

# Chapter 3

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## **Views** *(updated September 5, 2009)*

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## General Discussion

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Through the View menu, you select the context for what you want to do in COLUMBUS. By selecting a view, you are telling COLUMBUS what coordinates you want to use for the computations that will follow. *View selection is perhaps the most important decision you will make for your current project.*

From the View menu, you can also set up routes (for traversing, inverting, area computations and network design layout), hide stations, resize entities (station symbols, station names, error ellipses), zoom in/out, and establish the numeric sorting behavior in report columns.

If you want to perform a 1D Vertical network adjustment or traverse, you select the 1D Vertical view.

If you want to transform Geodetic coordinates to State Plane, you can either select the 2D Geodetic view or the 3D Geodetic view. If you want the transformation based on some average project height (for the purpose of computing the scale factors), you would select the 2D Geodetic view, **then enter the average project height in the OPTIONS - GLOBAL SETTINGS - 2D Height** field. If you want the scale factors to be based on the individual geodetic ellipsoid heights, you would choose the 3D Geodetic view, then select the **OPTIONS - GLOBAL SETTINGS - 3D Geodetic Height** (ellipsoidal) field.

Need to compute a 2D UTM traverse? Select the 2D UTM view first, then point and click your traverse route.

Need to convert ECEF XYZ coordinates to 3D Geodetic, change the view to Cartesian XYZ.

**For each of the scenarios described above (and dozens of other scenarios), the view indicates the coordinates to use during computations. Therefore, those coordinates must be set up in the project - they are the known coordinates.**

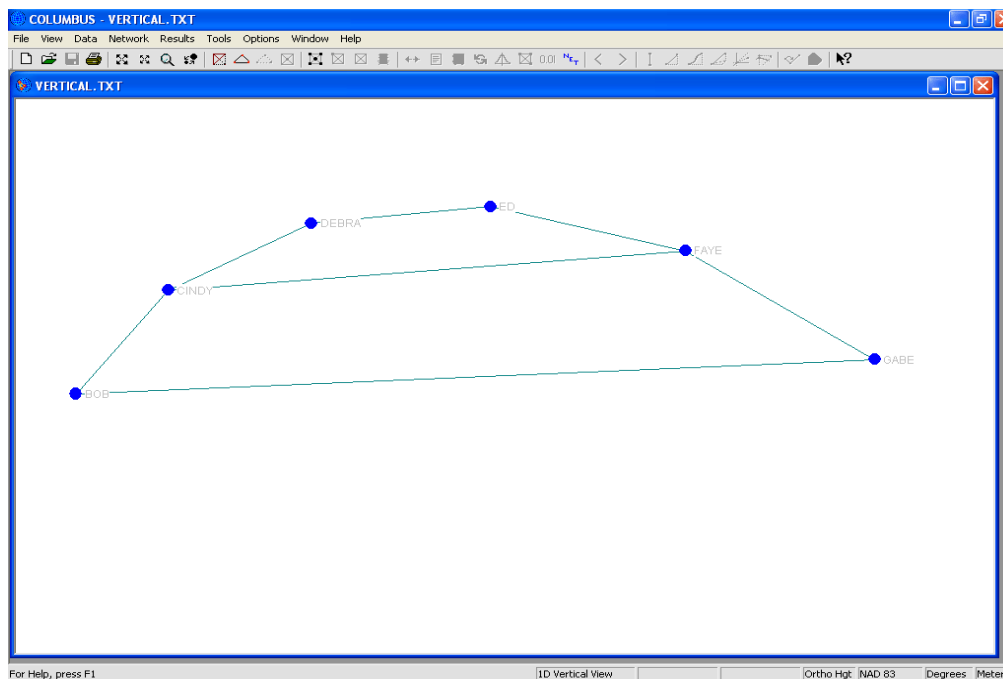
## 1D Vertical

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The 1D VERTICAL command changes the current view context to 1D Vertical. When selected, lines denoting 1D observations are displayed. This includes Height stations, Height Difference observations and Local Up observations.

Select this view to perform 1D vertical adjustments and traverses.

Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 1D vertical view, no stations have a 2D coordinates. Therefore, all stations names are drawn in this user selectable color.



To draw the 1D vertical view, COLUMBUS generates its own two-dimensional coordinate system to facilitate user interaction. The positional layout of the stations will **not resemble** your survey on the ground. However, you can see all connected stations and double-click on station symbols or lines to bring up station or observation data, respectively.

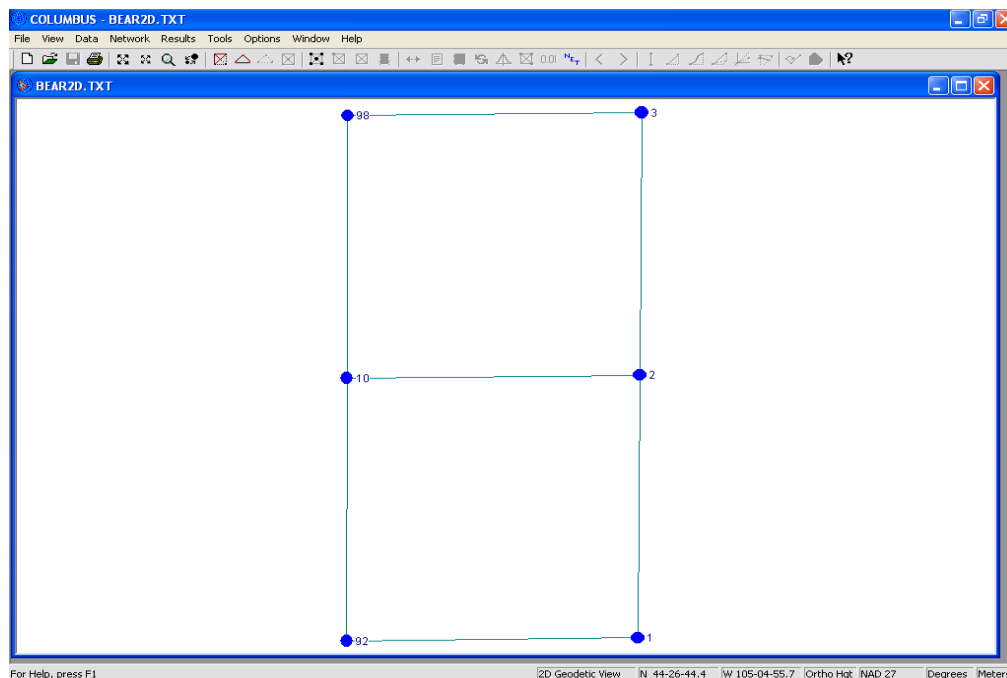
## 2D Geodetic

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The 2D GEODETIC command allows you to change the current view context to 2D Geodetic. When selected, 2D geodetic data are displayed. This includes geodetic stations and lines representing applicable observations.

Select this view to perform 2D geodetic adjustments, traverses and coordinate transformations at an average project height (set up average project height in the OPTIONS - GLOBAL SETTINGS - 2D Height field).

Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 2D geodetic view, stations with latitude and longitude of zero are assigned an arbitrary 2D coordinate for drawing purposes.



### 2D observations

- Azimuths
- Bearings
- Directions
- Horizontal Angles
- Zenith Angles (*used only to reduce chord distances to horizontal distances, where appropriate*)
- Chord Distances
- Horizontal Distances
- Geodesic Distances
- Geodesic Chord Distances
- Local Delta North, Local Delta East
- Latitude, Longitude

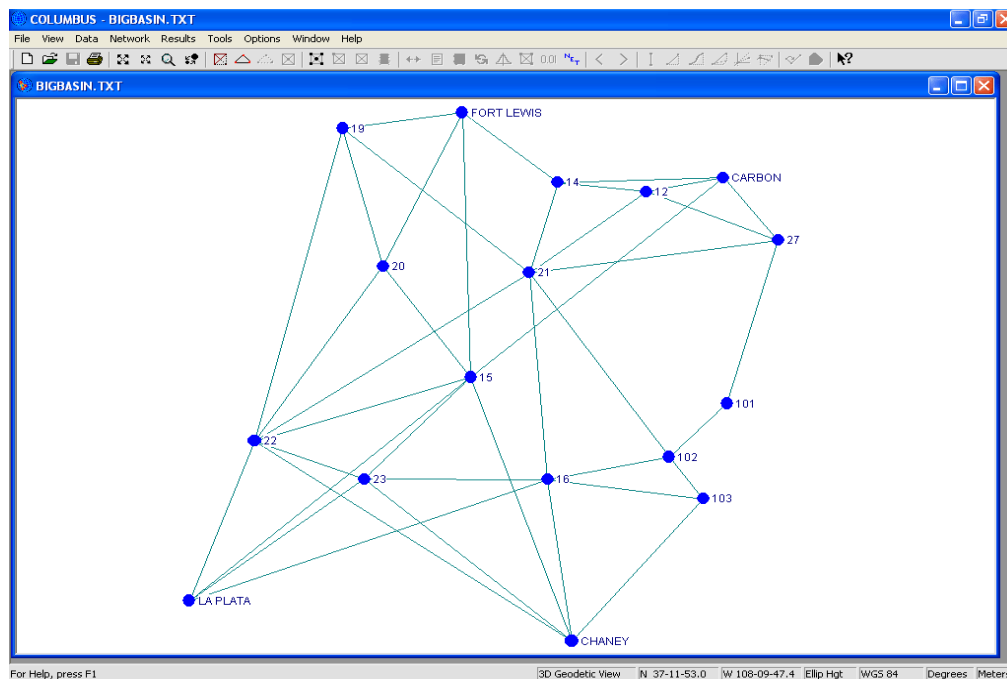
## 3D Geodetic

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The 3D GEODETIC command allows you to change the current view context to 3D Geodetic. When selected, 3D geodetic data are displayed. This includes geodetic stations and lines denoting all 3D observations.

Select this view to perform 3D geodetic adjustments, traverses and coordinate transformations.

Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 3D geodetic view, stations with latitude and longitude of zero are assigned an arbitrary 2D coordinate for drawing purposes.



### 3D observations

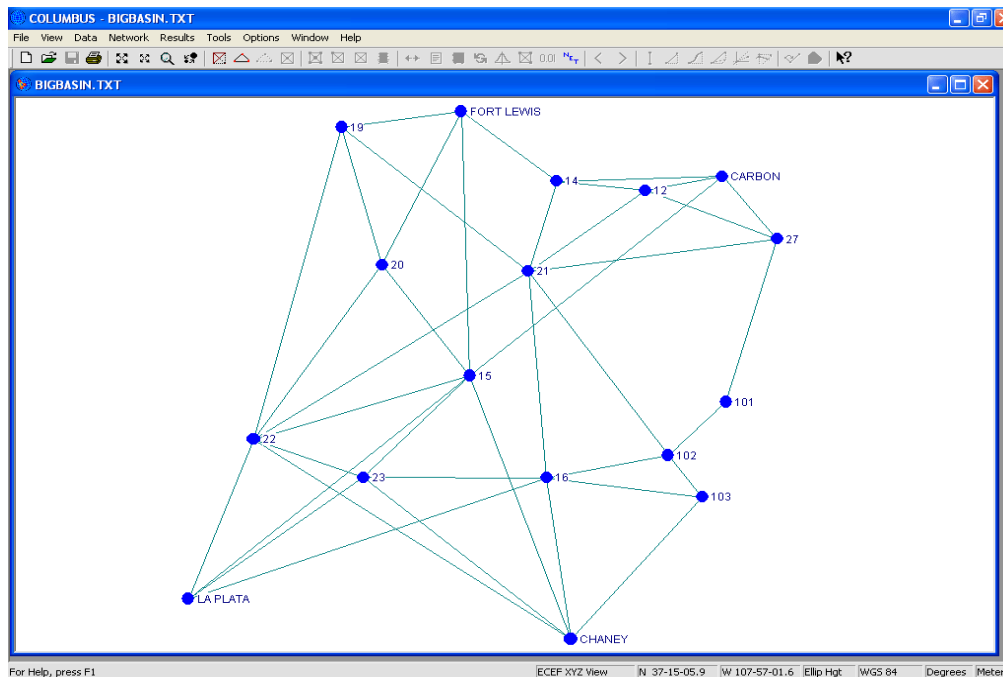
- Azimuths
- Bearings
- Directions
- Horizontal Angles
- Zenith Angles
- Chord Distances
- Horizontal Distances
- Geodesic Distances
- Geodesic Chord Distances
- Height Differences
- Local Delta North, Local Delta East, Local Delta Up
- GPS Delta X, Y and Z
- Latitude, Longitude, Height

## Cartesian XYZ

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The CARTESIAN XYZ command allows you to change the current view context to Cartesian XYZ. When selected, 3D Earth Centered Earth Fixed Cartesian data are displayed. This includes Cartesian stations and lines denoting all 3D observations.

Select this view to perform 3D ECEF (earth centered, earth fixed) cartesian adjustments and traverses.



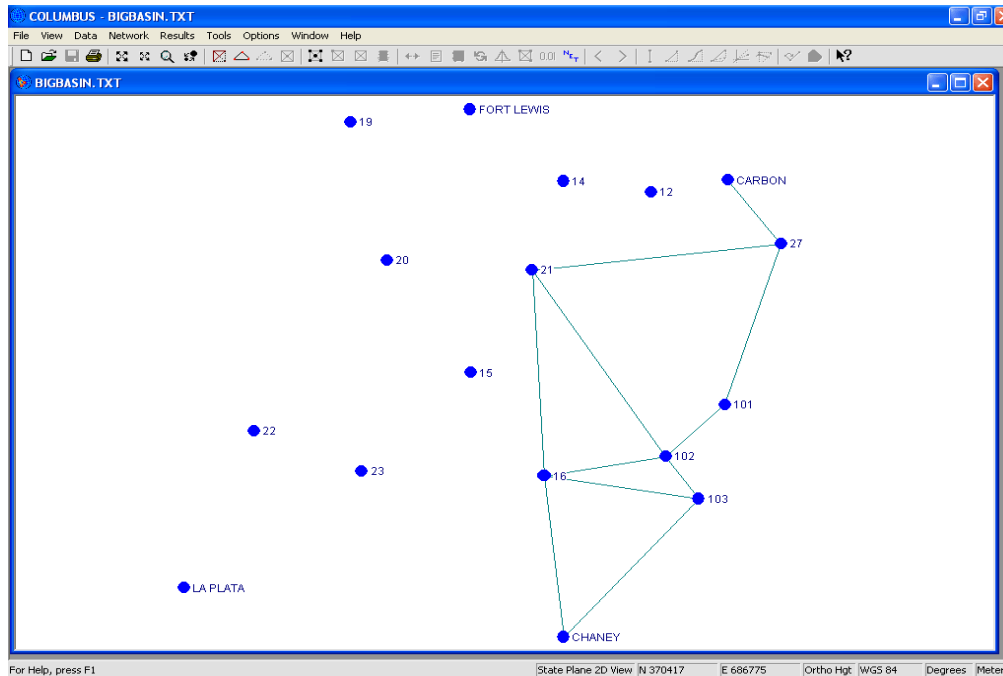
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the Cartesian XYZ view, coordinates that evaluate to a latitude and longitude of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## State Plane (2D)

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The 2D STATE PLANE command allows you to change the current view context to 2D State Plane. When selected, 2D State Plane data are displayed. This includes State Plane stations and lines denoting all 2D observations (see 2D Geodetic section for a complete list of valid 2D observations).

Select this view to perform 2D State Plane adjustments, traverses and coordinate transformations at an average project height (set up average project height in the OPTIONS - GLOBAL SETTINGS - 2D Height field).



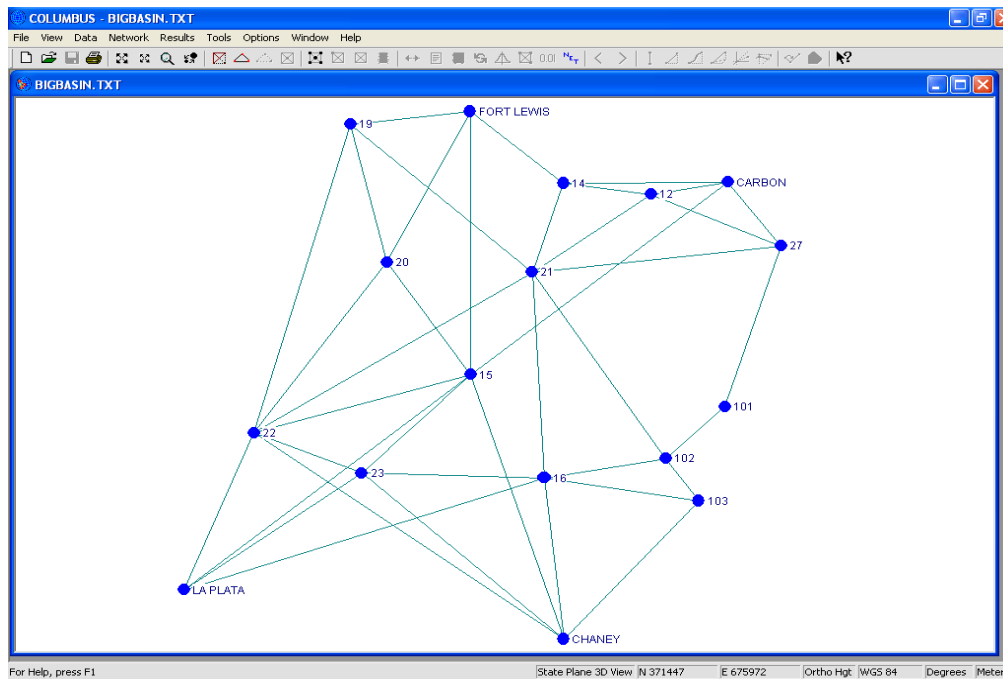
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 2D State Plane view, stations with north and east of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## State Plane (3D)

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The 3D STATE PLANE command allows you to change the current view context to 3D State Plane. When selected, 3D State Plane data are displayed. This includes State Plane stations and lines denoting all 3D observations (see 3D Geodetic section for a complete list of valid 3D observations).

Select this view to perform 3D State Plane adjustments, traverses and coordinate transformations.



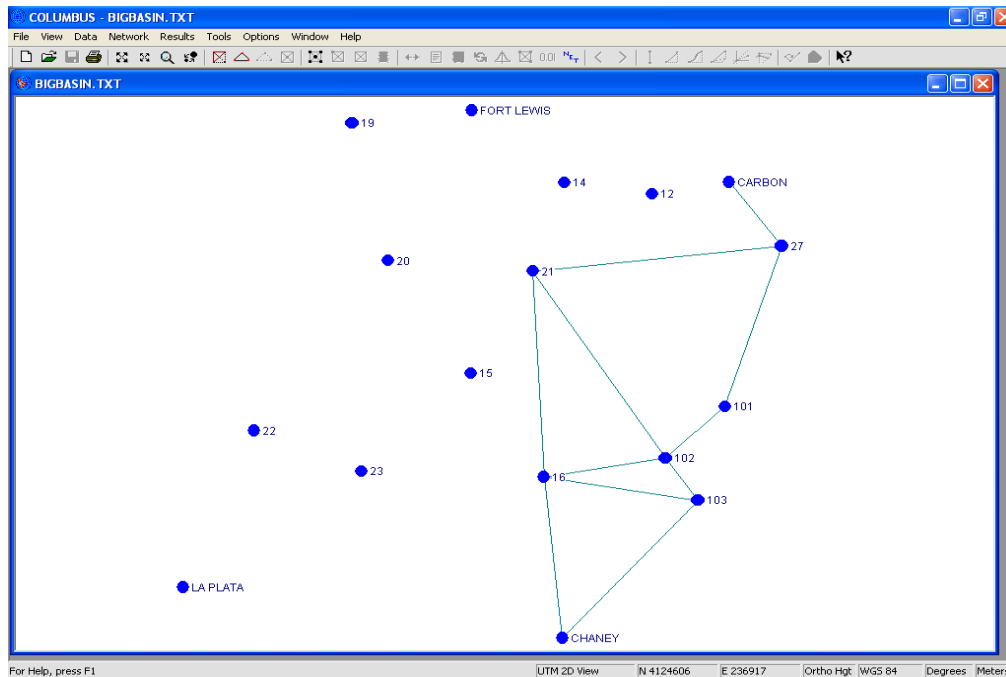
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 3D State Plane view, stations with north and east of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## UTM (2D - Universal Transverse Mercator)

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Use this command to change the current view context to 2D UTM. When selected, 2D UTM data are displayed. This includes UTM stations and lines denoting all 2D observations (see 2D Geodetic section for a complete list of valid 2D observations).

Select this view to perform 2D UTM adjustments, traverses and coordinate transformations at an average project height (set up average project height in the OPTIONS - GLOBAL SETTINGS - 2D Height field).



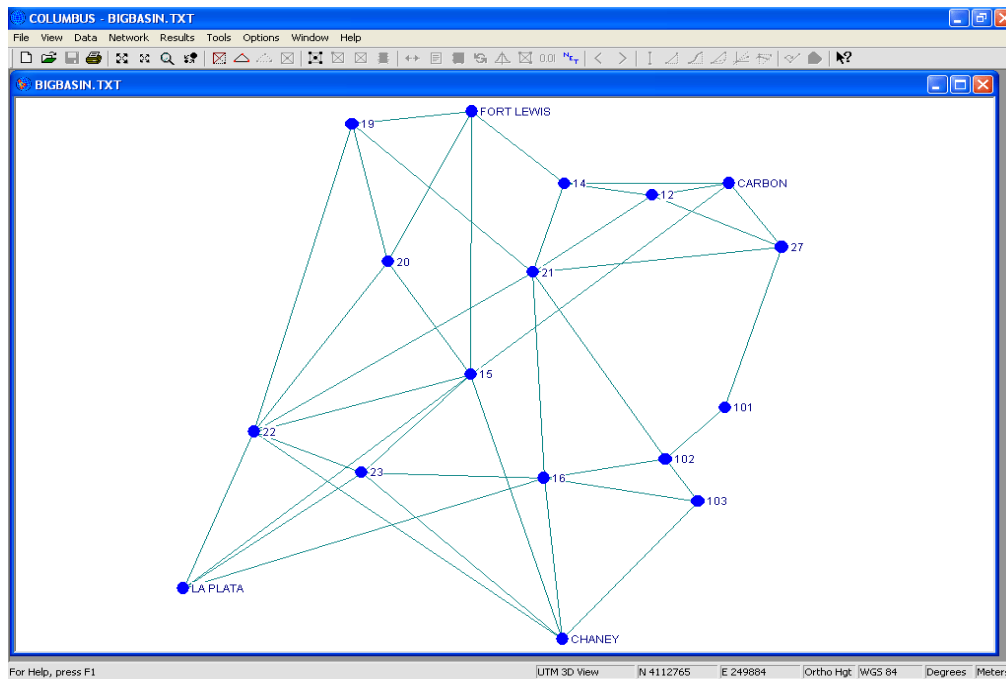
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 2D UTM view, stations with north and east of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## UTM (3D - Universal Transverse Mercator)

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Use this command to change the current view context to 3D UTM. When selected, 3D UTM data are displayed. This includes UTM stations and lines denoting all 3D observations (see 3D Geodetic section for a complete list of valid 3D observations).

Select this view to perform 3D UTM adjustments, traverses and coordinate transformations.



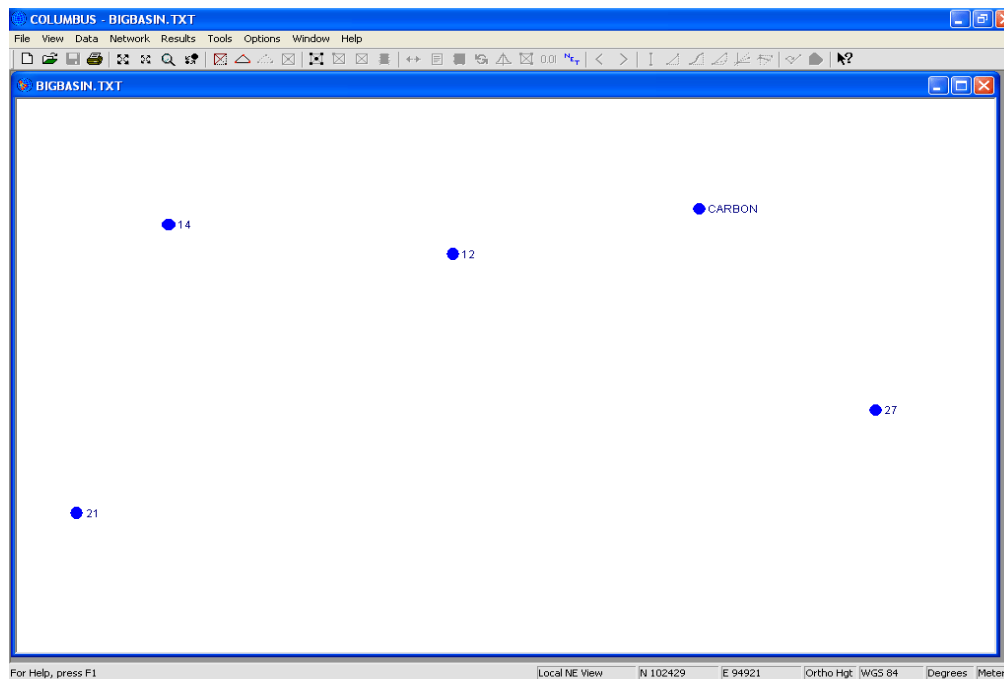
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 3D UTM view, stations with north and east of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## Local NE (2D - North, East)

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The 2D LOCAL NE command allows you to change the current view context to Local North, East. When selected, Local NE stations are displayed.

Select this view to perform 2D Local NE adjustments, traverses and coordinate transformations at an average project height (set up average project height in the OPTIONS - GLOBAL SETTINGS - 2D Height field).



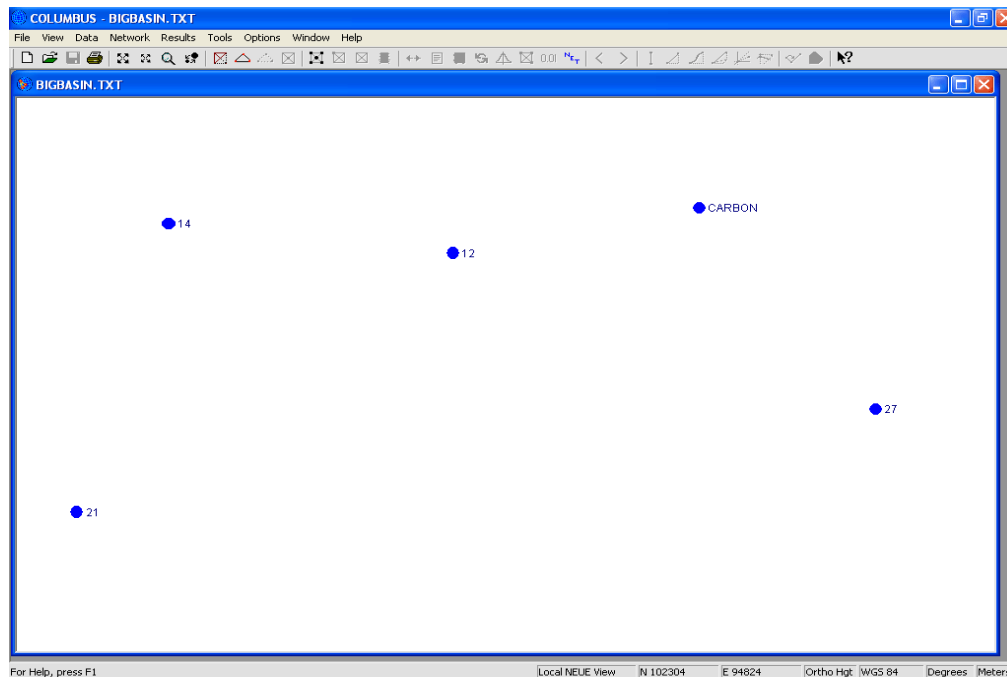
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 2D Local NE view, stations with north and east of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## Local NEE (3D - North, East, Elevation)

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The 3D LOCAL NEE command allows you to change the current view context to Local North, East, Elevation. When selected, Local NEE stations are displayed.

Select this view to perform 3D Local NEE adjustments, traverses and coordinate transformations.



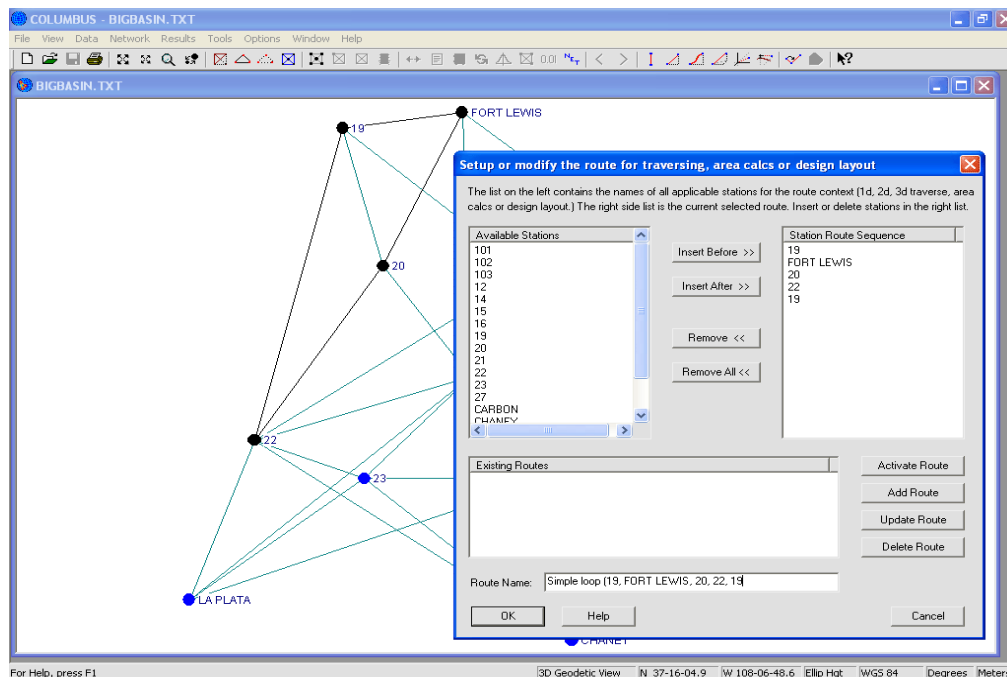
Station names which have no available 2D coordinates (for viewing purposes) can be identified by a customizable color. The color for **Station Names With Coords Of Zero** can be changed within the OPTIONS - COLORS dialog. For the 3D Local NEE view, stations with north and east of zero are assigned an arbitrary 2D coordinate for drawing purposes.

## Setup COGO/Design Route

The SETUP COGO/DESIGN ROUTE option allows you to create, edit, and save existing routes. A route is simply a sequence of stations. Once a route has been defined, it can be used for COGO (inversing and traversing), network design observation definition, or area computations (depending on the view context).

One way to establish a route is by successive point-and-click (right mouse button) operations on the applicable stations. COLUMBUS will then show a line between adjacent (selected) stations to provide a visual of the selected route.

You can also establish a route within this dialog.



The **Available Stations** list contains all the station names applicable to the current view context (1D Vertical, 2D Geodetic, 3D Geodetic, 2D State Plane, 3D State Plane, etc).

The **Station Route Sequence** list will be empty if no route has been set up. If you created a route using your mouse, then entered this dialog, this list will show each station in the order you established.

To add a new station to the **Station Route Sequence** list, do the following:

1. Highlight the station in the **Station Route Sequence** list (if any exist) for which you want the new station to be adjacent.
2. Highlight the station in the **Available Stations** list that you wish to add.
3. Invoke either the **Insert Before** or **Insert After** button to add the new station either before or after the station highlighted in the **Station Route Sequence** list.

To remove a station from the **Station Route Sequence** list, do the following:

1. Highlight the station to remove in the **Station Route Sequence** list.
2. Invoke the **Remove** button.

Using the steps above, you can modify an existing route or create a completely new route from within this dialog. When you close the dialog, the view will be updated (lines drawn between adjacent stations) to reflect your route changes.

Once a route has been defined, it can be also be saved within your project file for future use. When your project file is loaded, you simply enter this dialog and select the route you want to activate.

To save one or more routes within your project file, do the following:

1. Define a route within this dialog or by using the right mouse button (as described above).
2. Enter this dialog, enter a route name, then invoke the **Add** button to add the route to the **Existing Routes** list.
3. If the route already exists in the **Existing Routes** list, and you want to update that route (perhaps adding additional stations or removing stations from the route), use the **Update** button.
4. Click **OK** to exit this dialog, then select the FILE - SAVE or FILE - SAVE AS command to save your project. All routes that have been defined in this dialog (and given a route name) will be written into your project file (for future use).

## **Clear COGO/Design Route**

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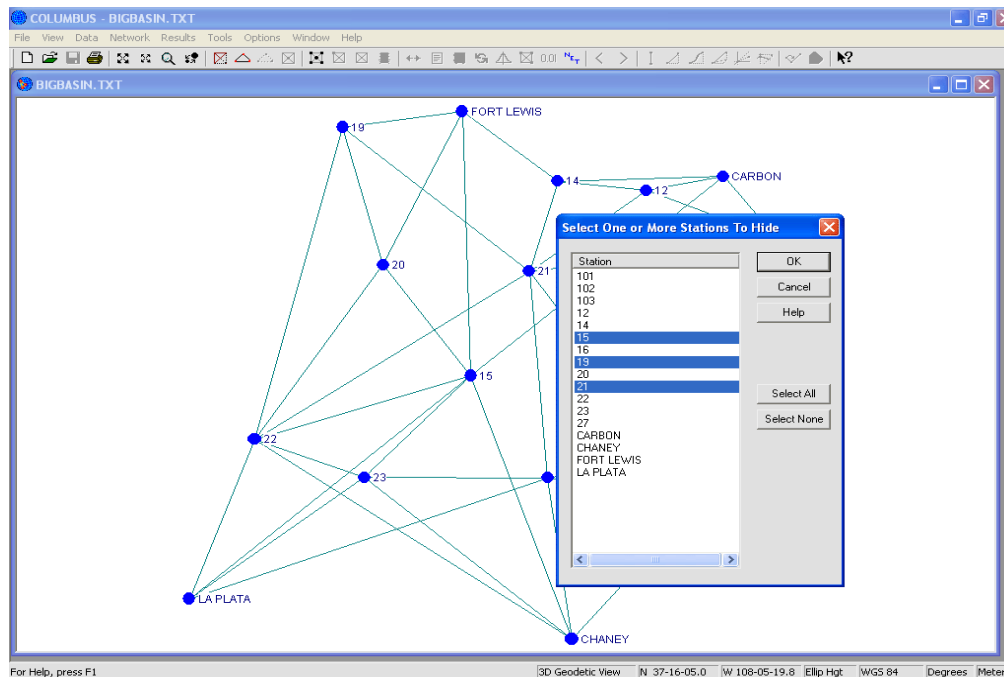
The CLEAR COGO/DESIGN ROUTE option allows you to clear the coordinate geometry (COGO), Network Design, or Area Computation route.

If this menu option is unavailable, no route has been established for the project's active datum.

## Hide Station(s)

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The HIDE STATION(S) option allows you to hide selected stations from the current view. This is especially useful when trying to zoom in on a small portion of a project when there are other stations that are very far from the stations of interest. By hiding the stations that are far away from the area of interest, you will be able to zoom into the area of interest with greater detail.



To hide a station, select the HIDE STATION(S) command from the VIEW menu. COLUMBUS will display all the available station names within a pick list. Station names are listed in alphabetical order. Lower case characters have lower priority in the alphabetical listing. Station names that consist of numbers (i.e., 1001, 110, etc.) will not be in order by their magnitude, but rather in order according to their characters (i.e., "0", "1", "2", etc.).

To select all stations, click Select All. To deselect all stations, click Select None. After selecting all the applicable stations, click OK. The selected stations will no longer be visible in the view. **Note:** The selected stations **have not** been removed from the project, they are only hidden from view. Use the Zoom In feature to more closely look at the remaining visible stations.

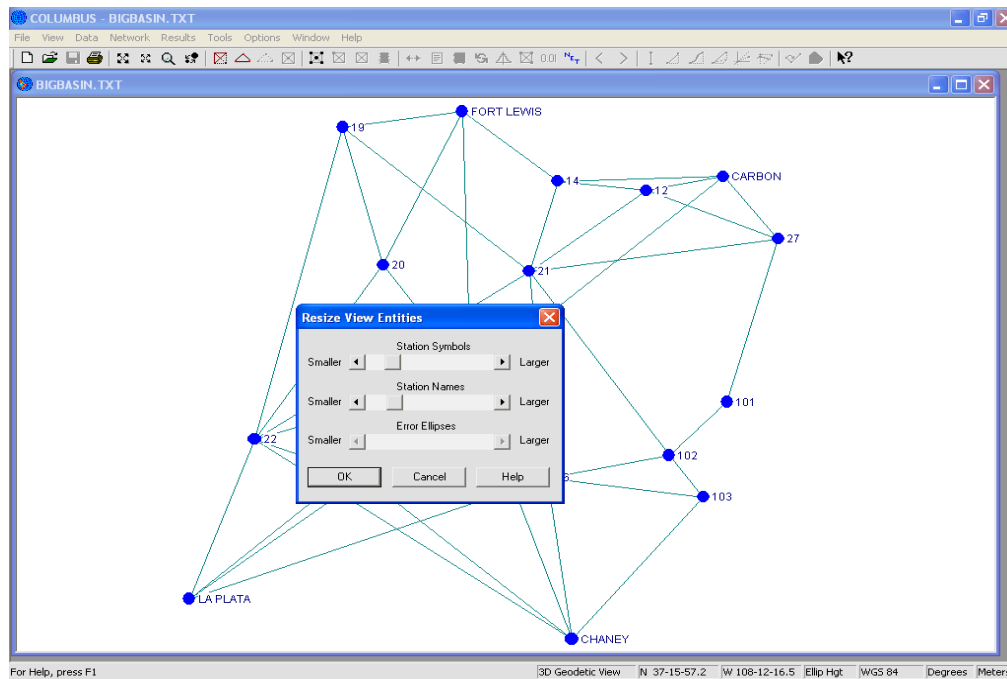
To unhide a station, again select the HIDE STATION(S) command from the VIEW menu. Select the station(s) to unhide by un-highlighting them. To de-select all stations, click Select None. After selecting all the applicable stations, click OK. The unhidden stations will again be visible in the view.

## Resize Entities

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The RESIZE ENTITIES option allows you to resize station symbols, station names and error ellipses/1D error intervals (error ellipses/1D intervals are only applicable to the Network Adjustment or Network Pre-Analysis graphical view).

If this menu option is unavailable, no data has been entered or loaded for the active project.



Use the slider bars to make the entities smaller or larger by moving the slider bar to the left or right. The slider bars move independently of each other.

To eliminate an entity from the view, move the slider bar all the way to the left (i.e., to its lowest setting).

## Sort By Absolute Value

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When this menu item is checked, a selected numeric column (in a report list), will be sorted by the absolute value of the numerics in that column. If there are five rows in the column, with numbers **-3.1, 7.0, 0.0, -9.7, 4.2**, they will be sorted (when in ascending order) as: **0.0, -3.1, 4.2, 7.0, -9.7**.

If this menu item is not checked, those same numbers would be sorted (when in ascending order) as: **-9.7, -3.1, 0.0, 4.2, 7.0**.

## Zoom In

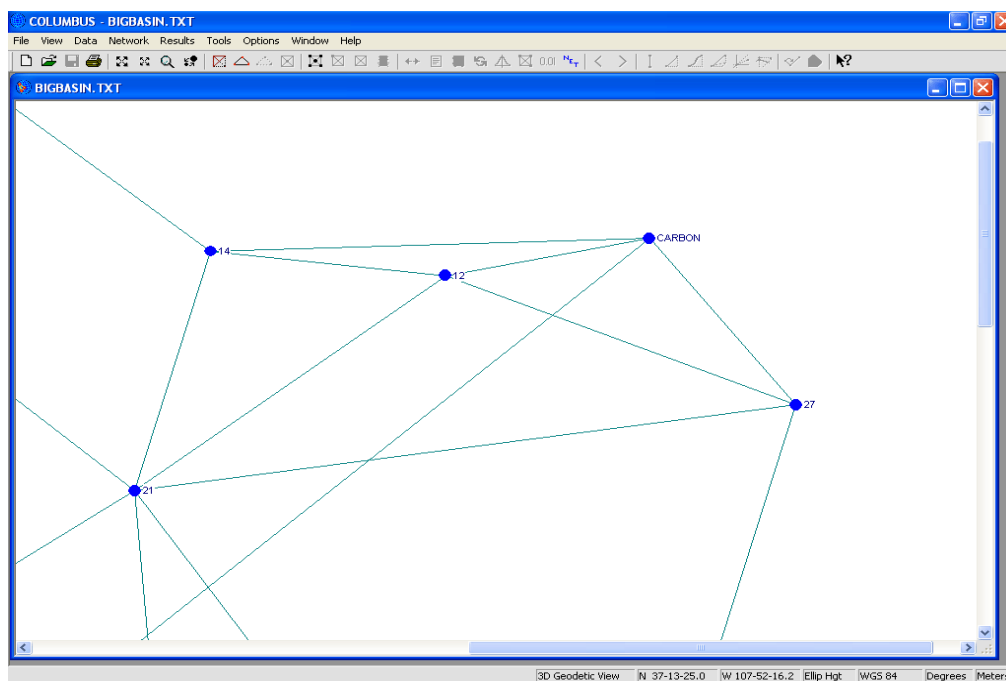
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The ZOOM IN option allows you to zoom in on the graphical view.

To zoom in, enable the **zoom in** mode by selecting the Zoom In command from the VIEW menu or click on the magnifying glass icon on the Toolbar. Click on the view area where you want the zoom centered. The view will then **zoom in** a small amount.

You can also draw a zoom box around the desired area by holding down the left mouse button and dragging the mouse to draw a box. Release the left mouse to **zoom in**.

To turn off the Zoom In mode, select the VIEW - ZOOM IN command or the Zoom In toolbar button to toggle it off.



## Zoom Out Partial

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The ZOOM OUT PARTIAL option allows you zoom out partially (roughly 10%) from the current zoom level.

To zoom out partially, enable the **zoom out partial** mode by selecting the Zoom Out Partial command from the VIEW menu or click on the smaller exploding arrows icon on the Toolbar. Click on the view area where you want the zoom centered. The view will then **zoom out** a small amount.

To turn off the Zoom Out Partial mode, select the VIEW - ZOOM OUT PARTIAL command or the Zoom Out Partial toolbar button to toggle it off.

## **Zoom Out Full**

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The ZOOM OUT option allows you to restore the graphical view to its original size.

To zoom out, select the Zoom Out command from the VIEW menu or click on the larger exploding arrows icon on the Toolbar. The graphical view will return to its original size.

## Toolbar

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The TOOLBAR option allows you to display and hide the Toolbar, which is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools and commonly used commands in COLUMBUS, such as FILE - OPEN. A check mark appears next to the menu item when the Toolbar is displayed.



To hide or display the Toolbar, choose Toolbar from the VIEW menu.

The following options are available from the Toolbar:



Click to Open a new document.



Open an existing document. COLUMBUS displays the Open dialog box, in which you can locate and open the desired file.



Save the active document with its current name. If you have not named the document, COLUMBUS displays the Save As dialog box.



Print the active document.



Zoom Out on the current view.



Zoom In on the current view.



Resize view entities (station symbols, names and error ellipses/1D error intervals).



Select next COGO/Area/Design station.



Select observation type and Standard Deviation for Design Leg.



Select network stations.



Select fixed network stations.



Select network observations.



Start network adjustment.



Restore original width for all columns.



Enter/select a report file.



Select adjusted stations to keep.



Switch context result types.



Toggle between Chi Square and 'F' multiplier.



View fixed station details for selected combination.



Change decimal place for viewing.



Set up network adjustment and network pre-analysis options.



Go to previous item.



Go to next item.



Compute 1D vertical inverse.



Compute 2D mean bearing inverse.



Compute 2D geodetic inverse.



Compute 3D local NEU inverse.



Compute 3D ECEF XYZ inverse.



Compute 3D astro geodetic inverse.



Compute 1D, 2D or 3D geodetic traverse.



Compute area for the selected polygon.

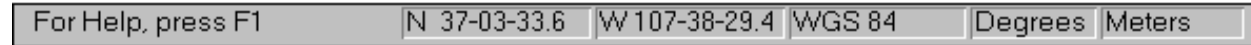


Context-sensitive Help.

## Status Bar

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The STATUS BAR option allows you to display and hide the Status Bar, which is displayed at the bottom of the COLUMBUS window. A check mark appears next to the menu item when the Status Bar is displayed.



To display or hide the status bar, use the Status Bar command in the VIEW menu.

The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

The right areas of the status bar indicate the following:

- Current view coordinates (including the height type in effect for 3D views)
- Current active datum
- Current angular units
- Current linear units