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Point Cloud

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Technical Support

via Discussion Groups

• Carlson Software operates user discussion groups located at news://news.carlsonsw.com. You can participate in user-to-user discussions on tips, tricks and problems. Our staff monitors these groups to ensure that all the issues are addressed. Visit our website at http://www.carlsonsw.com for information on how to access these groups.
• You may also access the Carlson Software Knowledge Base. Visit it directly at http://update.carlsonsw.com/kbase_main.php.

via Electronic Mail

• The Technical Support e-mail address is support@carlsonsw.com.

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• Knowledge Base, discussion groups, technical support documents and newsletters
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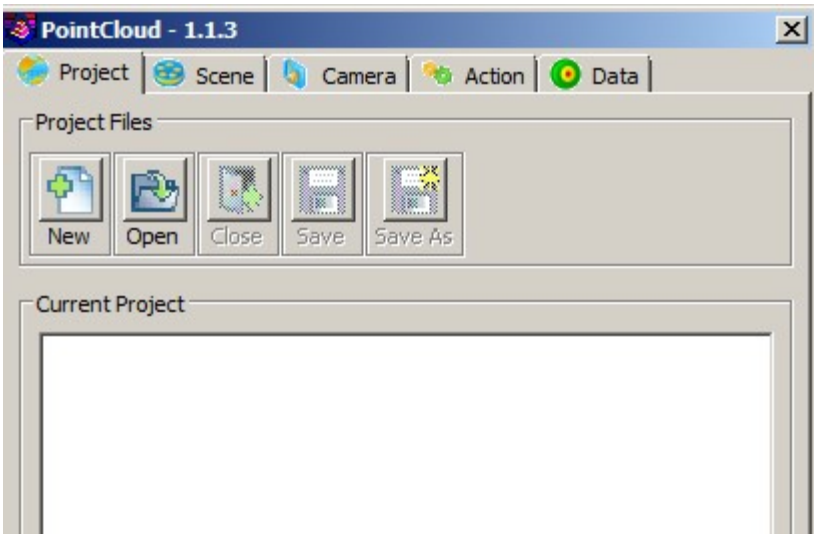
Carlson Point Cloud Training

The Project Manager

Start by switching to the Point Cloud module. You can click the Icon,  or Form the Settings menu, select Carlson Menus ⇨ Point Clouds Menu. Then select Point Clouds ⇨ Point Cloud Manager.

Every function and operation that can be performed in Point Cloud is accessed through the Project Manager. These functions are divided up among five major categories represented as tabs in the project manager: **Project**, **Scene**, **Camera**, **Action**, and **Data**.



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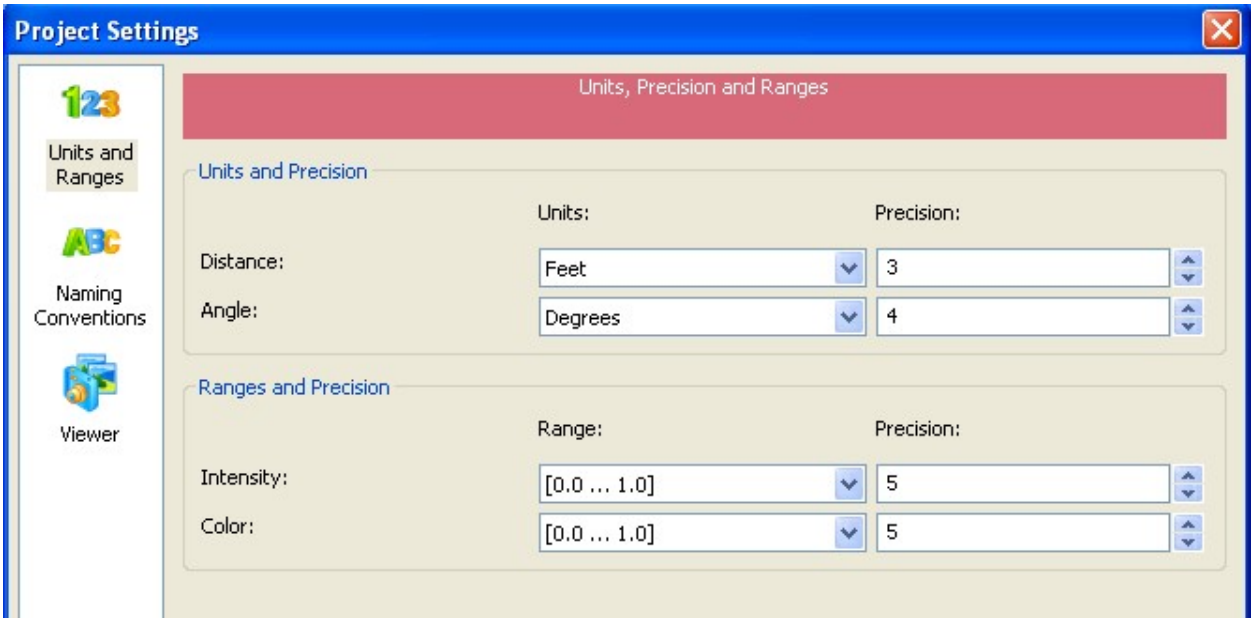
Settings

Typically, when a new project is started you will want to customize the project's various settings before any work is done. Right click Settings and click View.



Unit and Range settings, Naming Conventions and Viewer options are controlled here. Units and Ranges should be set properly prior to importing any Point Cloud data. We will be using feet for the first project. Exit Settings.

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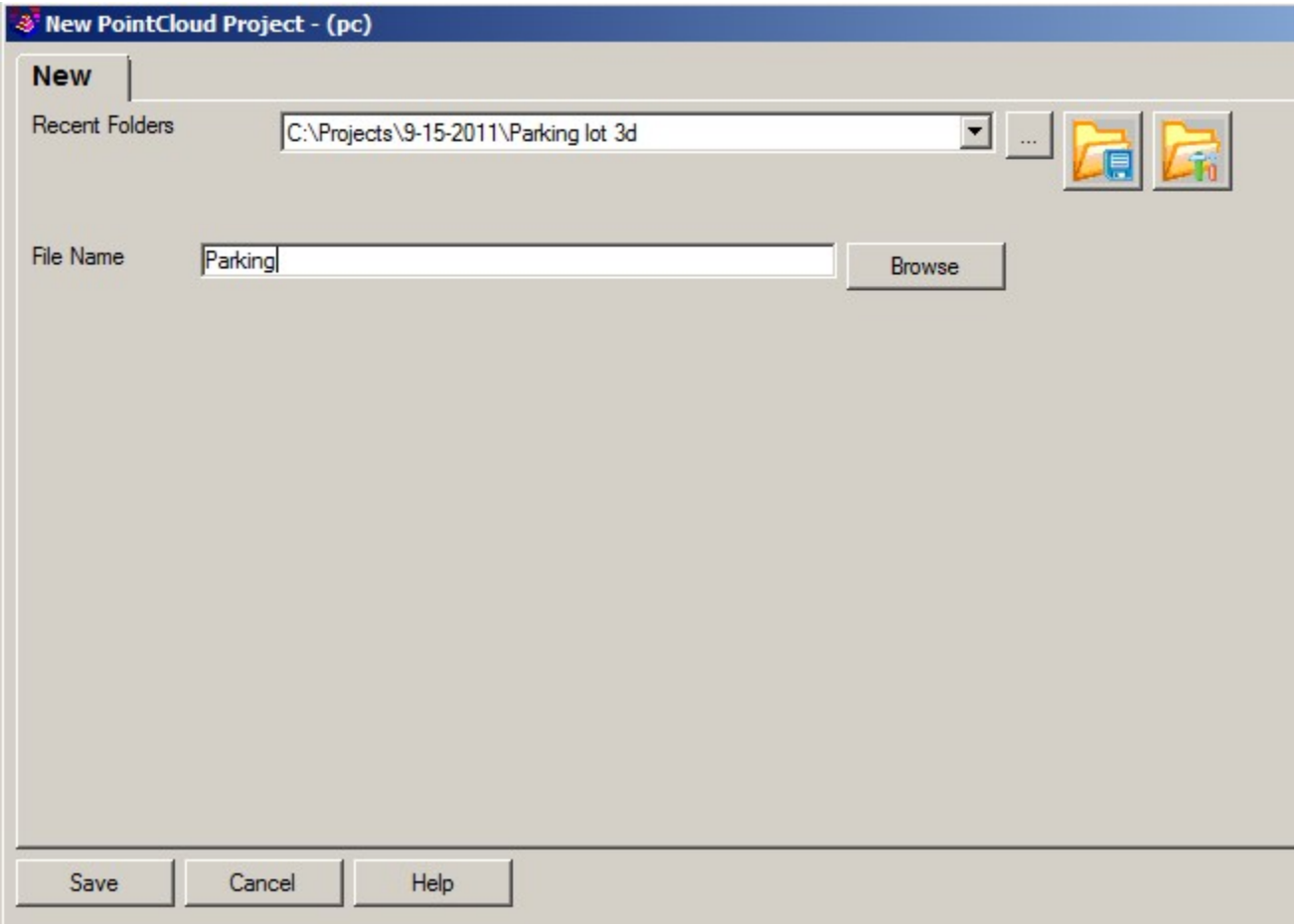
Starting a NEW Project

Pick the New ICON



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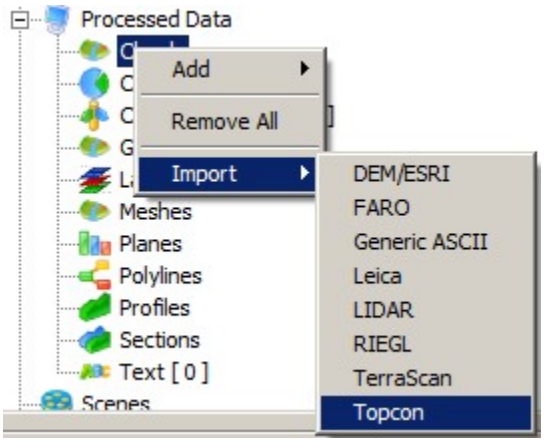
Import a Cloud

Pick Cloud\Import\



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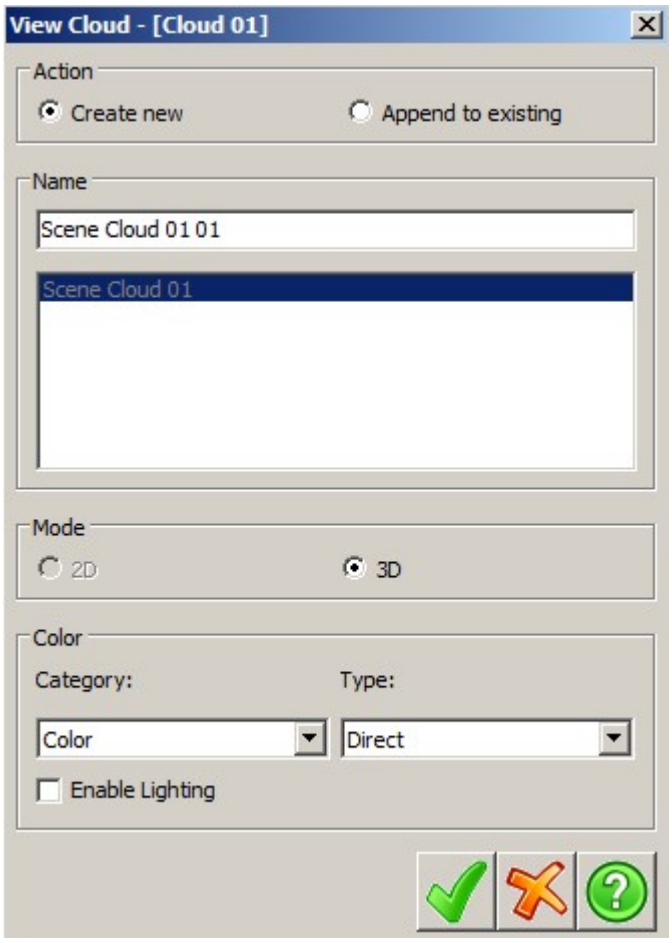
Creating a Scene

To create a scene with Point Clouds:

1. Right-click the object you want to view in the new scene.
2. Select View



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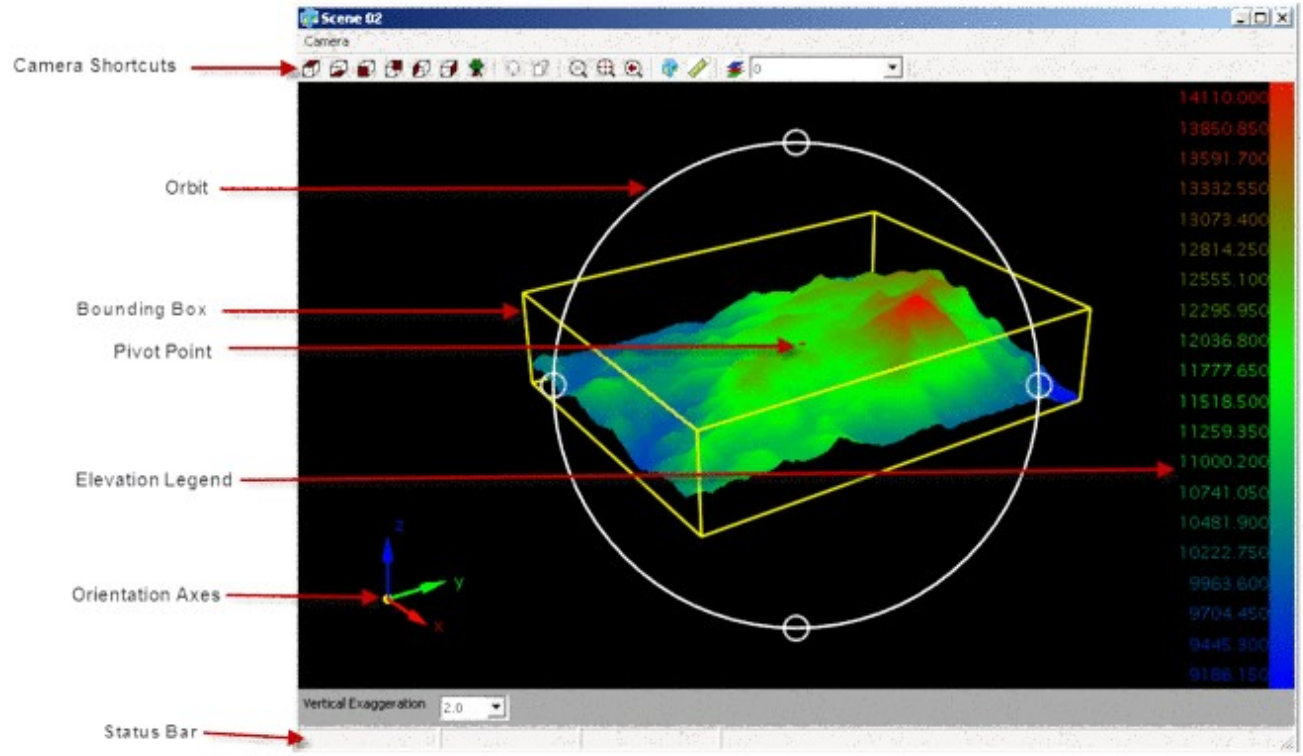
Point Cloud Viewer

The Carlson PointCloud viewer is where all virtual surveying and visual inspection of data is done in PointCloud. It has both 2D view mode functionality for viewing images and scans (as a flat image) as well as 3D view mode for viewing three dimensional data. Drawing in the viewer is divided into two different modes, dynamic and static. Dynamic mode draws a greatly reduced version of the current scene to improve draw speeds, while static mode will draw the full detailed scene. Typically, the viewer will run in dynamic mode when the user is attempting to do something interactive that involves camera, such as rotating the scene or zooming in, and it will draw in static mode when the camera isn't being manipulated. Options that pertain to how much detail is drawn in the current scene in dynamic and static mode can be changed in the Scene page of the Project Manager.



By default, the left mouse button operates in an orbit mode similar to the 3D viewer in the Carlson Civil Suite, the middle mouse button pans, and the right mouse button zooms. Mouse behavior for the current viewer can be changed in the **Camera Tab** of the Project Manager.

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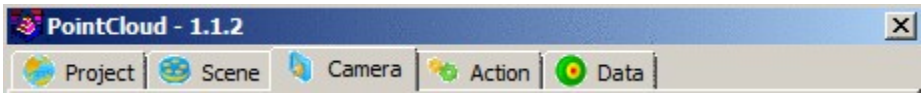
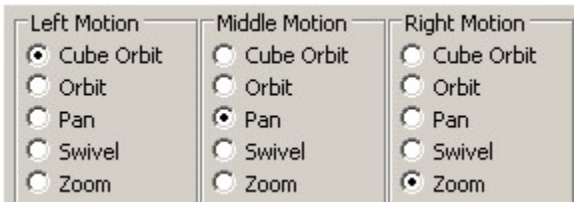
The Camera Tab

The **Camera Tab** is the third tab in the Project Manager and has several functions that govern the current scene's camera behavior and positioning as well as functions that allow access to some camera presets. The Camera Tab will only be active if there is a currently open scene, otherwise all of its controls will be ghosted out.



The Mouse Motion Panels

The **Left Motion**, **Middle Motion**, and **Right Motion** panels control the behavior of the left, middle and right mouse buttons, respectively.



Cube Orbit rotates the camera around the center of the scene's bounding box, the default behavior for the left mouse button.
Orbit will orbit the camera around the pivot, and the pivot's behavior can be defined in the **Pivot** panel.
Pan pans the camera, moving the camera laterally or vertically from its perspective, the default behavior for the middle mouse button.
Swivel rotates the camera view direction around its current position.
Zoom will zoom the camera, moving the mouse up will zoom in, moving the mouse down will zoom out. This is the default behavior for the right mouse button.

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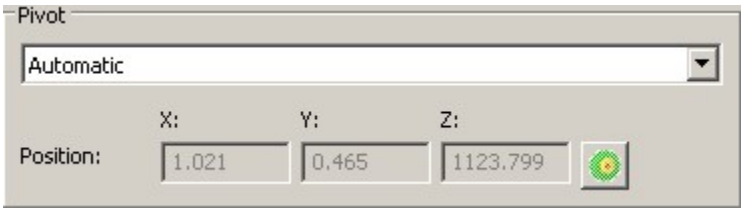
The Pivot Panel

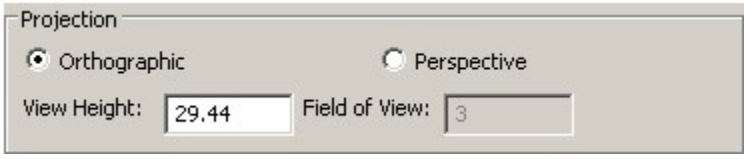
The **Pivot Panel** determines the behavior of the pivot point when in **Orbit** mode.



Automatic, the default behavior, moves the pivot to the valid data nearest to the cursor whenever orbit mode is activated.
Center will move the pivot point to the center of the scene's bounding box.
Custom will enable the **Position** controls and allow entry of the Pivot point manually (or via a ctrl-click in the scene if you press the green target button).
Origin will move the pivot point to the origin of the scene's coordinate system.
Target will place the pivot point at the nearest valid data to the center camera's view.

The Projection Panel

The **Projection** panel determines the projection mode of the current camera.



Orthographic projection mode will not apply perspective distortion (to simulate the effect of a real-world camera lense) and the **View Height** option will determine the height of the view (in world units).
Perspective projection mode will apply a perspective distortion, and the **Field of View** option determines the vertical viewing angle of the cone that defines the camera's visibility.

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The Action Tab

The **Action Tab** is the fourth tab in the **Point Cloud Manager**. It is here where all data extraction, as well as virtual surveying, is done in Carlson Point Cloud. There must be a currently open scene with 3D data for the controls in the action page to be enabled; otherwise they will be ghosted out.

Actions that can be taken with a scene are broken up into five different Panels: **Selection Set**, **Edit**, **Transform**, **Create**, and **Extract**. These categories are arranged such that operations that you would typically do first are at the top of the page, for instance, you must select the data you wish to modify before hiding any of it, or if you're going to transform the data you would perform transformations before you extract any of it.

CTRL Key Setting

The CTRL Key Setting controls how selection is done in the scene window. The default is **use CTRL Key to Pick**. This means the user must hold the CTRL key down and left click in the scene to select point or create points, polylines or text. The other option is **Use CTRL Key to Navigate**. This option allows the user to simply left click to make selections in the scene

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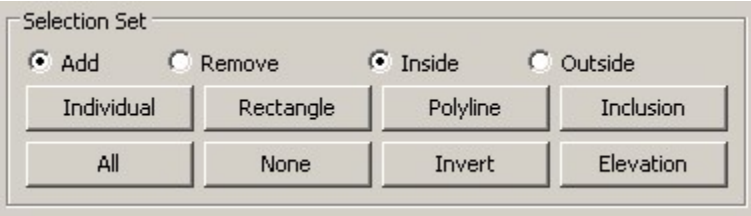
Selection Set Panel

The four radio buttons at the top of the **Selection Set** panel operate as two sets and determine the behavior of the selection methods (**Individual**, **Rectangle**, **Polyline** and **Inclusion**).



Add/Remove determines whether the objects that pass the criteria of the selection method are added or removed from the current selection set.

Inside/Outside determines whether to perform the selection operation on all entities inside or outside the drawn rectangle/polyline.

There are four selection modes:

1. **Individual**, in which every mouse click attempts to select the object currently under the cursor, useful for precision selection of individual points.
2. **Rectangle**, in which the user clicks a base point and a second point that defines the opposite corners of a selection rectangle.
3. **Polyline** in which the user clicks several times to define the shape of the polyline and right-clicks to close the polyline.
4. **Inclusion** in which the user selects a polyline previously drawn in the scene using the create Polyline command.

There are also four global selection buttons:

1. **All**, which selects all entities in the scene.
2. **None**, which deselects all entities in the scene
3. **Invert**, which inverts the current selection set within the scene.
4. **Elevation**, The user specifies a maximum and minimum elevation and the selection set is built from points between the specified elevations. Points outside the elevation range are ignored.

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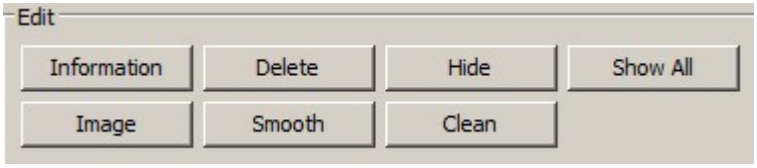
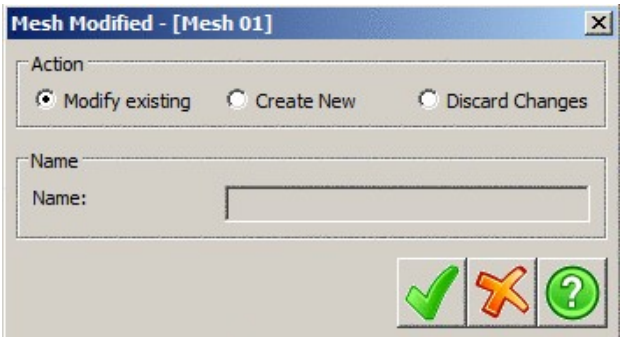
Edit Panel

The **Edit** panel contains controls for modifying the currently visible set of points.



The **Information** button displays a properties dialog with some general statistical information about the current selection set, including the number of points selected, ranges of their positions, and ranges of the color and intensity values.

The **Delete** button deletes the selected points from the scene and from the objects that contain them, if you delete some points from a scan, or faces from a mesh, you will be prompted for an action to take with the modified object's data after all scenes containing that object are closed.



Modify existing will save the changes to the original object (deleting points from the object as it is on disk, which cannot be undone).
Create New will create a new object to save the modified data and is typically the safer option because the original data is still available if needed.
Discard Changes will close the scene without saving your changes (deletions).

The **Hide** button temporarily hides the current selection set, which can help isolate the current area of interest without making permanent changes to the dataset.
Show All undoes all hide operations and will display everything in the scene again.

Image allows the user to drape an image over a mesh.

Smooth and **Clean** are functions performed on meshes only.

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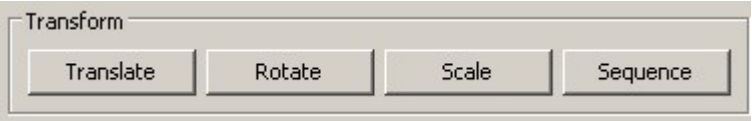
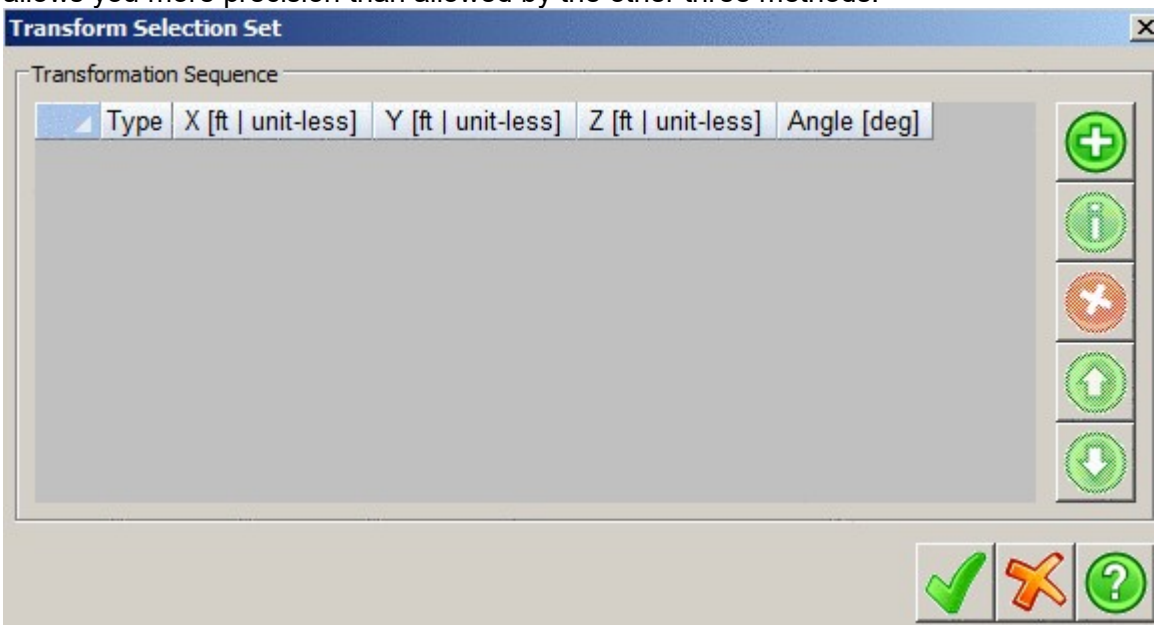
Transform Panel



The **Transform** panel contains several functions that relate specifically to transforming the current selection set. This allows for minor adjustments to be made to the selection set if it seems that data isn't properly aligned or if you want to move individual coordinate points to different locations.

Translate allows you to define a translation of the current data set by selecting a base start point and an ending point. Activating the translation mode will bring up a new panel in the action page that displays the current base point and end point of the translation as well as the resulting vector. A first click in the viewer will define the base point for the vector of translation and a second click will define the end point of that vector.
Rotations allow you to rotate the current selection set with three clicks. The first click will define the center of rotation, and the angle of rotation will be determined from angle between the vectors made between the second and third clicks and the first click.
Scaling is performed with two clicks. The first click defines the origin of the scaling operation, and the magnitude of the vector between the first and second vectors determines the magnitude of the scale operation.
Sequence brings up a separate dialog that allows you to define a sequence of transformations and allows you more precision than allowed by the other three methods.



Initially, the dialog will have no transformations specified, to add a transformation, press the **+**button. After pressing this button another dialog will pop up with all the options for the new transformation to add to the sequence.

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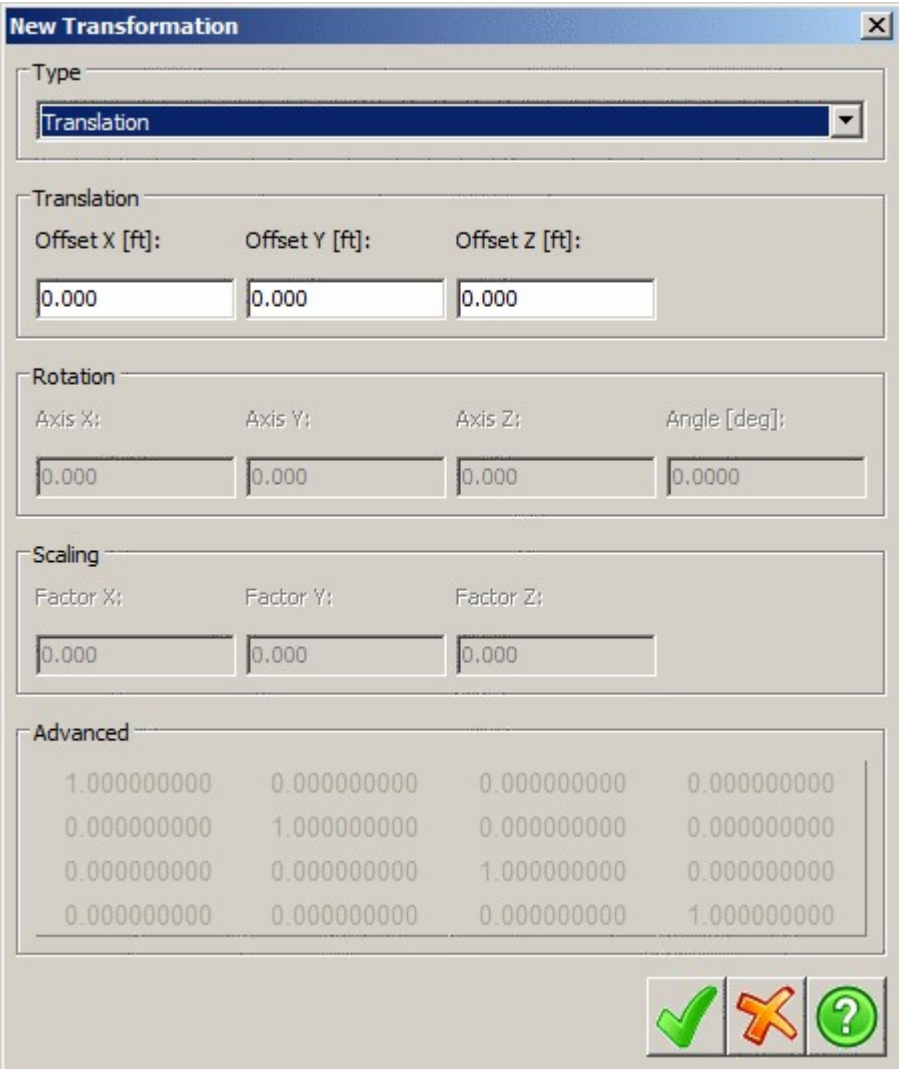

There are four kinds of transformations you can choose from in the list box: **Translation**, **Rotation**, **Scaling**, and **Advanced**. Each of the simple translations are the same as they are in the transform panel, only you must provide the actual numbers instead of interacting via mouse-clicks. The advanced transformation allows you to specify a transformation matrix to be applied to data. After clicking the check button you should be taken back to the **Transform Selection Set** dialog. From here you can add more transformations, modify the currently selected one by pressing the green **i** button, delete them by pressing the red **x** button, or change their order of application to the data using the green arrow buttons. Press the **check** button in the Transform Selection Set dialog to apply the transformations to the selected data.

Similar to the **Delete** button in the **Edit** panel, when a cloud has been transformed and is about to be closed by the program, the user will be asked by the program for the desired course of action. The Cloud Modified dialog will pop up with the option to either save the changes to the already existing item, create a new object with the changes made, or just throw away the changes.

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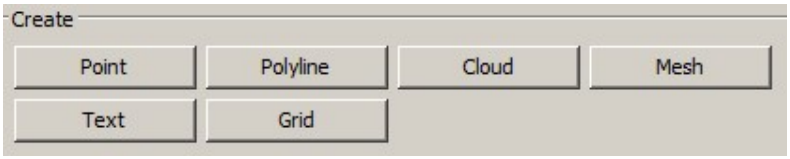
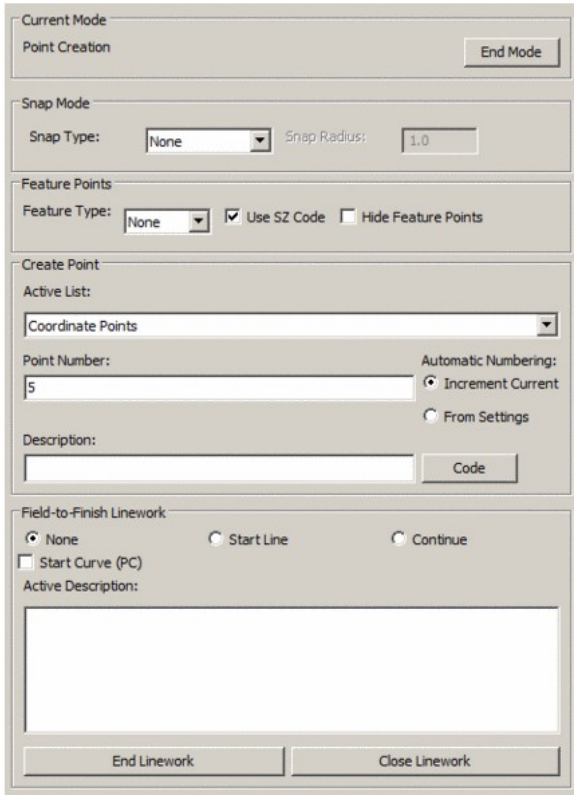
Create Panel



The **Create Panel** allows you to manually create new project items either by specifying their points in the viewer (**Point Polyline** and **Text**) or by creating a new data set from the currently selected data points (**Cloud**, **Mesh** and **Grid**).

Create Point

Clicking **Point** in the Create Panel will set the Current Mode to Point Creation and display the four panels that comprise the point creation mode.



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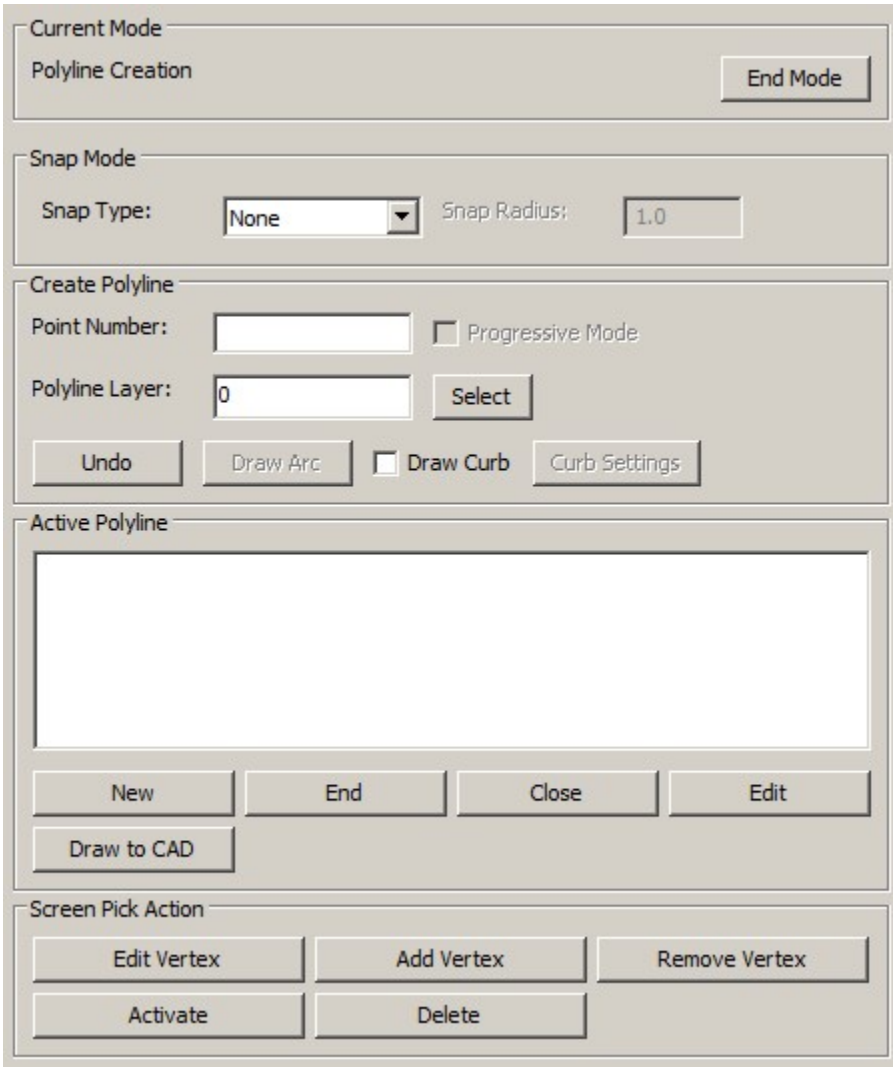
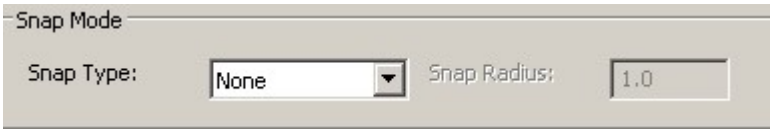
Create Polyline

Clicking **Polyline** in the Create Panel will set the Current Mode to Polyline Creation and display the four panels that comprise the polyline creation mode.



The Snap Mode Panel offers ten different options for snapping to points in the cloud in the open scene.



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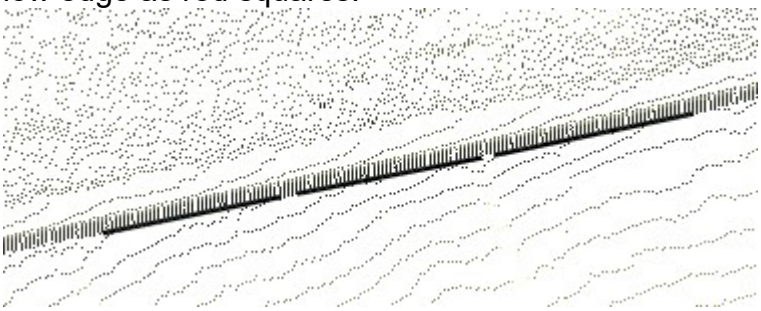
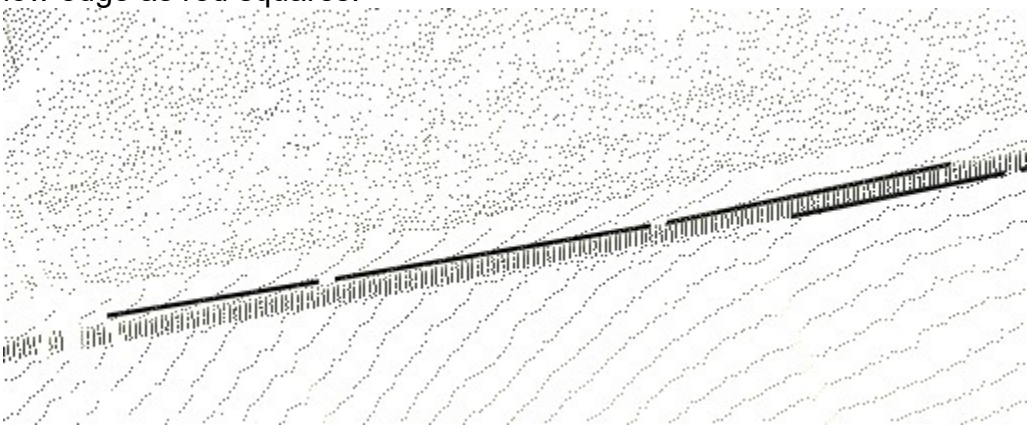
None - No snap function is active. The vertex of the polyline will be placed at the cloud point nearest to the selected location.
Low - The polyline vertex is placed at the lowest point (smallest z value) within the Snap Radius.
High - The polyline vertex is placed at the highest point (largest z value) within the Snap Radius.
Low Edge - Snaps to the low edge of a feature. A dynamic window in the upper left of the scene displays a cross section of the area within the Snap Radius and displays the high and low edge as red squares.



High Edge - Snaps to the high edge of a feature. A dynamic window in the upper left of the scene displays a cross section of the area within the Snap Radius and displays the high and low edge as red squares.



Average Point - This snap averages Northing, Easting and Elevation for all points within the Snap Radius and uses the averaged values for the coordinate for the new polyline vertex.
End Point - Snaps the new polyline vertex to the endpoint of existing polylines.
Mid Point - Snaps the new polyline vertex to the midpoint of existing polylines.
Node - Snaps the new polyline vertex to points placed in the drawing using Carlson Point Cloud.
Nearest - Snaps the new polyline vertex to the point on an existing polyline nearest to the cursor location.

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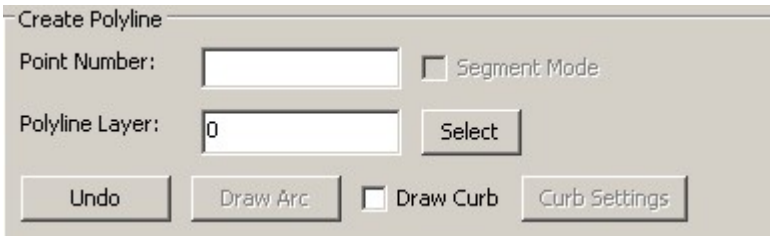
The Create Polyline Panel sets options for creating polylines from the Point Cloud. Each option is discussed below.



Point Number - This option allows the user to draw polylines between points created by the create point command. Simply type the starting point number in the Point Number field and press enter. Type the next point number and press enter. A polyline is drawn between the numbers entered. Continue entering point numbers to draw more segments. The point numbers must be in the Coordinate Points list found on the **Project Tab**.
Segment Mode - Segment mode can only be used when the Snap Type is set to High Edge or Low Edge. Segment Mode creates a best fit polyline between the two selected points by breaking the selected distance into smaller segments with length equal to the snap radius. A point is found at each new segment location and a best fit line created through the resulting points.
Polyline Layer - Users can specify the layer to draw the new polyline on by typing a name in the Polyline layer field. Users may also click the Select button and select any layer currently in the scene or they may create a new layer to be used by typing it at the bottom of the Select Polyline layer dialog box.
Undo - Removes the last polyline segment drawn and allows the user to continue the polyline creation from the previous endpoint.
Draw Arc - Draws a three point arc in the current polyline using the last point selected as the PC. The user is prompted to specify second point on arc. A line will display for the PC to the POC. After selecting the second point the user is prompted to specify end point of arc. The arc is drawn and the line from the PC to POC is gone.

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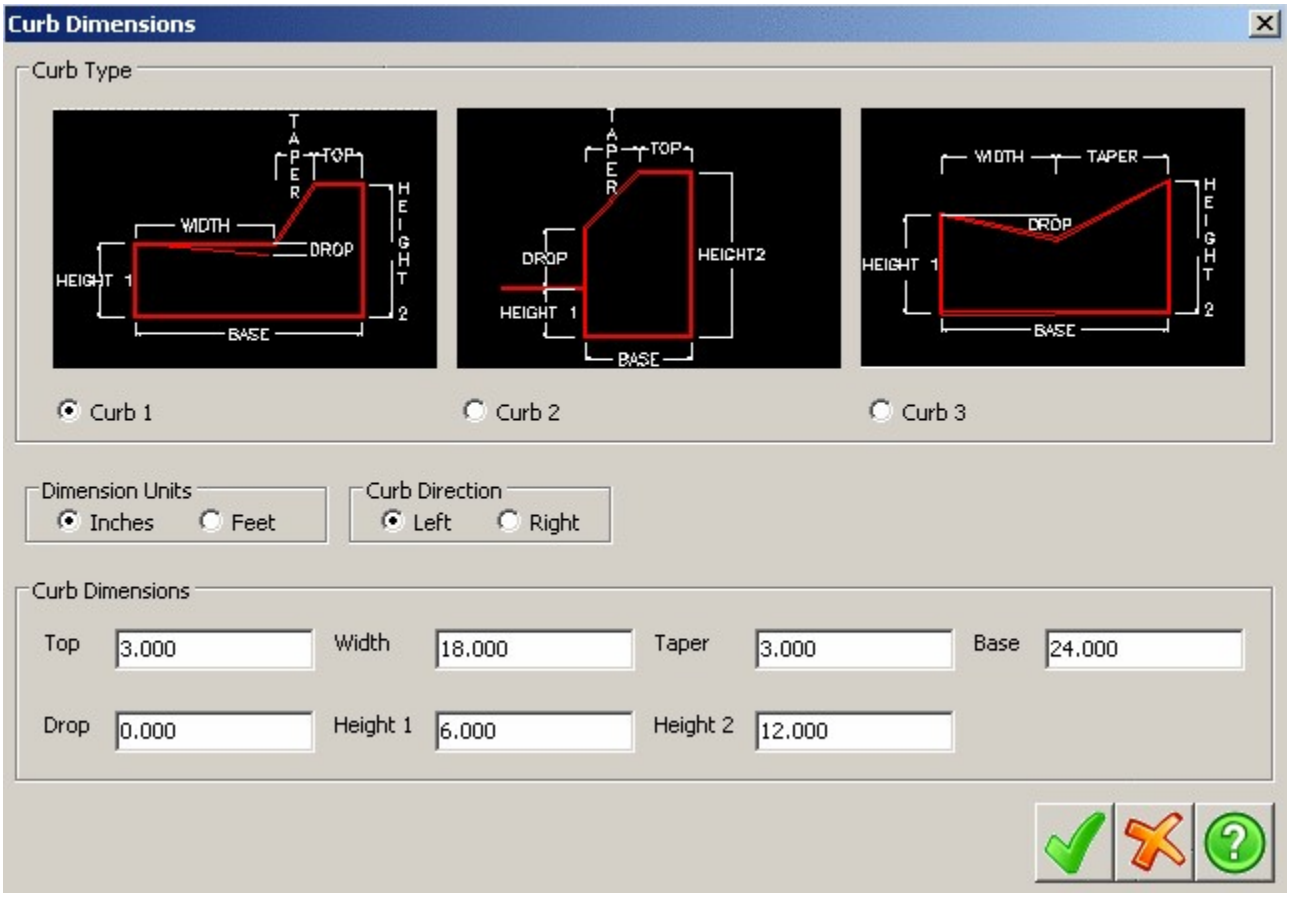
Draw Curb - The draw curb toggle when selected activates the Curb Settings Button
Curb Settings - There are three curb types to choose from by clicking the radio button below the desired curb type. The Dimensions for each curb can be specified using either feet or inches. The curb direction is relative to the direction you select the curb points in.



The polyline created from your picked points will be named like any other polyline you draw. The additional polylines created from the draw curb routine will include the name of the main polyline and a suffix number.

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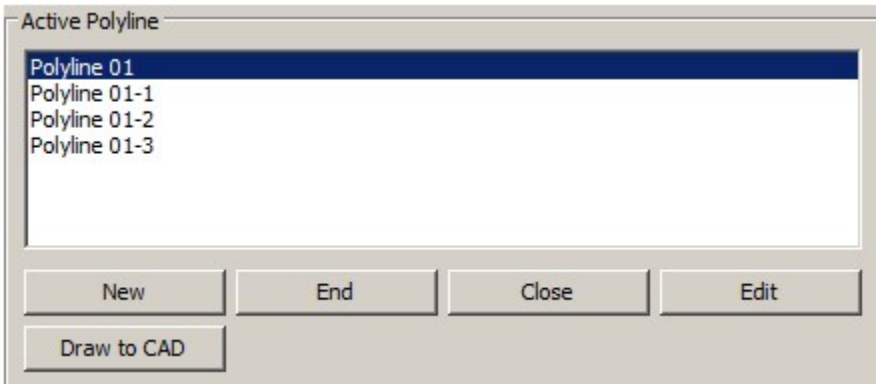
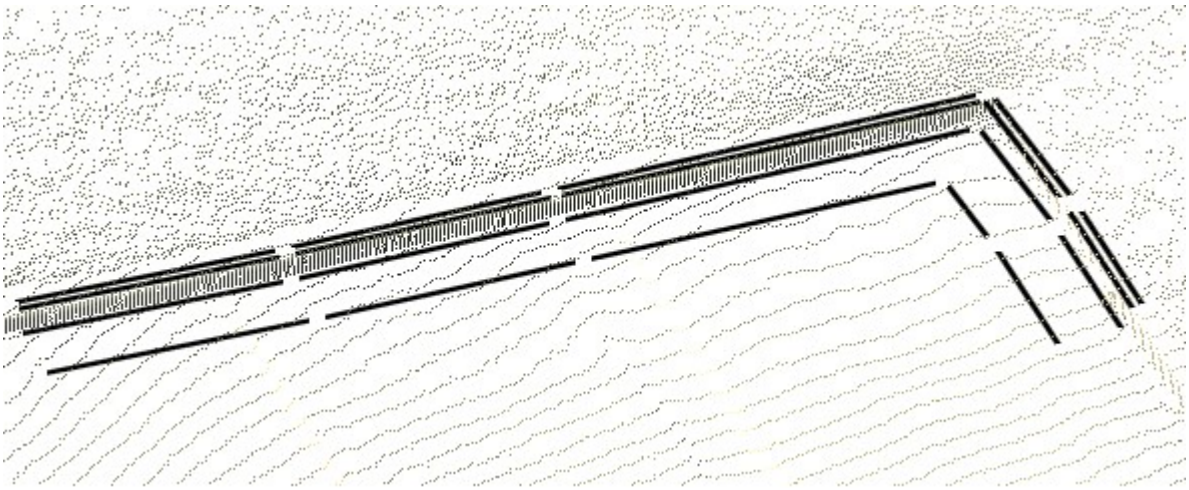


Below is an example of polylines created using Curb Type 1.



The Active Polyline Panel controls the polyline creation for the current or active polyline. There can be more than one active polyline at a time. The polyline that is being worked with will be highlighted in the list of polylines that are active. You can change polylines you are working by clicking them in the active list. It is recommended to work with only one polyline at a time, ending its session when you are to avoid confusion with multiple active polylines.

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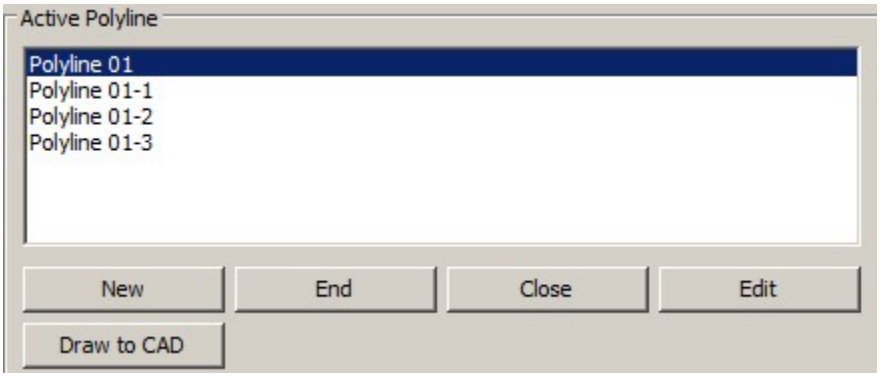
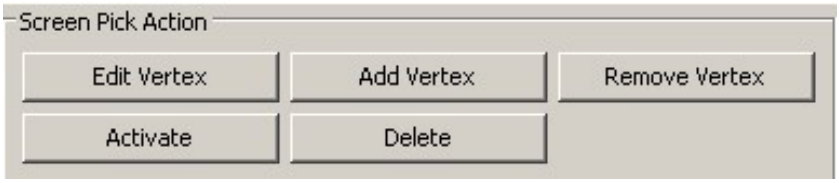


New - Starts a new polyline
End - Ends the polyline that is highlighted in the list of Active Polylines
Close - Closes the current polyline to its starting point
Edit - Opens the Edit Polyline dialog box. The Edit Polyline dialog box can also be accessed by double clicking a polyline on the project tab or right clicking a polyline on the project tab and selecting Edit. For more information on the Polyline edit Dialog box see **Polyline Editor**
Draw to CAD - Draws the active polylines into the current CAD file.

The Screen Pick Action Panel provides options for editing polylines in the active scene. Each option is discussed below.



Edit Vertex - The user is first prompted to select the polyline they want to edit. After selecting a polyline the user is prompted to pick near the point to edit. The dialog box below is presented to the user.

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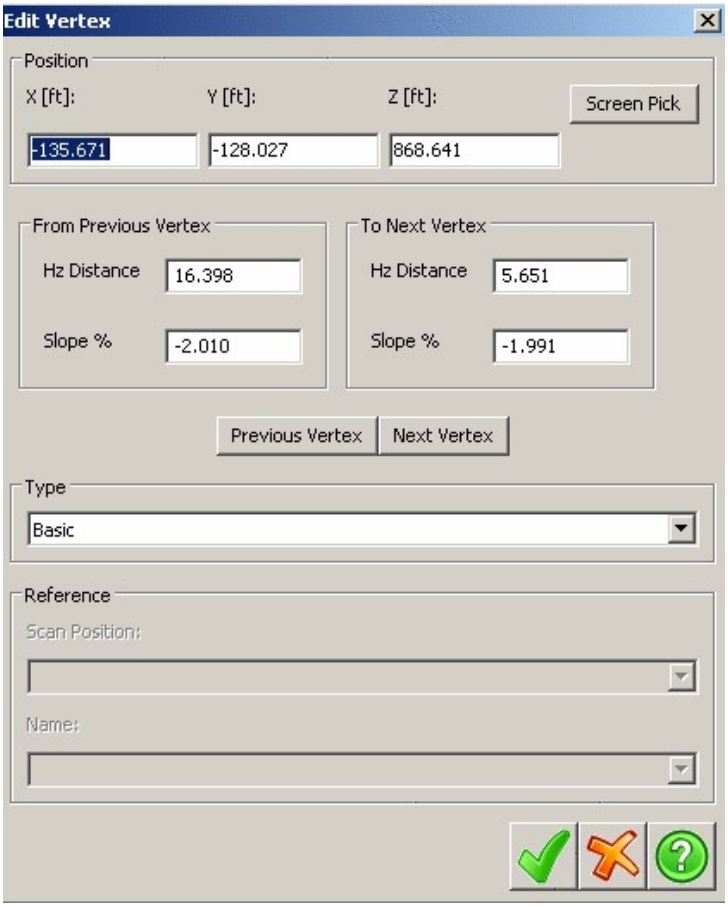

The user can change coordinates by typing in the X, Y or Z fields or screen picking. There are buttons to advance to the Next vertex or return to the previous vertex. The user can also change the point type from basic to Coordinate Point reference.

Add Vertex - The user is prompted to select the polyline to add a vertex to and then to select the point to add. Vertices can be added until the End Add Vertex button is clicked.
Remove Vertex - The user is prompted to select the polyline to remove a vertex from and then to pick the vertex to remove. The user can continue to remove vertices until the End Remove Vertex button is clicked.
Activate - The Activate button can be used to make a polyline previously drawn active again so you can add on to that polyline. The user is prompted to select the polyline to activate. Multiple polylines can be activated. Click the End Activate button before trying to work with one of the activated polylines.
Delete - The user is prompted to select the polyline to delete. There is not an undo command for this delete function.

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Create Cloud

Clicking **Cloud** will bring up the standard Point Cloud creation dialog. In this case it will create a cloud with all the selected data in the current scene.

Create Mesh

Clicking **Mesh** in the Create Panel will bring up the standard Mesh Creation dialog. In this case it will create a mesh with all the selected data in the current scene. However, one minor change is that the **Normal** panel has a **From Scene** option radio button which will make the mesh pull in its normal from the current camera's view direction. This allows you to view a scene of data and find an optimal viewing angle that gives the best results as a normal for the mesh.

Create Text

Clicking **Text** in the Create Panel will set the Current Mode to Text Creation and display the two panels that comprise the text creation mode.

Create Grid

Clicking **Grid** in the Create Panel will bring up the standard Grid Creation dialog. In this case it will create a Grid with all the selected data in the current scene.

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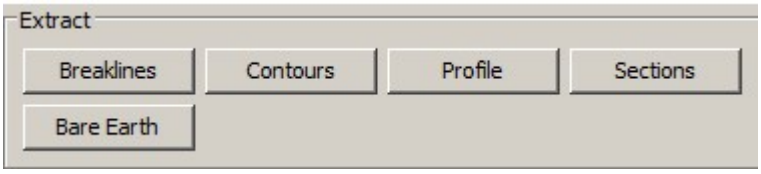
Extraction Panel



Each of the Data Extraction functions is designed for use on a fully processed mesh object. Results for these functions not used with a mesh may not be accurate. Because of their complexity each extraction function, Extract Breaklines, Extract Contours, Extract Profile, Extract Section and Extract Bare Earth has its own help pages.

Extract Breaklines

PointCloud has an automatic breakline extracting function to help facilitate the processing of a dataset. In order to extract breaklines, you must have a mesh open in the viewer and for best results you should have it colored by normals (although this isn't required because you can manually enter in the normals). Before you can extract breaklines you must specify the area in the mesh that you wish to extract breaklines from using the selection tools. After you have selected the area from which you wish to extract breaklines, the **Extract Breaklines** button should no longer be ghosted out. After pressing the **Extract Breaklines** button a new panel should be displayed at the bottom of the Action Page which displays all the options for configuring PointCloud's breakline extraction utility. Additionally, the viewer window will remove the coloring of the current selection to prevent it from interfering with the zone flag specification process, the viewer still internally keeps track of the area of the mesh that you have selected.

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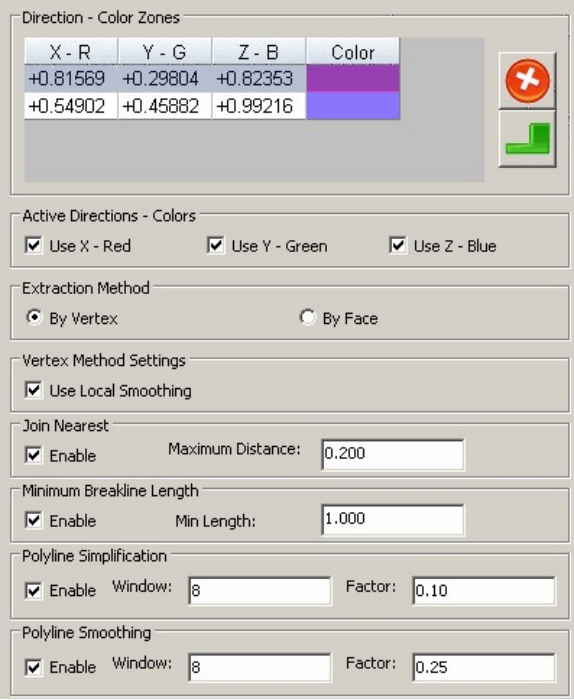

To add color zones, *Ctrl + Click* in the 3d view window on the mesh at a location that has the color/normal you want to define your zone. This will add the color to the Color Zones table, and you can manually modify the value if it isn't quite what you want it to be. You can choose which directions you want to be considered when zone classification is being performed using the **Use X, Use Y,** and **Use Z** check boxes. Restricting directions can yield better results in certain situations. For instance, if you're trying to extract edges along a curb, it would be best to turn off **Use X** and **Use Y** and only use the Z direction of the normal to determine the zone, due to the fact that curbs are usually a corner with a vertical surface and a horizontal surface.

There are two methods of breakline extraction: **By Vertex** and **By Face**. In the vertex method of breakline extraction, each vertex of the working selection is assigned one of the zones based off the normal at that vertex. PointCloud then creates polyline vertices on each edge that connects vertices that belong to different zones. These polyline vertices are then perturbed based on how the vertex normal's compare to the normal that defines its zone. This method is the default method and generally gives better results in datasets that have hard edges (such as corners of buildings).

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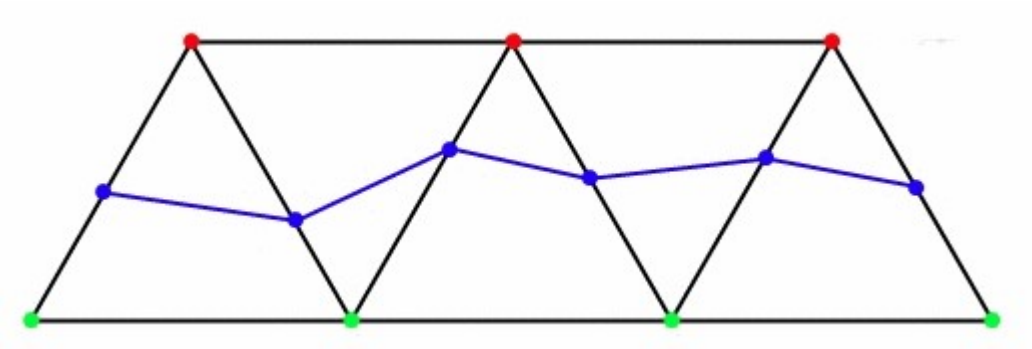

Simple example of the Vertex Method

The vertex method has one unique setting that does not belong to the face method: **Use Local Smoothing**, which averages the normal at each vertex with it's neighbor's normals to provide a smoother set of normals to work with. This helps to give more continuous breakline edges by accomodating for places in the mesh that may be distorted due to faulty data.

In the face method of breakline extraction, each face of the working selection is assigned a zone based off it's normal. Polylines are then created out of the edges that border faces that belong to different zones. The face method also has unique options of minimum area and triangle count values for each zone area. This is to prevent a common problem with the face definition method where a single face or a small number of faces near the border will be classified as belonging to a zone other than the one they currently reside in, creating an extremely small zone.

The **Join Nearest** option will join any polylines whose endpoints are within the threshold distance of each other. This can help to bridge gaps in the mesh that could arise from parts of a scan being in shadow.

The **Polyline Simplification** option will remove each vertex that is within a certain distance to the least squares approximation. Window is the number of neighbor vertices to use when generating the least squares approximation. Threshold is a positive number that determines the distance under which vertices will be removed from the polyline.

The **Polyline Smoothing** option will smooth a each vertex in the polyline using a least squares approximation. Window is the number of neighbor vertices to use when generating the least squares approximation. Factor is a number between 0.0 and 1.0, 0.0 being no smoothing performed and 1.0 being fitting each vertex to it's respective least squares line (usually makes the polyline extremely linear given a window size greater than 8).

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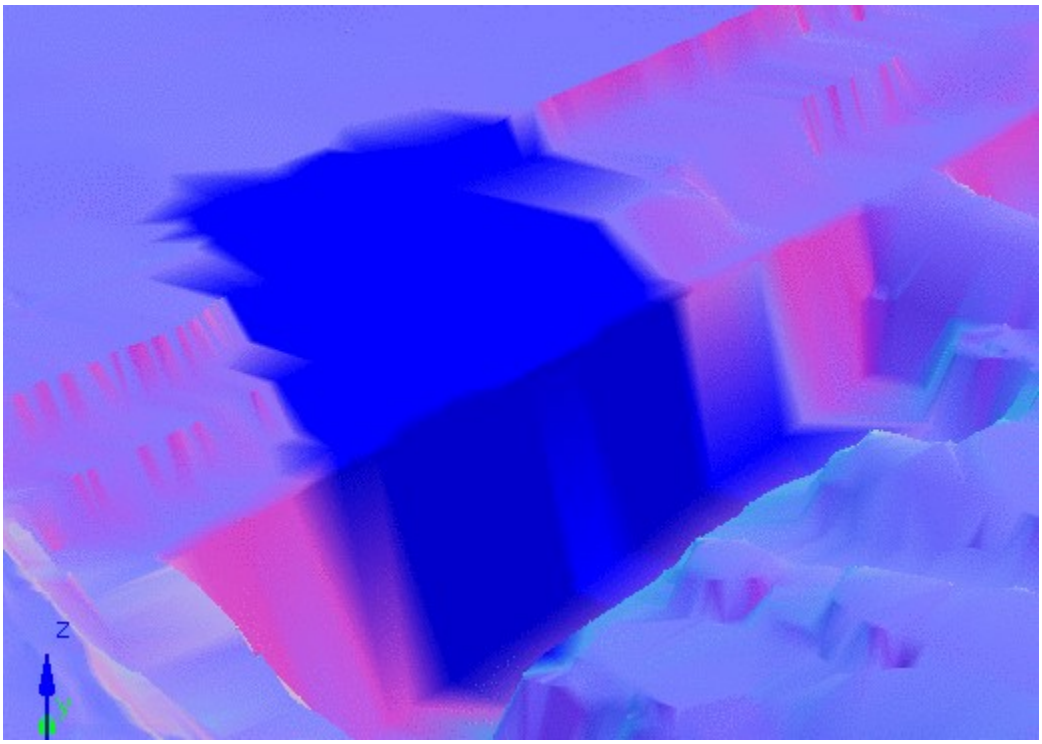
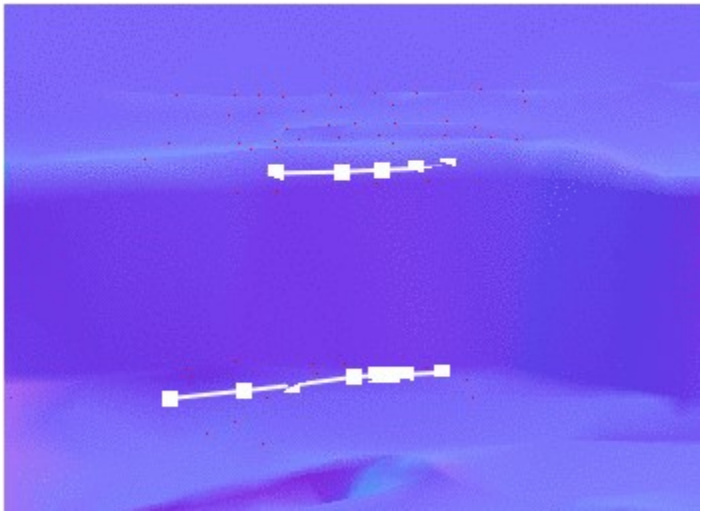
Pressing the **Show** button will show the zones in the viewer given the current configuration but not actually create the polyline themselves. This gives you a chance to review your settings and make sure that the zones are configured properly without adding any extra objects to the project.



Pressing **Extract** will extract the breaklines with the given settings. Each breakline polyline will be added to the project with the a name generated from the current project settings.



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Prompts

Specify Zone Flag Position Ctrl-Click in the viewer to select the color zone for breakline extraction

Notes:

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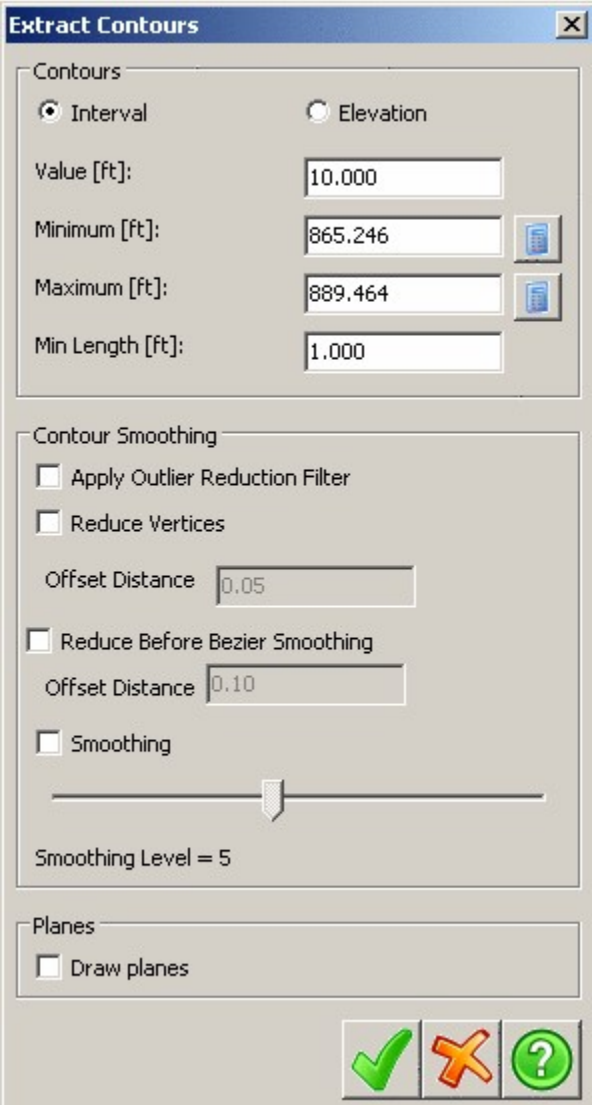
Extract Contours

Clicking the **Contours** button in the extract panel of the **Action Tab** will bring up a separate dialog with options relating to extracting contours from the current scene.



Notes:

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The **Interval** extraction method extracts contours at every multiple of elevation interval between the minimum and maximum elevation values (a minimum of 2.5 and an interval of 5.0 would have the first contour elevation be at 5.0). The **Elevation** method only extracts the contours at the specified elevation value. By default, the **Minimum** and **Maximum** elevation values are the minimum and maximum elevations of current scene and clicking the calculator icon to the right of each of these values will return them back to their default values. **Min Length** determines the minimum length of a contour line to be drawn. Upon extraction, contours will be given an automatically generated name and added to the **Contours** folder in the project tree.

Contour Smoothing

The **Apply Outlier Reduction Filter** reduces spikes in contours from errant points.
Reduce Vertices removes vertices from the contour polylines provided the removed vertex is not further away from the new line than the **Offset Distance**
Reduce Before Bezier Smoothing works in a manner similar to reduce vertices using its own **Offset Distance**
Smoothing - Sliding the bar to the left results in a lower setting which will have less looping or less freedom to curve between contour line points. Likewise, moving the slider to the right results in a setting that increases the looping effect. Note that too much smoothing applied in some situations can result in crossing contours.

If **Draw planes** is enabled, plane objects will be added to the project and the scene that cut the through the scene at each extracted elevation level.

Notes:

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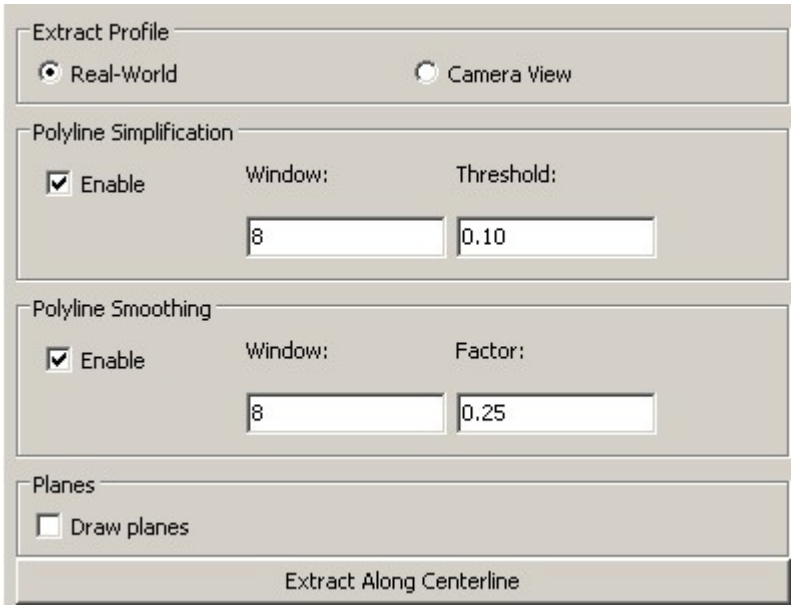
Extract Profile

The profile extraction functionality can be activated by going to the Action Tab and clicking the **Extract Profile** button. The only requirement for profile extraction is that the data that you're trying to extract a profile from is a mesh. Although Carlson PointCloud will try to extract a profile from a cloud or scan if attempted, the results are rarely ideal. Pressing the **Extract Profile** button also puts the current viewer into profile extraction mode, which will show a tooltip with instructions on how to extract the profile and clicking in the viewer will draw the profile. To exit profile extraction mode, click the **End Mode** button.



Profiles can be extracted in two kinds of coordinate systems: **Real-World** and **Camera View**.

Real-World is the most commonly used method and extracts the profile in the current scene's coordinate system. The z values, or elevation values, are those found in the surface the profile is being extracted from.
Camera View is much less commonly used and uses the current camera as the origin instead of the scene's origin, and elevation values are effectively distances from the camera. This mode can be useful if you're trying to extract a profile out of a vertical surface such as a wall or are trying to get the profile of an object from a direction other than the z axis. **Camera View** mode gives the best results if the current camera is in parallel projection mode (perspective mode will distort the profile).

The **Polyline Simplification** option will remove each vertex that is within a certain distance to its least squares approximation. Window is the number of neighbor vertices to use when generating the least squares approximation. Threshold is a positive number that determines the distance under which vertices will be removed from the polyline.

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The **Polyline Smoothing** option will smooth each vertex in the polyline using a least squares approximation. Window is the number of neighbor vertices to use when generating the least squares approximation. Factor is a number between 0.0 and 1.0, 0.0 being no smoothing performed and 1.0 being fitting each vertex to its respective least squares line (usually makes the polyline extremely linear given a window size greater than 8).

If **Draw Planes** is enabled, plane objects that follow the path of the initial selection polyline will be drawn into the viewer after the profile is extracted.

Extract Along Centerline when clicked the user is prompted for the .CL file to use. The horizontal location of the centerline is extracted from the mesh.

After selecting your profile by manual method or .CL file, a dialog will open asking for an action to perform with the extracted profile, this gives you a chance to review the profile and the option to save it to the project, extract it, or draw it in CAD software.

If **Draw in AutoCAD/IntelliCAD** is selected, the program will draw the profile into your CAD application.
If **Save to File** is selected, you will be asked for a filename and directory to place your new .PRO file.
If **Save to Project** is selected, the profile will be added to your project with its name generated from your project settings. Profiles saved to the project may be drawn in CAD and/or exported to a .PRO file at a later time.

Prompts

Click to Begin Polyline Left-click in the viewer to create the polyline for the profile, Right-click to end the polyline.

Choose Profile Destination Dialog Select the desired destination for the file.

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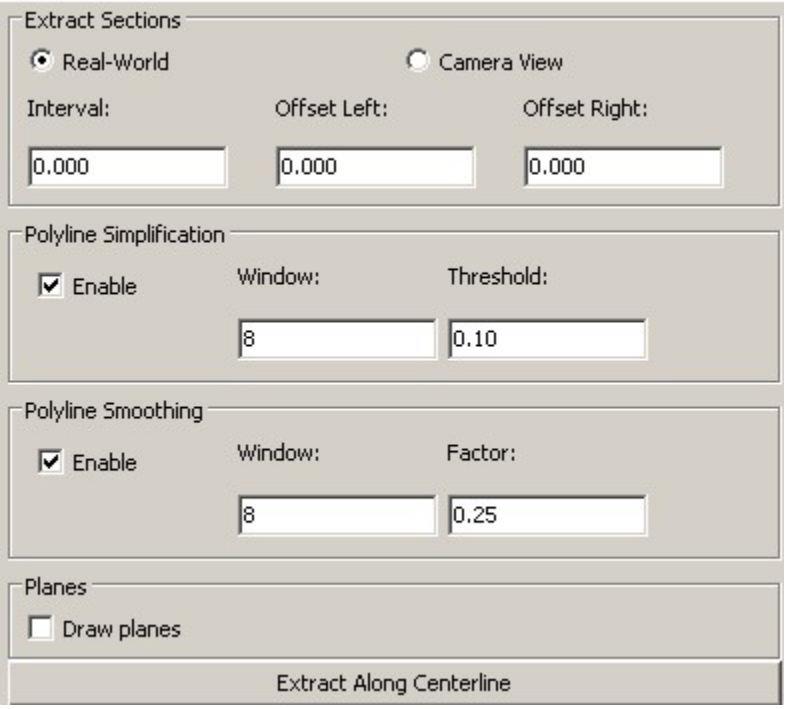
Extract Sections

Clicking the **Sections** button in the Extract Panel of the **Action Tab** will put the current mode into Section Extraction mode.



Sections can be extracted in two kinds of coordinate systems: **Real-World** and **Camera View**.

Real-World is the most commonly used method and extracts the sections in the current scene's coordinate system. The z values, or elevation values, are those found in the surface the sections is being extracted from.
Camera View is much less commonly used and uses the current camera as the origin instead of the scene's origin, and elevation values are effectively distances from the camera. This mode can be useful if you're trying to extract sections out of a vertical surface such as a wall or are trying to get sections of an object from a direction other than the z axis. **Camera View** mode gives the best results if the current camera is in parallel projection mode (perspective mode will distort the profile).

The width of the sections and the frequency at which they are extracted along the designated path are controlled by three parameters.

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Left Offset is the distance left of the path the sections will extend. Left is determined base on the direction the extraction path was drawn or "up station".
Right Offset is the distance right of the path the sections will extend. Right is determined base on the direction the extraction path was drawn or "up station".
Interval is the value that determines the distance along the path between sections.

The **Polyline Simplification** option will remove each vertex that is within a certain distance to its least squares approximation. Window is the number of neighbor vertices to use when generating the least squares approximation. Threshold is a positive number that determines the distance under which vertices will be removed from the polyline.

The **Polyline Smoothing** option will smooth each vertex in the polyline using a least squares approximation. Window is the number of neighbor vertices to use when generating the least squares approximation. Factor is a number between 0.0 and 1.0, 0.0 being no smoothing performed and 1.0 being fitting each vertex to its respective least squares line (usually makes the polyline extremely linear given a window size greater than 8).

If **Draw Planes** is enabled, Plane objects will be added to the project and the scene that follow each section line.

Extract Along Centerline when clicked the user is prompted for the .CL file to use. The horizontal location of the centerline is extracted the sections from the mesh.

After these options have been set to the preferred values, the user can extract the sections by left clicking in the viewer to draw the path polyline and right clicking to end it. The sections are saved to the project and can be drawn in CAD or exported to a .SCT file from the **Project Tab**.

Prompts

Left-click to create polyline Left-click in the viewer to create the polyline for the profile, Right-click to end the polyline.

Notes:

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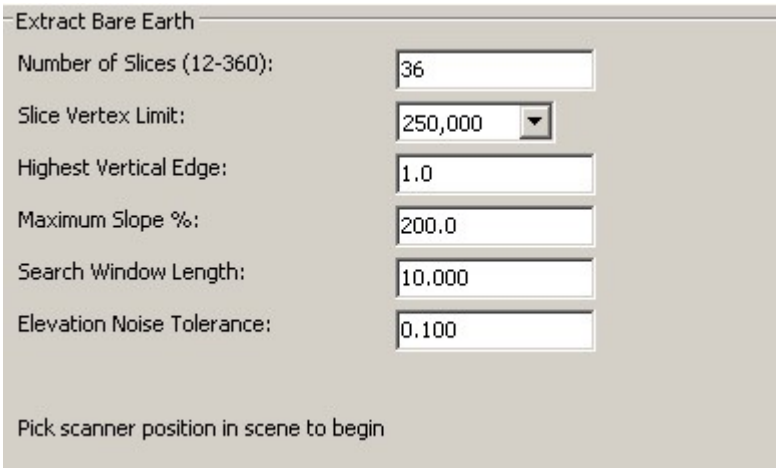
Bare Earth

Clicking the **Bare Earth** button will expand the **Bare Earth** panel and put the Current Mode into Bare Earth mode. Settings may be adjusted as desired. When you move your cursor to the Scene window Point Cloud is ready for you to specify the "scanner" position or center of the Bare Earth extraction. The scene must be in plan view to run the bare Earth extraction. Points are examined and either included or excluded for the Bare Earth Cloud based on the extraction parameters.



There are several options that will effect the Bare Earth extraction.

Number of Slices (12-360) - This value determines the number of division of a 360 degree circle to use when extracting the Bare Earth. The default value of 36 uses 10 degrees in each slice.
Slice Vertex Limit - This is the maximum number of points that will be used in each slice. The total number of points used to generate the Bare Earth result is the Vertex Slice limit times the number of slices.
Highest Vertical Face - This value should be equal to the highest vertical feature in the ground surface plus a little extra for some tolerance. For example, if the highest vertical edge is a 6 inch curb, then you should enter something like 0.75 to capture the curb with a bit of a buffer. The program removes points that exceed the Highest Vertical Face value.
Maximum Slope % - This value should be equal to the steepest slope in the ground surface plus some extra for tolerance. For example, if the steepest ground slope is a 2:1 side slope, then use something like 60 (50% plus a 10% buffer). The program removes points that exceed the Maximum Slope % value.
Search Window Length - This is how far from each data point that the program will check other data points for the Highest Vertical Edge and Max Slope criteria.
Elevation Noise Tolerance - This should be the expected elevation tolerance of the point measurements. For example, use 0.1 when the data point elevations are within +/- 0.1 of the target surface. The program removes data points that are isolated and higher than this elevation tolerance from their neighbors.

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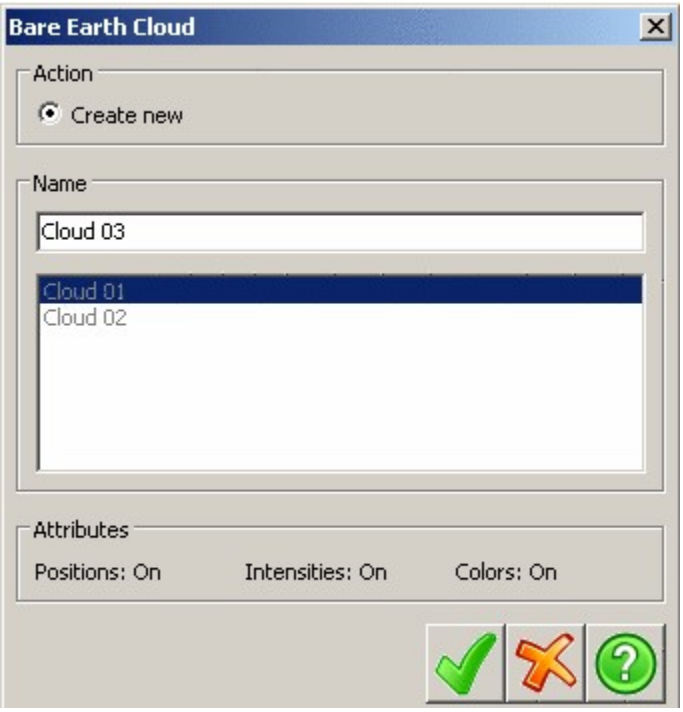
Prompts

Specify Scanner Position: -Ctrl-Click in the Scene window-



A default name will be provided for the new cloud being created based on the Name Conventions under Settings. You may change the name by typing in the Name field.

Accepts the new cloud file name and begins the Bare Earth Extraction.

Cancels the file creation and the Bare earth extraction.

Accesses the Bare Earth Extraction help file.

Notes:

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Export to CAD

Project Review

1. **Contours:** Right mouse click and export to CAD.
2. **Coordinate Points:** Right mouse click and export Field to Finish which uses Carlson Survey FLD file.
3. **Mesh:** Export to a Carlson TIN file.
4. **Polyline:** Draw ALL
5. **Profile:** Export to a Carlson .PRO file which can be read in Survey or Civil.
6. **Cross-Section:** Export to a Carlson .SEC file which can be read back into Civil only.

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