Save As*** command. However, the data files will also be left in your default project directory and this may add to unnecessary file clutter on your system.

When ForeSight DXM creates a new project, a file with the extension .PRO is created in the default project folder. The default folder will be initially set to ***My Documents***. You can change this default location in ***File*** | ***Preferences...*** | ***System*** | ***Default Directory***. Once changed, all new projects will be saved to this directory.

Data Files

If TDS coordinate, raw data, or control files, or Nikon coordinate or raw files are linked or imported to a project; they will be copied from their source folder to the folder where the project is located. If a file with the same name is already in the project folder, you will be prompted if it is okay to overwrite the existing file. DXF, ASCII, and LandXML files are all handled in the same way.

File Management Tips

There are several ways that ForeSight DXM can be used to manage, view and edit files. Whichever way you choose to use ForeSight DXM, it is important that you understand what the program is doing with your data files.

Single Folder Option

If you like to maintain one folder with all of your field data files in it, then you may consider having one ForeSight DXM project file in that directory. As you add files to the directory, also link them to that ForeSight DXM project. ForeSight DXM can then be used to easily browse and view any data file in the directory. If edits, exports or conversions are needed, you can do them easily and quickly. For actual projects where you need to import or link several files, it is still best to create a new folder for the project.

Folder for Each Project Option

Another option is if you use defined folders and sub-folders for each of your jobs. In this case, create a specific ForeSight DXM project file for each new job you are working on. All data that is linked to or imported into the project will also be moved to the project folder. In this way, you can maintain the original files while also using them for your current project.

Manage Data

ForeSight DXM provides a number of ways to work with data files of different types. ForeSight DXM projects can contain links to a large number of supporting files. The ***Project Navigator*** in ForeSight DXM can be used with the current project as a tool to view, edit and work with these files. As you add links to files, they will appear in the ***Project Navigator***. If you click on a file in the project navigator other than the actual project file, the associated editor will open that file. For a file to have an associated editor, a program must have registered that file type on your computer, or you must have selected a program from the file manager in Windows.

When working with a project, the actual ***Manage Data*** dialog box can be found under the ***Jobs*** menu, or the ***Project*** menu, depending on if you are viewing a Job, CR5, Nik, or Project file. You can also right-click on a Job, CR5, or Nik file from the ***Project Navigator*** and select ***Manage Data*** from the context menu. You cannot access the ***Manage Data*** dialog box when working with other non-project data files in their native format.

ForeSight DXM allows you to edit all TDS file types in their native formats including project files (*.PRO), TDS Windows CE and CE.net data collector files or job files (*.JOB), TDS Coordinate files (*.CR5), and Raw Data files (*.RW5, *.RAW). In addition, Nikon files are also supported. In all cases, the editing capabilities will be limited compared to working with a Project file since all other data file types are not capable of storing all the types of data that a project file can contain. All non-TDS or Nikon files must be either imported into a Project file or converted to a job file and linked to a project.

There are two meanings of “Project” depending on context. The first meaning is the overall ForeSight DXM Project. This refers to the working environment of ForeSight DXM and all the internal data and linked files. The second meaning is the actual ForeSight DXM project database file, the (*.PRO) file. The project file contains all the imported or created data that displays in the Plan view and it contains all the links to the other files. In this way the ForeSight DXM project can be used to manage your overall work.

JOB files and CR5 files are TDS data collector files. These files are used on TDS data collectors to store field data. Although there can be multiple TDS data collector files linked to a Project, only one can be open for editing at any given time. If you make changes to a linked data collector file, ForeSight DXM will prompt you to save the changes before closing the file. The current data collector file that is open in the editor will be closed if a different file is selected from the project manager, or if the Project is closed. If you have made changes to a job file, and then decide that these

changes were incorrect, close the job file and select ***Cancel*** when prompted to save the changes. The changes will then be discarded.

What Manage Data Does

Manage Data is used to move survey data from a project file to a data collector file, or from a data collector file to a project file. Manage Data is the only way to accomplish this task. The reason for this workflow is that the Manage Data feature contains the ability to rectify differences in coordinate systems, projections, units, and also manages point name conflicts. The Manage Data feature provides a controlled method for transferring data to different files.

The Manage Data routine is only available when working with a Project file or when editing a TDS or Nikon data file while it is linked to a Project file. The Manage Data routine is *not* available when you are editing a data file by itself in its native format.

If you have data sets with no geodetic information, Manage Data is a simple one-dialog box process. If you have geodetic data, Manage Data gives you the ability to manage how the Projection settings interact between files and insures that the data integrity is maintained.

Using Manage Data

If you are editing a Project file, the menu item is ***Project*** | ***Manage Data***. If you are editing a data file that is linked to a project, the menu item is ***Job*** | ***Manage Data***.

If you are working with a linked data file and you select ***Manage Data***, you will be moving data from the current data file into the project file. If you are currently working with the project file, you will move data from the project to the currently selected data file.

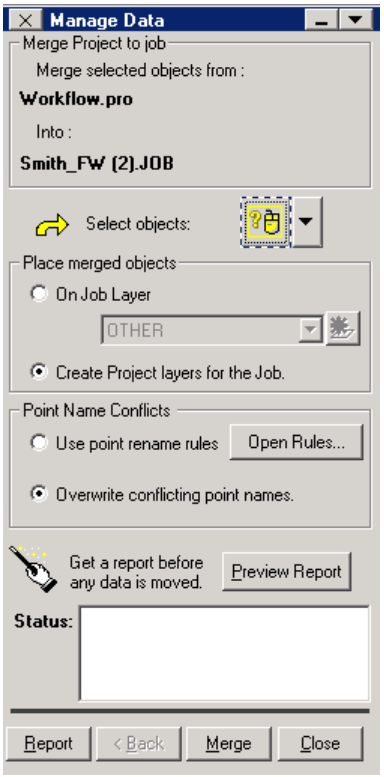
The source and destination file names are always shown in the top section of the ***Manage Data*** dialog box. For this description, we will reference user interface text with <Source> and <Destination> where you would see “Merge selected objects from” and “Into,” respectively, depending on which document the data is coming from and where it is going.

Managing Data with No Geodetic Records

If a data file is selected and does not contain any geodetic information or any form of specified coordinate system or projection, then using Manage Data is just a couple of quick steps.

Open the ***Manage Data*** dialog box by selecting ***Job*** | ***Manage***. If you are currently working in the Project, select ***Project*** | ***Manage Data***. Confirm that the <Source> and <Destination> files displayed in the ***Manage Data*** dialog box are showing the correct file names.

Select the items that you wish to move. Selection from the map view, or any of the edit grids is allowed. You can use any of the available selection methods to select objects. When moving data into a data file, only objects that are supported by the data file will be moved. For example, Survey Pro Job files do not support CAD blocks; therefore blocks are not moved into a job file.



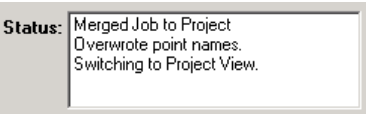
Next, select which layer to place the objects on using the ***Place merged objects*** section. The options involve either selecting a particular layer to place all the objects on, or to use the existing layer information in the source file. ForeSight DXM will create all the necessary layers in the destination file.

After making a layer choice, select the option for ***Point Name Conflicts***. You can either use the point rename rules or select to overwrite the existing destination points if they have the same name as points in the source file. You can view your current point rename rules by selecting the ***Open Rules*** button.

The manage data process will check the selected point objects for an exact duplicate point in the destination document. If any of the selected points already have duplicates in the destination document, they will not be considered by the rename rules and they will not be merged. Points are considered duplicates only if every parameter, including layer, is identical.

The ***Preview Report*** button allows you to see the points, lines, and alignments that will be merged and the results of the point renaming operations, if any. A final report will also be available after the operation is complete.

Finally, press the ***Merge*** button. The ***Status*** field will then report the operations completed during the merge.



At this point, the ***Report*** button will open a final report detailing all the operations of the merge. As with all reports generated by ForeSight DXM, the report will be linked to the project if it is saved in the project folder. The reports can provide an excellent project history resource when reviewing the work done.

Managing Data with Geodetic Data

The ***Manage Data*** function will also transfer geodetic information between project and job. Since the source file and destination file may have different coordinate systems, some way of managing these differences is required.

Introduction to ForeSight DXM Geodetics

Both the job file and the project file have two main types of geodetic settings. The first type is the projection mode and can be one of two types for the horizontal and one of two types for the vertical.

Horizontal	**Vertical**
Ground – TDS Localization	Localization (+Geoid)
Mapping Plane	Ellipsoid

The mode setting is always present in the files but initially may not be set. The default horizontal projection mode is Ground – TDS Localization and the default vertical mode is Localization (+Geoid). If no geodetic actions have been taken with the file, the default mode will appear or a different mode can be selected but no projection or Localization information (i.e. projection record) will be attached.

The second type of geodetic setting is the projection record. A projection record needs to be set prior to performing any geodetic calculations. The projection record contains a complete set of coordinate system parameters (ellipsoid, datum, map projection, geoid model and a possible Localization adjustment). The record can be selected from the database when in Mapping Plane mode, configured and created in Survey Pro while using the Ground- TDS Localization mode, or can be manually keyed in.

A project or job file can have two projection records, one in Ground – TDS Localization mode and one in Mapping Plane mode. If a file has two projection records, you can pick the desired record by simply choosing which horizontal

projection mode to use. Then, the projection record currently attached to the set projection mode is the one used for geodetic computations.

Note: Please see Geodetics on Page 137 for further information on geodetic operations in ForeSight DXM.

Note: The following examples show how to move data from a job to the project. The procedure is the same if you were moving data from the project to a job. The terms source and destination file are used to generalize the procedures.

Situation 1: Source file and destination file have matching coordinate systems

In this case, operation of the ***Manage Data*** routine is exactly like the operation for no geodetic records above. Since the records match, there is no need for any adjustments.

Situation 2: Source file has coordinate system, destination file does not

The first step is virtually the same as described above for no geodetic data. The only difference is that you will see a [***Next>***] button instead of a [***Merge***] button. Once the items are selected press the [***Next>***] button.

The second page of the ***Manage Data*** routine is used to rectify projection and adjust points. The [***Current Projection Details***] button can be used to open a display for complete details on the current projection set for the source file.

The ***Rectify Projection*** section has two options, ***Update <Destination> with <Source> Projection*** or ***Keep <Destination> Projection***. The options below in the ***Adjust Points*** section will change based on the setting in the ***Rectify Projection*** section. If the destination file has no projection assigned, it will default to Ground – TDS Localization for horizontal mode and Localization (+Geoid) for vertical mode, and no geodetic projection record data will appear in the details view.

Select the option for the projection that you want and then select the option you want for adjusting points in the ***Adjust Points*** section. Since there is no projection yet in the destination document, you can not adjust all points to the new system. Therefore,

the ***Adjust only points with geodetic coordinates*** control is default on, and can not be changed.

Once you are satisfied with your selections, you can preview a report using the [***Preview Report***] button, or you can select [***Merge***] to complete the operation. A report will be available for printing or saving when the ***Manage Data*** process completes.

Situation 3: Source and destination file have projection records that do not match

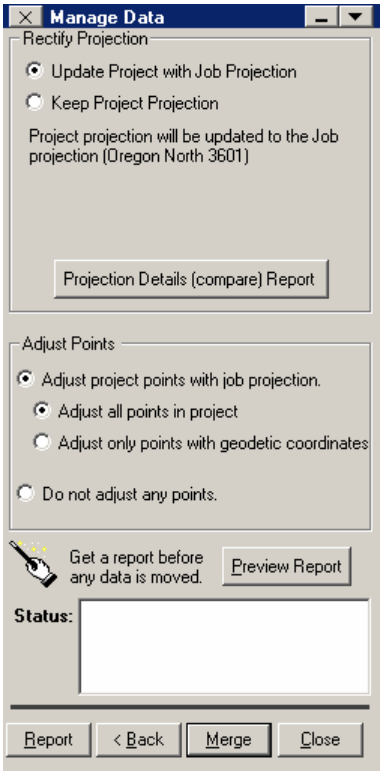
The first step is virtually the same as described above for no geodetic data. The only difference is that you will see a [***Next>***] button instead of a [***Merge***] button. Once the items are selected press the [***Next>***] button.

The second page of the ***Manage Data*** routine is used to rectify projection and adjust points. The [***Current Projection Details***] button can be used to open a display for complete details on the current projection set for both the source and destination files.

The ***Rectify Projection*** section has two options, ***Update <Destination> with <Source> Projection*** and ***Keep <Destination> Projection***. The options in the ***Adjust Points*** section will change based on the setting in the ***Rectify Projection*** section.

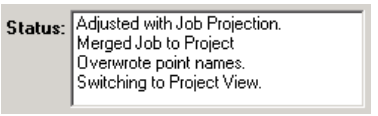
Select the option for the projection that you want to set in the destination document and then select the option you want for adjusting points in the ***Adjust Points*** section. If you choose to ***Adjust All Points***, all points will be recomputed in the new coordinate system. Points with geodetic coordinates will be transformed based on their geodetic position. Points with plane only coordinates will be transformed into temporary geodetic positions, which will be used to calculate the new plane coordinates. If you choose to ***Adjust only points with geodetic coordinates***, ForeSight DXM will only re-compute the plane position of those points with geodetic positions.

Case 1: ***Update <Destination> with <Source> Projection***



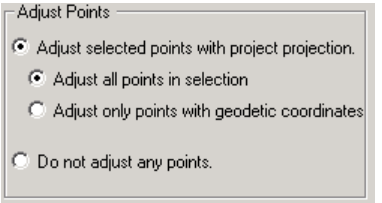
The options will be to ***Adjust <Destination> points with <Source> projection*** or ***Do not adjust any points***. If you choose to adjust points, you then need to select which points you wish to adjust. The options are to ***Adjust all points in <Destination>*** or to ***Adjust only points with geodetic coordinates***. If you choose to ***Adjust All Points***, all points will be recomputed in the new coordinate system. Points with geodetic coordinates will be transformed based on their geodetic position. Points with plane only coordinates will be transformed into temporary geodetic positions, which will be used to calculate the new plane coordinate. If you choose to ***Adjust only points with geodetic coordinates***, then ForeSight DXM will only re-compute the plane position of those points with geodetic positions.

If you select ***Do not adjust any points***, then the point adjust options will be disabled and no adjustment will be made. This will mean that both the Latitude, Longitude and Height values and Northing, Easting and Elevation values will remain unchanged for the existing project data.



Once your selections are made, click on the [***Merge***] button. The ***Status*** field will display the actions taken and the view will switch to the ***<Destination>*** file. At this time the final Report can be generated by pressing the [***Report***] button.

Case 2: ***Keep <Destination> Projection***



The options will be to ***Adjust selected points with project projection*** or to not adjust any points. If you choose to adjust points, the points that will be adjusted are the points from the source file selection. The source file projection itself will not be changed.

The options are to ***Adjust all points in selection*** or to ***Adjust only points with geodetic coordinates***. If all

points are selected, then all the existing points in the selection will be adjusted to the new projection. Points without geodetic will be resolved to temporary WGS84 Latitude, Longitude, Height using the current projection and then adjusted to the new projection. These points will not be stored with LLH values, only the NEE coordinates will be stored for each point.

If only geodetic is selected, then only those points with geodetic Latitude, Longitude, Height data will be adjusted. All other points will retain their existing Northing, Easting and Elevation values.

If ***Do not adjust any points*** is selected, then no point coordinates will be adjusted. This will mean that the Latitude, Longitude and Height values and the Northing, Easting and Elevation values will remain unchanged.

Once your selections are made, click on the [***Merge***] button. The ***Status*** field will display the actions taken and the view will switch to the ***<Destination>*** file. At this time, the final Report data can be generated by pressing the [***Report***] button.

Case 3: Localization Update

When the projection records are of the same zone, but different Localization solutions, the Adjust Points section will default to Adjust only points with geodetic coordinates. This occurs because in the Localization case, the local coordinates are the fixed control, and the localization transform is used to adjust the GPS measurements into that local system. Therefore, when only the localization has changed, you should keep the existing plane only points, and readjust only the coordinates from geodetic measurements taken under the old Localization solution.

Polylines and Alignments

Both polylines and alignments will also be adjusted if they are selected using the Manage Data routine. Because of the differences between polylines and alignments, they are handled differently by the adjustment engine. Polylines and Alignments are discussed in more detail in the *Points, Polylines and Alignments* section on Page 67.

Polylines

Polylines will follow the points they are attached to. Polylines are permanently attached to points so if the points get adjusted, the polyline segments will as well. Therefore, the orientation of each polyline segment is adjusted when we move the points. However, polyline curves also need to be corrected. When adjusting points with change of coordinate system, all polyline arcs are scaled by the difference of the average combined scale factor of the two endpoints of the curve.

Alignments

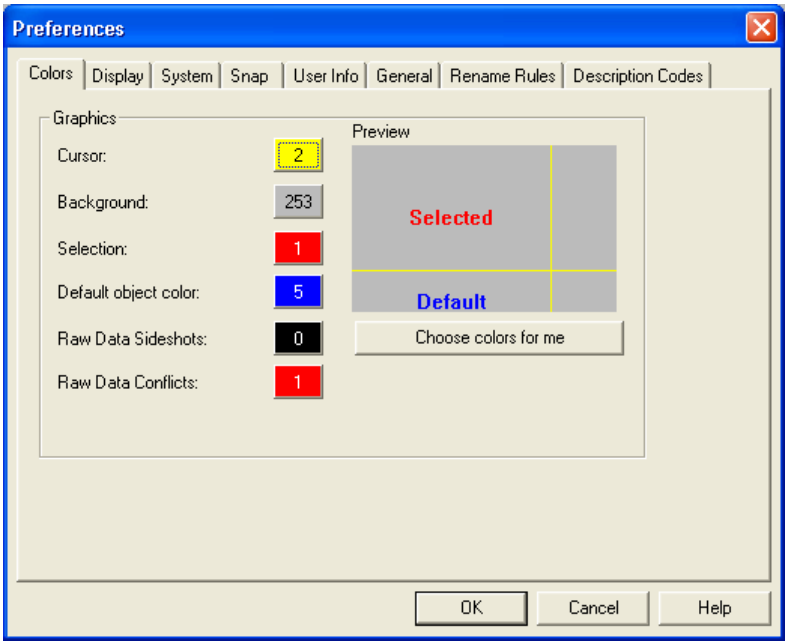
Alignments are anchored at their point of beginning (POB). When converting from one coordinate system to another, each alignment must be scaled and rotated at the POB. The scale is the difference in combined scale factor between the two coordinate systems at the POB. The rotation is the difference in meridian convergence between the two coordinate systems at the POB. This method will keep the relative proportions of the alignment correct. If the alignment is particularly long, there could be differences in scale as compared between where the alignment started and where it ends. This could cause differences in computed distances between existing points and the alignment. These differences are usually quite small.

Preferences

The ***File*** | ***Preferences*** dialog box is used to configure several different settings in ForeSight DXM. Each screen is explained below.

Colors

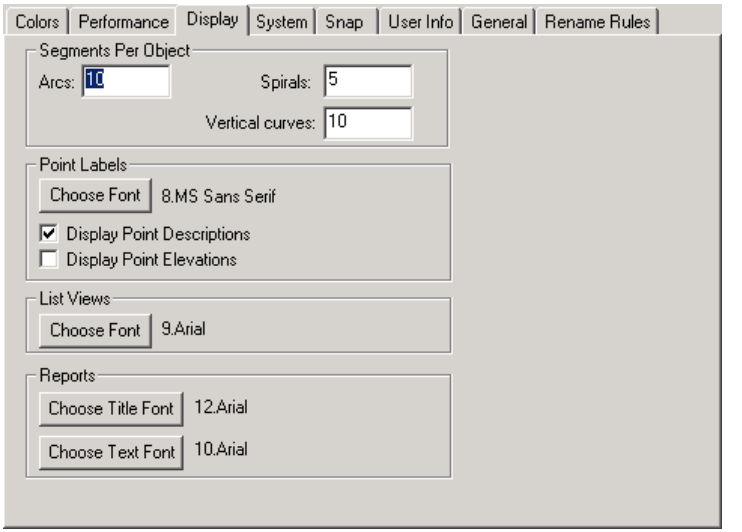
The ***Colors*** card allows you to change the default colors for the objects displayed in the Plan View. Clicking any of the colored buttons will open a color map where you can select a new color by clicking on it.



Clicking on the [***Choose colors for me***] button will change all the colors back to the default color scheme.

Display

The ***Display*** card is used to configure what is displayed in the Plan View.



The ***Segments Per Object*** section is used to configure the number of segments that are used to draw the corresponding curved objects to the screen in the Plan View. The more segments used, the smoother the object will appear, but the more complex the Plan View will become.

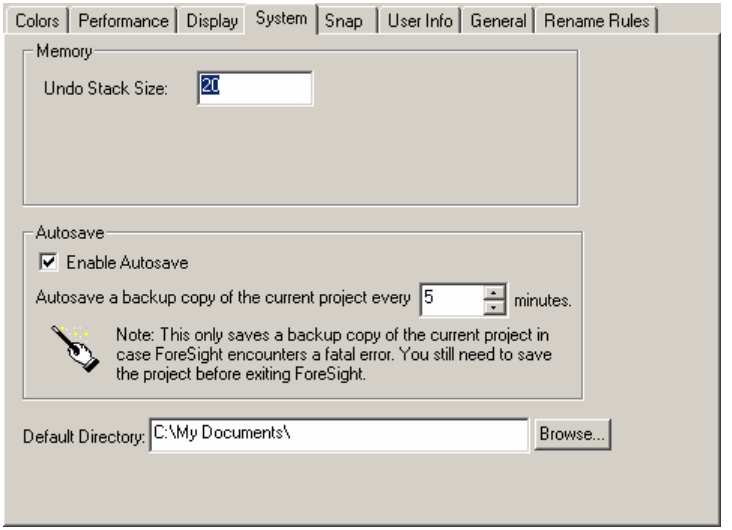
The ***Point Labels*** section is used to select what is displayed in relation to points. The [***Choose Font***] button can be used to select a different font used in the Plan View for displaying point information.

When ***Display Point Descriptions*** is checked, point descriptions will be displayed in the Plan View. When ***Display Point Elevations*** is checked, point elevations will be displayed in the Plan View.

There are three settings for fonts. The first is for ***List Views*** and affects the fonts used for the data grid views for Points, Polylines, and Alignments, etc. The second two are used for ***Reports*** generated by ForeSight DXM. To set a font, select the ***Choose Font*** button and select the appropriate font from the Windows Font picker.

System

The ***System*** card lets you configure more options that deal with the PC's memory and auto-saving.

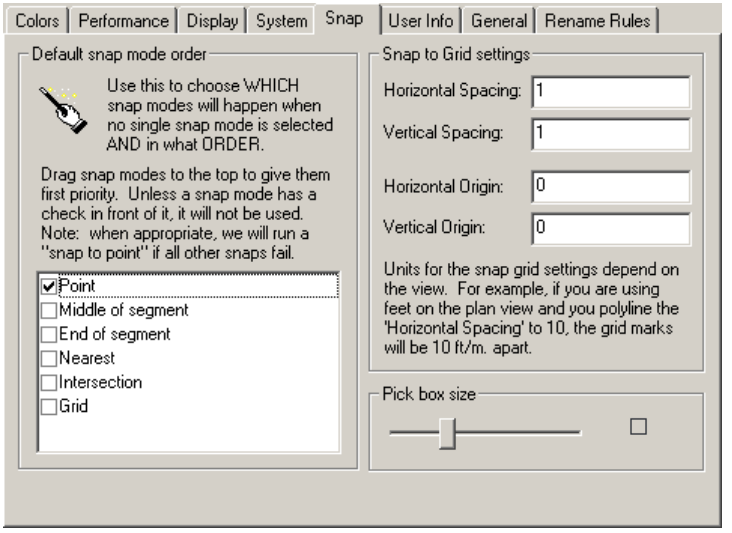


In the ***Memory*** section, the ***Undo Stack Size*** specifies the number of undo procedures that can be performed.

When ***Enable Autosave*** is checked, a backup of the project will automatically be saved after each time the number of minutes specified is reached. This backup will only be restored if the program is shut down unexpectedly. This function is not a replacement for the normal ***File*** | ***Save Project*** routine, which should still be performed manually on a regular basis.

Snap

The ***Snap*** card is used to configure the snap settings. The use of snap modes is discussed later.



The ***Default snap mode order*** section is used to select which snap modes will be used by default when no snap mode is selected in the Snap toolbar.

Check the boxes that correspond with the snap modes you want to be used and drag them so they are listed in the order where the modes with most priority are listed first.

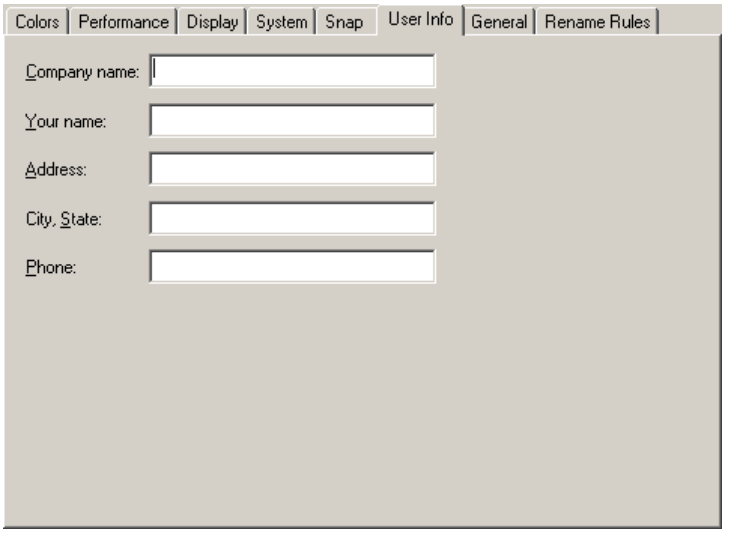
In the ***Snap to Grid*** settings,

set the spacing you want to use for a *snap to grid*. The units are the same as those set for the project. When the Snap to Grid button is enabled, the cursor will snap to the nearest intersection of this grid. The origin for this grid can be set to any coordinates in the ***Horizontal*** and ***Vertical Origin*** fields.

The ***Pick box*** size slider is used to select the size of the pick box when the cursor is moved over the Plan View.

User Info

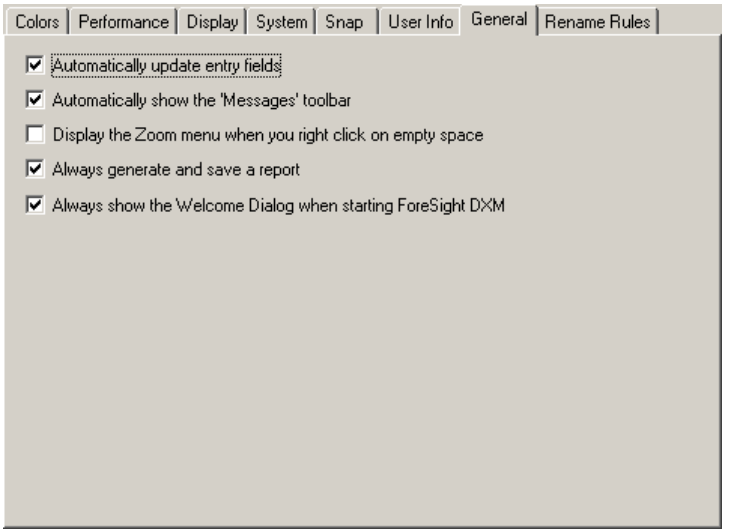
The ***User Info*** card can be used to personalize your copy of ForeSight DXM. This information will not be used anywhere else in the program.



General

The ***General*** card is used to toggle the following checkboxes:

- ***Automatically update entry fields***: this will automatically update any field where information is manually entered after the cursor leaves that field. When this is unchecked, another

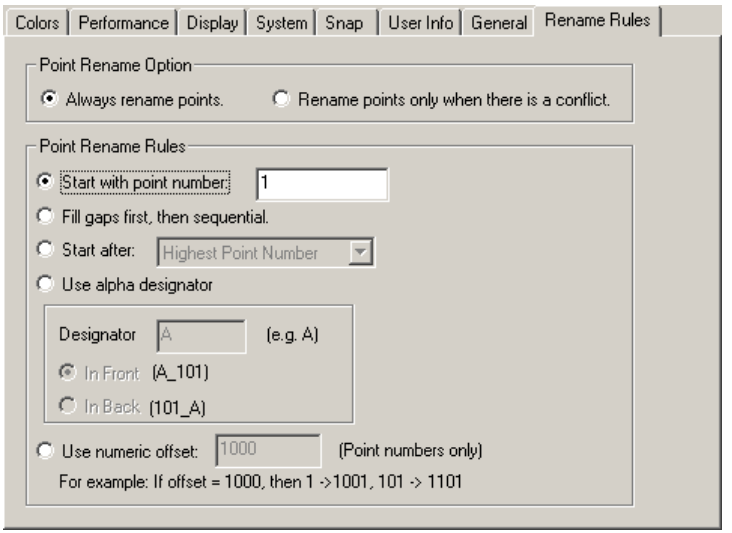


step, such as pressing [***OK***], is required before the new information entered is accepted.

- ***Automatically show the 'Messages' toolbar***: When a message can be displayed after a specific function can be performed, it will automatically be displayed in the message window. When this is unchecked, the Toggle Messages button would need to be activated for messages to be displayed.
- ***Display the Zoom menu when you right-click on space***: When right-clicking in the plan view, the Zoom menu will be displayed at the cursor location. If this is unchecked, nothing will happen.
- ***Always generate and save a report***: This will open a report in a new window after completing a routine in ForeSight DXM that is designed to generate a report. If this is unchecked, no report that can be saved will be created, but a report will be displayed in the message area if the Toggle Messages button is activated.
- ***Always show the Welcome Dialog when Starting ForeSight DXM***: The Welcome message will be displayed when ForeSight DXM is started when this is checked.

Rename Rules

The ***Rename Rules*** card is used to define how to handle points with duplicate names as they are merged into another project or job.



If ***Always rename points*** is selected, all points will be renamed as they are merged according to how the remaining fields are configured.

If ***Rename points only if there is a conflict*** is selected, and there is at least one conflict, all the points will be renamed.

Under the ***Rename Rules***, ***Start with point number*** should be set to the point number that will be assigned to the first point that is

renamed. Each consecutive point that is renamed will be given the next available point number.

When ***Fill gaps first, then sequential*** is selected, any points will be renamed with the first available point number, where 1 is the lowest possible point name.

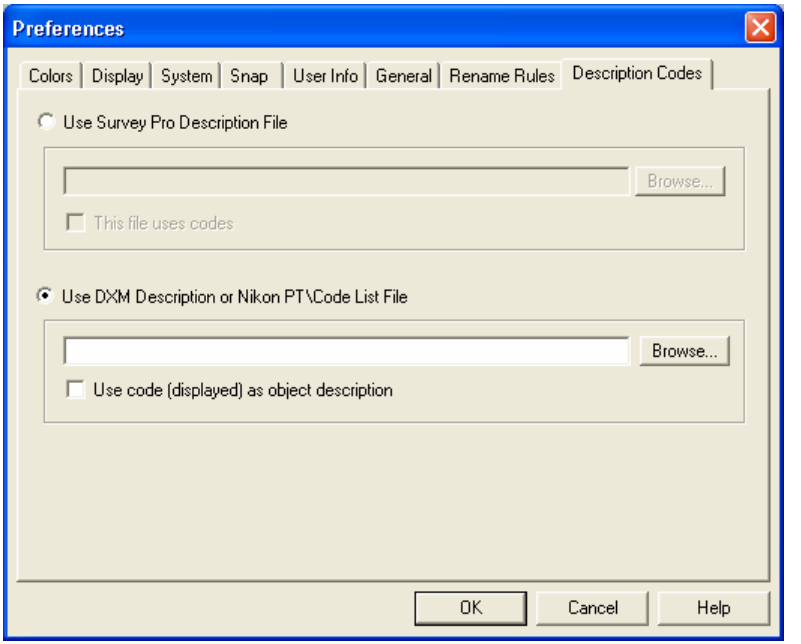
If ***Start After*** is selected, you can select to start the point renaming after the ***Highest point number***, the ***Next Round 100***, the ***Next Round 1000***, or the ***Next Round 10000***.

When ***Use alpha designator*** is selected, points will be renamed with the number convention defined in this screen, along with predefined alpha character(s). In the ***Designator*** field, enter the text that you want added to each renamed point and select if you want the text to be ***In Front*** of the original point name, or ***In Back*** of it.

When ***Use numeric offset*** is selected, any numeric point name that is renamed will be the old name plus the numeric offset entered here.

Description Codes

The ***Description Codes*** card allows for the name and type of the current descriptor file to be quickly viewed. The file can be selected here, but it can also be changed in the ***Map Menu*** items. Each of those routines allows for the descriptors (and descriptor files) to be changed.



Use ***Survey Pro Description File*** lets the user designate a description file, which is in a .txt format, by browsing to the location and selecting the chosen file.

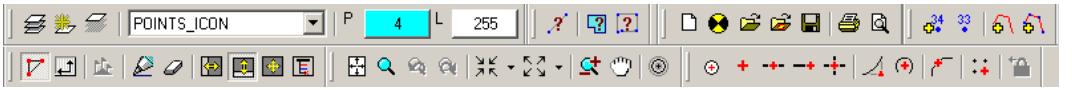
This file uses codes can be left unchecked if codes are not used in the .txt descriptor file.

Use DXM Description or Nikon PT\Code List File can be selected if the desired descriptor file is in the .Des or .Lst format. These files can

be created using the ***Nikon Code List Editor***.

Use code (displayed) as object description can be selected for the .Des or .Lst file. When creating a .Des or .Lst descriptor file, there is a field for Code (displayed) and Code (Stored). If this box is checked the code (displayed) will be written into the data file, regardless of the code (stored).

The Toolbar



The Toolbar at the top of the screen is used for accessing frequently used tools. If the mouse is held over a button, a small text box called a Tool Tip will appear that indicates the function of the button. These buttons can be rearranged on the tool bar, removed from the tool bar, or moved almost anywhere on the screen as a floating dialog box.

You can turn off individual toolbar button sets by selecting ***Toolbars*** from the ***View*** menu. To move button groups simply click and hold at the corner of one of the groups and drag it to where you want it.

Standard Toolbar

The Standard toolbar contains shortcuts to functions contained within the ***File*** and ***Edit*** menus. There are shortcuts for opening, closing and saving files as well as printing. There are also buttons that shortcut to the undo and redo functions.

View Toolbar

The View toolbar has shortcuts that allow quick access to the various views or ways to display data.

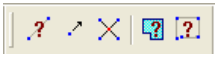
Layers Toolbar

The Layers toolbar contains options for working with layers. The usage of the layers tools is discussed in the Layers section.

Zoom Toolbar

The Zoom toolbar contains buttons for the various zooming, panning and selecting tools in the ***View*** menu. The usage of the zoom tools is discussed in the Zoom section.

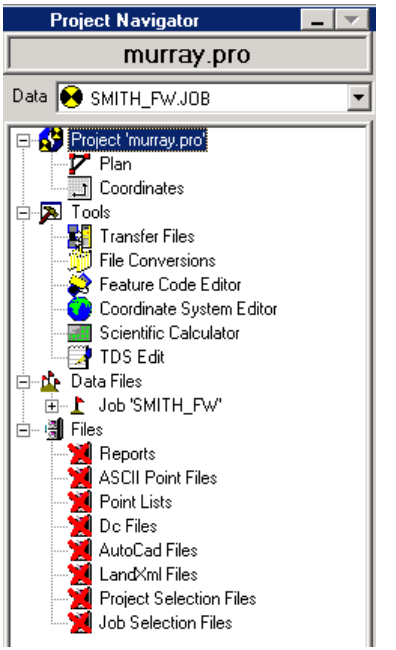
Cogo Toolbar



The Cogo toolbar contains shortcuts to all the options in the ***Cogo*** menu. The usage of the Cogo functions is discussed in the Cogo section.

Dialog Bar

The Dialog Bar is the area on the left side of the user interface where various tool and function dialogs will be displayed. The base level of the dialog bar is called the Project navigator. As different tools are used, the dialogs for those tools will be stacked on the dialog bar until they are closed.



Messages

The Messages toolbar (also called the Message box) is displayed at the bottom of the screen. It is an area for displaying text results of calculations. The message bar will appear any time a function is used that can generate a text report. Dragging on the top border can resize the Messages Toolbar. You can hide the message bar by pressing the ***Toggle Messages*** button or selecting ***Toolbars*** from the ***View*** menu and un-checking ***Messages***.

Point 1	Point 2	Distance	Direction	Northing	Easting	Elevation
23	221	38.2293	55°35'25"	21.6037	31.5399	0.700
217	220	21.6862	198°59'49"	-20.5051	-7.0592	-6.346

The Message box can also be set in manual mode in ***File*** | ***Preferences***... | ***General***. The ***Automatically show the "Messages" toolbar*** checkbox tells ForeSight DXM to show the Message toolbar anytime a report is generated. If the check is cleared, the Message box will not automatically open, although the reports will still be available if you manually open the box. We suggest you leave the Message toolbar in automatic mode until you become familiar with what functions generate reports that are placed in the Message box.

Overview Window

The ***Overview*** window is listed in the toolbar selection list, but is not really a toolbar in that it can only be used as a floating window. It is used to provide a view of the entire job in miniature. The inner box can be made larger or smaller and it can be moved using the mouse. Moving the inner box causes a pan action in the Plan view and shrinking or growing the box causes a zoom action. You can also click and drag a new window to zoom and pan to a specific area. The ***Overview*** window will not automatically refresh when the Plan view changes. You must right-click in the ***Overview*** window area to get a menu and then click on ***Refresh***.

Snap Mode Toolbar

The snap mode toolbar is used to select a snap mode. The usage of the snap modes is discussed in the Snap section.

Map Toolbar

The Map toolbar contains shortcuts to all the options in the ***Map*** menu. The usage of the Map functions is discussed in the Map section.

DC Settings

The DC Settings toolbar contains tools for communicating with your data collector. There are tools for transferring information and for selecting the type of unit. The usage of these tools is discussed in more detail in the Transfer section of this manual starting on Page 85.

Hotkeys

ForeSight DXM has keyboard shortcuts, or *hotkeys*, available to perform a variety of functions quickly.

Hotkey	Function	
Alt + Backspace	Toggle between Job and Project	
Ctrl + 1	Plan View	Numbered Hotkeys relate to view options
Ctrl + 2	Profile View	
Ctrl + 3	Sheet View	
Ctrl + 4	Coordinates	
Ctrl + 5	Raw Data	
Ctrl + 6	Job View	
Ctrl + 7	Surface View	
Ctrl + 8	Full Screen	
Ctrl + A	Zoom Extents	
Ctrl + B	Display Point Labels	Located next to non-plotting point labels.
Ctrl + D	Delete Objects	
Ctrl + E	Erase Scratch	
Ctrl + F	Feature Code Editor	
Ctrl + G	Geodetic Calculator	
Ctrl + I	Inverse Point to Point	
Ctrl + J	Add / Edit Points	Similar functions on same row
Ctrl + K	Add / Edit Polylines	
Ctrl + L	Add / Edit Alignments	
Ctrl + M	Manage Data	
Ctrl + N	Non-Plotting Point Labels	
Ctrl + O	Open Project	
Ctrl + P	Print	
Ctrl + R	Calculator	
Ctrl + S	Save File/Project	
Ctrl + T	File Transfer	
Ctrl + W	File Conversion	
Ctrl + Y	Redo	
Ctrl + Z	Undo	
Alt + (+)	Zoom In	
Alt + (-)	Zoom Out	
Ctrl + X	Cut	Windows functions
Ctrl + C	Copy	
Ctrl + V	Paste	
F1	Help Menu	
F5	Refresh	
Alt 1~6	Load Selection #	
Alt F1~F6	Save Selection #	

Interface Conventions

There are several conventions used consistently in ForeSight DXM.

Special Function Buttons

These buttons are used throughout the program to specialize the function of the mouse. When these buttons are clicked, they will become active. An active button is shown graphically with a scrolling blue and white border around it. Once the button is active the mouse can be used to select objects from the drawing.

The ***Mouse Select*** button is used to select an object from the current view. For example the object could be a point for computing an inverse or a set for computing an area.

The ***New Layer*** button is always displayed near a layer selection drop down list in a dialog box. Use this button to quickly access the ***New Layer*** dialog box to add a layer. Once the new layer is created, it will be selected in the adjacent layer drop down list.

Right-Mouse-Click Menus

ForeSight DXM offers a context sensitive right-mouse-click menu for all objects in the drawing. Right-click on any object and a menu will appear that will allow you to edit, delete, or modify the object in some way. The menu will be different for each type of object. It can be a real time saver.

Zooming and Panning

Zooming is defined as changing the current scale of the viewing area. In effect it increases and decreases the relative size of the drawing on the screen. Panning moves the drawing from side to side and up and down to facilitate viewing the job.

Zoom controls

ForeSight DXM offers several methods for zooming, they are all quite simple, and are designed to provide you flexibility. The notation in brackets show the alternative key combination to activate the particular zoom. If you use a wheel mouse, the wheel can be used for zooming in and out. Also, if the wheel is pressed down, activating a wheel click action, you can use your mouse to pan. Panning continues until the wheel mouse is let up.

 Zoom Extents (Ctrl+A)

Zoom Extents scales the view so that all the objects that are in the project and are viewable are contained within the viewing area. In most cases, zoom extents is a very useful tool for fitting your entire drawing inside the viewable area of your screen. If you have one point that is a long distance from the main drawing and you hit zoom extents, it may look like the drawing has disappeared because the objects will be so small. You can use the zoom previous button to go back to the zoom level you were at before. To keep zoom extents from trying to fit objects that are so far apart into the viewable window, you can delete the object that is so far from the rest of the drawing if it is no longer needed. You can also move the object to a separate layer and turn that layer's visibility off.

 Zoom Window (Ctrl+W)

Zoom Window allows you to use your mouse to define a rectangular area to zoom in to. Once the Zoom Window button is pressed, you click once in one corner of the rectangle and once in the opposite corner to define the area you want to zoom to.

 Zoom Previous (Ctrl+9)

Zoom Previous moves the zoom setting to what it was prior to your last change. Zoom previous works off a list of previous zoom settings so you can keep toggling back through the list for as many zooms that you have done.

 Zoom Next (Ctrl+0)

Zoom Next is the same as zoom previous, but moves through the list of zoom settings in the opposite direction.

  Zoom In (Alt+ (+)) and Zoom Out (Alt + (-))

These zooms move the view in or out by a specified percentage amount. The amount of zoom can be set by using the drop down list activated by clicking on the arrow next to the zoom button. Each time the zoom button is pushed, the view will change by the selected amount.

 Zoom Real Time (Ctrl+Q)

Zoom Real Time uses the mouse to set the zoom level. To use it, first click on the zoom real time button, then click and drag anywhere on the drawing area. Dragging up causes the view to zoom in and dragging down causes the view to zoom out. Zoom real time will redraw as you zoom in or out. For very large jobs or very slow computers, pan real time will not provide a smooth redraw of the screen. Drag the mouse slowly for best results in these situations.

Panning

 There is only one pan button and it provides all the panning functionality. Pan Real Time is controlled using the mouse much like zoom real time. To pan, click on the pan button then click and drag on the drawing area. Dragging left causes the view to shift left and so on for all the directions. Pan real time will redraw as you move the drawing. For very large jobs or very slow computers, pan real time will not provide a smooth redraw of the screen. Drag the mouse slowly for best results in these situations.

Selecting Objects

You select drawing objects to tell ForeSight DXM which objects you want to edit, report on, export, etc. If no object has been selected, then ForeSight DXM cannot make any changes.

There are four basic methods for selecting objects. These methods are valid for any object in the current view.

Select Button

This is the button described above and is used to select individual items with the mouse. Once the Select button is active, objects on the screen can be selected by clicking on them. This button can also be used to draw a rectangle to select multiple objects by clicking and dragging.

Double Clicking

You can double click on any object on the screen or in the editors at the bottom of the screen to open the appropriate edit dialog for that object.

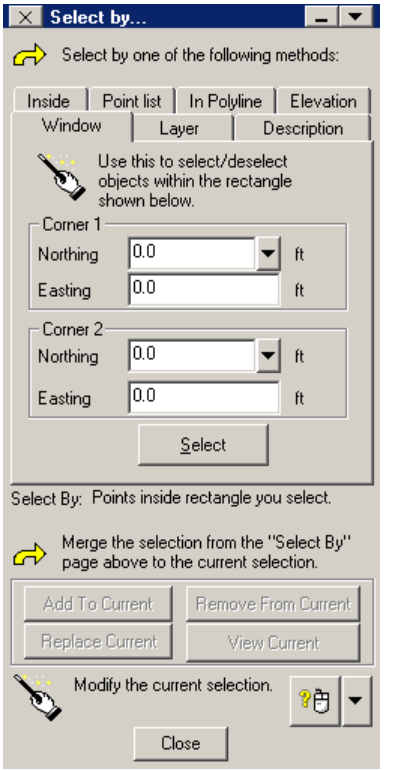
Right-mouse-click

Right-clicking on an object brings up a context sensitive menu for the object.

The *Select by* Dialog Box

This dialog can be accessed from most of the edit dialogs and from anywhere it might be necessary to select multiple objects. The dialog box can vary slightly depending from where it was accessed.

Open the ***Map*** | ***Edit Multiple Points*** dialog box. (Also available from other editing dialog boxes.) Click the button to the right of the [***Select***] button and click on ***Select by*** to open the ***Select by*** dialog.



Choose a selection method. The default method is by using a rectangular area called a *Window*. Anything within the window will be selected. You can also choose by ***Layer***, ***Point list***, ***Inside*** (all the points that are within the boundaries of a polyline), ***Polyline*** (all the points that are used to define a polyline), ***Elevation*** (select only 2D points, or points with a specific elevation), or by using the object's ***Description*** (e.g., a point description of TREE).

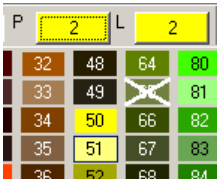
Once the items are selected, you can click [***Replace Current***] to make the selected items the only items selected. Clicking [***Add to Current***] would add the selected items to any items that were previously selected. Clicking [***Remove from Current***] will remove the items selected from the previously selected items.

The final step is to close the ***Select by*** dialog to return to the dialog you started from, in this case to the ***Edit Multiple Points*** dialog. ForeSight DXM will remember the objects you have selected and you can then edit them all simultaneously.

Colors

ForeSight DXM allows you to select the color on layers independently.

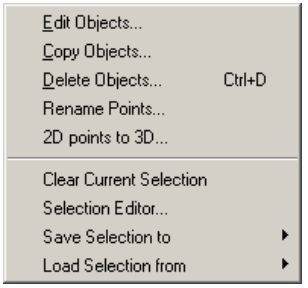
NOTE: The X through a color indicates that the color is used as the background or highlight color. That color can still be used on an object, but it is not recommended since the object would then be impossible to see or appear highlighted when it was not.



If the default layer color for lines or points is changed, all the lines or points on that layer will change to the new color. If an object is moved from one layer to another, its color will change based on the new layer's default setting.

When editing a linked Job file (TDS data collector file), no color selection for layers is possible. Job files do not support layer colors and therefore no color setting can be made. Objects in Job files will be drawn using the default color set in the ***File*** | ***Preferences*** dialog box.

The Edit Menu

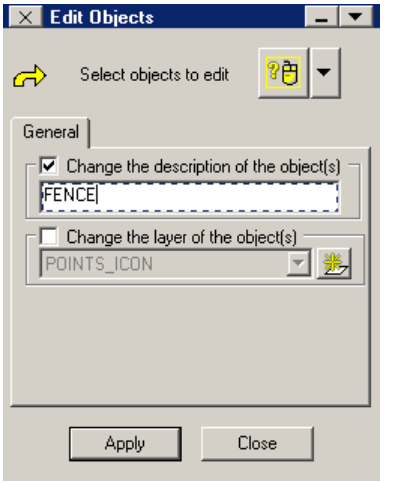


The ***Edit*** pull-down menu contains some simple routines that are useful while working in almost any part of ForeSight DXM. Each routine is briefly explained here so you can use them throughout the rest of the manual.

Editing Objects

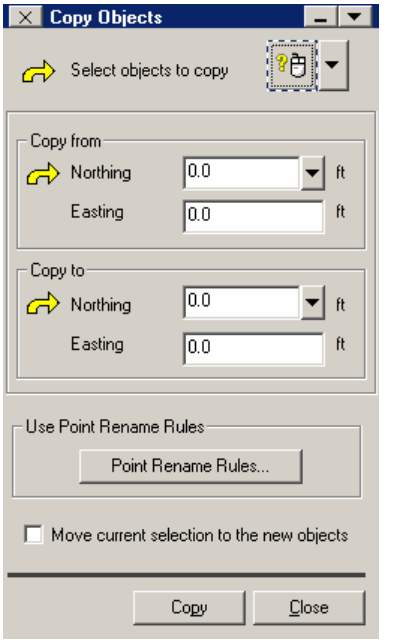
There are several different pages of editing options: Copy, Move, Edit, Rotate and Delete. Each option is described below.

Edit Objects



This page allows you to change the layer or description of the selected objects. Check the boxes for the changes that you want to make then select the appropriate change in the same field as the checkbox. Once you are finished filling in the dialog, click the [***Apply***] button.

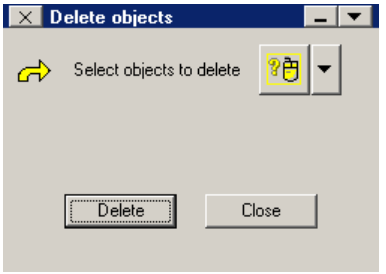
Copy Objects



The copy objects the same distance and direction as defined by the difference between the ***Copy from*** location and the ***Copy to*** location. For each location, you can either enter the coordinates by hand, or click anywhere on your map. After each location is defined, click the [***Copy***] button to copy the objects. You can continue clicking the [***Copy***] button to make additional copies of the selected items to positions progressively further away from their starting locations. The [***Point Rename Rules***] button accesses the ***Rename Rules*** preferences where the naming of the new points is configured.

Delete Objects

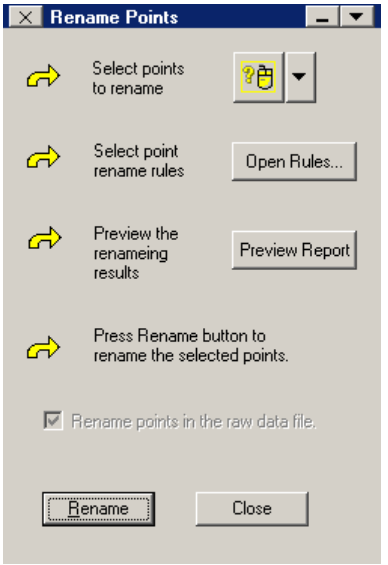
The Delete Objects option allows you to select objects from your map and delete them. Simply select the objects from your map using the ***Mouse Select*** button then click [***Delete***].



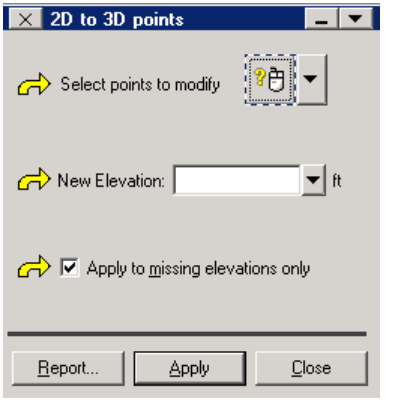
Note: In many dialog boxes, you can click the button to the right of the ***Mouse Select*** button and select ***List of Selected Objects*** to see a list of all the objects that are currently selected.

Rename Points

This option will rename the selected points. The [***Open Rules***] button accesses the ***Rename Rules*** preferences where the naming of the new points is configured. The [***Preview Report***] button displays a report so you can preview exactly how the selected points will be renamed. Pressing [***Rename***] will perform the renaming of the selected points.



2D to 3D Points



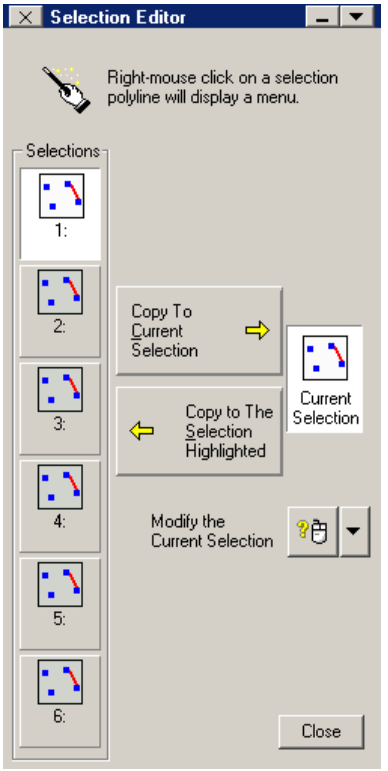
This option will assign a specified elevation to all the selected points that do not have elevation, which will occur after importing 2D file from AutoCAD. This routine can also change the existing elevations of the selected points to a specified elevation. The specified elevation is entered in the ***Elevation*** field. When the ***Only change points with missing elevations*** checkbox is checked, only the selected points with missing elevations will be changed. When this is un-checked, all selected points will be changed.

Clear Current Selection

This option will deselect any objects that are currently selected on your map. If you are unsure whether anything is selected in the first place just look at the bottom right corner of the ForeSight DXM window. There will be a small, boxed area on the status bar. If anything is selected there will be a number in the box.

Selection Editor

The selection editor allows you to maintain up to 6 different and independent groups of selected objects. The current selection is located on the right side of the dialog and can be saved to any location on the left side. Save the current selection by tapping the box where you want to save it on the left side and then tap the [***Copy to The Selection Highlighted***] button. Alternatively, you can drag the ***Current Selection*** box over any of the six boxes on the left side to save the selection. Right-clicking on any of the saved selections provides access to useful functions including the ability to name a saved selection. To make a saved selection the current selection, click on it, then click the [***Copy to Current Selection***] button, or just drag it over the ***Current Selection*** box on the right.



The  button will open the following list of options:

Select by: Opens the ***Select by*** dialog where objects can be selected using several different methods. (See Page 50.)

Select all: Selects every object in the project.

Clear Selection: un-selects the currently selected objects.

Invert Selection: un-selects the currently selected objects and selects all the objects that are not currently selected.

List of Selected Objects: opens a detailed list of all the currently selected objects.

Tip: Holding the mouse cursor over the ***Mouse Pick*** button  will display a simplified list of the selected objects.

Save Selection to File: prompts you for a file name and saves the current selection to the specified *.SEL file, which can then be used later.

Load Selection from File: loads a selection that was previously saved to a *.SEL file and makes it the current selection.

Save Selection to File

This option is a shortcut to saving the current selection to a specific location in the Selection Editor (described above). Simply expand the menu item by touching the mouse to it and enter the file name. You can also use the keyboard shortcut to save the current selection to any of the six locations by pressing [Alt] along with [F1] through [F6], respectively.

Load Selection from

This option is a shortcut to restore a saved selection from the Selection Editor to make it the current selection. Simply expand the menu item by touching the mouse to it and click the saved selection from the list that you want to use as the current selection. You can also use the keyboard shortcut to restore a specific saved selection to use as the current selection by pressing [Alt] along with [1] through [6], respectively.

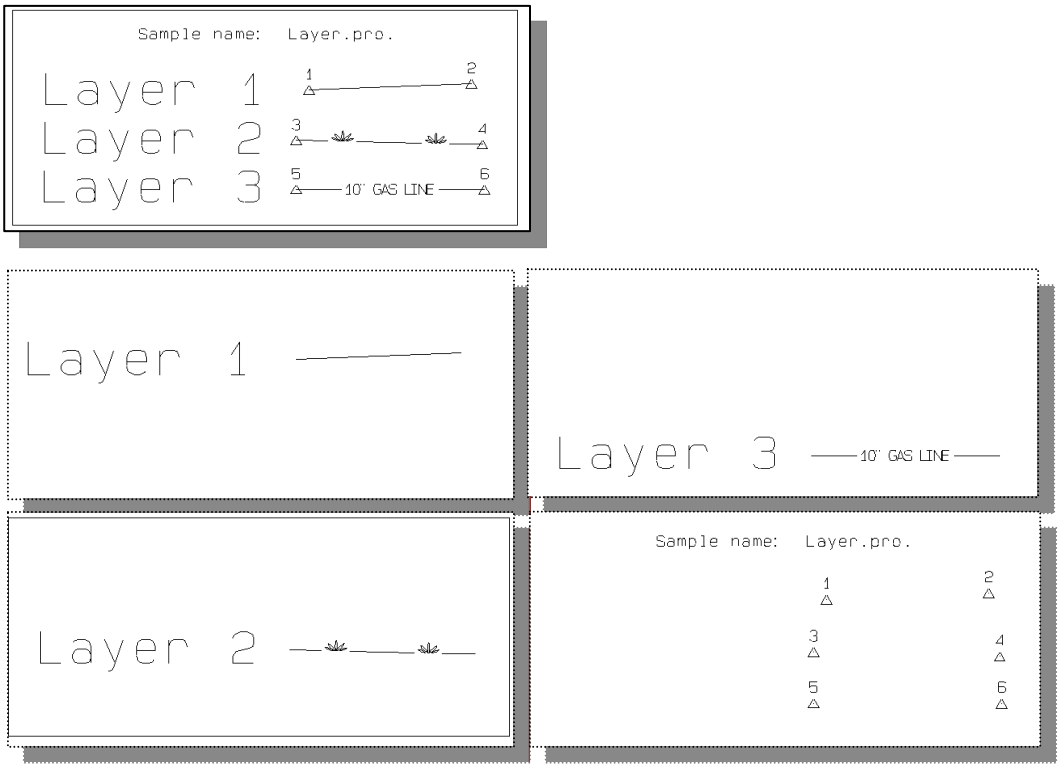
Layers

Overview

A *layer* can be thought of as a transparent sheet of paper with objects drawn on it. Every object drawn by ForeSight DXM is placed on a layer. Understanding layers is important in getting the most out of ForeSight DXM.

Understanding layers

Each layer in a project can contain different objects. When all the layers are viewed simultaneously, they make up the entire drawing. The figure below shows how four layers are used to make up the sample drawing at the top.



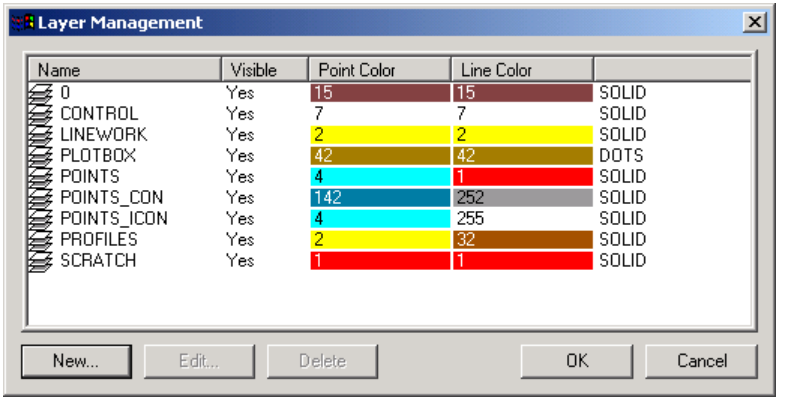
Using the Layer Toolbar

Start by opening a project, such as the sample project `Murray.pro`. Look for the ***Layer*** toolbar (shown below). If it is not visible, select ***View*** | ***Toolbars*** and check the ***Layers*** checkbox.

Layer Management

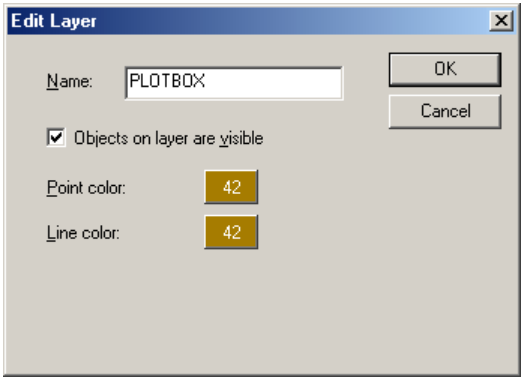
The Layer Management dialog box allows you to change the name of a layer, select if the layer is visible, and change the point and line colors for a layer.

Click the Manage Layers button. The ***Layer Management*** dialog box appears (You could also select ***Project*** | ***Manage layers***.)



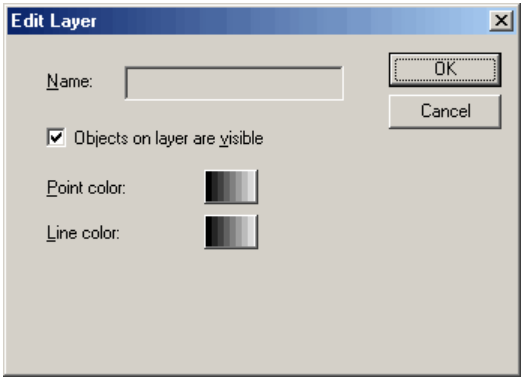
To delete a layer, select it from the list and click [***Delete***].

You can toggle a particular layer to be visible or invisible by clicking on the word ***Yes*** or ***No*** in the ***Visible*** column that corresponds with the layer you want to change.



You can also change the visible setting, along with the name and colors for a layer by clicking on the desired layer and then clicking the [***Edit***] button.

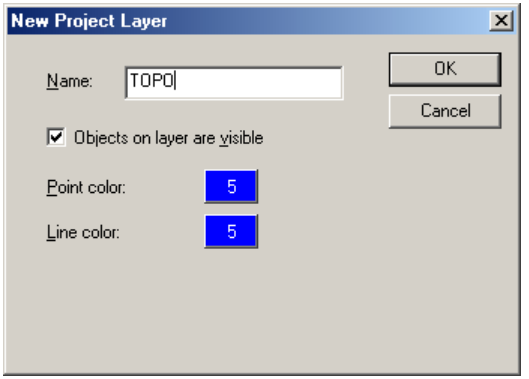
Press the [***OK***] button to proceed.



Editing multiple layers at once

Multiple layers can be edited simultaneously. From the Layer Management dialog, hold down the [Ctrl] key while clicking on each layer that you want to edit. Once all the desired layers are selected, click [***Edit***]. A variation of the Edit Layer dialog will open where the visibility and point/line color can be assigned to all the selected layers.

New Layer



A new layer can be created using the following steps.

Press the New Layer button. This will open the ***New Project Layer*** dialog box.

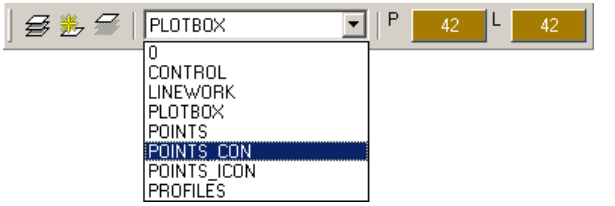
Enter a name for the new layer in the ***Name*** field, check the box if you want the objects on the layer to be visible, and then choose any color you like for the points and lines by clicking on the corresponding color buttons and selecting a color.

Click on [***OK***] to continue.

Active Layer

The *active layer* is the layer to which new objects will be added by default. It is also the layer that the ***Isolate Active Layer, Point Color,*** and ***Line Color*** controls act on.

The layer that is selected in the drop-down list of the ***Layer*** toolbar is the active layer. To change the active layer, simply select another layer from the drop-down list.



Isolate Active Layer

When a layer is *isolated*, it is the only visible layer. To isolate a layer, first make sure it is the active layer as described above and then click the Isolate Active Layer button.

The Isolate Active Layer button will remain in the down position as long as the active layer is isolated. Press the button again to show all the visible layers.

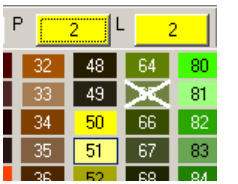
Point and Line Color

You can change the line and point colors from the Layer Management dialog box, but a faster method is to change them directly from the Layers toolbar.

Select the layer that contains the point or line color that you want to change from the drop-down list in the Layers toolbar. (Make this the active layer.)

Click on the ***P*** Color button to change the color of the points on the active layer or press the ***L*** Color button to change the color of the lines.

Select the desired color from the color map.



NOTE: The X through a color indicates that the color is used as the background or highlight color. That color can still be used on an object, but it is not recommended since the object would then be impossible to see or appear highlighted when it was not.

Special layers

ForeSight DXM may create several special layers for you.

The Control Layer

If you have imported control points into a Job file and then moved that data into the project, all the points from the CONTROL layer in the Job file will be placed on the CONTROL layer. The control layer in the project simply helps organize data so you can determine where that data came from.

In the Job file, the CONTROL layer works in much the same way. The CONTROL layer just lets you know that the points on this layer were imported from another Job as control.

The 0 Layer

All projects will have a Layer 0. You will not be able to delete it. ForeSight DXM requires at least one layer so if no other layer is available, the 0 Layer becomes the default.

The Scratch Layer

ForeSight DXM has a layer that is especially easy to erase – the SCRATCH layer. Construction lines are placed on the SCRATCH layer for easy removal.

There are three ways to erase the scratch layer:

Menu:	***View*** **|** ***Erase Scratch***
Keyboard:	(CTRL + E)
Toolbar:	 Erase scratch layer button

Construction lines

When you inverse between two points, ForeSight DXM may (depending on your settings) draw a line between them. We call this line a construction line. It is placed on the SCRATCH layer and erased when the SCRATCH layer is erased.

You can't directly add objects to the SCRATCH layer.

Layer tips

Experienced CAD operators tend to use more layers than beginners. Experience shows that organizing your drawing into different layers can speed up your work.

When a dialog has an option to create a new layer, it is often a good idea to create a new layer.

You can use the layer toolbar to find out what is on each layer of your drawing. First, click on the  Isolate Active Layer button. Then select the first layer in the active layer drop down list. Finally press the down arrow key. The selection in the active layer list will move to the next layer in the list. The drawing area will show only the objects on the new layer. Continue pressing the down arrow until you have viewed all the layers.

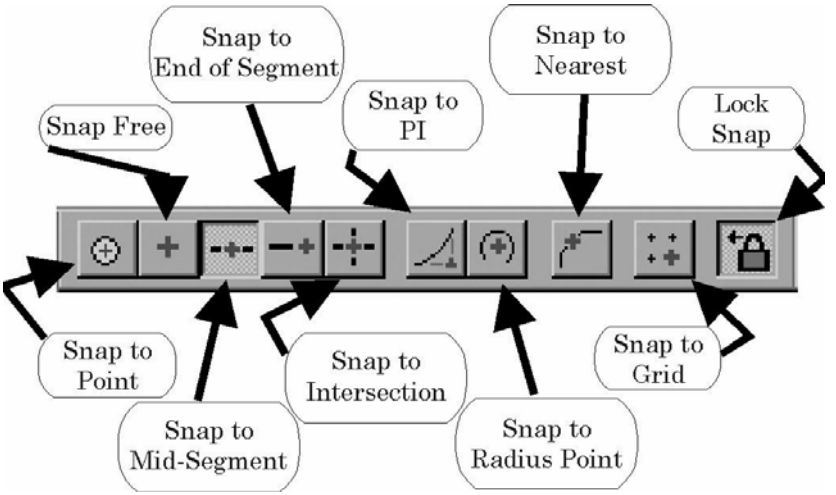
Snap Settings

Snap is the behavior of the cursor, which allows it to "lock on" to a nearby object or an attribute of the object. Snaps let you create points and compute exact coordinates by clicking near the location that you are interested in. Snaps work by getting the position information that you want from objects on the screen. For example, if you wanted to put a new point at the intersection of two polylines then there is a snap that will accurately place the point.

The Snap Toolbar

The Snap toolbar contains buttons that let you choose one of nine different snap modes. The snap functions are described in the next section. Below is a diagram showing the button for each snap mode. It is important to remember that the snap set using the toolbar will override the default snap settings defined in ***File*** | ***Preferences*** | ***Snap***.

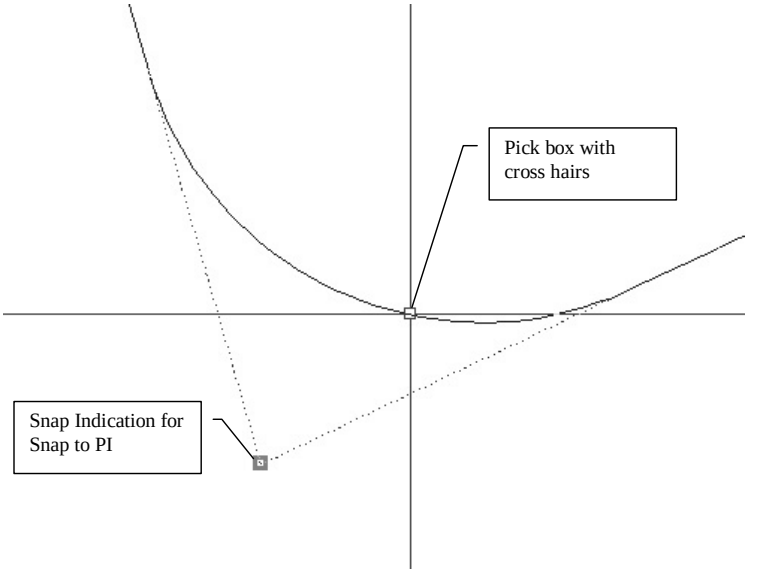
The ***Lock Snap*** button maintains your current snap mode after you have made a selection. If the ***Lock Snap*** button is not depressed, the mode button will disable itself after a selection, returning to the ***Default snap*** setting.



Snap Modes

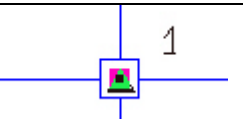
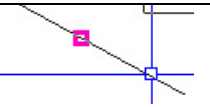
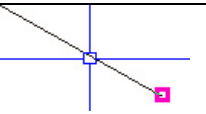
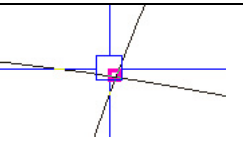
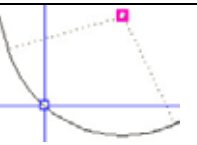
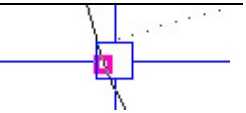
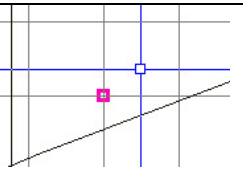
In general, a part of the appropriate object must pass or lie inside the pick box in order for the snap to be effective (except when in "***Snap Free***" mode). The appropriate part of the object for each mode is indicated below.

When you use the pick box to select a target for an operation, such as drawing a polyline, ForeSight DXM will show you the location of the snap with a floating pick box, called the Snap Indicator, drawn in your highlight color.



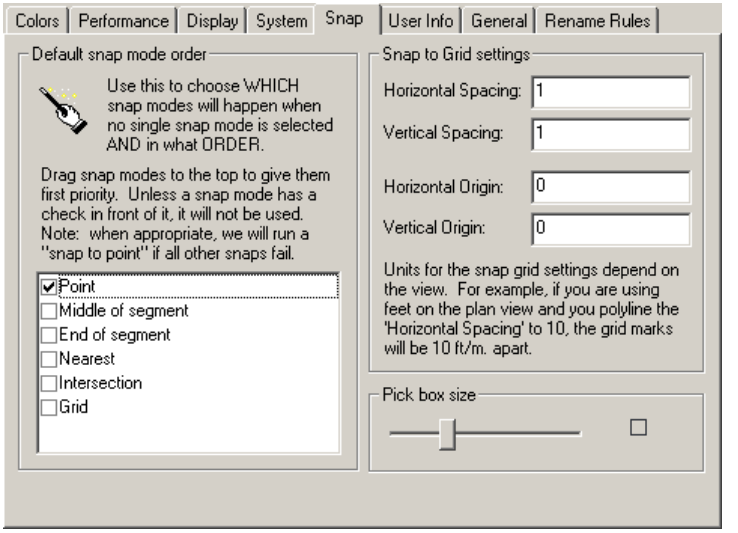
ForeSight DXM will also show you the coordinates of the pick box position under the lower left corner of the Plan View.

NOTE: There are several terms used to describe the mouse pointer in this manual. **Cursor** is used to describe the pointer when it is held over the menu or a dialog box. **Pick box** is used to describe the pointer when it is over the drawing area in any View. The term mouse is also used as a generic term for the mouse pointer.

	***Snap to Point***	The cursor will only snap to an existing point. The point must be inside the pick box when you click to select the point.	
	***Snap Free***	ForeSight DXM will snap to the coordinates at the center of the pick box when you click.	
	***Snap to Mid-segment***	ForeSight DXM will snap to the middle of the segment of a polyline or alignment. The snap position will be on the line.	
	***Snap to End of Segment***	The cursor will snap to the nearest end of a line segment. Part of the line must pass inside the pick box when you click to select the end of the segment	
	***Snap to Intersection***	The cursor will snap to the intersection of two lines when both lines are inside the pick box.	
	***Snap to PI***	The cursor snaps to the Point of Intersection of the arc or spiral under the cursor. Some part of the arc or spiral must lie inside the pick box to find the intersection point.	See graphic on previous page.
	***Snap to Radius Point***	The cursor snaps to the radius point of an arc. Some part of the arc must be inside the pick box when you click to find the radius point.	
	***Snap to Nearest***	The cursor snaps to the location on a line which is the nearest to the center of the pick box.	
	***Snap to Grid***	This setting causes the snap to lock on to a pre-defined grid location that is closest to the cursor. The grid is set in ***File*** | ***Preferences*** | ***Snap***.	

Snap Defaults

The default snap modes can be accessed using the ***File*** | ***Preferences*** | ***Snaps***. This screen is explained on Page 37.



Points, Polylines and Alignments

Overview

Points, Polylines and Alignments are all integral objects used in both ForeSight DXM and Survey Pro. This section will discuss adding and editing these objects.

Polylines are used throughout ForeSight DXM for everything from defining boundaries when computing areas to defining a traverse. Understanding polylines is crucial to understanding ForeSight DXM.

Alignments are another type of line used in ForeSight DXM, but Alignments are different from polylines in two ways. Alignments do not require any points to be defined, whereas polylines are simple line segments between existing points. Alignments can contain vertical curves and complex horizontal curves whereas polylines can only contain straight lines and simple horizontal curves.

Points

Add / Edit Points

The ***Add / Edit Points*** is a dual use routine. It allows the editing of both an existing point, or to create a new point. ***Add / Edit Point*** can only be used to edit or create one point at a time. See the section on Edit Multiple Points for information on how to edit multiple points.

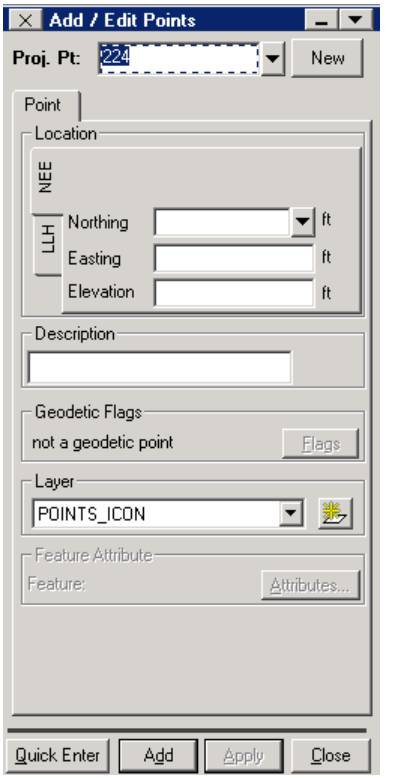
Open the ***Add / Edit Points*** dialog by selection ***Map*** | ***Add Edit Points***. You will need to have points in the project or an open job file in order to edit points.

The dialog will open in Add mode. This means that there will be a new point number in the ***Point*** field and the values for the point will be ready for editing. The routine will switch from Add mode to Edit mode if an existing point is selected. Conversely, if you are currently editing an existing point, and you type in a new point number or click on the ***New*** button, the routine will switch to Add mode.

Add Mode

Add mode means that the Add / Edit Points routine is ready to add a new point to the project or the job, whichever you are currently working in. Add mode has all the fields enabled and ready for data.

To add a point:



1. Type a new point name into the Point field, or click on the [***New***] button. The [***New***] button will increment the last point in the file and place this in the field. If your last point is point 51, then 52 will be placed in the field. For alphanumeric points, if 'Last1' is your last point then 'Last2' will be placed in the field.
2. Enter new coordinate values. You can type these values in, click anywhere on the map view, or use snaps to select positions from objects. You can also select the ***Elevation*** field independently to select elevations from the map. It is also possible to leave the ***Elevation*** field blank, as ***2D*** surveys are supported in ForeSight DXM.
3. Enter a description in the ***Description*** field and select the appropriate layer for the point.
4. If the point has geodetic coordinates, the geodetic flags can be edited by clicking the [***Flags***] button.
5. Once you are satisfied with the values, click on the [***Add***] button. The new point will be added to the file. The ***Point*** field will increment to the next available point name.

You can also add geodetic coordinate values using the ***LLH*** tab on the side of the ***Location*** section. The ***LLH*** location fields work the same as the ***NEZ*** fields, but ***NEZ*** field values are required before storing the point. They can be set to 0 if required.

Notice that in the button row at the bottom of the dialog box, there is a button labeled ***Quick Enter***. This is a way to streamline your entry of new points. You can select which fields to automatically advance to when entering points.

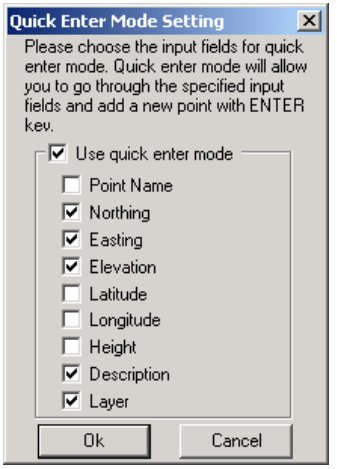
Editing Geodetic Flags

When the [***Flags***] button is selected from the Geodetic Flags group, the Geodetic Flags dialog appears. This dialog is used to edit the set up group and geodetic control point flags for a single point, or for multiple points. When editing a multiple points, you can choose to modify only the setup group, only the control point flags, or both. When editing a single point, you will update both the setup group and the geodetic control point flags.

Select the options you want and click ***OK***.

Using Quick Enter

1. Click on the ***Quick Enter*** button.
2. Select your settings. For example, if you want to enter points with the same elevation, description and layer, and want the points to be sequential, starting at 1, then select ***Northing***, ***Easting*** only. Click on [***OK***] to save the settings and close the dialog box. ForeSight DXM will remember these settings.



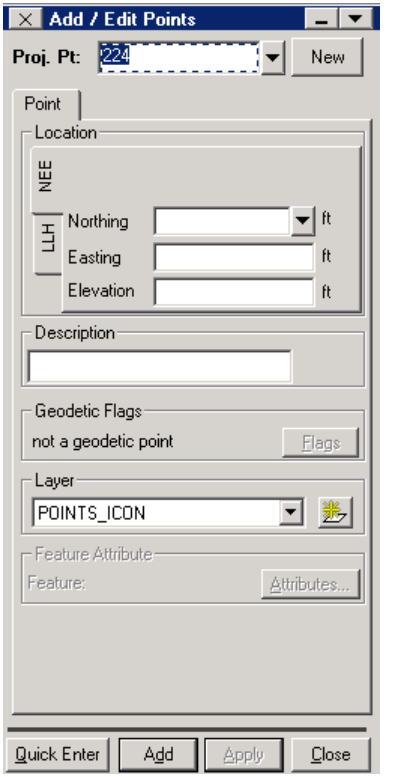
3. Type in 1 into the ***Point*** field. Press ***Enter***.
4. The focus will switch to the ***Northing*** field. Enter your value and press ***Enter***.
5. The focus will switch to the ***Easting*** field. Enter your value. Press ***Enter***
6. The point will be added as soon as you press ***Enter***. The focus will change back to the ***Northing*** field and the point name will increment by 1.

If you do not wish to use ***Quick Enter***, click on the [***Quick Enter***] button and clear the ***Use quick enter field*** and click on [***OK***].

Note: When using Quick Enter, the Enter button on your keyboard will advance through the selected fields. The Tab button will advance the focus to the next field, just like in normal editing mode.

Edit Mode

Edit Mode is enabled whenever an existing point is selected by either clicking or typing in a point name. Edit mode will initialize with the entry fields disabled. To edit a particular field, you will need to click on the check box for the section the field is in.

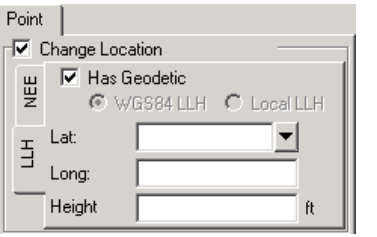


Editing a Point

1. Select a point to edit by selecting the point from the map, or from the edit grid.
2. Click on the check box for the section you want to edit.
3. Make your changes and then click [***Apply***]. The changes will be saved. If you click [***Close***] prior to clicking [***Apply***], the changes will not be saved.

Using Geodetic

If your point has a geodetic location, LLH, as well as a NEZ location, you can add that data using the ***LLH*** tab in the ***Location*** section. You can add LLH information to points even if you do not have a projection assigned, but the program will warn you that it cannot verify the NEZ location to the LLH location. If you wish to keep the LLH data, select to do so, if not select to not save.



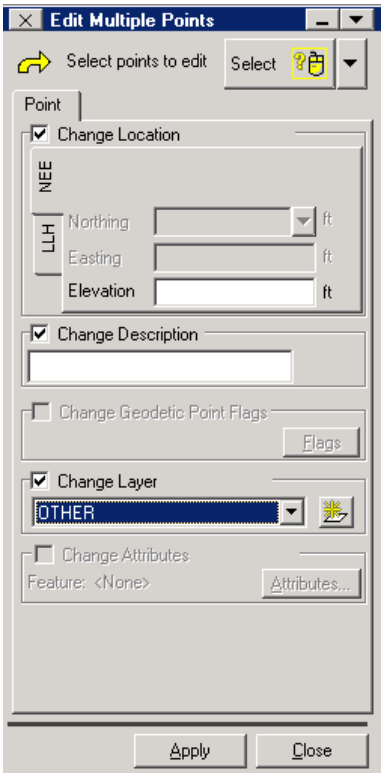
1. Select a point to edit
2. Click on the ***Change the location of this point*** check box to activate the section.
3. Click on the ***LLH*** tab and enter your values. You can also click on an existing GPS point to get the values, or anywhere on the screen if you have a projection solved.
4. Click the [***Apply***] button.

If you have no projection assigned, you will be warned that the program cannot verify the NEZ location with the LLH location. Choose the option that you want from the warning dialog box.

If you do have a projection solved, you may be warned that the plane and geodetic positions do not match. You will be offered the option to rectify the position based off of the current projection. If you decide to rectify the coordinates, you will be provided with a second option. You can choose to either hold the NEZ position or the LLH position. After making your selection the warning dialog box will close. You *must* then press the [***Apply***] button again to make the change permanent.

Edit Multiple Points

Edit Multiple Points is very similar to Add / Edit Points. The main difference is the ability to edit multiple points at once and the fact that you cannot add new points from this screen.



1. Click ***Map*** | ***Edit Multiple Points***.
2. Select the points you desire to edit. Selections can be made from the map by clicking or dragging a window, by using the [***Select***] button, by loading from a saved selection or by clicking in the Coordinates view window. The Coordinates view window will show the selections made.
3. Click on the appropriate check box for the section you wish to edit. For example, if you wish to change the layer for all the points, click on the ***Change layer*** check box.
4. Make the changes that you desire. You will not be allowed to change the location of all the points to the same place, but you can change the elevation for all the points selected.
5. Click on the [***Apply***] button to save the changes. Clicking [***Close***] without clicking on the [***Apply***] button will close the dialog box and not save the changes.

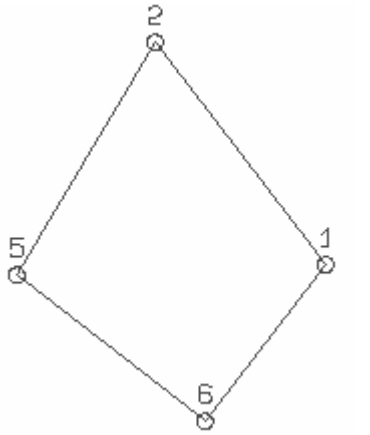
Working with 2D Points

ForeSight DXM allows you to process data files and create projects, with two dimensional survey data. Two-dimensional points are noted by having "---" in the elevation field. It is important to remember that a ***2D*** data point can never lead to ***3D*** data. For example, a two dimensional point, which is used to calculate an inverse between itself and another point, can only result in a two-dimensional solution. No elevation data will be generated.

Some other routines, which will be affected by having ***2D*** data, include: ***Add/Edit Alignments*** (no vertical segments will be possible), ***Translate*** and ***Scale*** (elevation changes will only be applied to those points with a current elevation), and ***Cut Sheet Reports*** (no cut/fill information will be generated).

Polylines

A polyline is an object that joins points together with lines and arcs. A polyline is made up of segments that are drawn between existing points. The figure here shows a closed polyline. The polyline was drawn between points 5, 2, 1, 6 and 5 again to close the polyline. As you can see, there are four segments in the polyline.



Creating Straight Polyline Segments

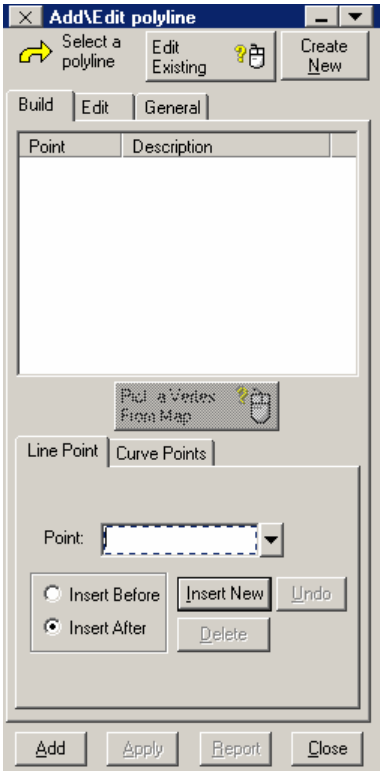
Before you can create a polyline, you need some points. Open any project that contains some points using ***File*** | ***Open***.

You should have the point labels (***View*** | ***Point Labels***) turned on to make it easier to select points.

Change the active layer to where you want the polylines stored. You can also create a new layer using the Add Layer button and make the new layer the active layer.

Creating Polylines by Clicking Points

There are three different ways to add straight polyline segments to a drawing. The first one is to click on each point that you want in the polyline as described below.



1. Select ***Map*** | ***Add / Edit Polyline*** to open the ***Add / Edit Polyline*** dialog, or simply use [Ctrl]-[S] the keyboard shortcut.
2. With the ***Line Point*** tab selected, click inside the ***Point*** field so that it is active.
3. Click on the point on the map that you want to use as the first point in the new polyline. Now as you move the mouse, you will see an anchor line drawn from this point to the current mouse position. This anchor line is simulating the next segment that will be added to the polyline.

Note: There is a shortcut for the above steps. Right-click on the starting point and select ***Build Polyline...*** from the context menu.

4. Click on the remaining points in the polyline. By default, each new point will be added after the previous point in the point list, but clicking the ***Insert Before*** radio button will result in new points being added before the selected point.
5. When you are finished creating the polyline, click the bottom-left [***Add***] button. Once you close the ***Add/Edit Polyline*** dialog box, the polyline will appear as a solid line on the map.

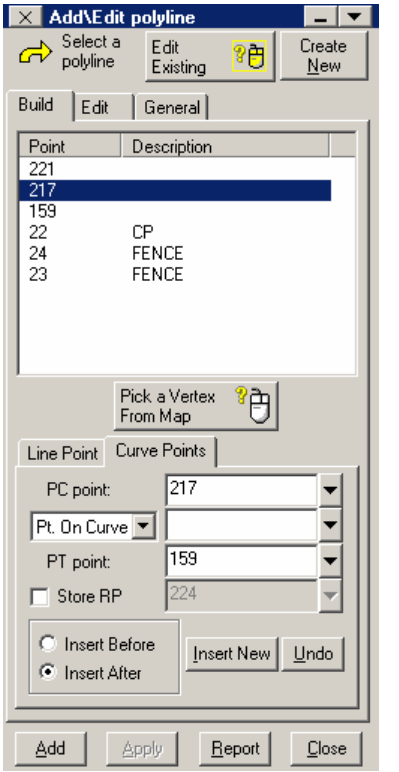
Creating a Polyline by Entering a List of Point Numbers

Another way to create a polyline is to type in a list of the points that define the polyline.

1. From the ***Add/Edit Polyline*** dialog box, enter the first point for the polyline in the Point field and tap the [***Insert New***] button located in that section.
2. Continue adding the point numbers until all the points are entered and finally tap the [***Add***] button.

Creating a Curved Segment

A polyline can contain a curve as long as the PC and PT points exist in the project, along with a third point. The third point can be either a ***Radius Point***, the curve's ***PI Point***, or another point located anywhere on the curve segment (***Pt. On Curve***).



Note: Additional options for defining a curve are available when using the Edit Curve routine, described later.

1. With the ***Build*** tab selected in the ***Add/Edit Polyline*** dialog box, select the ***Curve Points*** tab.
2. With the PC and PI known, select if the remaining point of the curve is a ***Radius Point***, a ***PI Point***, or a ***Pt. On Curve*** from the drop down list.
3. Click in the ***PC Point*** field and then enter its point number or click on the PC point in the map view.
4. Enter the point numbers for the two remaining points, or click on them in the map view.
5. Click the [***Insert New***] button. The curve will then be added to the point list and will be displayed in the map view.

Deleting a Polyline

The easiest way to delete a polyline is to right-click on the polyline and select ***Delete Polyline*** from the context-sensitive menu.

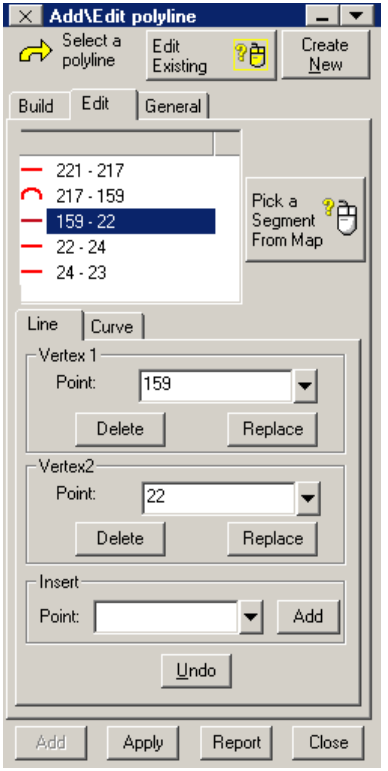
Editing Polylines

An existing polyline can be edited as follows.
Select ***Map*** | ***Add / Edit Polyline*** to open the ***Add/Edit Polyline*** dialog, or simply right-click on the polyline you want to edit and select ***Edit Polyline*** from the context-sensitive menu.

Adding to an Existing Polyline

You can add a segment to the polyline while the ***Build*** tab is selected. Simply select the point from the list that will be a vertex to the new segment and fill in the ***Line Point*** section or ***Curve Points*** section to define the new line or curved segment just as you did when creating the polyline.

Editing a Straight Polyline Segment



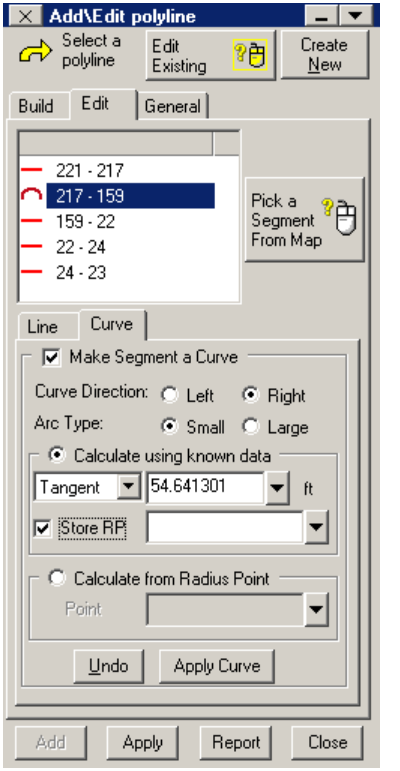
Select the ***Edit*** tab from the ***Add/Edit Polyline*** dialog if you want to modify or delete any existing data for the selected polyline.

Each segment of the polyline will be listed here. Clicking on any particular segment from the list will make that segment stand out in the map view.

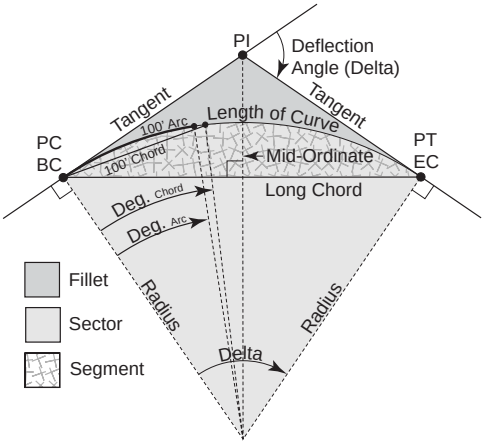
When editing a straight segment, either vertex that defines that segment can be deleted or replaced. To delete a vertex, click the [***Delete***] button that corresponds with the vertex you want to delete. The resulting polyline can be viewed on the map. To replace a point number for either vertex of the selected segment, enter the new point number in the appropriate field and press the corresponding [***Replace***] button.

Editing a Curved Polyline Segment

An existing curved segment can be edited or a straight segment can be turned into a curved segment.



1. From the ***Add/Edit Polyline*** dialog box, select the ***Edit*** tab, and then select the curved segment from the list that you want to edit or the straight segment that you want to change to a curved segment
2. Select the ***Curve*** tab to access the curve editor and check the ***Make Segment a Curve*** checkbox.
3. In the ***Curve Direction*** field, select if the curve turns to the ***Left*** or ***Right*** (from the PC to the PT).
4. In the ***Arc Type*** field, select if the curve is ***Small*** (less than 180°) or ***Large*** (greater than 180°).
5. You can input the curve data in either of the following two ways:
    a. Select the ***Calculate using known data*** radio button and select the desired length or angle method from the drop-down list, then define that length or angle in the corresponding field. You can optionally store the radius point by checking the ***Store RP*** checkbox and entering a point number for it in the corresponding field.



i. ***Length*** (arc length)

ii. ***Tangent*** (length from PC to PI)

iii. ***Delta*** (PC-RP-PT angle)

iv. ***Mid***. (Mid Ordinate length)

v. ***External*** (length)

vi. ***Arc deg***. (angle)

vii. ***Chord deg***. (angle)

b. Select the ***Calculate from Radius Point*** radio button and enter the point number in the corresponding ***Point*** field, or click within the field and then click on the radius point from the map.

6. Click the [***Apply Curve***] button followed by the [***Apply***] button.

Note: If the straight polyline segment is still visible, click the Erase Scratch Layer button, or select ***View*** | ***Erase Scratch***, or use the [Ctrl]-[E] keyboard shortcut.

Changing a Polyline's Description

1. Click the ***General*** tab in the ***Add/Edit Polyline*** dialog.
2. Check the ***Change the description of the object(s)*** checkbox.

Changing a Polyline's Layer

1. Click the ***General*** tab in the ***Add/Edit Polyline*** dialog.
2. Check the ***Change the layer of the object(s)*** checkbox.
3. Select the new layer for the polyline from the corresponding drop-down list, or create a new layer using the New Layer button.
4. Click [***Apply***].

Alignments

Alignments typically describe the centerline of a road. An alignment can be used on the data collector in the Offset Staking, Offset Points, Offset Lines, and Slope Staking screens. Unlike polylines, alignments do not need points for the locations where the alignment changes (called *nodes*).

Alignments are created by separately defining the horizontal and vertical details of a line. Although no points are required to define an alignment, the starting position must be tied to a specific location in the current job, called the POB, which can be defined by an existing point or known coordinates.

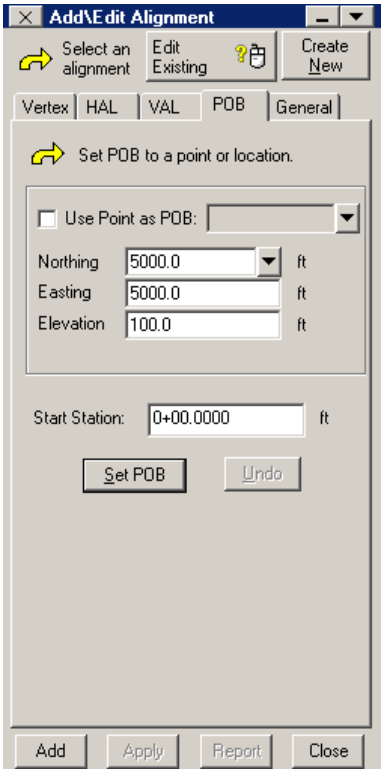
The horizontal and vertical details of an alignment are defined in sections. The first horizontal and vertical section always begins at the same specified starting location and each new segment is appended to the previous horizontal or vertical segment.

Once all the horizontal and vertical alignment segments are defined, ForeSight DXM merges the information to create a single 3-dimensional line. An existing alignment can later be edited or deleted, but in the example below, we will create a new alignment.

The vertical alignment (VAL) must be equal in length or greater than the horizontal alignment. The HAL must not be greater than the VAL.

Creating an Alignment

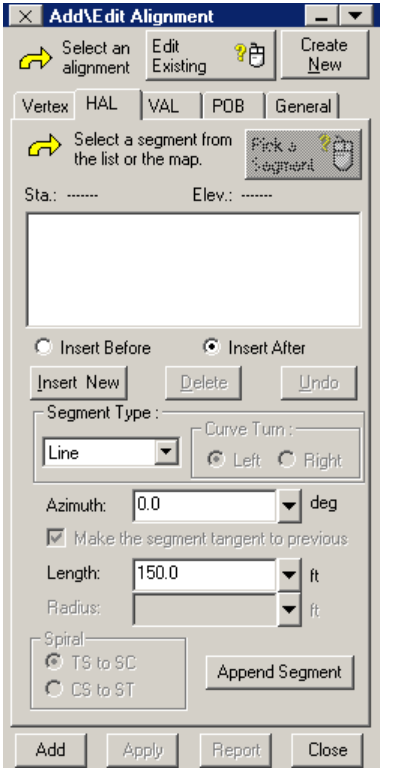
In this step-by-step example, we will create an alignment that has all the possible horizontal and vertical segment types.

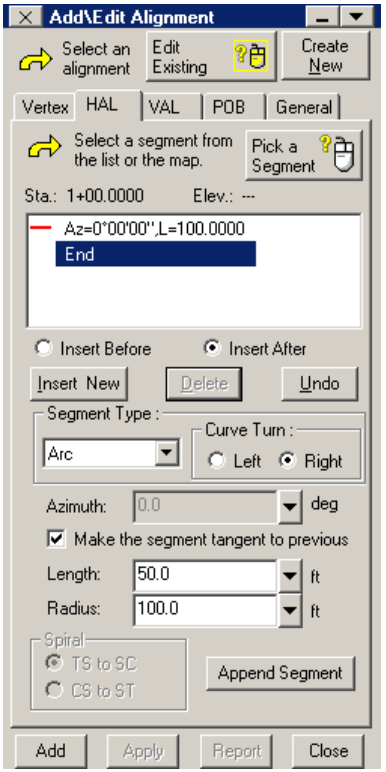


1. Select ***Map*** | ***Add/Edit Alignments***.
2. Click the ***POB*** tab, if it isn't already selected and enter a ***Northing***, ***Easting*** and ***Elevation*** of 5000, 5000, 100, respectively. The beginning of the alignment will then be anchored to this location. You could alternatively check the ***Use Point as POB*** checkbox and enter or select a point number in the corresponding field to define the POB using an existing point from the project.
3. Any location along the completed alignment will be specified in stationing, beginning from the ***Start Station***. For simplicity, leave the ***Start Station*** at ***0+00*** and click [***Set POB***]. This will set the start station and automatically open the ***HAL*** screen where you can begin defining the horizontal portion of the alignment.

Horizontal Alignment

1. We will first enter a straight line segment with an azimuth of 0 and a length of 150. With the ***HAL*** tab selected, make sure ***Line*** is selected for the ***Segment Type***. In the ***Azimuth*** field, enter ***0*** and in the ***Length*** field, enter ***150***.
2. Click either [***Insert New***] or [***Append Segment***] to enter the first HAL segment. (If the segment is not visible in the Plan View, click the Zoom Extents button.)





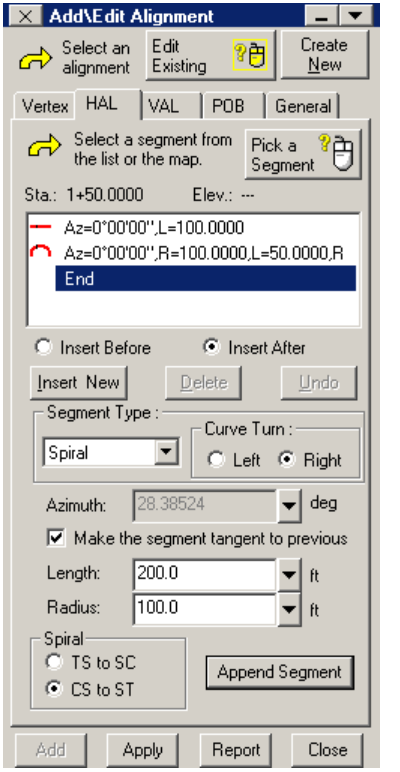
3. We will now add an arc to the alignment. Make sure ***End*** is selected in the list of segments. For the ***Segment Type***, select ***Arc***. For the ***Curve Turn***, select ◉ ***Right***.
4. Check the ***Make the segment tangent to previous*** checkbox so the curve will automatically transition smoothly from the previous segment.
5. Enter a ***Length*** of ***50*** and a ***Radius*** of ***100*** and click either [***Insert New***] or [***Append Segment***] to add the segment to the horizontal alignment.

Note: A new segment can be inserted before or after the selected segment by using the [***Insert New***] button and choosing either ◉ ***Insert Before*** or ◉ ***Insert After***.

Note: When any segment is selected in the list of segments (***End*** must not be selected), The [***Append Segment***] button changes to [***Update Segment***] and can be used to make changes to the selected segment. The selected segment is shown in the Plan View as a bold line.

6. Now we will add a spiral curve to the horizontal alignment. For the ***Segment Type***, select ***Spiral*** and for the ***Curve Turn***, select ***Right***.
7. Check the ***Make the segment tangent to previous*** checkbox.
8. Enter a ***Length*** of ***200***, a ***Radius*** of ***100***, and under ***Spiral***, select ***CS to ST***.
9. Click either [***Insert New***] or [***Append Segment***] to enter the spiral segment to the horizontal alignment.

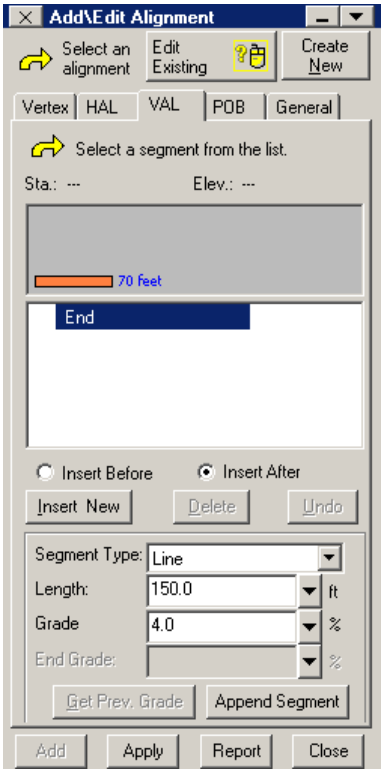
We have now added all available horizontal segment types. Next, we will define the vertical alignment.



Vertical Alignment

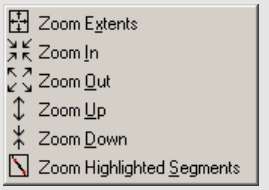
The horizontal and vertical alignments are defined independently, but they always begin at the same POB.

1. Start by clicking the ***VAL*** (Vertical Alignment) tab and select the ***Insert After*** radio button.



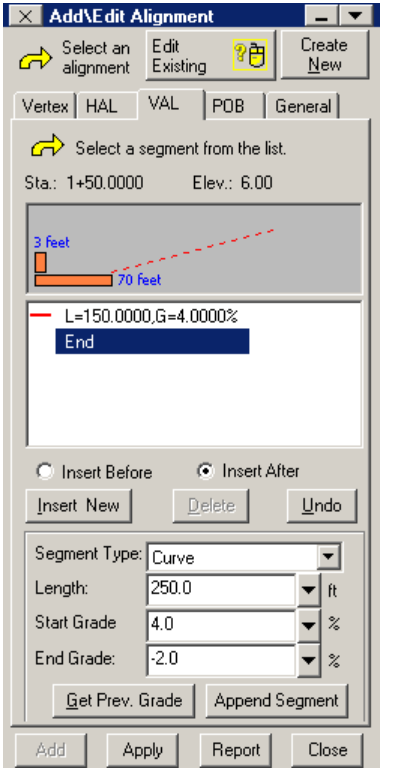
2. We will first enter a vertical grade of +4%. Change the ***Segment Type*** to ***Line*** and insert a ***Length*** of ***150*** and a ***Grade*** of ***4***.
3. Tap either [***Insert New***] or [***Append Segment***] to add the segment to the vertical alignment.

Tip: Right-clicking within the VAL preview window will open a context-sensitive zoom menu that allows a variety of zoom option for the preview. You can also drag the contents of the VAL preview around with the left mouse button.



4. Now we will enter a parabolic vertical curve. Change the ***Segment type*** to ***Curve*** and enter a ***Length*** of ***250***.
5. Click [***Get Prev. Grade***] to set the ***Start Grade*** to ***4.0*** from the previous vertical segment.
6. Enter an ***End Grade*** of ***-2*** and click [***Insert New***] or [***Append Segment***] to add the segment to the vertical alignment.

You have now created a new alignment using all the available types of segments.



Note: If the horizontal and vertical alignments end at different stations, they can only be processed in the staking routines as far as the end of the shortest alignment.

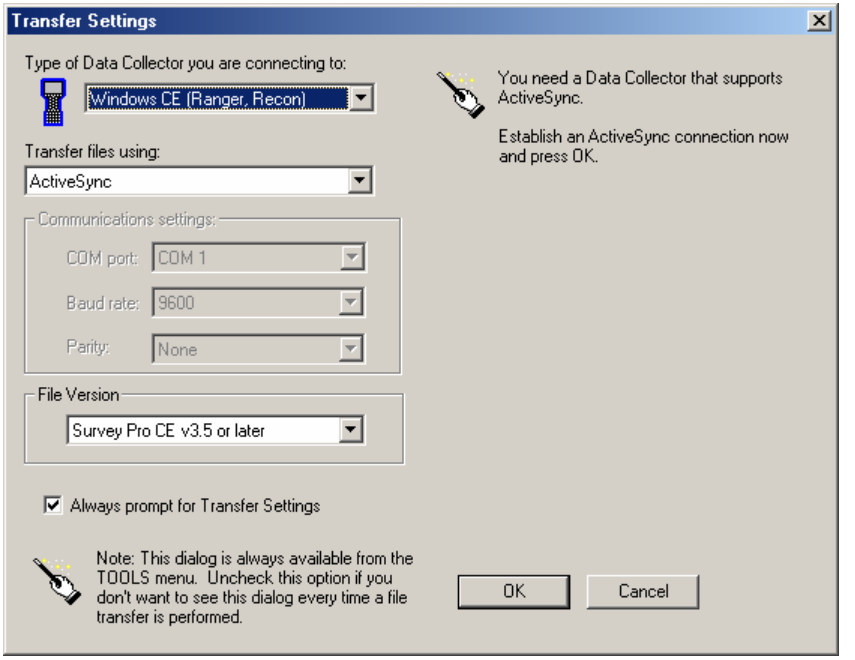
Transfer

This section will guide you through transferring to and from your TDS data collector or Nikon total station. There are four possible modes that you can use: *Microsoft ActiveSync*, *Kermit Server Mode*, *Kermit Manual Mode*, or transfers with a *Nikon Total Station*, which is similar to Kermit Manual Mode. Each mode is described below.

Note: ActiveSync mode is strongly recommended for all Windows CE-based data collectors. It provides more user-friendly two-way communications and also allows the use a faster USB connection for transfers. ActiveSync can be installed from the TDS Works CD or downloaded from Microsoft.com.

The routines of ***Get File from Data Collector*** and ***Send Job to Data Collector*** are specifically designed for use in conjunction with a ForeSight DXM project. Prior to using these routines, it is best to have selected a name and a location for the project and then save it. In this way, the files that are downloaded will be saved to the proper project folder. If you are currently working in an Untitled project, it is best to use the ***Send / Receive*** routine. ***Send / Receive*** allows the selection of a destination folder independent of the project.

Transfer Settings



1. Before performing a transfer, the transfer settings should be configured. Select ***Transfer*** | ***Transfer Settings...*** to open the ***Transfer Settings*** dialog box.
2. Select the type of data collector you are connecting to from the upper drop-down list. The type of data collector selected will determine which options are available in the remaining fields.
3. In the ***Transfer files using:*** field, select the transfer mode that you want to use from the following options. (This option is not available when transferring with a Nikon total station.)
    a. ***ActiveSync***: This is only available on data collectors with Windows-based operating systems, and when the ActiveSync software is installed on the PC. This is the best choice when it is available.
    b. ***Kermit Server Mode***: This is the best option to use when ActiveSync is not available. This option is available on most data collectors

except for the HP48. The data collector must be manually set to server mode before transfers can occur.

c. ***Kermit Manual Mode***: This is the only option available for the HP48 platform.

4. Configure the ***Communication settings***. (These are not applicable when transferring with ActiveSync.)

   a. ***COM Port***: This is the COM Port on the PC that the data collector cable is plugged into.

   b. ***Baud rate***: This must match the baud rate set in the data collector for file transfers.

   c. ***Parity***: This must match the parity set in the data collector for file transfers. If you are unsure, select ***None***.

5. Select the ***File Version*** that describes the type of file on your data collector. (The options here will vary depending on the selected data collector.)

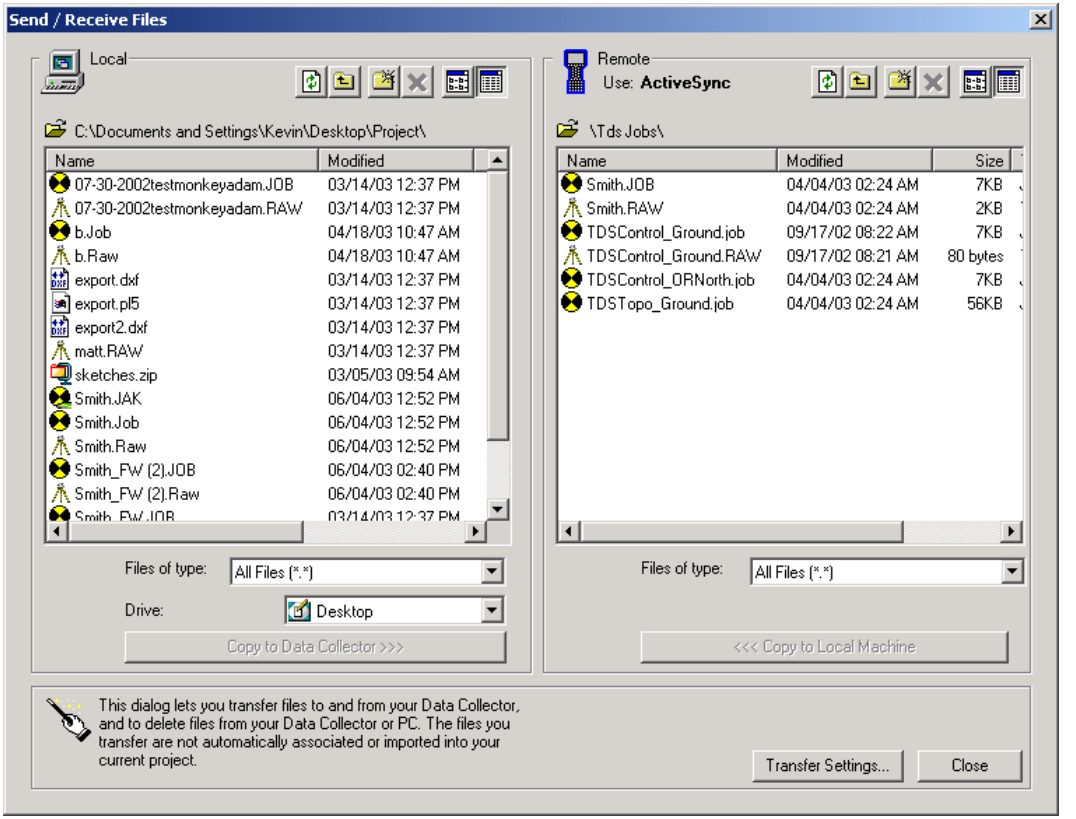
6. Checking the ***Always prompt for Transfer Settings*** checkbox will result in the ***Transfer Settings*** dialog box to appear prior to starting any file transfer routine.

7. Click the [***OK***] button.

Send / Receive Files

The ***Transfer*** | ***Send Receive Files*** dialog box is used to transfer files between the data collector or total station, and the PC. The options available will be different depending on if you are connecting using ActiveSync, Manual Mode, or to a Nikon total station.

Send / Receive using ActiveSync or Server Mode



When accessing the ***Send Receive Files*** dialog box using ActiveSync or Server Mode, you not only can send and receive files; you can view the files on both systems simultaneously. You can also create new folders and delete files or folders.

1. Connect your data collector to the PC.
    a. If using ActiveSync, be sure ActiveSync detects the device and makes a connection.
    b. If using server mode, enable server mode on the data collector.
2. In ForeSight DXM, select ***Transfer*** | ***Send Receive Files*** to open the ***Send Receive Files*** dialog box. The contents of the PC are displayed on the left side and the contents of the data collector are displayed on the right.
3. Typically you will navigate to the folder that contains the files that you want to transfer on the appropriate side of the dialog box, and navigate to the folder where you want to send the files to on the other side.
4. The ***Files of type*** drop-down list can be used to display only files of the selected type.
5. Select the file(s) that you want to transfer and click either the ***Copy to Data Collector*** or the ***Copy to Local Machine*** button, depending on which direction the files are being transferred.

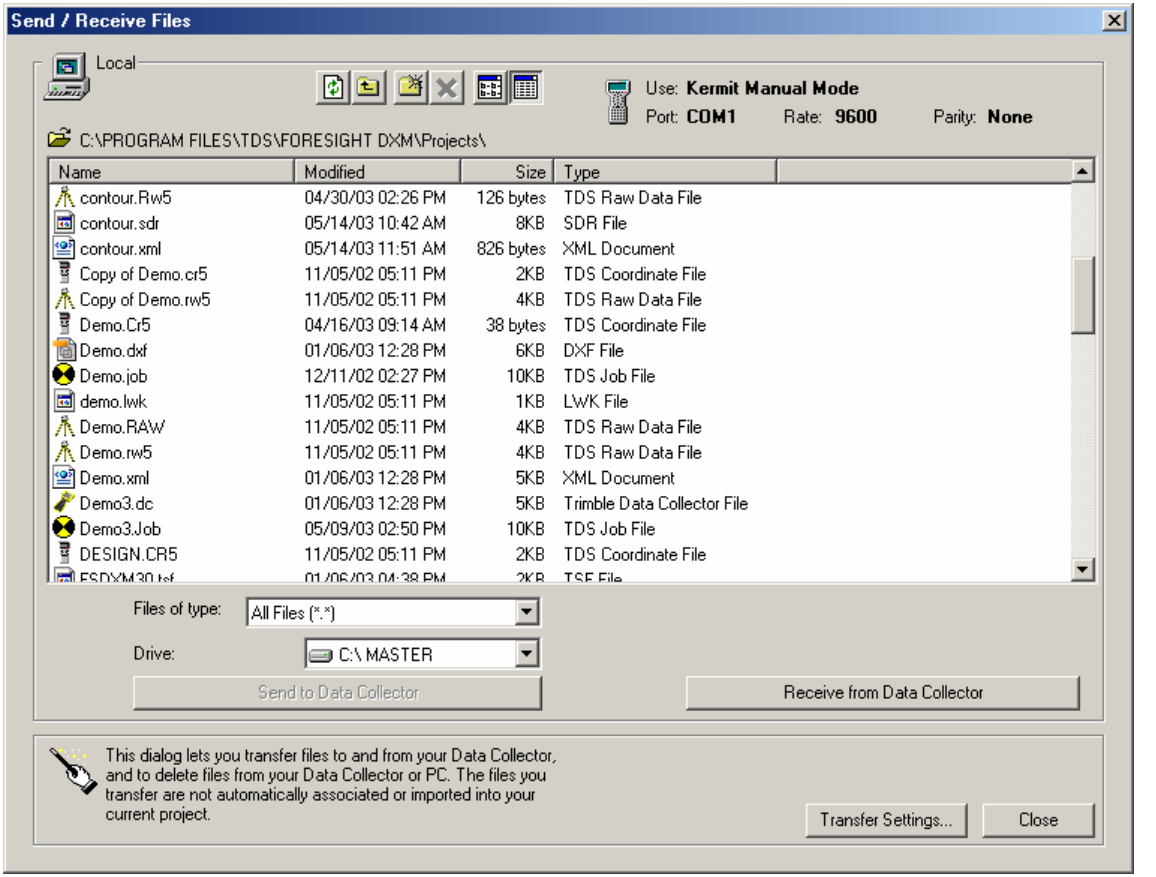
The following buttons are available in the ***Send Receive Files*** dialog box:

-  Refreshes the directory listing.
-  Moves up one level to the parent directory (folder).
-  Will create a new folder within the current folder.
-  Deletes the selected file(s) or folder.
-  Displays only the file names in the current folder.
-  Displays the file names, size, date, and type in the current folder.

Send / Receive in Manual Mode

When transferring files in Manual Mode, the files on the data collector are not visible from the PC and only a single file can be transferred at a time. This routine also requires interaction from both the PC and the data collector for successful transfers.

Make sure the ***Transfer Settings*** field is set to ***Kermit Manual Mode*** in the ***Transfer Settings*** screen.



1. Connect your data collector to the PC.
2. In ForeSight DXM, select ***Transfer*** | ***Send Receive Files*** to open the ***Send Receive Files*** dialog box. The contents of the PC are displayed.

To send a file to the data collector from the PC

3. On the PC, navigate to the folder that contains the file that you want to transfer and click once on that file to select it.
4. Click the ***Send to Data Collector*** button on the PC.
5. On the data collector, initiate the Receive File command from the transfer menu and then click ***OK*** at the prompt on the PC to send the file.

To send a file to the PC from the data collector

3. On the data collector, choose the SEND option from the Transfer menu and locate the file you want to send.
4. On the PC, press the ***Receive from Data Collector*** button.
5. On the data collector, send the file. (On the HP48, you would highlight the file and press the [SELCT] softkey.)
6. Repeat these steps for any additional files that you want to send.

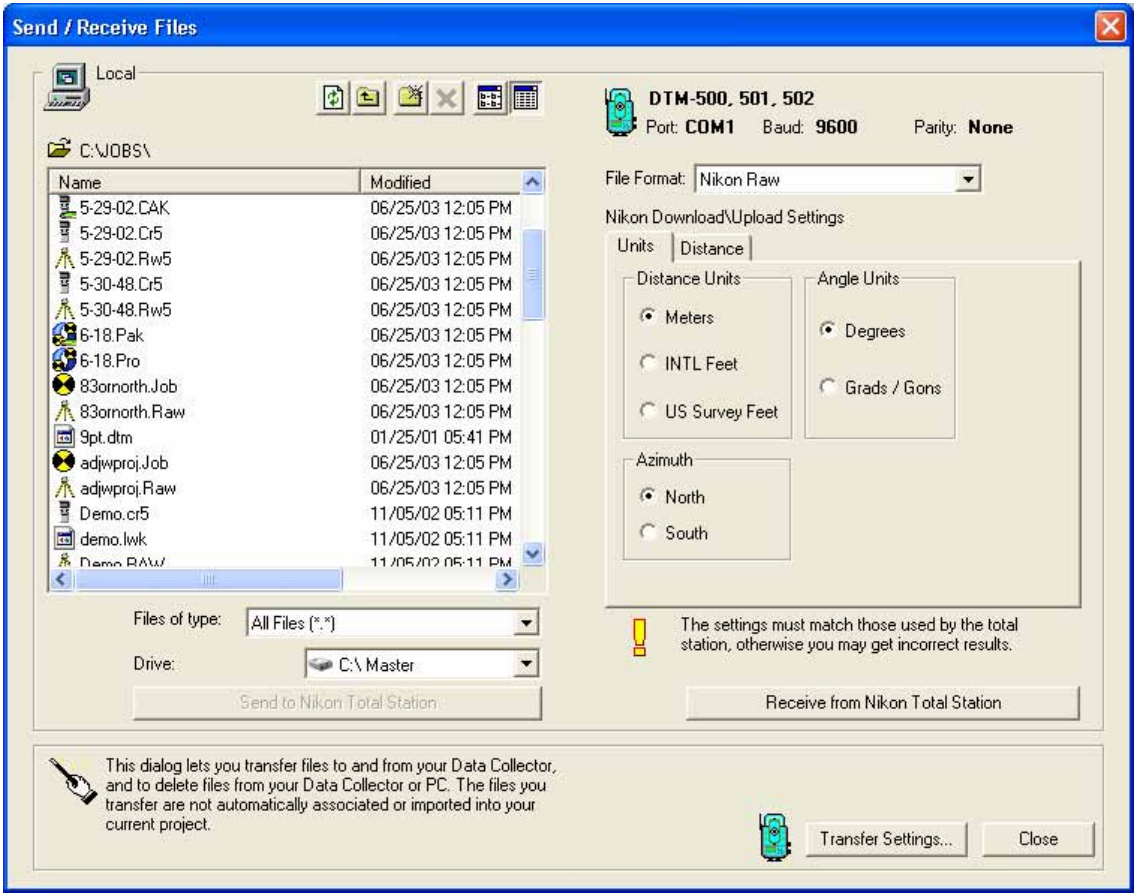
Send / Receive to a Nikon Total Station

When transferring files to a Nikon total station, the process behaves much like transferring in Manual Mode since the files on the total station are not visible from the PC and interaction from each platform is required for successful transfers.

Nikon transfers require that some details of the file being transferred be specified since there is no way to determine this information automatically.

Some information is converted during the transfer so the resulting file can be used on the platform where it is stored.

The ***Type of data collector you are connecting to*** field must be set to ***Nikon Total Station*** in the ***Transfer Settings*** screen.



1. Connect your total station to an available serial (COM) port on the PC.
2. In ForeSight DXM, select ***Transfer*** | ***Send Receive Files*** to open the ***Send Receive Files*** dialog box. The contents of the PC are displayed on the left side of the screen.
3. On the right side of the screen, go through the settings under the ***Units*** and ***Distance*** tabs and configure them to match the details of the file you want to send.

Note: The file details must be configured correctly or else the values in the resulting transferred file will be incorrect.

4. The ***File Format*** field is used to define the type of file that is being transferred. The option titled ***Other*** in the ***File Format*** field is used when you are sending a file from the total station to the PC in a non-Nikon format (selected on the total station), such as an SDR file format.

To send a file to the total station from the PC

5. On the PC, navigate to the folder that contains the file that you want to transfer and click once on that file to select it.
6. Click the [***Send to Nikon Total Station***] button on the PC.
7. Follow the directions, which appear, being sure to start receiving on the total station prior to hitting OK on the PC.

Note: If the source file on the PC contains coordinate data as well as other types of data, only the coordinate data will be transferred to the Nikon total station.

To send a file to the PC from the total station:

5. On the total station, select the file.
6. On the PC, press the [***Receive from Nikon Total Station***] button.
7. Follow the directions, which appear, being sure to press OK on the PC prior to starting to send the file from the total station.

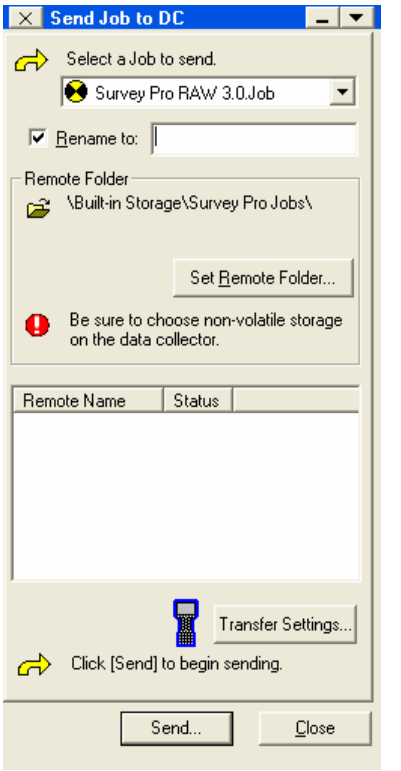
Send Job to Data Collector

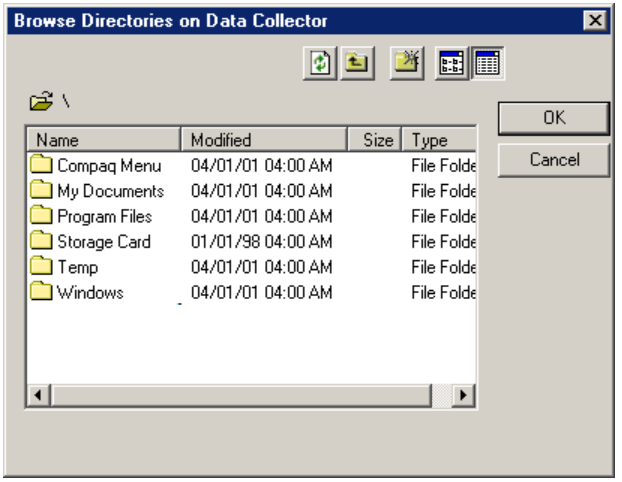
Any jobs that are linked to the current project can be easily sent to the data collector using the ***Send Job to Data Collector*** routine. The format of the file that is sent and how it is sent depends on the type of data collector that the file is being sent to as well as the method the file is sent as defined in the ***Transfer Settings*** screen.

If the job is sent to a DOS-based data collector, or an HP48, it is automatically converted to a CR5 file during the transfer. Sending to a Nikon total station is described on Page 91.

Sending with Kermit or ActiveSync

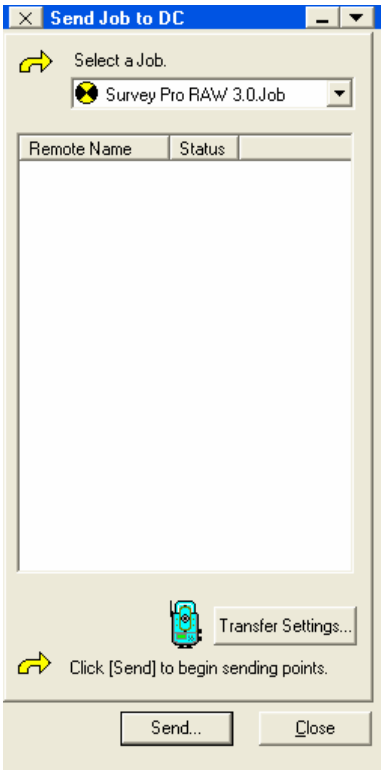
1. Select ***Transfer*** | ***Send Job to Data Collector***.
2. Use the ***Select a Job to send*** drop-down list to select the job that you want to send to the data collector. This job must be currently linked to the project.
3. If you want the job to have a different name on the data collector, check the ***Rename to*** checkbox and specify the new name in the corresponding field.





1. When transferring with ActiveSync, or in Server Mode, the path were the job will be sent on the data collector will be displayed in the ***Remote Path*** field. To change the path, use the [***Set Remote Folder...***] button to navigate and select a new path.
2. Click [***Send Job***] to start the transfer.

Note: If transferring using Manual Mode, you will be prompted to press the Receive button on the data collector. After doing so, click [***OK***] from this dialog to send the file.



Sending to a Nikon Total Station

No matter what type of data is stored in a Job on the PC, only the coordinates will be transferred when sending a Job to a Nikon total station.

1. Select ***Transfer*** | ***Send Job to Data Collector***.
2. Use the ***Jobs*** drop-down list to select the job that you want to send to the data collector. (Only the jobs currently linked to the project are available.)
3. Tap [***Send***] to continue.

Note: The file details must be configured correctly or else the values in the resulting transferred file will be incorrect.

4. A dialog will appear to walk you through configuring the total station for the upload.

5. On the total station, initiate the RECEIVE command and then click [***OK***] at the prompt on the PC to send the file.

Get Job from Data Collector

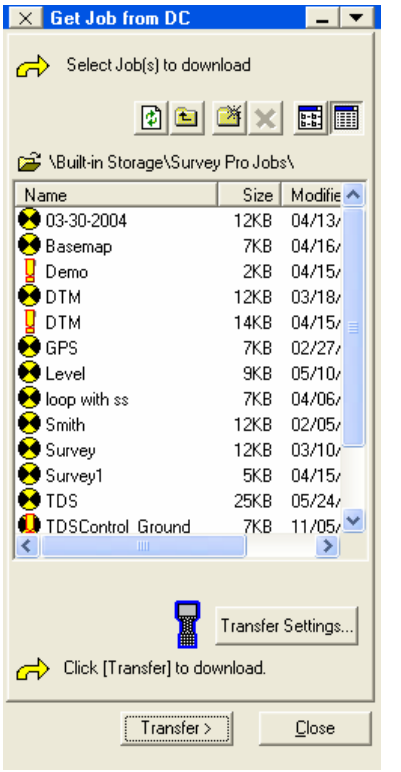
This routine is used to transfer job files from the data collector to the local machine and link them to the ForeSight DXM project. This routine will download selected job files (.JOB and .CR5) plus their associated raw files (.RAW or .RW5) and any attached support files (such as .FEA) and link these files to the project.

The first step is to transfer the data files from your data collector to the local machine. The procedure here depends on your transfer mode. In Kermit Manual Mode, you must transfer the files one by one before continuing. In server mode, you can select just the jobs you want and ForeSight DXM will automatically transfer all the associated files for you. The second step is to copy and link the transferred files to the project directory. The final step is to review the files copied and the actions taken in the project.

Step One: Download Files

Kermit Server or Active Sync Mode

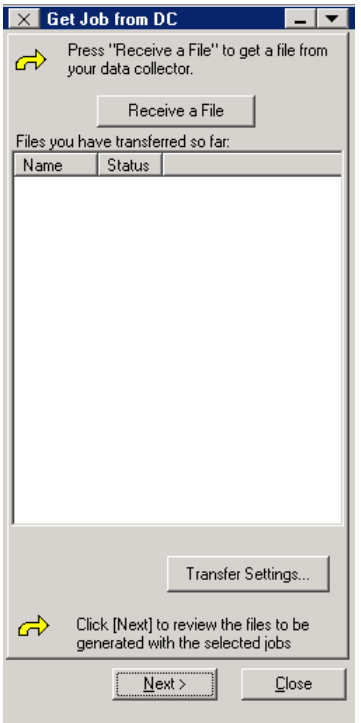
1. With the data collector connected to the PC and with ActiveSync running, or while it is in server mode, select ***Transfer*** | ***Get Job from Data Collector***.
2. Navigate to and select the job(s) you want to transfer to from your data collector to the PC.
3. The ***Files of type*** field can be used to display all the ****.JOB*** or ****.CR5*** files from the current directory on the data collector.
4. With the file(s) selected, click [***Transfer>***] to download the selected jobs and their associated support files to the PC.



Note: At this point, no files have been copied or linked to the project. You must complete this wizard or no files will be saved on your PC.

The following buttons are available in the ***Send Receive Files*** dialog box:

- Refreshes the directory listing.
- Moves up one level to the parent directory (folder).
- Will create a new folder within the current folder.
- Deletes the selected file(s) or folder.
- Displays only the file names in the current folder.
- Displays the file names, size, date, and type in the current folder.



Manual Mode and Nikon Total Station

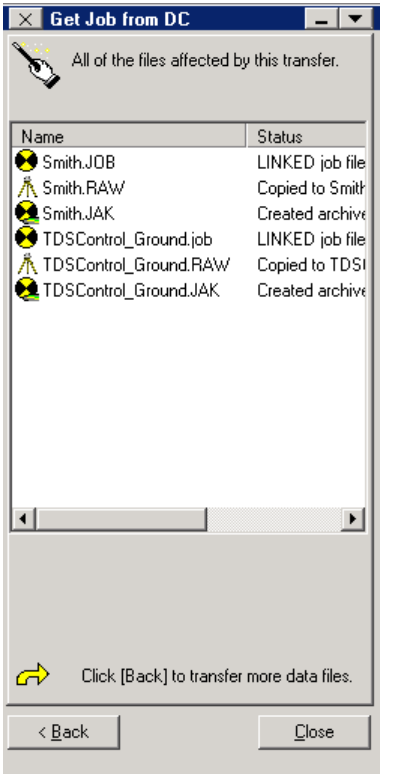
1. With the data collector connected to the PC select ***Tools*** | ***Get Job from Data Collector***.
2. Click the [***Receive***] button. A dialog will open prompting you to begin the transfer from the data collector.
3. On the data collector, issue the command to send the file (on the HP48, you would highlight the file and press the [SELCT] softkey) and then on the PC, click [***OK***] at the prompt. For a Nikon total station, click [***OK***] on the PC, and then start the transfer from the gun.
4. Repeat the above steps to transfer any additional files. The ***Files you have transferred so far*** section of the ***Get Job from DC*** dialog will display a list of all the files that have been transferred during the current session.
5. When you are finished downloading files from the data collector, click [***Transfer>***]. For each selected job file (.JOB, .CR5, or .NIK), ForeSight DXM will

attempt to pair it with the associated raw file (.RAW, .RW5, or NRD). For jobs with no downloaded raw file, ForeSight DXM will generate a raw file from the linked job. For any files that do not go with a selected job, ForeSight DXM will copy them to the project directory and link them under their appropriate file type.

Step Two: Copy Files and Link Jobs

The second step is to review the complete list of downloaded files

In the top list box, review the complete list of files affected by this process. This list includes both files downloaded from the data collector that will be copied to the project directory, and files that will be generated by ForeSight DXM when the selected jobs are linked to the project.



1. In the bottom list box, select the available associated files to copy to the project directory along with the job files. By default all associated support files are copied with the selected jobs. It is recommended that you select all associated files.
2. Click [***Link>***] to copy the files to your project directory and link the selected jobs to the project.

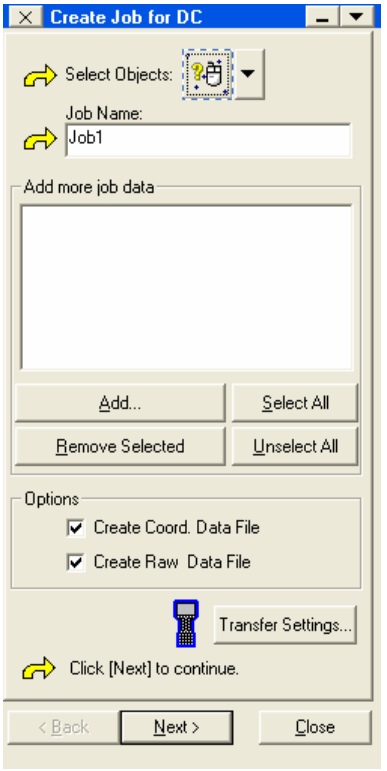
Step Three: Review Results

The final page shows a list of all the files affected by the copy and link to the project.

1. Click [***<Back***] if you want to transfer more files.
2. Click [***Close***] when you are done.

Create Job for Data Collector

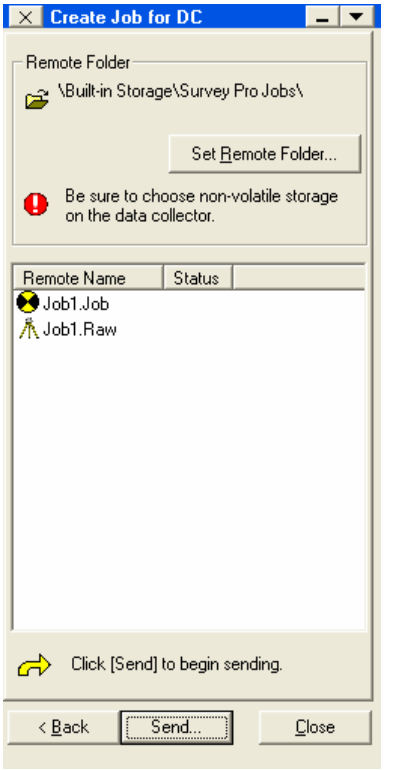
This routine allows you to select a set of points from the current project and send only the selected points to the data collector in the form of a new job and raw data file.



1. Select ***Transfer*** | ***Create Job for Data Collector*** to open the ***Send Job Wizard***.
2. By default, a new job and raw data file will be created called "`Job1`." You can type a new name for the files in the top field.
3. Use the button to select the points from the current project or job that you want to send to the data collector, or use the corresponding button to select from a variety of other point-selection methods.
4. Select what types of files you want generated. You can choose to create a job file, raw data file or both by selecting the appropriate check boxes.
5. You can optionally click the [***Add***] button to add additional files to the ***Add more job data*** window. You can also select any files that you do not want to send to the data collector and remove them from the list by clicking the [***Remove Selected***] button. There are also [***Select All***] and [***Unselect All***] buttons to highlight files in the list.
6. When you are done with your point selection, click [***Next >***] to open the second dialog.

This dialog lists all the files that are to be sent to the data collector. If connected using ActiveSync or Kermit Server Mode, you should select the [***Set Remote Folder***] button to select the path on the data collector for where you want to send the selected files.

Click the [***Send***] button to start the transfer of all the files and this will complete the procedure. If you are connected using Kermit Manual Mode, you will be prompted to initiate the Receive command on the data collect prior to sending the first file. Once the data collector is ready to receive, click [***OK***] from this prompt to send the first file. Repeat this procedure until all the files have been sent.

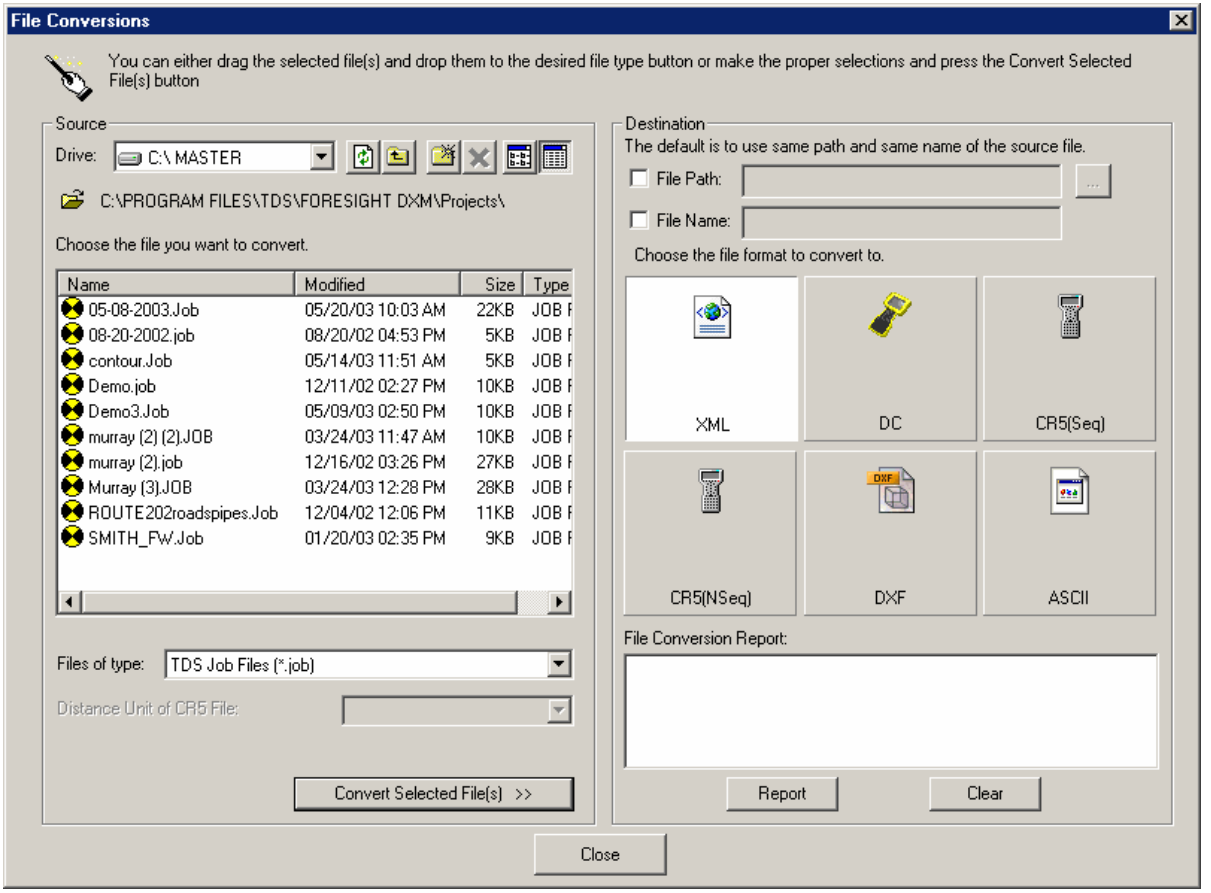


File Conversions

This section will guide you through the process of converting from one file format to another.

The File Conversion utility is different from the File Export capabilities of the project. File Conversion takes saved files from your system and converts them to other file formats, which also get saved onto your system. File conversions from .JOB to .DXF will only produce points in the DXF file. If a DXF file is required that contains lines as well, you will need to import the Job data into a project file and then use the ***File*** | ***Export*** routine.

Select ***Tools*** | ***File Conversions*** to open the ***File Conversions*** dialog.



Select the type of source file you are converting from the ***Files of type*** drop-down list. Only the files of the selected type will be displayed on the left side. The selection made here will determine the file types that the source file can converted to, and which buttons are displayed on the right side of the dialog.

In the ***Choose the file you want to convert*** section, navigate to the directory where the file(s) you want to convert are located. Double click on any folder displayed to change to that folder and use the following buttons to navigate.

1.  Refreshes the directory listing.
2.  Moves up one level to the parent directory (folder).
3.  Will create a new folder within the current folder.
4.  Deletes the selected file(s) or folder.
5.  Displays only the file names in the current folder.
6.  Displays the file names, size, date, and type in the current folder.

In the ***Destination*** section, leave both checkboxes unchecked if you want to save the new file in the same location and with the same name (but with a different extension) as the source file. Check the ***File Path*** and/or ***File Name*** checkboxes and specify a new path or file name, respectively.

There are two ways to perform the actual conversion:

- You can select the file(s) to be converted from the left side of the dialog; click the button on the right side that corresponds to the file you are converting to; then click the [***Convert Selected File(s)*** >>] button.
- The other method is to select the file(s) from the left side of the dialog, then drag them over the button on the right that describes the file type you want to convert them to.

The contents of the source file, as well as the source and destination file types selected determine if anything other than coordinate data is written to the destination file.

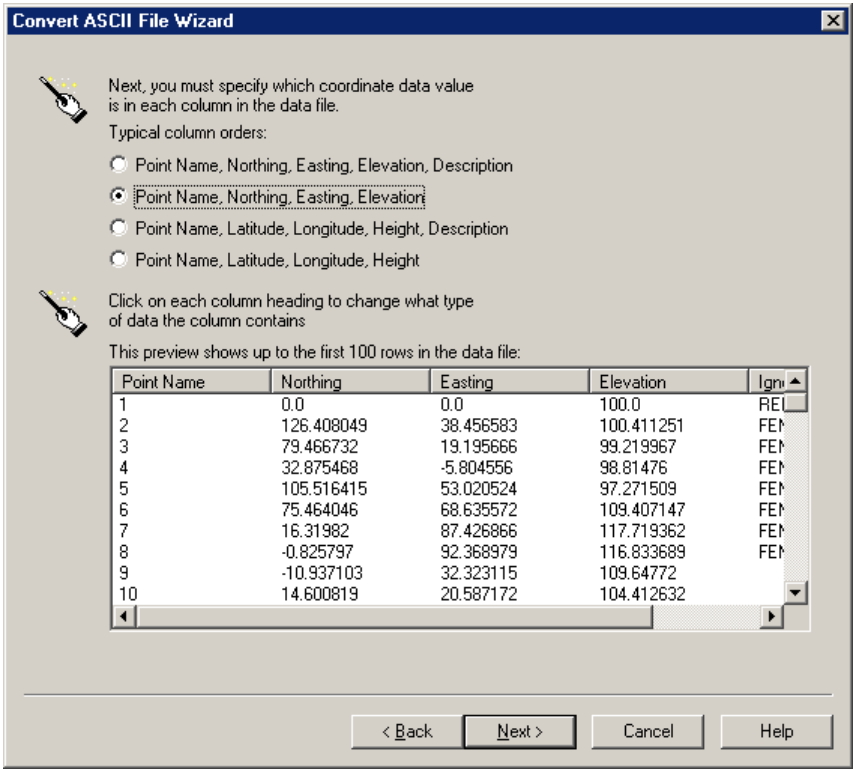
ASCII Conversion

Since there is no set standard for the format of an ASCII coordinate file, converting to or from an ASCII file requires additional steps to define the format of the ASCII file.

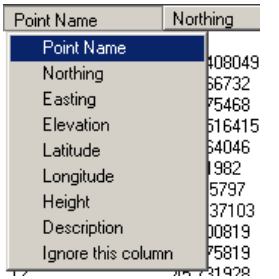
Converting from an ASCII Source File

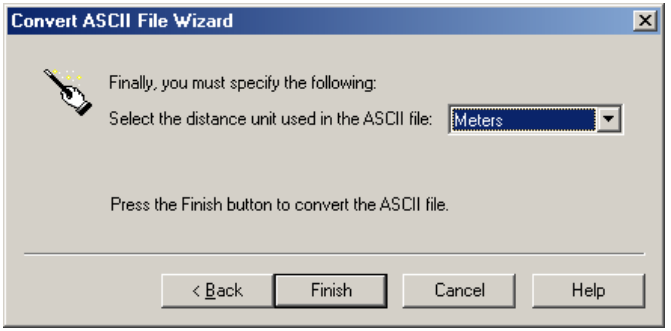
1. Locate the ASCII source file and begin the desired conversion. The first screen of the ***Convert ASCII File Wizard*** will open.

2. Specify how each column in the source file are separated by selecting the appropriate radio button and click [***Next*** >]



3. Select the order of the columns by clicking the appropriate radio button.
   You can also define each column independently by clicking on any column heading and selecting the appropriate title. When the dialog box is configured correctly, click [***Next >***].

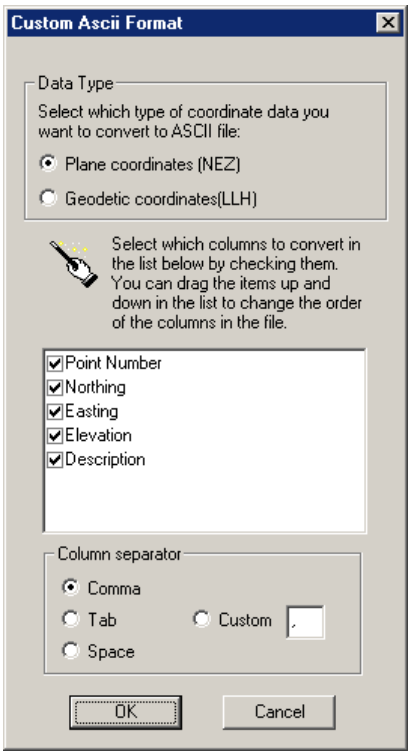




4. In the final screen of the Wizard, specify the units used for distances from the drop-down list and click [***Finish***].

Converting to an ASCII Destination File

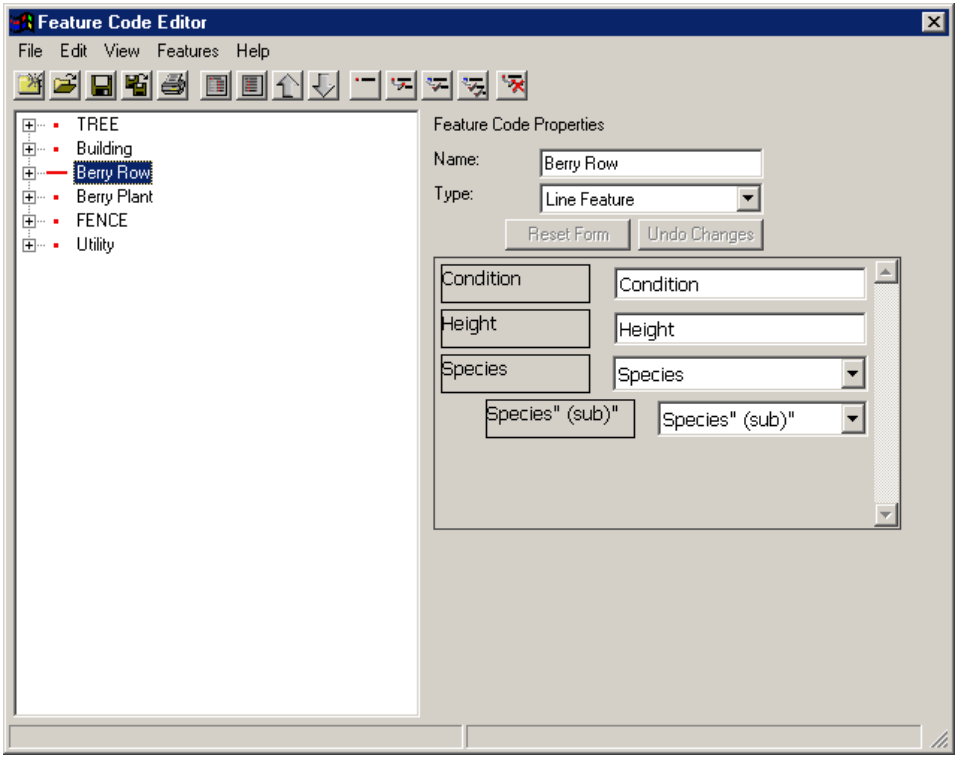
1. Locate the desired source file and begin the ASCII conversion. The ***Custom ASCII Format*** dialog box will open where you can define the format of the resulting ASCII file.



2. In the ***Data Type*** field, select if you are creating ***Plane coordinates*** or ***Geodetic coordinates***.
3. Select the desired order of the resulting columns by dragging the individual column titles listed in the order that you want them to appear in the destination file. If you want to exclude any particular column(s), uncheck them.
4. In the ***Column separator*** field, define how you want to separate each column by selecting the appropriate radio button.
5. Click [***OK***] to create the ASCII file.

Feature Code Editor

This section covers the Feature Code Editor. A Feature File is used to help describe objects in Survey Pro for Windows CE. Select **Feature Code Editor**, from the **Tools** menu to launch it.



Getting Started

In the past, describing a point during data collection involved typing out a description, or using descriptor codes prior to storing it. This was often an awkward and limited solution.

TDS Survey Pro for Windows CE allows you to describe points using *feature codes*. Feature codes can be used to describe points more quickly and in more detail than a standard text description, particularly when data is collected for several points that fit into a single category. For example, if the locations for all the utility poles in an

area were being collected, a single feature code could be used to separately describe the condition of each utility pole.

When describing a point using feature codes, a selection is made from any number of main categories called *features*. Once a particular feature is selected, any number of descriptions can be made from sub-categories to the selected feature called *attributes*.

In general, a feature describes what an object is and attributes are used to describe the details of that object.

The primary function of the TDS Feature Code Editor is to create feature code files. These can contain all of the feature and attribute information that is needed for any particular job.

The TDS Feature Code Editor can also be used to view or modify the selected features in a particular job and to export them to any of several different file formats for use in other popular software packages.

Features

The most fundamental part of any feature code is called a *feature*. Features generally describe what an object is. There are three types of features: *points*, *lines*, and *areas*, which are described below.

When assigning a feature to data that was collected in Survey Pro for Windows CE, only features of the same type are available for selection. For example, if selecting a feature to describe a point in a job, only the point features are displayed. Likewise, if selecting a feature to describe a polyline, only the line features in the feature file are displayed.

- **Point Features**
  A point feature consists of a single independent point. Examples of a point feature would be objects such as a tree, a utility pedestal, or a fire hydrant.
- **Line Features**
  A line feature consists of two or more points that define a linear object, such as a fence or a waterline.
- **Area Features** (Not used in Survey Pro for Windows CE)
  An area feature consists of several points that define a two-dimensional object that has a measurable area, such as a lake or a city lot.

Note: Survey Pro for Windows CE does not store information that specifically defines an area, therefore area features are ignored in Survey Pro for Windows CE. Area features are only available to maintain compatibility with feature files used in other TDS software applications.

Attributes

A feature, by itself, would not be useful in describing a point or a line with much detail since a feature only helps describe what the stored point is. *Attributes* are used to help describe the details of the object.

Attributes are either typed in from the keyboard or selected from a pull-down menu and fall into the following three categories.

String Attributes

A string attribute consists of a title and a field where the user can type any characters from the data collector's keypad up to a specified maximum length. An example of a string attribute is an attribute titled **Notes** where the user would type anything to describe a feature.

Value Attributes

A value attribute accepts only numbers from the keypad. These attributes are setup to accept numbers that fall in a specified range. Some examples of a numeric attribute would be the height of a tree or a utility pole's ID number.

Menu Attributes

A menu attribute is an attribute that is selected from a pull-down menu rather than typed in from the keypad. Menu items can also have sub-menu items. For example, you could have a feature labeled **Utility** with a pull-down menu labeled **Type** containing **Pole** and **Pedestal**. There could also be sub-menu items available that could be used to describe the pole or pedestal in more detail. Menus can only be two levels deep, but there is no limit to the number of items that can be listed in a pull-down menu.

Creating a Feature File

The following examples show how each type of feature and attribute is created.

To follow along with any of the examples, you can open an existing feature file, or you can create a new feature file using the following steps:

1. Click the New Feature Code File button  , or pull down the ***File*** menu and select ***New***. The New Feature File dialog box will open and prompt you for a file name.
2. Enter a file name in the ***File name*** field. (The ***.FEA** extension is added for you automatically in the next step.) The file name can be any name you want and it does not have to match a job name.
3. Click the [***Save***] button.

Creating a Feature

1. The fist step to adding a new feature code can be performed using any of the following three commands:
   - Click on the New Feature Code button  .
   - Press [Ctrl]-[F] on your keyboard.
   - Pull down the ***Features*** menu and select ***New Feature***.
2. A question mark will be displayed along with a blinking cursor. ? Type the name of your feature and press [Enter].
4. Select if your feature will be used to describe a ***Point*** or a ***Line*** from the drop-down list in the ***Type*** field located on the right side of the screen under the ***Feature Code Properties***. (***Area*** features are not used in Survey Pro for Windows CE.)

Note: You can easily change the name of any existing feature or attribute and is described on Page 116.

Creating a String Attribute

1. First select the desired feature that you want to associate the new attribute with by clicking on it.
2. Open the Select Attribute Type dialog with any of the following commands:
   - Click on the New Attribute button  .
   - Press [Ctrl]-[A] on your keyboard.
   - Pull down the ***Features*** menu and select ***New Attribute***.
3. Select the ***String*** attribute type by clicking the corresponding radio button and then click [***OK***], or press [S] on your keyboard to select it.

Note: The fastest method of entering feature codes and attribute is by using the keyboard hotkeys. For example, the fastest method to reach this point when entering an attribute is to hold down [Ctrl] and press [A] followed by [S].

---

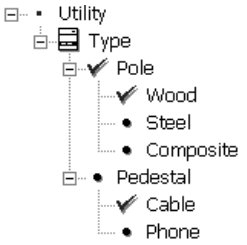
4. A question mark will be displayed along with a blinking cursor.  Type the name of your attribute and press [***Enter***].
5. Define the maximum allowable length of the feature in the ***Max. Length*** field located on the right side of the screen under the ***String Attribute Properties***. When the user fills in this field to describe the feature, he will be limited to using the number of characters defined here.

Creating a Value Attribute

1. First select the desired feature that you want to associate the new attribute with by clicking on it.
2. Open the Select Attribute Type dialog with any of the following commands:
   - Click on the New Attribute button  .
   - Press [Ctrl]-[A] on your keyboard.
   - Pull down the ***Features*** menu and select ***New Attribute***.

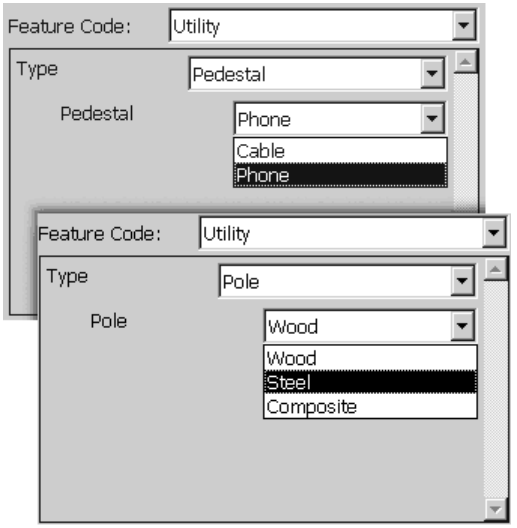
3. Select the ***Value*** attribute type by clicking the corresponding radio button, or press [V] on your keyboard to select it and then click [***OK***].
4. A question mark will be displayed along with a blinking cursor. ? Type the name of your attribute and press [Enter].
5. Define the parameters listed below on the right side of the screen under the ***Numeric Attribute Properties***.
   - **Decimals**: is the number of decimal places that will be displayed for the entered attribute. For example, if 1 is entered here and a numeric attribute is entered of 15.666 during data collection, the value will be automatically rounded to 15.7.
   - **Minimum**: is the minimum value allowed. If an attempt is made to enter a smaller value for this attribute during data collection, an error will result.
   - **Maximum**: is the maximum value allowed. If an attempt is made to enter a larger value for this attribute during data collection, an error will result.
   - **Default**: is the default value for this attribute. If nothing is entered for this attribute when describing the associated feature during data collection, the default value is automatically used.
   - **Units**: if units have been defined using the Unit Editor, described on Page 117, the units for this value attribute can be selected from a drop-down list. As a result when using this attribute during data collection, the attribute title will also display the selected units in parenthesis. For example, if a value attribute were titled **Height**, and **Ft** was selected for the units, the title will be displayed as **Height (Ft)** for that attribute during data collection.

Creating a Menu Attribute



To illustrate how a menu attribute is created, we will build the menu displayed here. The menu structure, as viewed from the Feature Code Editor, is shown, along with how the dialog would look in a data collector.

The feature code is named **Utility** and contains a menu attribute named **Type**. The **Type** menu attribute contains two menu items called **Pole** and **Pedestal**.



The **Pole** menu item contains three sub-menu items called **Wood**, **Steel** and **Composite**, which would be used to describe the type of utility pole. The **Pedestal** menu item contains two sub-menu items called **Phone** and **Cable**, which would describe the type of utility pedestal.

Create the 'Utility' Feature

1. Create a new feature called **Utility** with the steps described on Page 110

Add the 'Type' Menu Attribute

1. Select the **Utility** feature that was just created by clicking on it.
2. Open the Select Attribute Type dialog with any of the following commands:
   - Click on the New Attribute button .
   - Press [Ctrl]-[A] on your keyboard.
   - Pull down the ***Features*** menu and select ***New Attribute***.
3. Select the ***Menu*** attribute type by clicking the corresponding radio button, or press [M] on your keyboard to select it and then click [***OK***].
4. A question mark will be displayed along with a blinking cursor. ? Enter **Type** as the name of the new attribute and press [Enter].

Note: You can save the work you have done at any time by clicking the **Save** button or by pulling down the **File** menu and selecting **Save**.

Add the 'Pole' and 'Pedestal' Menu Items

1. Select the **Type** menu attribute by clicking on it.
2. Add a new menu item using any of the following commands:
   - Click on the New Menu Item button.
   - Press [Ctrl]-[M] on your keyboard.
   - Pull down the ***Features*** menu and select ***New Menu Item***.
3. A question mark will be displayed along with a blinking cursor. ? Enter **Pole** as the name of the new menu item and press [Enter].
4. Repeat Steps 1 through 3 to add the second menu item, except name it **Pedestal** in Step 3.

Note: When a menu item or sub-menu item is selected, the Menu Item Properties for that item are displayed on the right side of the screen. This contains a field called **Default** where either **Yes** or **No** can be selected. When **Yes** is selected for a menu or sub-menu item, a ✓checkmark is displayed next to it. This indicates that this item will be the default selection when using the feature code during data collection.

Add the Sub-Menu Items to the 'Pole' Menu Item

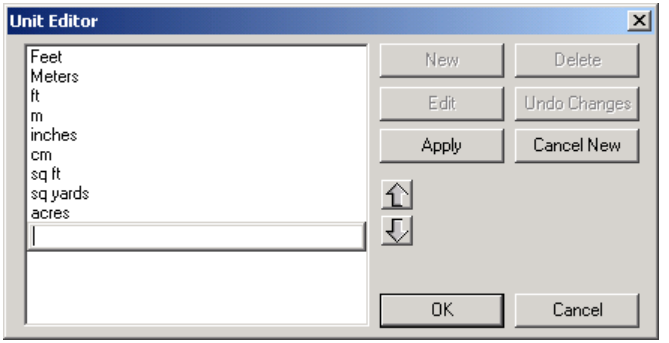
1. Select the **Pole** menu item by clicking on it.
2. Add a new sub-menu item using any of the following commands:
   - Click on the New Sub-Menu Item button.
   - Press [Ctrl]-[S] on your keyboard.
   - Pull down the ***Features*** menu and select ***New Sub-Menu Item***.
3. A question mark will be displayed along with a blinking cursor. ? Enter **Wood**, **Steel**, or **Composite** as the name of the new menu item and press **[Enter]**.
4. Repeat Steps 1 through 3 until each of the **Wood**, **Steel**, and **Composite** sub-menu items have been created.

Add the Sub-Menu Items to the 'Pedestal' Menu Item

1. Select the **Pedestal** menu item by clicking on it and then follow Steps 1 and 3 to create the **Cable** and **Phone** sub-menu items.

The Unit Editor

The Unit Editor is used to create a list of units, which can be used with value attributes within the current feature file. When a value attribute is created, the units for that attribute can be selected from the list of units created with the Unit Editor. This will then display the selected units in parenthesis after the value title. For example, if a value attribute were titled **Height**, and **Ft** was selected for the units, the title will be displayed as **Height (Ft)** for that attribute during data collection.



To open the Unit Editor, pull down the ***View*** menu and select ***Units...***

Adding a New Unit Name

To add a new unit, click the [***New***] button, type the new unit name, and click [***Apply***] or press [Enter]. Alternatively, you can simply start typing the new unit name as long as the Unit Editor is open.

Editing an Existing Unit Name

To change an existing unit name, simply click on it to select it then click the [***Edit***] button, or double-click on the unit name. Edit the name, and press [Enter] or click [***Apply***].

Deleting an Existing Unit Name

To delete an existing unit name, simply click on it to select it then click the [***Delete***] button, or press the [Delete] key on your keyboard.

Rearranging the Unit Names

To change the order that the unit names occur in the list, select the unit name that you want to move and press the  or  buttons to move the unit name up or down in the list.

Undo Changes

Clicking the [***Undo Changes***] button will remove **all** of the changes that were made with the Unit Editor since it was last open – use cautiously!

Exiting the Unit Editor

To save your changes and close the Unit Editor, click the [***OK***] button. If you want to close the Unit Editor without saving your changes, click [***Cancel***].

Editing a Feature File

The routines in this section are used to change the way an existing feature file looks. Most of these routines will affect how the feature file contents will appear when using it during data collection in Survey Pro for Windows CE, but some only affect how things appear within the Feature Code Editor.

Renaming Items

To rename any feature or attribute, select it by clicking on it and then edit the existing name in the ***Type*** field shown on the right side of the screen under ***Properties.***

Changing the Order of Items

To change the order of any feature or attribute, click on that item to select it, and then click on the  and  keys to move the item to the desired location.

Note: Moving an item that contains sub-items will result in the selected item and all of its sub-items to be moved simultaneously.

Deleting Items

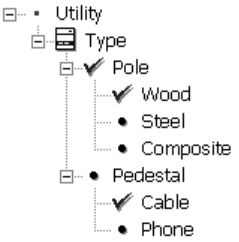
To delete an item, select the item by clicking on it and do any of the following steps:

- Click the Delete Item button .
- Pull down the ***Feature*** menu and select ***Delete Item***.
- Press the [Delete] key on your keyboard.

Note: Deleting an item that contains sub-items will result in the selected item and all its sub-items to be deleted.

Expanding and Collapsing Branches

Fully Collapsed Branch



Fully Expanded Branch

The Feature Code Editor displays feature files in a branch format where any item that contains sub-items will show the sub-items branch off from the main item. The items that are in view from the Feature Code Editor depend on which branches are expanded and which are collapsed. The branches that can be expanded are shown with a ⊞ symbol and the branches that can be collapsed are shown with a ⊟.

To expand a particular branch, click on the ⊞ symbol associated with that branch. Likewise, you can click on the ⊟ symbol to collapse a particular branch.

Another way to expand or collapse a branch is right-click on the branch and select ***Expand*** or ***Collapse***.

You can also quickly expand all the branches in a feature file by clicking the Expand All button or by pulling the ***View*** menu down and selecting ***Expand All***. Similarly all the branches in a feature file can be collapsed by clicking the Collapse All button or by pulling the ***View*** menu down and selecting ***Collapse All***.

Moving and Copying Items

You can copy an item to another location by copying and pasting the item from the ***Edit*** menu just like with most Windows' applications. Likewise, you can move an item by cutting and pasting.

Below are shortcut methods to copy or move items by dragging them with a mouse.

To copy an item to another location, right-click on the item and drag it to the new location. When using this method, the item will be displayed as the icon shown here while the item is being dragged.

To move an item, left-click on it and drag it to the new location. When moving an item in this way, the item is displayed as the icon shown here while it is being dragged.

If you attempt to drag an item to an invalid location, the icon will change to a 

symbol.

The Form Editor

The Form Editor is used to change the size and position of the various fields for any particular feature. This will affect the appearance of the dialog box that is displayed when describing a feature during data collection.

To edit a form, select the feature whose form you want to edit by clicking on it. The form is displayed on the right side of the screen, as it would look on a data collector.

Note: The Form Editor can only be used when a feature is selected – it is not available if an attribute is selected.

Moving a Field

To move a field in the Form Editor, position the mouse pointer over the field that you want to move. When the pointer becomes a ✣, click and drag the field to the desired position.

Resizing a Field

You can resize a field horizontally or vertically with the Form Editor. To resize horizontally, move the cursor near the desired vertical edge until the cursor becomes a ↔ and then click and drag the edge to the new position. Resizing vertically is performed the same way, only the cursor is held over the horizontal edge that needs to be moved until it becomes a ↕.

Note: Menu items cannot be resized vertically.

Changing Text Colors

To change the color of the text in any field, double click on the text in the Form Editor. This will open the Color dialog box. Simply click on the color that you want to use for the text and click [***OK***].

If you want more colors to choose from, custom colors can be created using the [***Define Custom Colors***] button.

Resetting Your Form

If a mistake is made in the Form Editor, you can use any of the following commands to put things back the way they were:

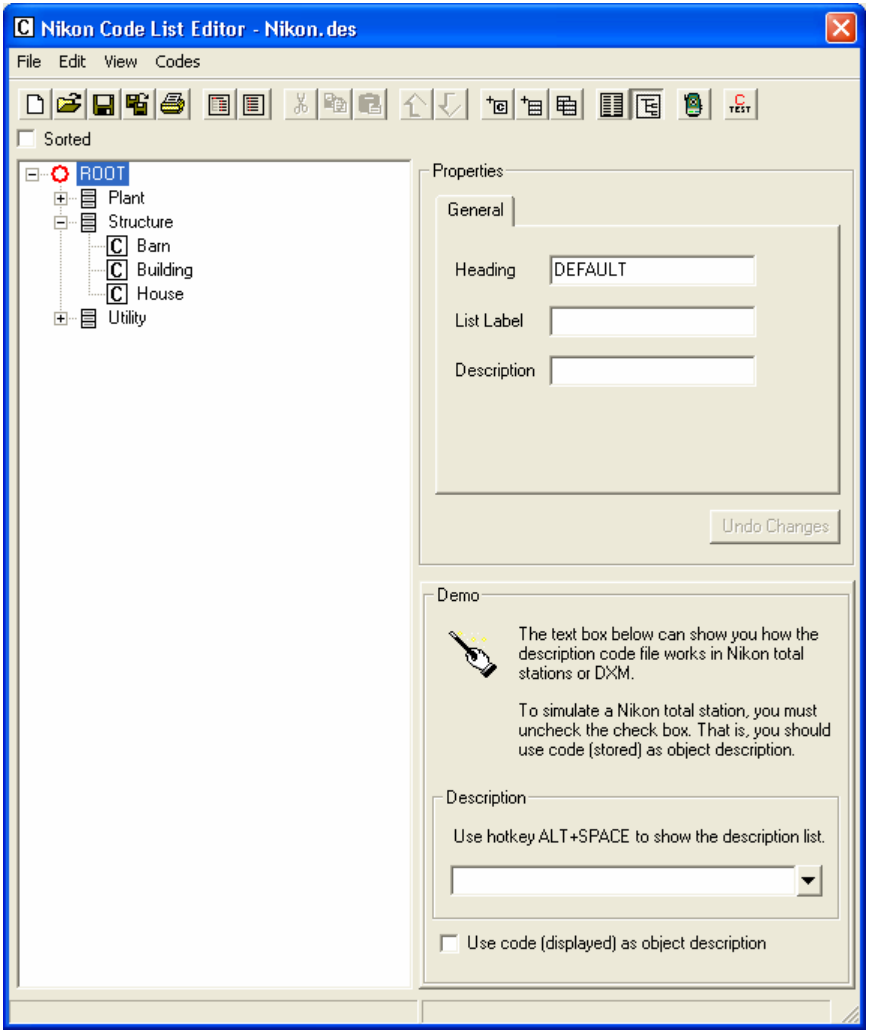
- Click the [***Undo Changes***] button to undo all changes that have been made since the particular feature has been selected.
- Click the [***Reset Form***] button to change everything back to the default layout for the current feature.
- Pull down the ***Features*** menu and select ***Reset All Forms...*** to change the layout for every feature back to a default layout

Note: If you do not want changes to inadvertently be made to any forms, pull down the **Features** menu and select **Lock Form Editor**. This will place a checkmark ✓ next to this menu item and disable the Form Editor. Repeat the process to unlock the Form Editor.

Note: For information on the use of a feature file in a data collector running Survey Pro, refer to your Survey Pro manual.

Nikon Code List Editor

This editor is used to create or edit Nikon Code List files in Nikon PT/Code list format or DXM Description file format (.DES). The code list file can then be exported to a Nikon total station for use during data collection. A code list file helps eliminate tedious description entries in the field.



In general, a code list allows the total station user to navigate through a list of options to find the right description for a collected point. The user has the ability to

create ***codes***, which can be embedded in ***lists*** and ***sub-lists***. In this example, the descriptor House is more easily found by navigating through the list Buildings | Permanent, instead of browsing through a list of the four possible building types.

It is important to remember that each ***list*** and ***sub-list*** must culminate in a ***code*** for the list to function properly on the total station. A list, which doesn't end with a code at each branch, essentially, leads the user to a dead end during data collection.

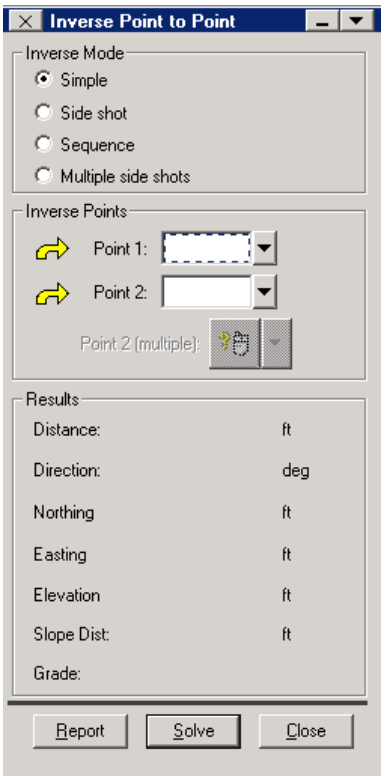
The total station can be simulated with the Demo in the lower right corner of the screen. By pressing Alt+Space, you can navigate the descriptions and lists, just as you would on the total station. Use this feature to insure you have created a useable file, before you export it.

Coordinate Geometry

COGO is short for Coordinate Geometry – a specialized form of math that uses functions from both trigonometry and geometry. This section will go over the COGO routines included with ForeSight DXM.

Construction Lines

Just as a reminder, ForeSight DXM can use special lines that are drawn on the Scratch layer to show you the operation just completed. This is helpful when doing inverses or intersection calculations. It helps you visualize what ForeSight DXM is using to do the calculations. Construction lines can be erased by pressing [***Ctrl***]-[***E***] or by using the Erase Scratch Layer button  .



Inverse Point to Point

Inverse is the process of determining the distance and direction between two locations. The basic operation of ***Inverse Point to Point*** is very simple; it only needs two point numbers and it will compute the distance and direction between the points. The kind of report that is generated depends on the ***Inverse Mode*** selected at the top of the dialog box. The basic report is displayed in the ***Results*** area.

To open the ***Inverse Point to Point*** dialog, select ***COGO*** | ***Inverse Point to Point***. There are four different methods for performing inverses with ForeSight DXM. See below for examples of each.

Simple Mode

Select the ***Simple*** radio button in the ***Inverse Mode*** section. Then click in the ***Point 1:*** field to make it active. Click on the point that you want to inverse from. Once you click the focus will move from the ***Point 1:*** field to the ***Point 2:*** field. Click on the point that you want to inverse to. The results will be automatically displayed in the ***Results*** section and in the Message Box. (You could also manually type in the point numbers for the ***Point 1:*** and ***Point 2:*** fields and then click on the [***Solve***] button at the bottom of the dialog box to get the same results.)

Once you click on the second point to fill in the ***Point 2:*** field, the focus will move back to the ***Point 1:*** field ready for the next two points to inverse between. For as long as you leave the Inverse dialog open, the report will continue to be added to the text in the message box which can then be viewed, copied, printed or saved as a file. The results of ***Simple*** mode inverses are shown below:

Point 1	Point 2	Distance	Direction	Northing	Easting	Elevation	Slope Distance	Grade (%)
31	6	402.963	217°45'59"	-318.548	-246.792	-6.000	403.008	-1.489%
31	34	246.902	210°02'54"	-213.719	-123.632	-4.188	246.938	-1.696%
31	40	501.703	227°09'32"	-341.141	-367.870	-11.464	501.834	-2.285%

Side Shot Mode

Select the ***Side shot*** radio button in the ***Inverse Mode*** section. The only difference between ***Side shot*** and ***Simple*** modes is that once ***Point 2***: is filled in and the results computed, the focus does not return to the ***Point 1***: field. The focus will stay in the ***Point 2:*** field allowing you to get a radial report of multiple points by continuing to click on points. The results looks like below:

Point 1	Point 2	Distance	Direction	Northing	Easting	Elevation	Slope Distance	Grade (%)
31	6	402.963	217°45'59"	-318.548	-246.792	-6.000	403.008	-1.489%
31	34	246.902	210°02'54"	213.719	123.632	4.188	246.938	1.696%
31	40	501.703	227°09'32"	-341.141	-367.870	-11.464	501.834	-2.285%
31	40	501.703	227°09'32"	341.141	367.870	11.464	501.834	2.285%

Sequence Mode

Select the ***Sequence*** radio button to put ***Inverse*** into the ***Sequence*** mode. ***Sequence*** takes the previous ForeSight DXM point (***Point 2:*** field) and makes it the current occupy point (***Point 1:*** field). You can think of ***Sequence*** as being similar to a Traverse operation. The report looks like below:

Point 1	Point 2	Distance	Direction	Northing	Easting	Elevation	Slope Distance	Grade (%)
31	6	402.963	217°45'59"	-318.348	-246.792	-6.000	403.008	-1.489%
31	34	246.902	210°02'54"	-213.719	-123.632	-4.183	246.938	-1.696%
31	40	501.703	227°09'32"	-341.141	-367.870	-11.464	501.834	-2.285%
31	40	501.703	227°09'32"	-341.141	-367.870	-11.464	501.834	-2.285%
31	40	501.703	227°09'32"	-341.141	-367.870	-11.464	501.834	-2.285%

Multiple Side Shot Mode

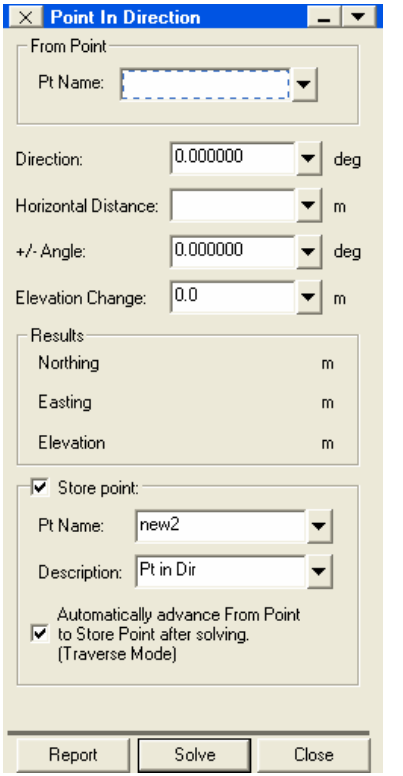
Multiple Side Shot Mode is the same as ***Side shot*** mode except you can use the select features of ForeSight DXM to select multiple points based on description, layer, color etc. The report looks like the following:

Point 1: 31

Point 2	Description	Distance	Direction	Northing	Easting	Elevation	Slope Distance	Grade (%)
35	TREE	257.923837	193°08'10"	-251.175	-58.618	-1.577	257.929	-0.612%
36	TOPO	253.110888	177°30'33"	-252.872	11.000	0.386	253.111	0.153%

Point in Direction

Point in Direction is possibly the most useful tool for computing new points that ForeSight DXM offers.



From Point

Enter the point that you want to use as your base. This is where the indicated direction and distance will originate from for computing the new point.

Direction

Enter the direction in either bearing or azimuth. If you have an existing line that defines the direction you can activate this field and then click on the line to get the direction information, or define a direction between two points by clicking each point sequentially in the Map View. If you want to add or subtract from the entered direction, you can click the corresponding button and make your desired selection.

Horizontal Distance

Enter the horizontal distance that you want to move from the ***From Point*** to place the new point. This value must not be zero.

+/- Angle

This field is optional and allows you to modify the angle in the ***Direction*** field by adding to it the angle specified here. Leave this value set to zero if you do not want to change the angle specified in the ***Direction*** field.

Elevation Change

Enter the vertical distance from the ***From Point***'s elevation that you want applied to the new point's elevation. Enter positive values for an increase in elevation and negative numbers for a decrease in elevation relative to the ***From Point***'s elevation. The resulting elevation is the ***From Point***'s elevation plus the ***Elevation Change*** value.

Results

This section displays the computed coordinates for the new point.

Store Point

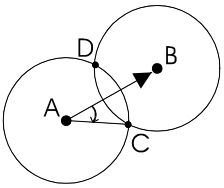
If this box is left unchecked, the location of the new point will be computed after clicking [***Solve***], but a new point will not be stored. If you want to store the new point in the current job, check this box and enter a point name in the corresponding ***Pt. Name*** field. If the point already exists, ForeSight DXM will prompt you if you want to overwrite before removing the old point. You can also enter a description to use for the new point. The ***Pt. Name*** field will increment by one each time you press the [***Solve***] button.

Automatically advance From Point…

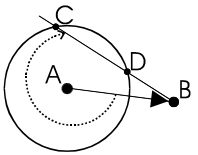
When this box is checked, the current ***Store Point*** will automatically become the next ***From Point*** after clicking [***Solve***] in the same way as if you traversed to the newly-created point. If left unchecked, the ***From Point*** will not change after clicking [***Solve***].

Intersection

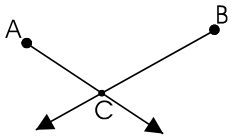
Intersection is used to determine coordinate positions of an intersection given two existing points and either direction or distance information from the given points. Depending on the situation, there can be up to two results. Since it is impossible to compute the elevations of the intersections, the results will always be 2D.



Distance-Distance



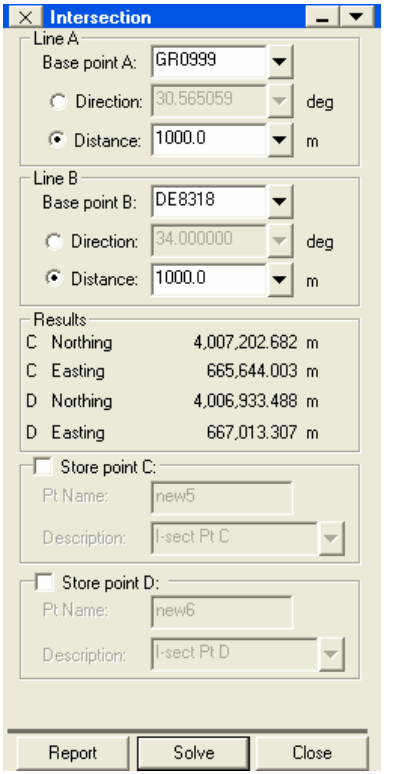
Distance-Direction



Direction-Direction

Line A

Enter an existing point in the ***Base point A*** field. This will be the first reference point. Select either Direction or Distance radio button and enter a value by clicking on an existing object or typing it in the field.



Line B

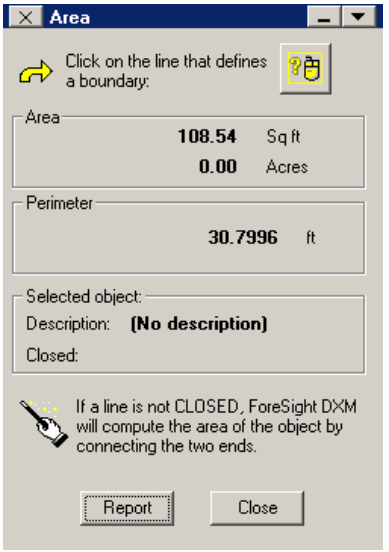
Do the same as above for ***Base point B*** for a second reference point.

Storing Points

By default, ***Store point C*** will be active. If you do not want to store any points, do not check the ***Store point C*** or ***Store point D*** check boxes. (Store point D will not be active when performing a direction-direction intersection.) In the case where neither store point boxes are checked, ForeSight DXM will compute the results and draw construction lines and print results in the message window but no points will be stored. Once you determine that you want to store one or both points, check the appropriate box(es) and click on the ***Solve*** button again.

Results

Up to two new points will be stored using the given parameters. If you did not check the store point fields, the results will show point C and D instead of point names. Point C is the first point stored and will be the point that is clockwise from a line from Base Point A to Base Point B if Distance-Distance is used. If Distance-Direction is used, point C will be clockwise from a line from the base point using distance to the base point using direction. (See the graphic showing the types of intersections above.)



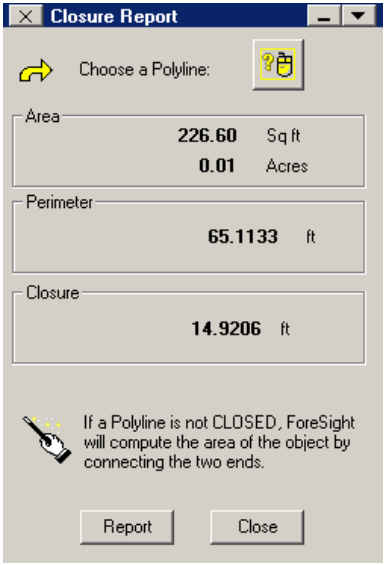
Compute Area

Area gives the area of a closed polyline. If the line is not closed, ForeSight DXM will still give results connecting the last vertex or point on the line to the first.

Results

Area, Perimeter, and the polyline's Description

The units will be acres and square feet if you are using imperial units or hectares and square meters if you are using metric units. The perimeter will be in feet or meters and will include the distance from the last point or vertex to the first if it is not a closed polygon or circle being used.



Closure Report

Closure Report gives you information on how far the last point in a polyline is from the first point.

Results

Area (Acres and Sq ft or Hectares and Sq M), Perimeter, Closure and a list of all the coordinate values and stations with bearing and distance to the next point.

Survey Adjustments

Overview

Survey adjustments are accessed from the ***Adjustments*** menu. These adjustments can translate, rotate, or change the scale of your project.

Translation Adjustment

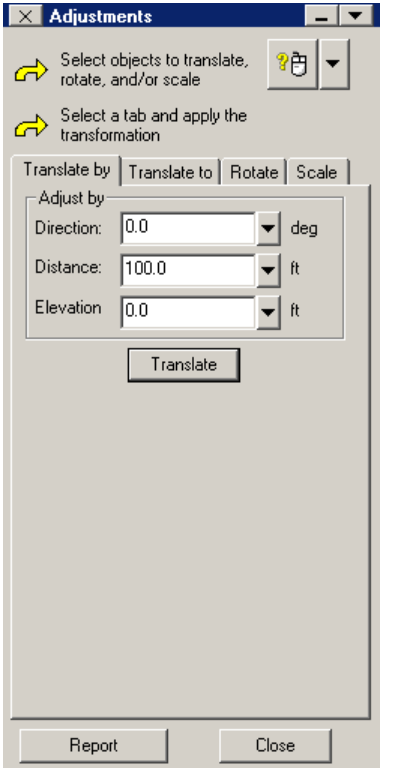
When you do a translation adjustment, you are moving a group of selected objects horizontally and/or vertically a specified distance and direction.

As an example, let's say you started a job by occupying a point whose coordinates were unknown so you arbitrarily assigned coordinates to it. Later you learned the actual coordinates for the initial occupy point. In this case, all of the points that were collected that day would be incorrect by the same distance and direction, but the points would be correct in relation to one another. Translating all of the coordinates from the job would quickly move them to their correct positions.

Translate by

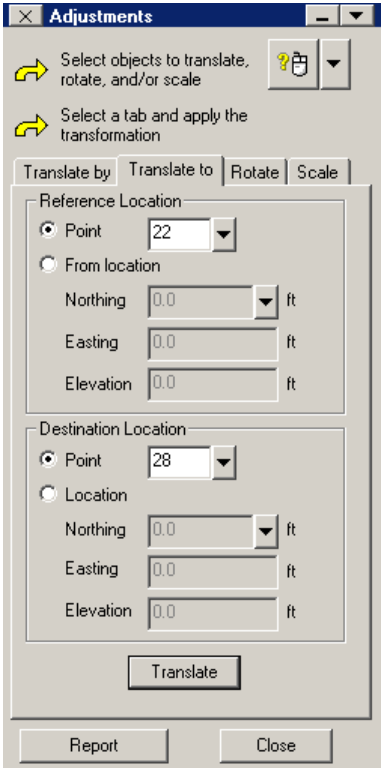
The ***Translate by*** adjustment method will move a group of selected objects by a specified distance and direction.

1. Select ***Adjustments*** | ***Translate / Rotate / Scale...*** and be sure the ***Translate by*** tab is selected.
2. Using the ***Mouse select*** button or the ***Select*** button, select the objects that you want to translate.
3. Enter the direction, distance and change in elevation in the appropriate fields.
4. Click the [***Translate***] button. The selected objects will be moved the distance and direction that you specified.



Translate to

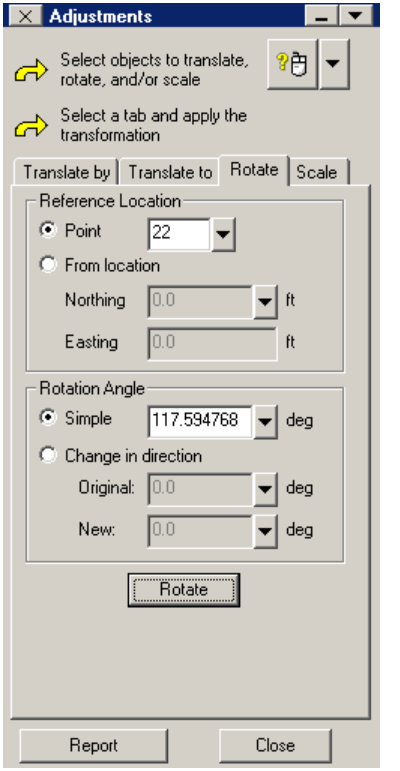
The ***Translate to*** adjustment method will also move a selected group of objects from one location to another location, but the distance and direction that they are moved is defined by the current position of a base point and a final position for the base point. All the other selected objects are moved the same distance and direction as the base point.



1. Select ***Adjustments*** | ***Translate / Rotate / Scale...*** and click the ***Translate to*** tab.
2. Using the ***Mouse select*** button or the ***Select*** button, select the objects that you want to translate.
3. Select a reference point or location. This is typically a point with incorrect coordinates whose coordinates are now known.
4. Select a destination point or location. This is the position where the base point will be after the translation.
5. Press the [***Translate***] button. All the selected objects will be moved the same distance and direction as the base point.

Rotation Adjustment

When a rotation is performed to a group of objects, all the objects are rotated by a specified amount around a reference point or location. This routine is commonly used to adjust a survey where an assumed backsight azimuth or incorrect backsight point was used.

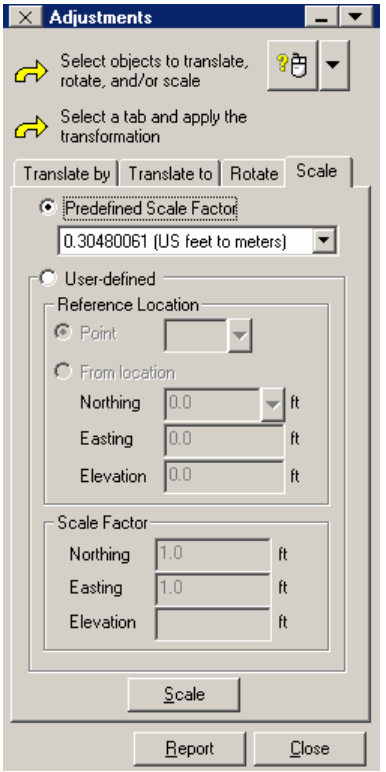


1. Select ***Adjustments*** | ***Translate / Rotate / Scale...*** and click the ***Rotate*** tab.
2. Using the ***Mouse select*** button or the ***Select*** button, select the objects that you want to rotate.
3. In the ***Reference Location*** area of the dialog, select either a reference point or location. After the rotation, the coordinates for this point or location will not change. You can think of this point as the center of a rotating disk.
4. In the ***Rotation Angle*** area of the dialog either enter a rotation angle in the ***Simple*** field or specify a change in direction. The ***Change in direction*** method calculates a rotation angle after you enter a beginning and ending bearing such an assumed backsight bearing and the correct backsight bearing.
5. Click the [***Rotate***] button to rotate the selected coordinates.

Scale Adjustment

A scale adjustment is performed when the distances taken in the field need a scale factor applied to them. The ***Scale*** adjustment routine can also be used to convert a job that was collected in feet to meters, or from meters to feet (either international or U.S. Survey feet).

Scale works on the Delta (difference) between the reference location and the object(s) you are adjusting. If your reference northing (Y) is 5000 and the point you are scaling has a northing (Y) of 5100 the Delta is 100 so the result would be 5000+ (100*.3048) =5030.48, if you are converting from International feet to meters. This is also true of elevations, the Delta of the reference elevation and the point elevation is scaled and then added to the reference.



1. Select ***Adjustments*** | ***Translate / Rotate / Scale...*** and click the ***Scale*** tab.
2. Using the ***Mouse select*** button or the ***Select*** button, select the objects that you want to scale.
3. In the ***Reference Location*** section of the dialog, enter either a reference point or reference location. This is the point or location used that all the other points are scaled from. After the adjustment, the reference location will not be changed.
4. In the ***Scale Factor*** section of the dialog enter the scale factor that you want applied. Usually the Northing and Easting fields will be the same. If you do not want a scale factor applied to the elevations, leave its scale factor set to 1. If you are converting between feet and meters, you can quickly get the correct scale factors by checking the ***Use Conversion*** check box then selecting the appropriate conversion from the drop-down list.
5. Press the ***Scale*** button to scale the selected objects.

Geodetics

For projects using GPS coordinates, you must set up a coordinate system to perform calculations on geodetic positions. ForeSight DXM uses the same coordinate systems and geodetic calculation engine as Survey Pro. The following section describes how to use ForeSight DXM to configure project and job file coordinate systems, how to manage geodetic measurements, and how to use the geoid file tools to support Survey Pro GPS data collection.

Geodetic Basics

Projection Mode

Both ForeSight DXM and Survey Pro have two horizontal and vertical projection modes. The choice of horizontal mode depends on the project requirements. Most survey projects are on a small site (less than 10_km or 6_mi in diameter) and use a simple 'flat earth' system where plane trigonometry is applied to measured angles and distances. For such projects the ***Ground – TDS Localization*** mode would typically be used. In this mode, the map projection zone is configured automatically by Survey Pro using the first GPS base setup. Other projects require that a specific map projection is used, and distances must be scaled to the conformal map grid. For such projects, the ***Mapping Plane*** mode is used and the map projection zone is selected by the user from one of the records stored in the Coordinate System Database file (*.CSD). The choice of vertical mode is simple. If you need to convert GPS heights into orthometric elevations, you must set the vertical mode to ***Localization (+Geoid)***. If you do not need elevations, set the vertical mode to ***Ellipsoid Heights***.

Below is a summary of the different horizontal and vertical projection modes:

Horizontal

Ground - TDS Localization

- Local coordinates are at ground level, based on the project height.
- Distances shot with EDM are at ground scale, so are 1:1 with coordinates solved by the projection.
- Default map projection and datum are automatically initialized with RTK base setup in Survey Pro.

Mapping Plane

- Local coordinates are on a conformal map projection grid.
- Distances shot with EDM are usually scaled by the combined scale factor to distances on the map projection grid.
- User selects map projection zone.

Vertical

Localization (+Geoid)

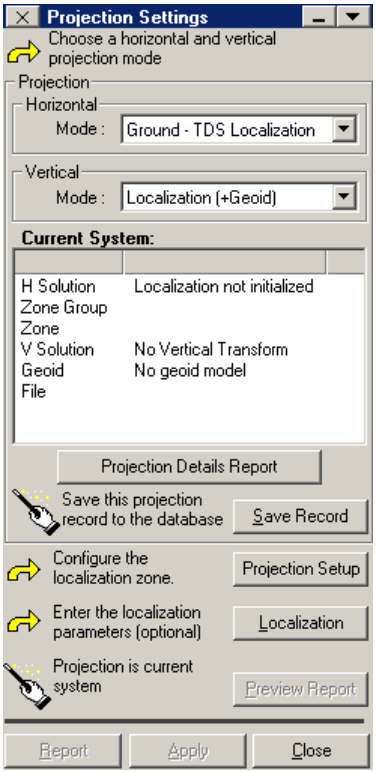
- Vertical coordinate is orthometric elevation.
- User must solve transformation from ellipsoid heights to elevations. This is done with Localization on control points, or using a geoid model, or a combination of both.

Ellipsoid Heights

- Vertical coordinate is ellipsoid height.
- This mode requires no transformation setup. Use this mode when vertical coordinates do not need to be elevations.

Projection Records

Once the projection mode is chosen, a projection record needs to be set before geodetic calculations can be done. A projection record is a collection of parameters to completely define an ellipsoid, datum, map projection, geoid model, and possibly a Localization adjustment. How you set the projection record depends on your horizontal mode. If your horizontal projection mode is ***Ground – TDS Localization***, the map projection zone is configured automatically by Survey Pro. Alternatively, you can configure this record manually by keying in the parameters. If your horizontal projection mode is ***Mapping Plane,*** you need to select a zone from the coordinate system database. It is possible, in both Survey Pro jobs and ForeSight DXM jobs and projects, to have two projection records; one projection record would be used when in ***Ground-TDS Localization*** mode and the other projection record would be used when in ***Mapping Plane*** mode.



The default projection for new files is ***Ground – TDS Localization*** for the horizontal projection and ***Localization (+Geoid)*** for the vertical. The Localization will not be initialized if no projection has been set for the project or job file.

As with Survey Pro, ForeSight DXM also uses a Coordinate System Database file (*.CSD) to store the map projection and datum transformation parameters for many different coordinate systems (zones) from around the world. Also, horizontal and vertical localization adjustments can be stored as site records in the database. Below is a list of the terminology used to describe the different records in the coordinate system database.

Zone: Is the basic record type. A zone record specifies the type of map projection and its parameters. Most zone records in the database already have a datum, ellipsoid, and geoid record attached.

Site: Is a zone record with a horizontal and/or vertical localization adjustment added. Localizations are mainly used to correct GPS positions starting from an autonomous base. They can be computed from control points or from manual input of parameters.

Zone Group: Is a collection of zones and/or site records used to keep the database organized and helps make user selection easier.

Datum: Is a type of datum transformation and its parameters. A datum record will always have a corresponding ellipsoid record in the database.

Ellipsoid: Are the two parameters specifying the ellipsoid of the datum.

Geoid: Is the geoid model (and the associated data file) used to correct GPS heights to orthometric elevations.

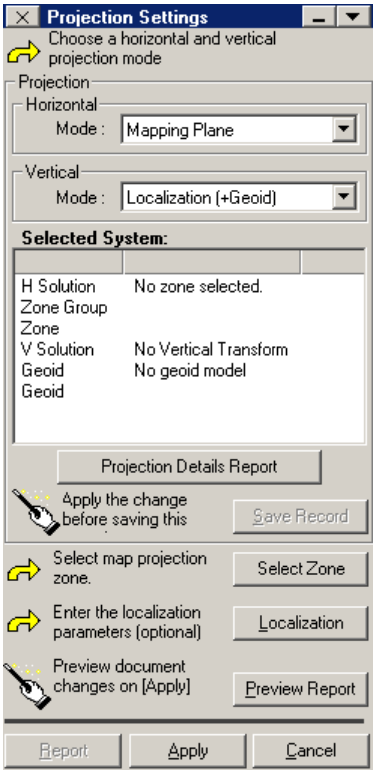
Save Record

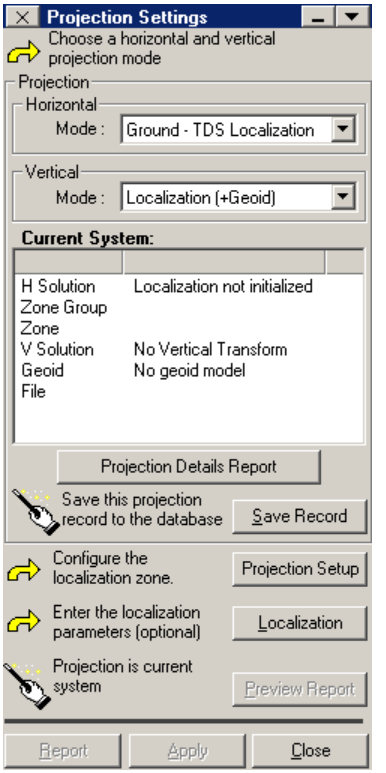
The [***Save Record***] button will save the current projection record to the coordinate system database file. Before the record is saved to the database file, the program first searches for a matching numerical record in the database (names are ignored). If no equivelent record is found, the program then searches the database for a record with the same name, and will prompt the user to rename the record if required. The

record is saved to the coordinate system database file, “complete.csd” in the ForeSight DXM application directory.

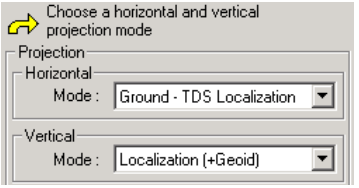
Projection Settings

The ***Project*** | ***Projection Settings*** (or ***Job*** | ***Projection Settings***) dialog is used to configure the coordinate system for both the job and project files. The section below describes how to select the horizontal and vertical projection mode, how to select a map projection zone record from the database or how to configure a TDS Localization zone, how to add a horizontal and vertical Localization adjustment to the zone, and how to readjust the document with the new coordinate system.





Select Projection Mode

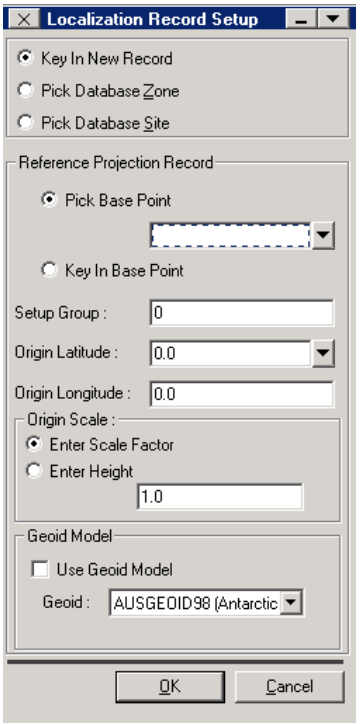


Choose the Horizontal and Vertical projection mode from the two combo boxes at the top of the ***Projection Settings*** dialog.

Projection Settings

The method used to select the map projection zone depends on the horizontal mode you are working in.

Ground – TDS Localization



In ***Ground – TDS Localization*** horizontal mode, a map projection zone is configured automatically in Survey Pro when the first RTK base setup is performed. There is usually no reason to configure a Localization zone using ForeSight DXM, since the TDS Localization projection record in the project will be set when you use ***Manage Data*** to merge coordinates from job to project. If you do need to set up a TDS Localization zone in ForeSight DXM, click on the [***Projection Setup***] button to open the ***Localization Record Setup*** dialog.

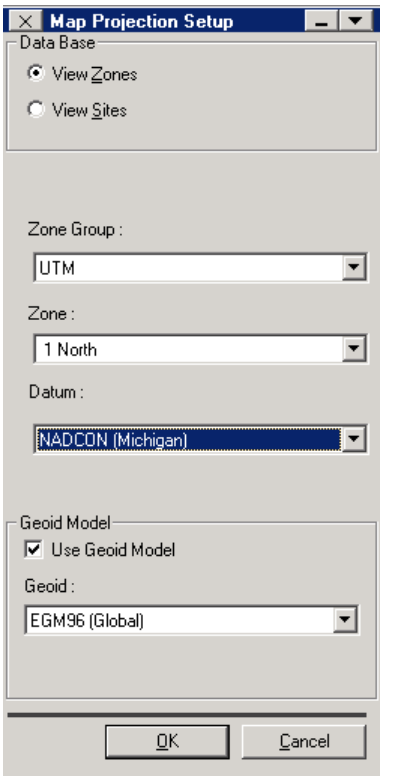
To configure the TDS Localization zone, you need to specify an origin, a setup group, and a geoid (if desired). In Survey Pro, the origin is the location of the first base position. In ForeSight DXM, you can set the origin in one of two ways: Click on the ***Pick Base Point*** button to select a point with geodetic coordinates, such as a RTK survey base point. Or, click on the ***Key In Base Point*** to input the origin values. When keying in the origin values, you can set the ***Origin Scale*** by entering a scale factor or by entering an origin height, and the dialog will convert it to a scale factor. If this localization is to match a solution from an autonomous base, then enter the ***Setup Group***; see the section on the Localization Adjustment for more information on setup

groups. Finally, check the ***Use Geoid Model*** box if you wish to use a geoid model and select the appropriate model from the list. Click on [***OK***] when you are satisfied with the settings.

You can also select a TDS Localization zone, or a solved TDS Localization site, from the coordinate system database file. Click on either ***Pick Database Zone*** or ***Pick Database Site*** to select TDS Localization records from the database. If there are no TDS Localization zone or site records in the database you will not be able to switch to those controls.

Map Projection

In ***Mapping Plane*** horizontal mode, a map projection zone is selected from the coordinate system database. Tap the [***Select Zone***] button to open the ***Map Projection Setup*** dialog where you can select any zone or site record in the database. First click on either ***View Zones*** or ***View Sites*** to show the zones or site records in the database file. If you wish to select a zone, select the correct zone group and choose an available zone. If the selected zone record does not have a datum record attached in the database, then you must also select a ***Datum*** from the list to attach to your zone. If the selected zone record has a datum, its name will be displayed. If you wish to select a site, pick the record from the choices in the ***Site*** control. If there are no sites in the database, then a warning message will appear when you click on this button.



Finally, choose if you wish to use the geoid model attached to the zone record in the database. By default, if a record in the database uses a geoid, the ***Use Geoid Model*** check box will be selected and the name of the geoid will be set in the ***Geoid*** control. If you wish to use a different geoid, then select it from the list. If you do not wish to use a geoid, or if you wish to attach a geoid to a record that does not have one, change the state of the ***Use Geoid Model*** check box to reflect your choice.

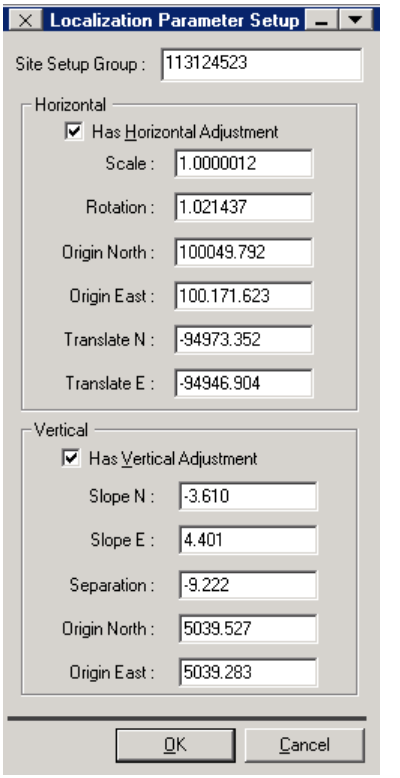
Localization Adjustment

A Localization is an adjustment applied to map projection horizontal coordinates and to ellipsoid heights to adjust the positions into any local system. A horizontal Localization is a 2D similarity transformation used to convert the coordinates from an intermediate map projection to coordinates in your local system. In ***Ground - TDS Localization*** mode, the intermediate map projection is the default zone initialized by Survey Pro. In ***Mapping Plane*** mode, the intermediate system is the inaccurate map projection positions emanating from an autonomous GPS base setup. A vertical Localization is a correction from measured ellipsoid heights or geoid elevations calculated from heights, into local elevations. This correction can be a simple vertical shift or a three-parameter inclined plane transformation.

To configure either the horizontal or vertical Localization, tap the [***Localization***] button to open the ***Localization Parameter Setup*** dialog. The parameters to enter for horizontal and vertical solution are the same regardless of your projection mode. However, the parameters will have a different range of values for the two different modes because of the different nature of the intermediate map projection. The meaning of a site setup group, the six horizontal, and the five vertical Localization parameters is explained in more detail below.

Setup Groups

When you set up different base stations with autonomous positions, each position is only accurate to +/- 30m (+/- 10 m with Selective Availability (SA) turned off). Geodetic coordinates measured from your first autonomous base will not be accurately connected to geodetic coordinates from a different autonomous base. Although the different Localization parameters will accurately transform both sets of data to the local coordinate system, it is not possible to compare the geodetic coordinates from the different sets of data.



Survey Pro and ForeSight DXM solve this problem by assigning a setup group each time a new autonomous base is set. A setup group is a unique flag attached to each point record generated by GPS. Setup groups in Survey Pro are assigned as follows:

- When you set a new base point with an autonomous GET, Survey Pro creates a new setup group for this point.
- When you collect geodetic measurements, each new point is assigned the setup group of the current base station.
- When you set the base on an existing point with geodetic coordinates, the point's existing setup group is used as the new base station setup group.
- When you set the base on a point with existing plane coordinates and compute geodetic coordinates using the 'Move Base' algorithm, the setup group of the base point is the setup group of the projection record.

Note: It is highly recommended that you use only one autonomous base setup in any job or project. If you use more than one autonomous setup in a single job, both Survey Pro and ForeSight DXM will check the setup group of each point against the setup group of the current projection record. Both programs will only calculate using geodetic coordinates with setup groups that match the current projection record.

Horizontal Localization Parameters

Scale: is the scale difference between the intermediate mapping plane and the local system. Scale should generally be very close to 1.0. In Ground – TDS Localization mode, a value of 1.0 means that GPS measured distances match the distances between the control points on the ground at the origin reference height. In Mapping plane mode, a value of 1.0 means that the GPS measured distances match the distances between the control points on the conformal map grid.

Scale values are often reduced to parts per million in order to relate the factor to a distance. One ppm (the sixth decimal place i.e. 1.000001 or 0.999999) is equal to 1mm in 1km; this is well below RTK precision. Fifteen ppm (1.000015 or 0.0.999985) is equal to 15mm in 1km; this is a usual RTK precision, so anything in this range is expected. A scale value significantly greater or smaller than 1.0 may indicate problems with the control point accuracy and/or the control measurement precision. In Ground – TDS Localization mode, it might also indicate a base reference height too high or low for the survey area, or a scale bias in the control point local coordinates.

Rotation: is the rotation between intermediate mapping plane and the orientation of the local grid. In ***Ground – TDS Localization*** mode there is a wide range of expected values for rotation, since the local grid often has a somewhat arbitrary orientation. For example, if you solved a Localization on a traverse network started from a magnetic compass bearing, the rotation would be a couple of degrees (magnetic compass precision) plus the magnetic declination. In ***Mapping Plane*** mode, the rotation should be very close to 0.0, since GPS measures orientation with respect to geodetic north, and the intermediate mapping plane has orientation defined by geodetic north. In ***Mapping Plane*** mode, a rotation value significantly greater or smaller than 0.0 may indicate problems with the control point accuracy and/or control measurement precision. It might also be an orientation bias of the mapping plane control system that you wish to solve for.

Origin: is the point on the intermediate mapping plane about which the scale and rotation is applied. It is the coordinate on the intermediate mapping plane of the centroid of the control points. It is the average of the (N, E) coordinates calculated from the control points' geodetic locations on the intermediate mapping plane. In ***Ground – TDS Localization*** mode, the origin should be close to (100000, 100000)m, since these are the false north and east parameters of the localization intermediate mapping plane. In ***Mapping Plane*** mode, this value should be in the same neighborhood as the control point coordinates.

Translation: is the shift between the origin and the centroid of the control points' local coordinates. In ***Ground – TDS Localization*** mode, the translation will often be a large negative number, since the origin is around (100000, 100000) and the local

coordinates are often around (5000,5000). In ***Mapping Plane*** mode, the translation should be no larger than plus or minus 30m, since it is comes from the GPS base autonomous setup, and this is the precision of an autonomous position.

Vertical Localization Parameters

Slope: is the North and East tilt of the inclined plane adjustment. These values are given in parts per million, and represent the radian angle values of the deflection between the ellipsoid normal and the local gravity vector. These values can also be called 'deflection of the vertical'. They should typically be less than 50ppm.

Separation: is the shift between the local elevation and the vertical reference surface. The vertical reference surface is geoid elevations when a geoid model is used, and is the ellipsoid when ellipsoid heights are used. Three factors will affect the expected range of values for separation: accuracy of heights, use of a geoid model, and accuracy of local control elevations. If you have heights measured from an autonomous GPS base, you will see +/- 30 m introduced by the autonomous position. If you are not using a geoid model, the shift value will contain the geoid separation. Finally, if your local elevations are not accurate, such as when you start a job at the default (5000,5000,100), then the shift will also contain the bias between your vertical system and real elevations.

Origin: is the local coordinate of the first point used in the control point list. The slope values are applied from this point.

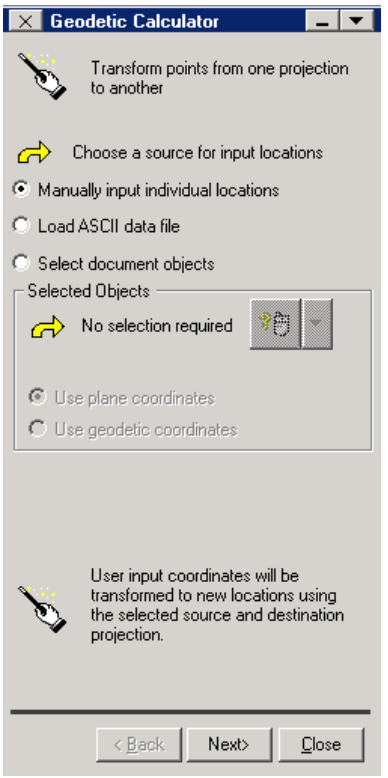
Geodetic Calculator

You can use the ***Tools*** | ***Geodetic Calculator*** function to convert positions from one coordinate system to another. Source coordinates can come from the open document (project, job or .CR5 file), from an ASCII text file, or keyed in one at a time. Results can be saved in a report, or exported to an ASCII file.

Page One: Select Input Method

You can input source coordinates from one of three sources. You can ***Manually input individual locations***, you can ***L`oad ASCII data file*** values, or you can ***Select document objects*** from the current file.

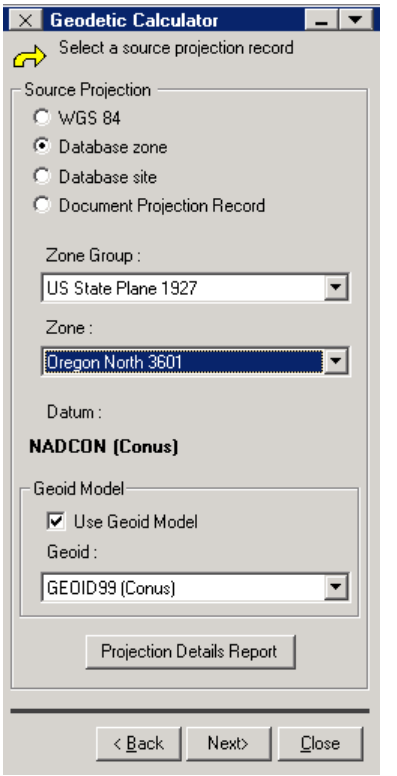
Choose an input method.



1. If your input method is ***Select document objects***, you also need to choose which coordinate values of the selected points to use. Choose ***Use plane coordinates*** if you wish to convert from the document point's plane values (North, East, Elevation). Choose ***Use geodetic coordinates*** if you wish to convert from the document point's geodetic values (Latitude, Longitude, Height). If you choose ***Use plane coordinates***, all selected points will be used. If you choose ***Use geodetic coordinates***, only selected point records with geodetic values will be used.
2. Tap [***Next>***] to select the source projection record.

Page Two: Select Source Projection

The source projection is used to define the transformation from the input coordinates to WGS84. If your input values are plane coordinates or local geodetic coordinates, these values will be transformed to WGS84 geodetic coordinates using the source projection.



Select the source projection type. You can choose from:

- ***WGS84***: will use no transformation. This choice requires input coordinate values in WGS84 Latitude, Longitude, Height.
- ***Database zone***: will display all the zone groups and zones in the database, so you can pick a zone. This choice allows input coordinate values of either local geodetic or local plane values.
- ***Database site***: will display all the sites in the database so you can pick a site record. This choice allows input coordinate values of either local geodetic or local plane values.
- ***Document projection record***: will use the document projection record for the transformation. This choice allows input coordinate values of either local geodetic or local plane values.

1. Select a ***Zone Group*** and ***Zone*** if necessary. For database zones that have no datum, the datum control will show a list of database datums. For database zones with a datum, database sites, and the document projection record, the datum control will show the name of the current datum and no selection is necessary.
2. Select ***Use Geoid Model*** as necessary. By default, the database record's geoid will be selected. You can over ride this to use a different goeid model or to not use a geoid model.
3. Tap [***Next>***] to select the destination projection record.

Click the [***Show Record Report***] button to display a report of the selected record's projection details.

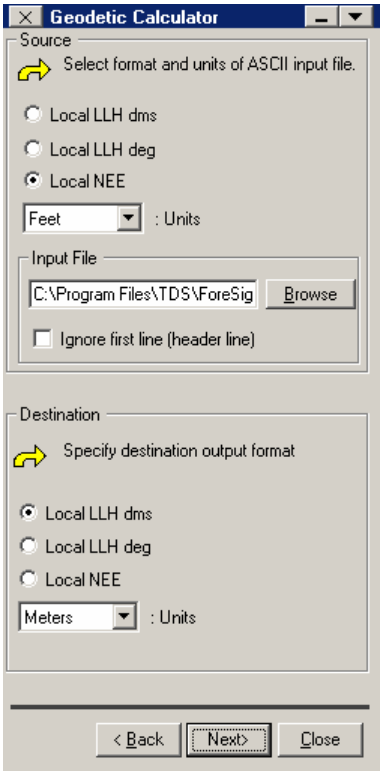
Page Three: Select Destination Projection

The destination projection is used to define the transformation from WGS84 to the destination coordinate system.

See the instructions for selecting a source projection above.

Page Four: Specify Formats

The next page is used to specify the formats of the input and output values. The user interface on this page will depend on your input method, and your choice of source, and destination projection. The illustration below shows all the available controls.



1. Select the format for the source coordinates. Choose ***LLH dms*** to enter (Latitude, Longitude, Height) in the usual ddd.mmssssss style. Choose ***LLH deg*** to enter (Latitude, Longitude, Height) in decimal degrees. Choose ***NEE*** to enter (Northing, Easting, Elevation).
   - If your source projection is WGS84, then you can choose only WGS84 LLH dms or WGS84 LLH deg.
   - If ***Select document objects*** was chosen in the first screen as the input method, then this screen is replaced with a static display of the source format.
2. Select the units for the source coordinates.
   - If your input type is selected document points, then the source units are defined by the document, and this control is replaced with a static display of the current document units.
   - If your input type is manual, and the source projection is the document projection, then the units are defined by the document, and this control is replaced with a static display of the current document units.
3. If your input source is Load ASCII data file, then select the input file name. Click [***Browse***] to open the file save dialog and pick a file name.

- Check ***Ignore First Line*** (header line) if your input file has a header in the first line. Leave this box unchecked if your input file has no header.

4. Select the format for the destination coordinates. Choose ***LLH dms*** to enter (Latitude, Longitude, Height) in the usual ddd.mmssssss style. Choose ***LLH deg*** to enter (Latitude, Longitude, Height) in decimal degrees. Choose ***NEE*** to enter (Northing, Easting, Elevation).

    - If your destination projection is WGS84, then you can choose only WGS84 LLH dms or WGS84 LLH deg.

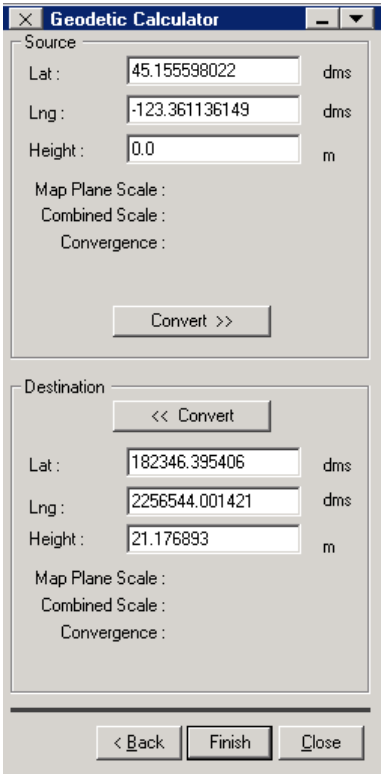
5. Select the units for the destination coordinates.

    - If your input type is manual, and the destination projection is the document projection, then the units are defined by the document, and this control is replaced with a static display of the current document units.

Page Five: Results

Manual input individual locations

If the source for input is ***Manual input***, the final page is where you enter the geodetic points to transform. The input values and the results for each point are shown on the interface. The results for all points transformed in this session are also written to the report window.



1. Input a source coordinate based on the format specified on the previous page.
   - If your source projection is the document projection record, and your source format is either Local LLH dms or Local NEE, then the ForeSight DXM graphic data exchange mechanism is enabled for these controls, and you can get a coordinate value by picking from the document map.
2. Click **[*Convert*>]** to transform the source coordinate into the destination coordinate. The ***Map Plane Scale***, ***Combined Scale***, and ***Convergence*** values are displayed for source and destination coordinates.
3. You can also input a destination coordinate, and hit [**<*Convert***] to transform this value to the source projection.

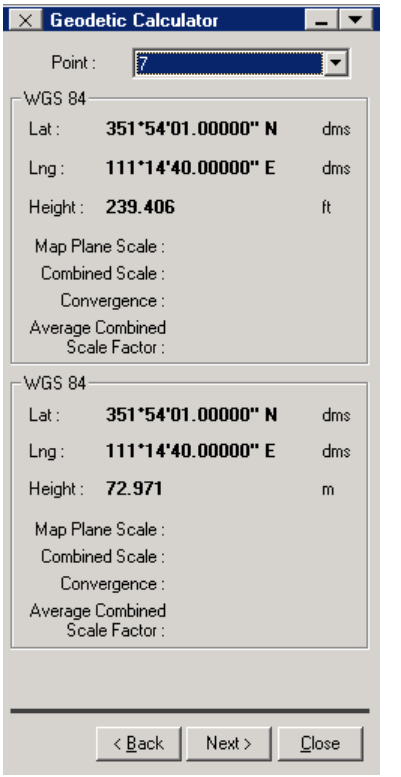
If your destination projection is the document projection record, and your destination format is either Local LLH dms or Local NEE, then the ForeSight DXM graphic data exchange mechanism is enabled for these controls, and you can get a coordinate value by picking from the document map.

Load ASCII file or Selected Document Points

If the source for input is either an ASCII file or selected document points, the next page shows the results for each point adjusted. You can choose the input point from the drop down list, and the results for that point are displayed in the user interface. The results for the entire coordinate set are also shown in the report window.

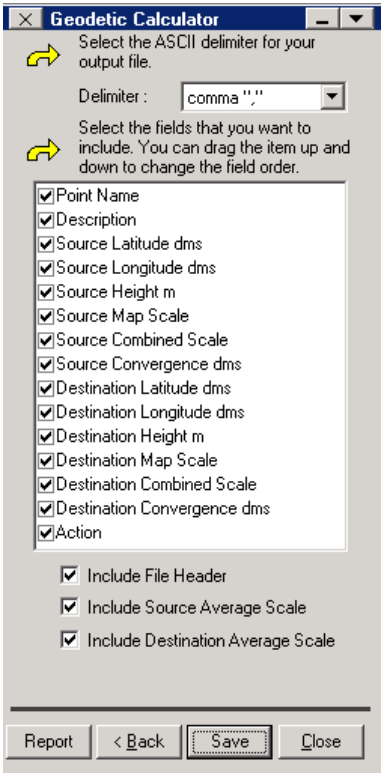
1. Select the point name from the ***Point*** drop down list, and the user interface will update with the input and results for that point

Tap [***Next>***] to print a custom report or save the results to an ASCII file.



Page Six: Save Custom ASCII file or Report

If the source for input is either an ASCII file or selected document points, the final page allows you to generate and save a custom report file and/or a custom ASCII output file.



1. If you want to store an ASCII output file, select the desired ASCII delimiter from the drop down list.
2. Select the fields you want in your output, and arrange the field order. You can drag the fields up or down to change the field order. Only fields that are checked will be included in the output.
3. Select additional information you desire in the output. You can include: a file header describing the fields, the source average combined scale factor, the destination average combined scale factor.
4. Click [***Report***] to generate a ForeSight DXM report with the selected fields.
5. Click [***Save***], enter a file name, and select the [***Save***] button to save the selected fields to the specified ASCII file.

Import GPS Control

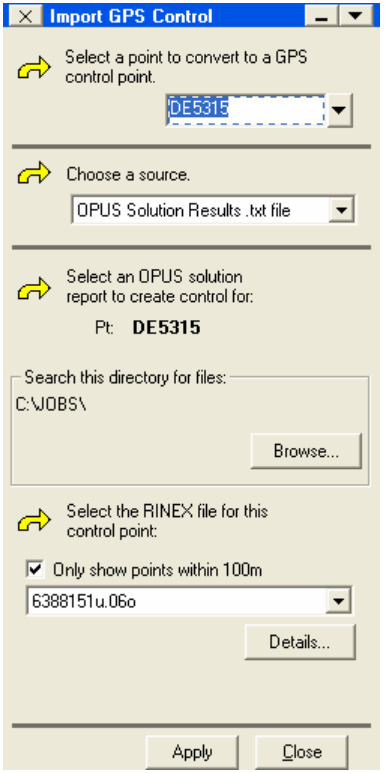
In some cases, you can occupy a GPS control point in the field during data collection, but you do not have the correct mapping plane local north, east, elevation coordinate for that control point. In this case, you cannot use this point to solve a localization.

The Import GPS Control routine automates the process of taking a data collected point and merging it with the proper local north, east, elevation coordinate from some external source to create a GPS control point. Once there are enough control points, you can localize and update all of the GPS collected points with the proper local coordinates. You can only import GPS control when your horizontal projection mode is set to Mapping Plane. There are three common work flow scenarios when using the Import GPS Control routine:

- You start a survey with your base on a new autonomous position. You set the base to log data for post processing while you do your RTK. In the field, you begin your survey without solving localization. You then submit the post processing data file to the NGS' OPUS service and get back the calculated local coordinate. You then wish to adjust the survey to match the calculated coordinate for your base.
- You start a survey with your base on a new autonomous position. You occupy one or more NGS control monuments during the survey, but you do not have the data sheet with the published north, east, and elevation coordinate in the field. You get back to the office and download these data sheets from the NGS web site, and you wish to solve a localization using these points as control.
- You start a survey with your base on an autonomous position. You occupy one or more control points during the survey, but you do not have the proper north, east, elevation coordinate in the field. You get back to the office and you calculate the proper coordinate for these points by some method such as an adjustment of post processed baselines, or from another crew's job file measurement to the same point. You then wish to solve a localization using these points as control.

Detailed Procedure

1. Open the ***Adjustments*** | ***Import GPS Control*** screen. The menu item is enabled only when there is a valid projection setup for the current job/project and when the horizontal projection mode is set to mapping plane.



2. Select a point that you wish to make into a GPS control point. You must select points that have geodetic (LLH) coordinates.

3. Select a method to input the source for the accurate location of the control point. Your choices are: NGS Data Sheet .txt file, OPUS Solution Results .txt file, or Key In Coordinate. The selection made here will determine the fields that follow in the dialog box.

Note: To use an NGS data sheet, download the data sheet for one or more desired points from the NGS web site, open the *.htm data sheet files using your web browser, and then click on File > Save As. Specify to save the file as a plain text file, and make sure the file has a .txt extension. To use an OPUS solution results file, open the email containing the solution report with your email editor, and then click on File > Save As. Specify to save the file as plain text, and make sure the file has a .txt extension.

4. Enter the source for the accurate local coordinate to apply to the selected point. If you are using an OPUS solution report or an NGS data sheet, use the ***Browse*** button to locate the appropriate directory and then pick the desired item from the drop down list. If you want to see additional details on any item, tap Details. If you are keying in a local coordinate, choose the Coordinate Type and key in the North, East, and Elevation, or the Latitude, Longitude, and Height.

5. Tap Apply after you have entered the local coordinate for the selected point. Repeat the above steps for any additional points if necessary.

Solve Localization

When you start a GPS survey from an autonomous base position, you need to solve a localization to adjust GPS measurements into local coordinates. This is the case for both horizontal projection modes. In most situations, localization takes place in the field using Survey Pro, but in situations where there was not enough control information to localize in the field, or you simply want to redo your localization, you can localize with ForeSight DXM using the ***Adjustments*** | ***Solve Localization*** menu item.

When using Ground - TDS Localization, you need to solve a localization to relate your arbitrary GPS start point into your non-geodetic local system. When using a Mapping Plane, you need to solve a localization to shift the autonomous GPS start point into accurate geodetic coordinates.

In either horizontal mode, the procedure is the same. Starting from an autonomous GPS base setup, you measure GPS positions on control points with know local plane (N,E) coordinates. The parameters for a 2D similarity transformation are calculated with a least squares solution using the control points. These parameters are added to the zone record (the default Ground - TDS Localization mode zone or the selected Mapping Plane mode zone) to create a zone based site record.

Vertical localization, with or without a geoid model, uses the same field procedure. Starting from an autonomous GPS base setup, you measure GPS positions on control points with know local elevations. The vertical adjustment parameters are calculated from the control points. The vertical adjustment will be either a shift to correct geoid elevations to local elevations, or an inclined plane to correct for vertical shift and tilts.

Localization with Control Points

Horizontal localization is a simple 2D similarity transformation that scales, rotates and translates coordinates on an intermediate mapping plane to coordinates in your local system. In Ground - TDS Localization mode, the intermediate mapping plane is the default map projection initialized for ground distances at the base height. In Mapping Plane mode, the intermediate mapping plane is the inaccurate coordinates calculated on the selected map projection from the autonomous GPS base.

Vertical localization is a correction from measured ellipsoid heights or geoid elevations calculated from heights, into local elevations. This correction can be a simple shift or a three-parameter inclined plane.

Localization with Control Points: Summary

- Take GPS measurements to at least the minimum number of control points. In Ground – TDS Localization mode, at least two horizontal control points are required. In Mapping Plane mode, at least one horizontal control point is required. In Localization (+Geoid) mode at least three vertical control points are required when there is no geoid model, and one vertical control point is required when there is a geoid model.
- Click ***Adjustments*** | ***Solve Localization*** to open the Solve Localization dialog.
- Select the points to use for horizontal and vertical control and select the desired options in the remainder of the dialog.
- Tap Solve to compute a localization solution.
- Verify the solution residual or misclosure quality and tap Apply to apply the localization.

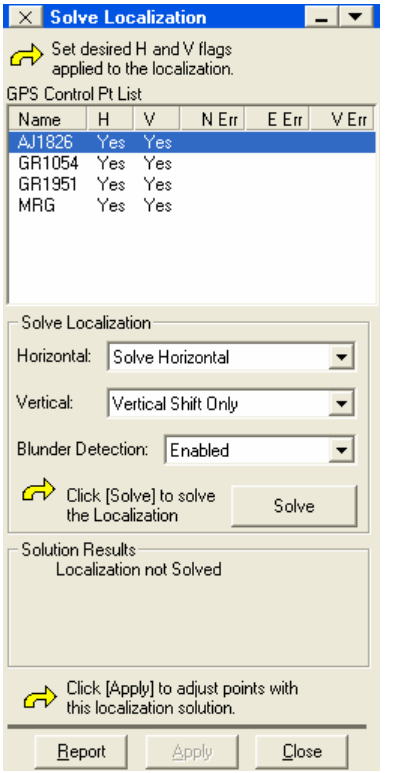
Detailed Procedure

Since the procedure is the same for both horizontal and vertical localization solutions, the instructions below cover both cases.

1. Click ***Adjustments*** | ***Solve Localization*** to open the Solve Localization dialog.

2. In the GPS Control Pt List, control points collected will be identified with an H and/or V. Points marked H will be used to solve horizontal localization. Points marked with a V will be used to solve vertical localization. You can select or deselect any point by highlighting that point and then tap corresponding H and/or V column, or you can press H and/or V on the keyboard.

3. If you wish to hold the horizontal scale of the GPS measurements, but you want the localization adjustment to correct for a rotation, select Solve Rotation Only in the Horizontal field.



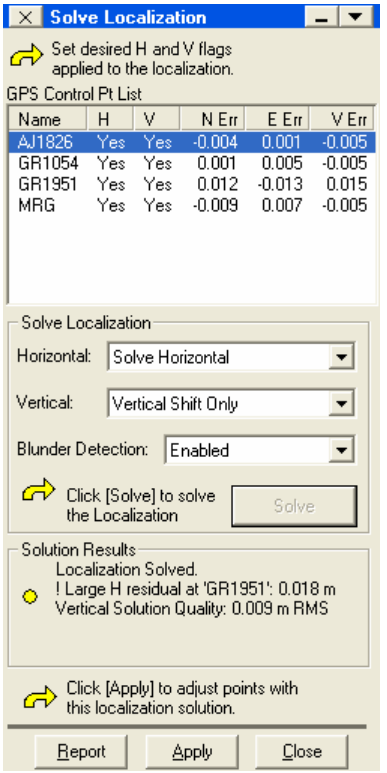
Note: When using Solve Rotation Only, you are only allowed to use two horizontal control points.

4. In the Vertical field, you have the choice to adjust Vertical Shift Only, Vertical Shift + Inclined Plane, or no vertical adjustment.

5. When blunder detection is enabled, we will use all of the selected horizontal and vertical control points to attempt to detect any gross errors in the localization control points. If any gross errors are detected, you will be prompted to remove those points from the horizontal or vertical solution and the localization will be resolved with the new control point assignments. When blunder detection is turned off, we will simply show the RMS of the solution in the results area.

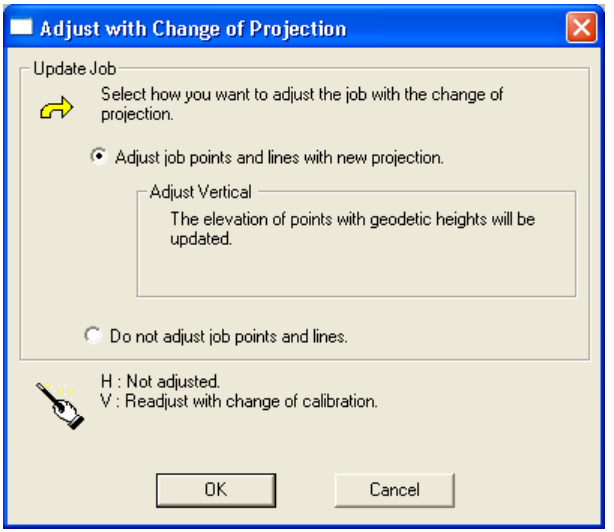
Note: In order for blunder detection to run, you must have at least one more than the minimum number of control points for the H or V solution.

6. Tap Solve. The localization parameters are computed using the selected control points, and the dialog box is filled in with solution RMS values.



7. The Solution Results box consists of the result of the solution along with an indicator hinting to the quality of the solution. If blunder detection is used, those results are displayed here, otherwise RMS results are shown.

   If you are not happy with the solution residual or misclosure values for any point and have not yet applied the solution, you can change the control points used by tapping in the H and/or V columns and then tap Solve again to recalculate the solution and update the Solution Results.



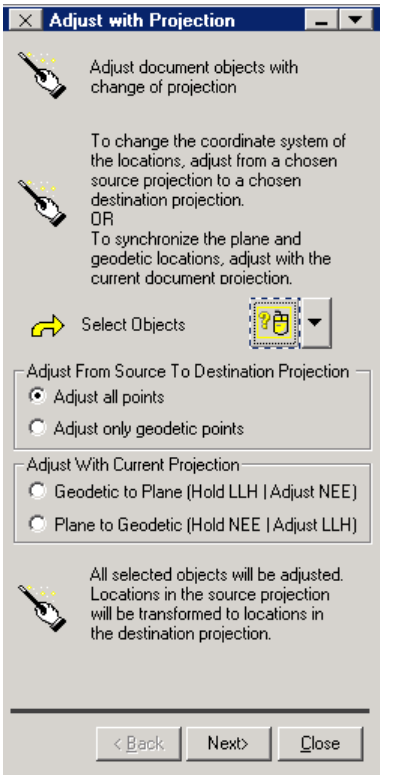
8. When you are happy with the solution, tap Apply. The Adjust with Change of Projection dialog will open where you can select to apply the solution results to all or none of the points and lines of the project. Tap OK to finish the adjustment. GPS control flags are then updated and the project marked modified.

Adjust With Projection

You can use the ***Adjustments*** | ***Adjust with Projection*** function to convert document objects from one coordinate system to another, or to readjust document objects to match the current coordinate system.

Page One: Select Objects

You can perform two types of adjustment with selected document objects. The first type of adjustment is to transform document objects from a source coordinate system to a destination coordinate system. This is the type of adjustment done by the Manage Data routine and the Projection Settings routine when the projection record is changed in the document. The second type of adjustment is to update either the geodetic or the plane coordinates of selected objects based on the current projection record. This is the type of adjustment performed by the Survey Pro projection "Readjust Points" routine.



1. Select objects to adjust. There are four options to adjust selected objects:

   - ***Adjust all points***. This option will adjust all the plane location of all selected objects from a chosen source projection to a chosen destination projection. Points with geodetic coordinates will be adjusted to the destination projection using their WGS84 (Latitude, Longitude, Height) value. Points with plane only coordinates will be transformed to WGS84 (Latitude, Longitude, Height) using the source projection, and then transformed to the destination projection.
   - ***Adjust only geodetic points***: This option will adjust the plane location of selected points that have geodetic coordinates. Points will be transformed to the chosen destination projection using their WGS84 (Latitude, Longitude, Height) value.
   - ***Readjust Geodetic To Plane***: This option will adjust the plane coordinate of selected

objects that have geodetic coordinates. The current document projection will be used to transform the WGS84 (Latitude, Longitude, Height) values into new plane coordinates.

- ***Readjust Plane to Geodetic***: This option will compute WGS84 coordinates for all plane points based on the current document projection. Points that had a geodetic coordinate will be updated with a new geodetic coordinate. Points that did not already have a geodetic coordinate will be updated with one. All points will have the set up group of the current projection record.

Page Two/Three: Select Projection Record

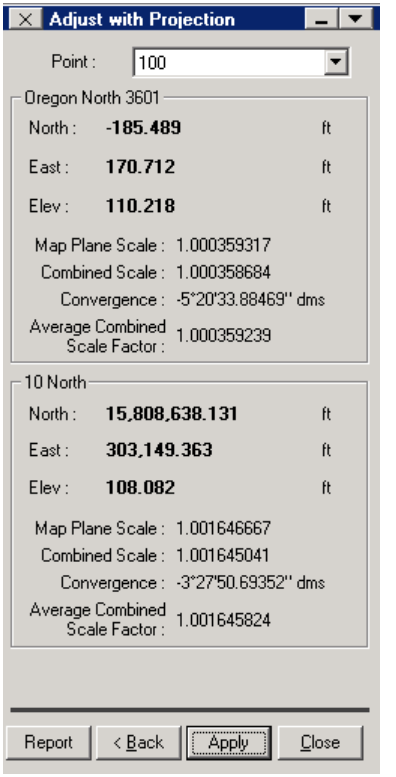
The next page(s) show the source and destination projection records. If your adjustment option is Adjust all points or Adjust geodetic only, then the next two pages are used to select the source and destination projection records. If your adjustment option is Readjust Geodetic to Plane or Readjust Plane to Geodetic, the second page will show a static display of the current document projection record, and the page to select the destination projection does not appear.

For information on selecting the projection record, see the section above.

Final Page: Results and Apply Adjustment

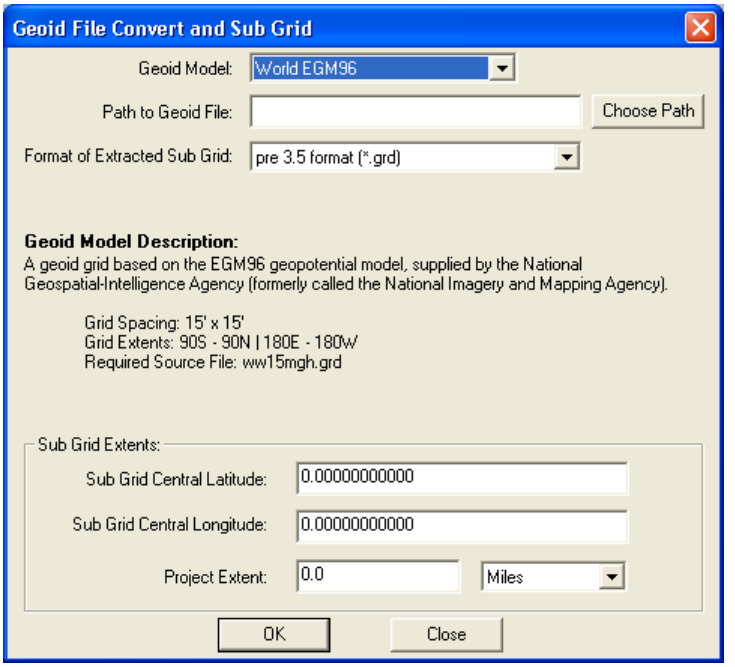
The final page displays the results of the adjustment and is used to apply the adjustment to the document. You can choose the input point from the drop down list, and the results for that point are displayed in the user interface. The results for the entire coordinate set are also shown in the report window.

1. Click [***Report***] to show a report of the adjustment results.
2. Click [***Apply***] to apply the adjustment to the document.



Geoid File Convert and Sub-Grid

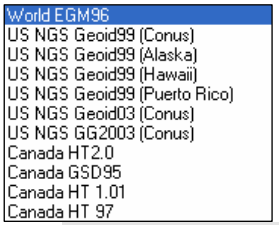
Depending on the chosen geoid model and the desired result, the ***Geoid File Convert and Sub-Grid*** routine has three possible functions. It can:



1. Convert an entire geoid file into Trimble Geoid Grid File (.ggf) format.
2. Extract a sub grid from a geoid file.
3. Simultaneously extract a sub-grid from a geoid file and convert it to .ggf format.

The modified geoid file can then be transferred to the data collector using ***Transfer | Send Receive Files.***

Creating and Converting a Sub Grid Geoid File:



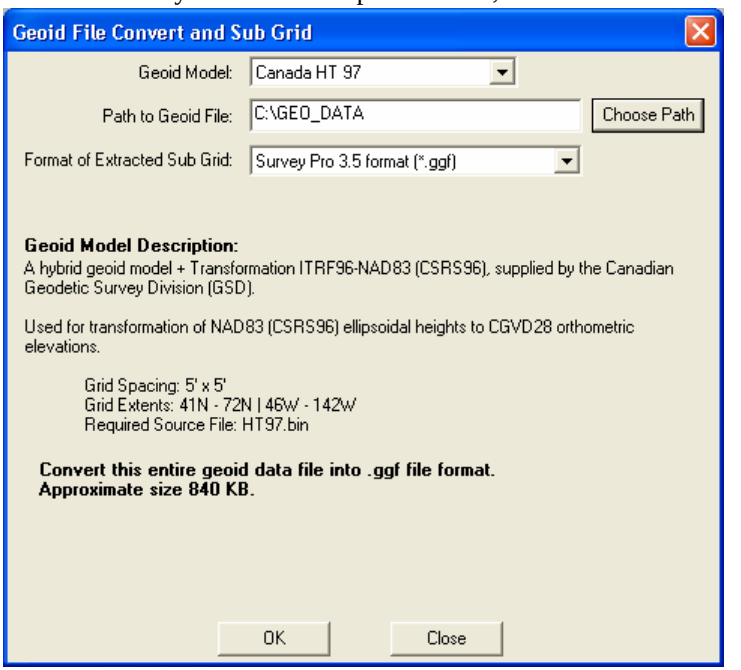
1. Select the ***Geoid Model***.
2. Specify the ***Path to Geoid File***. Click [***Choose Path***] if you need to browse to the source data file location.

Note: This is the path to the original source file for this geoid and not the path to the files used by the geodetic engine in ForeSight DXM. All of the supported geoid models are contained on the TDS Survey Works CD in "Root\Geodata" and are listed here.

3. Specify the ***Format of extracted sub grid***. If you are using Survey Pro 3.5 or later, this is the .GGF file format. If you are using a version of Survey Pro prior to 3.5, this is the same file type as the source geoid file.
4. Enter a ***Sub Grid Central Latitude*** and a ***Sub Grid Central Longitude*** location. Remember that the Sub Grid Central Longitude is entered as a negative number for locations in the U.S.
5. Enter a ***Project Extent*** and specify the units. These values will be used with the Central Latitude/Longitude values to calculate the area of the sub grid file.
6. Click [***OK***] to create the sub grid file. The ***Save As*** window will open. Name the file, and save it in the desired location.

Converting a Geoid File

The older Canadian geoids (GSD95, HT 1.01, or HT 97) do not require/allow a sub grid to be extracted. The file can be converted, in its entirety, to .ggf format for versions of Survey Pro 3.5 or later. For Survey Pro versions prior to 3.5, the entire geoid file can be transferred into the data collector without modification.



Note the replacement of the ***Sub Grid Extents*** portion of the dialog with a sentence, which reads, "***Convert this entire geoid data file into .ggf format***.

To convert:

1. Choose the Geoid Model.
2. Specify the ***Path to Geoid File***.
3. Click [***OK***] to convert the geoid file. Name it, and save it in the desired location.

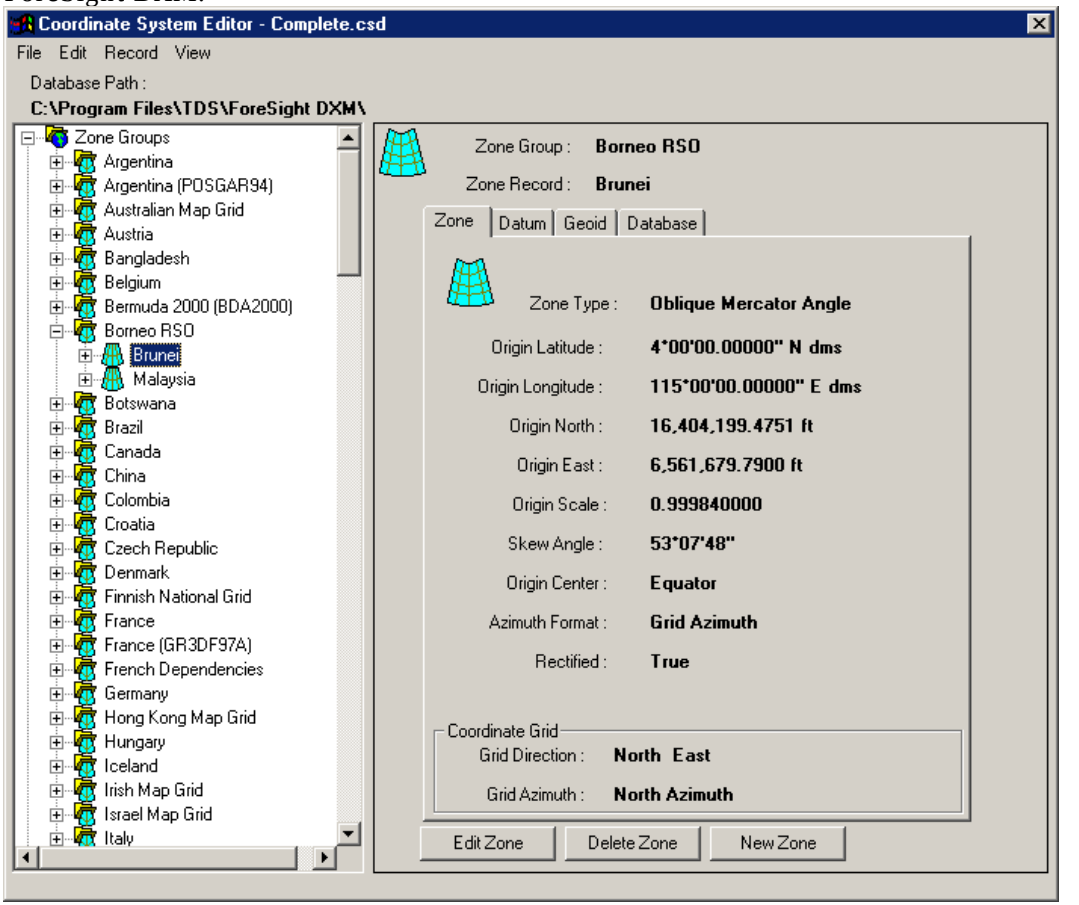
Note: The coordinate system database contains many more geoid models not supported by this routine. Although you can use these models in both ForeSight DXM and Survey Pro (versions 3.5 and above), you cannot parse these data files using the Extract Sub grid dialog.

Transferring the Geoid File to a Data Collector

Transfer the file using ***Transfer*** | ***Send Receive Files***. If you are using Survey Pro 3.5 or later, the .ggf geoid file MUST be placed in the directory "Disk\Geodata" on a Ranger, or "Built-In Storage\Geodata" on a Recon. If you are using a version of Survey Pro prior to 3.5, the .grd or the .bin geoid file can be placed in any directory on the data collector, and you set the path to geodetic files in the Survey Pro.

Coordinate System Editor

The Coordinate System Editor (CSE) is a ForeSight DXM tool that provides a simple and intuitive way to create and edit a coordinate system database file. The program allows you to edit the details of a site, zone group, datum, ellipsoid, and geoid record. You can open the CSE by selecting ***Tools*** | ***Coordinate System Editor*** from within ForeSight DXM.



The CSE window is divided into two sides. The left hand side represents the open database, and contains a tree of all the database records. The right hand side is the working window. When a record is selected from the open database tree, the working

window shows the record properties. When a record is being edited, or a new record is being created, the working window is used to modify or input the record parameters. When a new database is being created, the working window shows a tree control of records to be saved in the new database.

Navigating the Open Database

The open database tree control shows each database record. Some record types are dependant on other records. For example, a zone record has an attached datum, and a datum record has an attached ellipsoid. Each record in the tree can be expanded to show its constituent records by clicking the corresponding ⊞ button. Records can be collapsed by clicking ⊟ for when you do not need to see the records of a particular type.

The ***View*** menu also includes some basic tools to aid in navigation.

- ***Expand All***: This will expand the tree for every item, displaying all database records.
- ***Collapse All***: This will reduce the tree down to the root level of records.
- ***Show All Records***: This will allow all records with a Visible or Hide tag to be viewable.
- ***Hide All Records***: This will collapse the tree down to display only records with a Visible tag.

Coordinate System Record Types

The coordinate system database file (*.csd) contains a number of different record types. Some record types contain other records as constituent parts. Below is a description of the different record types, their parameters, and their constituent parts.

All Records

All database records have some common parameters:

- ***Record Name***: Each record will have a name. This name must be unique for this type of record. The exception is that you can have zones of the same names if they are in different zone groups. Also, you can have multiple datums of the same name as long as they are all of different datum types and they all use the same ellipsoid.

- ***Visible / Hidden Flag***: Each record has a flag indicating if it is a visible or hidden record.
- ***Record Note***: A record may have a note. This string, up to 256 characters, is a means to attach additional information to the record. TDS uses the record note to attach the set up group to zone based sites (see sites below).

Geoid Record

A Geoid record describes a grid geoid file used to interpolate geoid separations for a (Latitude, Longitude) position. A geoid record does not have any other constituent parts. The geoid record parameters are:

- ***Geoid Name***: The geoid name describes the geoid model. It is used by the software to associate the geoid with a geoid file, by matching the geoid name to the information in the geoid file header.
- ***Geoid File Name***: This is the name of the geoid file. This file, which must be located in the proper geodata directory, is used by the geoid record to perform the interpolations of geoid separation. Geoid files must be in the geoid grid file (*.ggf) format.

Ellipsoid Record

An ellipsoid record describes a rotational ellipsoid used to model the shape of the earth. An ellipsoid record does not have any other constituent parts. The ellipsoid record parameters are:

- ***Semi Major Axis***: This parameter, often referred to using the variable name 'a' is the long axis of the ellipse.
- ***Ellipse Other Parameter***: The other parameter of the ellipsoid record may be one of the following: semi minor axis, flattening, reciprocal flattening, first or second eccentricity, first or second eccentricity squared.

Datum Record

A datum record describes a transformation between WGS84, the reference frame of GPS observations, and a local geodetic reference frame. A datum record will always have an attached ellipsoid record. There are four datum types used by the coordinate system database file:

WGS84 Datum: The WGS84 datum is a special case. Using this datum means that no datum transformation is applied. The WGS84 datum uses the World Geodetic

System 1984 ellipsoid. Only one datum of type WGS84 can exist in the database, and it is always a system record.

Molodensky Datum: The Molodensky datum transformation defines a translation in the X, Y, and Z directions to move from the origin of the WGS-84 ellipsoid to the origin of the local ellipsoid (or vice versa).

For a detailed discussion of the Molodensky algorithms and parameters for a number of the datums included in the coordinate system database, please refer to Department of Defense World Geodetic System 1984: Its Definition and Relationships with Local Geodetic Systems, Defense Mapping Agency Technical Report TR 8350.2, 1991.

The Molodensky transformations were originally developed to reduce the number and complexity of the manual computation steps needed to perform approximate datum transformations. As computers now perform most of these calculations, it is better to use the more accurate Seven Parameter transformation if possible.

The Molodensky datum transformation is sometimes called a Three Parameter datum transformation. The three parameters are:

- ***Translation X***: the shift on the X axis between this datum and WGS84.
- ***Translation Y***: the shift on the Y axis between this datum and WGS84.
- ***Translation Z***: the shift on the Z axis between this datum and WGS84.

The (XYZ) translation can be defined in one of two directions. The shift is either the local datum to WGS84, or WGS84 to the local datum.

Seven Parameter (3D Similarity) Datum: A seven parameter datum is a 3D similarity transform between the local system and WGS84. It is defined by seven parameters:

- ***Translation X***: the shift on the X axis between this datum and WGS84.
- ***Translation Y***: the shift on the Y axis between this datum and WGS84.
- ***Translation Z***: the shift on the Z axis between this datum and WGS84.
- ***Rotation X***: the rotation on the X axis between the two datums.
- ***Rotation Y***: the rotation on the Y axis between the two datums.
- ***Rotation Z***: the rotation on the Z axis between the two datums.
- ***Scale PPM***: the scale between the two datums. Because the scale is often small, this value is given in parts per million (ppm). For example, + 5 ppm

corresponds to a unity based scale factor of 1.000005, and –5ppm corresponds to a unity based scale factor of 0.999995.

The parameters can be defined in one of two directions: either the local datum to WGS84, or WGS84 to the local datum.

Grid File Datum: A grid datum is a set of files that define the datum shift for grid locations, where the datum shift for any location can be interpolated from the files. It uses a set of two (for horizontal transformation only) or three (for horizontal and vertical transformation) grid data files. The grid data files are in the datum grid file (*.dgf) format.

Zone Record

A zone record describes a map projection, used to transform geodetic (Latitude, Longitude) positions into plane (Northing, Easting). There are many different zone types possible in the coordinate system database file, and the CSE can display the parameters of any zone. However, the CSE only supports editing and creation of the five most common types. All zone types share the following parameters:

- ***Origin Latitude***: The local geodetic latitude of the origin of the map projection zone.
- ***Origin Longitude***: The local geodetic longitude of the origin of the map projection zone.
- ***Origin Northing***: Also called False Northing, is the Y value of the origin coordinate of the map projection zone.
- ***Origin Easting***: Also called False Easting, is the X value of the origin coordinate of the map projection zone.
- ***Grid Direction***: Describes the direction of increasing positive coordinates. The most common grid direction is North East, which matches the Cartesian xy system used in mathematics.
- ***Grid Azimuth***: Describes the azimuth format of the zone. North azimuth has direction clockwise from the positive y-axis. South azimuth has direction clockwise from the negative y-axis.

The following zones use different additional parameters:

- **Transverse Mercator Zones**
- **Lambert Conformal Conic One Parallel Zones**
- **Oblique Stereographic Zones**

- ***Origin Scale***: The scale factor at the origin of the map projection zone.

- **Lambert Conformal Conic Two Parallel Zones**
- **Albers Equal Area Conic Zones**
  - ***North Parallel***: Is the local geodetic latitude of the northern standard parallel of the conic section tangent to the ellipsoid.
  - ***South Parallel***: Is the local geodetic latitude of the southern standard parallel of the conic section tangent to the ellipsoid.
- **Oblique Mercator Angle Zones**
  - ***Origin Scale:*** The scale factor at the origin of the map projection zone.
  - ***Skew Angle:*** Angle at the central meridian of the projection**.**
  - ***Origin Centre:***
    - Origin at center of projection: this indicates that the origin of the projection is coincident with the center of the projection.
    - Origin at equator: this indicates that the origin of the projection is at the equator, as is normally the case.
  - ***Azimuth Format:***
    - Azimuth at Center of Projection: this represents the direction of the projection's cylindrical axis defined as an azimuth at the center of the projection.
    - Azimuth at Equator: this represents the direction of the projection's cylindrical axis defined as an azimuth at its point of intersection with the equator.
  - ***Rectified:*** Coordinates are 'rectified' if the local plane is rotated by the azimuth angle of the central meridian of the projection so that Grid North lines up with True North.

Zone Based Site Record

A zone based site record describes an adjustment applied to a zone record. Since this record is based on a map projection zone, its constituent parts include a zone, a datum, an ellipsoid, and possibly a geoid. However, unlike other records, zone based site records have their own copy of each of their constituent parts, so they do not actually depend on any other records in the database. There are three possible types of adjustment contained in a zone based site record, and a site may have any or all of

the following adjustments: horizontal adjustment, vertical adjustment, and a ground coordinate system.

- ***Horizontal Adjustment***: A horizontal adjustment is a 2D similarity transformation applied to map projection locations to adjust to local coordinates. The Horizontal adjustment is also called a Horizontal Localization, or a Horizontal Calibration. For complete details on meaning of the horizontal adjustment parameters, see Page 145.
- ***Vertical Adjustment***: A vertical adjustment is an inclined plane vertical transformation, or a geoid model transformation, or a combination of both, to adjust ellipsoid heights to orthometric elevations. For complete details of the vertical adjustment parameters, see Page 146.
- ***Ground Coordinate System***: A Ground Coordinate System is a grid to ground transformation applied to map projection locations to scale and translate the coordinates into a ground level system. The ForeSight DXM interface does not expose ground coordinate systems anywhere else in the software, so the parameters are explained in detail here.
- ***Ground Coordinates Origin***: The local geodetic coordinate of the origin of the ground coordinate system. This will be the point around which the scale factor is applied. The horizontal location of this point will be used to calculate the mapping plane scale factor for the system. The vertical location of this point will be used to calculate the ellipsoid scale factor for this system. This value is optional, and if the ground site has no origin location, the scale factor is applied at the projection origin.
- ***False North Offset***: An offset subtracted from the map projection northing (y) value to shift the coordinates into a distinct space to make the scaled values easy to recognize compared to the map projection values. An offset is optional, but recommended to avoid confusion between the scaled and grid values.
- ***False East Offset***: An offset subtracted from the map projection easting (x) value.
- ***Origin Scale***: The scale factor applied to the ground system. The origin scale factor is typically the inverse of the combined scale factor at the ground site origin.

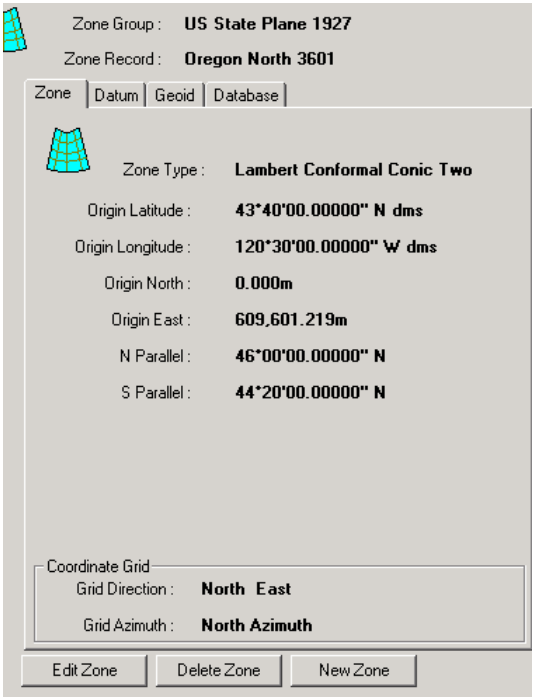
Zone Groups

A zone group record is a database mechanism to hold a collection of zones. Zones covering the same geographical area or cadastral jurisdiction are organized into appropriately named zone groups. Zone group records have no constituent parts.

Viewing a Record

To view a record in the current database file, simply select the record, or any of its constituent records from the tree. The record details working window will open, and there will be a tab for each constituent part of the selected record.

The [***Edit RECORD***] button will open the selected record in the appropriate editor where it can be modified. If the record is a system record, a warning will be displayed explaining that only certain fields can be edited for that record. See *Editing an Existing Record* on Page 174.



The [***Delete RECORD***] button will delete the selected record and any records that contain this record as a constituent part. System records cannot be deleted.

The [***New RECORD***] button will duplicate the selected record and put the CSE in *Create New Record* mode (see *Creating a New* Record on Page 176) where the details of the copied record can be modified and then saved to the current database as a new record.

Editing an Existing Record

To edit an existing record, select the record from the open database tree, and then tap [***Edit RECORD***] from the record details working window, or select Edit Record from the Edit menu.

Make the desired changes to the record and then click the [***Apply***] button to apply the changes. Canceling without applying the changes will result in no change being made.

The fields that can be edited depend on the type of record that is selected. The following list outlines the fields that can be edited for various record types.

All Records

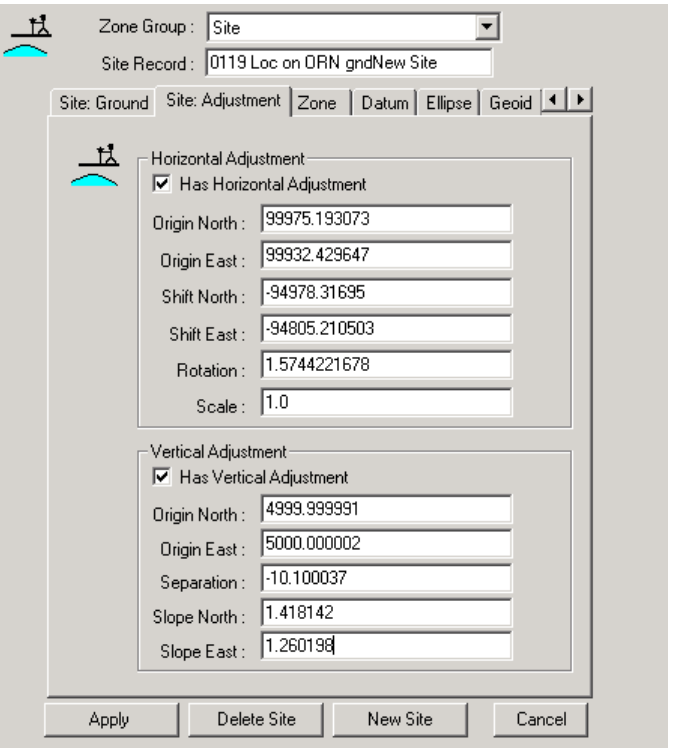
You can edit the hidden/visible record flag and the note attached to the record.

System Zone Records

You can change the geoid used by the zone

Non-System Records

You can edit any property of the record. See the description of database records for a complete list of record parameters.

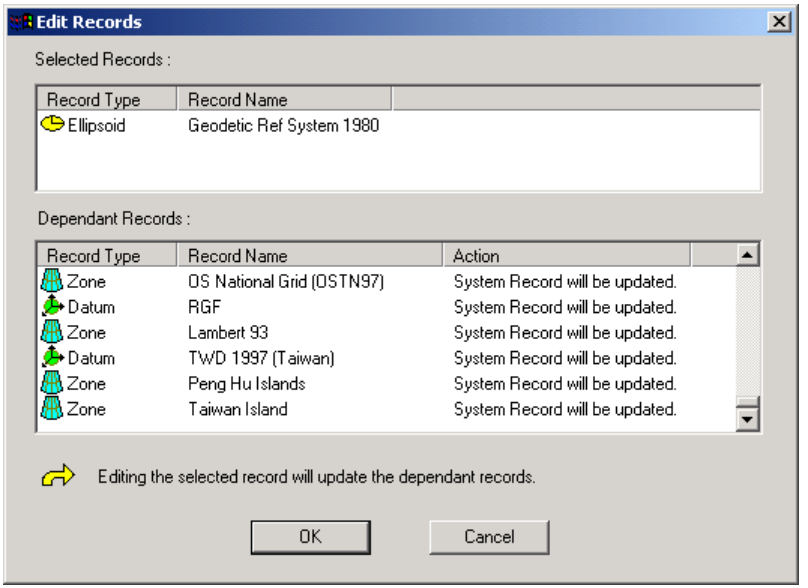


Editing or Deleting Dependant Records

When you edit (or delete) a record that is a constituent part of another record, all of the dependant records will also be updated (or deleted). The following list describes the record dependancy of the different record types.

- Modify a geoid: All zones that use that geoid are modified
- Modify an ellipsoid: All datums using that ellipsoid and all zones using that datum are modified.
- Modify a datum: All zones using that datum are modified.
- Modify a zone group: All zones in that group are modified.
- Modify a site: nothing else is modified. Site records have their own copies of all their constituent parts.

When modifying a record that has dependant records, this message box is displayed:



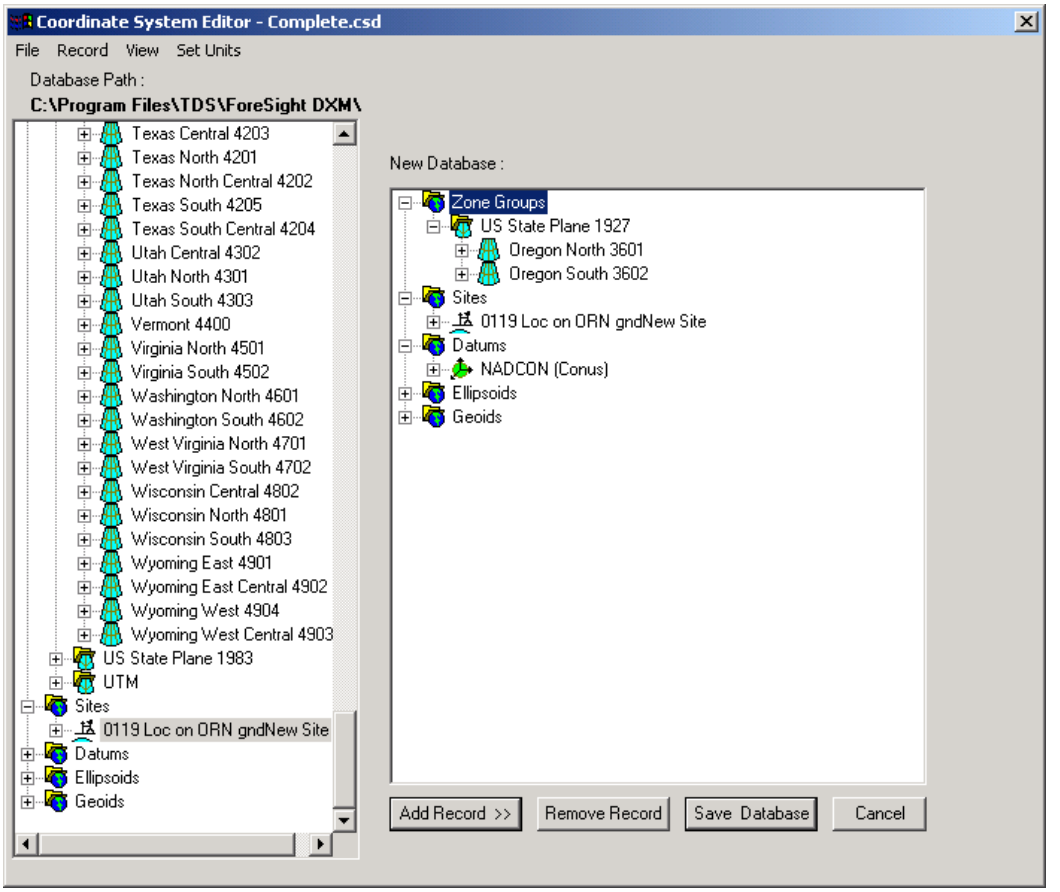
Click [***OK***] to proceed with the edit or deletion. Click [***Cancel***] to abort the operation.

Creating a New Record

To create a new record, click [***New RECORD***] on the record properties working window, or select ***New RECORD*** from the Record menu. When the [***New RECORD***] button on the working window is used, the parameters for the new record will be initialized using the current record. The same is true when you use the ***New RECORD*** menu item and the currently selected record is of the same type as the record you choose to create. Also, in the case of sites, if you have a zone selected, and you choose the ***New Site Record*** menu item, the new site's zone, datum, ellipsoid, and geoid parameters are initialized using the selected site.

Creating a New Database

To create a new database, select ***File*** | ***Create New Database***. The New Database working window will open on the right hand side. This window will initially be empty. You can then add records to the new database and save it to a new file.



Adding Records

To add a record to the new database, select the record in the open database and click the [***Add Record*** >>] button. This will copy the selected record, and all its constituent records, to the new database.

Removing Records

To remove a record from the new database, simply select the record and click [***Remove Record***]. If the selected record has dependant records, the dependant records will also be removed.

Note: Records cannot be removed from the current database displayed on the left hand side of the window.

Saving the New Database

Once all the desired records have been added to the new database, click [***Save Database***] to choose a name for the new file and save it to disk. Once a new database is saved, the new database working window disappears, and the newly saved database is loaded as the open database on the left hand side of the interface. You can also select ***File*** | ***Save Database***, or click the [***Save Database***] button. A prompt will warn you that the new database will be closed from the editor and automatically selected as the current database.

Index

R

S

T

U

V

Z